Fuji Electric
Innovating Energy Technology

Instruction Manual

Inverter Support Software

FRENIC-HVAC/AQUA Loader

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⚠CAUTION

Thank you for purchasing our high-performance, vector control FRENIC-HVAC/AQUA series of inverters.

- This manual provides all the information on Fuji's inverter support software FRENIC-HVAC/AQUA Loader. Read this manual carefully for correct use of FRENIC-HVAC/AQUA Loader
- This manual does not contain information on the inverter itself. Read the inverter user's manual, inverter instruction manual in conjunction with this manual.
- Incorrect handling may prevent Loader from operating correctly, shorten the inverter service life, or cause problems.

Fuji Electric Co., Ltd. **INR-SI47-1712b**

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Preface

This manual provides all the information on Fuji's inverter support software FRENIC-HVAC/AQUA Loader.

Read this manual carefully for correct use of FRENIC-HVAC/AQUA Loader.

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Incorrect handling may prevent Loader from operating correctly, shorten the inverter service life, or cause problems.

These materials are subject to change without notice. Be sure to obtain the latest editions for use.
The latest editions can be downloaded from our Web side at: Fe Library

■ Safety Precautions

Read this manual thoroughly before proceeding with installation, connections (wiring), or operation. Ensure you have sound knowledge of the device and software and have familiarized yourself with all safety information and precautions before proceeding to operate the inverter via FRENIC-HVAC/AQUA Loader.

Safety precautions are classified into the following two categories in this manual.

⚠WARNING	Failure to heed the information indicated by this symbol may result in death or serious injury.
⚠CAUTION	Failure to heed the information indicated by this symbol may result in minor or light injury and/or substantial property damage.

Wiring and Connection of Cables

⚠WARNING⚠
• Be sure to turn off the power to the inverters and related devices before making RS-485 connection. **Risk of electric shock if this warning is not heeded.**

⚠CAUTION
・When connecting an RS-485 communications cable to the RJ-45 connector on the inverter, be sure to check the pin assignment of the device to be connected. For details, refer to Chapter 1, Section 1.2.3. " Configuring an RS-485 communications network." **An trouble could occur.**

Operation

⚠WARNING
・ Resetting an alarm with a run command being ON will cause the inverter to run the motor unexpectedly. **An accident could occur.**

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⚠WARNING

・Loader or OS freezes or is forced to quit when Loader is operating the inverter(s) from the Test run window, the connected inverter(s) cannot be stopped from Loader. If it happens, perform any of the following operations to stop the inverter(s).

1) Prepare a separate emergency stop switch and use it to stop the inverter.
2) Turn off the power to the inverter.
3) Turn off the external run command at the inverter side and switch the command source from "Via communications line" to "From inverter" by doing one of the following:
   - Turn off the terminal which the ***LE*** command is assigned to.
   - Set function code y99 data (Link support function) to "0 "using the keypad.
   - Set function code H30 data (Link function) to "0" using the keypad.

・When operating the inverter(s) from the Test run window, never change the target inverter, or disconnect the RS-485 communications cable, USB cable, or keypad. Doing so makes it impossible to stop the inverter(s) from Loader. It is dangerous.
An accident could occur.

・When auto-tuning code sets to “1” or “2”, the motor could rotate. Make sure that there is no danger in rotating the motor.
Injuries could occur.

⚠CAUTION

・If change the test run target inverter when it is operating, there is no way to stop it, so it is dangerous. To keep safety, stop operating the previous inverter, then start the test run of subsequent inverter.
An trouble could occur.

・Depend on customizable logic code, running sequence would change, the inverter starts suddenly, could cause unexpecred movement. Secure safety, then starts running.
Injuries could occur.

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Chapter 1 Before Using FRENIC-HVAC/AQUA Loader

This chapter gives an overview of the inverter support software FRENIC-HVAC/AQUA Loader and provisions for its installation and operation.

1.1. Overview

1.1.1. Features

- Loader enables a PC to support remote operation of inverters either individually or collectively via the RS-485 port or the USB port on the inverters.
- Simplified operation of Loader allows you to easily manage and set the function code data for the inverter.

1.1.2. Warranty

Limited Warranty	In no event will Fuji Electric Co., Ltd. be held liable for any damage (including, but not limited to lost profit, suspension or interruption of operations, loss of operational data or other monetary loss) whatsoever resulting from the use of the software or malfunction of the same or from information contained in this document.

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1.2. Connecting Inverters to a PC

1.2.1. Connection

The table below lists the connection methods available for connecting inverters to a PC.

PC : Inverters	On PC	On inverter	Connection
1 : 1	USB	USB	Using a USB cable
	USB	RS-485	Via a USB / RS-485 converter
	COM port (RS-232C)	RS-485	Via an RS-232C / RS-485 converter
1 : n	USB	RS-485	Via an RS-232C / RS-485 converter When using an RJ-45 connector, use a branch adapter for multi-drop connection for each of the 2nd and the subsequent inverters.
	COM port (RS-232C)	RS-485	Via an RS-232C / RS-485 converter

Note

1) For details about the RS-232C / RS-485 converter and USB / RS-485 converter, refer to Section 0 “Communications support devices for RS-485".
2) To minimize the effects of noise, separate the signal lines from the power lines. Refer to Section 0 “Noise suppression”.
3) The inverter cannot be concurrently shared by the Loader-running PC and other host equipment (e.g., PLC). To use Loader, therefore, be sure to disconnect the cables of other host equipment from the RS-485 port on the inverter.
4) For multi-drop connection of inverters, assign different station addresses to each of the inverters connected.

⚠WARNING⚠

- Be sure to turn off the power to the inverters and related devices before making RS-485 connection.

  Risk of electric shock if this warning is not heeded.

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1.2.2. Configuring USB network

1.2.2.1. Example of networking

To configure a USB network connecting the inverter and a Loader-running PC, use a commercially available USB cable (mini B connector). (See Note below.)

Connection using the USB connector

For connection using the USB connector, refer to Section 0"Communication settings"

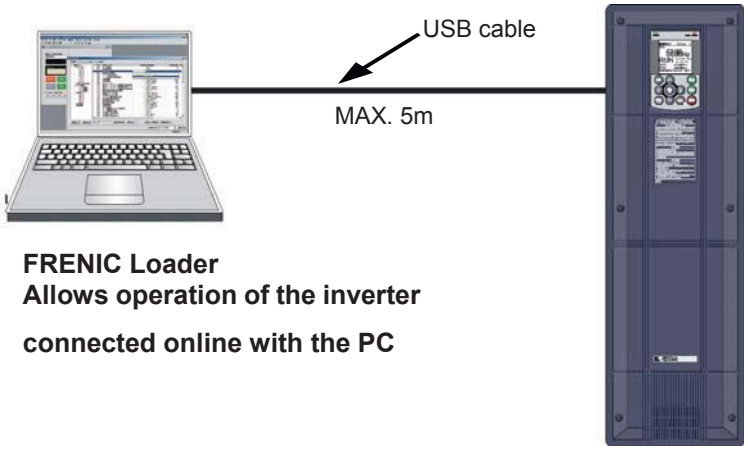

Figure 1.2.2.1. USB Network Using a USB Cable (mini B)

Table 1.2.2.1. Specifications of USB Network

Specifications	USB 1.1 compliant
Transmission speed	12M bps
Wiring length	Max. 5 m
Connector	USB mini B connector

Note When connecting the inverter to a PC via the USB port, be sure to connect them, one to one. Do not use a USB hub.

1.2.2.2. USB Connector on Control PCB

The USB port (CN10*) is located on the upper right of the control printed circuit board (control PCB) as shown below. To connect the USB cable to CN10, remove the front cover so that you can see the control PCB.
*miniB connector, Version 2.0 compliant

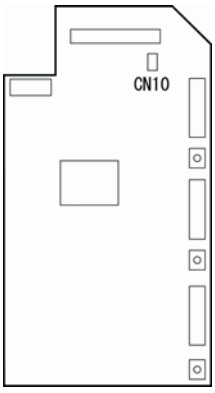

Figure 1.2.2.2 Location of USB Connector

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1.2.3. Configuring an RS-485 communications network

1.2.3.1. Example of networking(COM port1)

For connecting inverters in multi-drop connection, use the branch adapters for multi-drop connection as shown below.

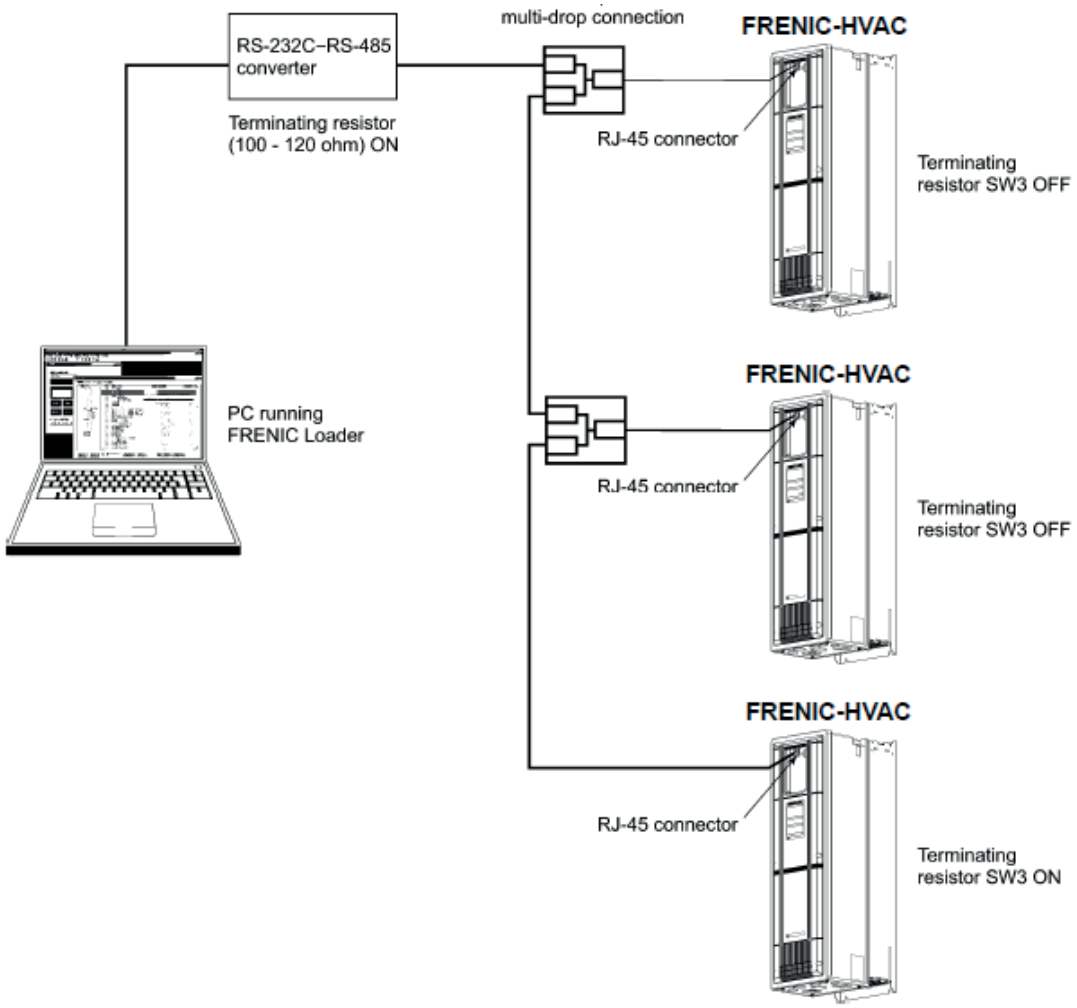

Figure 1.2.3.1. RS-485 Multi-drop Network (RJ45 connector connections)

