VRC9

Virtual Robot Controller

User's Guide

ver.1.2.1

CONTENTS

1 Outline

VRC9 is a virtual robot module of DENSO RC9 controller. By using VRC9, client application comes to be able to control and monitor the DENSO ROBOT.

This book has been described about a basic matter to use VRC9. Please refer to the following documents for use from the program language.

・RC9 Provider User's Guide

ORiN2\CAO\ProviderLib\DENSO\RC9\Doc\RC9_ProvGuide_en.pdf

・ORiN2 Programming Guide

ORiN2\CAO\Doc\ORiN2_ProgrammersGuide_en.pdf

1.1 Conditions for Use

System requirement

OS:	Windows 10 (64bit)
CPU:	Multi-core processor (2GHz or more)
Memory size:	2GB or larger
Screen size:	SXGA (1280x1024) or larger

Application software

ORiN2 SDK DENSO Products (or more above package)

1.2 Functions

When programming in a universal language (Visual C++, Visual BASIC, Delphi, LabVIEW, etc.) on the PC, connecting to the VRC9 lets you control DENSO Robotics and monitor their statuses in a virtual environment. Being able to simulate the operation of actual robots without actually using them dramatically improves development efficiency.

2 Installing VRC9

2.1 Installing ORiN2 SDK

VRC9 requires ORiN2 SDK for execution. Please install ORiN2 SDK of a correct version before installing VRC9. For about version information of the ORiN2 SDK, refer to “5.2. Version of the related files”.

2.2 Installing VRC9

Please execute “Setup.exe” in the setup tool, and then operate it according to the wizard window.

<VRC9 installation screen>

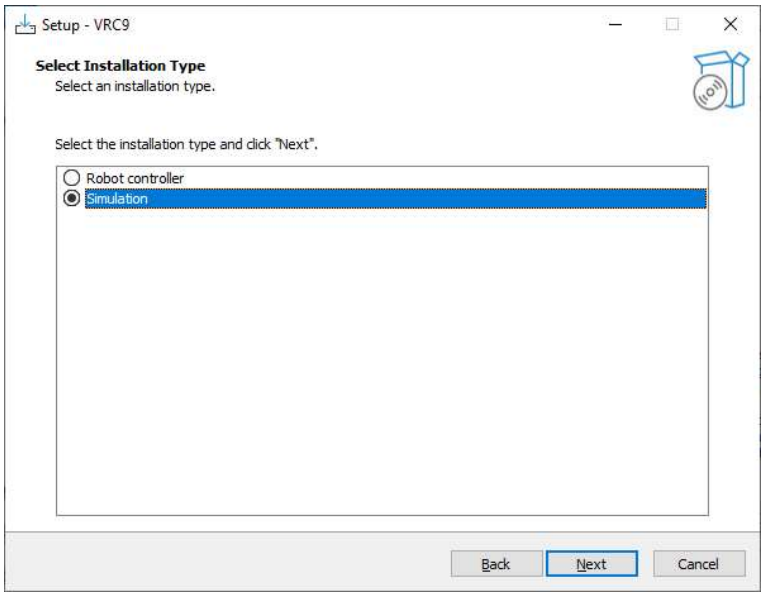
Note ……

- If suitable ORiN2 SDK is not installed in the PC, an error message appears and then VRC9 installation will be cancelled. In this case, install ORiN2 SDK first, and then retry VRC9 installation.

……

2.2.1 Selecting installation type

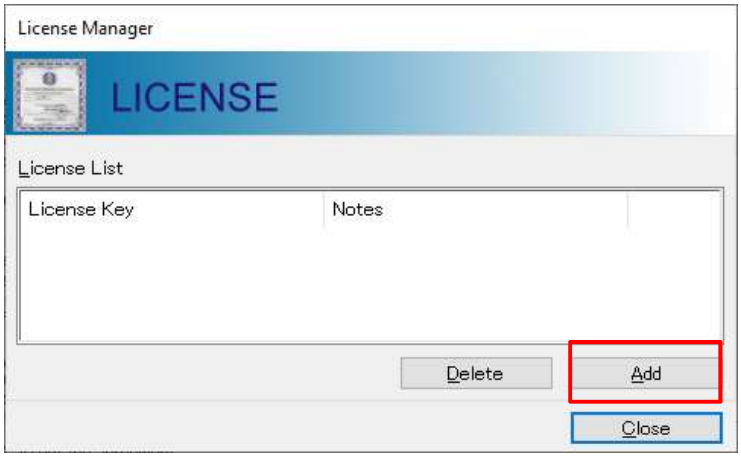
In a process of the installation, the Select Installation Type screen is displayed. Select the [Simulation] radio button, and click [Next] button.



