MotoSim EG-VRC Ver 5.00
OPERATION MANUAL

FOR WINDOWS

Upon receipt of the product and prior to initial operation, read this manual thoroughly, and retain for future reference.

MOTOMAN INSTRUCTIONS

MOTOSIM EG-VRC Ver 5.00 OPERATIONS INSTRUCTIONS
NX100 INSTRUCTIONS
NX 100 OPERATOR'S MANUAL (for each purpose)
NX 100 MAINTENANCE MANUAL
DX100 OR DX200 INSTRUCTIONS
DX100 OR DX200 OPERATOR'S MANUAL (for each purpose)
DX100 OR DX200 MAINTENANCE MANUAL
FS100 OR FS100L INSTRUCTIONS
FS100 OR FS100L OPERATOR'S MANUAL (for each purpose)
FS100 OR FS100L MAINTENANCE MANUAL

The operator's manual above corresponds to specific usage. Be sure to use the appropriate manual.

Part Number: 156225-1CD
Revision: 0

MOTOMAN ROBOTICS

MANDATORY

- This manual explains teaching, playback, editing operations of jobs and files, operation management of MotoSim EG-VRC. Read this manual carefully and be sure to understand its contents before operation.
- General items related to safety are listed in instruction manuals supplied with the manipulator. To ensure correct and safe operation, carefully read the instructions on safety before reading this manual.

CAUTION

- Some drawings in this manual are shown with the protective covers or shields removed for clarity. Be sure all covers and shields are replaced before operating this product.
- The drawings and photos in this manual are representative examples and differences may exist between them and the delivered product.
- YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications. If such modification is made, the manual number will also be revised.
- If your copy of the manual is damaged or lost, contact a YASKAWA representative to order a new copy. The representatives are listed on the back cover. Be sure to tell the representative the manual number listed on the front cover.
- YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids your product's warranty.
- Software described in this manual is supplied against licensee only, with permission to use or copy under the conditions stated in the license. No part of this manual may be copied or reproduced in any form without written consent of YASKAWA.

NOTE

This instruction manual is applicable to both FS100 (a controller for small-sized manipulators) and THE FS100L (a controller for large and medium-sized manipulators). The description of "FS100" refers to both "FS100" and "FS100L" in this manual unless otherwise specified.

Notes for Safe Operation

Before using this product, read this manual and all the other related documents carefully to ensure knowledge about the product and safety, including all the cautions.

In this manual, the Notes for Safe Operation are classified as “WARNING”, “CAUTION”, “MANDATORY”, or ”PROHIBITED”.

WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to personnel.
CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury to personnel and damage to equipment. It may also be used to alert against unsafe practices.
MANDATORY	Always be sure to follow explicitly the items listed under this heading.
PROHIBITED	Must never be performed.

Even items described as “CAUTION” may result in a serious accident in some situations. At any rate, be sure to follow these important items.

NOTE

To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as “CAUTION” and “WARNING”.

Notation for Menus and Buttons

Descriptions of the programming pendant, buttons, and displays are shown as follows:

Item	**Manual Designation**
Menu	The menus displayed on screen are denoted with { }. ex. {TOOL}.
Button	The buttons, check boxes, radio buttons displayed on screen are denoted with [ ]. ex. [Close]; [Sync] check box; [Fast] radio button.

Description of the Operation Procedure

In the explanation of the operation procedure, the expression "Select • • • " means the following operations:

- To move the cursor to the object item and left-click on it with the mouse.
- To pick out the object item by the tab key and press the Enter key.
  (In case of selecting a menu, use arrow keys instead of the tab key to pick out the object item, then press the Enter key.)

Registered Trademark

In this manual, names of companies, corporations, or products are trademarks, registered trademarks, or bland names for each company or corporation. The indications of (R) and TM are omitted.

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1 Introduction

1.1 Overview of MotoSim EG-VRC

MotoSim EG-VRC is a software which has been developed as an offline teaching system for YASKAWA industrial robot MOTOMAN series.
MotoSim EG-VRC reduces teaching time requiring an actual robot, supports improvement of productivity and insures operator’s safety by enabling robot teaching on a personal computer.
MotoSim EG-VRC is an application software for MS-Windows having excellent operability and many advantages such as running multiple applications at once.

1.1.1 Difference of Operation from Ver 4.10

The appearance of MotoSim EG-VRC Ver 5.00 differs greatly from Ver 4.10 or before. Therefore, the difference in the operation method of a main screen is summarized so that the user before Ver 4.10 could get used early.

- Runs two or more MotoSim EG-VRC. However, the number of the cells which can be used by MotoSim EG-VRC is one.
- "Docking Window"
- "Quick Access Toolbar"
- "Comparison Table with the New Menu from the Old Menu and the Old Tool Bar"

1.2 Notice and Restriction about MotoSim EG-VRC

1.2.1 Optional Functionof controller

Below is a list of the available optional functions on MotoSim EG-VRC. For any other optional function not listed below, please consult your Yaskawa representative.

Function Name	DX200	DX100	FS100	NX100
Relative Job	○	○	○	○
TCP	○	○	○	○
Macro Instruction	○	○	○	○
I/F Panel	○	○	○	○
External Reference Point	○	○	○	○
Parallel Start Instruction	○	○	○	○
Coordinated Instruction	○	○	○	○
Extended Control Group	○	○	○	○
Station Angle Display	○	○	○	—
Softlimits Customization	○	○	—	—
Tool No. Switching	○	○	○	○
SI Unit Indication	○	○	○	—
Display IO Name in Job	○	○	○*1	—
Variable Allocation	○	○	○	—
Functional safety	○*2	—	—	—

***1** Standard function for FS100.
***2** Please refer to Section 1.2.5 "Restriction of Function of Controller".

Please refer to section
Section A.4 "Standard function about DX200"
Section A.5 "Standard function about DX100"
for the list of available standard function.

1.2.2 Using data saved from a real controller with MotoSim EG-VRC

To use the data saved from a real controller, depending on the environment, there are circumstance where the "CMOS.BIN' from the real controller can be used.
However, in some cases there may be problem cause by "CMOS.BIN" version incompatibility.
In such cases, please use the individual data file save from the real controller for the jobs, condition files, parameters, etc. to reconstruct the system environment.

NOTE

In regard to the FS100 controller, the "CMOS.BIN" file saved from a real controller can not be used with MotoSim EG-VRC to create the environment.

1.2.3 Using MotoSim EG-VRC data on a real controller

Some data created with MotoSim EG-VRC can be use on the real controller, and some data cannot be use.

Usable data	Job Condition files General data All the name data
Unusable data	Parameters CIO Program

NOTE

- The "CMOS.BIN" file cannot be saved from MotoSim EG-VRC.
  Therefore, the "CMOS.BIN" cannot be used with a real controller.
- Option function selected by MotoSim EG-VRC can not be executed on the real robot.
- Parameter file or CIO program file of MotoSim EG-VRC can not be executed on the real robot. YASKAWA is not responsible for incidents arising from using these files.

1.2.4 Function depending on the system version of controller

Some functions of MotoSim EG-VRC can not use depending on the system version of controller. Please refer to Section A.6 "List of Function depending on the system version of controller".

1.2.5 Restriction of Function of Controller

- MotoSim EG-VRC can not be connected to the real robot or pendant.
- MotoSim EG-VRC can not simulate the job in real time.
- MotoSim EG-VRC can not simulate CIO in real time.
- The function needed the special hardware (sensor, COMARC etc.) is disable.
- VPP is not supported the Enable Switch.

- MotoSim EG-VRC is supported the standard controller version only.
- The simulated coasting range is different from the real robot, when the emergency stop is done.
- Functional Safety is not supported.
- Some INFORM connecting to the external device is not supported. ARCON/ARCOF SVSPOT SVSPOTMOV are supported.
- In regard to the NX100 controller, SVSPOT and SVSPOTMOV are not supported.
- Data transmission is not supported.
- Remote mode is not supported.
- Collision Detection is not supported.
- The standard CIO ladder is supported only. Modified CIO ladder is out of guaranteed operating range. So, lamps at the top of VPP (ex. servo lamp) may not work correctly, or IO Connect/IO Monitor/IO Event may not work correctly.
- Loading batch CMOS file "CMOSxx.HEX" saved from memory expanded system is supported only.
- Saving batch CMOS file "CMOSxx.HEX" and all CMOS area file "ALCMSxx.HEX" is not supported.
- In regard to the FS100 controller series, Loading/Saving/Verifying/Deleting the batch files and the all CMOS area file is not supported.
  The appropriate files are "JOBxx.HEX", "CMOSxx.HEX", and "ALCMSxx.HEX".
- Ladder editor, PP application for arc welding, and MOTOPAL are not supported.
- MotoPlus function, MotomanSync function, and the applications used these functions are not supported.
- PP customize function is not supported.
- The simulation of spot gun change system is not supported.
- "PP display scroll function DX200 by touching operation" of DX200 controller is not available.
- Function of MotoSim EG-VRC for Function Safety is available only when the controller is DX200 and Function safety option is available.
- Function safety in which a simulation is possible on MotoSim EG-VRC is as follows.
  - Robot Range Limit
  - Axis Range Limit
  - Speed Limit
  - Tool Angle Monitor

  Following function safety can not be simulated on MotoSim EG-VRC.
  - Axis Speed Monitor
  - Tool Change Monitor
  - Safety Signal
- When the edited files are loaded to DX200, it is necessary to put it in "SAFETY MODE", and to disable "SAVE DATA CRC CHECK FUNC.(FSU)". After loading, please make sure to enable "SAVE DATA CRC CHECK FUNC.(FSU)".
  Make sure to check the settings of the DX200.

1.2.6 Accuracy

- Positional Accuracy
  When the job made in MotoSim EG-VRC is executed on the real robot, teaching points may be misaligned by the strain and placement error of work, and the deflection of robot. So, check the teaching points by NEXT/BACK, and modify them.
- Trajectory Accuracy
  The simulated trajectory range is different from the real robot. When the job made in MotoSim EG-VRC is executed on the real robot, check the teaching points by NEXT/BACK, and do test running. After sufficient operation check, execute playback.
- Cycle time Accuracy
  The simulated cycle time is different from the real robot. If robot job contain the position level "PL=0" in move command, the resulting cycle time simulation may not provide sufficient accuracy compared to the actual robot.
- Robot model Accuracy
  Robot model is only external form, bolt hole and anchor bolt may be left out. Movable parts other than robot (ex. cable) can not be simulated.

1.2.7 Hardware Requirements

When simulate follow situation, PC with high-end CPU or graphic board may need.

- Multiple controllers are used. (4 or more)
- High-capacity CAD data is used.
- Collision check is used.

1.2.8 Supported robot model

The robot models supported by MotoSim EG-VRC are those displayed on the virtual pendant for the controller version selected at the time of creation. Please refer to Section A.7 "List of Manipulator Models and Offset Values Supported by MotoSim EG-VRC" for the list of available model.
However, for similar robot model that only have differences in the details of their shape, it maybe possible to do simulation using the standard robot model (model ending with A0*).

1.3 Environment Required for MotoSim EG-VRC

To run MotoSim EG-VRC, the following hardware and software are required:

OS	Microsoft Windows XP Service Pack3 (32bit) Windows 7 (32bit / 64bit) JAPANESE and ENGLISH Windows version are supported only. *1
CPU	Intel® Core™ 2 Duo or more multi-core processor.
Memory	2 GB or more
Hardware Disk	1 GB or more
Monitor	Supported by MS-Windows (256 colors or more)
Hardware Key	Used under single user environment. For details, refer to Section 1.4 "Hardware Key" in the following section.
Other	Graphic Board for 3D.

***1** MS-Windows XP, MS-Windows 7 are registered trademarks of Microsoft Corporation, USA.

NOTE

- MotoSim EG-VRC may not execute correctly, because of PC model, Graphic Board, other connected peripherals, and installed software, etc.
- When .NET Framework 3.5 SP1 is not installed to a personal computer, it is automatically installed by installation of MotoSim EG-VRC.

1.4 Hardware Key

A hardware key is supplied with MotoSim EG-VRC and must be attached to your computer's USB port. Otherwise, MotoSim EG-VRC will not function properly. If multiple USB keys are in use, a USB hub can be used to expand the number of available USB ports. if you have difficulties using multiple USB hardware keys, contact Yaskawa Motoman customer service at (937)847-3200.

1.5 Installing MotoSim EG-VRC

1. It is strongly recommended that you exit all applications before running the setup program..

> NOTE
> • Be sure to login in administrator mode when installing the MotoSim EG-VRC in Windows XP/7, or else the system related DLL files in Windows might not be updated.
> • When .NET Framework 3.5 SP1 is not installed in the personal computer, .NET Framework 3.5 SP1 is automatically installed by installation of MotoSim?EG-VRC.

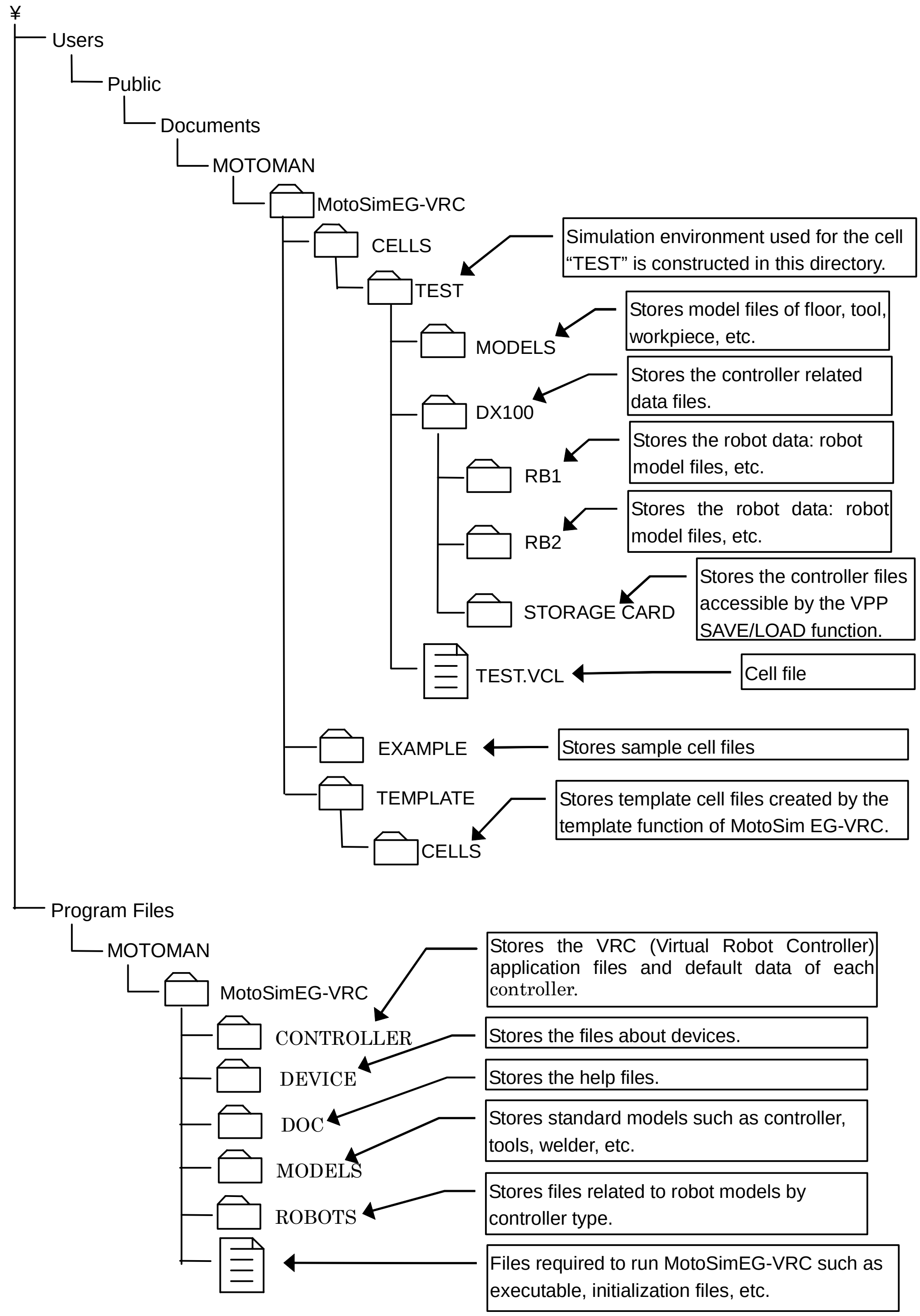
2. When the install CD is inserted into the CD-ROM drive, the [MotoSim EG-VRC - InstallShield Wizard] window appears automatically.
   If you are using Windows 7, the [User Account Control] dialog appears, so click [OK] in the dialog.
3. Follow the on-screen instructions.
4. When the setup is completed, MotoSim EG-VRC is registered under the {MotoSim EG-VRC} folder that appears by clicking the [Start] button in the task bar and selecting {Program} and then {Motoman}.
5. Connect the hardware key to the printer port or USB port.
   For details, refer to Section 1.4 "Hardware Key".

1.6 Definition of Terms

Cell (*.vcl)	A file in which MotoSim EG-VRC simulation environmental data are recorded. Folder information to store the operation contents, model file information such as robots, workpieces or tools, data of operational environment layout, etc. is recorded.
Model file (*.mdl)	A file in which geometric data of robots, workpieces or tools are recorded.
Parent model	Each model requires a coordinate that refers to something in the layout. Model to which the coordinate of a model refers to is called "parent model". The most basic reference model in the MotoSim EG-VRC is "world". Normally, world becomes parent for workpiece models or robot models. However, since tool models or positioners move along with external axis or robot axes, they refer to different parent models than fixed model. Since tool models must move with the robot, the robot model flange is normally set as the parent model of the tool model.

1.7 Folder Configuration

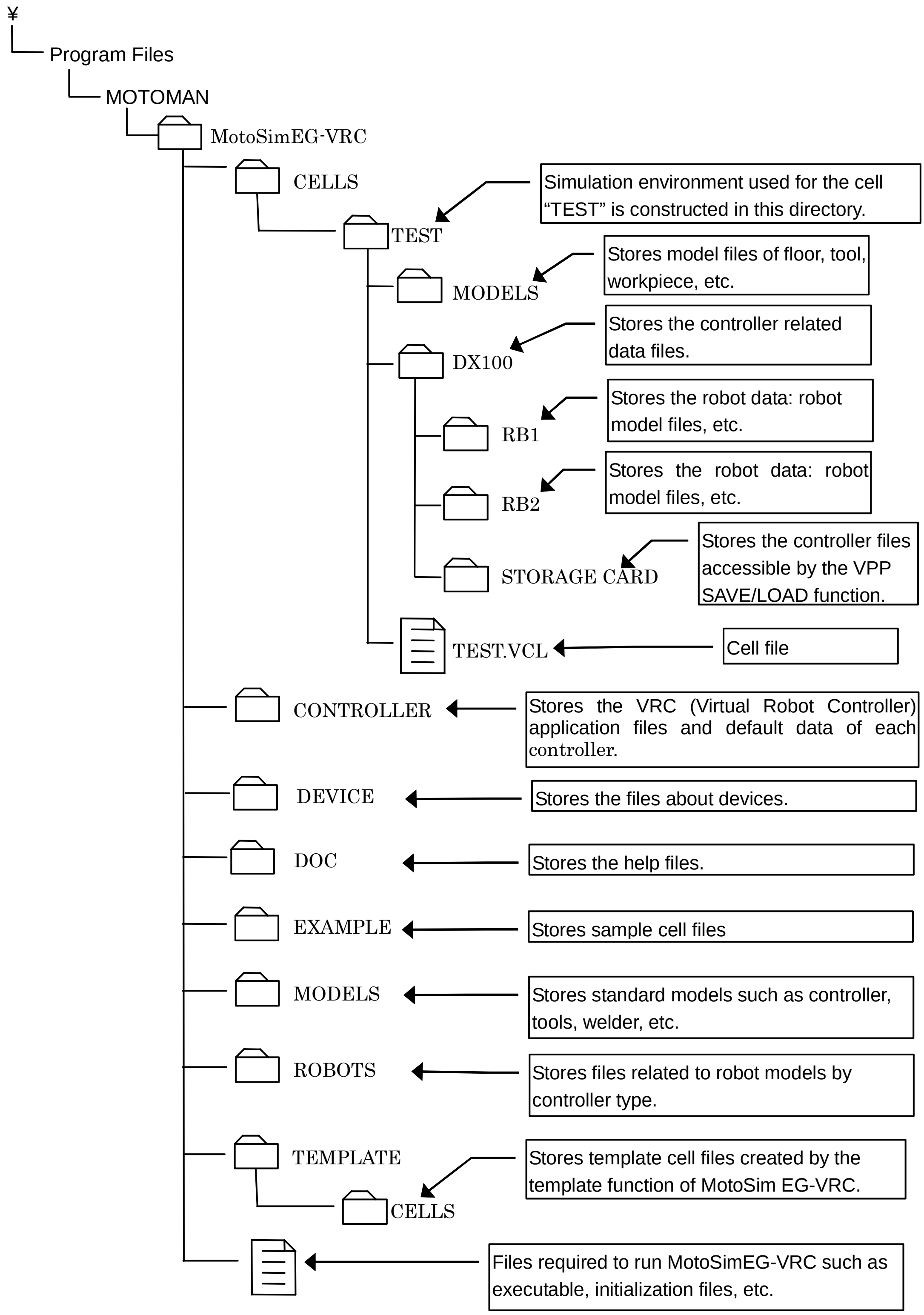
■ Folder Configuration of Windows 7



The above diagram is based on the assumption that the cell "TEST" is the file in which the simulation environmental data is stored, and that there is one controller named "NX100" with 2 robots defined under the folders "RB1" and "RB2".

The model files other than the robot model files are stored in the folder "TEST\MODELS".

■ Folder Configuration of Windows XP



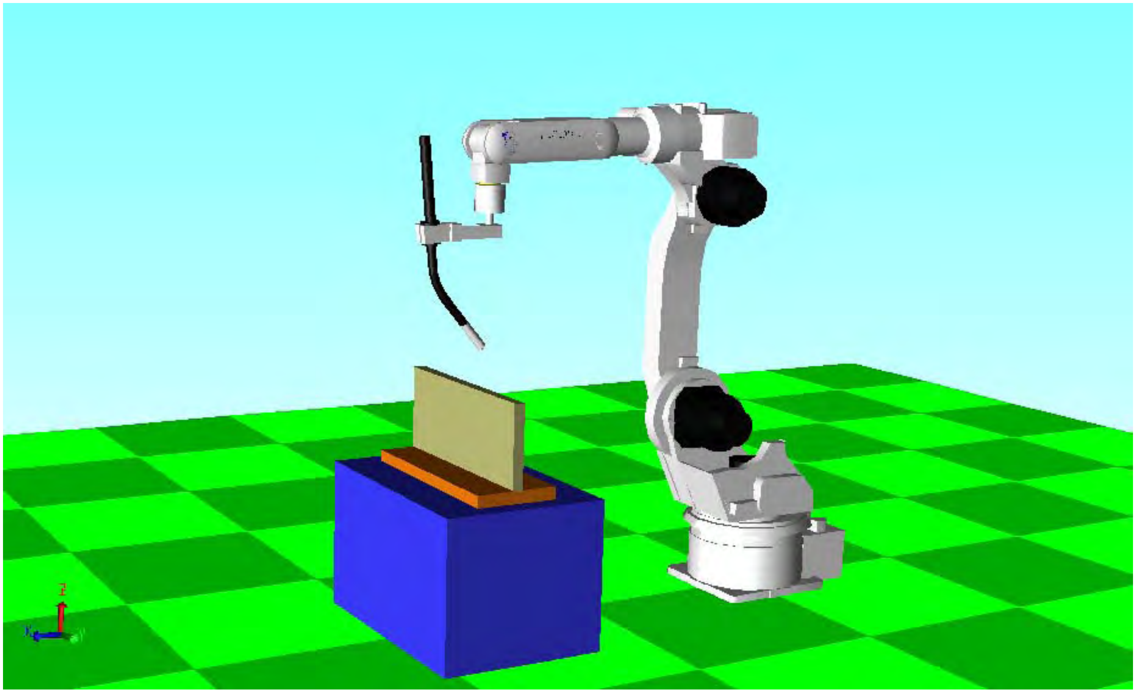
The above diagram is based on the assumption that the cell "TEST" is the file in which the simulation environmental data is stored, and that there is one controller named "NX100" with 2 robots defined under the folders "RB1" and "RB2".
The model files other than the robot model files are stored in the folder "TEST\MODELS".

2 MotoSim EG-VRC Quick Tour

This chapter describes the basic operation of MotoSim EG-VRC by giving practical examples to first time users of this system.
Read this chapter thoroughly in order to quickly take advantage of the excellent operability and various functions of MotoSim EG-VRC.

2.1 Overview

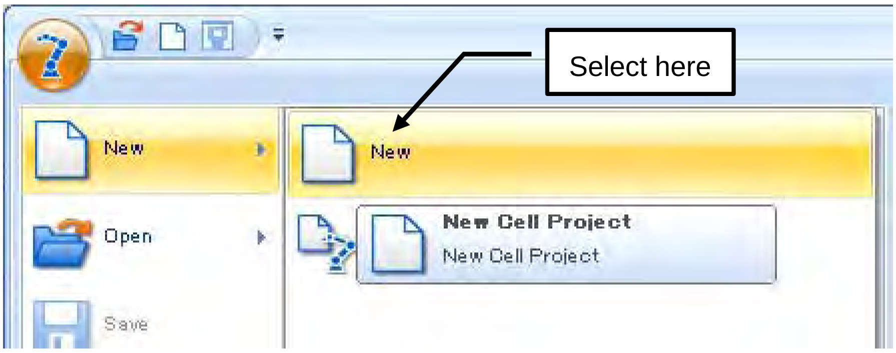
This chapter describes the procedures from cell construction to job creation. An arc welding application is used as an example to illustrate the creation of workpieces for fillet-welding and a welding torch for tool, and then to teach a welding path.
The following sections aim to create a robot, a workpiece and a stand like the ones prepared in "Arc_samp_NX" sample cell shown in the figure below.



2.2 Cell Construction

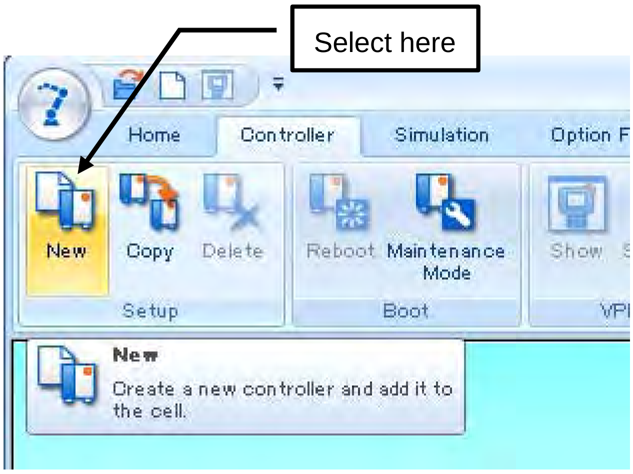
1. Click on [START] in the task bar menu, then click {PROGRAM} - {Motoman} - {MotoSim EG-VRC} - {MotoSim EG-VRC} to run MotoSim EG-VRC.

2. When the main window appears, Click the MotoSim EG-VRC button ( ), and select the [New] - [New] menu.



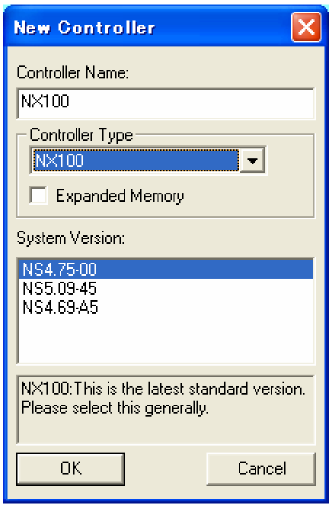
3. When the New Cel dialog box appears, enter any cell name: a folder where cells, parameter data, model data, job data, etc. are stored can also be set. (The new folder name is the same as the cell name.) In this example, the "TestCell" cell is created in the "CELLS" folder in the "Cells" folder.
Enter "CelTest" in the File name edit box and click the [OK] button.

4. The new cell with only a floor model appears.
   Register a controller in the cell by selecting the [Controller] tab, in the [Setup] group, click the [New] button.

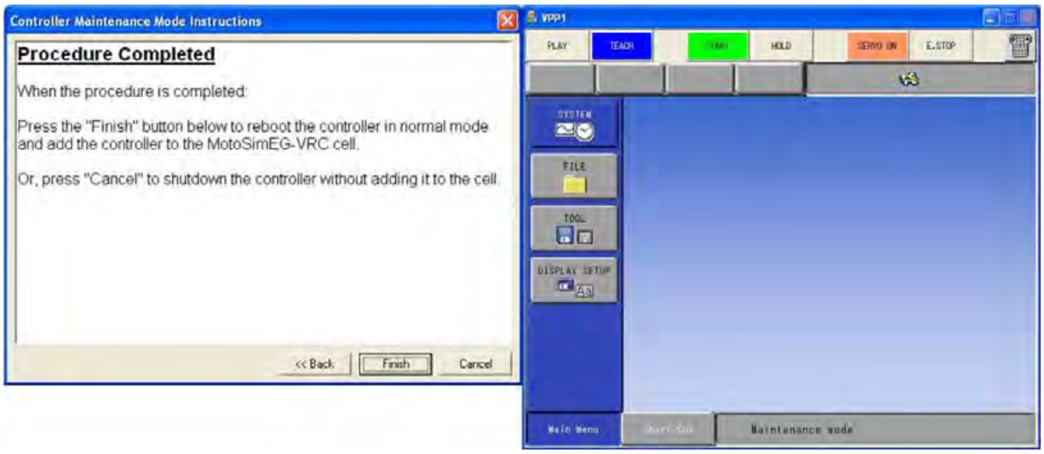


5. The "Create Controller with" will display.
   Select "No CMOS.BIN file" and press the [OK] button.

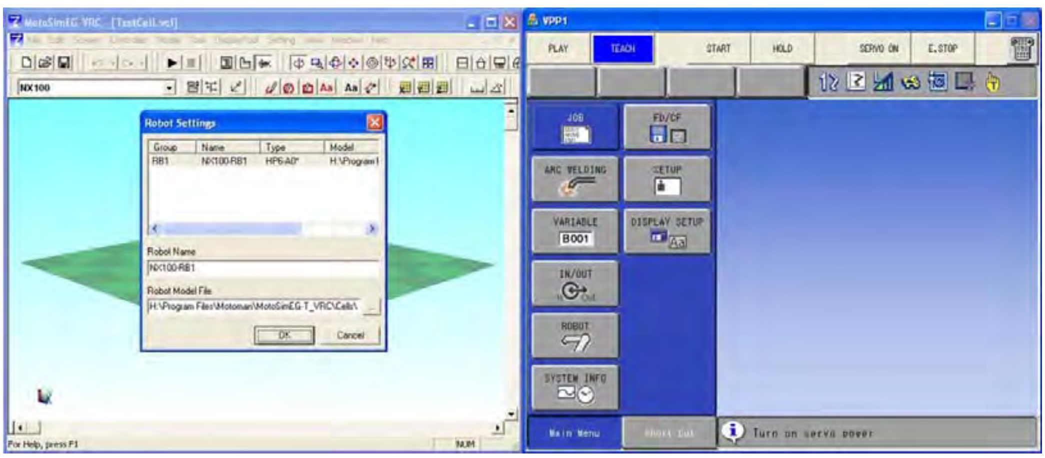
6. Select the controller system version, then press the [OK] button.



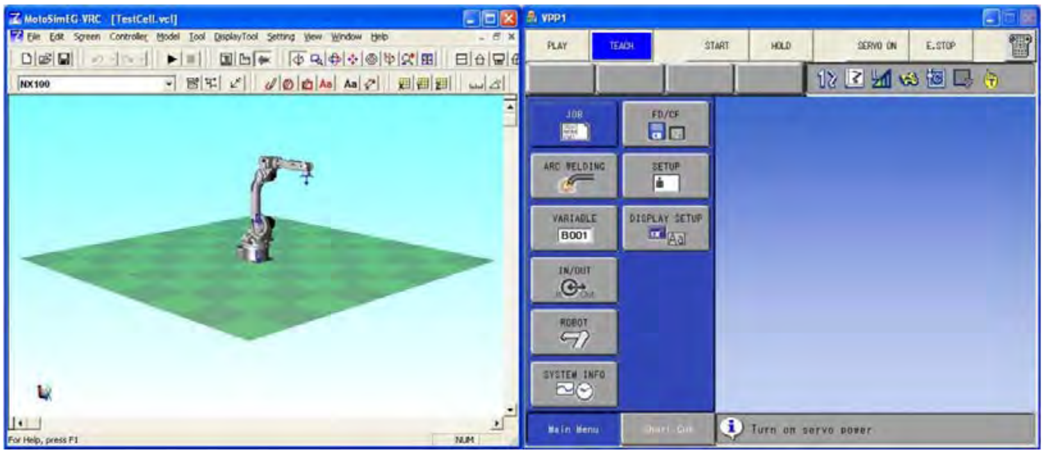
7. Controller Initialization.
   The virtual controller will boot with the selected sytem version. This may take a few moments. Once the boot up is completed, the virtual pendant will display in maintenance mode along with the “Controller Maintenance Mode Instructions” guide.
   When adding a controller with “No CMOS.BIN”, the controller needs to be initialized.
   Follow the steps displayed by the intstruction guide dialog to initialize the controller.
   When asked for the “Control Group”, select the robot “HP6-A0*” for the R1 group (press the spacebar to display the list of available robots.)
   When all the initialization steps are completed, press the [Complet] button of the instruction guide dialog to reboot the controller in normal operation mode.



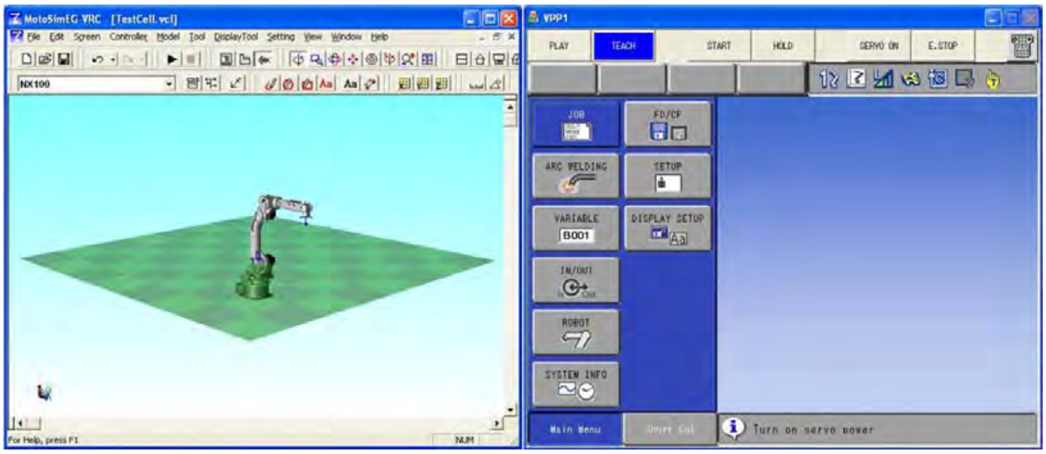
8. Once the virtual controller has rebooted, the virtual programming pendant will display in normal mode.
   In the “Robot Settings” dialog that will also appear, enter a name for the robot (for this example, the default name “NX100-RB1” is used.) Select the model file corresponding to the robot type (for the HP6-A0* select the “HP6-a00.mdl” file).
   Press the [OK] button.



9. When the controller registration has been completed normally, the robot model appears in the cell screen as shown in the figure below.



However, as shown in the following figure, the robot may be displayed as if it is sank in the floor. This is because the offset value of the robot operational origin and the floor center coordinate has been set to 0 (initial value). In this case, correct the robot position by following steps 10 and 11.

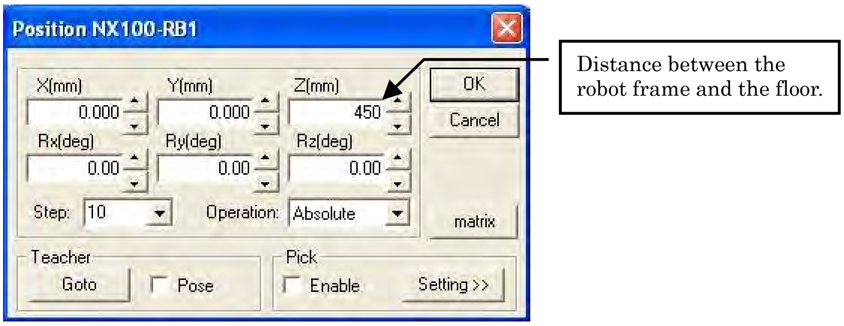


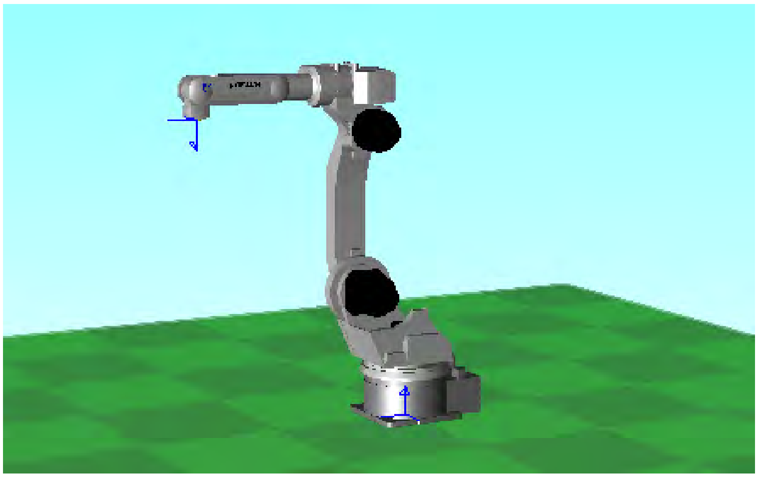
10. On the [Home] tab, in the [Model] group, click the [CadTree] button, display the Cad Tree selection box.
    Select “NX100-RB1” and click on [Pos] button.

11. In the Position dialog box below, the robot model can be moved to any arbitrary place. In the case of NX100-RB1, the height from the floor to the robot operational origin is 450 mm, enter "450" for "Z" and click the [OK] button.

NOTE

The height from the floor to the robot operational origin (here the height is 450 mm) can be obtained by measuring the distance between the floor and the robot bottom by clicking the on the [Home] tab, in the [Mesurement] group, click the [Distance] button. Refer to Section 5.1 "MotoSim EG-VRC Display" for the details of measuring tools, and Section A.7 "List of Manipulator Models and Offset Values Supported by MotoSim EG-VRC" for each robot offset values.





NOTE

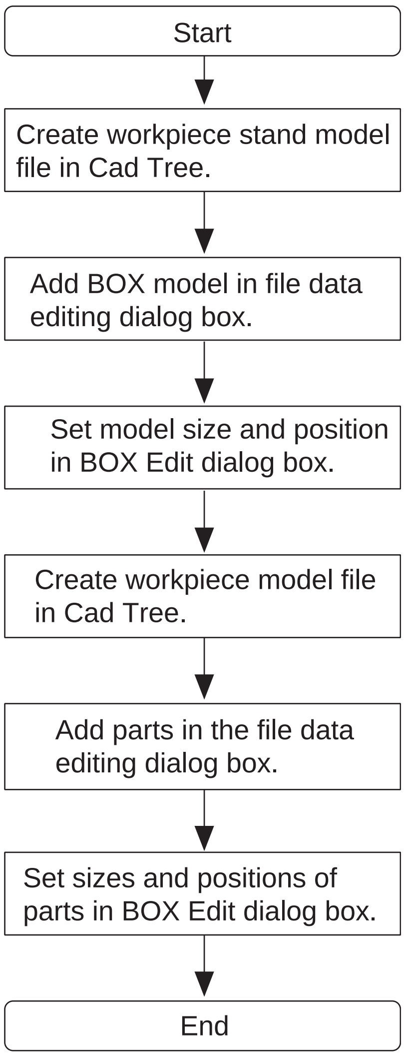
When initialized the robot controller, MotoSim EG-VRC set the absolute data automatically. So absolute setting is not needed in MotoSim EG-VRC.
Refer to " 7.1.4 Initializing the Controller (FS100) " for details.

2.3 Creation of Models

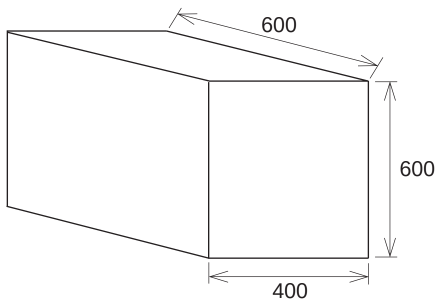
This section explains how to create workpiece models and tool models using the CAD functions.

2.3.1 Creating a Workpiece and a Workpiece Stand

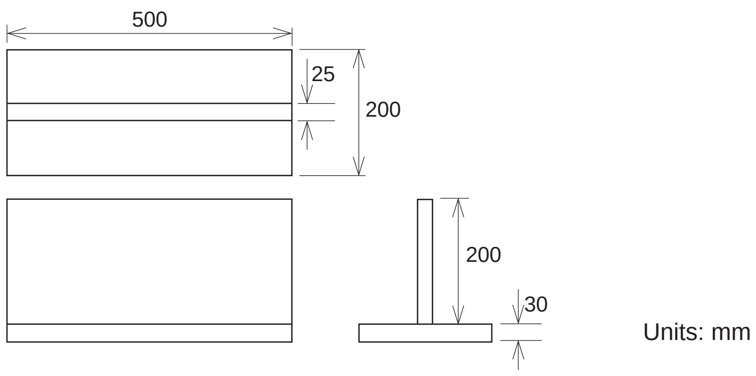
Follow the flowchart below to create a workpiece and its stand.



1. The dimensions of the workpiece model and workpiece stand model are shown in the following figure:



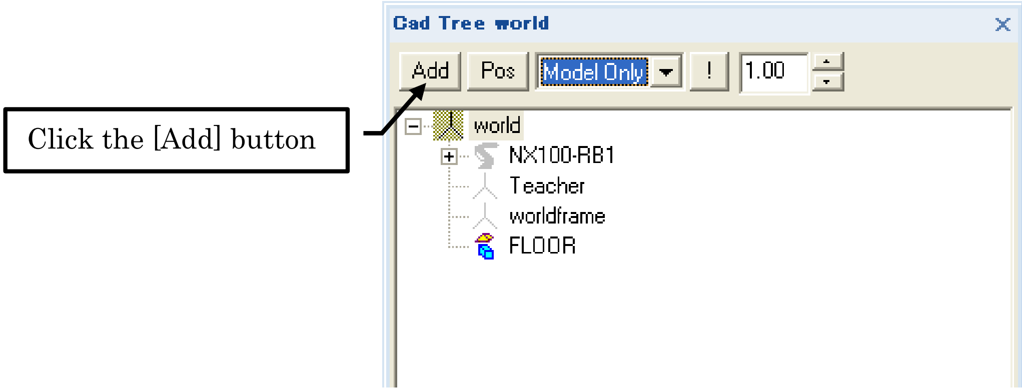
Workpiece Stand Model



Workpiece Model

2. On the [Home] tab, in the [Model] group, click the [CadTree] button, the [CadTree] dialog appears.

3. When the Cad Tree appears, select "world" from the model tree; select {New Model} in the right-click menu, or click the [Add] button.

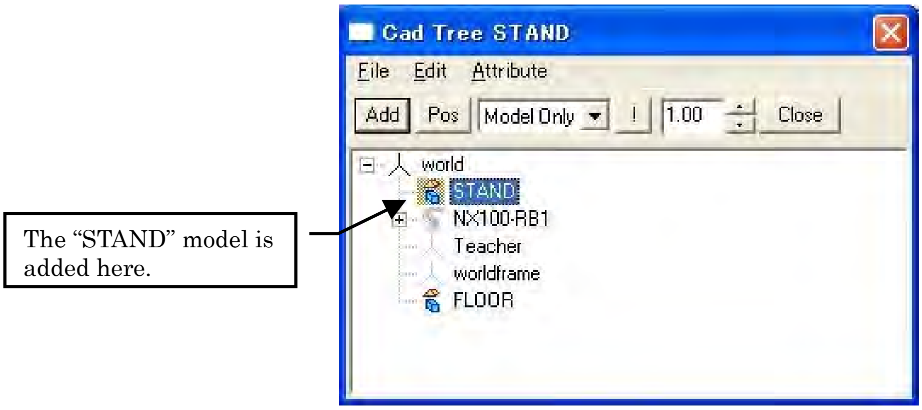


NOTE To create a new model in the model selection screen, verify that the cursor is pointed to "world" so that it will be the parent model.

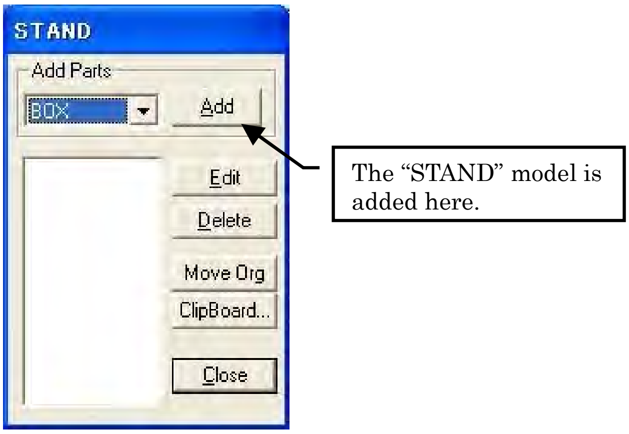
4. Enter "STAND" (a word for “stand” in Japanese) in the Add Model Dialog box and click the [OK] button.

A confirmation dialog box appears, to create the new model: click on [OK].

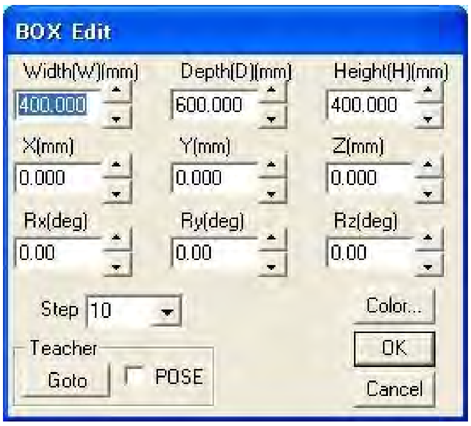
5. The "STAND" model appears in the Cad Tree: point the cursor to "STAND" and double-click it.



6. The model editing dialog box appears: select “BOX” from the "Add Parts" combo box, and click [Add].



7. The BOX Edit dialog box appears: input the dimensions of the workpiece stand.

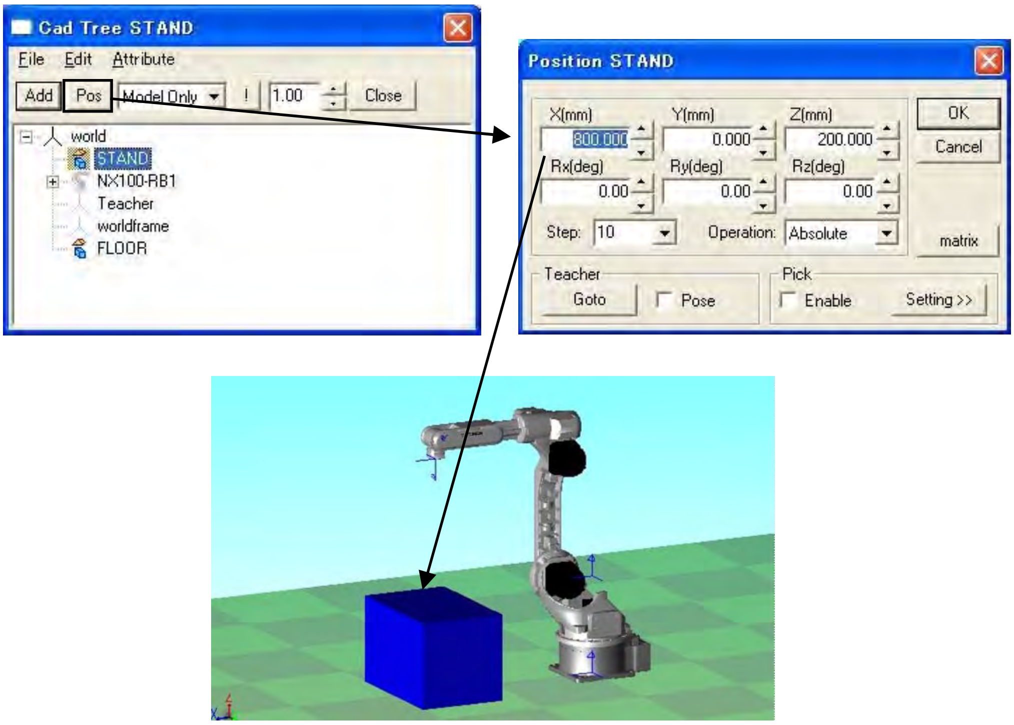


NOTE

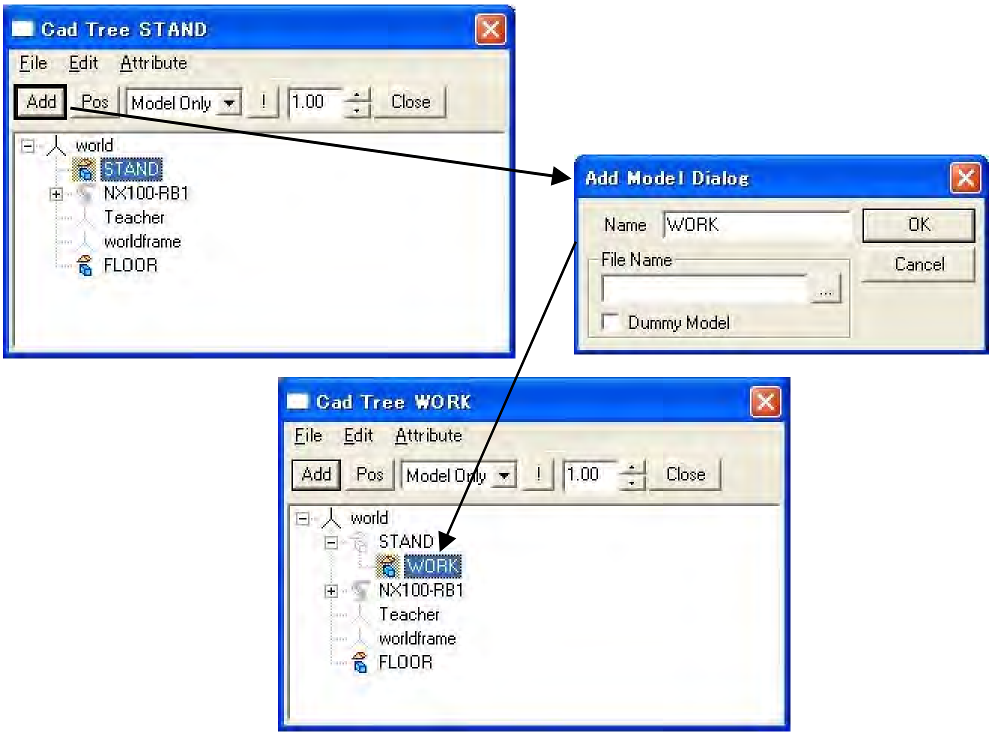
When a part is added with the [Add] button, the parts editing dialog box appears automatically. However, to reedit a part that has already been added, use the [Edit] button to display the part editing dialog box after selecting the subject part name.

Select 400 for width, 600 for depth and 400 for height by using the spin button at the side of the edit box or by entering the values directly. The incremental values of the spin box can be changed from 0.1 to 100 in the incremental value list box. Select desired colors, and check if the stand is displayed properly.
When satisfied, click the [OK] button to return to the file data editing box. Click the [Close] button in the file data editing dialog box to complete the creation of workpiece stand model.

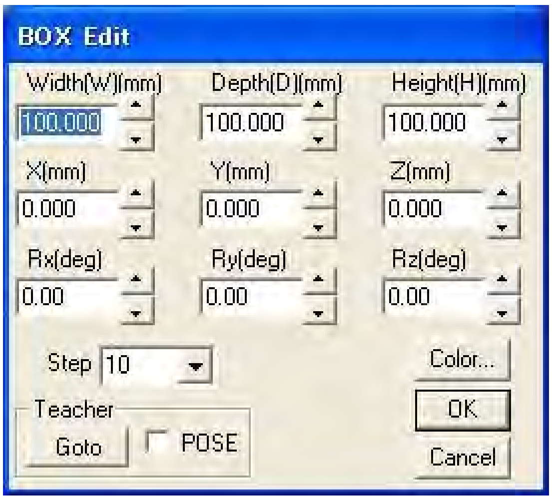
8. The workpiece stand model is located at the center of the floor under the current conditions: therefore, click the [Pos] button in the Cad Tree to display the position dialog box, and input 800 for X, 0 for Y and 200 for Z to modify the model location.



9. To create a workpiece, set "STAND" as the parent model by pointing the cursor to "STAND" in the Cad Tree. Create a new model named "WORK" as shown in the figures below.



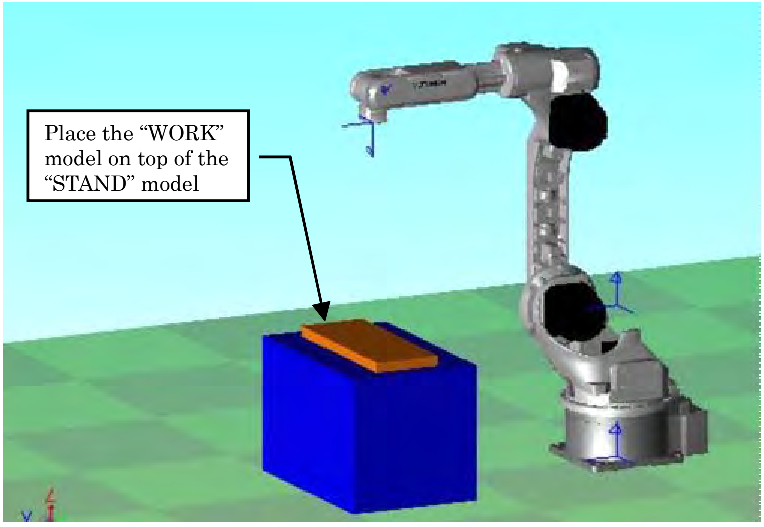
10. Display the BOX Edit dialog box by selecting "BOX" from the "Add Parts" combo box in the model editing dialog box, then click [Add].



11. Set the workpiece size and position as shown in the table below in the BOX Edit dialog box: this model will be the bottom part of the fillet-welding workpiece.

Width (W)	200	Depth (D)	500	Height (H)	30
X (mm)	0	Y (mm)	0	Z (mm)	0
Rx (degree)	0	Ry (degree)	0	Rz (degree)	0

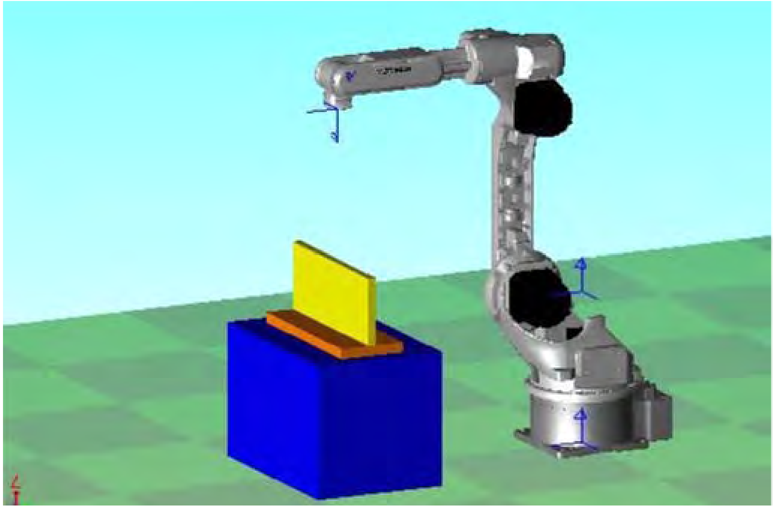
12. The model is currently displayed in the center of STAND model: to modify its position, first close the BOX Edit dialog box by clicking [OK] and the file data editing dialog box by clicking [Close]; after closing those dialog boxes, click the [Pos] button in Cad Tree to display the Position dialog box, and enter 0 for X, 0 for Y, and 215 for Z to display WORK model on top of STAND model.



13. Create the upper part of the workpiece: the upper workpiece is composed of a second BOX part. Double-click "WORK" in Cad Tree to call up the file data editing dialog box, and add another BOX model (note that this operation should not be done by clicking the [Add] button in the Cad Tree).

14. Set the workpiece size and position as shown in the table below in the BOX Edit dialog box.

Width (W)	25	Depth (D)	500	Height (H)	200
X (mm)	0	Y (mm)	0	Z (mm)	115
Rx (degree)	0	Ry (degree)	0	Rz (degree)	0



15. Check if the workpiece model has been created according to the dimensions specified in the step 1.
If the model has different dimensions or to change the color of the model, proceed to the step 16 and 17 to make modifications.

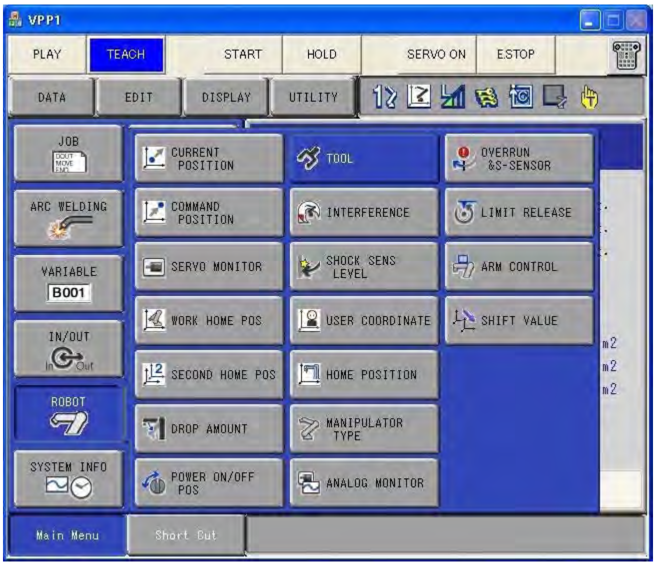
16. Display the BOX Edit dialog box by pointing the cursor to BOX model to be edited among the models added to the Cad Tree, then double-click it.

17. Reedit the workpiece size, etc. in the BOX Edit dialog box. To modify the color of the model, click on the [Color...] button.

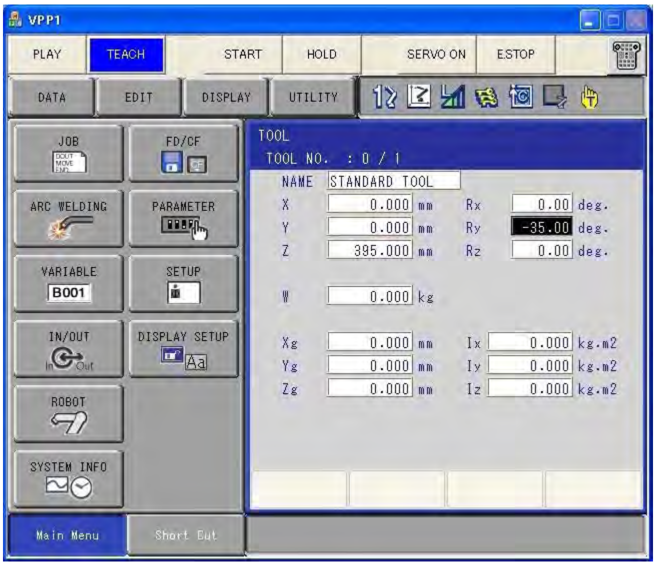
2.3.2 Editing Tool Data

This section explains on how to edit the tool data. The tool to be created is a torch for arc-welding. The tool dimensions are: 0 mm for X, 0 mm for Y, and 395 mm for Z.

1. On the Virtual Programming Pendant, select from the main menu {ROBOT} - {TOOL}.



2. The TOOL settings appear. Move the cursor with the arrow keys to the Z field. Press the [Spacebar] to select the Z field for edition and enter the value "395". Press [Enter] to register the entered value. Repeat the same procedure for the Ry field and enter a value of -35. (In this example, the tool end curves by "Ry = -35" relative to the flange axis.



2.3.3 Adding a Tool Model

There are two ways to add a tool model:

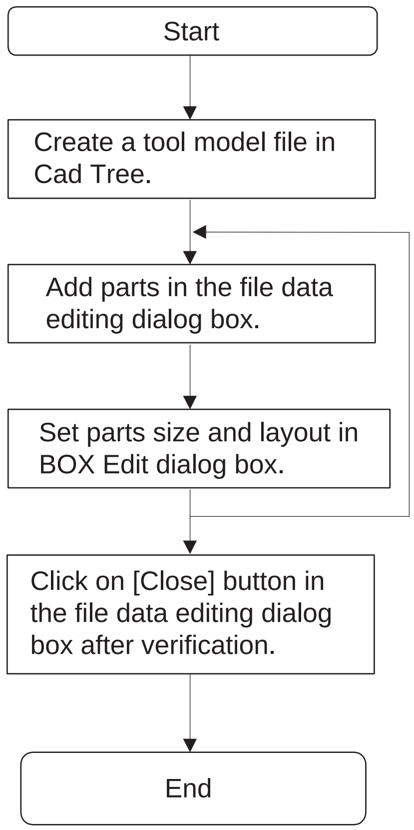
(1) Create a tool model with the CAD function of MotoSim EG-VRC.
(2) Read a tool model in the HSF format (*.hsf).

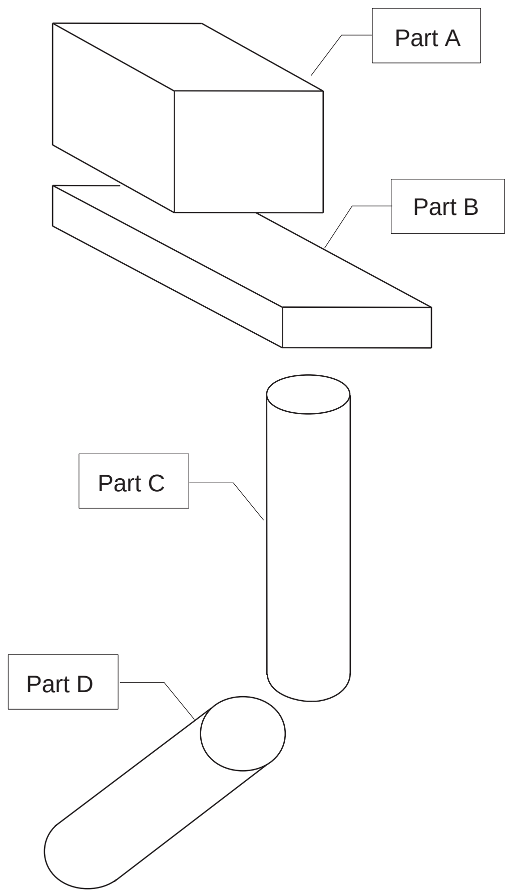
First, method (1) is used to explain the creation of a tool model with the MotoSim EG-VRC CAD function.

In method (2), an HSF format model is used; this is explained in "Reading the HSF Format Model" later on.

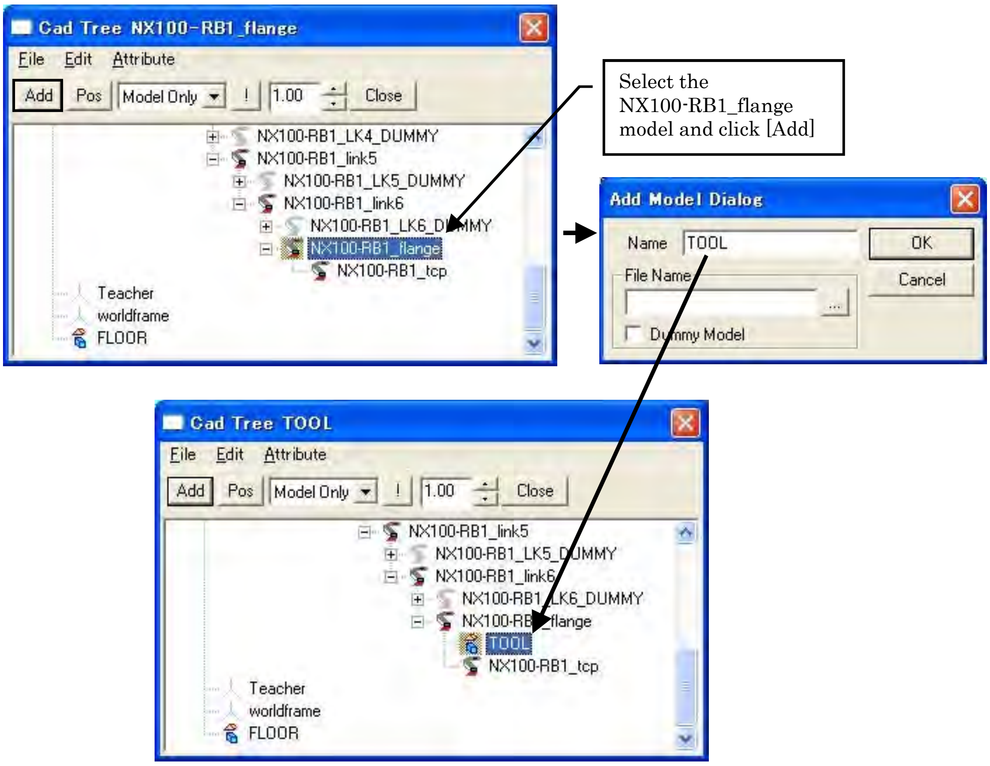
■ Creating and Adding a Tool Model with the CAD Function

Follow the flowchart below to create a tool model.

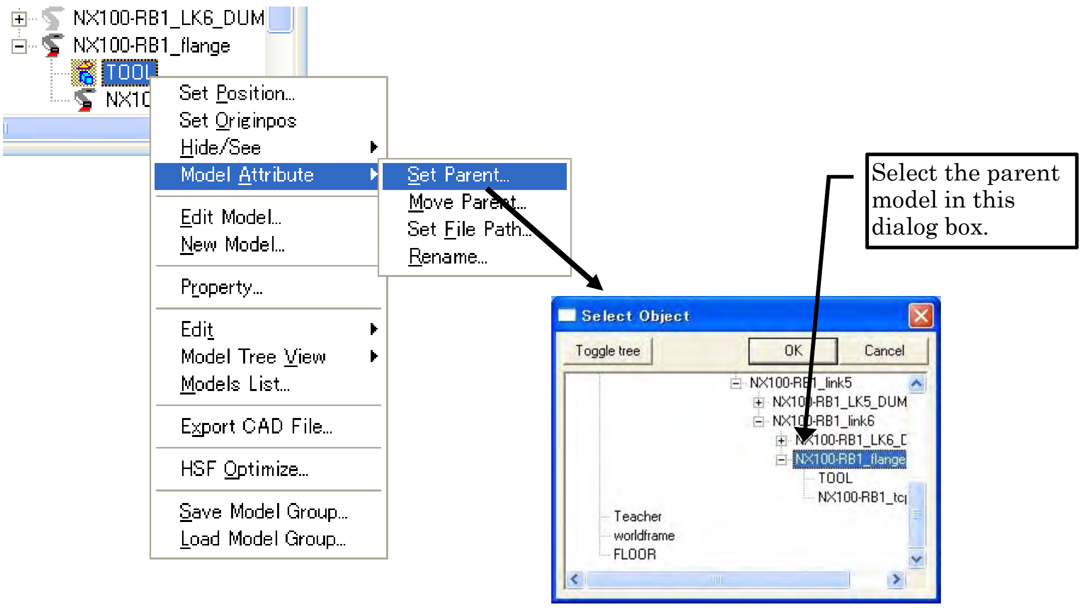




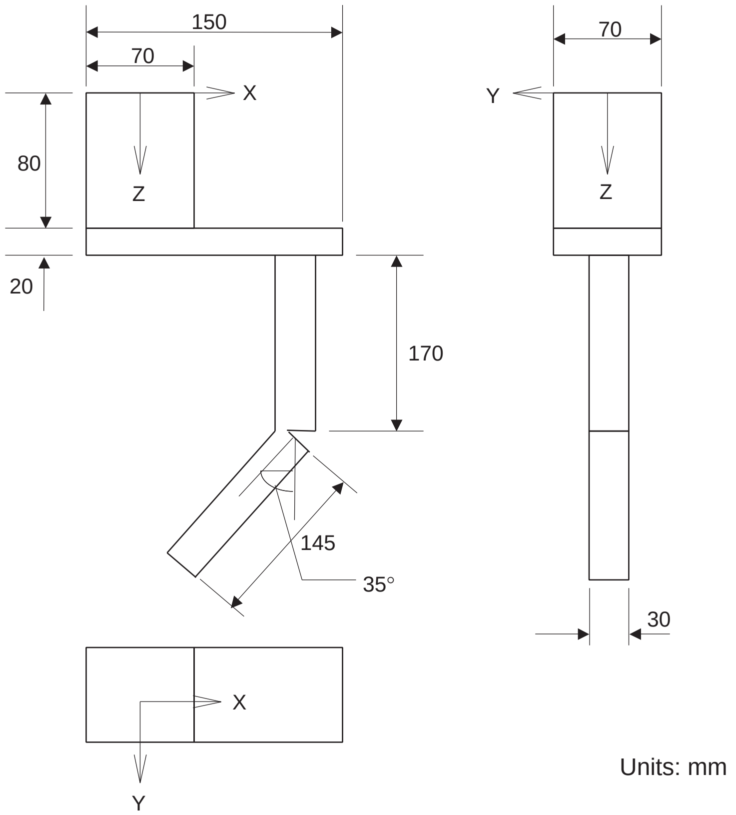
1. Display the Cad Tree to create a new model names "TOOL". In this case, point the cursor to "NX100-RB1_flange" and create a new model so that the parent model of the tool model is the flange of the robot.



If the parent model is not set correctly, change the parent model by selecting {Model Attribute} - {Set Parent } as shown in the following figure.



2. The dimensions of the tool model are shown in the following figure:



3. Double-click "TOOL" in the Cad Tree to display the file data editing dialog box, and add parts in the file data editing dialog box.
   The tool model is composed of two BOX models and two CYLINDER models. Assume these four parts as parts A, B, C and D, respectively: edit parts A and B in the BOX edit dialog box and parts C and D in the CYLINDER Edit dialog box.
   The following tables show the size and layout of each parts A, B, C and D.

• Part A (BOX)

Width (W)	70	Depth (D)	70	Height (H)	80
X (mm)	0	Y (mm)	0	Z (mm)	40
Rx (degree)	0	Ry (degree)	0	Rz (degree)	0

• Part B (BOX)

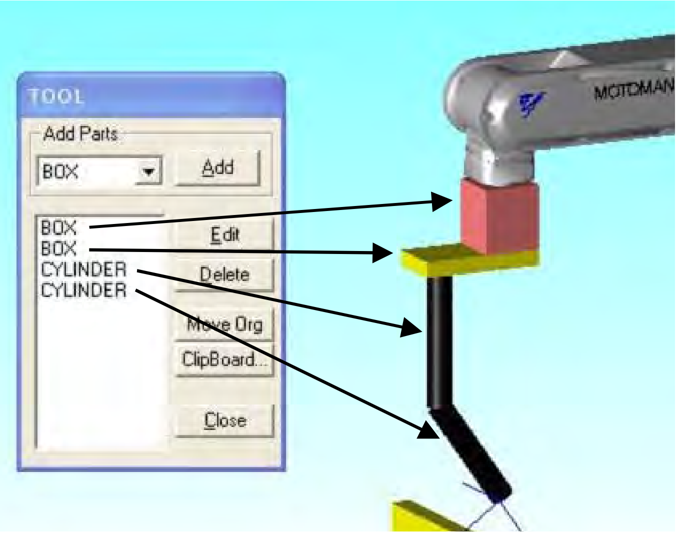
Width (W)	150	Depth (D)	70	Height (H)	20
X (mm)	40	Y (mm)	0	Z (mm)	90
Rx (degree)	0	Ry (degree)	0	Rz (degree)	0

• Part C (CYLINDER)

Lower Dia.	30	Height (mm)	170	Division	16	Upper Dia.	30
X (mm)	80	Y (mm)	0	Z (mm)	100		
Rx (degree)	0	Ry (degree)	0	Rz (degree)	0		

• Part D (CYLINDER)

Lower Dia.	30	Height (mm)	145	Division	16	Upper Dia.	30
X (mm)	80	Y (mm)	0	Z (mm)	270		
Rx (degree)	0	Ry (degree)	-35	Rz (degree)	0		

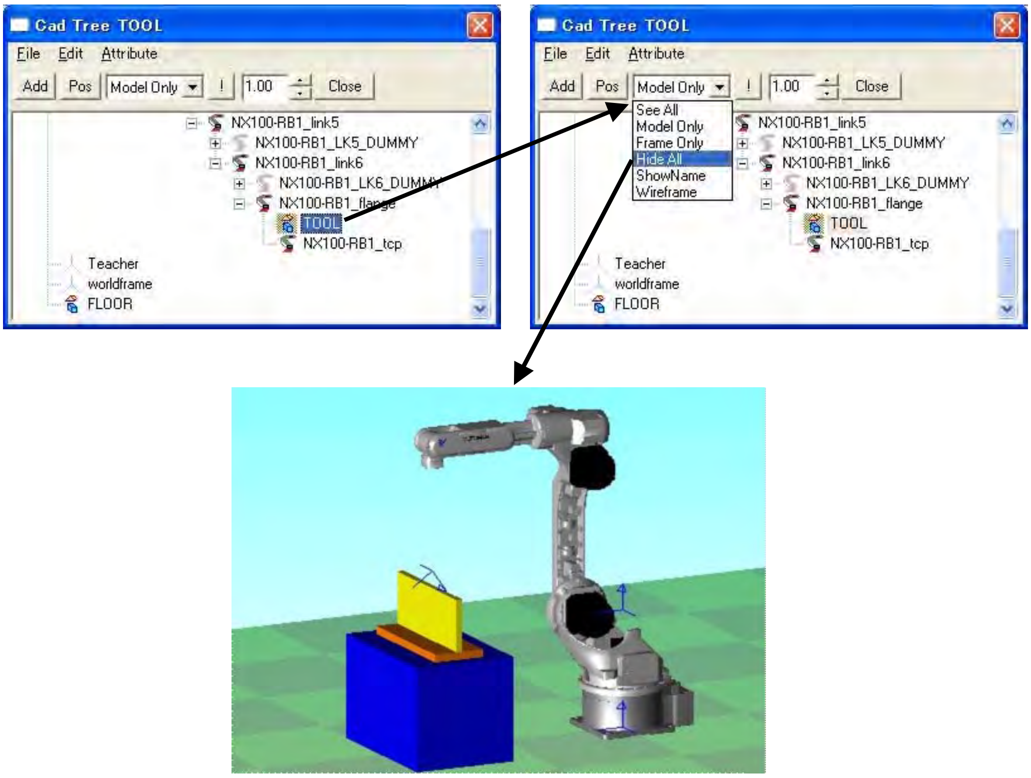


4. When the parts are all added, check the tool model on the screen, then click on the [Close] button to exit the file data editing dialog box.

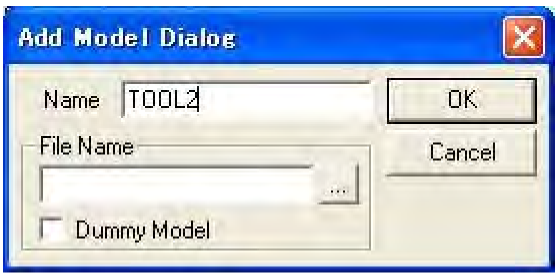
5. Verify that the size and layout of the tool model, STAND model and WORK model are properly set, and click the [Close] button in the Cad Tree to complete creation of the models.

■ Reading the HSF Format Model

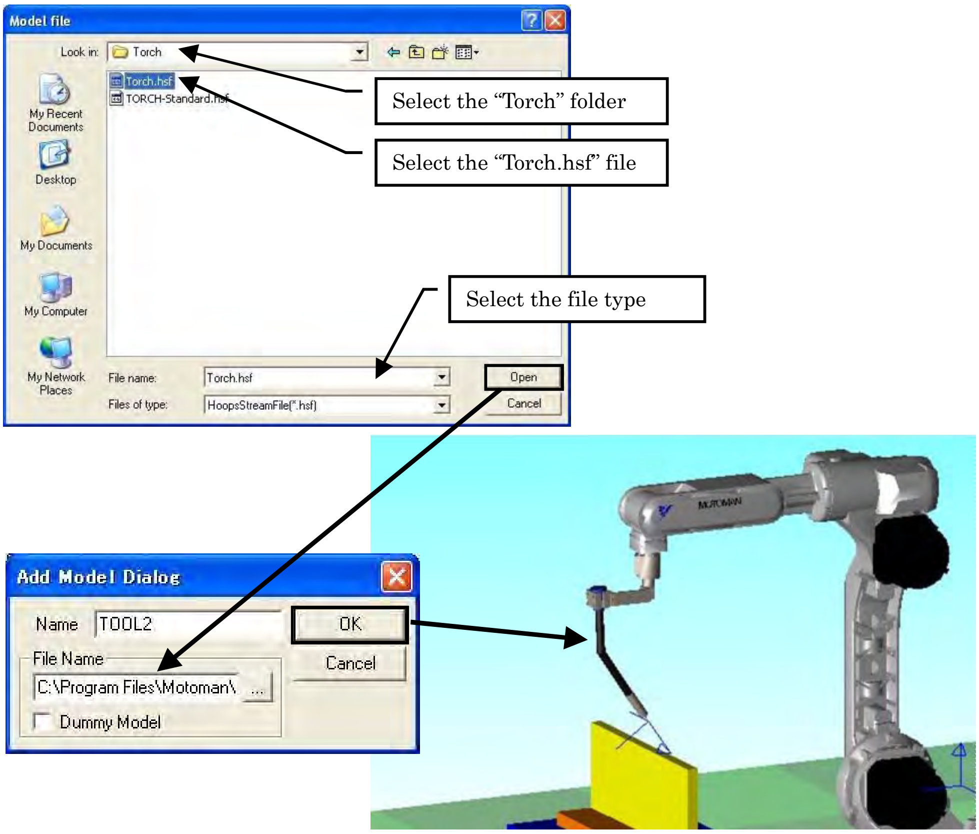
This section describes how to add a tool model which is provided as an HSF format (*.hsf). If the tool model has been already added in the previous section "Creating and Adding a Tool Model with the CAD Function", select "TOOL" from the Cad Tree and select "Hide" to hide it.



1. Select "NX100-RB1_tcp" in Cad Tree and click [Add] to display the Add Model Dialog dialog box, then enter "TOOL2" in the Name edit box.



2. Click the [...] button of the file name and select "Torch.hsf" file in the folder "Models\Torch"; click the [OK] button.



NOTE The HSF model files can be added by drag and drop from the Explorer. (Refer to Section 9.11 "Reading a Model" for details.) In this case, answer "Yes" when prompt "Select the parent model? and then select "NX100-RB1_tcp" as the parent.

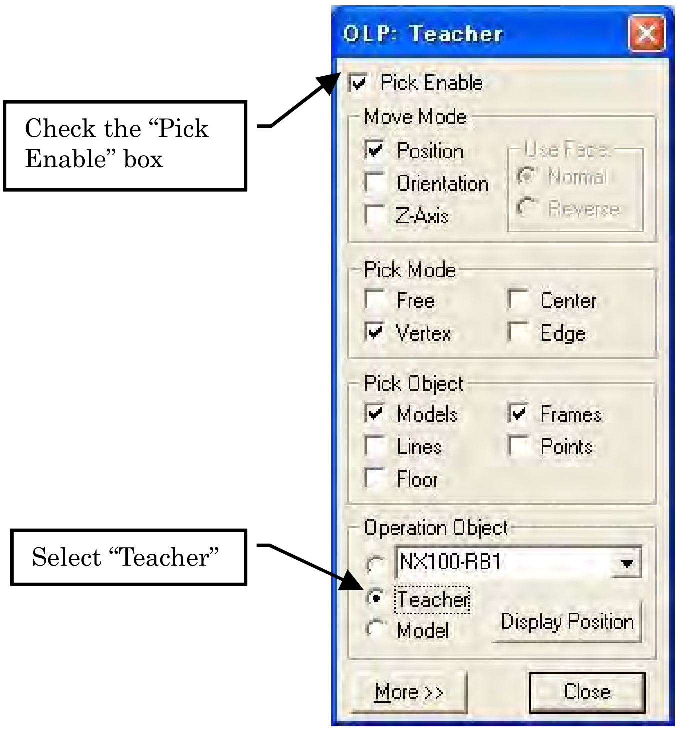
2.4 Setting of Target Points (AXIS6 Model)

This section explains on how to add an AXIS6 model before starting to teach. This procedure is not necessarily required, however, it makes future teaching easier.

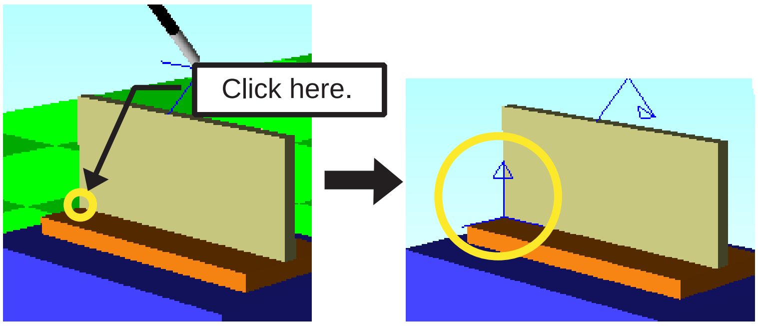
AXIS6 is a model composed of only X, Y, and Z-axis frames. Set AXIS6 as target points for the following two steps which will be teach later.

- Step 3: welding start position
- Step 4: welding end position

1. On the [Home] tab, in the [Teaching] group, click the [OLP] button to display OLP dialog box as shown below. Select the [Teacher] radio button in the "Operation Obj" section, check the [OLP Pick] check box.



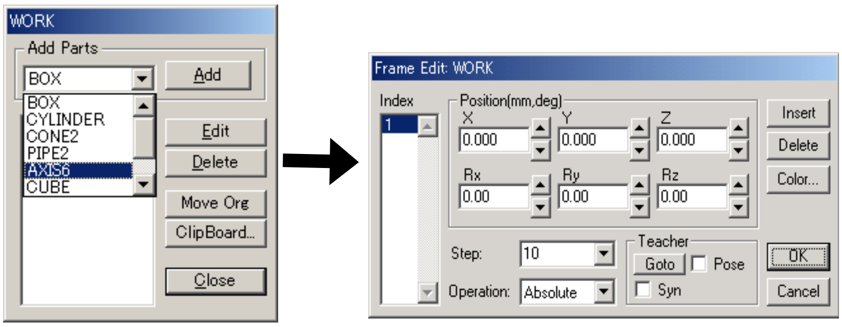
2. Set the Teacher to the welding start position of Step 3: click the welding start position with [Enable] checked.



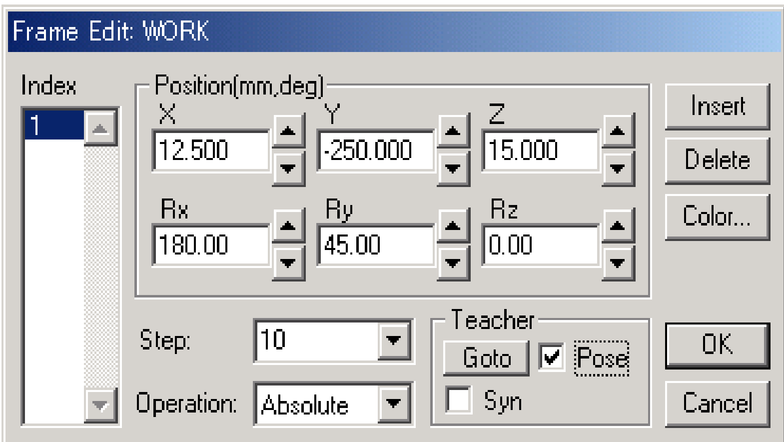
3. Set the Teacher to optimum angle for the tool welding position: in the following example, welding is performed at an angle of 45° to the welding position. Press the [Display Position] button from the OLP panel and set Rx, Ry and Rz as shown below.

Rx (degree)	180	Ry (degree)	45	Rz (degree)	0

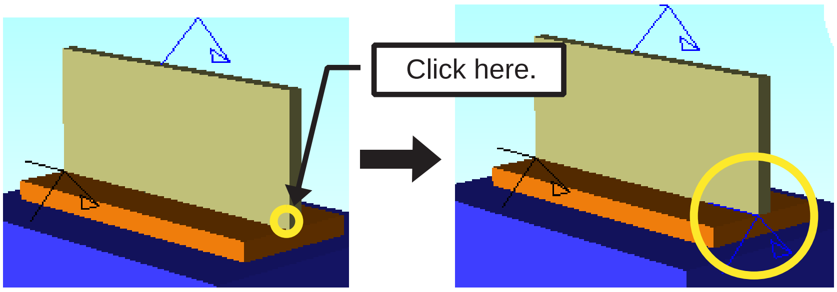
4. Double-click the "WORK" model in the Cad Tree and add AXIS6 in the file editing dialog box.



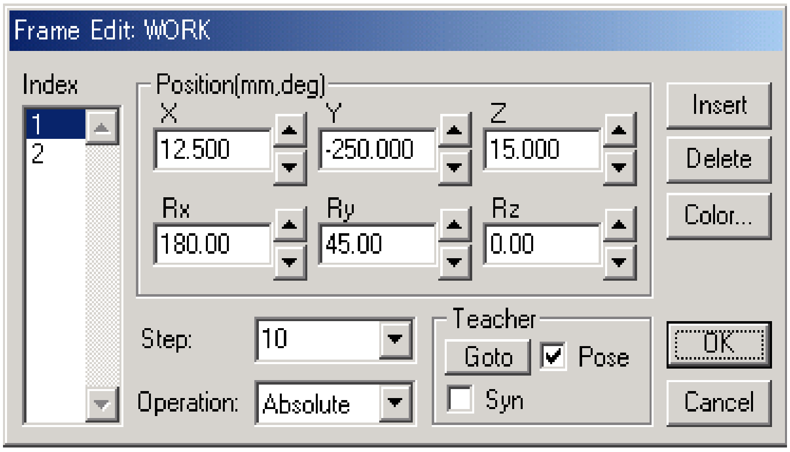
5. Click on [Add] and verify that the number “1” has been added to the Index list box. Then, check the [Pose] check box in the Teacher group and click the [Goto] button. With this operation, the teacher frame color in the cell window changes, which means that AXIS6 has been set to the teacher coordinate and orientation and now overlaps it.



6. Set AXIS6 to the welding end point by performing steps 1 and 2 again, however, since the welding end point is to be set this time, be sure to click the part shown below in the OLP function. (Since the teacher angle has already been modified in the 3rd step, the angle modification is not necessary here.)



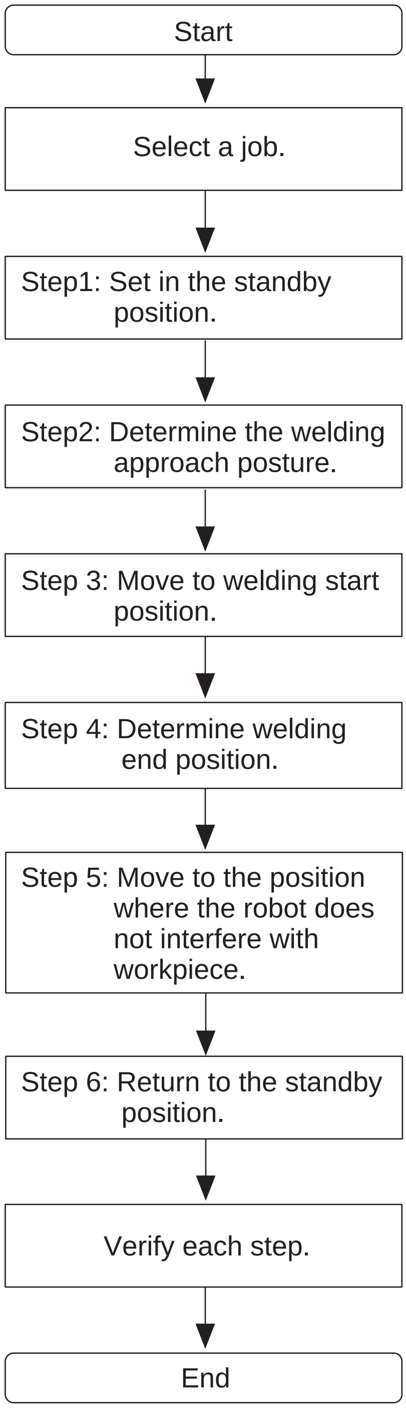
7. Add frame number 2 by clicking the [Insert] button in Frame Edit dialog box for AXIS6 which has been previously set; verify that the [Pose] check box is checked and click on [Goto].



8. When AXIS6 is set, click on [OK] to complete the setting.

2.5 Teaching

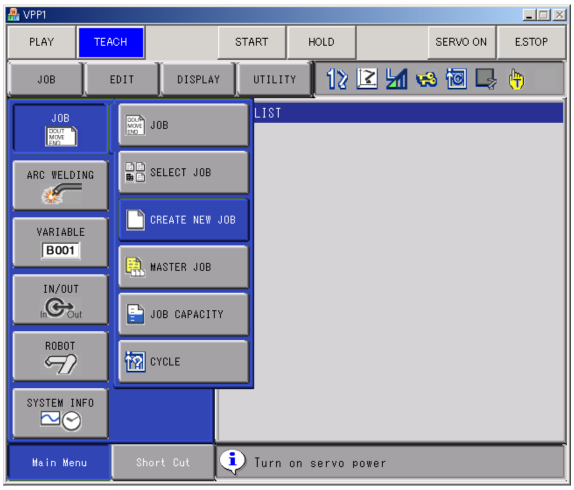
Follow the flowchart below to create an actual job for arc-welding.



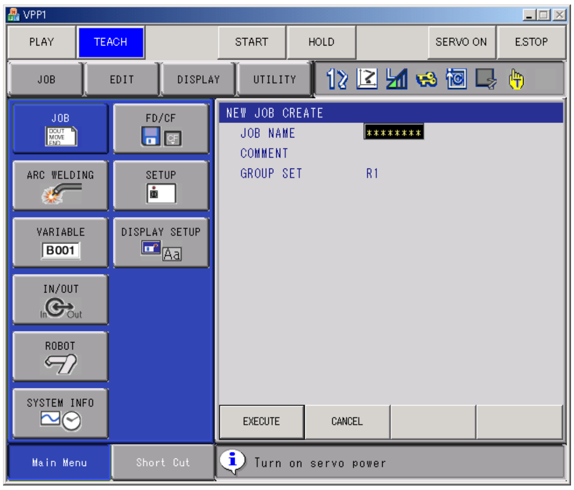
2.5.1 Creating a New Job

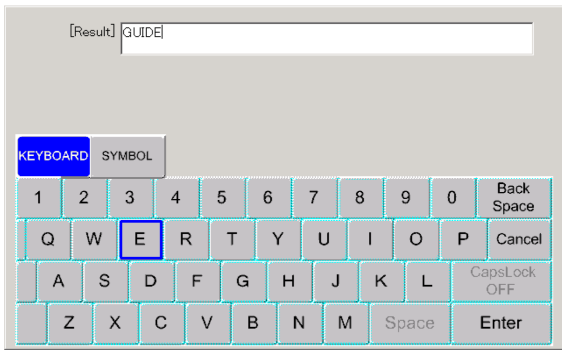
Create a new job before teaching:

1. On the virtual pendant main menu, select {JOB} - {CREATE NEW JOB}



2. With the cursor in the “JOB NAME” field, press the [Spacebar] to select the “JOB NAME” field and display the alphanumeric input window. Enter a name for the job. For this example, enter "GUIDE" in the “Result” field and then press [ENTER]. To enter a name for the job, the keyboard is also available. For details, please refer to the " 5.2.5 Input with keyboard ".

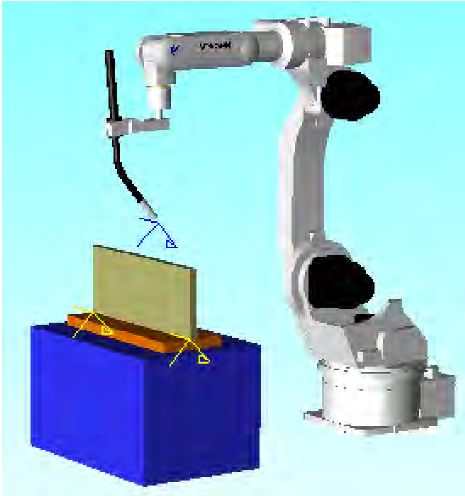


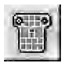


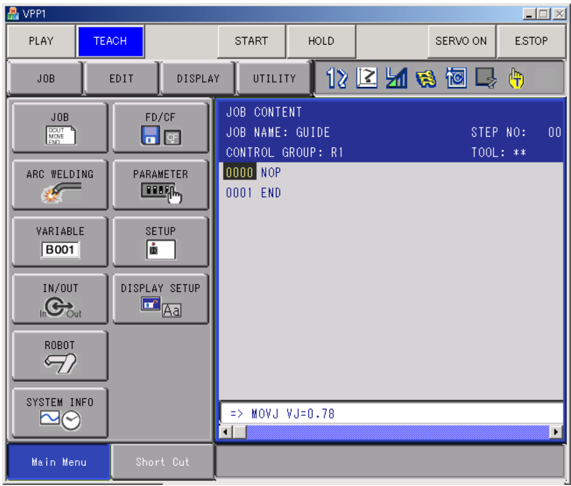
3. Click the [EXECUTE] button or press [ENTER], to create the new job.

2.5.2 Teaching the Standby Position

1. Press the [SERVO ON] button. Once the servo power is activated, move the robot to its standby position by using the Virtual Pendant axis keys.



To display or hide the pendant keypad, press the [/] key or click on the  icon.

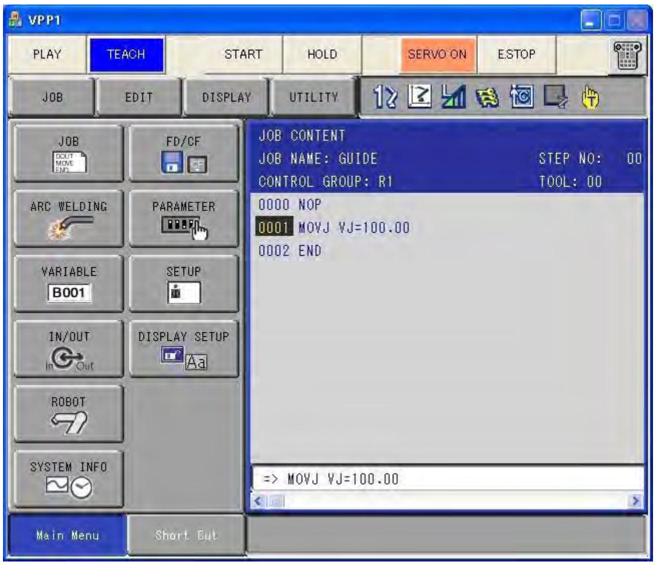


2. In the input line, select the motion type using the [MOTION TYPE] key of the pendant keypad.
   For this example, select joint motion (MOVJ)

3. Set the motion speed:
   • Press [Select] to the focus in the input line.
   • Move the cursor to the speed value with the cursor key.
   • Select the speed value by using the [SHIFT] and the up and down arrow of the cursor key.

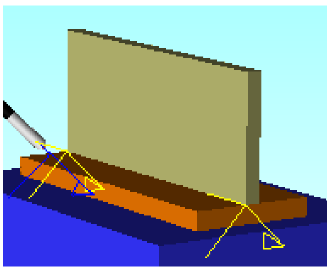
   For this example, set the motion:
   • Type: Joint Motion (MOVJ)
   • Speed: 100%

4. Press [Enter] to register the motion instruction to the robot current position.



2.5.3 Determining the Welding Approach Posture

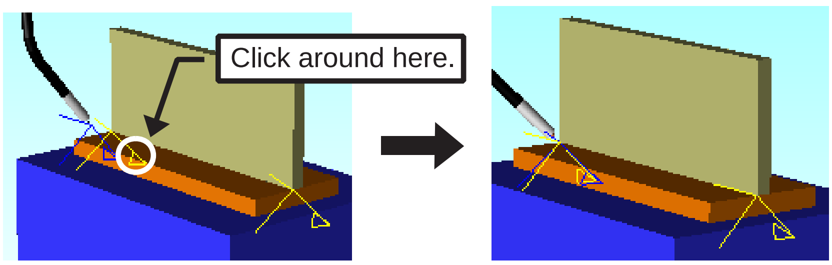
Use the virtual pendant to posture the robot so that it can perform welding.
Press [Enter] to register this step (Step 2).



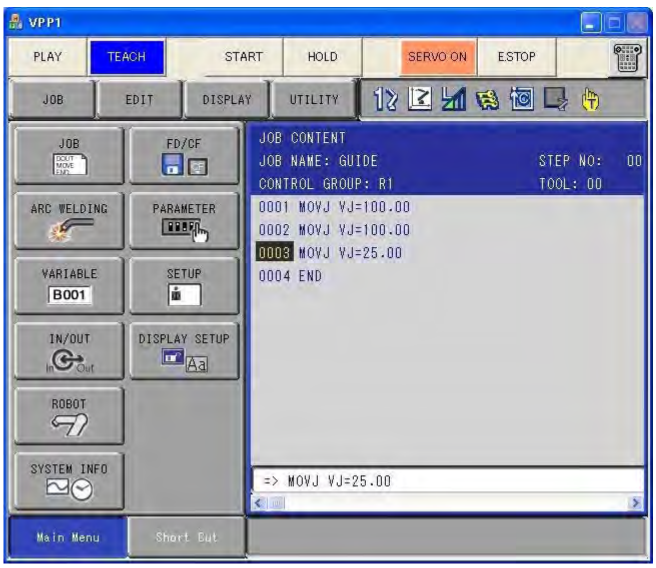
2.5.4 Teaching the Welding Start Position

1. On the [Home] tab, in the [Teaching] group, click the [OLP] button to display the OLP dialog box.

2. Select the [OLP Pick] check box and [Vertex] check box in the “Pick type” section, and click an arbitrary point; the TCP moves to overlap the vertex near the clicked point.
   To make the most of the AXIS6 which has been set to the welding start point in the previous section, the OLP settings should be made as follows:
   - OLP Active: Checked
   - Move Mode: Position, Orientation
   - Pick Mode: Vertex
   - Pick Object: Frames
   - Operation Object: Robot Name (NX100-RB1)
3. Click on AXIS6 displayed on the screen with the mouse as shown in the figure below: the tool angle is adjusted to the angle of the AXIS6.
   If the tool collides with the workpiece due to an improper tool angle, avoid the collision by manually repositioning the robot with the programming pendant dialog box.

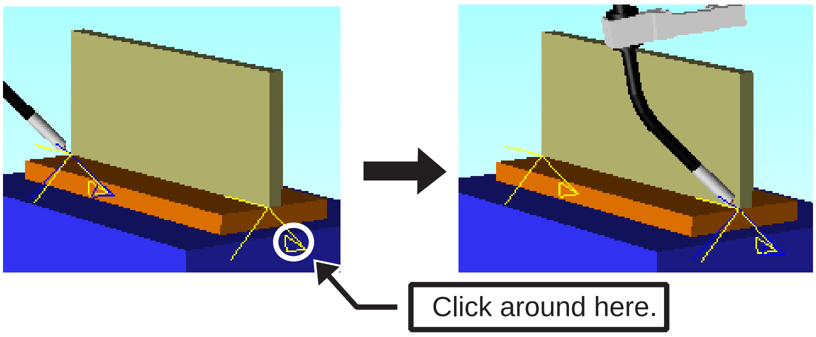


4. With the virtual pendant, set the motion:
   - Type: Joint Motion (MOVJ)
   - Speed: 25%
5. Press [Enter] to register this step (Step 3).



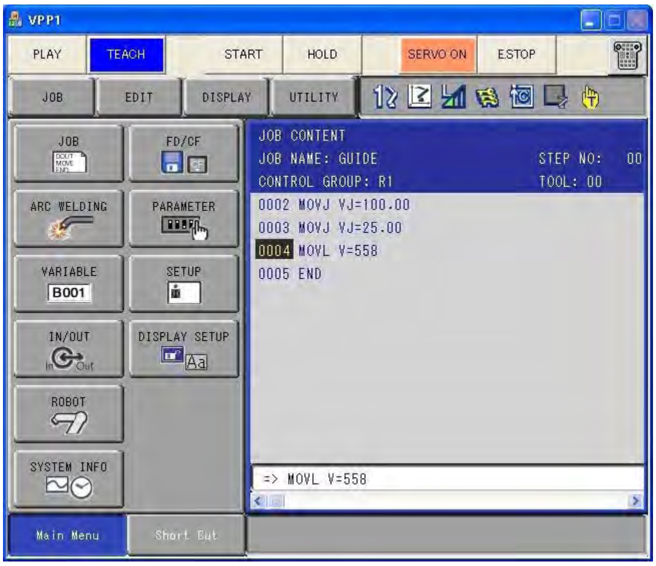
2.5.5 Teaching the Welding End Position

1. Enable the OLP function and click on AXIS6 which has been set to the welding end point to move the tool to the welding end point.



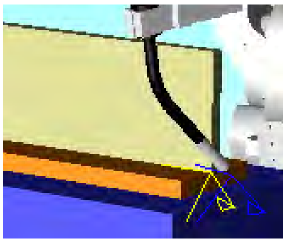
2. With the virtual pendant, set the motion:
   - Type: Linear Motion (MOVL)
   - Speed: 558 cm/min

3. Press [Enter] to register this step (Step 4).



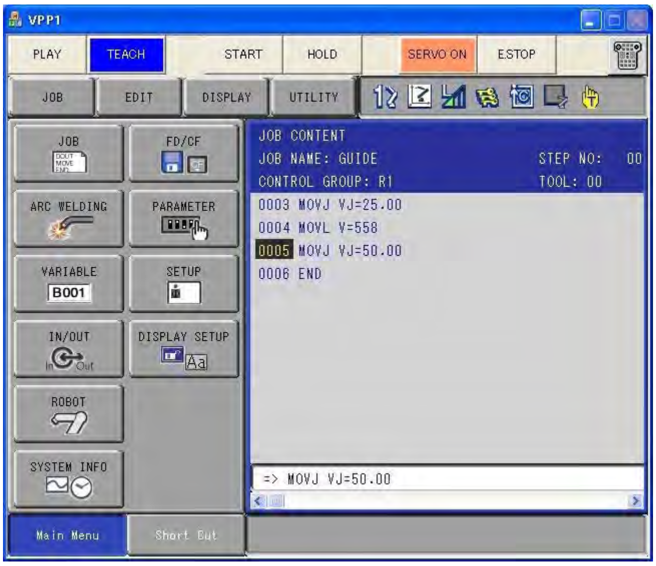
2.5.6 Teaching the Torch Retraction

1. Use the virtual pendant axis keys to move the robot away from the weld.



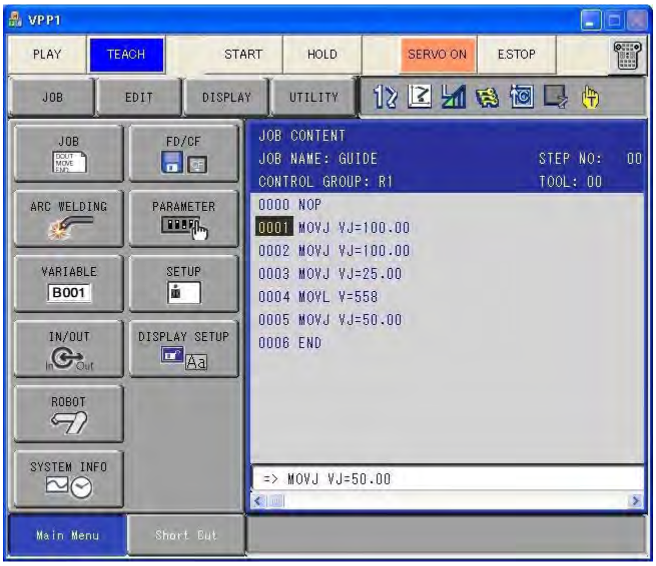
2. Set the motion:
   - Type: Joint Motion (MOVJ)
   - Speed: 50%

3. Press [Enter] to register this step (Step 5).



2.5.7 Returning to the Standby Position

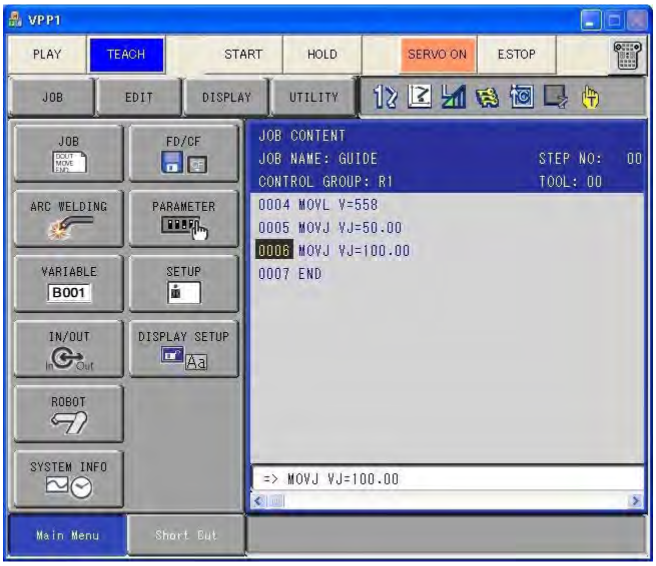
1. On the virtual pendant, move the cursor in the job to the first step.
   Press and hold the [FWD] key on the virtual pendant keypad to move the robot to this position.
   (Use the [FAST] and [SLOW] keys to adjust the speed for manual operation.)
   When the robot reaches the position for step 1, the robot will stop and the job cursor will stop blinking.



2. Set the motion:
   • Type: Joint Motion (MOVJ)
   • Speed: 100%

3. Move the job cursor back to Step 5 (before the END command).

4. Press [Enter] to register this step (Step 6).



2.5.8 Verifying Each Step

On the virtual pendant, move the cursor in the job to the first step.
Press and hold the [FWD] key on the virtual pendant keypad to move the robot to this position. When the robot reaches the position, the robot will stop and the job cursor will stop blinking. Release the [FWD] key, then press it again to move to the next step of the job. Repeat until the end of the job is reached.

2.5.9 Editing a JOB

A JOB can be edited with the following procedure.

■ Modifying Steps Position

1) Move the cursor to the step to be modify.
2) Move the robot to the desired position using the virtual pendant or MotoSim EG-VRC functions (OLP, Position panel...)
3) Press the [MODIFY] key of the pendant keypad and the [ENTER] key.

■ Adding Steps

1) Move the cursor to the step preceding the insertion point.
2) Move the robot to the desired position using the virtual pendant or MotoSim EG-VRC functions (OLP, Position panel...)
3) Set the motion type and motion speed.
4) Press the [ADD] key of the pendant keypad and then the [ENTER] key

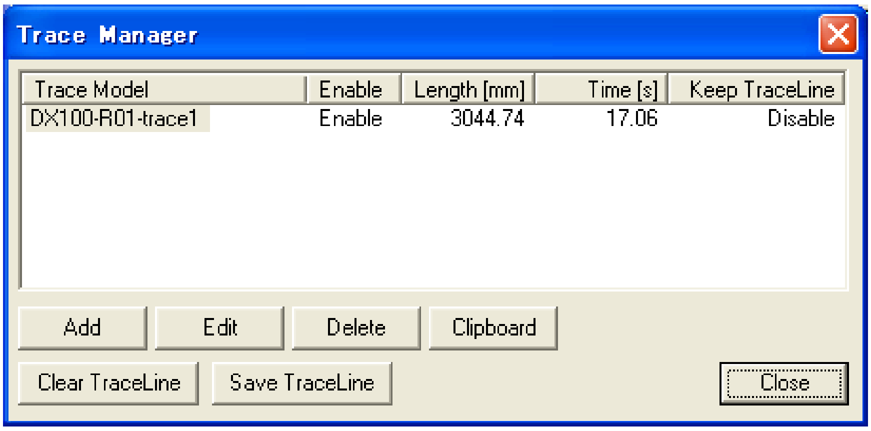
■ Deleting Steps or Instructions

1) Move the cursor to the instruction to delete.
2) If the instruction is a motion instruction (step), move the robot to the step position by pressing and holding the [FWD] key until the robot stops moving and the cursor stops blinking.
3) Press the [DELETE] key of the pendant keypad and then the [ENTER] key.

2.6 Playback

1. On the virtual pendant, move the job cursor to the top of the job.
2. In MotoSim EG-VRC, click the job execution button [Start] to perform playback and check the movement.

3. When the playback is completed, the play time can be displayed by clicking [Trace] to show the Trace Manager dialog.



NOTE

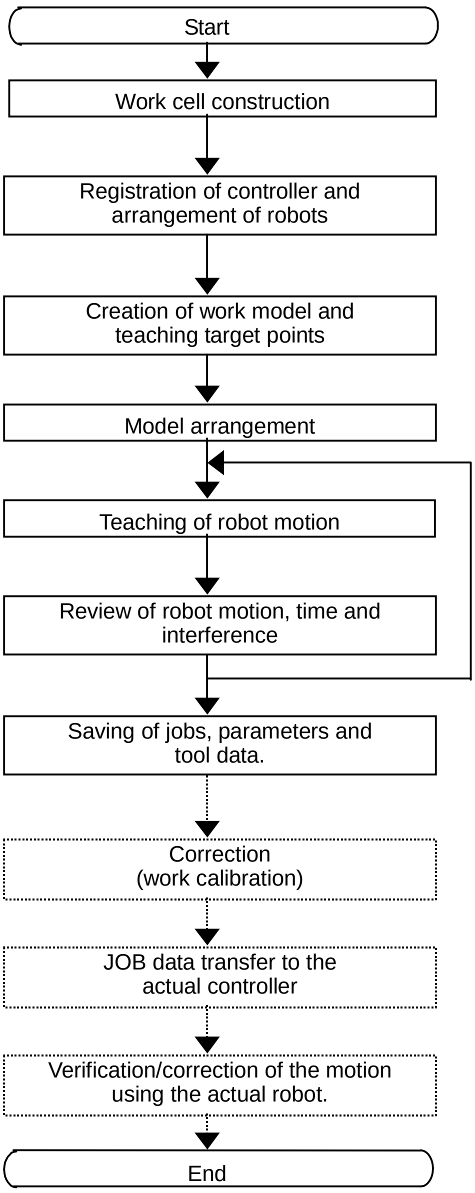
- To modify the job after playback the virtual pendant next to be change back to teach mode by pressing the [TEACH] button.
- During the execution of job, please do not sleep or hibernate the PC. The display of cell window may not recover.

3 Offline Teaching Procedure

This chapter describes the procedure for offline teaching and examination of robot application with MotoSim EG-VRC, and other related software.

3.1 Operation Flow

The following flowchart shows the general flow of the offline teaching using MotoSim EG.



Construct MotoSim EG-VRC operational environment (cell) on the computer.

Register created controller and layout the robots in the cell.

Create models to represent the workpiece, tool, etc. using MotoSim EG-VRC. Set target points to simplify teaching.

Layout the model on the cell.

Perform teaching and playback by using MotoSim EG-VRC to examine the motion.

From the virtual pendant menu, select {FD/CF} - {SAVE} ans save the job and data.

Correct the layout error between MotoSim EG-VRC and the actual manipulator.

Send/receive job and data to the actual controller using CompactFlash or transmission software.

Reduce the error between MotoSim EG-VRC data and actual robot using calibration software, and verify and correct the motion.

Solid lines indicate operation by MotoSim EG-VRC and dotted lines indicate operations by other software.

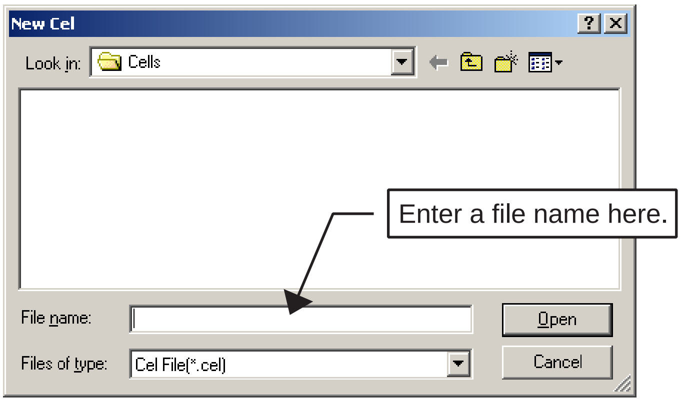
4 Creating and Editing a Cell

This chapter explains on how to create and edit a cell. Before starting to program robot motion with MotoSim EG-VRC, first create a cell and then register the controllers with the type and number of the robots to be used.
For controller and robot registration, refer to Section 7.1 "Adding a New Controller".

4.1 Creating a New Cell

Procedure

1. Click the MotoSim EG-VRC button ( ), and select the [New] - [New] menu.
2. Enter a file name in the File name edit box, and click on [Open] to create a basic cell.



4.1.1 Template Function

If the template cells are registered, the new cell is created from the template, so creation time is shortened. And the template cells can be renamed and deleted.

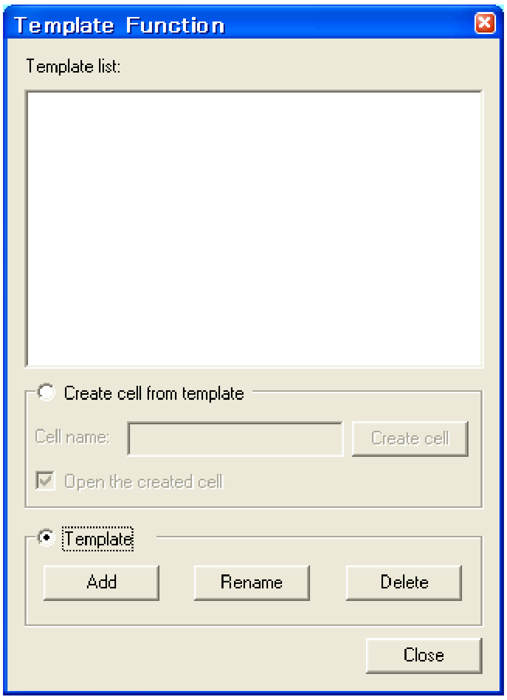
■ Registration of Template

The cell are currently open is registered as the template. When many cells with same robot configuration are created, creating the cell can be easily through the use of the template.

Procedure

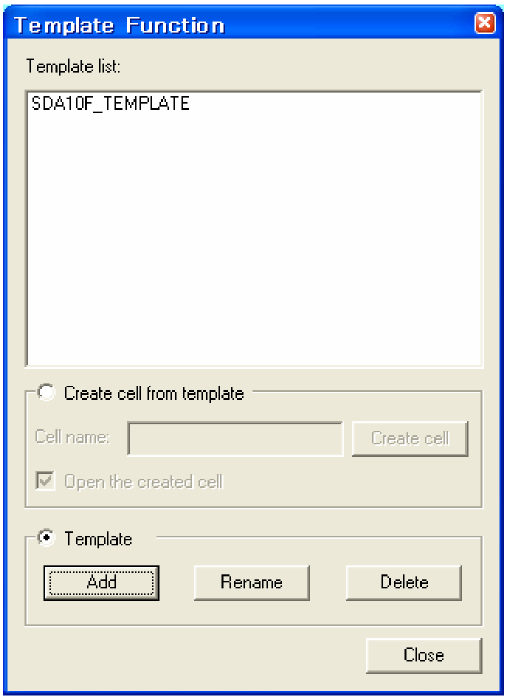
1. Open the cell to register as template.
2. Click the MotoSim EG-VRC button ( ), and select the [New] - [Template] menu.

3. Select the [Template] radio button, and click the [Add] button.



4. Set the name of template, and click the [OK] button.

5. The registered template is displayed in the template list.

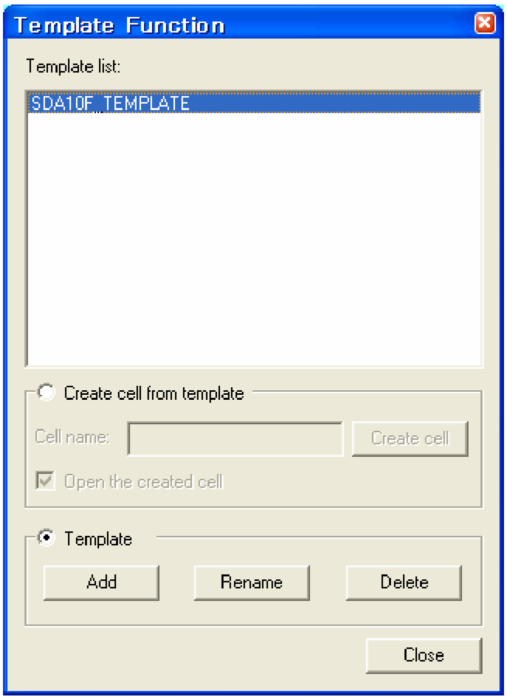


■ Rename the Template

The registered template is renamed.

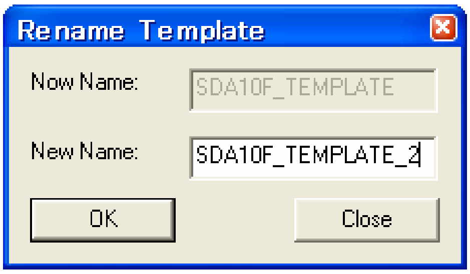
Procedure

1. Click the MotoSim EG-VRC button ( ), and select the [New] - [Template] menu.
2. Select the name of template to rename in the template list.

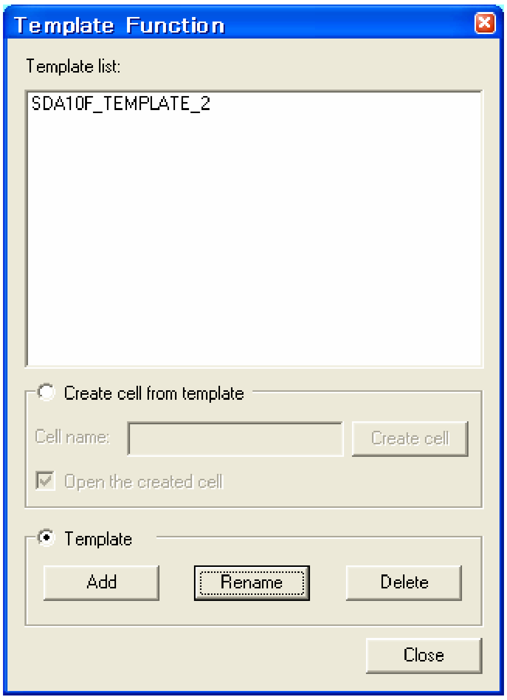


3. Select the [Template] radio button, and click the [Rename] button.

4. Set the new name of template, and click the [OK] button.



5. The renamed template is displayed in the template list.



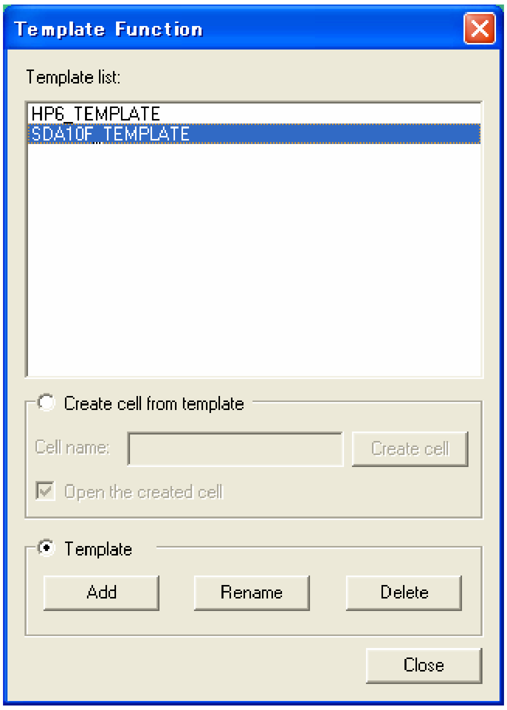
■ Delete the template

The registered template is deleted.

Procedure

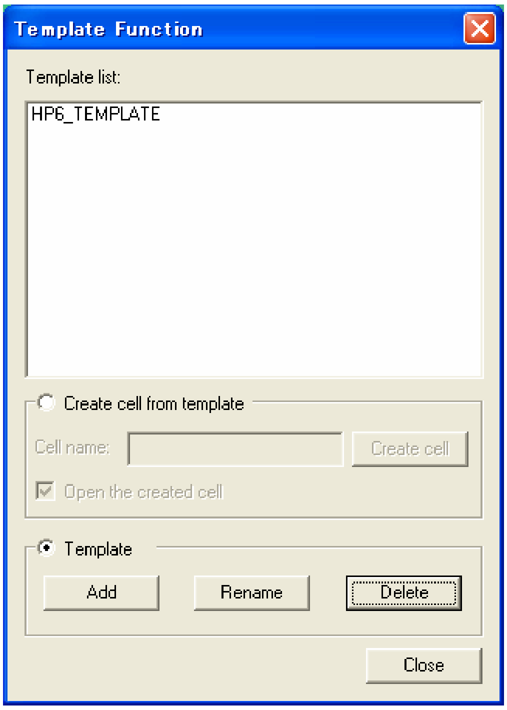
1. Click the MotoSim EG-VRC button ( ), and select the [New] - [Template] menu.

2. Select the name of template to delete in the template list.



3. Select the [Template] radio button, and click the [Delete] button.
4. A confirmation dialog box is displayed. Click the [OK] button.

5. The deleted template disappears in the template list.

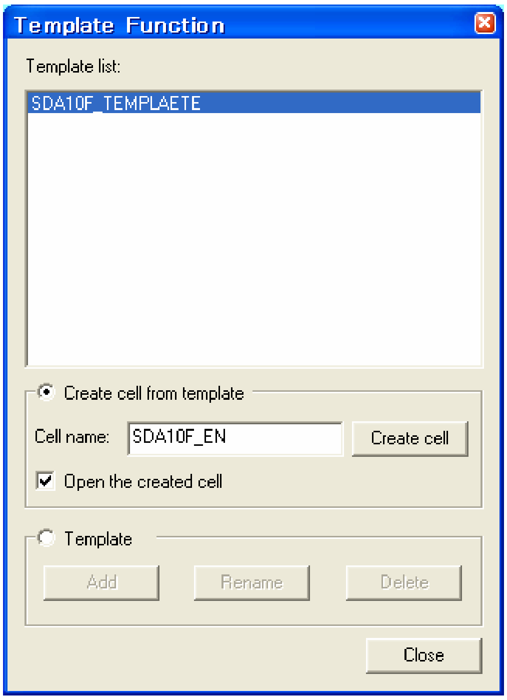


■ Create the new cell from the template

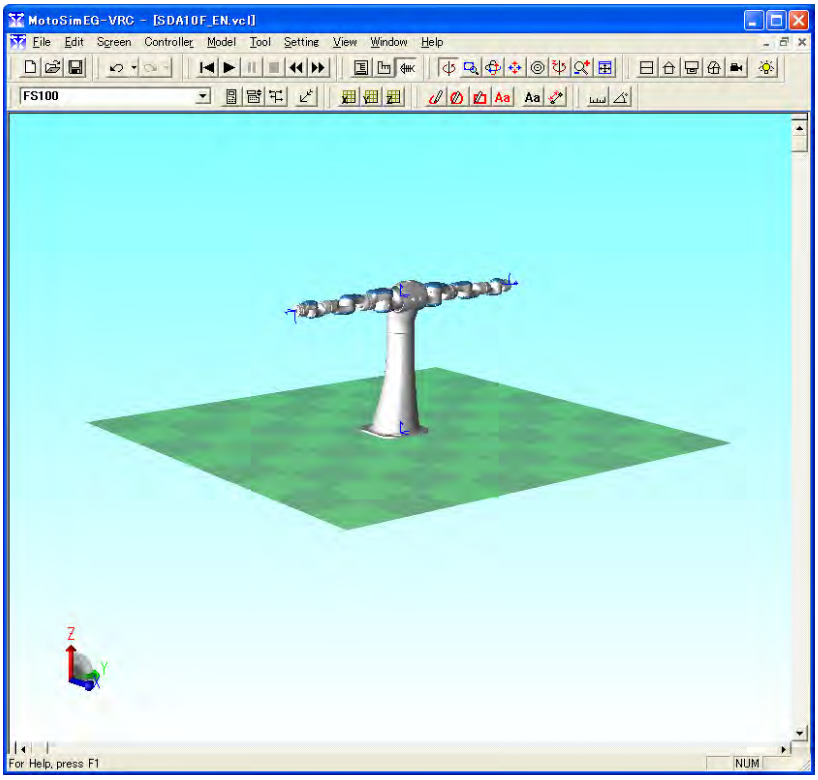
The new cell is created from the registered template.

Procedure

1. Click the MotoSim EG-VRC button ( ), and select the [New] - [Template] menu.
2. Select the name of template to delete in the template list.
3. Select the [Create cell from template] radio button, and set the name of new cell.
4. Click the [Create cell] button.



5. The new cell is created. If the [Open the created cell] is checked, the new cell is opened.



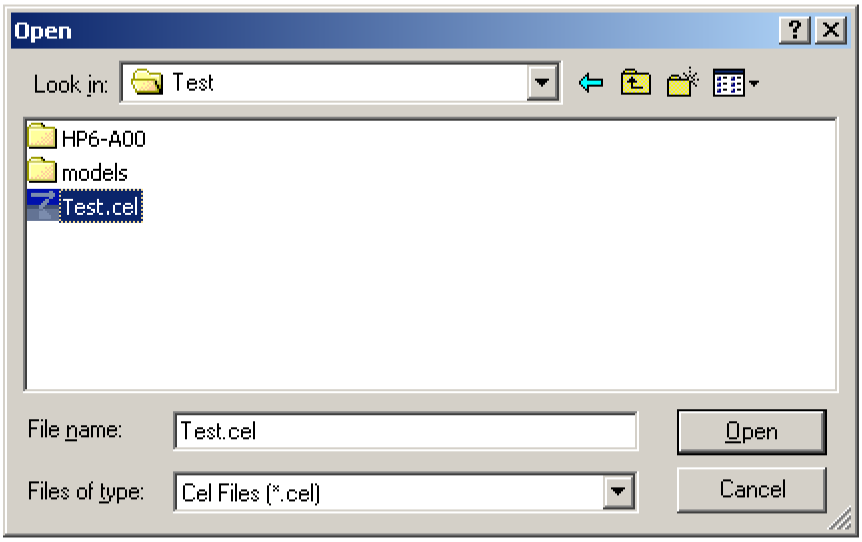
4.2 Opening a Cell

Procedure

1. Click the MotoSim EG-VRC button ( ), and select the [Open] - [Open] menu.

   When the sample cell is opened, click the MotoSim EG-VRC button ( ), and select the [Open] - [Open Sample Cell] menu.

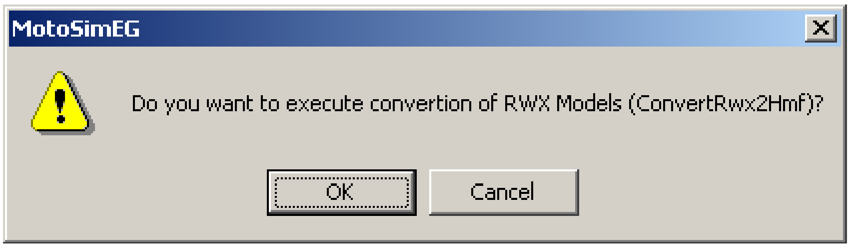
2. Select a cell file, and click on [Open]: the cell appears.



NOTE

When opening a cell with LINE data (wire frame), it is recommended to use LINE data in the HMF format: opening a cell with LINE data in other format may take some time.
If the LINE data is in the format other than HMF, convert the LINE data with “MDL2HMF.EXE” (located in a folder where MotoSim EG has been installed).

If there is a model in the RWX format in the cell, the following dialog box appears.
Click on [OK] to open the cell: the cell opens after the model in RWX format is automatically converted to HMF format.



NOTE

- When the model is converted, a cell with corresponding HMF format will automatically be created as well: the RWX format cell will be saved under the name "*.vcl.BCL".
- If the cell created upon the model conversion is not saved, the model will be converted again the next time the cell is open.

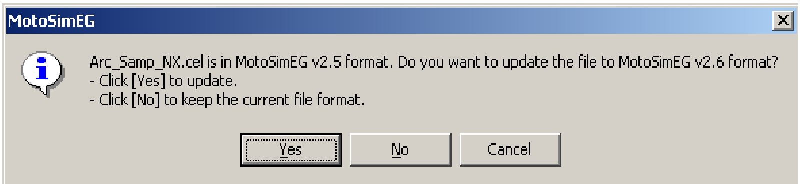
4.3 Storing a Cell

A cell file can be stored either under it current name “Save” or under a new name “Save As”.

> **NOTE** Newer cell files containing HSF files may not display properly on older MotoSim EG-VRC versions. If a cell file need to be used with an older MotoSim EG-VRC version, it is recommended to save it in the corresponding version with the "Save As" dialog box.

4.3.1 Save

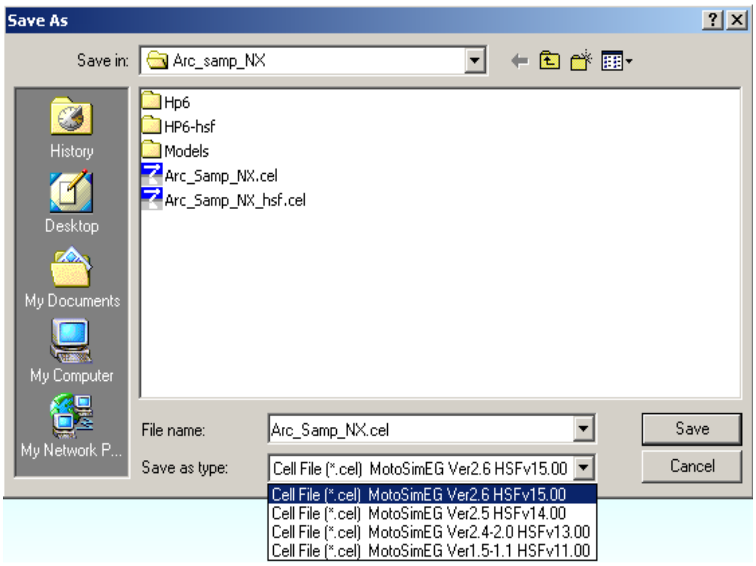
To store a file under its current name, click the MotoSim EG-VRC button ( ), and select the [Save] menu.
If the cell file was loaded from an older MotoSim EG-VRC version, the following message will display to confirm if the cell should be saved in the cell original format or in the MotoSim EG-VRC current version.



Click [Yes] to save the file in MotoSim EG-VRC current version. Click [No] to save the file in its original version. Click [Cancel] to abort saving the cell file.

4.3.2 Save As

To store a file under a new name, click the MotoSim EG-VRC button ( ), and select the [Save As] menu. Then store the file with the desired cell name. By changing the "Save as type" selection, the cell file may also be saved in a previous MotoSim EG-VRC format.



4.4 Exiting a Cell and MotoSim EG-VRC

To exit MotoSim EG-VRC, click the MotoSim EG-VRC button ( ), and select the [Exit] menu.
They can also be terminated by clicking button in the control menu box on each window.

4.5 Designating Relative Path in the Cell File

When clicking the MotoSim EG-VRC button ( ), and the [Relative Path] menu item as a check mark in front. the path informations stored in the cell file are relative to the cell file folder. If unchecked, the full path starting from the driver root is stored in the cell file. The check mark can be toggled by selecting [Relative Path] . A cell saved with relative path is easier to transfer to another computer. To store the file (refer to Section 4.3 "Storing a Cell").

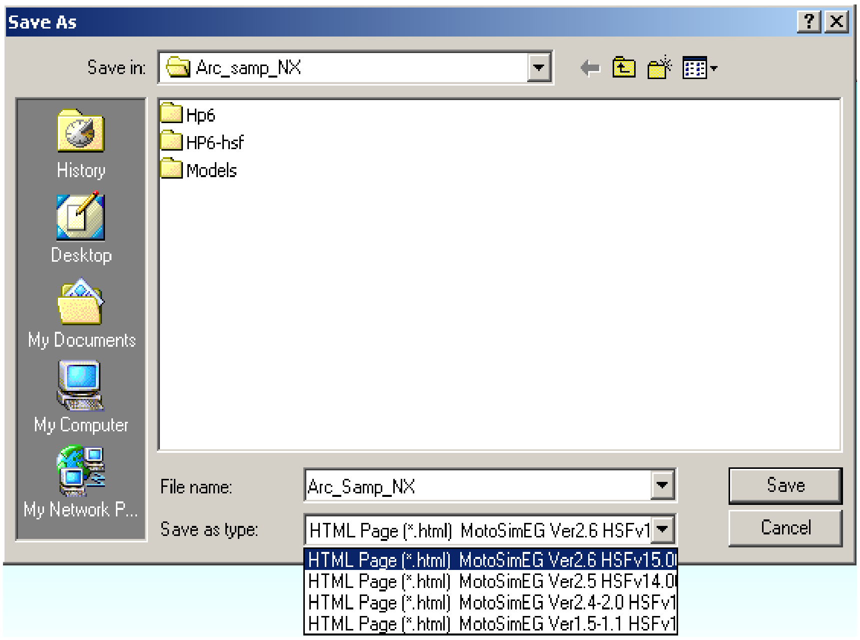
4.6 Exporting a File

This section explains how to output the current display of the models in the cell window to an HTML files. The output file is in 3 dimensions and enables changing viewpoint, zoom, etc.

Procedure

1. Determine the display state of the models on the cell window.

2. Click the MotoSim EG-VRC button ( ), and select the [Export] menu. Select the export file format in the "Save as type" box and save the file with the desired file name.



NOTE

- When exporting to HTML format, a HTML file and a HSF file are saved. Both files are required to display the HTML data properly.
- When exporting HSF file format, only the HSF file is saved. A separate application supporting HSF format display will be required to view the HSF file by itself.
- When storing the cell as an HTML file, be sure that the folder name consists of one-byte characters only; a file with two-byte characters may not be successfully opened.
- To view the cell saved in HTML file, use a personal computer which has access to the Internet. When viewing the HTML files of the simulation, an Internet connection is required to install the necessary ActiveX controls. Allow any ActiveX controls blocked by Windows security settings.

4.6.1 Playback animation file export

Job playback animation of the cell display can be exported to HTML file format.

NOTE

- When the job is executed, click the Start button.
  (If the click the [PLAY] button on the virtual pendant, the animation file is not included.)
- The color change of models occurring during playback (such as collision check) will not be included in the animation file.

Procedure

1. Set the display status of the models in the cell.
2. Click the MotoSim EG-VRC button ( ), and select the [Options] menu. Under the "Robot Options" tab, in the "Animation Playback" section, check the "Export HSF file" box.
3. Select the job for which you want to create an animation. Playback the entire job.
4. Click the MotoSim EG-VRC button ( ), and select the [Export] menu. In the "Save as type" box select "HTML Page (*.html). Save the file under the desired file name. (This will also save an HSF file.)

4.6.2 Exported HTML file display operations

Once the exported HTML file is open, the view can be manipulated with the mouse.

- The view can be change by clicking, holding and dragging with the left mouse button. To set camera manipulation mode, right mouse click on the view and select one of the following mode: Orbit (Rotate), Pan (Shift), Zoom (Zoom), Zoom to Window (Zoom to Extents). For detail on the camera mode, please refer to Section 5.1 "MotoSim EG-VRC Display".

- In the case of HTML animation file, to playback the animation right mouse click and select {Animation} - {Play}. The playback can be paused/resumed by right clicking and selecting {Animation} - {Pause}. The animation can be reset to the beginning by right clicking and selecting {Animation} - {Rewind}.

5 Displays

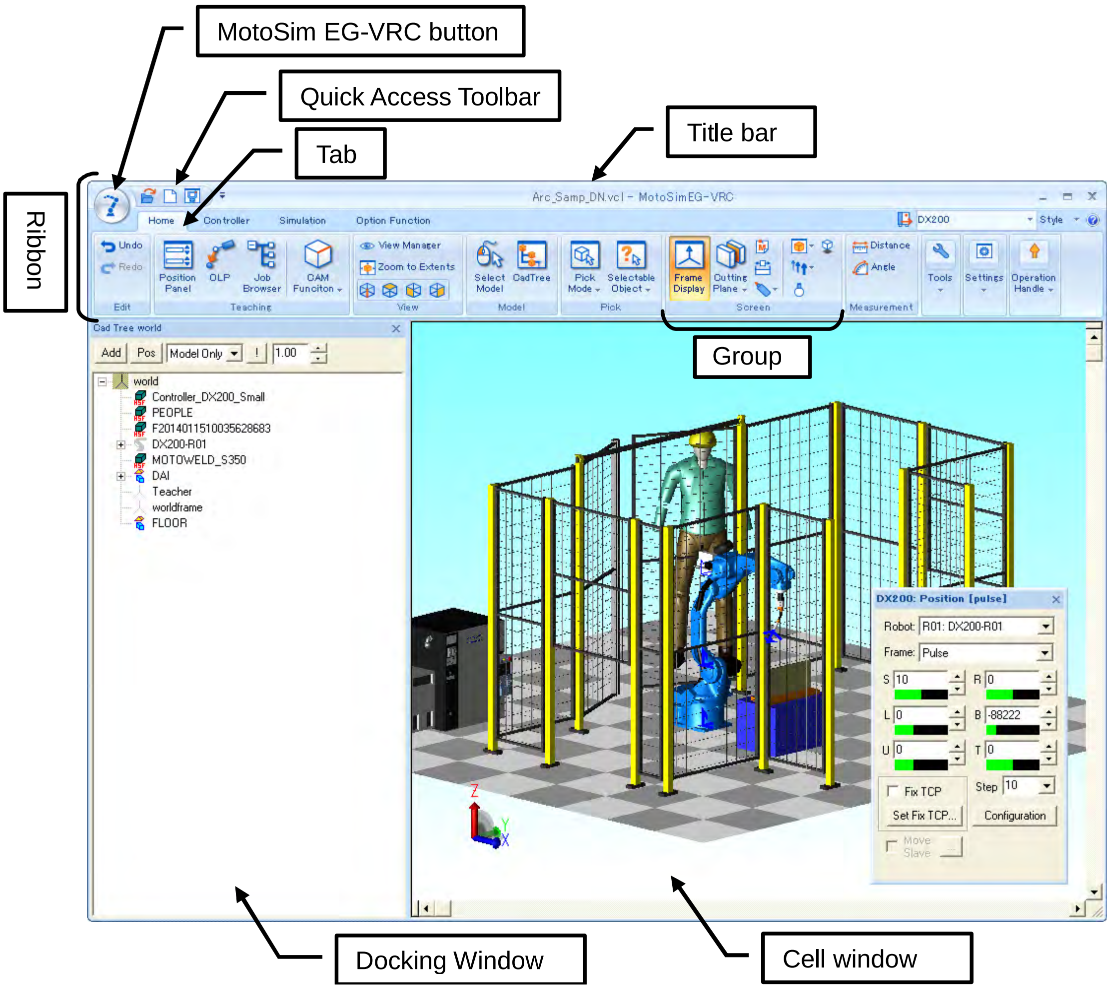
MotoSim EG-VRC has various displays. The main MotoSim EG-VRC display shows the cell layout and the robot motion in a 3D environment. Also, for every VRC controller in the cell there is a Virtual Pendant that allows to operate the VRC controller in the same manner than the real controller.