Note

- Pins 1, 2, 7, and 8 on the RJ-45 connector are exclusively assigned to power supply and grounding for keypads. When connecting other devices to the RJ-45 connector, take care not to use those pins. Failure to do so may cause a short-circuit hazard. Use pins 4 and 5 only.
- When selecting additional devices to prevent the damage or malfunction of the control PCB caused by external noises or eliminate the influence of common mode noises, be sure to refer to Section 1.2.3.3. " Communications support devices for RS-485"
- The maximum wiring length must be 500 m.
- Use cables and converters meeting the specifications for proper connection. (Refer to [2]"Requirements for the cable (COM port 1: for RJ-45 connector)"

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1.2.3.2. Example of networking (COM port2)

To configure an RS-485 communications network connecting inverters and a Loader-running PC, use a Shielded twisted pair cable for long distance transmission. (See Note below.)

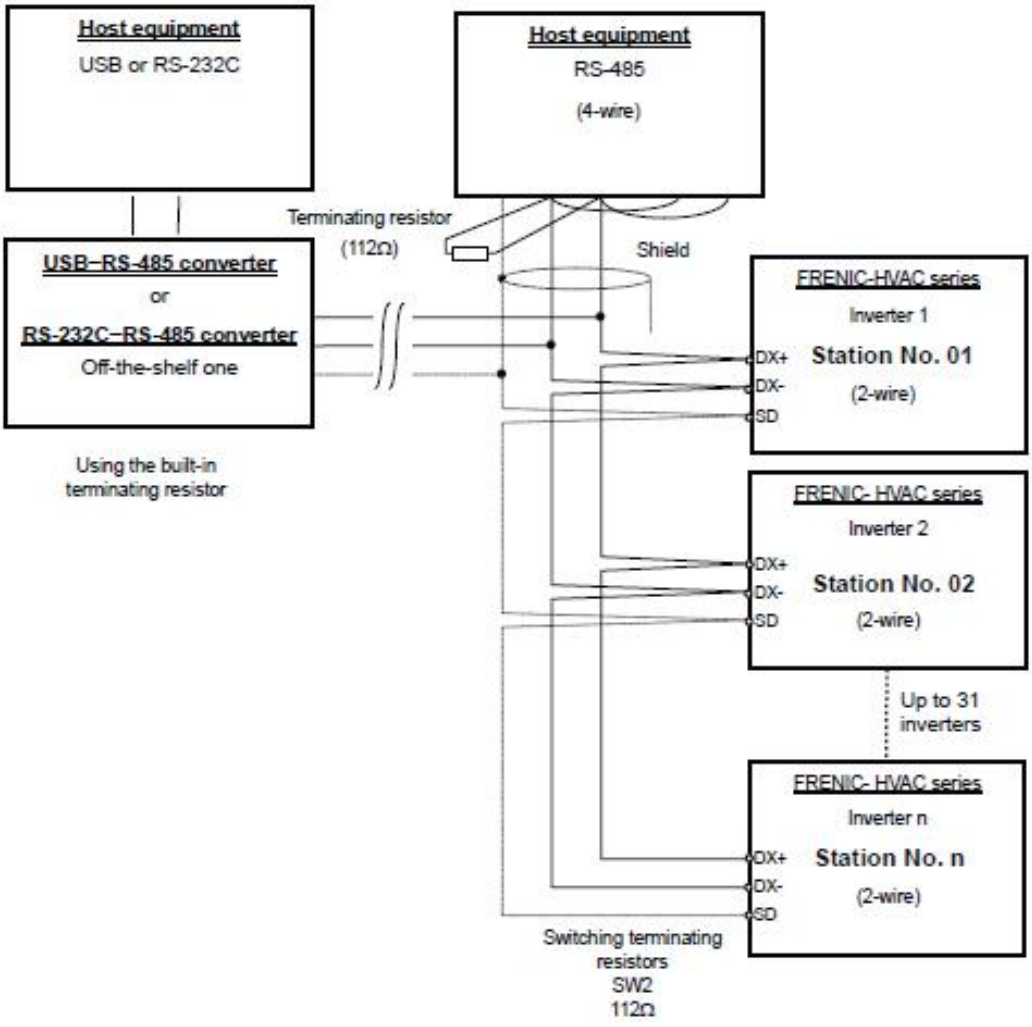

Figure 1.2.3.2. Multi-drop Connection Diagram (Connecting to the Terminal Block)

Note ・Use cables and converters meeting the specifications for proper connection. (Refer to [3] "Requirements for the cable (COM port 2: for RS-485 connector)" in Section 1.2.3.3. " Communications support devices for RS-485")

・The maximum wiring length must be 500 m.

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1.2.3.3. Communications support devices for RS-485

This section describes the devices required for connecting the inverter to a PC having no RS-485 interface or for connecting two or more inverters in multi-drop network.

[1] Converter

Usually PCs are not equipped with an RS-485 communications port but with an RS-232C port. To connect inverters to a PC, therefore, you need an RS-232C–RS-485 converter or a USB–RS-485 converter. To run the FRENIC-HVAC correctly, use a converter satisfying the requirements given below.

Recommended converter spec

Send/receive switching:	Auto-switching by monitoring of send/receive data status at the PC (RS-232C)
Electric isolation:	Electrically isolated from the RS-485 port
Fail-safe:	Fail-safe facility*
Other requirements:	Superior noise immunity

* The fail-safe facility refers to a feature that ensures the RS-485 receiver's output at "High" (logical value = 0) even if the RS-485 receiver's input is opened or short-circuited or all the RS-485 drivers are inactive.

Send/receive switching system

The RS-485 communications system of the inverter acts in half-duplex mode (2-wire) so the converter must feature a send/receive switching circuitry. Generally, the switching system may be either one of the following.
(1) Auto-switching by monitoring of send/receive data
(2) Switching by RS-232C control signal of RTS or DTR (hardware flow control system)

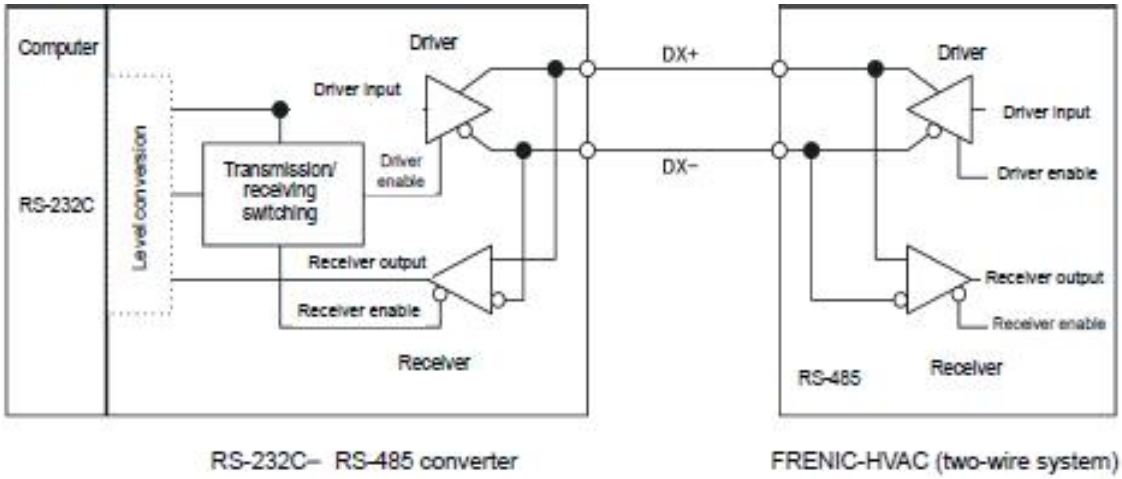

Figure 1.2.3.3. Communications Level Conversion

Recommended converter

System Sacom Sales Corporation (Japan):KS-485PTI(RS-232C - RS-485 converter）
:USB-485I RJ45-T4P(USB - RS-485 converter）

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[2] Cable for RJ-45 connector (COM port 1)

Use a standard 10BASE-T/100BASE-TX LAN cable (US ANSI/TIA/EIA-568A category 5 compliant, straight type).

Note The RJ-45 connector (COM port 1) has power source pins (pins 1, 2, 7 and 8) exclusively assigned to keypads. When connecting other devices to the RJ-45 connector, take care not to use those pins. Using them will cause a short-circuit hazard. Use pins 4 and 5 only.

[3] Cable for RS-485 connector (COM port 2)

To ensure the reliability of connection, use twisted pair shield cables for long distance transmission AWG 16 to 26.

Recommended LAN cable
Manufacturer: FURUKAWA Electric Co., Ltd.
AWM2789 Cable for long distance connection
Type (Product code): DC23225-2PB

[4] Branch adapter for multi-drop

An RS-485 communications network for inverters utilizes 2-wire 10BASE-T LAN cables fitted with an RJ-45 connector at both ends. To connect those inverters to the network in multi-drop mode, use branch adapters for multi-drop.

Recommended branch adapter
SK Koki (Japan): MS8-BA-JJJ

1.2.3.4. Noise suppression

Depending on the operating environment, instruments may malfunction due to the noise generated by the inverter. Possible measures to prevent such malfunction are: separating the wiring, use of shielded cable, isolating the power supply, and adding an inductance component. Show below is an example of adding an inductance component.

Adding inductance components

To suppress or eliminate noise for keeping the network in high noise immunity level, insert inductance components such as choke coils in series in the signal circuit, or pass the RS-485 communications cable through a ferrite core ring or wind it around by 2 or 3 turns as shown below to keep the impedance of the signal lines high.