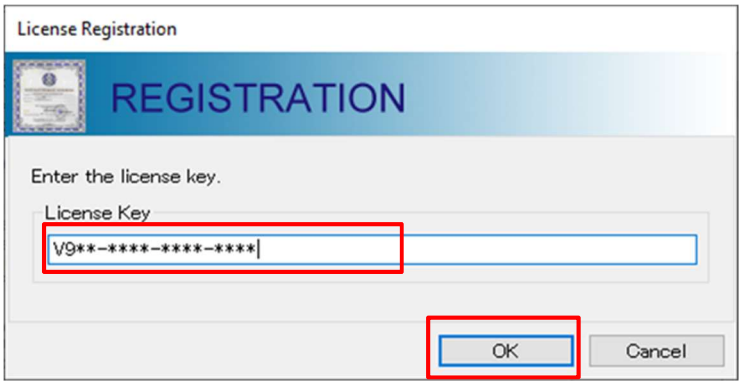
<Select Installation Type screen>

2.2.2 Registering license

In a process of the installation, the License Manager screen is displayed. Click [Add] button, the License Registration screen is displayed. And, enter the [License key] printed on the license sheet to the license key field, and click [OK] button.



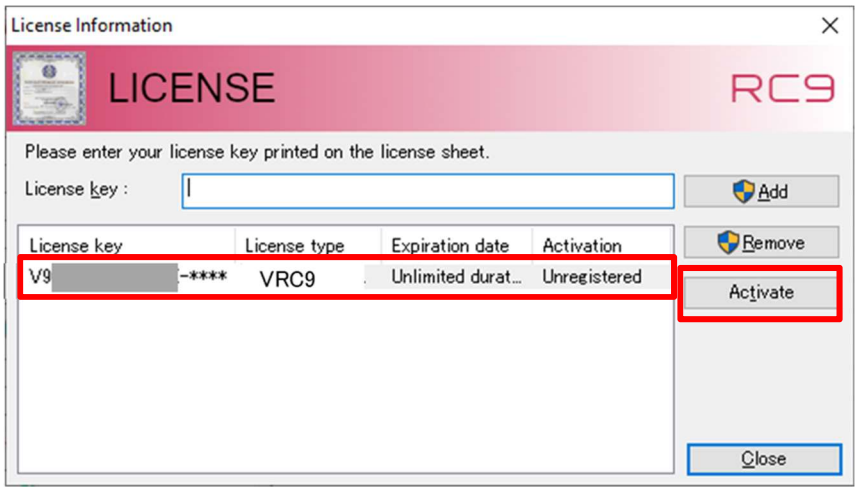
<License screen>



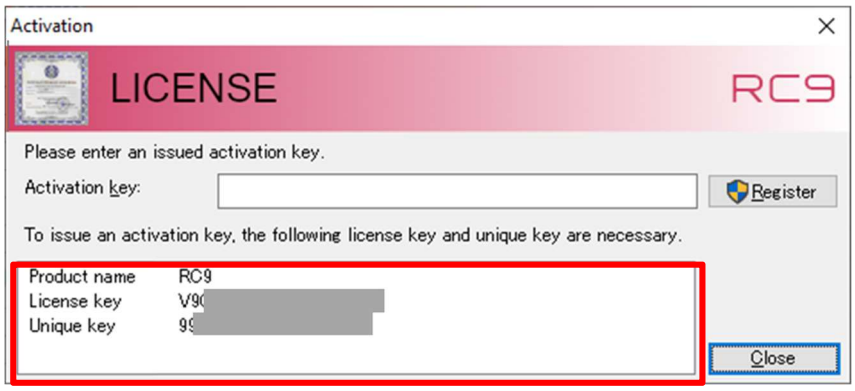
<Input license key>

2.2.3 Acquiring an Activation Key

1. From the license information window, select a license key to activate.
2. Click [Activation] to display the activation window.