5.1 MotoSim EG-VRC Display

For improvement of operability, the basic operations of MotoSim EG-VRC are common with those of other Windows applications.

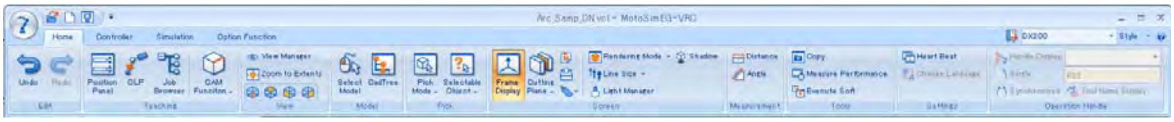
The following figure shows the MotoSim EG-VRC main window.

> **NOTE** The appearance of MotoSim EG-VRC Ver 5.00 differs greatly from Ver 4.10 or before. For more detail, please refer to the Section 1.1.1 "Difference of Operation from Ver 4.10".

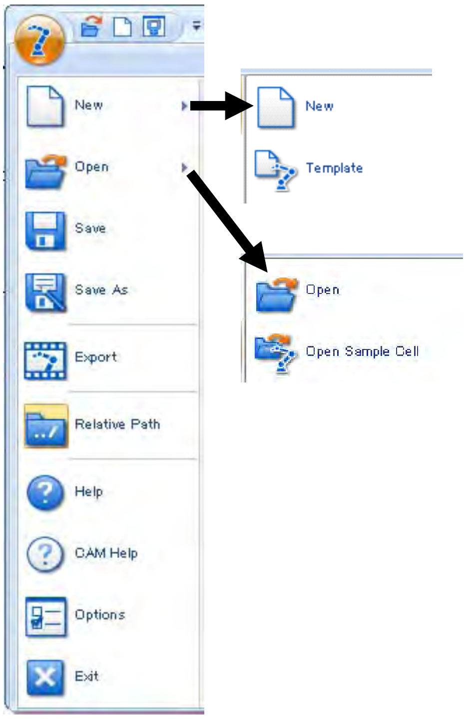


5.1.1 Ribbon

The ribbon is a command bar that organizes the features of an application into a series of tabs at the top of the main window. The ribbon replaces the traditional menu bar and toolbars.



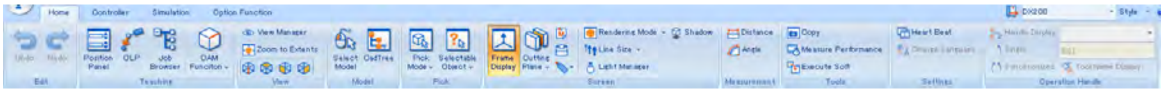
■ MotoSim EG-VRC button



New	
New	Creates a new cell. For details, refer to Section 4.1 "Creating a New Cell" .
Template	Create the new cell form the template. For details, refer to Section 4.1.1 "Template Function"
Open	
Open	Reads an existing cell. For details, refer to Section 4.2 "Opening a Cell".

Open Sample Cell	Reads an existing sample cell. For details, refer to Section 4.2 "Opening a Cell".
Save	Saves the edited cell information of a cell file. For details, refer to Section 4.3.1 "Save".
Save As	Save the active cell file with a new name. For details, refer to Section 4.3.2 "Save As".
Export	The display state of the model currently displayed on the cell is outputted to an HTML file as it is. For details, refer to Section 4.6 "Exporting a File".
Relative Path	Description of the path information on a cell is carried out to a relative path. For details, refer to Section 4.5 "Designating Relative Path in the Cell File".
Help	The help of MotoSim EG-VRC is displayed.
CAM Help	The help of a MotoSim EG-VRC CAM function is displayed.
Options	Displays the Option dialog box. For details, refer to Chapter 10 "Configuration Settings".
Exit	To close the active cell. For details, refer to Section 4.4 "Exiting a Cell and MotoSim EG-VRC".

■ Home



Edit	
	Undoes the last operation. Click the down arrows beside the icon to display the last 9 operations. Selecting an operation from the list will undo this operation and all the operations performed after.
	Redoes the last undone operation. Click the down arrows beside the icon to display the last 9 undone operations. Selecting an operation from the list will redo this operation and all the undone operations performed before.

NOTE

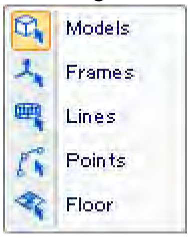
- Undo and Redo function supports the robot position change, model edition, Cad Tree operations and camera viewpoint operations. Any operation generated by the virtual pendant or the playback of a JOB is not supported by the Undo and Redo function.
- Undo and Redo function may generate temporary files (mseg????.tmp) located in the Temp folder under the MotoSimEG installation folder. Deleting these files while MotoSimEG-VRC is running may prevent undoing some operations. Normal termination of the MotoSimEG-VRC application will automatically remove all temporary files in this folder.

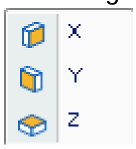
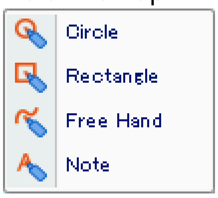
Teaching	
	Displays the Position Panel. Position Panel displays the robot position, pulse data, etc. For details, refer to Section 8.1 "Position Panel".
	Displays OLP dialog box and enables OLP function. Moves the end of the robot tool or a model to a target point with one-click operation. For details, refer to Section 8.9 "Teaching".
	Displays the Job Browser. For details, refer to Section 8.15 "Job Browser".

	For detail on the CAM function please refer to CAM help (click  and select [CAM Help] menu).  • This function is available MotoSim EG-VRC ver4.00 or later. • To use this function (CadPack option), the MotoSim EG-VRC-CadPack is required. (The MotoSim EG-VRC-CadPack is separate product from MotoSim EG-VRC.) • For Laser-welding use and Laser-cutting use, the additional options sold separately are needed.

View	
	Displays the View Manager panel, which offers a wider selection of standard view and allows to save and load up to 10 user defined views. For details, refer to Section 6.1.2 "Preset Viewpoint Operation".
	Displays all the models in the cell to fit in the view.
	Change the viewpoint to display the default isometric view.
	Changes the viewpoint to display the default top view.
	Change the viewpoint to display the default side view.
	Changes the viewpoint to display the default front view.

Model	
	Selects a model: click any point of the desired model for selection.
	Displays the model “Cad Tree” (tree structure organization of the models), indicating models display status and relationship. Can be used to add and edit models. For details, refer to Section 9.1.1 "Outline of the Cad Tree".

Pick	
	The Pick Mode sets conditions determining the selected point in the clicked area. For details, refer to "Pick Mode Setting". 
	Pick object set filters on the type of objects that can be selected by the mouse pick. For details, refer to "Pick Object Setting". 

Screen	
	Toggles display of the AXIS6 in frame indicators in the view.
	Displays cross-section X/Y/Z. For details, refer to Section 6.7 "Cutting Planes". 
	Creates a memo (text). For details, refer to Section 6.6 "Memo".
	Creates a dimension line. For details, refer to Section 6.10 "Measure Line".
	Draws a free-form line/circle/rectangle or adds a note (text). For details, refer to Section 6.5 "Markup". 

Rendering Mode	The display mode can be change. For details, refer to Section 6.11 "Changing the Rendering Mode". Flat Shading Gouraud Shading Wire Frame Smooth Transition
Line Size	Changes the frame line to display the width. For details, refer to Section 6.12.1 "Changing Frame Width". Small Medium Large
Light Manager	Displays the Light Manager panel, which allows to add or remove lights, and to modify each light's properties. For details, refer to Section 6.2 "Light Manager Operation".
Shadow	Shadows can be displayed for the models on the screen. For details, refer to Section 6.3 "Displaying Shadows".

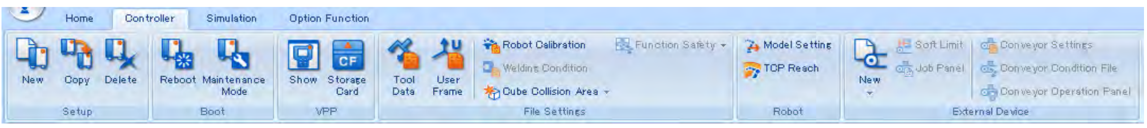
Mesurement	
Distance	Measures the distance between two clicked points. For details, refer to Section 6.8 "Measure Distance".
Angle	Measures the angle between three clicked points. For details, refer to Section 6.9 "Measure Angle".

Tools	
Copy	Copy the static image of the cell window. For details, refer to Section 6.12.2 "Copying the Image".
Measure Performance	Drawing performance is measured.
Execute Soft	External software is executed. For details, refer to Section 8.14 "Running an External Software".

Settings	
Heart Beat	The re-drawing interval at the playback is set every second (s). For details, refer to Section 7.5.4 "Refresh Interval".
Change Language	Sets the language. For details, refer to Section 10.4 "Language and Unit Settings".

Operation Handle	For details, refer to Section 8.9.2 "Operation Handle". NOTE This function is available with the following robots only. FS100 BMDA003-A00
Handle Display	Display/Hide the Operation handle.
Single	When operate the Operation handle, the selected robot (R1 or R2) only moves.
Synchronized	When operate the Operation handle, the selected robot and another robot move to keep their TCP the same relative position.
BASE AXIS	Select the coordinate of the Operation handle. The following coordinates are available. BASE AXIS ROBOT AXIS TOOL AXIS USER AXIS
R01+R02+B01+B02	Display the control group of the current job.
Tool Name Display	Display/Hide the tool names at the tip of tool (TCP).

■ Controller



Setup	
New	Create a new controller and define a system in MotoSim EG-VRC. For details, refer to Section 7.1 "Adding a New Controller".
Copy	A controller already define in a MotoSimEG-VRC cell can be copied over to another cell. For details, refer to Section 7.2 "Copying a Controller from another Cell".
Delete	To delete the controller and its associated robots from a cell. For details, refer to Section 7.3 "Deleting a Controller".

Boot	
Reboot	Reboot the controller to update parameter changes. For details, refer to Section 7.5.3 "Reboot Controller".
Maintenance Mode	The controller is rebooted in the maintenance mode. For details, refer to Section 7.10 "VRC Maintenance Mode".

VPP	
Show	Displays the Virtual Pendant. Virtual Pendant can be operated same as Teaching Pendant of each controller. For details, refer to Section 5.2 "Virtual Pendant".
CF Storage Card	Open the Storage Card folder

File Settings	
Tool Data	Modify the tool data file. For details, refer to Section 7.5.1 "Tool Editor".
U User Frame	Modify the user frame data. For details, refer to Section 7.5.2 "User Frame".
Robot Calibration	Modify robot callbration data file. For details, refer to Section 7.6.3 "Robot Calibration Setting".
Welding Condition	Set the welding machine for spot welding. For details, refer to Section 11.8.3 "Setting of welding machine".
Cube Collision Area	Display/delete the cube interference area. For details, refer to Section 7.5.6 "Cube Interference Area".

	Display and modify the safety function. For details, refer to Section 7.11 "Displaying model / Editing Data of Safety Function". 

Robot	
	Set the robot model. For details, refer to Section 7.6.1 "Robot Property".
	Draw TCP Reach View. For details, refer to Section 7.6.2 "Reach View".

External Device	
	Creates a new external device. For details, refer to Section 7.7 "Peripheral Equipment". 
	Set the soft limit. For details, refer to Section 7.7.4 "Modifying the Soft Limit of a Device".
	Displays the Job Panel. For details, refer to Section 7.7.6 "Programming a Device".
	Edit conveyor specification. For details, refer to "Conveyor Setting".
	Set the conveyor condition file. For details, refer to Section 7.7.9 "Conveyor Synchronization".
	Display conveyor operation panel. For details, refer to Section 7.7.8 "Conveyor Operation Panel".

■ Simulation

Playback	
	Moves the cursor in the job to the first step on the virtual pendant, and sets the robot position to the position of starting the job.  This function can not use depending on the system version of controller. Please refer to Section A.6 "List of Function depending on the system version of controller".
	Executes the job currently selected of all the controllers in the cell. Use the virtual pendant to change the selected job.  During the execution of job, please do not sleep or hibernate the PC. The display of cell window may not recover..
	Interrupts the job under execution.
	Enables a job to skip backward step by step.
	Enables a job to skip forward step by step.
	Display the Stage master. For details, refer to Section 8.7 "Stage Master".
	To playback without considering the lag of servo.
	Display the Cycle time. For details, refer to Section 7.8 "Cycle Time".

Monitor	
	Display the Variable Monitor. For details, refer to Section 8.5 "Variable Monitor".

	Displays a window which enables monitoring of the [Virtual I/O] signals. The I/O signals are link to the job I/O instructions execution. For details, refer to Section 8.2 "I/O Monitor".
	Display the Speed Graph. For details, refer to Section 8.13 "Speed Graph Function".
	Display the Pulse Record. For details, refer to Section 8.8 "Pulse Recorder".
	Display the Lap Time Panel. For details, refer to Section 8.6 "Lap Time Panel".
	Display the Trace Manager. For details, refer to Section 7.9 "Trace".

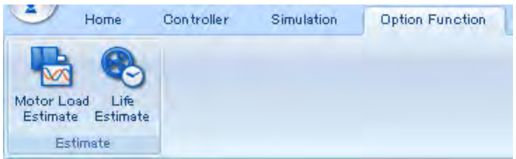
Collision	
	Display the Collision Detection. For details, refer to Section 8.10 "Collision Detection".

I/O Settings	
	Display the I/O Events. For details, refer to Section 8.3 "I/O Events".
	Display the I/O commection. For details, refer to Section 8.4 "I/O connection".

Model Simulation	
	Display the Model Script Editor. For details, refer to Section 9.12 "Model Script".

Settings	
	Display the Sensing Option Setting. For details, refer to Section 8.11 "Sensing Option Setting".
	Display the Paint Panel. For details, refer to Section 8.12 "Spray Model for Paint".

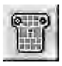
■ Option Function



Estimate	
	Displays the Motor Load Estimate. For details, refer to Section 12.1 "Motor Load Estimate".
	Displays the Life Estimate. For details, refer to Section 12.2 "Life Estimate".

5.2 Virtual Pendant

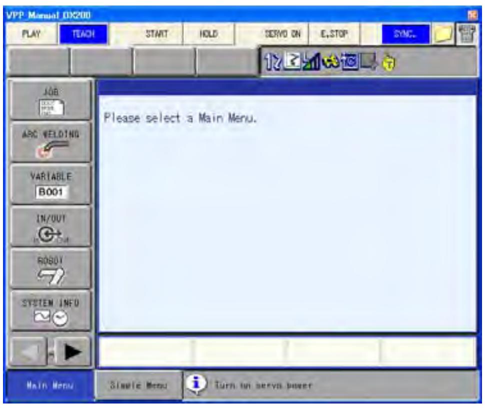
When a Virtual Robot Controller (VRC) is registered in a cell, the associated Virtual Pendant is displayed. The Virtual Pendant can be use to operate the VRC controller is the same manner as with the programming pendant of each controller. The Virtual Pendant is composed of two separed windows: the pendant screen and the prendant keypad. The display of the pendant keypad can be toggled from the pendant screen by pressing the [/] key or by clicking on the

 icon.

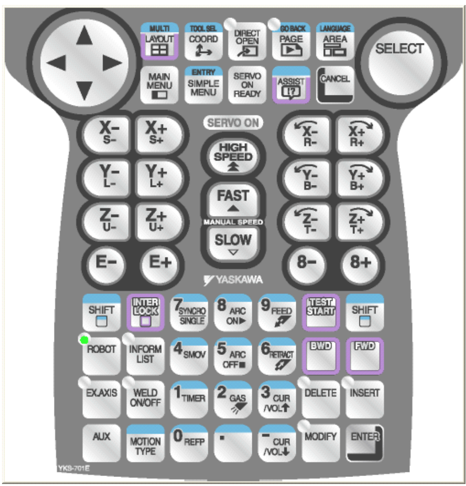
NOTE

- For operation on the Virtual Pendant, please refer to each controller “Operator Manual”.
- When two keys are to be pressed simultaneously, the keys are shown with a “+” sign between them, such as [SHIFT]+[COORD]. Press and hold the first key and then press the 2nd key.
- Multiple axis keys cannot be used simultaneously.
- When resizing the pendant screen, if necessary, the display font size can be adjusted by selecting {DISPLAY SETUP} - {CHANGE FONT} from the Virtual Pendant main menu.

5.2.1 DX200 Virtual Pendant

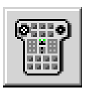
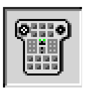


Pendant Screen



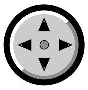
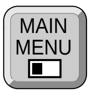
Pendant Keypad

■ Virtual Pendant Button

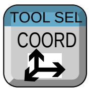
Button	Keyboard Equivalent	Description
PLAY TEACH	Home	Selects TEACH Mode The axis operation and edition from the programming pendant are enabled.
PLAY TEACH	Teach	Selects PLAY Mode The playback of taught job is enabled.
START START	Delete	Starts the manipulator motion in playback operation. The lamp on this button is lit during the playback operation. The lamp turns OFF when the playback operation is stopped by alarm occurrence, HOLD signal, or mode change.
HOLD	End	Holds the manipulator motion. When lamp is turned OFF, the manipulator stays stopped until a START command is input. The start and axis operations are disabled while the lamp is lit.
SERVO ON SERVO ON	Page Up	Turns ON the servo power. Press this button to enable the servo power to be turned ON. The SERVO ON lamp is lit while the servo power is ON.
ESTOP ESTOP		Turns OFF the servo power. When the servo power is turned OFF, the SERVO ON LED on the programing pendant will extinguish. An emergency stop message is displayed on the screen.
SYNC. SYNC.		Activates the job synchronization mode. When the SYNC button is blue, the robot position is instantly change to match the selected step of the displayed job.
		Open the Storage Card folder When this button is clicked, the storage card folder of this controller is opened.
 	/	Displays the Virtual Pendant keypad When the button is down, the Virtual Pendant keypad is displayed.

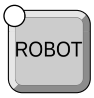
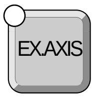
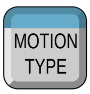
NOTE When resizing the pendant screen to a smaller size, the displayed text maybe shorten to fit in the smaller size buttons.

■ Virtual Pendant Keypad

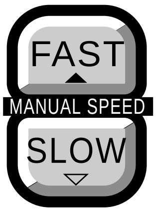
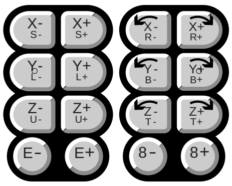
Keypad key	Keyboard Equivalent	Description
[SELECT] 	Space	**Works as described below.** • Selects menu items in the main menu area and the pull-down menu area. • Makes the selected item ready to be set in the general-purpose display area. • Displays multiple messages in the message area.
Cursor 	↑ ←→ ↓	**Moves the Cursor in the direction of the arrow.** • The size of the Cursor and the range/place where the Cursor can move will vary depending on the window. • If the UP Cursor button is pressed when the Cursor is on the first line, the Cursor will move to the last line of the job. Conversely, if the Cursor is on the last line of the job and the DOWN Cursor button is pressed, the Cursor will jump to the first line of the job. SHIFT key + UP Scrolls the screen upward. SHIFT key + DOWN Scrolls the screen downward. SHIFT key + RIGHT Scrolls the screen to the right. SHIFT key + LEFT Scrolls the screen to the left.
[MAIN MENU] 	F1	**Displays the main menu.** If this button is pressed while the main menu is displayed, the main menu disappears. MAIN MENU key + UP Increases the brightness of the screen. MAIN MENU key + DOWN Decreases the brightness of the screen.
[SIMPLE MENU] 	F2	**Displays the simple menu.** If this button is pressed while the simple menu is displayed, the simple menu disappears.

Keypad key	Keyboard Equivalent	Description
[SERVO ON READY] 	Page Down	**Enables the servo power supply to be turned ON.** Press this button to enable the servo power supply to be turned ON if the servo power supply is shut OFF by the emergency stop or overrun signal. When this button is pressed: • In the play mode, the servo power supply is turned ON if the safeguarding is securely closed. • In the teach mode, the SERVO ON lamp flashes and the servo power supply is turned ON when the Enable switch is ON. • The SERVO ON lamp is lit while the servo power is ON.
[ASSIST] 	F3	**Displays the menu to assist the operation for the currently displayed window.** Pressing this button with SHIFT key or INTERLOCK key displays the help guidance for the operation. • SHIFT key + ASSIST key The function list of key combinations with SHIFT key appears. • INTERLOCK key + ASSIST key The function list of key combinations with INTERLOCK key appears.
[CANCEL] 	Esc	**Cancels the current status.** • Deletes the sub menu in the main menu area and the pull-down menu area. • Cancels the input data or the input status in the general-purpose display area. • Cancels the multiple views in the message area. • Cancels the occurred error.
[MULTI] 	F5	**Works for the multi mode.** If this button is pressed when the multi mode is ON, the active window switches. SHIFT key + MULTI Key Switches between the multi-window display and the single-window display when the multi mode is ON.

Keypad key	Keyboard Equivalent	Description
[COORD]  	K	**Select the operation coordinate system when the manipulator is operated manually.** • Five coordinate systems (joint, cartesian, cylindrical, tool and user) can be used. Each time this key is pressed, the coordinate system is switched in the following order: "JOINT"→"WLD/CYL"→"TOOL"→"USER" • The selected coordinate system is displayed on the status display area. SHIFT key + COORD Key The coordinate number can be changed when the "TOOL" or "USER" coordinate system is selected.
[DIRECT OPEN]  	L	**Displays the content related to the current line.** • To display the content of a CALL job or condition file, move the Cursor to the next line and press DIRECT OPEN key . The file will be displayed for the selected line. Display content will vary depending on the type of instruction used in the job. Example: For a CALL instruction, the content of the called job will be displayed. For a work instruction, the content of the condition file will be displayed. For Input/output instructions, the input/output condition will be displayed. • The lamp on this button is lit while the direct open is ON. Press this button while the lamp is lit to return to the previous window.
[PAGE]  	F4	**Displays the next page.** The page can be switched only when the lamp on this button is lit. SHIFT key + PAGE key Switches to the previous page.
[AREA]  	TAB	**Moves the Cursor in the following order : "Menu Area"→"General-Purpose Display Area"→"Message Area"→"Main Menu Area". If no item is displayed, the Cursor does not move.** SHIFT key + AREA key The language can be switched when the bilingual function is valid. (Bilingual function is optional.) AREA key + DOWN Moves the Cursor from the general-purpose display area to the operation button when the operation button is displayed. AREA key + UP Moves the Cursor to the general-purpose display area when the Cursor is on the operation button.
[SHIFT]  	Shift	**Changes the functions of other keys by pressing this key together.** Can be used with ASSIST key, COORD key, AREA key, [MOTION TYPE], [ROBOT], [EX. AXIS], Cursor key or Numeric key to access alternate functions. Refer to the description of each key for the alternate SHIFt functions.

Keypad key	Keyboard Equivalent	Description
[INTERLOCK] 	Ctrl	**Changes the functions of other keys by pressing together.** Can be used with ASSIST key, MULTI key, [TEST START], [FWD], or Numeric key (Numeric key customize function), [ROBOT]. Refer to the description of each key for the alternate NTERLOCK functions.
[INFORM LIST] 	O	**Displays instruction lists of commands available for job editing.**
[ROBOT] 	I	**Enables the robot axis operation.** [ROBOT] is active for the system where multiple manipulators are controlled by one DX200 or the system with external axes. SHIFT key + [ROBOT] The robot under axis operation can be switched to a robot axis which is not registered to the currently selected job. INTERLOCK key + [ROBOT] Switchs the application when several applications are set to a robot.
[EX.AXIS] 	F11	**Enables the external axis (base axis or station axis) operation.** [EX.AXIS] is active for the system with external axes. SHIFTkey + [**EX. AXIS**] The external axis under axis operation can be switched to an external axis which is not registered to the currently selected job.
[MOTION TYPE] 	F7	**Selects the interpolation type for playback operation.** The selected interpolation type is shown in the status display area on the screen. • Each time this key is pressed, the interpolation type changes in the following order: "MOVJ"→" MOVL"→"MOVC" SHIFT key + [MOTION TYPE] The interpolation mode changes in the following order: "STANDARD"→" EXTERNAL REFERENCE POINT"*→" CONVEYOR"* Interpolation type can be changed in any mode. *: These modes are purchased options.

Keypad key	Keyboard Equivalent	Description
[TEST START]	N	**Moves the manipulator through taught steps in a continuous motion when [TEST START] and INTERLOCK key are simultaneously pressed.** The manipulator can be moved to check the path of taught steps. Operation stops immediately when this key is released. • The manipulator operates according to the currently selected operation cycle: "AUTO", "1CYCLE" or "STEP". • The manipulator operates at the taught speed. However, if the taught speed exceeds the maximum teaching speed, the operation proceeds at the maximum teaching speed.
[FWD]	F12	**Moves the manipulator through the taught steps while this key is pressed.** • Only move instructions are executed (one instruction at a time, no welding instructions). INTERLOCK key + [FWD] All instructions are executed. [0] + [FWD] Moves to the reference point of the cursor line. The manipulator operates at the selected manual speed. Make sure that the selected manual speed is the desired one before starting operation.
[BWD]	M	**Moves the manipulator through the taught steps in the reverse direction while this key is pressed.** • Only move instructions are executed (no weld commands). The manipulator operates at the selected manual speed. Make sure that the selected manual speed is the desired one before starting operation.
[DELETE]	F9	**Deletes the registered instruction.** • Deletion completes when [ENTER] is pressed while this key lamp is lit.
[INSERT]	F8	**Inserts a new instruction.** • Insertion completes when [ENTER] is pressed while this key lamp is lit.
[MODIFY]	F6	**Modifies the taught position data or instruction.** • Modification completes when [ENTER] is pressed while this key lamp is lit.
[ENTER]	Enter	**Registers instructions, data, current position of the manipulator, etc.** • When [ENTER] is pressed, the instruction or data displayed in the input buffer line moves to the Cursor position to complete a registration, insertion, or modification.

Keypad key	Keyboard Equivalent	Description
MANUAL SPEED keys 	D C	**Sets the speed for manual operation. This speed is also valid for operations with [FWD] and [BWD].** • There are four speed levels (slow, medium, fast, and inching). The speed changes as described below. The selected speed is displayed on the status area. Each time [FAST] is pressed, manual speed changes in the following order: "INCH"→" SLOW"→"MED"→"FST". Each time [SLOW] is pressed, manual speed changes in the following order: "FST"→"MED"→"SLOW"→"INCH"
[HIGH SPEED] 	E	**Makes the manipulator move at high speed while this button and one of the axis keys are pressed simultaneously during manual operation. No need to change the setting of speed.** • The speed for [HIGH SPEED] is specified in advance.
Axis Key 	Q W R T A S F G Z X V B Y U H J	**Moves specified axes on manipulator.** • The manipulator axes only move while the key is pressed. • Multiple axes can be operated simultaneously by pressing two or more keys at the same time. The manipulator operates in the selected coordinate system at the selected manual speed. Make sure that the selected coordinate system and the manual speed are the desired ones before starting the axis operation. It is possible to allocate any external axes to [E-] + [E+], [8-] + [8+] keys to operate them.
Numeric Key 	0-9 - .	**Enters the number or symbol when the ">" prompt appears on the input line.** • "." is the decimal point. "-" is a minus sign or hyphen. The Numeric keys are also used as function keys. Refer to the explanation of each function for details.

■ Keyboard Layout

The Virtual Pendant keypad key all have a corresponding key on the computer keyboard. When the Virtual Pendant Screen has the input focus, the those keyboard key can be pressed instead of clicking the keys on the pendant keypad.

ESC	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
CANCEL	MAIN MENU	SIMPLE MENU	ASSIST	PAGE	MULTI	MODIFY	MOTION TYPE	INSERT	DELETE	APPLIC ATION	EX.AXIS	FWD

`	1	2	3	4	5	6	7	8	9	0	-	=	Backspace
	1	2	3	4	5	6	7	8	9	0	-		Backspace

TAB	Q	W	E	R	T	Y	U	I	O	P	[	]	¥
AREA	X- S-	X+ S+	HIGH SPEED	X- R-	X+ R+	E-	E+	ROBOT	INFORM LIST	AUX			

CapsLock	A	S	D	F	G	H	J	K	L	;	'	Enter
	Y- L-	Y+ L+	FAST	Y- B-	Y+ B+	8-	8+	COORD	DIRECT OPEN			ENTER

Shift	Z	X	C	V	B	N	M	,	.	/	Shift
SHIFT	Z- U-	Z+ U+	SLOW	Z- T-	Z+ T+	TEST START	BWD		.	Keypad Display	SHIFT

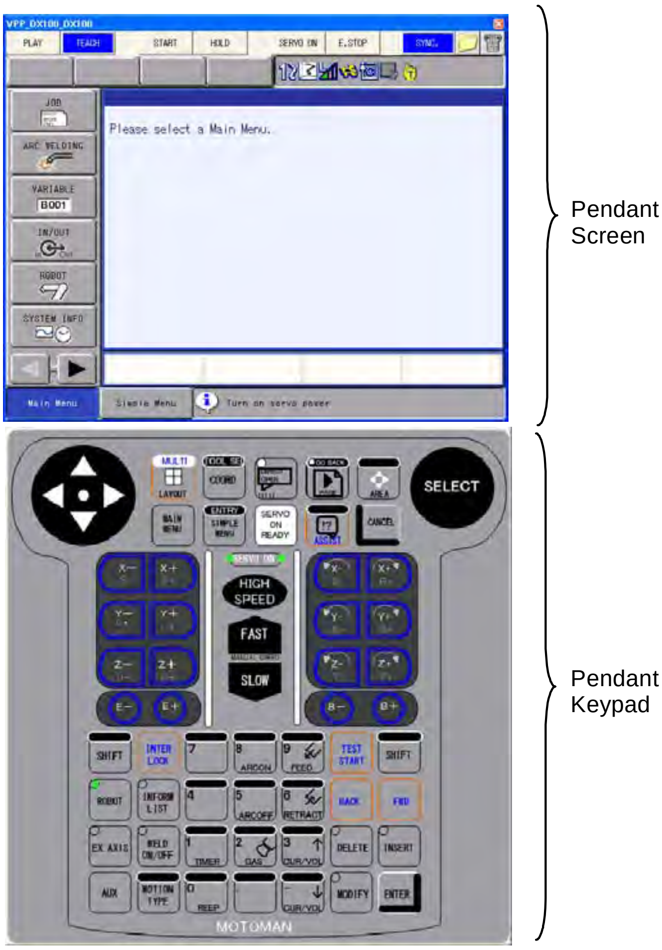
Ctrl	Win	Alt	Space	Alt		Ctrl
INTERLOCK			SELECT			INTERLOCK

Insert	Home	Page Up
Teach	Play	

Delete	End	Page Down
Start	Hold	Servo On Ready

↑	←	↓	→
↑	←	↓	→

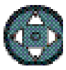
5.2.2 DX100 Virtual Pendant

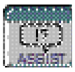
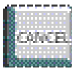
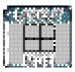


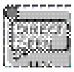
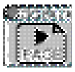
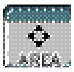
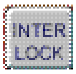
■ Virtual Pendant Button

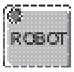
The pendant buttons are the same as those for DX100 virtual pendant.
For details, please refer to the "Virtual Pendant Button" of the Section 5.2.1 "DX200 Virtual Pendant" .

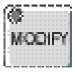
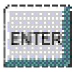
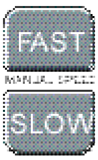
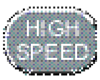
■ Virtual Pendant Keypad

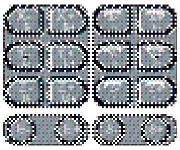
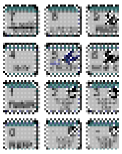
Keypad key	Keyboard Equivalent	Description
[SELECT] 	Space	Works as described below. • Selects menu items in the main menu area and the pull-down menu area. • Makes the selected item ready to be set in the general-purpose display area. • Displays multiple messages in the message area.
Cursor 	↑ ←→ ↓	Moves the cursor in the direction of the arrow. • The size of the cursor and the range/place where the cursor can move will vary depending on the window. • If the UP cursor button is pressed when the cursor is on the first line, the cursor will move to the last line of the job. Conversely, if the cursor is on the last line of the job and the DOWN cursor button is pressed, the cursor will jump to the first line of the job. [SHIFT] + UP Scrolls the screen upward. [SHIFT] + DOWN Scrolls the screen downward. [SHIFT] + RIGHT Scrolls the screen to the right. [SHIFT] + LEFT Scrolls the screen to the left.
[MAIN MENU] 	F1	Displays the main menu. If this button is pressed while the main menu is displayed, the main menu disappears. [MAIN MENU] + UP Increases the brightness of the screen. [MAIN MENU] + DOWN Decreases the brightness of the screen.
[SIMPLE MENU] 	F2	Displays the simple menu. If this button is pressed while the simple menu is displayed, the simple menu disappears.
[SERVO ON READY] 	Page Down	Enables the servo power supply to be turned ON. Press this button to enable the servo power supply to be turned ON if the servo power supply is shut OFF by the emergency stop or overrun signal. When this button is pressed: • In the play mode, the servo power supply is turned ON if the safeguarding is securely closed. • In the teach mode, the SERVO ON lamp flashes and the servo power supply is turned ON when the Enable switch is ON. • The SERVO ON lamp is lit while the servo power is ON.

Keypad key	Keyboard Equivalent	Description
[ASSIST] 	F3	Displays the menu to assist the operation for the currently displayed window. Pressing this button with [SHIFT] or [INTERLOCK] displays the help guidance for the operation. • [SHIFT] + [ASSIST] The function list of key combinations with [SHIFT] appears. • [INTERLOCK] + [ASSIST] The function list of key combinations with [INTERLOCK] appears.
[CANCEL] 	Esc	Cancels the current status. • Deletes the sub menu in the main menu area and the pull-down menu area. • Cancels the input data or the input status in the general-purpose display area. • Cancels the multiple views in the message area. • Cancels the occurred error.
[MULTI] 	F5	Works for the multi mode. If this button is pressed when the multi mode is ON, the active window switches. [SHIFT] + [MULTI] Switches between the multi-window display and the single-window display when the multi mode is ON.
[COORD] 	K	Select the operation coordinate system when the manipulator is operated manually. • Five coordinate systems (joint, cartesian, cylindrical, tool and user) can be used. Each time this key is pressed, the coordinate system is switched in the following order: "JOINT"→"WLD/CYL"→"TOOL"→"USER" • The selected coordinate system is displayed on the status display area. [SHIFT] + [COORD] The coordinate number can be changed when the "TOOL" or "USER" coordinate system is selected.

Keypad key	Keyboard Equivalent	Description
[DIRECT OPEN] 	L	Displays the content related to the current line. • To display the content of a CALL job or condition file, move the cursor to the next line and press [DIRECT OPEN]. The file will be displayed for the selected line. Display content will vary depending on the type of instruction used in the job. Example: For a CALL instruction, the content of the called job will be displayed. For a work instruction, the content of the condition file will be displayed. For Input/output instructions, the input/output condition will be displayed. • The lamp on this button is lit while the direct open is ON. Press this button while the lamp is lit to return to the previous window.
[PAGE] 	F4	Displays the next page. The page can be switched only when the lamp on this button is lit. [SHIFT] + [PAGE] Switches to the previous page.
[AREA] 	TAB	Moves the cursor in the following order : "Menu Area"→"General-Purpose Display Area"→"Message Area"→"Main Menu Area". If no item is displayed, the cursor does not move. [SHIFT] + [AREA] The language can be switched when the bilingual function is valid. (Bilingual function is optional.) [AREA] + DOWN Moves the cursor from the general-purpose display area to the operation button when the operation button is displayed. [AREA] + UP Moves the cursor to the general-purpose display area when the cursor is on the operation button.
[SHIFT] 	Shift	Changes the functions of other keys by pressing together. Can be used with [MAIN MENU], [ASSIST], [COORD], [AREA], [MOTION TYPE], cursor key or Numeric key to access alternate functions. Refer to the description of each key for the alternate [SHIFT] functions.
[INTERLOCK] 	Ctrl	Changes the functions of other keys by pressing together. Can be used with [ASSIST], [MULTI], [TEST START], [FWD], or Numeric key (Numeric key customize function). Refer to the description of each key for the alternate [INTERLOCK] functions.
[INFORM LIST] 	O	Displays instruction lists of commands available for job editing.

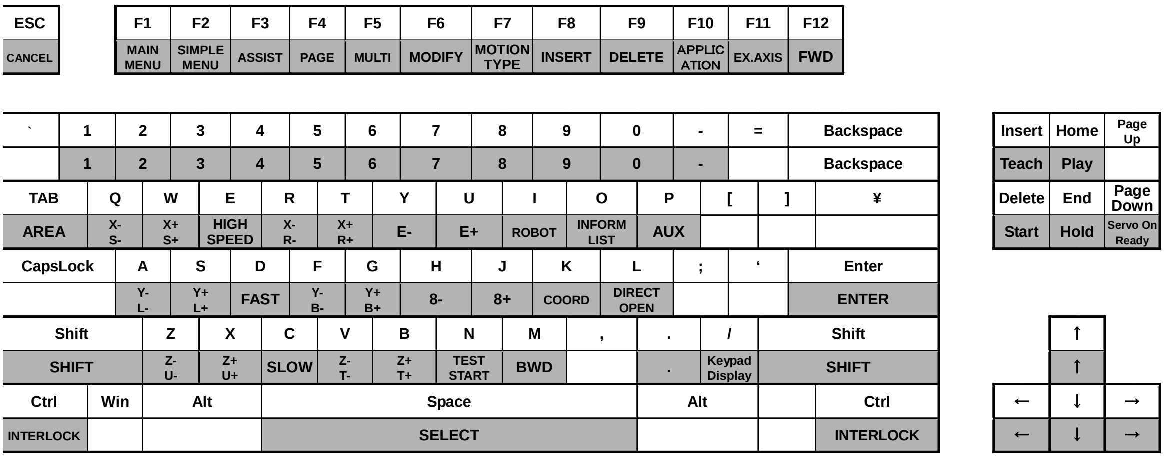
Keypad key	Keyboard Equivalent	Description
[ROBOT] 	I	Enables the robot axis operation. [ROBOT] is active for the system where multiple manipulators are controlled by one DX100 or the system with external axes.
[EX.AXIS] 	F11	Enables the external axis (base axis or station axis) operation. [EX.AXIS] is active for the system with external axes.
[MOTION TYPE] 	F7	Selects the interpolation type for playback operation. The selected interpolation type is shown in the status display area on the screen. • Each time this key is pressed, the interpolation type changes in the following order: "MOVJ"→" MOVL"→"MOVC"→"MOVS" [SHIFT] + [MOTION TYPE] The interpolation mode changes in the following order: "STANDARD"→" EXTERNAL REFERENCE POINT"*→" CONVEYOR"* Interpolation type can be changed in any mode. *: These modes are purchased options.
[TEST START] 	N	Moves the manipulator through taught steps in a continuous motion when [TEST START] and [INTERLOCK] are simultaneously pressed. The manipulator can be moved to check the path of taught steps. Operation stops immediately when this key is released. • The manipulator operates according to the currently selected operation cycle: "AUTO," "1CYCLE," or "STEP." • The manipulator operates at the taught speed. However, if the taught speed exceeds the maximum teaching speed, the operation proceeds at the maximum teaching speed.
[FWD] 	F12	Moves the manipulator through the taught steps while this key is pressed. • Only move instructions are executed (one instruction at a time, no welding instructions). [INTERLOCK] + [FWD] All instructions are executed. [REFP] + [FWD] Moves to the reference point of the cursor line. The manipulator operates at the selected manual speed. Make sure that the selected manual speed is the desired one before starting operation.

Keypad key	Keyboard Equivalent	Description
[BWD] 	M	Moves the manipulator through the taught steps in the reverse direction while this key is pressed. • Only move instructions are executed (no weld commands). The manipulator operates at the selected manual speed. Make sure that the selected manual speed is the desired one before starting operation.
[DELETE] 	F9	Deletes the registered instruction. • Deletion completes when [ENTER] is pressed while this key lamp is lit.
[INSERT] 	F8	Inserts a new instruction. • Insertion completes when [ENTER] is pressed while this key lamp is lit.
[MODIFY] 	F6	Modifies the taught position data or instruction. • Modification completes when [ENTER] is pressed while this key lamp is lit.
[ENTER] 	Enter	Registers instructions, data, current position of the manipulator, etc. • When [ENTER] is pressed, the instruction or data displayed in the input buffer line moves to the cursor position to complete a registration, insertion, or modification.
MANUAL SPEED keys 	D C	Sets the speed for manual operation. This speed is also valid for operations with [FWD] and [BWD]. • There are four speed levels (slow, medium, fast, and inching). The speed changes as described below. The selected speed is displayed on the status area. Each time [FAST] is pressed, manual speed changes in the following order: "INCH"→" SLOW"→"MED"→"FST" Each time [SLOW] is pressed, manual speed changes in the following order: "FST"→" MED"→"SLOW"→"INCH"
[HIGH SPEED] 	E	Makes the manipulator move at high speed while this button and one of the axis keys are pressed simultaneously during manual operation. No need to change the setting of speed. • The speed for [HIGH SPEED] is specified in advance.

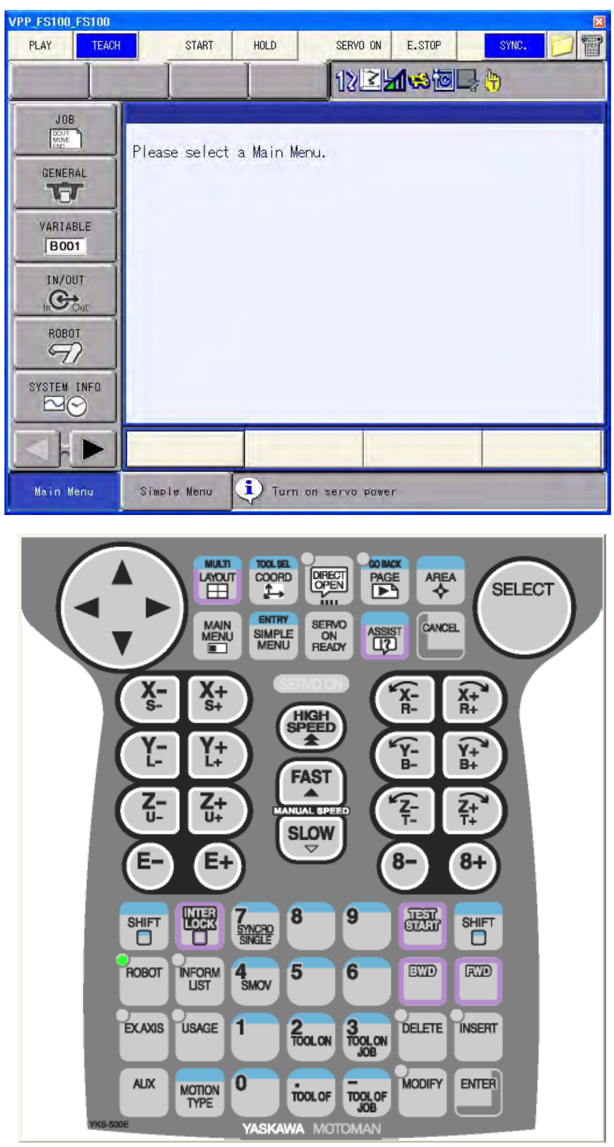
Keypad key	Keyboard Equivalent	Description
Axis Key 	Q W R T A S F G Z X V B Y U H J	Moves specified axes on manipulator. • The manipulator axes only move while the key is pressed. • Multiple axes can be operated simultaneously by pressing two or more keys at the same time. The manipulator operates in the selected coordinate system at the selected manual speed. Make sure that the selected coordinate system and the manual speed are the desired ones before starting the axis operation.
Numeric Key 	0-9 - .	Enters the number or symbol when the ">" prompt appears on the input line. • "." is the decimal point. "-" is a minus sign or hyphen. The Numeric keys are also used as function keys. Refer to the explanation of each function for details.

■ Keyboard Layout

The Virtual Pendant keypad key all have a corresponding key on the computer keyboard. When the Virtual Pendant Screen has the input focus, the those keyboard key can be pressed instead of clicking the keys on the pendant keypad.



5.2.3 FS100 Virtual Pendant



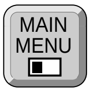
Pendant Screen

Pendant Keypad

■ Virtual Pendant Button

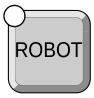
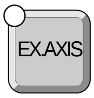
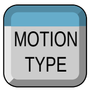
The pendant buttons are the same as those for DX100 virtual pendant.
For details, please refer to the "Virtual Pendant Button" of the Section 5.2.1 "DX200 Virtual Pendant" .

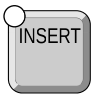
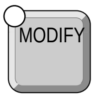
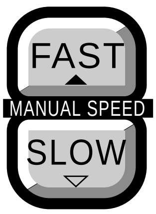
■ Virtual Pendant Keypad

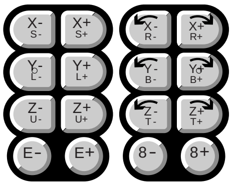
Keypad key	Keyboard Equivalent	Description
[SELECT]  	Space	**Works as described below.** • Selects menu items in the main menu area and the pull-down menu area. • Makes the selected item ready to be set in the general-purpose display area. • Displays multiple messages in the message area.
Cursor 	↑ ←→ ↓	**Moves the Cursor in the direction of the arrow.** • The size of the Cursor and the range/place where the Cursor can move will vary depending on the window. • If the UP Cursor button is pressed when the Cursor is on the first line, the Cursor will move to the last line of the job. Conversely, if the Cursor is on the last line of the job and the DOWN Cursor button is pressed, the Cursor will jump to the first line of the job. SHIFT key + UP Scrolls the screen upward. SHIFT key + DOWN Scrolls the screen downward. SHIFT key + RIGHT Scrolls the screen to the right. SHIFT key + LEFT Scrolls the screen to the left.
[MAIN MENU]  	F1	**Displays the main menu.** If this button is pressed while the main menu is displayed, the main menu disappears. MAIN MENU key + UP Increases the brightness of the screen. MAIN MENU key + DOWN Decreases the brightness of the screen.
[SIMPLE MENU]  	F2	**Displays the simple menu.** If this button is pressed while the simple menu is displayed, the simple menu disappears.
[SERVO ON READY]  	Page Down	**Enables the servo power supply to be turned ON.** Press this button to enable the servo power supply to be turned ON if the servo power supply is shut OFF by the emergency stop or overrun signal. When this button is pressed: • In the play mode, the servo power supply is turned ON if the safeguarding is securely closed. • In the teach mode, the SERVO ON lamp flashes and the servo power supply is turned ON when the Enable switch is ON. • The SERVO ON lamp is lit while the servo power is ON.

Keypad key	Keyboard Equivalent	Description
[ASSIST]	F3	**Displays the menu to assist the operation for the currently displayed window.** Pressing this button with SHIFT key or INTERLOCK key displays the help guidance for the operation. • SHIFT key + ASSIST key The function list of key combinations with SHIFT key appears. • INTERLOCK key + ASSIST key The function list of key combinations with INTERLOCK key appears.
[CANCEL]	Esc	**Cancels the current status.** • Deletes the sub menu in the main menu area and the pull-down menu area. • Cancels the input data or the input status in the general-purpose display area. • Cancels the multiple views in the message area. • Cancels the occurred error.
[MULTI]	F5	**Works for the multi mode.** If this button is pressed when the multi mode is ON, the active window switches. SHIFT key + MULTI Key Switches between the multi-window display and the single-window display when the multi mode is ON.
[COORD]	K	**Select the operation coordinate system when the manipulator is operated manually.** • Five coordinate systems (joint, cartesian, cylindrical, tool and user) can be used. Each time this key is pressed, the coordinate system is switched in the following order: "JOINT"→"WLD/CYL"→"TOOL"→"USER" • The selected coordinate system is displayed on the status display area. SHIFT key + COORD Key The coordinate number can be changed when the "TOOL" or "USER" coordinate system is selected.

Keypad key	Keyboard Equivalent	Description
[DIRECT OPEN] 	L	**Displays the content related to the current line.** • To display the content of a CALL job or condition file, move the Cursor to the next line and press DIRECT OPEN key . The file will be displayed for the selected line. Display content will vary depending on the type of instruction used in the job. Example: For a CALL instruction, the content of the called job will be displayed. For a work instruction, the content of the condition file will be displayed. For Input/output instructions, the input/output condition will be displayed. • The lamp on this button is lit while the direct open is ON. Press this button while the lamp is lit to return to the previous window.
[PAGE] 	F4	**Displays the next page.** The page can be switched only when the lamp on this button is lit. SHIFT key + PAGE key Switches to the previous page.
[AREA] 	TAB	**Moves the Cursor in the following order : “Menu Area”→“General-Purpose Display Area”→“Message Area”→“Main Menu Area”. If no item is displayed, the Cursor does not move.** SHIFT key + AREA key The language can be switched when the bilingual function is valid. (Bilingual function is optional.) AREA key + DOWN Moves the Cursor from the general-purpose display area to the operation button when the operation button is displayed. AREA key + UP Moves the Cursor to the general-purpose display area when the Cursor is on the operation button.
[SHIFT] 	Shift	**Changes the functions of other keys by pressing this key together.** Can be used with ASSIST key, COORD key, AREA key, [MOTION TYPE], [ROBOT], [EX. AXIS], Cursor key or Numeric key to access alternate functions. Refer to the description of each key for the alternate SHIFt functions.
[INTERLOCK] 	Ctrl	**Changes the functions of other keys by pressing together.** Can be used with ASSIST key, MULTI key, [TEST START], [FWD], or Numeric key (Numeric key customize function), [ROBOT]. Refer to the description of each key for the alternate NTERLOCK functions.
[INFORM LIST] 	O	**Displays instruction lists of commands available for job editing.**

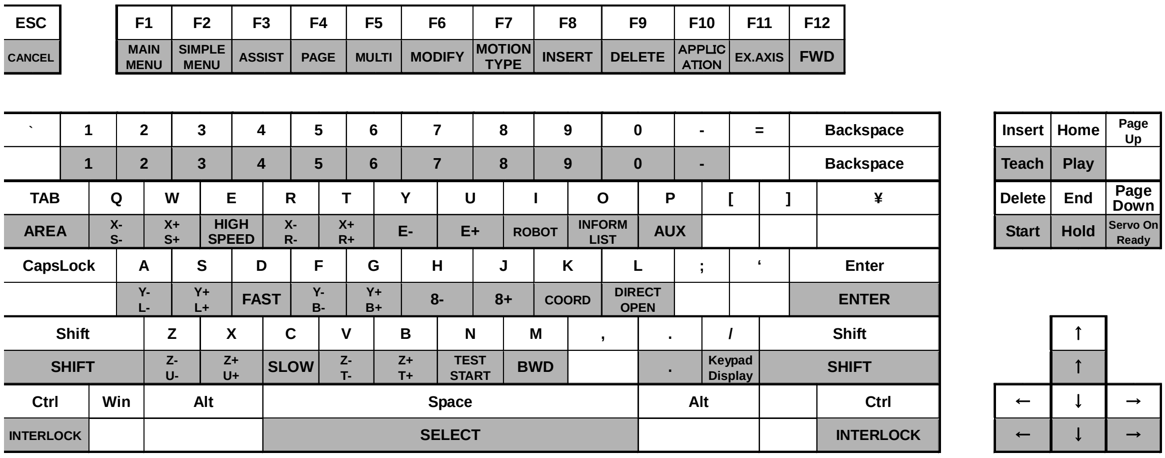
Keypad key	Keyboard Equivalent	Description
[ROBOT] 	I	**Enables the robot axis operation.** [ROBOT] is active for the system where multiple manipulators are controlled by one FS100 or the system with external axes. SHIFT key + [ROBOT] The robot under axis operation can be switched to a robot axis which is not registered to the currently selected job. INTERLOCK key + [ROBOT] Switchs the application when several applications are set to a robot.
[EX.AXIS] 	F11	**Enables the external axis (base axis or station axis) operation.** [EX.AXIS] is active for the system with external axes. SHIFTkey + [**EX. AXIS**] The external axis under axis operation can be switched to an external axis which is not registered to the currently selected job.
[MOTION TYPE] 	F7	**Selects the interpolation type for playback operation.** The selected interpolation type is shown in the status display area on the screen. • Each time this key is pressed, the interpolation type changes in the following order: "MOVJ"→" MOVL"→"MOVC" SHIFT key + [MOTION TYPE] The interpolation mode changes in the following order: "STANDARD"→" EXTERNAL REFERENCE POINT"*→" CONVEYOR"* Interpolation type can be changed in any mode. *: These modes are purchased options.
[TEST START] 	N	**Moves the manipulator through taught steps in a continuous motion when [TEST START] and INTERLOCK key are simultaneously pressed.** The manipulator can be moved to check the path of taught steps. Operation stops immediately when this key is released. • The manipulator operates according to the currently selected operation cycle: "AUTO", "1CYCLE" or "STEP". • The manipulator operates at the taught speed. However, if the taught speed exceeds the maximum teaching speed, the operation proceeds at the maximum teaching speed.

Keypad key	Keyboard Equivalent	Description
[FWD] 	F12	**Moves the manipulator through the taught steps while this key is pressed.** • Only move instructions are executed (one instruction at a time, no welding instructions). INTERLOCK key  + [FWD] All instructions are executed. [0] + [FWD] Moves to the reference point of the cursor line. The manipulator operates at the selected manual speed. Make sure that the selected manual speed is the desired one before starting operation.
[BWD] 	M	**Moves the manipulator through the taught steps in the reverse direction while this key is pressed.** • Only move instructions are executed (no weld commands). The manipulator operates at the selected manual speed. Make sure that the selected manual speed is the desired one before starting operation.
[DELETE] 	F9	**Deletes the registered instruction.** • Deletion completes when [ENTER] is pressed while this key lamp is lit.
[INSERT] 	F8	**Inserts a new instruction.** • Insertion completes when [ENTER] is pressed while this key lamp is lit.
[MODIFY] 	F6	**Modifies the taught position data or instruction.** • Modification completes when [ENTER] is pressed while this key lamp is lit.
[ENTER] 	Enter	**Registers instructions, data, current position of the manipulator, etc.** • When [ENTER] is pressed, the instruction or data displayed in the input buffer line moves to the Cursor position to complete a registration, insertion, or modification.
MANUAL SPEED keys 	D C	**Sets the speed for manual operation. This speed is also valid for operations with [FWD] and [BWD].** • There are four speed levels (slow, medium, fast, and inching). The speed changes as described below. The selected speed is displayed on the status area. Each time [FAST] is pressed, manual speed changes in the following order: "INCH"→" SLOW"→"MED"→"FST". Each time [SLOW] is pressed, manual speed changes in the following order: "FST"→"MED"→"SLOW"→"INCH"

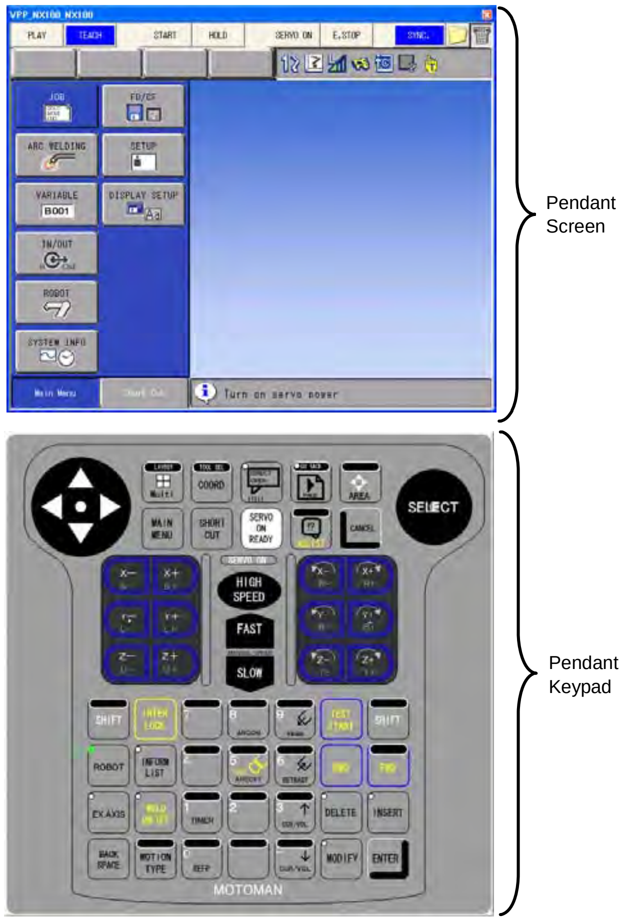
Keypad key	Keyboard Equivalent	Description
[HIGH SPEED] 	E	**Makes the manipulator move at high speed while this button and one of the axis keys are pressed simultaneously during manual operation. No need to change the setting of speed.** • The speed for [HIGH SPEED] is specified in advance.
Axis Key 	Q W R T A S F G Z X V B Y U H J	**Moves specified axes on manipulator.** • The manipulator axes only move while the key is pressed. • Multiple axes can be operated simultaneously by pressing two or more keys at the same time. The manipulator operates in the selected coordinate system at the selected manual speed. Make sure that the selected coordinate system and the manual speed are the desired ones before starting the axis operation. It is possible to allocate any external axes to [E-] + [E+], [8-] + [8+] keys to operate them.
Numeric Key 	0-9 - .	**Enters the number or symbol when the ">" prompt appears on the input line.** • "." is the decimal point. "-" is a minus sign or hyphen. The Numeric keys are also used as function keys. Refer to the explanation of each function for details.

■ Keyboard Layout

The Virtual Pendant keypad key all have a corresponding key on the computer keyboard. When the Virtual Pendant Screen has the input focus, the those keyboard key can be pressed instead of clicking the keys on the pendant keypad.



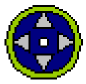
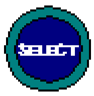
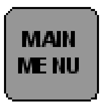
5.2.4 NX100 Virtual Pendant

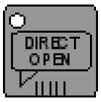
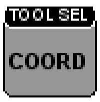


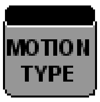
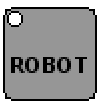
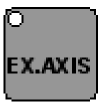
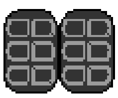
■ Virtual Pendant Button

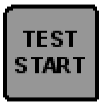
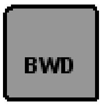
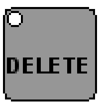
The pendant buttons are the same as those for DX100 virtual pendant.
For details, please refer to the "Virtual Pendant Button" of the Section 5.2.1 "DX200 Virtual Pendant" .

■ Virtual Pendant Keypad

Keypad key	Keyboard Equivalent	Description
Cursor 	↑ ← → ↓ □	Moves the cursor in the direction of the arrow. The size of the cursor and the range/place where the cursor can move will vary depending on the window. If the UP cursor button is pressed when the cursor is on the first line, the cursor will move to the last line of the job. Conversely, if the cursor is on the last line of the job and the DOWN cursor button is pressed, the cursor will jump to the first line of the job. • [SHIFT] + UP Goes back to the previous page. • [SHIFT] + DOWN Goes to the next page. • [SHIFT] + RIGHT Scrolls the instruction area of the job content or play back display to the right. • [SHIFT] + LEFT Scrolls the instruction area of the job content or playback display to the left.
[SELECT] 	Space	Selects menu items such as main menu, pull-down menu, etc.
[MAIN MENU] 	F1	Displays the main menu. If this button is pressed while the main menu is displayed, the main menu disappears. [SHIFT] + [MAIN MENU] While a window opens, the window is switched in the following order: Window → Sub-menu → Main menu
[SERVO ON READY] 	Page Down	Enables the servo power supply to be turned ON. Press this button to enable the servo power supply to be turned ON if the servo power supply is shut OFF by the emergency stop or overrun signal. When this button is pressed: • In the play mode, the servo power supply is turned ON if the safeguarding is securely closed. • In the teach mode, the SERVO ON lamp flashes and the servo power supply is turned ON when the Enable switch is ON. • The SERVO ON lamp is lit while the servo power is ON.

Keypad key	Keyboard Equivalent	Description
[AREA] 	Ctrl	Moves the cursor between “Menu Area” and "General Purpose Display Area." When [SHIFT] is pressed simultaneously: • [SHIFT] + [AREA] The language can be switched when the bilingual function is valid. (Bilingual function is optional.) • DOWN cursor button + [AREA] Moves the cursor to the operation button on the screen if displayed. • UP cursor button + [AREA] Moves the cursor to the general-purpose display area when the cursor is on the operation button.
[PAGE] 	F4	Displays the next page. [SHIFT] + [PAGE] The previous page is displayed. The page can be changed when  appears in the status area on the screen.
[DIRECT OPEN] 	F7	Displays the content related to the current line. To display the content of a CALL job or condition file, move the cursor to the next line and press [DIRECT OPEN]. The file will be displayed for the selected line. Display content will vary depending on the type of instruction used in the job. Example: For a CALL instruction, the content of the called job will be displayed. For a work instruction, the content of the condition file will be displayed. For Input/output instructions, the input/output condition will be displayed.
[COORD] 	F6	Select the operation coordinate system when the manipulator is operated manually. Five coordinate systems (joint, cartesian, cylindrical, tool and user) can be used. Each time this key is pressed, the coordinate system is switched in the following order: "JOINT"→"WLD/CYL"→"TOOL"→"USER" The selected coordinate system is displayed on the status display area. [SHIFT] + [COORD] The coordinate number can be changed when the "TOOL" or "USER" coordinate system is selected.

Keypad key	Keyboard Equivalent	Description
MANUAL SPEED keys 	D C	Sets the speed for manual operation. This speed is also valid for operations with [FWD] and [BWD]. There are four speed levels (slow, medium, fast, and inching). Each time [FAST] is pressed, manual speed changes in the following order: "INCH"→" SLOW"→"MED"→"FST" Each time [SLOW] is pressed, manual speed changes in the following order: "FST"→" MED"→"SLOW"→"INCH" The selected speed is displayed on the status area.
[HIGH SPEED] 	E	Changes the speed of axis operation when the axis button is pressed. The speed of the manipulator will change to high regardless of the programmed speed while this key is pressed. The speed for [HIGH SPEED] is specified in advance.
[MOTION TYPE] 	P	Selects the interpolation type for playback operation. The selected interpolation type is shown in the status display area on the screen. Each time this key is pressed, the interpolation type changes in the following order: "MOVJ"→" MOVL"→"MOVC"→"MOVS" [SHIFT] + [MOTION TYPE] The interpolation mode changes in the following order: "STANDARD"→" EXTERNAL REFERENCE POINT"*→" CONVEYOR"* Interpolation type can be changed in any mode. *: These modes are purchased options.
[ROBOT] 	I	Enables the robot axis operation. [ROBOT] is active for the system where multiple manipulators are controlled by one NX100 or the system with external axes.
[EX.AXIS] 	K	Enables the external axis (base axis or station axis) operation. [EX.AXIS] is active for the system with external axes.
Axis Key 	Q W R T A S F G Z X V B	Moves specified axes on manipulator. The manipulator axes only move while the key is held down. Multiple axes can be operated simultaneously by pressing two or more keys at the same time. The manipulator operates in the selected coordinate system at the selected manual speed. Make sure that the selected coordinate system and the manual speed are the desired ones before starting the axis operation.

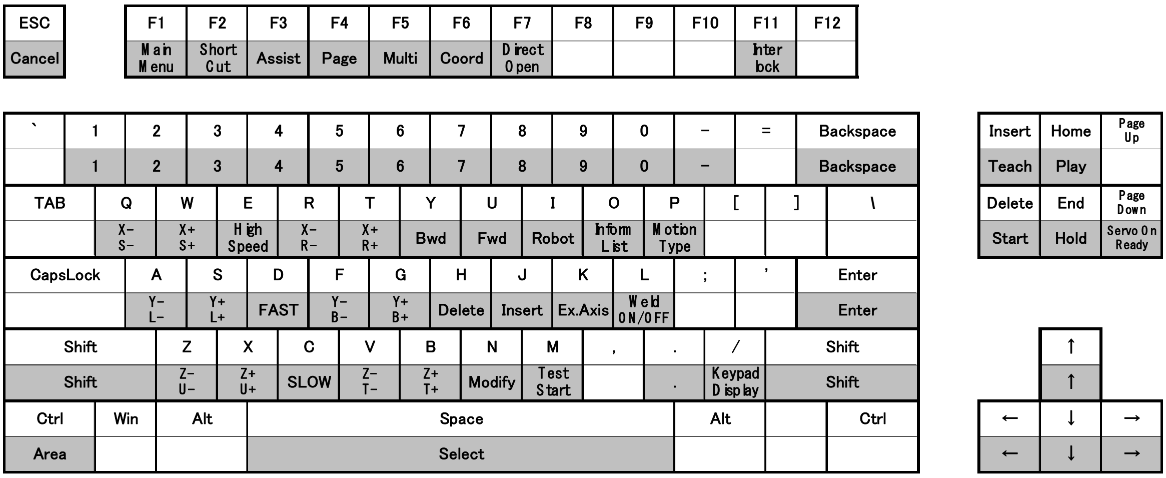
Keypad key	Keyboard Equivalent	Description
[TEST START] 	M	Moves the manipulator through taught steps in a continuous motion when [TEST START] and [INTERLOCK] are simultaneously pressed. The manipulator can be moved to check the path of taught steps. The manipulator operates according to the currently selected operation cycle: "AUTO," "1CYCLE," or "STEP." The manipulator operates at the taught speed. However, if the taught speed exceeds the maximum teaching speed, the operation proceeds at the maximum teaching speed. Operation stops immediately when this key is released.
[FWD] 	U	Moves the manipulator through the taught steps while this key is pressed. Only move instructions are executed (one instruction at a time, no welding instructions). [INTERLOCK] + [FWD] All instructions except move instructions are executed. [SHIFT] + [FWD] Move instructions are executed in succession. As for the operation of pressing [REFP] simultaneously, refer to the “NX100 Operator Manual”. The manipulator operates at the selected manual speed. Make sure that the selected manual speed is the desired one before starting operation.
[BWD] 	Y	Moves the manipulator through the taught steps in the reverse direction while this key is pressed. Only move instructions are executed (no weld commands).
[INFORM LIST] 	O	Displays instruction lists of commands available for job editing.
[CANCEL] 	Esc	Cancels data input and resets errors.
[DELETE] 	H	Deletes registered instructions and data. Deletion completes when [ENTER] is pressed while this key lamp is lit.

Keypad key	Keyboard Equivalent	Description
[INSERT]	J	Inserts new instructions or data. Insertion completes when [ENTER] is pressed while this key lamp is lit.
[MODIFY]	N	Modifies taught position data, instructions, and data. Modification completes when [ENTER] is pressed while this key lamp is lit.
[ENTER]	Enter	Registers instructions, data, current position of the manipulator, etc. When [ENTER] is pressed, the instruction or data displayed in the input buffer line moves to the cursor position to complete a registration, insertion, or modification.
[SHIFT]	Shift	Changes the functions of other keys by pressing together. Can be used with [MAIN MENU], [COORD], [MOTION TYPE], cursor key, Numeric key, page key to access alternate functions. Refer to the description of each key for the alternate [SHIFT] functions.
[INTERLOCK]	F11	Changes the functions of other keys by pressing together. Can be used with [TEST START], [FWD], Numeric key (Numeric key customize function). Refer to the description of each key for the alternate [INTERLOCK] functions.
Numeric Key	0-9 - .	Enters the number or symbol when the ">" prompt appears on the input line. "." is the decimal point. "-" is a minus sign or hyphen. The Numeric keys are also used as function keys. Refer to the explanation of each function for details.
[BACK SPACE]	Back space	Deletes the last character while typing characters.
[Multi]	F5	Displays multiple windows. **This function is for future use. (Cannot be used with the NX100 of the current version.)**
[SHORTCUT]	F2	Displays the shortcut selection dialog box. **This function is for future use. (Cannot be used with the NX100 of the current version.)**

Keypad key	Keyboard Equivalent	Description
[ASSIST] 	F3	Displays the menu to assist the operation for the currently displayed window. **This function is for future use. (Cannot be used with the NX100 of the current version.)**

■ Keyboard Layout

The Virtual Pendant keypad key all have a corresponding key on the computer keyboard. When the Virtual Pendant Screen has the input focus, the those keyboard key can be pressed instead of clicking the keys on the pendant keypad.

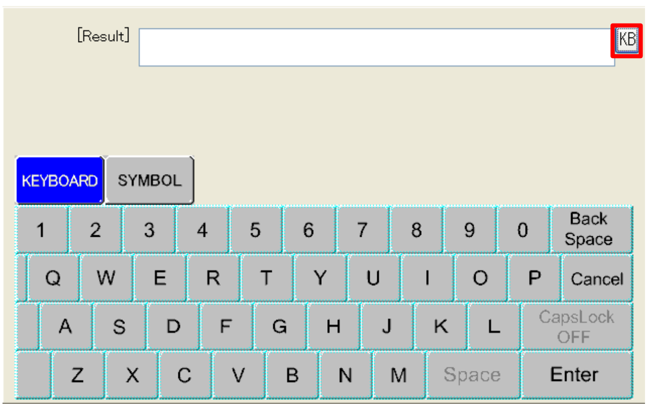


5.2.5 Input with keyboard

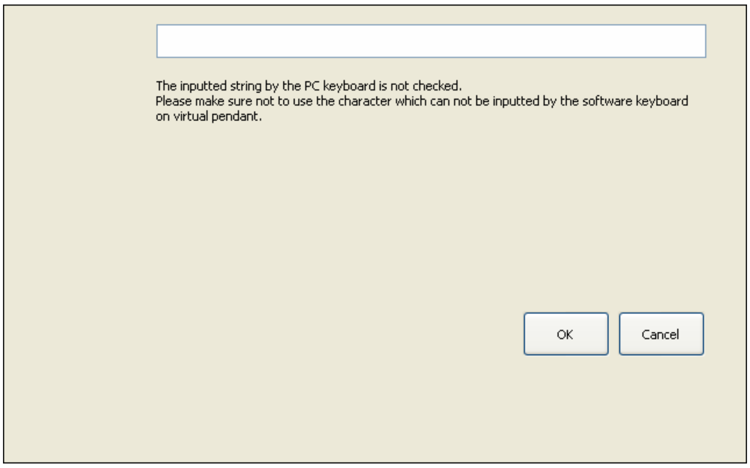
In MotoSim EG-VRC, To enter the string, the keyboard is also available.

Procedure

1. Click the [KB] button in the software keypad.



2. Enter the string, and click the [OK] button, the inputted string is fixed and the previous screen appears. Press the [Cancel button, the inputted string is canceled and the previous screen appears.

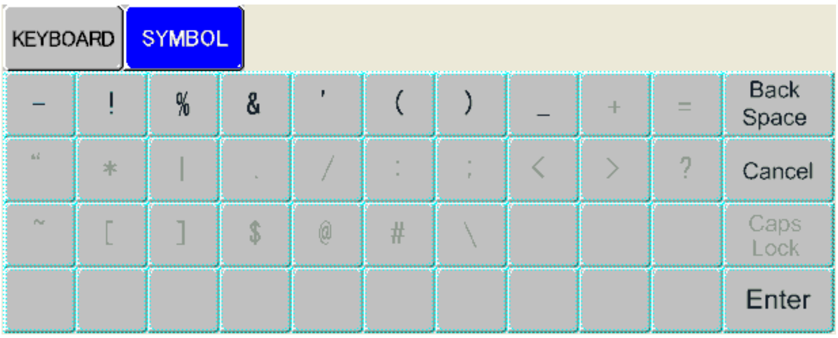


NOTE

- The inputted string is not checked. Please make sure not to use the character which can not be inputted by the software keyboard.
- The other operation can not used on the input mode. When use the other operation, Press the [OK] button or the [Cancel] button to close the input window.

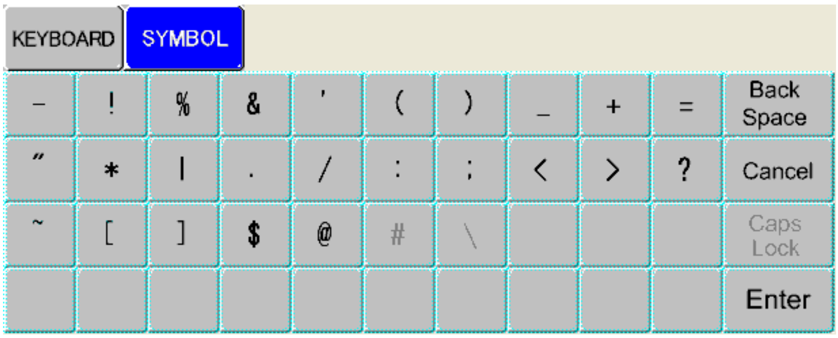
■ Input the job name or folder name

If the gray-out characters as bellow are inputted, the characters are deleted from the inputted string, when the inputted string is fixed (when the previous screen appears)



■ Input the label name

If the gray-out characters as bellow are inputted, the characters are deleted from the inputted string, when the inputted string is fixed (when the previous screen appears).



6 Display Operation

The display tool functions help to achieve better visualization enabling text input on the cell window, sectional display of models, display mode change, etc.

6.1 Viewpoint Operation Tools

MotoSim EG-VRC can control the display with the viewpoint operation tool as follows:

6.1.1 Viewpoint Operation with the Mouse

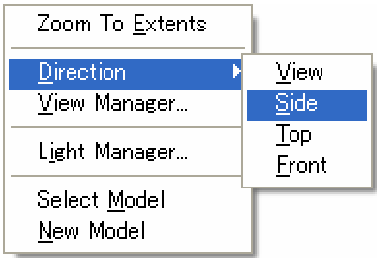
Each viewpoint operation mode is assigned to the button of the mouse.
Drag with the mouse to the up to down or side to side, a viewpoint will change by the viewpoint operation mode currently assigned to the button.

The assignment of the viewpoint operation mode is as follows.

Viewpoint Operation Mode	Mouse Operation	Viewpoint Movement
Parallel	Press-and-hold the scroll wheel and drag	Drag the mouse from side to side and up and down to synchronize the viewpoint with the mouse motion.
Rotate	Press-and-hold the scroll wheel and the right button, and drag	For vertical rotation, drag the mouse up and down; for horizontal rotation, drag the mouse from side to side.
Zoom	Rotate the scroll wheel	Zoom in and out the image by dragging the mouse upward (to zoom in) or downward (to zoom out) over the screen.
Zoom And Rotate	Press-and-hold the right button and drag	Zoom in and out the image by dragging the mouse upward (to zoom in) or downward (to zoom out) over the screen; rotate the image centering on the Z-axis of "world" coordinates by dragging the mouse from side to side.
Change the viewpoint	Press the scroll wheel	Click any desirable point so that the image is displayed with the clicked point located in the center of the screen.

■ Right Mouse Button Operation

A pop-up menu for viewpoint operation appears by clicking the right mouse button on the cell window.



6.1.2 Preset Viewpoint Operation

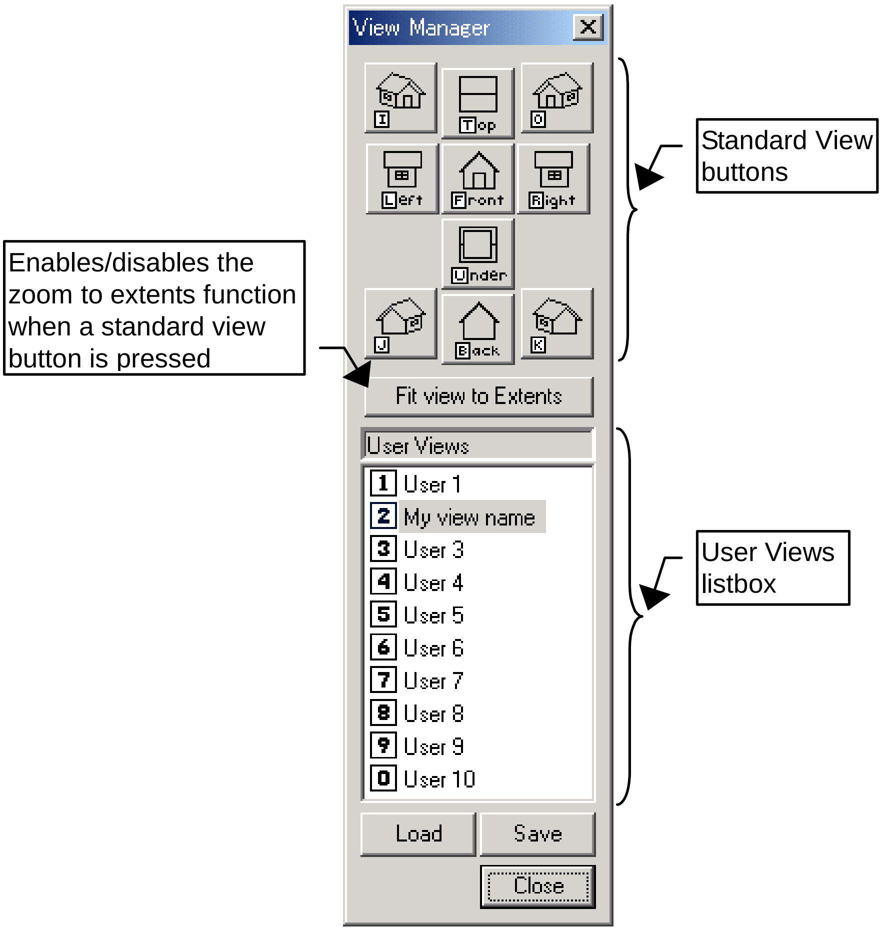
The camera viewpoint can also be changed to a preset viewpoint.

The most communly used viewpoint are available by clicking on the [Home] tab, in the [View] group .
For detail on the preset viewpoint choices please refer to Section 5.1.1 "Ribbon".

Further preset viewpoint choices are available with the View Manager.

■ Viewpoint Operation with the View Manager

The View Manager panel allows to quickly change the view point of the scene by selecting one of the standard views or user views.
The View Manager panel can be displayed by clicking the [Home] tab, in the [View] group, the [View Manager] button.



View Manager

Item	Description
[Standard View] buttons	Changes the viewpoint to display associated the standard view.
[Fit view to extends] button	Displays all the models in the cell to fit in the view.
[User View] listbox	Double clicking one of the views will display the associated user defined view.Clicking the selected view name will enable the edition mode to allow renaming the selected view.
[Load] button	Changes the viewpoint displayed on the screen to the user view selected in the "User View" listbox.
[Save] button	Saves the current viewpoint displayed on the screen to the user view selected in the "User View" listbox.
[Close] button	Closes the View Manager panel.

NOTE User views definitions are only saved to the file when the cell is saved.

■ Using Shortcuts

Each view has an associated shortcut key that can be used to recall one of the defined views when the input focus is on either the cell display or on the View Manager panel. Pressing one of the numeric keys (1... 9, 0) will load the corresponding user view; the "0" key is used for the 10th user view. The first letter of the standard view name is used (.e.i. "T" for the Top view, "F" for the Front view...), the letters are indicated on the buttons of the View Manager panel. The keys "I", "O", "J" and "K" are used for the four isometric views.

■ Smooth Transition

The viewpoint can be changed with or without smooth transition function by setting the display as follows:

Smooth transition ON (smooth transition checked in the menu):

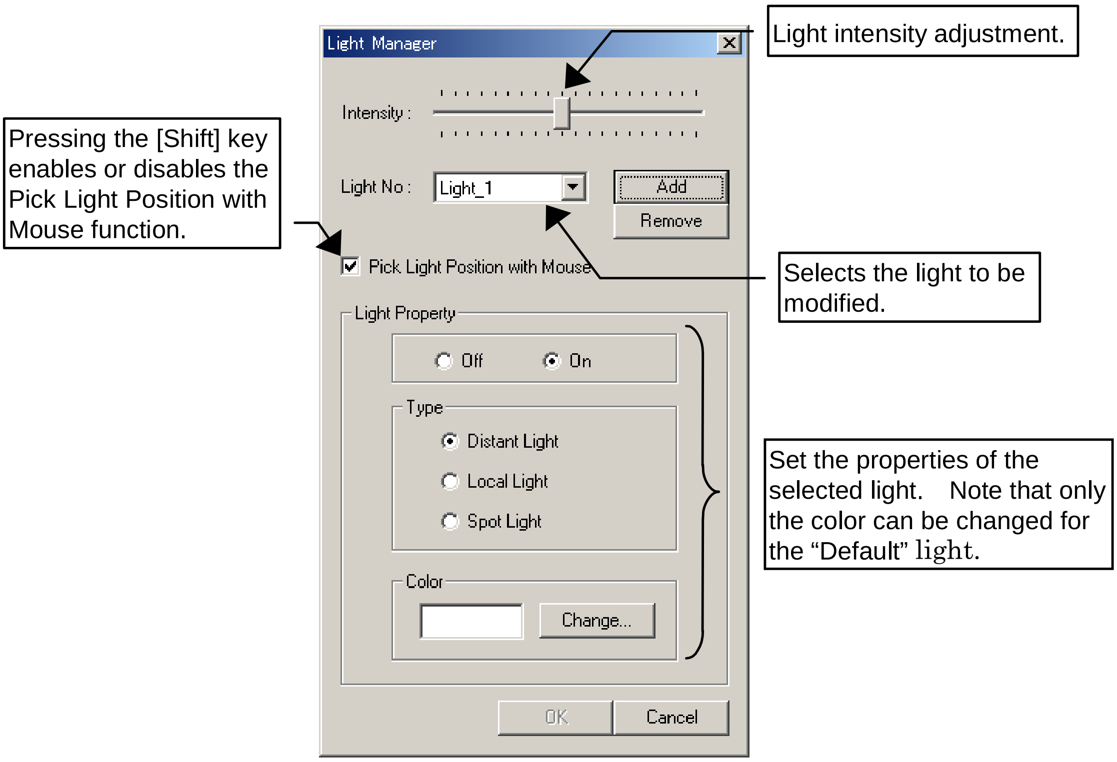
- The viewpoint changes as the image continuously moves.
- For the duration setting, click the MotoSim EG-VRC button (), and select the [Options] menu.

Smooth transition OFF (smooth transition unchecked in the menu):

- The viewpoint changes instantaneously.

6.2 Light Manager Operation

The Light Manager panel allows to add or remove lights and to modify the settings or each light. In addition to the default light, up to 4 additional lights can be added.
On the [Home] tab, in the [Screen] group, click the [Light Manager] button, the [Light Manager] dialog appears.



Light Manager

Intensity	Adjusts the intensity of the lights. Sliding the control toward the left will reduce the general lighting of the scene. Sliding the control toward the right will increase it. (The standard intensity is 100) All the lights are affected by this control.
Light No.	Selects a light for operations. The properties of the currently selected light are displayed in the Light Property .

Light Manager

Add	Adds a new light. To complete the operation, click on the main view to position the light. A light object will be displayed to indicate the location of the light. Up to 4 lights can be added. For more details please refer to the "Adding and Modifying Lights" and "Light Sources" .
Remove	Deletes the currently selected light. Note that the "Default" light cannot be deleted.
Pick Light Position with Mouse	When checked, clicking on the main view will move the position of the light to the clicked position. (When unchecked, clicking the main view doesn't change the light position and allows view point change operation.) Pressing the [Shift] key toggles the Pick Light Position with Mouse check mark.
Light Property	[On / Off] [Off] : The selected light is turned off. But, the light is not erased, the settings remains valid. [On] : The selected light is turned on. [Type] Distant Light : Light rays are all parallel (coming from an infinite dis tance) Local Light : Omni directional rays coming from the light source point (light marker). Spot Light : Cone shaped directional rays coming from the light source point (light marker). For more detail, please refer to the "Light Sources" . [Color] The color of the light is displayed in the rectangle. [Change] Displays the Color Dialog to change the color of the light.
OK	Closes the Light Manager panel.The lights information will be save to the cell file when the cell is saved. The light markers in the main view will disappear when Light Manager is closed. To display the light markers again, reopen the Light Manager panel.
Cancel	Cancels the light setting modifications and closes the Light Manager panel. The light markers in the main view will be deleted.

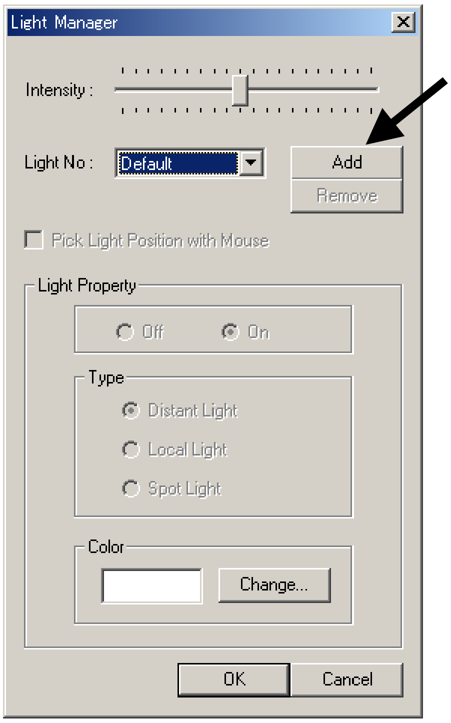
NOTE

- To preserve the light settings for next time the cell is opened, the cell needs to be saved after the light settings are changed.
- When exporting files (i.e. html format), changing the light settings don't affect the resulting exported file.

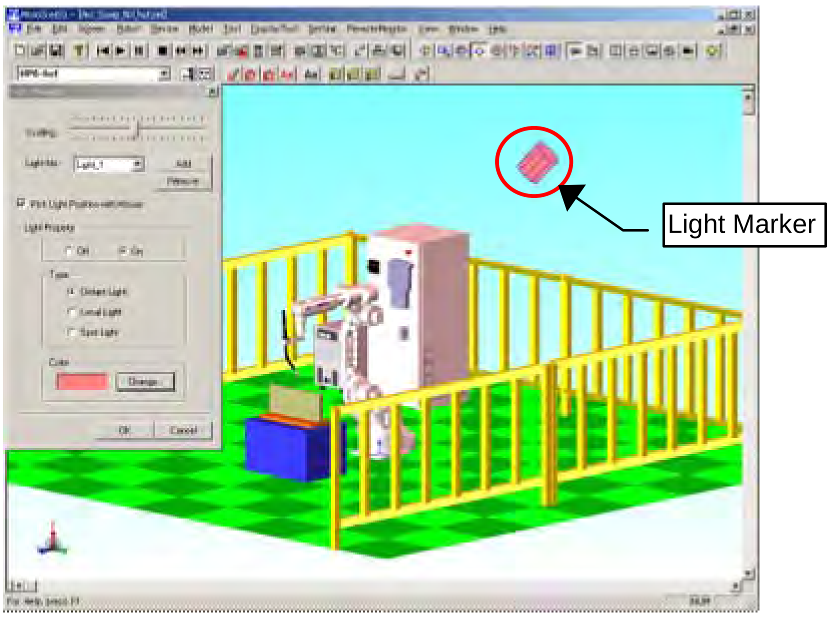
■ Adding and Modifying Lights

Operation Procedure

1. Press the [Add] button. The properties of the newly added light will display in the Light Property . (At this stage, the light source still isn't created.)

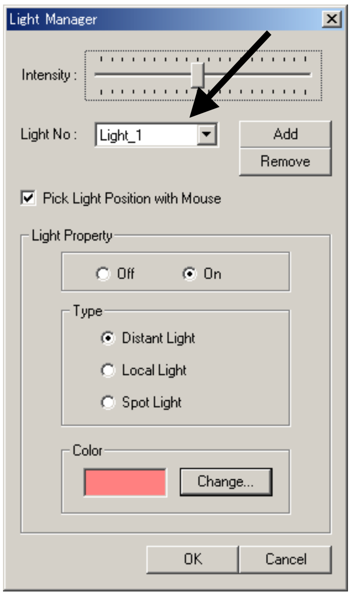


2. Click on the main view to position the light. The light will be created and a light marker will be displayed to indicate the location of the light.
The light location and type can be confirmed by looking at the light marker in the main view.



The lighting of the cell will change to reflect the new light influence.
As long as the [Pick Light Position with Mouse] is checked, clicking on the main view will move the light to the clicked position. Other items can be changed in the Light Property .
Note that a maximum of 4 lights can be added to the cell.

3. To modify existing light, first select the "Light No." and then change the settings in the "Light Property".



4. Press [OK] or [Cancel] to close the Light Manager panel.
When the Light Manager is closed the light markers in the main view will disappear. To display the light markers again, reopen the Light Manager panel.

NOTE

To preserve the light settings for next time the cell is opened, the cell needs to be saved after the light settings are changed.

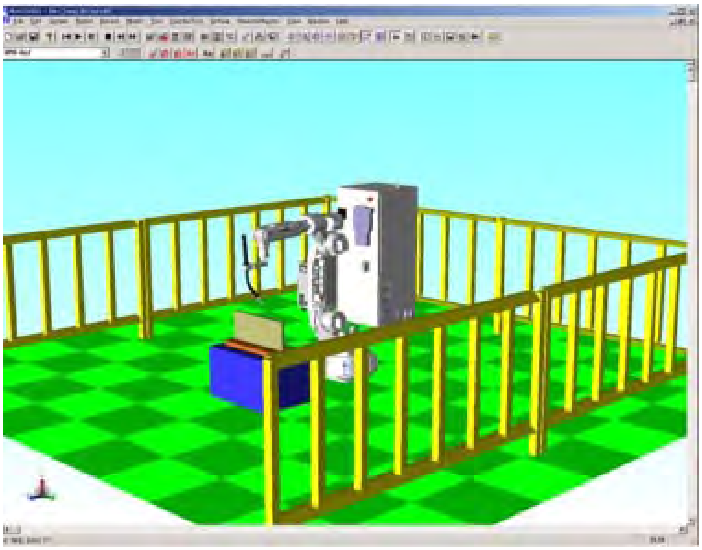
■ Deleting Lights

Select the light number. Press the [Remove] button to remove the light.
Note that the "Default" light cannot be deleted.

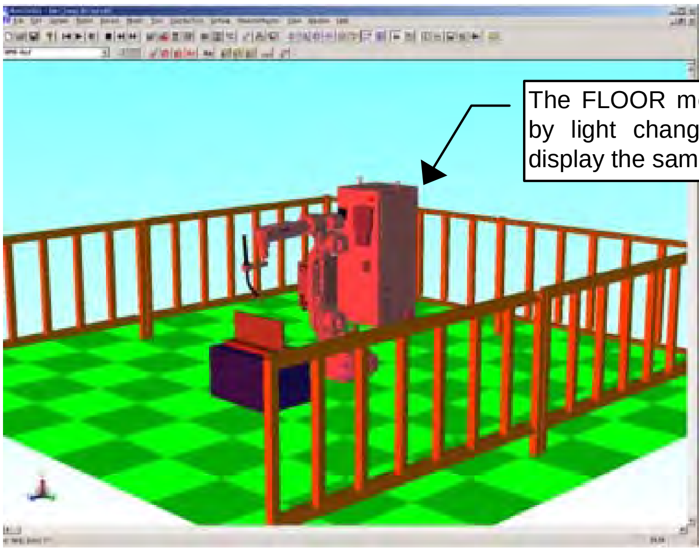
■ Light Sources

Default

Directional light constantly attached to the viewpoint. The initial light color is white.



Result after changing the light color



The FLOOR model is not affected by light change and will always display the same way.

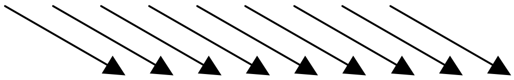
The light reflection and intensity of the whole scene can be modified by adjusting the "Intensity" value.

Intensity: 100 75 50

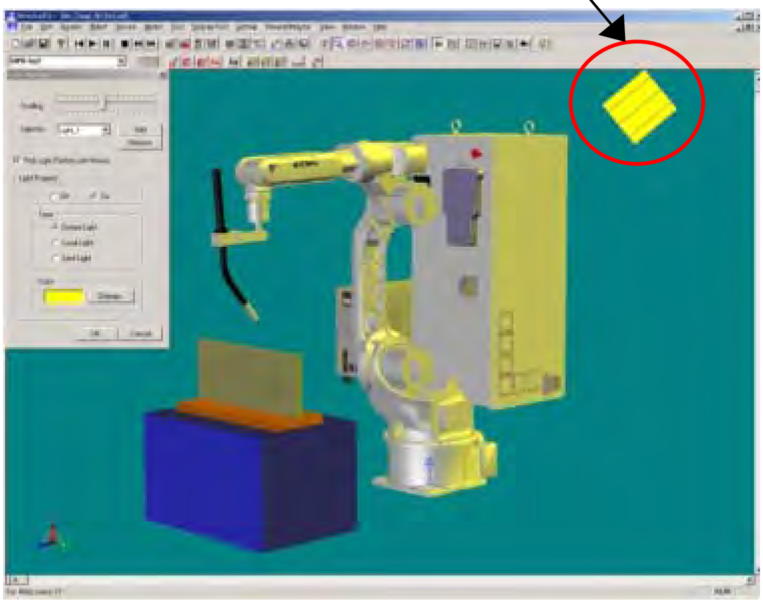


Distant Light

Light is emitted from a infinite distance so that all the rays are parallel.Light type for general use. The light direction is from the clicked position toward the viewpoint center.

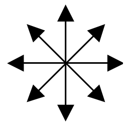


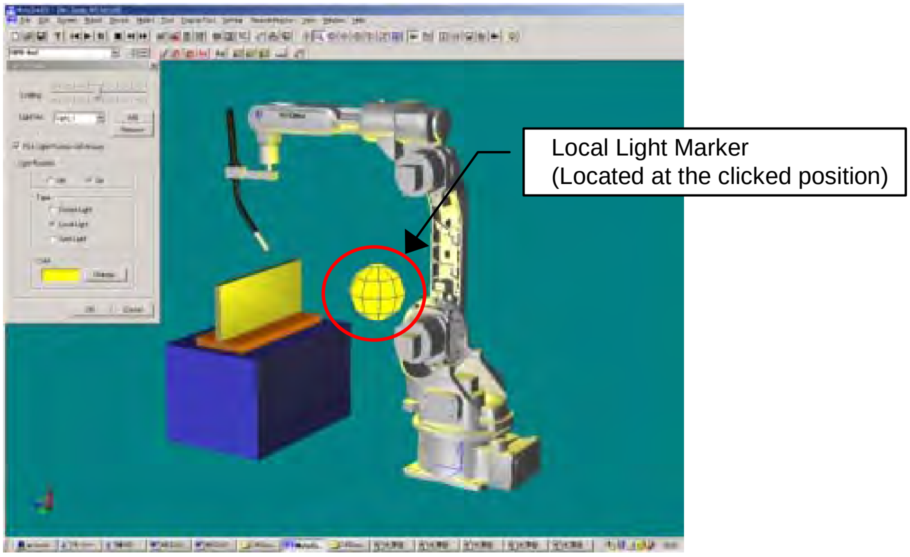
Distant Light Marker
(Located at the clicked position)



Local Light

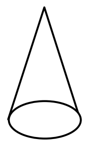
Light is emitted in all direction from the light position.
Useful for generating light from a given point.

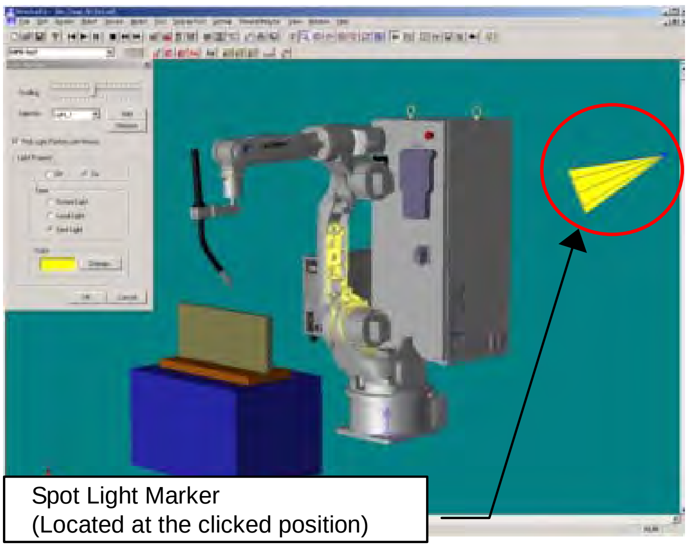




Spot Light

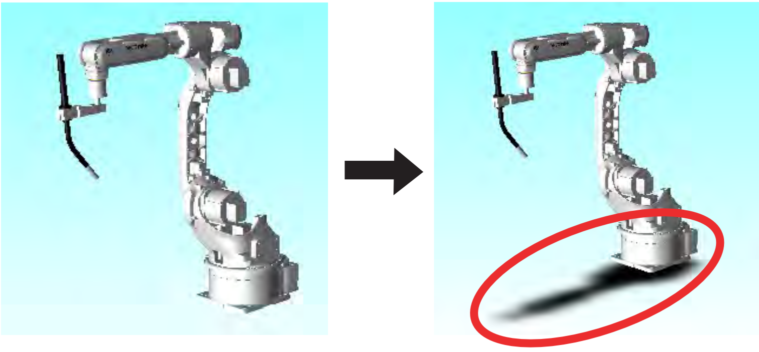
Light is emitted in a specific direction forming a cone from the light position in a cone shape. Useful to illuminate a specific face of a part.
The light direction is from the clicked position toward the viewpoint center.
For proper illumination of a model or a face, it may be necessary to relocate the viewpoint center on the intended target before setting the light position.
Viewpoint center can be moved with click on the mouse wheel.





6.3 Displaying Shadows

Shadows can be displayed for the models on the screen.
Since the shadows are not easily visible when the floor is displayed, use the shadow with the opacity of floor image decreased (approx. to 0.5 or less), or hide the floor image.
For the detailed setting of shadow, refer to Section 10.1.4 "Shadow".



6.4 Pick Settings

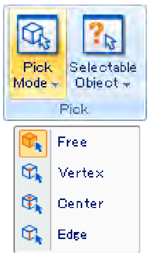
The Pick settings influence the selection of objects when picking object in the cell view with the mouse.

■ Pick Mode Setting

The Pick Mode sets conditions determining the selected point in the clicked area.

Procedure

On the [Home] tab, in the [Pick] group, click the [Pick Mode] button, and select one of the following items.



- Free: Selects the point of the model corresponding to the clicked position.
- Vertex: Selects the model vertex nearest to the clicked position.
- Center: Selects the face or edge center nearest to the clicked position. Note that in order to select the center of the cylindrical model, select the model using [Vertex] instead of [Center].
- Edge Selects the edge point nearest to the clicked position.

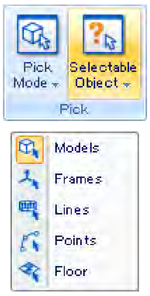
NOTE That these settings are also linked to the same settings available in the OLP dialog.

■ Pick Object Setting

Pick object set filters on the type of objects that can be selected by the mouse pick.

Procedure

On the [Home] tab, in the [Pick] group, click the [Selectable Object] button, and select one of the following items.

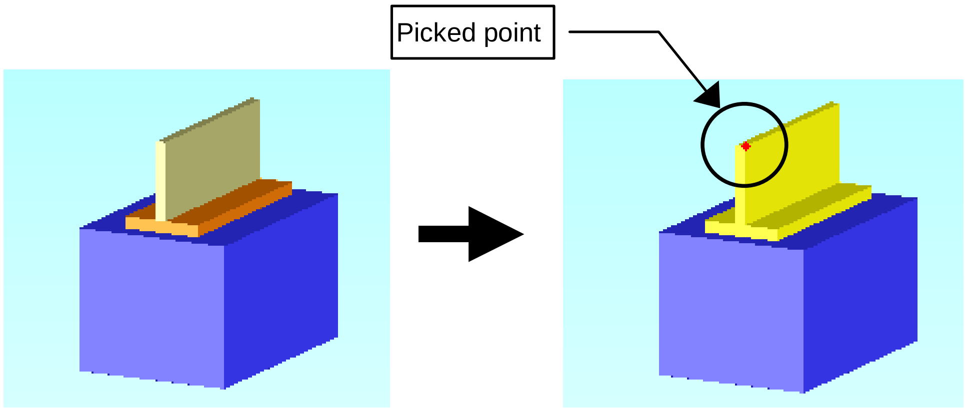


- Models: Solid models.
- Frames: Model frame or AXIS6 models. (Note: The model frame needs to be visible to be selected.)
- Lines & Inters: Lines such as LINE part, WORK line and wireframe model, and intersection lines generated by the intersection of parts or models. (Note the intersection lines are displayed during the pick operation when the left mouse button is pressed down. In cells with many detailed models, the intersection generation may slow down the pick function response. In such case, you may uncheck this item to improve performance.)
- Points: Points such as TRACE points.
- Floor: FLOOR parts. (Note: FLOOR parts tend to interfere selection depending on the viewpoint, therefore their selection is managed independently from other models.)

NOTE That these settings are also linked to the same settings available in the OLP dialog.

■ Pick method and screen display

When the mouse pointer is over the cell view, press down the left mouse button. The model considered for selection will display in yellow with a red dot to indicate the specific point location. The display will update to represent change of selection as the mouse pointer is moved over different models. The actual selection is made only when the mouse button is released.



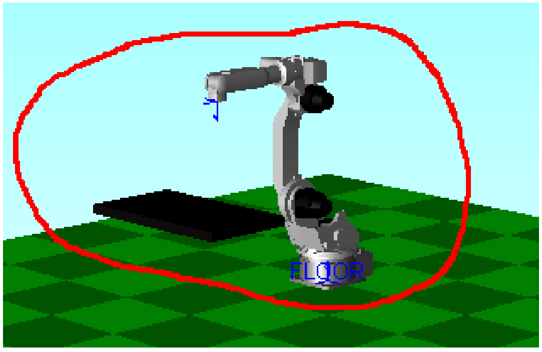
6.5 Markup

Graphic forms (such as circles, rectangles) and text can be temporarily drawn on the cell window.

6.5.1 Freehand

This section explains on how to draw a free-form line.

NOTE The line drawn on the cell is deleted by changing the viewpoint of the window.



Procedure

1. Set the viewpoint of the window. (This step must be done first since the line will be deleted when the viewpoint is changed.)

2. On the [Home] tab, in the [Screen] group, click the [Make-up] button, and select [Free Hand].

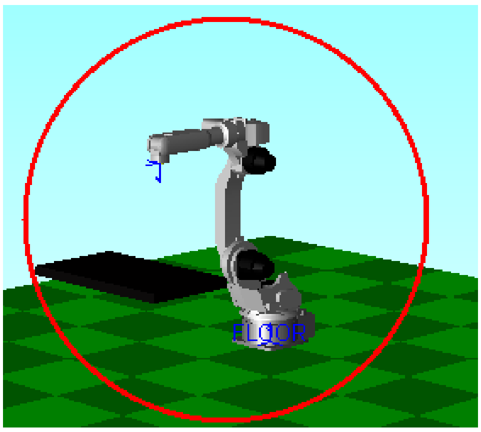
Position the mouse pointer at a desired point, and drag the mouse freely so that the mouse pointer on screen draws a line with the mouse movement.

Click the MotoSim EG-VRC button ( ), and select the [Options] menu to set the color and thickness of the line. Refer to Section 10.2 "Markup Settings" for details.

6.5.2 Circle

This section explains on how to draw a circle.

NOTE The circle drawn on the cell is deleted by changing the viewpoint of the window.



Procedure

1. Set the viewpoint of the window. (This step must be done first since the circle will be deleted when the viewpoint is changed.)

2. On the [Home] tab, in the [Screen] group, click the [Make-up] button, and select [Circle].

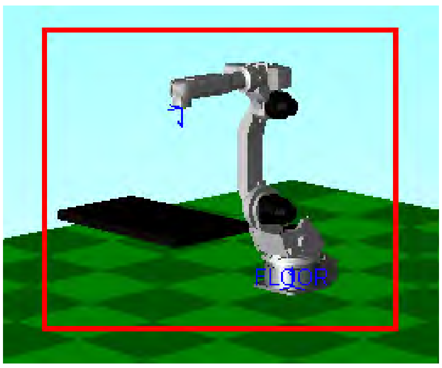
Position the mouse pointer at a desired point, and drag the mouse: a circle is drawn centering around the point where the mouse started dragging.

Click the MotoSim EG-VRC button (), and select the [Options] menu to set the color and line thickness of the circle. Refer to Section 10.2 "Markup Settings" for details.

6.5.3 Rectangle

This section explains on how to draw a rectangle.

NOTE The rectangle drawn on the cell is deleted by changing the viewpoint of the window.



Procedure

1. Set the viewpoint of the window. (This step must be done first since the rectangle will be deleted when the viewpoint is changed.)

2. On the [Home] tab, in the [Screen] group, click the [Make-up] button, and select [Rectangle].

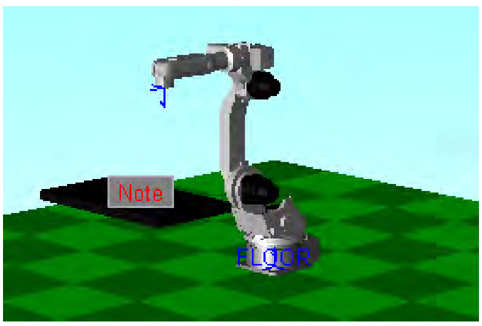
Position the mouse pointer at a desired point, and drag the mouse: a rectangle is drawn from the point where the mouse started dragging.

Click the MotoSim EG-VRC button ( ), and select the [Options] menu to set the color and line thickness of the rectangle. Refer to Section 10.2 "Markup Settings" for details.

6.5.4 Notes

This section explains on how to add a note.

NOTE The note added on the cell is deleted by changing the viewpoint of the window.



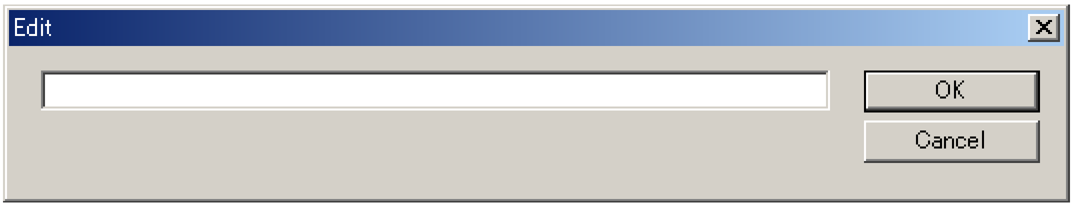
■ Adding a Note

Procedure

1. Set the viewpoint of the window. (This step must be done first since the note will be deleted when the viewpoint is changed.)

2. On the [Home] tab, in the [Screen] group, click the [Make-up] button, and select [Notes].

Click any point on the window where to add notes; a "Note" indication appears at the clicked point. Right-click the “Note” to open a pop-up menu, and select {Edit} to enter texts.



3. Click on [OK] after entering the texts.
Click the MotoSim EG-VRC button (), and select the [Options] menu to set the font and color of the text. Refer to Section 10.2 "Markup Settings" for details.

NOTE
- The note added on the cell is deleted by changing the viewpoint of the window.
- When adding two-byte characters, use a font that properly displays two-byte characters.

■ Deleting a Note

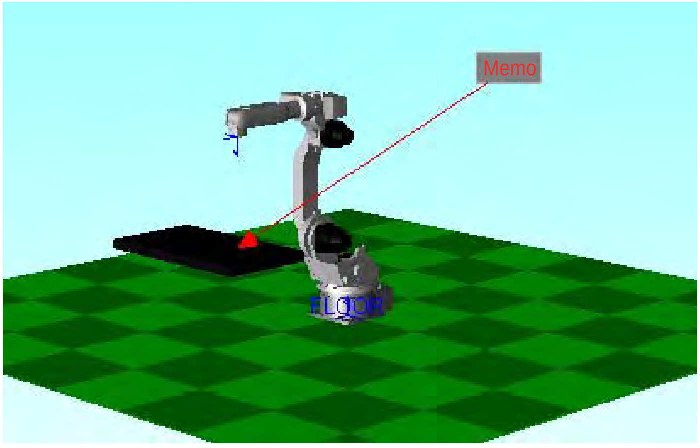
Select the note to be deleted, and right-click it. Select {Delete} from the pop-up menu to delete the text.

■ Relocating a Note

Drag a note to a different location with on the [Home] tab, in the [Screen] group, click the [Make-up] button, and selected [Notes].
Note that the arrow remains at the same point.

6.6 Memo

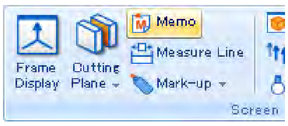
This section explains on how to create a memo (text).



■ Creating a Memo

Procedure

1. On the [Home] tab, in the [Screen] group, click the [Memo] button.



Click the desired model and drag the mouse to the desired memo location; a "Memo" indication with an arrowed line appears at the position where the mouse button is released after dragging.

> **NOTE** Non-displayed model or the point where there is no model cannot be selected as a subject for the memo indication whereas any point of the model displayed on the window can be selected for the memo indication.

2. Right-click “Memo” to open a pop-up menu, and select {Edit} to enter texts.

3. Enter texts, and click on [OK].
   Click the MotoSim EG-VRC button ( ), and select the [Options] menu to set the font and color of the texts. Refer to Section 10.2 "Markup Settings" for details.

NOTE

When adding two-byte characters, use a font that properly displays two-byte characters.

■ Deleting a Memo

Select a memo to be deleted, and right-click it. Select {Delete} from the pop-up menu to delete the memo with the arrowed line.

■ Relocating a Memo

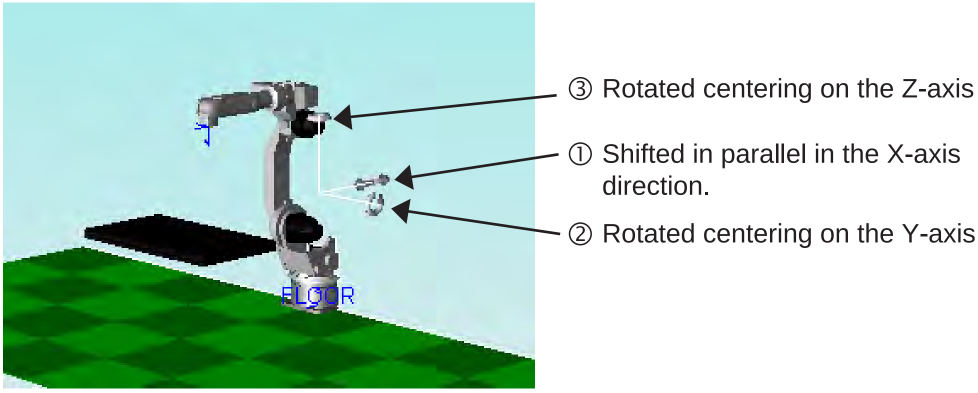
Drag a note to a different location with on the [Home] tab, in the [Screen] group, click the [Make-up] button, and selected [Memo].
Note that the arrow remains at the same point.

6.7 Cutting Planes

This section explains on how to display cross sections that are perpendicular to the X-, Y-, Z-axes directions in the cell window.

6.7.1 X-Cutting Planes

With this command, the X-cutting plane (a cutting plane which is perpendicular to the X-axis direction in the window) can be displayed as shown in the following figure:



■ Displaying the X-Cutting Plane

When the X-cutting plane is not displayed.On the [Home] tab, in the [Screen] group, click the [Cutting Plane] button, and select [X]

■ Deleting the X-Cutting Plane

When the X-cutting plane is displayed.On the [Home] tab, in the [Screen] group, click the [Cutting Plane] button, and select [X]

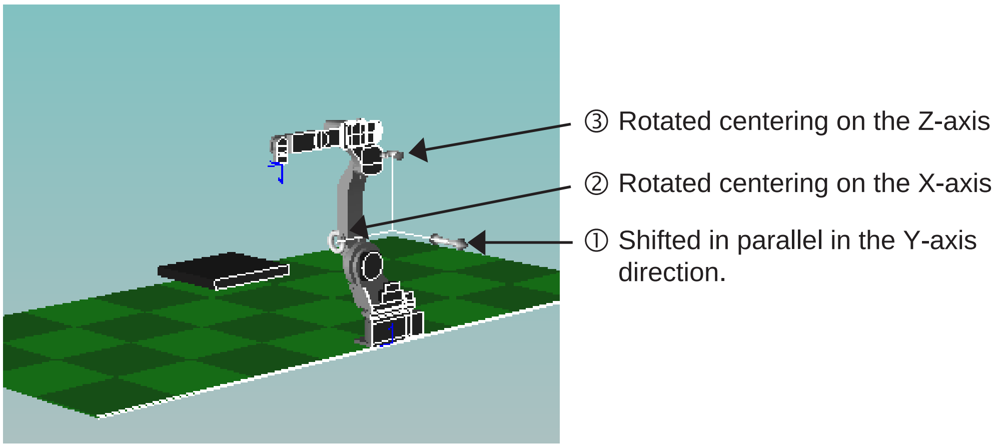
■ Changing Display of the X-Cutting Plane

Drag the tools ① to ✍ on the figure above to rotate the X-cutting plane centering on the Y- or Z-axis, or shift it in a direction parallel to the X-axis.

①	Shift the X-cutting planes in a direction parallel to the X-axis.
✍	Rotate the X-cutting planes centering on the Y-axis.
✍	Rotate the X-cutting planes centering on the Z-axis.

6.7.2 Y-Cutting Planes

With this command, the Y-cutting plane (a cutting plane which is perpendicular to the Y-axis direction in the window) can be displayed as shown in the following figure:



■ Displaying the Y-Cutting Plane

When the Y-cutting plane is not displayed.On the [Home] tab, in the [Screen] group, click the [Cutting Plane] button, and select [Y]

■ Deleting the Y-Cutting Plane

When the Y-cutting plane is displayed.On the [Home] tab, in the [Screen] group, click the [Cutting Plane] button, and select [Y]

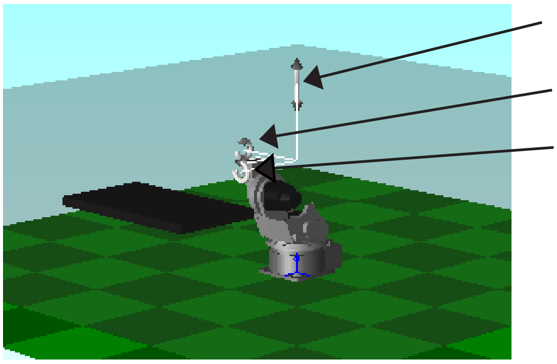
■ Changing Display of the Y-Cutting Plane

Drag the tools ① to ✍ on the figure above to rotate the Y-cutting plane centering on the X- or Z-axis, or shift it in a direction parallel to the Y-axis.

①	Shift the Y-cutting plane in a direction parallel to the Y-axis.
✍	Rotate the Y-cutting plane centering on the X-axis.
✍	Rotate the Y-cutting plane centering on the Z-axis.

6.7.3 Z-Cutting Planes

With this command, the Y-cutting plane (a cutting plane which is perpendicular to the Z-axis direction in the window) can be displayed as shown in the following figure:



① Shifted in parallel in the Z-axis direction.

③ Rotated centering on the Y-axis

② Rotated centering on the X-axis

■ Displaying the Z-Cutting Plane

When the Z-cutting plane is not displayed.On the [Home] tab, in the [Screen] group, click the [Cutting Plane] button, and select [Z]

■ Deleting the Z-Cutting Plane

When the Z-cutting plane is displayed.On the [Home] tab, in the [Screen] group, click the [Cutting Plane] button, and select [Z]

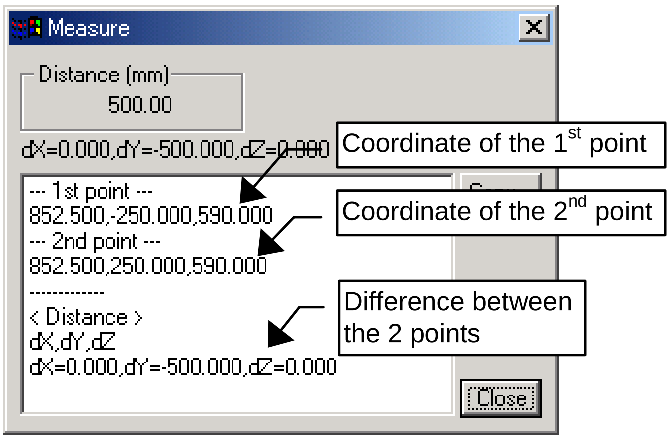
■ Changing the Z-Cutting Plane

Drag the tools ① to ✍ on the figure above to rotate the Z-cutting plane centering on the X- or Y-axis, or shift it in a direction parallel to the Z-axis.

①	Shift the Z-cutting plane in a direction parallel to the Z-axis.
✍	Rotate the Z-cutting plane centering on the X-axis.
✍	Rotate the Z-cutting plane centering on the Y-axis.

6.8 Measure Distance

Click 2 points to measure the distance between them.



Measure Distance dialog

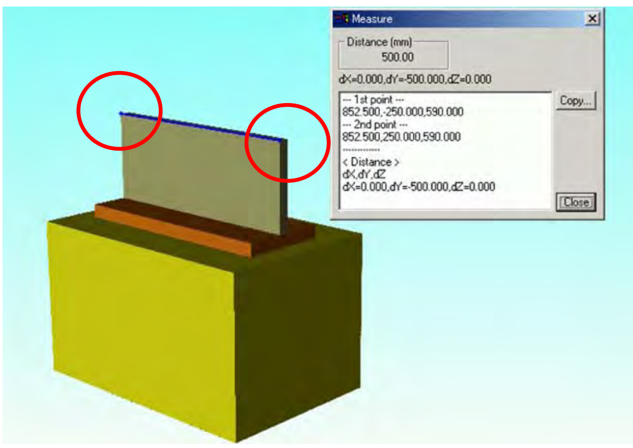
Copy	Copies the measurement result to the clipboard.
Close	Closes the Measure Distance dialog.

Procedure

1. On the [Home] tab, in the [Mesurement] group, click the [Distance] button.

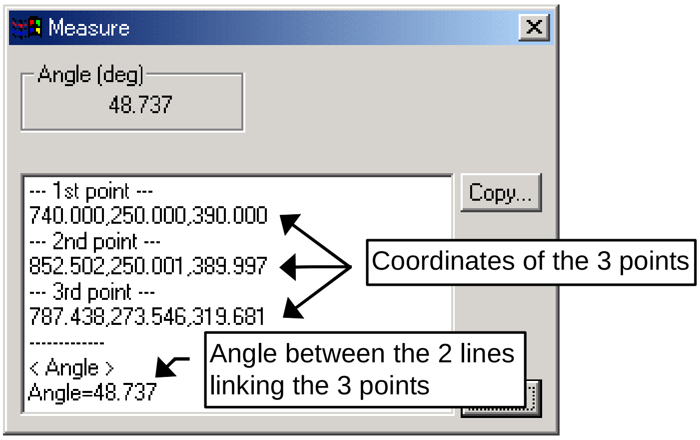
2. Click any 2 points on the models with the mouse. (Blue dots on the clicked positions and a blue line joining the points appears.) The Measure Distance dialog displays with the measurement results.

> NOTE: When clicking in an area the selected point depends on the current "Pick Mode" and "Pick Object" settings. Please refer to Section 6.4 "Pick Settings" for details.



6.9 Measure Angle

Click 3 points to measure the angle between them.



Measure Distance dialog

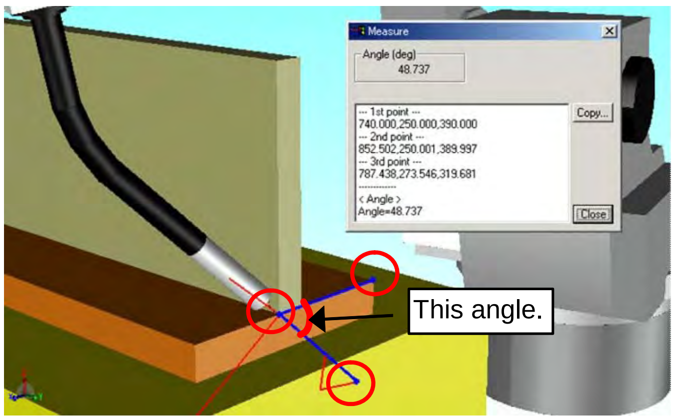
Copy	Copies the measurement result to the clipboard.
Close	Closes the Measure Angle dialog.

Procedure

1. On the [Home] tab, in the [Mesurement] group, click the [Angle] button.

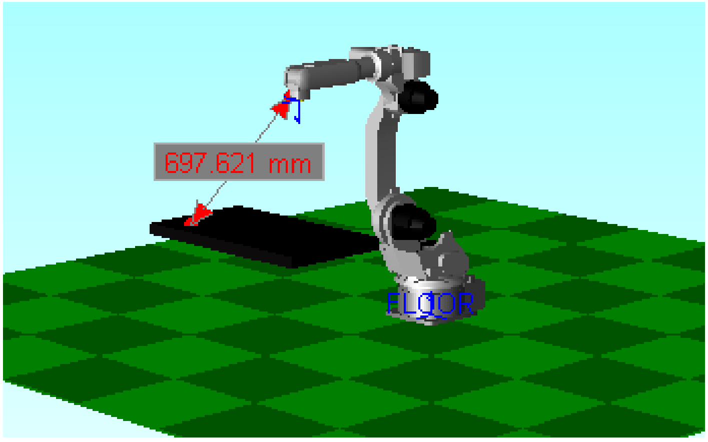
2. Click with the mouse any 3 points on models. (Blue dots on the clicked positions and blue lines joining the points will appear.) The Measure Angle dialog will display with the measurement results.

NOTE When clicking in an area the selected point depends on the current "Pick Mode" and "Pick Object" settings. Please refer to Section 6.4 "Pick Settings" for details.



6.10 Measure Line

With this command, a dimension line can be created as shown in the figure below.



■ Creating a Dimension Line

Procedure

1. On the [Home] tab, in the [Mesurement] group, click the [Measure Line] button.

2. Click a model and drag; a dimension line with two-headed arrow appears where the mouse is dragged across, displaying the dimension between the both ends.

NOTE

- Non-displayed model or the point where there is no model cannot be selected as a subject for the dimension line indication whereas any point of the model displayed on the window can be selected for the dimension indication.
- When clicking in an area the selected point depends on the current "Pick Mode" and "Pick Object" settings. Please refer to Section 6.4 "Pick Settings" for details.

■ Deleting a Dimension Line

Select a dimension to be deleted, and right-click it. Select {Delete} from the pop-up menu to delete the dimension with the dimension line.

■ Relocating a Dimension Line

Drag a note to a different location with on the [Home] tab, in the [Mesurement] group, click the [Measure Line] button.
Note that the arrow remains at the same point.

6.11 Changing the Rendering Mode

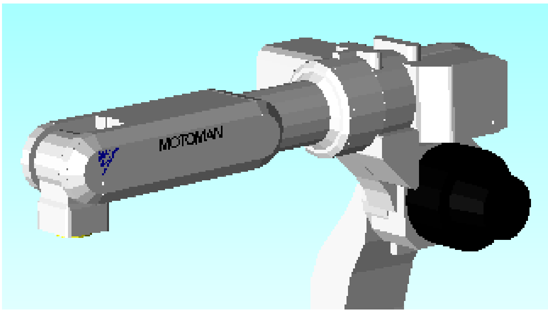
On the [Home] tab, in the [Screen] group, click the [Rendering Mode] button, the display mode can be change..

SUPPLE-MENT

- The cell is displayed in "GourandShading" mode when it is opened.
- For edition, select desired mode from "FlatShading", "GourandShading", or "Wireframe".

Flat Shading

The image displayed in flat shaded rendering mode:

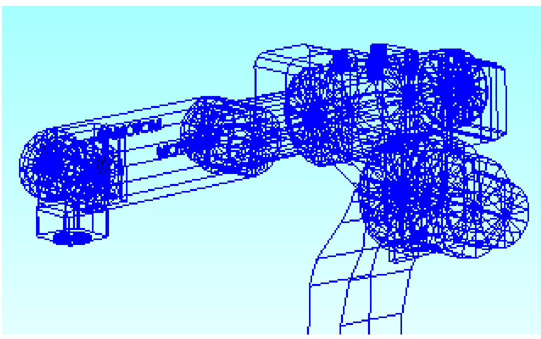


Gourand Shading

The image displayed in Gourand shaded rendering mode:

Wire Frame

The image displayed in wire frame:



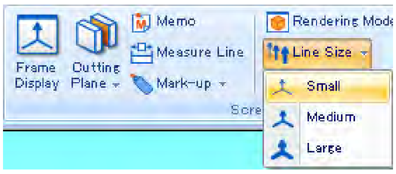
6.12 Other Display Operations

6.12.1 Changing Frame Width

Modify the frame line width for better visualization on the display.
Refer to Section 10.1.5 "Frame & AXIS6" to set the frame length.

Procedure

On the [Home] tab, in the [Screen] group, click the [Line Size] button,and select the frame width from {Small}, {Medium}, or {Large}.



6.12.2 Copying the Image

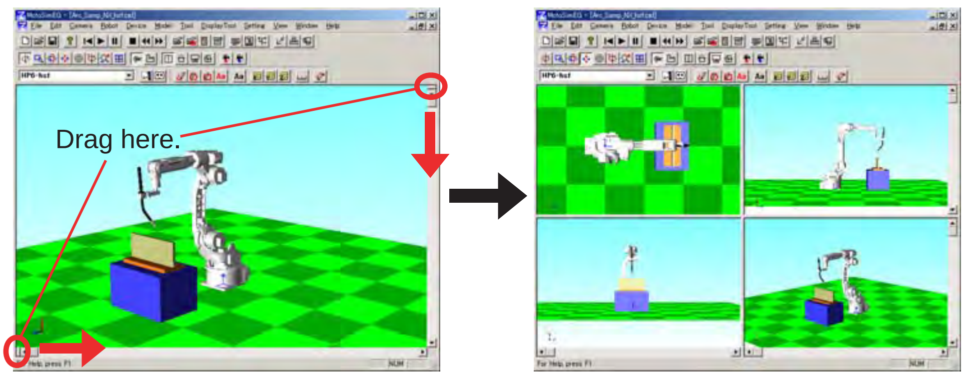
Copy the static image of the cell window: the copied data can be used in other application software by pasting it.

Procedure

Display the cell to be copied. On the [Home] tab, in the [Tools] group, click the [Copy] button, or hold down the Ctrl key and press the C key.

6.12.3 Dividing a Cell Window

A cell window can be divided up to four views by dragging a separator of the vertical or horizontal scroll bar in the cell window. This function provides users with different viewpoint angles, enabling teaching or playback operations viewed from several directions.



6.12.4 Printing the Image

MotoSim EG-VRC does not have any printing function.
On the [Home] tab, in the [Tools] group, click the [Copy] button, or hard-copy the screen (Alt + Print Screen), and paste it to another application.

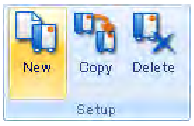
7 Controller and Robot Settings

MotoSim EG-VRC allows many robot and controller operations, such as adding, deleting, etc. This chapter describes operation related to setting controllers and robots

7.1 Adding a New Controller

A single controller may have one or more control group representing robot, base station or external stations. Then, there are 2 ways to create the environment. One is to recreate the system configuration in the MotoSim EG-VRC with the "CMOS.BIN" file saved from a real controller. The "CMOS.BIN" file contains all the information defining a controller and its robots. The other is to create the "CMOS.BIN" file in the MotoSim EG-VRC.

On the [Controller] tab, in the [Setup] group, click the [New] button, the new controller can be created.



There are 2 ways to proceed depending on the presence or absence of the "CMOS.BIN" file.

- If there is not the "CMOS.BIN" file (the "CMOS.BIN" file is created in the MotoSim EG-VRC), proceed to Section 7.1.1 "Create a New VRC Controller (no file)".
- If there is the "CMOS.BIN" file (the "CMOS.BIN" file is taken from a real controller), proceed to Section 7.1.2 "Create VRC Controller (using CMOS.BIN file.)".

NOTE In regard to the FS100 controller, the "CMOS.BIN" file saved from a real controller can not be used with MotoSim EG-VRC to create the environment.

Note that a controller that has already been created by MotoSim EG-VRC cell can be simply copied into the cell. To do so, please refer to Section 7.2 "Copying a Controller from another Cell".

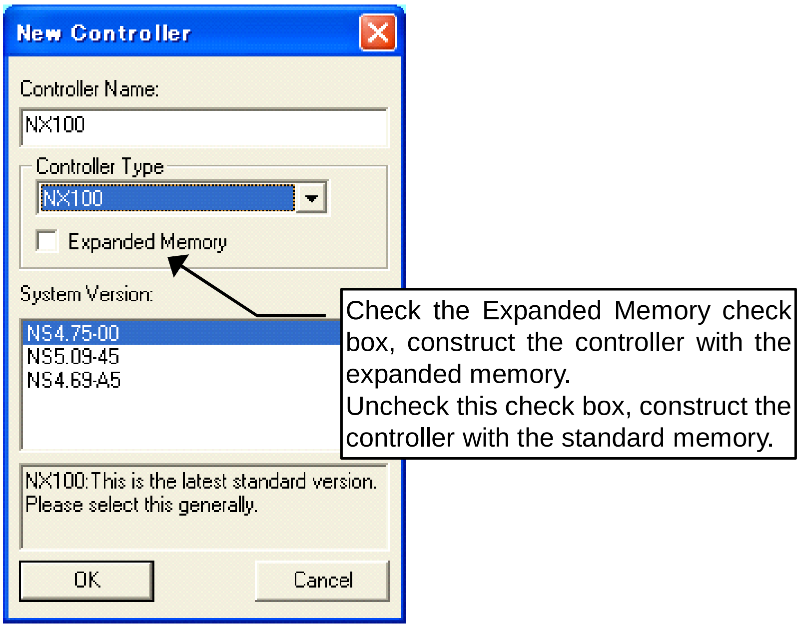
7.1.1 Create a New VRC Controller (no file)

Create a new controller and define a system in MotoSim EG-VRC.

Procedure

1. On the [Controller] tab, in the [Setup] group, click the [New] button. To display the "Create Controller" dialog. Select "New VRC Controller (no file)" and press the [OK] button.

2. The "New Controller" dialog box appears. Select the controller type and then the system version from the list below. If desired you may change the default name for the controller. Click the "OK" button.

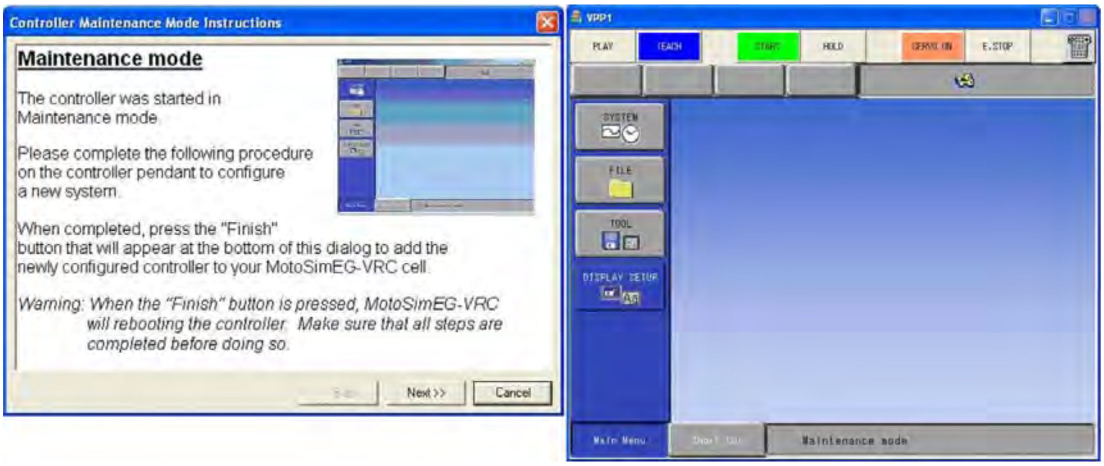


NOTE

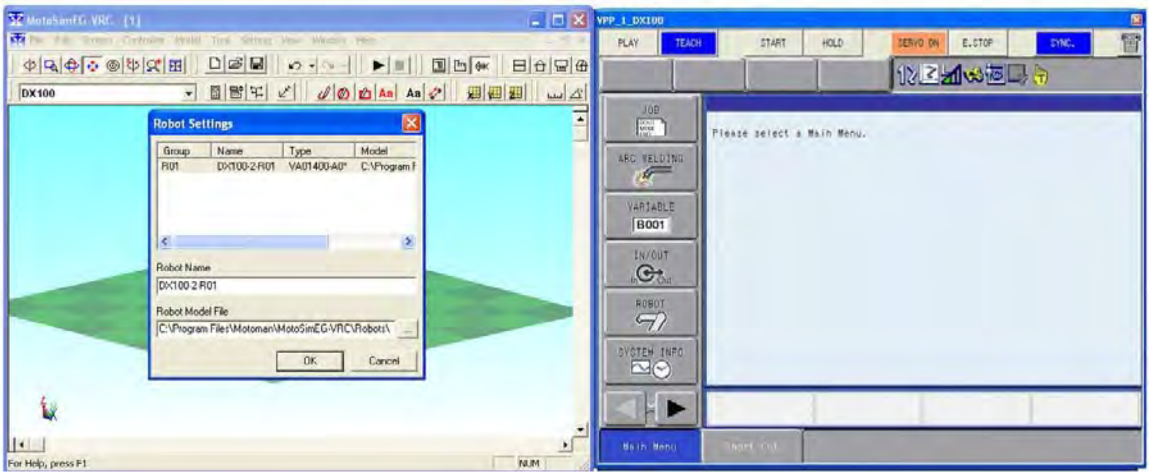
- When ECD80D-A00 (NX100) is registered, select the following controller certainly. That robot model is only used with the following controller system version.
  [Controller Type] NX100
  [System Version] NS 4.69-A5
- The expanded memory option is not supported for the FS100 controller.

3. The controller will launch with the selected system version and display the Virtual Pendant in maintenance mode. (This may take a few moments.) At the same time, the “Controller Maintenance Mode” Instruction Guide will appear.
   Since there is no CMOS.BIN file, it is necessary to initialize the controller with the Virtual Pendant in order to define the system (language, robot, application...).
   To do so:
   - Initialize the controller
   - Once the controller initialization is completed, click on the “Finish” button of the Instruction Guide to reboot.

   For details how to proceed to set initialize the controller, follow the procedure described in the “Instruction Guide” or refer to Section 7.1.3 "Initializing the Controller (DX200, DX100, NX100)" that follow later in this chapter.



4. The Virtual Pendant will close and reboot in normal mode. (This may take a few moments.) The “Robot Setting” dialog will display. A default robot name and model file should be pre-entered. If required, enter a name for the robot and select a robot model file corresponding to the robot type. (In the example below, the robot model is “VA01400-A00” the corresponding model is “VA01400-A00.mdl”.) Robot models are found in the “Robot” folder under MotoSimEG-VRC install folder. Click the [OK] button.



5. The robot will display with the selected model file.

NOTE

When initialized the robot controller, MotoSim EG-VRC set the absolute data automatically. So absolute setting is not needed in MotoSim EG-VRC.
Refer to Section 7.1.4 "Initializing the Controller (FS100)" for details.

7.1.2 Create VRC Controller (using CMOS.BIN file.)

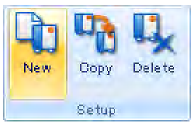
Reproduce an existing system composition in MotoSim EG-VRC using the "CMOS.BIN" file saved from a real system.

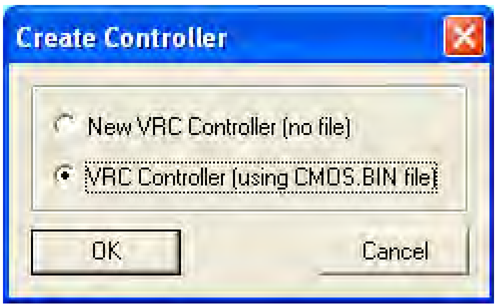
NOTE

In regard to the FS100 controller, the "CMOS.BIN" file saved from a real controller can not be used with MotoSim EG-VRC to create the environment.

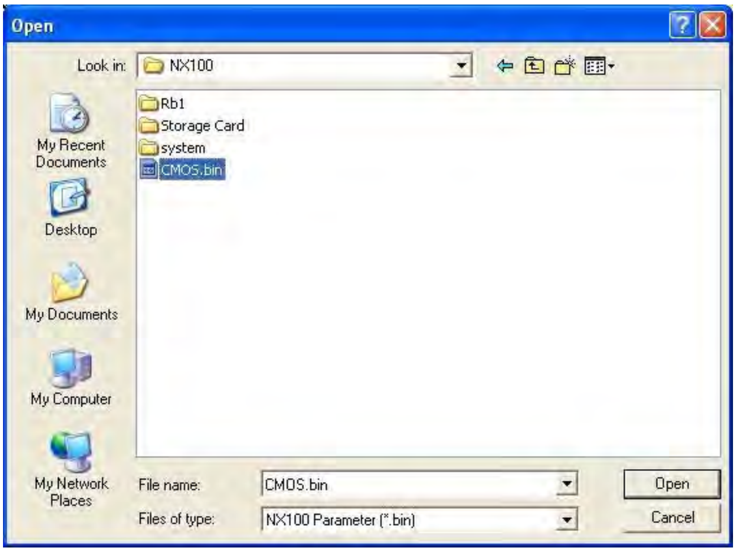
Procedure

1. On the [Controller] tab, in the [Setup] group, click the [New] button. To display the "Create Controller" dialog. Select "VRC Controller (using CMOS.BIN file)" and press the [OK] button.

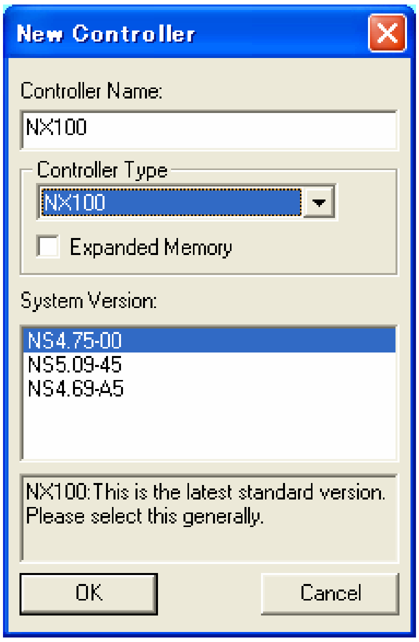




2. The “Open” dialog box appears. Select the CMOS.BIN file to be used to create the controller, and click [Open].



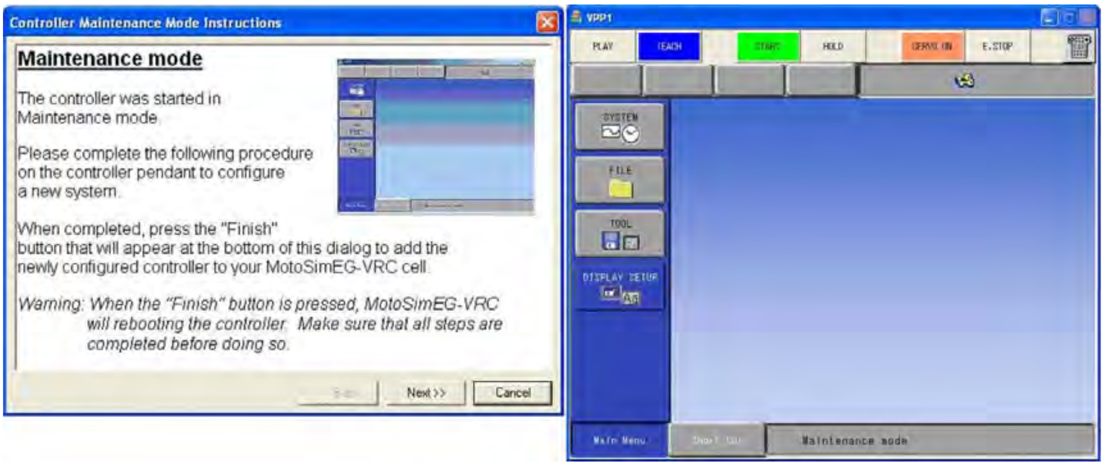
3. The "New Controller" dialog box appears. Select the controller type and then the system version from the list below that corresponds to the version of system from which came the "CMOS.BIN" selected in step 2. If desired you may change the default name for the controller. Click the "OK" button.