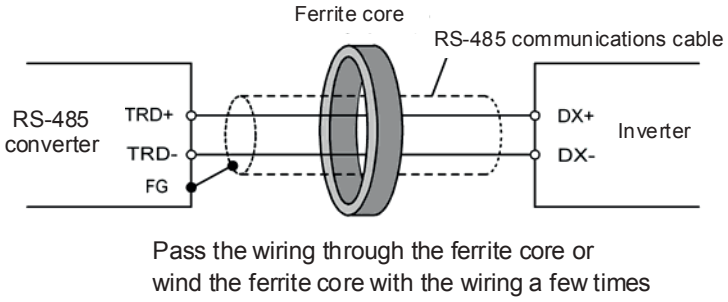

Figure 1.2.3.4. Adding an Inductance Component

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1.3. Installation

1.3.1. Installing software

Before installation

Execute the following before installation.

Check items	Requirements
Windows OS	Microsoft Windows XP(SP3 or later), Vista (32/64-bit[*1]) , or 7 (32/64-bit[*1])
Hard disk space	Free space of approx. 20MB or more
Other applications	Terminate all the applications being in execution.
Uninstalling older version	If older version FRENIC-HVAC_AQUA Loader is installed, please uninstall it.

[FRENIC-HVAC_AQUA Loader_E_ Ver_□□□□_setup.exe[*2]] and [MsgMgr USB E Setup. exe] are contained in the CD that comes with Fuji Inverter FRENIC- HVAC/AQUA. Copy these setup files to any folder.

*1 64-bit version correspond to ver.2.0.1.0 or later.

*2 Numerical value comes in “Ver_□□□□” of “Loader_setup.exe” .

Note To use FRENIC-HVAC/AQUA Loader, you need to install two setup files: the loader software main program [FRENIC-HVAC_AQUA Loader_E_Ver_□□□□_setup.exe] and the message manager [MsgMgr USB E Setup.exe] that manages communications.

To install the loader software, install with an account that has sufficient authority to install the software.

Installing software,macthing with using OS

Windows 7	Refer to 1.3.1.1. Installing Windows 7
Windows XP	Refer to 1.3.1.2. Installing Windows XP
Windows Vista	Refer to 1.3.1.3. Installing Windows Vista

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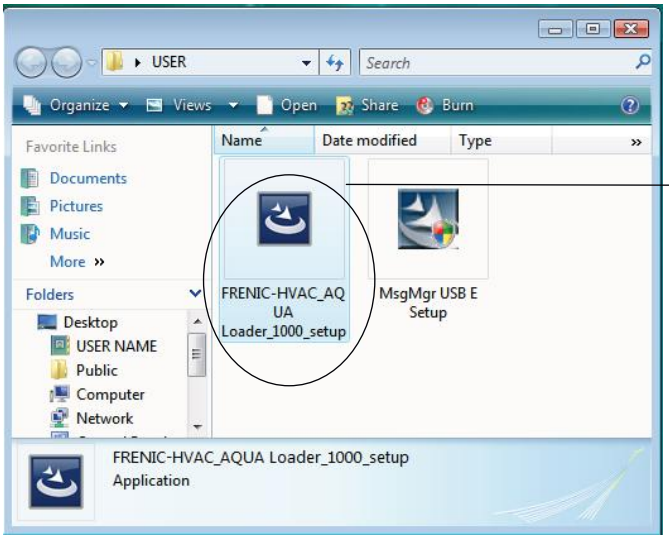
1.3.1.1. Installing Windows 7

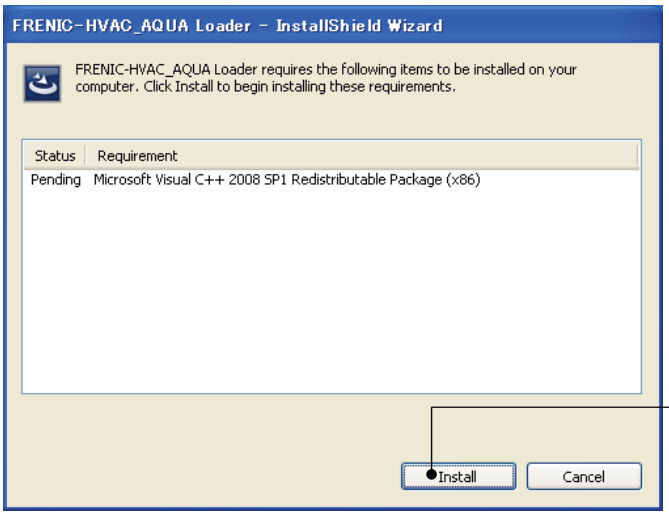
[1] Installing loader

Follow the wizard and install Loader as shown below.

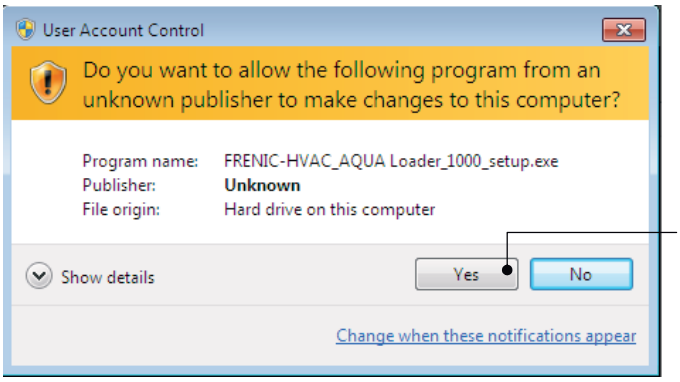


Double-click the FRENIC-HVAC_AQUA Loader_E_Ver_□□□□_setup.exe icon.

The exe automatically starts the installation wizard.



To continue, click **Install**.



To continue, click **Yes.**

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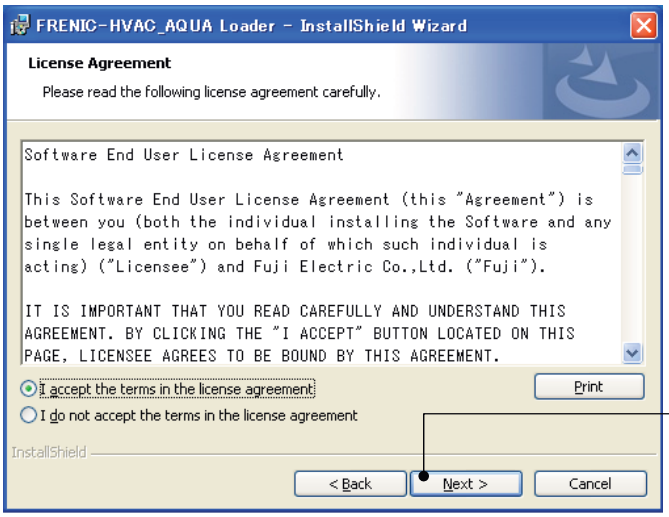
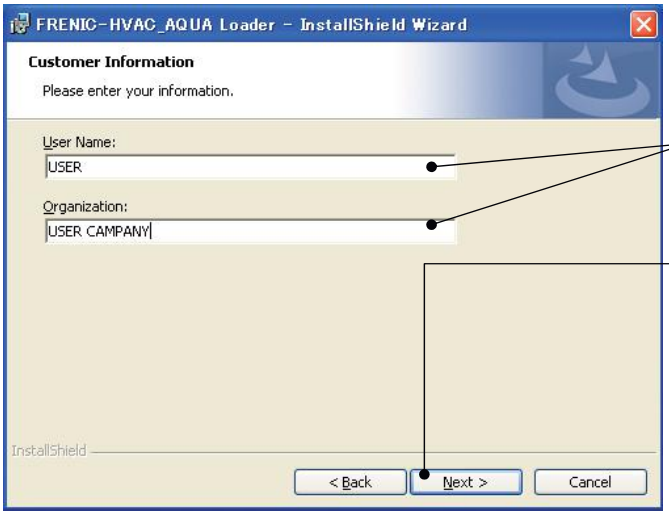
To continue, click **Next**.



Carefully read the license agreement.

If you agree, click **Next** to proceed.



Enter your user name and company name.

After entry, click **Next** to proceed.

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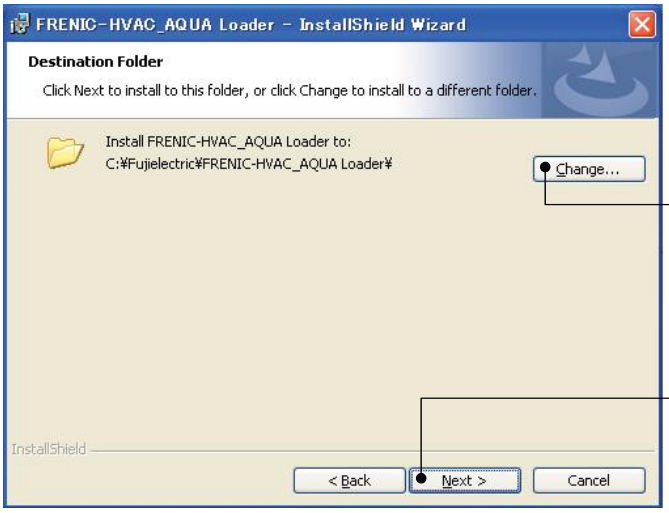
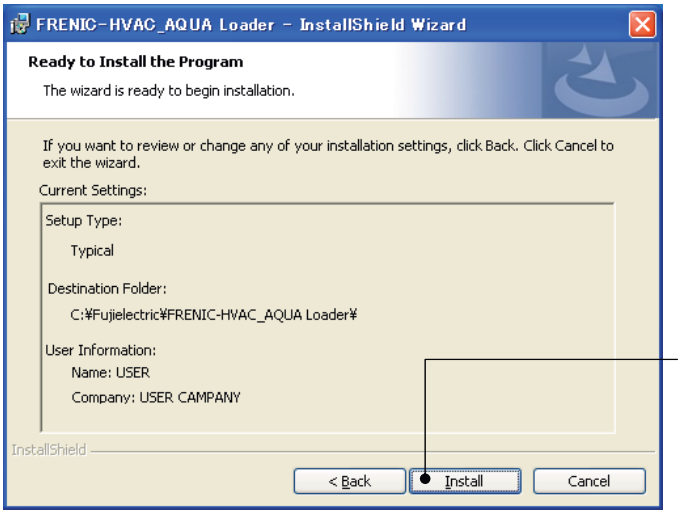


Select the destination folder to install. A default folder has appeared.

In the case of OS drive is “C”, a default folder is “C:¥Fujielectric¥FRENIC-HVAC_AQUA Loader”.

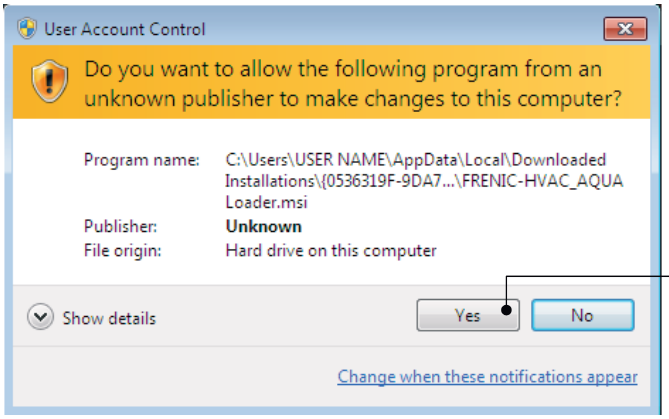
To select a different folder, click **Change...**.