3. Check the license key and a unique key and make a note of them.

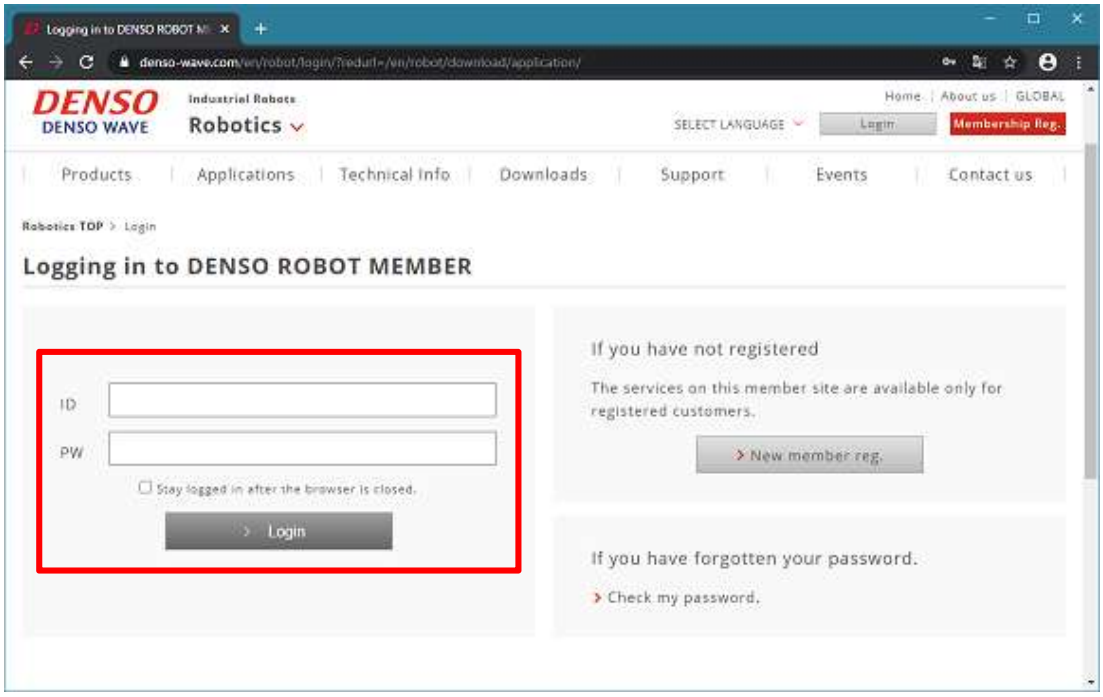


4. Issue an activation key from the DENSO WAVE ROBOTICS website.

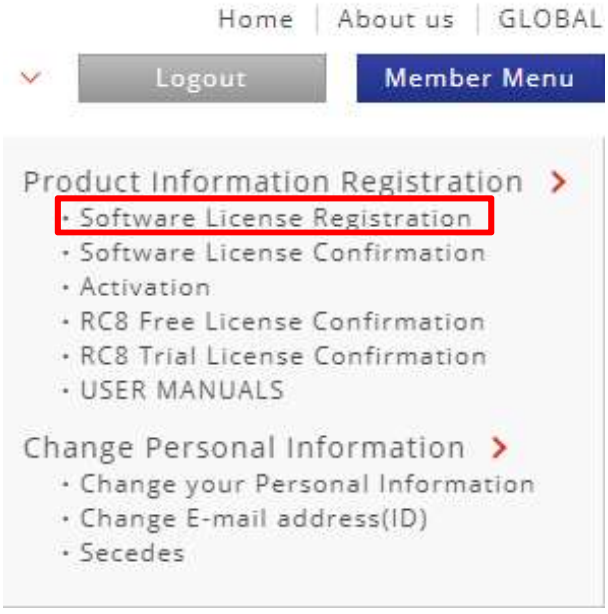
2.2.2.1. Issuing an Activation Key on Our Website

1. Log in from the login page of our member site “DENSO ROBOTICS MEMBER”.
   (https://www.denso-wave.com/en/robot/login/)
   Enter [ID] and [PW], and then click [Login] button.