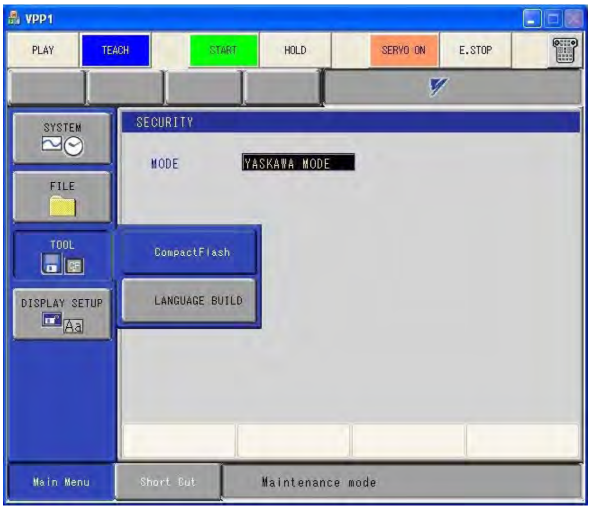
NOTE

When ECD80D-A00 (NX100) is registered, select the following controller certainly.
That robot model is only used with the following controller system version.
[Controller Type] NX100
[System Version] NS 4.69-A5

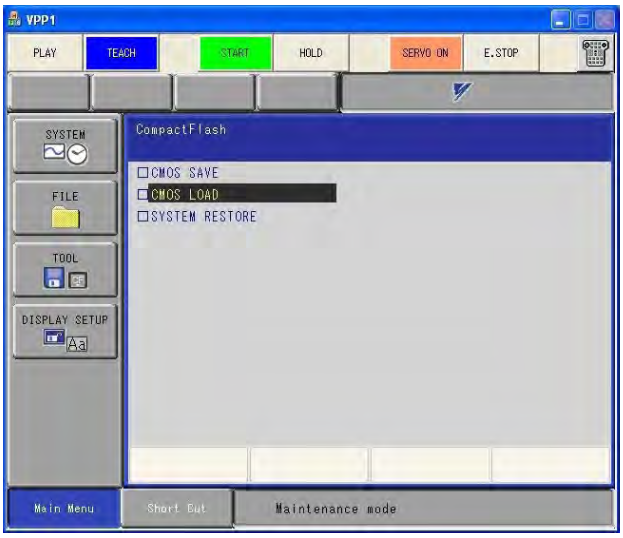
4. The controller will launch with the selected system version and display the Virtual Pendant in maintenance mode. (This may take a few moments.) At the same time, the “Controller Maintenance Mode” Instruction Guide will appear.



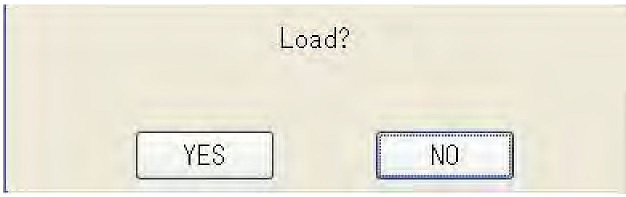
5. From the virtual pendant main menu, select [TOOL] - [Compact Flash] to load the CMOS.BIN data.



6. Move the cursor to select "LOAD CMOS" and press the [space] key or click [Select].

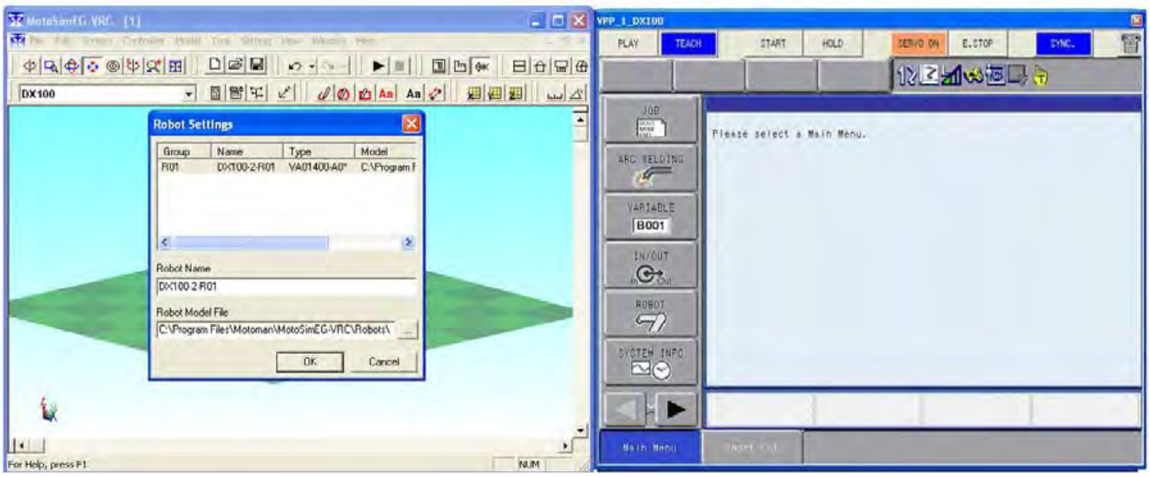


7. A confirmation dialog box will appear, select [Yes] to start loading the CMOS data.

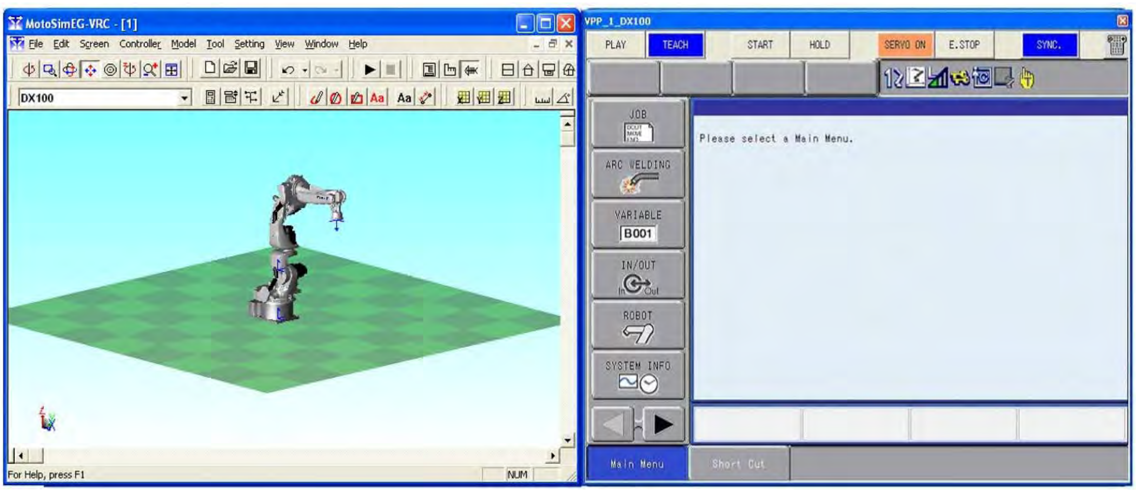


This may take a few moments and warning message, indicating not to turn off the controller, appears at the bottom of the Virtual Pendant. Wait until the message disappears before proceeding to another operation that may cause the controller to reboot or close.

8. Once the controller CMOS load is completed, click the [Finish] button from the [Controller Maintenance Mode Instruction] dialog.
9. The Virtual Pendant will close and reboot in normal mode. (This may take a few moments.) The “Robot Setting” dialog will display. A default robot name and model file should be pre-entered. If required, enter a name for the robot and select a robot model file corresponding to the robot type. (In the example below, the robot model is “VA01400-A00” the corresponding model is “VA01400-A00.mdl”.) Robot models are found in the “Robot” folder under MotoSimEG-VRC install folder. Click the [OK] button.



10. The robot will display with the selected model file.

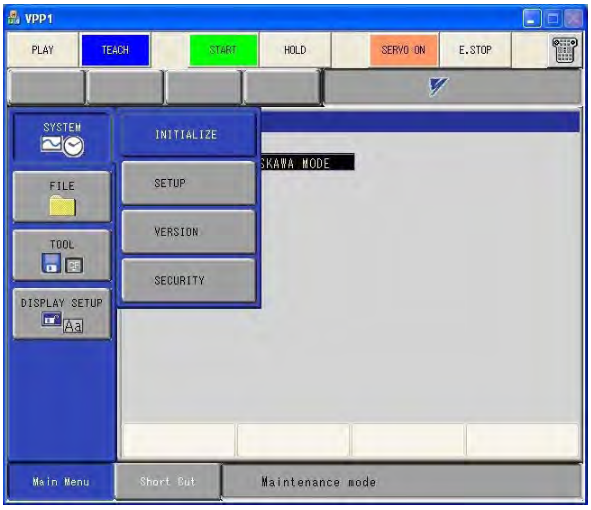


7.1.3 Initializing the Controller (DX200, DX100, NX100)

Using the virtual pendant in maintenance mode, the system of controller (language, robot, application…) can be set.

Procedure

1. Select {SYSTEM} - {INITIALIZE} from the main menu.



NOTE A series of configuration screen will display to configure the controller. Press [ENTER] to go to the next screen. Press the [Esc] key on the keyboard or [CANCEL] on the pendant keypad to go back to the previous screen.

NOTE To change a field, move the cursor over that field with the arrow keys and then select it by pressing the [Space] key on the keyboard or by clicking the [Select] button on the pendant keypad. Depending on the field, either select a value from the list of choices; or enter the required value and press [ENTER] to register the value.

2. In the “LANGUAGE” screen, select a language for LANGUAGE1 and LANGUAGE2.

NOTE The Virtual Pendant interface can change between the set languages by pressing the [SHIFT] key on the keyboard and clicking the [AREA] key on the pendant keypad.

3. In the “CONTROL GROUP” screen, define the control groups by selecting the manipulator connecter to the each group. “R” groups are for robot, “B” groups are for robot base station and “S” groups are for external axis devices. When the selection is complet, press [ENTER] to go to the next screen.

NOTE

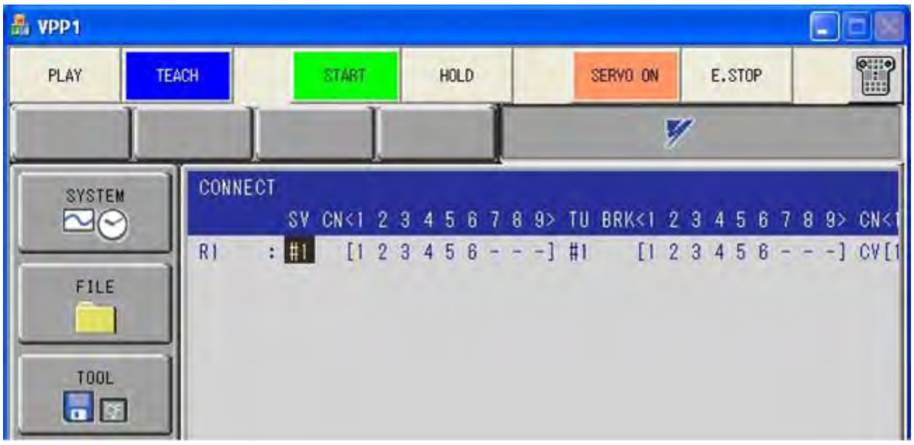
• The robot models supported by MotoSim EG-VRC are those displayed on the virtual pendant for the controller version selected at the time of creation. Please refer to Section A.7 "List of Manipulator Models and Offset Values Supported by MotoSim EG-VRC" for the list of available model. However, for similar robot model that only have differences in the details of their shape, it maybe possible to do simulation using the standard robot model (model ending with A0*).

• When ECD80D-A00 (NX100) is registered, select the following controller certainly. That robot model is only used with the following controller system version.

[Controller Type] NX100

[System Version] NS 4.69-A5

4. The “CONNECT” screen doesn’t need any change. Press [ENTER] to go to the next screen.



5. In the “APPLICATION” screen, select the application that correspond best to what the robot will be doing.

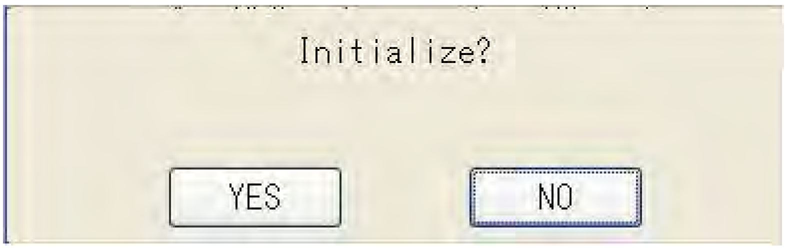
6. The “OPTION BOARD” screen doesn’t need any change. Press [ENTER] to go to the next screen.

7. The “I/O MODULE” screen is only for confirmation and I/O modules selection cannot be changed at this step. Press [ENTER] twice to go to the next screen. To add I/O modules please refer to Section 11.4 "Adding I/O Board Module".

8. The “CMOS MEMORY” screen cannot be modified. Press [ENTER] to go to the next screen.

9. The “DATE/TIME SET” screen cannot be modified. Press [ENTER] to go to the next screen.

10. A confirmation dialog box will appear, select [YES] to start initializing the CMOS data. Then, the message "Initializing system data. Don't turn the power off." is displayed at the bottom of the virtual pendant. Don't operate anything while that message is displayed. If the initialization is finished, the message is changed to "Maintenance Mode".

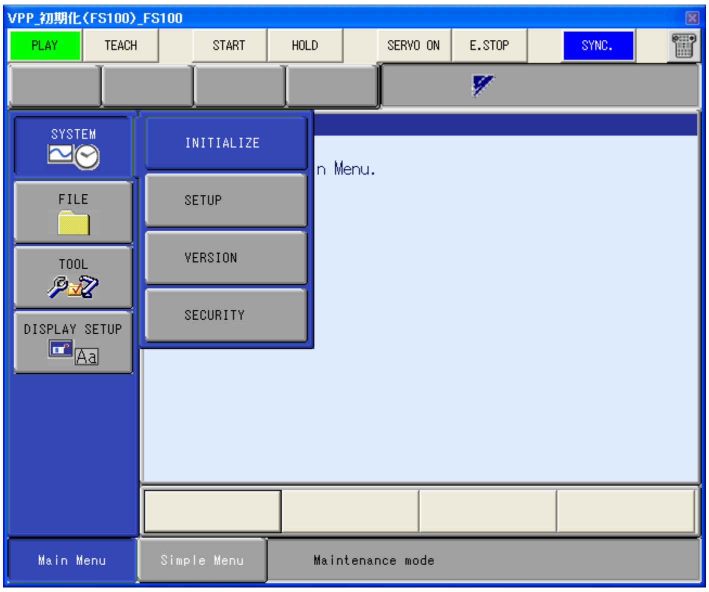


7.1.4 Initializing the Controller (FS100)

Using the virtual pendant in maintenance mode, the system of controller (language, robot, application…) can be set.

Procedure

1. Select {SYSTEM} - {INITIALIZE} from the main menu.

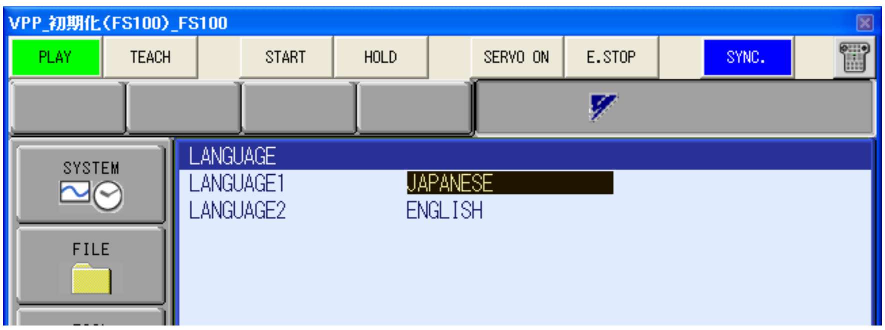


NOTE A series of configuration screen will display to configure the controller. Press [ENTER] to go to the next screen. Press the [Esc] key on the keyboard or [CANCEL] on the pendant keypad to go back to the previous screen.

NOTE To change a field, move the cursor over that field with the arrow keys and then select it by pressing the [Space] key on the keyboard or by clicking the [Select] button on the pendant keypad. Depending on the field, either select a value from the list of choices; or enter the required value and press [ENTER] to register the value.

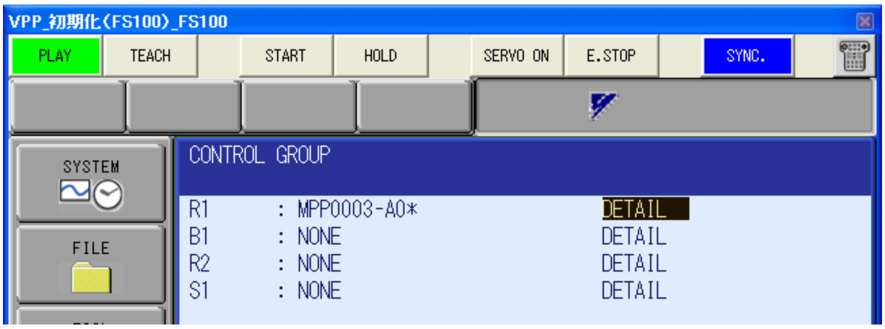
2. In the "LANGUAGE" screen, select a language for LANGUAGE1 and LANGUAGE2.

   When the selection is completed, press [ENTER] to go to the next screen.



NOTE The Virtual Pendant interface can change between the set languages by pressing the [SHIFT] key on the keyboard and clicking the [AREA] key on the pendant keypad.

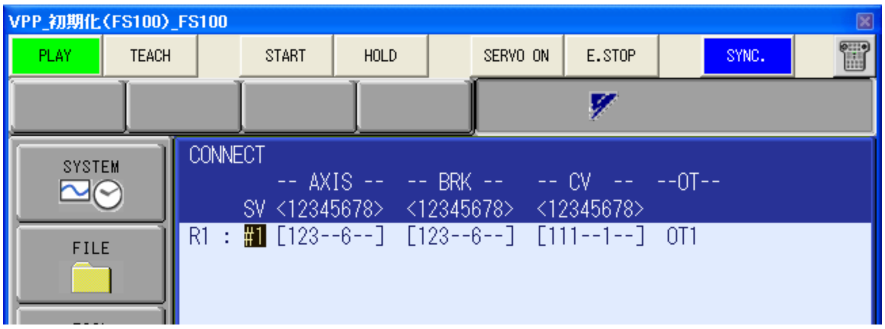
3. In the "CONTROL GROUP" screen, define the control groups by selecting the manipulator connecter to the each group. "R" groups are for robot, "B" groups are for robot base station and "S" groups are for external axis devices. When the selection is completed, press [ENTER] to go to the next screen.



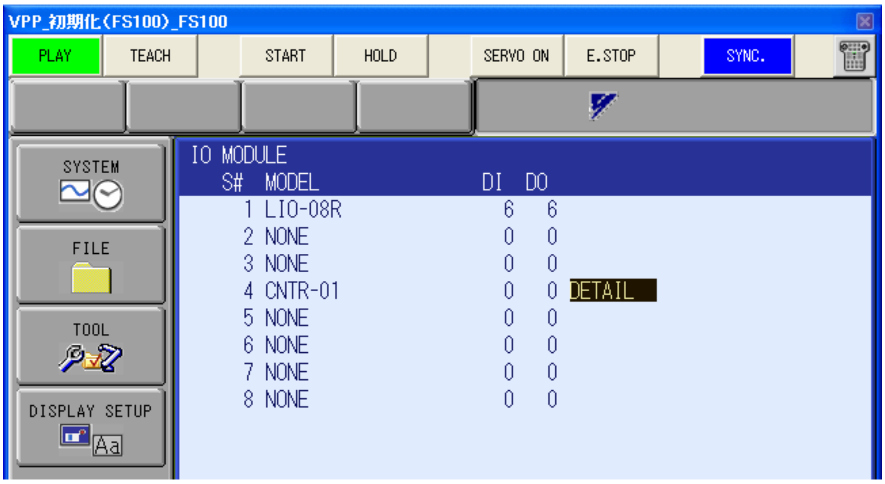
NOTE

The robot models supported by MotoSim EG-VRC are those displayed on the virtual pendant for the controller version selected at the time of creation. Please refer to Section A.7 "List of Manipulator Models and Offset Values Supported by MotoSim EG-VRC" for the list of available model. However, for similar robot model that only have differences in the details of their shape, it maybe possible to do simulation using the standard robot model (model ending with A0*).

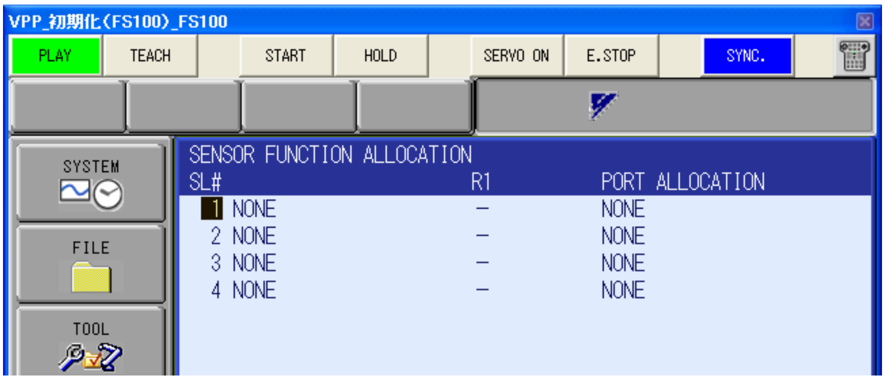
4. The "CONNECT" screen doesn't need any change. Press [ENTER] to go to the next screen.



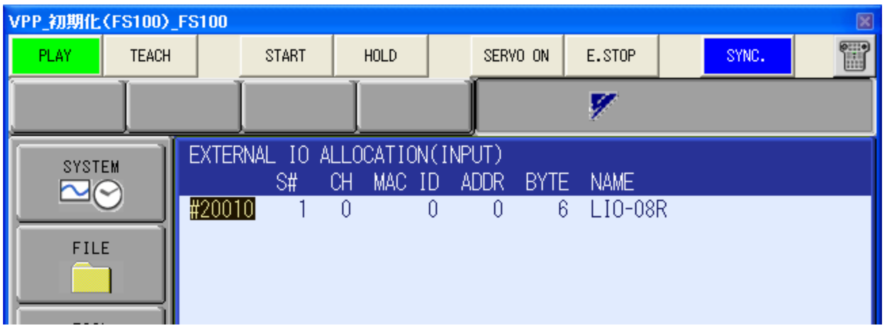
5. The "IO MODULE" screen doesn't need any change. Press [ENTER] to go to the next screen.



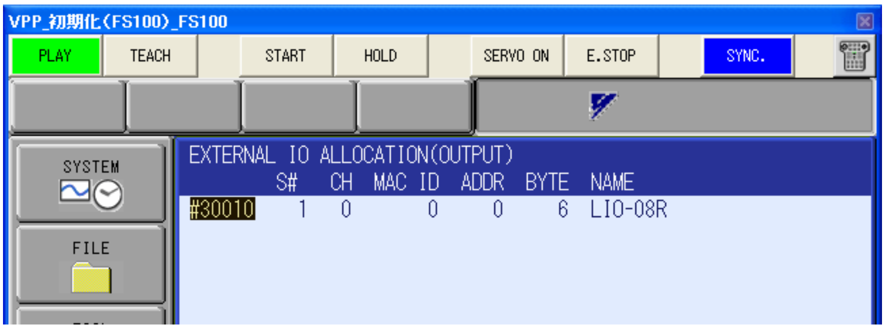
6. The "SENSOR FUNCTION ALLOCATION" screen doesn't need any change. Press [ENTER] to go to the next screen.



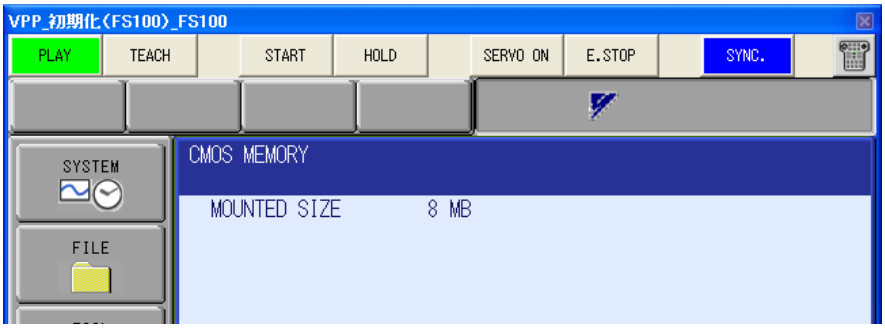
7. The "EXTERNAL IO ALLOCATION(INPUT)" screen doesn't need any change. Press [ENTER] to go to the next screen.



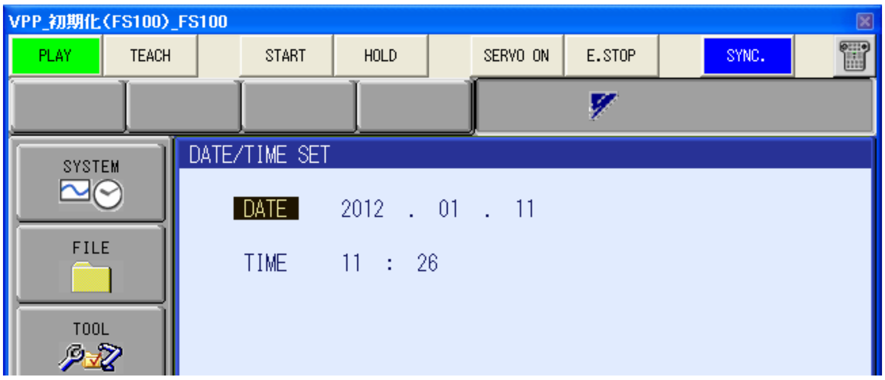
8. The "EXTERNAL IO ALLOCATION(OUTPUT)" screen doesn't need any change. Press [ENTER] to go to the next screen.



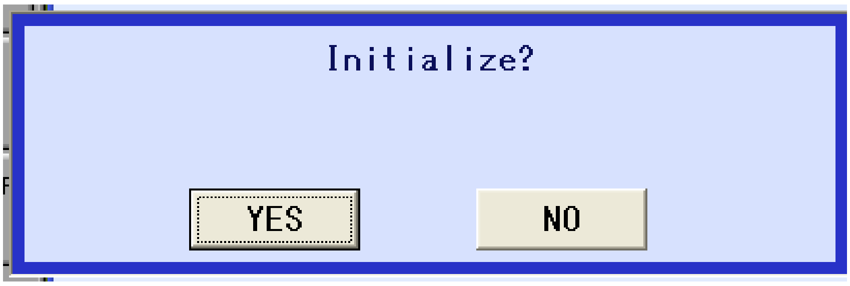
9. The "CMOS MEMORY" screen doesn't need any change. Press [ENTER] to go to the next screen.



10. The "DATE/TIME SET" screen doesn't need any change. Press [ENTER] to go to the next screen.



11. A confirmation dialog box will appear, select [YES] to start initializing the CMOS data. Then, the message "Initializing system data. Don't turn the power off." is displayed at the bottom of the virtual pendant. Don't operate anything while that message is displayed. If the initialization is finished, the message is changed to "Maintenance Mode"



7.1.5 Defining the Robot Home Position

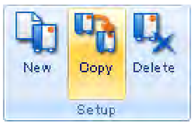
When initialized the robot controller, MotoSim EG-VRC set the absolute data automatically. So absolute setting is not needed in MotoSim EG-VRC. (This setting should be needed in real robot.)

7.2 Copying a Controller from another Cell

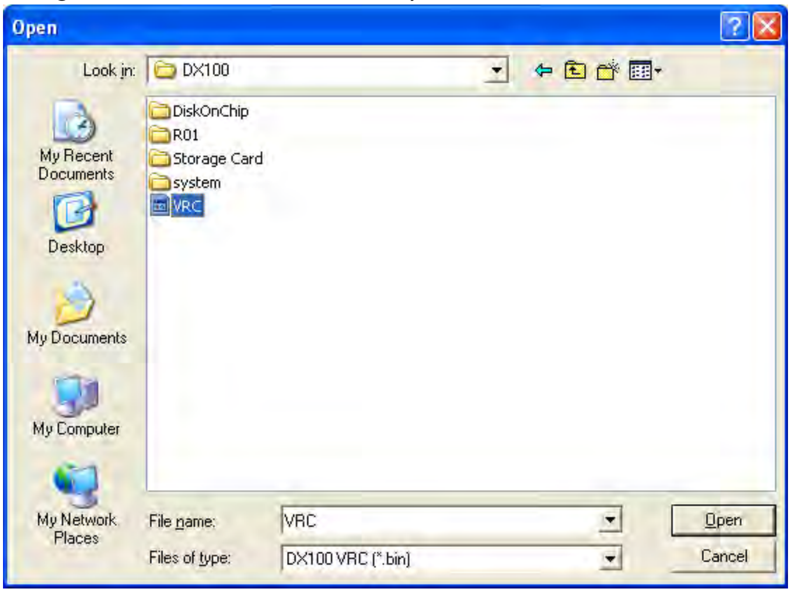
A controller already define in a MotoSimEG-VRC cell can be copied over to another cell.

Procedure

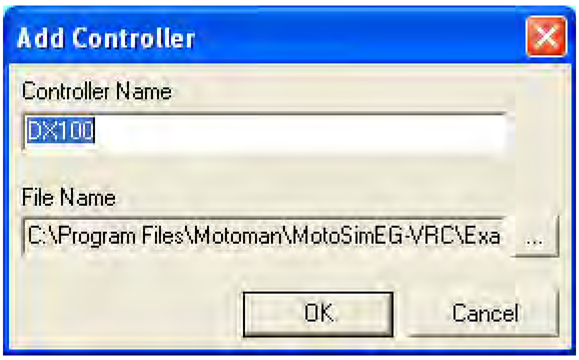
1. On the [Controller] tab, in the [Setup] group, click the [Copy] button.



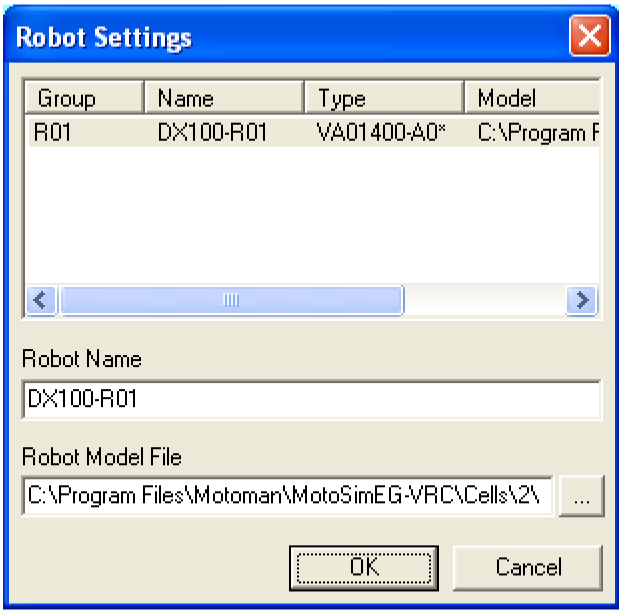
2. The “Open” dialog box appears. Select the VRC.BIN file located in the controller folder (folder bearing the name of the controller) of a MotoSimEG-VRC cell, and click [Open].



3. The “Add Controller” dialog box appears. Enter a name for the controller. The “File Name” field already contains the path to the VRC.BIN selected in step 2 above. Click [OK]. The controller and robot files will be copied over to the current cell folder and the controller will boot in normal mode. This may take a few moments.



4. When the controller has completed its boot up, the “Robot Setting” dialog will display. Default robot name and model file should be pre-entered. If required, they may be modified. Click the [OK] button.



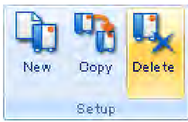
5. The robot will display with the selected model file.

7.3 Deleting a Controller

To delete the controller and its associated robots from a cell, follow the procedure below.

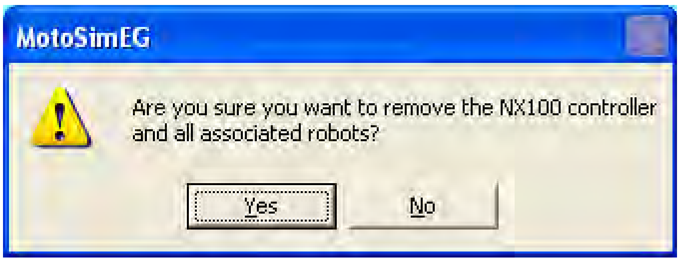
Procedure

1. On the [Controller] tab, in the [Setup] group, click the [Delete] button.



2. The “Select Controller/Robot” dialog box appears. Select the controller to be deleted, then click on [OK].

3. The confirmation message below will appear. Select [Yes] to remove the controller from the cell.

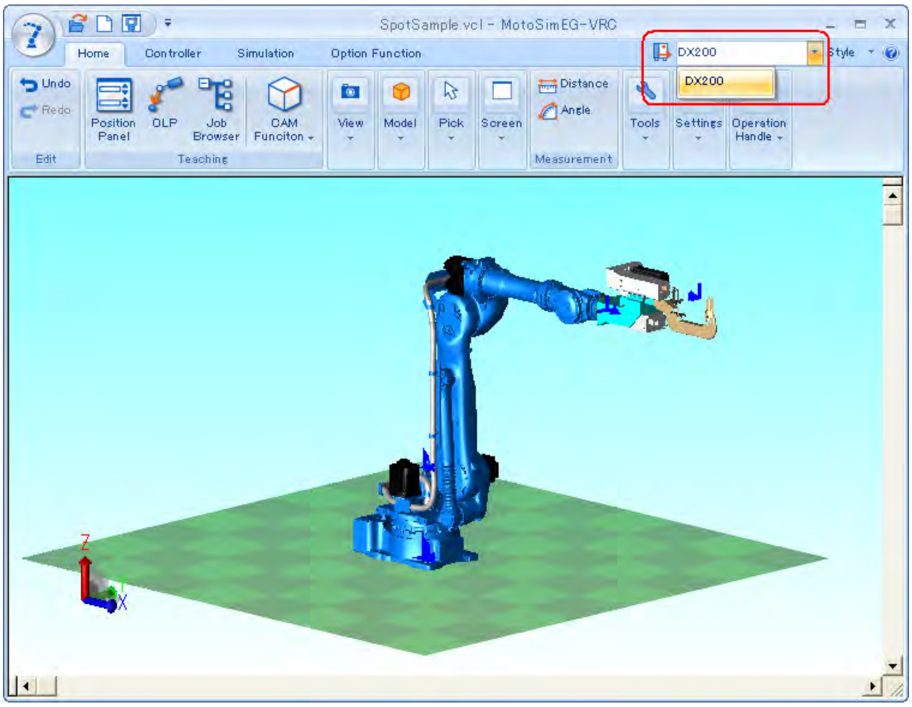


NOTE

The controller is removed from the cell but its corresponding folder and files are not deleted from the cell folder.
A delete controller may be added later on by using the “Copy Controller...” menu. (For details refer to Section 7.2 "Copying a Controller from another Cell")

7.4 Select Controller

A cell always have an active controller .
Simply click on the down arrow to display the list of controllers and select the desired controller. (See figure below)



7.5 Controller Setting

7.5.1 Tool Editor

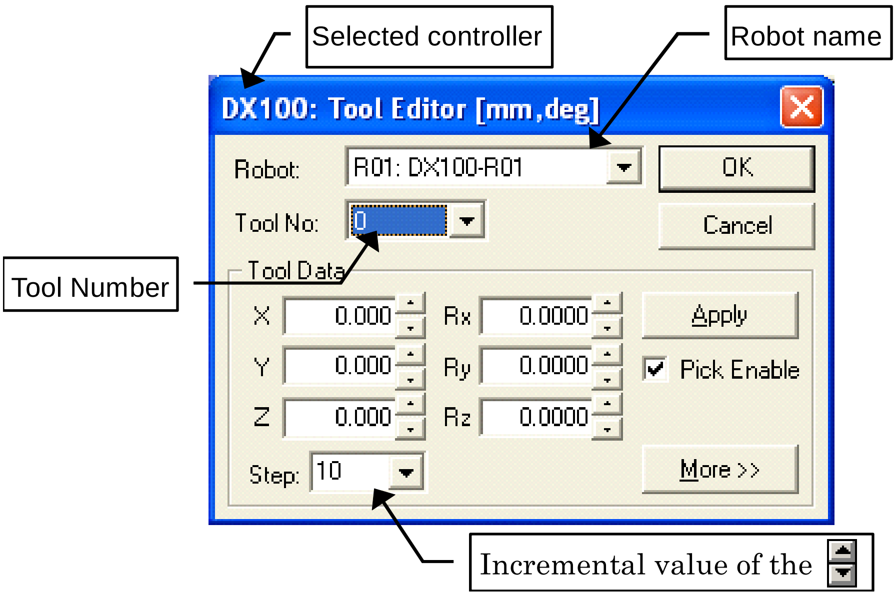
The Tool Editor is used to select the active tool and to modify the tool data.
On the [Controller] tab, in the [File Settings] group, click the [Tool Data] button, the [Tool Editor] dialog appear.

Select the tool number, and then, if required, modify the tool data by using the spin button at the side of each edit box or entering a value directly. The tool data can also be changed by checking the [Pick Enable] check box and clicking in the cell window.

NOTE

- In a cell with multiple controllers, it is necessary to select the controller to edit with the ribbon  before opening the Tool Editor dialog box.
- In order to change the Tool No., the controller must be set to operate with multiple tools. Use the following parameter to activate the multiple tool function on the controller:
  - DX200, DX100, FS100
    - S2C431: Tool number change (0: Single tool, 1: Multiple tool)
  - NX100 S2C333: Tool number change (0: Single tool, 1: Multiple tool)

  For more detail please refer to the "Tool Coordinates" of the controller "Operator's Manual".
- To change the tool selection and tool data using the virtual pendant, please refer to the "Tool Coordinates" of the controller "Operator's Manual".

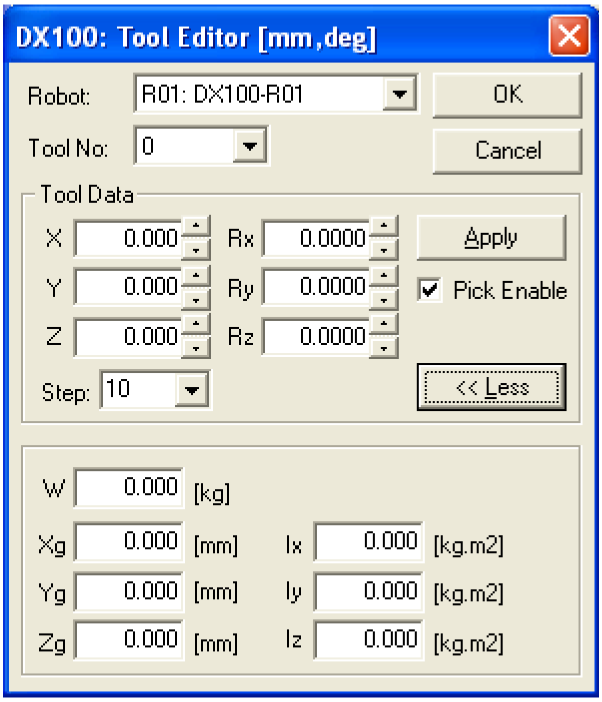


Tool Editor Dialog Box

Item	Description
[OK] button	Closes the dialog box after modifying the tool data.
[Cancel] button	Closes the dialog box without modifying the data to the new values.
[Apply] button	Modifies the tool data; does not close the dialog box.
[Pick Enable] check box	Enables mouse picking operation to move the tool center point to the clicked position. When clicking in an area the selected point depends on the current "Pick Mode" and "Pick Object" settings. Please refer to Section "6.4 Pick Settings" for details. Pressing the [Shift] key enables or disables the [Active] checkbox.
[Exp >>] button	Displays tool load information, enabling data setting.

■ Setting the Tool Load Information

Tool Editor dialog box extends to show the tool load information as follows when [Exp. >>] button is selected.

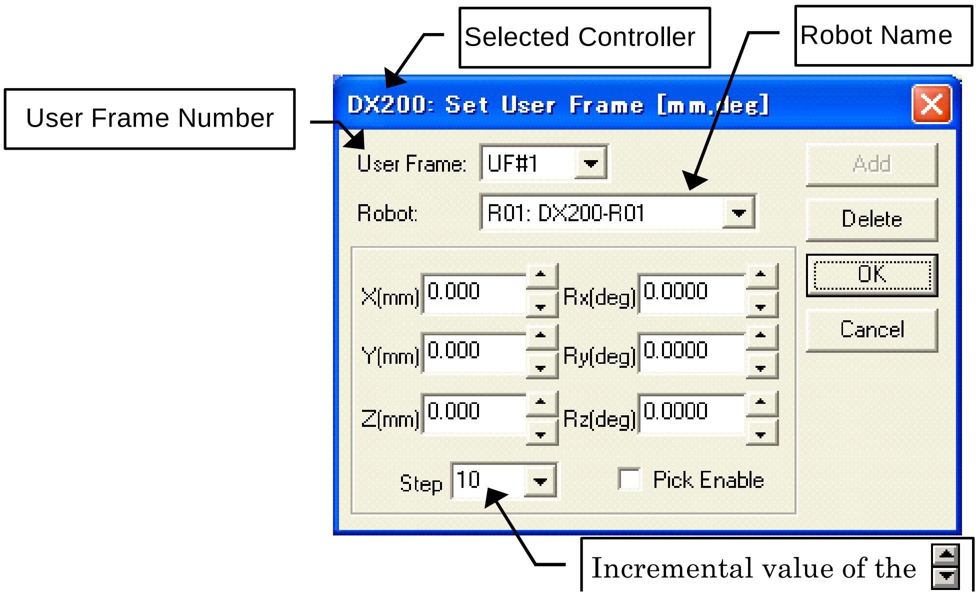


7.5.2 User Frame

The Set User Frame dialog box is used define user coordinate system or delete existing ones. On the [Controller] tab, in the [File Settings] group, click the [User Frame] button, the [Set User Frame] dialog appear.

NOTE

- In a cell with multiple controllers, it is necessary to select the controller to edit with the ribbon  before opening the Set User Frame dialog box.
- To change the user coordinate selection and the coordinate system definition using the virtual pendant, please refer to the "User Coordinates" of the controller "Operator's Manual".
- Master tool user coordinate can be edited the values only. New master tool user coordinate can not be created in this dialog. When select the existing master tool user coordinate, robot name is gray out.



Set User Frame Dialog Box

Item	Description
[Add] button	Create a coordinate system for the selected user frame number.
[Delete] button	Delete the coordinate system of the selected user frame number.
[Pick Enable] check box	Enables mouse picking operation to move the user frame to the clicked position. When clicking in an area the selected point depends on the current "Pick Mode" and "Pick Object" settings. Please refer to Section "6.4 Pick Settings" for details. Pressing the [Shift] key enables or disables the [Active] checkbox.
[OK] button	Closes the dialog box after confirming the overwrite of user frame.

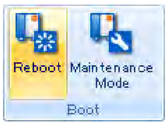
Set User Frame Dialog Box	
Item	Description
[Cancel] button	Closes the dialog box without modifying the data to the new values.

Procedure

1. Select the user frame number to be edited with the top left combobox.
2. If the selected UF#2 doesn't already exist, press to the [Add] button.
3. Check the [Active] checkbox, and then left-click with the mouse on the cell window to move the user frame to the clicked position.
4. If necessary, set the axis values to move the user frame.
5. Press [OK] to save the user frame settings.

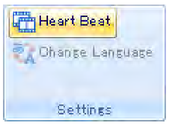
7.5.3 Reboot Controller

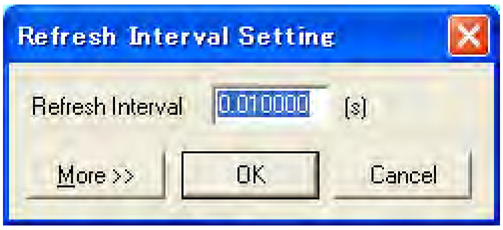
Some operation perform in the Virtual Pendant such as parameter changes may require to reboot the controller in order for the change to be affective.
On the [Controller] tab, in the [Boot] group, click the [Reboot] button,The controller can be rebooted.



7.5.4 Refresh Interval

The re-drawing interval at the playback is set every second (s).
During playback, the drawing time interval can be set in the "Refresh Interval" dialog box.
On the [Home] tab, in the [Settings] group, click the [Heart Beat] button,the [Refresh Interval] dialog appears.
The VRC sends position data to MotoSimEG-VRC for every segment (usually between 10 and 20 milliseconds). For animation purpose, the screen doesn't need to be refreshed so quickly. The refresh interval can be adjusted to optimize the playback visualization according to a specific computer capability.



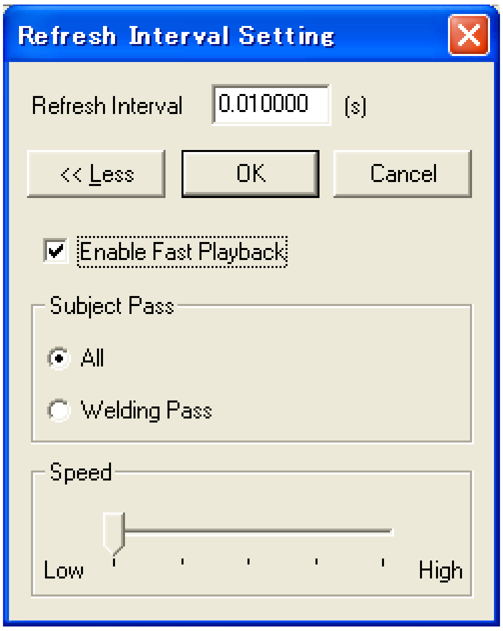


■ Setting of high-speed playback function

When [More >>] button is pushed, the high-speed playback set up information is displayed. The playback can be done at high speed by setting the high-speed playback function.

NOTE

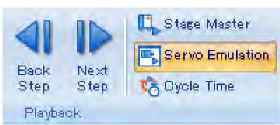
- The high-speed playback function is a function sped up by omitting the segment data. The effect might not become visible according to a set value at drawing intervals and computers that use it.
- Please do not use this function when you want to check the movement of every one segment on the pulse record.



Item	Description
[Enable Fast Playback] check box	The high-speed playback function is made effective.
[Subject Pass]	The section where the high-speed playback function is made effective is set. All : The function is made effective in all sections. Welding Pass : The function is made effective while welding (ARCON-ARCOF section).
[Speed]	The degree at the speed of the high-speed playback function is set by five stages.

7.5.5 Servo Emulation

To playback without considering the lag of servo, On the [Simulation] tab, in the [Playback] group, click the [Servo Emulation] button.

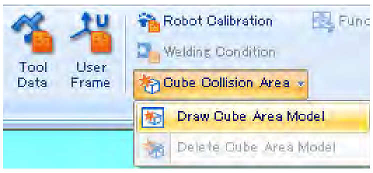


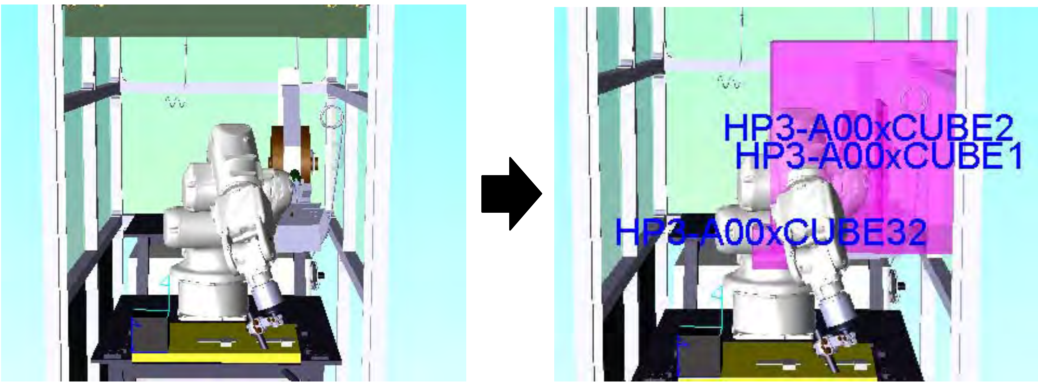
7.5.6 Cube Interference Area

Interference area can be define on the controller to determine if a robot is in a given cube or prevent the robot to enter the defined area.

■ Displaying the Cube Interference Area

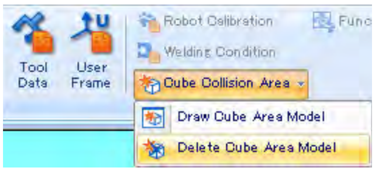
On the [Controller] tab, in the [File Settings] group, click the [Cube Interference Area] button and select [Draw Cube Area Model] , the defined interference cubes display.





■ Deleting the Cube Interference Area

On the [Controller] tab, in the [File Settings] group, click the [Cube Interference Area] button and select [Delete Cube Area Model] , the defined interference cubes display.
This will only delete the models, the cube area definition in the controller will not be affected.



■ Setting the Cube Interference Area

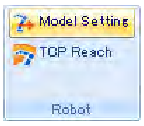
The cube interference areas can be defined by using the Virtual Pendant. Please refer to the "INSTRUCTIONS" of the controller for the procedure.

> **NOTE** If the cube areas are already displayed and the cube definitions are changed, the cube model in MotoSimEG-VRC will not automatically be updated.
> After modifying the cubes with the Virtual Pendant, the {Cube Area Update & Display} menu need to be selected in order to update the MotoSimEG-VRC display.

7.6 Robot Settings

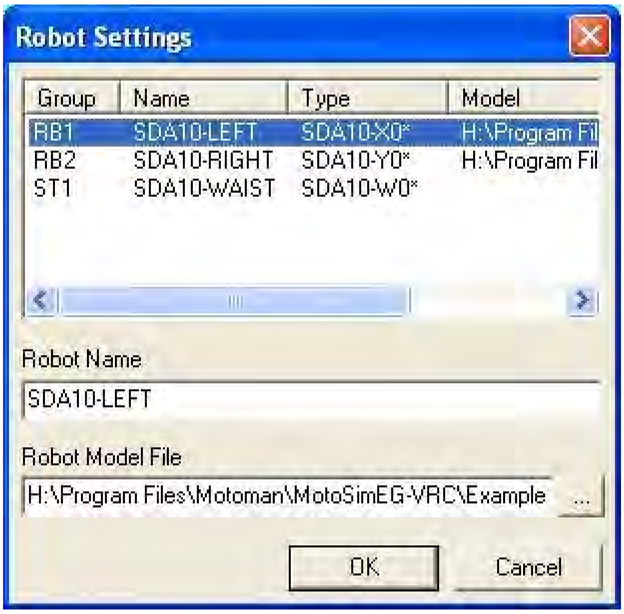
7.6.1 Robot Property

The “Robot Property” diaog can be used to change the robots name and their model files. On the [Controller] tab, in the [Robot] group, click the [Model Setting] button, the [Robot Settings] dialog appears.



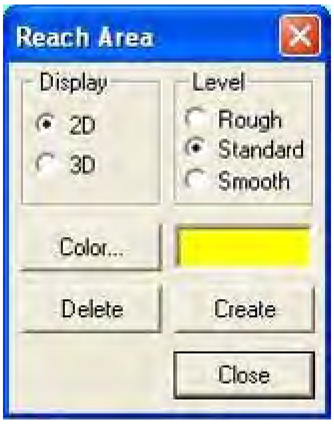
Procedure

1. Select a robot from the robot list. Its name and model file will display in the corresponding field in the section below the robot list.
2. Edit the robot name or select a new model file.
3. If multiple changes are required, repeat the above steps. As new selections are made the data in the robot list will be updated.
4. When all the changes have been entered, press the “OK” button to apply those changes and close the “Robot Settings” dialog. Or, press “Cancel” to discard the changes.



7.6.2 Reach View

The motion range of the robot P-point (wrist rotation center) can be displayed in 2D or 3D.
To create or delete Reach View models,
On the [Controller] tab, in the [Robot] group, click the [TCP Reach] button, the [Reach Area] dialog appears.



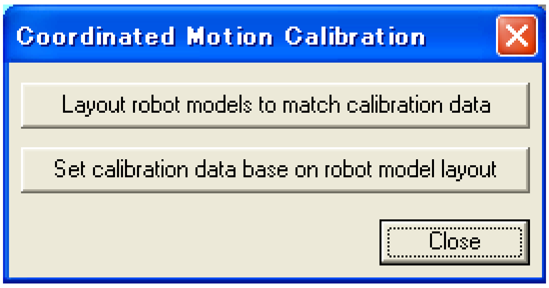
Reach Area Dialog Box

Item	Description
“Disp” section	Specifies display style for range of motion. (For some robot models, 3D display is not available.) • [2D] radio button: displays range of motion in 2D style. • [3D] radio button: displays range of motion in 3D style. NOTE Motion Range can be displayed in both 2D and 3D style simultaneously: Select 2D and press the [Create] button; then select 3D, change color (optional) and press [Create] again.
“Level” section	Selects display level (rough/standard/fine) of range of motion.
[Color] button	Displays Color dialog box to specify colors.
[Delete] button	Deletes the previously created Reach View models.
[Create] button	Creates a Reach View model of the specified style representing the range of motion of the cell active robot.
[Close] button	Closes Reach Area dialog box.

7.6.3 Robot Calibration Setting

The robot calibration data define the relative position between robots and stations of a same controller. This information is necessary to use the “Coordination Motion” function of the controller. In order for MotoSimEG-VRC to properly display the coordinated motion between robots/stations, the controller calibration data and robot/station model layout must correspond to each other.

To adjust the controller calibration and robot/station model layout to correspond to each other, display the “Coordinated Motion Calibration” dialog by selecting: on the [Controller] tab, in the [File Setting] group, click the [Robot Calibration] button.



“Coordinated Motion Calibration” Dialog Box

Item	Description
Layout robot models to match calibration data	Adjusts the relative position between the robot/station models to match the calibration data of the controller. NOTE The calibration data must be define in the controller before using this function.
Set calibration data base on robot model layout	Sets the calibration data of the controller based on the relative position between the robot/station models in the MotoSimEG-VRC layout.
[Close] button	Closes the “Coordinated Motion Calibration” dialog box.

NOTE The “Calibration” menu item is only available for controller with the “Coordinated Motion” option activated. In order to activate this function,please refer to the steps to set {OPTION FUNCTION} for each controller in the Section "11.6 Dual-Arm robot Setting".

7.7 Peripheral Equipment

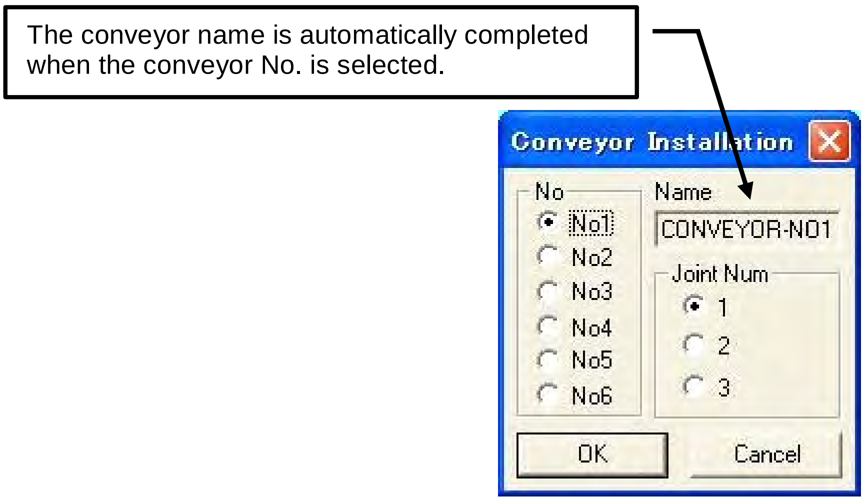
Peripheral Equipment or Device are considered as a RCS controllers. Their name appears in the Controller lists with the other controllers. They can be programmed to move in the same manner as a robot controller by creating jobs and then playing them back.
Three types of device are available: conveyor, press and gantry.

7.7.1 Adding a Conveyor

■ Adding a Conveyor

Conveyors are device that can be setup with 1 to 3 linear axis (X, Y, Z).
To add a conveyor to the cell. On the [Controller] tab, in the [External Device] group, click the [New] button, and select [Conveyor] the [Conveyor Installation] dialog appears.

NOTE Up to 6 conveyors can be added to a cell. The conveyor is registered as a controller with the name displayed in the "Name" edit box of the Conveyor Install dialog box. This name is determine by the selection of the conveyor number and cannot be changed.



Conveyor Installation dialog box

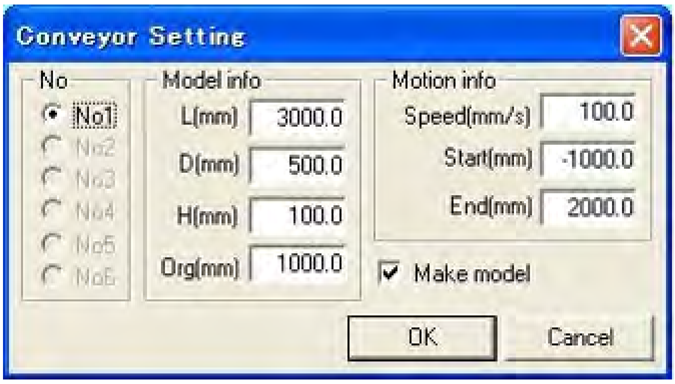
Item	Description
"No" section	Specifies the conveyor number.
"Joint Num" section	Specifies the number of axis by selecting one of the radio buttons.

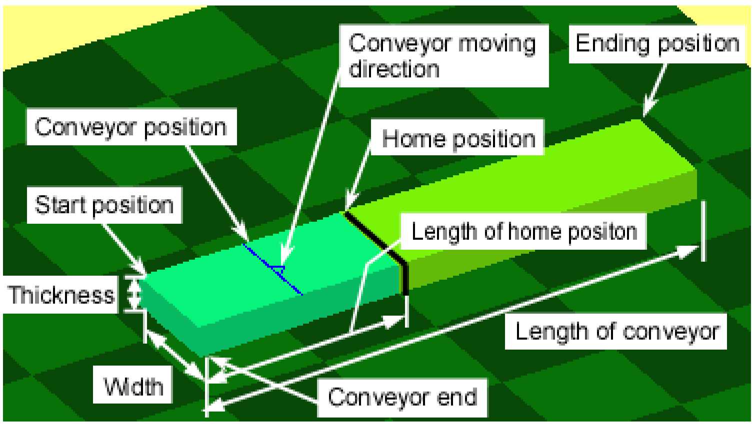
Conveyor Installation dialog box

Item	Description
[OK] button	Adds the conveyor to the cell and then displays the “Conveyor Setting” dialog box. Refer to Section "7.7.1 Adding a Conveyor" for details.

■ Conveyor Setting

Specify the dimensions, speed, and operating range of the conveyor to be registered in the Edit Conveyor Information dialog box.
This dialog is automatically displayed when a new conveyor is installed. It can also be displayed afterward to modify the conveyer settings by selecting:
On the [Controller] tab, in the [External Device] group, click the [Conveyor Setting] button.





Conveyor Setting dialog box

Item	Description
"No" section	Specifies the conveyor number to set the condition.

<table>
<tr><th colspan="2">Conveyor Setting dialog box</th></tr>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>"Model info" section</td><td>Specifies the dimensions of the conveyor to be registered.
<table>
<tr><td>"L(mm)" edit box</td><td>Entire length of the conveyor.</td></tr>
<tr><td>"D(mm)" edit box</td><td>Width of the conveyor.</td></tr>
<tr><td>"H(mm)" edit box</td><td>Thickness of the conveyor. (Distance from the floor to the conveyor top.)</td></tr>
<tr><td>"Org(mm)" edit box</td><td>Limit switch position for the conveyor home position. (Distance from the conveyor end.)</td></tr>
</table></td></tr>
<tr><td>"Motion info" section</td><td>Specifies the dimensions of the conveyor to be registered.
<table>
<tr><td>"Speed(mm/s)" edit box</td><td>Operation speed of the conveyor.</td></tr>
<tr><td>"Start(mm)" edit box</td><td>Start position of the conveyor operation. (Specify the distance from the home position of the conveyor.)</td></tr>
<tr><td>"End(mm)" edit box</td><td>End position of the conveyor operation. (Specify the distance from the home position of the conveyor.)</td></tr>
</table></td></tr>
<tr><td>[make model] check box</td><td>Creates a default conveyor model.</td></tr>
</table>

NOTE

- When the default conveyor model is modified, clear the [make model] check box unless the default conveyor model is to be used. If the [make model] check box is not cleared, the modification for the model becomes invalid, and the model is restored to the default model.

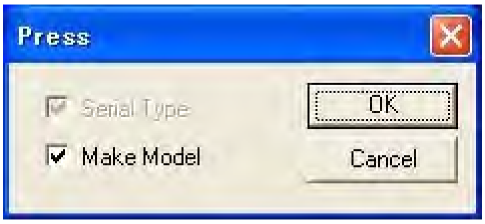
7.7.2 Adding a Press

Presses are device that have 3 linear axis (X, Y, Z). By default, only the Z-axis is enabled to move because the X and Y axes motion have been restrained by soft limits. To change the soft limit restriction please refer to the Section "7.7.4 Modifying the Soft Limit of a Device" .

To add a press to the cell. On the [Controller] tab, in the [External Device] group, click the [New] button, and select [Press] .

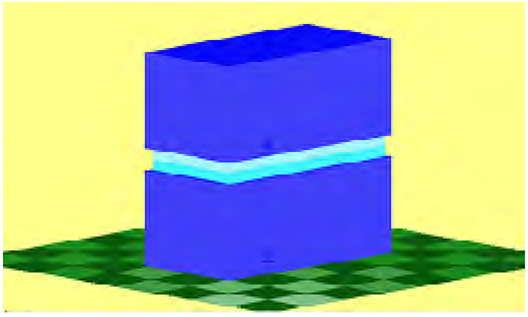
Procedure

1. On the [Controller] tab, in the [External Device] group, click the [New] button, and select [Press] the [Press] dialog appears.
   Select if the default press model is to be used or not by checking or unchecking the [Make Model] check box. (The [Make Model] check box is selected by default.)
   Press the [OK] button.



2. Enter the name of the press in the “Device Install” dialog, as shown in the figure below.
   Press the [OK] button.

3. The press is added to the cell and a model is automatically generated if the [Make Model] option was checked in the “Press” dialog.



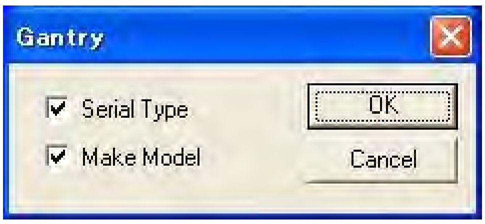
7.7.3 Adding a Gantry

A gantry device is composed of a “robot” model (RB1) with three linear axes (X, Y, Z) for the base and a “station” model (ST1) with three external rotation axes for the head (Rx, Ry, Rz). The control point (TCP) is thoroughly determined by the three rectangular linear axes, and is independent of the external axes.

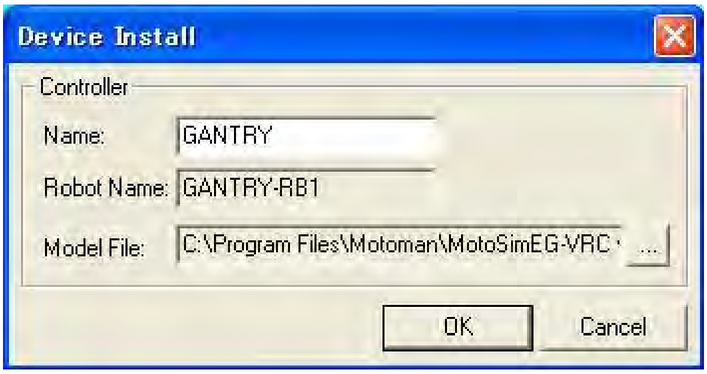
To add a gantry to the cell. On the [Controller] tab, in the [External Device] group, click the [New] button, and select [Gantry] .

Procedure

1. On the [Controller] tab, in the [External Device] group, click the [New] button, and select [Gantry] the [Gantry] dialog appears.
   Select the check box to specify if the following items in “Gantry” dialog box are required.
   [Series List] check box: Configuration of external rotation axis.
   (Checked: serial configuration; cleared: parallel configuration.)
   [Make Model] check box: Creation of a model. (Check the box if model creation is desired.)
   Note that both check boxes are selected by default.
   Press the [OK] button.



2. Enter the name of the gantry in the “Device Install” dialog, as shown in the figure below. Press the [OK] button.



3. The gantry is added to the cell and a model is automatically generated if the [Make Model] option was checked in the “Gantry” dialog.

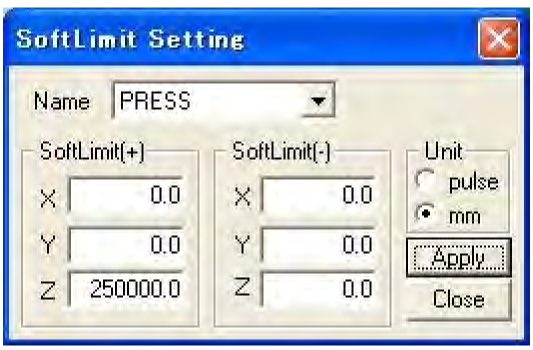
7.7.4 Modifying the Soft Limit of a Device

The motion range of device can be modified with the “Soft Limit Setting” dialog.

Procedure

1. On the [Controller] tab, in the [External Device] group, click the [Soft Limit] button, the [Soft Limit Setting] dialog appears.

2. Select the device to be edited from the “Name” combobox.
   Note that when a gantry device is selected, the dialog expand to also display settings for the Rx, Ry, Rz axes.



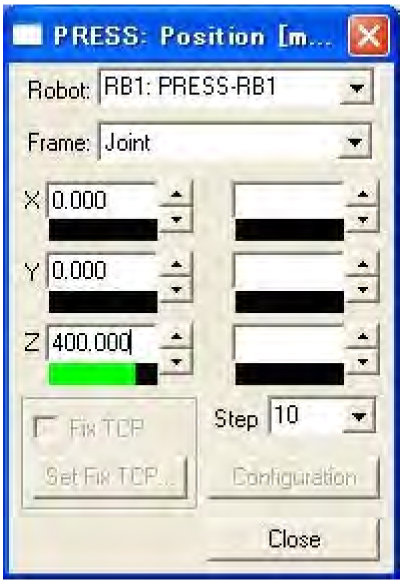
3. Modify the values as required and press the [Apply] button to make the modification.
4. Press “Close” to close the dialog.
5. For the modification to take affect, close the cell file and then open it again.

> **NOTE** To enable the modifications, reload the cell.

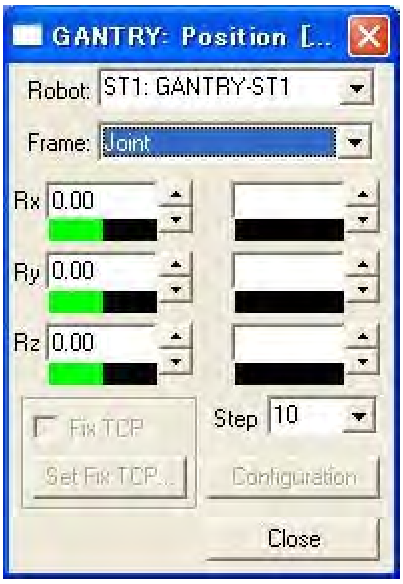
7.7.5 Moving a Device

Devices can be moved by using the Position Panel.
On the [Home] tab, in the [Teaching] group, click the [Position Panel] button, the [Position Panel] dialog appears.

Unlike other robots, they can only be moved using the “Pulse” or “Joint” frame coordinate system. Using the “Joint” frame is the equivalent of a rectangular coordinate system (coordinate X, Y, Z in millimeters).



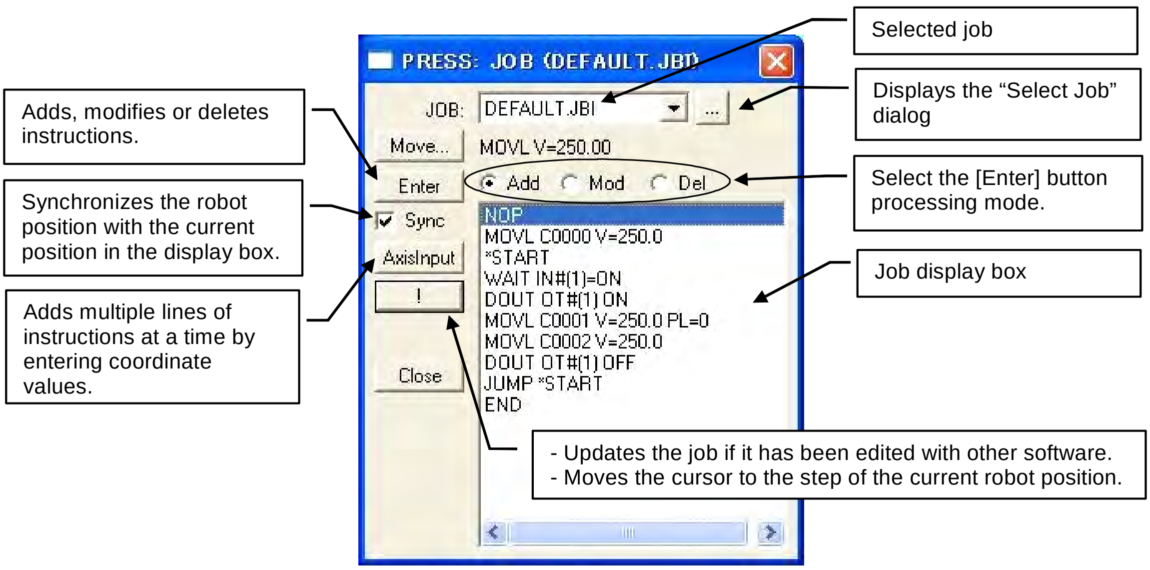
Gantry also have a station (external axes) mounted at the end of the robot TCP (X, Y, Z axes) that allows Rx, Ry and Rz rotations. To move this axis, change the selection in the robot combobox to the robot name ending by “-ST1”.



For further detail on the Position Panel operation, please refer to Section "8.1 Position Panel" .

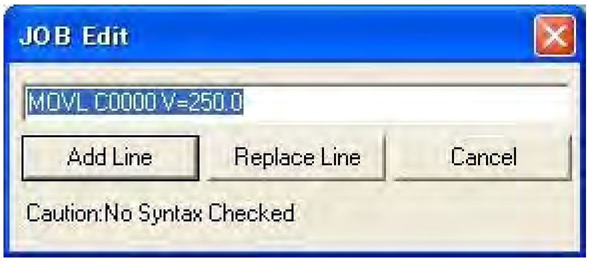
7.7.6 Programming a Device

Devices can be programmed to move in the same manner as a robot controller by creating jobs and then playing them back.
The Job panel is used to display the job and allow teaching. On the [Controller] tab, in the [External Device] group, click the [Job Panel] button, the [Job Panel] dialog appears.



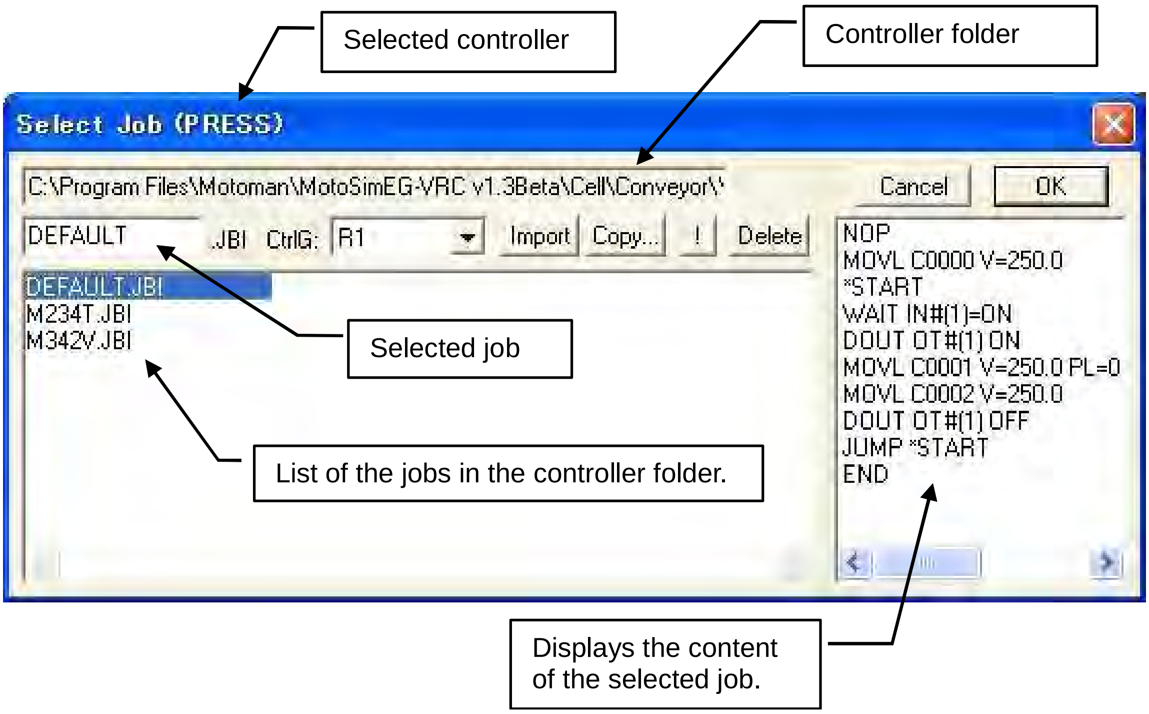
NOTE If the cell contains multiple devices and the "Multiple Controller Dialog" mode is enable, a separate Job panel can be displayed for each device in the cell. Select the device to be displayed in the controller combobox of the toolbar before displaying the Job panel.

Job Panel

Item	Description
Job selection combobox	Select the current job from the dropdown list or click on the [...] button to its right to display the “Select Job” dialog. (Refer to the " Select Job " for details.
Job display box	The device moves to the step selected in the job display panel if the [Sync] step synchronization check box is selected. JOB Edit dialog box for job editing appears by double-clicking the selected line. JOB Edit Dialog Box: Modify the instruction in the edit box. Select either the [Add Line] or [Replace Line] button. 
[Enter] button	Executes the command selected among [Del], [Add], [Mod] radio buttons.
[MOVE...] button	Displays the Interpolation dialog box. Specify motion type, speed and position level for the playback operation, and click [OK].  NOTE To enable the modification of the motion type and speed when a teaching position is modified, select the [Allow Modif.] check box.
[Close] button	Closes the Job Panel

■ Select Job

The Select Job dialog box (see the figure below) allows to select, copy, delete the jobs. It can also import jobs registered in other cells.



Selecting a Job

Select a job from the job list, then click on [OK].

Creating a Job

Type the name of the new job in the “Selected Job” field. The job name may not exceed 8 characters and cannot contain any spaces.

Importing a Job

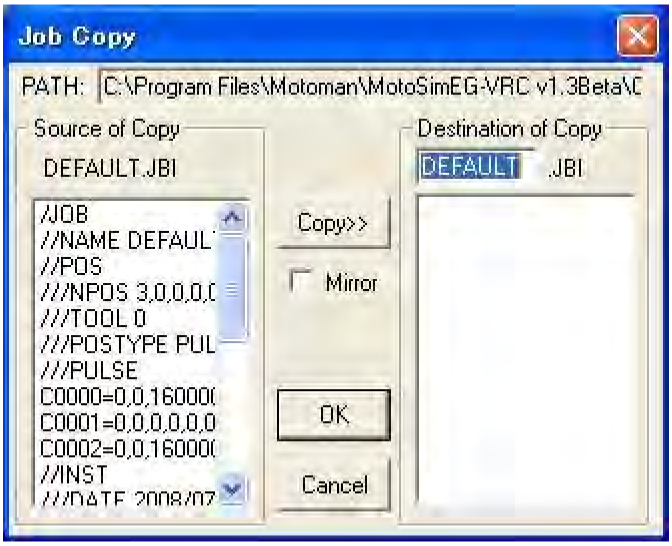
Procedure

1) Click on [Import].
2) Select a job, and click [Open].
3) Click [OK] to import the job.

Copying a Job

Procedure

1) Select a job to be copied, and click on [Copy...]: the Job Copy dialog box as shown below appears.



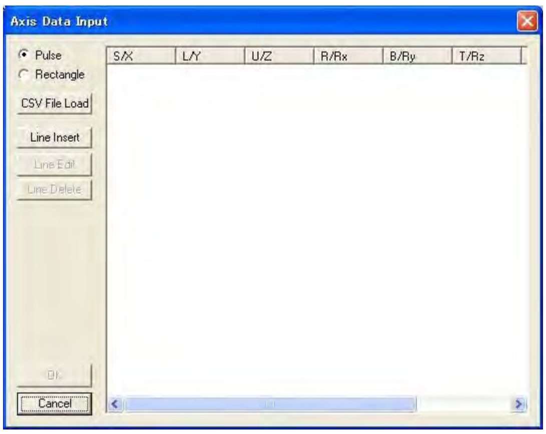
2) Enter a job name in the Destination of Copy edit box, and click on [Copy>>].
3) The job to be copied is displayed on the right; check the item, then click on [OK] to copy the job.

Deleting a Job

Select a job to be deleted from the job list in the Select dialog box, then click on [Delete].

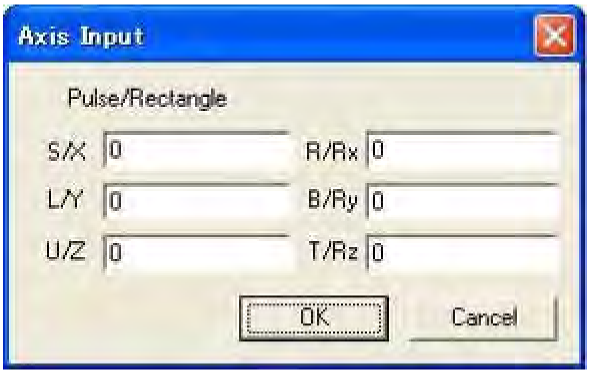
■ Input of Coordinates (AxisInput)

Press [AxisInput] in the Job Panel to display Axis Data Input dialog box shown below, and create a list by entering coordinate values (either pulse or rectangle). Instructions are added to the job for each point of the list.



Axis Data Input Dialog Box

Item	Description
[Pulse] radio button	Coordinate values are entered in pulse value.
[Rectangle] radio button	Coordinate values are entered in rectangle value.
[CSV File Load] button	Loads the coordinate values from a CSV file, and inserts the coordinate values right after the selected line in the list.
[Line Insert] button	Inserts the coordinate entered in the Axis Input dialog box right after the selected line in the list.
[Line Edit] button	Edits the selected line in the Axis Input dialog box.
[Line Delete] button	Deletes the selected line from the list. (Multiple selection is allowed.)
[OK] button	Closes the Axis Data Input dialog box; the list is added as instructions.
[Cancel] button	Closes the Axis Data Input dialog box without modifying the job.



Axis Input Dialog Box

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Pulse/Rectangle</td><td>
<table>
<tr><th rowspan="2">Coordinate</th><th colspan="2">Radio Button selected in
the Axis Data Input Dialog Box</th></tr>
<tr><th>Pulse</th><th>Rectangle</th></tr>
<tr><td>S/X</td><td>S-axis</td><td>X-axis</td></tr>
<tr><td>L/Y</td><td>L-axis</td><td>Y-axis</td></tr>
<tr><td>U/Z</td><td>U-axis</td><td>Z-axis</td></tr>
<tr><td>R/Rx</td><td>R-axis</td><td>Rx-axis</td></tr>
<tr><td>B/Ry</td><td>B-axis</td><td>Ry-axis</td></tr>
<tr><td>T/RZ</td><td>T-axis</td><td>Rz-axis</td></tr>
</table>
</td></tr>
<tr><td>[OK] button</td><td>Applies the modification, and closes the Axis Input dialog box.</td></tr>
<tr><td>[Cancel] button</td><td>Closes the Axis Input dialog box without executing the modification.</td></tr>
</table>

Procedure

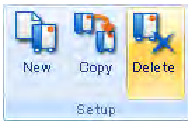
1. Select either the [Pulse] or [Rectangle] radio button in Axis Data Input dialog box.
2. Edit coordinate values with [Line Insert], [Line Edit], or [Line Delete], and create a list. If a CSV file already exists, load coordinate values by selecting [CSV File Load].
3. When the list is completed, press [OK] to add the created list as instructions after the selected line in the job.

> NOTE
> The motion type and speed of MOVE instructions which have been added with the input of coordinates are the set values specified in Interpolation dialog box displayed by clicking [MOVE...] in the Job Panel.

7.7.7 Other Operations with devices

■ Deleting a Device

Device and their model can be deleted by using the same procedure as other controllers.
On the [Controller] tab, in the [Setup] group, click the [Delete] button, the [Select Controller/Robot] dialog appears..



■ I/O Signals for Devices

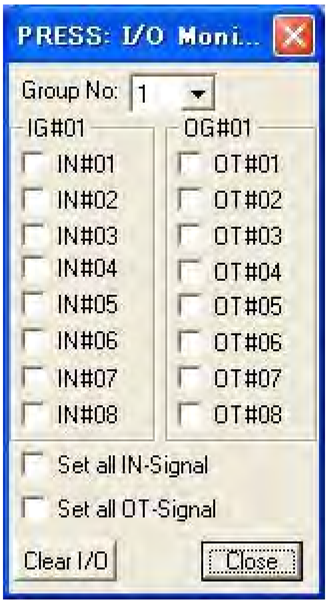
Devices also have I/O signals that can be use to interact with other controllers in the cell.
They can be used in a similar way than those of a VRC controller.

Device I/O Monitor

The I/O Monitor for device is displayed in the same way as other controller but the displayed dialog is different.
On the [Simulation] tab, in the [Monitor] group, click the [I/O Monitor] button, the [I/O Monitor] dialog appears

NOTE: If the cell contains multiple device and the "Multiple Controller Dialog" mode is enable, a separate I/O Monitor can be displayed for each device in the cell. Select the device to be displayed in the controller combobox of the toolbar before displaying the I/O Monitor.

I/O Monitor can display signals change from an instruction and also give signals to the robot by selecting an IN signal before or during playback.
The I/O data specified in I/O Monitor can be saved as well.

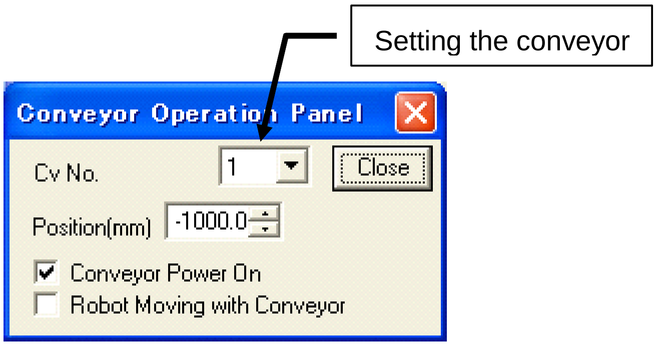


I/O Monitor Dialog Box

Item	Description
[Group No]	Specifies the I/O group number to display.
[Set all IN-Signal] check box	Turns ON all the IN signals of all registered robots. Uncheck the box to turn OFF all the IN signals.
[Set all OT-Signal] check box	Turns ON all the OUT signals of all registered robots. Uncheck the box to turn OFF all the OUT signals.
[Clear I/O] button	Clears all the signals of the selected robot.
[Close] button	Closes I/O Monitor dialog box.

7.7.8 Conveyor Operation Panel

This panel is used to operate the conveyor with 1 axis.
To operate the conveyor with multi-axis, refer to Section "7.7.5 Moving a Device".

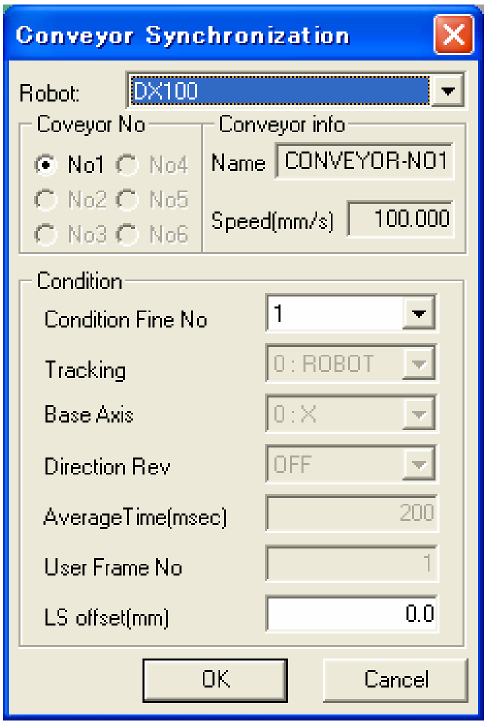


Conveyor Operation Panel

Item	Description
Position	To set the conveyer position for teaching the robot, input the number or set the number by the button. NOTE: The position of conveyor in [Position] is reflected LS offset value of the each robot. When the other robot is selected, the position of conveyor in [Position] is changed, without the displayed conveyor is not operating.
Conveyor Power On	When this is turned off during playback, the review on stopping the conveyor is enabled.
Robot Moving with Conveyor	If this is turned on, the selected robot moves with conveyor on operating the conveyor. When [Robot Moving with Conveyor] is used, set the conveyor synchronization of the selected robot in advance.

7.7.9 Conveyor Synchronization

This panel is used to set the synchronization condition between the robot and the conveyor. If the conveyor synchronization option is available, this panel is displayed automatically when the conveyor is added. Refer to Section "11.8 Setting of spot welding simulation" about conveyor synchronization option.
To change the synchronization condition of registered conveyor. On the [Controller] tab, in the [External Device] group, click the [Conveyor Condition File] button, the [Conveyor Synchronization] dialog appears.



Conveyor Synchronization Setting

Item	Description
Robot	The list of the controller which can use the conveyor synchronized function is displayed. Select the controller by the list.
Conveyor No	Select the conveyor synchronized with the controller selected by [Robot].
Conveyor Info	The name and speed of the conveyor selected by [Conveyor No] is displayed.

Conveyor Synchronization Setting

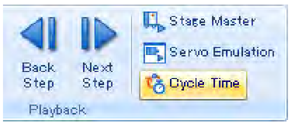
Item	Description
Condition	[Condition File No] : Select the conveyor condition file of the selected conveyor and controller. the file is registered by the virtual pendant. [Tracking] : Specify whether to carry out the synchronization with the robot-axis or the base-axis. [Base Axis] : When the [Base Axis] is selected by [Tracking], the selected axis is dis played. [Direction Rev] : When the [Base Axis] is selected by [Tracking], the item is displayed. When the conveyor traveling direction is opposite of the forward direction of base axis, this item is "ON". [Average Time (msec)] : The averaged travel time of conveyor is displayed. [User Frame No] : The user frame number of the conveyor direction is displayed. The user frame number corresponding to the conveyor number is selected automatically. [LS offset (mm)] : Set the distance of the conveyor origin position. When this item is set to 1000mm, the conveyor origin position of the selected robot is located 1000mm before the origin position on the display.

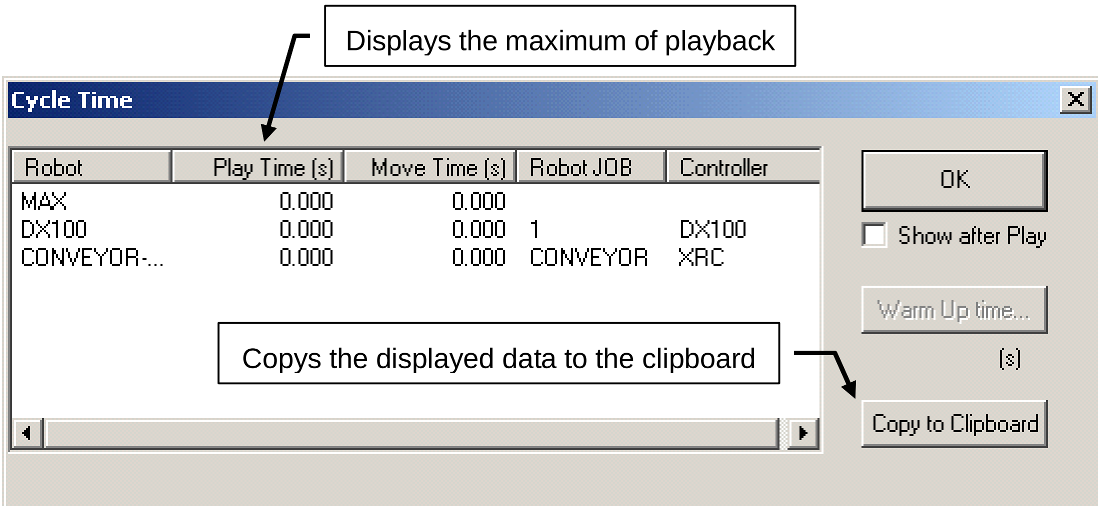
7.8 Cycle Time

On the [Controller] tab, in the [Playback] group, click the [Cycle time] button.

The latest cycle time of playback is displayed on the following display.

> **NOTE** This function can not use depending on the system version of controller. Please refer to Section "A.6 List of Function depending on the system version of controller".





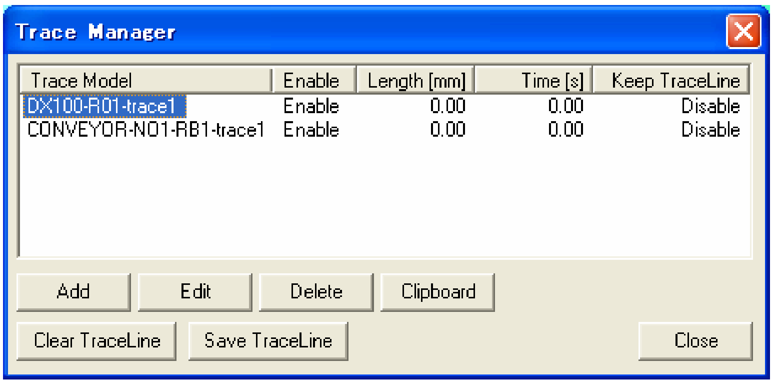
7.9 Trace

Trace is a function to display update points of the robot position when the robot playback is performed. Larger dots in the traces mean the separation of the command data (step end). Traces can be set with the "Trace Manager" dialog box. On the [Simulation] tab, in the [Monitor] group, click the [Trace] button.

> **NOTE** This function can not use depending on the system version of controller. Please refer to Section "A.6 List of Function depending on the system version of controller".

7.9.1 Trace Manager

Multiple traces can be set.
When a controller is registered to the cell a trace is automatically added for Tool Center Point (TCP) of each robot.



“Trace Manager” Dialog Box

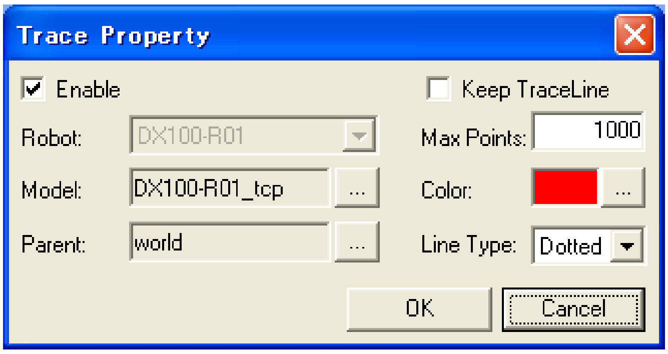
Item	Description
Trace list	Displays the information of the defined traces. Trace Model: Name of the trace model (used in the CadTree) Enable: Enable/Disable the trace generation during playback. Length: Approximate travel distance of the traced point during playback. Time: Playback Time Keep TraceLine: In the case of Disable, the trace lines is deleted automatically before the playback is started. The “Trace Property” of a trace can be displayed by double-clicling on a trace from the list.
[Edit] button	Edits a trace with the “Trace Property” dialog. For details refer to Section "7.9.2 Trace Properties".

"Trace Manager" Dialog Box

Item	Description
[Add] button	Defines a new trace with the "Trace Property" dialog. For details refer to Section "7.9.2 Trace Properties".
[Delete] button	Deletes the trace definition currently selected in the trace list.
[Clipboard] button	Opens the "Trace Copy" dialogs with the data of the trace currently selected in the list. For details refer to Section "7.9.3 Trace Copy".
[Clear Model] button	Deletes all the trace models. Note that before playback, all the previously generated trace models are automatically deleted.
[Clear TraceLine] button	Delete all the trace lines.
[Save TraceLine] button	Save the trace lines as the model file. NOTE The trace is not saved on the cell. When it needs that the trace is saved, the trace is saved by [Save TraceLine], and save the cell.
[Close] button	Closes the "Trace Manager" dialog box.

7.9.2 Trace Properties

The "Trace Property" dialog box is displayed by pressing the [Edit] or [Add] button of the "Trace Manager" dialog box.
It allows to set the trace properties such as the color, number of points, traced model, etc.



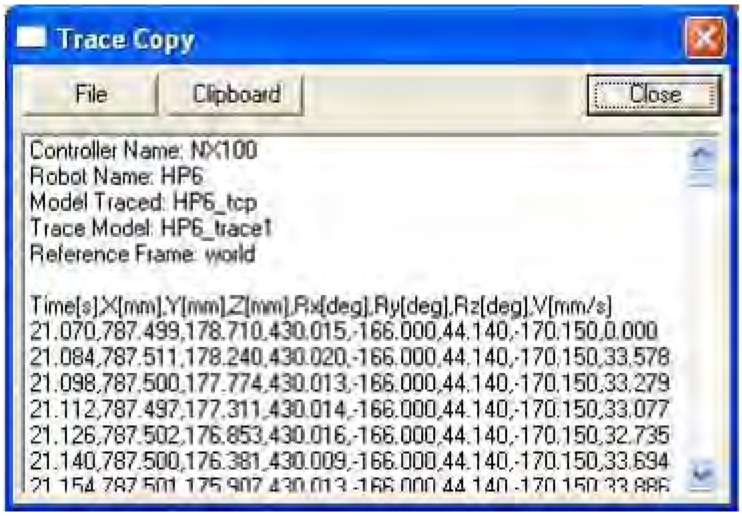
"Trace Property" Dialog Box

Item	Description
[Enable]	Indicates that the trace will be generated during playback when checked.

Item	Description
[Robot]	Selects the robot associated with the trace. A trace point is generated everytime the robot position is updated during playback. This field cannot be modified when editing an existing trace.
[Model]	Displays the name of the model that will be traced. The default model is the robot TCP. To change model, press the [...] button beside the “Model” field to display the “Select Model” dialog box. Select a model and press [OK].
[Parent]	Displays the name of the model that is used as the parent of the trace and as a coordinated system for the trace point. The default model is the “world” model. To change model, press the [...] button beside the “Parent” field to display the “Select Model” dialog box. Select a model and press [OK].
[Keep TraceLine]	When this item is checked, the trace lines before playback is not deleted and the playback is started.
[Max Points]	Defines the maximum number of data points that are generates in the trace model. The value may be increase up to 20 000 points. When the maximum value is reached, the oldest points are erased as new points are generates.
[Color]	Displays the color of the trace model. To change the color, press the [...] button beside the “Color” field to display the “Color” dialog box. Select a color and press [OK].
[Line Type]	Selects the line type: dotted, normal, thick.
[OK] button	If in [Add] mode: adds a new trace definition. If in [Edit] mode: updates the selected trace definition. Closes the “Trace Property” dialog box.
[Cancel] button	Closes the “Trace Property” dialog box.

7.9.3 Trace Copy

The “Trace Copy” dialog box is displayed by pressing the [Clipboard] button of the “Trace Manager” dialog box.
It allows to copy the last playback data points of the selected trace to the clipboard or a text file.
The displayed trace data are "Controller Name", "Robot Name", "Model Traced", "Trace Model", and "Reference". Then, the values of position and speed at each trace points are displayed.



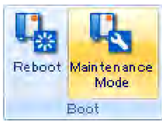
“Trace Copy” Dialog Box

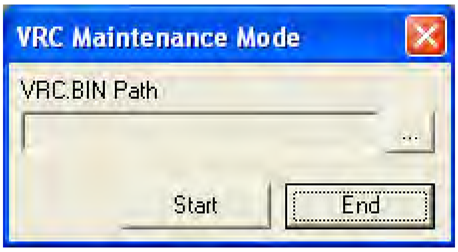
Item	Description
[File] button	Saves the displayed trace information to a text file.
[Clipboard] button	Copies the displayed trace information to the clipboard.
[Close] button	Closes the “Trace Copy” dialog box.

7.10 VRC Maintenance Mode

NOTE The VRC Maintenance mode can only be started when there are no opened cell in MotoSim EG-VRC. Before proceeding, save and close all opened cells.

The VRC controller can be started up in maintenance mode to perform various maintenance task such as initializing data, setting, etc. When there are no opened cell, the “VRC Maintenance Mode” dialog can be displayed by selecting from MotoSim EG-VRC : on the [Controller] tab, in the [Boot] group, click the [Maintenance Mode] button.





VRC Maintenance Mode

VRC.BINPath	Select the VRC.BIN file to be maintenance by pressing the [...] button.
Start	Start up the controller (VRC.BIN) and displays the Virtual Pendant in maintenance mode.
End	Closes the Virtual Pendant and shuts down the controller.

NOTE Some operations in the Virtual Pendant may take a few moments. Do not press the “End” button until the Virtual Pendant has completed its current operation.
Closing the “Virtual Pendant” in the middle of an operation may cause the lost of VRC.BIN data.

7.11 Displaying model / Editing Data of Safety Function

Display the model from Safety Function File. And the file can be edited.
Following function is available in MotoSim EG-VRC.

- Display the robot range limit data
- Edit the safety function data
- Display the tool interference model
- Display the robot approximate model

NOTE

- This function is available only when the controller is DX200 and the parameter of safety function is available.
- Function safety in which a simulation is possible on MotoSim EG-VRC is as follows.

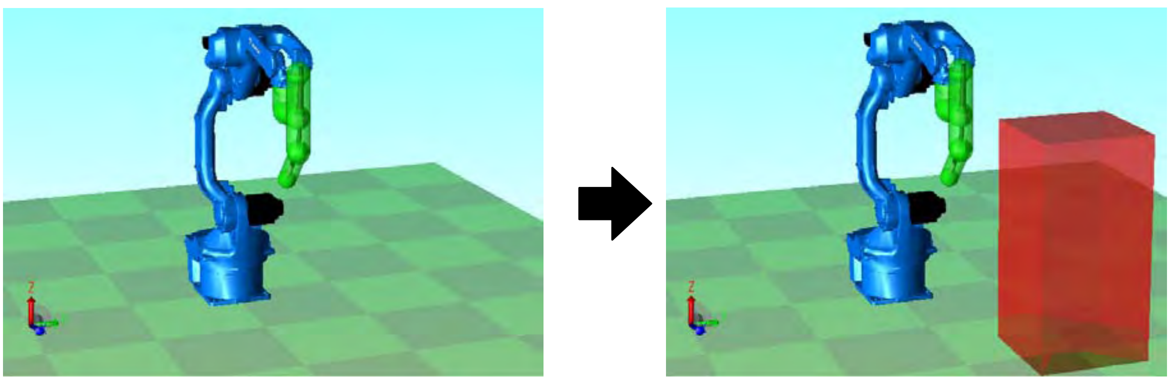
  Robot Range Limit
  Axis Range Limit
  Speed Limit
  Tool Angle Monitor

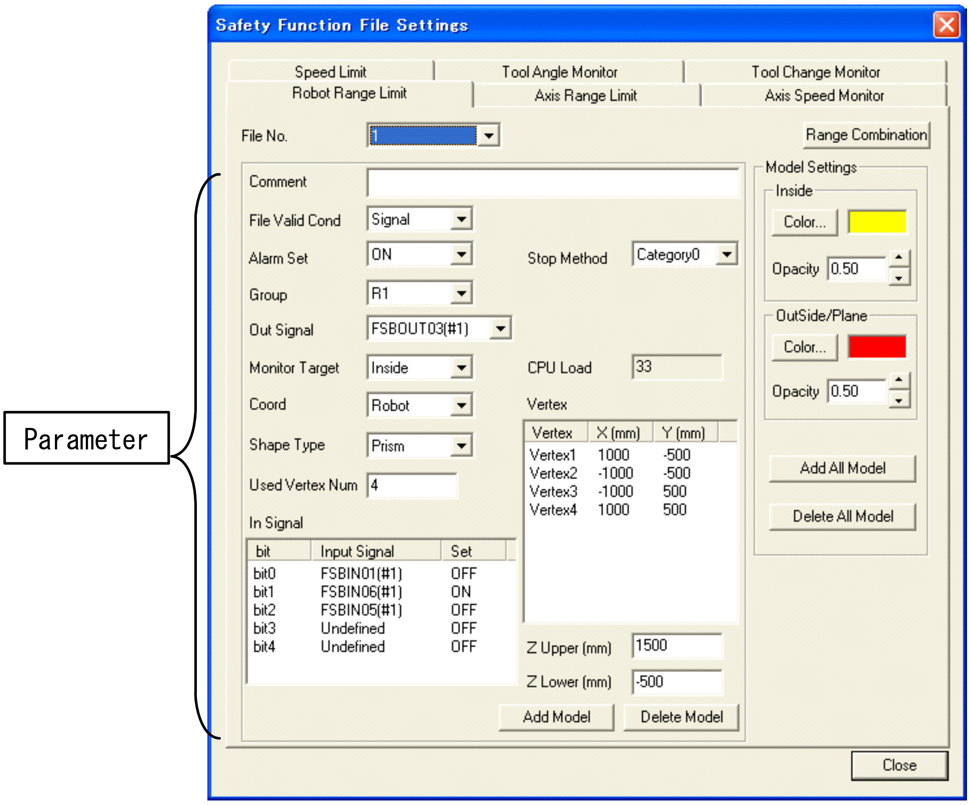
  Following function safety can not be simulated on MotoSim EG-VRC.

  Axis Speed Monitor
  Tool Change Monitor
  Safety Signal
- When the edited files are loaded to DX200, it is necessary to put in "SAFETY MODE", and to disable "SAVE DATA CRC CHECK FUNC.(FSU)". After loading, please make sure to enable "SAVE DATA CRC CHECK FUNC.(FSU)".
  And, please make sure to check the settings on DX200.

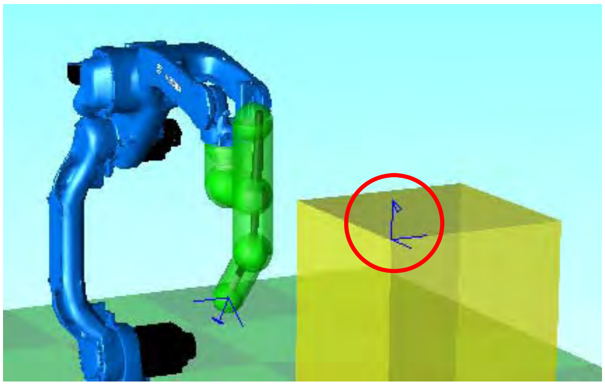
7.11.1 Displaying Robot Range Limit

Display the model from the Robot Range Limit.
On the [Controller] tab, in the [File Settings] group, click the [Function Safety] button, and select [Safety Function File]. And. choose the [Robot Range Limit]tab.





[Robot Range Limit]

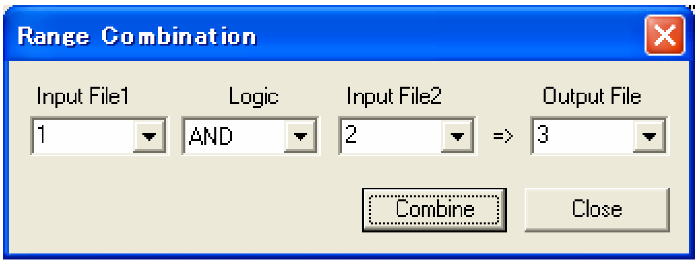
Item	Description
File No.	Select the file number. When selecting the file number, the parameter is displayed. [Add Model] The model of selected file number is displayed. Click the vertex list when the model is displayed, teacher model is moved to that position.  [Delete Model] The model of selected file number is cleared.
Parameter	For those details or Editing them, please refer to "DX200 OPTIONS INSTRUCTIONS FOR FUNCTIONAL SAFETY BOARD OPERATION".

[Robot Range Limit]

Item	Description
Range Combination	Range combination dialog appears, and combine the ranges.
Model Settings	Set the contents of Inside model or Outside/Plane model. [Color] Displays the Color Dialog to change the color of model. [Opacity] Specifies the opacity of model. The value can be set between 1.00 and 0.00, which corresponds respectively to fully opaque and completely transparent. [Add All Model] The models of all file number are displayed. [Delete All Model] The models of all file number are cleared.
Close	Close the dialog.

■ Area Combination

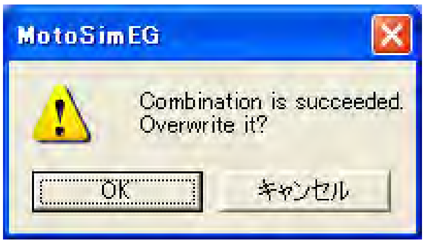
Creates a new area by combining two already-specified areas.
Click the [Area Combination] button, the [Range Combination] dialog is displayed.
For details, please refer to "DX200 OPTIONS INSTRUCTIONS FOR FUNCTIONAL SAFETY BOARD OPERATION".



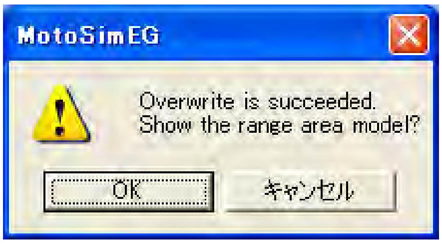
[Range Combination]

Item	Description
Input File1	Select the input file1.
Logic	Select "AND" or "OR".
Input File2	Select the input file2.
Output File	Select the output file.
Combine	Execute Combination.
Close	Close the dialog.

When combination is finished, the following dialog is displayed. Click the [OK] button, a new area is written to output file. Click the [Cancel] button, a new area is not written.



When overwriting is finished, the following dialog is displayed. Click the [OK] button, a new area model is displayed. Click the [Cancel] button, a new area model is not displayed.



7.11.2 Editing the Safety Function Data

Edit the safety function file. Following files are available. To edit the files, it is necessary to put them into the robot folder. On the [Controller] tab, in the [File Settings] group, click the [Function Safety] button, and select [Safety Function File] the [Safety Function File Settings] dialog appears.

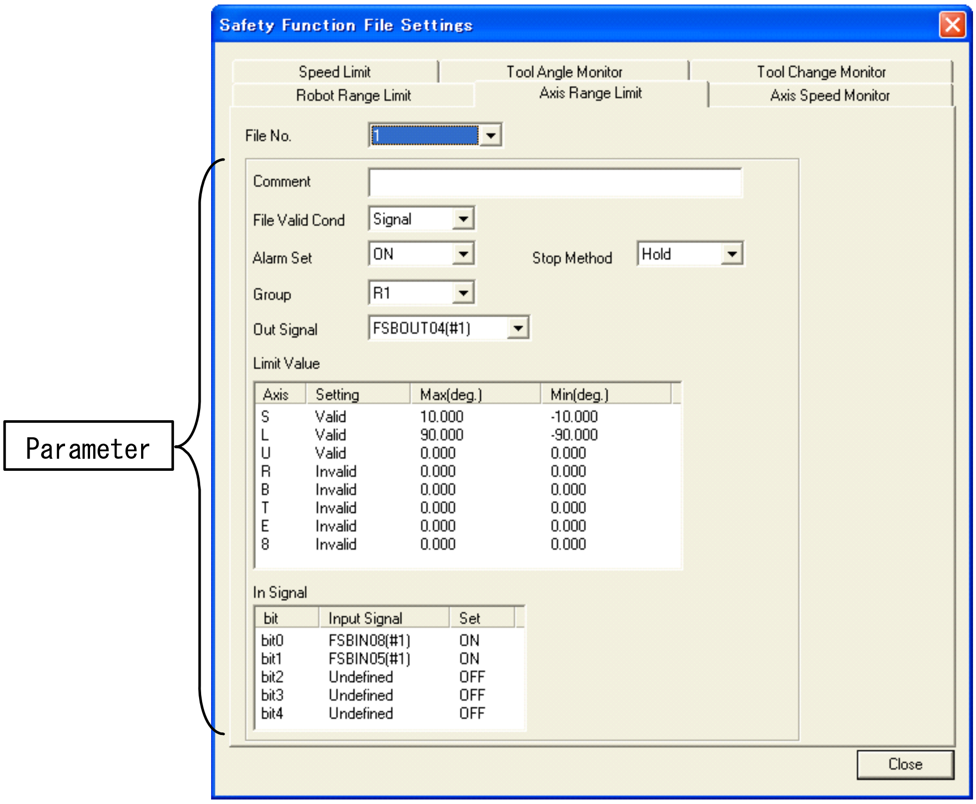
- Robot Range Limit
- Axis Range Limit
- Axis Speed Monitor
- Speed Limit
- Tool Angle Monitor
- Tool Change Monitor

■ Robot Range Limit Data

Edit the Robot Range Limit Data. Choose the {Robot Range Limit} tab. For details, please refer to Section "7.11.1 Displaying Robot Range Limit".

■ Axis Range Limit Data

Edit the Axis Range Limit Data. Choose the {Axis Range Limit} tab.

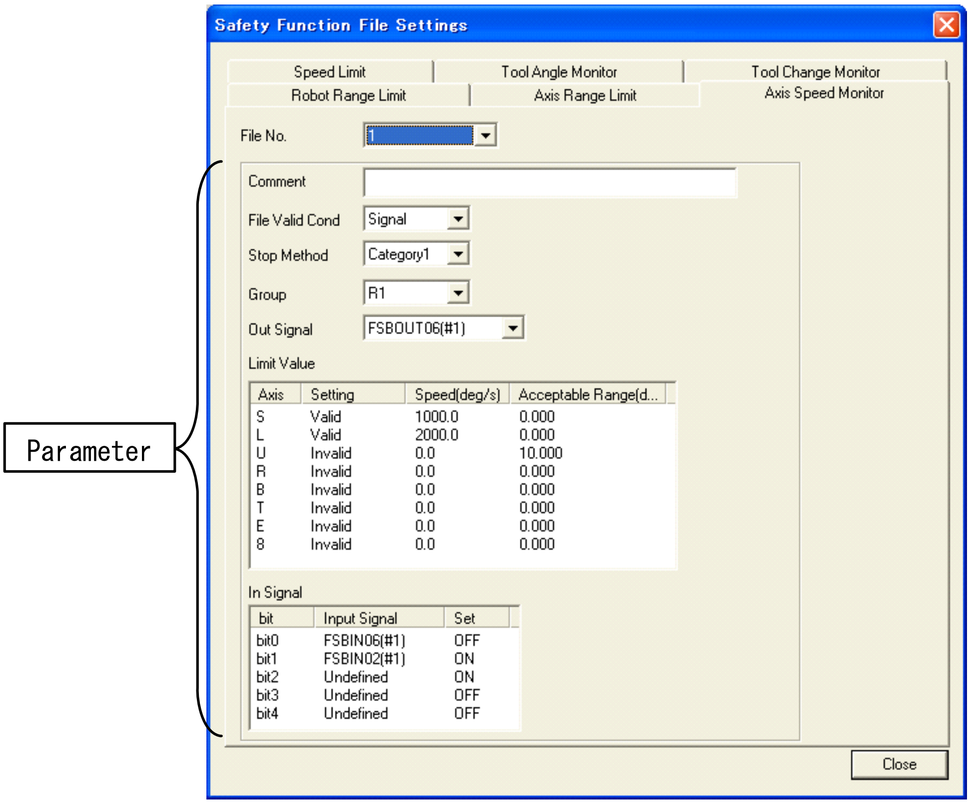


[Axis Range Limit]

Item	Description
File No.	Select the file number. When selecting the file number, the parameter is displayed.
Parameter	For those details or Editing them, please refer to "DX200 OPTIONS INSTRUCTIONS FOR FUNCTIONAL SAFETY BOARD OPERATION".
Close	Close the dialog.

■ Axis Speed Monitor Data

Edit the Axis Speed Monitor Data. Choose the {Axis Speed Monitor} tab.

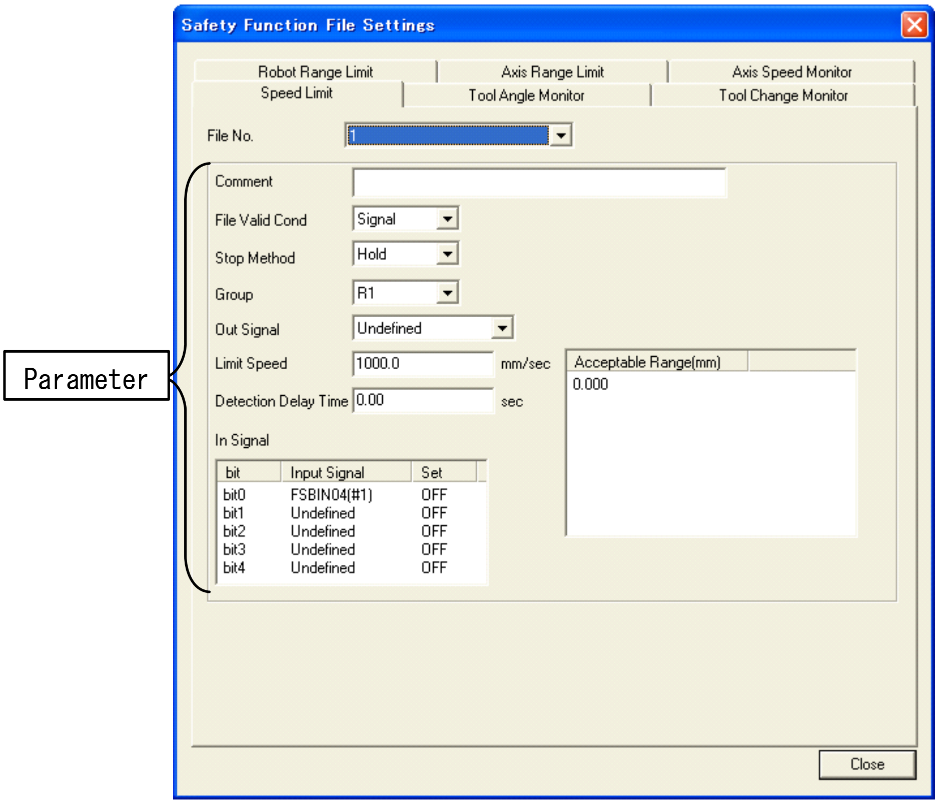


[Axis Speed Monitor]

Item	Description
File No.	Select the file number. When selecting the file number, the parameter is displayed.
Parameter	For those details or Editing them, please refer to "DX200 OPTIONS INSTRUCTIONS FOR FUNCTIONAL SAFETY BOARD OPERATION".
Close	Close the dialog.

■ Speed Limit Data

Edit the Speed Limit Data. Choose the {Speed Limit} tab.

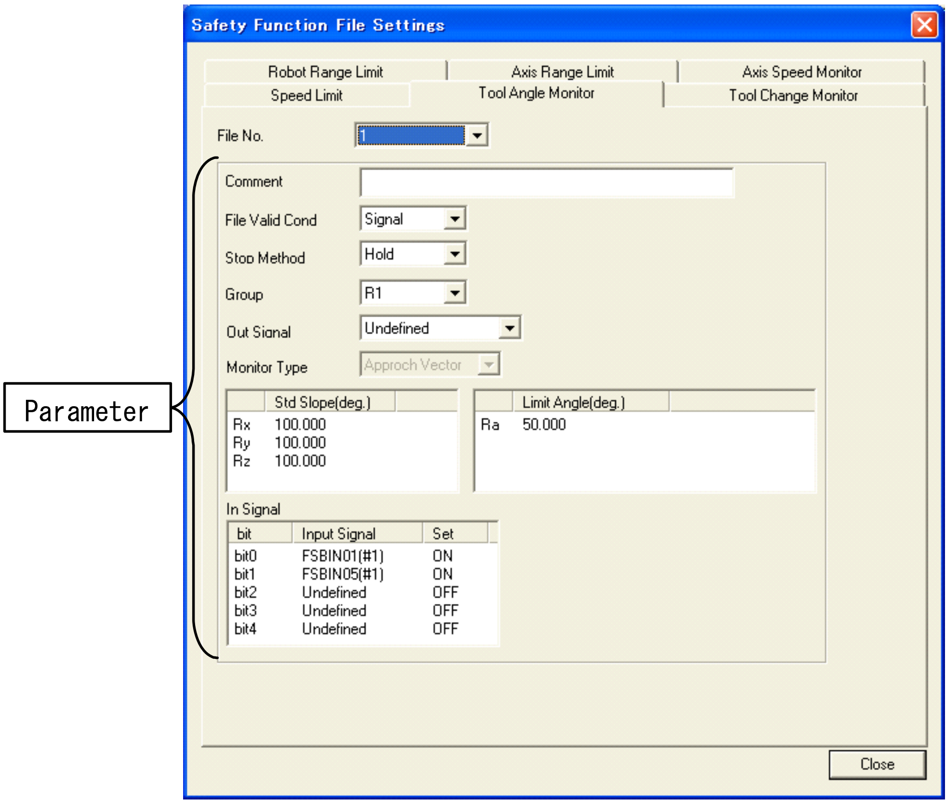


[Speed Limit]

Item	Description
File No.	Select the file number. When selecting the file number, the parameter is displayed. Select the Speed Limit in Teach Mode, the setting of it is available.
Parameter	For those details or Editing them, please refer to "DX200 OPTIONS INSTRUCTIONS FOR FUNCTIONAL SAFETY BOARD OPERATION".
Close	Close the dialog.

■ Tool Angle Monitor Data

Edit the Tool Angle Monitor Data. Choose the {Tool Angle Monitor} tab.

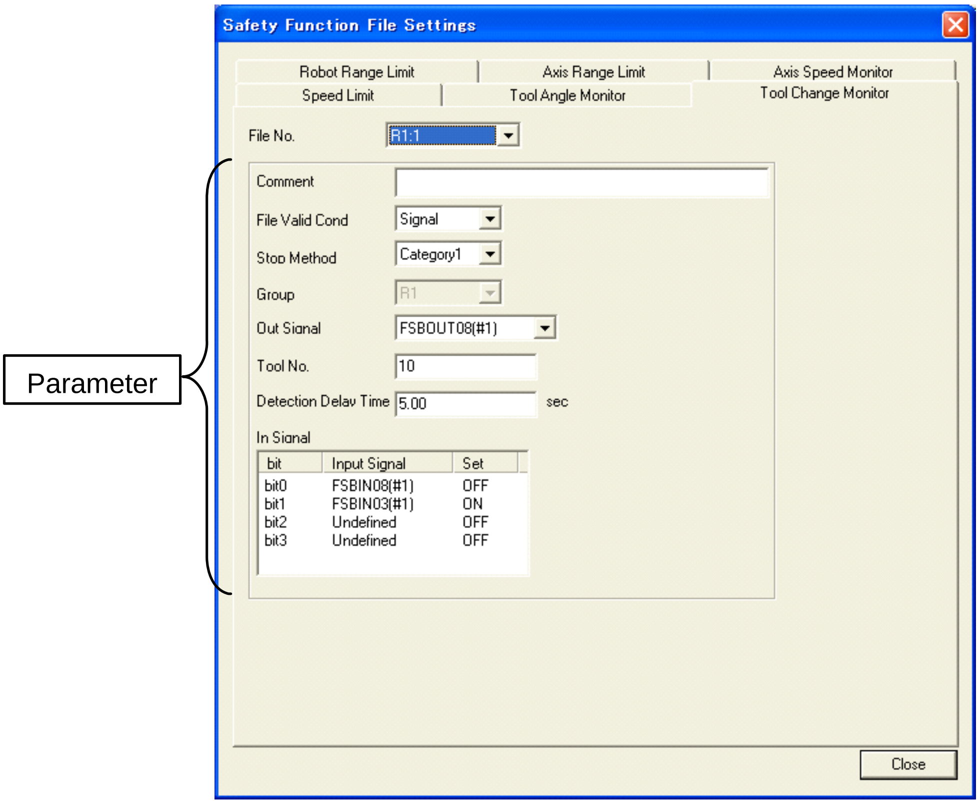


[Tool Angle Monitor]

Item	Description
File No.	Select the file number. When selecting the file number, the parameter is displayed.
Parameter	For those details or Editing them, please refer to "DX200 OPTIONS INSTRUCTIONS FOR FUNCTIONAL SAFETY BOARD OPERATION".
Close	Close the dialog.

■ Tool Change Monitor Data

Edit the Tool Change Monitor Data. Choose the {Tool Change Monitor} tab.

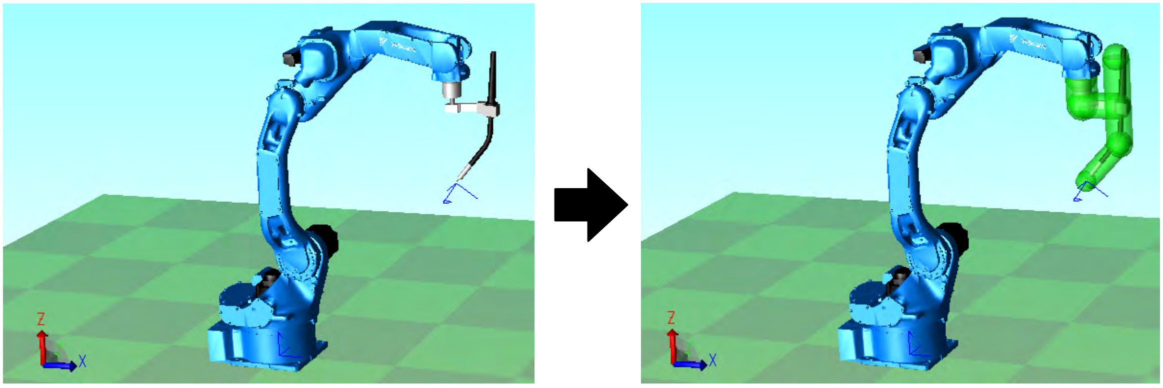


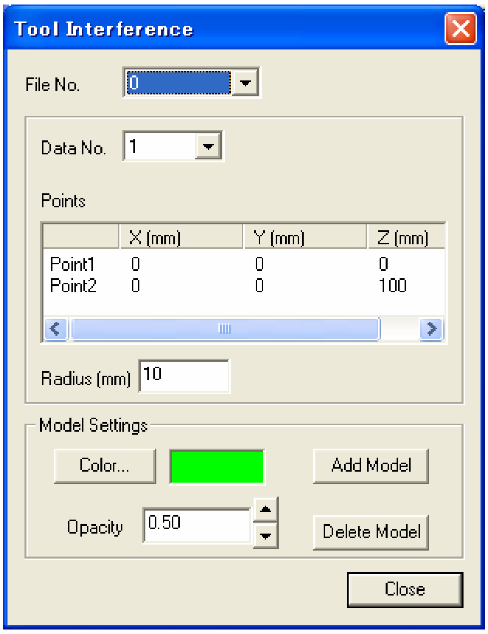
[Tool Change Monitor]

Item	Description
File No.	Select the file number. When selecting the file number, the parameter is displayed.
Parameter	For those details or Editing them, please refer to "DX200 OPTIONS INSTRUCTIONS FOR FUNCTIONAL SAFETY BOARD OPERATION".
Close	Close the dialog.

7.11.3 Displaying the Tool Interference Model

Display the tool interference model from the Tool Interference Data.
On the [Controller] tab, in the [File Settings] group, click the [Function Safety] button, and select [Tool Interference Model] the [Tool Interference] dialog appears.



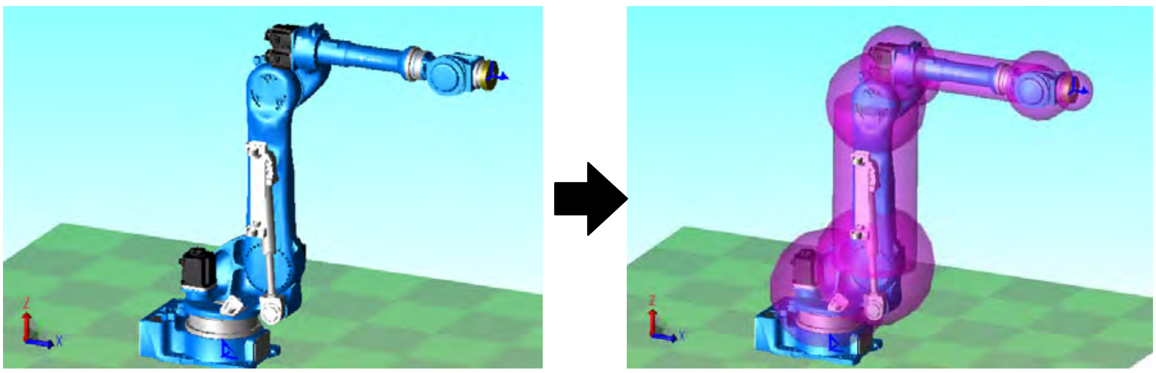


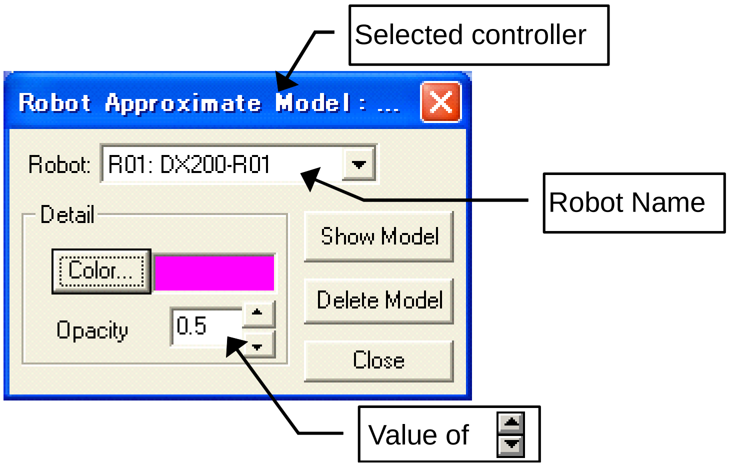
Item	Description
File No.	Select the file number. When selecting the file number, the parameter is displayed.

Item	Description
Data No.	Select the data number. [Points] Specify the X, Y, and Z of two points. [Radius] Specify the radius of sphere and cylinder. For those details or Editing them, please refer to "DX200 OPTIONS INSTRUCTIONS FOR FUNCTIONAL SAFETY BOARD OPERATION".
Model Settings	Display/Clear the tool interference model. [Color] Displays the Color Dialog to change the color of model. [Opacity] Specifies the opacity of model. The value can be set between 1.00 and 0.00, which corresponds respectively to fully opaque and completely transparent. [Add Model] The model of the file number is displayed. [Delete Model] The model of the file number is cleared.
Close	Close the dialog.

7.11.4 Displaying the Robot Approximate Model

Display the robot approximate model from robot parameter.
On the [Controller] tab, in the [File Settings] group, click the [Function Safety] button, and select [Robot Approximate Model] the [Robot Approximate] dialog appears.





[Robot Approximate Model]

Item	Description
Show Model	Display the approximate model. [Color] Displays the Color Dialog to change the color of model. [Opacity] Specifies the opacity of model. The value can be set between 1.00 and 0.00, which corresponds respectively to fully opaque and completely transparent. NOTE When the parameter does not have approximate model, the model is not displayed.
Delete Model	Clear the approximate model.
Close	Close the dialog.

8 Tool Functions

MotoSim EG-VRC has tools to operate and teach a robot, including functions to display the current position and pulses of the robot; it also has functions that simplifies teaching operations such as OLP (on-screen teaching function to teach target point) and interference check function.
This chapter explains each function and its application.

8.1 Position Panel

The Position panel displays position data of a robot, and enables robot operation by entering numerical values in pulses or coordinate units.
On the [Home] tab, in the [Teachingl] group, click the [Position Panel] button, the [Position Panel] dialog appears.

NOTE If the cell contains multiple controllers and the "Multiple Controller Dialog" mode is enable, a separate Position panel can be displayed for each robot in the cell. Select the robot to be displayed in the robot combobox of the toolbar before displaying the Position panel.

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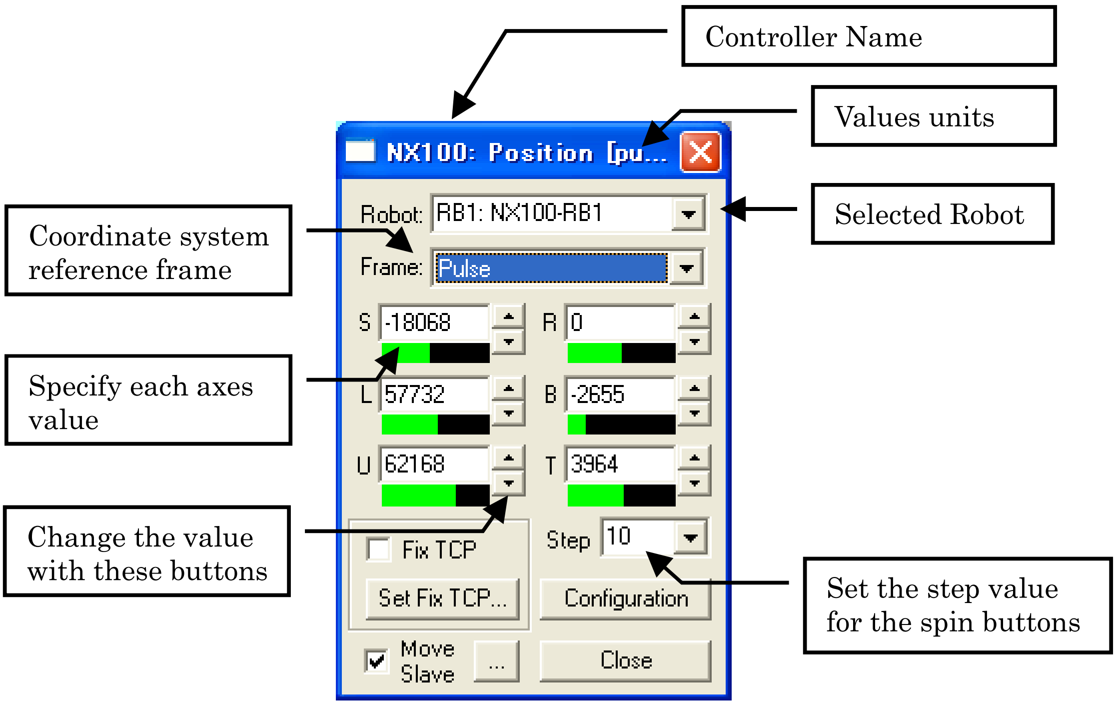


Position Data Panel

Item	Description
[Frame] combobox	The coordinate system reference frame can be selected with the "Frame" combobox. The choice of frame available in the list may change depending on the robot configuration.
[Fix TCP] checkbox	When checked, the [Fix TCP] function is enabled. The robot TCP position remains fixed relative to another model in the cell. Refer to section Section "8.1.2 Fix TCP" for details.
[Set Fix TCP...] button	Displays the "Select Model" dialog to change the model reference used by the Fix TCP function.
[Configuration] button	Displays the robot "Configuration" dialog to select a different robot configuration to reach the current position. (Refer to section Section "8.1.3 Robot Position Configuration" for details)
[Move Slave] checkbox	When checked, the [Move Slave] function is enabled. When a robot or station is moved, other slave robots from the same controller are moved with it so that their TCP maintain the same relative position to the moved robot or station. By default all robots are set as slave. The individually setting of each robot can be changed by pressing the [...] button to display the “Set Slave Robot” dialog. Note that when the function is enable, if one of the robot cannot reach the proper position, all the robots are prevented from moving.
[Close] button	Closes the position data panel.

NOTE The Fix TCP section is not available when the Frame is set to "Work Angle".

Keyboard entry

The value of an axis can be entered directly with the numeric keys. Select the desired axis edit box, enter the new value, and then press the [Enter] key to update the robot position or the [Tab] key to move to the next axis.

■ Pulse

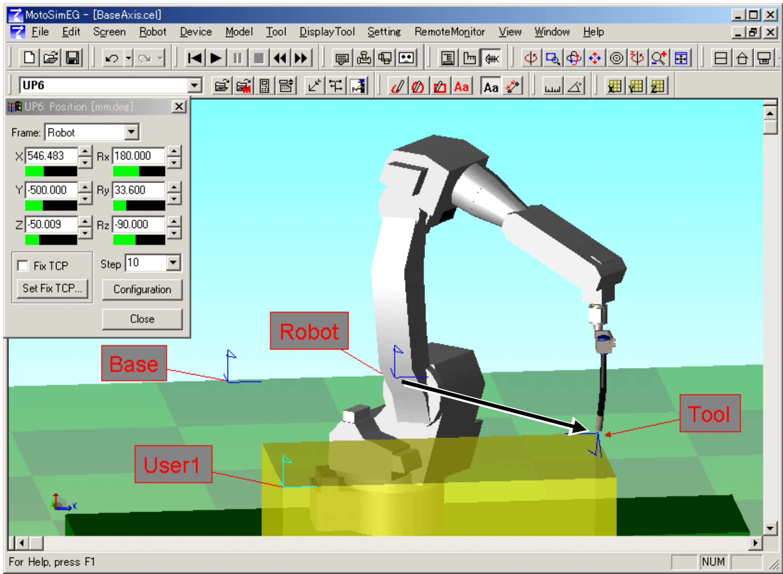
Displays the pulse values of the S, L, U, R, B, T axis of the robot.

■ Joint

Displays the angular values of the S, L, U, R, B, T axis in angular units (degrees or radians).

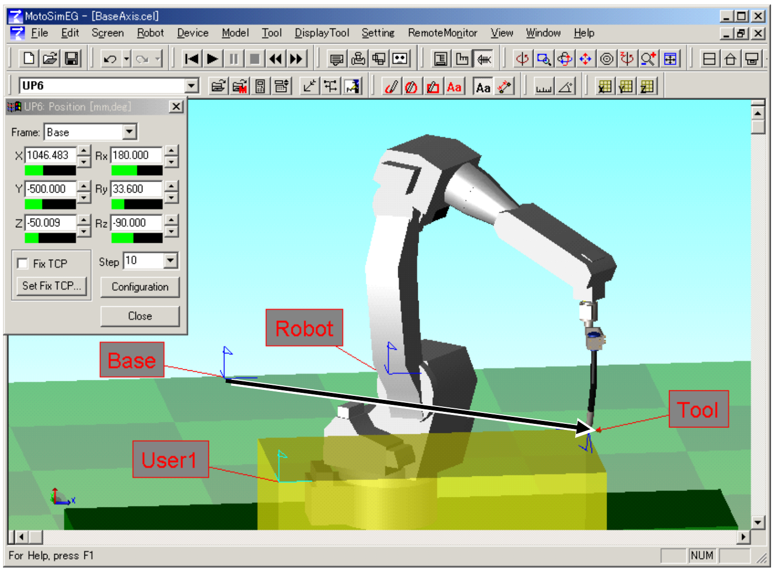
■ Robot

Displays the position (X, Y, Z, Rx, Ry, Rz) of the robot current Tool frame (TCP) relative to the Robot frame.



■ Base

Displays the position (X, Y, Z, Rx, Ry, Rz) of the robot current Tool frame (TCP) relative to the Base frame. If the robot doesn't have any base axis, the Base frame and Robot frame overlaps each other.

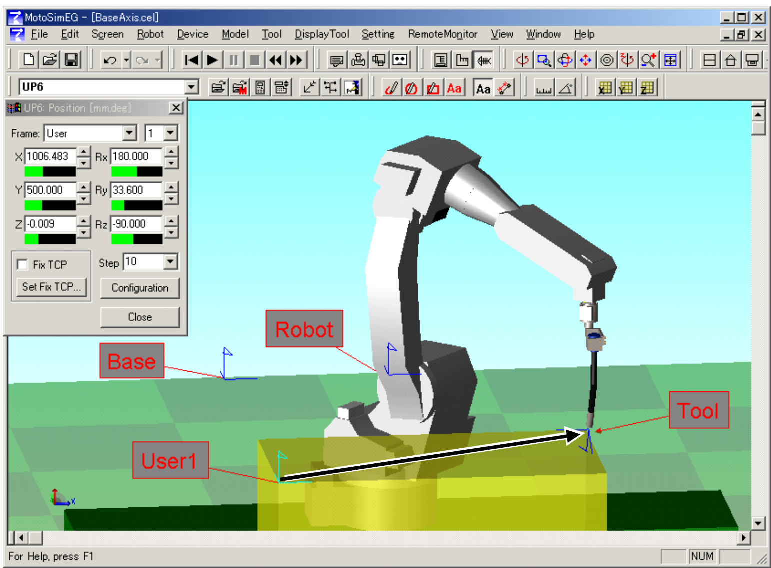


■ Tool

This frame is useful to move the robot in the Tool coordinate system (X, Y, Z, Rx, Ry, Rz) but the displayed values are always "0" even though the robot moves since the reference system and the Tool coordinate frame are the same.

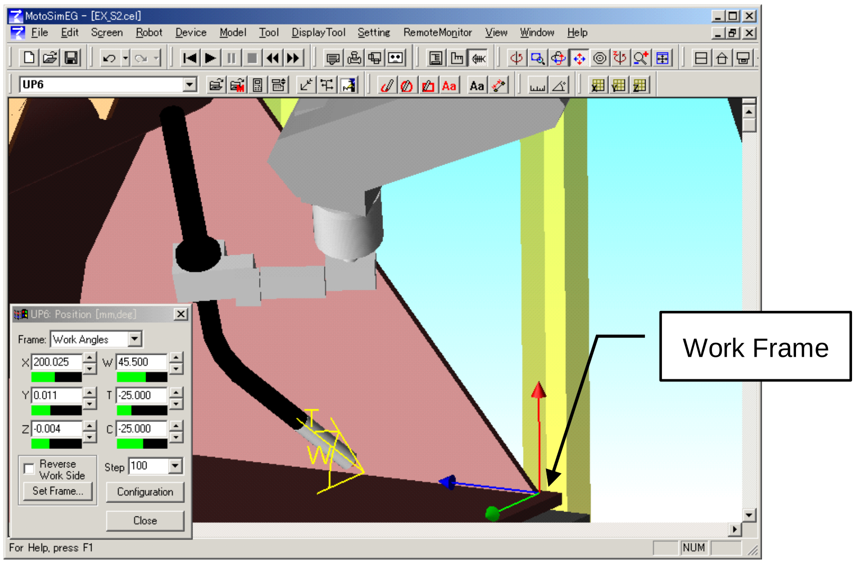
■ User

Displays the position (X, Y, Z, Rx, Ry, Rz) of the robot current Tool frame (TCP) relative to the selected user frame. When selected, a 2nd combobox will appear next to the "Frame" combobox to allow the selection of the user frame number. Only the defined user frame will appear in the list. At least one user frame need to be define in order to select the User Frame reference system.