Click **Next** to proceed.



The screen confirming your selection appears.

Click **Install** to proceed.



To continue, click Yes.

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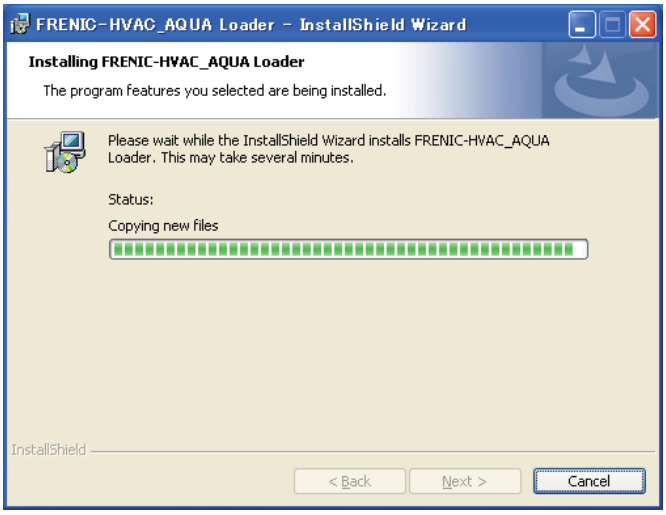
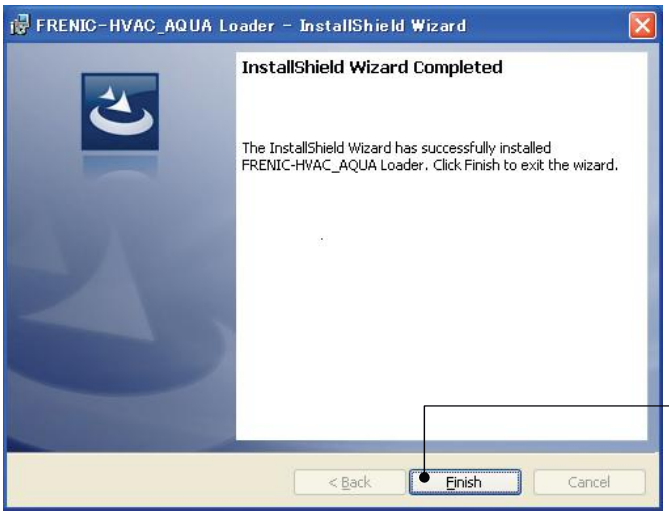


The installation progress bar appears..



Upon completion of the installation, the screen at left appears.

Click **Finish**.

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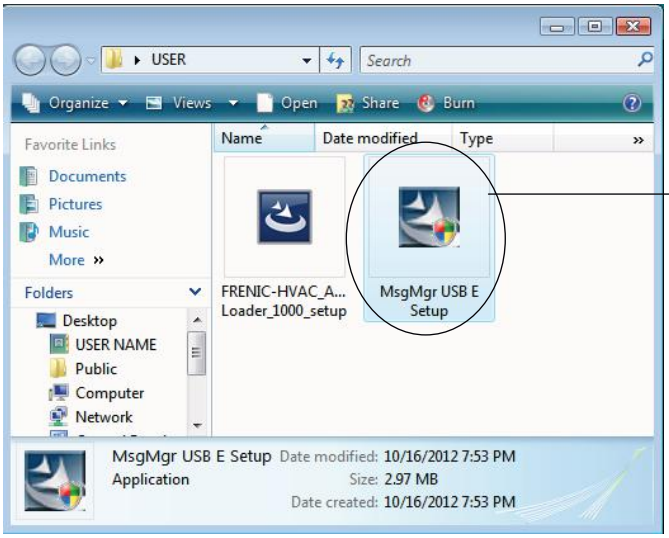
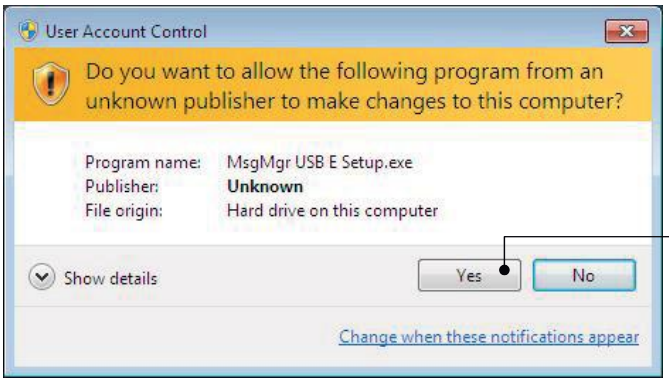
[2] Installing Message Manager

Follow the wizard and install Message Manager as shown below.

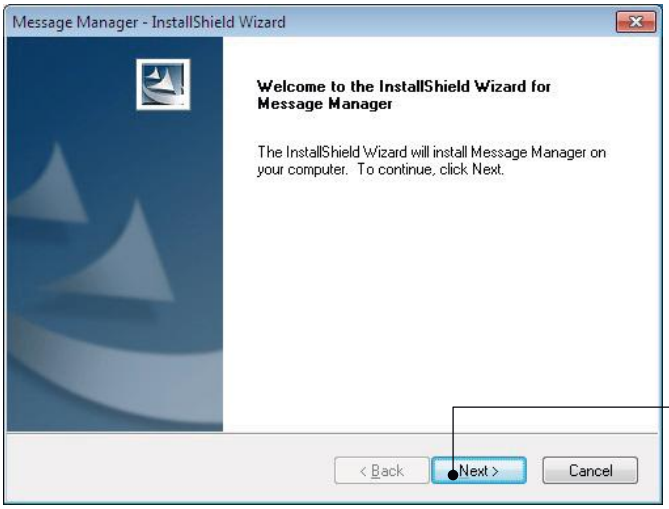


Double-click the MsgMgr USB E Setup.exe icon.

The exe automatically starts the installation wizard.



To continue, click **Yes**.



To continue, click **Next**.

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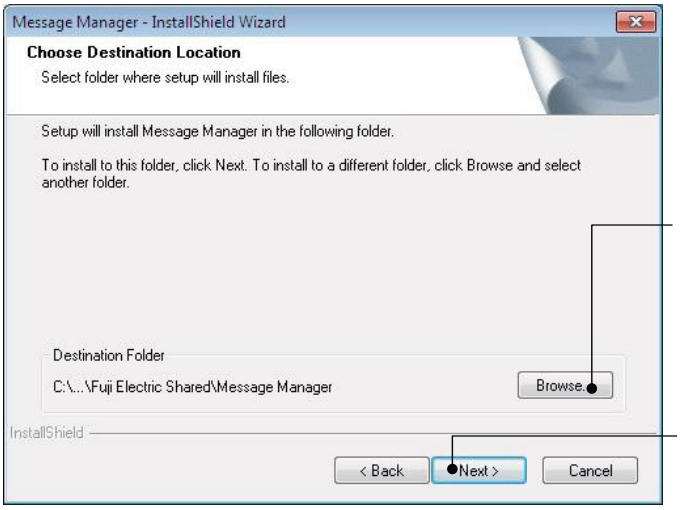
Carefully read the license agreement.

Click **Yes** to proceed.

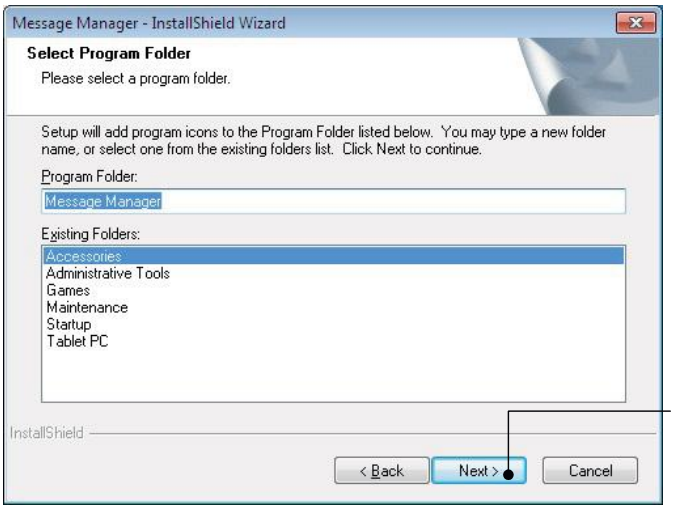


Select the destination folder to install. A default folder has appeared.

In the case of OS drive is “C”, a default folder is “C:¥Program Files ¥Common Files¥Fuji Electric Shared¥Message Manager”.

To select a different folder, click **Browse...**

Click **Next** to proceed.



Select the start menu folder that the shortcut to FRENIC Loader is to be added to.

After entry, click **Next** to proceed.

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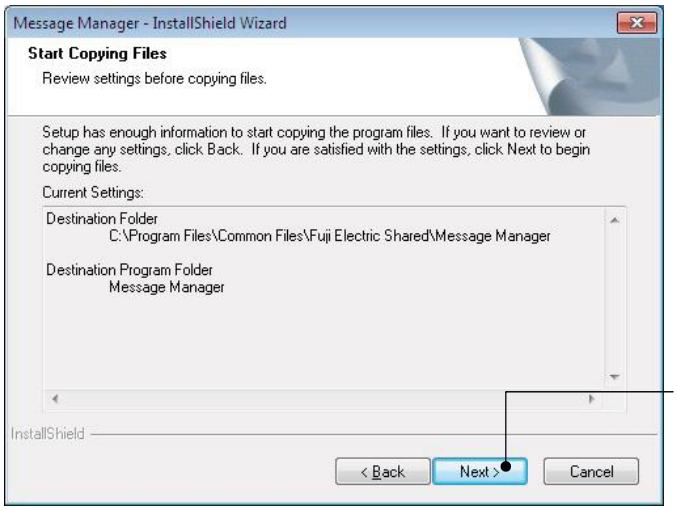
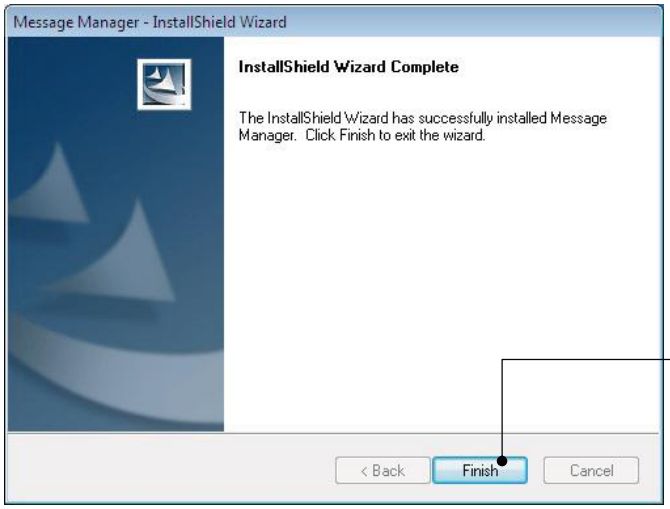


The screen confirming your selection appears.