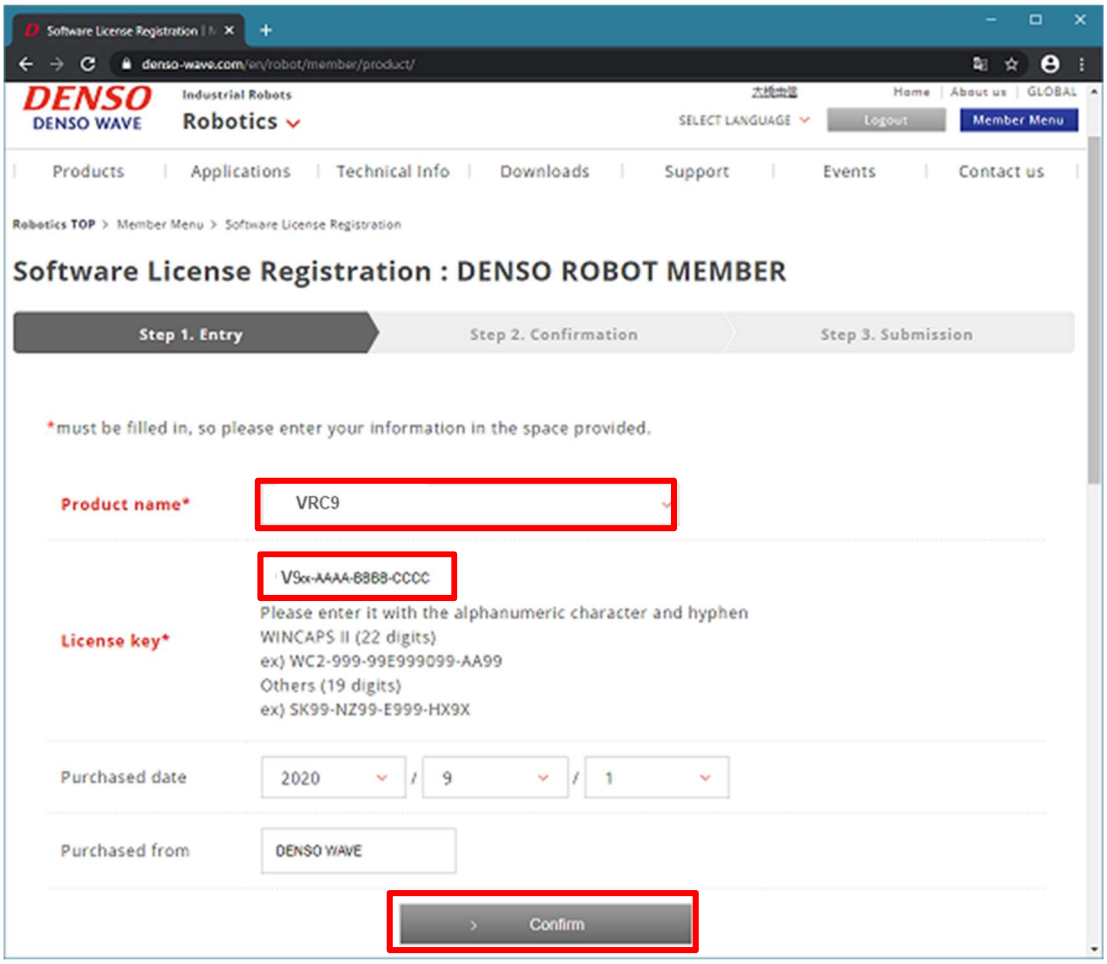
Note
- If you do not have DENSO ROBOT MEMBER login ID, click [New Member reg.] button to register as a member.



2. From the [Member Menu], select [Software License Registration].



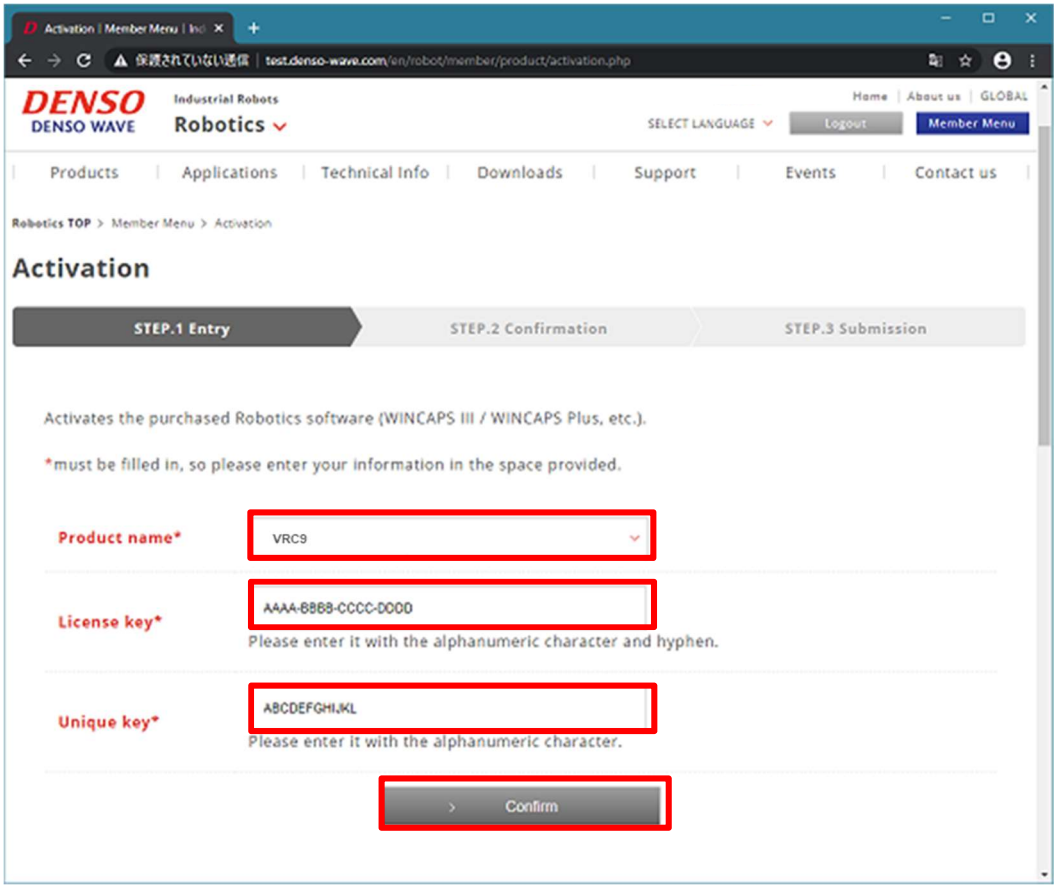
3. Software license registration window opens.
Enter [Product name] and [License key], and click [Confirm].