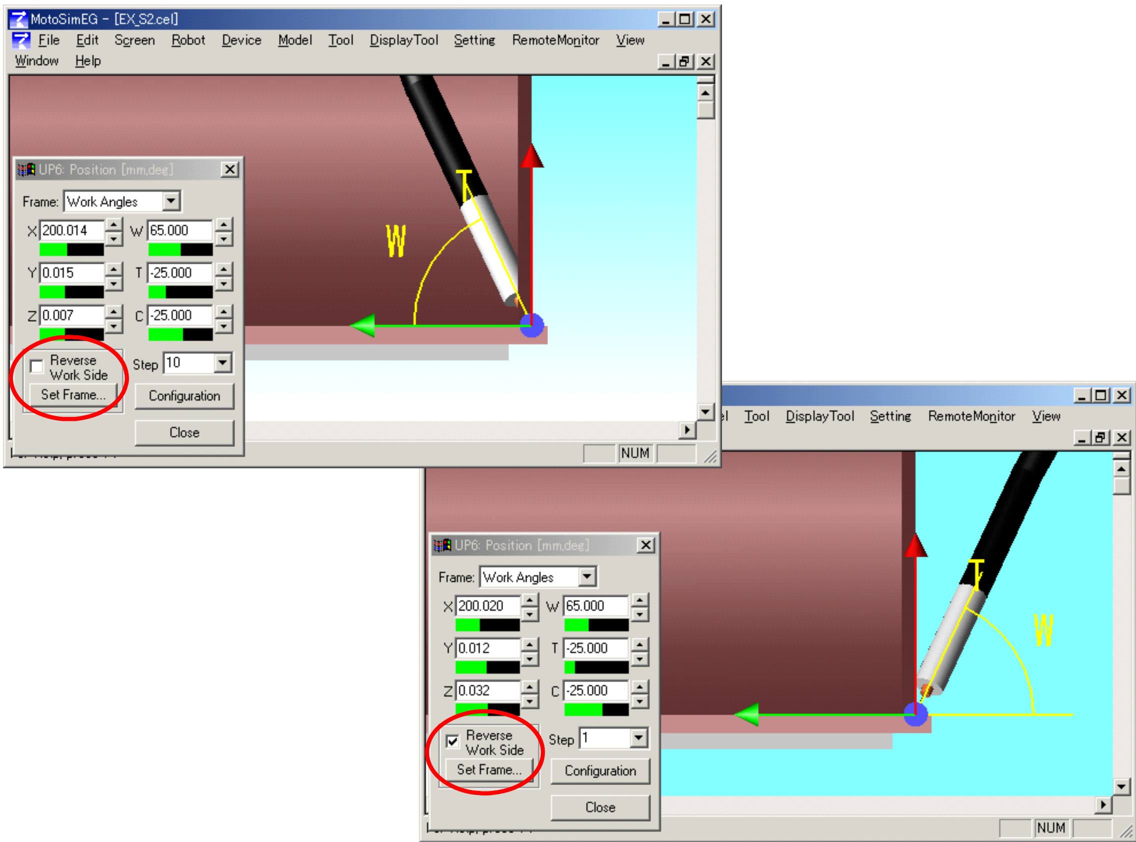
■ Work

Displays the position (X, Y, Z, W, T, C) of the robot current Tool frame (TCP) relative to the set Work frame. When this coordinate system is selected, the "Set Frame..." button and the "Reverse Work Side" checkbox will appear under the axis values.



The Work frame is defined by three components: the frame position (or origin), the travel direction, and the work surface. The normal of the work surface is set as the Z-axis (red arrow) and the tool travel direction is set as the X-axis (blue arrow). The Y-axis (green arrow) will be set perpendicular to the other two axes.

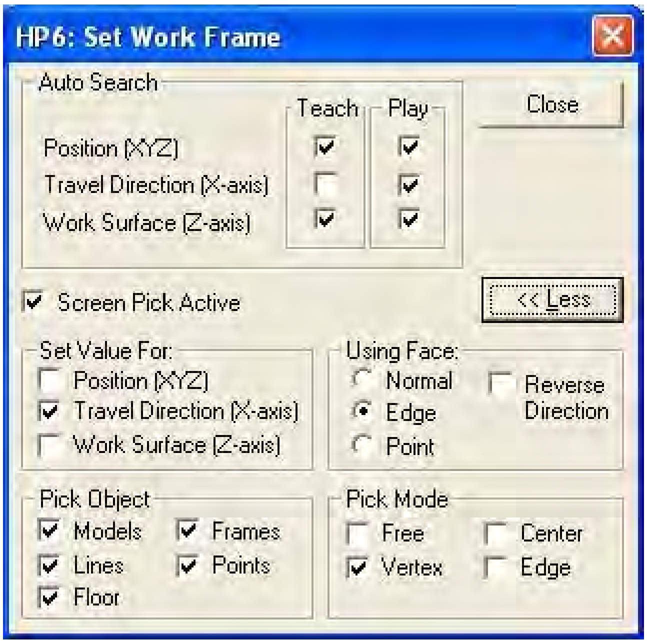
The Work angle (W) is defined by the angle between the tool and the work surface in the YZ plane. Changing the value of "W" will rotate the tool around the Work frame X-axis. The "W" angle is define between -90.0 and 90.0 degrees. The Reverse Work Side checkbox indicates if the Work Angle is on the same side then the Y-axis (unchecked) or on the opposite side (checked). If a work angle is moved over the 90.0 degree limit, the work angle side will change and the work angle will be set back within its allowable limit.



The Travel angle (T), also called the Push/Pull angle, is defined as the angle between the torch and the YZ plane. When set to 0 degree, the tool is in perpendicular to the travel direction. If "T" is positive, the tool is pushing; and if it is negative, the tool is pulling. The "C" angle is the rotation angle around the Tool Z axis.

8.1.1 Work Frame Setting

The Work frame can be set manually or automatically. Press the "Set Frame..." button to display the Work Frame Set dialog and set your preferences.



Set Work Frame

Item	Description
"Auto Search" section	Determine which components of the Work frame are to be automatically updated as the robot moves. Settings during teaching [Teach] and during playback [Play] are independently set.
[Screen Pick Active] check box	Enables the mouse picking operation.Pressing the [Shift] key enables or disables the "Screen Pick Active" mode.
[Close] button	Closes the dialog box.
[More] or [Less] button	Displays or hides the pick mode setting section.
"Set Value For:" section	Determine which values of the Work Frame will be changed when the screen is clicked.
"Use Face:" section	Determines which information for a click surface is used to set the Travel Direction or the Work Surface. [Normal] radio button: The normal of the face is used. [Edge] radio button: The edge direction closes to the picked point is used. Note if both the X-axis and the Z-axis are checked, the Z-axis is set in the Edge direction. [Point] radio button: The direction defined by the Work frame origin and the picked face point is used. The [Reverse Direction] checkbox can be used to select the opposite direction.

Set Work Frame

Item	Description
"Pick Object" section	Sets the type of objects that can be selected when clicking on the screen. Please refer to Section "6.4 Pick Settings".
"Pick Mode" section	Sets conditions determining the selected point in the clicked area. Please refer to Section "6.4 Pick Settings".

Auto Search

MotoSimEG can automatically set the Work frame by searching from the work surface. The tool Z-axis positive direction is searched to find the first intersecting face. The found face intersection point and normal can be used to calculate the frame position and Z-axis. The travel direction (or Work frame X-axis) can automatically be determined by using the robot previous position and new position.

Each component of the Work frame can be set to automatically updated as the robot moves or not. The settings are independently set for "Teach" and "Play" mode. By default the "Auto Search" is active (checked) for all the components except for the "Travel Direction" in "Teach" which tends make jogging operation of the robot difficult because the Work frame changes after each position change.

NOTE

- The Work surface search and calculation can become fairly intensive in cells with large models made of thousand of faces and will slow down the playback animation. For such cases, it may necessary to turn off (uncheck) the Work Surface auto search and manually set the Z-direction.
- When the tool is close to an edge formed by multiple faces, the face with the normal pointing upward will be selected over the other ones.
- If no surface can be found, the position is set as the tool position and the previously found normal (Z-axis) is reused.

Manually setting the Work Frame

The Work frame components can be set manually by clicking on the screen. To control the pick result, press the "More" button to display the Pick Setting section of the dialog. Select the value to be set and click on the screen to change those values to those of the clicked geometry.

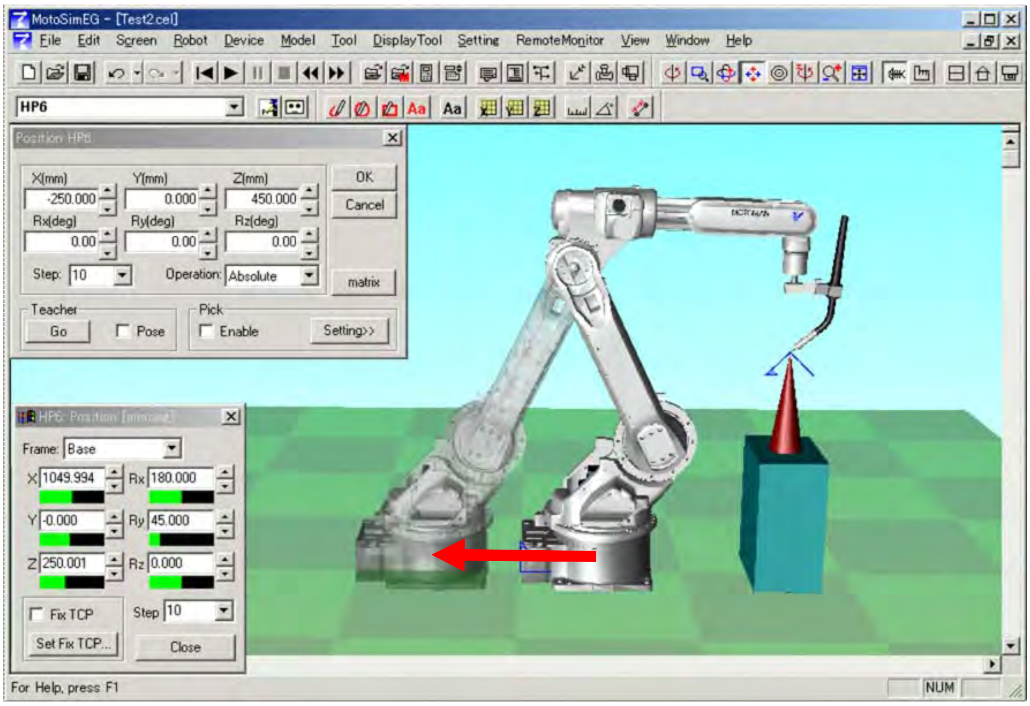
Note that the "Auto Search" - "Teach" check boxes and the "Pick" - "Set Value for" check boxes are exclusive of one another. By default, only the "Travel Direction" is checked to be manually set by using the face point information ("Use Face: point"). Therefore, clicking on the screen will cause travel direction (X-axis) to turn in the work surface plane to point toward the clicked point.

8.1.2 Fix TCP

The Fix TCP function allows fixing (or attaching) the robot TCP position relative to another model in the cell. If the robot base or the attached model is moved, the robot changes position so that it TCP remains in the same position relative to the specified model.

The Fix TCP function is enabled by the robot Position panel. Check the "Fix TCP" check box to enable the function. The default model to which the TCP is attached is the world. To change the model, press the "Set Fix TCP..." button to display the "Select Model" dialog.

This function is useful to determine the layout of a cell. For example the robot TCP can be attached to a work piece. As the robot base or work piece are moved around during the layout procedure, the robot automatically adjust itself to keep its TCP in the same position on the work piece. It then becomes obvious if the work piece become out of reach, because robot will no longer maintain its position on the work piece.

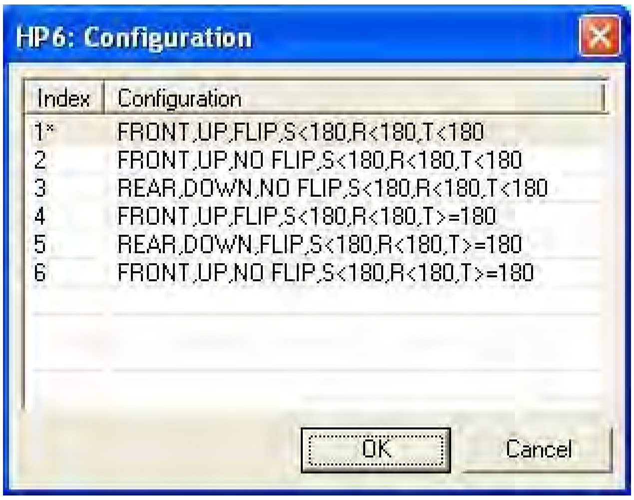


Its can also be used when teaching a robot with external axis. After the tool has been set in position, if the robot external axis need to be changed, with the Fix TCP function enabled the robot tool will remains in position. This avoids having to adjust the robot tool after moving the external axis.

NOTE The function is automatically disabled if the Position panel is closed or if a job is played back. The Fix TCP section is not available when the Frame is set to "Work Angle".

8.1.3 Robot Position Configuration

The robot position "Configuration" dialog displays a list of different ways the robot can reach its current position. To display the "Configuration" dialog, select {Tool} - {Teaching} - {Robot Configuration} or from the robot "Position" panel click the "Configuration" button.



Configuration Dialog Box

Item	Description
Configuration List	Displays the list of all available robot configurations in which the robot can reach the current position. Changing the selected configuration will move the robot into the specified configuration. The asterisk next to the index number indicates the initial configuration of the robot.
[OK] button	Closes the Configuration dialog and changes the robot configuration to the select one.
[Cancel] button	Closes the Configuration dialog and returns the robot to its initial configuration.

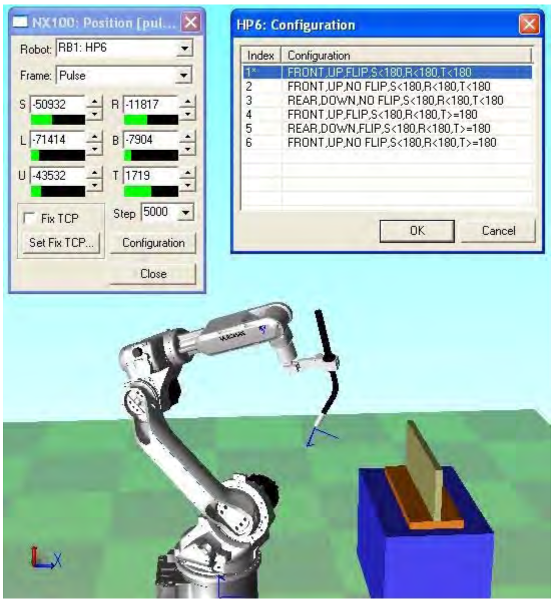
A robot can often reach the same position in different ways. The robot resulting pulse position will be different but the tool will be at same position (XYZ position). The robot configuration is used to differentiate between those possibilities.

The configuration is define by six parameters:

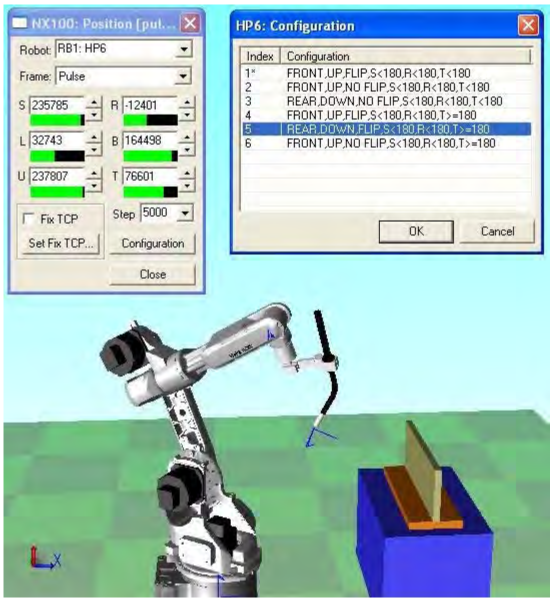
FRONT or REAR	Specifies if the B-axis rotation center is in the FRONT or the REAR of the S-axis rotation center.
UP or DOWN	Specifies if the elbow of the robot (angle between the lower and upper arm) is UP or DOWN.

FLIP or NO FLIP	DX200, DX100, FS100 : B-axis position Specifies if the angle of the B-axis is to be positive or negative. FLIP: B-axis angle is greater or equal to 0° NO FLIP: B-axis angle is small than 0° NX100 : R-axis position Specifies if the R axis is FLIP or NOFLIP. FLIP position indicates an angle from -90° to 90°, 270° to 360°, or -360° to -270°.
S<180 or S>=180	Specifies if the S-axis absolute angle is smaller then 180° (within one turn) or greater (over one turn).
R<180 or R>=180	Specifies if the R-axis absolute angle is smaller then 180° (within one turn range) or greater (over one turn range).
T<180 or T>=180	Specifies if the S-axis absolute angle is smaller then 180° (within one turn range) or greater (over one turn range).

Example:



FRONT,UP,FLIP,S<180,R<180,T<180



REAR,DOWN,FLIP,S<180,R<180,T>=180

8.2 I/O Monitor

The I/O Monitor allows the simulation of the input and output signals of the YIU0x unit (DX100) or the NIO0x board of the NIF0x unit and other I/O expansion boards. It displays the current I/O states of the controller. Input signals can be changed manually before or during playback. Output signals maybe changed by the execution of I/O instructions during job playback or by the virtual pendant.

On the [Simulator] tab, in the [Monitor] group, click the [I/O Monitor] button, the [Virtual I/O] dialog appears.

NOTE

If the cell contains multiple controllers and the "Multiple Controller Dialog" mode is enable, a separate I/O Monitor can be displayed for each controller in the cell. Select the controller to be displayed in the controller combobox of the toolbar before displaying the I/O Monitor.

NOTE

The I/O Monitor support the following I/O expansion boards:

DX200, DX100:

- JARCR-XOI01
- JARCR-XOI02
- JARCR-XOI03

The analog EW boards are not supported for the DX200/DX100.

FS100:

- LIO-08R (JAPMC-IO2308-E)
- LIO-09R (JAPMC-IO2309-E)

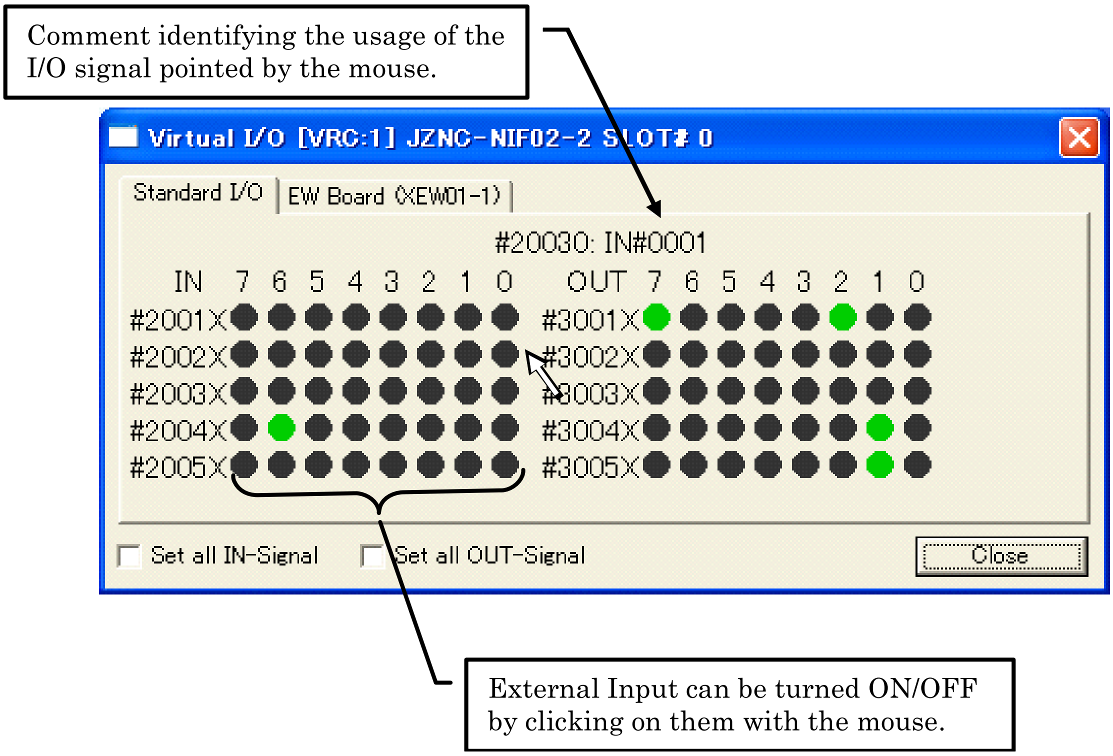
NX100:

- JARCR-XOI01
- JARCR-XOI02
- JARCR-XOI03
- JANCD-XEW01-1
- JANCD-XEW01-2
- JANCD-XEW02

To add or remove I/O expansion board refer to section Section "11.4 Adding I/O Board Module".

8.2.1 Dedicated and General I/O

This function emulated the I/O of the YIU0x unit (DX100) or the NIO0x board of the NIF0x unit. These I/O are found under the “Standard I/O” tab.



Virtual I/O

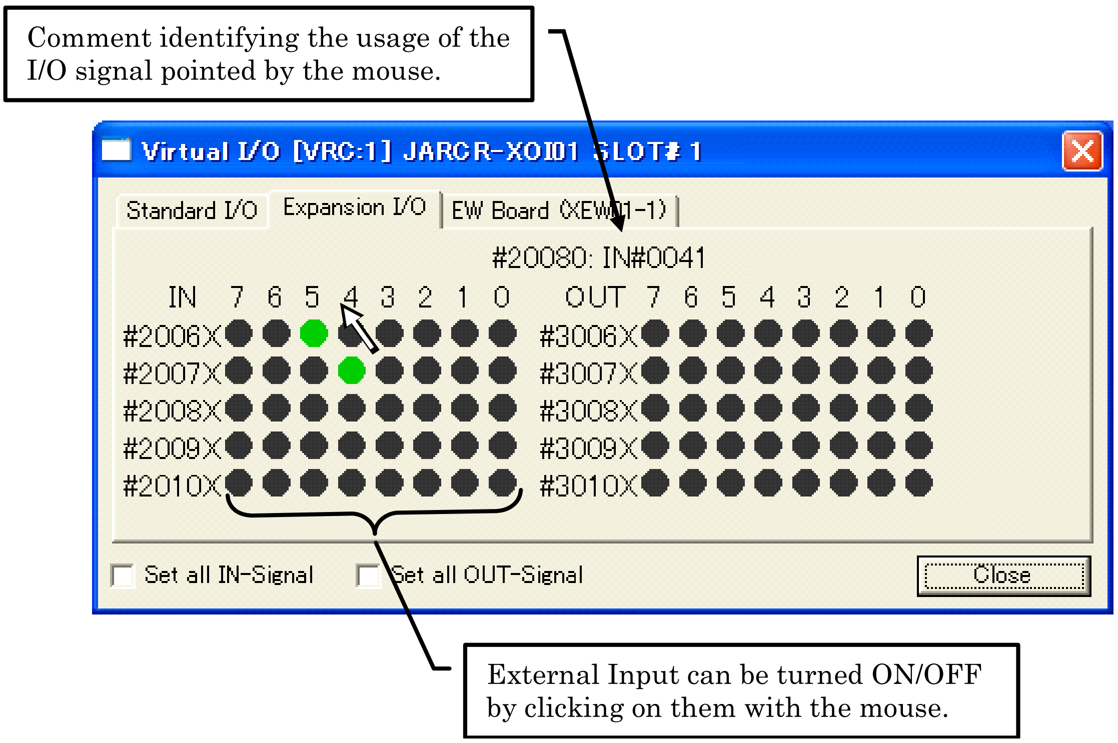
IN section	External input signals #20010 to #20057 ON/OFF status display. The ON/OFF status can be toggled by left clicking on a signal status icon. ● (Green) : ON ● (Black) : OFF
OUT section	External output signals #30010 to #30057 ON/OFF status display. The ON/OFF status of the signals cannot be change by clicking on them. ● (Green) : ON ● (Black) : OFF
[Set all IN-Signal] check box	All general-purpose input (IN#0001 - IN#1024) is put into the state of the compulsion input.
[Set all OUT-Signal] check box	All general-purpose outputs (OUT#0001 - OUT#1024) are made an output status.
[Close] button	Closes the “Virtual I/O” window.

NOTE For the relationship between the External Input/Ouput signals and the Universal Input/Output signal please refer to the Section "8.2.4 Inputs and Outputs".

8.2.2 Expanded Digital I/O

This function emulated the expanded digital I/O of the XIO0x board. These I/O are found under the “Expanded I/O” tab.

NOTE The expanded digital I/O board [JANCR-XOI0x] need to be added to the CMOS in order to be displayed. Please refer to Section "11.4 Adding I/O Board Module".



Virtual I/O

IN section	External input signals #20060 to #20107 ON/OFF status display. The ON/OFF status can be toggled by left clicking on a signal status icon. ● (Green) : ON ● (Black) : OFF
OUT section	External output signals #30060 to #30107 ON/OFF status display. The ON/OFF status of the signals cannot be change by clicking on them. ● (Green) : ON ● (Black) : OFF
[Set all IN-Signal] check box	All general-purpose input (IN#0001 - IN#1024) is put into the state of the compulsion input.
[Set all OUT-Signal] check box	All general-purpose outputs (OUT#0001 - OUT#1024) are made an output status.
Close	Closes the “Virtual I/O” window.

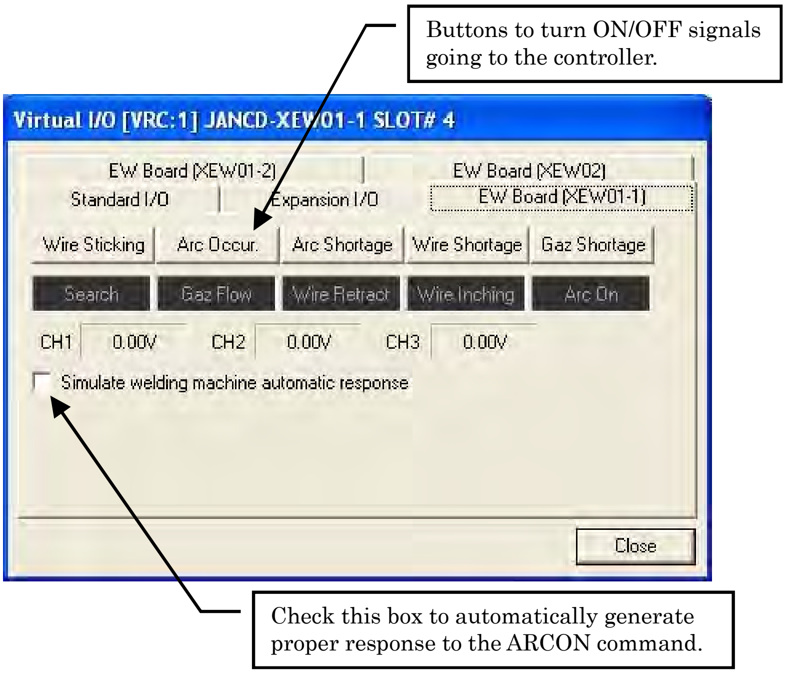
NOTE For the relationship between the External Input/Ouput signals and the Universal Input/ Output signal please refer to the Section "8.2.4 Inputs and Outputs".

8.2.3 Analog I/O (EW Board)

This function emulated the analog and digital I/O of the XEWxx board. These I/O are found under the “EW Board” tab.

NOTE
- This function cannot be use in the case of DX100 controller.
- This function is enabled when the CMOS loaded from a real system contains an analog I/O board [JANCR-XEWxx].
  For details, please refer to Section "11.4 Adding I/O Board Module".

■ JANCD-XEW01-1

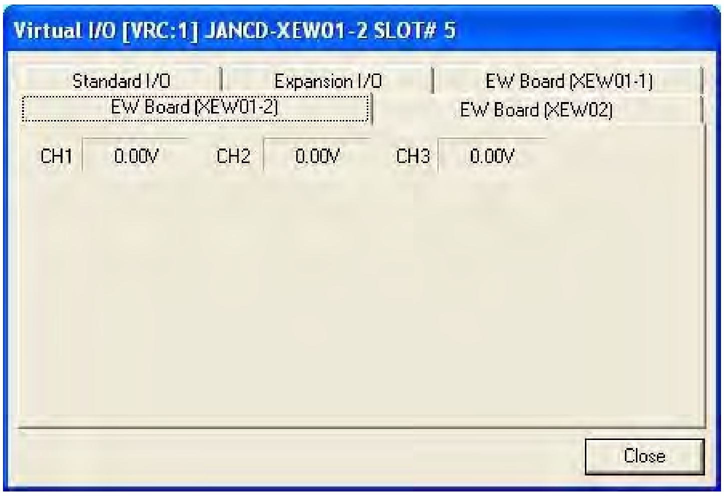


Virtual I/O

Wire Sticking	Signals to the controller that the wire is sticking. (#21274)
Arc Occurence	Signals to the controller that the arc is on. (#21273)
Arc Shortage	Signals to the controller that the arc was extinguished. (#21272)
Wire Shortage	Signals to the controller that there is a shortage of wire. (#21271)
Gaz Shortage	Signals to the controller that there is a shortage of gaz. (#21270)
Search	Signals to enable the search function. (#31275)

Gaz Flow	Signals to enable the gaz flow. (#31274)
Wire Retract	Signals to retract the wire. (#31273)
Wire Inching	Signals to feed the wire. (#31272)
ArcOn	Signals to enable the welding arc. (#31271)
CH1	Display the analog output value of channel 1. (AOUT1)
CH2	Display the analog output value of channel 2. (AOUT2)
CH3	Display the analog output value of channel 3. (AOUT3)
Simulate welding machine automatic response	Enables the automatic simulation of the normal response from a welding machine to the controller “Arc On” command.
Close	Closes the “Virtual I/O” window.

■ JANCD-XEW01-2

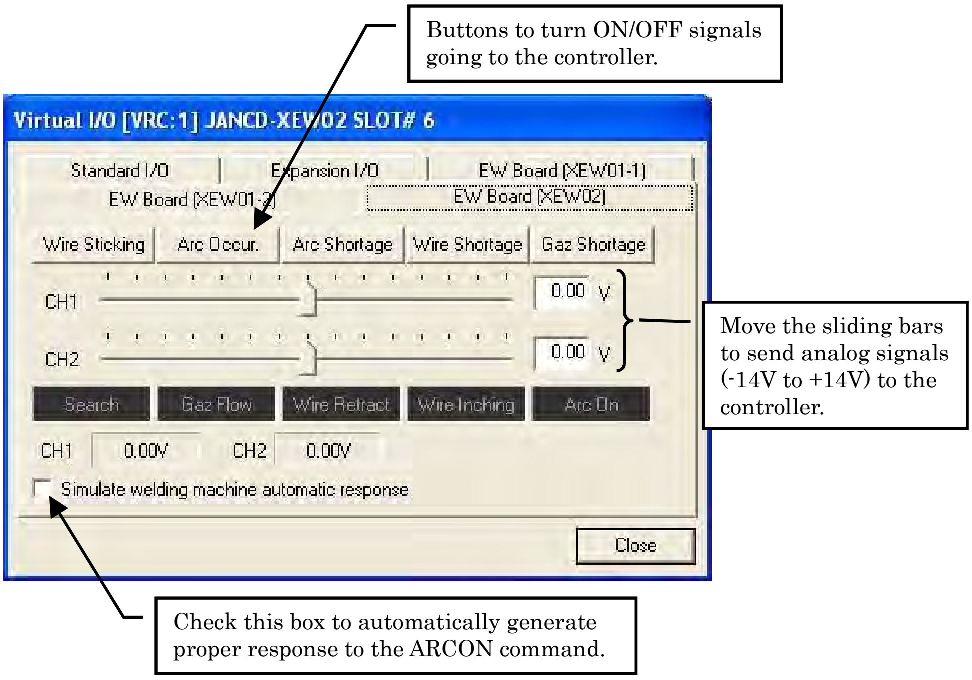


Virtual I/O

CH1	Display the analog output value of channel 1. (AOUT1)
CH2	Display the analog output value of channel 2. (AOUT2)
CH3	Display the analog output value of channel 3. (AOUT3)
Close	Closes the “Virtual I/O” window.

■ JANCD-XEW02

Virtual I/O



Wire Sticking	Signals to the controller that the wire is sticking. (#21274)
Arc Occurence	Signals to the controller that the arc is on. (#21273)
Arc Shortage	Signals to the controller that the arc was extinguished. (#21272)
Wire Shortage	Signals to the controller that there is a shortage of wire. (#21271)
Gaz Shortage	Signals to the controller that there is a shortage of gaz. (#21270)
CH1 Slider	Set the analog value send to the controller on channel 1. (AIN01)
CH2 Slider	Set the analog value send to the controller on channel 2. (AIN02)
Search	Signals to enable the search function. (#31275)
Gaz Flow	Signals to enable the gaz flow. (#31274)
Wire Retract	Signals to retract the wire. (#31273)
Wire Inching	Signals to feed the wire. (#31272)
ArcOn	Signals to enable the welding arc. (#31271)
CH1	Display the analog output value of channel 1. (AOUT01)
CH2	Display the analog output value of channel 2. (AOUT02)
Simulate welding machine automatic response	Enables the automatic simulation of the normal response from a welding machine to the controller “Arc On” command.
Close	Closes the “Virtual I/O” window.

8.2.4 Inputs and Outputs

■ DX200, DX100, NX100

DX200

Classification of I/O signals

Logic Name	Classification	Description	Range
0xxxx	General Input	Reference with input instruction of the job.	00010 - 05127 (4096 signals)
1xxxx	General Output	Reference with input instruction of the job.	10010 - 15127 (4096 signals)
2xxxx	External Input	Signal No. corresponding to the input terminal.	20010 - 25127 (4096 signals)
3xxxx	External Output	Signal No. corresponding to the output terminal.	30010 -35127 (4096 signals)
4xxxx	Specific Input	Signal to change the operating condition of the robot.	40010 - 41607 (1280 signals)
5xxxx	Specific Output	Signal notifying the operating condition of the robot.	50010 - 53007 (2400 signals)
6xxxx	Interface Panel Input	Signal notifying the operating condition of the interface panel.	60010 - 60647 (512 signals)
7xxxx	Auxiliary Relay	Auxiliary relay in the concurrent I/O	70010 - 79997 (7992 signals)
80xxxx	Control Status	Monitoring of the hardware signal status of the robot control section.	80010 - 80647 (512 signals)
82xxxx	Pseudo Input	Pseudo input relay reading from the system parameter.	82010 - 82207 (160 signals)
27xxxx	Network Input	Input signal from thenetwork device.	27010 - 29567 (2048 signals)
37xxxx	Network Output	Output signal to the network device.	37010 - 39567 (2048 signals)
Mxxxx	Register	1 word data (16 bits) General Register M000 - M559 Analog output register M560 - M599 Analog input register M600 - M639 System Register M650 - M999	M00 - M999 (1000 signals)

DX100

Classification of I/O signals

Logic Name	Classification	Description	Range
0xxxx	General Input	Reference with input instruction of the job.	00010 - 02567 (2048 signals)
1xxxx	General Output	Reference with input instruction of the job.	10010 - 12567 (2048 signals)
2xxxx	External Input	Signal No. corresponding to the input terminal.	20010 - 22567 (2048 signals)
3xxxx	External Output	Signal No. corresponding to the output terminal.	30010 -32567 (2048 signals)
4xxxx	Specific Input	Signal to change the operating condition of the robot.	40010 - 41607 (1280 signals)
5xxxx	Specific Output	Signal notifying the operating condition of the robot.	50010 - 52007 (1600 signals)
6xxxx	Interface Panel Input	Signal notifying the operating condition of the interface panel.	60010 - 60647 (512 signals)
7xxxx	Auxiliary Relay	Auxiliary relay in the concurrent I/O	70010 - 79997 (7992 signals)
80xxxx	Control Status	Monitoring of the hardware signal status of the robot control section.	80010 - 80647 (512 signals)
82xxxx	Pseudo Input	Pseudo input relay reading from the system parameter.	82010 - 82207 (160 signals)
25xxxx	Network Input	Input signal from thenetwork device.	25010 - 27567 (2048 signals)
35xxxx	Network Output	Output signal to the network device.	35010 - 37567 (2048 signals)
Mxxxx	Register	1 word data (16 bits) General Register M000 - M559 Analog output register M560 - M599 Analog input register M600 - M639 System Register M650 - M999	M00 - M999 (1000 signals)

NX100

Classification of I/O signals

Logic Name	Classification	Description	Range
0xxxx	General Input	Reference with input instruction of the job.	00010 - 01287 (1024 signals)
1xxxx	General Output	Reference with input instruction of the job.	10010 - 11287 (1024 signals)
2xxxx	External Input	Signal No. corresponding to the input terminal.	20010 - 21287 (1024 signals)
3xxxx	External Output	Signal No. corresponding to the output terminal.	30010 -31287 (1024 signals)
4xxxx	Specific Input	Signal to change the operating condition of the robot.	40010 - 40807 (640 signals)
5xxxx	Specific Output	Signal notifying the operating condition of the robot.	50010 - 51007 (800 signals)
6xxxx	Interface Panel Input	Signal notifying the operating condition of the interface panel.	60010 - 60647 (512 signals)
7xxxx	Auxiliary Relay	Auxiliary relay in the concurrent I/O	70010 - 79997 (79921 signals)
80xxxx	Control Status	Monitoring of the hardware signal status of the robot control section.	80010 - 80647 (512 signals)
82xxxx	Pseudo Input	Pseudo input relay reading from the system parameter.	82010 - 82127 (96 signals)
22xxxx	Network Input	Input signal from thenetwork device.	22010 - 23287 (1024 signals)
32xxxx	Network Output	Output signal to the network device.	32010 - 33287 (1024 signals)
Mxxxx	Register	1 word data (16 bits)	M00 - M499 (500 signals)

An External Input signal (#20010 - #25127(DX200), #22567(DX100), #21287(NX100)) or External Output signal (#30010 - #35127(DX200), #32567(DX100), #31287(NX100)) is allocated for each I/O data of the board.

The standard NIO0x board can transmit to the controller 40 input points (5 bytes) and 40 output points (5 bytes). The first 16 I/O points are normally configured has dedicated I/O. The dedicated I/O assignment depends on the controller selected application. The remaining I/O points are assigned to the General I/O which corresponds to the I/O with the I/O instruction of a job.

Input	Output
20010 - 20017: Dedicated Input 20020 - 20027: Dedicated Input	30010 - 30017: Dedicated Output 30020 - 30027: Dedicated Output
20030 - 20037 : General I/O (IN#001-008) 20040 - 20047 : General I/O (IN#009-016) 20050 - 20057 : General I/O (IN#017-024)	30030 - 30037 : General I/O (OUT#001-008) 30040 - 30047 : General I/O (OUT#009-016) 30050 - 30057 : General I/O (OUT#017-024)

In the case of a Digital I/O expansion board (JARCR-XOI01, JARCR-XOI02 or JARCR-XOI03), the board can transmit to the controller 40 input points (5 bytes) and 40 output points (5 bytes).
There external signals normally followsthose of the NIOxx board and are assigned to General I/O.

Input	Output
20060 - 20067 : General I/O (IN#025-032) 20070 - 20077 : General I/O (IN#033-040) 20080 - 20087 : General I/O (IN#041-048) 20090 - 20097 : General I/O (IN#049-056) 20100 - 20107 : General I/O (IN#057-064)	30060 - 30067 : General I/O (OUT#025-032) 30070 - 30077 : General I/O (OUT#033-040) 30080 - 30087 : General I/O (OUT#041-048) 30090 - 30097 : General I/O (OUT#049-056) 30100 - 30107 : General I/O (OUT#057-064)

To help identify the correspondance between the I/O board signal and the controller signal, comments for each I/O point can be added in the VRCNXMAIN.INI file under the [IO_ALLOC] section. The comment corresponding to an I/O point is displayed in the Virtual I/O dialog comment section when the mouse pointer is over a I/O point.

The information is entered in the following format:

LG<External I/O No.>=Comment

For example:
File:VRCNXMAIN.INI

```
[IO_ALLOC]
LG20030=IN0001
LG20031=IN0002
LG20032=IN0003
...
```

■ FS100

FS100

Classification of I/O signals

Logic Name	Classification	Description	Range
0xxxx	General Input	Reference with input instruction of the job.	00010 - 01287 (1024 signals)
1xxxx	General Output	Reference with input instruction of the job.	10010 - 11287 (1024 signals)
2xxxx	External Input	Signal No. corresponding to the input terminal.	20010 - 21287 (1024 signals)
3xxxx	External Output	Signal No. corresponding to the output terminal.	30010 -31287 (1024 signals)
4xxxx	Specific Input	Signal to change the operating condition of the robot.	40010 - 41607 (1280 signals)
5xxxx	Specific Output	Signal notifying the operating condition of the robot.	50010 - 52007 (1600 signals)
6xxxx	Interface Panel Input	Signal notifying the operating condition of the interface panel.	60010 - 60647 (512 signals)
7xxxx	Auxiliary Relay	Auxiliary relay in the concurrent I/O	70010 - 79997 (7992 signals)
80xxxx	Control Status	Monitoring of the hardware signal status of the robot control section.	80010 - 80647 (512 signals)
82xxxx	Pseudo Input	Pseudo input relay reading from the system parameter.	82010 - 82207 (160 signals)
25xxxx	Network Input	Input signal from thenetwork device.	25010 - 26287 (1024 signals)
35xxxx	Network Output	Output signal to the network device.	35010 - 36287 (1024 signals)
Mxxxx	Register	1 word data (16 bits) General Register M000 - M559 Analog output register M560 - M599 Analog input register M600 - M639 System Register M650 - M999	M00 - M999 (1000 signals)

An External Input signal (#20010 - #21287) or External Output signal (#30010 - #31287) is allocated for each I/O data of the board.

In the case of a Digital I/O expansion board (LIO-08R, LIO-09R), the board can transmit to the controller 32 input points (4 bytes) and 32 output points (4 bytes).

In regard to the first board, the configuration of the first 16 I/O points (2 bytes) is dedicated by system. The dedicated I/O assignment depends on the controller selected application. The remaining 16 I/O points (2 bytes) are assigned to the General I/O which corresponds to the I/O instruction of a job.
In regard to the subsequent board, 32 input points and 32 output points are assigned to the General I/O.
When the board is set, the area for 48 input points and 48 output points (6 bytes) is reserved. The first 32 points (4 bytes) are usable area, and the remaining 16 points (2 byte) are unusable area (they are assigned to the area of the board status).

When two I/O expansion boards are set, I/O signals are as follows.
.

Input	Output
20010 - 20017 : Assigned by system 20020 - 20027 : Assigned by system 20030 - 20037 : General I/O (IN#001-008) 20040 - 20047 : General I/O (IN#009-016) 20050 - 20057 : Unusable Area 20060 - 20067 : Unusable Area	30010 - 30017 : Assigned by system 30020 - 30027 : Assigned by system 30030 - 30037 : General I/O (OUT#001-008) 30040 - 30047 : General I/O (OUT#009-016) 30050 - 30057 : Unusable Area 30060 - 30067 : Unusable Area
20070 - 20077 : General I/O (IN#033-040) 20080 - 20087 : General I/O (IN#041-048) 20090 - 20097 : General I/O (IN#049-056) 20100 - 20107 : General I/O (IN#057-064) 20110 - 20117 : Unusable Area 20120 - 20127 : Unusable Area	30070 - 30077 : General I/O (OUT#033-040) 30080 - 30087 : General I/O (OUT#041-048) 30090 - 30097 : General I/O (OUT#049-056) 30100 - 30107 : General I/O (OUT#057-064) 30110 - 30117 : Unusable Area 30120 - 30127 : Unusable Area

To help identify the correspondence between the I/O board signal and the controller signal, comments for each I/O point can be added under the [IO_ALLOC] section in the "VRCNXMAIN.INI" file. The comment corresponding to an I/O point is displayed on the comment section in the Virtual I/O dialog when the mouse pointer is over a I/O point.

The information is entered in the following format:

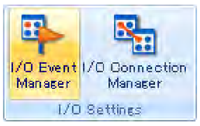
    LG<External I/O No.>=Comment

For example:
File:VRCNXMAIN.INI

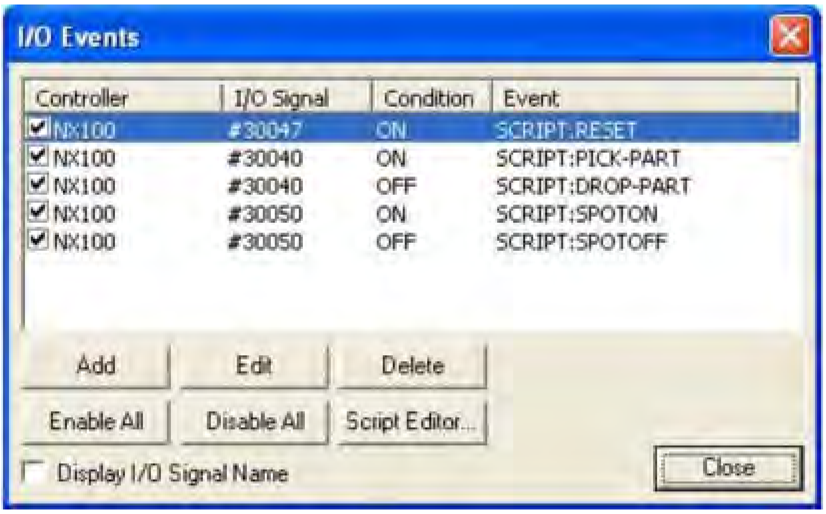
```
[IO_ALLOC]
LG20030=IN0001
LG20031=IN0002
LG20032=IN0003
...
```

8.3 I/O Events

An I/O Event allows to monitor a specific I/O state during playback. When the I/O state changes to a set condition, it triggers an event, which executes a model script.
For example, in a handling application, if the output #1 is used to open and close the gripper, an event can be linked to this I/O signal in MotoSim EG-VRC to execute a model script to change the gripper appearance to an open or close state.
On the [Simulator] tab, in the [I/O Setting] group, click the [I/O Events Maneger] button, the [I/O Events] dialog appears.



8.3.1 I/O Event Manager



I/O Events Dialog Box

Item	Description
I/O Event list	List of all the I/O Events registered in the cell. • Controller: Name of the controller. The checkbox on the left of the controller name, indicates if the I/O Event is enables or not. The enable state can be changed by clicking on the checkbox. • I/O Signal: Displays the I/O number or I/O name of the I/O signal being monitors. Displayed information is changed by checking or unchecking the “Display I/O Signal Name” checkbox. • Condition: The event will execute when the I/O signal changes to this condition (ON or OFF). • Event: Description of the event that will be executed when the I/O signal changes to the set condition. Double-clicking on an I/O Events will display its I/O Event Property dialog for edition.
[Display I/O Signal Name] checkbox	When checked the I/O Signal column in the list displays the I/O name instead of the I/O number.
[Add] button	Displays the “I/O Event Property” dialog to create a new I/O event.
[Edit] button	Displays the “I/O Event Property” dialog of the currently selected I/O Event for edition.
[Delete] button	Deletes the currently selected I/O Event.
[Enable All] button	Enables all of the I/O Events
[Disable All]button	Disables all of the I/O events.
[Script Editor]button	Displays the “Model Script Editor” dialog to add or edit the model scripts. (For details, refer to Section "9.12 Model Script")
[Close]button	Closes the I/O Events dialog.

NOTE The I/O names displayed for a I/O signals correspond to those defined in the VRCNXMAIN.INI file (For detail, refer to section Section "8.2.4 Inputs and Outputs")

8.3.2 I/O Event Property

The “I/O Event Property” dialog box is displayed by pressing the [Edit] or [Add] button of the “I/O Events” dialog box.
It allows setting the I/O Event properties such as the I/O signal, condition and event.

"I/O Event Property" Dialog Box

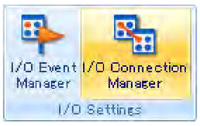
Item	Description
[Enable]	Indicates that the I/O Event will be monitored during playback when checked.
[Controller]	Selects the controller associated with the I/O Event. This field cannot be modified when editing an existing I/O Event.
[I/O Signal]	Selects the controller I/O signal that will be monitored during playback. The combobox list contains both the I/O number and I/O name, but only one of the information will display in the box. Displayed information is changed by checking or unchecking the "Display I/O Name" checkbox. The combobox list only contains the I/O signals available on the selected controller. Changing controller selection changes the list content.
[Condition]	Selects if the event will execute when the I/O signal changes to the ON or OFF condition.
[Event]	Enter or select the script name to be executed when the I/O signal changes to the set condition.
[OK] button	If in [Add] mode: adds a new I/O Event definition. If in [Edit] mode: updates the selected I/O Event definition. Closes the "I/O Event Property" dialog box.
[Cancel] button	Closes the "I/O Event Property" dialog box.

NOTE

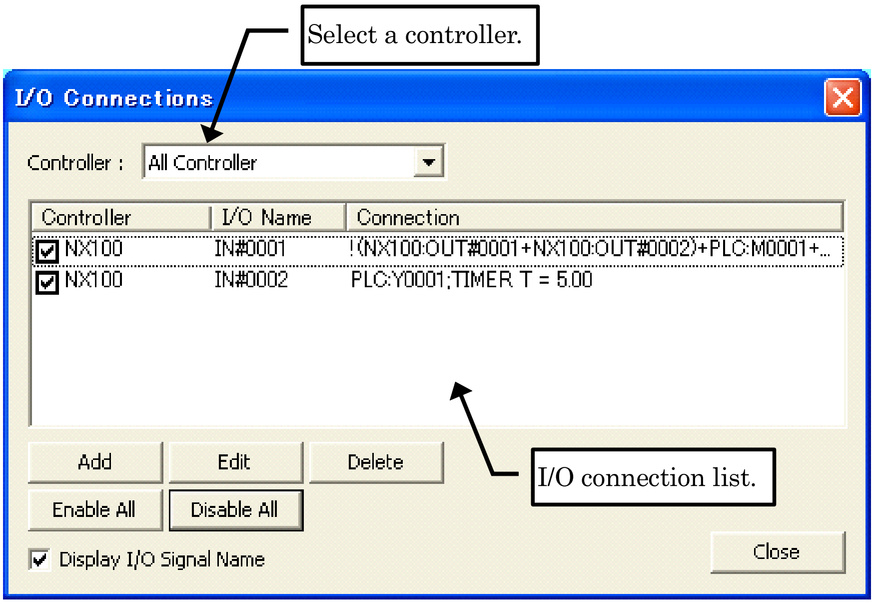
The I/O names displayed for the I/O signals correspond to those defined in the VRCNXMAIN.INI file (For detail, refer to Section "8.2.4 Inputs and Outputs")

8.4 I/O connection

The I/O connect allows to exchange I/O signals between robot controllers.
It is possible to interlock the motion of robot to set this function.
On the [Simulator] tab, in the [I/O Setting] group, click the [I/O Connection Maneger] button, the [I/O Connections] dialog appears.



8.4.1 Management of I/O connection



I/O Connection

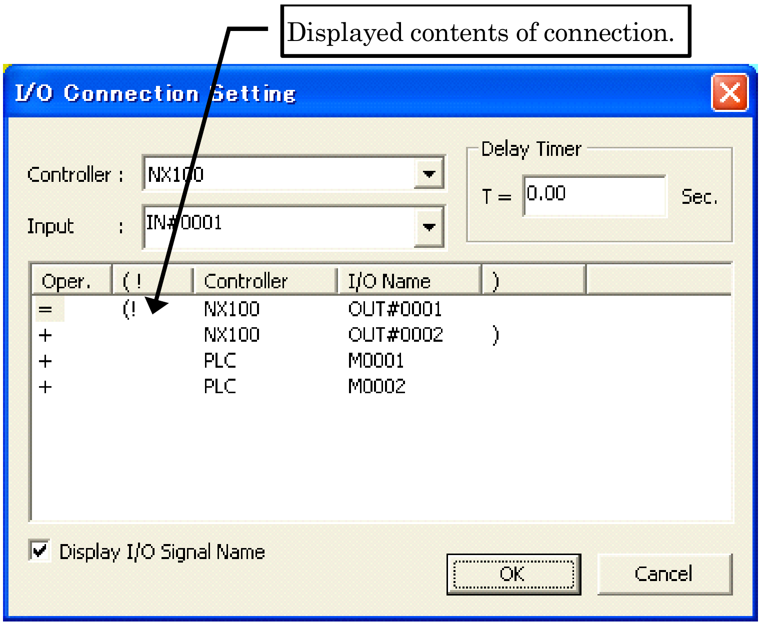
Item	Description
Controller	The robot controller can be selected. When selected the "ALL Controller", all setting can be displayed in current cell.

I/O Connection

Item	Description
I/O connection list	List of all the I/O connections registered in the cell. • Controller: Name of the controller. The checkbox on the left of the controller name, indicates if the I/O Event is enables or not. The enable state can be changed by clicking on the checkbox. • I/O Name: Displays the I/O number or I/O name of the I/O signal being input. Displayed information is changed by checking or unchecking the “Display I/O Signal Name” checkbox. • Connection: The value of connection will be output to I/O name signal. Double-clicking on an I/O Connections will display its I/O Connection Property dialog for edition.
[Display I/O Signal Name] checkbox	When checked the I/O Name column in the list displays the I/O name instead of the I/O number.
[Add] button	Displays the I/O Connection Setting dialog to create a new I/O Connection.
[Edit] button	Displays the I/O Connection Setting dialog of the currently selected I/O Connection for edition.
[Delete] button	Deletes the currently selected I/O Connection.
[Enable All] button	Enables all of the I/O Connection.
[Disable All]button	Disables all of the I/O Connection.
[Close]button	Closes the I/O Connection dialog.

8.4.2 I/O Connection setting

The I/O Connect setting dialog box is displayed by pressing the [Edit] or [Add] button of the I/O Connection dialog box. It allows setting the I/O Connection properties such as the I/O Name and connection.



I/O Connection setting

Controller	The robot controller can be selected to edit the I/O connection.
Input	Select the controller I/O name that will be connected. Displayed information is changed by checking or un-checking the [Display I/O Name check] box. The combo-box list only contains the I/O Names available on the selected controller. Changing controller selection changes the list content.
Delay Timer	The time can be set to delay to substitute connection for input. (Unit of time is second)
[Display I/O Signal Name] checkbox	When checked the I/O Name column in the list displays the I/O name instead of the I/O number
Connection	Displayed contents of connection by selecting the Input. • [Oper.]: "+","*", " " can be selected. • [(!]: "!", "(", "!(", "(!", " " can be selected. • [Controller]: The robot controller can be selected that will have the output signals. • [I/O Signal]: Displayed I/O signals as output by un-checking the [Display I/O Signal Name] checkbox. • [I/O Name]: Displayed I/O names as output. • [ )]: ")", " " can be selected. Should be set to be equal to the number of pre brackets.
[OK] button	If in [Add] mode: adds a new I/O Connection definition. If in [Edit] mode : updates the selected I/O Connection definition. Closes the I/O Connection Property dialog.

I/O Connection setting

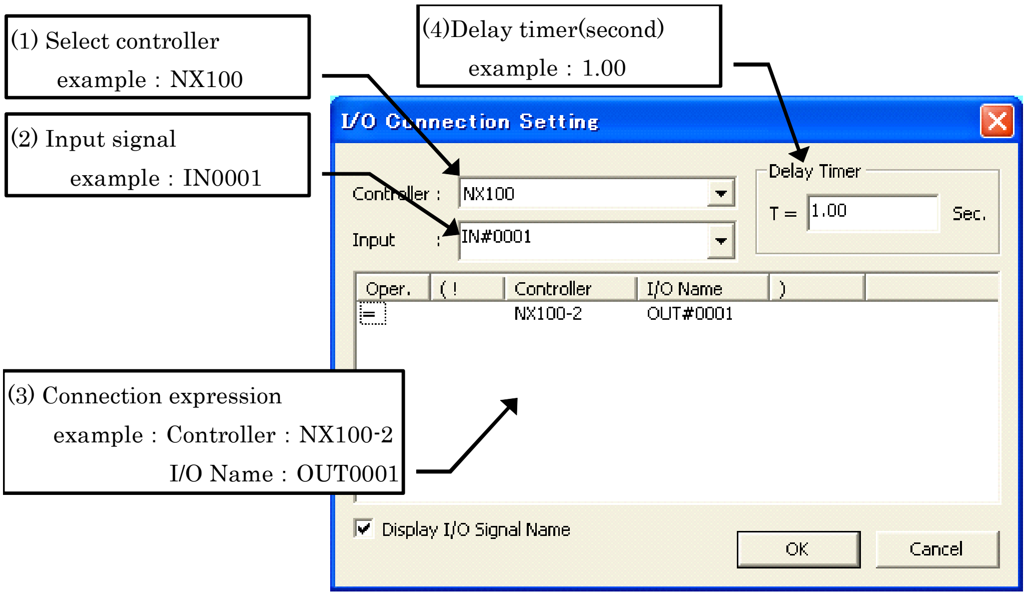
[Cancel] button	Closes the I/O Connection Property dialog.

Logical expression

+	Mean OR (∪).
*	Mean AND (∩).
!	Mean NOT. This will be used to set "make-before-break contact".
( )	Mean bracket.

Procedure

1. When pushed [Add] button, displays the I/O Connection Setting dialog to create a new I/O Connection. When pushed [Edit] button , Displays the I/O Connection Setting dialog of the currently selected I/O Connection for edition.
2. After setting each items, and pushed [OK] button, connection will be updated. Below is example setting, the [OUT001] of [NX100-2] will be set to the [IN001] of [NX100-1] after 1.0 second.



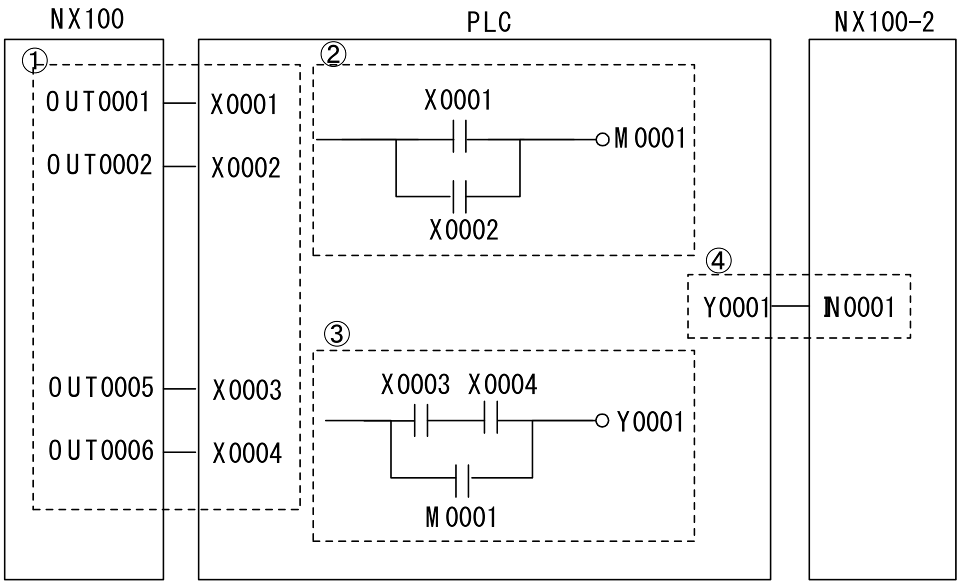
■ PLC setting

The PLC device can be used to set the complicated connection
“X“, “Y“, “M“ means,

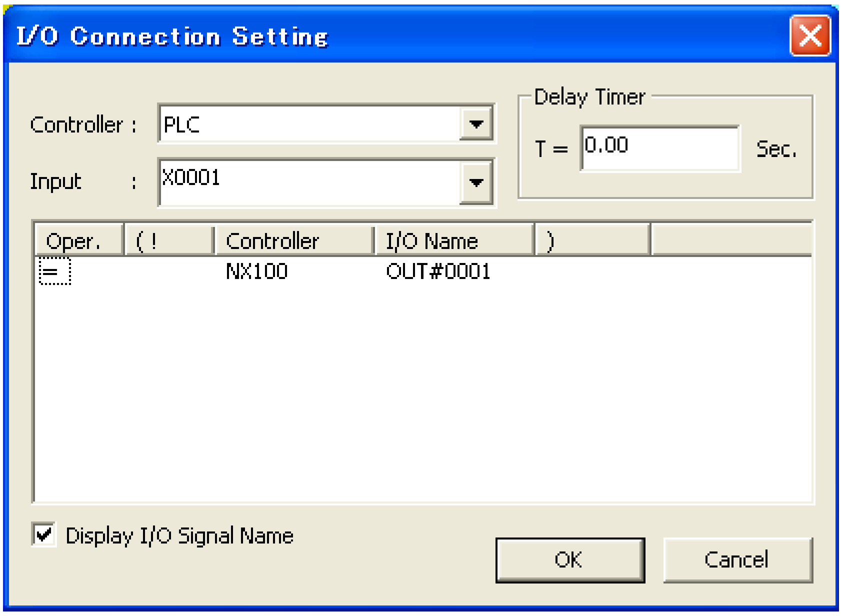
- “X“ : Input signal
- “Y“ : Output signal
- “M“ : Internal register

The maximum number of each signal is 128.

Below is example diagram to set,

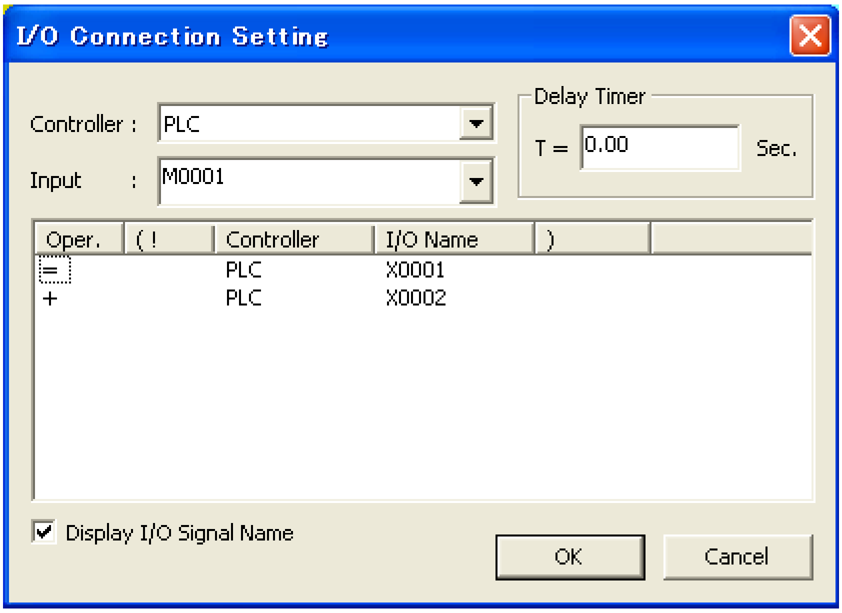


1. Set to substitute OUT001 of NX100 for X001 of PLC device.

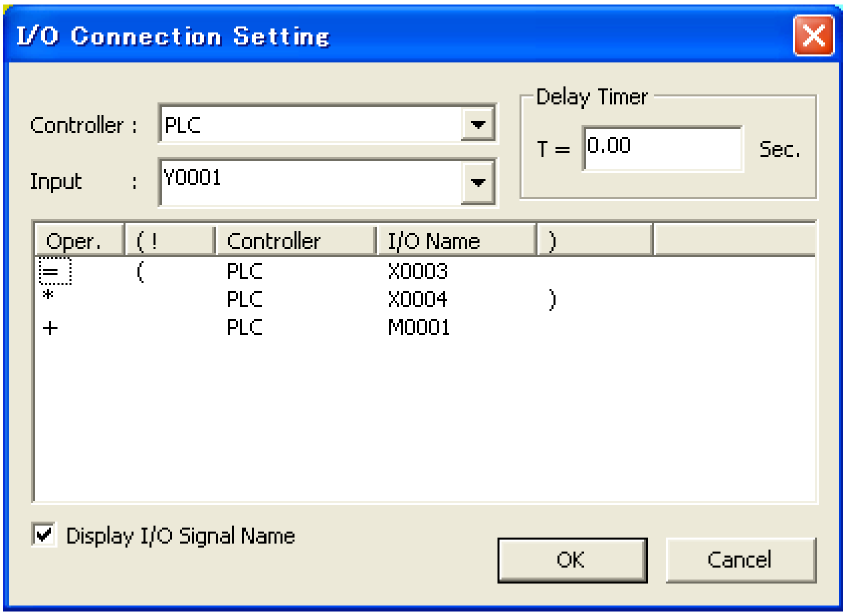


Also, “OUT0002”, “OUT0005” and “OUT0006”set to substitute “X0002”, “X0003” and “X0004” of PLC device.

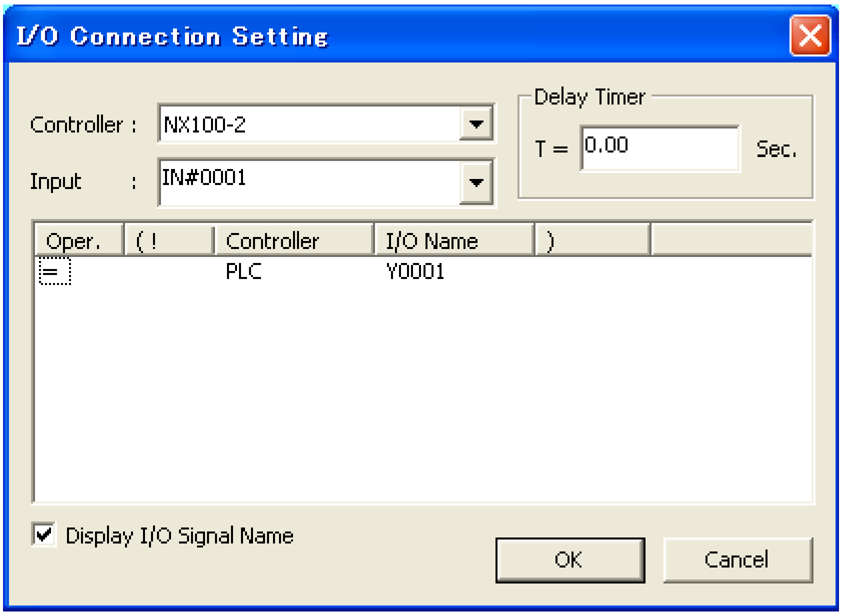
2. Set to substitute the internal register [PLCX:0001+PLC:X0002] for [PLC:M0001].



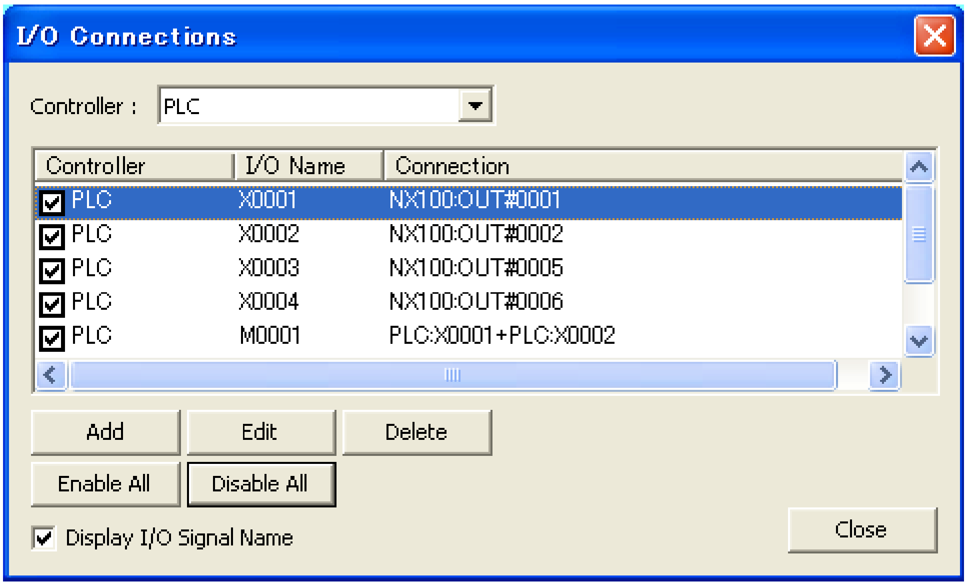
3. Set to substitute the internal register [(PLC:X0003*PLC:X0004) + PLC:M0001] for PLC:Y0001.



4. Finally, set to substitute PLC:Y001 for NX100-2:IN001.



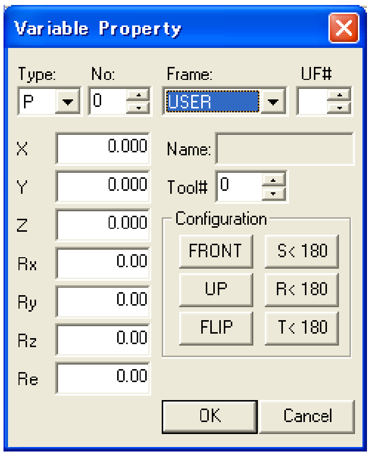
The setting of example diagram is finished,



8.5 Variable Monitor

Displaying and editing the robots are enabled by setting the Variable Monitor.
On the [Simulator] tab, in the [Monitor] group, click the [Variable Monitor] button, the [Variable Monitor] dialog appears.

Variable Monitor

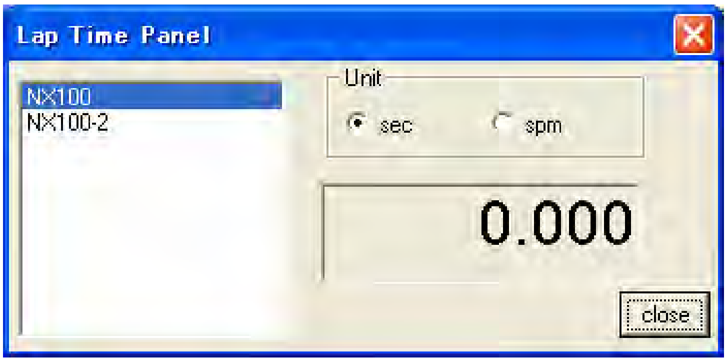
Item	Description
[Add(A)] button	Displays the Variable Property dialog box to set the variables to be displayed and edited. When setting a position variable (such as P, BP, EX variables), be sure to specify the frame (coordinate) in the FRAME combo box. Setting of FRAME: Variable P: When "USER" has been selected, set the user coordinate number in the [UF#] box. Variable BP: Enabled only when "PULSE" or "BASE" is selected. Variable EX: Enabled only when "PULSE" is selected. 

Variable Monitor

Item	Description
[Mod(M)] button	Displays the Variable Property dialog box to modify the variables. If "PULSE" is selected in the FRAME combo box when a position variable (such as P, BP, EX variables) is selected in the Name combo box, no selection can be made in the .TYPE. section.
[Del(D)] button	Deletes the selected variables.
[Clear(L)] button	Deletes all the variables displayed in the Variable Monitor window.
[Close(C)] button	Closes the Variable Monitor window.

8.6 Lap Time Panel

The Lap Time Panel dialog box shows playback time of a specified section or the number of stroke per minute (spm).
On the [Simulator] tab, in the [Monitor] group, click the [Lap Time Panel] button, the [Lap Time Panel] dialog appears.



NOTE This function can not be used with high-speed playback function. Refer to Section "7.5.4 Refresh Interval" about high-speed playback function.

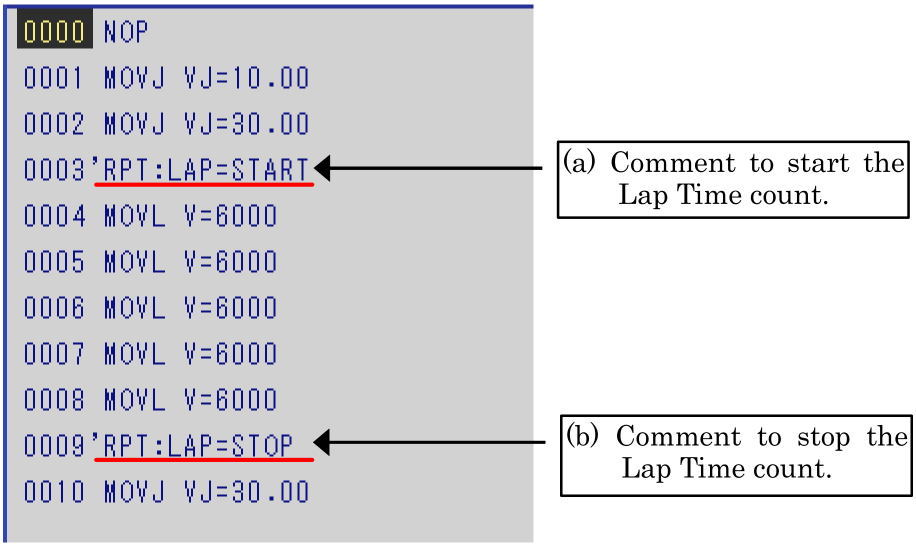
Procedure

1. Enter the following comment at the point where the lap time count is to be started. (Note that the comment has to be entered before the start point as shown in the figure below at "(a)".)

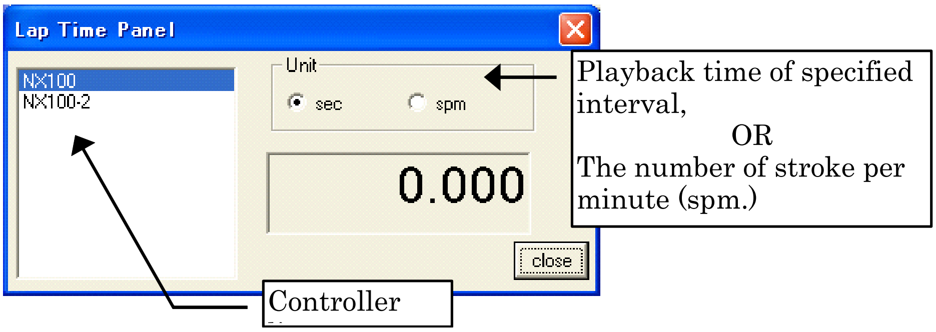
   'PRT:LAP=START

2. Enter the following comment at the point where the lap time count is to be stopped. (Note that the comment has to be entered after the end point as shown in the figure below at "(b)".)

    'PRT:LAP=STOP



3. On the [Simulator] tab, in the [Monitor] group, click the [Lap Time Panel] button, the [Lap Time Panel] dialog appears.



4. Play back the job.

> **NOTE** Controllers can not be selected during the playback.

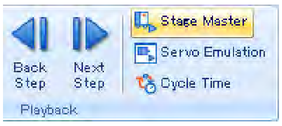
5. After the playback, the Lap Time Panel dialog box shows the playback time between two points specified in step 1 and 2 above, or the number of stroke per minute (spm) of the currently selected controller.
   To display the lap time of each controllers, change the robot selection in the controller list.

6. Press  to reset the value to zero in the Lap Time Panel dialog box.

8.7 Stage Master

The Stage Master dialog allows selecting which controller will be affected by the 

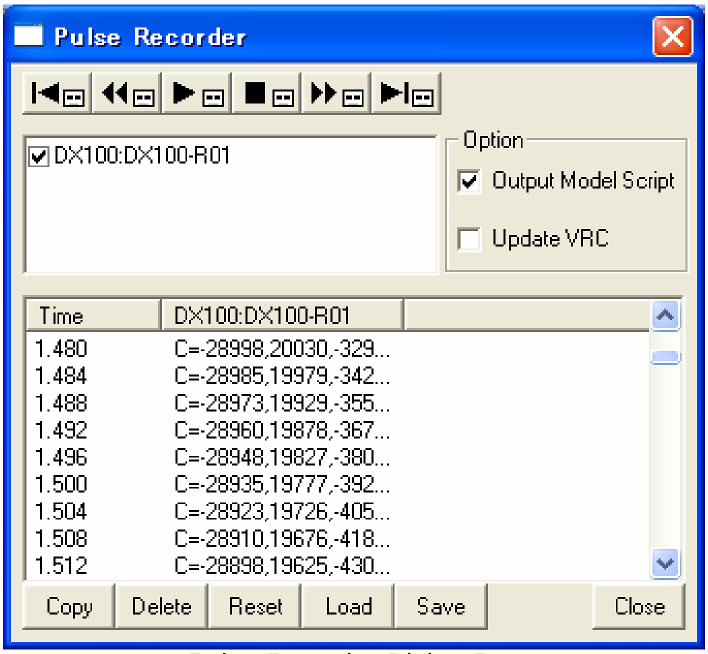
playback start command.
On the [Simulator] tab, in the [Playback] group, click the [Stage Master] button, the [Stage Master] dialog appears.
In the Stage Master dialog, put a check mark next to the controller that will be affected by the playback start command then press [OK] to close the dialog.



8.8 Pulse Recorder

When playback is performed with [Pulse Recorder] dialog box displayed on the screen, the pulse position of the specified robot or the model information are displayed in the dialog box at every screen refresh. When it needs that the model information are displayed, Check the [Output Model Script].
When moving the cursor in the displayed list of data, if the selected data line contains pulse information, the robots are moved to the specified pulse positions. If the selected data line contains model information, the model script is executed.

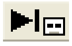
On the [Simulator] tab, in the [Monitor] group, click the [Pulse Recorder] button, the [Pulse Recorder] dialog appears.



Pulse Recorder Dialog Box

Item	Description
	Moves the cursor to the first data line and executes it.
	Move the cursor to the previous data line and executes the line.
	Continuously executes the data line in the pulse record from the cursor current position to the end of the list or until stopped.
	Stops the continuous execution of the data lines started by pressing the  button.
	Moves the cursor to the next data line and executes the line.

Pulse Recorder Dialog Box

Item	Description
	Moves the cursor to the last data line and executes it.
Output Model Script	Model information is displayed in the list of pulse record.
Update VRC	When the pulse record is played, the robot position is set to the controller. If this item is "OFF", the playback gets faster because the robot position is not reflected.
[Copy] button	Copies all the data lines to the clipboard.
[Delete] button	Deletes the data line where the cursor is located.
[Reset] button	Deletes the all the data lines.
[Load] button	Retrieves the previously saved data lines from a text file (.txt).
[Save]button	Stores all the data lines in a text file (.txt).
[Close]button	Closes the Pulse Recorder.

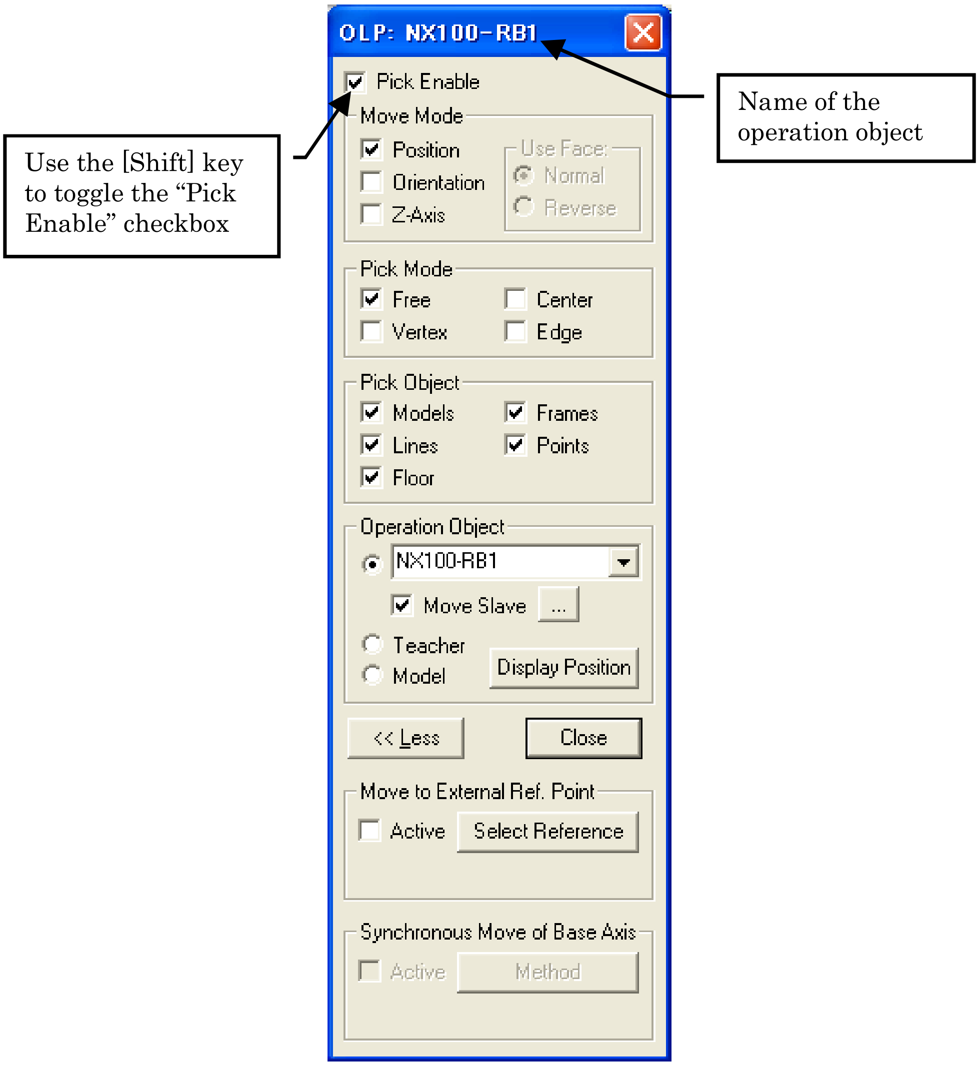
NOTE

- Buttons in the Pulse Recorder dialog box can only be used after a job has been played back.
- When the pulse record is played, the robot position is updated at refresh intervals. Refer to Section "7.5.4 Refresh Interval"" for refresh interval.

8.9 Teaching

8.9.1 OLP

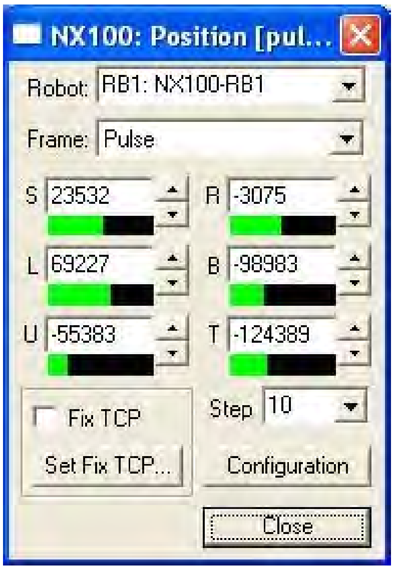
OLP is a teaching tool that simplifies the robot teaching by moving the robot to an target position.
On the [Home] tab, in the [Teaching group, click the [OLP] button, the [OLP] dialog appears.
For the details on how to use OLP, refer to Section "11.1 Teaching Using OLP Function".



OLP dialog box

Item	Description
[OLP Pick] check box	To be selected whenever OLP is used. The check box is automatically cleared when another function is selected to operate the robot.
"Move Mode" section	Determines the method to move to the target point. [Position] check box: The Operation Object is moved to the position (XYZ) of the target point. [Orientation] check box: The Operation Object is turned to match the orientation (Rx, Ry, Rz) of the target point frame. [Z-Axis] check box: The Operation Object is turned so that its Z-axis matches the Z-axis of the target point frame. [Use Face] section: This setting is enable with [Orientation] or [Z-Axis] mode. It can be use to change the direction of the Z-Axis when selecting a face. [Normal] radio button: The Z-axis is in the same direction as the face normal. [Reverse] radio button: The Z-axis is in the opposite direction of the face normal. NOTE If only the orientation is to be changed without changing the position, uncheck the [Position] checkbox before clicking any point.
"Pick Mode" section	Sets conditions determining the selected point in the clicked area. [Free] check box: Point of the model at the clicked position. [Vertex] check box: Nearest vertex from the clicked position. [Center] check box: Center of the nearest face or edge from the clicked position. [Edge] check box: Nearest edge point from the clicked position.
"Pick Object" section	Sets the type of the object to be selected when clicking on the cell view. (Multiple items can be selected) [Model] check box: Solid models. [Frame] check box: Model frame or AXIS6 models. [Lines & Inters] check box: Lines such as LINE part, WORK line and wireframe model, and intersection lines generated by the intersection of parts or models. [Point] check box: Points such as TRACE points. [Floor] check box: FLOOR parts.

OLP dialog box

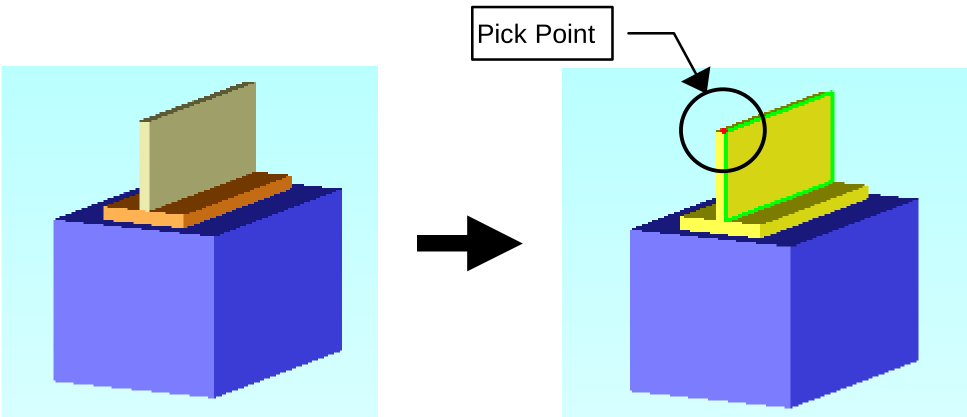
Item	Description
“Operation Obj” section	Selects an object to be moved to the target point. [Robot TCP] radio button: -Sets the robot TCP as the object to move.To select the robot, please refer to Section "7.3 Deleting a Controller". [Move Slave] checkbox: - When checked, the [Move Slave] function is enabled. When a robot or station is moved, other slave robots from the same controller are moved with it so that their TCP maintain the same relative position to the moved robot or station. By default all robots are set as slave. The individually setting of each robot can be changed by pressing the [...] button to display the “Set Slave Robot” dialog. [Teacher] radio button: -Sets the “Teacher” coordinate axis as the object to move. [Model] radio button: -Sets the selected model as the object to move. Model can be selected with  or {Screen} - {Model} - {SelectModel} or the [CADTree]. [XYZ] button: -Displays the position data panel as shown below to manually modify the position or orientation of the operation object.  Position dialog  Teacher dialog NOTE Refer to the dialog title bar to confirm the operation object name.

OLP dialog box

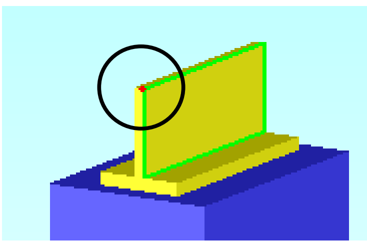
Item	Description
“Move to External Ref. Point” section	TUse to move the part held by the robot to a specific point (External Reference Point). [Active] check box: - When check the robot will move the point clicked on the model it is holding to the defined external reference. [Select Reference] button: Displays the Select Model dialog to select a model (frame) as the external reference point.
"Synchronous Move of Base Axis" section	Use to move the base axis (servotrack) at the same time as the robot when moving to a target point. [Active] check box: - When check the base axis will move according the set method to enable the robot to reach the target point. [Method...] button -Specifies the method to move the base axis.

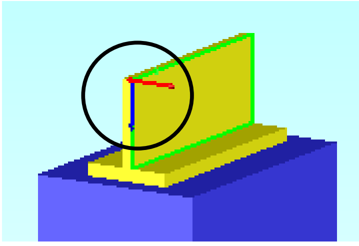
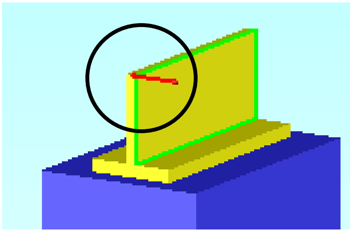
■ OLP Function Pick Method and Display

When the mouse pointer is over the cell view, press down the left mouse button. The model considered for selection will display in yellow with a red dot to indicate the specific point location. In the case of a solid model, the border (edges) of the pick face will be highlighted in green. The display will update to represent change of selection as the mouse pointer is moved over different models. The actual selection is made only when the mouse button is released.



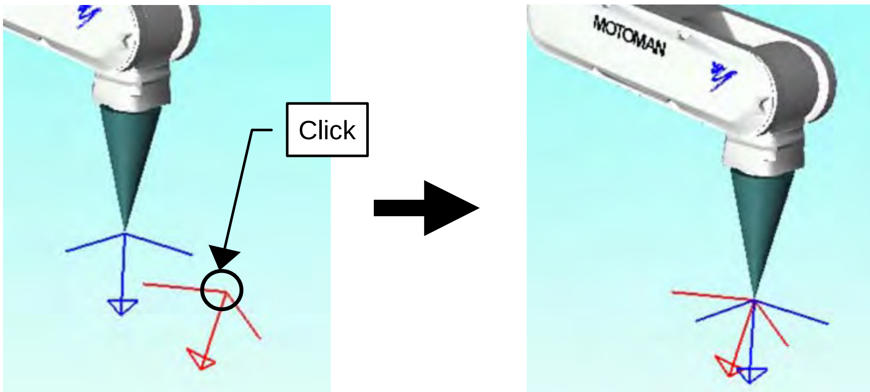
The pick point display will change depending on the selected move mode.

	Displays a point.
Position	

Orientation	Displays a frame (Z-axis is in red). 
Z-axis	Display an arrow (Z-Axis). 

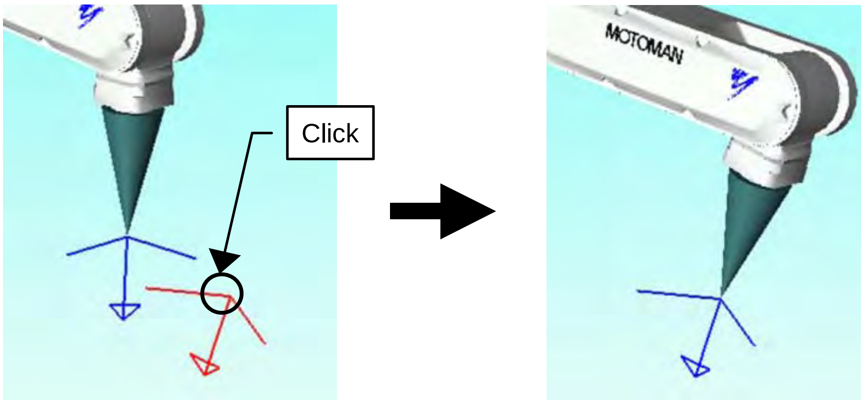
■ Selecting [Position] in the "Move Mode" section: (Other items set at default)

The robot moves so that the robot TCP overlaps with any clicked point.
Note that this motion does not involve any change in the wrist posture.



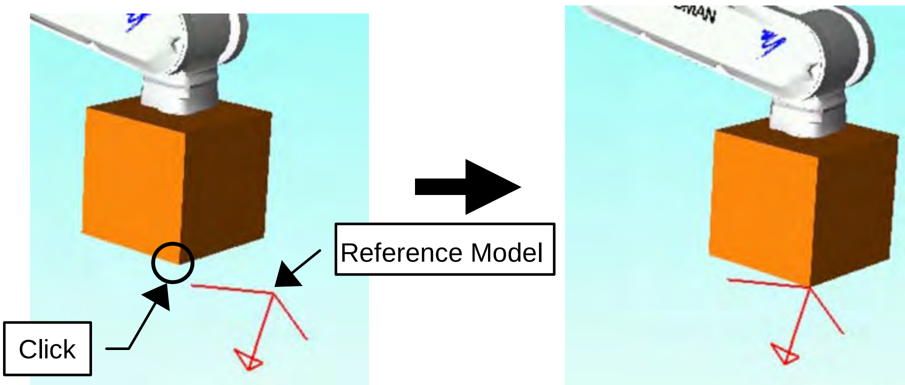
■ Selecting [Position] and [Orientation] in the "Move Mode" section: (Other items set at default)

The robot moves changing its wrist's posture so that the frame of the robot TCP overlaps the frame of the clicked point.



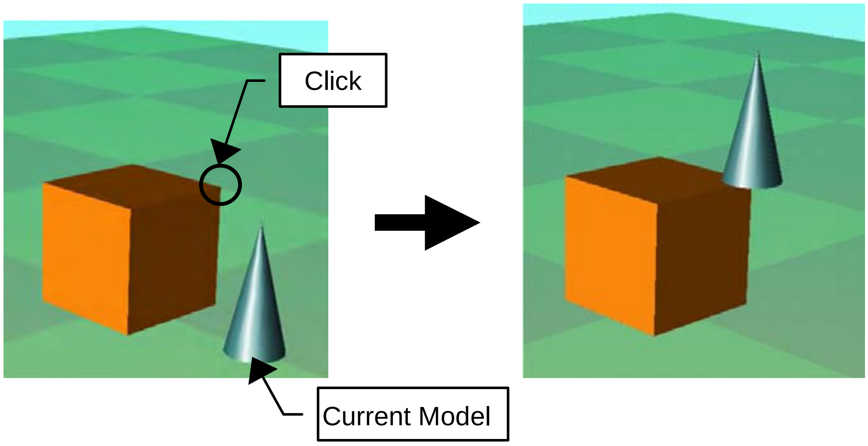
■ Selecting "Move to External Reference Point"

Click a point on a model carried by the robot and the robot will move to bring that point to the reference point. (The reference point needs to have been set before this operation can be used.)



■ Selecting [CurModel] in the "Operation Object" section

Click a point and the currently selected model will be move to the click location. The name of the current model is displayed in the OLP dialog title bar.



NOTE

For more details on the OLP operation, please refer to Section "11.1 Teaching Using OLP Function".

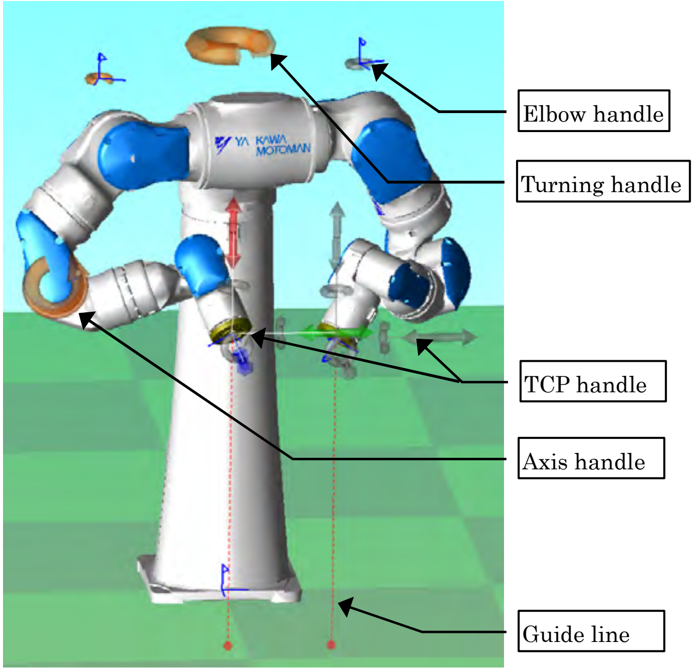
8.9.2 Operation Handle

The operation handle is to perform robot jog operation by intuitive operation.
Drag the operation handle on the cell screen, the position of the robot is changed. So, unskilled engineers can perform robot operation easily.
On the [Home] tab, in the [Operation Handle] group, click the [Handle Display] button, the operation handle is displayed.

NOTE

- This function is available with the following robots only.
  FS100 BMDA003-A00
- During dragging operating the handle, The current position in the virtual pendant is not changed. When releasing the mouse button, the current position in the virtual pendant is reflected.

■ Handle



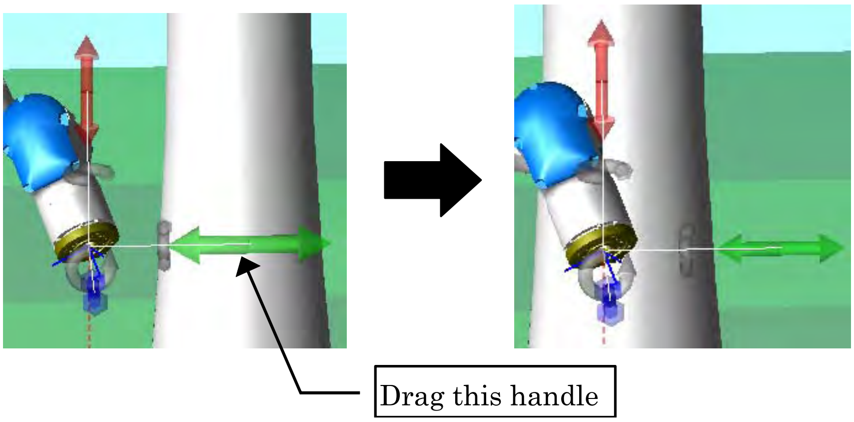
> **NOTE**
>
> The rotating handle is displayed on the cell view as below. To operate this handle, Move the mouse in right and left.
>
> 

TCP handle	This handle is to operate the position of TCP, it displayed on the TCP flame. The following coordinates are available to operating this handle. • Base axis • Robot axis • Tool axis • User axis The TCP handle included in the control group of the current job is colored.
Turning handle	This handle is to operate turning-axis. The turning handle included in the control group of the current job is colored.
Elbow handle	This handle is to operate elbow angle. The elbow handle included in the control group of the current job is colored.
Axis handle	When the mouse cursor is on the robot model, this handle is displayed. This handle is to operate each axis. The axis handle included in the control group of the current job is colored.
Guide line	This is supporting indication to make the position on the XY plane plain visually. The guide line is a perpendicular dashed line towards XY plane from the TCP handle.

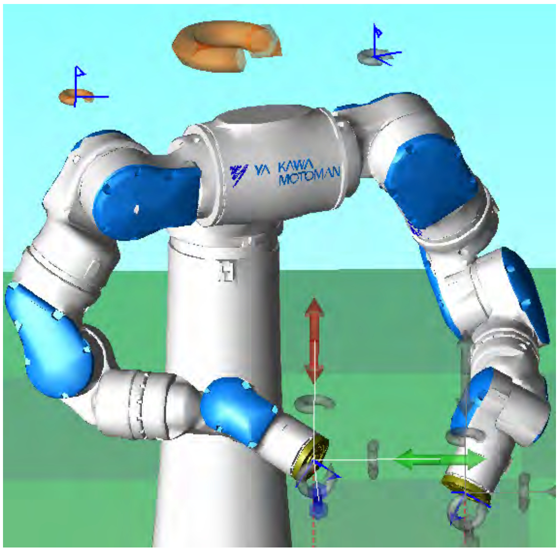
■ Display and operating the operation handle

TCP handle

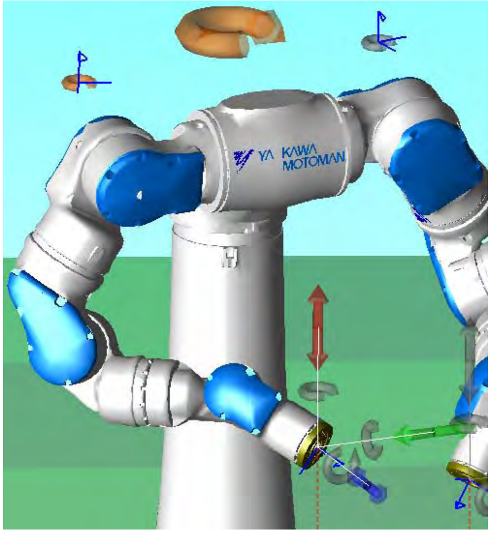
The following coordinates are available to operating TCP handle. The operating coordinate is selected by Sync toolbar. To operate the handle, drag the handle of the direction to move. When click the handle, the handle is displayed little bigger.
For example, to move as below, drag the green handle to right.



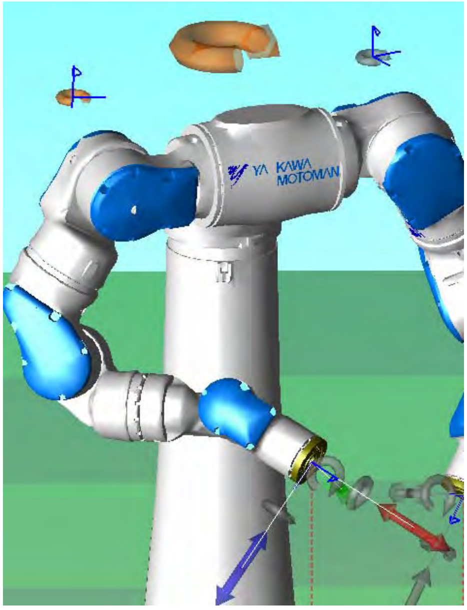
Base axis: TCP handle always moves with posture same as a base coordinate.



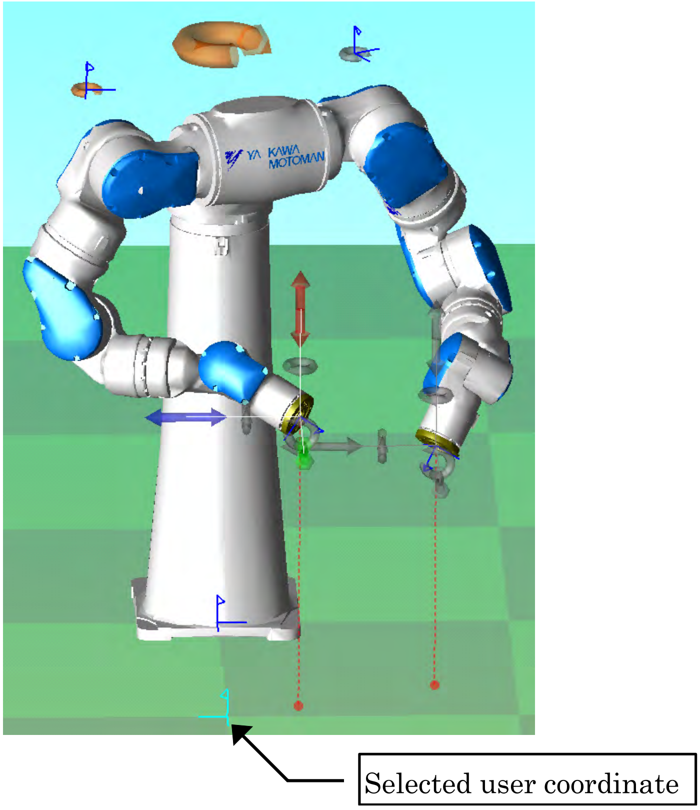
Robot axis: TCP handle always moves with posture same as a robot coordinate.



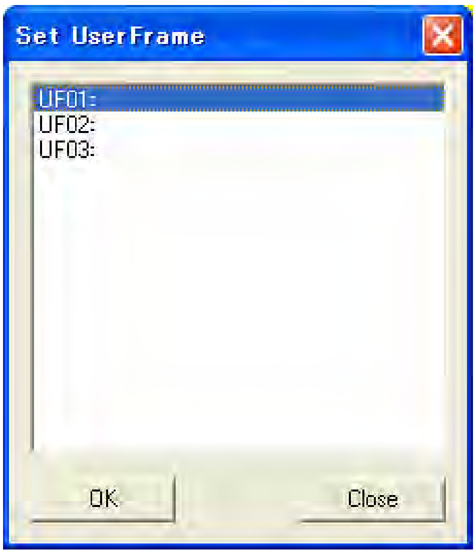
Tool axis: TCP handle always moves with position and posture same as TCP.



User axis: TCP handle always moves with posture same as a selected user coordinate.

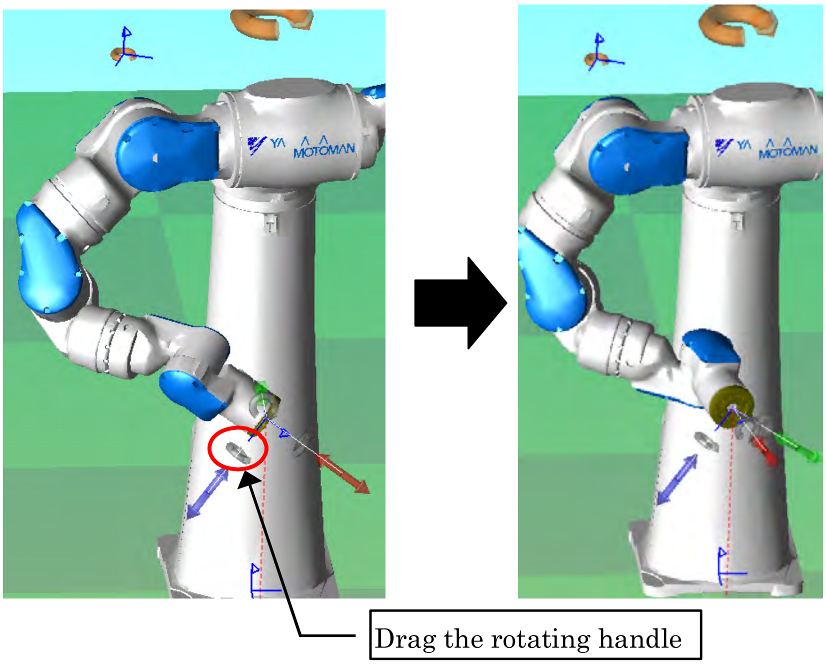


• When select USER AXIS on the sync toolbar, the following dialog box is displayed.



Posture handle

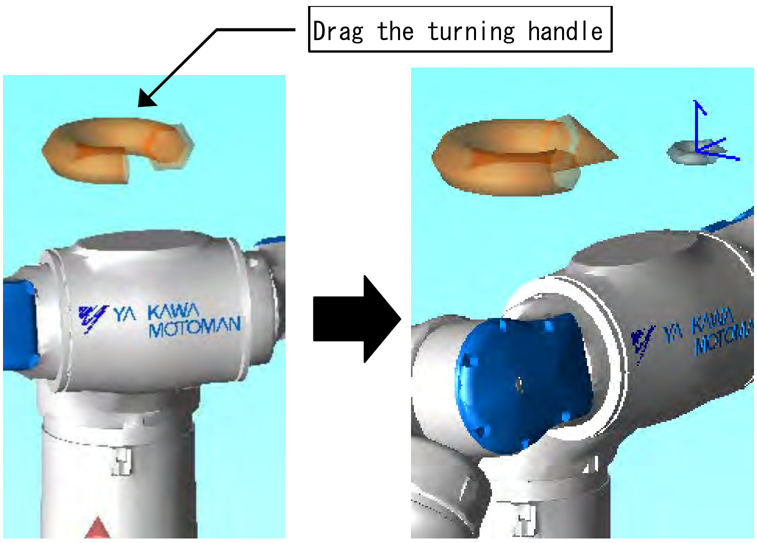
To regulate the posture of TCP, Drag the rotating handle of the TCP handle. The operating coordinate is selected by Sync toolbar.
For example, select TOOL AXIS on the sync toolbar and drag the rotating handle as below, TCP posture rotates about the X-axis of TCP (the blue handle) and the robot posture is changed.



> **NOTE** When the rotating handle is dragged with BASE AXIS, ROBOT AXIS and USER AXIS, the TCP handle is not move. But the robot posture is changed. (When operate the other handle operation, the robot and TCP handle move.)

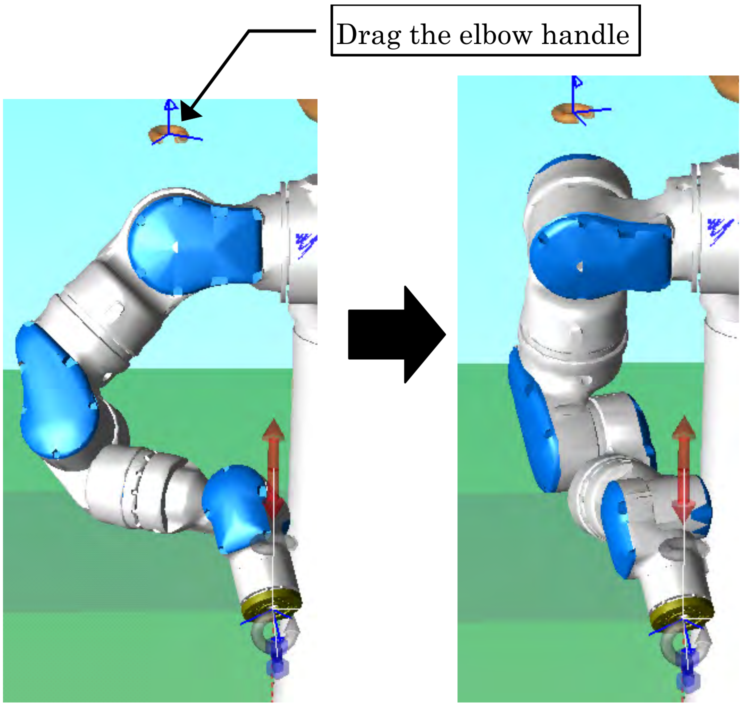
Turning handle

This handle is to operate turning-axis. When click the handle, the handle is displayed little bigger.
For example, to move as below, drag the turning handle to right.



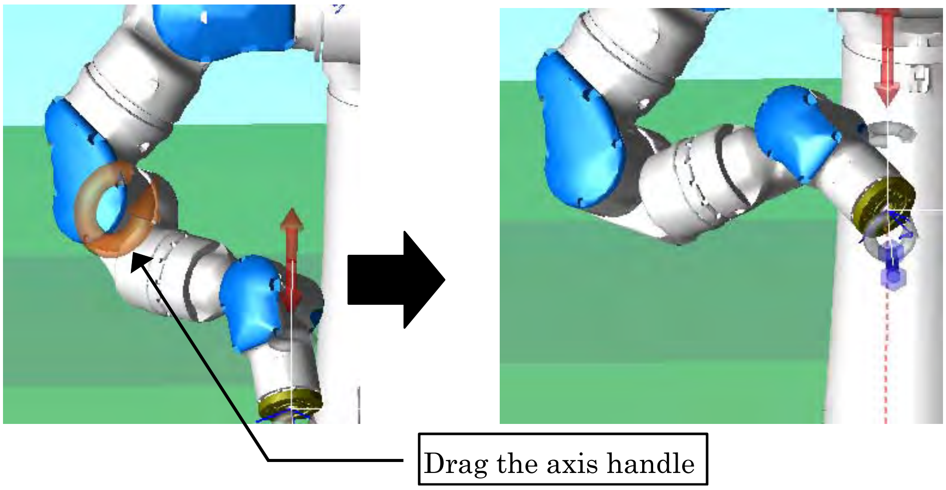
Elbow handle

This handle is to operate elbow angle. When click the handle, the handle is displayed little bigger.
For example, to move as below, drag the turning handle to right.



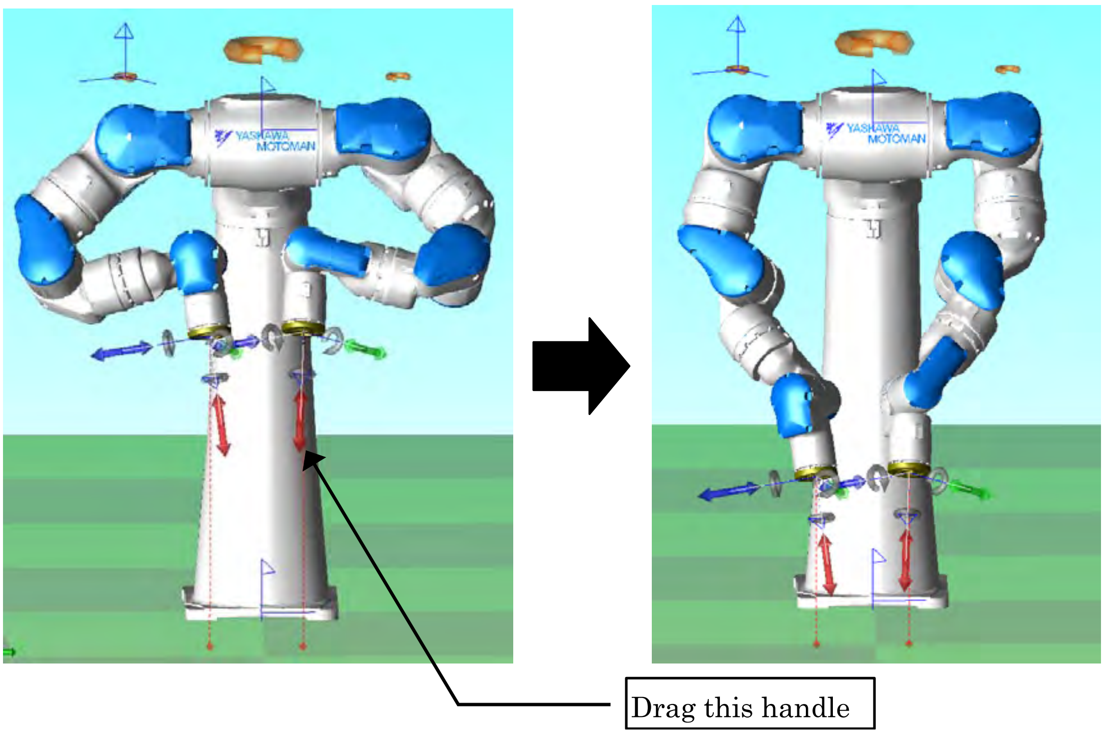
Axis handle

When the mouse cursor is on the robot model, this handle is displayed. This handle is to operate each axis. Drag this handle, the corresponding axis rotates.



■ Synchronized operation

When operate the Operation handle, the selected robot and another robot can move to keep their TCP the same relative position.
On the [Home] tab, in the [Operation Handle] group, click the [Synchronized] button, and operate the operation handle.
For example, to move as below, drag the red handle of R1 to down, R2 moves to keep their TCP the same relative position.



8.10 Collision Detection

This function displays the collision between some models.
When the collision is detected, the model is displayed in red, and the robot pulse data and the executing job name is displayed in the collision log.

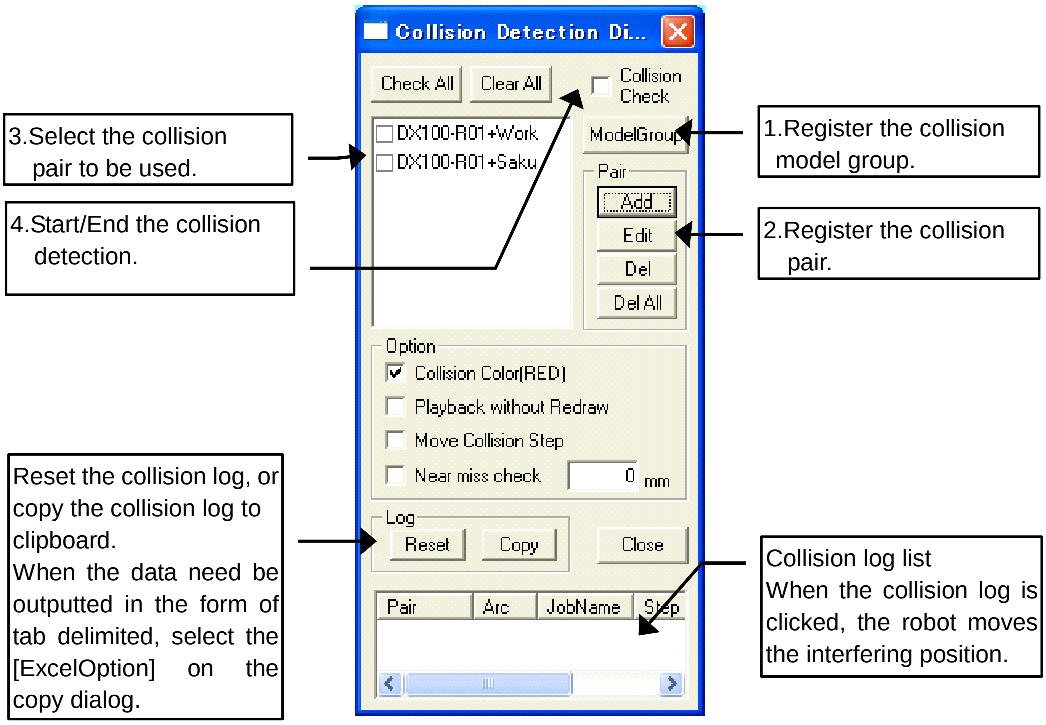
To use the Collision detection, the following settings are needed.

1. The model (work, robot, etc.) group is registered as "Collision model group".
2. To detect collision, the model group pairing is registered as "Collision pair".
3. Select the Collision pair, and start the Collision Detection.

For details, please refer to Section "11.3 Collision Detection Setting".

8.10.1 Collision Detection Dialog

In this dialog, set up to detect collision, and operate the start/end the collision detection.
On the [Simulation] tab, in the [Collisions] group, click the [Collision Detection] button, the [Collision Detection] dialog appears.



Collision Detection dialog option

Item	Description
Collision Color (RED)	The interfering model is displayed in red.
Playback without Redraw	To reduce the time to check collision, Redraw is skipped on playback.
Move Collision Step	When the collision log is clicked, the robot moves the interfering position, and the cursor location in the virtual pendant moves to the step number position recorded in that log. When this operation is used, set the teach mode.
Near miss check	When the models approach with in the selected distance, the models are considered interfering.

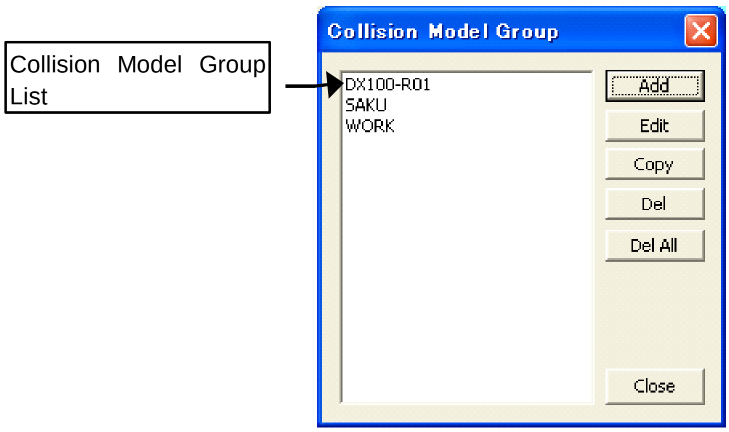
NOTE

- The function is not available for hidden model.
- Near miss check option may need time to process.
- [Playback without Redraw] and [Move Collision Step] can not use depending on the system version of controller. Please refer to Section "A.6 List of Function depending on the system version of controller".

8.10.2 Collision Model Group Setting

■ Collision Model Group Display

The model (work, robot, etc.) group is registered as "Collision model group".
To display the Collision Model Group dialog box, click the [ModelGroup] button on the Collision setting dialog box.



Collision Model Group

Item	Description
Collision Model Group List	The registered collision model group is displayed. When the collision model group is selected, the models of the collision model group are highlighted.

Collision Model Group

Item	Description
Add	The new collision model group is created.
Edit	The collision model group selected in the list is edited. When the collision model group in the list is double-clicked, that can be edited.
Copy	The new collision model group is created based on the collision model group selected in the list.
Del	The collision model group selected in the list is deleted.
Del All	All collision model group selected in the list are deleted.

■ Auto-registration of the collision model group

The collision model group of robot is registered automatically in following case. Edit it if needed.

- When the new controller is created
- When the old cell (before MotoSim EG-VRC ver2.60) is opened.

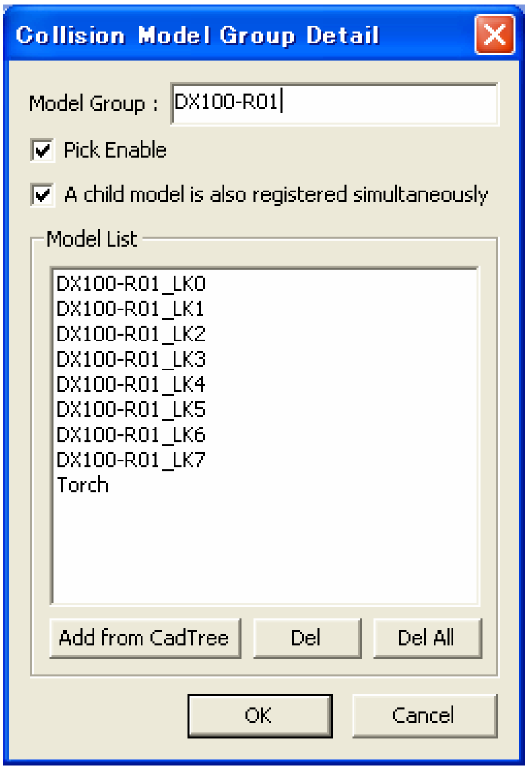
NOTE

- The tool model is not added. Click the [Edit] button, and add the tool model if needed.
- The time to check collision depends on the number of model and the complexity of model.
  All robot models are registered by Auto-registration. If some robot models need not be checked, narrow down the models of the collision model group at the Collision Model Group Detail Dialog Box.

■ Collision Model Group Detail Display

The models (work, robot, etc.) are registered/deleted to the collision model group.
To display the Collision Model Group Detail dialog box, click the [Add] button, the [Edit] button,

or the [Copy] button on the Collision Model Group dialog box

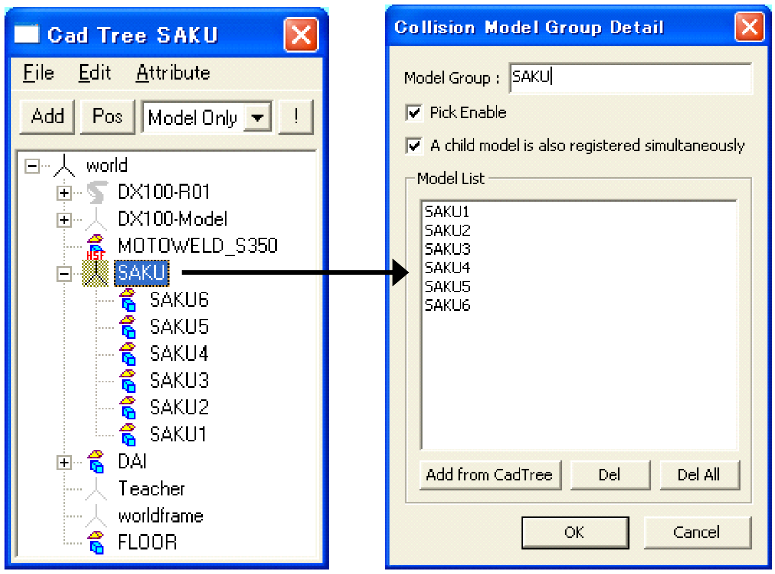


.

Collision Model Group Detail

Item	Description
Pick Enable	On the [Home] tab, in the [Model] group, click the [Select Model] button. Select the model in the MotoSim EG-VRC, that model is added to the [Model List]. 
Add from CadTree	Select the model on the CadTree, and click the [Add from CadTree] button, that model is added to the [Model List].

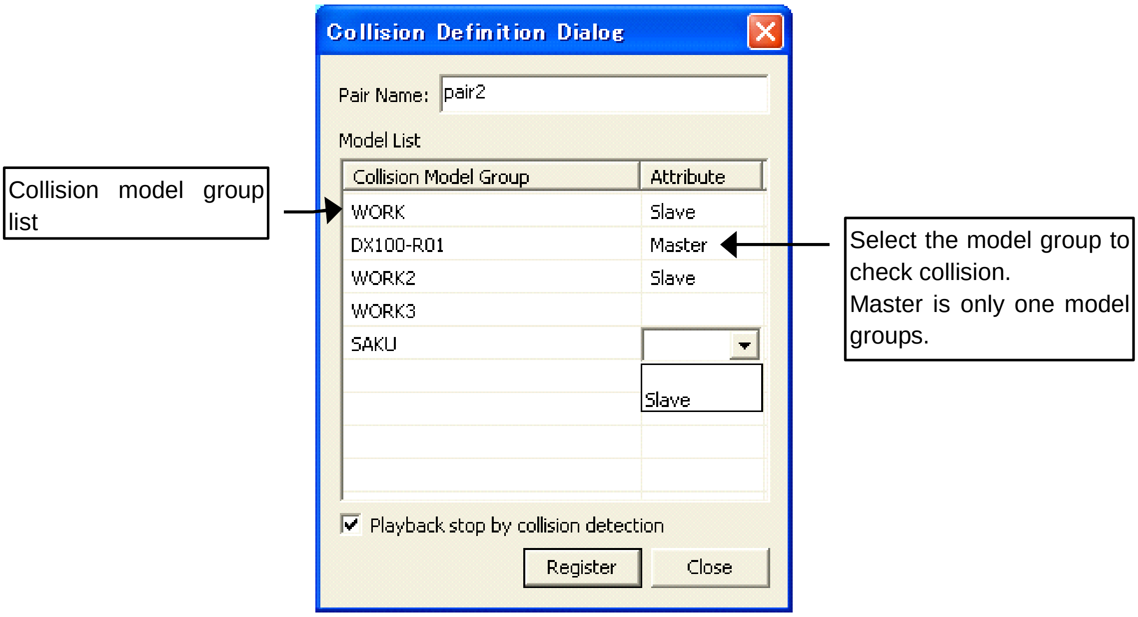
Collision Model Group Detail

Item	Description
A child model is also registered simultaneously	When the model is added, the child model of that is also registered simultaneously. For example, If the "SAKU" is selected in the CadTree and the [Add from CadTree] button is clicked, the child models "SAKU1", "SAKU2", "SAKU3", "SAKU4", "SAKU5", and "SAKU6" are also added. ("SAKU" is dummy model, so it is not added.) 
Del	The selected model in the [Model List] is deleted.
Del All	All models in the [Model List] are deleted.

8.10.3 Collision Definition Setting

■ Collision Definition Dialog

To detect collision, the model group pairing is registered as "Collision pair".
To display the Collision Definition dialog box, click the [Add] button, and the [Edit] button on the Collision Detection dialog box.
Collision Detection function check if master interfere slaves. So, select one model group as Master, and Select one or more model group(s) as Slave.



Collision Definition

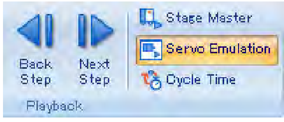
Item	Description
Collision model group list	The registered collision model group is displayed in the list. When the collision model group is selected, the models of the collision model group are highlighted. To check the collision model group, set the Attribute items "Master" or "Slave".
Playback stop by collision detection	Set the robot action when collision occurs. If this is checked, playback is stopped when collision is detected in playback. When the playback is continued without interruption, do not check this, and register the collision definition.

8.11 Sensing Option Setting

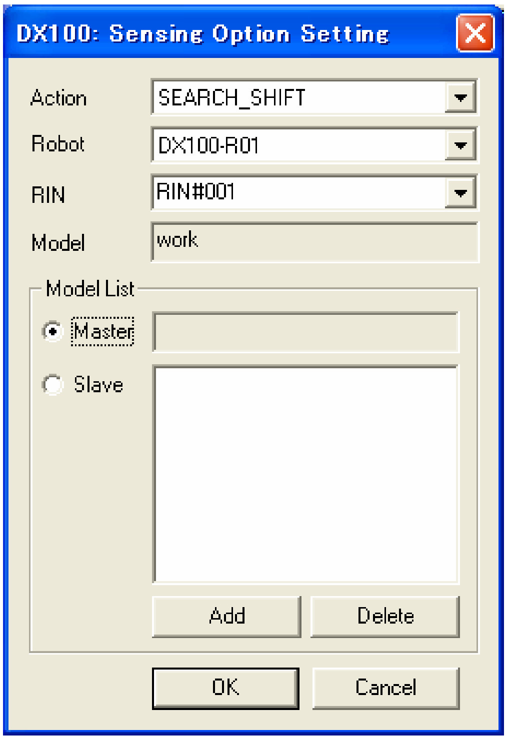
When the Sensing option is used, to detect the point where the wire of robot has contact with the work, the searching operation (Starting Point Detection function) is available.
Please refer to "INSTRUCTIONS FOR BASIC OPERATION OF STARTING POINT DETECTION FUNCTION" of each the controller for details.

NOTE

- This function can not be used for the FS100 controller.
- When this function is used, "Starting point detecting function" of option function in maintenance mode need be checked "use".
- When this function is used, turn off the servo simulation.On the [Simulation] tab, in the [Playback] group, click the [Servo Emulation] button.



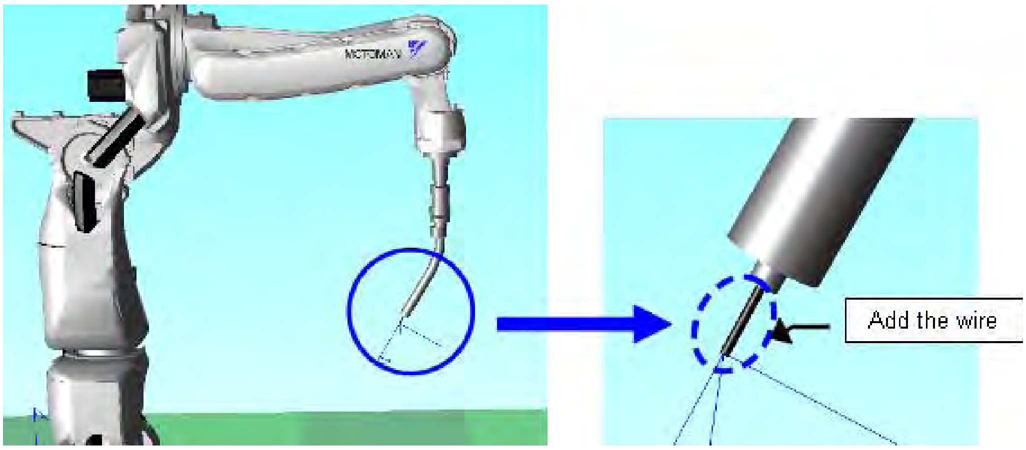
- Sensing function (SRCH tag of MOV* instruction) can be simulated, but sensing result is not the real one.
- The master model of sensing gets deeply into the slave one depending on the moving speed of sensing.



Procedure

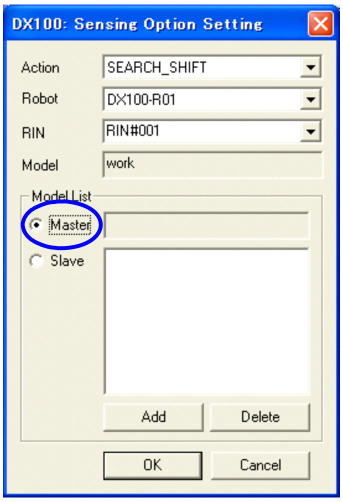
It explains the procedure for setting the sensing option between the wire of robot (Model name: wire) and the work (Model name: work).

1. The wire (Model name: wire) is added at the torch head of robot.
   In this case, the "CYLINDER" is used for the parts of wire.

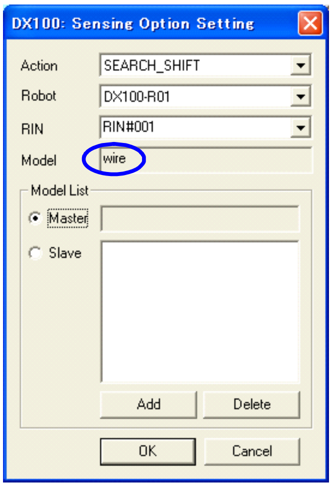


2. On the [Simulation] tab, in the [Settings] group, click the [Sensing Setting] button, the [Sensing Option Setting] dialog appears.

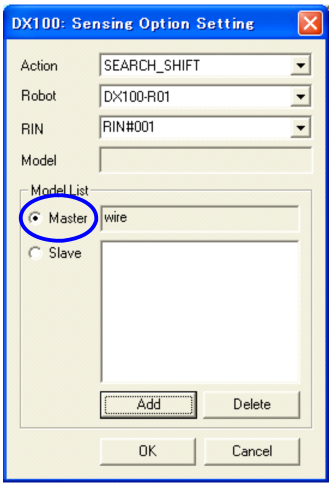
3. Select [Master] in the [Model List] group.



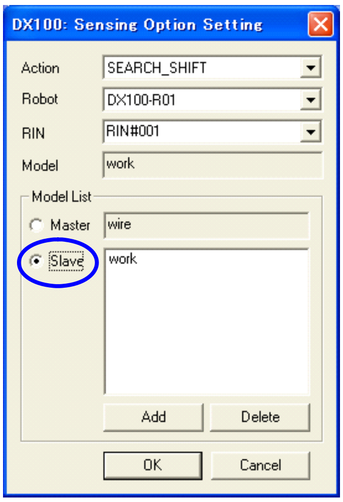
4. On the [Home] tab, in the [Model] group, click the [Select Model] button. Click the "wire" model, "wire" is displayed at [Model].



5. Click the [Add] button, the "wire" is set to the [Master] in the [Model List] group.



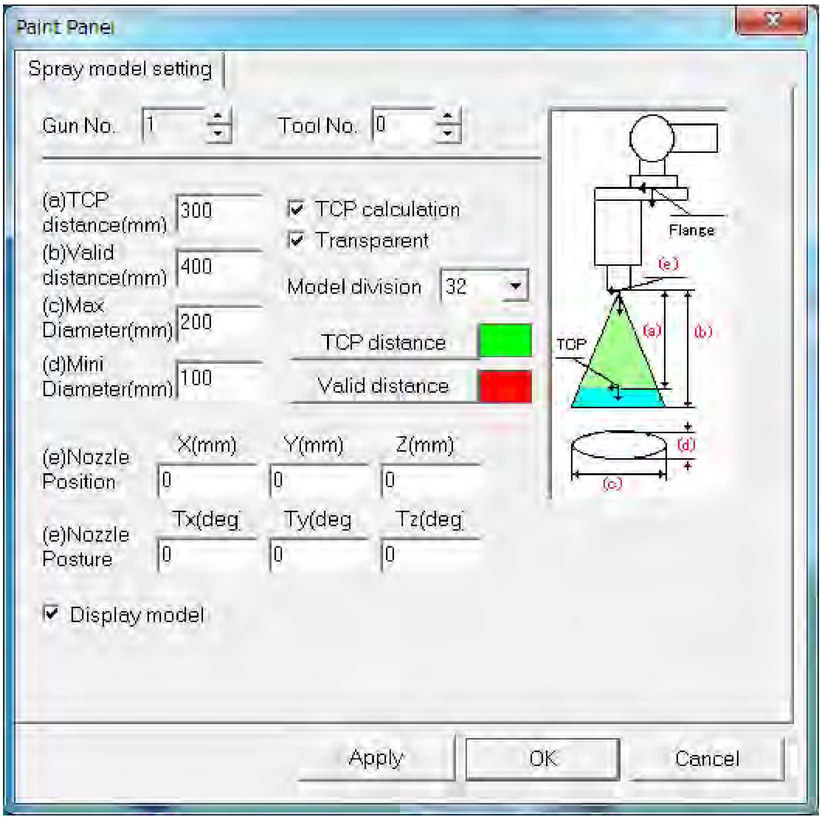
6. Select [Slave] in the [Model List] group, and set the "work" to the [Slave] as Step 4 and 5.



7. Click the [OK] button.

8.12 Spray Model for Paint

The Spray Model for Paint function allows creating the spray model easily. The spray model is displayed and hidden automatically, when the SPYON or SPYOF instruction is executed.



Paint Panel

Item	Description
[Gun No.] spin box (1 to 3)	Paint gun number.
[Tool No.] spin box	Specifies the tool number to set the paint gun number.
"(a)TCP distance" edit box	Distance from the paint spray outlet (nozzle).
"(b)Valid distance" edit box	Effective range to apply paint from the nozzle.
"(c)Max Diameter" edit box	Maximum width of the paint spray face.
"(d)Mini Diameter" edit box	Minimum width of the paint spray face.
"(e)Nozzle Position" edit boxes	Nozzle position viewed from the flange.

Paint Panel

Item	Description
"(e)Nozzle Posture" edit boxes	Nozzle posture viewed from the flange.
[TCP calculation] check box	Automatically calculates tool dimensions according to the input information.
[Transparent] check box	Displays paint model in translucent color.
"Model division" combo box	Number of divided paint spray faces.
[TCP distance] button	Paint color from nozzle to TCP.
[Valid distance] button	Paint color from nozzle to the end of the valid painting distance.
[Display model] check box	Displays the created spray model.

Procedure

1. Select the controller for the spray model setting.
2. On the [Simulation] tab, in the [Settings] group, click the [Paint Setting] button, the [Paint Panel] dialog appears.
   Set the Gun No. and Tool No. to according to the job.

3. Click the [OK] button or the [Apply] button, and then the spray model is created.
4. When the playback is executed, the spray model related to the Gun No. of SPYON or SPYOF instruction is displayed and hidden automatically.

NOTE This function can not used with two or more robot system.

8.13 Speed Graph Function

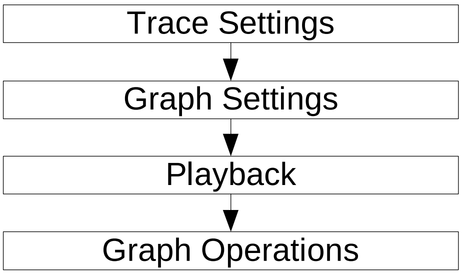
This function displays on a graph the robot TCP speed during playback.

NOTE

- This function cannot be used in conjunction with the High-Speed Playback function. For details on the High-Speed Playback function, please refer to Section "7.5.4 Refresh Interval" of the MotoSimEG-VRC Operation Manual.
- This function doesn't support multiple controllers or a controller with multiple robots.
- The speed displayed in this function is the speed of the TCP of the R1 robot of the current controller selected at the time the Speed Graph dialog was displayed.

8.13.1 Basic usage

The procedure for using the Speed Graph function is as follows.

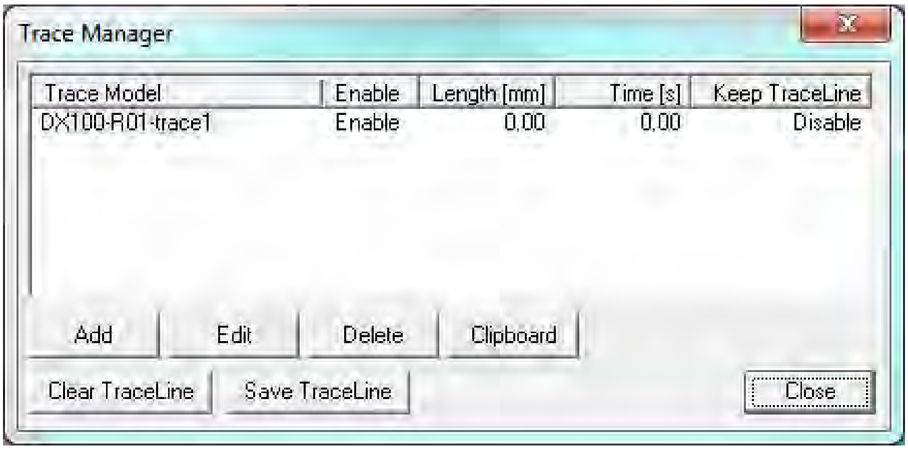


8.13.2 Trace Settings

To display the speed in the graph, this function uses the data from the robot TCP trace. Therefore, the Trace function must be enabled and set to the robot TCP in order to use this function.For more details about the Trace function, please refer to Section "11.2 Trace Function" of the MotoSimEG-VRC Operation Manual.

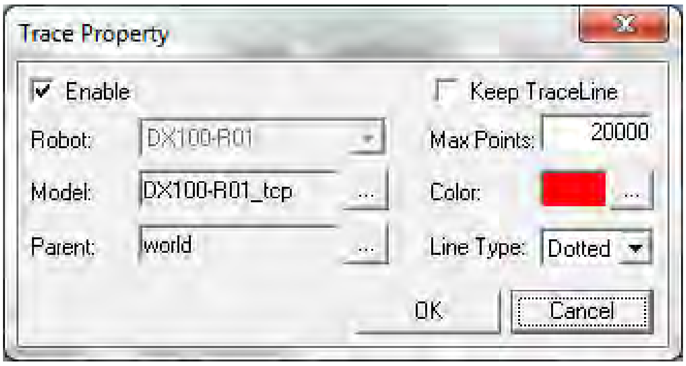
Procedure

1. On the [Simulation] tab, in the [Monitor] group, click the [Trace] button, the [Trace Manager] dialog appears. To use the speed graph, you will need to set the trace to the TCP model: <ControllerName>-R01_tcp (example: DX100-R01_tcp). By default, the trace <ControllerName>-trace1 is already set to the TCP of the controller's R1 robot.