Click **Next** to proceed.



Upon completion of the installation, the screen at left appears.

Click **Finish**.

[3] Installing USB driver

Using the USB interface for accessing the inverter(s) requires installing the USB driver to your PC. The driver installation is required only once at the first use of the USB interface.

Note If the USB driver has not been installed correctly, no communication via the USB interface is possible.

First of all, connect the USB connector (A) on the PC and the USB connector (mini B) on the inverter's keypad with each other using a USB cable.

Note Before installation of the USB driver, install Loader and Message Manager.

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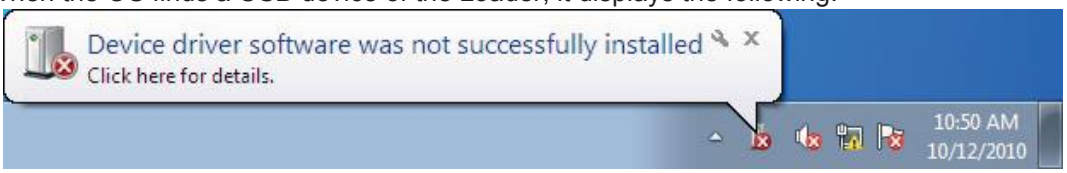
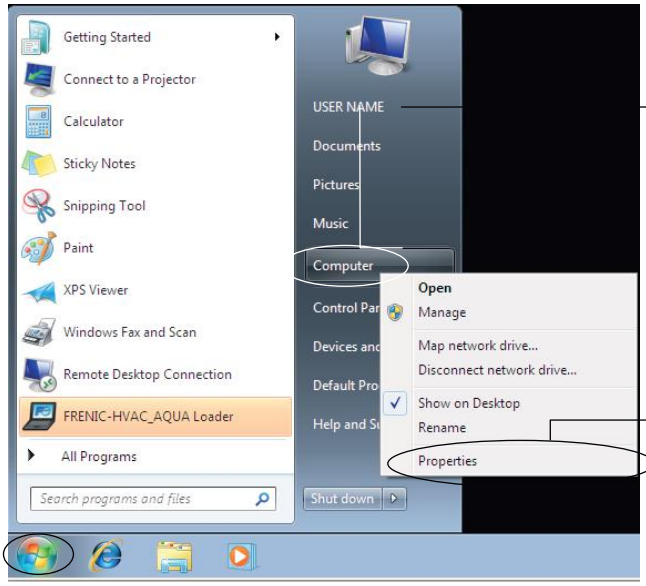
When the OS finds a USB device of the Loader, it displays the following.



The system-supplied driver setup wizard does not run automatically. Install the USB driver as shown below.



From the **Start** menu, select and right-click **Computer** to show the submenu.

Click **Properties**.

Left-Click

Wait for the Control Panel Home screen and click **Device Manager**.

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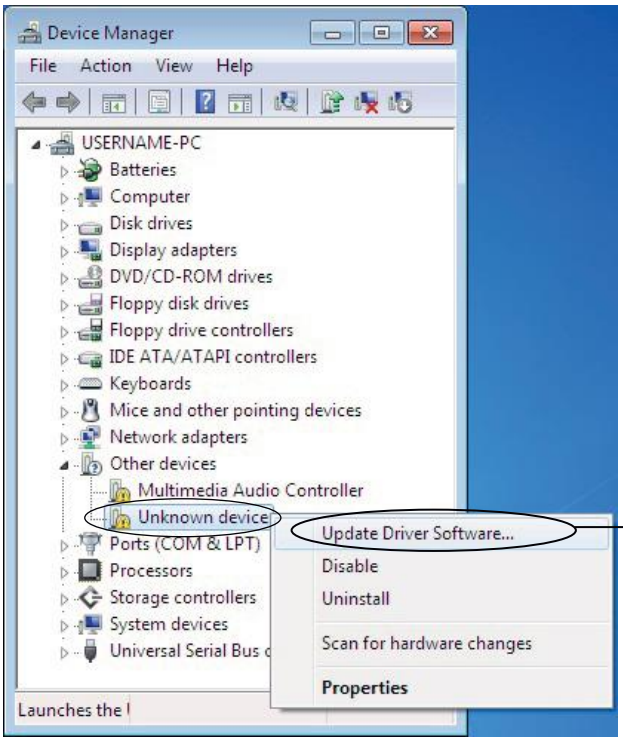
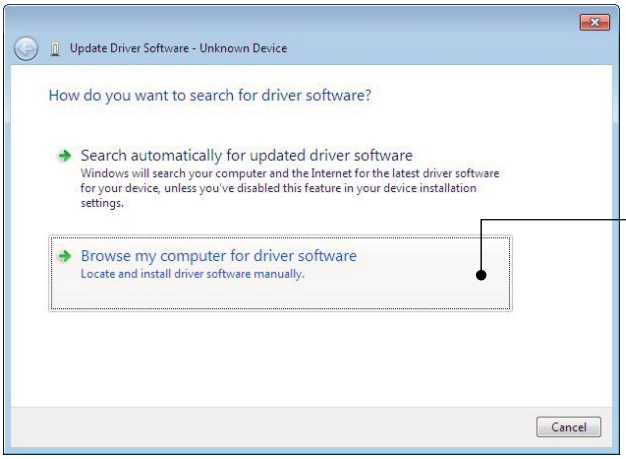
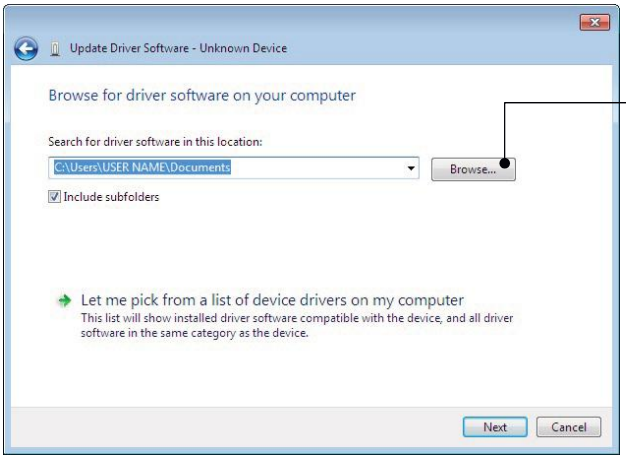


On the **Device Manager** window, right-click **Unknown device** to show the drop-down

Click **Update Driver Software…**.



Click **Browse my computer for driver software**.



Click **Browse…**.

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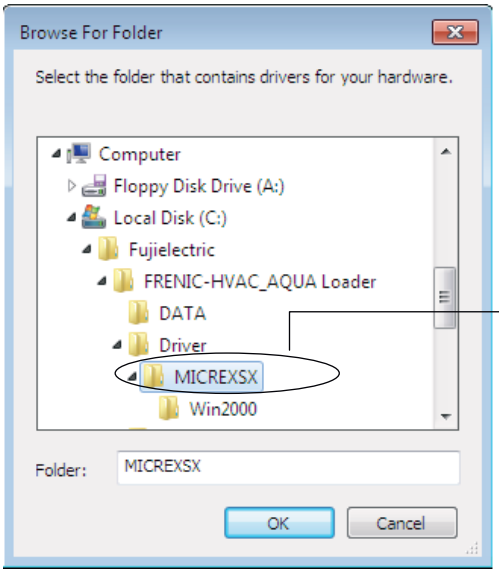
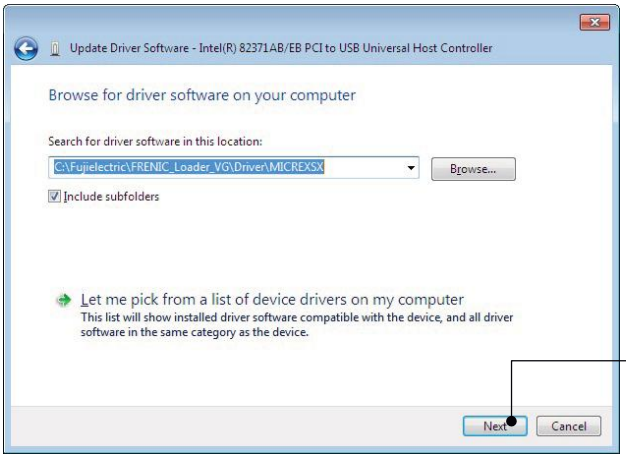
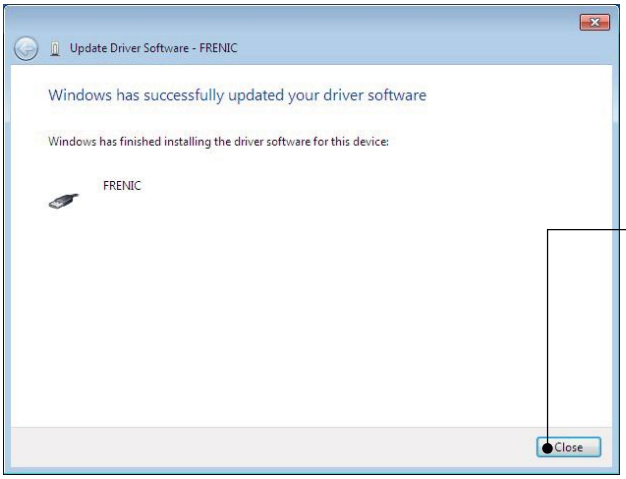


In the folder in which FRENIC-HVAC_AQUA Loader has been installed, select ¥Driver¥MICREXSX and then click **OK**.
The default folder is C:¥FujiElectric¥ FRENIC-HVAC_AQUA_Loader¥Driver¥ MICREXSX when the OS drive is C.



To continue, click **Next**.

Click **Install this driver software anyway**.



Upon completion of the installation, the screen at left appears.

To exit the installation wizard and return to Windows, click **Close**.

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[4] Checking the installation of the USB driver

To check whether the USB driver has been installed correctly, select Windows “Start” →”Control panel”,open”Device Manager”. If “**FRENIC**” is added to the sub-tree of Loader USB device, the driver has been installed correctly.