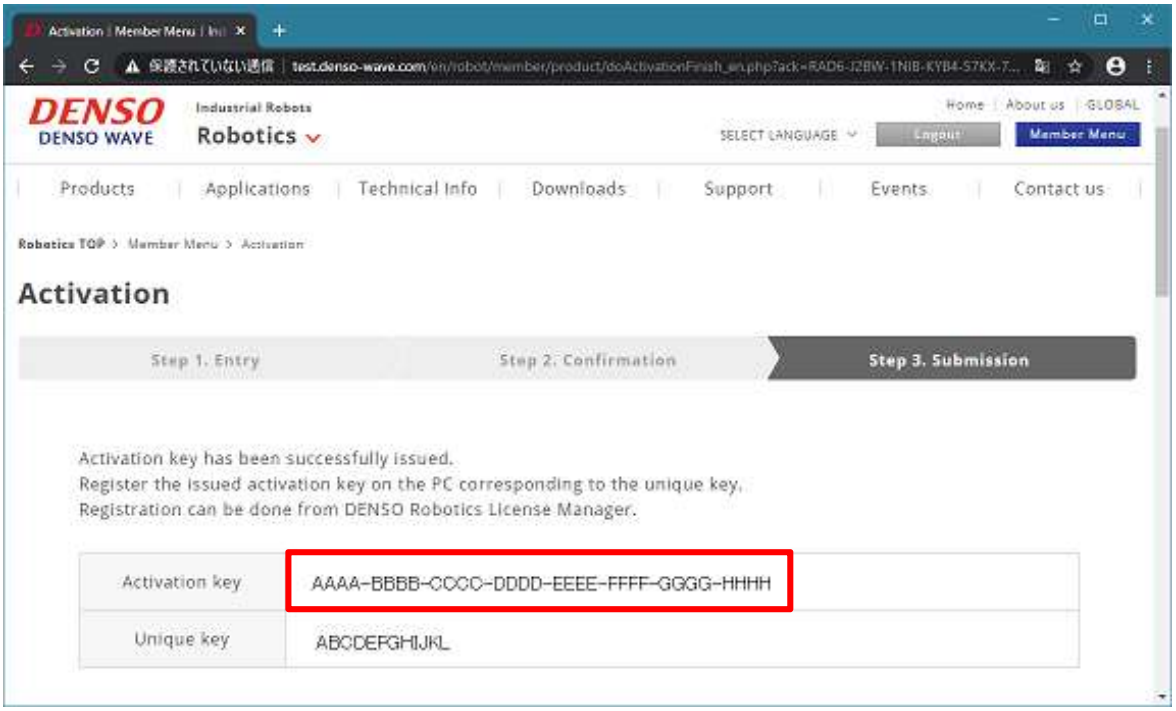
4. Log out from DENSO ROBOT MEMBER and log in again.
From the [Member Menu], select [Activation].

Note
- If the software license registration and re-login are not done correctly, this menu do not appear.

5. Enter [Product name], [License key] and [Unique key], and click [Confirm].



6. An activation key is issued.



2.2.2.2. Issuing an Activation Key by Sending an Email

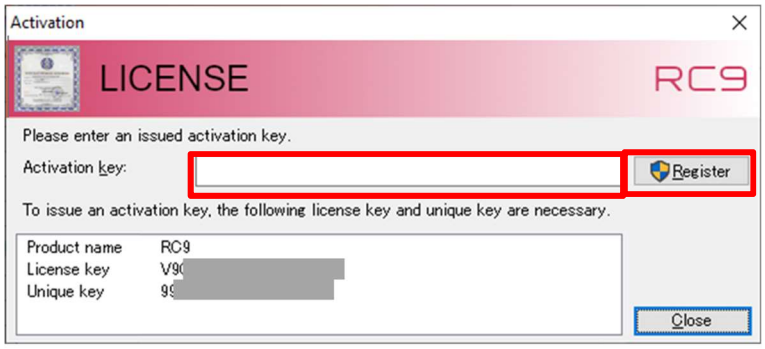
1. If you cannot issue the activation key on our website, please send us a request email. Please use the following email template and send it to "fa-contact@denso-wave.com".