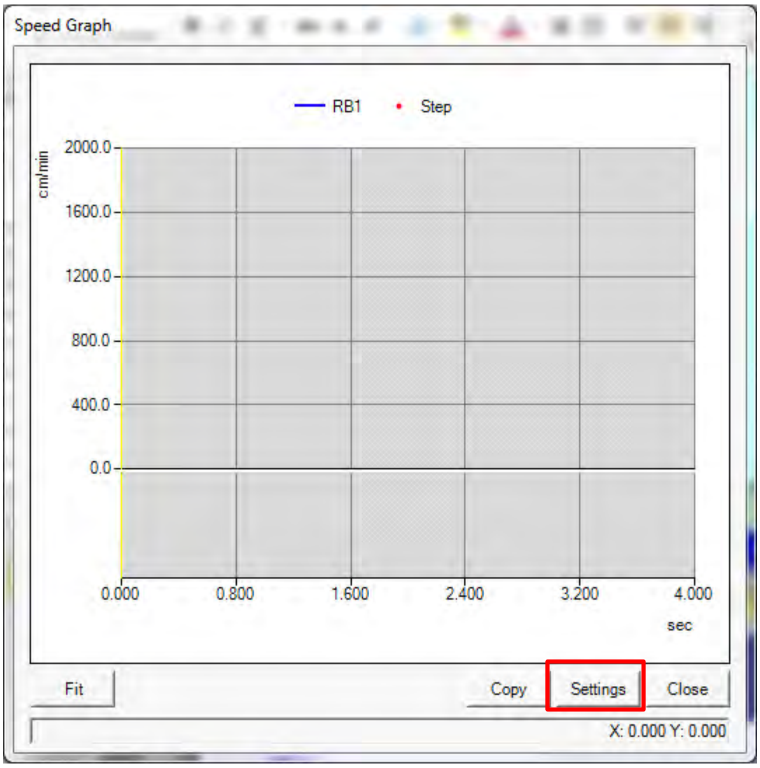
If it does not exist or was changed, please create a trace for the model "[controller name]-R01_tcp".

2. To verify the settings, double-click on the trace "<ControllerName>-trace1" or select it and press the [Edit] button. In the "Trace Property" dialog, if it not already set, select the "<Controller_Name>-R01_tcp" model in the "Model" field.
   To display the speed relative to a moving work piece, change the "Parent" field from "world" to the model representing the work piece.



8.13.3 Graph Settings

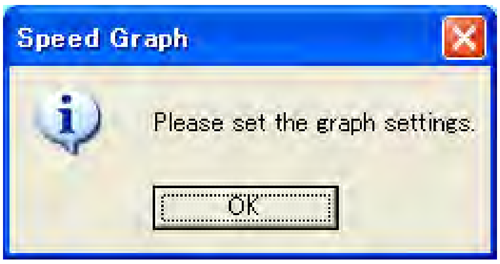
Set the graph settings before displaying the graph.
On the [Simulation] tab, in the [Monitor] group, click the [Speed Graph] button, the [Speed Graph] dialog appears.



Press the [Settings] button to display the "Graph Settings" dialog.

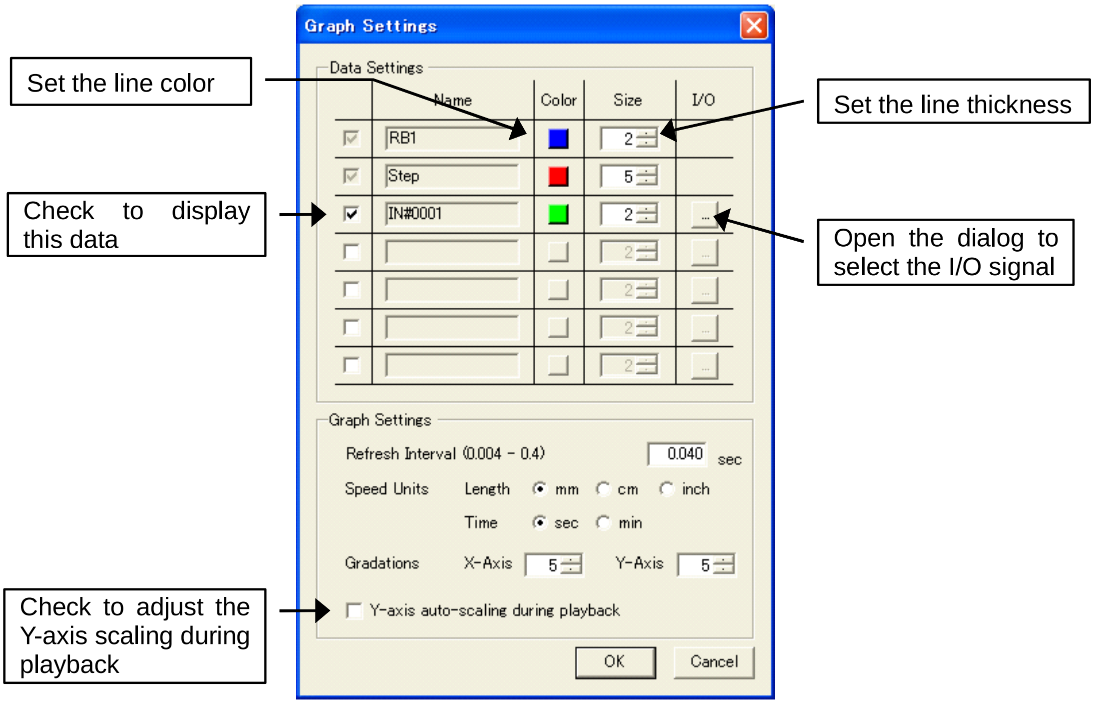
NOTE

If the following message displays, the settings for the current controller are not set properly. Please verify the graph settings.



■ Graph Settings Dialog

In this dialog, display parameters such as I/O signals, line color, line thickness, scale, etc. can be set. Up to 5 I/O signals can be displayed. The same I/O signal cannot be set multiple times.

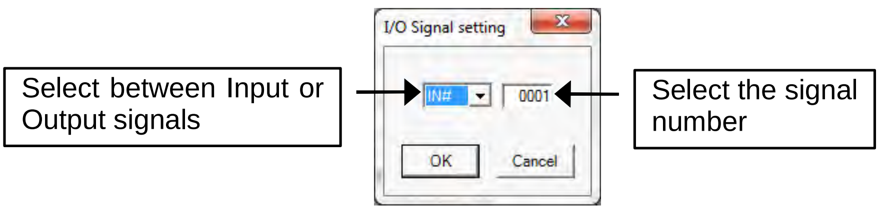


Graph Settings [Graph Settings]

Item	Description
Refresh Interval	Sets the rate at which the Speed Graph is updated. (0.004 to 0.4 sec)
Speed Units	Sets the speed units for the Y-axis.
Gradations	Sets the number of gradation lines along the X and Y axes.
Y-axis auto-scaling during playback	When checked, the Y-axis scaling is automatically adjusted during playback to display the full range of the speed.

■ I/O Signal Setting Dialog

The "I/O Signal Setting" dialog is used to select the I/O signal to plot on the speed graph.

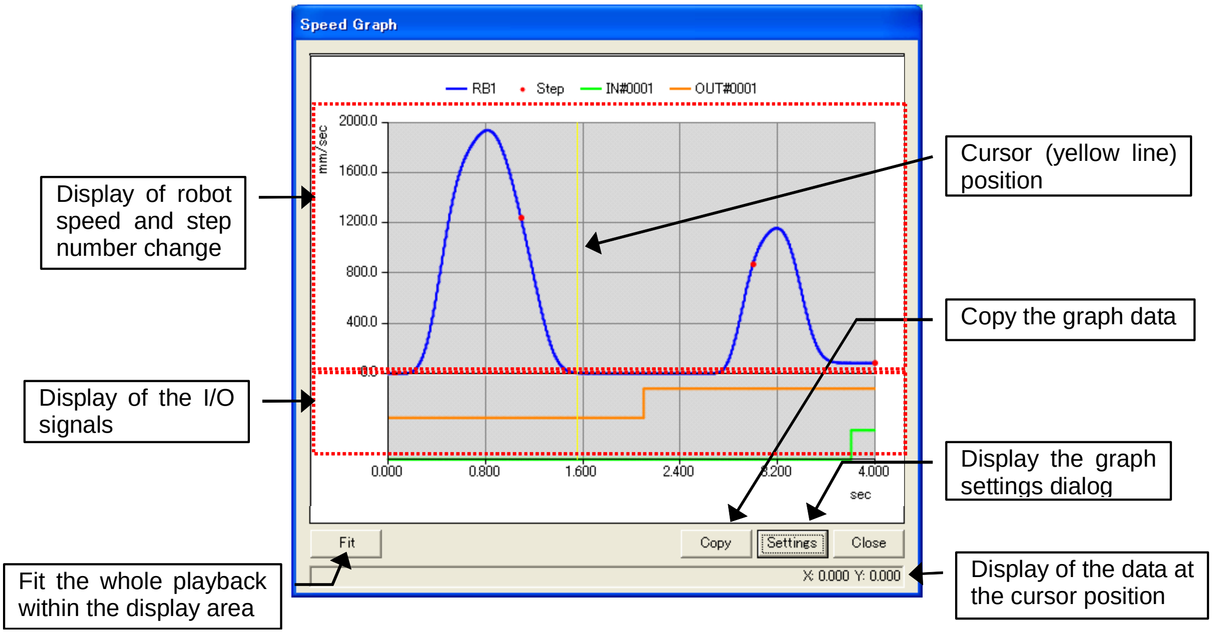


8.13.4 Playback

During playback, the speed is plotted on the speed graph. The graph can display up to 200.0 seconds of data. Playback data beyond 200.0 seconds will not be displayed. Also note that graph operations cannot be done during playback.

8.13.5 Graph Operations

After playback is complete, various operations can be done with the speed graph.



Mouse Operations

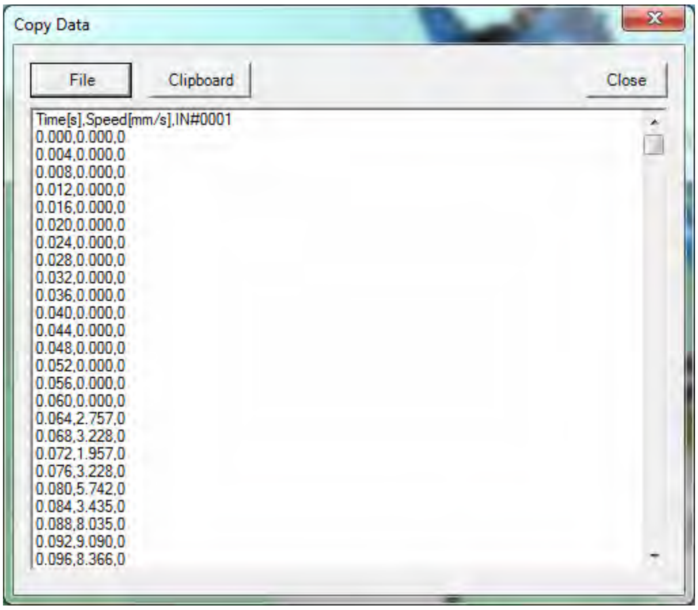
Click on the graph	Move the cursor position (yellow line) to the clicked position. The robot in the MotoSimEG-VRC window will also move to the position corresponding to the cursor position.
Mouse Wheel	Roll the mouse wheel to change the X-axis scaling factor.
[Ctrl] key + Mouse Wheel	Roll the mouse wheel to change the Y-axis scaling factor.
Drag the scrollbar	Drag the bottom scrollbar to horizontally pan (X-axis) the graph in the display area.

Keyboard Operations

[←] [→] keys	Move the cursor position by one segment.
[Ctrl] + [←] [→] keys	Move the cursor position rapidly.
[Home] key	Move the cursor and the display area to X=0.0
[End] key	Move the cursor and the display area to X=Max.

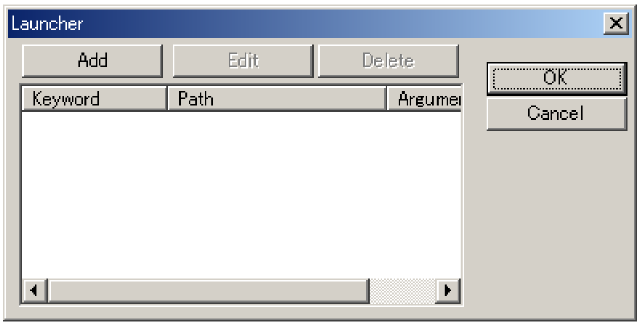
■ Graph Data Copy

When the [Copy] button from the "Speed Graph" dialog is pressed, the "Copy Data" dialog displays. Press the [File] button to save the data to a text file. Press the [Clipboard] button to copy the data to the Windows clipboard so that the data can be paste in another application.

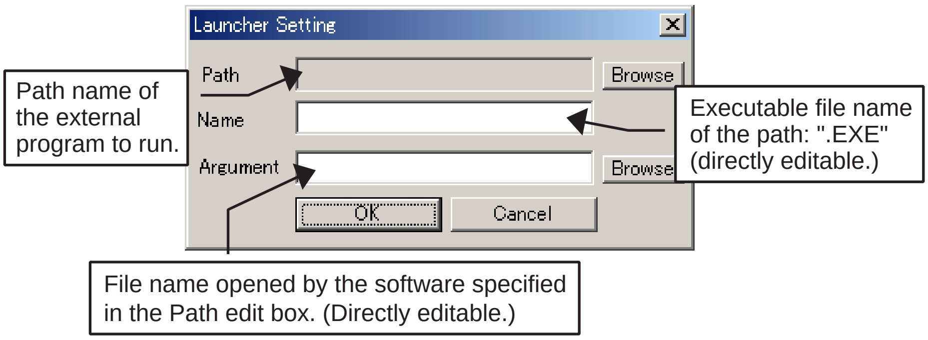


8.14 Running an External Software

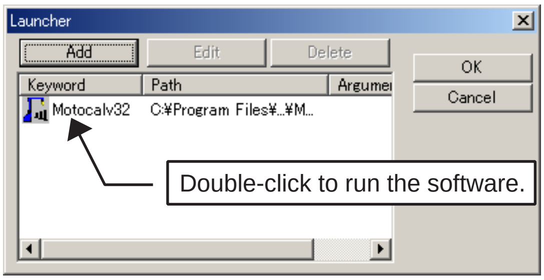
To run an external software with MotoSim EG. On the [Home] tab, in the [Tools] group, click the [External Software] button, the [Launcher] dialog appears and perform the settings explained in the list below.



Launcher Dialog Box

Item	Description
[Add] button	Select [Add] to register the software to run; the Launcher Setting dialog box appears. Press the [Browse] button on the right of the Path edit box. Select the desired program (executable file), and press [OK]. (The file name will be automatically entered in the Name edit box.) 
[Edit] button	Edits the settings of the registered software.
[Delete] button	Deletes the registered software.

Launcher Dialog Box

Item	Description
“Keyword” column	Double-click the desired software in the “Keyword” column to run the external software. 

8.15 Job Browser

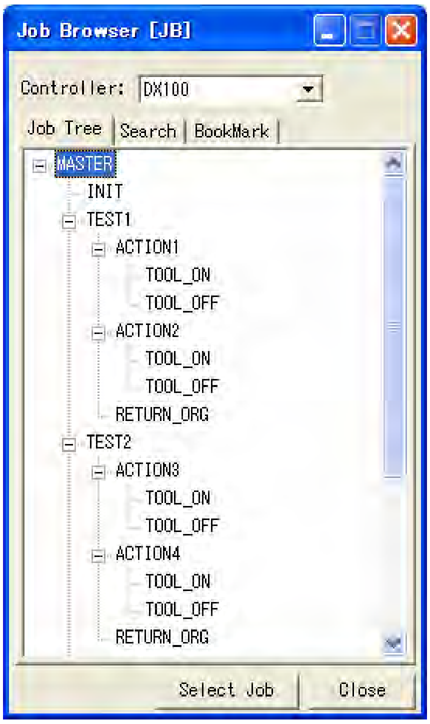
Job Browser supported the selection the job. Job Browser is available for the NX100, DX100 and FS100.
On the [Home] tab, in the [Teching] group, click the [Job Browser] button, the [Job Browser] dialog appears.

NOTE This function can not use depending on the system version of controller. Please refer to Section "A.6 List of Function depending on the system version of controller".

■ When starting Job Browser for the first time

When starting Job Browser for the first time, the bellow dialog appears. Open the Search tab in the Job Browser, search the job, and set the job to the root of the job tree.

■ Main Window

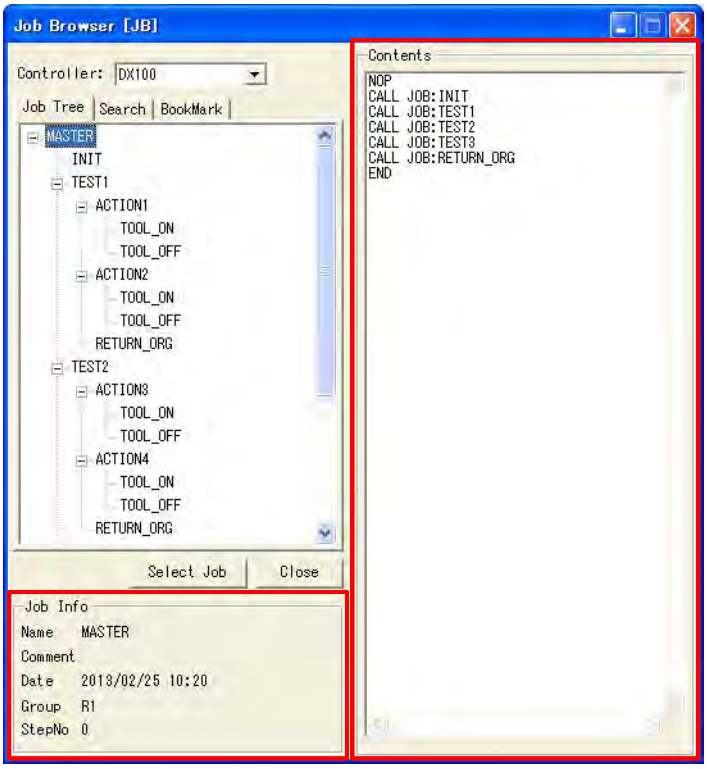


Job Browser

Item	Description
Controller	Select the controller.
Job Tree tab	Job Tree tab shows the job hierarchy as a tree.
Search tab	Search the job in the controller on the Search tab.
Bookmark tab	Bookmark tab shows the registered jobs as bookmark.
Select Job	Set the selected job in the tree or list to the virtual pendant.
Close	Close the Job Browser.

■ Sub Window

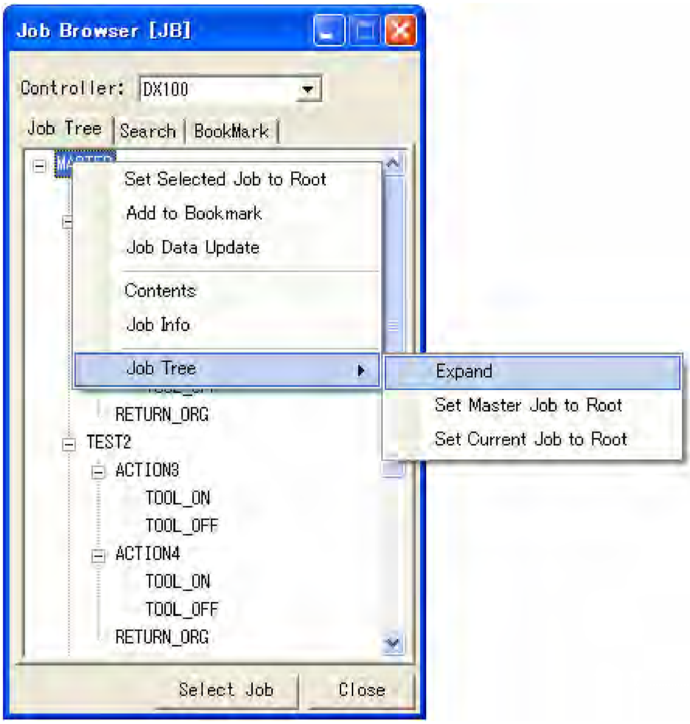
Job information and contents are displayed at the sub window. Job Browser enables the user to selectively hide and display the sub window.



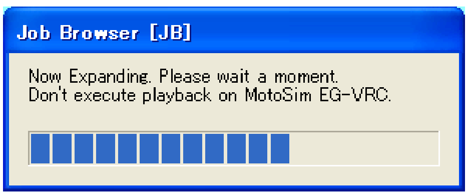
Sub window

Item	Description
Contents	Display the contents of the selected job. The line of the Contents list can be selected. When set the job to the virtual pendant, the cursor is set to the selected line. Double-click the line, the job can be set to the virtual pendant. (The cursor is set to the selected line.)
Job Info	The job header of the selected job is displayed.
Name	The name of selected job is displayed.
Comment	The comment of selected job is displayed.
Date	The date of selected job is displayed.
Group	The control group of selected job is displayed.
StepNo	The steps number of selected job is displayed.

Right-click menu



Right-click menu

Item	Description
Set Selected Job to Root	The selected job is set to the root of Job tree. The current job tree is cleared.
Add to Bookmark / Remove from Bookmark	The selected job is added to (removed from) the Bookmark.
Job Data Update	The selected job data is updated. The node is closed.
Contents	Display/Hide the Contents window.
Job Info	Display/Hide the Job Info window.
Expand	The Job tree is expanded from the selected node. NOTE: During the expansion, the follow dialog box is displayed. Do not execute the playback. 
Set Master Job to Root	Set the master job set in the virtual pendant to the root of Job tree. If the master job is not set, The root of Job tree is not set.

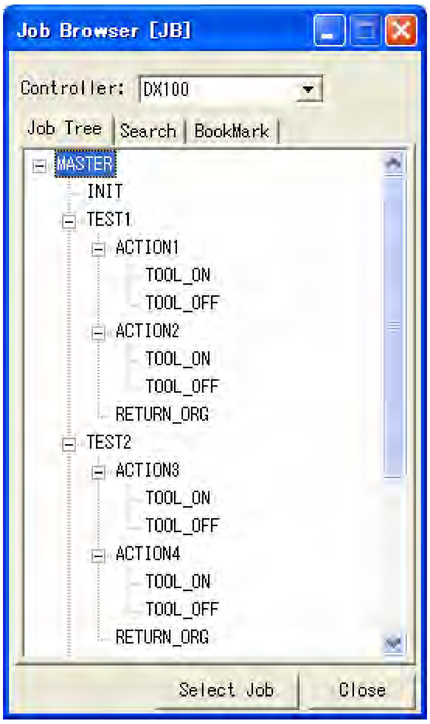
Right-click menu

Item	Description
Set Current Job to Root	Set the current job set in the virtual pendant to the root of Job tree. If the current job is not set, The root of Job tree is not set.

■ Job Tree Tab

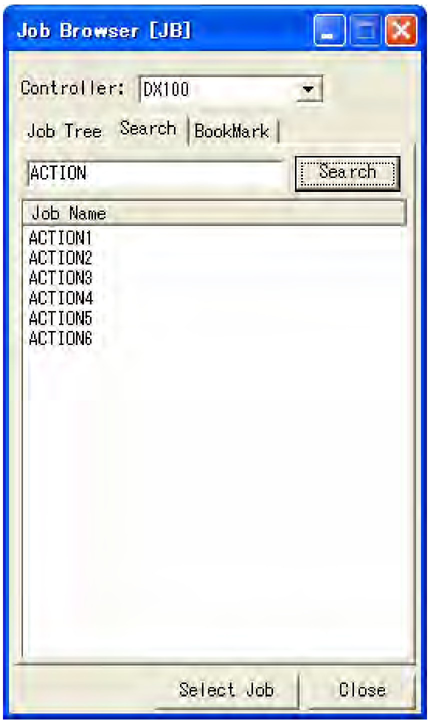
Display the hierarchy structure of jobs as tree structure. The target instructions are CALL JOB, JUMP JOB and PSTART JOB. The tree is displayed until eight-level. And the tree can be expanded. The root of tree is set the follow jobs.

- The selected job on the Job tree
- The selected job in the list (Search tab/Bookmark tab)
- Master job in the virtual pendant
- Current job in the virtual pendant



■ Search Tab

Press the [Search] button, jobs in the virtual controller is searched and the appropriate jobs are displayed in the list. A keyboard search is available. When the text box is empty, All jobs are displayed.



■ Bookmark Tab

The selected job in the tree/list can be registered as bookmark.
It is useful for registering jobs with much reference number of times.

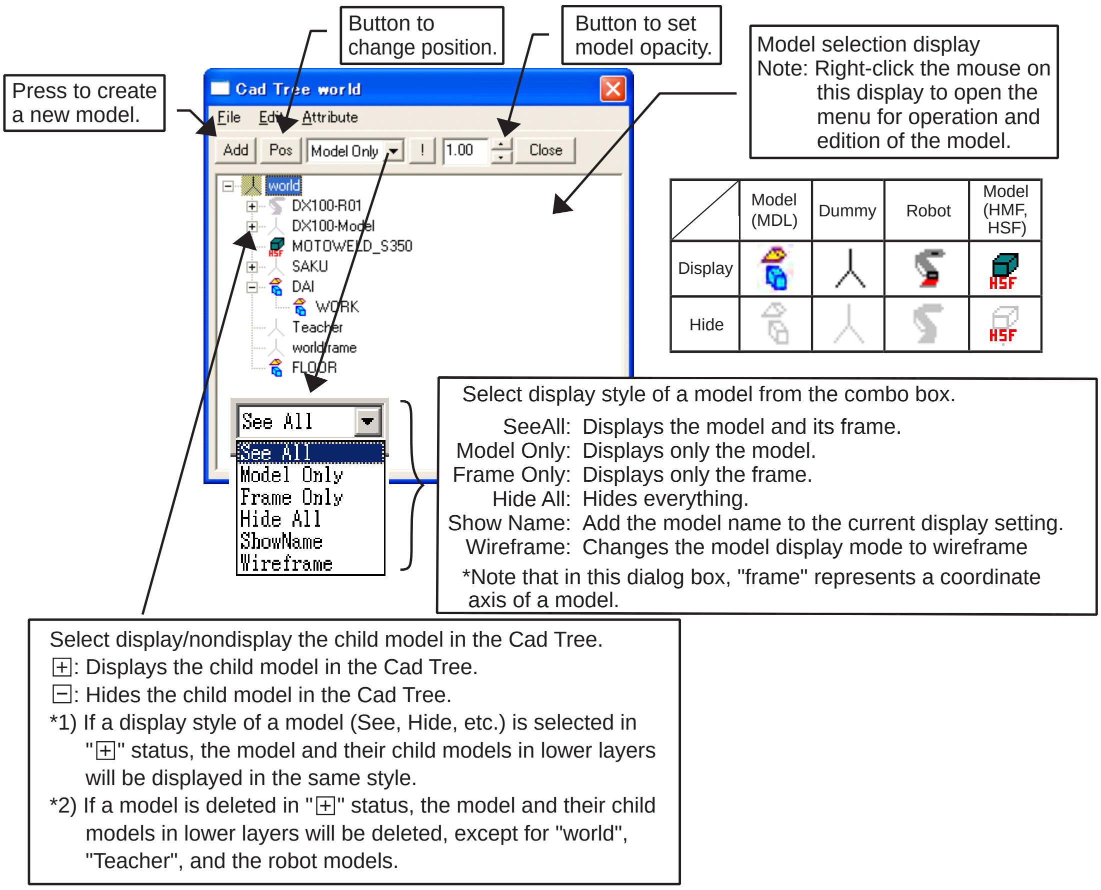
9 Model Editings

This chapter explains the operations for creating and editing the workpiece and tool models using the CAD functions.
A model is generally created by combining basic figures, such as cubes and cylinders; in addition to the general method, MotoSim EG-VRC supports the model creation by reading HSF and HMF data.

9.1 Cad Tree

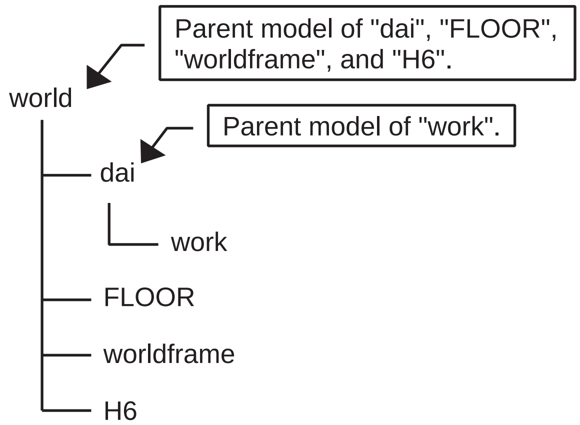
9.1.1 Outline of the Cad Tree

On the [Home] tab, in the [Model] group, click the [CadTree] button, the [Cad Tree] dialog appears.



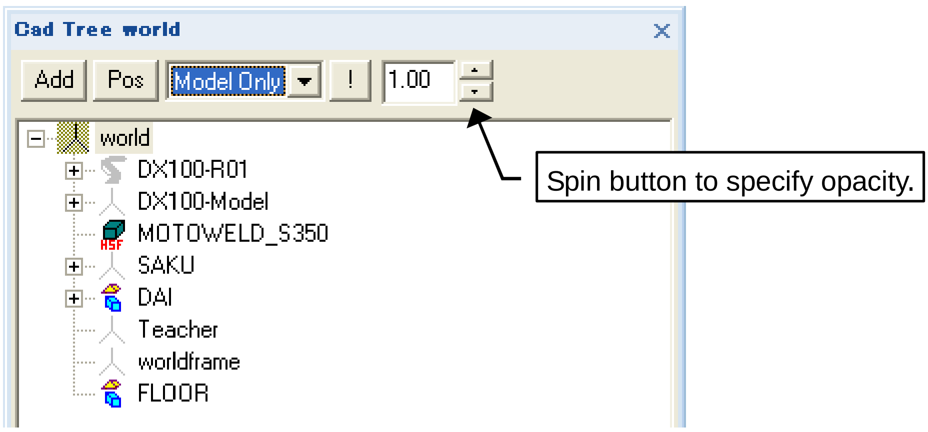
9.1.2 Tree Structure

The Cad Tree displays a column of models in a tree structure.
As shown in the following diagram, a model in the level immediately above the subject model is the parent model of the subject model.



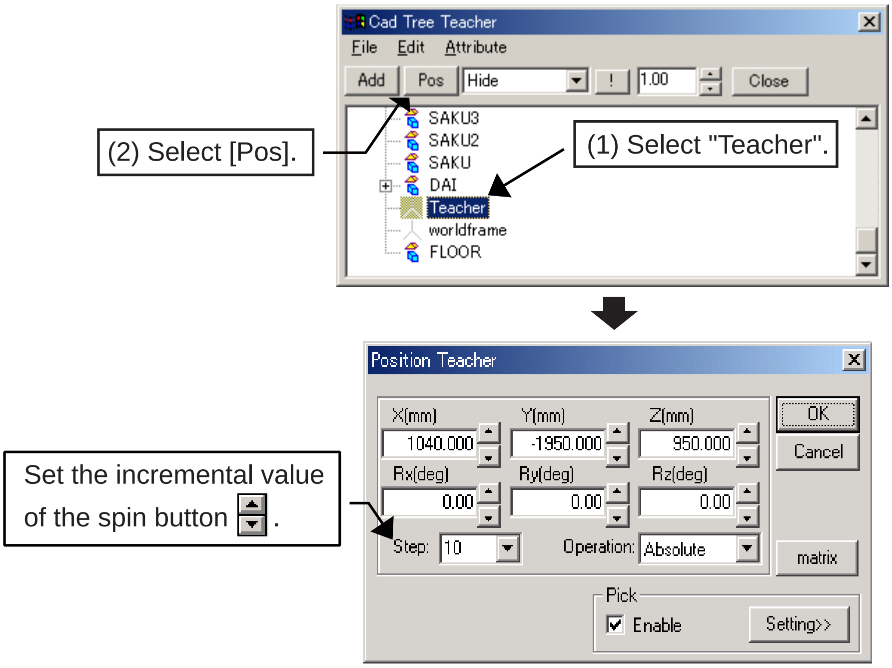
9.1.3 Opacity Settings

To set the model opacity, select the model in the Cad Tree and set the value using the spin button indicated in the following figure.
The maximum value of opacity is “1.00”. Decreasing the value below the maximum value reduces the opacity, the model becomes translucent enabling to see other models through it. If the value is set to “0”, the model becomes completely transparent and can no longer be seen.



9.1.4 Teacher

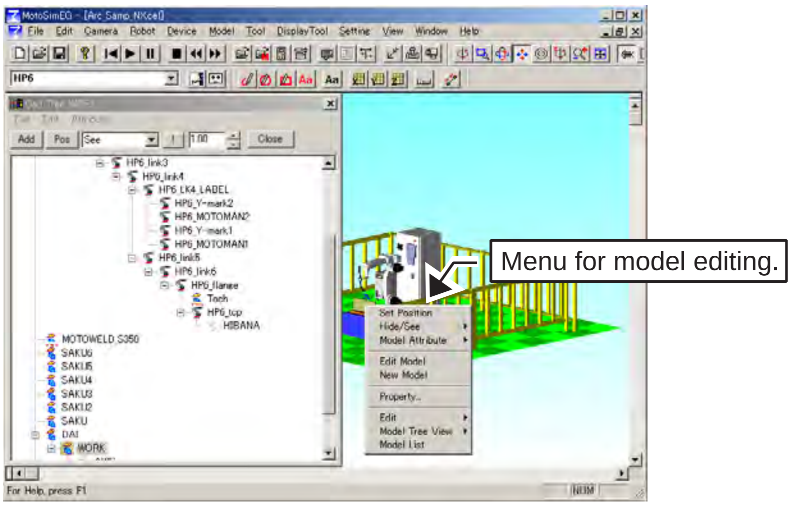
"Teacher" is a tool to create a target point (coordinate) at an arbitrary position, and is displayed as an AXIS6 frame on the screen. It simplifies the use of OLP-related function and the relocation of parts.
To enable the Teacher, point the cursor to "Teacher" in the Cad Tree, and click on [Pos] to display the “Position Teacher” dialog box. Specify the values in this dialog box. (For further detail on the "Position" dialog box, please refer to Section "9.5 Positioning a Model").



9.1.5 Mouse-Driven Model Editing

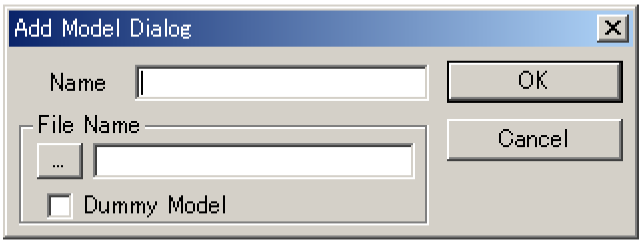
■ Right Mouse Button Operation

A pop-up menu for model editing operation appears by clicking the right mouse button at a location where a model is displayed.
However, note that the viewpoint operation menu appears when clicking the right mouse button where there is no model displayed or when the Cad Tree is not on the screen.



9.2 Creating a New Model

To start creating a new model, click on [Add] of the Cad Tree menu to display the Add Model dialog box.

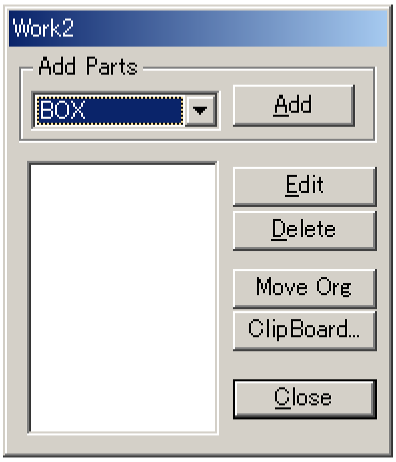


Procedure

1. Enter a name of the new model to be created in the Name edit box of the Add Model dialog box.
   (By default, the model name and the model file name are the same: the model file is created with the model name.)

2. Click [OK] in the Add Model dialog box.
   A newly created model is displayed in the Cad Tree. (Note that new model file does not contain any data at this point.)

3. Double-click the new model name in the Cad Tree to edit the model.
   The file data editing dialog box (as shown below) appears; refer to Section "9.3 Editing a Part" to edit the file data.



4. When the creation of the model is completed, click [Close] to complete the file data editing.

■ Creating a Model from an Existing Model

A new model creation can be achieved not only by creating parts with the CAD function, but also with an existing model file. In addition to those methods, a new model can also be added with the method explained in Section "9.11 Reading a Model".

Procedure

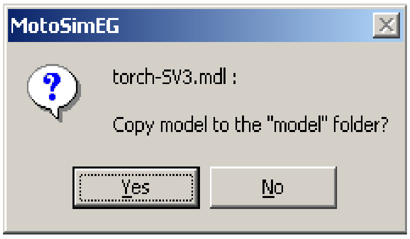
1. Click [Add] of the Cad Tree, or select {File} - {New Model} from the right-click menu of the Cad Tree.

2. The Add Model dialog box appears. Press the [...] button on the left of the File Name edit box to select a file.

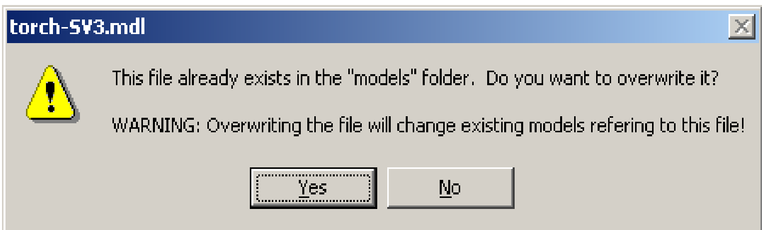
3. Enter a new model name in the Name edit box of the Add Model dialog box.

4. Click [OK].

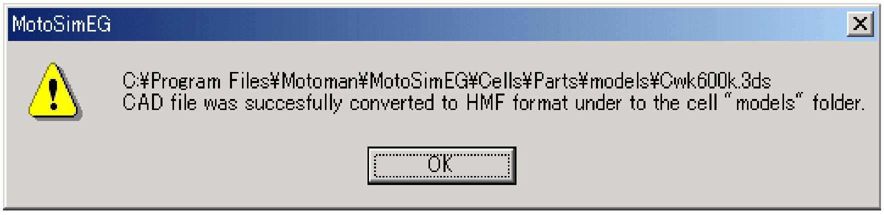
5. If the model file path doesn't correspond to the "models" folder under the cell folder, the following dialog box will display and offer to copied model file to the "models" folder of the cell.



If the "Yes" button is clicked and a file with the same name already exists in the cell "models" folder. The following dialog will display to ask for overwrite confirmation.



For RWX or 3DS model format, the files will automatically be converted to HMF format. The created HMF file will be located in the "models" folder of the cell. After the conversion is successfully completed, the following message will display.



NOTE

When adding LINE data (wire frame), it is recommended to use LINE data in the HMF format: adding LINE data in other format may take some time.
If the LINE data is in a format other than HMF, convert the LINE data with "MDL2HMF.EXE" before adding the model. (The MDL2HMF.EXE is located in a folder where MotoSim EG-VRC was installed).

■ Creating a Dummy Model

Dummy model is a model with only the position and direction data and no modeling data (model file). Normally, external servo track or rotation axis have a reference position that is fixed and unchangeable (even if it is changed, it returns to the original position when opening the cell next time).
To avoid such problem, use a dummy model: create a dummy model, then register the external axis as a child model of the dummy model. This way, the reference position of the external axis or rotating axis can be moved by changing the reference position of the dummy model.

Procedure

1. Click [Add] on the Cad Tree dialog box, or select {File} - {New Model} from the right-click menu of the Cad Tree.

2. The Add Model dialog box appears; enter a new model name in the Name edit box.

3. Check the [Dummy Model] check box.

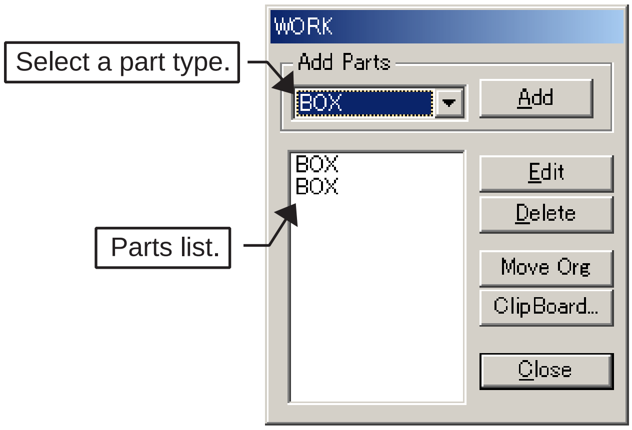
4. Click [OK].

9.3 Editing a Part

MotoSim creates a model data file by combining basic figures such as cubes and cylinders: such figures are called "parts" in this manual.
The following sections explain on how to edit the parts using the file data editing dialog box of the Cad Tree.

9.3.1 Displaying the File Data Editing Dialog Box

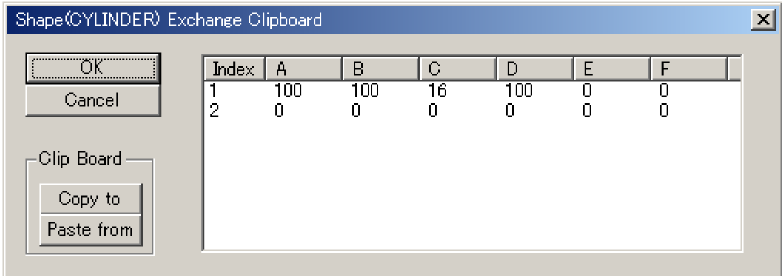
In the Cad Tree, double-click the model to be edited, or select {Attribute} - {Edit File Data} to display the file data editing dialog box as follows:



File data editing dialog box

Item	Description
[Add] button	Displays a dialog box to edit the part selected in [Add Parts] combo box. Also displays the added part on the cell window.
[Edit] button	Displays a dialog box to edit the part selected in the parts list. (Multiple selection is not possible.)
[Delete] button	Deletes the part selected in the parts list. (Multiple selection is not possible.)
[Move Org] button	Changes the parent of the part selected in the parts list. Refer to Section "9.9.1 Changing the Parent Model" for details.

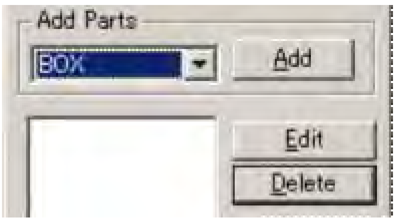
File data editing dialog box

Item	Description
[ClipBoard...] button	Stores/Retrieves the data of the part selected in the parts list on the clipboard. 
[Close] button	Closes the file data editing dialog box.

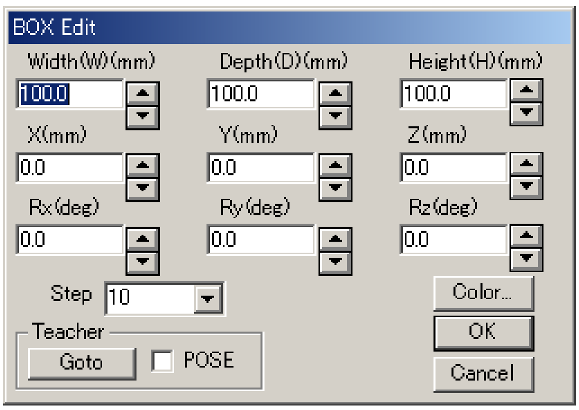
9.3.2 Registering a Part

Procedure

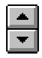
1. Select a type of parts to be added in [Add Parts] combo box in the file data editing dialog box.



2. Click [Add] to display the part on the cell window; the parts editing dialog box appears.



3. See descriptions below to edit the part in the parts editing dialog box:

   - Enter the values for model size, position, etc. with the spin buttons  or key-strokes. (The incremental value of the spin buttons is specified in the Step combo box.)
   - Click [Color...] to display the Color dialog box, and specify the color.
   - To move the part to an arbitrary point with the Teacher, set the Teacher to the target position; click [Goto] in the "Teacher" section to move the part to the teacher coordinate. To move the part including the posture to the teacher, check the [POSE] check box and then click [Goto]. (For the details of the Teacher, refer to Section "9.1.4 Teacher".)

4. When all the settings for the model are completed in the parts editing dialog box, click [OK] to add the part to the model data file.

5. Create a model by repeating the steps 1 to 4 to register additional parts.

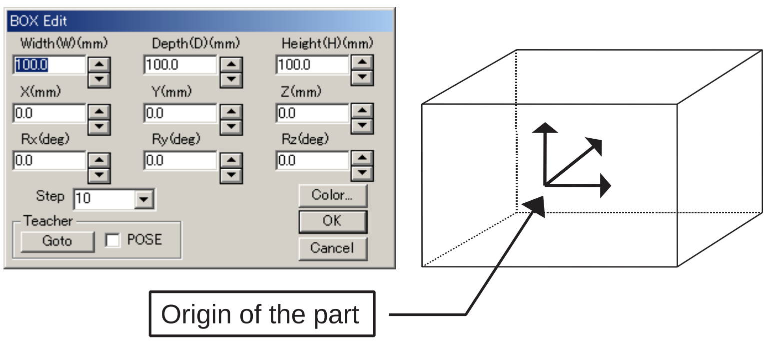
9.3.3 Part Types

This section explains on how to edit the parts according to the part type.

■ BOX

The BOX is a rectangular parallelepiped part, which can be edited in the BOX Edit dialog box.

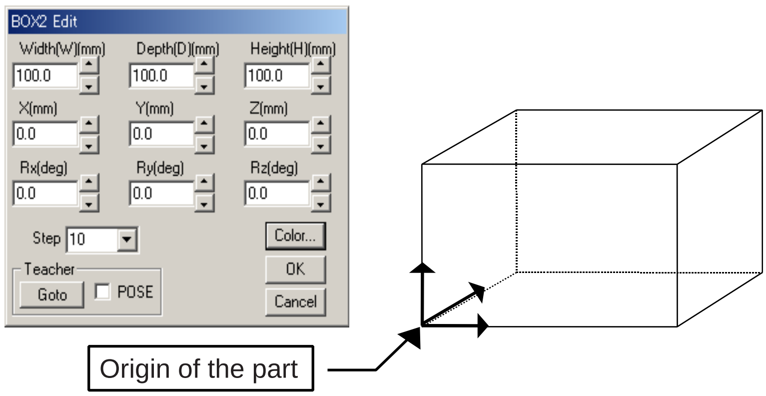
- The origin of the part is the center of the BOX part model.



■ BOX2

The BOX2 is a rectangular parallelepiped part, which can be edited in the BOX2 Edit dialog box.

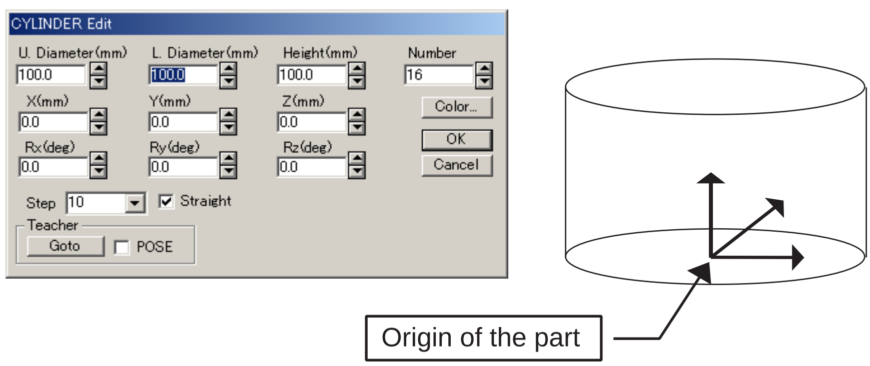
- The origin of the part is the vertex of the BOX2 part model.



■ CYLINDER

The CYLINDER is a cylindrical part, which can be edited in the CYLINDER Edit dialog box.

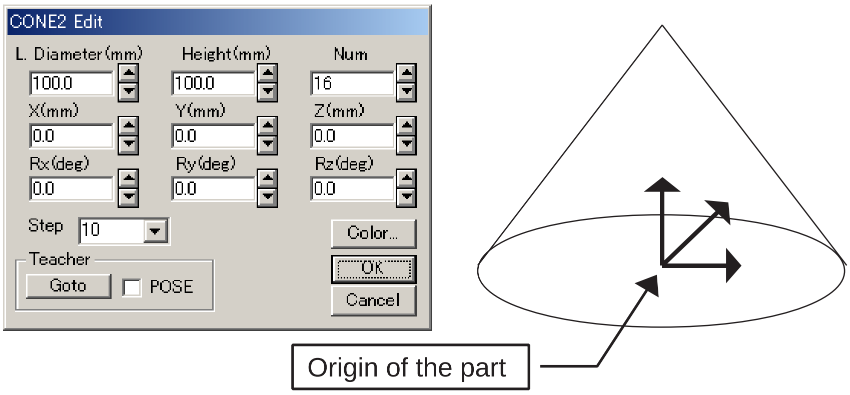
- Selecting the [Straight] check box links the values of the upper and lower diameters ("U. Diameter" and "L. Diameter", respectively).
- The value in "Number" edit box represents the number of sides to form a cylinder: the larger the number becomes, the more perfect the cylinder becomes. Therefore, when "3" is input, the number of side faces becomes three, forming a triangular cylinder.
- The origin of the part is the center of the CYLINDER bottom.



■ CONE2

The CONE2 is a conic part, which can be edited in the CONE2 Edit dialog box.

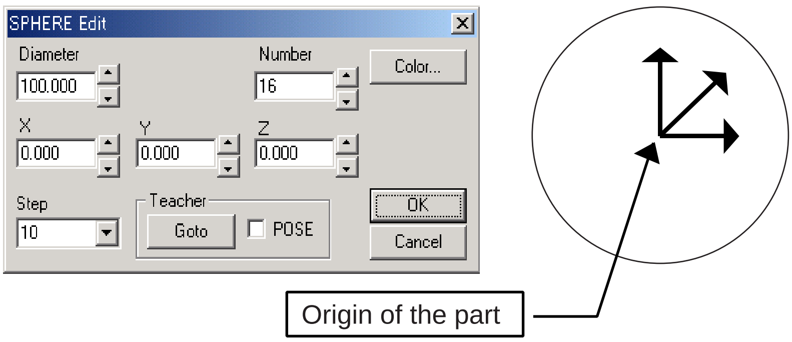
- The origin of the part is the center of the CONE2 bottom.



■ SPHERE

The SPHERE is a spherical part, which can be edited with the "SPHERE Edit" dialog box.

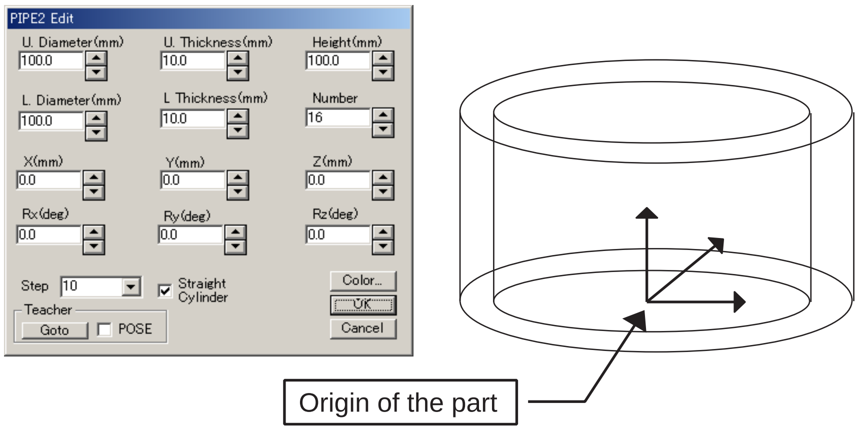
- The origin of the part is the center of the sphere.



■ PIPE2

The PIPE2 is a pipe part, which can be edited in the PIPE2 Edit dialog box.

- The values in "U. Thickness" and "L. Thickness" edit boxes respectively represent the thickness of upper and bottom faces of the pipe.
- Selecting the [Straight Cylinder] check box links the upper and lower diameters ("U. Diameter" and "L. Diameter", respectively), and the upper and bottom face thickness.
- The origin of the part is the center of the PIPE2 bottom.



■ AXIS6

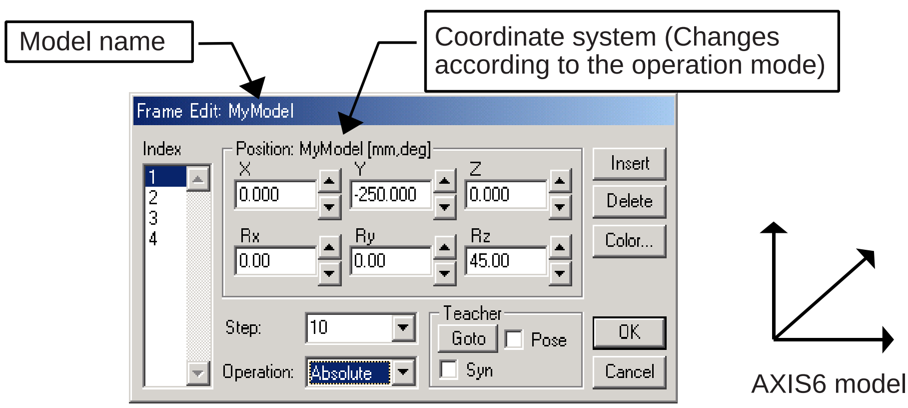
The AXIS6 is a part that may contain multiple frames (position and orientation data). The frames can be used as a target point or for external axis setting. It can be edited in the Frame Edit dialog box.

- To add a frames, press [Insert]. The frames are added to the "Index" list box.
- To delete a frame, select the frame number in the "Index" list box, and press [Delete].
- To edit a frame, select the frame number in the "Index" list box and modify the values in the "Position" section. The position can be displayed and modified relative to various coordinated system depending on the "Operation" mode.

  "Operation" combo box settings

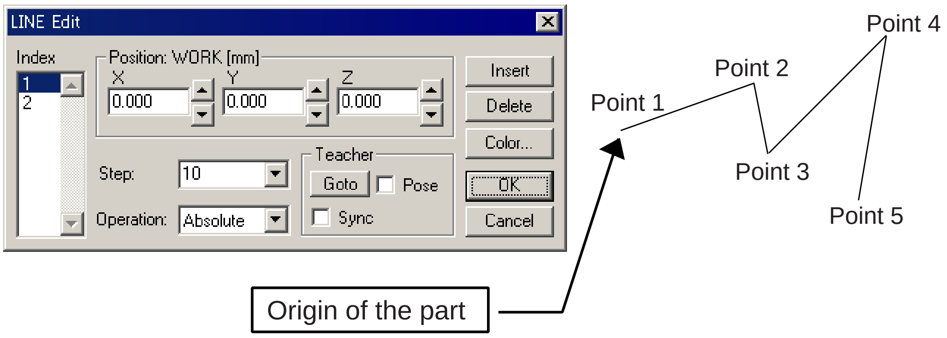
"Absolute"	Displays the position with reference to the model frame.
"Relative"	Displays the position with reference to the frame original position when initially selected in the "Index" list box.
"SelModel"	Displays the position with reference to a selected model. When this mode is first selected the "Select Model" dialog will display to allow selection of the reference model.

NOTE The frame corresponding to the selected "Index" of the list box is highlighted in red in the main view.



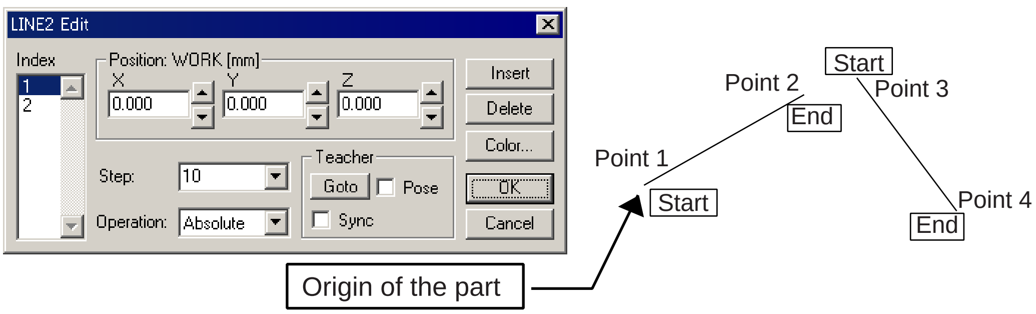
■ LINE

The LINE is a part that contains multiple points. The points are links together by straight-line segments to form a continuous line. It can be edited with the "LINE Edit" dialog box. A minimum of 2 points must be defined for the line to display. Points can be inserted, edited or deleted in the same manner as the "FRAME Edit" dialog box. (Please refer to the " AXIS6 " section for details).



■ LINE2

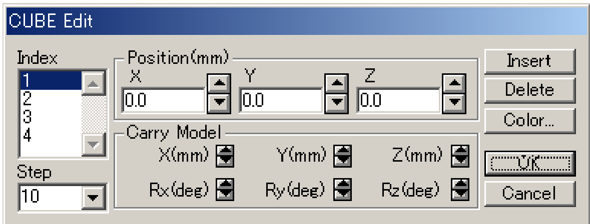
The LINE2 is a part that may contains multiple lines each made of 2 points. It can be edited with the "LINE2 Edit" dialog box. The points with an odd index number are the starting points and those with an even index number are the end points. The total number of defined points must be even to display all the segments. Points can be inserted, edited or deleted in the same manner as the "FRAME Edit" dialog box. (Please refer to the " AXIS6 " section for details).

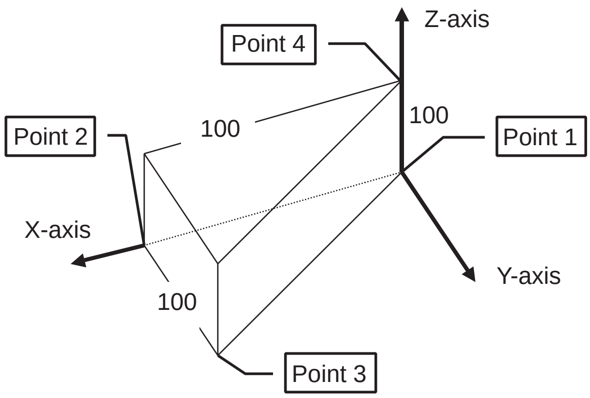


■ CUBE

The CUBE is a polyhedron part, which can be edited in the CUBE Edit dialog box.

- When a CUBE model is added, a model with four points appears on the screen, with the four points already registered in the CUBE Edit dialog box as shown below.
- The apex of the figure at the bottom is registered as a point from No. 1, the point in the height direction is the last registered point in the model file form.
  The points at the apex of the bottom figure are arranged as follows:
    -When the height is set to Z-axis positive (+) direction: counterclockwise to Z-axis positive (+) direction.
    -When the height is set to Z-axis negavite (-) direction: clockwise to Z-axis positive (+) direction.

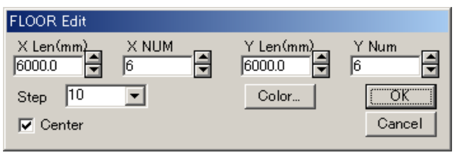


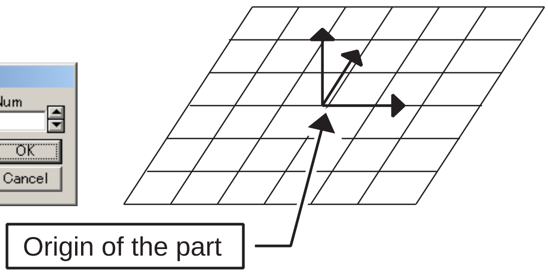


■ FLOOR

The FLOOR is a floor part, which can be edited in the FLOOR Edit dialog box.

- The values "X Num" and "Y Num" edit boxes respectively represent the numbers of dividing lines that divide the face in the X-direction and Y-direction.
- The origin of the part is the center of the FLOOR model.

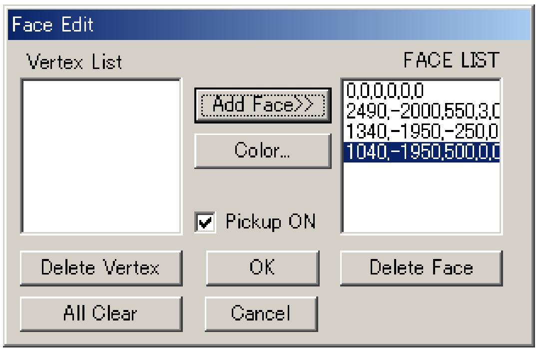


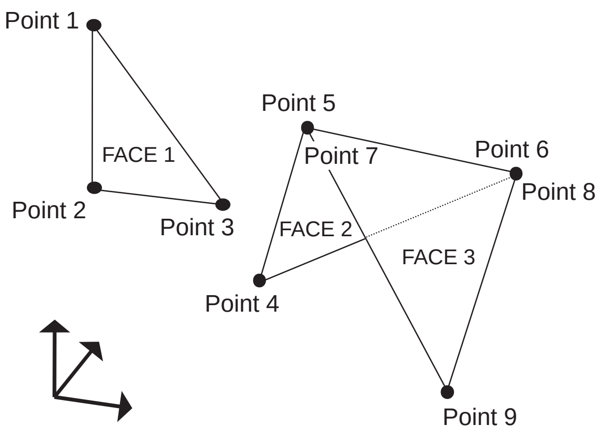


■ FACE

The FACE is a face part, which can be edited in the Face Edit dialog box.

- Register apexes to create faces.
  Several faces can be created in one FACE part, however, there must be three or more points to create each face. If the points are not in the same plane, the face will be divided into some triangles. Therefore, unless these points are clearly on the same plane, create the FACE with units of three points.





Procedure

1. Select the [Pickup ON] check box.
   (Clear the check box to change the viewpoint on the screen.)

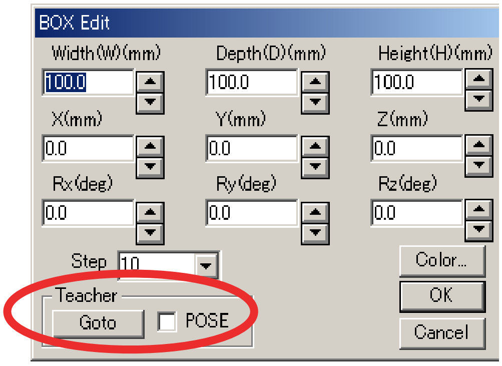
2. Click the points 1, 2 and 3 as shown in the above figure.
   The frame of the clicked point is displayed in "Vertex List" box. Click [Add Face>>] to create the FACE 1 defined by three points.

3. Click the points 4 to 6, and click [Add FACE>>] to create FACE 2.

4. Click the points 7 to 9, and click [Add FACE>>] to create FACE 3.

■ "Teacher" Section of the Parts Editing Dialog Box

The parts BOX, CYLINDER, CONE2, PIPE2, AXIS6, SPHERE, LINE, LINE2 can be relocated by using the "Teacher" section of each editing dialog box.
When using the Teacher, it has to be previously set: refer to Section "9.1.4 Teacher" for details.



"Teacher" section of the parts editing dialog box

Item	Description
[Goto] button	Moves the part to the Teacher position.
[POSE] check box	Moves the part including the posture to the Teacher position.

9.4 Editing a Model

A model can be cut, copied, pasted, etc. with commands under {Edit} of the Cad Tree.
Select a model from the Cad Tree, and edit the model with the commands described below:

■ Cut

Cuts the selected model.

■ Copy

Copies the selected model.

■ Paste

Pastes the cut or copied model in an arbitrary place.
When selecting {Copy} - {Paste} within the same cell, enter the model name to be copied.

■ Delete

Deletes the selected model. However, the model file will not be deleted though the model is deleted from the Cad Tree and the cell window.
When deleting the currently selected model including its child models are to be deleted, set the display/nondisplay status (⊞ or ⊟) on the left of the model name to ⊞ in the Cad Tree, then select [Delete]. Note, however, that the "world", "Teacher", and robot model will not be deleted even if they are in the ⊞ status.

■ Add

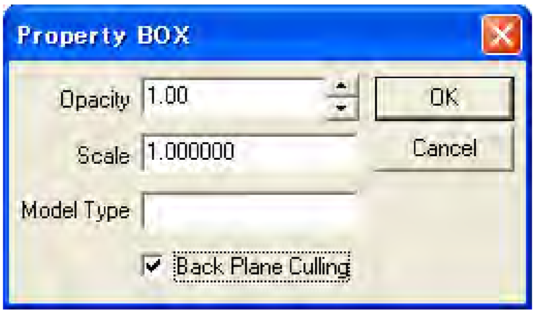
Creates a new model.
Refer to Section "9.2 Creating a New Model" for details.

■ Rename

Changes the model name.
Note, however, that the names of "world", "Teacher", and the robot model names cannot be changed.

■ Property

Specifies opacity, scale, and model type. (The command {Property} is located under {Attribute}.)

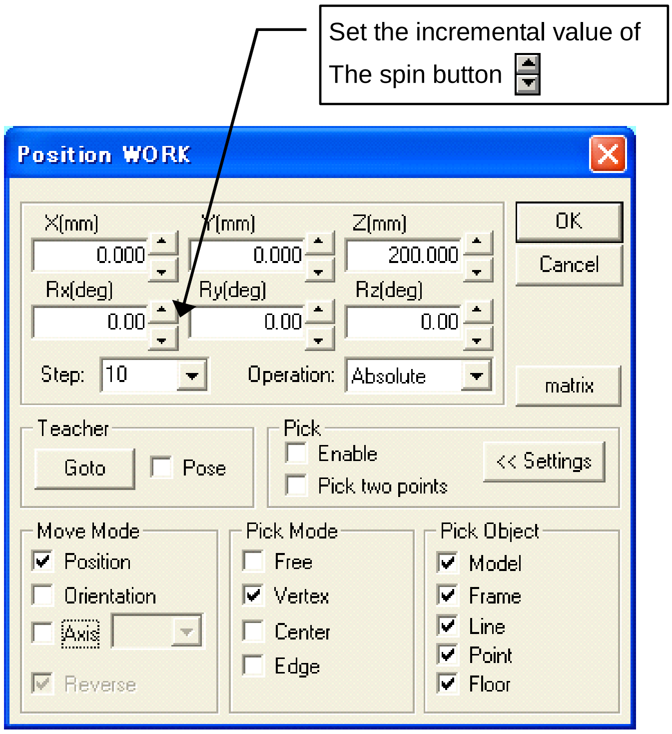


Property dialog box

Item	Description
[Opacity] edit box	Specifies the opacity of the model.
[Scale] edit box	Specifies the scale of the model.
[Model Type] edit box	Specifies a character string in the model.
[Back Plane Culling] check box	Set up whether the back plane of CAD data is shown or hidden. When the back plane is shown, the CAD data is displayed according to that data. When the back plane is hidden, display speed is faster. NOTE When the back plane is hidden, some parts of the CAD data may be lost. When the CAD data need be displayed collect, check off the Back Plane Culling.
[OK] button	Applies the modifications, and closes the Property dialog box.
[Cancel] button	Closes the Property dialog box without applying the modifications.

9.5 Positioning a Model

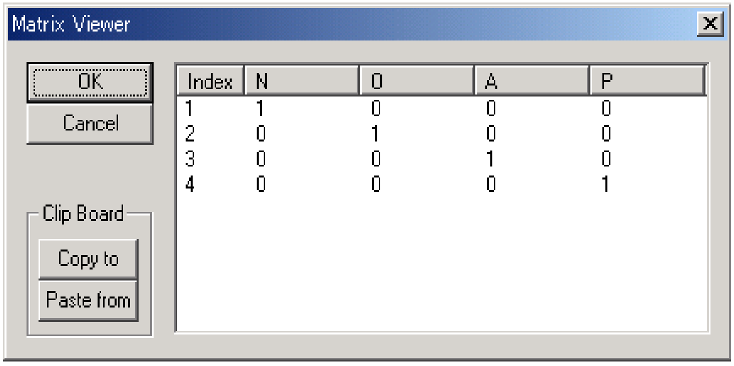
Position a model by specifying the values in the Position dialog box.
To display the Position dialog box, click on [Pos] button or select {Attribute} - {Set Position} menu item of the Cad Tree.



Position dialog box

Item	Description
"Operation" combo box	"Absolute" Displays the position with reference to the parent model, and moves the model. "Relative" Displays the position with reference to the selected model, and moves the model. "SelModel" Displays the Select Object dialog box; displays the position with reference to the model specified in the Select Object dialog box, and moves the model.

Position dialog box

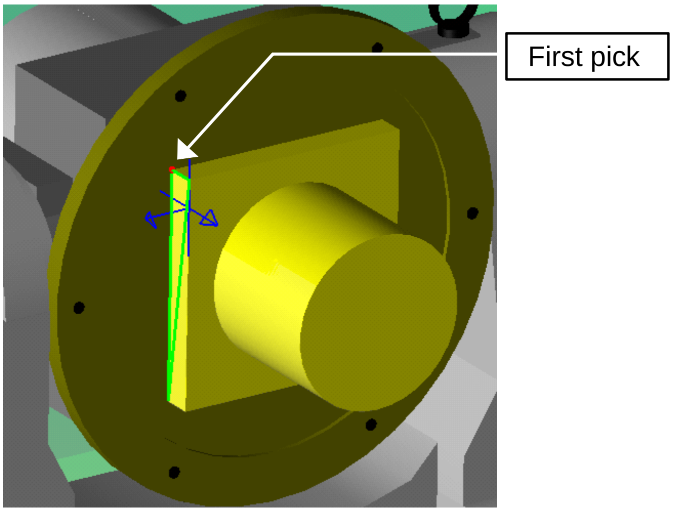
Item	Description
[matrix] button	Allows to store or retrieve the data of the Position dialog box in the clipboard. 
"Teacher" section	Move the model to the Teacher current position. [Goto] button Moves the model to the Teacher position. [POSE] check box When checked and the [Goto] button is used, the model also moves to match the Teacher orientation. When using the Teacher, it has to be previously set: refer to Section "9.1.4 Teacher" for details.
"Pick" section	[Enable] check box Enables the mouse picking operation. Pressing the [Shift] key enables or disables the "Pick Enable" mode. [Pick two points] check box The chosen model is parallel-shifted so that the specified point of the model may unite with the pick position of the 2nd point. [Settings >>] or [<< Settings] buttons Displays or hides the pick setting section.
"Move Mode" section	Determines the method to move to the picked point. [Position] check box The model is moved to the position (XYZ) of the picked point. [Orientation] check box The model is turned to match the orientation (Rx, Ry, Rz) of the picked point frame. [Axis] check box The model axis specified in the combobox is turned so that it matches the picked face normal. [Reverse] check box This setting is enable with [Orientation] or [Axis] mode. It can be use to change the direction of the picked face normal.
"Pick Mode" section	Sets conditions determining the selected point in the clicked area. Please refer to " Pick Mode Setting " for details.
"Pick Object" section	Sets the type of the object to be selected when clicking on the cell view. (Multiple items can be selected) Please refer to " Pick Object Setting " for details.
[OK] button	Applies the modifications, and closes the Position dialog box.

Position dialog box

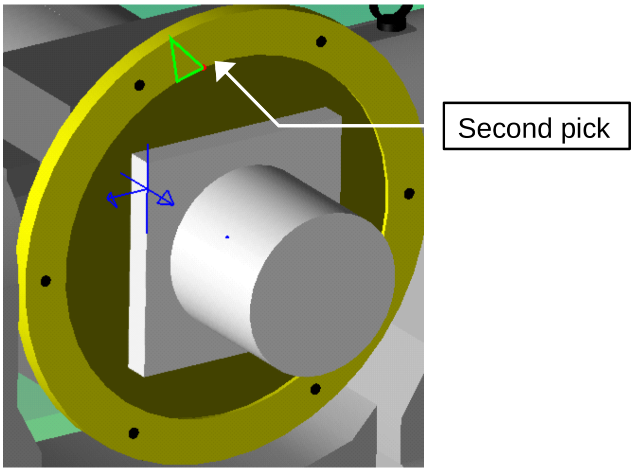
Item	Description
[Cancel] button	Closes the Position dialog box without applying the modifications.

The operating procedure of a two-point pick is explained concretely below.

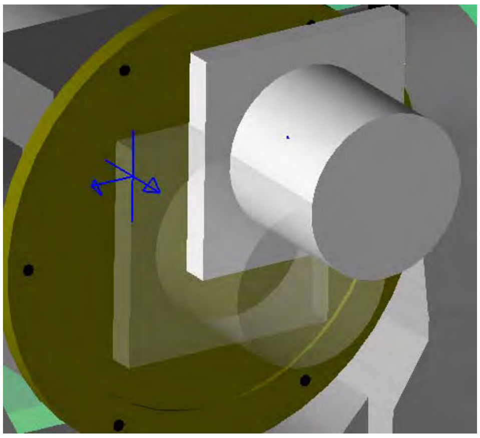
1. With the first pick, the point to align is specified.



2. With the second pick, the movement place is specified.

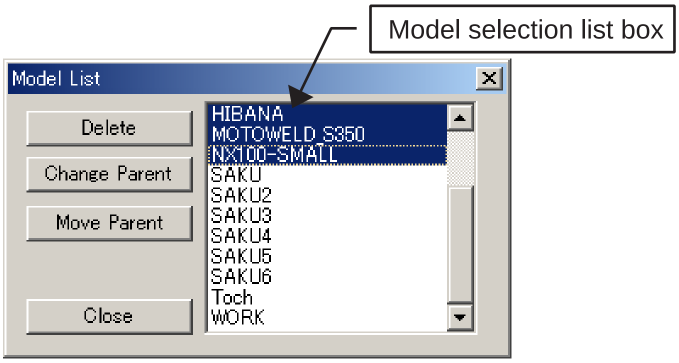


3. The point specified as the first point moves to the position of the second point.



9.6 Editing Multiple Models (Model List)

Multiple models can be edited in the Model List dialog box. To open the dialog box, select {Edit} - {Models List} of the Cad Tree right-click menu.

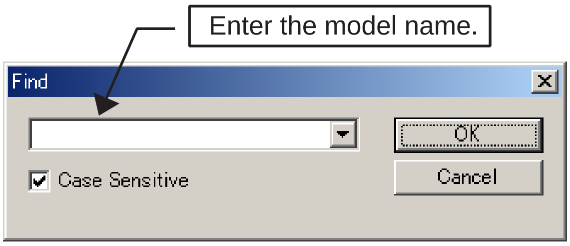


Model List dialog box

Item	Description
Model selection list box	Displays the models registered in the cell. The selected models are highlighted. (Multiple selection is possible.)
[Delete] button	Deletes the models selected in the model selection list box. The models on the cell window are also deleted, however, their model files still exist.
[Change Parent] button	Changes the parents of the models selected in the model selection list box. Refer to Section "9.9.1 Changing the Parent Model" for details.
[Move Parent] button	Moves the parents of the models selected in the model selection list box. Refer to Section "9.9.2 Moving the Parent Model" for details.
[Close] button	Closes the Model List dialog box.

9.7 Searching a Model

Search for a desired model with the Find dialog box. To open the dialog box, select {Edit} - {Find} from the Cad Tree right-click menu.
If the entered name exists, the model is selected in the Cad Tree.



9.8 Saving and Reading a Model Group

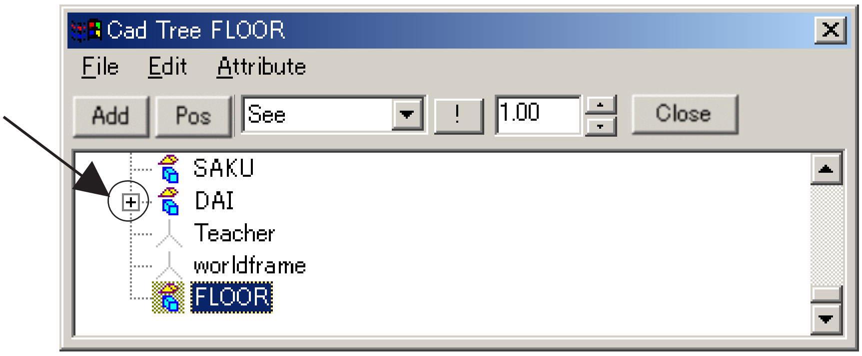
A model and its parent-child relevant information can be saved as a set.
This can be done by creating a folder under [cell folder name\models] and naming it with the same name as the subject model, then by saving the following files in the new folder:

- The parent-child relevant information of the model (ModelInfo.dat).
- Subject model and its all the child models (*.mdl, *.hsf).

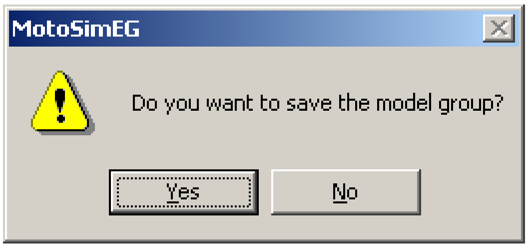
■ Saving a Model Group

Procedure

1. Select a model with the status symbol (on the left of the selected model name) in the Cad Tree set to ⊞.



2. Select {Edit} - {Save Model Group} from the Cad Tree right-click menu.
Select [Yes] to create a folder with the same name as the model selected in the step 1.
The files of the model (selected in the step 1) and its child models are copied to the folder, and a parent-child relevant information file "ModelInfo.dat" is generated.



■ Reading a Model Group

Select {Edit} - {Load Model Group] from the Cad Tree right-click menu. Select a "ModelInfo.dat" file to read the saved model including its child models.

> **NOTE** If there is a model with the same name in the current cell, the second one will automatically be numbered. (The number will be added after the name.)

■ Syntax of the ModelInfo.dat

```
MODEL
    {
    NAME=Camera_Dummy     //Logical name of the model
    PARENT=world          //Parent model name
    FILENAME=dummy        //File name
    COLOR=RGB (0,0,255)   //Color of the model
    HIDESEE=1             //Display/nondisplay information
    OPACITY=0.25          //Opacity
    AXIS6=4000.000,5500.000,2000.000,-1.57,0.00,-0.35     // Position of the model
    }
```

9.9 Changing and Moving the Parent Model

9.9.1 Changing the Parent Model

The parent model of an arbitrary model can be changed with {Parent Change} under {Attribute} of the Cad Tree menu.
With this function, the relation (coordinate) between the selected model and its parent model is automatically changed, and the model position does not change. Use this function in case of changing the parent model while keeping the model in the same position.

To use this function, select the desired model in the Cad Tree, then select {Attribute} - {Parent Change} from the Cad Tree right-click menu.

9.9.2 Moving the Parent Model

The parent model of an arbitrary model can be moved with {Parent Move} under {Attribute} of the Cad Tree menu.
Since the relation (coordinate) between the selected model and its parent model does not change with this function, the selected model position changes when it is moved to its new parent model with {Parent Move}.

To use this function, select the desired model in the Cad Tree, then select {Attribute} - {Parent Move} from the Cad Tree right-click menu.

9.10 Changing a Model File

The model file of an existing model can be changed with {ChangeFilePath} under {Attribute} of the Cad Tree menu.

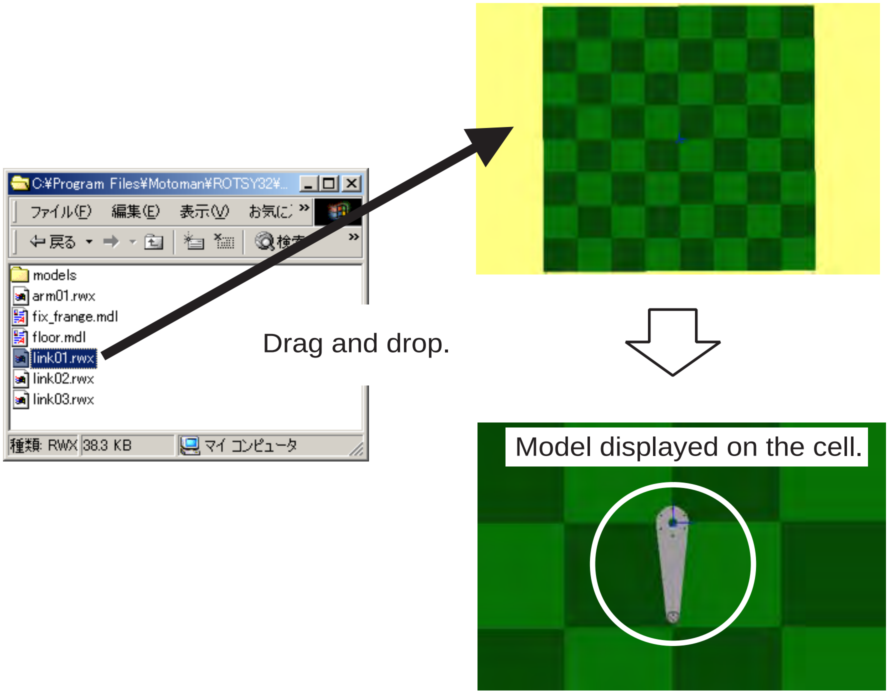
To use this function, select a model to be changed in the Cad Tree, then select {Attribute} - {ChangeFilePath} from the Cad Tree menu. Select the desired model file in a file selection dialog box to change the model file.
Note that the change will only take effect the next time the cell is open.

NOTE

The model files for "world", "Teacher", and robot models cannot be changed.

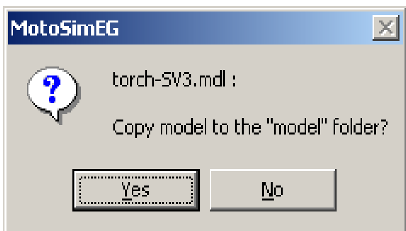
9.11 Reading a Model

A model appears on the cell by dragging and dropping its model file (in the HSF, HMF, MDL, 3DS, or RWX format) to the cell window, and the model file is copied to the "models" folder. In this operation, a parent model can also be selected.

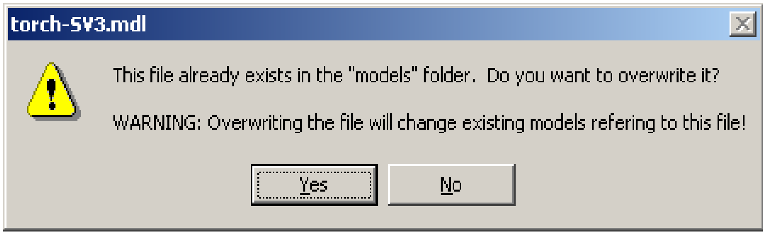


Procedure

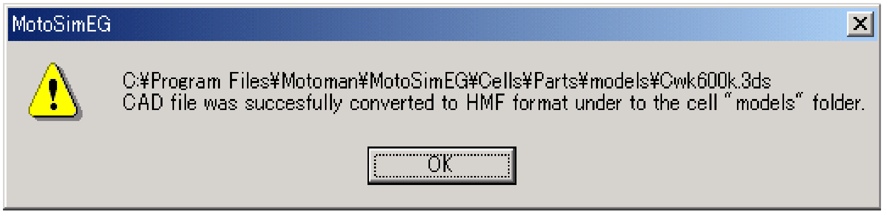
1. Drag and drop an arbitrary model to the cell window; If the model file path doesn't correspond to the "models" folder under the cell folder, the following dialog box will display and offer to copied model file to the "models" folder of the cell.



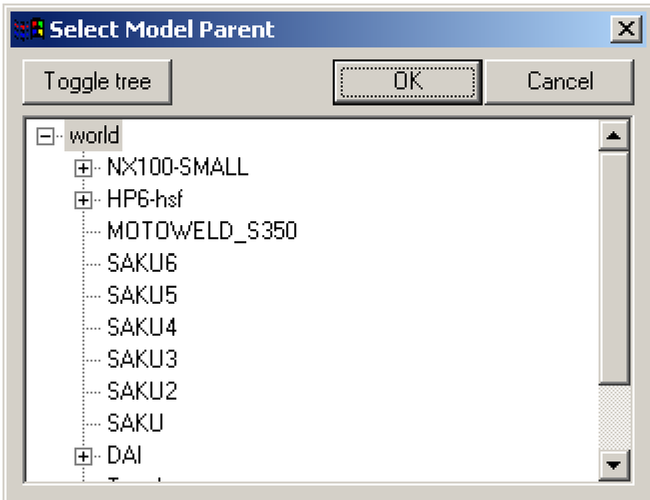
If the "Yes" button is clicked and a file with the same name already exists in the cell "models" folder. The following dialog will display to ask for overwrite confirmation.



For RWX or 3DS model format, the files will automatically be converted to HMF format. The created HMF file will be located in the "models" folder of the cell. After the conversion is successfully completed, the following message will display.



2. The Select Model Parent dialog will display. Select the model that will become the parent of the new model and press the [OK] button. (By default the "world" model is selected.)



NOTE

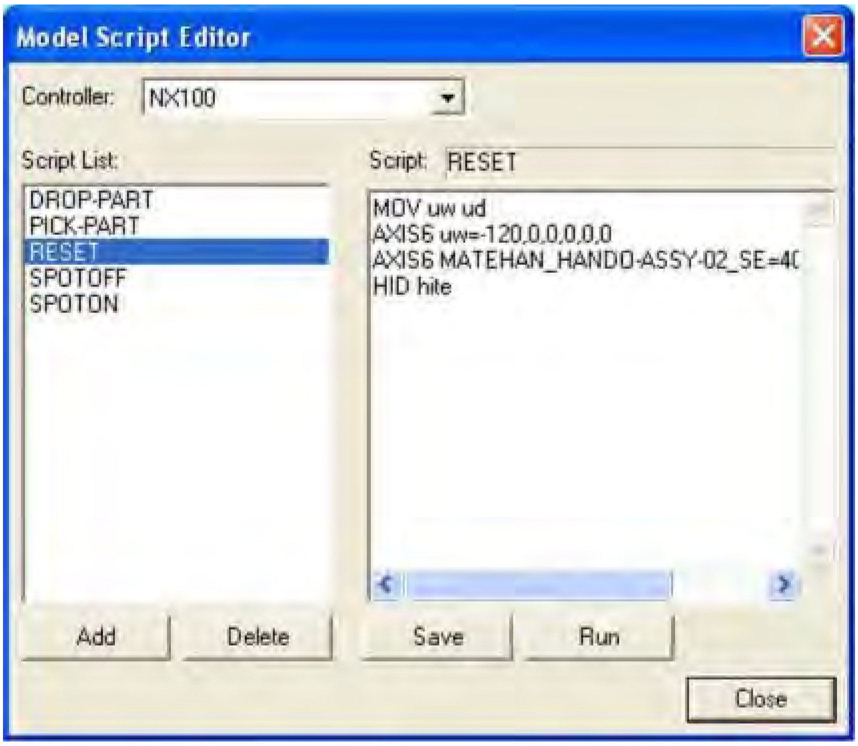
When adding LINE data (wire frame), it is recommended to use LINE data in the HMF format: adding LINE data in other format may take some time.
If the LINE data is in a format other than HMF, convert the LINE data with “MDL2HMF.EXE” before adding the model. (The MDL2HMF.EXE is located in a folder where MotoSim EG-VRC was installed).

9.12 Model Script

Model script allows manipulate models by the execution of a series of model commands. The model script editor allows to write and manage the model script of the specified controller. The model script can be executed from the Model Script Editor or from an I/O Event during playback. (For details on I/O Events refer to section Section "8.3 I/O Events").

9.12.1 Model Script Editor

To display the Model Script Editor select {Model} - {Model Script Editor} from the main menu.



Model Script Editor Dialog Box

Item	Description
Controller	Select the controller for which the scripts are to be edited.
Script List	Displays the list of scripts for the selected controller. Select a script to display/edit its content in the right section of the dialog.
Script	Displays the name of the selected script. The script content in displayed in edit box below where the model commands can be added or modified.

Model Script Editor Dialog Box

Item	Description
[Add] button	Adds a new script to the list. A dialog will display to enter the script name. Enter a name and press OK. The new script will be added to the list.
[Delete] button	Deletes the script currently selected in the script list.
[Save]button	Save the script content to file. Note: Scripts are saved to the “ModelScript.txt” file under each controller folder.
[Run]button	Execute the script selected.
[Close]button	Closes the Model Script Editor dialog.

9.12.2 Model Commands

Model commands can be used in model script to manipulate models in the cell. Note that model names are case sensitive. Make sure that the names are typed exactly like the name of the model appearing in the Cad Tree.

◆ Model Display

Notation	SEE M1
Meaning	Displays the model M1.

◆ Model Non-display

Notation	HID M1
Meaning	Hides the model M1.

◆ Model Move 1 (Set Model Parent)

Notation	MOV M1 M2
Meaning	Moves the model M1 in the Cad Tree to change its parent to M2. Without changing the model location on the display, the model relative position from its new parent (M2) is changed automatically.

◆ Model Move 2

Notation	AXIS6 M1=10,20,30,0,0,0
Meaning	Moves the model M1. The position from the parent is changed to (10,20,30,0,0,0).

◆ Model Move 3

Notation	ADDX6 M1=10,20,30,0,0,0
Meaning	Moves the model M1. The position from the parent is changed by adding (10,20,30,0,0,0) to the current position.

◆ Model Copy 1

Notation	DUP M1 M2
Meaning	Copies (duplicates) the model M1 to create M2.
Note	If MotoSim EG-VRC is saved without deleting the copied model, the description (information on arrangement, etc.) is written in to the cell. The copied model will reference the same model data file (.mdl) as the original model.

◆ Model Copy 2

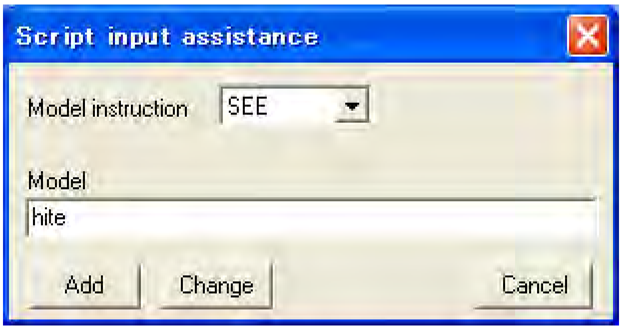
Notation	REF M1 M2
Meaning	Copies (references) the model M1 to create M2.
Note	Even if MotoSim EG is saved without deleting the copied model, the description (information on arrangement, etc.) is not written in to the cell.

◆ Model Deletion

Notation	DEL M1
Meaning	Deletes the model M1.

9.12.3 Display of script input assistance

As for the script, the edit that uses the manual edit and the “Script input assistance” dialog box can be done.
The “Script input assistance” dialog box opens when the line edited in the “Model Script Editor” dialog box is double-clicked.



Model Script Editor Dialog Box

Item	Description
Model instruction	The model instruction is selected. (The input item changes by the selected model instruction.)Please refer to the explanation of the following each model instructions for details.
[Add] button	The edited model instruction is added to a selected line. (Former model instruction moves below by one line.)
[Change] button	A selected line is changed by the edited model instruction.
[Cancel]button	The script input assistance is closed without changing the edited content.

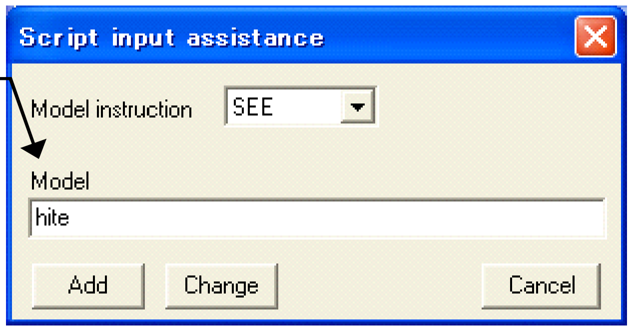
It explains the input item of each model instruction.

◆The model's display (SEE), the model's non-display (HID), and the model's deletion (DEL)

The [model] is input.

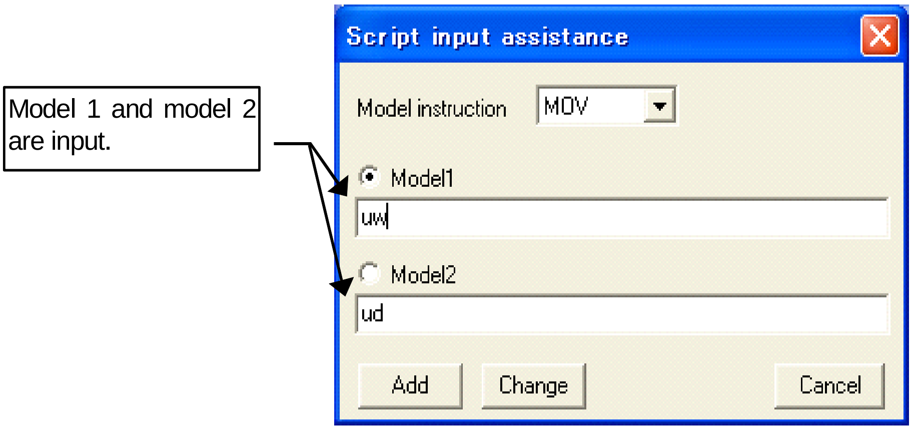
The [model] is input by either the selection with the direct input or Cad Tree or .

The model name is input.



◆ The model's movement 1(MOV), the model's copy 1(DUP), and the model's copy 2(REF) [Model1] and [Model2] are input.

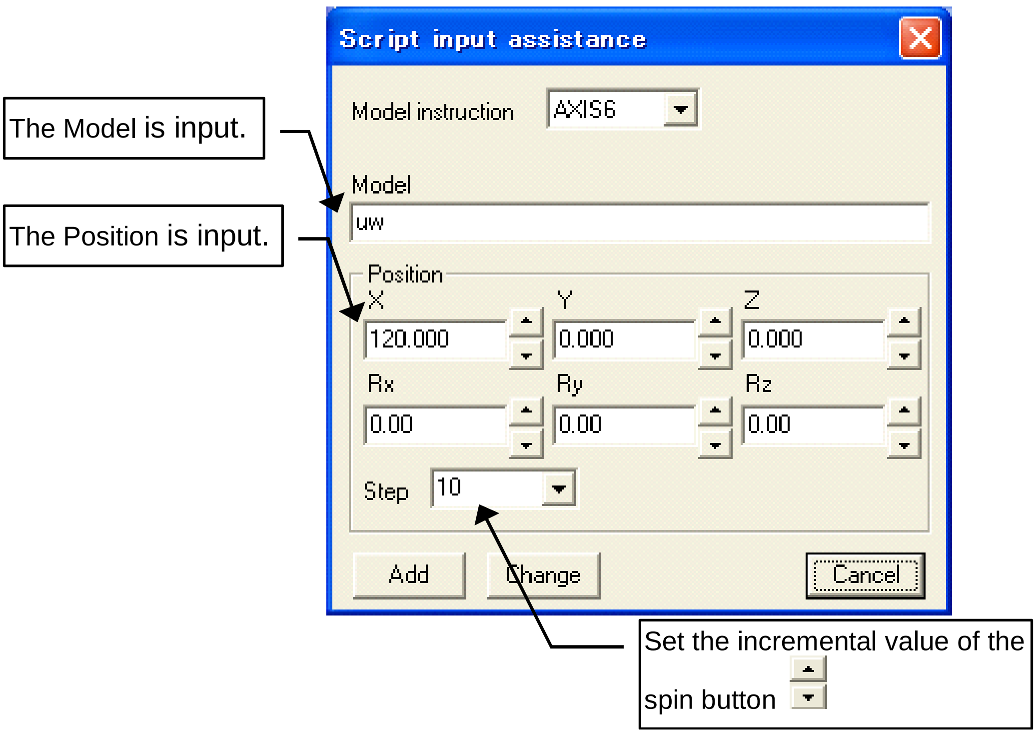
The [Model] is input by either the selection with the direct input or Cad Tree or .



◆ The model's movement 2(AXIS6) and the model's movement 3(ADDX)
The [Model] and the [Position] are input.

The [Model] is input by either the selection with the direct input or Cad Tree or .

The position is input either with the direct input or of each item. The incremental value of is set by [Step].



9.13 CAD Data Import <CadPack Option>

NOTE To use this function (CadPack option), the MotoSim EG-VRC-CadPack is required. (The MotoSim EG-VRC-CadPack is separate product from MotoSim EG-VRC.)

Loads the following CAD data format to the cell directly.

- IGES
- STEP
- Inventor
- ProE
- Solidworks
- CATIA V5
- SAT

And, when loading the data to cell, the following format is specified.

- HSF
- SAT

This function is accessible by:

a)The Add Model dialog of the [Cad Tree]

(For details, please refer to section " Creating a Model from an Existing Model ".)

b)Dragging and dropping the file over the cell display area.

(For details, please refer to section Section "9.11 Reading a Model".)

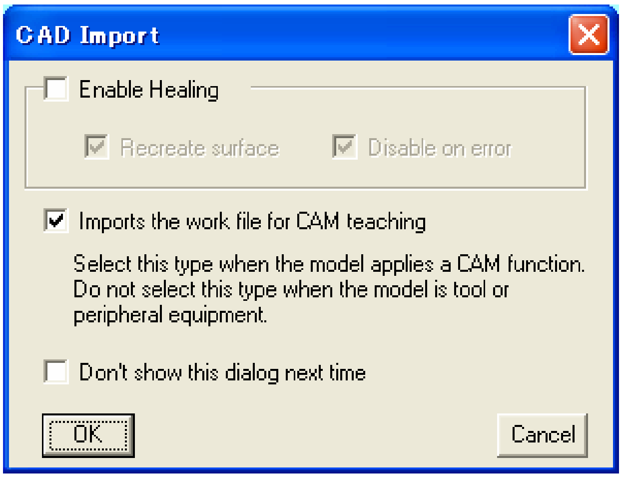
NOTE When adding a model with method a) Add Model dialog, it is necessary to select "All (*.*)" in the "File Type" section, in order to display all the file types and be able to select the IGES or SAT files.

■ CAD Data Import

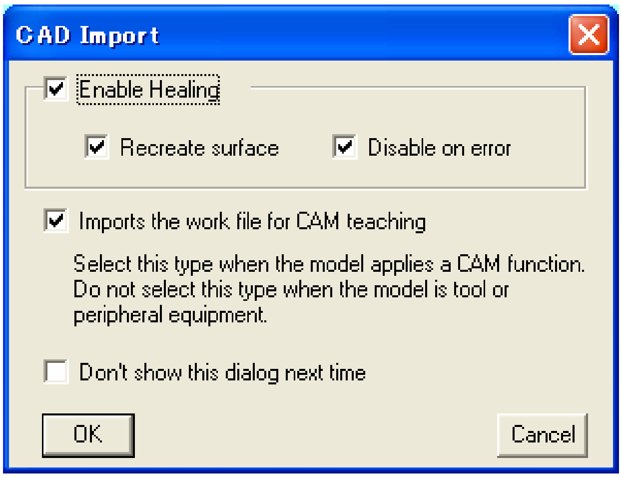
Before importing CAD data, the "CAD Import" dialog will display. The healing settings in the dialog can be changed if required. (This dialog doesn't display when importing SAT file.)

To change the default settings related to the CAD Import, please refer to section Section "10.6 CAD Import/Export <CadPack Option>".

The figure below shows, the "CAD Import" dialog when the IGES data healing is disabled.
This is the default setting.



The "CAD Import" dialog with the IGES data healing enabled.



CAD Import

"Enable Healing" section	When enabled, a healing algorithm is applied to the imported CAD data. [Recreate surface] check box The [Recreate surface] option is normally selected. The [Recreate surface] is part of the normal healing process. If it is unselected, this step will be skipped in the healing process. If the surface regeneration doesn't give the intended results, unselect the "Recreate Surface" may improve the healing results. [Disable on error] check box The [Disable on error] option is normally selected. When the [Disable on error] is selected, the healing will be disabled if an error occurs during the healing process.
Imports the work file for CAM teaching	Select this type when the model applies a CAM function. Do not select this type when the model is tool or peripheral equipment. General CAD data are displayed  in the CadTree dialog, and the model for CAM teaching are displayed .

CAD Import

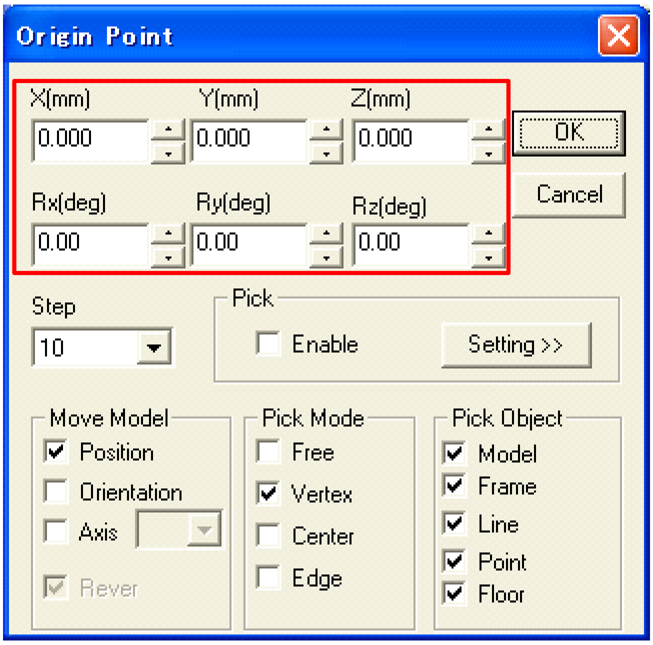
[Don't show this dialog next time] check box	If checked, the "IGES Import" dialog will no longer be displayed when an IGES file is imported. The "IGES Import" dialog display can be re-enable in the "Option Setting" dialog under the "CAD Import/Export" tab. Please refer to section Section "10.6 CAD Import/Export <CadPack Option>".
[OK]button	The IGES file import will proceed with the options set in the dialog.
[Cancel]button	Cancel the IGES file import

NOTE

The healing process attempts to repair any corrupted data of the imported CAD files. However, the processing time to import a file may increase significantly when healing is used. The performance may also vary depending on the extent and nature of the errors in the original CAD file. In some cases, result with healing may be worst than reading the file without healing.

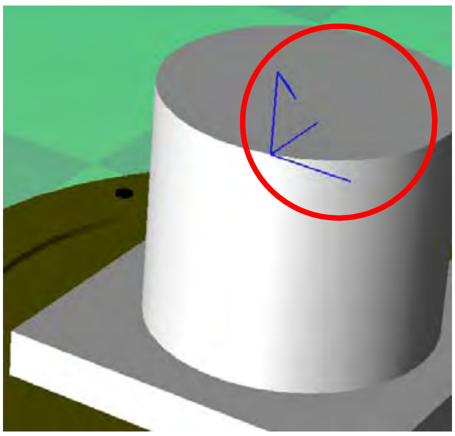
9.14 Changing the Coordinate Origin of CAD Data <CADPack Option>

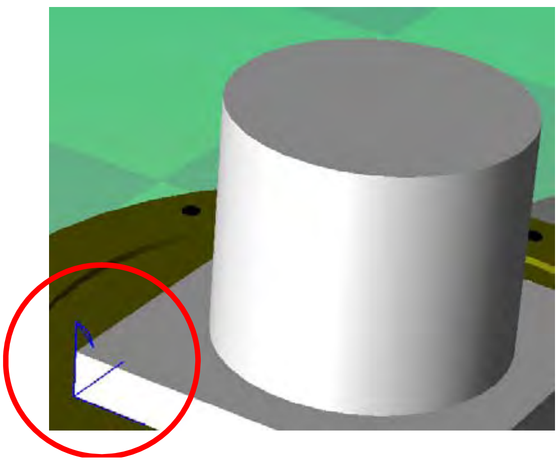
Change the coordinate origin of external CAD data.
After [Cad Tree] is displayed, right-click on the work to change the coordinate origin and select the [set Originpos] menu. Then the [Origin Point] dialog is displayed, change the value of position.



NOTE This function is available with the following format of external CAD Data.
CATIA, SOLIDWORKS, Pro/E, INVENTOR, IGES, STEP, SAT

It is possible to change the coordinate origin of external CAD data as follows.





9.15 CAD Data Export

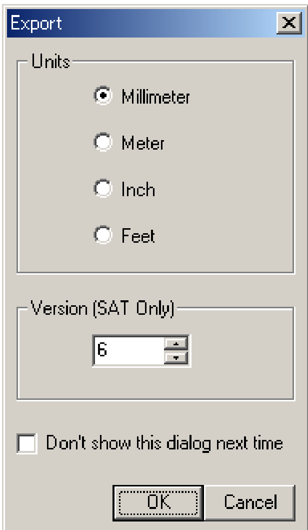
NOTE When IGES or SAT data are exported (CadPack option), the MotoSim EG-VRC-CadPack is required. (The MotoSim EG-VRC-CadPack is separate product from MotoSim EG-VRC.)

Exports in IGES,SAT or HSF format the data of multiple models with their relative position from a selected base point.

■ Export

Before the CAD data of IGES or SAT format is exported, the "Export" dialog is displayed. The export settings in the dialog can be changed if required.
To change the default settings related to the export, please refer to section Section "10.6 CAD Import/Export <CadPack Option>".

NOTE The settings selected in the "Export" dialog will not change the settings in the "Option Setting" dialog under the "CAD Import/Export" tab.



Export

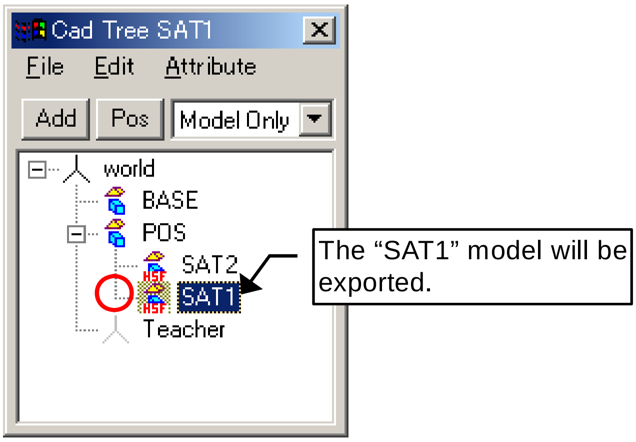
[Units] radio button	Sets the measuring units of the exported SAT or IGES files.
"Version (SAT Only)" section	Sets the SAT file version used in the exported file.Recommended value: 6 (Setting range: 4 to 16)

Export

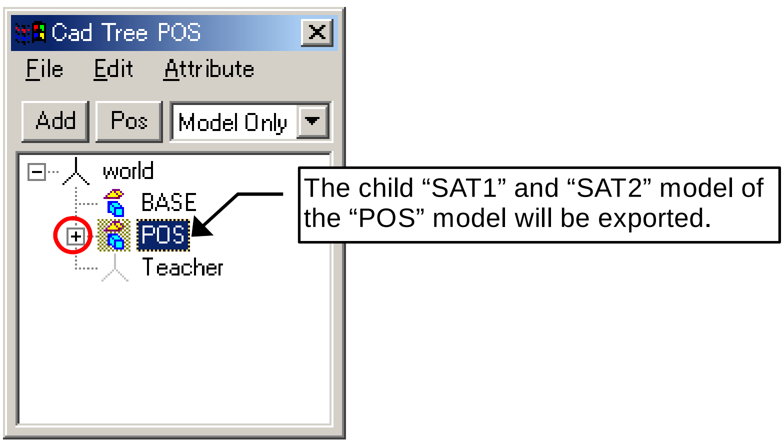
[Don't show this dialog next time] check box	If checked, the "IGES Import" dialog will no longer be displayed when an IGES file is imported. The "IGES Import" dialog display can be re-enable in the "Option Setting" dialog under the "CAD Import/ Export" tab. Please refer to section Section "10.6 CAD Import/ Export <CadPack Option>".
[OK]button	The CAD export will proceed with the options set in the dialog.
[Cancel]button	Cancel the CAD export.

Procedure

1. Select in the Cad Tree the models to export.
   - To select a single model:
     Expand the model node so that there is no "+" icon on the left of the model name and select the model.



   - To select multiple models
     Collapse the node containing the desired models so that there is a "+" icon on the left of the model name. All the child models in the collapsed branch will also be exported.



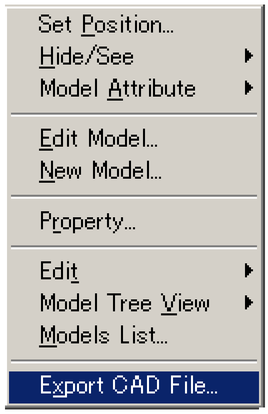
NOTE

Only the model referring to

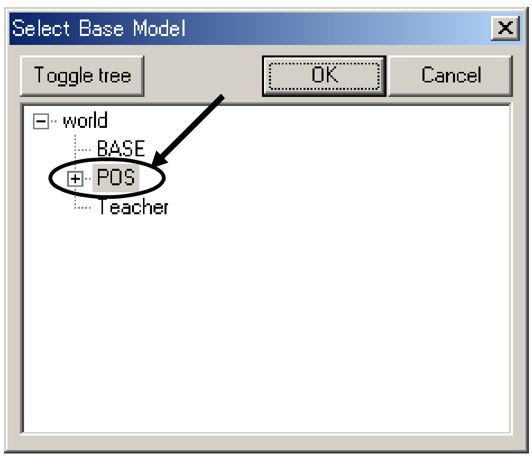
- IGES,SAT or HSF format files;
- .mdl files composed of BOX, BOX2, CYLINDER, CONE2, SPHERE, PIPE2, AXIS6, LINE, LINE2 parts;

can be exported. When selecting multiple models, at least one of the selected models must make reference to such CAD file.

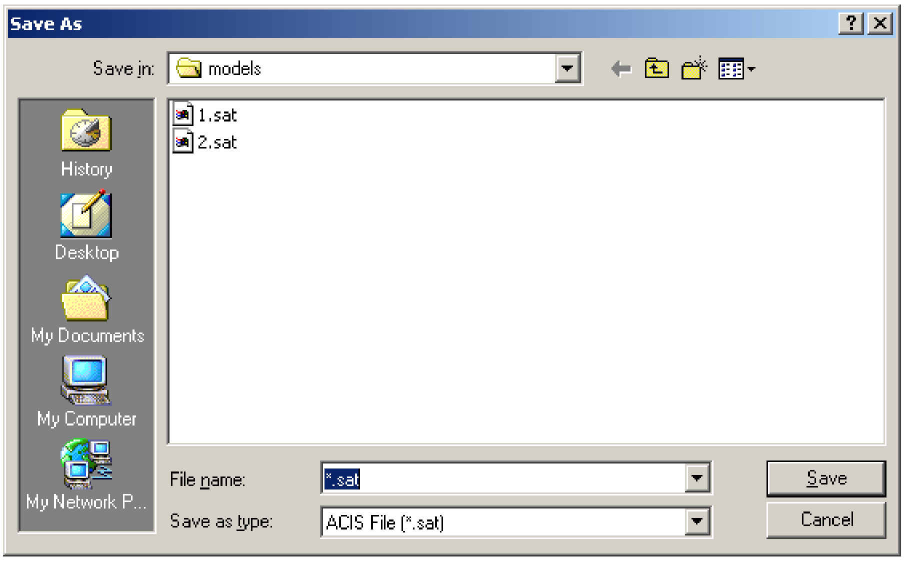
2. Right click on the CadTree to display the popup menu. Then select "Export CAD File..."



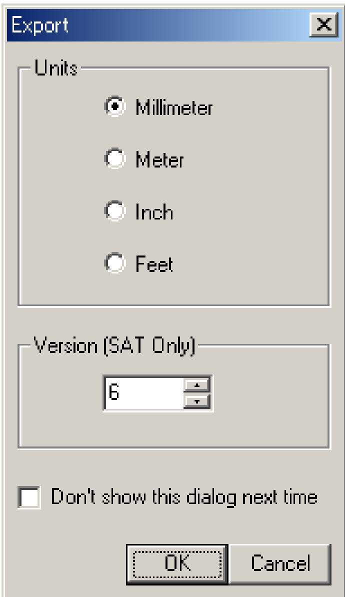
3. In "Select Base Model" dialog, select the model to be used as the base point (origin) of the exported model and press the [OK] button.



4. In the "Save As" dialog, select the file type (IGES,SAT or HSF). Enter a filename and press the [Save] button.



5. If the "Export" dialog is set to display, the "Export" dialog will display to confirm the IGES/SAT export settings. Change the settings as required, and then press [OK]. For more details please refer to the " Export " section above.



6. When the export is completed the following message will display.

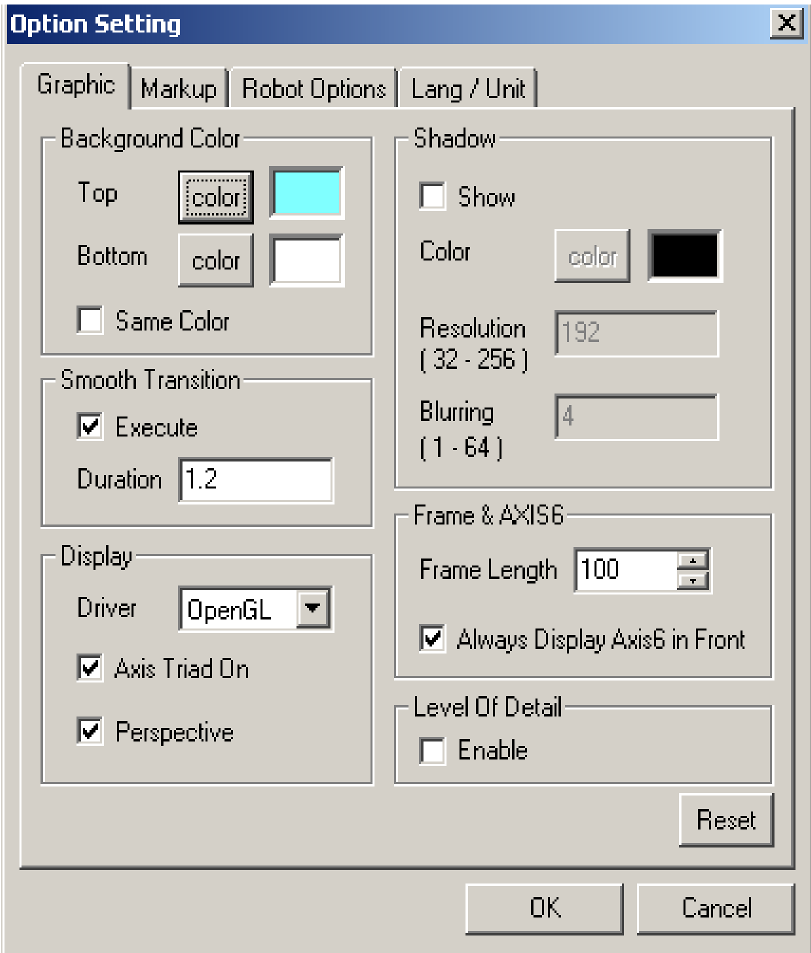
10 Configuration Settings

Various configuration settings can be made in the Option Setting dialog box.

Click the MotoSim EG-VRC button ( ), and select the [Options] menu.

10.1 Graphical Settings

For the graphical settings, select the “Graphic” tab of the Option Setting dialog box.



Graphic tab

Item	Description
[Reset] button	Restores all the values to the default setting.
[OK] button	Applies the modifications, and closes the dialog box.
[Cancel] button	Closes the dialog box without applying the modifications.

10.1.1 Background Color

Specify the background color of the cell window in the “Background Color” section.

Item	Description
"Top" color indication box	Displays the current color of the upper part of the background. Press [color] to display the Color dialog box, and select the desired color.
"Bottom" color indication box	Displays the current color of the bottom part of the background. Press [color] to display the Color dialog box, and select the desired color.
[Same Color] check box	Check this check box to set the “Bottom” background color to the same color as the “Top” background.

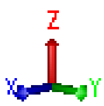
10.1.2 Smooth Transition

Specify if a smooth transition is executed when changing viewpoint in the “Smooth Transition” section.

Item	Description
[Execute] check box	Select to execute the smooth transition function when changing the viewpoint.
"Duration" edit box	Specify the duration of the smooth transition. (Editable when the [Execute] check box is selected.)

10.1.3 Display

Configure the graphic driver in the "Display" section.

Item	Description
"Driver" combo box	Select a graphic driver from the list: "OpenGL" is selected by default. The graphic drivers currently available are "OpenGL" and "WinGDI". NOTE To apply the change of graphic driver, reload the cell.
[Axis Triad On] check box	Displays the coordinate axis below on the lower left of the cell window. 
[Perspective] check box	Check this check box to display the cell in perspective.

10.1.4 Shadow

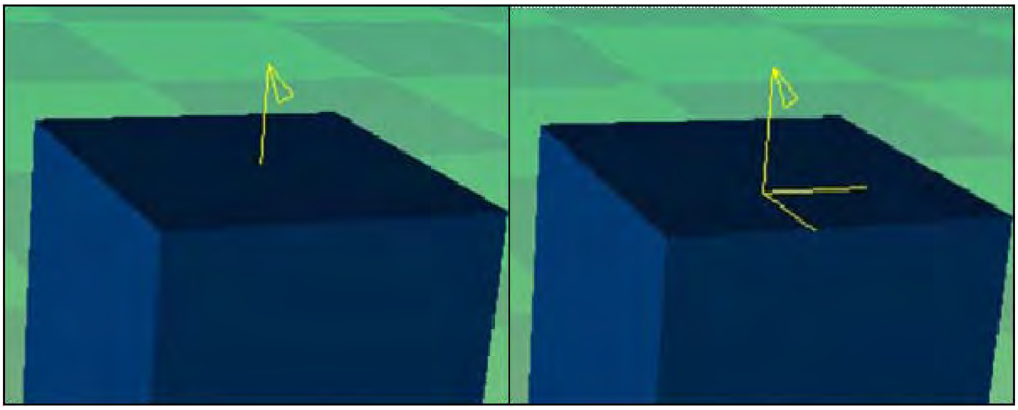
Set the following items for shadow display in the “Shadow” section.

Item	Description
[Show] check box	Select to display shadows on the cell window.
"Color" indication box	Displays the current color of the shadows. Press [color] to display the Color dialog box, and select a desired color. (The [color] button is enabled when the [Show] check box is selected.)
"Resolution" edit box	Enter the resolution value. (Editable when the [Show] check box is selected.)
"Blurring" edit box	Enter the value for the gradation effect. (Editable when the [Show] check box is selected.)

10.1.5 Frame & AXIS6

Specify the Frame and Axis6 display property.

Item	Description
“Frame Length” spin box	Enter the value of the frame and Axis6 length with the spin button.
"Always Display Axis6 in Front" checkbox	When checked, the Axis6 are displayed in front of all the other parts.



Regular Display Axis6 Displayed in Front

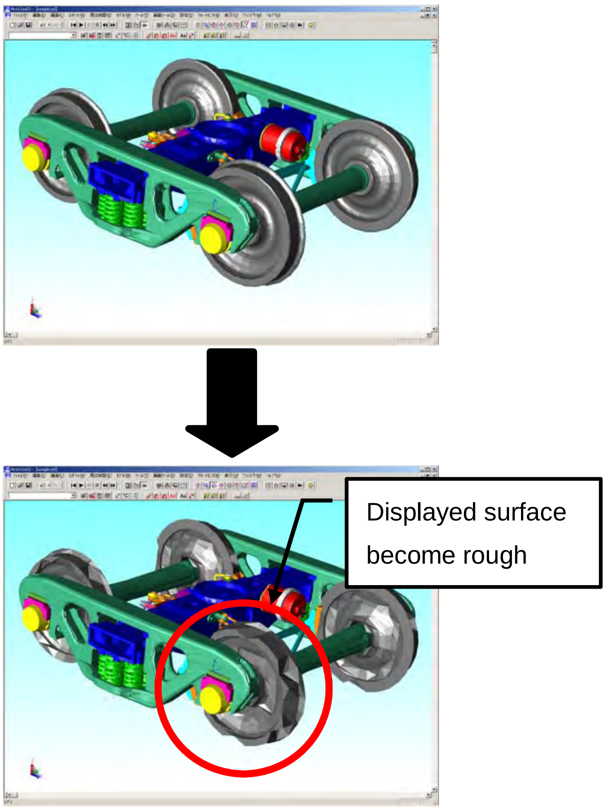
10.1.6 Level of Detail

When changing the scene viewpoint or during playback the level of detail can be decrease in order to obtain a smoother animation. This function is useful to improve display performance of cell containing a large amount of data such as very detailed HSF model.

Item	Description
Enable	When this item is checked, the level of detail will be reduced during viewpoint change and playback. The level of detail data will also be generated for the HSF models when required. NOTE • When the function is enabled, a message offers to generate the level of detail data for the currently opened cell. If the data was previously generated for this cell, it is not necessary to regenerate the data and you may press "Cancel". • The generation of the level of detail data may take some time depending on the size of the model file.

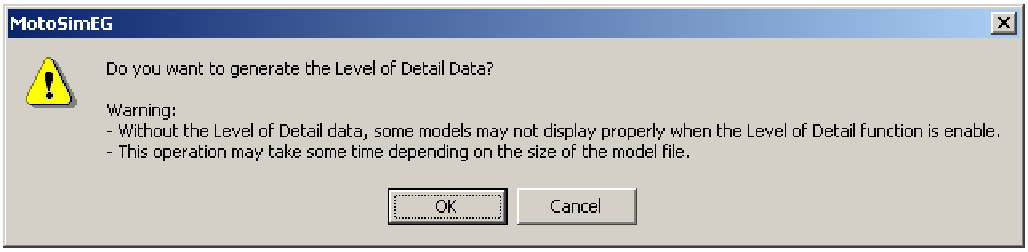
NOTE

- When the displayed surface becomes rougher during viewpoint change or playback, depending on the data some model elements may not display.
- It is easier to distinguish the discrepancies between levels of detail when displaying the cell in "Flat Shading" (refer to Section "6.11 Changing the Rendering Mode").



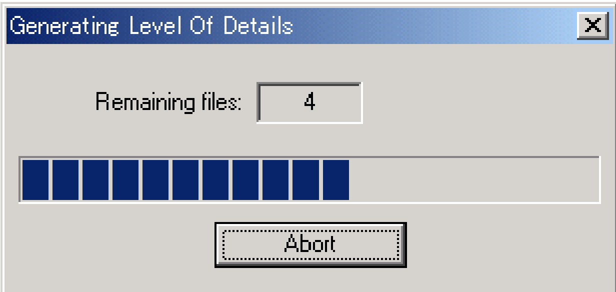
■ Generating the Level of Detail Data

When the Level of Detail function is enabled, the level of detail data need to be generate for the function to work properly. If an opened cell doesn't contain the level of detail data, a message will prompt the user to confirm that the data should be generated at this time.



While generating the level of detail data, the "Generating Level of Detail" dialog will display the generation progress. To stop the data generation, click on the "Abort" button. Note that when aborting the generation, the current file processing will continue until completed, and then the generation will stop and data for the remaining file will not be created

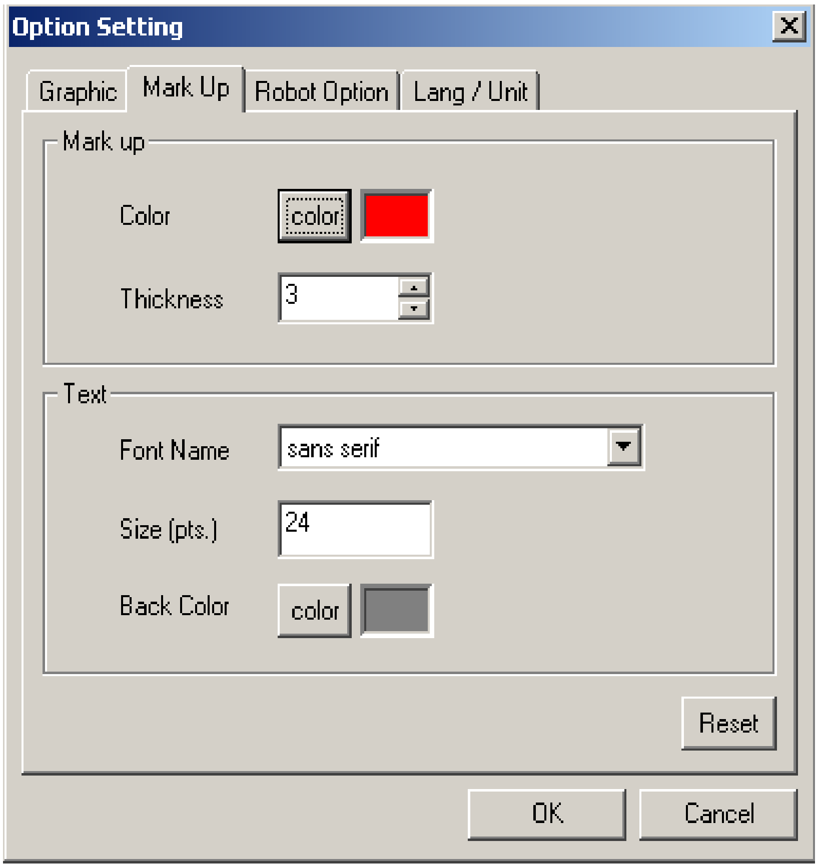
.



When adding HSF model and the Level of Detail is enable, the level of detail data will automatically be generated for the new model. The "Generating Level of Detail" progress dialog will display but the process cannot be aborted.

10.2 Markup Settings

To configure the lines and texts on the cell window, select the "Mark Up" tab of the Option Setting dialog box.



Mark Up tab

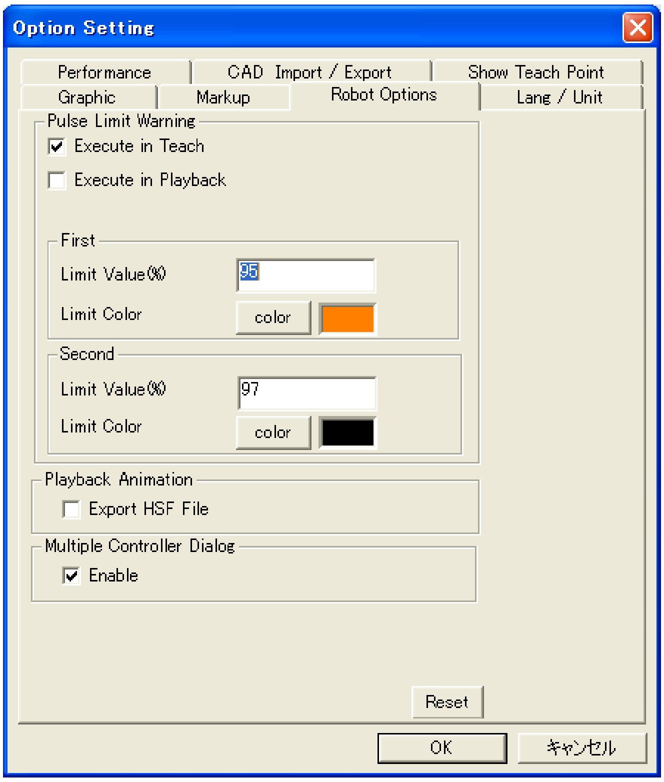
Item	Description
"Mark up" section	"Color" indication box Displays the current color of the markup object (line and text). Press [color] to display the Color dialog box, and select the desired color. "Thickness" spin box Directly enter the value or specify the value with the spin button to specify the thickness of the markup line.

Mark Up tab

Item	Description
"Text" section	"Font Name" combo box Select a desired font for the text. NOTE When using two-byte characters for the text, make sure to select a font which can be displayed properly. "Size (pts.)" edit box Specify the size of the font. "Back Color" indication box The color indication box displays the current markup text background color. Press [color] to display the Color dialog box. And select the desired background color.
[Reset] button	Restores all the values to the default setting.
[OK] button	Applies the modifications, and closes the dialog box.
[Cancel] button	Closes the dialog box without applying the modifications.

10.3 Robot Option Settings

When a robot axis reaches its limit position, the color of the axis changes.



Robot Option tab

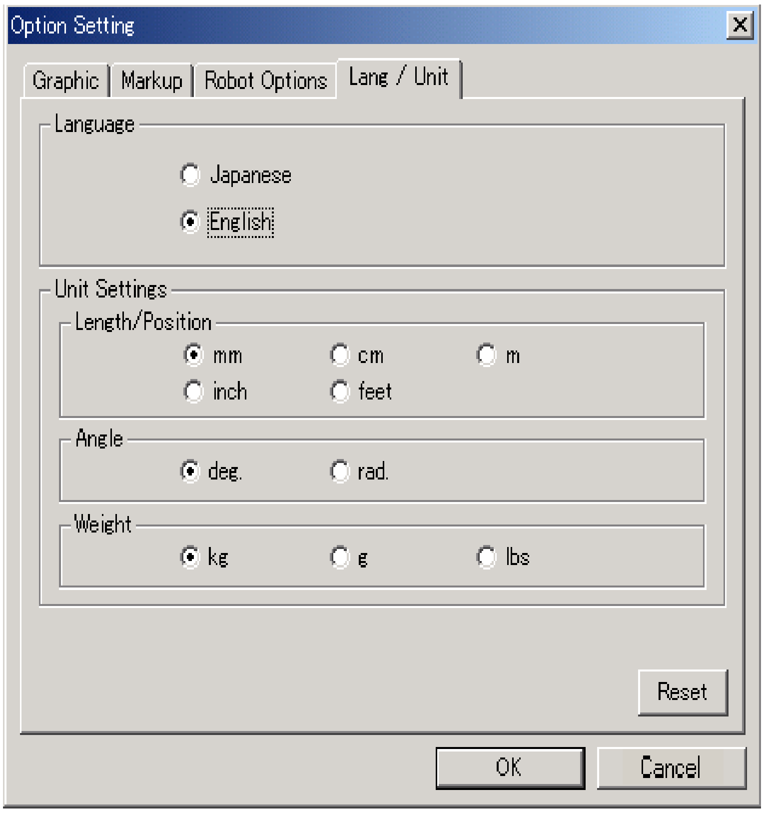
Item	Description
"Pulse limit warning" section	[Execute in Teach] check box Select to display the axis reaching its limit in a reverse color or a limit color in a teaching operation. [Execute in Play] check box Select to display the axis reaching its limit in a reverse color or a limit color in a playback operation. First "Limit Value (%)" edit box Directly enter the value to specify the limit value for the first limit axis check. "Limit Color" indicaiton box Displays the current first limit color. Press [color] to display the Color dialog box, and select the desired color. Second "Limit Value (%)" edit box Directly enter the value to specify the limit value for the second limit axis check. "Limit Color" indicaiton box Displays the current second limit color. Press [color] to display the Color dialog box, and select the desired color.

Robot Option tab

Item	Description
"Playback Animation" section	When this item is checked, the job playback animation is stored in memory. After the playback, the animation can then be exported in HSF file format. NOTE • When the job is executed, click the ▶ button. (If the click the [PLAY] button on the virtual pendant, the playback animation is not included.) • The playback animation file does not support any model color change the may occur during playback (such as collision detection, limit warning...). • For the file export operation, please refer to the Section "4.6.1 Playback animation file export".
"Multiple Controller Dialog" section	When enabled MotoSim EG-VRC will display a separate copy of controller related dialog or panel for each controller in the cell. When a dialog is initially displayed, it is set to the currently selected controller. Once displayed the dialog will always display the information for the same controller, even if the current controller is changed. To display multiple copy of a same dialog, display a first copy of the dialog, then change the current controller and display the dialog again.
[Reset] button	Restores all the values to the default setting.
[OK] button	Applies the modifications, and closes the dialog box.
[Cancel] button	Closes the dialog box without applying the modifications.

10.4 Language and Unit Settings

To configure the language and unit, select the "Lang / Unit" tab of the Option Setting dialog box.

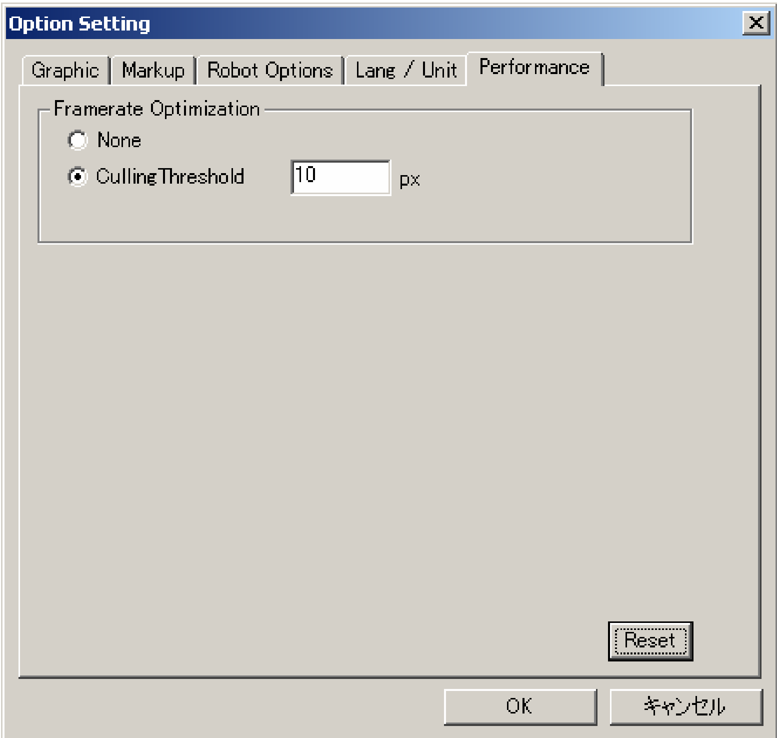


Lang / Unit tab

Item	Description
"Language" section	Select the [Japanese] or [English] radio button to configure the language. To set from the main menu, select {View} - {English} or {Japanese}.
"Unit Settings" section	Select the units for each type of values. "Length/Position" edit box Indicates the unit of the length. "Angle" edit box Indicates the unit of the angle. "Weight" edit box Indicates the unit of the weight.
[Reset] button	Restores all the values to the default setting.
[OK] button	Applies the modifications, and closes the dialog box.
[Cancel] button	Closes the dialog box without applying the modifications.

10.5 Performance Settings

To configure the performance, the "Performance" tab of the Option Setting dialog box.



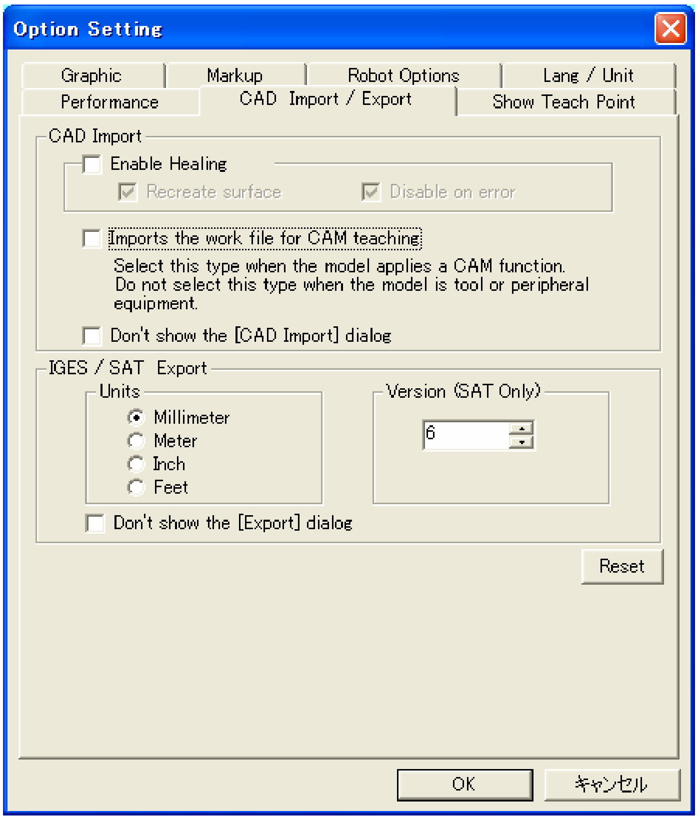
Performance tab

Item	Description
"Framerate Optimization" section	"None" radio button All model data are displayed. "Culling Threshold" radio button Model data which displayed size is smaller than the selected pixel on the display are not displayed. NOTE If the threshold is large, performance is improved. But, if the threshold is overlarge, the necessary model data are not displayed. Set up the threshold in accordance with the model data.
[Reset] button	Restores all the values to the default setting.
[OK] button	Applies the modifications, and closes the dialog box.
[Cancel] button	Closes the dialog box without applying the modifications.

10.6 CAD Import/Export <CadPack Option>

NOTE

To use this function (CadPack option), the MotoSim EG-CadPack is required. (The MotoSim EG-CadPack is separate product from MotoSim EG.)



10.6.1 CAD Import

Option settings related to reading CAD format files.

“Enable Healing” section	When enabled, a healing algorithm is applied to the importedCAD data.
[Recreate surface] check box	The [Recreate surface] option is normally selected. The [Recreate surface] is part of the normal healing process. If it is unselected, this step will be skipped in the healing process. If the surface regeneration doesn't give the intended results, unselect the "Recreate Surface" may improve the healing results.
[Disable on error] check box	The [Disable on error] option is normally selected. When the [Disable on error] is selected, the healing will be disabled if an error occurs during the healing process.

Imports the work file for CAM teaching	Select this type when the model applies a CAM function. Do not select this type when the model is tool or peripheral equipment. General CAD data are displayed in the CadTree dialog, and the model for CAM teaching are displayed .
[Don't show the [CAD Import] dialog] check box	When this option is selected, the "CAD Import" dialog will not display when an IGES file is read. NOTE For details on the CAD data import, please refer to Section "9.13 CAD Data Import <CadPack Option>".

NOTE The healing process attempts to repair any corrupted data of the imported CAD files. However, the processing time to import a file may increase significantly when healing is used. The performance may also vary depending on the extent and nature of the errors in the original CAD file. In some cases, result with healing may be worst than reading the file without healing.

10.6.2 IGES/SAT Export

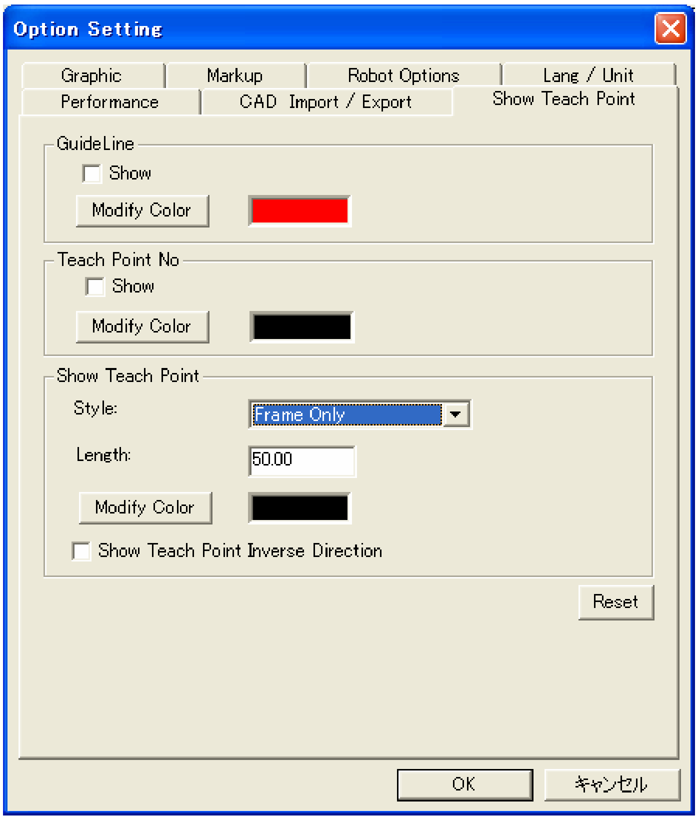
Units	Sets the measuring units of the exported SAT or IGES files.
Version (SAT Only)	Sets the SAT file version used in the exported file. Recommended value: 6 (Setting range: 4 to 16)
[Don't show the [Export] dialog] check box	When this option is selected, the "Export" dialog will not display when the "Export CAD file" function is used. NOTE For details on the IGES, SAT data export, please refer to Section "9.15 CAD Data Export".