Installation finished successfully

Installation failed

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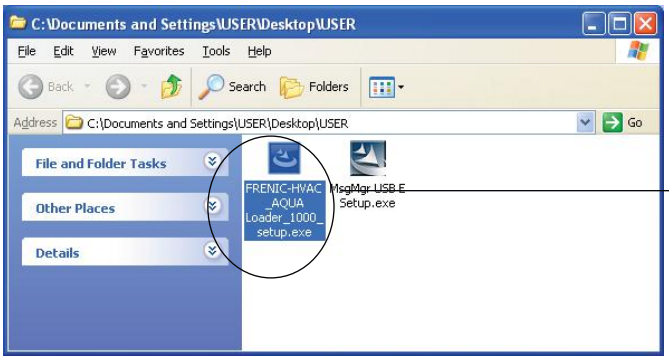
1.3.1.2. Installing Windows XP

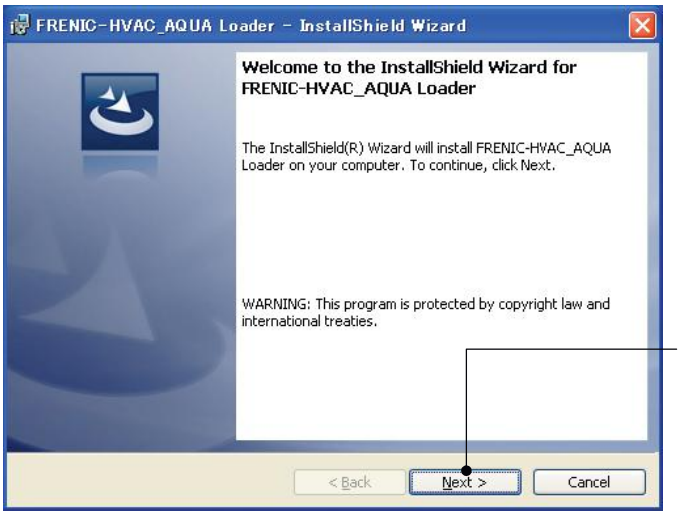
[1] Installing loader

Follow the wizard and install Loader as shown below.

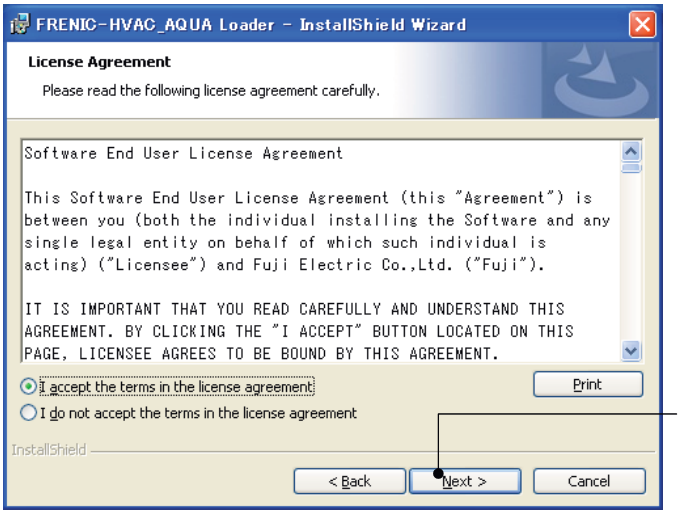


Double-click the RENIC-HVAC_AQUA Loader_E_ Ver_□□□□_setup.exe icon.

The exe automatically starts the installation wizard.



To continue, click **Next**.



Carefully read the license agreement.

If you agree, click **Next** to proceed.

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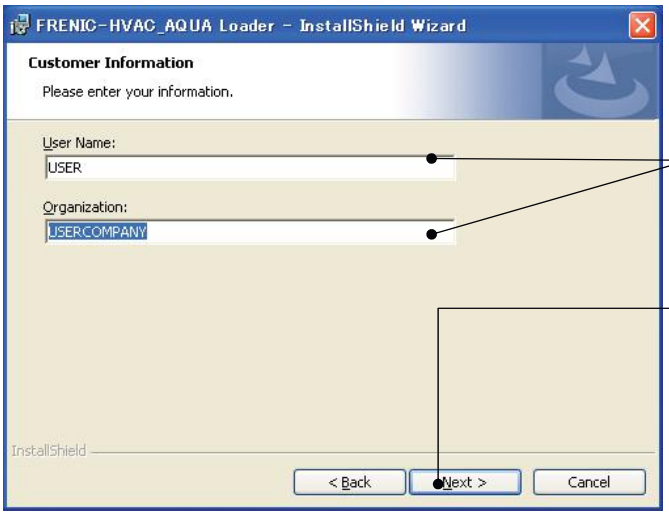
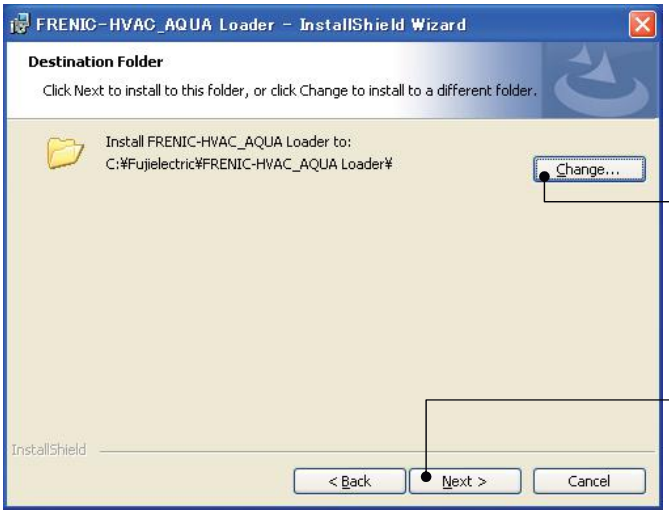


Enter your user name and company name.

After entry, click **Next** to proceed.

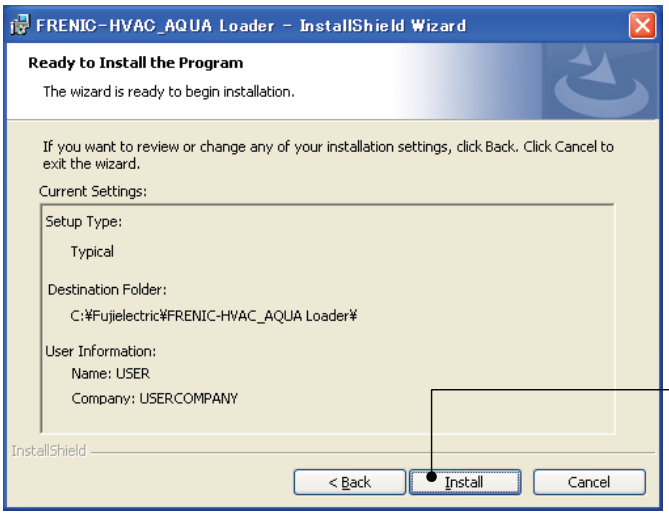


Select the destination folder to install. A default folder has appeared.

In the case of OS drive is “C”, a default folder is “C:¥Fujielectric¥FRENIC-HVAC_AQUA Loader”.

To select a different folder, click **Chage…**.

Click **Next** to proceed.



The screen confirming your selection appears.

When it is ready to restart, click Yes **Install.**

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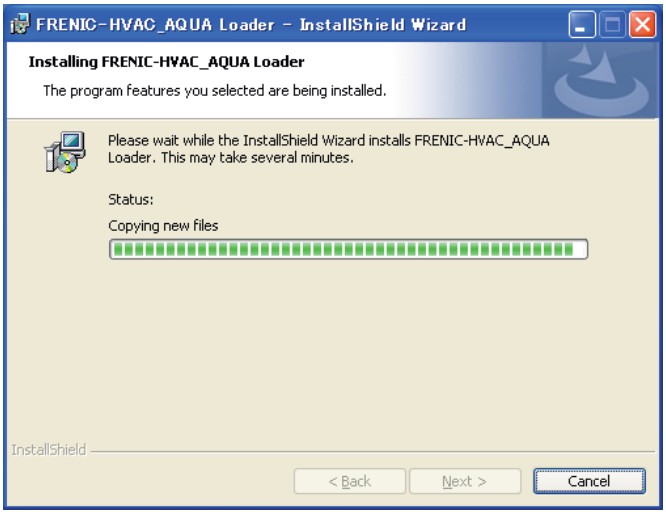
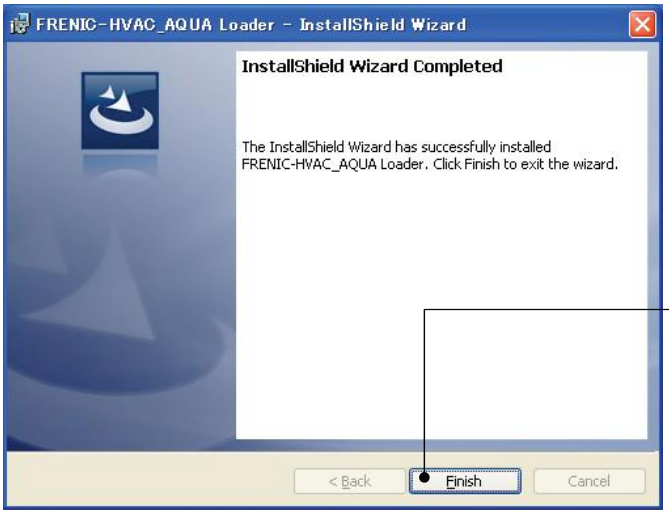
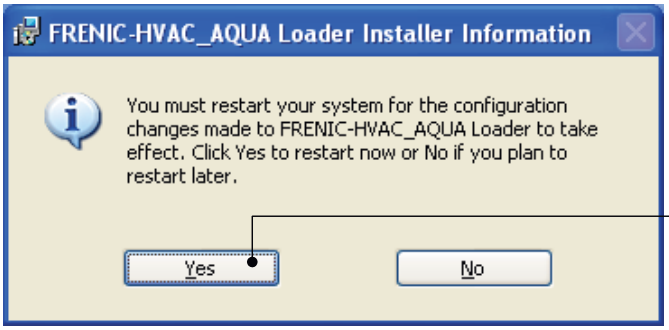


The installation progress bar appears.



Upon completion of the installation, the screen at left appears.

To exit the installation wizard and return to Windows, click **Finish**



When it is ready to restart, click **Yes**.

*If you do not restart FRENIC-HVAC/AQUA Loader, the program cannot be normally installed.