Mail to : fa-contact@denso-wave.com Title: Activation key issuance request Text 1. Company name: 2. Name: 3. Email address: 4. Product name: VRC9 5. License key (Shown in the Activation window) 6. Unique key : (Shown in the Activation window)

2. We will issue an activation key and send it to you via an email.
3. Enter the activation key included in the email into the activation window.

2.2.4 Activation Key Registration

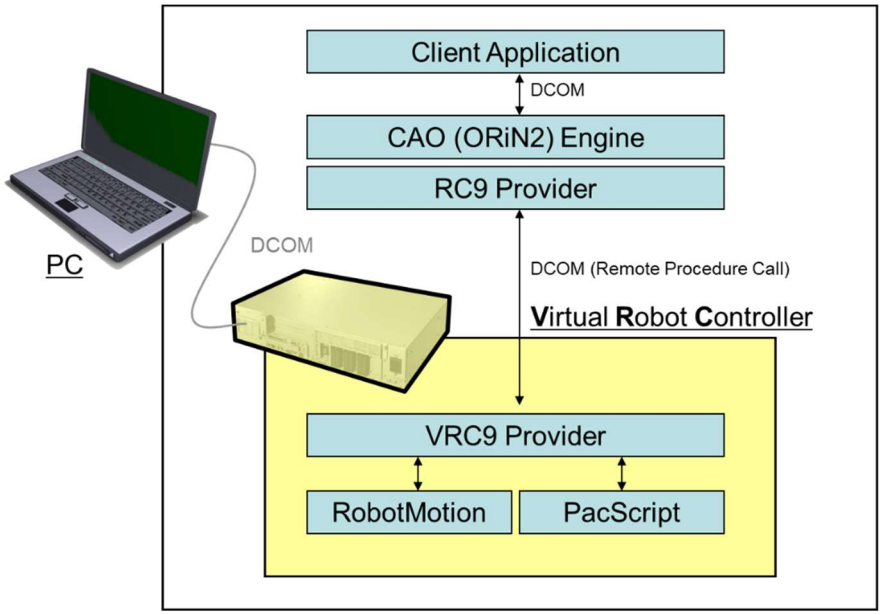
Enter the activation key in the activation window of the License Manager, and click [Register]. When "Succeeded in the registration of the activation key" message appears, the activation has been completed.



3 Using VRC9

3.1 Connecting to a VRC9

The connection from the client application to VRC9 is the following procedures. It can be connected directly with VRC9 by selecting the RC9 provider when the incoming connection is done to the CAO engine.



<Modular structure of VRC9 connection>

3.2 Select Robot type

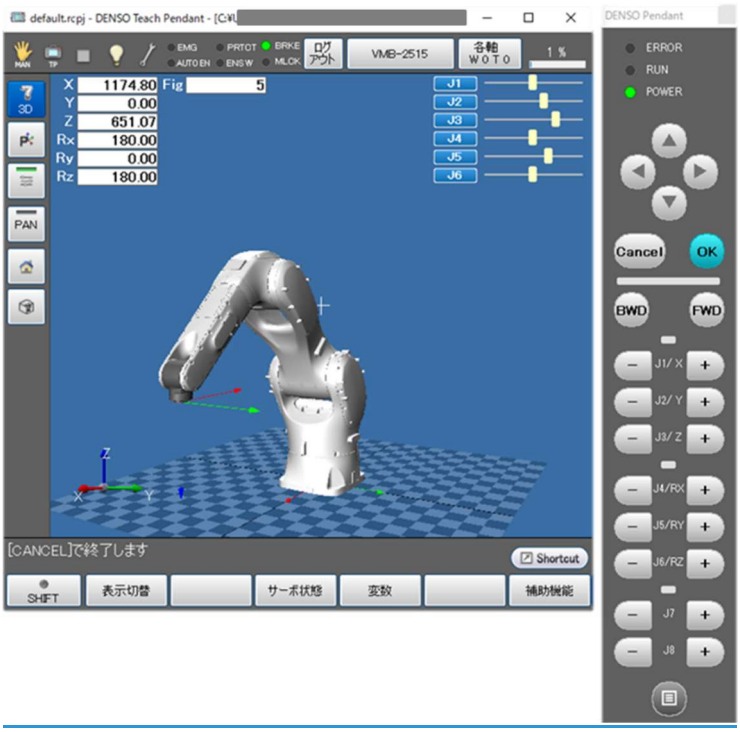
The robot type of VRC9 can be specified by using the project file (*.rcpj). Please refer to the AddController method of the RC9 Provider Guide for details.

3.2.1 Project file (*.rcpj)

The project file is made from the off-line programming software WINCAPS3.