10.7 Show Teach Point <CadPack Option>

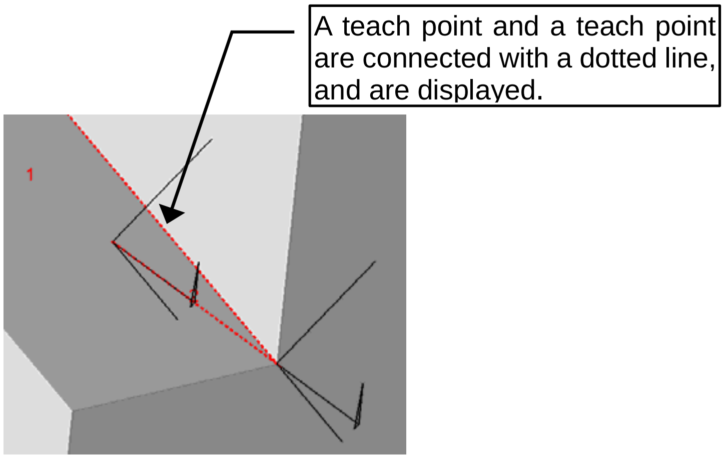
NOTE

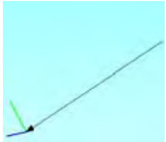
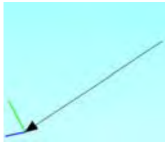
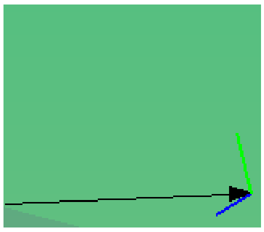
To use this function (CadPack option), the MotoSim EG-VRC-CadPack is required. (The MotoSim EG-VRC-CadPack is separate product from MotoSim EG-VRC.)

To configure the Teach Point, the "Show Teach Point" tab of the Option Setting dialog box.



GuideLine	
[Show] check box	Select displaying the guide lines or not.

[Modify Color] button	Select the color of the guide line. 
Teach Point No	
[Show] check box	Select displaying the teach point no. or not.
[Modify Color] button	Select the color of the teach point no.
Show Teach Point	
Style	Frame only  Arrow Only (S)  Arrow Only (M)  Arrow Only (L)  Frame and Arrow (S) 

Style	Frame and Arrow (M)  Frame and Arrow (L)  None
Length	Change the frame length (Z-Axis) of teach point.
[Modify Color] button	Select the color of the frame length (Z-Axis)
[Show Teach Point Inverse Direction] check box	Select reversing the frame length (Z-Axis)or not. 
[Reset] button	Initialize the settings.
[OK] button	The settings are saved and the dialog is closed.
[Cancel] button	The settings are canceled and the dialog is closed.

11 Applied Operation

11.1 Teaching Using OLP Function

■ What is OLP Function?

Normally, teaching operation uses the programming pendant to move the robot model to the target position. The OLP (Off-Line Programming) function is a quick and efficient way to move the robot to a target position. When the desired destination is located on a model, by using the OLP panel, the end of the tool (TCP) can conveniently be moved to the target position by simply clicking on the screen (for example, any point of a workpiece, etc.).

SUPPLE-MENT

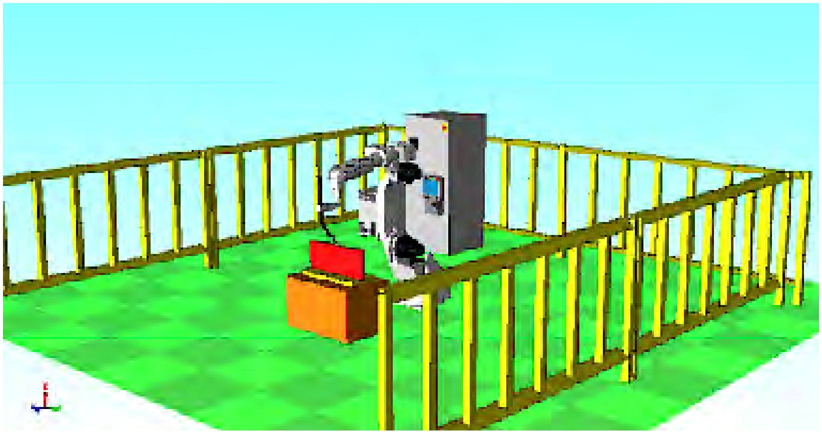
- When moving the robot tool end with the OLP function, the message "Cannot reach this point" may appear even if the robot is not too far from the target point. This may happen when the tool end cannot be moved to the target point due to the shape or current posture of the robot.
- A point other than the target point may be selected depending on the point clicked and the view position. When this occurs, use the programming pendant to move the robot or change the camera scope of the screen to click on the proper model.

11.1.1 Teaching Operation Setup

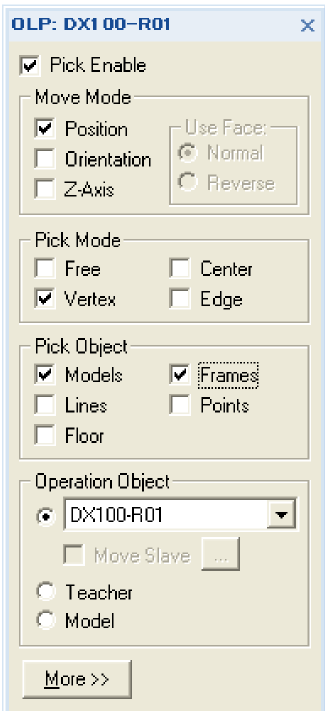
The teaching operation is explained by using “Arc_Sample.vcl” as an example.

Procedure

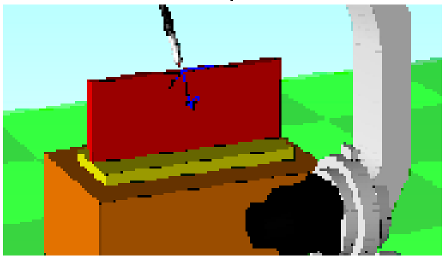
1. Open “Arc_Sample.vcl”.
   (If it is difficult to perform the teaching operation, hide the displayed models such as fence, controller, etc. by selecting the obstructing model and then setting its display property to “Hide All” in the combo box on the Cad Tree dialog box.)



2. On the [Home] tab, in the [Teaching] group, click the [OLP] button, the [OLP] dialog appears.



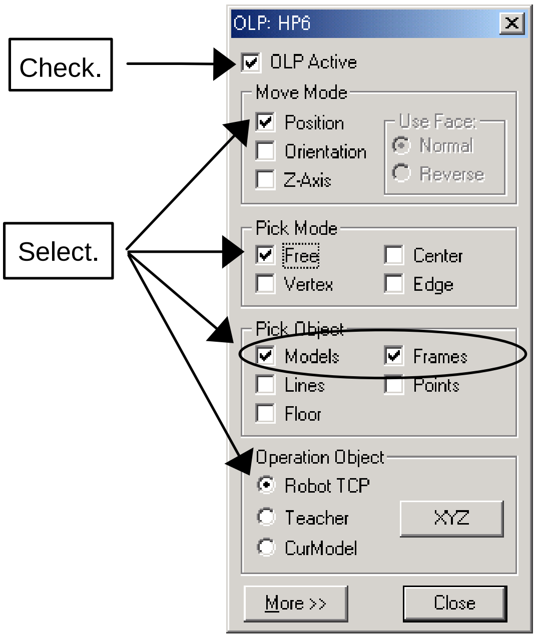
3. Display the cell window so that the workpiece is visible as shown in the figure below.



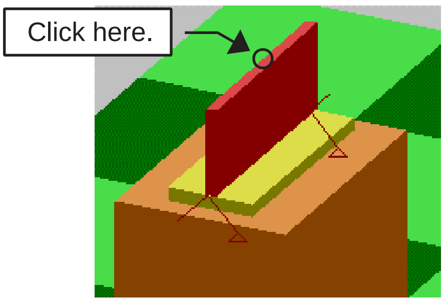
11.1.2 Position Designation in Free Mode

In "Free" mode, the tool end (TCP) moves to the point of the model corresponding to the clicked position.

1. Set each item in the OLP dialog box as shown in the following figure.

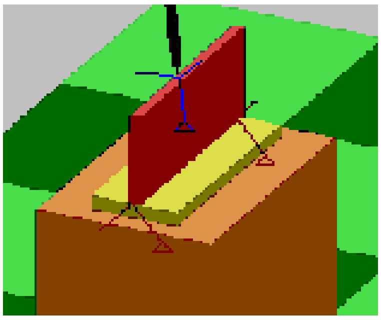


2. Click on the following position of the workpiece model displayed in the cell window.



3. The tool end moves to the clicked position.

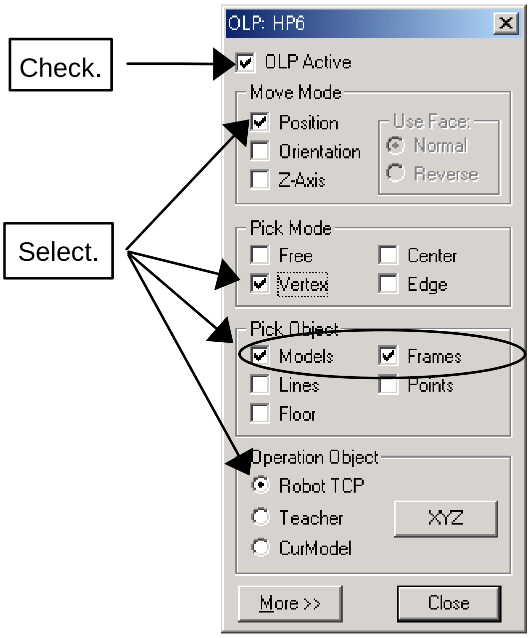
Click on another point, and the tool end moves to the clicked position.



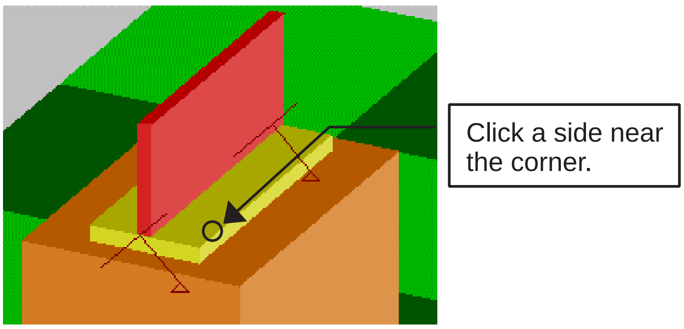
11.1.3 Position Designation in Vertex Mode

In "Vertex" mode, the tool end (TCP) moves to the model vertex nearest to the clicked position.

1. Set each item in the OLP dialog box as shown in the following figure.

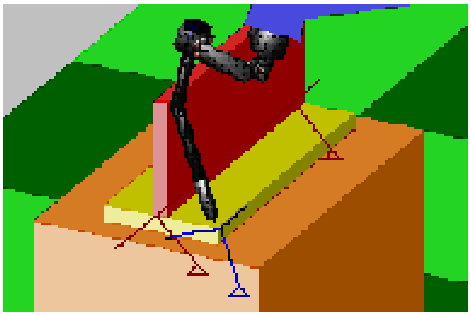


2. Click on the following position of the workpiece model displayed in the cell window.



3. The tool end moves to the nearest vertex.
   Click on a point near another vertex to check if the tool end moves to the nearest ver-

tex.

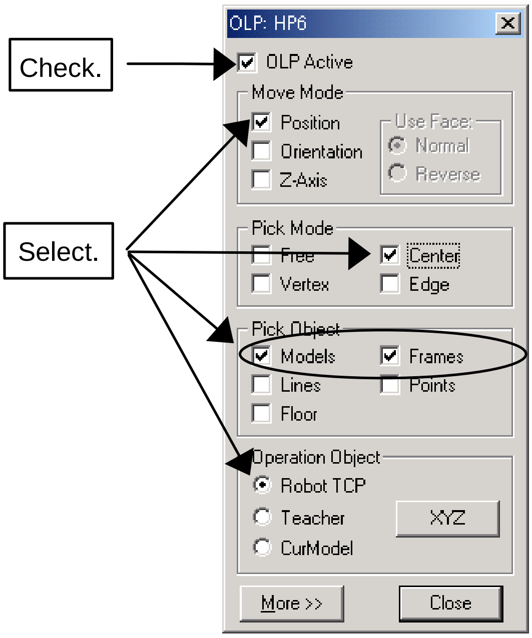


11.1.4 Position Designation in Center Mode

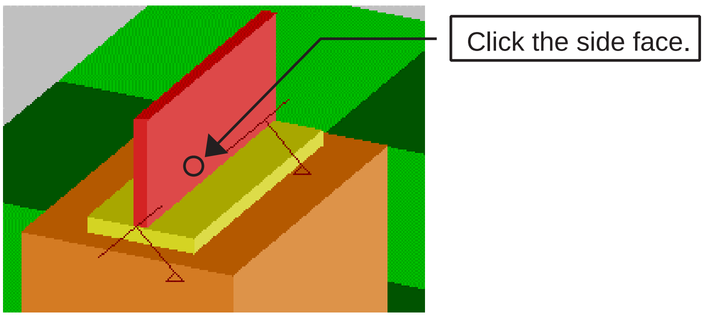
In "Center" mode, the tool end (TCP) moves to the face or edge center nearest to the clicked position.

.

1. Set each item in the OLP dialog box as shown in the following figure.

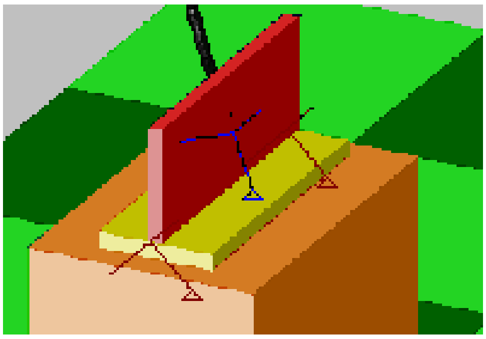


2. Click on the following position of the workpiece model displayed in the cell window.



3. The tool end moves to the center point of the designated model face or edge.
   If the tool overlaps on the model, the tool direction is improper. Use the programming pendant to correct the position afterward.
   Click on another face to check if the tool end moves to the center of the designated

model face.

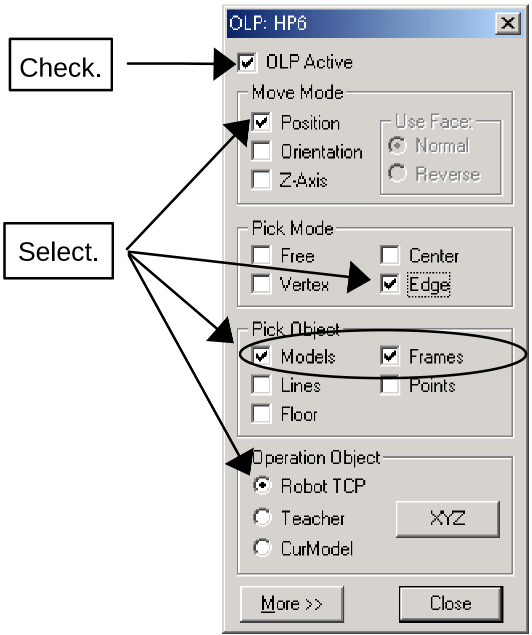


11.1.5 Position Designation in Edge Mode

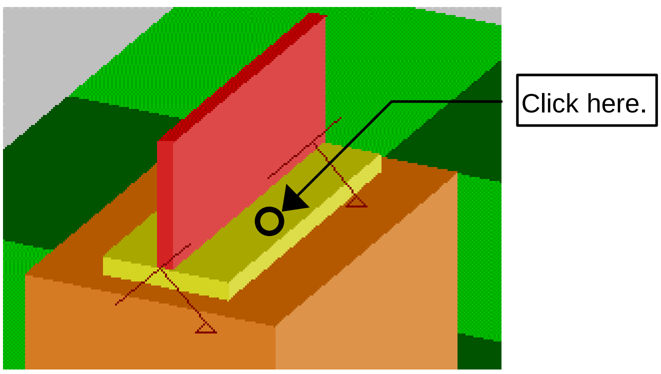
IIn "Edge" mode, the tool end (TCP) moves to the edge point nearest to the clicked position.

.

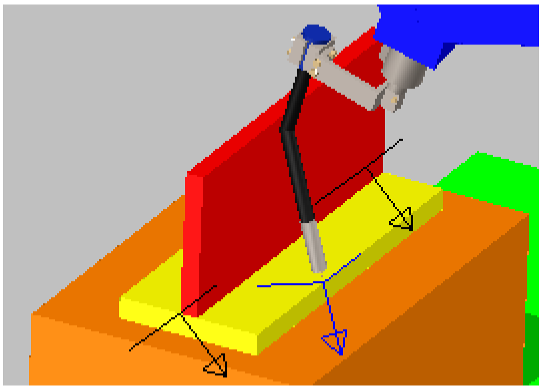
1. Set each item in the OLP dialog box as shown in the following figure.



2. Cick on the following position of the workpiece model displayed in the cell window.



3. The tool end moves to the edge point nearest to the clicked position. Click on another face point to check if the tool end moves to the closest edge.



11.1.6 Designation with Orientation Mode

Orientation Move Mode can be used by itself or in combination with the Position Mode. Checking the [Orientation] checkbox rotates the tool end frame to align it with the target point frame. If the [Position] mode is also check, the tool end will also move overlap the target frame. Therefore, if you only want to change the orientation of the tool without moving it, make sure to uncheck the [Position] checkbox.

The target point frame appears when the left mouse button is pressed down on a model and is represented by 3 colored arrows. The red arrow is the Z-axis and corresponds to the normal (or reversed normal) of the face where lies target point; the blue arrow is the X-axis and is defined by the face edge closest to the point; and the green arrow is the Y-axis and is orthogonal to the two other axis.

NOTE

- That some geometries, such as lines or points, do not have sufficient information to generate a frame information. In such cases, the tool end will maintain its original orientation.
- The direction of the Z-axis can be changed by selecting [Normal] or [Reverse] mode in the "Use Face:" section.

Procedure

1. Hide the T-shape workpiece and the stand to make it easier to create a new workpiece. On the [Home] tab, in the [Model] group, click the [CadTree] button, the [CadTree] dialog appears. To hide the lower hierarchy of the “DAI” tree. Confirm that the cursor is on the “DAI” model, then select “Hide All” in the Cad Tree dialog combobox to hide the model.

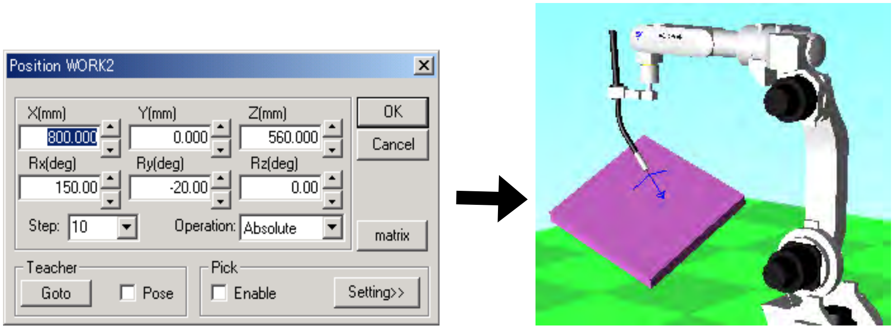
2. Select “world” in the Cad Tree and click on the [Add] button to add the BOX of the following specifications.
   Model: WORK2

Width (W)	500	Depth (D)	500	Height (H)	50

X (mm)	0	Y (mm)	0	Z (mm)	0
Rx (degree)	0	Ry (degree)	0	Rz (degree)	0

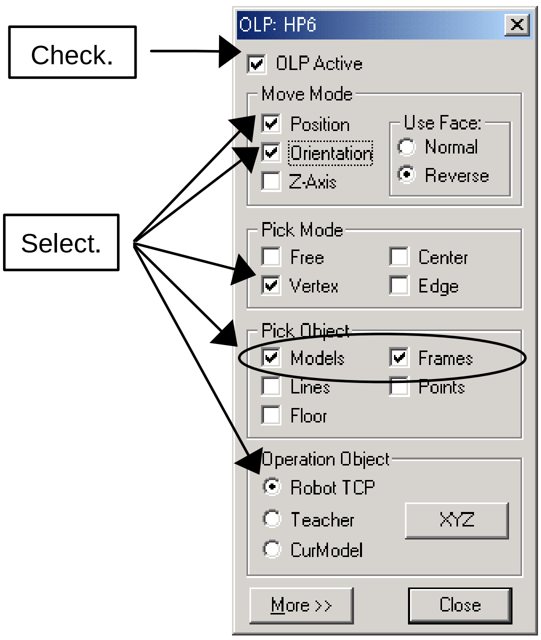
3. Click on the [Pos] button in the Cad Tree to set the position as shown in the table below.

X (mm)	800	Y (mm)	0	Z (mm)	560
Rx (degree)	150	Ry (degree)	-20	Rz (degree)	0

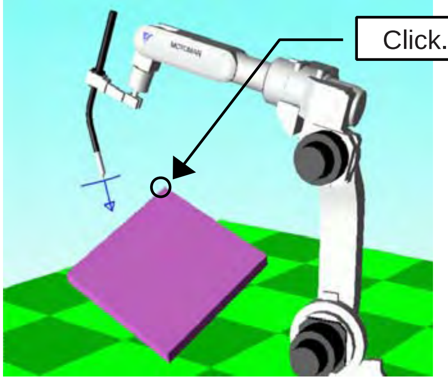


4. To see and understand the coordinate axis of “WORK2”, select “WORK2” in the Cad Tree, then select “SeeAll” to display the Frame of the coordinate axis on the “WORK2”.

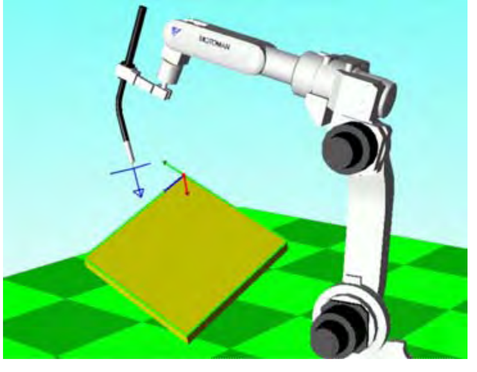
5. Set each item in the OLP dialog box as shown in the following figure.

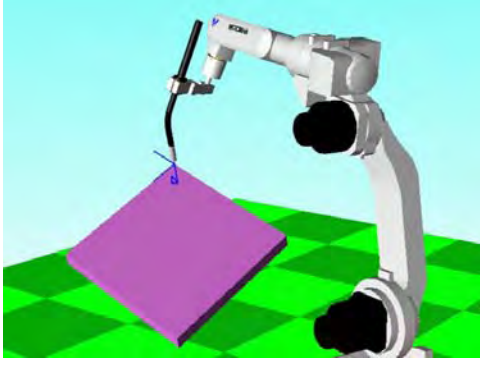


6. Click on the position of the “WORK2” as shown below.

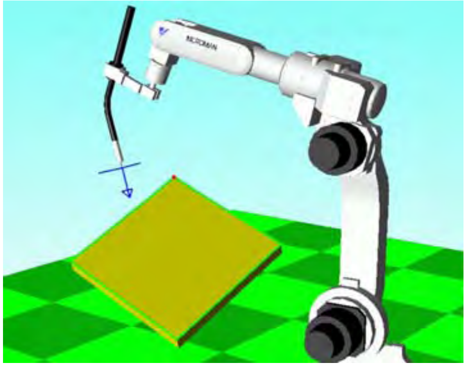


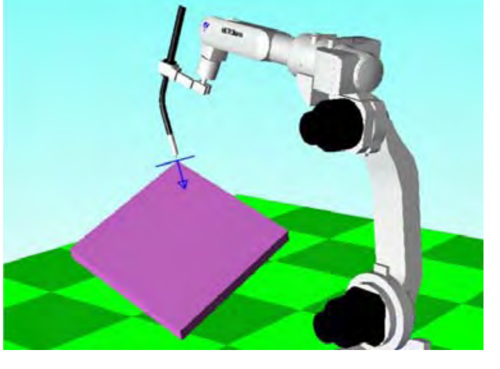
7. The tool end moves to the model vertex and the tool coordinate axis is aligned in the same direction as the target point frame that was displayed when the point was clicked.





If the [Orientation] checkbox is not checked, the direction of the tool coordinate axis will not be changed as shown below.





■ Designation with Z-Axis Mode

Z-Axis Move Mode can be used by itself or in combination with the Position Mode. Checking the [Z-Axis] checkbox rotates the tool end frame to align its Z-axis with the target point Z-axis. If the [Position] mode is also check, the tool end will also move overlap the target frame. Therefore, if you only want to change the orientation of the tool without moving it, make sure to uncheck the [Position] checkbox.

The target point Z-Axis appears when the left mouse button is pressed down on a model and is represented by a red arrows. For a solid, the Z-axis corresponds to the normal (or reversed normal) of the face where lies target point. For a line, it corresponds to the line direction to the next closest point.

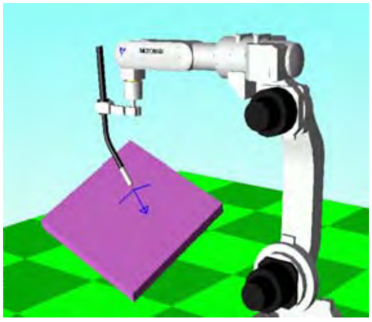
NOTE

- Points do not have sufficient information to generate Z-axis information. In such cases, the tool end will maintain its original orientation. .
- The direction of the Z-axis can be changed by selecting [Normal] or [Reverse] mode in the "Use Face:" section.

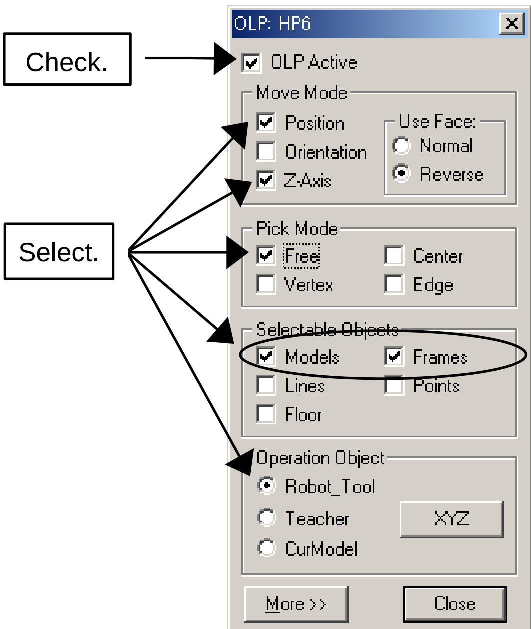
Procedure

The procedure is explained by using "WORK2", which has been used in "Designation with Orientation Mode", as an example.

1. Move the robot to its home position.

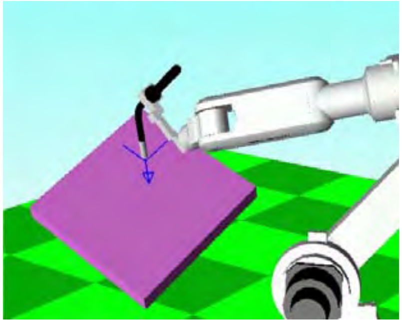


2. Set each item in the OLP dialog box as shown in the following figure.



3. Click on the face of the "Work2", and the tool Z-axis will turn so that the tool end is per-

pendicular to the clicked face of the model.



11.1.7 Pick Object Filter

The "Pick Object" section allows setting the type of model that can be selected with mouse. Use this section when pick operation cannot be executed properly because the objects overlap each other. This setting filters which object types can be selected and enables proper pick operation.

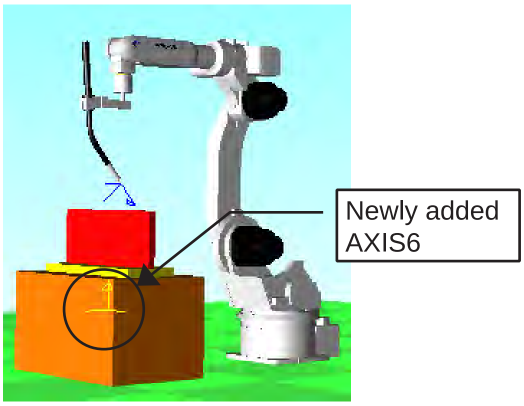
Procedure

The procedure is explained by using “WORK2”, which has been used in " What is OLP Function? ", as an example.

1. Display the Cad Tree; hide the “WORK2” and display the “DAI”.

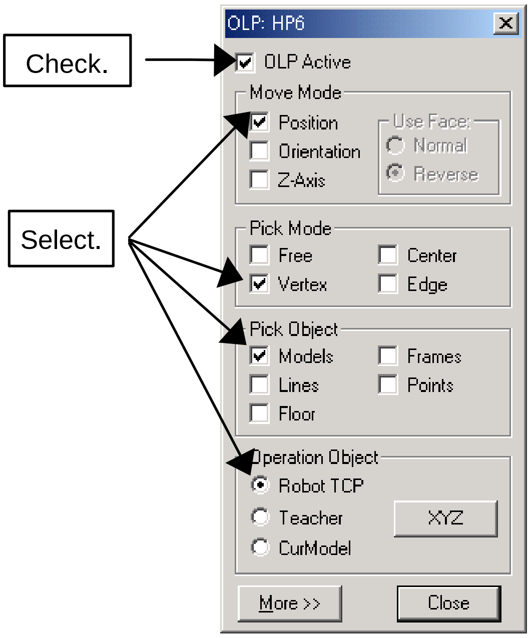
2. Select “DAI” in the Cad Tree to add the AXIS6 of the following specifications.
   Model: DAI (AXIS6)   Frame No.: 0

X (mm)	0	Y (mm)	0	Z (mm)	-100
Rx (degree)	0	Ry (degree)	0	Rz (degree)	0

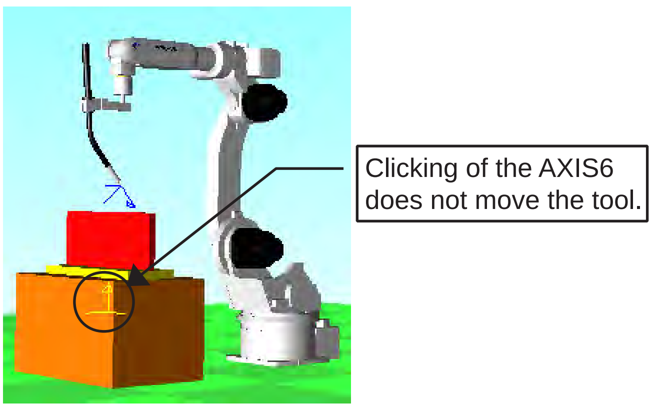


The AXIS6 is inside the BOX. (To see AXIS6 make sure that the Axis6 are always displayed in front in the "Options" dialog. Please refer to Section "10.1.5 Frame & AXIS6"

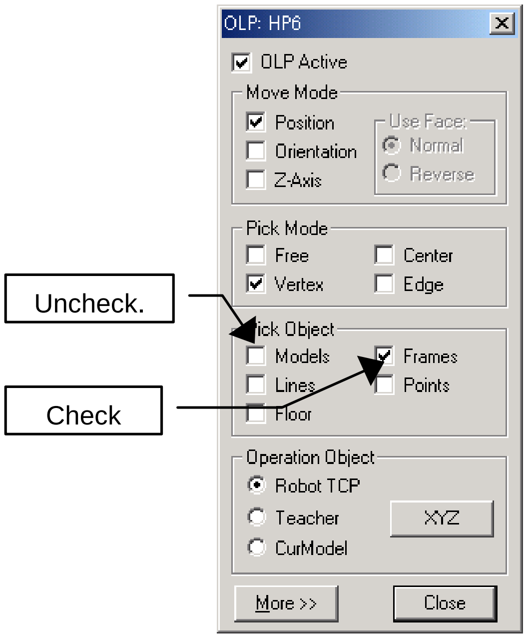
3. Set each item in the OLP dialog box as shown in the following figure.



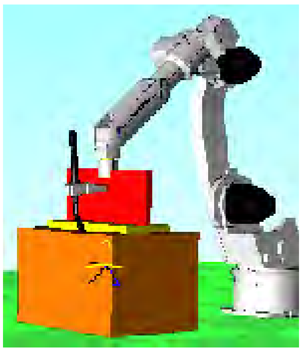
4. The tool does not move even though the “AXIS6” on the cell window is clicked. If you click around the vertex of the BOX, however, the tool moves to the vertex. This is because the [Frame] check box in the OLP dialog box has been cleared and only models are considered for selection.



5. Check the [Frame] check box for the “Pick Object” and clear the [Model] check box.



6. Click on the AXIS6, and the tool moves to the vertex of the AXIS6.

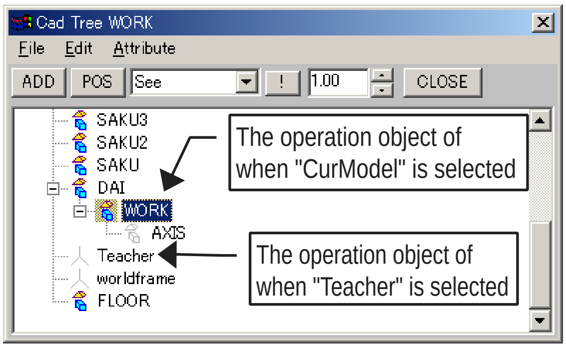


SUPPLE-MENT

It is recommended to use this function with both [Frame] and [Parts] checked for normal operation.

11.1.8 Changing of Operation Object

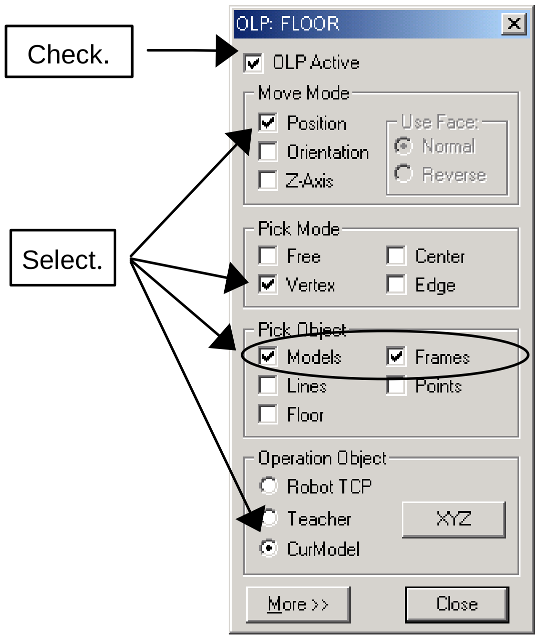
Setting the "Operation Object" section in the OLP dialog box allows changing the object moved by the pick operation. The "Operation Object" can be changed among.



Procedure

The procedure is explained by taking “CurModel” as an example.

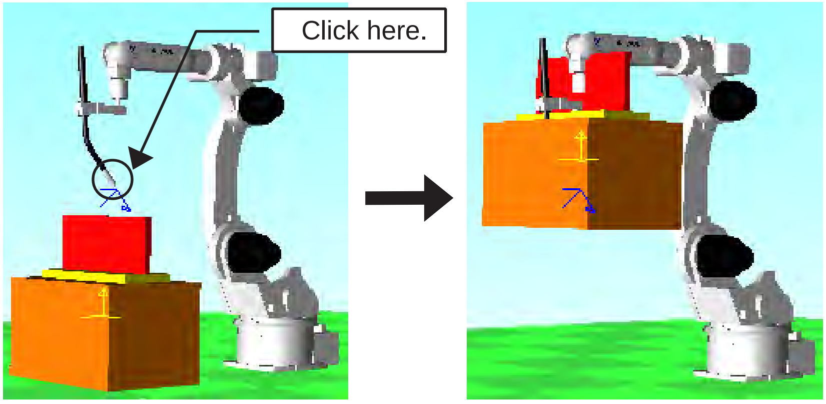
1. Set each item in the OLP dialog box as shown in the following figure.



2. Display the Cad Tree to select “DAI”, or click on the  button to select the “DAI” model in the cell window.

3. Select a model for the operation object.
   - When the current model was selected with the Cad Tree
     Click on the tool end in the cell window with the mouse, and the “DAI” moves to the tool end.
   - When the current mode was selected with the 

     button
     Check the [OLP Pick] check box, then click on the tool end on the cell window, and the “DAI” moves to the tool end.



Perform the same operation when the [Teacher] radio button is selected for the “Operation Obj” section.

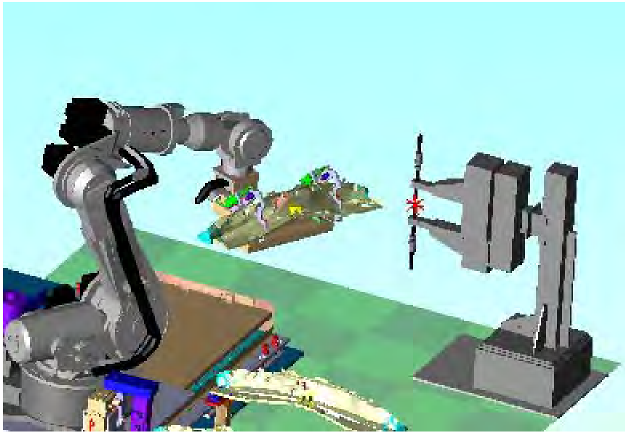
11.1.9 Move to External Reference Point

When the Move to External Reference Point function is active, the robot will move so that the point clicked on a model (carried by the robot) is brought to the external reference point. This is useful for applications like sealing and spot welding where the parts are handled by the robot and brought to a fix point (distribution nozzle, spot gun) for processing.

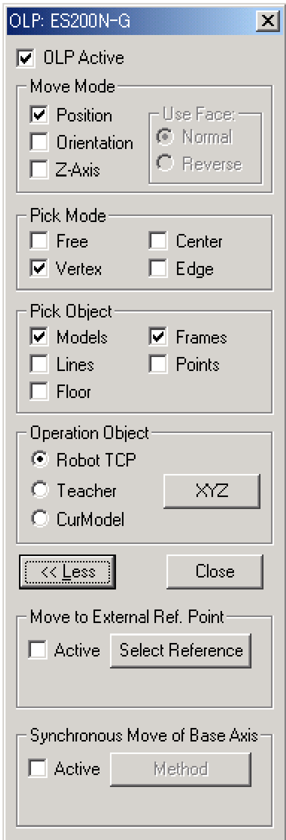
Procedure

The procedure is explained by using the "SpotWeld.vcl" as an example.

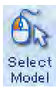
1. Open the "SpotWeld.vcl" located in the "Example" folder. The cell display should look like the one shown below.



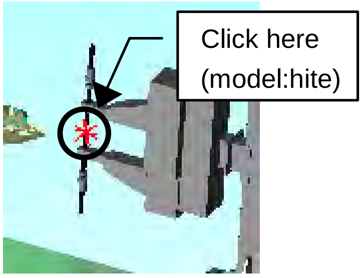
2. On the [Home] tab, in the [Teaching] group, click the [OLP] button, the [OLP] dialog appears. Click on the [More >>] button.



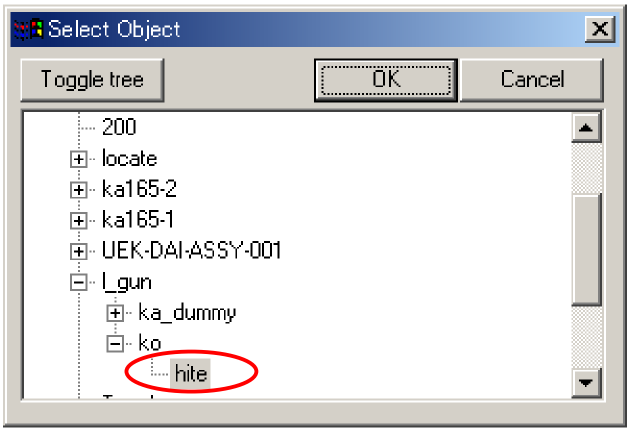
3. Set the external reference point.

With the "Select Model" mode 

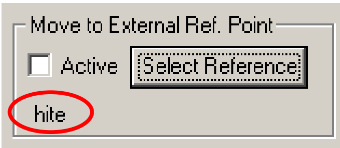
, select the "hite" model by clicking on it.



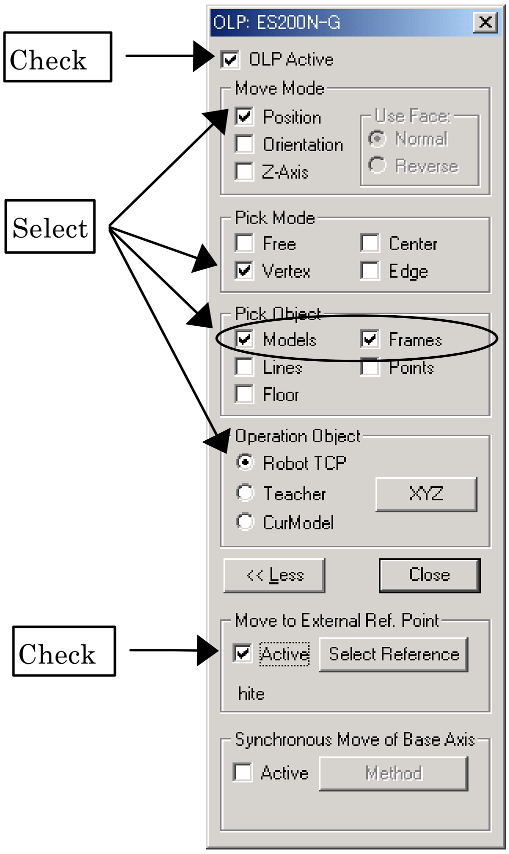
To set the external reference point, click on the [Select Reference] button, the [Select Model] dialog will display, select the "hite" model and press [OK].



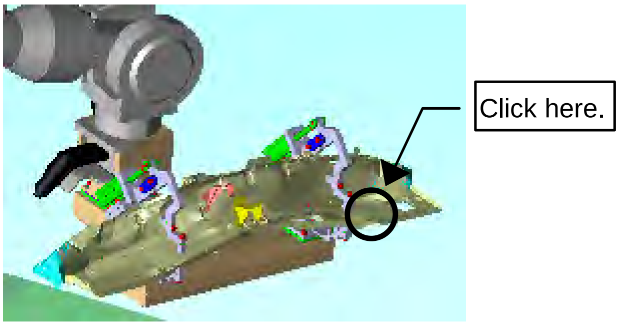
The name of the selected reference model is displayed in the "Move to External Ref. Point" section. Confirm that the "hite" model is selected.



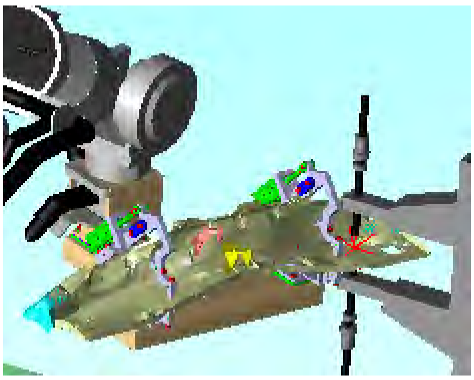
4. Set each item in the OLP dialog box as shown in the following figure.



5. Click on the work piece at the shown position.



6. The robot will move the work piece target point to the external reference point.



NOTE To use the "Move to External Reference Point" mode, the "Operation Object" needs to be set to robot.

11.1.10 Synchronous Base Axis Move to Target Point

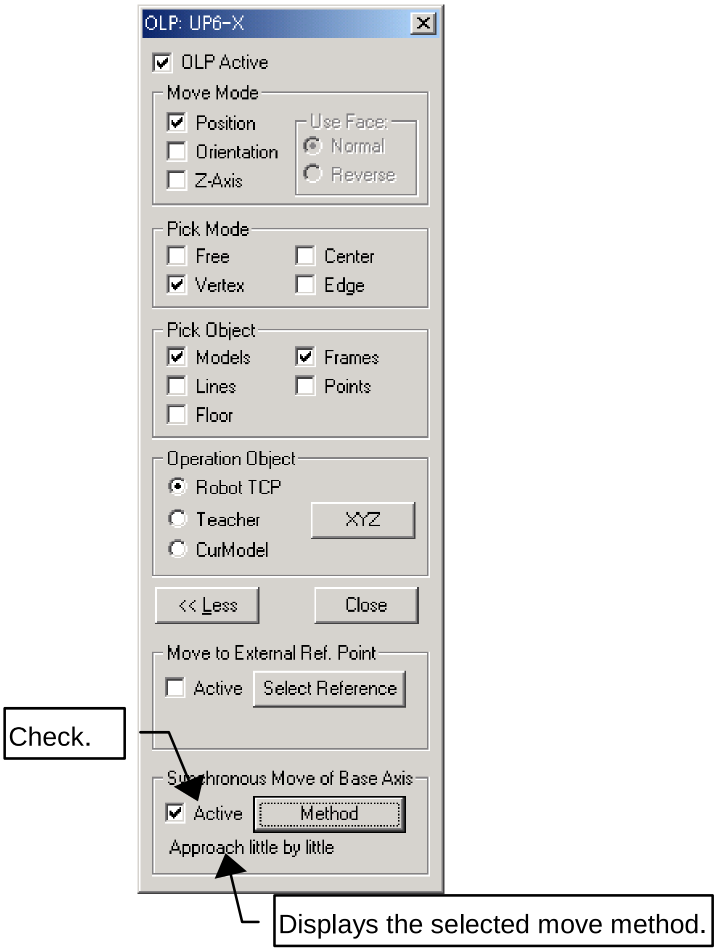
When a robot with servotrack/servotracks is moved with the OLP, the synchronous base axis move function allows the tool end (TCP) to move to the target point with the servotrack motion.
This operation function procedure is explained separately for robots with a single servotrack and robots with multiple servotracks.

■ Robot with Single Servotrack

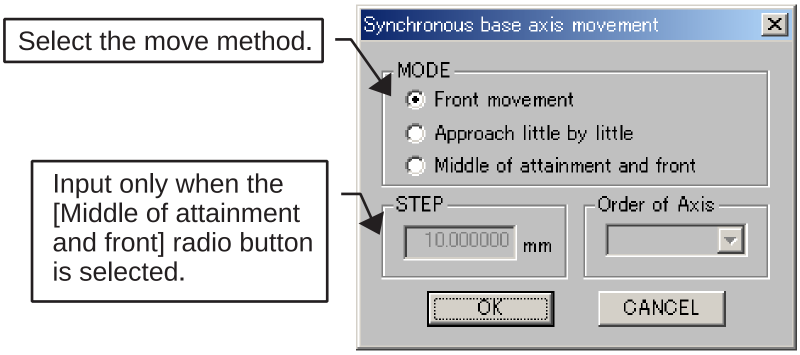
Procedure

1. For the robot with a single servotrack, the move method can be selected among:
   - Front movement;
   - Approach little by little; and
   - Middle of attainment and front.

2. Select the [Active] check box in the “Synchronous base axis move” .

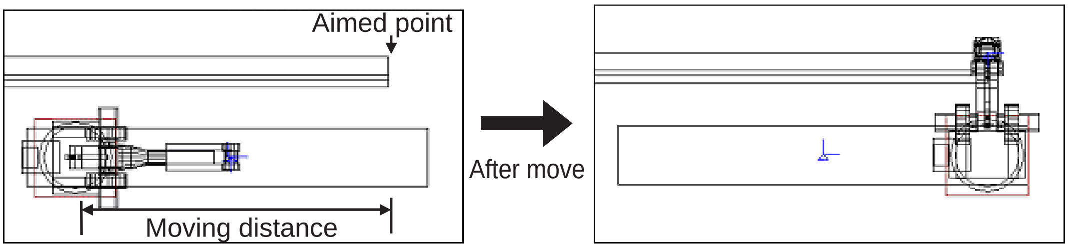


3. Click on the [Method] in the OLP dialog box to display the “Synchronous base axis movement” dialog box, and set the move method.



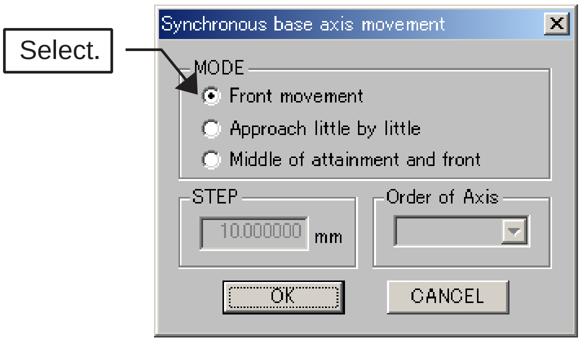
Front Movement

The function enabled with the [Front movement] radio button allows the tool end to move to the target point after the servotrack moves in front of the target point.



Procedure

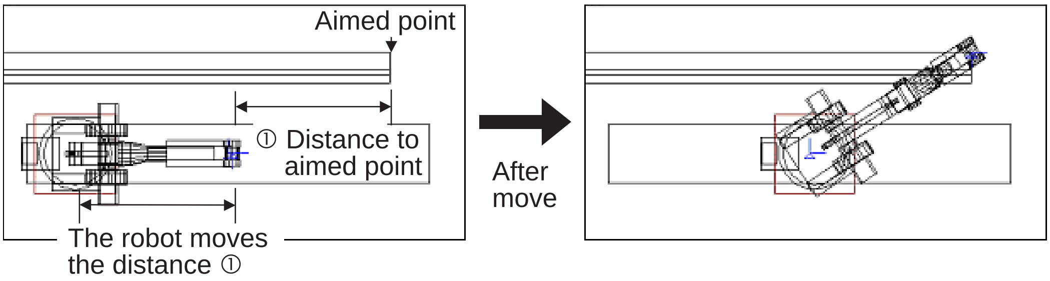
1. Select the [Front movement] radio button in the “Synchronous base axis movement” dialog box.



2. Click on the target point.
   - If the target point exceeds the servotrack soft limit, a message is displayed and the servotrack moves to the soft limit.
   - If the tool end (TCP) does not reach the target point, an error message is displayed but the servotrack moves in front of the target point.

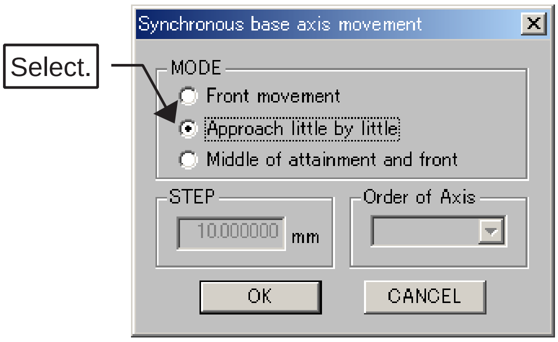
Approach Little by Little

The function enabled with the [Approach little by little] radio button allows the servotrack to move only the distance between the target point and the position of the current tool end (TCP), then the tool end (TCP) moves to the target point. In short, the servotrack and the tool end (TCP) move so that the current robot posture is maintained as much as possible.



Procedure

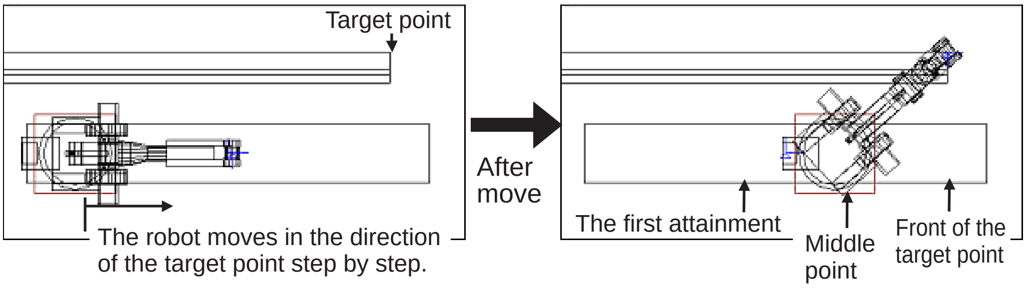
1. Select the [Approach little by little] radio button in the “Synchronous base axis movement” dialog box.



2. Click on the target point.
   - If the target point exceeds the servotrack soft limit, a message is displayed and the servotrack moves to the soft limit.
   - If the tool end (TCP) does not reach the target point, an error message is displayed but the servotrack moves in front of the target point.

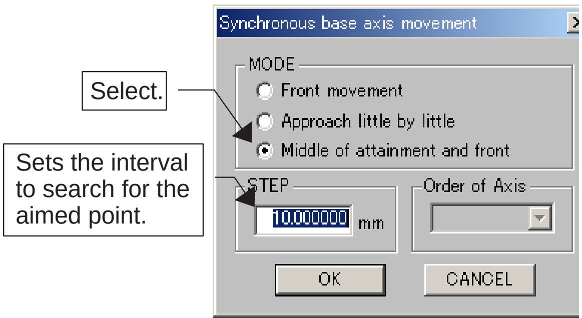
Middle of Attainment and Front

The function enabled with the [Middle of attainment and front] radio button allows the servotrack to move toward the target point step by step to search for the first position where the tool end (TCP) can attain the target point. The servotrack then moves to the middle point between the first attainment and the front of the target point, and the tool end (TCP) moves to the target point.

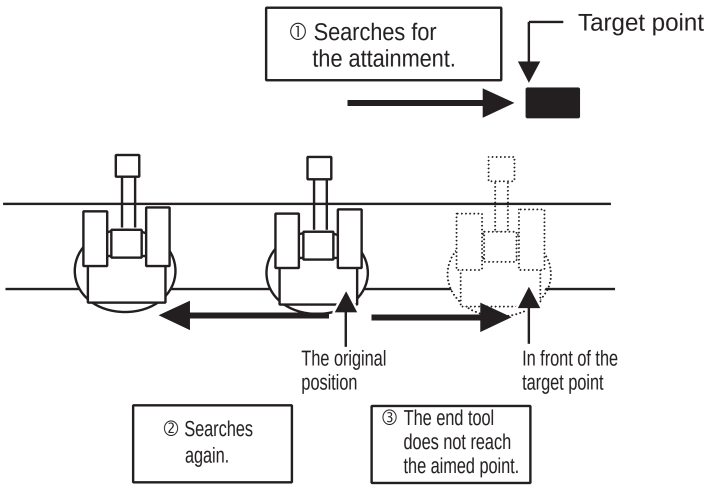


Procedure

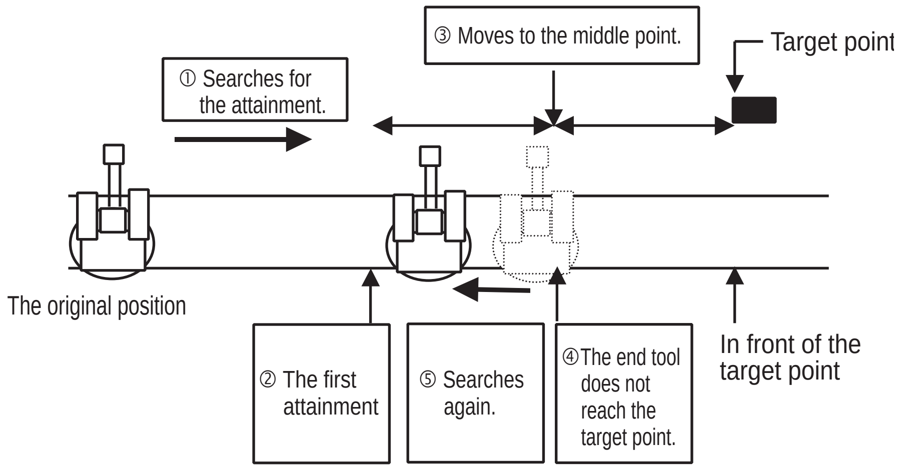
1. Select the [Middle of attainment and front] radio button in the "Synchronous base axis movement" dialog box. In the "STEP" edit box, set the moving amount for each step taken toward the target point.



2. Click on the target point.
   - If the tool end (TCP) does not reach the target point even though the servotrack moves in front of the target point, the attainment is searched with the servotrack moving in such a direction that the target point will be further (up to the maximum soft limit) than the servotrack position before moving.

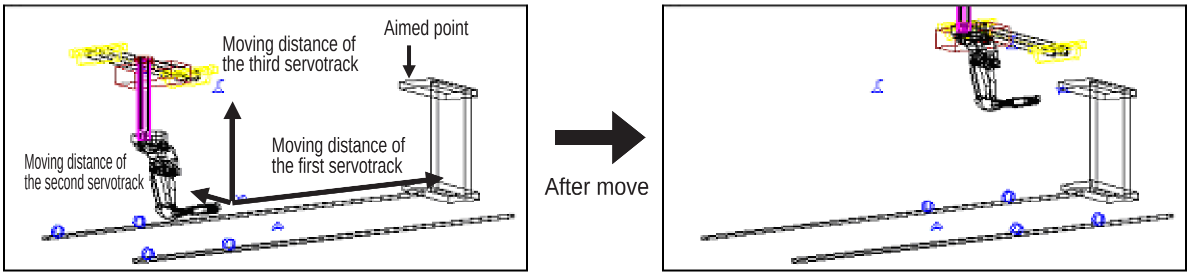


- If the tool end (TCP) does not reach the target point, an error message is displayed and the servotrack returns to the original position before moving.
- If the tool end (TCP) does not reach the target point because the servotrack moves to the middle point between the first attainment and the front of the target point, the attainment is searched again with the servotrack moving in such a direction that the target point will be further than the middle point.



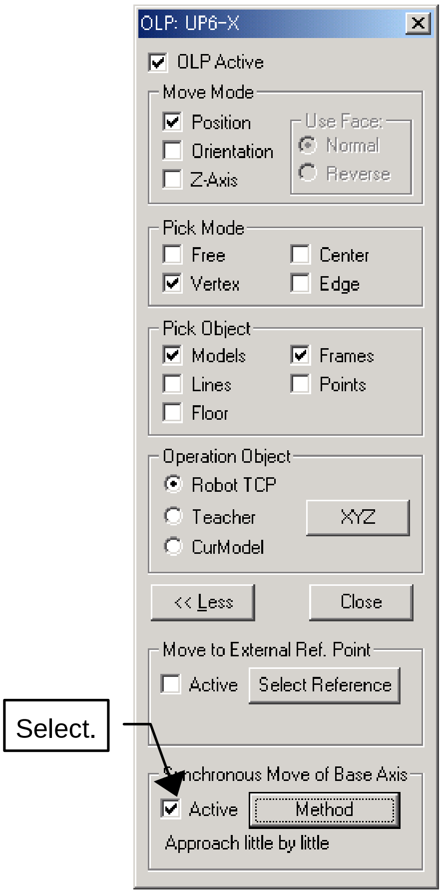
■ Robot with Multiple Servotracks

For the robot with multiple servotracks, each servotrack moves the distance between the current tool end (TCP) position and the target point, and the tool end (TCP) moves to the target point.



Procedure

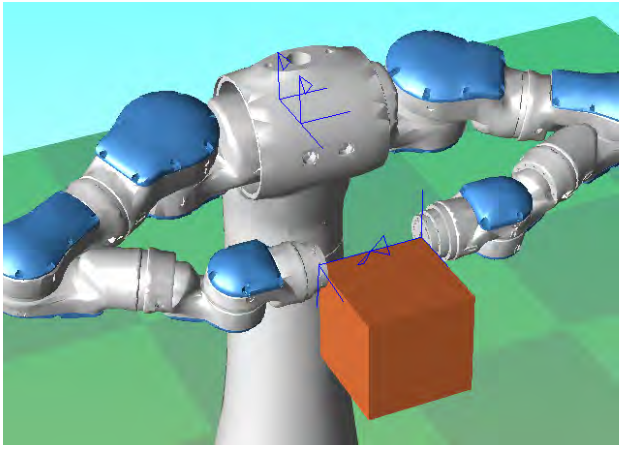
1. Select the [Active] check box in the "Synchronous base axis move". For the multiple servotracks, the servotrack move methods cannot be selected since only one method is available.



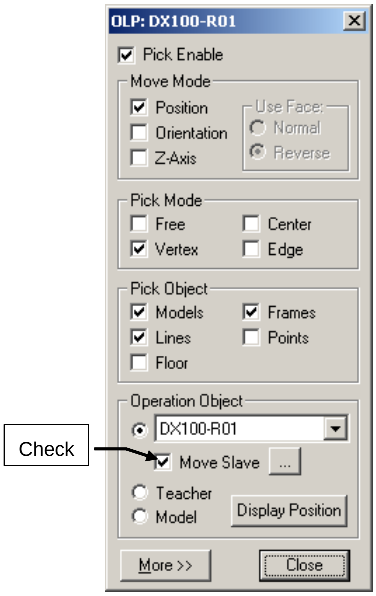
2. Click on the target point.
   - If the target point exceeds the servotrack soft limit, a message is displayed and the servotrack moves to the soft limit.
   - If the tool end (TCP) does not reach the target point, a message is displayed but the servotracks move the distance to the target point.

11.1.11 Position Designation with move slave function

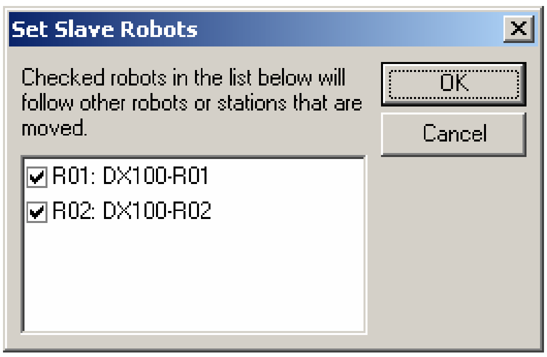
When the [move slave] checkbox is checked, the [Move Slave] function is enabled. When a robot or station is moved, other slave robots from the same controller are moved with it so that their TCP maintain the same relative position to the moved robot or station. For example, this section describes the move slave function with SDA10D-A00.



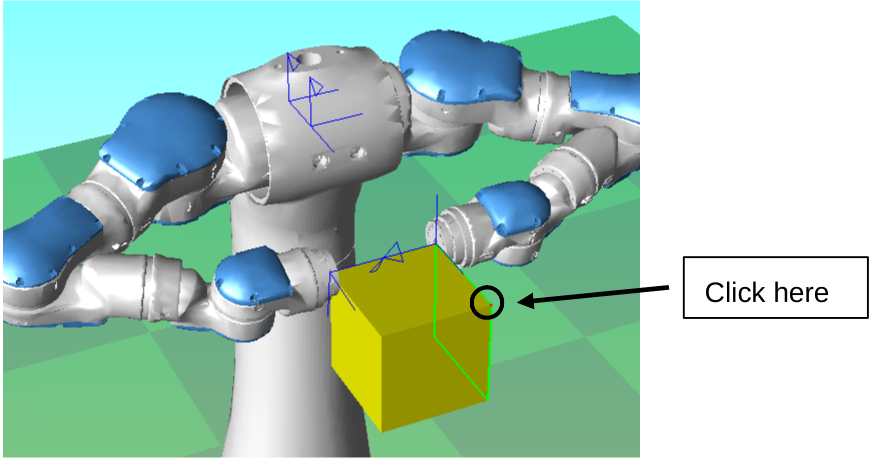
1. Display the OLP dialog box and check the [Move Slave] checkbox.



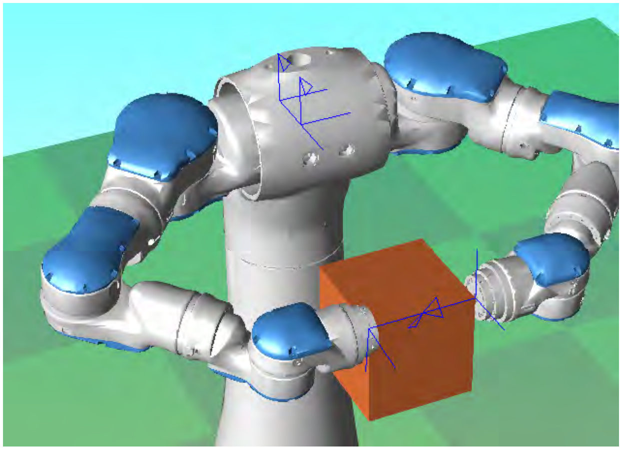
2. To display the "Set Slave Robots" dialog, click the […] button. Then set which robot are slave robots.



3. Click the arbitrary points of works in the MotoSim EG-VRC.



4. Then, slave robots are moved with it so that their TCP maintain the same relative position to the moved robot or station.



NOTE

When the function is enable, if one of the robot can not reach the proper position, all the robots are prevented from moving.

11.2 Trace Function

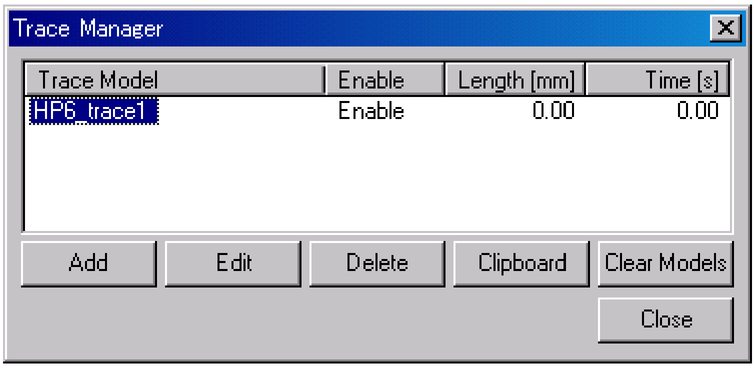
11.2.1 Changing Trace Object

The object normally traced is the tool end, however, the trace object can be changed.
The trace object is changed to the flange in the following explanation.

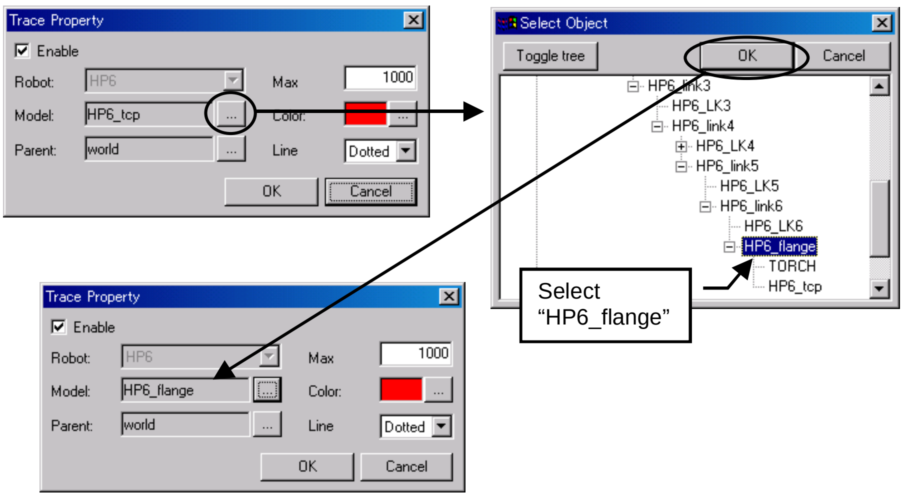
Procedure

The procedure is explained with the "Arc_Sample.vcl" example.

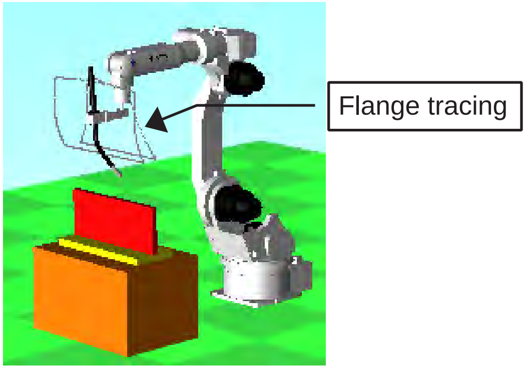
1. On the [Simulation] tab, in the [Monitor] group, click the [Trace] button, the [Trace] dialog appears.
   The "Trace Manager" dialog will appear. Trace can be added, edited or deleted. For this exemple, the default trace will be edited.



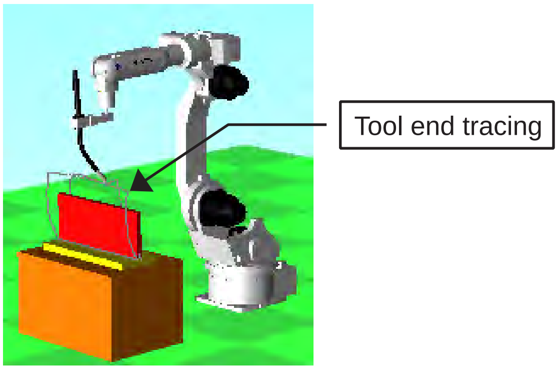
2. Display the trace property by double clicking on the "HP6_trace1" or by pressing the "Edit" button. Press the [...] next to the "Model" field to display the "Select Model" dialog and select the model to be traced. For this example, select the "HP6_flange" model. Then click on the [OK] button. Make sure that the "Model" edit box shows the selected model name and click on the [OK] button.



3. Execute an job.
   On the [Simulation] tab, in the [Playback] group, click the [Start] button.



The following figure shows when the tracing point is a tool.



11.2.2 Changing Trace Parent

The tracking drawn by the trace function is normally created and drawn as a model having "world" as the parent. Therefore, changing the name of the “Parent” in the Trace Configuration dialog box will change the parent of the tracking. This parent changing function is useful in the following cases:

- Tracing welding point positions when the robot holds and moves a workpiece to a fixed welding points.
- Points to be traced are set to welding points.

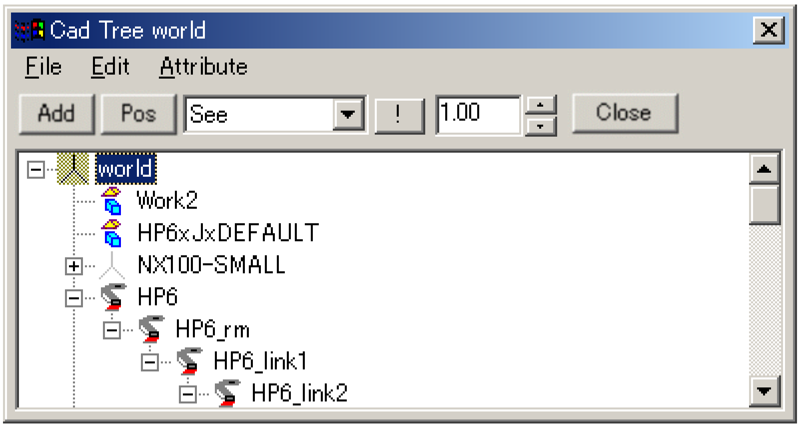
Procedure

The procedure is explained with the “Arc_Sample.vcl” example.

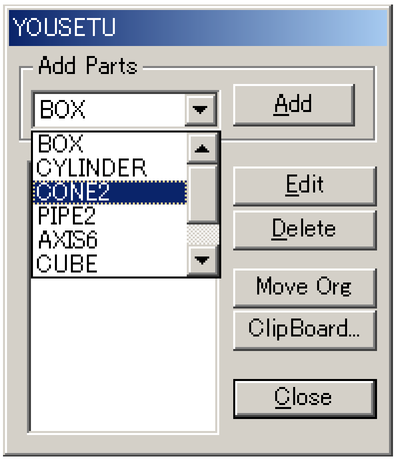
1. On the [Home] tab, in the [Model] group, click the [CadTree] button, the [Cad Tree] dialog appears.

To hide the “WORK” which is located on “DAI”, select “WORK” to set it to “Hide”.

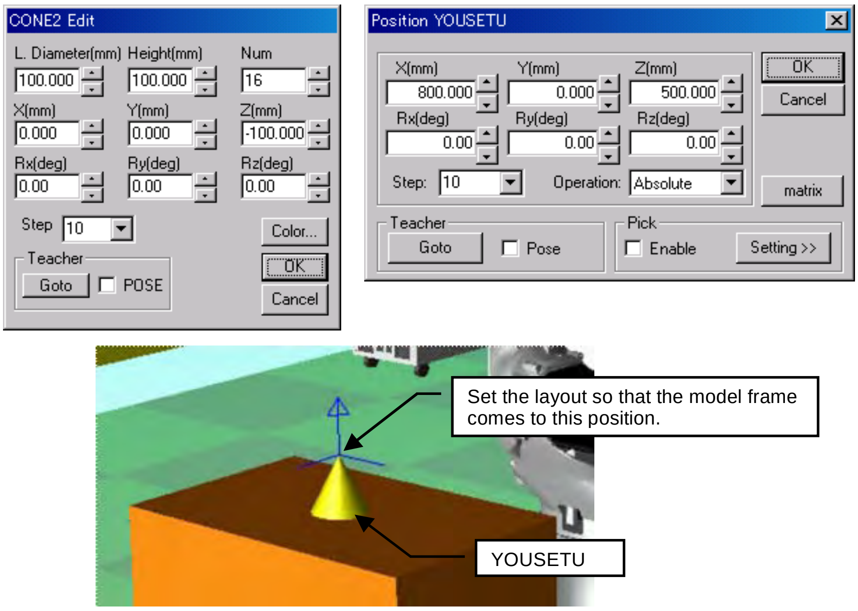
2. Select “world” from the Cad Tree and click on the [Add] button to create the “YOUSETU” model.



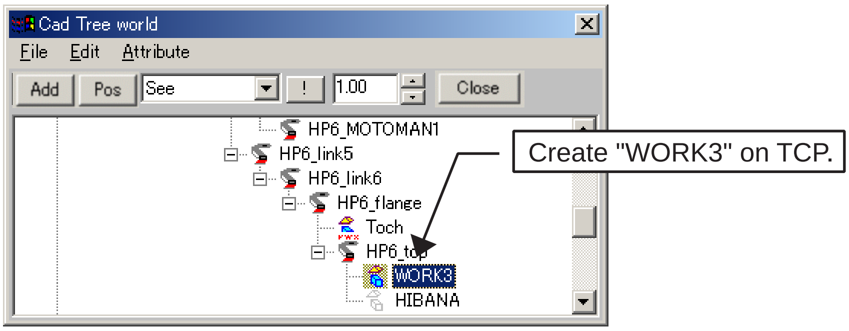
3. Add the “CONE2” model to “YOUSETU”.



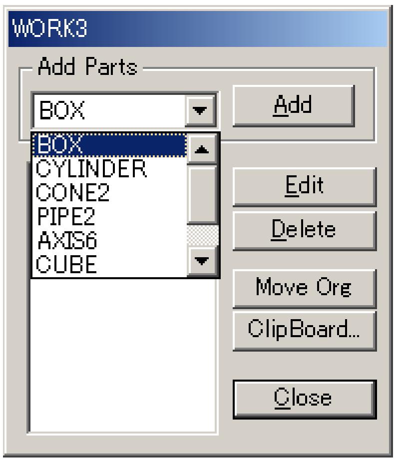
The following figures show “CONE2” and the layout setting.



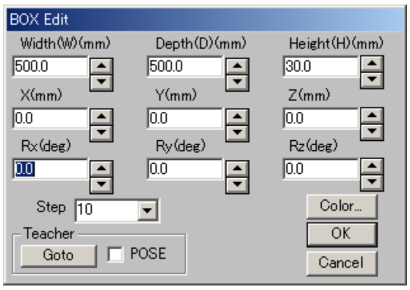
4. Create the “WORK3” model that has “TCP” as the parent.
   Select “HP6_tcp” from the Cad Tree, then click on the [Add] button.

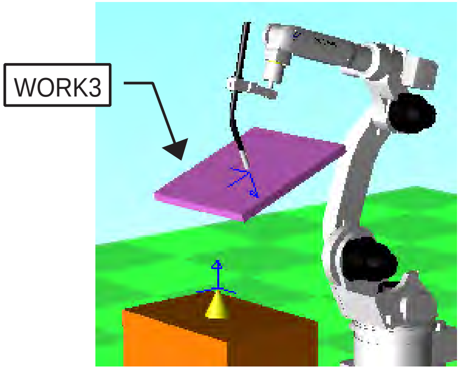


5. Add the “BOX” model to “WORK3”.



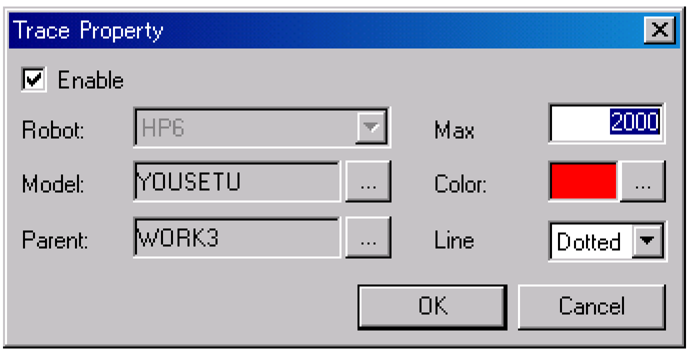
Set the BOX as follows.





6. On the [Simulation] tab, in the [Monitor] group, click the [Trace] button, the [Trace] dialog appears.

7. Display the trace property by double clicking on the “HP6_trace1” or by pressing the “Edit” button. Press the [...] next to the “Model” field to display the “Select Model” dialog and select the model to be traced. For this example, select the “YOUSETU” model. Then click on the [OK] button. Make sure that the “Model” edit box shows the selected model name.
8. Press the [...] next to the “Parent” field to display the “Select Model” dialog and select the model that will become the parent (and the reference coordinate frame) of the trace. For this example, select the “WORK3” model. Then click on the [OK] button. Make sure that the “Parent” edit box shows the selected model name.
9. The “Max. Points” field defines the maximum number of points that will be used by the trace, this affect the length of the trace. (If the number of tracing points exceeds the set value, tracing points are deleted in order from the oldest.)
   In this example, set the value to 2000.

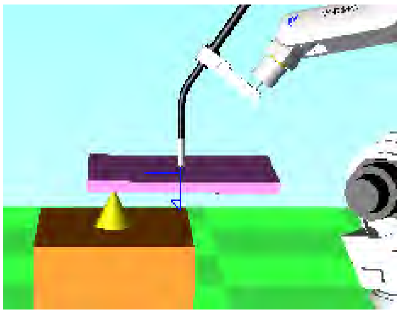


10. The “Color” field displays the color of the trace. Set any desired color by pressing the [...] button next to the color.

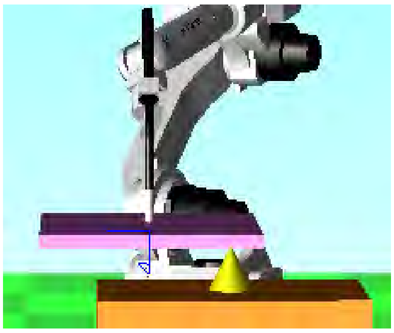
11. Click on the [OK] button to save the setting.

12. Using the Virtual Pendant, create a new job which welds four corners of a workpiece as

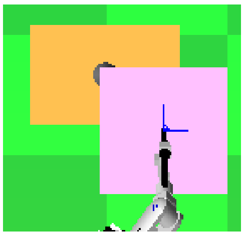
shown in the following figure. Teach the positions of each STEP with MOVL instructions.



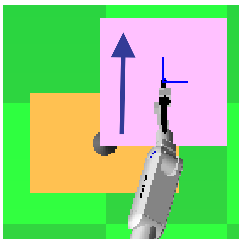
Initial State Viewed from Side



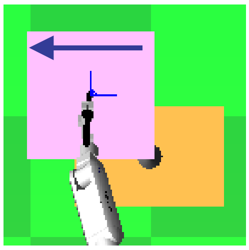
Initial State Viewed from Front



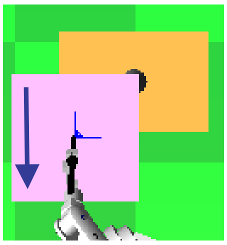
STEP 1



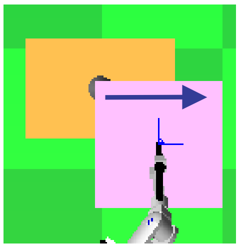
STEP 2



STEP 3

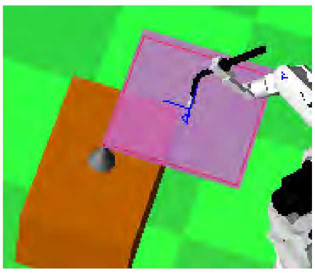


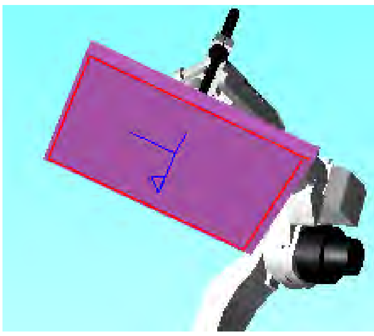
STEP 4



STEP 5

13. Execute the job and the tracing track attached to “WORK3” will be displayed. This helps to see which positions on the workpiece are to be welded.





As described above, changing the trace object and the parent with the Trace Configuration dialog box can leave the moving track of the target point that can be easily read.

11.3 Collision Detection Setting

This section explains to set up the collision detection and check the collision on the playback. Follow the flowchart below to set up the collision detection.

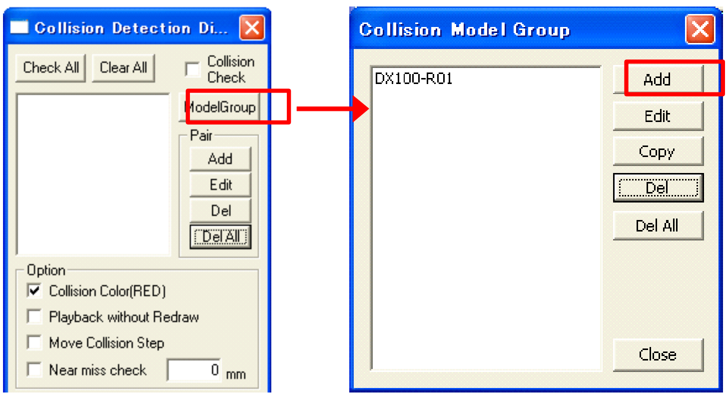
Collision model group registration
↓
Collision definition registration
↓
Start collision detection

■ Collision model group registration

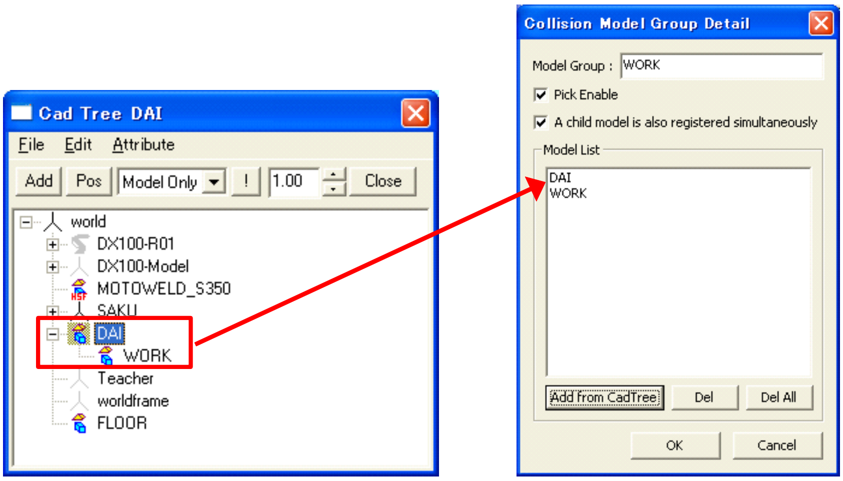
Procedure

1. On the [Simulation] tab, in the [Collision] group, click the [Collision Detection] button, the [Collision Detection] dialog appears.

2. Click the [ModelGroup] button on the Collision Detection dialog box, the Collision Model Group dialog box is displayed.
3. Click the [Add] button on the Collision Model Group dialog box, the Collision Model Group Detail dialog box is displayed.



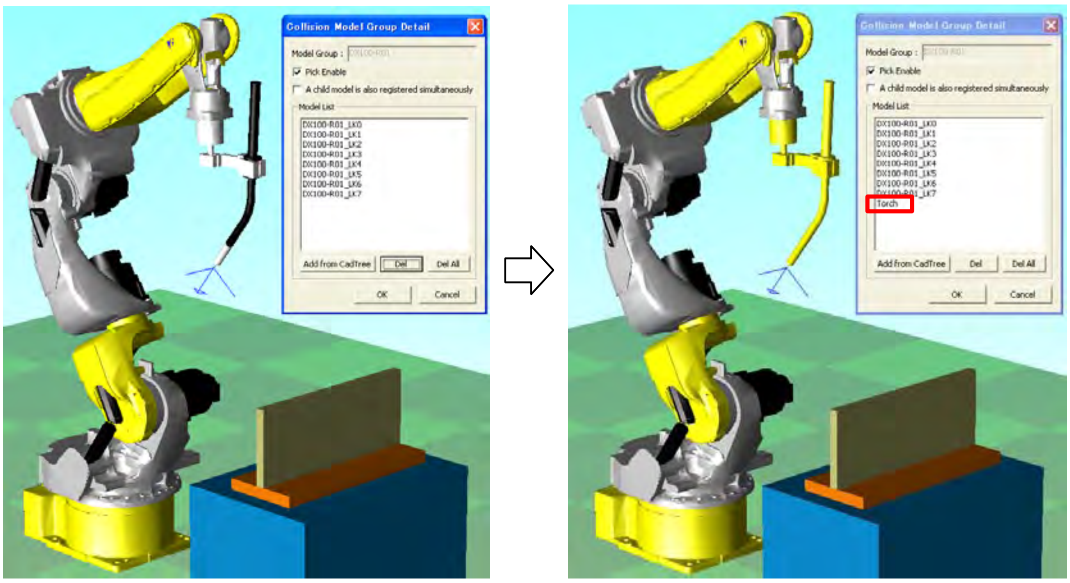
4. Enter the collision model group name to [Model Group], display the [CadTree] dialog box, and select the "DAI" in the CadTee dialog box.
   Check the [A child model is also registered simultaneously] and click the [Add from CadTree] button, "DAI" and "WORK" is added to the model list. Click the [OK] button to save.



5. To edit the collision model group of robot, Double-click "DX100-R01" on the Collision Model Group dialog box. The Collision Model Group Detail dialog box is displayed.

   Delete the unnecessary model from model list. Click the 

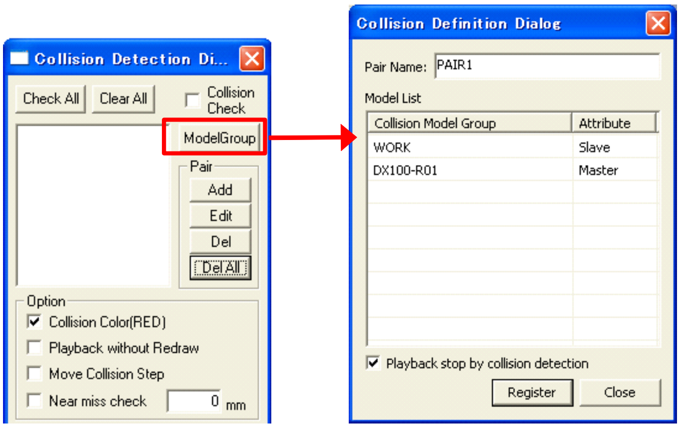
 button and click the tool model on the MotoSim EG-VRC window. "Torch" is added. Click the [OK] button to save.



■ Collision definition registration

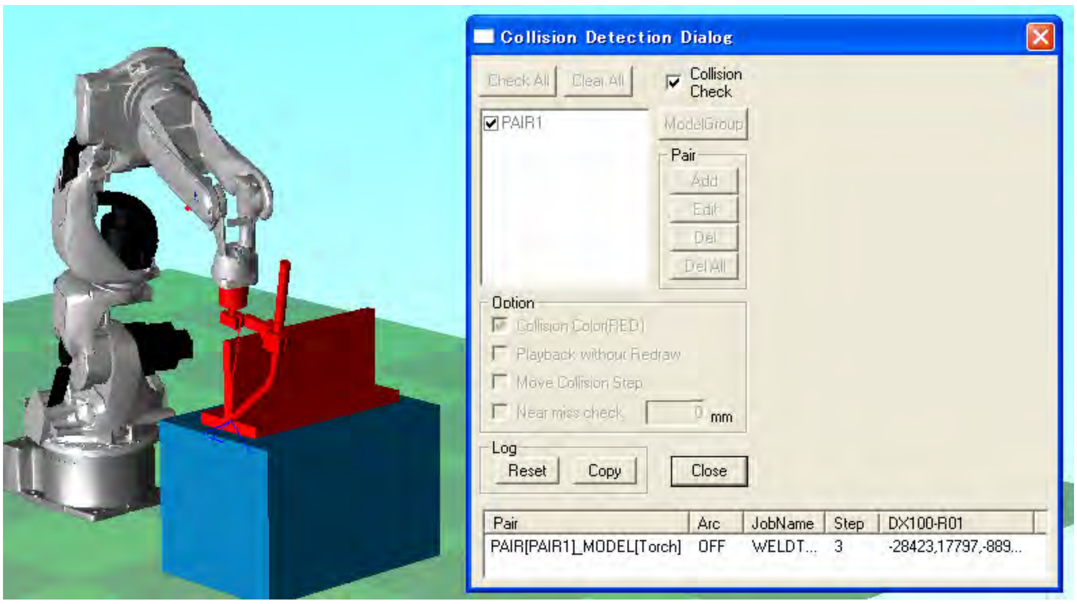
1. Click the [Add] button on the Collision Detection dialog box, the Collision Definition dialog box is displayed.

2. Enter "PAIR1" to the [Pair Name], Set Attribute of "DX100-R01" as "Master" and set Attribute of "WORK" as "Slave".



■ Start collision detection

1. Check the "PAIR1" check box on the Collision Detection dialog box, and check the [Collision Check] check box.
2. To execute the job, on the [Simulation] tab, in the [Playback] group, click the [Start] button. When the collision occurs, the models turn red, and playback is stopped.



11.4 Adding I/O Board Module

Even if CMOS.BIN of the real robot with I/O board module or welding board module, it is possible to add virtually those board modules to the virtual controller.

11.4.1 Adding I/O Board Module (DX200, DX100, NX100).

NOTE

- The following I/O expansion boards are supported:

  DX200, DX100:
  - JARCR-XOI01
  - JARCR-XOI02
  - JARCR-XOI03

  The analog EW boards are not supported for the DX200/DX100.

  NX100:
  - JARCR-XOI01
  - JARCR-XOI02
  - JARCR-XOI03
  - JANCD-XEW01-1
  - JANCD-XEW01-2
  - JANCD-XEW02
- When the new controller is created, this procedure can not be used. Prepare the cell registered the controller beforehand, and use the procedure of this section.

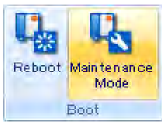
Procedure

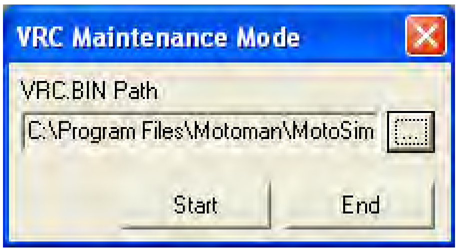
1. With a text editor software (e.i. Notepad) open the “HwEmu.ini” file located in the controller folder of the cell (the same folder that contains the VRC.BIN file).
2. Edit the file as follows and then save the file.

[HwEmu.ini]

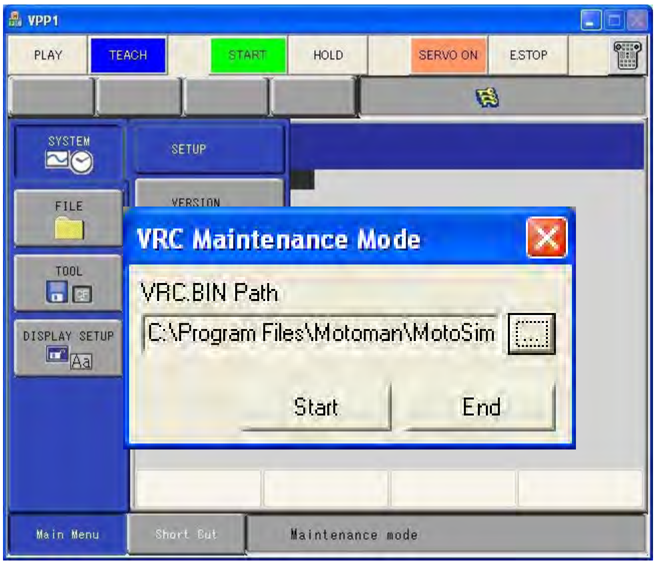
```
[VIRTUAL_SET]
VIRTUAL_SET=1
[RSW]
RSW=14
[BOARD]                    ←Set this value to 1
SLOT# 0=JZNC-NIF02-2
SLOT# 1=JARCR-XOI01        ←Do NOT change this.
SLOT# 2=
SLOT# 3=                   ←Do NOT change this.
SLOT# 4=JANCD-XEW01-1      ←Write the name of the desired board
    :                         (SLOT#1 to #15  are available to add boards)
    :
    :
SLOT#15=
```

3. Start MotoSim EG-VRC but do not open any cell. (If already running, close all open cell). On the [Controller] tab, in the [Boot] group, click the [Maintenance mode] button, the [Maintenance mode] dialog appears. Click the [...] button form that dialog and select the VRC.BIN file located in the controller folder of the cell. Then, click the [Start] button to launch the controller in Maintenance mode. (For more detail about the controller maintenance mode, refer to Section "7.10 VRC Maintenance Mode".)

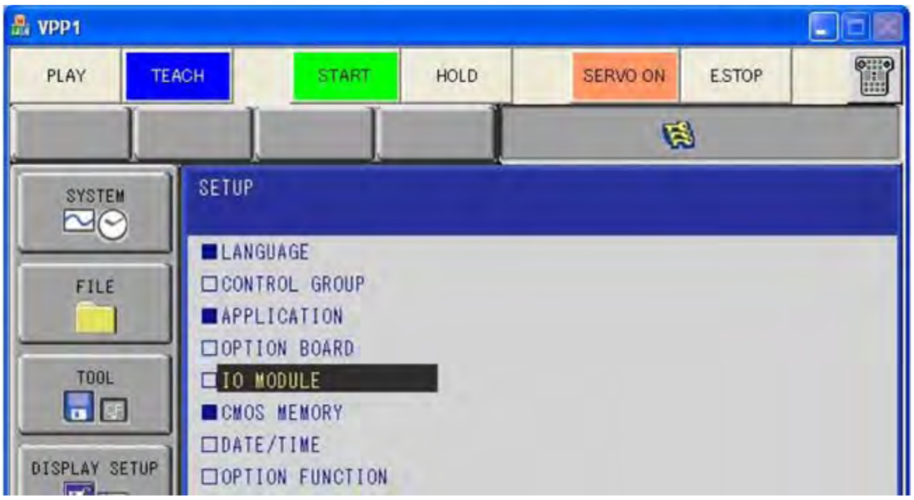




4. From the Virtual Pendant main menu select {SYSTEM} - {SETUP}.



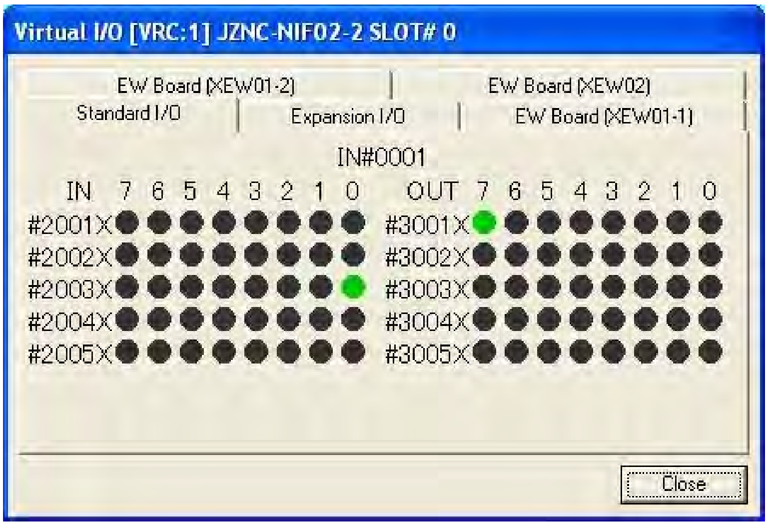
Then select {IO Module} from the setup list.



5. The list of “I/O MODULE” will display. Confirm that the board that were added in the “HwEmu.ini” file are present. .

Press [ENTER] twice. A confirmation message will appear, select “Yes”

6. In the MotoSim-EG-VRC “Maintenance Mode” dialog, select the [End] button to exit the controller maintenance mode.
7. Open the cell containing the modified controller. Display the Virtual I/O monitor and confirm that the added I/O boards are present.



NOTE

If the added I/O module doesn’t display.
Make sure that the “HwEmu.ini” file was properly modfied and that there are no typo in the board name.
Make sure that the modified “HwEmu.ini” file and the selected “VRC.BIN” are both located in the same controller folder of the same cell.

11.4.2 Adding I/O Board Module (FS100).

NOTE

- The following I/O expansion boards are supported:
  - LIO-08R (I/O expansion board)
  - LIO-09R (I/O expansion board)
  - CNTR01 (Counter board)

  I/O expansion boards other than listed above and welding boards are not supported.
- When the new controller is created, this procedure can not be used. Prepare the cell registered the controller beforehand, and use the procedure of this section.

NOTE

When this procedure is used, "SYPICK" instruction and "SYPLACE" instruction (used by high-speed picking) disappear from the command list. Then, use the following procedure with the virtual pendant.

1. Change the security mode to "MANAGEMENT MODE".
2. Select {SETUP} - {TEACHING COND.}.
3. Select {DATA} - {RESET INSTRUCTION}, and a confirmation dialog box will appear, select [YES] to reset instructions.

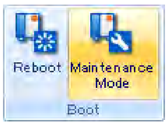
Procedure

1. When the cell is opened, save the cell and close it, and exit MotoSim EG-VRC.
2. With a text editor software (ex. Notepad) open the "HwEmu.ini" file located in the controller folder of the cell (the same folder that contains the VRC.BIN file).
3. Write the board name (ex. "LIO-08R") in the [BOARD] section, and save the file.

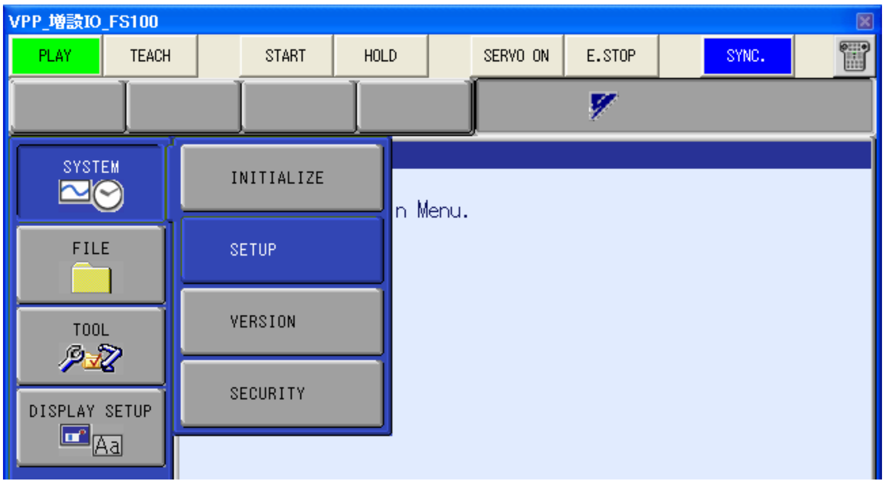
[HwEmu.ini]

```
[BOARD]
SLOT# 1=LIO-08R
SLOT# 2=LIO-08R          ←Set this by default
SLOT# 3=
SLOT# 4=CNTR01
SLOT# 5=                 ←Set this by default
SLOT# 6=
SLOT# 7=
SLOT# 8=
```

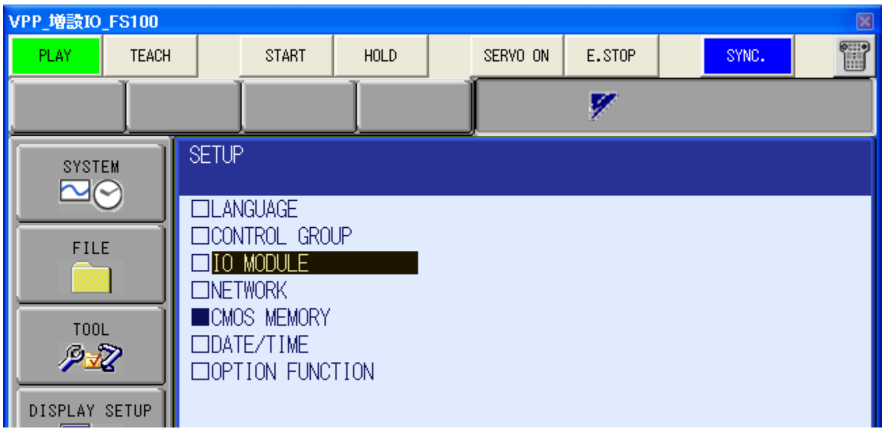
4. Start MotoSim EG-VRC but do not open any cell.
   On the [Controller] tab, in the [Boot] group, click the [Maintenance mode] button, the [Maintenance mode] dialog appears. Then, to launch the controller in Maintenance mode, operate in the "VRC Maintenance Mode" dialog. (For more detail about the controller maintenance mode, refer to Section "7.10 VRC Maintenance Mode".)



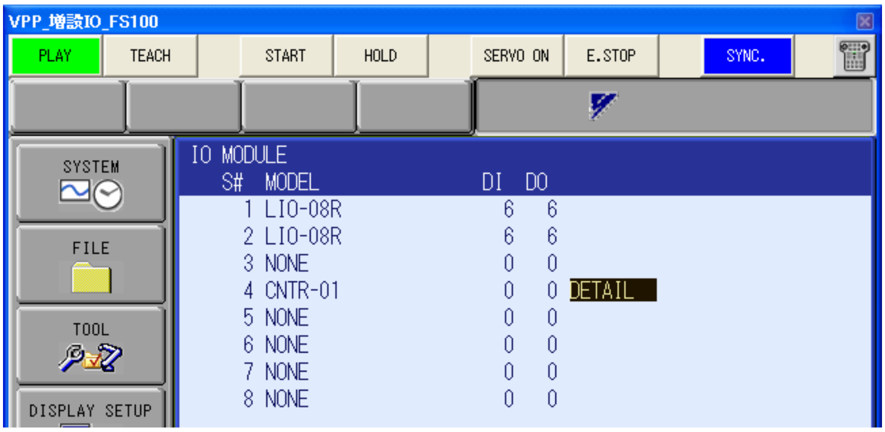
5. Select {SYSTEM} - {SETUP} in the virtual pendant.



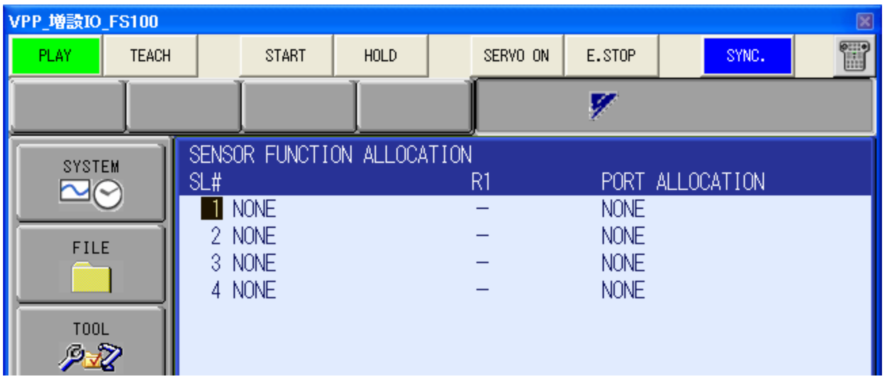
6. Select {IO Module} from the list in the {SETUP} display.



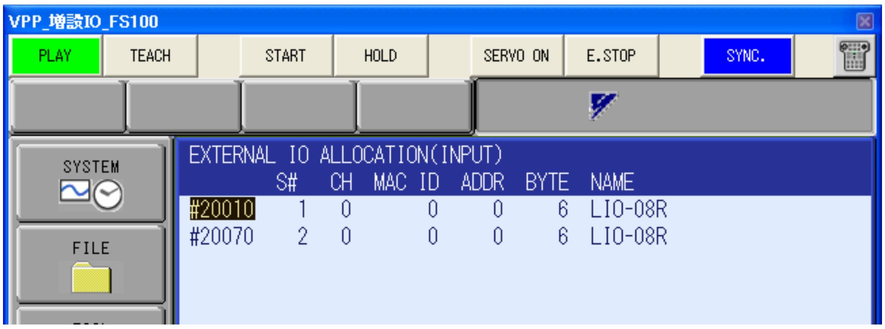
7. The list of [IO MODULE] is displayed. Confirm that the boards added in the "HwEmu.ini" file are present. After Confirming, click the [ENTER] button.



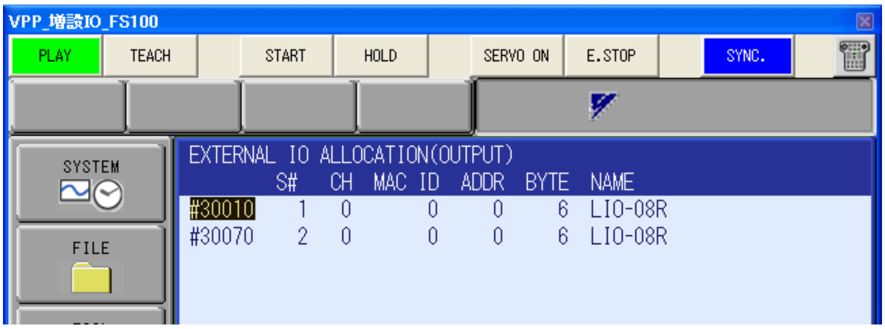
8. The "SENSOR FUNCTION ALLOCATION" screen doesn't need any change. Press [ENTER] to go to the next screen.



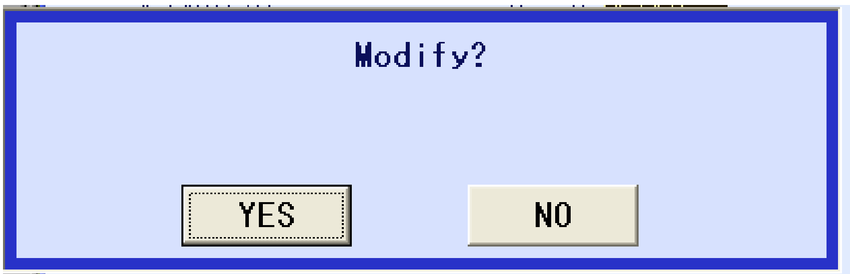
9. The "EXTERNAL IO ALLOCATION(INPUT)" screen doesn't need any change. Press [ENTER] to go to the next screen.



10. The "EXTERNAL IO ALLOCATION(OUTPUT)" screen doesn't need any change. Press [ENTER] to go to the next screen.

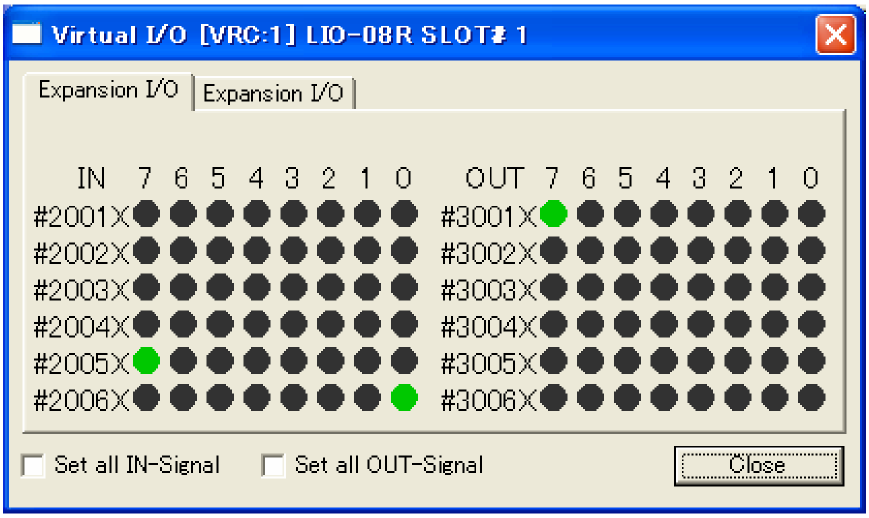


11. A confirmation dialog box will appear, select the [YES] button.



12. In the MotoSim EG-VRC "VRC Maintenance Mode" dialog, select the [End] button to exit the controller maintenance mode.

13. Open the cell containing the modified controller. Display the [Virtual I/O monitor] dialog and confirm that added I/O boards are present.



NOTE

If the added I/O module doesn't display.
Make sure that the "HwEmu.ini" file was properly modfied and that there are no typo in the board name.
Make sure that the modified "HwEmu.ini" file and the selected "VRC.BIN" are both located in the same controller folder of the same cell.

11.5 Option Function Setting

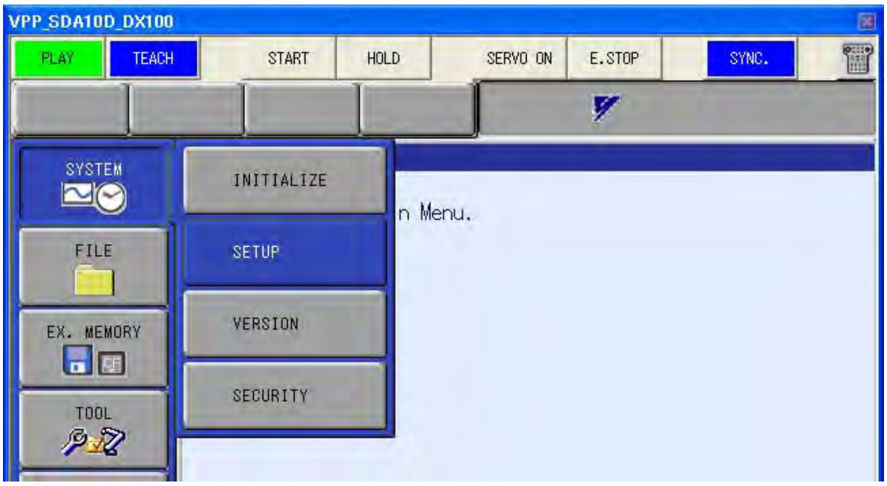
The particular operation is available by setting option function.

> NOTE
> MotoSim EG-VRC supports the function in the Section "1.2.1 Optional Functionof controller" only.

Procedure

1. Start the controller in maintenance mode. On the [Controller] tab, in the [Boot] group, click the [Maintenance mode] button, the [Maintenance mode] dialog appears. For details refer to section "7.10 VRC Maintenance Mode".

2. Select {SYSTEM} - {SETUP} in the virtual pendant.



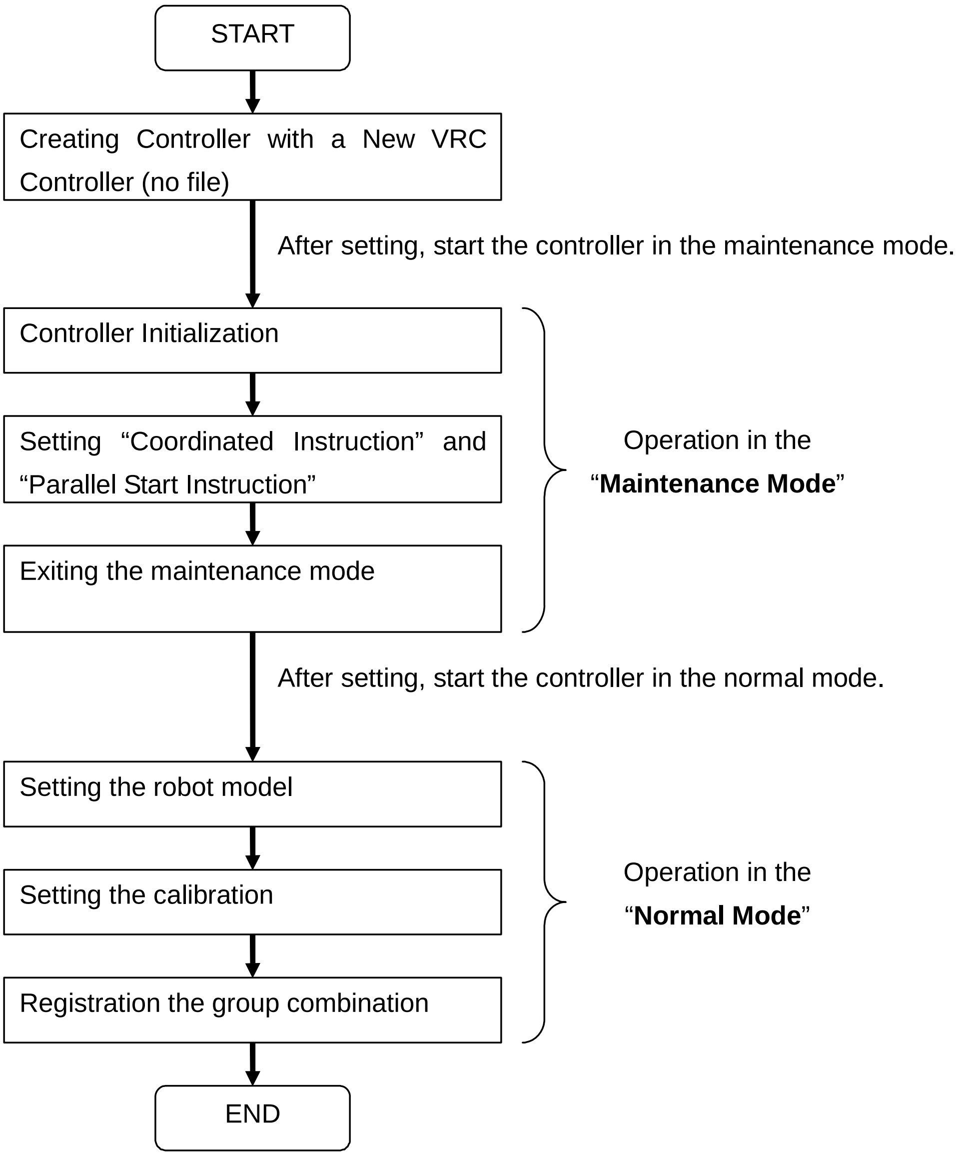
3. Select [OPTION FUNCTION] in the {SETUP} display.

4. Set the function used to "USED".
   For detail of each function, please refer to the controller "Operator's Manual".

11.6 Dual-Arm robot Setting

When the Dual-Arm robot (ex. SDA10-A00) is used, the job used "Coordinated Instruction" and "Parallel Start Instruction" can be created in MotoSim EG-VRC. This section describes how to setup Dual-Arm robots and how to activate optional functions such as "Coordinated Instruction" or "Parallel Start Instruction" of each controller.

Follow the flowchart below to setup Dual-Arm robots.



11.6.1 Dual-Arm robot Setting (DX100)

Dual-Arms are composed of right arm, left arm and one torso. When defining the control group of the controller during the initialization, three control groups need to be set. There are two robot groups (R1 and R2) for the arms and one station group (S1) for the rotation of the torso.

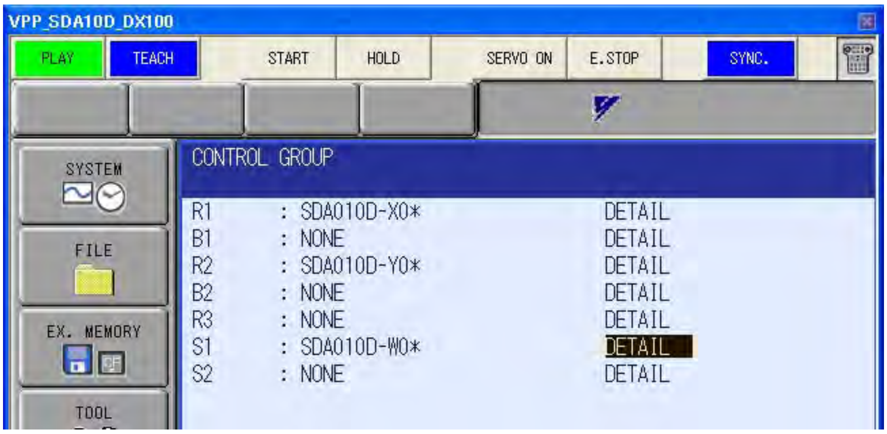
To determine the robot model to select from the robot list, remove the "A00" part of the robot type and replace it by:

- X0* for the left arm robot (R1)
- Y0* for the right arm robot (R2)
- W0* for the torso rotation (S1)

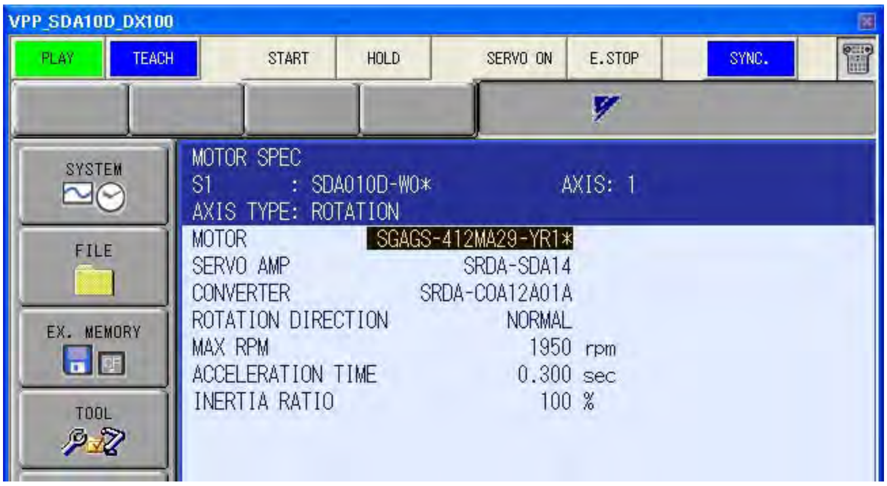
For example for a SDA010D-A00 robot, the control groups should be set to SDA010D-X00, SDA010D-Y00 and SDA010D-W00.

Procedure

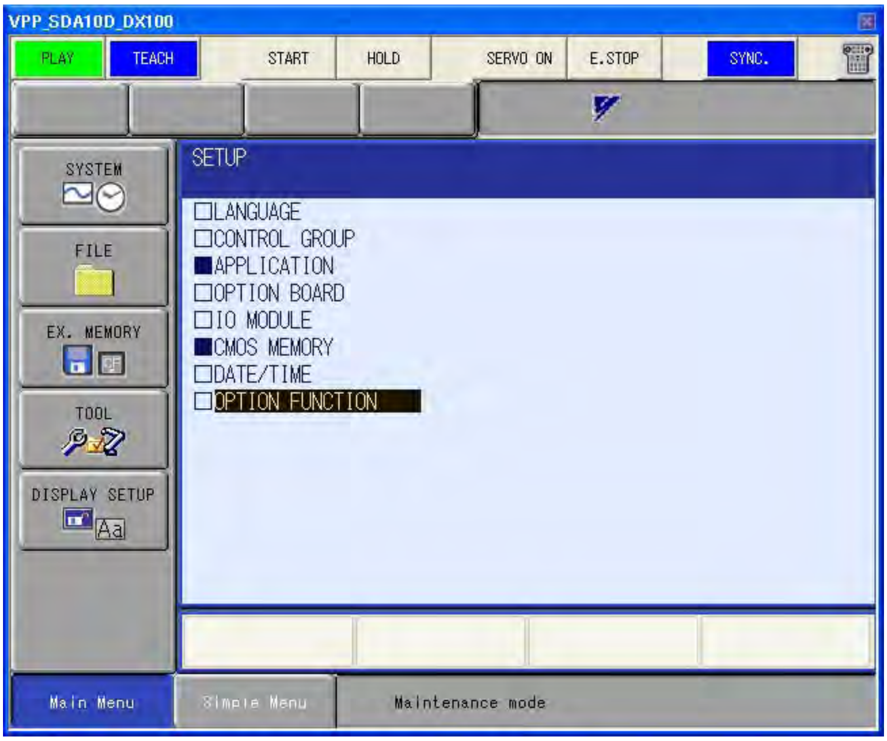
1. Proceed the step 1 and 2 of Section "7.1.1 Create a New VRC Controller (no file)". Select some system version of the "DX100". When the operation is finished, the controller starts in the maintenance mode.
2. Proceed all steps of Section "7.1.3 Initializing the Controller (DX200, DX100, NX100)". At the Step 3, set the control group to the following settings.



The "MECHANICAL SPEC" screen and "MOTOR SPEC" don't need any change. Press [ENTER] to go to the next screen.

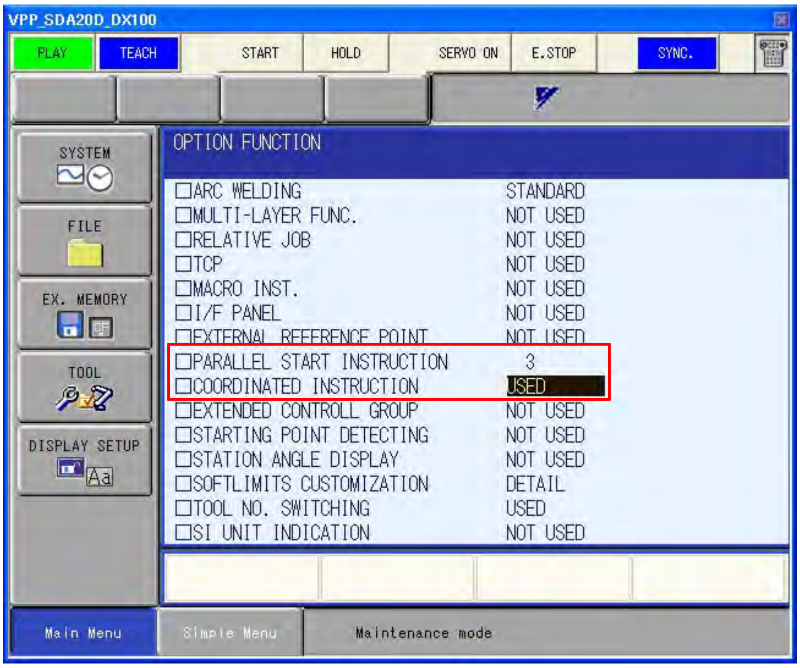


3. From the main menu, select {SYSTEM} - {SETUP}.
4. From the setup list, select {OPTION FUNCTION}.



5. Select the "Parallel Start Instruction" and set its value to "4 Tasks". When the confirmation message displays, select "Yes" to make the change.

6. Select the "Coordinated Instruction" and set its value to "Used". When the confirmation message displays, select "Yes" to make the change.



7. Close the controller "Maintenance Mode" by clicking the [Finish] button of the MotoSim EG-VRC "Instruction Guide" dialog.
8. To set the robot models , proceed the step 4 of Section "7.1.1 Create a New VRC Controller (no file)".
9. To set the calibration data of the controller, proceed "Set calibration data base on robot model layout" of Section "7.6.3 Robot Calibration Setting".
10. Change the security mode to "MANAGEMENT MODE" in the virtual pendant.
11. Select {SETUP} - {GRP COMBINATION}, add the group combination (ex. "R1+R2", "R1+R2",…)
    For detail of group combination, please refer to the "Controller Options: Instructions for Independent/Coordinated control function" manual.

11.6.2 Dual-Arm robot Setting (FS100)

Dual-Arms are composed of right arm, base axis of right arm, left arm and base axis of left arm. When defining the control group of the controller during the initialization, four control groups need to be set. There are two robot groups (R1 and R2) for the arms and two base axis group (B1, B2).

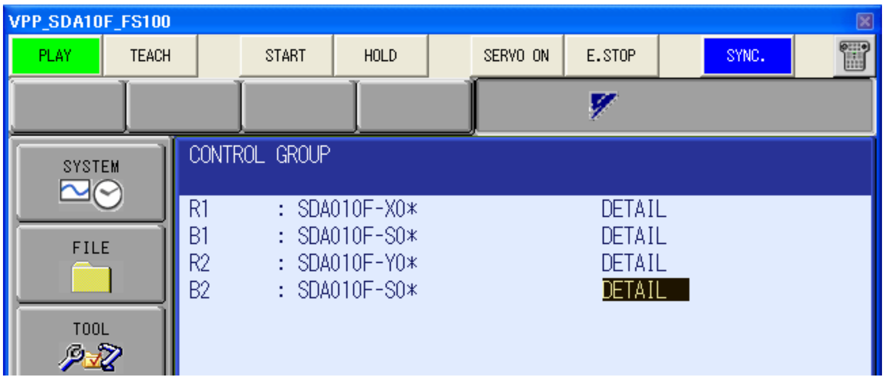
To determine the robot model to select from the robot list, remove the "A00" part of the robot type and replace it by:

- X0* for the left arm robot (R1)
- S0* for the base axis of the left arm robot (B1)
- Y0* for the right arm robot (R2)
- S0* for the base axis of the right arm robot (B2)

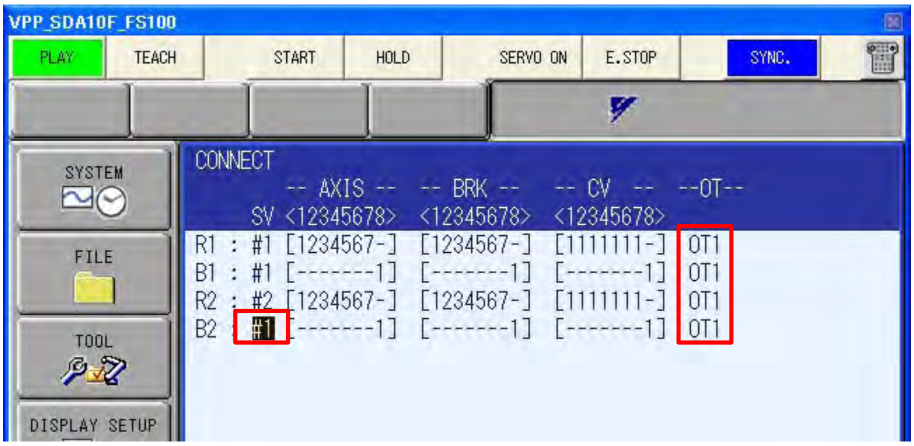
For example for a SDA010F-A00 robot, the control groups should be set to SDA010F-X00, SDA010F-S00, SDA010F-Y00 and SDA010F-S00.

Procedure

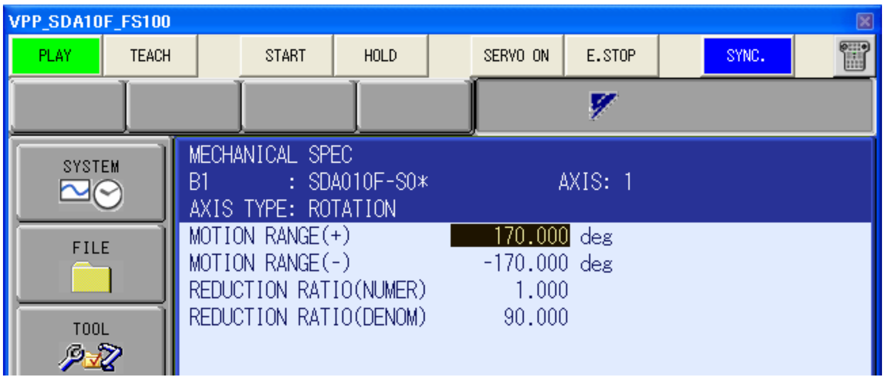
1. Proceed the step 1 and 2 of Section "7.1.1 Create a New VRC Controller (no file)". Select some system version of the "FS100". When the operation is finished, the controller starts in the maintenance mode.
2. Proceed all steps of Section "7.1.4 Initializing the Controller (FS100)". At the Step 3, set the control group to the following settings.

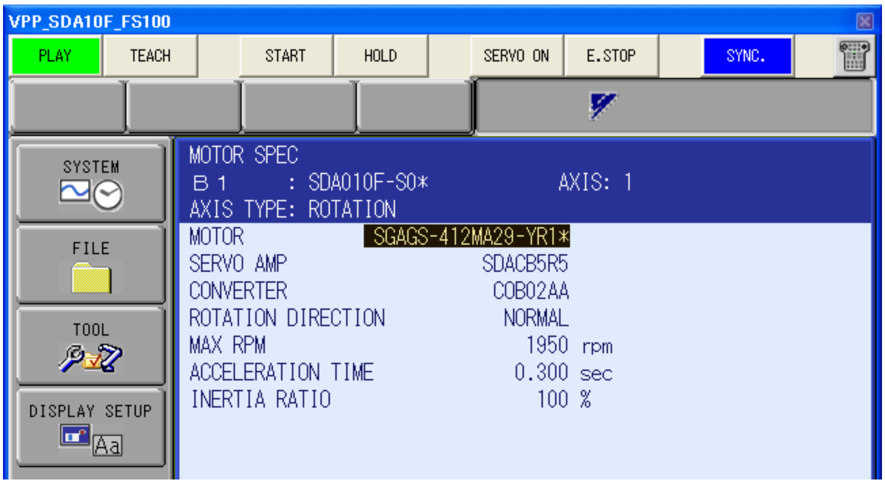


Then at the Step 4, set the connection to the following settings.



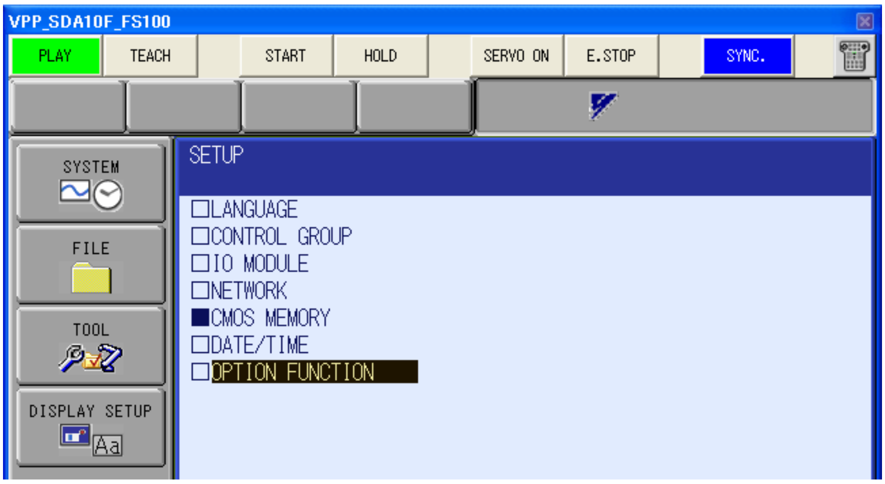
The "MECHANICAL SPEC" screen and "MOTOR SPEC" don't need any change.
Press [ENTER] to go to the next screen.



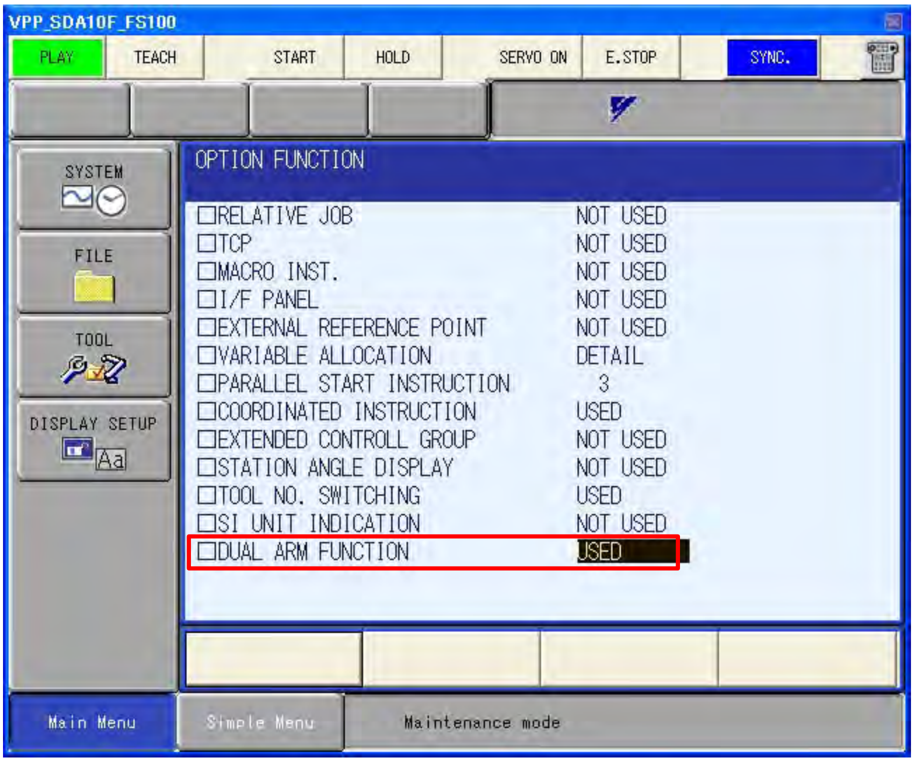


3. From the main menu, select {SYSTEM} - {SETUP}.

4. From the setup list, select {OPTION FUNCTION}.



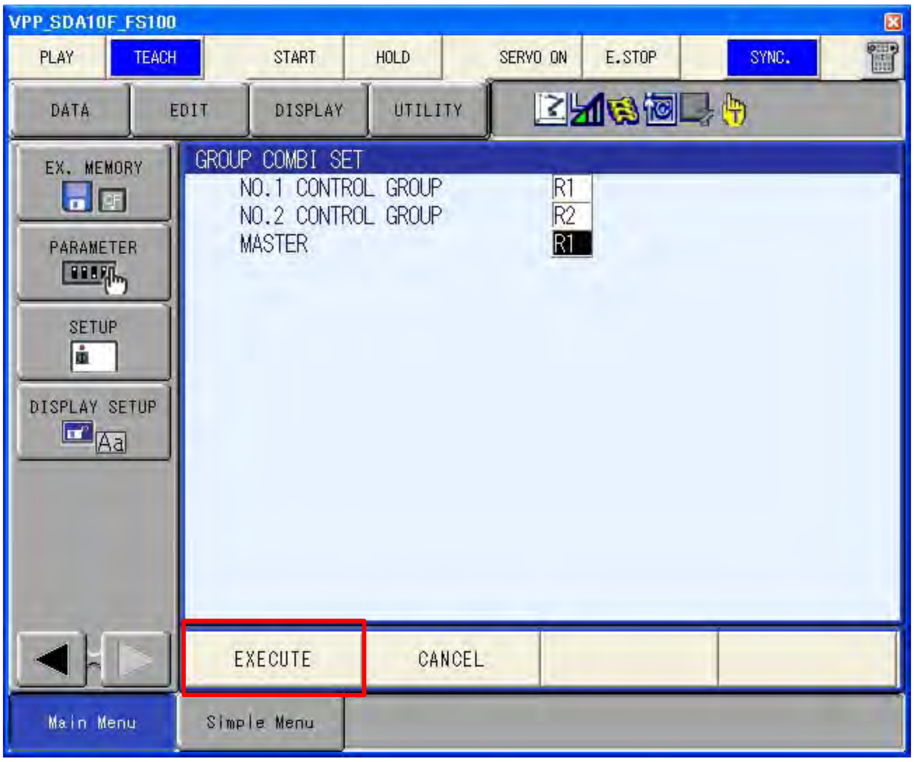
5. Select the "DUAL ARM FUNCTION" and set its value to "Used". When the confirmation message displays, select "Yes" to make the change.



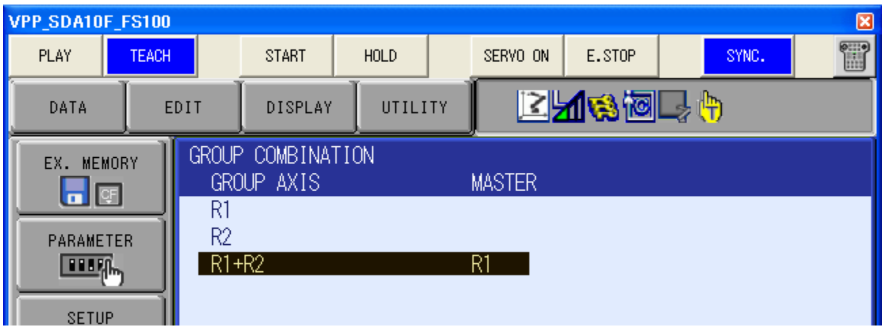
6. Close the controller "Maintenance Mode" by clicking the [Finish] button of the MotoSim EG-VRC "Instruction Guide" dialog.
7. To set the robot models , proceed the step 4 of Section "7.1.1 Create a New VRC Controller (no file)".
8. To set the calibration data of the controller, proceed "Set calibration data base on robot model layout" of Section "7.6.3 Robot Calibration Setting".
9. Change the security mode to "MANAGEMENT MODE" in the virtual pendant.
10. Select the {SETUP} - {GRP COMBINATION} menu in the virtual pendant.

11. Press [SELECT], and select "ADD GROUP".

12. Set the "NO.1 CONTROL GROUP" to "R1", "NO.2 CONTROL GROUP" to R2 and "MASTER" to R1. Then click the [EXECUTE] button.



13. If the "R1+R2:R1" group combination set is created, the setting is finished.



11.6.3 Dual-Arm robot Setting (NX100)

Dual-Arms are composed of right arm, left arm and one torso. When defining the control group of the controller during the initialization, three control groups need to be set. There are two robot groups (R1 and R2) for the arms and one station group (S1) for the rotation of the torso.

To determine the robot model to select from the robot list, remove the "A00" part of the robot type and replace it by:

- X0* for the left arm robot (R1)
- Y0* for the right arm robot (R2)
- W0* for the torso rotation (S1)

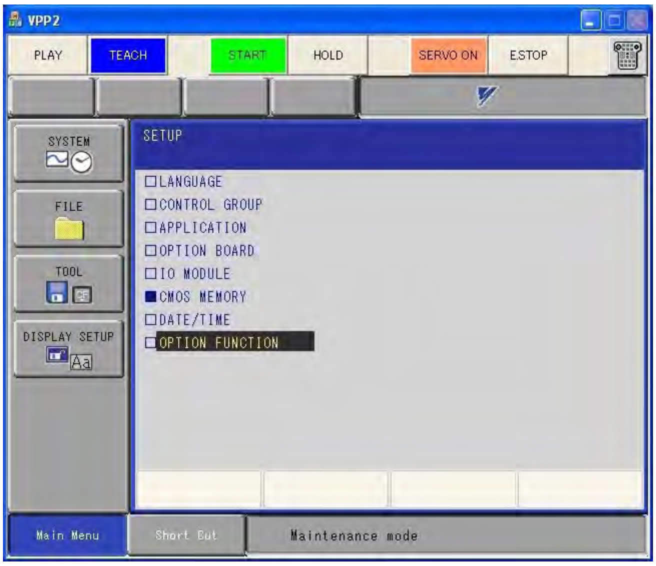
For example for a SDA10-A00 robot, the control groups should be set to SDA10-X00, SDA10-Y00 and SDA10-W00.