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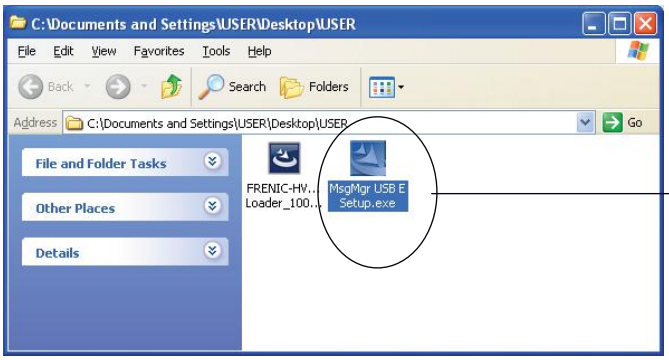
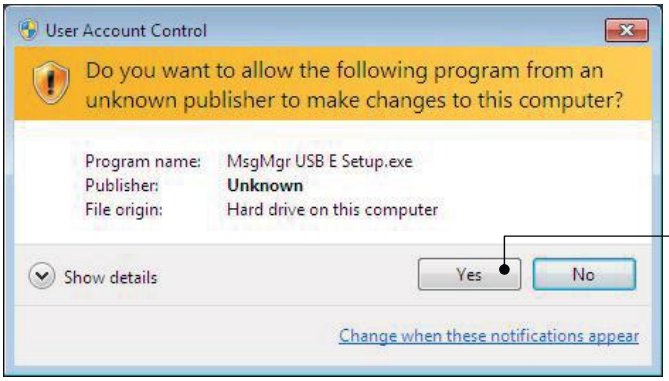
[2] Installing Message Manager

Follow the wizard and install Message Manager as shown below.

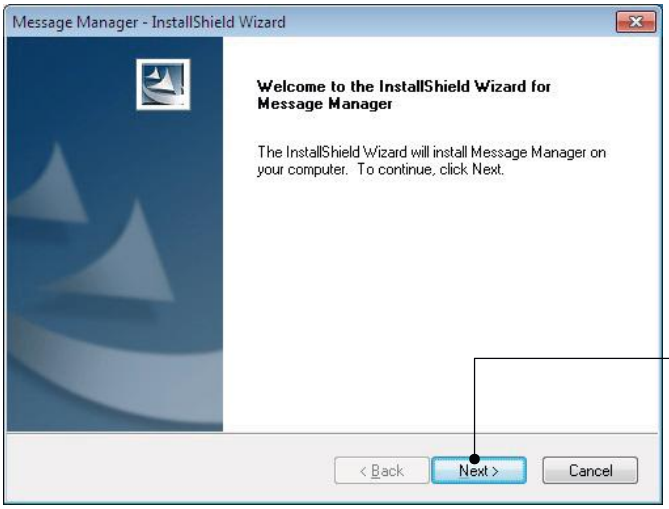


Double-click the MsgMgr USB E Setup.exe icon.

The exe automatically starts the installation wizard.



To continue, click **Yes**.



To continue, click **Next.**

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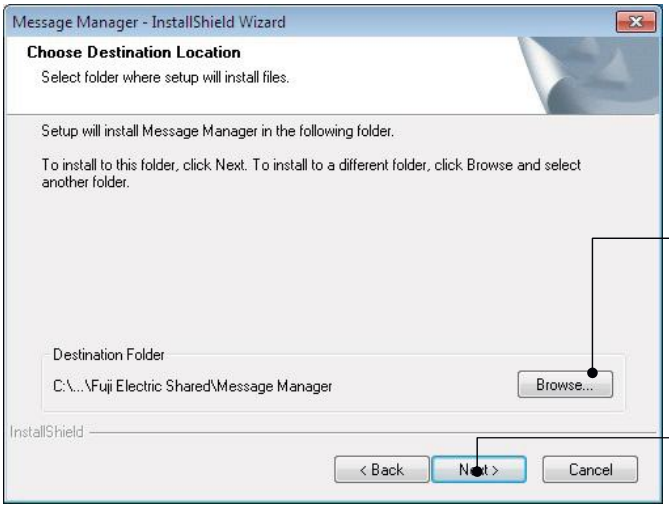
Carefully read the license agreement.

Click **Yes** to proceed.



Select the destination folder to install. A default folder has appeared.

In the case of OS drive is “C”, a default folder is “C:¥Program Files ¥Common Files¥Fuji Electric Shared¥Message Manager”.

Select the destination folder to install. A default folder has appeared.

Click **Next** to proceed.

Select the start menu folder that the shortcut to FRENIC Loader is to be added to.

After entry, click **Next** to proceed.

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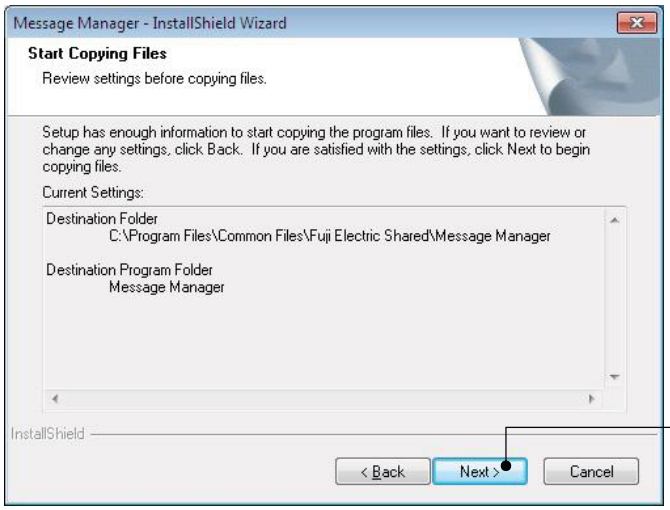
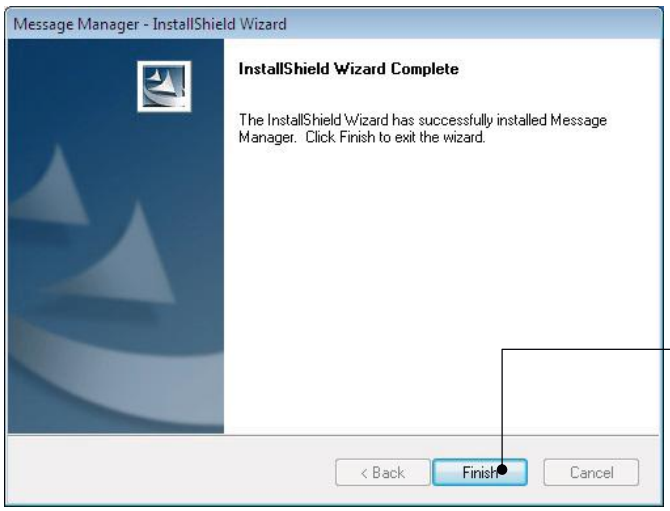


The screen confirming your selection appears.

Click **Next** to proceed.



Upon completion of the installation, the screen at left appears.

Click **Finish**.

[3] Installing USB driver

Using the USB interface for accessing the inverter(s) requires installing the USB driver to your PC. The driver installation is required only once at the first use of the USB interface.

Note If the USB driver has not been installed correctly, no communication via the USB interface is possible.

First of all, connect the USB connector (A) on the PC and the USB connector (mini B) on the inverter's keypad with each other using a USB cable.

Note Before installation of the USB driver, install Loader and Message Manager.

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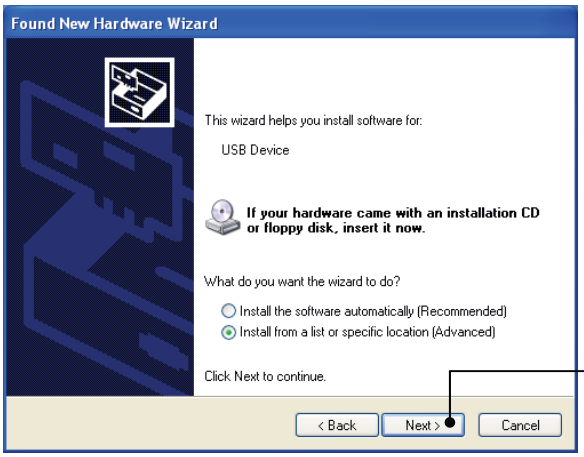
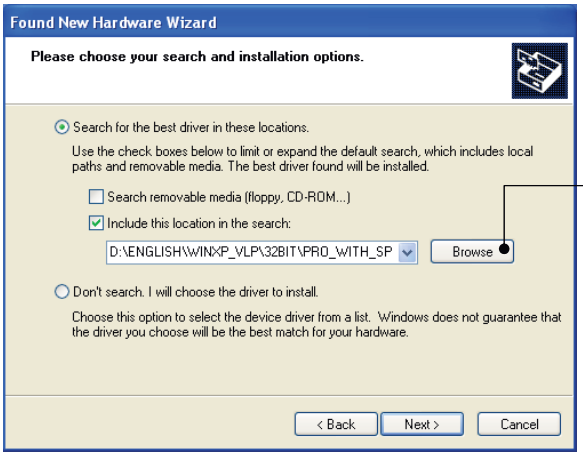
When the OS finds a USB device of the Loader, it displays the following. Follow the wizard and install Loader as shown below.

Wait for this screen to appear, select **Yes, now and every time I connect a device**, then click **Next**.



Select **Install from a list or specific location (Advanced)**, then click **Next**.



Select **Search for the best driver in these locations** and the **Include this location in the search** check box, then click **Browse…**.

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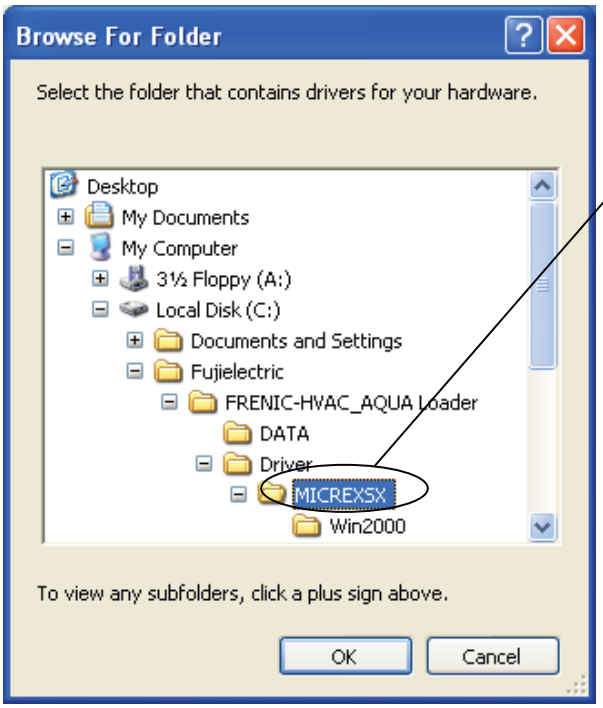
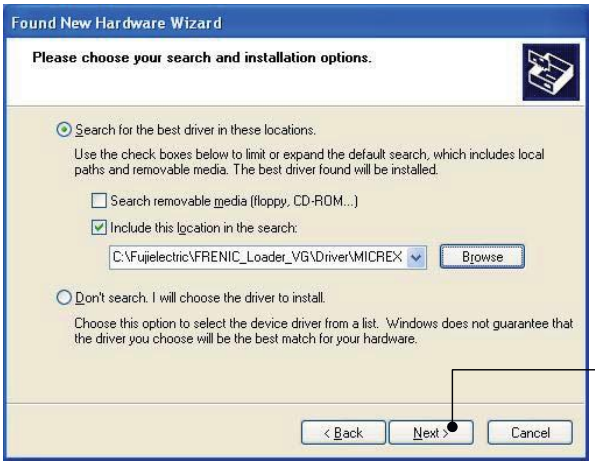
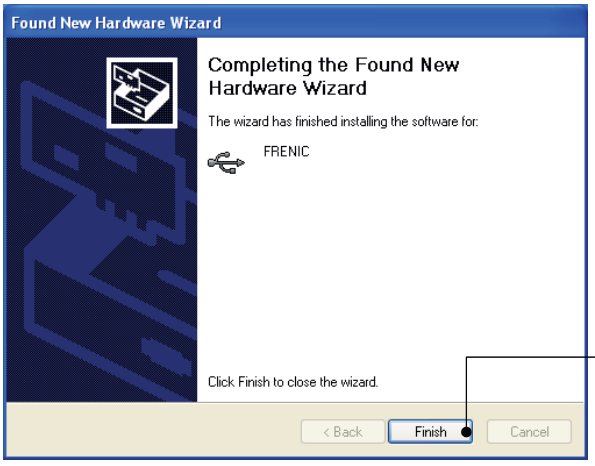


In the folder in which FRENIC-HVAC_AQUA Loader has been installed, select ¥Driver¥MICREXSX and then click **OK**.