3.3 Confirmation of state of robot

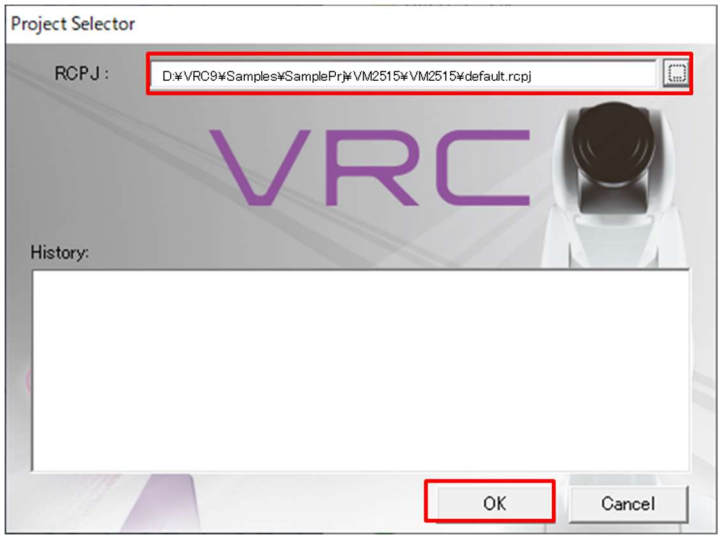
The state of VRC9 can be confirmed by the virtual pendant tool “VRC9 Teach Pendant”.



<VRC9 Teach Pendant>

3.3.1 Start of “VRC9 Teach Pendant”

1. Starting VRC9 Teach Pendant.
   Execute “VRC9 Teach Pendant” from start menu. (Start menu-> DENSO ROBOTICS -> VRC9 -> VRC9 Teach Pandant)
2. Selecting project file
   Select the project file on the Project Selector dialog, and then click the OK button.



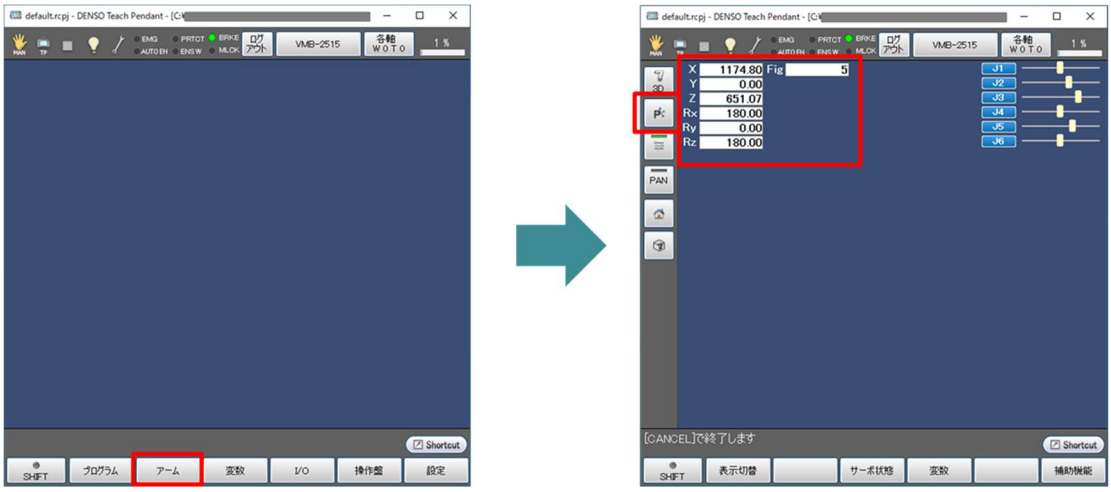
<Project Selector window>

3.3.2 Confirmation of current position of robot

A current position of the robot can be confirmed on the ‘arm’ window.

1. Display the Arm window

   Press [F2: Arm] button on a top screen. The current position of the robot can be confirmed by the numerical value. The display form can switch “P TYPE”, “J TYPE”, “T TYPE”, and “No display” with the button of the ‘switch of the pose’.

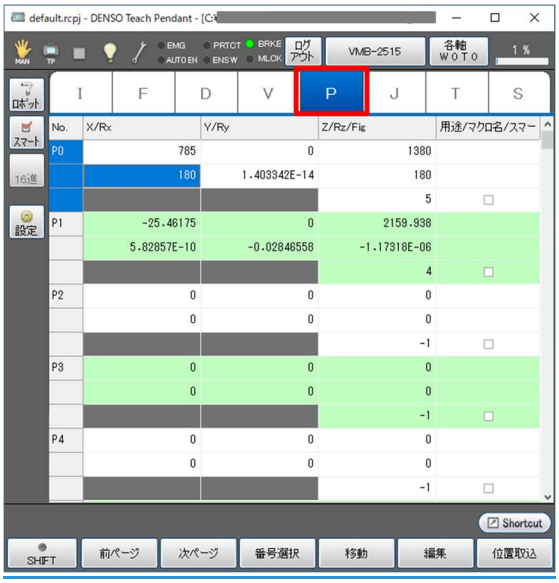


<Top window> **<Arm window>**

3.3.3 Confirmation of variable and state of IO

1. Confirmation of variable

   Press the [F3: Variable] button on a top screen. The variable window is displayed. Choose a variable type tag from the top of the screen, then change oRC9onfirm the variable.