Procedure

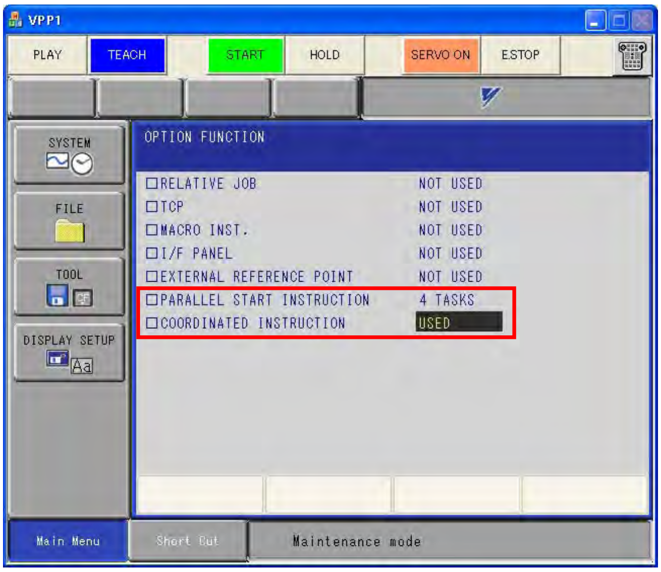
1. Proceed the step 1 and 2 of Section "7.1.1 Create a New VRC Controller (no file)". Select some system version of the "NX100". When the operation is finished, the controller starts in the maintenance mode.
2. Proceed all steps of Section "7.1.3 Initializing the Controller (DX200, DX100, NX100)". At the Step 3, set the control group to the following settings.

3. From the main menu, select {SYSTEM} - {SETUP}.

4. From the setup list, select {OPTION FUNCTION}.



5. Select the "Parallel Start Instruction" and set its value to "4 Tasks". When the confirmation message displays, select "Yes" to make the change.
6. Select the "Coordinated Instruction" and set its value to "Used". When the confirmation message displays, select "Yes" to make the change.

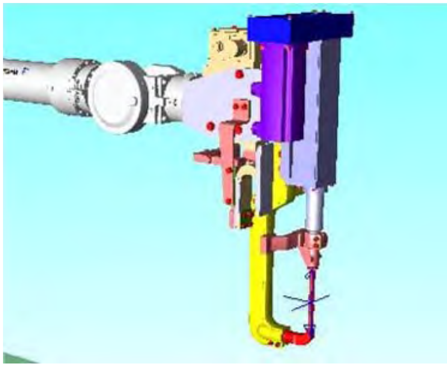


7. Close the controller "Maintenance Mode" by clicking the [Finish] button of the MotoSim EG-VRC "Instruction Guide" dialog.
8. To set the robot models , proceed the step 4 of Section "7.1.1 Create a New VRC Controller (no file)".
9. To set the calibration data of the controller, proceed "Set calibration data base on robot model layout" of Section "7.6.3 Robot Calibration Setting".
10. Change the security mode to "MANAGEMENT MODE" in the virtual pendant.
11. Select {SETUP} - {GRP COMBINATION}, add the group combination (ex. "R1+R2", "R1+R2",…)

    For detail of group combination, please refer to the "Controller Options: Instructions for Independent/Coordinated control function" manual.

11.7 External Axes Setting (Motor Gun)

The following example shows how to setup an external axis as a Motor Gun on a ES165N robot. By default external axis are setup to rotate around the Z-axis. This example explains how to change the default behavior of the external axis to make the Motor Gun model move linearly along the Z-axis.



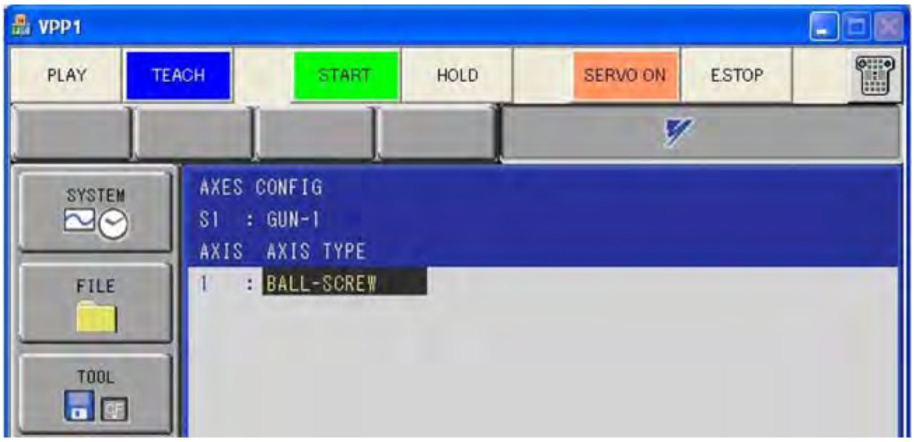
11.7.1 Initialization

Procedure:

Add a new controller with no CMOS.BIN according to the precedure of section 7.1.2 Create Controller with no CMOS.

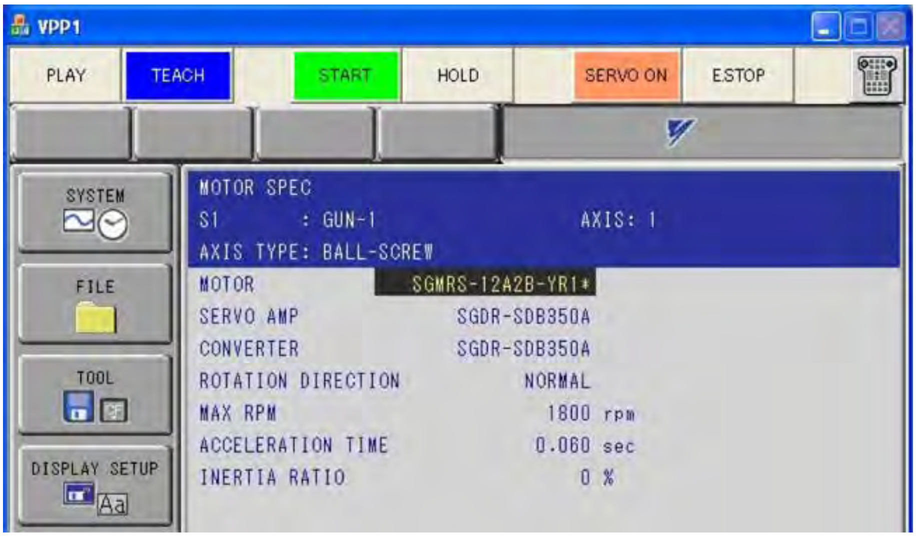
1. When initializing the controller with the procedure of section 7.1.5 Initializing the Controller, at the "CONTROL GROUP" screen (step 4), enter the information as follows:

   Press [ENTER] to go to the next screen.
2. The "CONNECT" screen doesn't need any change. Press [ENTER] to continue to the external axis setup screens.
3. The "AXIS CONFIG" defines the external axis mechanism type between "BALL-SCREW", "RACK&PINION" or "ROTATION". The available types depends on the machine type selected in the "CONTROL GROUP" screen. In the case of "GUN", the only choice is "BALL-SCREW". Press [ENTER] to go to the next screen.



4. In the “MECHANICAL SPEC” screen, define the “MOTION RANGE” (+ and -) of the axis. The values are the soft limit of the external axis and will prevent the axis from moving outside of this range.
   The “REDUCTION RATIO” is used to enter the ratio of the speed reducer. Usually in the case of a Motor Gun there are none, so both values are set to 1.
   The “BALL-SCREW PITCH” is the linear motion for one full revolution of the screw. As a reference, most motors encoder have a resolution of 4096 pulses per revolution. So in this example, a value of 4.096 mm/r means that the gun shaft will travel 0.001 mm for every pulse.
   Press [ENTER] to go to the next screen.

5. In the “MOTOR SPEC” screen, if you know which hardware will be used, you may enter it. Otherwise, leave the default value. For the “MOTOR” field, the choice will affect the encoder resolution. The “SGMRS” motor series are fairly standard and have a encoder resolution of 4096 pulses/revolution.
   Press [ENTER] to go to the next screen.



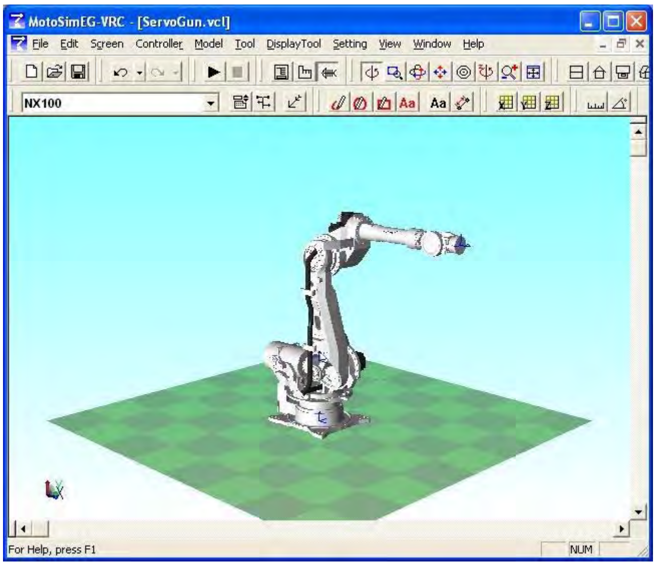
6. In the "APPLICATION" screen, select "MOTOR GUN" as the application.
7. Continue the regular initialization procedure as per section 7.1.5 Initializing the Controller. Press the "Finish" button of the "Instruction Guide" window to reboot the controller in normal mode.

11.7.2 Model setup and motion

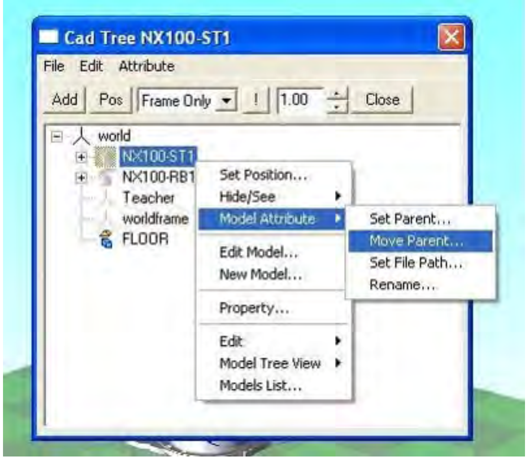
By default in MotoSim EG-VRC, the external axis are setup with the "world" model as a parent and the axis will rotate around the Z-axis. In the case of a Motor Gun the external axis need to be moved to the end of the robot and the motor motion change to move the model linearly along the Z-axis.

Procedure:

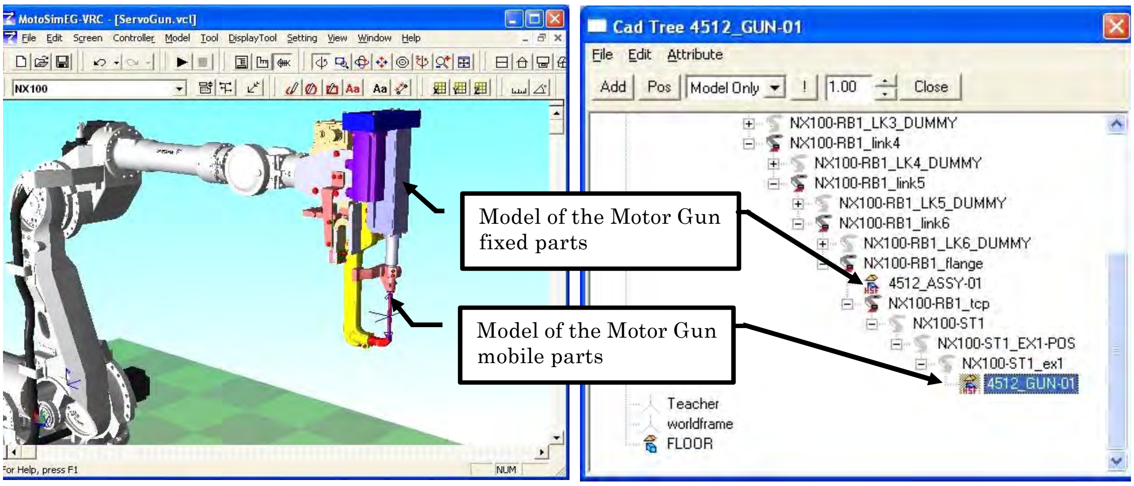
1. Once the controller has been added to the cell. The robot model will be displayed in the middle of the cell. The external axis will not have any model attached to it and will only be visible in the CADtree dialog.



2. Display the CADTree dialog, then select the controller station (e.i. NX100-ST1). Move this model to the robot TCP model (e.i. NX100-RB1_tcp) with the “Move Parent” function.



3. With the Virtual Pendant, define the robot TOOL. This will change the robot TCP model (e.i. NX100-RB1_tcp) in MotoSim EG-VRC.
4. Add or create a model for the Motor Gun fixed part with the robot flange (NX100-RB1_flange) as the parent.
5. Add or create a model for the Motor Gun mobile part with the station axis model (NX100-ST1_ex1) as a parent.



6. At this point, if the station axis is moved, the model will rotate around the Z-axis instead of moving along it. To change this, save and close the cell.
7. With a text editor (such as “Notepad”), open the cell file (*.vcl).
   In the controller section, under the station (ST1) section add the following line:

   AXIS1=(TYPE=Z);.

NOTE

Note that the ratio and offset can also be modified in this manner. This maybe useful if the Motor Gun specific hardware is unknown.

AXIS1=(TYPE=Z)(RATIO=1.0)(OFFSET=0.0);

where:

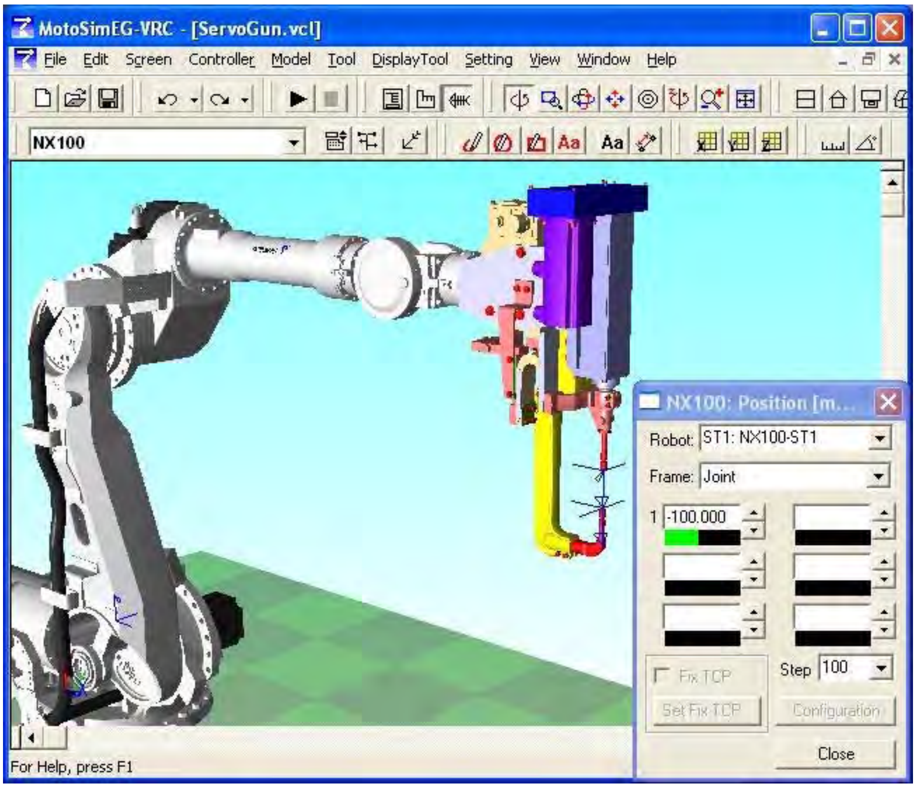
AXIS* : Axis No. of the robot (begins with 1.)
TYPE: Direction to move (X, Y, Z, Rx, Ry or Rz)
RATIO: The distance moved (mm or rad) for each pulse
OFFSET: The initial move amount (mm or rad)

```
CELL_INIT
{
VERSION=1, 1, 0, 0

CONTROLLER(0)
{
PATH=%CELPATH%¥NX100;
NAME=NX100;
RB1
        {
        NAME=NX100-RB1;
        FILE=%CELPATH%¥NX100¥RB1¥ES165N-A00.mdl;
        }
ST1
        {
        NAME=NX100-ST1;
        FILE=dummy;
        AXIS1=(TYPE=Z);
        }
TRACE
        {
        ROBOT=NX100-RB1;
        }
}
...
```

Add this line

8. Save the text file and then reopen the cell file with MotoSim EG-VRC. Confirm that the Motor Gun axis is working properly.



If the model doesn't move in the proper direction, you may need to adjust the orientation of the station axis 1 location frame (e.i. NX100-ST1_EX1-POS) and then readjust the Motor Gun mobile part model.

11.8 Setting of spot welding simulation

Electric gun of an external axis is set to the robot, and it explains the procedure for simulating the spot welding.

NOTE

- The simulation of the spot welding is a function that can be used only with DX200/DX100. It doesn't deal with other controllers.
- The simulation of spot gun change system is not supported.
- The following function keys for spot welding using motor gun are not supported.

  Manual spot welding ([INTERLOCK] + [./SPOT])
  Manual dry spot welding ([INTERLOCK] + [2/GUN CLOSE])
  Pressurizing ([INTERLOCK] +[8/PRESSURE])
  Releasing ([INTERLOCK] +[9/RELEASE])

11.8.1 Initialize

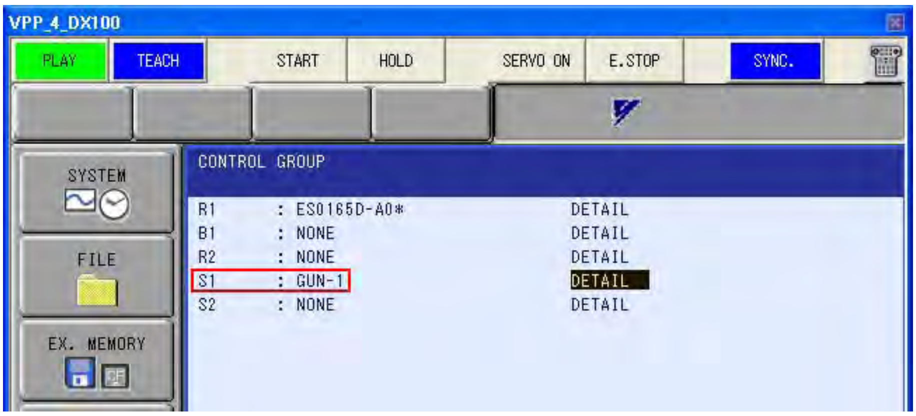
Procedure:

A new controller is registered by the operational procedure of Section "7.1.1 Create a New VRC Controller (no file)".

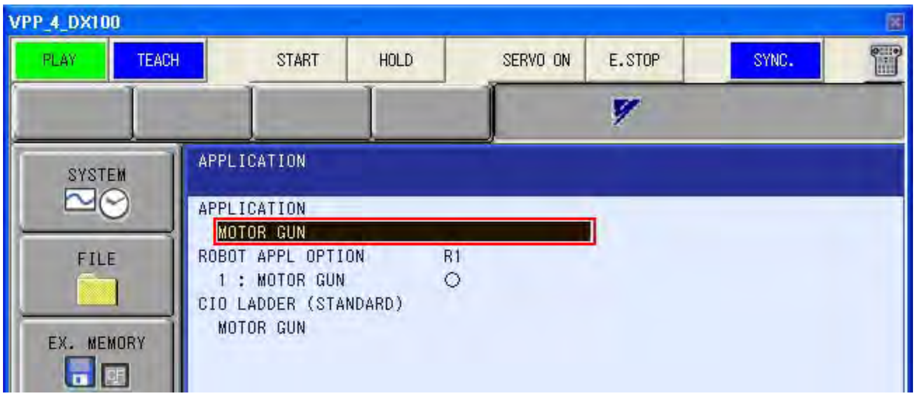
1. When initializing the controller with the procedure of section 7.1.3 Initializing the Controller, at the “CONTROL GROUP“ screen (Step3), enter the information as follows:
   Please refer to Section "7.1.3 Initializing the Controller (DX200, DX100, NX100)" for details of the controller's initialization.

NOTE

When the spot welding simulation is done with two or more robots, it is necessary to set gun according to the robot.
Please select "GUN-1" each S1 and S2 when systems are two robots.



2. Each item of the connection etc. keeps not changing, either [enter] being pushed, and it advancing to the function specification of a set screen of an external axis. Each item of the “MECHANICAL SPEC“and the “MOTOR SPEC“ is set, [enter] is pushed, and it advances to the following screen.
   Please refer to procedures 4 and 5 of Section "11.7.1 Initialization" for the setting of each item.
3. "MOTOR GUN" is selected by the usage.



4. The initialization setting is done according to procedure of Section "7.1.3 Initializing the Controller (DX200, DX100, NX100)". The completion button of the “Controller Maintenance Mode Instructions ” is pushed. A virtual pendant is restarted in the normal mode.

11.8.2 Setting of welded condition

It is variously set to simulate the spot welding.

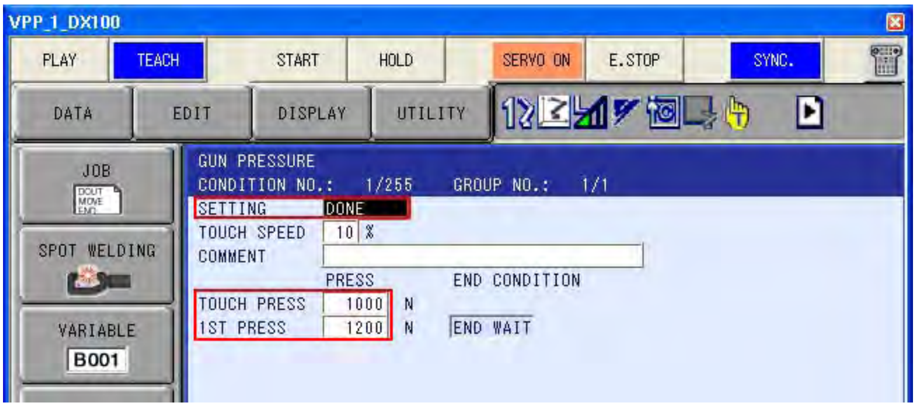
Procedure:

1. To change the setting of the spot welding, the security mode is changed to "MANAGEMENT MODE".
2. The main menu {SPOT WELDING} - {GUN PRESSURE} of a virtual pendant is selected.

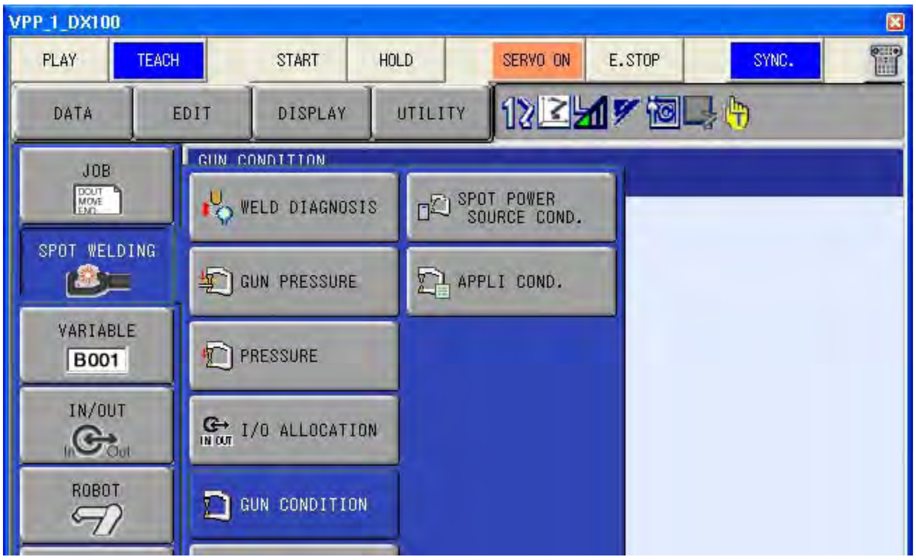
3. The setting of the gun pressurizing power is changed.
   An appropriate value is input to this “TOUCH PRESS“ and “1ST PRESS“, the cursor is matched to the item of the “SETTING”, the [SELECT] or the [Space] key is pushed, and the “SETTING” is changed to "DONE".

NOTE

This procedure does only necessary minimum setting.
For detailed setting, please refer to each controller's “OPERATOR’S MANUAL (FOR SPOT WELDING USING MOTOR GUN)“.

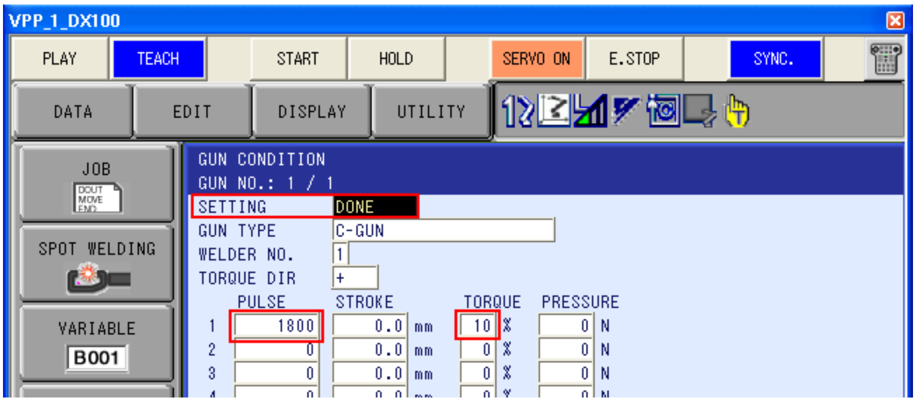


4. The main menu {SPOT WELDING} - {GUN CONDITION} of a virtual pendant is selected.

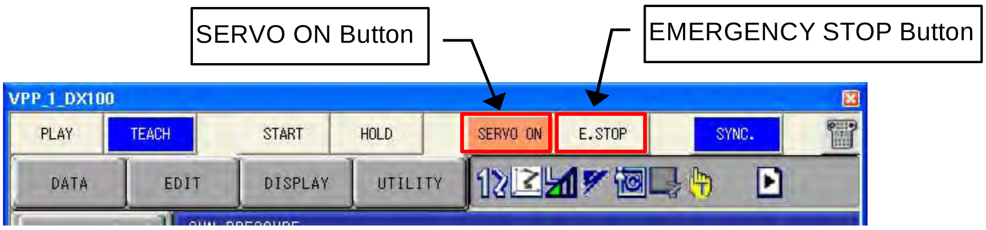


5. The setting of the gun characteristic is changed.
   An appropriate value is input to this “PUSLE“ and “TORQUE“, the cursor is adjusted to the item of the “SETTING”, the [SELECT] or the [Space] key is pushed, and the “SETTING” is changed to "DONE".

> **NOTE** This procedure does only necessary minimum setting.
> For detailed setting, please refer to each controller's “OPERATOR’S MANUAL (FOR SPOT WELDING USING MOTOR GUN)“.



6. To make changed gun pressurizing power and gun characteristic effective, the servo is turned off once. After that, it comes to be able to execute the simulation of the spot welding by turning on the servo again.

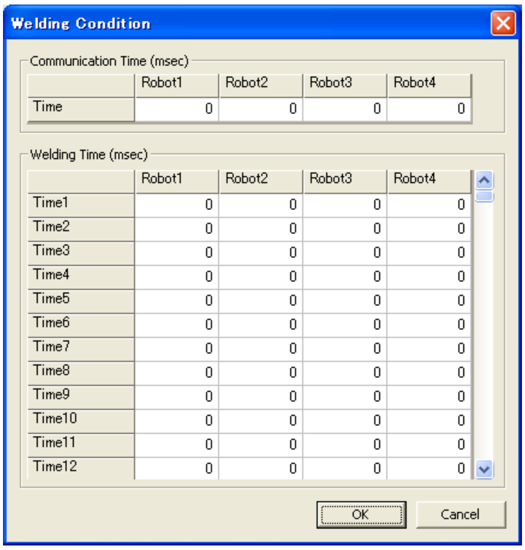


1) The emergency stop button is pushed, it puts into the emergency halt condition, and the servo is turned off.
2) The emergency stop button is pushed, and the emergency halt condition is released.
3) The servo is turned on pushing servo ON button.

> **NOTE** It becomes impossible to do the playback of the welding job normally if the setting is not reflected.
> Please execute the procedure of servo OFF and turning on when you change the setting.

11.8.3 Setting of welding machine

The welding machine can be simulated in MotoSim EG-VRC.
It is necessary to set the communication time and the welding time with the welding machine to simulate the welding machine.
On the [Controller] tab, in the [File Settings] group, click the [Welding Condition] button, the [Welding Condition]] dialog appears.



“Welding Condition” Dialog Box

Item	Description
[Communication Time (msec)] edit box	A fixed value of each welding machine is set
[Welding Time (msec)] edit box	The welding time of each welding condition number specified by the welding instruction is set.

11.8.4 Making and control group setting of job

The control group of the job sets and it is necessary to set the group combination before making the job is started.
Please refer to each controller's "OPERATOR'S MANUAL (FOR SPOT WELDING USING MOTOR GUN)" for details.

11.8.5 Setting of simulation of electric gun

Please refer to Section "11.7 External Axes Setting (Motor Gun)" for the setting to simulate electric gun.

11.9 Setting of Conveyor Synchronization

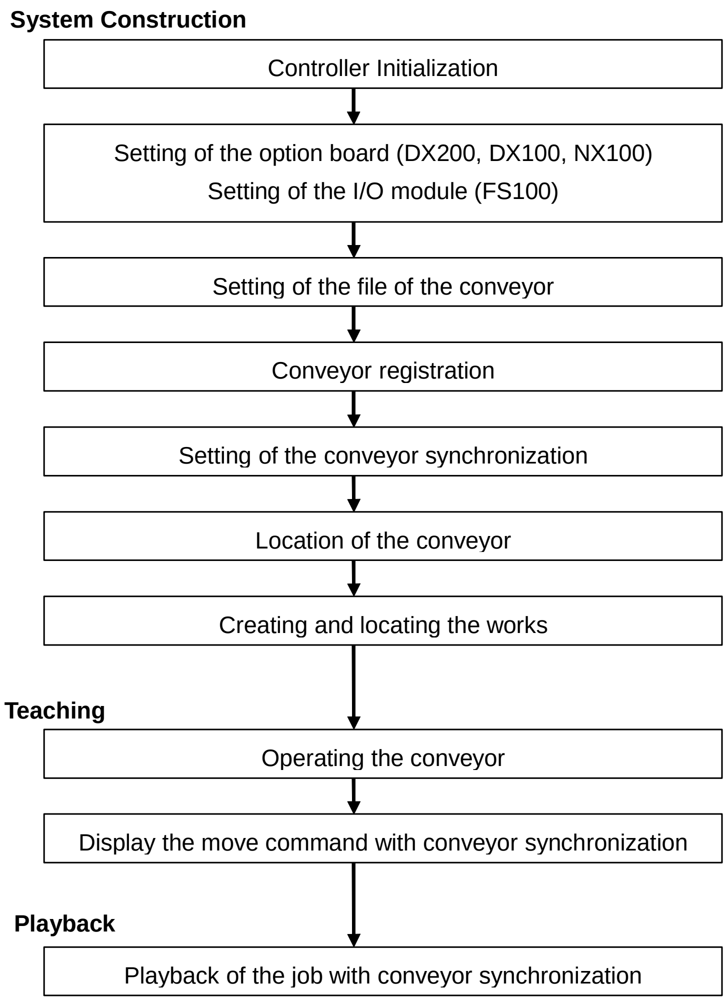
Set the conveyor synchronization for the robot, and it explains the procedure for the simulation of conveyor synchronization.

NOTE

- This function can not use depending on the system version of controller. Please refer to section Section "A.6 List of Function depending on the system version of controller".
- This function is available for 1 axis conveyor only. (2 axes and 3 axes conveyor can not be set conveyor synchronization.)
- This function can not use CMOS.BIN of a real robot.
- This function can not be used with high-speed playback function.Refer to section Section "7.5.4 Refresh Interval" about high-speed playback function.
- To simulate the job with high-speed picking, use the template function.
  Refer to section Section "4.1.1 Template Function" about template function.

11.9.1 Overview Flowchart

Follow the flowchart below to create the environment.



11.9.2 System Construction

It explains the procedure from the new cell creation to creation the environment for creating the job with conveyor synchronization.

■ Controller Initialization

Follow the procedure of section Section "7.1.1 Create a New VRC Controller (no file)" to create a new VRC controller. After Creation, the cell is saved and closed.

■ Setting of the option board (DX200, DX100, NX100)

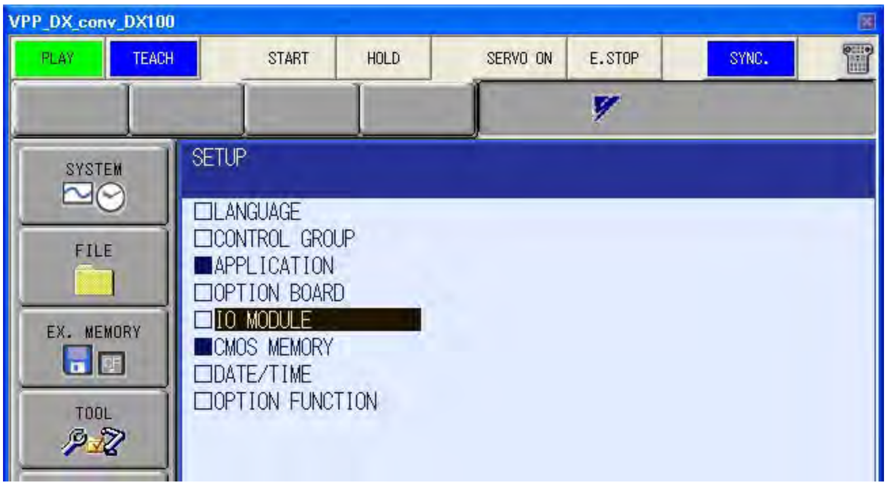
Procedure

1. With text editor software (ex. Notepad) open the "OPTION_BOARD.ini" file located in the controller folder of the cell.
2. Edit the file as follows

DX200, DX100	**NX100**	
[SLOT0]	[SLOT0]	
YCP02=1	NCP02=1	← Set those value
CONVEYOR.RO	CONVEYOR.ROM	
M=1	=1	
[SLOT1]	[SLOT1]	
YCP02=0	NCP02=0	
CONVEYOR.RO	CONVEYOR.ROM	

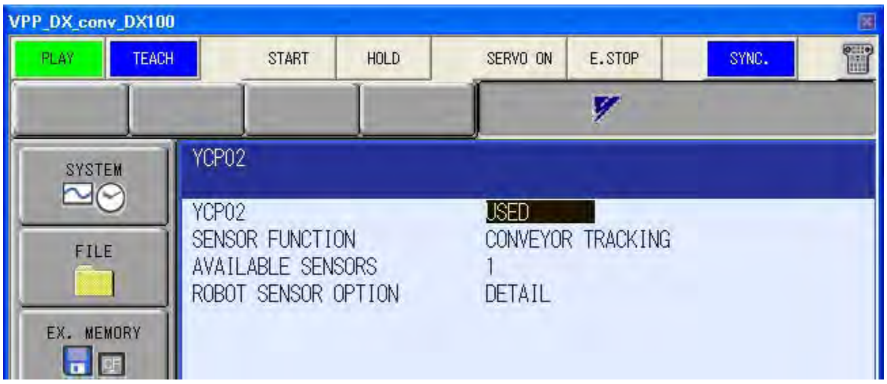
(Setting of the option board 1 for conveyor synchronization)
File of conveyor synchronization #1 to #3 are available

3. Start MotoSim EG-VRC in Maintenance mode. (For more detail the controller maintenance mode, refer to section Section "7.10 VRC Maintenance Mode".)
4. From the Virtual Pendant main menu select {SYSTEM} - {SETUP}.
5. Then Select {OPTION BOARD} from the setup list.



6. The option board set to "OPTION_BOARD.ini" file is displayed. Select the option board.

7. Set [YCP02] to [USED]. Push [Enter], and check message appears for three times, so select "Yes" all time.

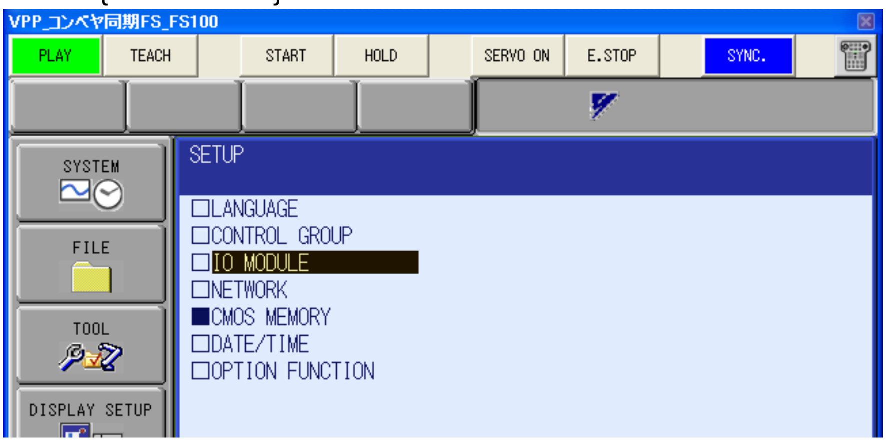


8. To Exit the maintenance mode, click the [End] button on the [VRC Maintenance Mode] of MotoSim EG-VRC.

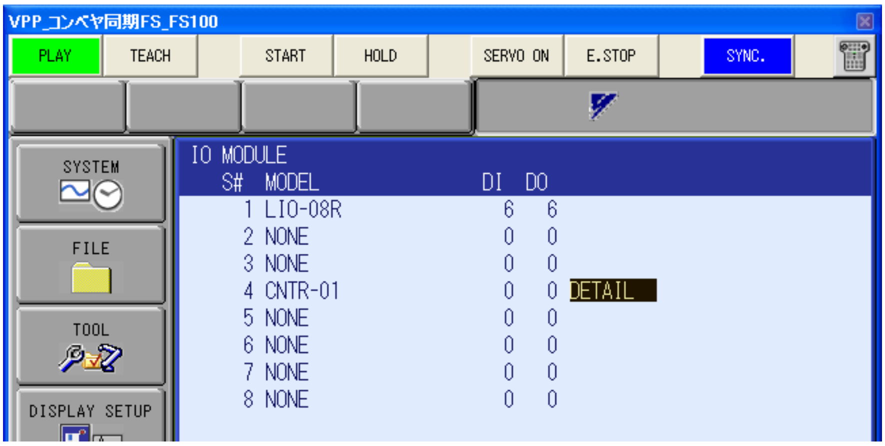
■ Setting of the I/O module (FS100)

Procedure

1. Start MotoSim EG-VRC in Maintenance mode. (For more detail the controller maintenance mode, refer to section Section "7.10 VRC Maintenance Mode".)
2. From the Virtual Pendant main menu select {SYSTEM} - {SETUP}.
3. Then Select {IO MODULE} from

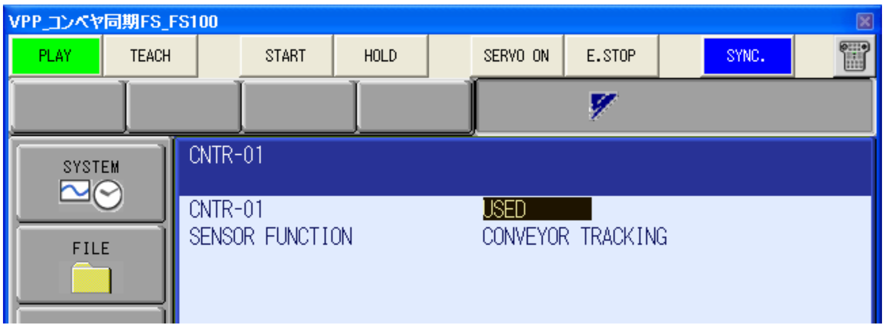


4. Select the [DETAIL] of the [CNTR-01] in the [IO MODULE] display.

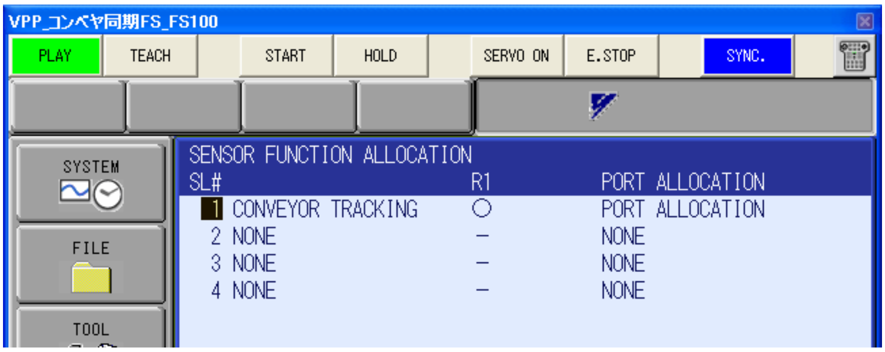


NOTE If the "CNTR-01" does not exist in the IO module list, it needs that the counter board is set. Then, use the step 1 to 3 in the procedure of Section "11.4.2 Adding I/O Board Module (FS100).", and proceed this section from the beginning.

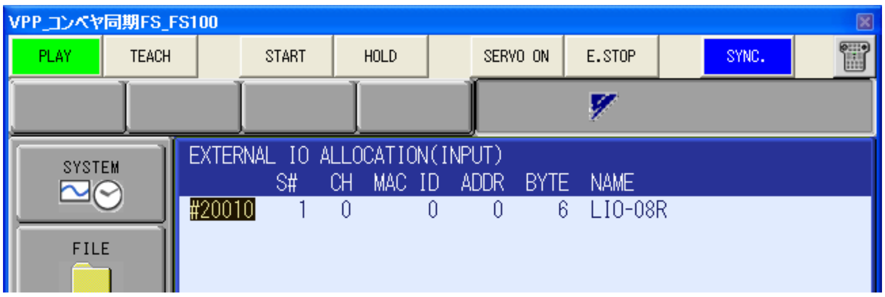
5. Set [CNTR-01] to [USED] and push [Enter].



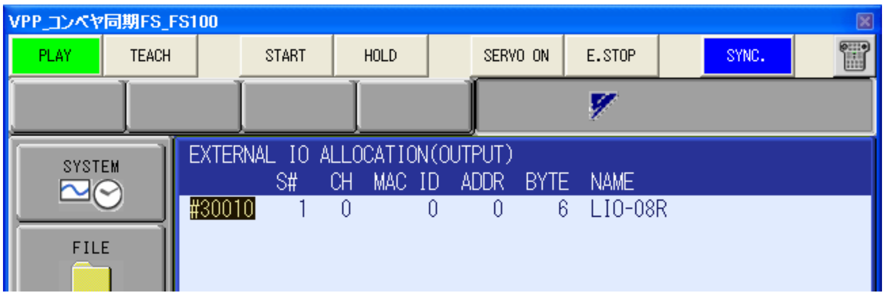
6. The "SENSOR FUNCTION ALLOCATION" screen doesn't need any change. Press [ENTER] to go to the next screen.



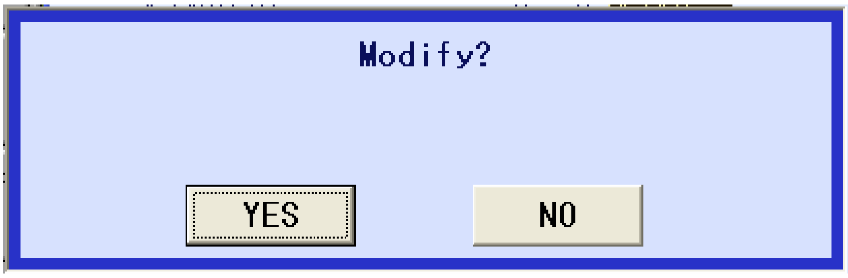
7. The "EXTERNAL IO ALLOCATION (INPUT)" screen doesn't need any change. Press [ENTER] to go to the next screen.



8. The "EXTERNAL IO ALLOCATION (OUTPUT)" screen doesn't need any change. Press [ENTER] to go to the next screen.



9. A confirmation dialog box will appear, select the [YES] button.



10. In the MotoSim EG-VRC "VRC Maintenance Mode" dialog, select the [End] button to exit the controller maintenance mode.

■ Setting of the file of the conveyor

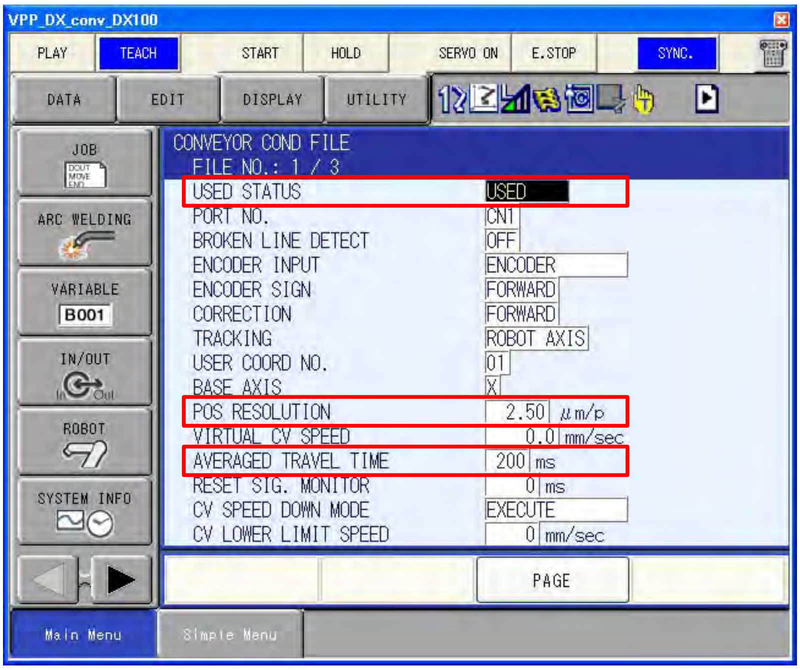
Procedure

1. Open the Cell, and Change the security mode to "MANAGEMENT MODE".
2. From the Virtual Pendant main menu select {ROBOT} - {SETUP}.

3. The setting of the conveyor condition is changed.
   - Set the value depending on the real robot to [POS RESOLUTION] and [AVERAGED TRAVEL TIME], and Set [USED STATUS] to [USED].
   - If the value of [POS RESOLUTION] is not set, [VERIFY ERROR (SENSOR PARAMETER)] alarm is occurred when [USED STATUS] is set to [USED].
   - When [SEGMENT OVER] alarm is occurred during playback, change [AVERAGED

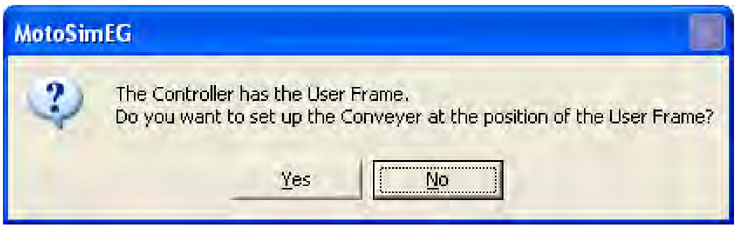
TRAVEL TIME] to the value such as 200ms.

> **NOTE**
> This procedure does only necessary minimum setting.
> For detailed setting, please refer to each controller's "INSTRUCTIONS FOR CONVEYOR SYNCHRONIZED FUNCTION".



■ Conveyor registration

Refer to section Section "7.7.1 Adding a Conveyor" about conveyor registration.
If there is the user coordinates corresponding to the conveyor in the controller, the following dialog box appears. Click [Yes] button, the conveyor is located corresponding to the user frame position.



■ Setting of the conveyor synchronization

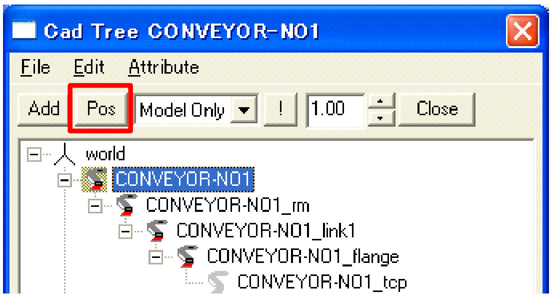
Refer to section Section "7.7.9 Conveyor Synchronization" about setting the conveyor synchronization. Then, robots with conveyor synchronization function made automatically the user coordinates at the target conveyor position with the user coordinates number corresponding to the conveyor number.

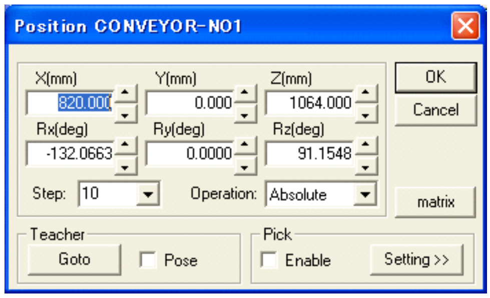
■ Location of the conveyor

Procedure

1. On the [Home] tab, in the [Model] group, click the [CadTree] button, the [CadTree] dialog appears. Select the conveyor model "CONVEYOR-NO [Conveyor Number] (ex. CONVEYOR-NO1) ".

2. Click the [Pos] button. Set the location of the conveyor, and click the [OK] button. Then, robots with conveyor synchronization function made automatically the user coordinates location corresponding to the conveyor location.



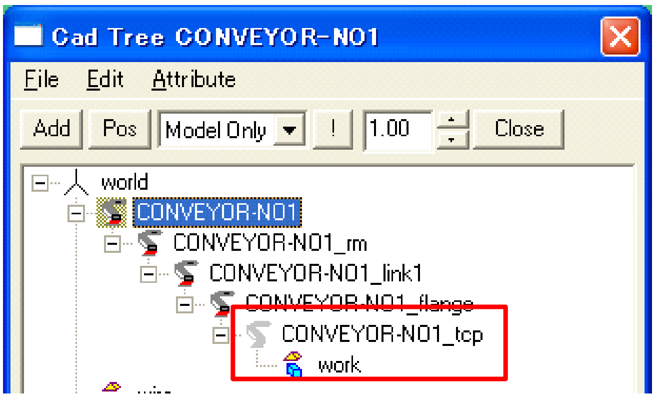


■ Creating and locating the works

Works are set on the conveyor.

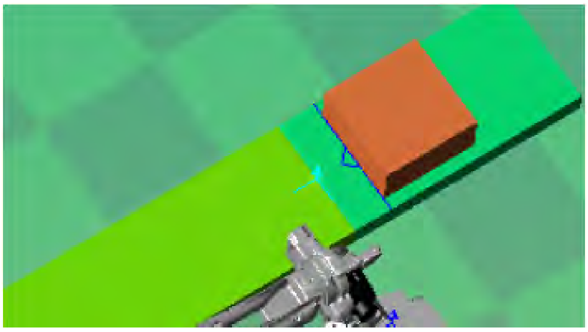
Procedure

1. Set "[Conveyor Name]_TCP" as the parent model by pointing the cursor to "[Conveyor Name]_TCP" in the Cad Tree, and the work models are created.



2. Works are set opposite the mark of the conveyor traveling direction (the triangle on the conveyor). When the line passes through the conveyor origin position (If STP is set other than zero by SYSTART command, when the line passes through the position set

by STP), conveyor synchronization gets start running.



11.9.3 Teaching

■ Operating the conveyor

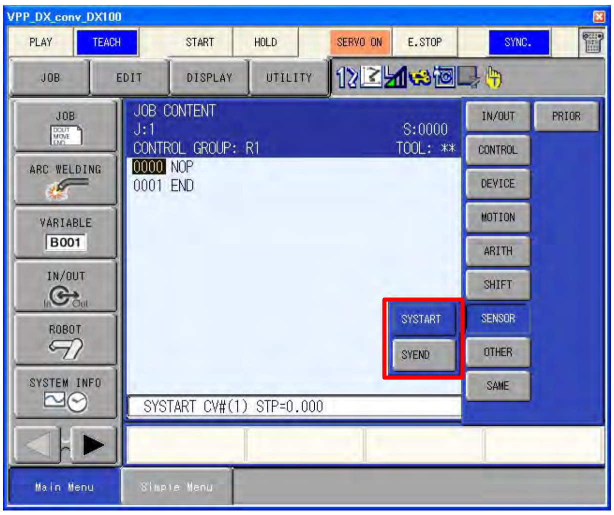
The ways of operating the conveyor are Operation by conveyor operation panel or operation by position panel.
Refer to section Section "7.7.8 Conveyor Operation Panel" and Section "7.7.5 Moving a Device" for detail.

> **NOTE** The position of conveyor in [Position] is reflected LS offset value of the each robot. When the other robot is selected, the position of conveyor in [Position] is changed, without the displayed conveyor is not operating.

■ Teaching the conveyor synchronized move instructions (SYSTART, SYEND, SYMOV*)

Teach the conveyor synchronized move instructions by the virtual pendant. Please refer to "INSTRUCTIONS FOR CONVEYOR SYNCHRONIZED FUNCTION" of each the controller for details.

- Click the [INFORM LIST] button of the virtual pendant, the command list dialog is displayed. Click the [SENSOR] button in the displayed dialog, SYSTART command and SYEND command are available.



• Click the [SHIFT] button and the [MOTION TYPE] button of the virtual pendant, MOV* command is changed to SYMOV* command. Then, click the [MOTION TYPE] button, the motion type is changed (SYMOVJ-> SYMOVL->SYMOVC). And, set the details.

11.9.4 Playback

■ Playback of the job with conveyor synchronization

Procedure

1. On the virtual pendant, move the cursor in the job to the first step. Set the robot position to the position of starting the job.
2. On the job panel of the conveyor, move the cursor in the job to the first step. Set the conveyor position to the position of starting the job.
3. On the [Simulation] tab, in the [Playback] group, click the [Start] button

NOTE The [START] button of the virtual pendant can not use the conveyor synchronization. Please execute the job with the above procedure.

11.10 High-Speed Picking Simulation Function

This function is able to easily simulate "Conveyor Synchronized Function", "Conveyor Synchronized Function with Shift Functions" and "Continuous Operation Conveyor Synchronized Function".

NOTE

- This function can be only used with the cells created from the template cell "MPP3_PICKING" (one MPP3 robot with FS100 controller and two conveyors). This function can not be used with the other cells.
- This function can not be used with high-speed playback function. Refer to Section "7.5.4 Refresh Interval" about high-speed playback function.
- Please do not modify the master job of a template cell.

11.10.1 Overview Flowchart

Follow the flowchart below to create the environment.

Creating a new cell from the template

↓

Location of the conveyors

↓

Setting the size and speed of the conveyors

↓

Location of the works

↓

Location of the pallets

↓

Playback

■ Creating a new cell from the template

Follow the procedure of section Section "4.1.1 Template Function" to create a new VRC controller. Select the "MPP3_PICKING" in the template list, and create a new cell.
A cell available to the high-speed picking simulation is created automatically.

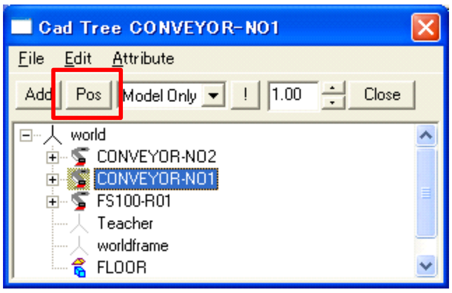
■ Location of the conveyors

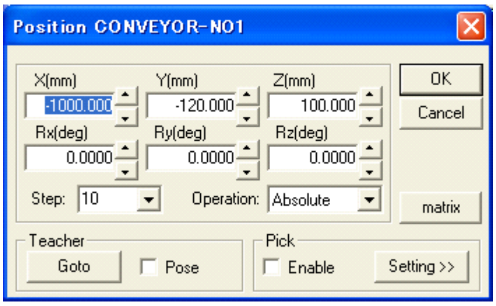
If needed, the location of the conveyors is changed.
In the template "MPP3_PICKING", the MPP3 robot picks the works from CONVEYOR-NO1, and places the works on the CONVEYOR-NO2.

Procedure

1. On the [Home] tab, in the [Model] group, click the [CadTree] button, the [CadTree] dialog appears.
   Select the conveyor model "CONVEYOR-NO [Conveyor Number] (ex. CONVEYOR-NO1) ".

2. Click the [Pos] button. Set the location of the conveyor, and click the [OK] button. Then, the user coordinates location of MPP3 robot (a light blue FRAME) is changed automatically corresponding to the conveyor location.

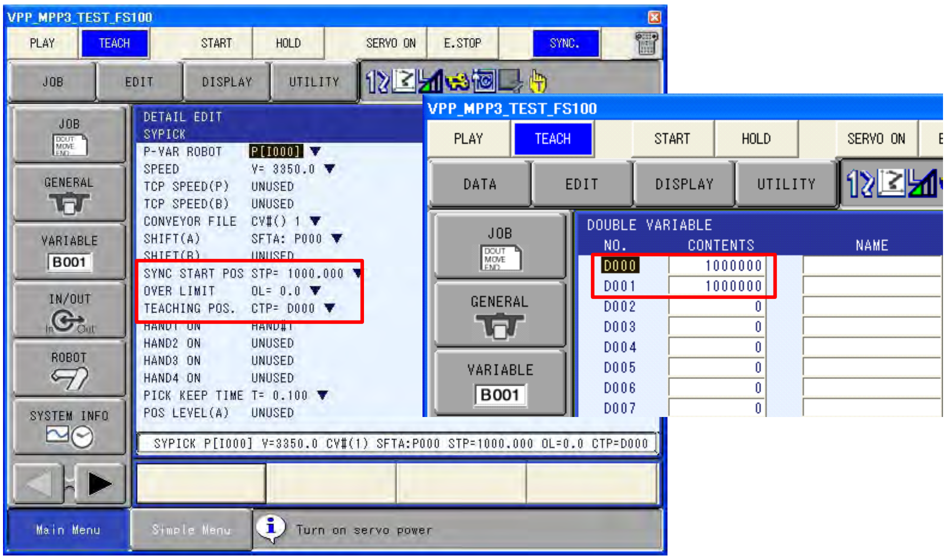


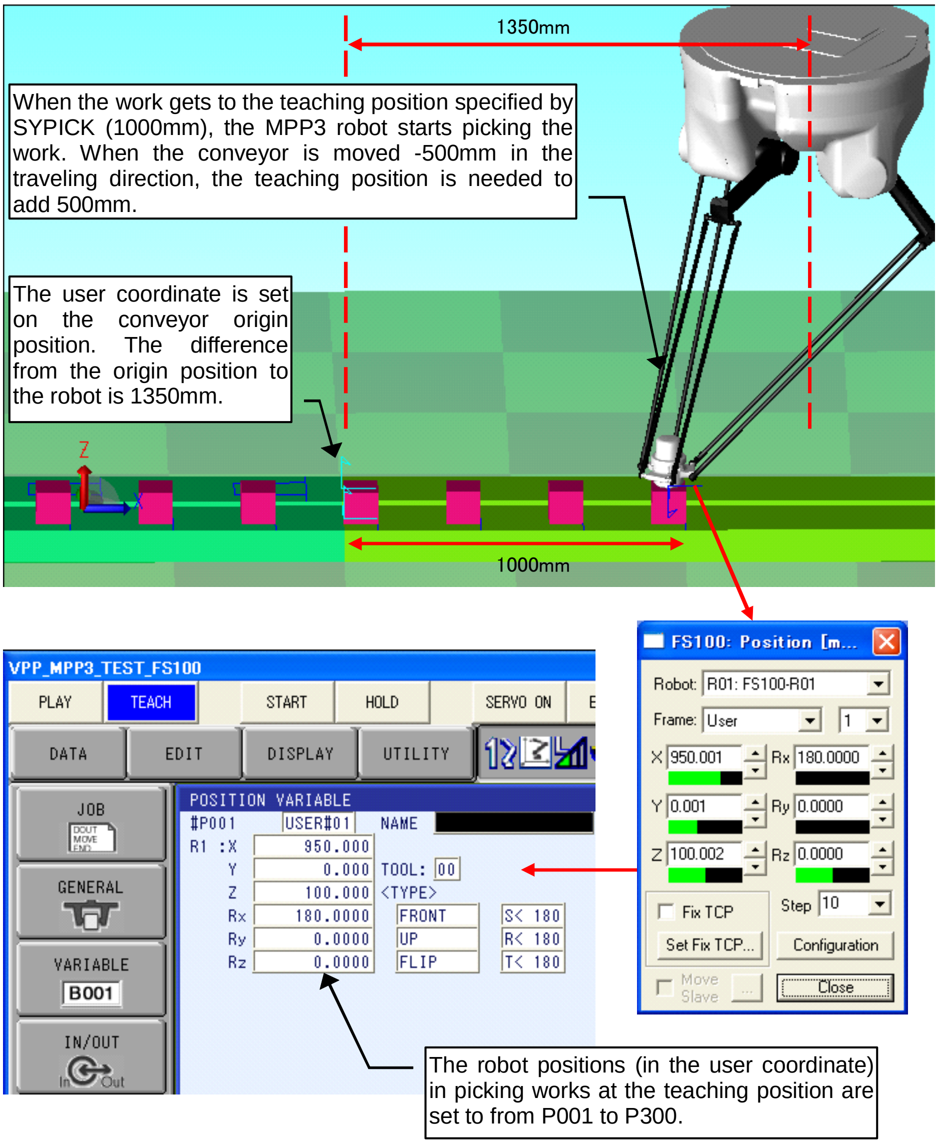


3. When the items other than the distance between the conveyors (Y direction) is changed, the following setting is needed.

   Display the "DETAIL EDIT" of the SYPICK/SYPLACE in the virtual pendant, and Set the "SYNC START POS" and "TEACHING POS." corresponding to the conveyor position.
   For example, When CONVEYOR-NO2 is moved -500mm in the X direction, "SYNC START POS" and "TEACHING POS." are added 500mm.
   1) Move the cursor to the SYPLACE instruction in the virtual pendant, and display the "DETAIL EDIT".
   2) Add 500 to the value of "SYNC START POS".
   3) Select the {VARIABLE} - {DOUBLE} menu, and add 500000 to the value of D001.

> NOTE
> Teaching position is set to the value of D000 (SYPICK), or D001 (SYPLACE) (unit : micrometer).


VPP_MPP3_TEST_FS100
PLAY TEACH START HOLD SERVO ON E.STOP SYNC.
JOB EDIT DISPLAY UTILITY
DETAIL EDIT
SYPICK
P-VAR ROBOT P[I000]
SPEED V= 3350.0
TCP SPEED(P) UNUSED
TCP SPEED(B) UNUSED
CONVEYOR FILE CV#() 1
SHIFT(A) SFTA: P000
SHIFT(B) UNUSED
SYNC START POS STP= 1000.000
OVER LIMIT OL= 0.0
TEACHING POS. CTP= D000
HAND1 ON HAND#1
HAND2 ON UNUSED
HAND3 ON UNUSED
HAND4 ON UNUSED
PICK KEEP TIME T= 0.100
POS LEVEL(A) UNUSED
SYPICK P[I000] V=3350.0 CV#(1) SFTA:P000 STP=1000.000 OL=0.0 CTP=D000
Main Menu
Simple Menu
Turn on servo power
VPP_MPP3_TEST_FS100
PLAY TEACH START HOLD SERVO ON
DATA EDIT DISPLAY UTILITY
JOB
GENERAL
VARIABLE
B001
IN/OUT
ROBOT
SYSTEM INFO
DOUBLE VARIABLE
NO. CONTENTS NAME
D000 1000000
D001 1000000
D002 0
D003 0
D004 0
D005 0
D006 0
D007 0


1350mm
When the work gets to the teaching position specified by SYPICK (1000mm), the MPP3 robot starts picking the work. When the conveyor is moved -500mm in the traveling direction, the teaching position is needed to add 500mm.
The user coordinate is set on the conveyor origin position. The difference from the origin position to the robot is 1350mm.
Z
1000mm
FS100: Position [m...
Robot: R01: FS100-R01
Frame: User 1
X 950.001 Rx 180.0000
Y 0.001 Ry 0.0000
Z 100.002 Rz 0.0000
Fix TCP Step 10
Set Fix TCP... Configuration
Move Slave Close
VPP_MPP3_TEST_FS100
PLAY TEACH START HOLD SERVO ON
DATA EDIT DISPLAY UTILITY
JOB
GENERAL
VARIABLE
B001
IN/OUT
POSITION VARIABLE
#P001 USER#01 NAME
R1 :X 950.000
Y 0.000 TOOL: 00
Z 100.000 <TYPE>
Rx 180.0000 FRONT S< 180
Ry 0.0000 UP R< 180
Rz 0.0000 FLIP T< 180
The robot positions (in the user coordinate) in picking works at the teaching position are set to from P001 to P300.

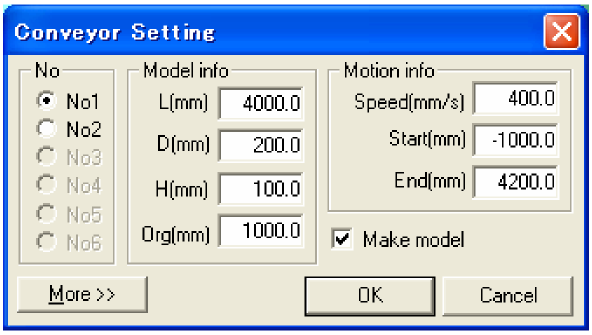
■ Setting the size and speed of the conveyors

If needed, the location of the conveyors is changed.
For details of the Conveyor Setting dialog, refer to section Section "7.7.1 Adding a Conveyor" about conveyor registration.

Procedure

1. On the [Contoller] tab, in the [External Device] group, click the [Conveyor Settings] button, the [Conveyor Setting] dialog appears.

2. Select the conveyor number to change.
3. Set the [L(mm)], [D(mm)], [H(mm)] of Model info.
4. Set the [Speed (mm/s)] of Motion info, and click the [OK] button.



■ Location of the works

Set the information (ex. size of work, work interval on the conveyor, ...) , and models are created automatically.

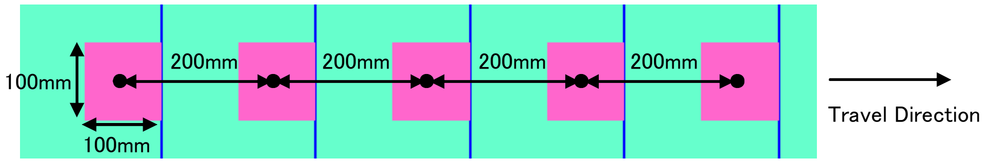
Procedure

1. Select the "FS100" to the current controller.
2. On the [Contoller] tab, in the [External Device] group, click the [Conveyor Settings] button, the [Conveyor Setting] dialog appears.

3. Select the conveyor No.1, and click the [More] button to display [Model Creation for High-Speed Picking] section.
4. Set the work size to the [Width(mm)] and [Height(mm)].
5. Set the works position on the conveyor in the [Pick Position] list.
6. Click the [Make] button, the work models are added on the CONVEYOR-NO1.

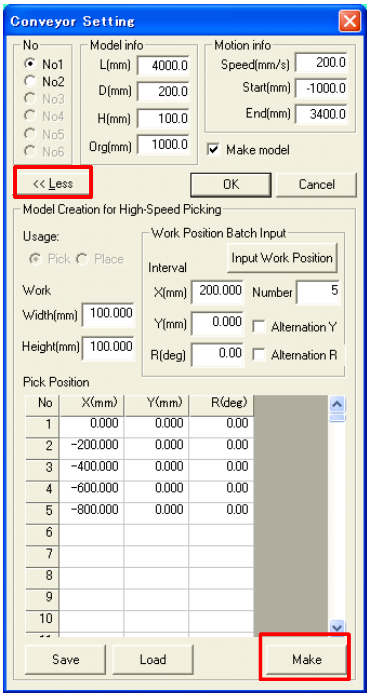
   For example, to set the works on the conveyor as below, the following procedure is operated.
   - Works size : Width 100 mm × Height 100 mm
   - The number of works : 5

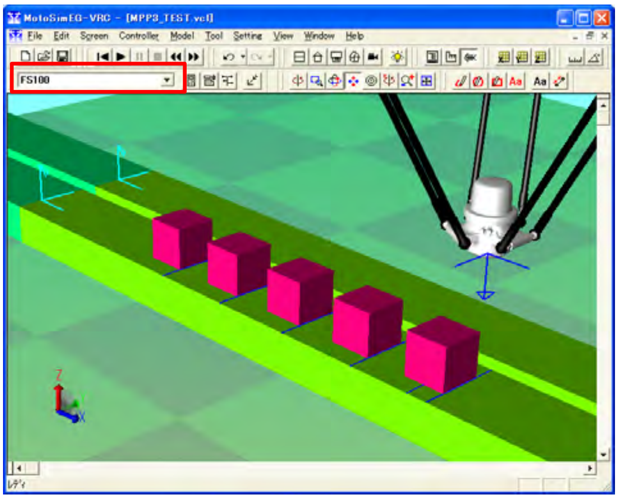
• Work interval : 200mm



(1) Set the [Work] as below,
   [Width(mm)] 100.000
   [Height(mm)] 100.000
(2) Set the [Work Position Batch Input] as below,
   [X(mm)] 200.000
   [Y(mm)] 0.000
   [R(deg)] 0.000
   [Number] 5
   Uncheck the [Alternation Y] checkbox and the [Alternation R] checkbox.
(3) Click the [Input Work Position] button, and click the [OK] button in the displayed confirmation dialog box. The work locations are set in the [Pick Position] list.
(4) Click the [Make] button.

For detail of the dialog, refer to " Location of the works " in the section "11.9.2 Advanced Setting".





■ Location of the pallets

Set the information (ex. size of pallet, work interval on the pallet, ...) , and models are created automatically.

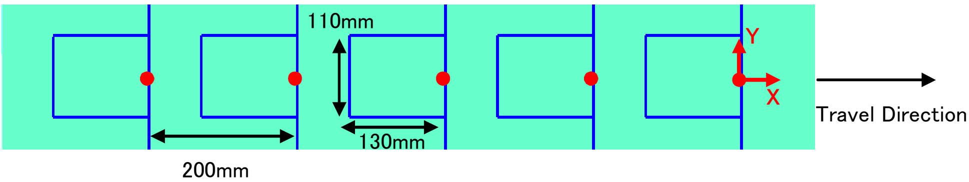
Procedure

1. Select the "FS100" to the current controller.

2. On the [Contoller] tab, in the [External Device] group, click the [Conveyor Settings] button, the [Conveyor Setting] dialog appears.

3. Select the conveyor No.2, and click the [More] button to display [Model Creation for High-Speed Picking] section.
4. Set the pallet size to the [W(mm)] and [L(mm)].
5. Set the works position on the conveyor in the [Pick Position] list.
6. Set the pallet interval on the conveyor and the number of interval to the [X(mm)] and [Number].
7. Click the [Make] button, the pallet models are added on the CONVEYOR-NO2.

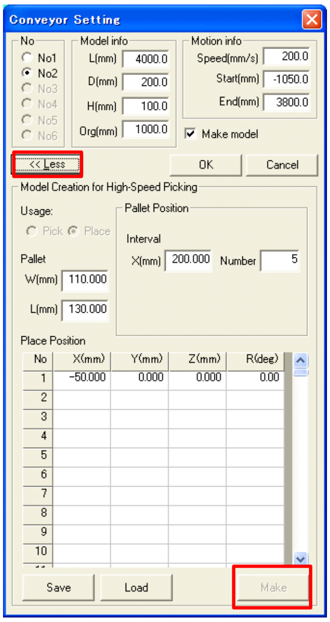
   For example, to set the pallets on the conveyor as below, the following procedure is operated.
   • Pallet size : Width 110mm × Length 130mm
   • The number of pallets : 5
   • Pallet interval : 200mm
   • 1 work per pallet

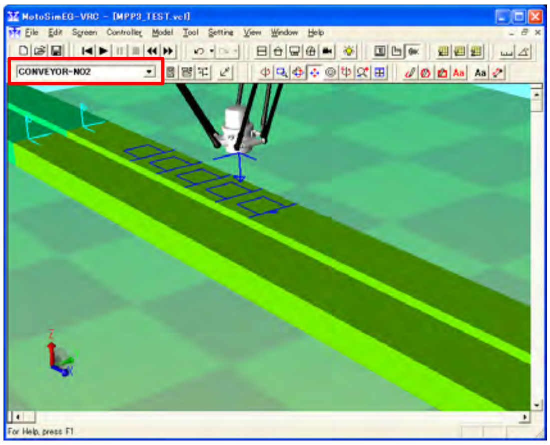


(1) Set the [Pallet] as below,
[W(mm)] 110.000
[L(mm)] 130.000
(2) Set the first line of [Place Position] list as below,
[X(mm)] -50.000
[Y(mm)] 0.000
[Z(mm)] 0.000
[R(deg)] 0.00
(3) Set the [Interval] in the [Pallet Position] section as below,
[X(mm)] 200.000
[Number] 5
(4) Click the [Make] button.

For detail of the dialog, refer to " Location of the pallets " in the section "11.9.2 Advanced

Setting".





■ Playback

1. On the [Simulation] tab, in the [Playback] group, click the [Reset] button.

2. On the [Simulation] tab, in the [Playback] group, click the [Start] button.

NOTE

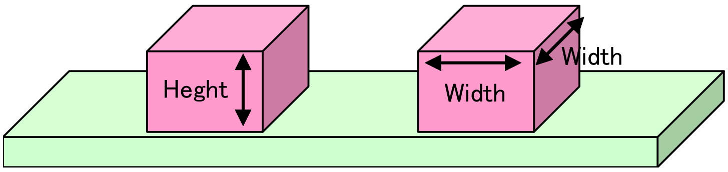
The [START] button of the virtual pendant can not use high-speed picking simulation function. Please execute the job with the above procedure.

11.10.2 Advanced Setting

This section describes other settings used by high-speed picking simulation function.

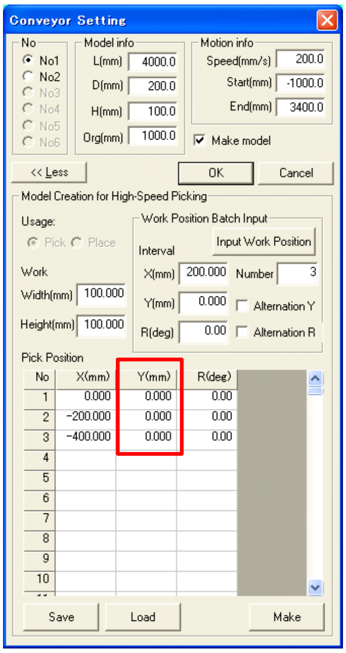
■ Location of the works

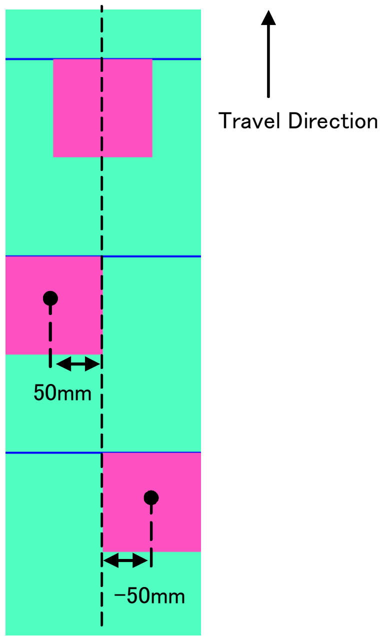
1. In the [Conveyor setting] dialog, the width and height is set to [Work].



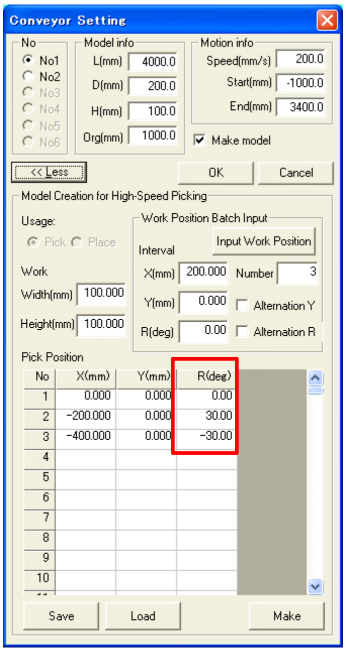
2. In the [Conveyor setting] dialog, to edit the [Pick Position] list, various work locations are enabled. The works are located on the conveyor, as many as of the number of lines in the [Pick Position] list.

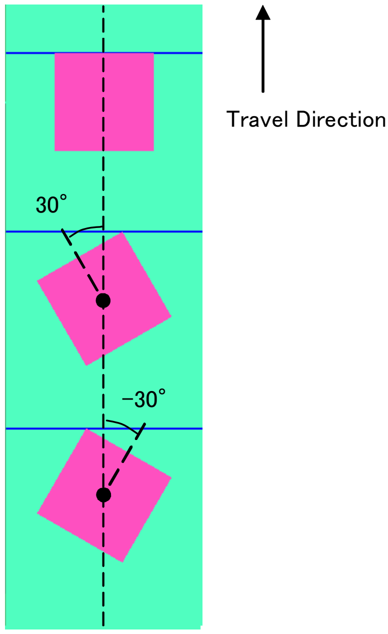
• When the value is set to the [Y(mm)] in the [Pick Position] list as below, the works are located from side to side.





- When the value is set to the [R(deg)] in the [Pick Position] list as below, the rotated works are located.

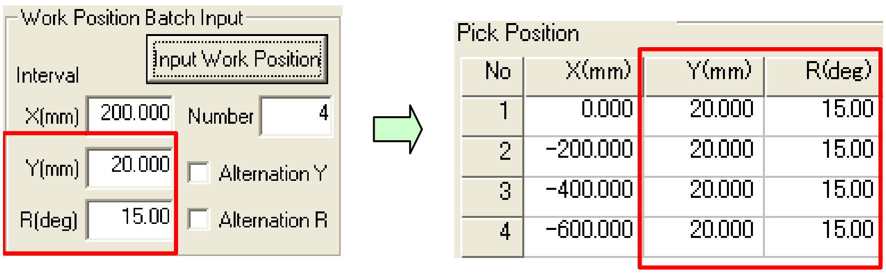




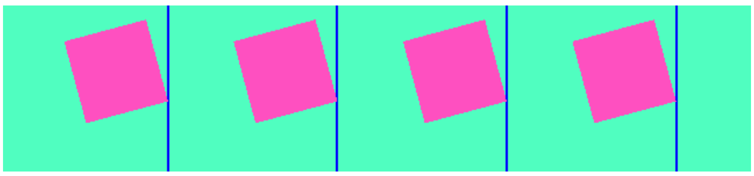
3. The [Pick Position] list can be set automatically with [Work Position Batch Input].

NOTE
- The upper limit of the number of works is 300.
- Once works increases, the playback might be slower.

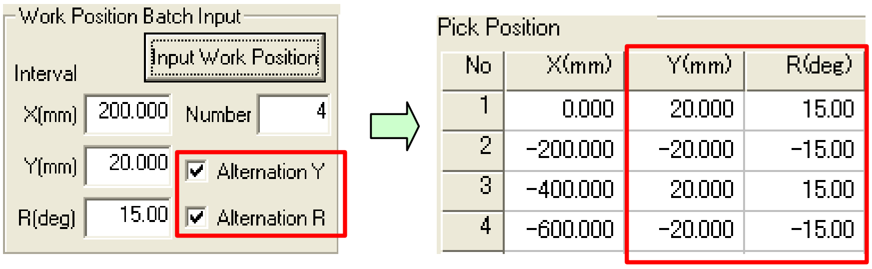
- When the values are set to the [Y(mm)] and [R(deg)] of the [Interval] and the [Input Work Position] button is clicked, that values are set to the [Y(mm)] and [R(deg)] of all lines in the [Pick Position] list.



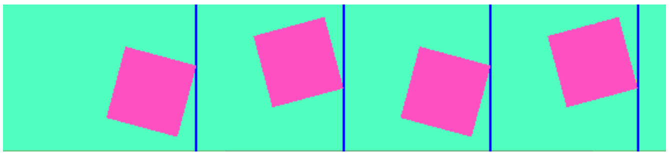
If the [Input Work Position] button is clicked with the above setting, the works are located as below.



• When the [Alternation Y] checkbox and the [Alternation R] checkbox are checked and the [Input Work Position] button is clicked, the values are set to the [Y(mm)] and [R(deg)] of all lines in the [Pick Position] list with alternating positive and negative values.

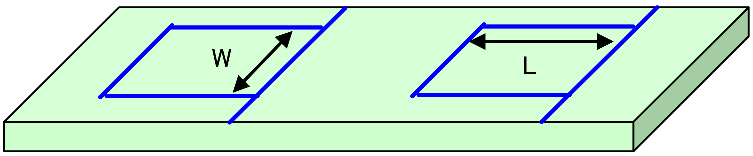


If the [Input Work Position] button is clicked with the above setting, the works are located as below.

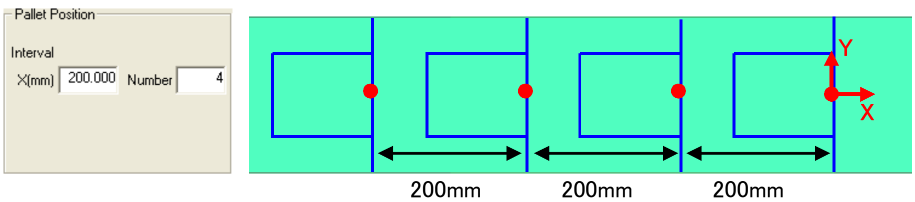


■ Location of the pallets

1. In the [Conveyor setting] dialog, the length of W direction and L direction are set to [Pallet].



2. In the [Conveyor setting] dialog, the number of pallets and the intervals are set to [Pallet].

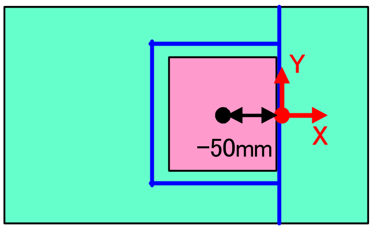


3. In the [Conveyor setting] dialog, the work locations on a pallet are set to the [Place Position] list. This setting is applied to the all pallets. Set the locations of the center of works from pallet origin position to the [Place Position] list.

• When one work is placed on the pallet, set the value to the [Place Position] list as below.
Set the value "width of work × (-0.5)" to the [X(mm)] of the first line.

Place Position

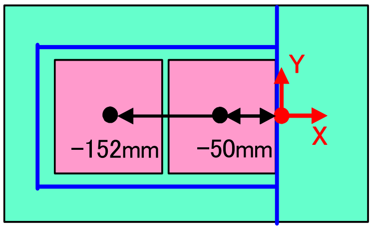
No	X(mm)	Y(mm)	Z(mm)	R(deg)
1	-50.000	0.000	0.000	0.00
2				
3				
4				



• When two works are placed on the pallet back and forth, set the values to the [Place Position] list as below.
Set the value "width of work × (-0.5)" to the [X(mm)] of the first line, and set the value "width of work × (-1.5) - the width of clearance" to the [X(mm)] of the second line. In the below setting, the width of clearance is 1mm.

Place Position

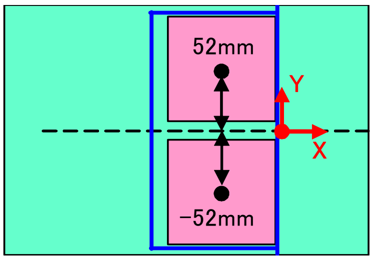
No	X(mm)	Y(mm)	Z(mm)	R(deg)
1	-50.000	0.000	0.000	0.00
2	-152.000	0.000	0.000	0.00
3				
4				



• When two works are placed on the pallet right and left, set the values to the [Place Position] list as below.
Set the value "width of work × 0.5 + the width of clearance" to the [Y(mm)] of the first line, and set the value "width of work × (-0.5) - the width of clearance" to the [Y(mm)] of the second line.

Place Position

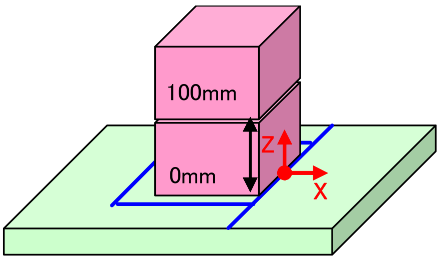
No	X(mm)	Y(mm)	Z(mm)	R(deg)
1	-50.000	52.000	0.000	0.00
2	-50.000	-52.000	0.000	0.00
3				
4				



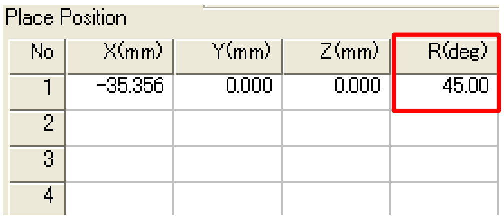
• When two works are placed on the pallet one above the other, set the values to the [Place Position] list as below.
Set 0 to the [Z(mm)] of the first line, and set "height of work" to the [Z(mm)] of the second line.

Place Position

No	X(mm)	Y(mm)	Z(mm)	R(deg)
1	-50.000	0.000	0.000	0.00
2	-50.000	0.000	100.000	0.00
3				
4				

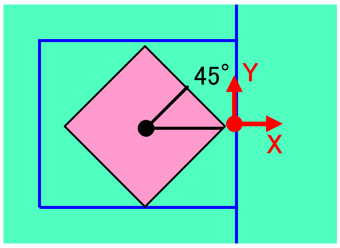


• When one work are rotated and placed on the pallet, set the values to the [R(deg)] in the [Place Position] list as below.



Place Position

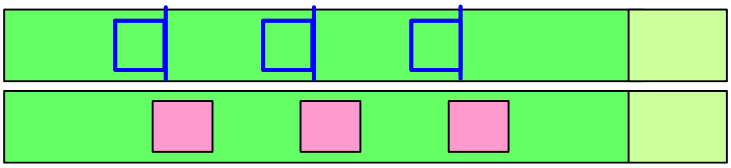
No	X(mm)	Y(mm)	Z(mm)	R(deg)
1	-35.356	0.000	0.000	45.00
2				
3				
4				



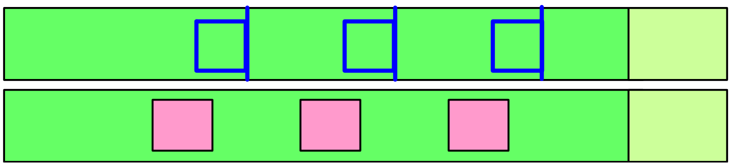
■ Changing the timing of stream

If the [Start(mm)] in the [Conveyor Setting] dialog is changed, the timing of stream of works (CONVEYOR-NO1) or pallets (CONVEYOR-NO2) can be changed.
To set the timing of pallets slower than that of works, shift the [Start(mm)] of the CONVEYOR-NO2 to the minus direction. To set the timing of pallets faster than that of works, shift the [Start(mm)] of the CONVEYOR-NO2 to the plus direction. Note that the [Start(mm)] of the conveyors is set the negative value certainly. And, the same setting is enabled in setting the [Start(mm)] of the CONVEYOR-NO1.

• When the [Start(mm)] of the CONVEYOR-NO2 is shifted to the minus direction, the timing is as below.



• When the [Start(mm)] of the CONVEYOR-NO2 is shifted to the plus direction, the timing is as below.



Procedure

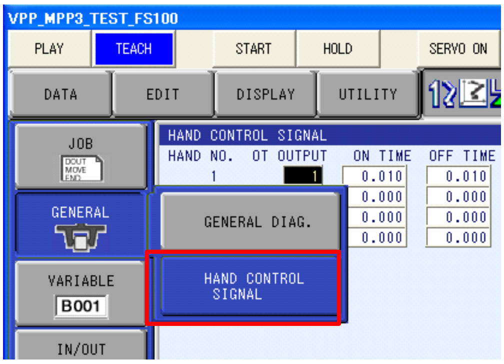
1. On the [Contoller] tab, in the [External Device] group, click the [Conveyor Settings] button, the [Conveyor Setting] dialog appears.

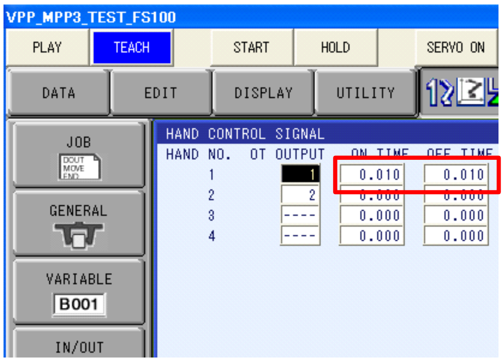
2. Set the [Start(mm)] of the [Motion info], and click the [OK] button.

■ Hand control signal setting

When the SYPICK/SYPLACE instructions are used, it needs that the general output signals are allocated for hand #1 to #4, to turn the hand (ex. vacuum pads) ON/OFF. That allocation is set in the [HAND CONTROL SIGNAL] display of the virtual pendant.

In the template "MPP3_PICKING", OT OUTPUT 1 is allocated for Hand #1.
If needed, set the values to the [ON TIME] and the [OFF TIME].
For details, please refer to "FS100 OPTIONS INSTRUCTIONS SUPPLEMENTARY FOR CONVEYOR SYNCHRONIZED FUNCTION CONTINUOUS OPERATION CONVEYOR SYNCHRONIZED FUNCTION".





11.10.3 Specifications of template cell "MPP3_PICKING"

■ Job for high-speed picking simulation

To simulate high-speed picking, the "SYPICK-SYPLACE" job is used.

```
0000 NOP
0001 DOUT OT#(1) OFF
0002 DOUT OT#(5) OFF
0003 TIMER T=0.010
0004 DOUT OT#(5) ON                // initialize of work model location
0005 SET I000 1                    // initialize of work counter
0006 SET I001 301                  // initialize of pallet counter
0007 CVQUE CV#(1)                  // clear conveyor queue (pick)
0008 CVQUE CV#(2)                  // clear conveyor queue (place)
0009 SYEND CV#(1)
0010 SYEND CV#(2)
0011 MOVL V=1000.0                 // move to the standby position
0012 *LOOP
0013 SYPICK P[I000] V=3350.0 CV#(1) SFTA:P000 STP=1000.000 OL=0.0
        CTP=D000 HAND#1 T=0.100 FLAG:B000
0014 CVQUE CV#(1)
0015 SYPLACE P[I001] V=3350.0 CV#(2) SFTA:P000 STP=1000.000 OL=0.0
        CTP=D001 HAND#1 T=0.100 FLAG:B000
0016 INC I000                      // add 1 to work counter
0017 INC I001                      // add 1 to pallet counter
0018 JUMP *LEND IF I000>I002       // determine if SYPICK continues
0019 JUMP *LOOP IF I001<=I003      // determine if SYPLACE continues
0020 CVQUE CV#(2)
0021 SET I001 301// initialize of pallet counter
0022 JUMP *LOOP IF I000<=I002      // determine if SYPICK continues
0023 *LEND
0024 MOVL V=1000.0                 // move to the standby position
0025 END
```

■ Variable allocation list

In this template cell, the below variables are used.

Variable	Default	Description
I000	1	I000 is used to the counter to access P001 to P300. It is initialized to 1 at the beginning of job, and be added 1 with each execution of SYPICK.
I001	301	I001 is used to the counter to access P301 to P600. It is initialized to 301 at the beginning of job, and be added 1 with each execution of SYPLACE. And, It is initialized to 301 when one pallet becomes filled with the works.
I002	10	I002 is compared with I000 for loop condition for the job. In creating the work models, it is set the number of works.
I003	302	I003 is compared with I001 for loop condition for the job. In creating the pallet models, it is set "the number of works placed per pallet + 300".
D000	1000000	D000 is set the teaching position of SYPICK instruction (unit: micrometer). Edit it if needed.
D001	1000000	D001 is set the teaching position of SYPLACE instruction (unit: micrometer). Edit it if needed.
P000	X0, Y0, Z-150 Rx0, Ry0, Rz0	P000 is set the value of [SHIFT(A)] of SYPICK/SYPLACE instruction. Edit it if needed.
P001 - P300	—	From P001 to P300 are used for [P-VAR ROBOT] of SYPICK instruction. In creating the work models, it is set the picking position based on the user frame #1.
P301 - P600	—	From P301 to P600 are used for [P-VAR ROBOT] of SYPLACE instruction. In creating the pallet models, it is set the picking position based on the user frame #2.

■ IO allocation list

In this template cell, the below IO signals are used.

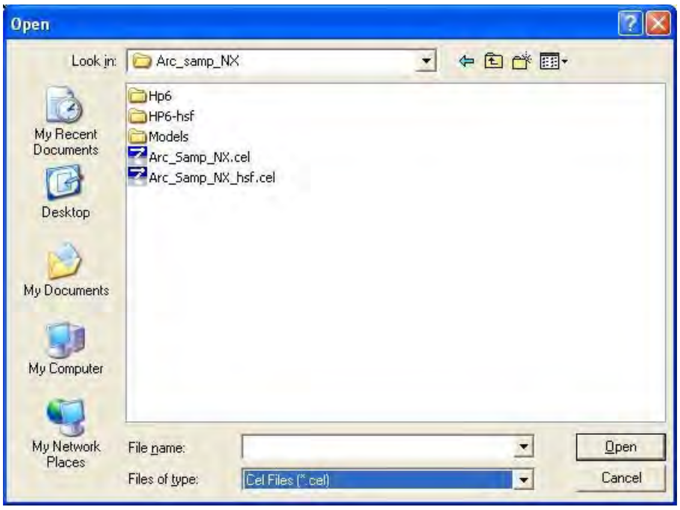
Variable	Default	Description
OT1	OFF	OT1 is used to turn the hand ON/OFF with SYPICK?SYPLACE instruction. It outputs ON with SYPICK instruction, and outputs OFF with SYPLACE instruction. Then the model script [SYPICK] or [SYPLACE] is called by IO event, the work model is replaced.
OT5	OFF	OT5 outputs ON at the beginning of the job. Then the model script [SYINIT] is called by IO event, the work models locations are initialized.

11.11 Converting a MotoSim EG cell to MotoSim EG-VRC

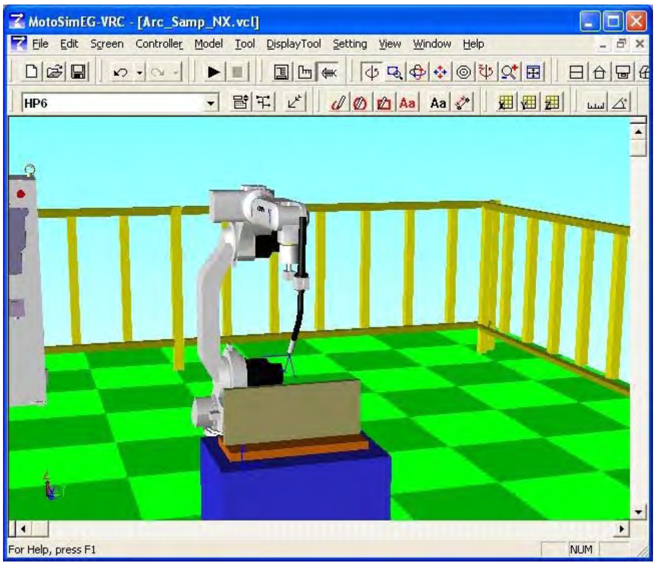
MotoSim EG-VRC can convert and load files created by MotoSim EG but cannot playback the job and the robot operations are limited. The MotoSim EG robot should be replace by the VRC corresponding robot type. You can transfer the robot tooling and jobs to the new controller.

Procedure

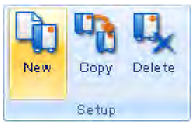
1. Click the MotoSim EG-VRC button ( ), and select the [Open] - [Open] menu.
2. In the “File Type” field select “MotoSim EG cell (*.cel)”. And then select the MotoSim EG cell to be converted. Press [Open].



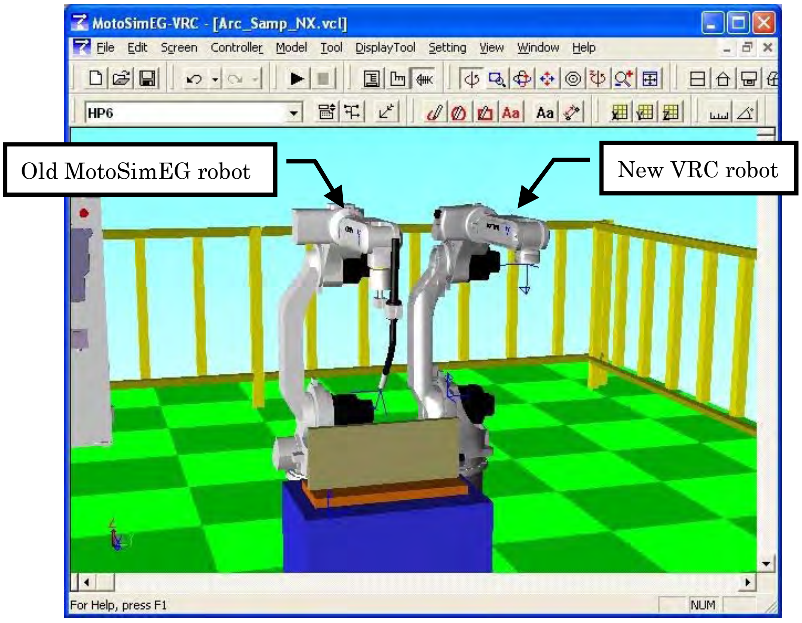
3. When the convertion confirmation message below appears, select “Yes” to convert the file to a “MotoSim EG-VRC (*.vcl)” file. The cell will display normally but the robot is still a “MotoSim EG” robot and will have limited operation.



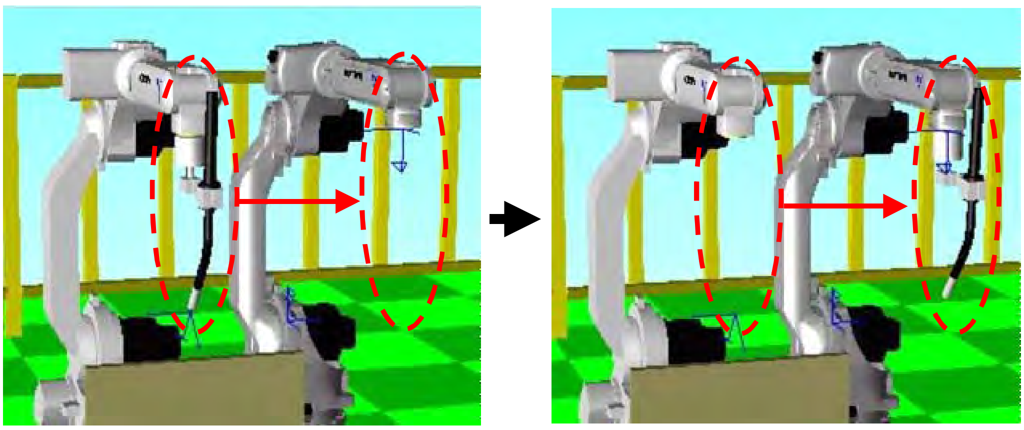
4. On the [Controller] tab, in the [Setup] group, click the [New] button, the new controller can be created.



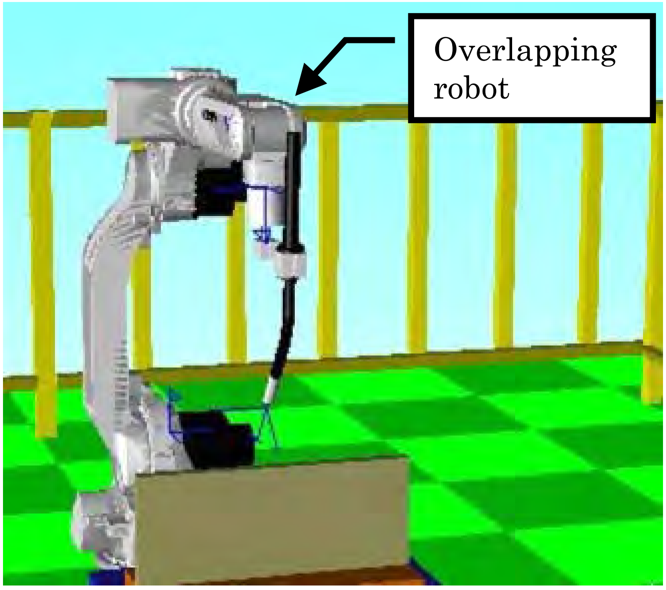
In the “Create Controller with...” dialog select “No CMOS.BIN file”. Proceed to add the controller as per the procedure of section 7.1.2 “Create Controller without CMOS.BIN file”.
In the initialization step at the “CONTROL GROUP” screen, select the robot type that matches the “MotoSim EG” robot of the cell.
Complet the procedure.



5. Once the VRC controller and robot has been added, transfer all robot tooling model from the MotoSim EG robot to the VRC robot using the models “Set Parent” function from the CAD tree. (For details, refer to section Section "9.9.2 Moving the Parent Model".)



6. You can set the location of the VRC robot to overlap the MotoSim EG robot. (For details, refer to section Section "9.5 Positioning a Model".)



7. Delete the “MotoSim EG” robot from the cell. (For details, refer to section Section "7.3 Deleting a Controller".) Save the cell.
8. Using “Windows Explorer”, copy the job files (.JBI) and condition files (TOOL.CND, UFRAME.CND...) from the MotoSim EG robot folder to the VRC controller “Storage Card” folder.
9. Load the transfered files into the VRC controller. (For details, refer to section Section "A.3.3 Load controller data to MotoSim EG-VRC")

NOTE

Unlike Windows, the VRC controller is case sensitive for the file names. Condition file names need to be entered with all capital letters or they will not be detected in the “Storage Card” folder. If this is not the case, rename the file name with Windows Explorer so that the names are written in capital letters.

11.12 Spot High Speed Spec Function

Set the spot high speed spec function for the robot, and it explains the procedure for the simulation of spot high speed spec function

NOTE

- This simulation of the spot high speed spec function is a function that can be used only with the following controller.

  Controller Types : DX200/DX100
  System Version : DX200 : Since DN1.01-00
  DX100 : Since DS3.20-00

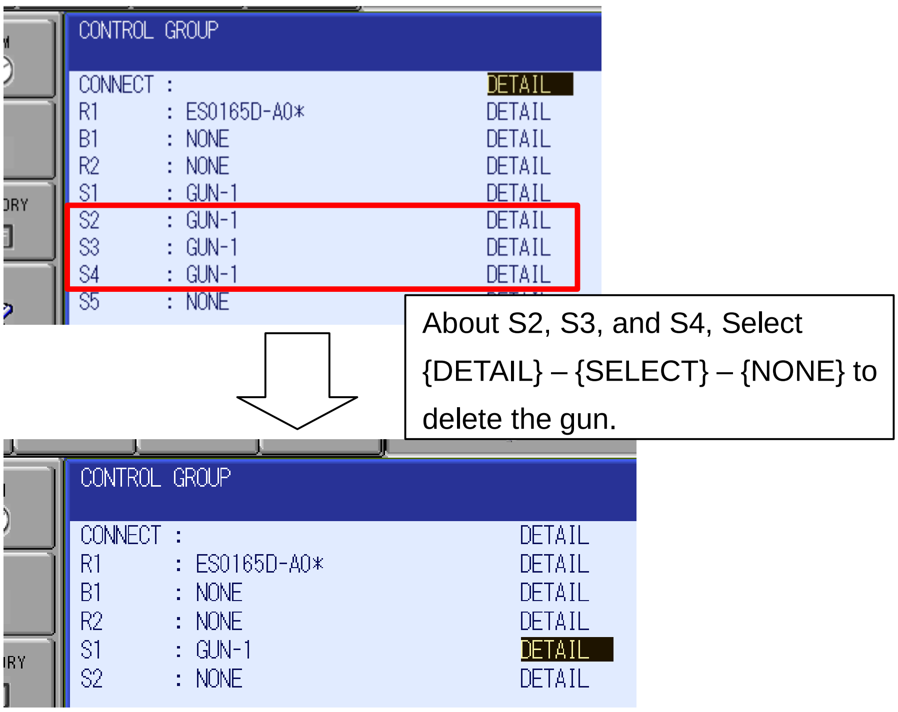
- This simulation of the spot high speed spec function is a function that can be used only with the following robots

  DX200 Only spot welding model.
  DX100.

ES0165D-A0*	ES0165D-A2*	ES0165D-B0*
ES0165D-C0*	ES0165D-E0*	ES0165D-F0*
ES0165D-X0*	ES0200D-A0*	ES0200D-A2*
ES0200D-B0*	ES0200D-C0*	ES0200D-X0*
MS0080W-A0*	MS0080W-A2*	MS0080W-B0*

- The simulation of spot gun change system is not supported.
  When the CMOS.BIN of the real controller is used to create the environment, delete the guns other than S1 by the Maintenance Mode of the virtual pendant.

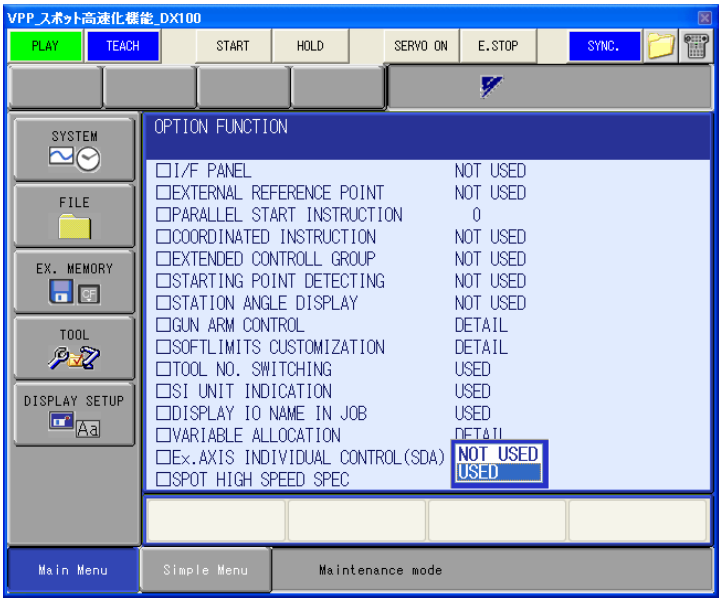
  Ex.) When the gun change system has S1, S2, S3, and S4, S2, S3, and S4 have to be deleted. To delete the guns other than S1, select the {SYSTEM} - {SETTING} - {CONTROL GROUP} with the Maintenance Mode of the virtual pendant.



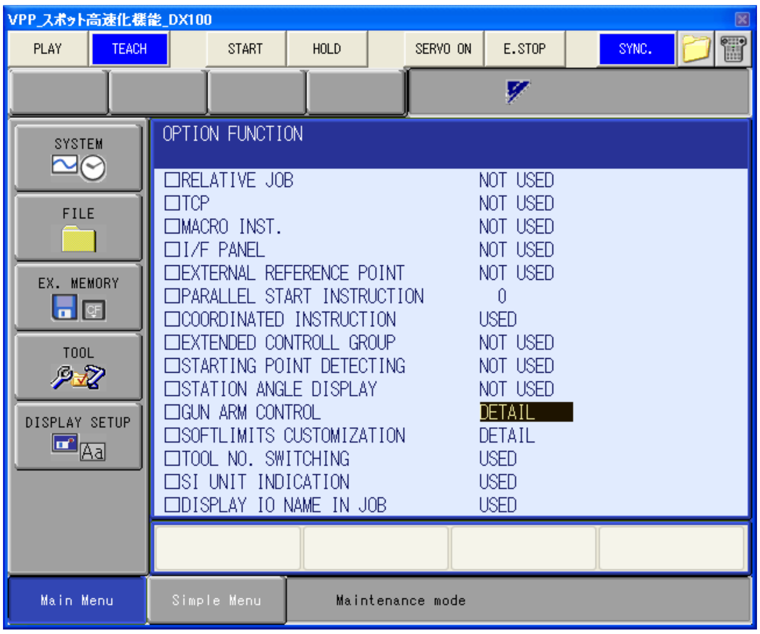
Procedure

1. A new controller for the simulation of the spot welding is registered by the operational procedure of Section "11.8 Setting of spot welding simulation". In this case, select the controller and robot as the above NOTE.
2. On the [Controller] tab, in the [Boot] group, click the [Maintenance mode] button, the [Maintenance mode] dialog appears.

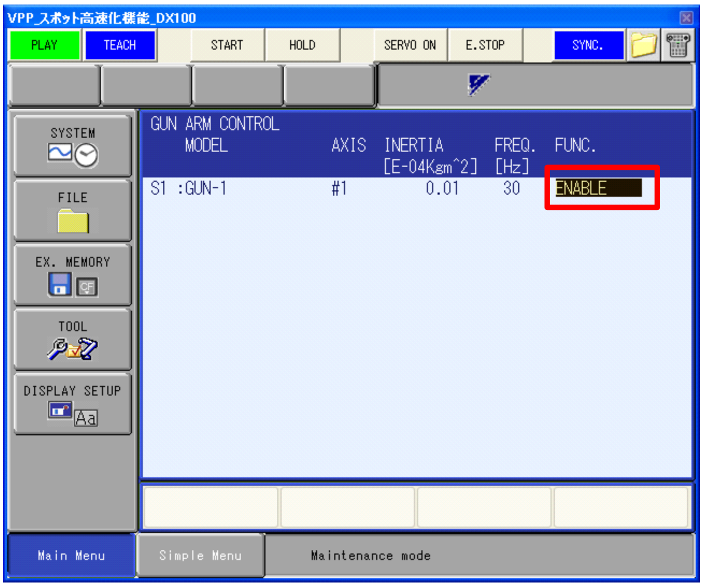
3. From the Virtual Pendant main menu select {SYSTEM} - {SETUP} - {OPTION FUNCTION}.
4. Select the "Spot High Speed Spec" and set its value to "Used". When the confirmation message displays, select "Yes" to make the change



5. In the case of DX200, proceed the step 7 next.
   In the case of DX100, Select the "Detail" of "Gun Arm Control".



6. Select the "Func." and set its value to "Enable". When the confirmation message displays, select "Yes" to make the change.



7. Click the "End" button of the "VRC Maintenance Mode" dialog.

11.13Setting of Paint workpiece supplying system "MOTOFEEDER"

The MOTOFEEDER is the turntable-typed workpiece supplying equipment with the external 2-axis structure.
The operation including the paint operation can be performed by setting the initial settings, and creating paint programs.
This section describes the procedure from the initial settings to the playback.

NOTE
- MOTOFEEDER can be used only with the bellow controller.
  Controller : NX100
  System Version : NS5.09-45
- Only one MOTOFEEDER can be registered per controller.

The procedure of MOTOFEEDER registration is as below.

System Construction

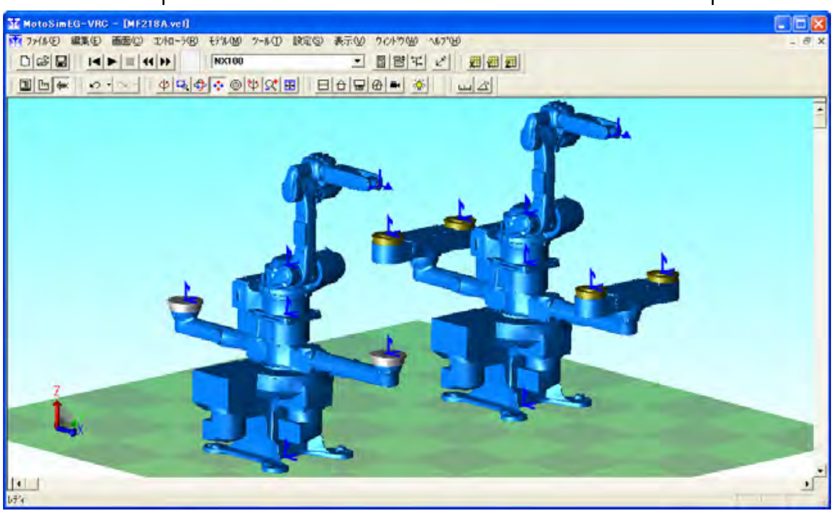
Controller Initialization
↓
MOTOFEEDER model setting
↓
Relocation of robot and MOTOFEEDER
↓
Master job Registration

Teaching

↓
Paint job creating and registering

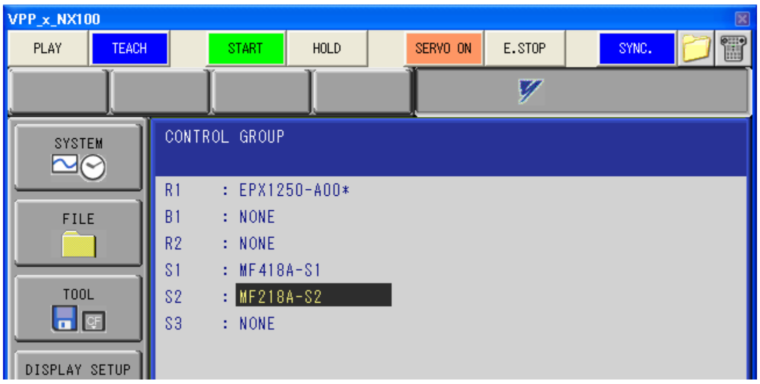
Playback

↓
Playback the paint job



11.13.1 Controller Initialization

The large rotary axis S1 and small rotary axis S2 are set as station axes.
When the controller is initialized, the control group is set as one robot (R1) and two station axes (S1, S2).



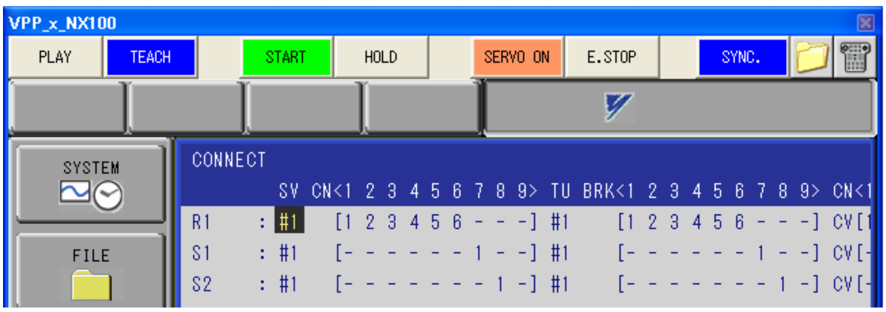
Procedure

1. Proceed to the step 1and 2 of Section "7.1.1 Create a New VRC Controller (no file)" to create a new VRC controller".
   Select "NS5.09-45" system version from "NX100". Operation is finished, the VRC Controller starts in maintenance mode.
2. Follow the procedure of section Section "7.1.3 Initializing the Controller (DX200, DX100, NX100)".
   When asked for the "Control Group", select the model to suit the actual robot system as a guide for the following table.

<table>
<tr><th rowspan="2">Actual robot system</th><th colspan="3">Model registration on the VRC controller</th></tr>
<tr><th>R1</th><th>S1</th><th>S2</th></tr>
<tr><td>Arm Length: 1600mm, With Manipulator, High-Speed Rotation Specification</td><td>EPX1250</td><td rowspan="10">MF418A-S1</td><td rowspan="5">MF218A-S2</td></tr>
<tr><td>Arm Length: 1800mm, With Manipulator, High-Speed Rotation Specification</td><td>EPX1250</td></tr>
<tr><td>Arm Length: 1400mm, Without Manipulator, High-Speed Rotation Specification</td><td>EPX1250 / EPX2050</td></tr>
<tr><td>Arm Length: 1600mm, Without Manipulator, High-Speed Rotation Specification</td><td>EPX1250 / EPX2050</td></tr>
<tr><td>Arm Length: 1800mm, Without Manipulator, High-Speed Rotation Specification</td><td>EPX1250 / EPX2050</td></tr>
<tr><td>Arm Length: 1600mm, With Manipulator, Heavy Load Specification</td><td>EPX1250</td><td rowspan="5">MF418A-S2</td></tr>
<tr><td>Arm Length: 1800mm, With Manipulator, Heavy Load Specification</td><td>EPX1250</td></tr>
<tr><td>Arm Length: 1400mm, Without Manipulator, Heavy Load Specification</td><td>EPX1250 / EPX2050</td></tr>
<tr><td>Arm Length: 1600mm, Without Manipulator, Heavy Load Specification</td><td>EPX1250 /EPX2050</td></tr>
<tr><td>Arm Length: 1800mm, Without Manipulator, Heavy Load Specification</td><td>EPX1250 / EPX2050</td></tr>
</table>

- Registration of R1
  MOTOFEEDER is registered in combination with EPX1250 or EPX2050, so select "EPX1250-A00*" or "EPX2050-A3**", "EPX2050-A5**", or "EPX2050-B5**". For With-Manipulator Specification, EPX1250 is available only.
- Registration of S1
  Select "MF418A-S1".
- Registration of S2
  For High-Speed Rotation Specification, select "MF218A-S2". For Heavy Load Specification, select "MF418A-S2".

3. Set the value in the Connect display as a guide for the following table.



• EPX1250

	SV	CN	1	2	3	4	5	6	7	8	9
R1	#1		–	1	2	3	4	5	6	–	–
S1	#1		1	–	–	–	–	–	–	–	–
S2	#1		–		–	–	–	–	–	1	–

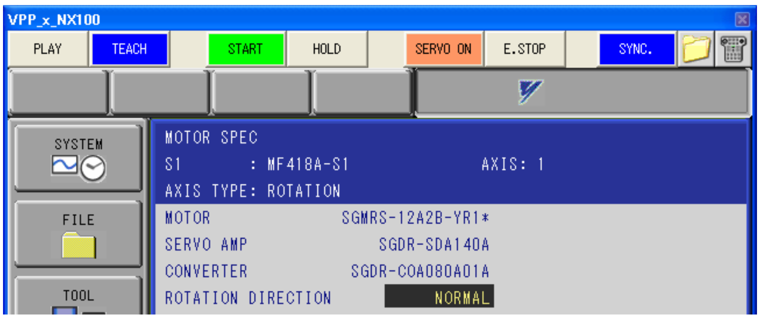
TU	BRK	1	2	3	4	5	6	7	8	9	CN	1	2	3	4	5	6	7	8	9
#1		–	1	2	3	4	5	6	–	–	CV	–	1	1	1	1	1	1	–	–
#1		1	–	–	–	–	–	–	–	–	CV	1	–	–	–	–	–	–	–	–
#1		1		–	–	–	–	–	–	–	CV	–		–	–	–	–	–	1	–

• EPX2050

	SV	CN	1	2	3	4	5	6	7	8	9
R1	#1		1	2	3	4	5	6	–	–	–
S1	#1		–	–	–	–	–	–	1	–	–
S2	#1		–		–	–	–	–	–	1	–

TU	BRK	1	2	3	4	5	6	7	8	9	CN	1	2	3	4	5	6	7	8	9
#1		1	2	3	4	5	6	–	–	–	CV	1	1	1	1	1	1	–	–	–
#1		–	–	–	–	–	–	1	–	–	CV	–	–	–	–	–	–	2	–	–
#1		–		–	–	–	–	–	1	–	CV	–		–	–	–	–	–	3	–

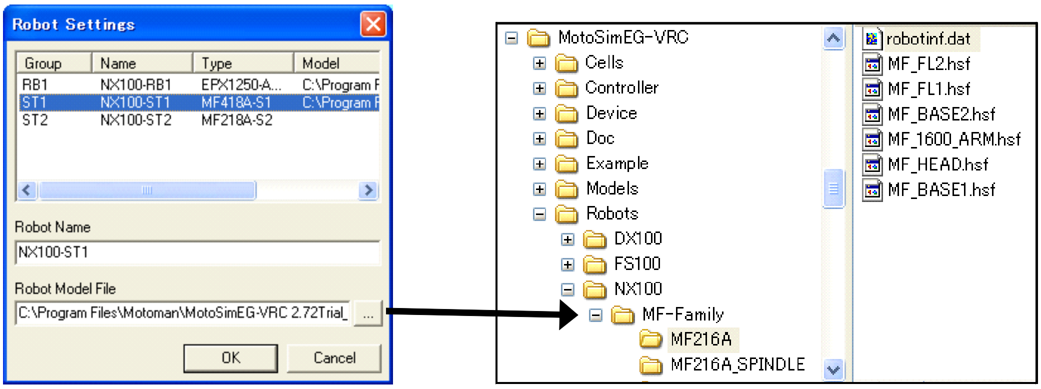
4. Set "ROTATION DIRECTION" of S1 and S2 to "REVERSE" in the motor spec display.



5. Set "APPLICATION" to "PAINT" in the application display. Then, press the [ENTER] button as default setting again, until controller initializing is finished.

11.13.2 MOTOFEEDER model setting

After controller setting is finished, the Robot Settings dialog box is displayed. Set the MOTOFEEDER model to "Robot Model File" of ST1.



Procedure

1. Robots\NX100\MF-Family" folder under the MotoSim EG-VRC install folder contains Robot models of MOTOFEEDER. Select the model file (robotinf.dat) to "Robot Model File" of ST1 as a guide for the following table.

Model registration on the VRC controller	Model File Folder
Arm Length: 1600mm, With Manipulator, High-Speed Rotation Specification	MF216A
Arm Length: 1600mm, With Manipulator, High-Speed Rotation Specification (with spindle unit)	MF216A_SPINDLE
Arm Length: 1800mm, With Manipulator, High-Speed Rotation Specification	MF218A
Arm Length: 1800mm, With Manipulator, High-Speed Rotation Specification(with Spindle unit)	MF218A_SPINDLE
Arm Length: 1400mm, Without Manipulator, High-Speed Rotation Specification	MF214B
Arm Length: 1400mm, Without Manipulator, High-Speed Rotation Specification(with spindle unit)	MF214B_SPINDLE
Arm Length: 1600mm, Without Manipulator, High-Speed Rotation Specification	MF216B
Arm Length: 1600mm, Without Manipulator, High-Speed Rotation Specification(with spindle unit)	MF216B_SPINDLE
Arm Length: 1800mm, Without Manipulator, High-Speed Rotation Specification	MF218B
Arm Length: 1800mm, Without Manipulator, High-Speed Rotation Specification(with spindle unit)	MF218B_SPINDLE
Arm Length: 1600mm, With Manipulator, Heavy Load Specification	MF416A

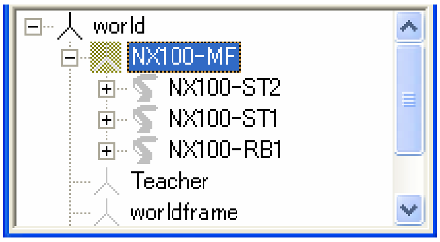
Arm Length: 1800mm, With Manipulator, Heavy Load Specification	MF418A
Arm Length: 1400mm, Without Manipulator, Heavy Load Specification	MF414B
Arm Length: 1600mm, Without Manipulator, Heavy Load Specification	MF416B
Arm Length: 1800mm, Without Manipulator, Heavy Load Specification	MF418B

2. After set "Robot Model File" of S1, press the [OK] button without setting "Robot Model File" of S2.
3. Virtual pendant restarts. Then, the "The initialization file of a controller is loaded" dialog box is displayed, press the [OK] button.

11.13.3 Relocation of robot and MOTOFEEDER

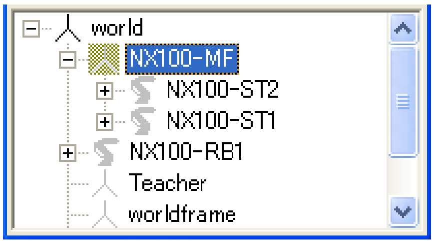
When the robot is displayed, relocate the robot model and MOTOFEEDER model in the CADTREE dialog box.
The robot model and MOTOFEEDER model are registered as below.
When relocate them, relocate the dummy model of MOTOFEEDER as below.

■ With Manipulator Specification



The dummy model "(Controller Name)-MF" is created. Robot model and MOTOFEEDER model are registered under the dummy model.

■ Without Manipulator Specification



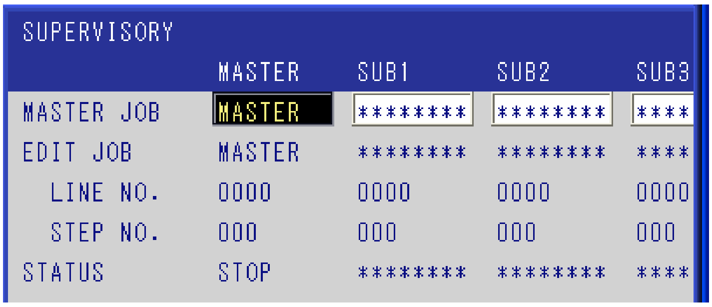
The dummy model "(Controller Name)-MF" is created. MOTOFEEDER model is registered under the dummy model. Robot model is registered under the world model.

11.13.4 Master job Registration

The paint operation of MOTOFEEDER and robot is performed with the prepared control job and the created paint job. The prepared job calls the created paint job. So, the prepared Job needs to be registered as Master Job.
The prepared control job has already loaded, register it as below.

Procedure

1. Select {JOB} - {CTRL MASTER} on the virtual pendant.
2. Press the [Space] key at MASTER of MASTER JOB, select "SETTING MASTER JOB" and press the [Space] key.
3. Select "MASTER.JBI", and press the [Space] key.

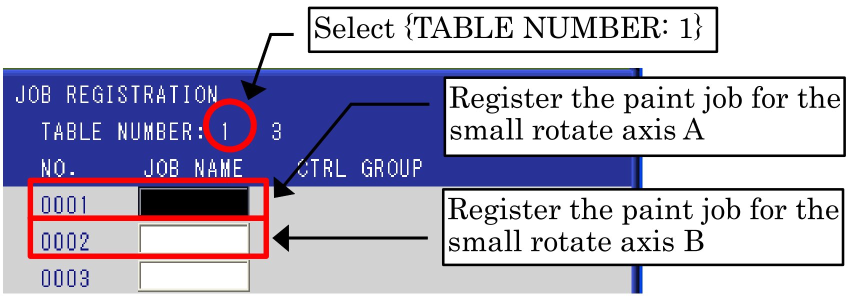


11.13.5 Paint job creating and registering

Create the paint job as usage. (Refer to manual "MOTOFEEDER OPERATING INSTRUCTIONS" about the procedure of creating the paint job.)
To perform the operation including the MOTOFEEDER motion, register the created paint job in the registration table.

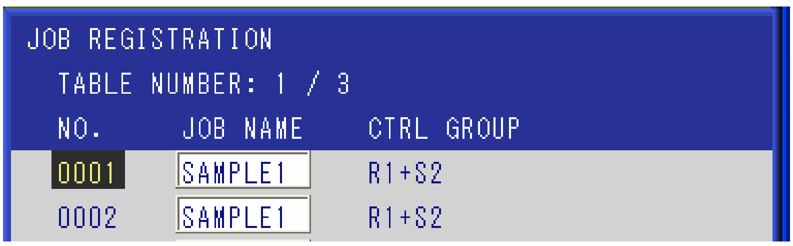
Procedure

1. Select {JOB} - {JOB REGISTRATION} on the virtual pendant.
2. Press the [Space] key at "JOB NAME" and select the paint job from job list.
   Set the paint job for the small rotary axis A: No. 0001, and set the paint job for the small rotary axis B: No. 0002.



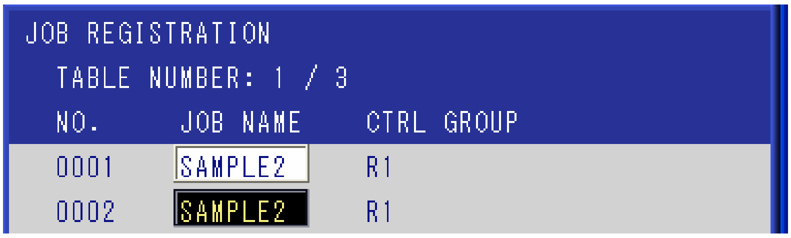
■ Without Spindle Unit Specification

The job "SAMPLE1" has already loaded. (Control Group: R1 + S2)
Set the "SAMPLE1" to No.001 and No.002, you can see the MOTOFEEDER motion of "SAMPLE1".



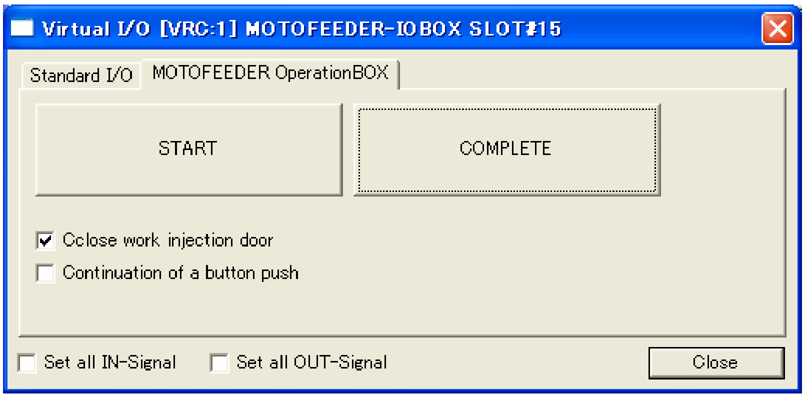
■ With Spindle Unit Specification

The job "SAMPLE2" has already loaded. (Control Group: R1)
Set the "SAMPLE2" to No.001 and No.002, you can see the MOTOFEEDER motion of "SAMPLE2".



11.13.6 Playback the paint job

To execute the paint job, use the MOTOFEEDER Operation BOX.
Select {Tool} - {I/O Monitor}, to display the Virtual I/O dialog box, and select the MOTOFEEDER Operation BOX.
After starting playback, press the button of Operating BOX, and the paint job is executed.



Item	Description
[START] button	The large rotary axis rotates, and the paint job is executed.
[COMPLETE] button	The large rotary axis rotates. But, the paint job is not executed.
[Close work injection door] checkbox	Check this check box, the input of safeguarding is "ON". When execute playback, this check box needs to be checked.
[Continuation of a button push] button	Check this check box, keep the START button or the COMPLETE button pressed.

12 Options

NOTE

The additional options sold separately are needed in order to use the following option functions of MotoSim EG-VRC or MotoSim EG-VRC-CadPack.

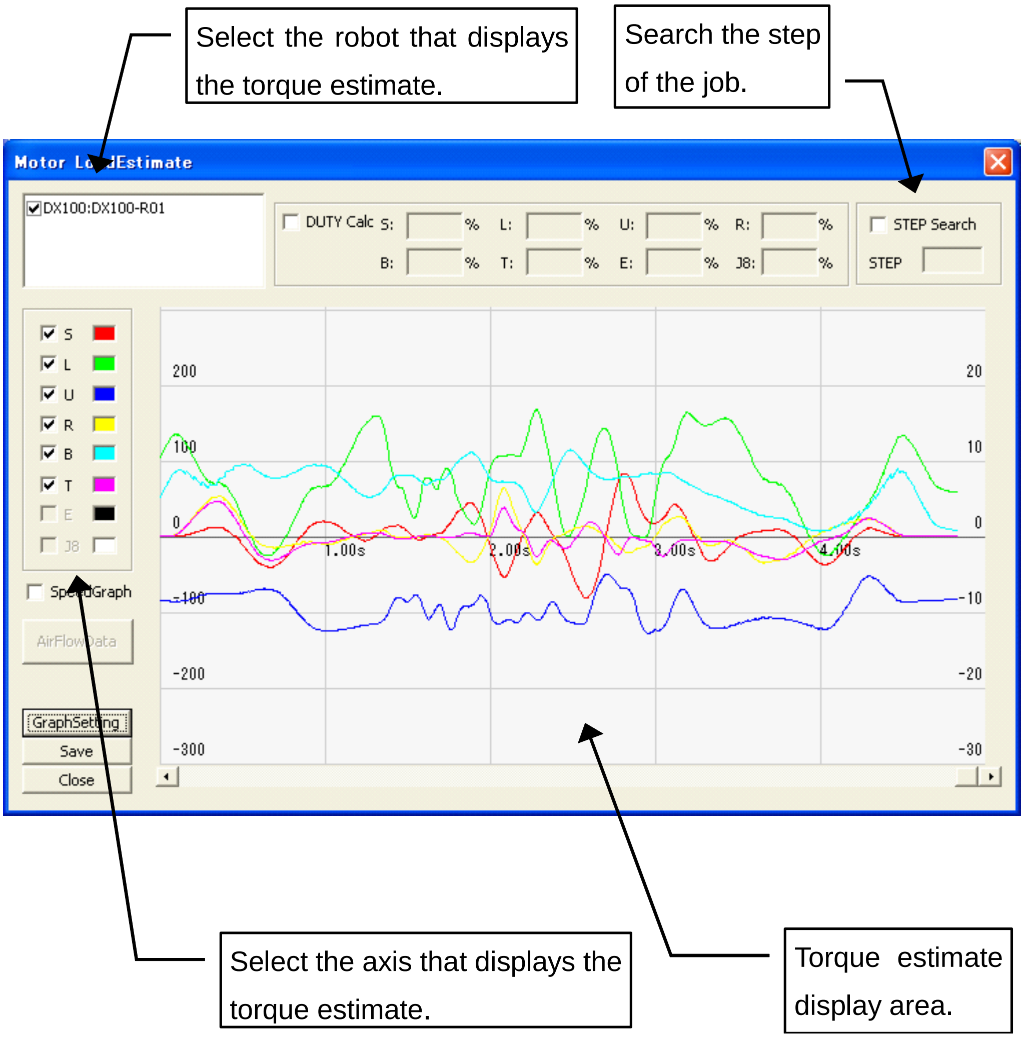
12.1 Motor Load Estimate

The estimate torque (the unit: The rated torque is displayed as 100%) and speed (the unit: rpm) of each axis are displayed after the playback of the robot in a wavy graph.
And, an arbitrary DUTY calculation in the section and the step of the job can be retrieved from the wavy graph.

On the [Option Function] tab, in the [Estimate] group, click the [Motor Load Estimate] button, the [Motor Load Estimate] dialog appears.

NOTE

- YASKAWA does not warrant the result of this function. It should be used only as a guide. Because it is affected by Tool settings, Load condition of real robot, Lubricated condition of grease, and Temperature.
  Configure the following items of Tool setting collectly, Weight, Position of the center of gravity, and Inertia moment. Especially, when Weight item of Tool setting is set lower than real tool weight, this function makes wrong results.
- A wavy graph is an estimated torque when the job is executed. Therefore, the torque in the interruption (ex. the emergency stop) is not included.
- This function can be used only with the robot axes (external axes are not included).
- This function cannot be used with two or more robot system other than a dual-arm robot.
- This function can be used only with the specified system version of controllers, and this function can be used only with target robots of Motor Load Estimate with that system version. Please refer to section "13.5 List of Function depending on the system version of controller".



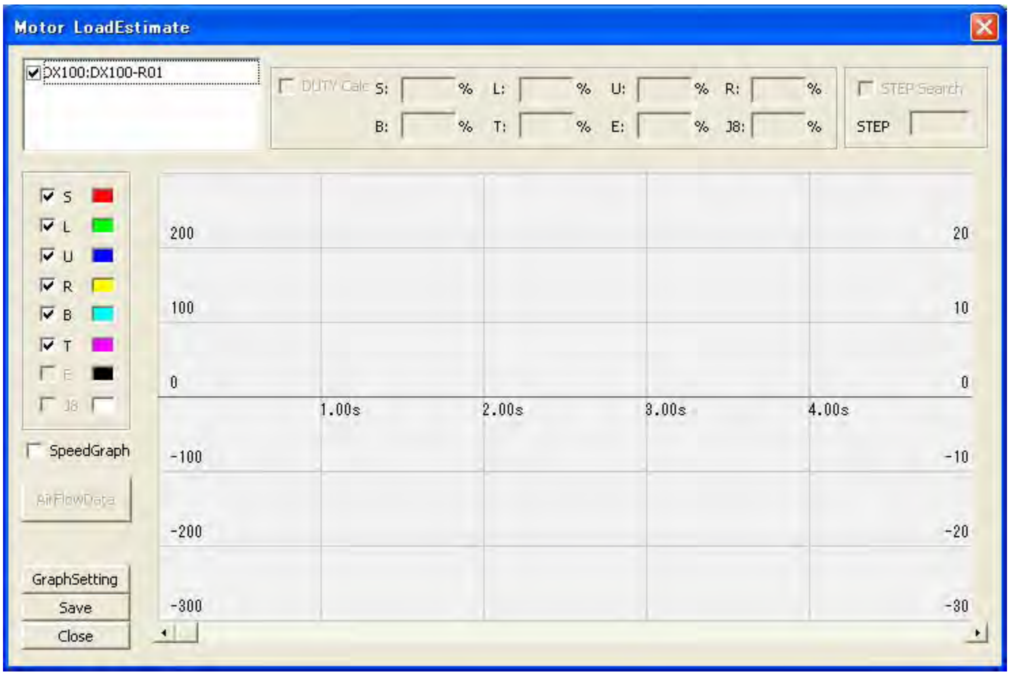
Motor Load Estimate

Item	Description
[SpeedGraph] check box	The speeds of each axis are displayed.
[GraphSetting] button	The display range (horizontal axis and spindle) in a wavy graph and the re-drawing intervals and the torque threshold are set.
[Save] button	The torque data every drawing time set with HartBeat is saved in text file (.TXT). Please refer to Section "7.5.4 Refresh Interval".
[Close] button	The Torque Estimate display is closed.

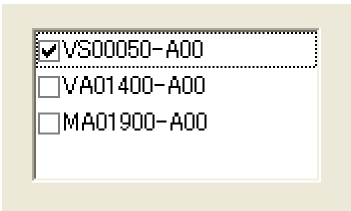
The vertical scale of left-side is torque, and right-side is speed.

Procedure

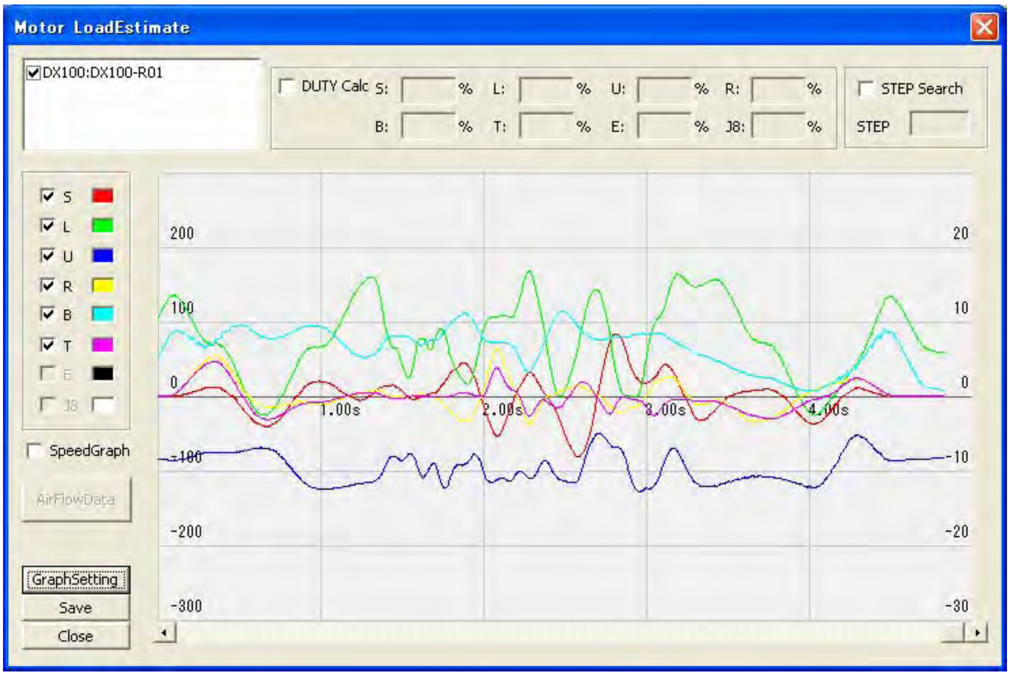
1. On the [Option Function] tab, in the [Estimate] group, click the [Motor Load Estimate] button, the [Motor Load Estimate] dialog appears.