<Variable window>

2. Confirmation of state of IO

Press [F4: I/O] on a top screen. The IO window is displayed. Target IO is confirmed by using the scroll bar or the number selection.

<IO window>

4 Precautions for use

4.1 Access to project file

VRC9 accesses data just like the RC9 controller. Therefore, it rewrites a project file in real time. Please make the backup data beforehand when original data is necessary.

Note

- VRC9 is a virtual robot module designed for RC9 controller, so you cannot execute this module with an RC8 type's project file.

4.2 Virtual pendant tool "VRC9 Teach Pendant"

VRC9 Teach Pendant is a tool to confirm the state of VRC9. Please do not use the setting functions such as a date or the language; it might change the system environment of PC.

5 Appendix

5.1 Sample programs

This chapter uses and explains Visual Basic6.0 (VB6), because the language is best for the introduction purpose though, C++, Java, NET, LabVIEW or Delphi and other programming languages are also available. Please refer to “ORiN2 SDK Programming Guide“ for the sample in other languages.

5.1.1 Connecting to the VRC9

To connect with VRC9, please follow the procedures below.

```
'1. Declares variables for objects.
    Dim g_eng as CaoEngine                  ' CaoEngine object
    Dim g_wrks as caoWorkspace              ' CaoWorkspace object
    Dim g_ctrl as CaoController             ' CaoController object

'2. Create each object
    Set g_eng = New CaoEngine
    Set g_wrks = g_eng.Addworkspace("NewWrks", "")
    Set g_ctrl = g_wrks.AddController("RC9", "CaoProv.DENSO.RC9", "",
                 "RCPJ={C:¥MyDocuments¥Test¥Test.rcpj}")
```

5.1.2 Disconnecting from the VRC9

To disconnect from the controller, delete not only the created object itself, but also delete the object from a collection class that manages the object. Following is an example code.

```
'1. Delete object
    g_wrks.Controllers.Remove g_ctrl.Index      ' delete CaoController from CaoWoekspace
    Set g_ctrl = Nothing                        ' delete CaoCtonroller
    g_eng.Workspaces.Remove g_wrks.Index        ' delete CaoWorkspaces from CaoEngine
    Set g_wrks = Nothing                        ' delete CaoWorkspace
    Set g_eng = Nothing                         ' delete CaoEngine
```

5.1.3 Movement and stopping of the Robot

To move the Robot, the controller must be in AUTO mode.

```
'1.  Connect CaoRobot object
    Dim g_robot as CaoRobot                     ' Variable that stores a CaoRobot object
    Set g_ robot = g_ctrl.AddRobot("Arm", "")
'2.  Get arm control authority
    g_robot.Execute "TakeArm"                   ' get arm semaphore
'3.  Start the motor
    g_robot.Execute "Motor", Array(1, 0)        ' motor ON
'4.  Move and stop of the robot
    g_robot.Move    1,"P(400, 300, 200, 180, 0, 180, 5)","Next"
    g_robot.Move    1,"P(350, 230, 185, 180, 0, 180, 5)","Next"
    g_robot.Halt
'5.  Stop the motor
    g_robot.Execute "Motor", Array(0, 0)        ' motor OFF
'6.  Release arm control authority
    g_robot.Execute "GiveArm"                   ' release arm semaphore
'7.  Delete robot object
    g_ctrl.Robots.Clear
    Set g_robot = Nothing
```

5.1.4 Others

Please refer to 'RC9 Provider Guide' for the program method about "Read, Write of the variable" and "Start and Stop of the robot program".

ORiN2\CAO\ProviderLib\DENSO\RC9\Doc\RC9_ProvGuide_en.pdf

5.2 Version of the related files

VRC9 relates to other software or data such as ORiN2 SDK. The following table shows the version correspondence between VRC9 and related files.

<Version of the associated file>

VRC9	ORiN2 SDK	WINCAPS3
Ver. 1.2.1	Ver. 2.1.54 or later	Ver. 3.62.0 or later

Revision History

Revised on:	Ver.	Content
08/19/2021	1.2.1	First edition

The purpose of this manual is to provide accurate information in the handling and operating of the robot. Please feel free to send youRC9omments regarding any errors or omissions you may have found, or any suggestions you may have for generally improving the manual.

In no event will DENSO WAVE INCORPORATED be liable for any direct or indirect damages resulting from the application of the information in this manual.