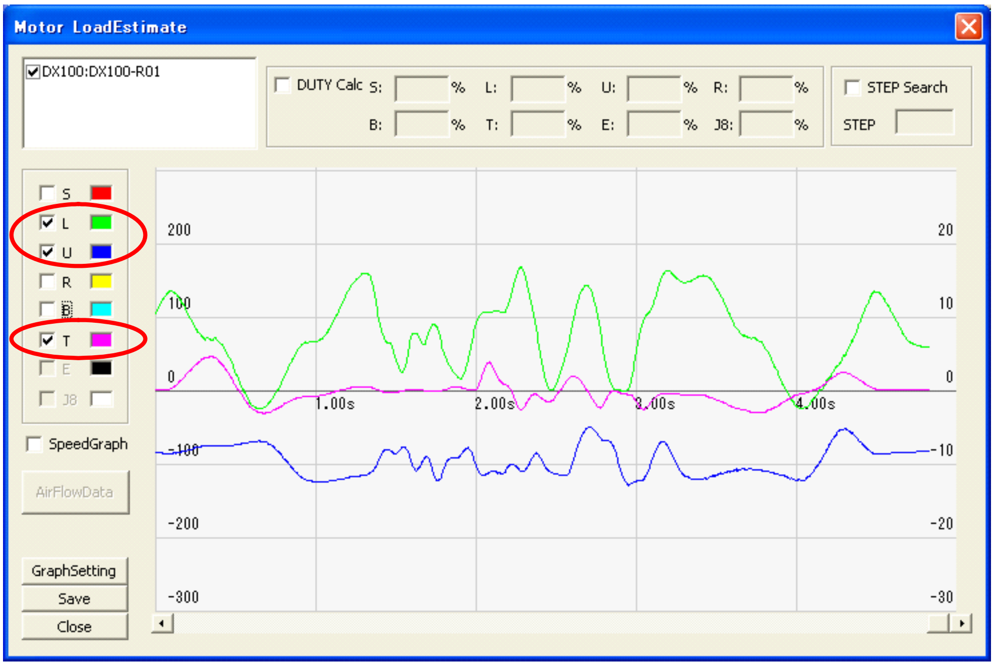
2. Select the robot that displays the torque estimate.



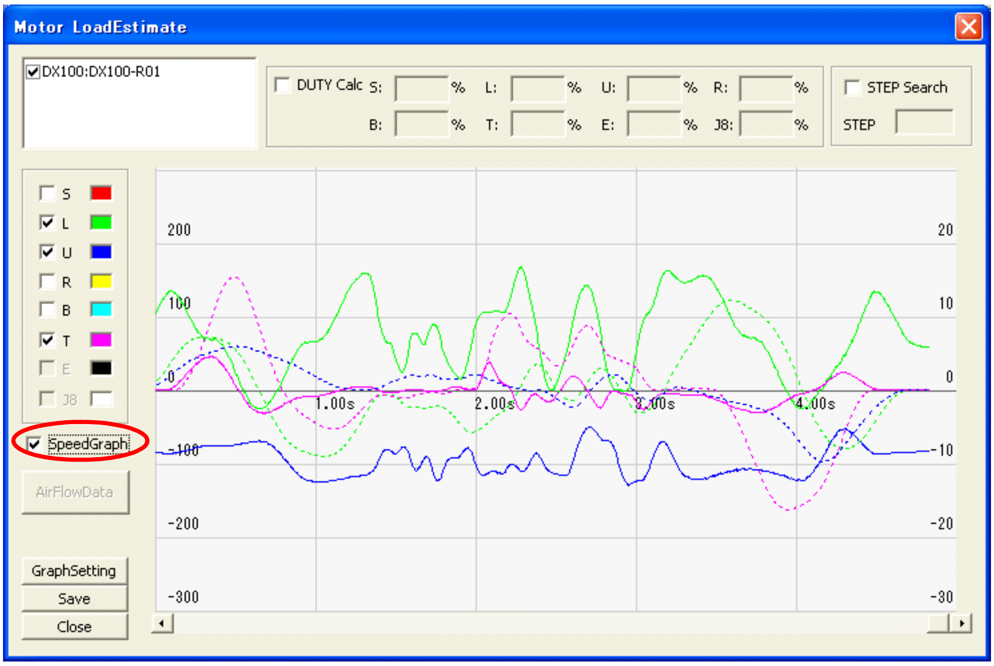
3. The job is executed, and the torque estimate of the selected robot is displayed.



4. Select the axis that displays the torque estimate in the check box of the axis. (The axis can be selected even before the job is executed.)

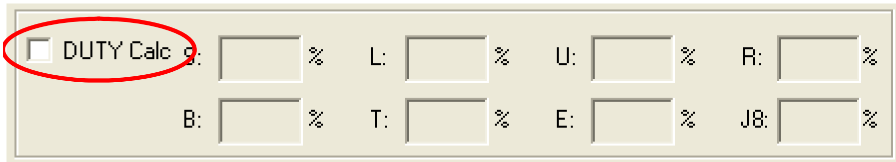


5. Check the [SpeedGraph] box, the graphs of each axis speed are displayed with a dotted line.

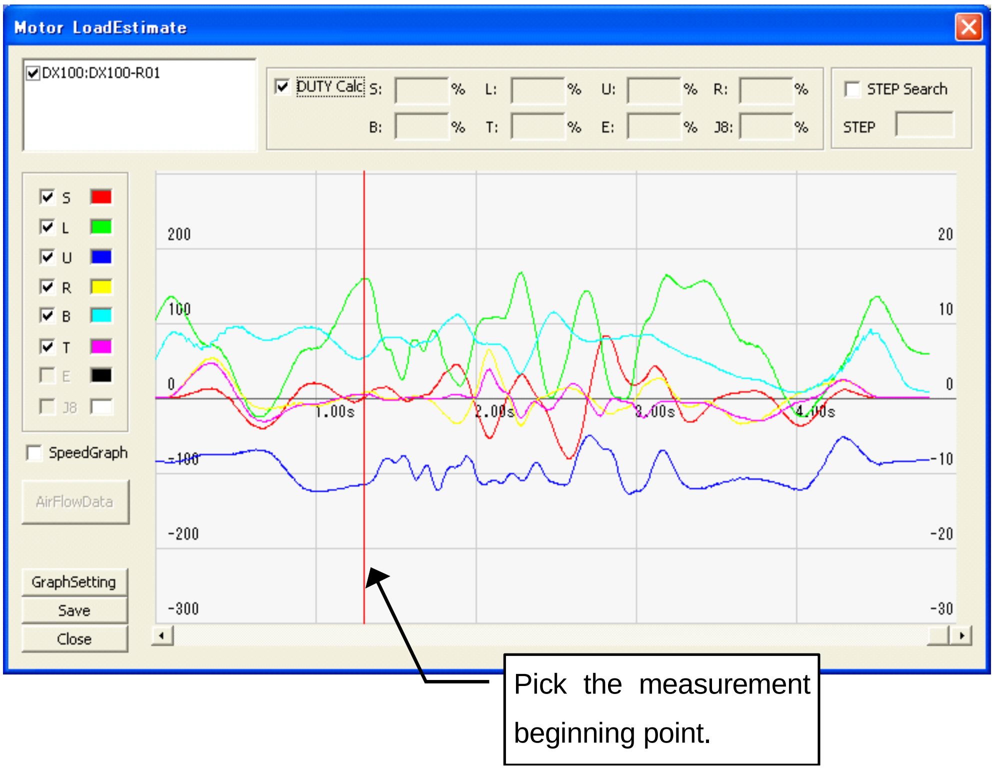


■ Duty calculation

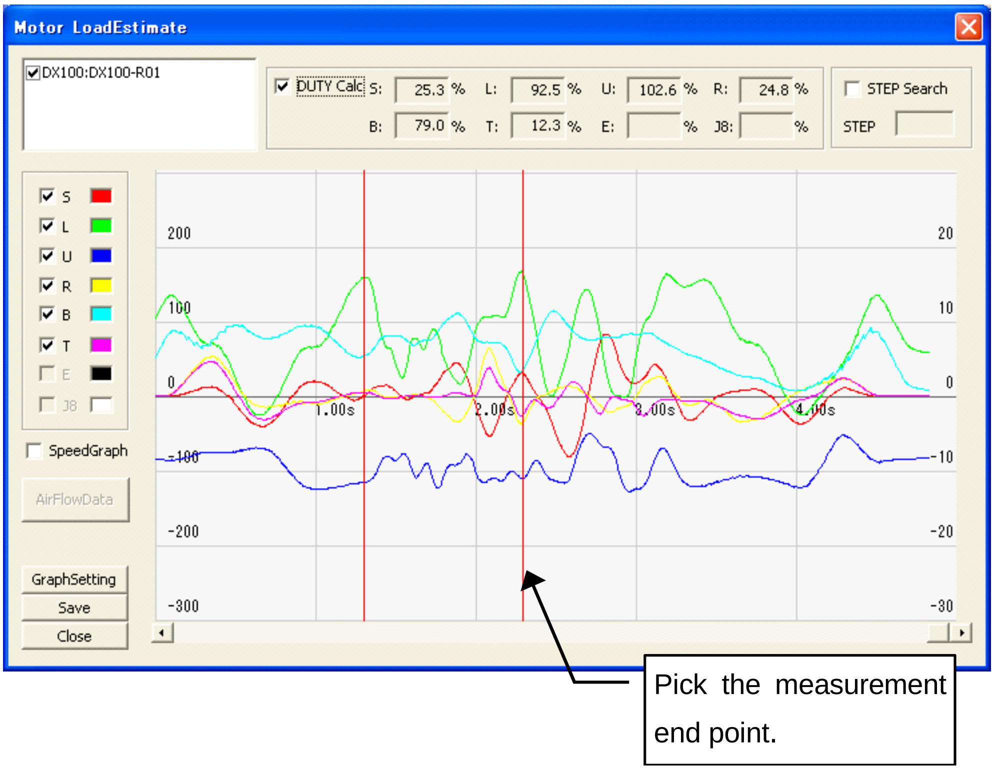
1. Check the [DUTY Calc] check box.



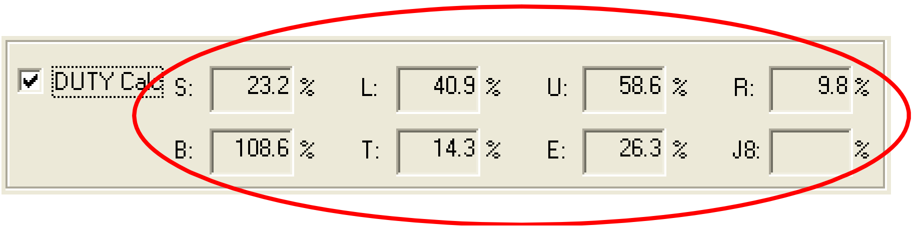
2. Pick the measurement beginning point.



3. Pick the measurement end point.

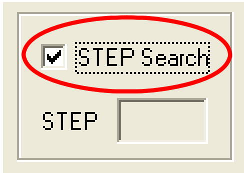


4. The measurement result is displayed.

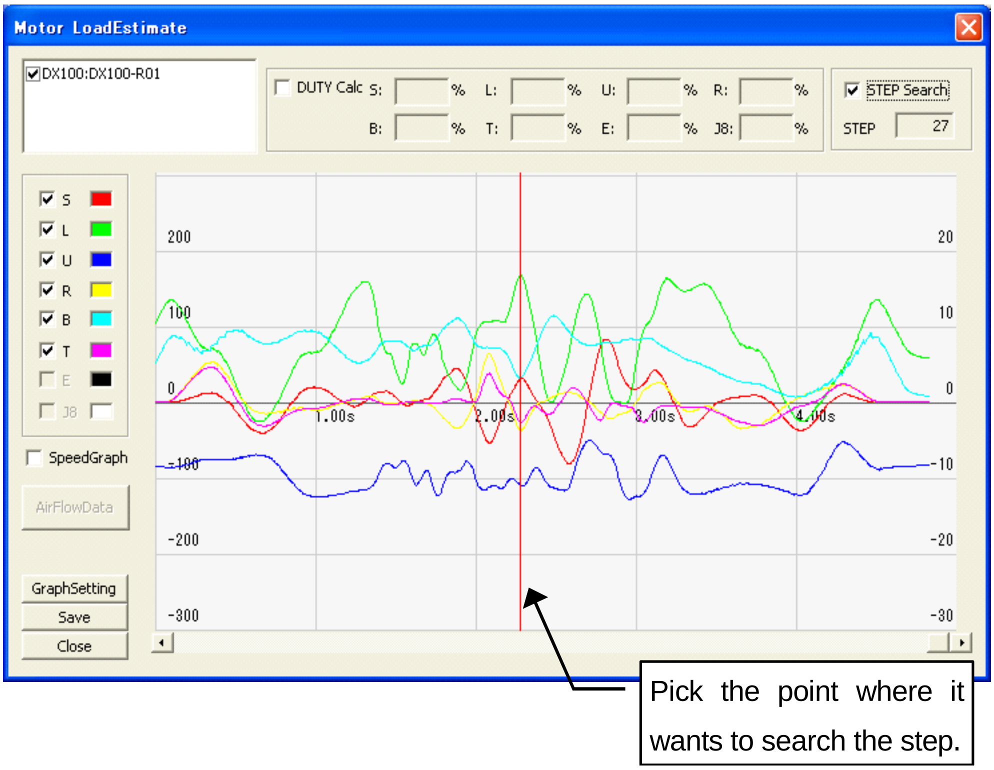


■ Step Search

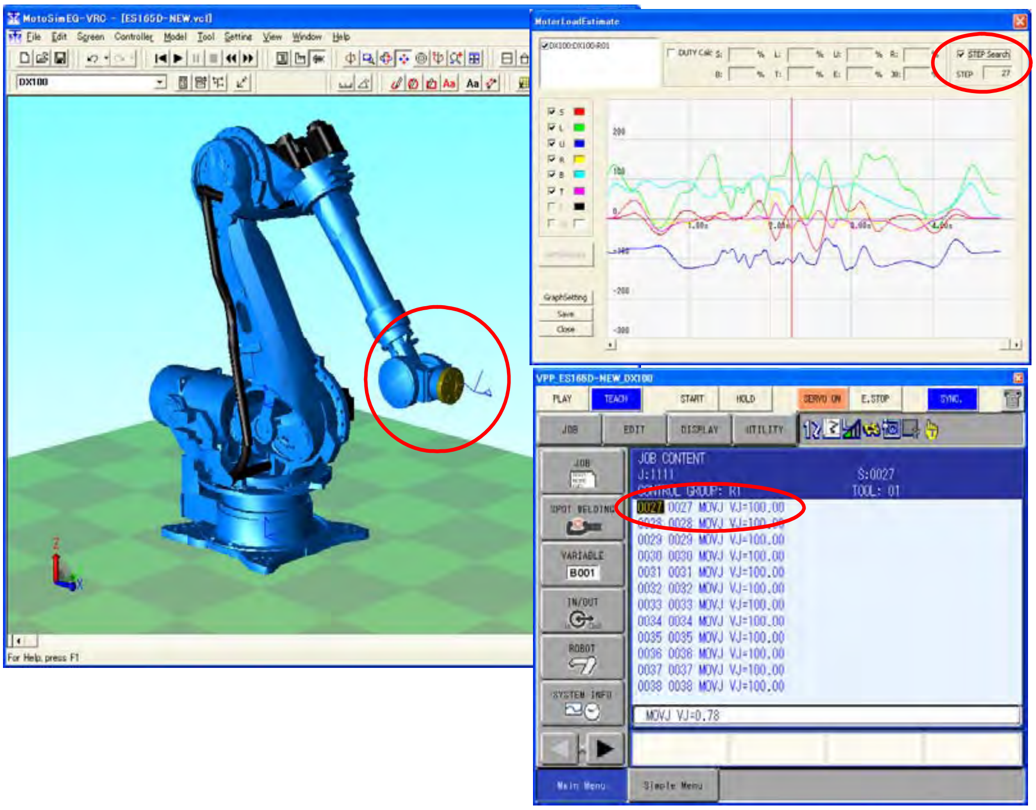
1. Check the [STEP Search] box.



2. Pick the point where it wants to search the step.



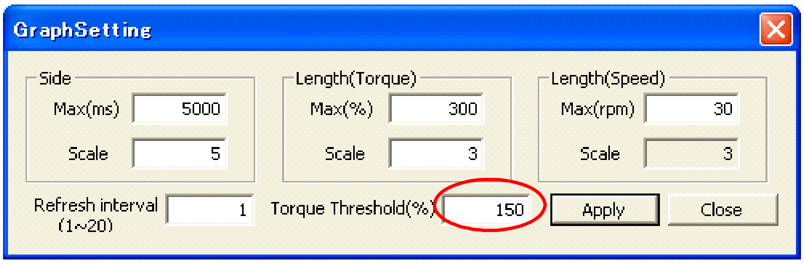
3. The step number is displayed, and robot moves to the searched position.



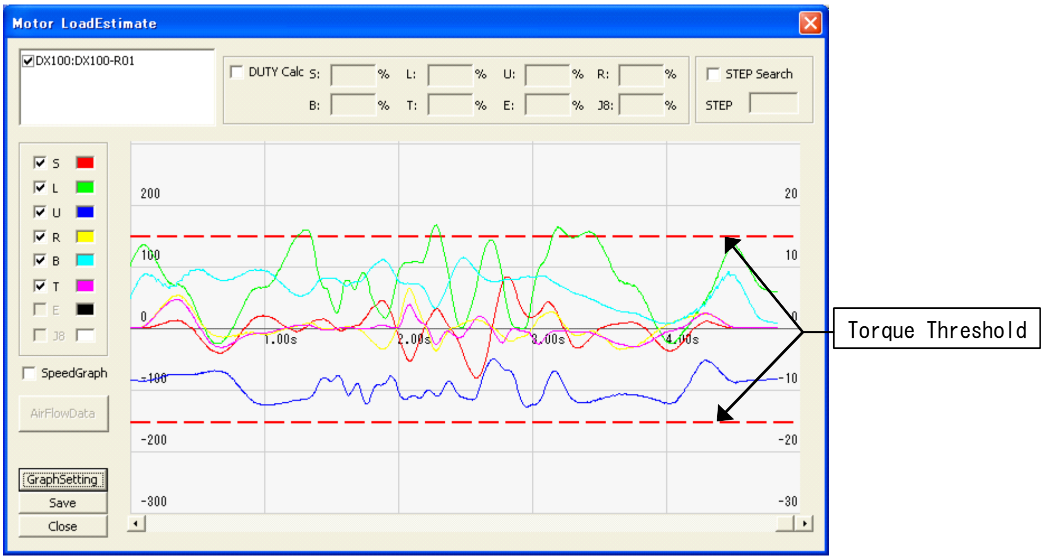
■ Torque Threshold Setting

To set the torque threshold, the threshold is displayed on the graph. It can be checked whether the presumed torque of each axis is over the threshold value during the playback has been exceeded.

1. Click the [GraphSetting] button, and enter the value of [Torque Threshold] in the dialog.



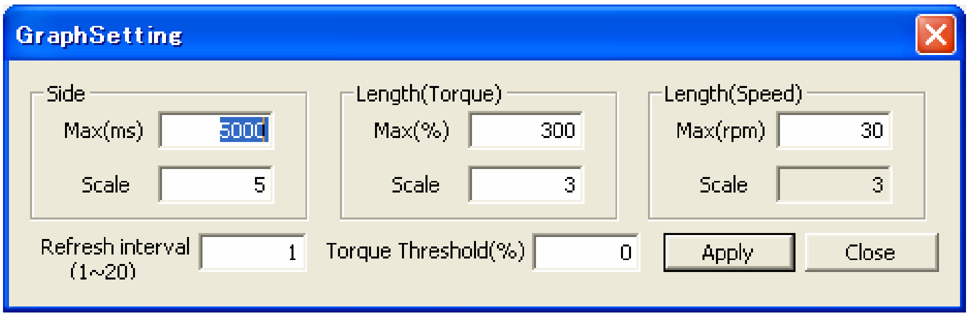
2. The Threshold value is displayed in the graph area with a dotted red line.



3. After the playback of a job, if the presumed torque exceeded the threshold value, the dialog will be displayed as follows.

■ Graph Setting

The display range (horizontal axis and spindle) in the torque estimate display area (wavy graph) and the re-drawing intervals are set.



Graph Setting

Item	Description
Side	Maximum value (ms) of a horizontal axis in a wavy graph and the number of scales are set.
Length(Torque)	Maximum value (%) of the spindle in a torque wavy graph and the number of scales are set. The number of scale is as common as Length(Speed).
Length(Speed)	Maximum value (rpm) of the spindle in a speed wavy graph and the number of scales are set. As for the number of scales, a setup of Length(Torque) is reflected.
Refresh interval (1-20)	The interval of the re-drawing time of a wavy graph is set.
Torque Threshold(%)	The threshold of torque is set.
[OK] button	A set value of each item is reflected. (The Graph Setting doesn't close.)
[Close] button	The Graph Setting is close.

■ Target robots for Moter Load Estimate

DX100

Model Name	Robot Type (Model File Name)	Remarks
EP4000D	EP4000D-J72	Added at Ver2.80
EP4000D	EP4000D-K72	Added at Ver2.80
EP4000D	EP4000D-L72	Added at Ver2.80
EPH130D	EPH130D-A00	Added at Ver2.80
EPH130RLD	PH13RLD-A00	Added at Ver2.80
EPH4000D	EPH400D-JA0	Added at Ver2.80

Model Name	Robot Type (Model File Name)	Remarks
EPH4000D	EPH400D-KA0	Added at Ver2.80
EPH4000D	EPH400D-LA0	Added at Ver2.80
ES165D	ES0165D-A00	Added at Ver2.60
ES200D	ES0200D-A00	Added at Ver2.72
HP20D	HP0020D-A00	Added at Ver2.81
MH5LS	MH005LS-A00	Added at Ver2.80
MH5S	MH0005S-A00	Added at Ver5.00
MH50	MH00050-A00	Added at Ver5.00
MH165	MH00165-A00	Added at Ver2.72
MH200	MH00200-A00	Added at Ver2.80
MH215	MH00215-A00	Added at Ver2.80
MH250	MH00250-A00	Added at Ver2.80
MH250	MH00250-B00	Added at Ver2.80
MPK2	MPK0002-B01	Added at Ver2.60
SDA5D	SDA005D-A00	Added at Ver4.00
SDA10D	SDA010D-A00	Added at Ver2.80
SDA10D	SDA010D-B00	Added at Ver2.80
SDA20D	SDA020D-A00	Added at Ver2.81
SIA5D	SIA005D-A00	Added at Ver4.00
SIA10D	SIA010D-A00	Added at Ver2.81
SIA20D	SIA020D-A00	Added at Ver2.60
SIA20D	SIA020D-Y00	Added at Ver2.81

FS100

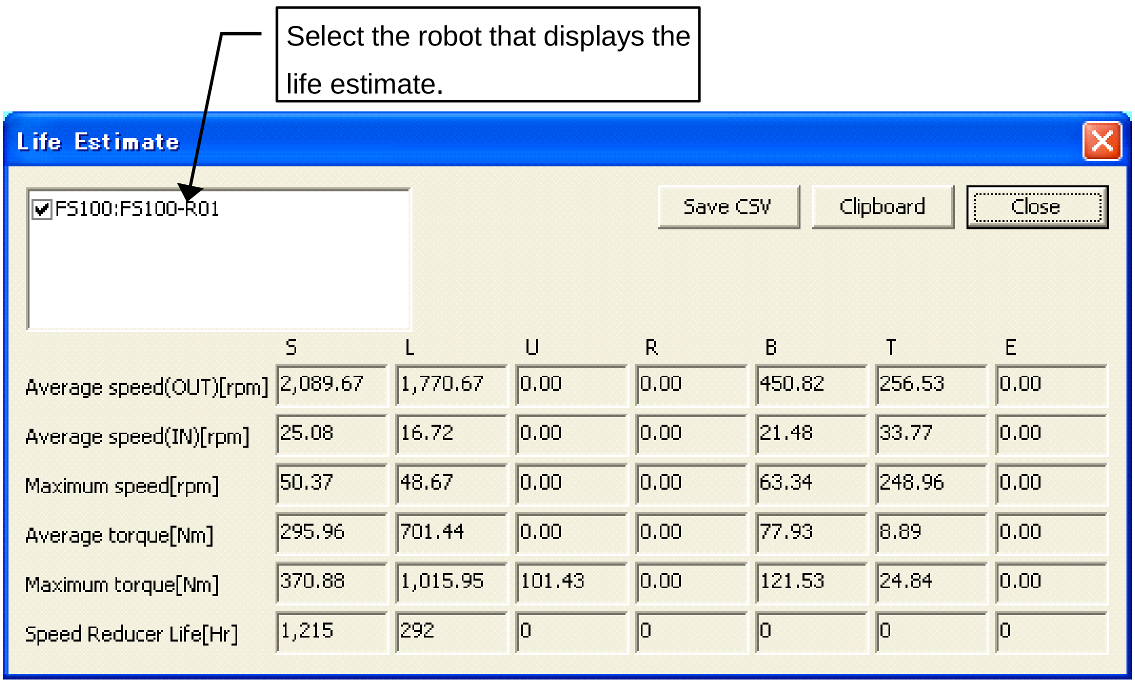
Model Name	Robot Type (Model File Name)	Remarks
MHJ	MH0000J-A00	Added at Ver2.80
MH3F	MH0003F-A00	Added at Ver2.72
MH5F	MH0005F-A00	Added at Ver2.60
MH5LF	MH005LF-A00	Added at Ver2.80
MPK2F	MPK002F-A00	Added at Ver2.60
MPP3	MPP0003-A00	Added at Ver2.60
SDA5F	SDA005F-A00	Added at Ver4.00
SDA10F	SDA010F-A00	Added at Ver2.80
SIA5F	SIA005F-A00	Added at Ver4.00
SIA10F	SIA010F-A00	Added at Ver2.81
SIA20F	SIA020F-A00	Added at Ver2.60

12.2 Life Estimate

Life estimate value of each reducer (Unit: Hour) is displayed when playback is executed.

NOTE

- YASKAWA does not warrant the result of this function. It should be used only as a guide. Because it is affected by Tool settings, Load condition of real robot, Lubricated condition of grease, and Temperature.
  Configure the following items of Tool setting collectly, Weight, Position of the center of gravity, and Inertia moment. Especially, when Weight item of Tool setting is set lower than real tool weight, this function makes wrong results.
- This function estimates the life of reducers from the normal result of playback. Therefore, the result of playback with interruption (ex. the emergency stop) is not included.
- This function can be used only with the robot axes. (external axes are not included.)
- This function cannot be used with two or more robot system other than a dual-arm robot.
- This function can be used only with the specified system version of controllers, and this function can be used only with target robots of Life Estimate with that system version. Please refer to section "13.5 List of Function depending on the system version of controller".



Life Estimate

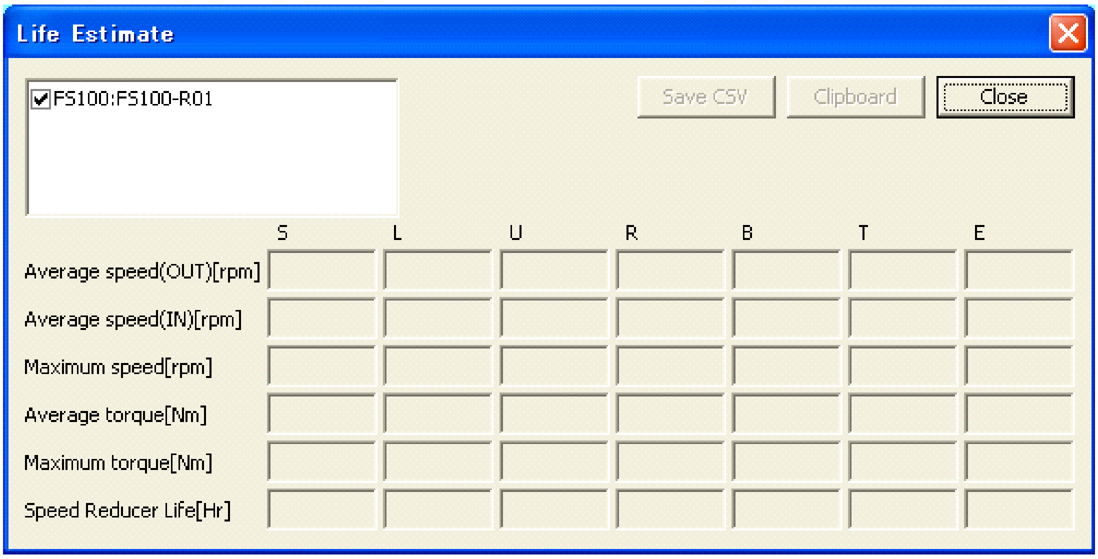
Item	Description
[Save CSV] button	The result of Life Estimate, the used torque data, the used gravity moment, and the used speed data are saved in text file (.csv).

Life Estimate

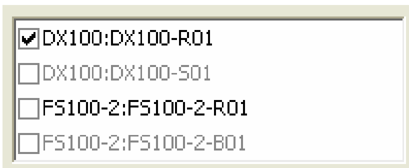
Item	Description
[Clipboard] button	The result of Life Estimate, the used torque data, the used gravity moment, and the used speed data are copied to the clipboard.
[Close] button	The Life Estimate display is closed.

Procedure

1. On the [Option Function] tab, in the [Estimate] group, click the [Life Estimate] button, the [Life Estimate] dialog appears.



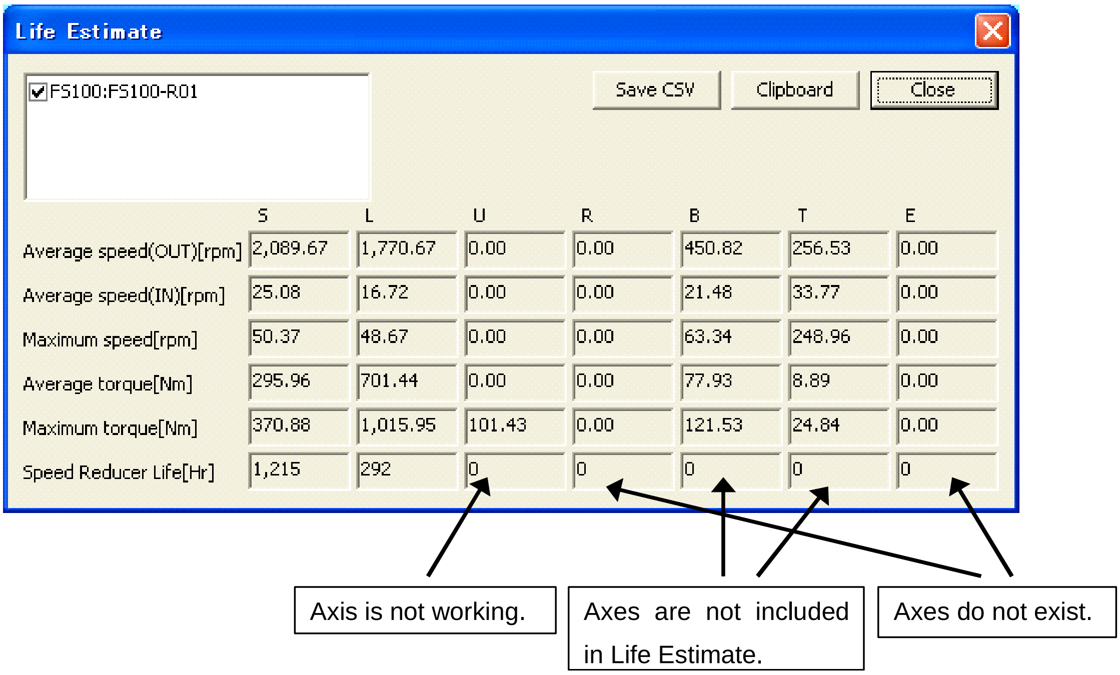
2. Select the robot estimated the reducer life.



3. The job is executed, and Average speed[rpm], Maximum speed[rpm], Average torque[Nm], Maximum torque[Nm], and Speed Reducer Life[Hr] are displayed.

NOTE

Reducer life time calculated by this function is that when the robot repeats this movement with this cycletime. The displaying areas exist for 7 axes, but the displaying areas of the Speed Reducer Life are displayed "0", when the axes are not working, the axes do not exist, or the axes are not included in Life Estimate.
If the robot has overhaul time, the value of Speed Reducer Life is displayed as [xxx over] (xxx is overhaul time), when it exceed overhaul time.



■ Target robots of Life Estimate

DX100

Model Name	Robot Type (Model File Name)	Remarks
EP4000D	EP4000D-J72	Added at Ver2.80
EP4000D	EP4000D-K72	Added at Ver2.80
EP4000D	EP4000D-L72	Added at Ver2.80
EPH130D	EPH130D-A00	Added at Ver2.80
EPH130RLD	PH13RLD-A00	Added at Ver2.80
EPH4000D	EPH400D-JA0	Added at Ver2.80
EPH4000D	EPH400D-KA0	Added at Ver2.80
EPH4000D	EPH400D-LA0	Added at Ver2.80
ES165D	ES0165D-A00	Added at Ver2.60
ES200D	ES0200D-A00	Added at Ver2.72
HP20D	HP0020D-A00	Added at Ver2.81
MH5LS	MH005LS-A00	Added at Ver2.80
MH5S	MH0005S-A00	Added at Ver5.00
MH50	MH00050-A00	Added at Ver5.00
MH165	MH00165-A00	Added at Ver2.72
MH200	MH00200-A00	Added at Ver2.80
MH215	MH00215-A00	Added at Ver2.80
MH250	MH00250-A00	Added at Ver2.80
MH250	MH00250-B00	Added at Ver2.80

Model Name	Robot Type (Model File Name)	Remarks
SDA5D	SDA005D-A00	Added at Ver4.00
SDA10D	SDA010D-A00	Added at Ver2.80
SDA10D	SDA010D-B00	Added at Ver2.80
SDA20D	SDA020D-A00	Added at Ver2.81
SIA5D	SIA005D-A00	Added at Ver4.00
SIA10D	SIA010D-A00	Added at Ver2.81
SIA20D	SIA020D-A00	Added at Ver2.60
SIA20D	SIA020D-Y00	Added at Ver2.81

FS100

Model Name	Robot Type (Model File Name)	Remarks
MHJ	MH0000J-A00	Added at Ver2.80
MH3F	MH0003F-A00	Added at Ver2.72
MH5F	MH0005F-A00	Added at Ver2.60
MH5LF	MH005LF-A00	Added at Ver2.80
MPK2F	MPK002F-A00	Added at Ver2.60
MPP3	MPP0003-A00	Added at Ver2.60
MPP3S	MPP003S-A00	Added at Ver4.10
SDA5F	SDA005F-A00	Added at Ver4.00
SDA10F	SDA010F-A00	Added at Ver2.80
SIA5F	SIA005F-A00	Added at Ver4.00
SIA10F	SIA010F-A00	Added at Ver2.81
SIA20F	SIA020F-A00	Added at Ver2.60

Appendix A

A.1 Data Format

This section describes the formats of model data files and cell data files.

■ Model File (*.mdl)

There are eight parts available for MotoSim EG as described later in " Each Part Format " of this section.
Data unit system is in millimeters (mm) and real numbers are available. Use decimal point as required.

Model Color Settings

The color of each model can be set by using the basic color code function or using RGB.
The following describe each setting.

- RGB

  RGB is created with the format RGB (0, 0, 0).
  Each color proportion can be set by a number from 0 to 255.

RGB (0, 0, 0)

Sets the proportion of blue.
Sets the proportion of green.
Sets the proportion of red.

<E.g.>	RGB(255,255,255)	Color: White
	RGB(255,0,0)	Color: Red
	RGB(0,255,0)	Color: Green
	RGB(0,0,255)	Color: Blue
	RGB(0,0,0)	Color: Black

Basic Color Code (QB Color) Function
Setting a number from 0 to 15 displays its corresponding color.
For example, setting BOX (4, 2) creates a red BOX model.

Number	Color	Number	Color
0	Black	8	Gray
1	Blue	9	Light blue
2	Green	10	Light green
3	Cyan	11	Light cyan
4	Red	12	Light red
5	Magenta	13	Light magenta
6	Yellow	14	Light yellow
7	White	15	Light white

Each Part Format

- BOX (color, num): Box form model
  Described with data of width, length, height, X, Y, Z, Rx, Ry and Rz.
  <Sample>

BLOCK	
{	
BOX(RGB(255,0,0),2)	Description
{	
100.000,100.000,100.000,0.000,0.000,0.000	Width, length, height, 0, 0, 0
0.000,0.000,0.000,0.000,0.000,0.000	X, Y, Z, Rx, Ry, Rz
}	
}	

- BOX2 (color, num): Box form model
  Described with data of width, length, height, X, Y, Z, Rx, Ry and Rz.
  <Sample>

BLOCK	
{	
BOX2(RGB(255,0,0),2)	Description
{	
100.000,100.000,100.000,0.000,0.000,0.000	Width, length, height, 0, 0, 0
0.000,0.000,0.000,0.000,0.000,0.000	X, Y, Z, Rx, Ry, Rz
}	
}	

- CYLINDER (color, num): Cylinder form model
  Described with data of lower face diameter, upper face diameter, height, number of divided faces, X, Y, Z, Rx, Ry and Rz.
  <Sample>

BLOCK	
{	
CYLINDER(RGB(255,0,0),2)	Description
{	
200.000,100.000,16.000,100.000,0.000,0.000	Lower face dia. height, No. of divided faces, upper face dia., 0, 0
0.000,0.000,0.000,0.000,0.000,0.000	X, Y, Z, Rx, Ry, Rz
}	
}	

- CONE2 (color, num): Cone form model
  Described with data of bottom diameter, height, number of divided faces, X, Y, Z, Rx, Ry and Rz.
  <Sample>

BLOCK	
{	
CONE2(RGB(255,0,0),2)	Description
{	
200.000,100.000,16.000,0.000,0.000,0.000	Bottom dia., height, No. of divided faces, 0, 0, 0
0.000,0.000,0.000,0.000,0.000,0.000	X, Y, Z, Rx, Ry, Rz
}	
}	

- SPHERE(color,num): Spherical model
  Described with data of diameter, number of divided faces, X, Y and Z.
  <Sample>

BLOCK	
{	
SPHERE(RGB(255,0,0),2)	Description
{	
100.000,30.000,0,0,0,0	Diameter, No.of devided face, 0, 0, 0, 0
0.000,0.000,0.000,0,0,0	X, Y, Z, 0, 0, 0
}	
}	

- PIPE2 (color, num): Pipe form model
  Described with data of lower face diameter, bottom plate thickness, upper face diameter, upper plate thickness, height, number of divided faces, X, Y, Z, Rx, Ry and Rz.
  <Sample>

BLOCK	
{	
PIPE2(RGB(255,0,0),2)	Description
{	
100.000,100.000,100.000,10.000,100.000,16.000	Lower face dia., bottom plate thickness, upper face dia., upper plate thickness, height, No. of divided faces
0.000,0.000,0.000,0.000,0.000,0.000	X, Y, Z, Rx, Ry, Rz
}	
}	

- AXIS6 (color, num): Model having information only of position and posture
  Described with data of X, Y, Z, Rx, Ry and Rz.
  “num” sets the number of target points.
  <Sample>

```
BLOCK
{
AXIS6(RGB(255,0,0),3)                        Description
{
0.000,0.000,0.000,0.000,0.000,0.000          Point1 (X, Y, Z, Rx, Ry, Rz)
100.000,0.000,0.000,0.000,0.000,0.000        Point2 (X, Y, Z, Rx, Ry, Rz)
200.000,0.000,0.000,0.000,0.000,0.000        Point3 (X, Y, Z, Rx, Ry, Rz)
}
}
```

- LINE(color,num): Continuous line model
  Described with data of X, Y and Z.
  "num" sets the number of points.
  <Sample>

```
BLOCK
{
LINE(RGB(255,0,0),3)                         Description
{
0.000,0.000,0.000                            Point1 (X, Y, Z)
100.000,200.000,300.000                      Point2 (X, Y, Z)
500.000,235.000,111.000                      Point3 (X, Y, Z)
}
}
```

- LINE2(color,num): Segmented line model
  Described with data of X, Y and Z.
  "num" sets the number of points.
  <Sample>

```
BLOCK
{
LINE2(RGB(255,0,0),4)                        Description
{
253.000,353.000,686.000                      Segment 1 Start (X, Y, Z)
89.000,254.000,79.000                        Segment 1 End (X, Y, Z)
413.000,3.000,99.000                         Segment 2 Start (X, Y, Z)
917.000,524.000,-48.000                      Segment 2 End (X, Y, Z)
}
}
```

- CUBE (color, num): Polygonal cube model
  Data of polygonal cube are described with data of bottom and height.
  A rectangular parallelepiped is composed of four points and one height, therefore, num is 5 in this case.
  <Sample>

BLOCK	
{	
CUBE(RGB(255,0,0),5)	Description
{	
0.000,0.000,0.000	Start point1 (X, Y, Z)(= End point 4)
100.000,0.000,0.000	End point1 (X, Y, Z)(= Start point 2)
100.000,100.000,0.000	End point2 (X, Y, Z)(= Start point 3)
0.000,100.000,0.000	End point3 (X, Y, Z)(= Start point 4)
0.000,0.000,100.000	Offset value (X, Y, Z)
}	
}	

- FLOOR (color, num): Floor form model
  Describes a plane meshed data string.
  Described with data of number of divided faces (vertical and horizontal) and frame data of floor end point.

  <Sample>

BLOCK	
{	
FLOOR(RGB(255,0,0),3)	Description
{	
6.000,6.000,0.000	No. of divided faces (X division No., Y division No., 0)
-1500.000,-3000.000,0.000	Floor end point1 (X, Y, Z)
1500.000,3000.000,0.000	Floor end point2 (X, Y, Z)
}	
}	

- FACE (color, num): Face model

  Describes a face with the frame data of X, Y, and Z of each point.

  In this case the face model is composed of three points on the face and the data for X, Y, Z, Rx, Ry and Rx, num is 4.

  <Sample>

BLOCK	
{	
FACE(RGB(255,128,0),4)	Description
{	
0.000,0.000,0.000,0.000,0.000,0.000	X, Y, Z, Rx, Ry, Rz Face is created with the following three points.
200.000,300.000,300.000,3,0,0	Point1 (X, Y, Z)
-200.000,300.000,300.000,0,0,0	Point2 (X, Y, Z)
-200.000,300.000,-300.000,0,0,0	Point3 (X, Y, Z)
}	
}	

■ Cell File

When constructing a cell, a cell file is created. The following describe an example of a cell file

```
CELL_INIT
{
VERSION=1, 0, 0, 0

CONTROLLER(0)
{
PATH=%CELPATH%\NX100;
NAME=NX100;
RB1
        {
        NAME=HP6;
        FILE=%CELPATH%\NX100\RB1\robotinf.dat;
        }
TRACE
        {
        ROBOT=HP6;
        }
}

MANIPULATOR
{
}

NSIMVIEW
{
CAMERAPOSITION=1.806423,3.445533,2.179023;
CAMERATARGET=0.594751,0.020004,0.705908;
CAMERAUPVECTOR=-0.161379,-0.341156,0.926049;
CAMERAFIELD=2.237789,1.568312;
USERVIEW
        {
        NO=0
        NAME=
        CAMERAPOSITION=0.000000,0.000000,0.000000;
        CAMERATARGET=0.000000,0.000000,0.000000;
        CAMERAUPVECTOR=0.000000,0.000000,0.000000;
        CAMERAFIELD=0.000000,0.000000;
        }
...
USERVIEW
        {
        NO=9
        NAME=
        CAMERAPOSITION=0.000000,0.000000,0.000000;
        CAMERATARGET=0.000000,0.000000,0.000000;
        CAMERAUPVECTOR=0.000000,0.000000,0.000000;
        CAMERAFIELD=0.000000,0.000000;
        }
}

NSIMLIGHT
{
LIGHT
        {
        NO=0
        DEFINE=1;
        ONOFF=1;
        TYPE=0;
        COLOR=RGB(255,255,255);
```

```
        LIGHTPOSITION=0.000000,0.000000,0.000000;
        LIGHTTARGET=0.000000,0.000000,0.000000;
        SCALLING=100.000000;
        }
...
LIGHT
        {
        NO=4
        DEFINE=0;
        ONOFF=0;
        TYPE=0;
        COLOR=RGB(255,255,255);
        LIGHTPOSITION=0.000000,0.000000,0.000000;
        LIGHTTARGET=0.000000,0.000000,0.000000;
        SCALLING=100.000000;
        }
}

}
MODEL_INIT
{
MODEL
        {
        NAME=FLOOR;
        PARENT=world;
        FILENAME=%CELPATH%\models\floor.mdl;
        COLOR=RGB(0,0,255);
        HIDESEE=1;
        OPACITY=0.50;
        SCALE=1.000000;
        AXIS6=0,0,0,0,0,0;
        }
MODEL
        {
        NAME=Teacher;
        PARENT=world;
        FILENAME=dummy;
        COLOR=RGB(0,0,255);
        HIDESEE=256;
        OPACITY=1.00;
        SCALE=1.000000;
        AXIS6=0,0,0,0,0,0;
        }
MODEL
        {
        NAME=HP6;
        PARENT=world;
        FILENAME=%CELPATH%\NX100\RB1\robotinf.dat;
        COLOR=RGB(0,0,255);
        HIDESEE=1;
        OPACITY=1.00;
        SCALE=1.000000;
        AXIS6=0,0,450,0,0,0;
        }
MODEL
        {
        NAME=HP6_LK0;
        PARENT=HP6_rm;
        FILENAME=%CELPATH%\NX100\RB1\HP6_LK0.hsf;
        COLOR=RGB(0,0,255);
        HIDESEE=1;
        OPACITY=1.00;
        SCALE=1.000000;
        AXIS6=0,0,-450,90,0,90;
```

```
        }
MODEL
        {
        NAME=HP6_LK1;
        PARENT=HP6_link1;
        FILENAME=%CELPATH%\NX100\RB1\HP6_LK1.hsf;
        COLOR=RGB(0,0,255);
        HIDESEE=1;
        OPACITY=1.00;
        SCALE=1.000000;
        AXIS6=0,0,0,90,0,90;
        }
...
MODEL
        {
        NAME=HP6_LK6;
        PARENT=HP6_link6;
        FILENAME=%CELPATH%\NX100\RB1\HP6_LK6.hsf;
        COLOR=RGB(0,0,255);
        HIDESEE=1;
        OPACITY=1.00;
        SCALE=1.000000;
        AXIS6=0,0,0,0,0,0;
        }
MODEL_RB
        {
        NAME=HP6_rm;
        HIDESEE=1;
        OPACITY=1.00;
        }
MODEL_RB
        {
        NAME=HP6_link1;
        HIDESEE=1;
        OPACITY=1.00;
        }

...
MODEL_RB
        {
        NAME=HP6_link6;
        HIDESEE=1;
        OPACITY=1.00;
        }
MODEL_RB
        {
        NAME=HP6_flange;
        HIDESEE=1;
        OPACITY=1.00;
        }
MODEL_RB
        {
        NAME=HP6_tcp;
        HIDESEE=257;
        OPACITY=1.00;
        }
}
PAIR_INIT
{
}
```

1) VERSION Command

- VERSION=1, 0, 0, 0
  Describes the MotoSim EG version.

2) CONTROLLER Command

The CONTROLLER command describes data concerning controllers.

- CONTROLLER(0)
  Describes the Controller No. 0.
  When more than one controller is used, the controllers are provided with numbers CONTROLLER(0), CONTROLLER(1), CONTROLLER(2) ✍✍✍.
- PATH=%CELPATH%\NX100;
  Describes the directory path to which the CONTROLLER refers.
  This directory needs a “VRC.BIN” file.
- NAME=NX100;
  Describes the name of the CONTROLLER.
- Control Group sub-commands (RB1, BS1,ST1)
  The control group sub-commands describes data concerning control groups. There are three type of control group RB for robot, BS for base station and ST for station. The type is followed by an index number.
  - NAME=HP6;
    Describes the name of the control group.
  - FILE=%CELPATH%\NX100\RB1\robotinf.dat;
    Describes the directory path contraining the robot models and file containing information on how the models are assemble together to make the robot.
- TRACE sub-command
  Describes that trace points are displayed at playback.
  - ROBOT=HP6;
    Name of the robot (control group) being traced.
  - MODEL=HP6_tcp;
    Name of the model being traced. If not specified, the robot TCP model is traced.
  - PARENT=world;
    Describes the name of the parent model. If not specified, the parent is the “world” model.
  - POINTS=1000;
    Description of the maximum number of trace points. If not specified, the value is 1000.

3) MANIPULATOR Command

The MANIPULATOR command describes functions to move models according to a robot axis value. Mainly used to move secondary link model of a robot.

4) NSIMVIEW Command

The NSIMVIEW command describes data related to the camera viewpoint.

5) NSIMLIGHT Command

The NSIMLIGHT command describes data related to the light type and position.

6) MODEL_INIT Command

The MODEL_INIT command describes data concerning models.

- MODEL
  Describes a MODEL.
  - NAME=HP6-A00;
    Describes the name of the MODEL.
  - PARENT=world;
    Describes the PARENT model of the MODEL.
  - FILENAME=%CELPATH%\HP6-A00\HP6-A00-MDL.mdl;
    Describes the directory path and MODEL file name to which the MODEL refers.
    If no MODEL file exists, "dummy" is described.
  - COLOR=RGB(0,0,255);
    Describes the color of the MODEL.
  - HIDESEE=1;
    Describes the display bit of the MODEL.
  - OPACITY=1.00;
    Describes the opacity of the MODEL.
  - SCALE=1.000000;
    Describes the scale factor of the MODEL.
  - AXIS6=0,0,450,0,0,0;
    Describes the relative coordinates to the MODEL PARENT.
- MODEL_RB
  Describes a robot joint model. Robot joints model define the frame of a robot joint. Only the NAME, HIDESEE and OPACITY values are defined (see above for description).

Default Models are:

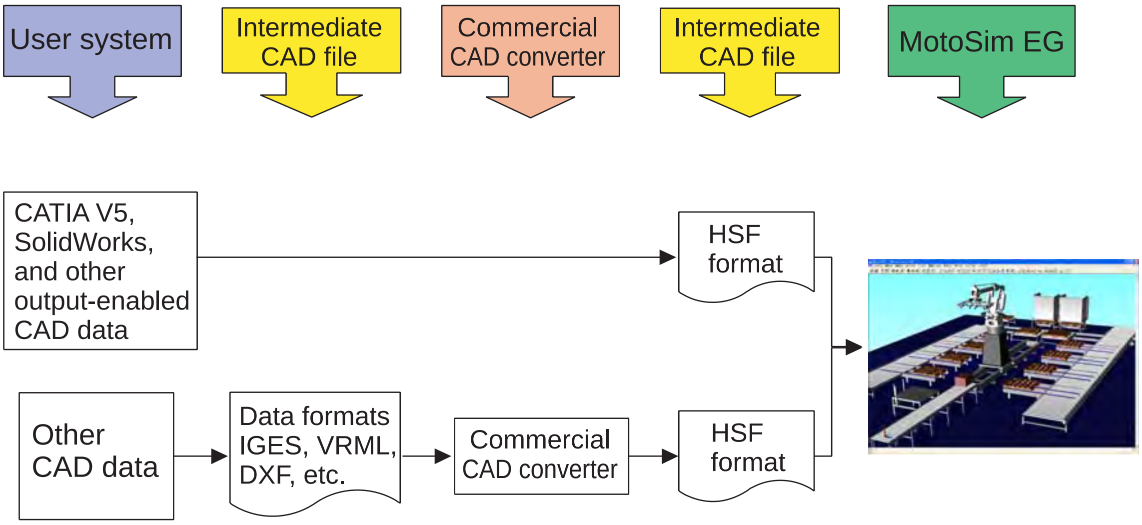
- world
  Starting point for all models. It does not appear.
- worldframe
  Displays the world position with a frame.
- Teacher
  Displays a frame to create a target coordinate on any point.
- FLOOR
  Displays world XY plane.

7) PAIR_INIT Command

The PAIR_INIT command describes pairs of models that are checked for collision when the collision detection function is active.

A.2 Reading the CAD Data with MotoSim EG-VRC

The CAD data must be converted into a form readable for MotoSim EG-VRC before starting the reading operation. The following flowchart shows the data conversion operations required for MotoSim EG-VRC.



NOTE

The CAD converters "PolyTrans" and "Inovate" are not included with MotoSim EG-VRC. Prepare such application software before the operation.

PolyTrans: Okino Computer Graphics (http://www.okino.com)

Inovate: IRONCAD (http://www.ironcad.com)

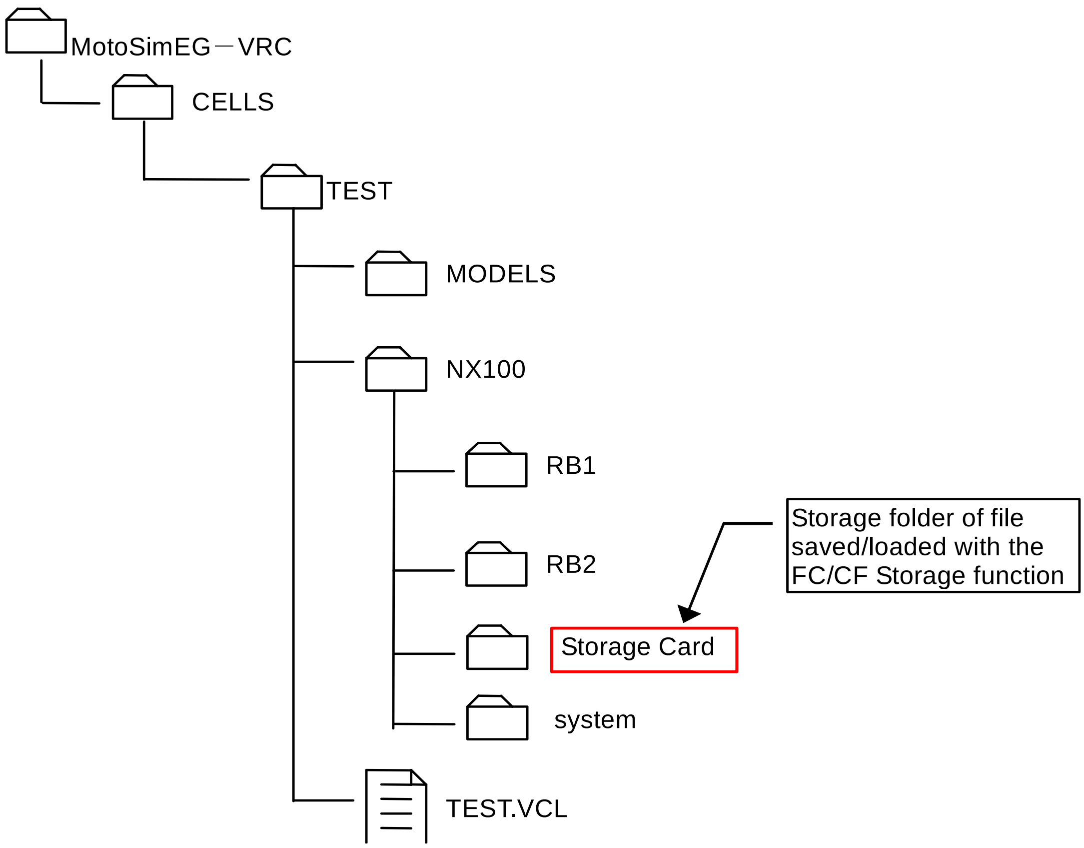
A.3 Storage Card

The FD/CF function of the Virtual Pendant is used to save or load MotoSim EG-VRC data such as edited jobs, condition files, etc.

A.3.1 Folder Structure

The folder used to save or load data files is the "Storage Card" folder located under the controller folder of the cell (for example in the figure below: \Cells\Test\NX100). Data saved or loaded are put in this folder. Like with the real controller, it is possible to create sub-folder under the "Storage Card" folder, and also load/save data from those folders.

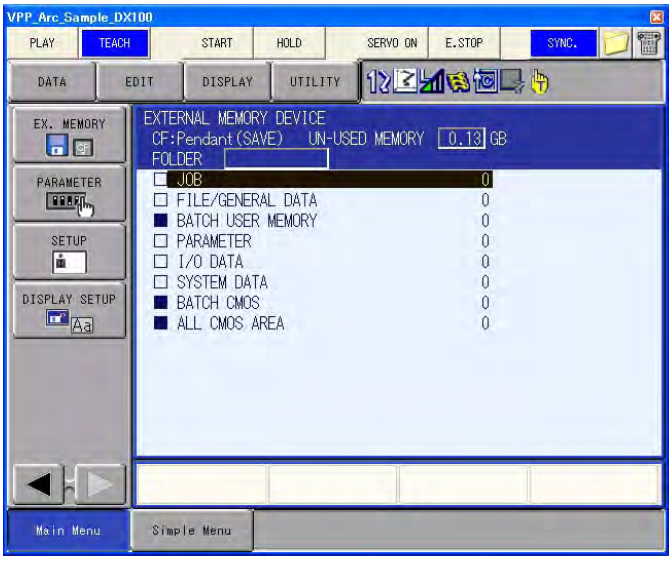
When the  button in the virtual pendant is clicked, the target folder can be opened.



A.3.2 Save controller data created with MotoSim EG-VRC

Procedure

1. Select {FD/CF} - {SAVE} from the Virtual Pendant main menu.



2. Select the type of data to be saved. For the figure below, {JOB} was selected. The list of files (in this case, the list of jobs) will display.

3. Select the files to be saved by moving the cursor on the file name and, press the [Space-bar] on the keyboard or click [Select] in the Virtual Pendant keypad. The selected files will be marked by a star ★ mark on there left.

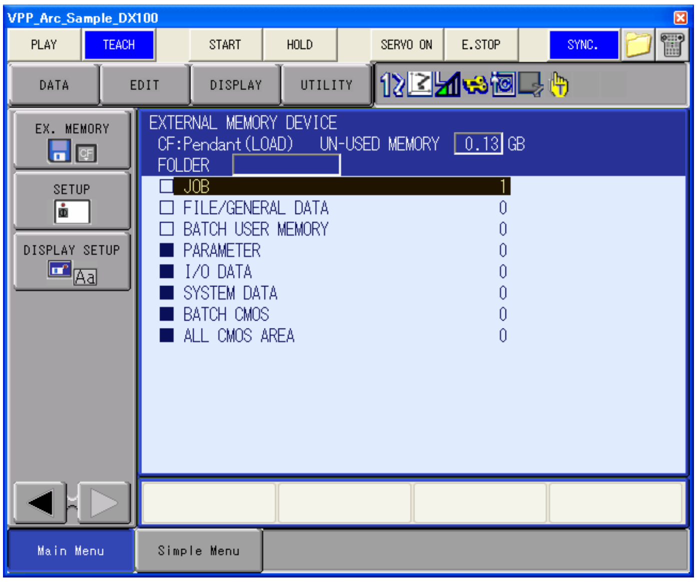
4. Press [Enter]. Select [Yes] in the confirmation dialog box that will display. The selected files will be saved in the “Storage Card”.

> **NOTE** Files cannot be overwritten. If the files already exist, an error message will display. First delete the existing file or select a different folder, then proceed with the save operation.

A.3.3 Load controller data to MotoSim EG-VRC

Procedure

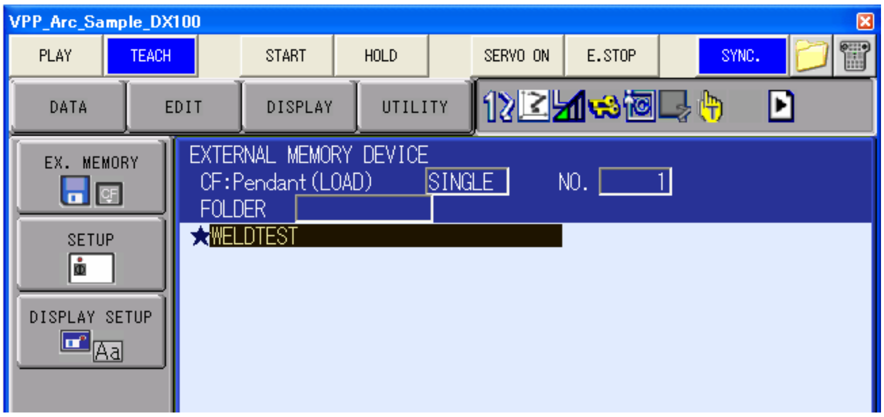
1. Select {FD/CF} - {LOAD} from the Virtual Pendant main menu.



2. Select the type of data to be saved. For the figure below, {JOB} was selected. The list of files in the “Storage Card” folder (in this case, the list of jobs) will display.

> **NOTE** Unlike Windows, the VRC controller is case sensitive for the file names. File names need to be entered with all capital letters or they will not be detected in the “Storage Card” folder. If this is not the case, rename the file name with Windows Explorer so that the names are written in capital letters.

3. Select the files to be loaded by moving the cursor on the file name and, press the [Space-bar] on the keyboard or click [Select] on the Virtual Pendant keypad. The selected files will be marked by a star ★ mark.



4. Press [Enter]. Select [Yes] in the confirmation dialog box that will display. The selected files will be loaded to the MotoSim EG-VRC controller.

NOTE

Job files cannot be loaded, if they already exist in the controller.
In such case, first rename or delete the existing job, then proceed with the load operation.

A.4 Standard function about DX200

○:Enable, △:Display only, ✕:Disable

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
JOB	JOB	JOB		○
		EDIT		○
		DISPLAY	ARC INFORMATION (ARC)	○
		UTILITY	SETUP SPECIAL RUN	○
			PARALLEL SHIFT JOB	○
			MIRROR SHIFT	○
			PAM	✕
			ARC SHIFT CANCEL (ARC)	○
	SELECT JOB	JOB		○
		EDIT		○
		DISPLAY	FOLDER	○
	CREATE NEW JOB			○
	MASTER JOB			○
	JOB CAPACITY			○
	CYCLE			○
	JOB EDIT(PLAY)	JOB	WRITING	○
		EDIT		○
		DISPLAY	FOLDER	○
	PLAY EDIT JOB LIST	JOB	WRITING	○
		EDIT		○
		DISPLAY	FOLDER	○
VARIABLE				○
IN/OUT	EXTERNAL INPUT			△
	EXTERNAL OUTPUT			△
	UNIVERSAL INPUT			△
	UNIVERSAL OUTPUT			△
	SPECIFIC INPUT			△
	SPECIFIC OUTPUT			△
	RIN			△
	CPRIN			△
	REGISTER			△

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
	AUXILIARY RELAY			△
	CONTROL INPUT			△
	PSEUDO INPUT SIG			△
	NETWORK INPUT			△
	NETWORK OUTPUT			△
	ANALOG OUTPUT			△
	SV POWER STATUS			△
	LADDER PROGRAM			△
	I/O ALARM			△
	I/O MESSAGE			△
	REMOTE			×
	ANT. OUTPUT			×
	TERMINAL			△
	IO SIMULATION LIST			△
	SERVO ON FACTOR			×
	RB STOP FACTOR MONITOR			△
ROBOT	CURRENT POSITION			○
	COMMAND POSITION			○
	SERVO MONITOR			×
	WORK HOME POS			○
	SECOND HOME POS			○
	DROP AMOUNT			×
	POWER ON/OFF POS			×
	TOOL			○
	INTERFERENCE			○
	SHOCK SENS LEVEL			×
	USER COORDINATE			○
	HOME POSITION			○
	MANIPULATOR TYPE			○
	ANALOG MONITOR			×
	OVERRUN&S-SENSOR			×
	LIMIT RELEASE			○
	ARM CONTROL			○
	SHIFT VALUE			○
	SOFTLIMIT SETTING			○
	SHOCK SENS LV. (CURRENT)			×

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
SYSTEM INFO	VERSION			○
	MONITORING TIME			×
	CONTROLLER INFORMATION			○
	ALARM HISTORY			○
	I/O MSG HISTORY			○
	LOGDATA			○
	USER DEFINITION MENU			○
	SECURITY			○
EX. MEMORY	LOAD			○
	SAVE			○
	VERIFY			○
	DELETE			○
	FOLDER			○
PARAMETER				△
SETUP	TEACHING COND.		LANGUAGE LEVEL	○
			INSTRUCTION INPUT LEARNING	○
			MOVE INSTRUCTION SET POSITION	○
			BUZZER WHEN POSITION TEACHING	○
			STEP ONLY CHANGING	○
			RECT/CYLINDRICAL	○
			TOOL NO. SWITCH	○
			TOOL NO. INTERLOCK FOR STEP ENTRY	○
			CHECK AT P-VAR TOOL NO. CHANGE	○
			POS. TEACH ONLY JOG CONTROL GROUP	○
			JOB UNDELETE FUNCTION	×
		DATA	RESET INSTRUCTION	×
	OPERATE COND.		SPEED DATA INPUT FORM	○
			CYCLE SWITCH IN TEACH MODE	○
			CYCLE SWITCH IN PLAY MODE	○
			CYCLE SWITCH IN LOCAL MODE	×

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
			CYCLE SWITCH IN REMOTE MODE	×
			SET CYCLE ON POWER ON	○
			SECURITY MODE WHEN POWER ON	○
			JOB STEP WHEN POWER ON	○
			GENERAL OUT KEEP WHEN POWER ON	×
	OPERATE ENABLE		EXTERNAL START	×
			PP START	○
			EXTERNAL MODE SWITCH	×
			EXTERNAL CYCLE SWITCH	×
			PP CYCLE SWITCH	○
			EXTERNAL SERVO ON	×
			PP SERVO ON	×
			DSW SERVO ON	×
	FUNCTION ENABLE		MASTER JOB CHANGE	○
			RESERVED START	×
			RESERVED START JOB CHANGE	×
			JOB SELECT WHEN PLAY MODE	○
			JOB SELECT WHEN REMOTE OR PLAY	○
			I/O-VARIABLE CUSTOMIZE FUNCTION	×
			GENERAL I/O NAME DISP. ON JOB	○
			ANTICIPATION FUNCTION	×
			ALL AXES ANGLE DISP FUNCTION	○
			CURSOR MOVE BY TOUCH(JOB)	×
	JOG COND.			○
	PLAYBACK COND.		CHECK/MACHINE LOCK	○
			MASTER CALLING UP	○
			INITIAL MOVE SPEED OF ROBOT	×

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
			START METHOD AFTER ABSO OVER	×
			SIGNAL NO. WHEN DROP VALUE OVER	×
	FUNCTION COND.			×
	DISPLAY COLOR COND.			○
	LOGDATA COND.			×
	DATE/TIME			○
	RESERVE JOB NAME			×
	USER ID			○
	SET SPEED			○
	KEY ALLOCATION			×
	JOG KEY ALLOC.			○
	WRONG DATA LOG			○
	ENERGY SAVING FUNCTION			×
	ENCODER MAINTENANCE			×
SAFETY FUNC.	M-SAFETY SIGNAL ALLOC			○
	TIMER DELAY SET			○
	SAFETY LOGIC CIRCUIT			○
DISPLAY SETUP				○
ARC WELDING (ARC, JIGLESS ARC)	ARC START COND.			○ *1
	ARC END COND.			○ *1
	ARC AUX COND.			○
	POWER SOURCE COND.			○
	ARC WELD DIAG.			○
	WEAVING			○
	ARC MONITOR			○
	ARC MONITOR (SAMPL)			○
	APPLI COND.(ARC)			○
	APPLI COND.(JIGLESS ARC)			× *2
HANDLING	HANDLING DIAG.			×
SPOT WELDING (SPOT)	WELD DIAGNOSIS	DATA	CLEAR CURRENT POS	×

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
	I/O ALLOCATION			○
	GUN CONDITION			○
	SPOT POWER SOURCE COND.			○
	APPLI COND.			○
SPOT WELDING (MOTOR GUN)	SPOT SUPERVISION			×
	CLEARANCE SETTING			○
	PRESSURE			○
	GUN PRESSURE			○
	TIP DRESS CONDITION			×
GENERAL	WEAVING			○
	GENERAL DIAG.			×
Maintenance mode				
System	INITIALIZE			○
	SETUP		LANGUAGE	○
			CONTROL GROUP	○
			APPLICATION	○
			OPTION BOARD	○
			IO MODULE	○
			CMOS MEMORY	×
			DATE/TIME	×
			OPTION FUNCTION	○ *3
	VERSION			○
	SECURITY			○
FILE	INITIALIZE			○
EX. MEMORY	LOAD			○
TOOL	LANGUAGE BUILD			×
DISPLAY SETUP				○

***1** Graphical setting display is not supported.

***2** WELDING SPEED PRIORITY can be used only.

***3** Please refer to section Section 1.2.1 "Optional Functionof controller" for the list of each optional function.

A.5 Standard function about DX100

○:Enable, △:Display only, ✕:Disable

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
JOB	JOB	JOB		○
		EDIT		○
		DISPLAY		○
		UTILITY	SETUP SPECIAL RUN	○
			PARALLEL SHIFT JOB	○
			MIRROR SHIFT	○
			PAM	✕
			SPEED OVERRIDE	○
			COND ADJUSTMENT	✕
	SELECT JOB			○
	CREATE NEW JOB			○
	MASTER JOB			○
	JOB CAPACITY			○
	CYCLE			○
VARIABLE				○
IN/OUT	EXTERNAL INPUT			△
	EXTERNAL OUTPUT			△
	UNIVERSAL INPUT			△
	UNIVERSAL OUTPUT			△
	SPECIFIC INPUT			△
	SPECIFIC OUTPUT			△
	RIN			△
	CPRIN			△
	REGISTER			△
	AUXILIARY RELAY			△
	CONTROL INPUT			△
	PSEUDO INPUT SIG			△
	NETWORK INPUT			△
	NETWORK OUTPUT			△
	ANALOG OUTPUT			△
	SV POWER STATUS			△
	LADDER PROGRAM			△

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
	I/O ALARM			△
	I/O MESSAGE			△
	REMOTE			✕
	TERMINAL			△
	IO SIMULATION LIST			△
ROBOT	CURRENT POSITION			○
	COMMAND POSITION			○
	SERVO MONITOR			✕
	WORK HOME POS			○
	SECOND HOME POS			○
	DROP AMOUNT			✕
	POWER ON/OFF POS			✕
	TOOL			○
	INTERFERENCE			○
	SHOCK SENS LEVEL			✕
	USER COORDINATE			○
	HOME POSITION			○
	MANIPULATOR TYPE			○
	ANALOG MONITOR			✕
	OVERRUN&S-SENSOR			✕
	LIMIT RELEASE			○
	ARM CONTROL			○
	LINK SERVOFLOAT			✕
	SHIFT VALUE			○
SYSTEM INFO	VERSION			○
	MONITORING TIME			✕
	ALARM HISTORY			○
	I/O MSG HISTORY			○
	SECURITY			○
EX. MEMORY	LOAD			○
	SAVE			○
	VERIFY			○
	DELETE			○
	FOLDER			○
PARAMETER				△
SETUP	TEACHING COND.	DATA	RESET INSTRUCTION	✕
			LANGUAGE LEVEL	○

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
			INSTRUCTION INPUT LEARNING	○
			MOVE INSTRUCTION SET POSITION	○
			BUZZER WHEN POSITION TEACHING	○
			STEP ONLY CHANGING	○
			RECT/CYLINDRICAL	○
			TOOL NO. SWITCH	○
			TOOL NO. INTERLOCK FOR STEP ENTRY	○
			POS. TEACH ONLY JOG CONTROL GROUP	○
			JOB UNDELETE FUNCTION	×
	OPERATE COND.		SPEED DATA INPUT FORM	○
			CYCLE SWITCH IN TEACH MODE	○
			CYCLE SWITCH IN PLAY MODE	○
			CYCLE SWITCH IN LOCAL MODE	×
			CYCLE SWITCH IN REMOTE MODE	×
			SET CYCLE ON POWER ON	○
			SECURITY MODE WHEN POWER ON	○
			JOB STEP WHEN POWER ON	○
			GENERAL OUT KEEP WHEN POWER ON	×
	OPERATE ENABLE		EXTERNAL START	×
			PP START	○
			EXTERNAL MODE SWITCH	×
			EXTERNAL CYCLE SWITCH	×
			PP CYCLE SWITCH	○
			EXTERNAL SERVO ON	×
			PP SERVO ON	×
			DSW SERVO ON	×
	FUNCTION ENABLE		MASTER JOB CHANGE	○

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
			RESERVED START	×
			RESERVED START JOB CHANGE	×
			JOB SELECT WHEN REMOTE OR PLAY	○
			I/O-VARIABLE CUSTOMIZE FUNCTION	×
			GENERAL I/O NAME DISP. ON JOB	○
			ANTICIPATION FUNCTION	×
			ALL AXES ANGLE DISP FUNCTION	○
	JOG COND.			○
	PLAYBACK COND.		CHECK/MACHINE LOCK	○
			MASTER CALLING UP	○
			INITIAL MOVE SPEED OF ROBOT	×
			START METHOD AFTER ABSO OVER	×
			SIGNAL NO. WHEN DROP VALUE OVER	×
	FUNCTION COND.			×
	DISPLAY COLOR COND.			○
	DATE/TIME			○
	RESERVE JOB NAME			×
	USER ID			○
	SET SPEED			○
	KEY ALLOCATION			×
	JOG KEY ALLOC.			○
	WRONG DATA LOG			○
	ENERGY SAVING FUNCTION			×
	ENCODER MAINTENANCE			×
DISPLAY SETUP				○
ARC WELDING	ARC START COND.			○ *1
	ARC END COND.			○ *1
	ARC AUX COND.			○
	POWER SOURCE COND.			○
	ARC WELD DIAG.			×

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
	WEAVING			○
	ARC MONITOR			×
	ARC MONITOR (SAMPL)			×
	APPLI COND.			× *2
HANDLING	HANDLING DIAG.			×
ARC WELDING (JIGLESS ARC)	ARC START COND.			○ *1
	ARC END COND.			○ *1
	ARC AUX COND.			○
	POWER SOURCE COND.			○
	ARC WELD DIAG.			×
	WEAVING			○
	ARC MONITOR			×
	ARC MONITOR (SAMPL)			×
SPOT WELDING	WELD DIAGNOSIS			×
GENERAL	WEAVING			○
	GENERAL DIAG.			×
SPOT WELDING	WELD DIAGNOSIS			×
	GUN PRESSURE			○
	PRESSURE			○
	CLEARANCE SETTING			○
	TIP INSTALLATION			×
Maintenance mode				
System	INITIALIZE			○
	SETUP		LANGUAGE	○
			CONTROL GROUP	○
			OPTION BOARD	○
			IO MODULE	○
			DATE/TIME	△
			OPTION FUNCTION	○ *3
	VERSION			○
	SECURITY			○
FILE	INITIALIZE			○
EX. MEMORY	LOAD			○
	SYSTEM RESTORE			×

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
TOOL	LANGUAGE BUILD			✕
DISPLAY SETUP				○

1 Graphical setting display is not supported.

2 WELDING SPEED PRIORITY can be used only.

3 Please refer to section Section 1.2.1 "Optional Functionof controller" for the list of each optional function.

A.6 List of Function depending on the system version of controller

■ DX200

Function	Version DN1.01-00
Motor load estimate	○
Life estimate	○
Reset Job	○
Cycle time display	○
Step end points display in the trace points	○
Collision step movement	○
Conveyor synchronization	○
Open the storage card folder	○
Job Browser	○
Lap Time Panel	○

■ DX100

Function	Version DS3.20-00
Motor load estimate	○
Life estimate	○
Reset Job	○
Cycle time display	○
Step end points display in the trace points	○
Collision step movement	○
Conveyor synchronization	○
Open the storage card folder	○
Job Browser	○
Lap Time Panel	○

■ FS100

Function	Version		
	FS3.03A-00	FS3.03B-00	FS2.00-00
Motor load estimate	○	○	×
Life estimate	○	○	×
Reset Job	○	○	○
Cycle time display	○	○	○
Step end points display in the trace points	○	○	○
Collision step movement	○	○	○
Conveyor synchronization	○	○	○
Open the storage card folder	○	○	○
Job Browser	○	○	○
Lap Time Panel	○	○	○

■ NX100

Function	Version		
	NS4.75-00	NS5.09-45	NS4.69-A5
Motor load estimate	×	×	×
Life estimate	×	×	×
Reset Job	○	○	×
Cycle time display	○	○	×
Step end points display in the trace points	○	○	×
Collision step movement	○	○	×
Conveyor synchronization	○	○	×
Open the storage card folder	○	○	○
Job Browser	○	○	×
Lap Time Panel	○	○	×

A.7 List of Manipulator Models and Offset Values Supported by MotoSim EG-VRC

■ DX200

Model Name	Robot Type (Model File Name)	Offset Value (mm)	Remarks
MA1440	MA01440-A00	450	Added at Ver4.00
MH12	MH00012-A00	450	Added at Ver4.00
MH180	MH00180-A00	650	Added at Ver4.01
MH225	MH00225-A00	650	Added at Ver4.01
MS165	MS00165-A00	650	Added at Ver4.01
MS210	MS00210-A00	650	Added at Ver4.01

■ DX100

Model Name	Robot Type (Model File Name)	Offset Value (mm)	Remarks
DX1350D	DX1350D-A00	480	Added at Ver2.60
EP4000D	EP4000D-J72	740	Added at Ver2.72
EP4000D	EP4000D-K72	740	Added at Ver2.72
EP4000D	EP4000D-L72	740	Added at Ver2.72
EPH130D	EPH130D-A00	730	Added at Ver2.45
EPH130RLD	PH13RLD-A00	600	Added at Ver2.72
EPH4000D	EPH400D-JA0	758	Added at Ver2.80
EPH4000D	EPH400D-JB0	758	Added at Ver2.72
EPH4000D	EPH400D-KA0	758	Added at Ver2.80
EPH4000D	EPH400D-KB0	758	Added at Ver2.72
EPH4000D	EPH400D-LA0	758	Added at Ver2.80
EPH4000D	EPH400D-LB0	758	Added at Ver2.72
ES165D	ES0165D-A00	650	Added at Ver2.00
ES165D-100	ES0165D-A10	650	Added at Ver2.81
ES165RD	ES165RD-A00	450	Added at Ver2.20
ES200D	ES0200D-A00	650	Added at Ver2.00
ES280D-230	ES0280D-A10	650	Added at Ver2.21
HP20D	HP0020D-A00	505	Added at Ver2.00
HP20D-6	HP0020D-A10	505	Added at Ver2.40
HP20RD	HP020RD-A00	305	Added at Ver2.21
IS300D	IS0300D-A00	0	Added at Ver2.21
MA1400	MA01400-A00	450	Added at Ver2.00
MA1800	MA01800-A00	555	Added at Ver2.10
MA1900	MA01900-A00	505	Added at Ver2.00
MC2000	MC02000-A00	680	Added at Ver2.40
MFL2200D-2650	MFL050D-C20	827	Added at Ver2.45
MFS2500D-4000	MFS060D-A00	0	Added at Ver4.00
MH5	MH00005-C00	330	Added at Ver2.21
MH5	MH00005-E00	330	Added at Ver2.24
MH5	MH00005-E10	330	Added at Ver2.24
MH5L	MH0005L-C00	330	Added at Ver2.21
MH5LS	MH005LS-A00	330	Added at Ver2.60
MH5S	MH0005S-A00	330	Added at Ver2.60
MH6	MH00006-A00	450	Added at Ver2.00
MH6	MH00006-C00	450	Added at Ver4.00
MH6-10	MH00006-A30	450	Added at Ver2.21
MH6S	MH0006S-A00	450	Added at Ver2.10
MH50	MH00050-A00	540	Added at Ver2.00
MH50-20	MH00050-A10	540	Added at Ver2.10
MH50-35	MH00050-A20	540	Added at Ver2.21

Model Name	Robot Type (Model File Name)	Offset Value (mm)	Remarks
MH80	MH00080-A00	540	Added at Ver2.24
MH165	MH00165-A00	650	Added at Ver2.25
MH165	MH00165-B00	650	Added at Ver2.25
MH165-100	MH00165-A10	650	Added at Ver2.81
MH200	MH00200-A00	650	Added at Ver2.80
MH215	MH00215-A00	650	Added at Ver2.21
MH250	MH00250-A00	650	Added at Ver2.40
MH250	MH00250-B00	650	Added at Ver2.40
MH400	MH00400-A0E	900	Added at Ver2.81
MPK2	MPK0002-A00	500	Added at Ver2.24
MPK2	MPK0002-B01	420	Added at Ver2.24
MPL80	MPL0080-A00	540	Added at Ver2.21
MPL100	MPL0100-A00	880	Added at Ver2.20
MPL160	MPL0160-A00	880	Added at Ver2.10
MPL300	MPL0300-A00	880	Added at Ver2.20
MPL500	MPL0500-A00	880	Added at Ver2.21
MPL800	MPL0800-A00	880	Added at Ver2.20
MS80	MS00080-A00	540	Added at Ver2.00
MS80W	MS0080W-A00	540	Added at Ver2.40
MS80W	MS0080W-B00	540	Added at Ver2.40
MS120	MS00120-A00	680	Added at Ver2.24
VD20S	RVD800S6A1	508.5	Added at Ver2.27
VD35D-G4A	RVD1230D6A1	556.5	Added at Ver2.27
VD35S-G4A	RVD1230S6A1	556.5	Added at Ver2.27
VD40D	RVD2200D6A1	624	Added at Ver2.72
VD40S	RVD2200S6A1	624	Added at Ver2.72
VD95D	RVD1450D6D1	679	Added at Ver2.27
SDA5D	SDA005D-A00	900	Added at Ver2.22
SDA10D	SDA010D-A00	1200	Added at Ver2.10
SDA10D	SDA010D-B00	550	Added at Ver2.10
SDA20D	SDA020D-A00	550	Added at Ver2.10
SIA5D	SIA005D-A00	309.5	Added at Ver2.45
SIA10D	SIA010D-A00	360	Added at Ver2.10
SIA20D	SIA020D-A00	410	Added at Ver2.10
SIA20D	SIA020D-Y00	0	Added at Ver2.21
SIA30D	SIA030D-A00	598	Added at Ver2.81
SIA50D	SIA050D-A00	540	Added at Ver2.00
UP120ED-165	UP120ED-A10	525	Added at Ver2.21
UP350D	UP0350D-A00	900	Added at Ver2.10
UP350D-600	UP0350D-B30	900	Added at Ver2.24
UP400RD	UP400RD-A00	1000	Added at Ver2.81
VA1400	VA01400-A00	450	Added at Ver2.00

Model Name	Robot Type (Model File Name)	Offset Value (mm)	Remarks
VS50	VS00050-A00	540	Added at Ver2.00

■ FS100

Model Name	Robot Type (Model File Name)	Offset Value (mm)	Remarks
BMDA3	BMDA003-A01	460	Added at Ver4.10
HP20F	HP0020F-A00	505	Added at Ver2.81
MHJ	MH0000J-A00	240	Added at Ver2.40
MH3BM	MH003BM-A00	350	Added at Ver2.80
MH3F	MH0003F-A00	290	Added at Ver2.40
MH5F	MH0005F-A00	330	Added at Ver2.40
MH5LF	MH005LF-A00	330	Added at Ver2.60
MH6F	MH0006F-A00	450	Added at Ver2.81
MPK2F	MPK002F-A00	420	Added at Ver2.60
MPK2F-5	MPK002F-A20	420	Added at Ver2.70
MPL160	MPL0160-A00	880	Added at Ver2.70
MPP3	MPP0003-A00	0	Added at Ver2.40
MPP3S	MPP003S-A00	0	Added at Ver4.10
SDA5F	SDA005F-A00	900	Added at Ver2.45
SDA10F	SDA010F-A00	1200	Added at Ver2.40
SIA5F	SIA005F-A00	309.5	Added at Ver2.70
SIA10F	SIA010F-A00	360	Added at Ver2.44
SIA20F	SIA020F-A00	410	Added at Ver2.44

■ NX100

Model Name	Robot Type (Model File Name)	Offset Value (mm)	Remarks
DA20	DA20-A00	559	
DIA10	DIA10-A00	1037	
DIA20	DIA20-A00	1050	Added at Ver2.10
DX1350N	DX1350N-A00	480	
EA1400N	EA1400N-A00	450	
EA1400N Ceiling Mounted Type	EA1400N-A10	450	
EA1800N	EA1800N-A00	555	
EA1900N	EA1900N-A00	505	
EA1900N Ceiling Mounted Type	EA1900N-A10	505	
ECD2500D-3700	ECD80D-A00	0	Added at Ver2.20
ECR200	ECR200-A00	735	
ECR3J	ECR3J-A00	290	Added at Ver2.20
ECR400R-200	ECR400R-A10	1005	Added at Ver2.20
ECR400R-400	ECR400R-B00	1005	Added at Ver2.20
ECS600N	ECS600N-A01	730	Added at Ver2.21
EH80	EH80-A00	540	
EH130	EH130-A00	650	
EH130	EH130-A20	650	
EH200	EH200-A00	730	
EH200-150	EH200-A10	730	
EP4000N	EP4000N-J00	740	
EP4000N	EP4000N-J10	740	
EP4000N	EP4000N-J30	740	
EP4000N	EP4000N-J40	740	
EP4000N	EP4000N-J50	740	
EP4000N	EP4000N-J60	740	
EP4000N	EP4000N-K00	740	
EP4000N	EP4000N-K10	740	
EP4000N	EP4000N-K30	740	
EP4000N	EP4000N-K40	740	
EP4000N	EP4000N-K50	740	
EP4000N	EP4000N-K60	740	
EP4000N	EP4000N-L00	740	
EP4000N	EP4000N-L10	740	
EP4000N	EP4000N-L30	740	
EP4000N	EP4000N-L40	740	
EP4000N	EP4000N-L50	740	
EP4000N	EP4000N-L60	740	

Model Name	Robot Type (Model File Name)	Offset Value (mm)	Remarks
EPH130	EPH130-A00	730	
EPH130	EPH130-C24	730	
EPH130R	EPH130R-A00	600	
EPH130RL	EPH130RL-A00	600	
EPH130RL	EPH130RL-A54	600	
EPH130RL-85	EPH130RL-A34	600	
EPH130RL-85	EPH130RL-A60	600	Added at Ver1.42
EPH4000	EPH4000-J01	758	
EPH4000	EPH4000-J11	758	
EPH4000	EPH4000-J31	758	
EPH4000	EPH4000-J41	758	
EPH4000	EPH4000-J51	758	
EPH4000	EPH4000-J60	758	
EPH4000	EPH4000-J71	758	Added at Ver1.42
EPH4000	EPH4000-J81	758	Added at Ver1.20
EPH4000	EPH4000-JA0	758	
EPH4000	EPH4000-K01	758	
EPH4000	EPH4000-K11	758	
EPH4000	EPH4000-K31	758	
EPH4000	EPH4000-K41	758	
EPH4000	EPH4000-K51	758	
EPH4000	EPH4000-K60	758	
EPH4000	EPH4000-KA0	758	
EPH4000	EPH4000-L01	758	
EPH4000	EPH4000-L11	758	
EPH4000	EPH4000-L31	758	
EPH4000	EPH4000-L41	758	
EPH4000	EPH4000-L51	758	
EPH4000	EPH4000-L60	758	
EPH4000	EPH4000-LA0	758	
EPL80	EPL80-A00	540	
EPL160	EPL160-A00	880	
EPL160	EPL160-A10	880	
EPL300	EPL300-A00	880	
EPL300	EPL300-A10	880	
EPL500	EPL500-A00	880	
EPL500	EPL500-A10	880	
EPX1250	EPX1250-A000	310	Added at Ver2.80
EPX2050	EPX2050-A300	600	Added at Ver2.80
EPX2050	EPX2050-A500	600	Added at Ver2.80
EPX2700	EPX2700-A000	0	Added at Ver2.80
EPX2700	EPX2700-A100	0	Added at Ver2.80

Model Name	Robot Type (Model File Name)	Offset Value (mm)	Remarks
EPX2750	EPX2750-A300	600	Added at Ver2.80
EPX2800	EPX2800-A000	795.5	Added at Ver2.80
EPX2800R	EPX2800R-A000	817.5	Added at Ver2.80
EPX2900	EPX2900-A000	750	Added at Ver2.80
ES120N	ES120N-A00	650	Added at Ver2.00
ES120N	ES120N-A20	680	Added at Ver2.00
ES165N	ES165N-A00	650	
ES165N-100	ES165N-A10	650	
ES165RN	ES165RN-A00	450	
ES200N	ES200N-A00	650	
ES200RN	ES200RN-A00	450	
ES200TN	ES200TN-A00	650	
ES200RN-120	ES200RN-A10	450	
ES280N	ES280N-A00	650	
HP3	HP3-A00	300	
HP3J	HP3J-J00	290	
HP3L	HP3L-A00	300	
HP3XF	HP3XF-A00	300	
HP3XF	HP3XF-B00	300	
HP5	HP5-A00	300	
HP6	HP6-A00	450	
HP6R	HP6-R00	240	
HP6R	HP6-R10	240	
HP6S	HP6-A10	450	
HP20	HP20-A00	505	
HP20-6	HP20-A10	505	
HP20 IP65	HP20-A20	505	
HP20R	HP20R-B2C	305	Added at Ver2.00
HP165	HP165-A00	650	
IA20	IA20-A00	450	
SDA10	SDA10-A00	1200	
SDA10	SDA10-B00	550	Added at Ver2.10
SDA20	SDA20-A00	550	Added at Ver1.42
SIA10	SIA10-A00	360	Added at Ver1.20
SIA20	SIA20-A00	410	Added at Ver1.20
SP800N	SP800N-A00	540	
SSA2000	SSA3-A00	450	
SSA2000 Ceiling Mounted Type	SSA3-A10	450	
SSF2000	SSF6-A00	450	
SSF2000R	SSF6R-A20	240	Added at Ver2.00
UP20MN	UP20MN-A00	540	

Model Name	Robot Type (Model File Name)	Offset Value (mm)	Remarks
UP50N	UP50N-A00	540	
UP50N	UP50N-A51	540	
UP50N	UP50N-AA1	540	Added at Ver1.20
UP50N-80	UP50N-A10	540	
UP50SN	UP50N-A20	540	
UP50SN	UP50N-A71	540	
UP50N-35	UP50N-A30	540	
UP50RN-35	UP50RN-A10	450	
UP120EN-165	UP120EN-A10	525	
UP130RN	UP130RN-B00	600	Added at Ver1.20
UP130RLN	UP130RN-A2A	600	
UP130RLN	UP130RN-A2B	600	
UP130RLN-85	UP130RN-A4A	600	
UP350N	UP350N-A00	900	
UP350N-200	UP350N-A10	900	
UP350N-500	UP350N-A20	900	
UP350N-600	UP350N-A30	900	
UP400RN	UP400RN-A00	1000	

■ MOTOPOS

Model Name	Robot Type	Model File Name	Remarks
D200B-C00	MPD200B-C00	D200B-C00	Added at Ver2.45
D250B(A00)	MPD250B-A00	D250B-A00	
D500B(A00)	MPD500B-A00	D500B-A00	
D500B(A12)	MPD500B-A12	D500B-A12	
D700B(A00)	MPD700B-A00	D700B-A00	Added at Ver2.20
S250B(A00)	MPS250B-A00	S250B-A00	
S500B(A00)	MPS500B-A00	S500B-A00	
T5000B	MPT5000B-A00	T5000B-A00	

■ MOTOFEEDER

Model registration on the VRC controller	Model Name	Remarks
Arm Length: 1600mm, With Manipulator, High-Speed Rotation Specification	MF216A	Added at Ver2.80
Arm Length: 1600mm, With Manipulator, High-Speed Rotation Specification(with spindle unit)	MF216A_SPINDLE	Added at Ver2.80
Arm Length: 1800mm, With Manipulator, High-Speed Rotation Specification	MF218A	Added at Ver2.80
Arm Length: 1800mm, With Manipulator, High-Speed Rotation Specification(with Spindle unit)	MF218A_SPINDLE	Added at Ver2.80
Arm Length: 1400mm, Without Manipulator, High-Speed Rotation Specification	MF214B	Added at Ver2.80
Arm Length: 1400mm, Without Manipulator, High-Speed Rotation Specification(with spindle unit)	MF214B_SPINDLE	Added at Ver2.80
Arm Length: 1600mm, Without Manipulator, High-Speed Rotation Specification	MF216B	Added at Ver2.80
Arm Length: 1600mm, Without Manipulator, High-Speed Rotation Specification(with spindle unit)	MF216B_SPINDLE	Added at Ver2.80
Arm Length: 1800mm, Without Manipulator, High-Speed Rotation Specification	MF218B	Added at Ver2.80
Arm Length: 1800mm, Without Manipulator, High-Speed Rotation Specification(with spindle unit)	MF218B_SPINDLE	Added at Ver2.80
Arm Length: 1600mm, With Manipulator, Heavy Load Specification	MF416A	Added at Ver2.80
Arm Length: 1800mm, With Manipulator, Heavy Load Specification	MF418A	Added at Ver2.80
Arm Length: 1400mm, Without Manipulator, Heavy Load Specification	MF414B	Added at Ver2.80
Arm Length: 1600mm, Without Manipulator, Heavy Load Specification	MF416B	Added at Ver2.80
Arm Length: 1800mm, Without Manipulator, Heavy Load Specification	MF418B	Added at Ver2.80

1.8 Frequently-Asked Questions

■ When the driver has been installed with USB type key connected to a personal computer

1. With the USB type key attached to a personal computer, delete the item registered as "USB Token" in Device Manager.
2. Uninstall the driver (Sentinel System Driver 5.41.1(32-bit)) with "Add/Remove Programs".
3. Install the driver with key detached from personal computer.

■ When a older version key driver has been installed over a newer key driver version.

In such case, the key driver may not operate properly.
Uninstall the Sentinel System Driver with Windows "Add / Remove Programs" function. Then reinstall the Sentinel key driver. For details, please refer to Section "1.4 Hardware Key" of the manual.

■ Cell file containing HSF files don't display properly

When cell file containing HSF model files, if the HSF format version is higher than the one currently supported by MotoSim EG-VRC, the HSF file may not display properly. In the case that a newer MotoSim EG-VRC version displays the cell properly, the newer MotoSim EG-VRC can save the cell file in a previous MotoSim EG-VRC format. This will also save the HSF file into the corresponding format version (Refer to Section "4.3.2 Save As" for details.) If the HSF file was generated by a 3rd party software, look in the that software HSF export options to export the file in an HSF format version corresponding to you current version of MotoSim EG-VRC.

■ MotoSim EG Cell file compatibility

MotoSim EG-VRC can convert and load files created by MotoSim EG but cannot playback the job and the robot operations are limited. The MotoSim EG robot should be replace by the VRC corresponding robot type. Please refer to Section "11.7 External Axes Setting (Motor Gun)".
Cell file created with MotoSim EG-VRC cannot be used by MotoSim EG or MotoSim EG.

■ MotoSim EG-VRC - CadPack Cell file compatibility

Cell file created with MotoSim EG-VRC can be used by MotoSim EG-VRC-CadPack. Cell file created with MotoSim EG-VRC-CadPack can also be used by MotoSim EG-VRC even if CAD data (IGES,SAT) was imported into the cell. When saving the cell, the MotoSim EG-VRC-CadPack converts imported CAD data into HSF files. Once that conversion is done, the regular MotoSim EG-VRC can open the file without problems.

■ Graphic Driver Concerns

With MotoSim EG-VRC, some old version display adapters (graphic drivers) may not properly generate memos and dimension lines. In those cases, it is necessary to upgrade the version of the display driver. For Intel type adapter, verify that the version number is 6.14.10.4020 or later, otherwise please upgrade the display driver.

Version Verification Procedure

The following example is for a IntelR Graphics Controller on a Windows 2000 operating systems.

1. With the mouse right click on the desktop and select "Properties" from the popup menu to display the Desktop Properties dialog.

2. Select the "Display" tab.

3. Click on the "Advanced" button to display the graphic driver property dialog.

4. Select the "IntelR Graphics Technology”ntab.

5. Verify the version. (The version is 6.13.01.3084. An upgrade is necessary.)

Version Upgrade Procedure

Download the necessary file (i.e. Win2K_XP1410.exe) from the download site and execute it. (In this example, the http://support.intel.com/support/go/downloads site was used.)

■ Backup VRC.BIN file

If computer power shortage or an application error occurs when MotoSim EG-VRC is accessing the VRC.BIN file, the file may become corrupted and prevent the controller and Virtual Pendant to load properly. As a safeguard, when the cell is saved, the previous copy of the VRC.BIN is kept as a backup.

To restore the backup copy of the VRC.BIN file:

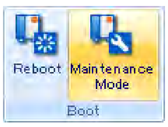
1. Open the controller folder under the cell directory and rename the VRC.BIN.bak file to VRC.BIN.
2. Start MotoSim EG-VRC but don't open the cell yet. If MotoSim EG-VRC is already running, close all the cells.
3. Start the controller in maintencae mode with the restored CMOS.BIN file On the [Controller] tab, in the [Boot] group, click the [Maintenance mode] button, and then selecting the newly renamed VRC.BIN. (For details, refer to Section "7.10 VRC Maintenance Mode".)

4. Load the VRC.BIN on the Virtual Pendant, select {Compact Flash} - {LOAD CMOS}. (This may take a few moments and warning message, indicating not to turn off the controller, appears at the bottom of the Virtual Pendant. Wait until the message disappears before proceeding to another operation that may cause the controller to reboot or close.)
5. Once the VRC.BIN load is done, close the controller by pressing the "End" button of the "VRC Maintenance Mode" dialog.
6. Open the cell.

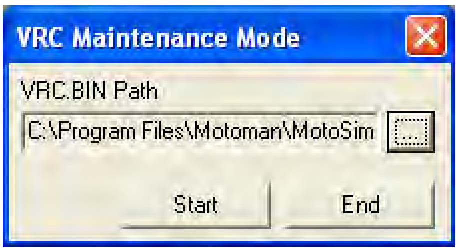
■ Recovery method when an alarm occurs during the creation of a new controller.

When a new controller is created with the "VRC Controller (using CMOS.BIN file)" of an actual controller, alarms may display on the Virtual Pendant.
In such case, use the following procedure:

1. Save the cell and then close it.
2. On the [Controller] tab, in the [Boot] group, click the [Maintenance mode] button, the [Maintenance mode] dialog appears.



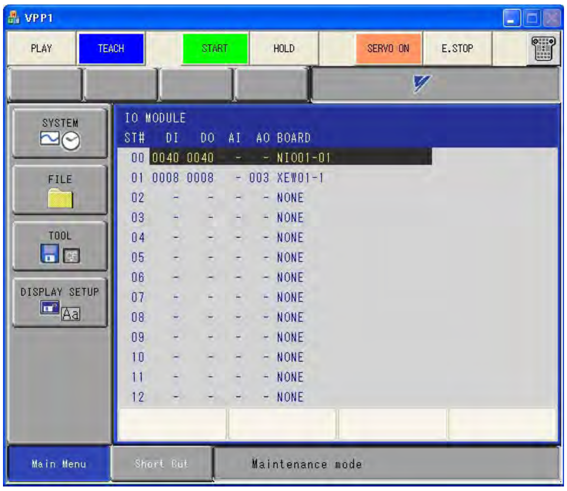
3. The VRC Maintenance Mode dialog will display. Use the browsing button to select the VRC.BIN file located in the controller folder under the cell folder. Once the VRC.BIN file is selected, press the [Start] button. The controller will start in maintenance mode and display the Virtual Pendant (it may take a few moments).



The procedures below corresponds to various alarm.

Alarm 0320 Verify error (I/O Module)

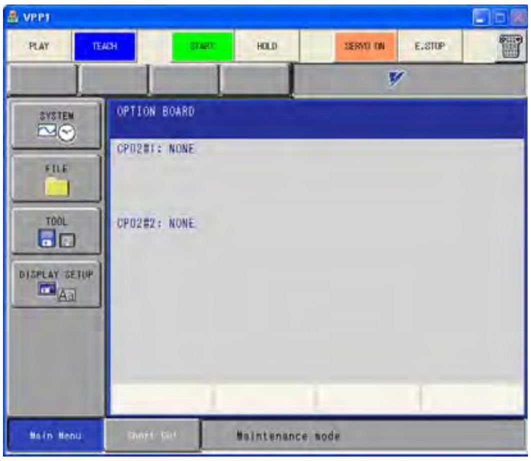
(1) Select {System} - {Setup}.
(2) Select [I/O Module].



(3) Press the [Enter] key twice. When the confirmation message displays, select [Yes].
(4) Press the [End] button of the [VRC Maintenance Mode] dialog to close the controller.
(5) When all the step above are completed. Reopen the cell.

Alarm 0020 Communication Error(CPU)

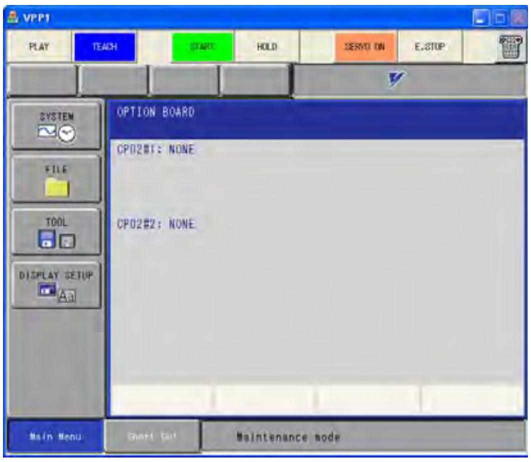
(1) Select {System} - {Setup}.
(2) Select [Options].



(3) Press the [Enter] key. When the confirmation message displays, select [Yes].
(4) Press the [End] button of the [VRC Maintenance Mode] dialog to close the controller.
(5) When all the step above are completed. Reopen the cell.

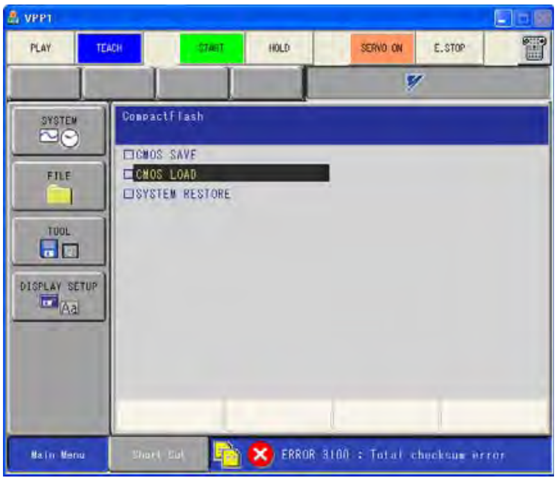
Alarm 0060 Communication Error (IO Module) [16]

(1) Select {System} - {Setup}.
(2) Select [Options].



(3) Press the [Enter] key. When the confirmation message displays, select [Yes].
(4) Select [IO Module].
(5) When the [IO Module] displays, press the [Enter] key twice.
(6) When the confirmation message displays, select [Yes].
(7) Press the [End] button of the [VRC Maintenance Mode] dialog to close the controller.
(8) When all the step above are completed. Reopen the cell.

Error 3100 Total checksum error



The CMOS cannot be loaded because the “VRC.BIN” version is from a controller version incompatible with the selected VRC version.
In such case, retrieve the individual data files from the actual controller and load them in the VRC controller.

1. On the pendant of the actual controller, select [FD/CF] - [SAVE] and save:
   - All the files from the JOB, FILE /GENERAL DATA, I/O DATA, SYSTEM DATA section.
   - The "BATCH PARAMETER (ALL.PRM)" file under the PARAMETER section.
2. In MotoSim EG-VRC, select [Controller] - [New Controller] and add a new controller with "No CMOS.BIN file".

   Please refer to Section "7.1 Adding a New Controller" for more details.

> **NOTE**
> When initializing this new controller, make sure to select the same settings as the actual controller (the control group and application must match to be able to load the individual files).

3. Copy the individual files retrieved from the actual controller in the "Storage Card" folder under the controller folder of the cell.
4. On the Virtual Pendant, select [FD/CF] - [LOAD]

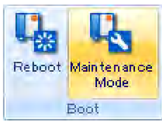
> **NOTE**
> When loading the individual files, please proceed in the following order:
> (1) PARAMETER file
> (2) I/O DATA files
> (3) Other files
> Please refer to section Section "A.3 Storage Card" for details.

■ Trouble shooting when virtual pendant doesn't accept operation after newly making controller (Nothing is displayed on the screen).

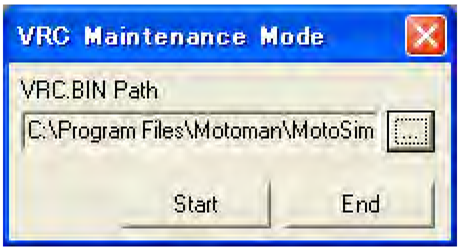
When a virtual pendant starts in the ordinary mode after completing CMOS loading operation in the maintenance mode when newly making it by setting "VRC Controller (using CMOS.BIN file)" when the controller newly makes it, a virtual pendant might not accept the operation at all (Even if the menu is selected, nothing is displayed on the screen).

When this phenomenon is generated, it restores it according to the following procedures.

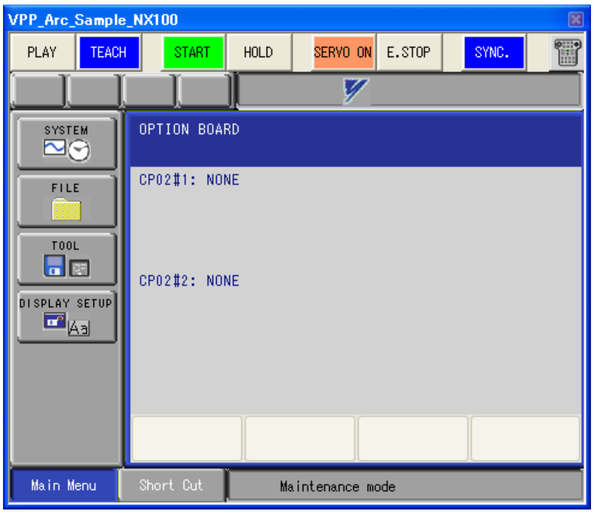
1. After the cell is preserved, the cell is closed.
2. On the [Controller] tab, in the [Boot] group, click the [Maintenance mode] button.



3. [VRC Maintenance Mode] appears.
   Select "VRC.BIN" that exists in the controller folder below the folder where the cell exists, Push [Start] , and the maintenance mode is started.

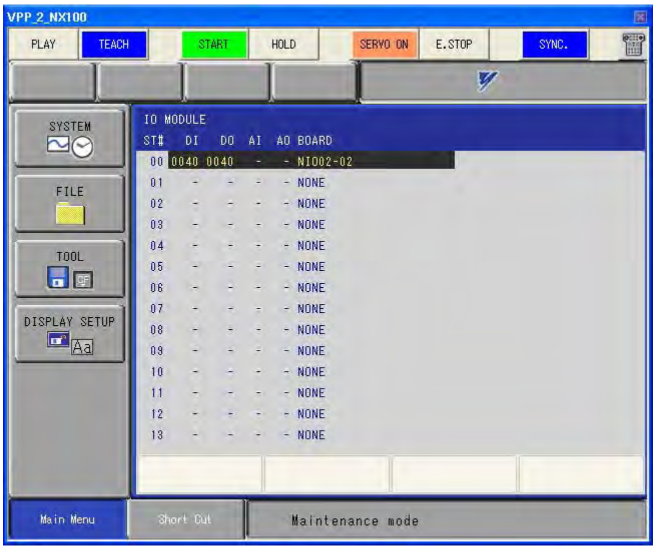


4. Select [SYSTEM]-[SETUP].
5. Select [OPTION BOARD].



6. Because the confirming message displays to push [enter], select [yes].

7. The “IO MODULE” screen displays it continuously. Select [SYSTEM]-[SETUP]-[IO MODULE] When it is not displayed.



8. Because the confirming message displays to push [enter] twice, select [yes].
9. The [End] is selected by the [VRC Maintenance Mode], and the maintenance mode is ended.
10. The restoration operation is completed above. Please open the cell again.

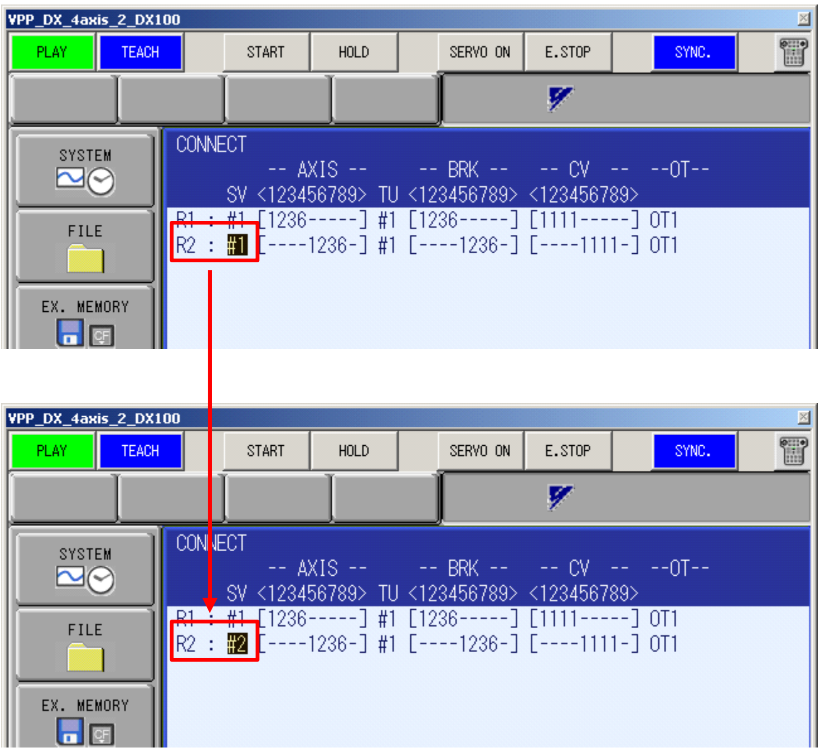
■ Caution on setting up two or more 4-axis robots (ex. MPL300) to the one controller

On creating a new controller without a New VRC Controller (no file), If two or more 4-axis robots are set up to the one controller, use the following procedure certainly.
Basically, the following procedure is equal to that of Section "7.1.1 Create a New VRC Controller (no file)", but Setting on the [CONNECT] display of "Initialize the controller in the step 3" is used the following procedure.

The procedure is explained with setting up the two 4-axis robots to the one controller.

Procedure

1. Proceed to 1 to 3 of Section "7.1.3 Initializing the Controller (DX200, DX100, NX100)".
2. On setting [CONNECT] in step 4 of Section "7.1.3 Initializing the Controller (DX200, DX100, NX100)", change [SV] from "#1" to "#2".



3. Proceed to the step 5 to 10 of Section "7.1.3 Initializing the Controller (DX200, DX100, NX100)".

■ Way to make the display speed faster

When the large CAD data is used, the Collision Detection function is used, or the performance of using PC is low, the display process can not executed smoothly, so the simulation speed may be lower.
If the above symptoms occurred, do the following operation, and the display performance may be made better.

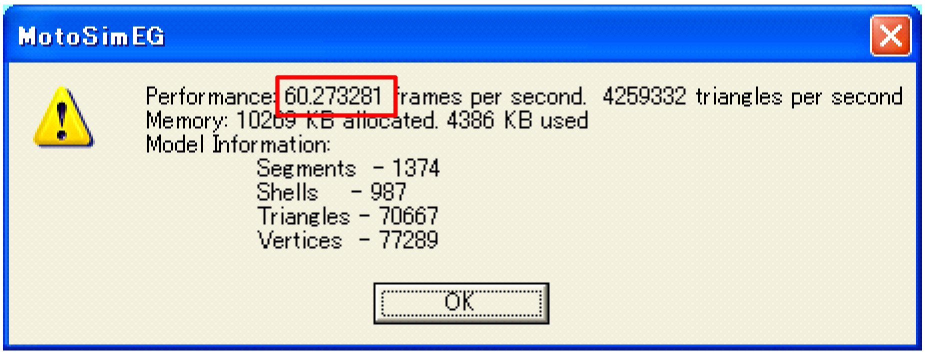
- Raise the number of Refresh Interval
  The number of redrawing is reduced, so the load of redrawing is reduced.
  → For details, please refer to the Section "7.5.4 Refresh Interval".
- Reduce the number of trace or Delete the trace
  The number of drawing trace is reduced, so the load of drawing trace is reduced.
  → For details, please refer to the Section "7.9 Trace".
- Enable "Back Plane Culling" of models
  The back plane of the CAD data is hidden, so the CAD data is displayed faster.
  → For details, please refer to the Section "9.4 Editing a Model".

• Raise the Culling Threshold of Framerate Optimization
Model data which displayed size is smaller than the selected pixel on the display are not displayed, so the model is displayed faster.
→ For details, please refer to the Section "10.5 Performance Settings".

• Hide the shadow
The shadow is hidden, so the load of drawing shadow is reduced.
→ For details, please refer to the Section "10.1.4 Shadow".

• Disable "Smooth Transition"
The viewpoint changes without "Smooth Transition", it changes immediately.
→ For details, please refer to the Section "10.1.2 Smooth Transition".

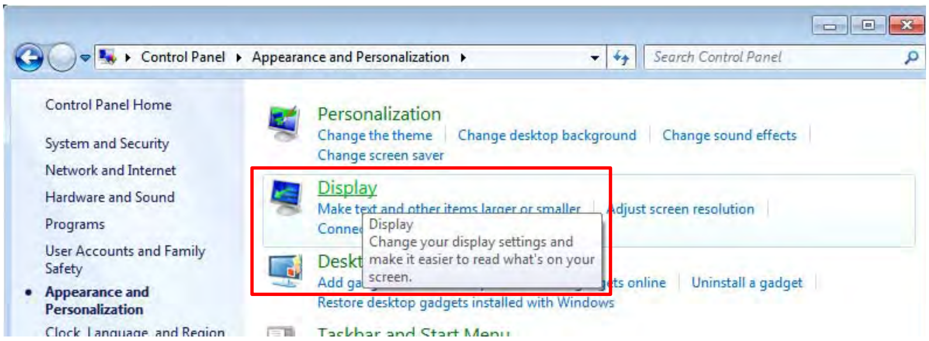
• Drawing performance is measurable.
On the [Home] tab, in the [Tools] group, click the [Measure Performance] button, the screen of MotoSimEG-VRC begins rotation and displays the number of drawing frames per second. If it measures before and after setting change and the following red frame numerical value becomes large, it is shown that drawing performance is going up.



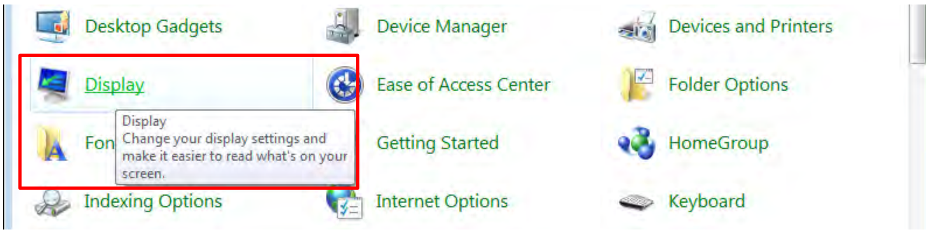
■ Solution in case characters is missing from the screen of MotoSimEG-VRC in Windows7

When a character is missing from the screen of MotoSimEG-VRC in Windows7, please change character size by the following procedure.

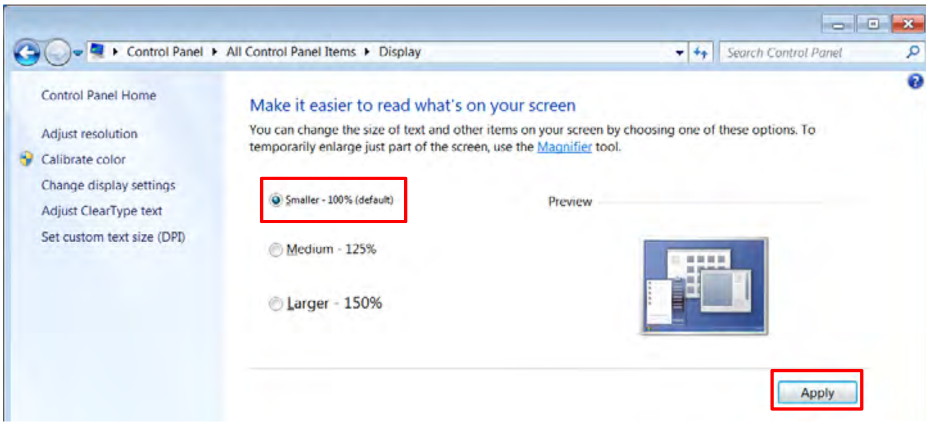
1. Open the {Display} of Control Panel.
   To open {Display}, Click the [Start] button, and [Control Panel].
   (a) In the case of "View by" is "Category":
   Click the [Appearance and Personalization] and [Display].



   (b) In the case of "View by" is "Large icons" or "Small icons":
   Click the [Display].



2. In [Make it easier to read what's on your screen], Select the [Smaller - 100%] button, and click the [Apply] button.



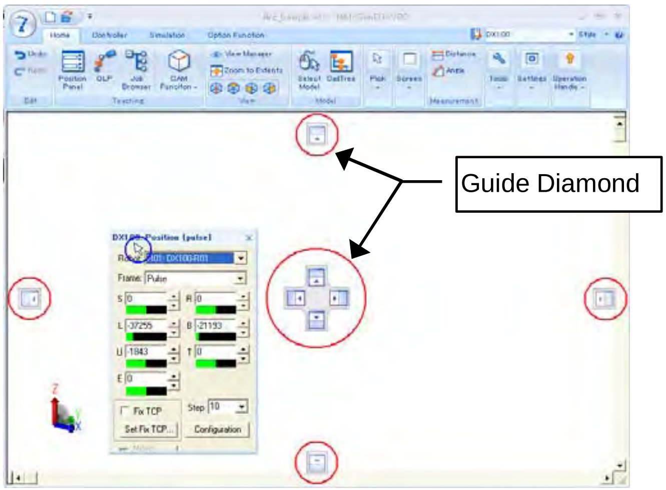
■ Docking Window

Some windows are dockable with any of the four directions of the main screen.
In MotoSim EG-VRC, the following windows are dockable.

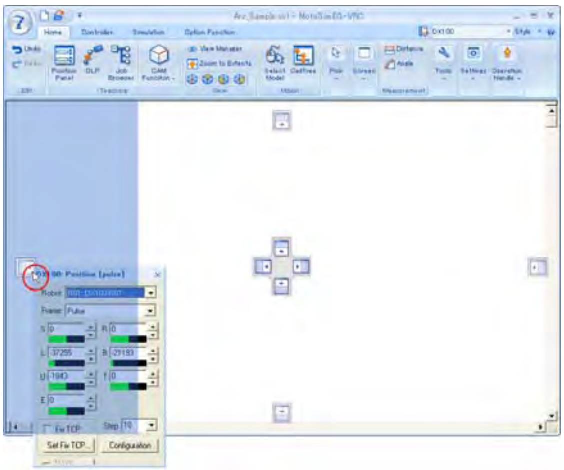
- Position Panel
- OLP
- CadTree
- Variable Monitor
- Pulse Recorder
- Lap Time Panel
- Collision Detection

Docking Operation

When the window is dragged to another position, the guide diamond is displayed in order to re-dock the window.

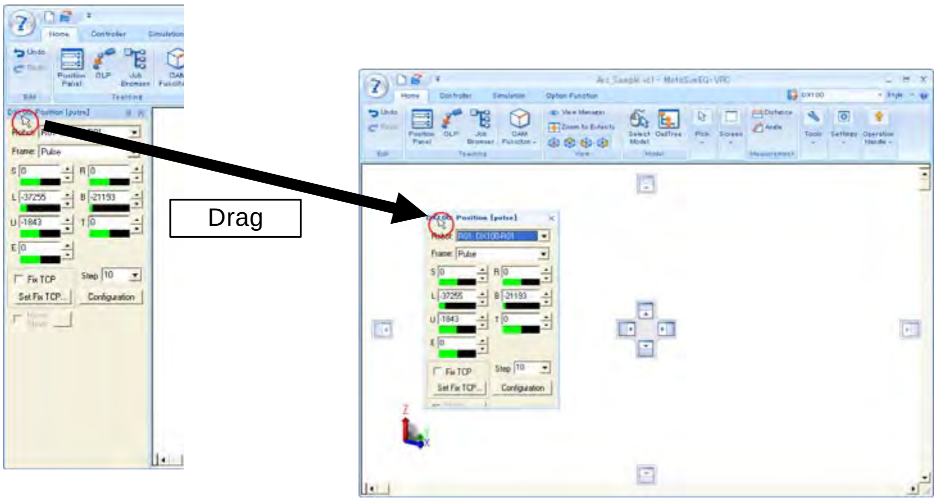


When the dragged window reaches the location where want to dock it , move the pointer over the corresponding portion of the guide diamond. The designated area is shaded. To dock the window in the position indicated, release the mouse button.



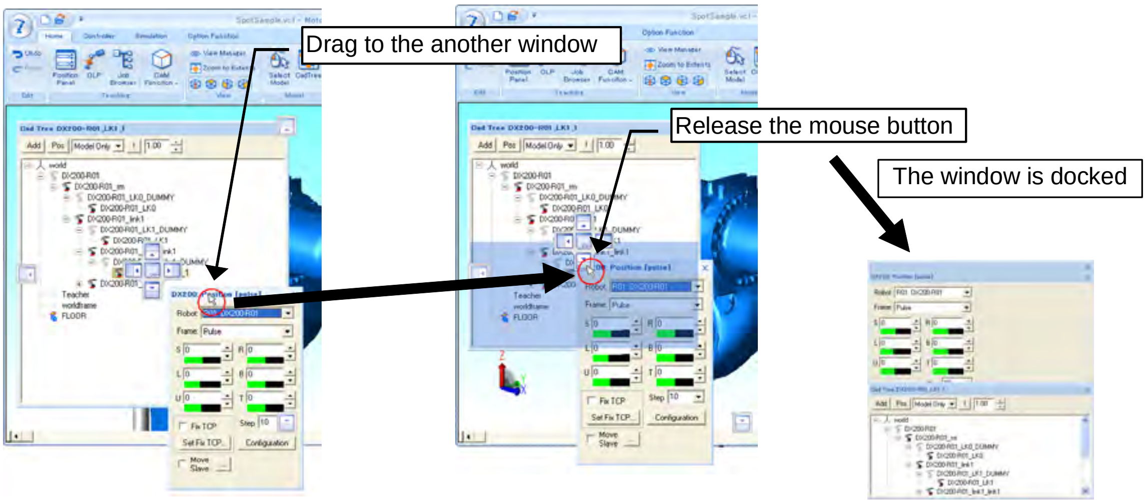
Floating Operation

Drag the window, and release the mouse button at places other than the guide diamond.



Docking Operation with Two or More Windows

When two or more dockable windows show, it can dock not only with the main window but with another window.



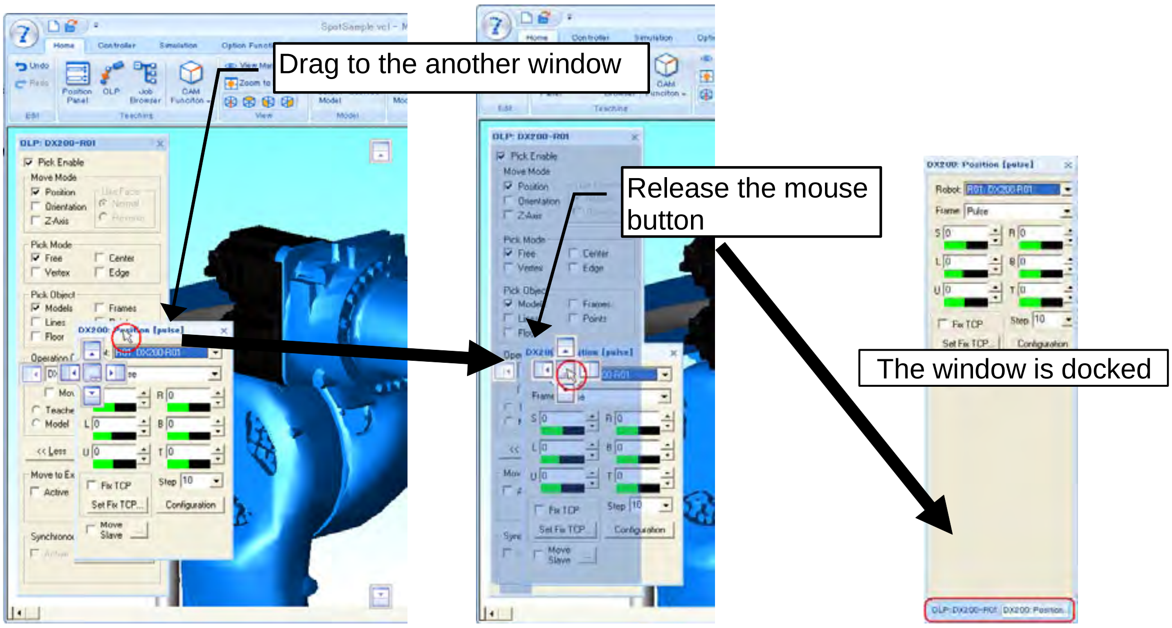
Floating Operation with Two or More Windows

Drag the window, and release the mouse button at places other than the guide diamond. Please refer to the "Floating Operation" for details.

Docking Operation as Tab with Two or More Windows

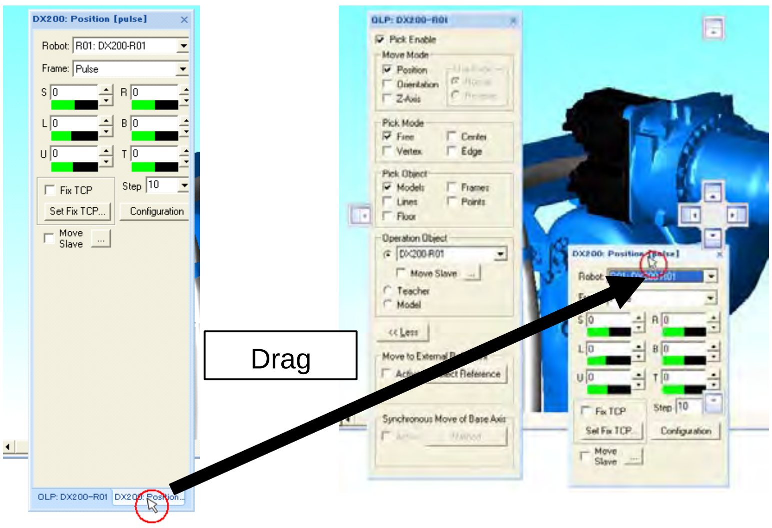
When two or more dockable windows show, Windows are dockable also as a tab.

Drag the window and move the pointer over the center of the guide diamond ( ) or drag to the title bar of another dockable window and release the mouse button.



Floating Operation as Tab with Two or More Windows

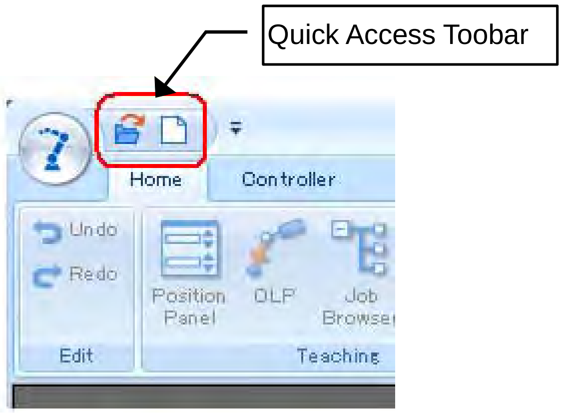
To float the window shown as the tab, drag it, and release the mouse button at places other than the guide diamond.



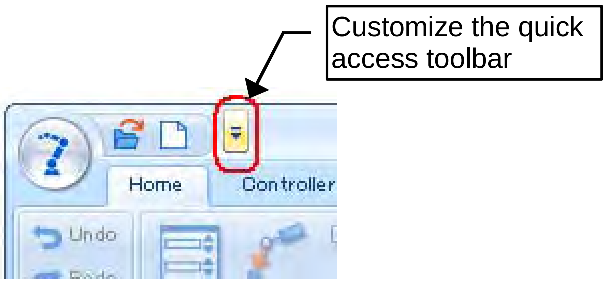
■ Quick Access Toolbar

"Quick Access Toolbar" is convenient to execute a command quickly, without not changing a ribbon tab or displaying a menu from the MotoSim EG-VRC button ( ).

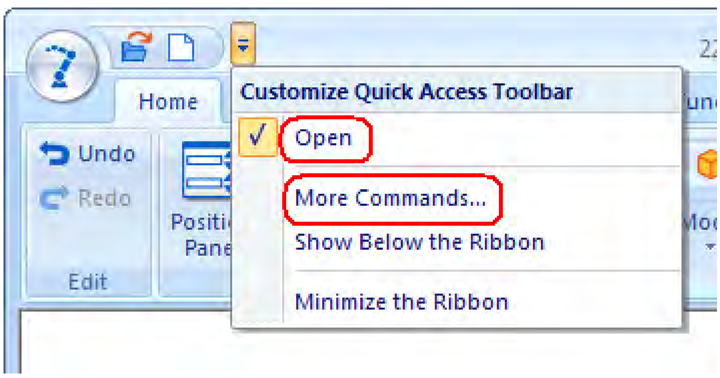
If prepopulate the quick access toolbar with the frequently used commands, the button of the commands can always be displayed.



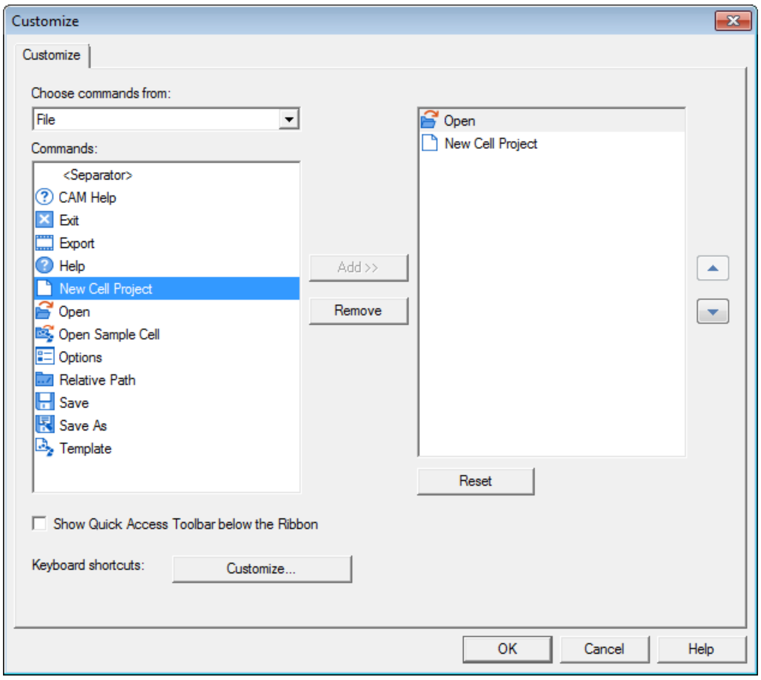
1. To customize the quick access toolbar, click the the following button. ( )



2. When add the "Open" command to the quick access toolbar, click the "Open" menu. When add the other commands, click the "More commands..." menu. The "Customize" dialog appears.



3. Select the tab name by "Choose commands from" list box, and the commands is displayed. Select the command, and click the [Add] button.



4. The added command is diplayed in the right side list. Click the [OK] button. Then the command is added to the quick access toolbar.

NOTE

To delete the command button from the quick access toolbar, right-click the target button, and click the "Remove from Quick Access Toolbar on the shortcut menu" menu.
When add or remove the two or more buttons, it can be operated efficiently in the "Customize" dialog.

■ Comparison Table with the New Menu from the Old Menu and the Old Tool Bar

Old Menu and the Old Tool Bar	New Menu
File	
New	- New - New
Open	- Open - Open
Close	
Save	- Save
Save As	- Save As
Open Sample Cell	- Open - Open Sample Cell
Template	- New - Template
Export File	- Export
Relative Path	- Relative Path
Exit	- Exit
Edit	
Undo	[Home] - [Edit] - Undo
Redo	[Home] - [Edit] - Redo
Copy	[Home] - [Tools] - Copy
Screen	
Camera Scope	
Zoom To Extents	[Home] - [View] - Zoom to Extents
Direction	
View	[Home] - [View] -

Old Menu and the Old Tool Bar	New Menu
Side	[Home] - [View] -
Top	[Home] - [View] -
Front	[Home] - [View] -
View Manager	[Home] - [View] - View Manager
Select Model	[Home] - [Model] - Select Model
Pick Mode	[Home] - [Pick] - Pick Mode
Free	Free
Vetex	Vertex
Center	Center
Edge	Edge
Pick Object	[Home] - [Pick] - Selectable Object
Models	Models
Frames	Frames
Lines	Lines
Points	Points
Floor	Floor
Line Size	[Home] - [Screen] - Line Size
Small	Small
Medium	Medium
Large	Large
Frame Display	[Home] - [Screen] - Frame Display
Rendering Mode	[Home] - [Screen] - Rendering Mode
FlatShading	Flat Shading
GourandShading	Gouraud Shading
Wireframe	Wire Frame
SmoothTransition	Smooth Transition

Old Menu and the Old Tool Bar	New Menu
Light Manager	[Home] - [Screen] - Light Manager
Shadow	[Home] - [Screen] - Shadow
Memo	[Home] - [Screen] - Memo
Dimension Line	[Home] - [Screen] - Measure Line
Markup	
Freehand	[Home] - [Screen] - Mark-up (Circle, Rectangle, Free Hand, Note)
Circle	
Rectangle	
Notes	
Cutting Planes	
X-Cutting Planes	[Home] - [Screen] - Cutting Plane (X, Y, Z)
Y-Cutting Planes	
Z-Cutting Planes	
Measure	
Distance	[Home] - [Mesurement] - Distance
Angle	[Home] - [Mesurement] - Angle
Controller	
New Controller	[Controller] - [Setup] - New
Copy Controller	[Controller] - [Setup] - Copy
Delete Controller	[Controller] - [Setup] - Delete
Select Controller/Robot	
Controller Setting	

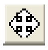
Old Menu and the Old Tool Bar	New Menu
Tool Data	[Controller] - [File Settings] - Tool Data
User Frame Data	[Controller] - [File Settings] - User Frame
Open a folder external storage	[Controller] - [VPP] - CF Storage Card
Reboot Controller	[Controller] - [Boot] - Reboot
Boot MaintenanceMode	[Controller] - [Boot] - Maintenance Mode
Refrash Interval	[Home] - [Settings] - Heart Beat
Servo Emulation	[Simulation] - [Playback] - Servo Emulation
Welding Condition	[Controller] - [File Settings] - Welding Condition
Cube Area Update & Display	[Controller] - [File Settings] - Cube Collision Area
Delete Cube Area Model	
Safety Function	[Controller] - [File Settings] - Function Safety Safety Function File Tool Interference Model Robot Approximate Model
Safety Function File	
Tool Interference Model	
Robot Approximate Model	
Robot Setting	
Property	[Controller] - [Robot] - Model Setting
ReachView	[Controller] - [Robot] - TCP Reach
Calibration	[Controller] - [File Settings] - Robot Calibration

Old Menu and the Old Tool Bar	New Menu
Device	[Controller] - [External Device] - [New] - [Conveyor] / [Press] / [Gantry]
Add Conveyor	
Ade Press	
Add Gantry	
SoftLimit Setting	[Controller] - [External Device] - [Soft Limit]
Job Panel	[Controller] - [External Device] - [Job Panel]
Conveyor Operation Panel	[Controller] - [External Device] - [Conveyor Operation Panel]
Conveyor Setting	[Controller] - [External Device] - [Conveyor Settings]
Conveyor Synchoronization	[Controller] - [External Device] - [Conveyor Condition File]
Playback	
Cycle Time	[Simulation] - [Playback] - [Cycle Time]
Start	[Simulation] - [Playback] - [Start]
Hold	[Simulation] - [Playback] - [Stop]
Step Next	[Simulation] - [Playback] - [Back Step]
Step Back	[Simulation] - [Playback] - [Next Step]
Reset Job	[Simulation] - [Playback] - [Reset]
Trace	[Simulation] - [Monitor] - [Trace]
Model	
New Model	
Edit Model	
Hide/See	
Model	
Frame	

Old Menu and the Old Tool Bar	New Menu
Name	
Wiring View	
Model Attribute	
Set Parent	
Move Parent	
Set File Path	
Rename	
Set Position	
Property	
Edit	
Cut	
Copy	
Patsh	
Delete	
Fine	
Model Tree View	
Refresh View	
Expand Tree	
Models List	
Save Model Group	
Load Model Group	
Model Script Editor	[Simulation] - [Model Simulation] - Model Script Manager
Tool	
CAD Tree	[Home] - [Model] - CadTree
Positon Panel	[Home] - [Teaching] - Job Browser
OLP	[Home] - [Teaching] - OLP
Job Shift	

Old Menu and the Old Tool Bar	New Menu
I/O Monitor	[Simulation] - [Monitor] - I/O Monitor
I/O Events	[Simulation] - [I/O Settings] - I/O Event Manager
I/O Connections	[Simulation] - [I/O Settings] - I/O Connection Manager
Variable Monitor	[Simulation] - [Monitor] - Variable Monitor
Lap Time Panel	[Simulation] - [Monitor] - Lap Time Panel
StafeMaster	[Simulation] - [Playback] - Stage Master
Collision Detection	[Simulation] - [Collision] - Collision Detection
Sensing Definition	[Simulation] - [Settings] - Sensing Setting
Pulse Record	[Simulation] - [Monitor] - Pulse Record
Paing Setting	[Simulation] - [Settings] - Paint Setting
Show Speed Graph	[Simulation] - [Monitor] - Speed Graph
Execute Soft	[Home] - [Tools] - Execute Soft
Execute JobBraowser	[Home] - [Teaching] - Job Browser
Option	- Options [Home] - [Settings] - Change Language
CAM	[Home] - [Teaching] - CAM Funciton
Create Job Form CAM	
Load Robot Settings	
Option Tool	

Old Menu and the Old Tool Bar	New Menu
Motor Load Estimate	[Option Function] - [Estimate] - Motor Load Estimate
Life Estimate	[Option Function] - [Estimate] - Life Estimate
View	
Toolbar	
File Bar	
Edit Bar	
Playback Bar	
CAD Bar	
View Bar	
Controller Bar	
Memo Bar	
Cutting Bar	
Mesure Bar	
Status Bar	
Japanese	
Windwos	
Cascade	
Tile Horizontally	
Tile Vertically	
Split	
Help	
Help	- Help
CAM Help	- CAM Help
Version	
Performance	[Home] - [Tools] - Measure Performance
Toolbar Only	
	[Controller] - [VPP] - Show

Old Menu and the Old Tool Bar	New Menu
BASE AXIS	[Home] - [Operation Handle] - BASE AXIS
	[Home] - [Operation Handle] - Single
	[Home] - [Operation Handle] - Synchronized
	[Home] - [Operation Handle] - Tool Name Display
R02+B02	[Home] - [Operation Handle] - R01+R02+B01+B02
	[Home] - [Operation Handle] - Handle Display

Revision History

Date	CEN / ECN	Revision No.	Reason For Revision	Initials
6/16/2014	14-0699M	4	The manual changed throughout due to: 1. The appearance of MotoSim EG-VRC Ver5.00 differs. 2. Operation method of the main screen. 3. Runs two or more MotoSim EG-VRC. However, the number of the cells which can be used by MotoSim EG-VRC is one. - " Docking Window " - " Quick Access Toolbar " - " Comparison Table with the New Menu from the Old Menu and the Old Tool Bar "	JFC

YASKAWA

MotoSim EG-VRC
OPERATION MANUAL

FOR WINDOWS

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MOTOMAN ROBOTICS

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