The default folder is C:¥Fuji Electric ¥ FRENIC- HVAC_AQUA Loader ¥Driver¥ MICREXSX when the OS drive is C.



Click **Next**.
Installation starts.



Upon completion of the installation, the screen at left appears.

Click **Finish**

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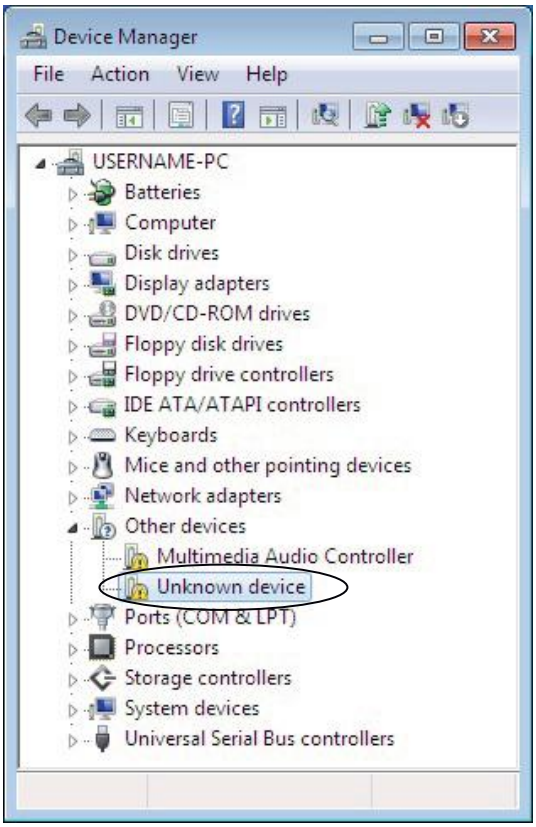
[4] Checking the installation of the USB driver

To check whether the USB driver has been installed correctly, select Windows" Start" →"My computer", select "property" with right-click, open "Hard ware"→"Device Manager" with left-click. If "**FRENIC**" is added to the sub-tree of Loader USB device, the driver has been installed correctly.

Installation finished successfully

Installation failed



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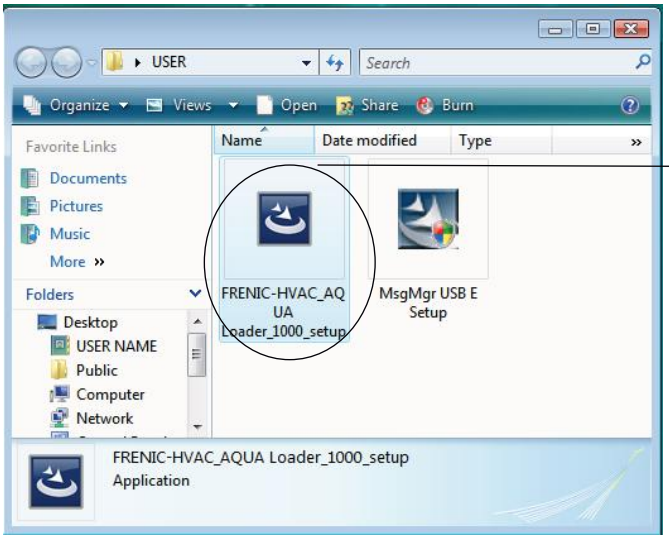
1.3.1.3. Installing Windows Vista

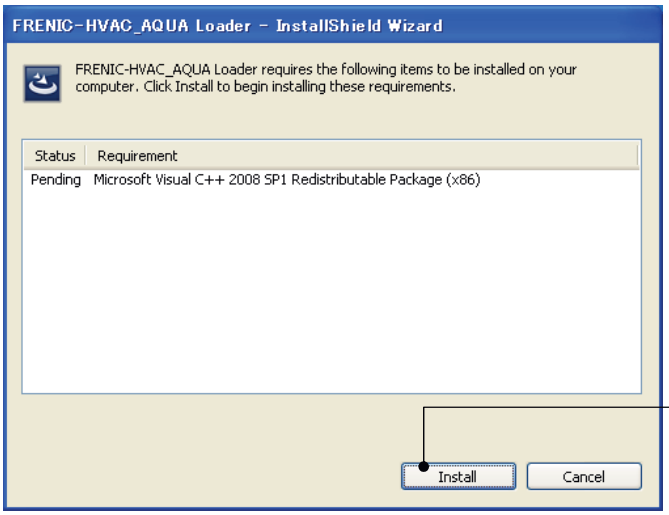
[1] Installing loader

Follow the wizard and install Loader as shown below.

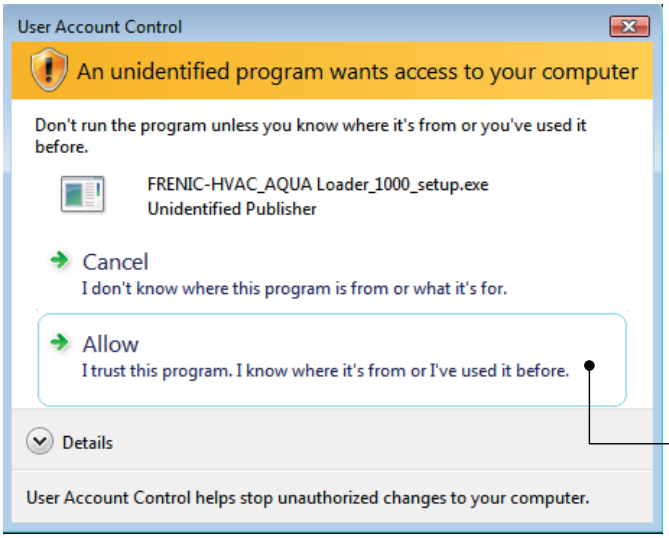


Double-click the FRENIC-HVAC_AQUA Loader_E_Ver_□□□□_setup. exe icon.

The exe automatically starts the installation wizard.



To continue, click **Install**.



To continue, click **Allow**.

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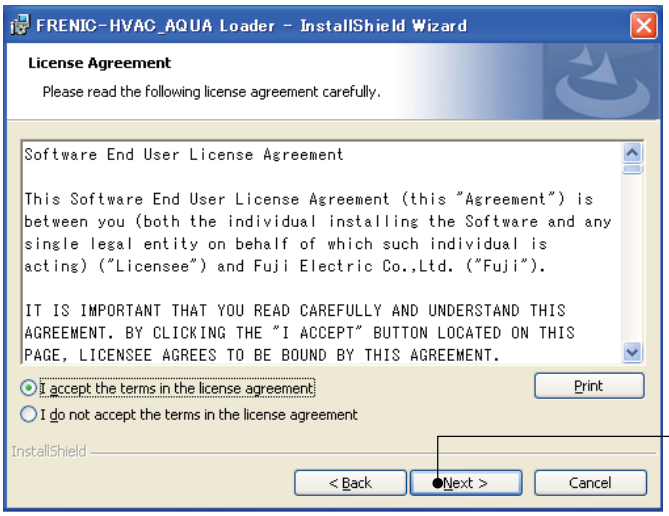
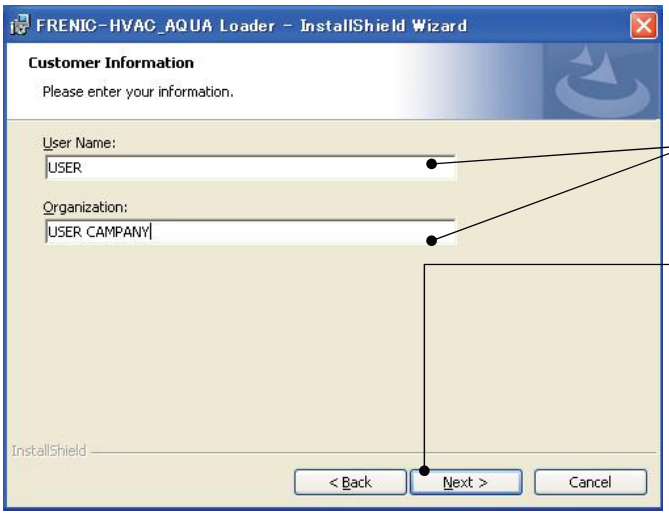
To continue, click **Next**.



Carefully read the license agreement..

Click **Next** to proceed.



Enter your user name and company name.

After entry, click **Next** to proceed.

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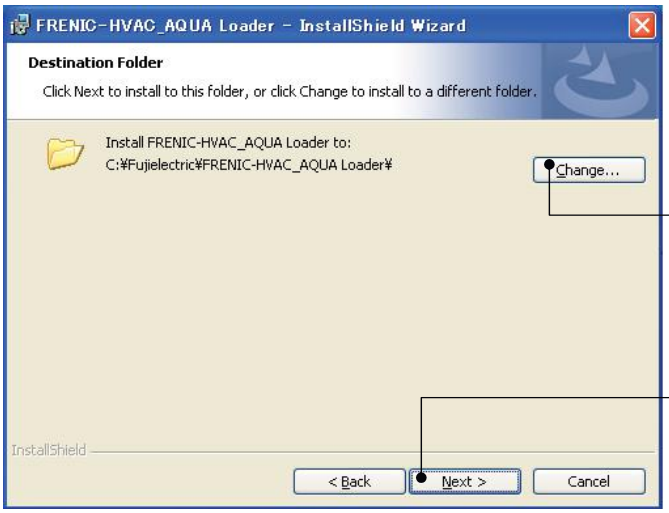
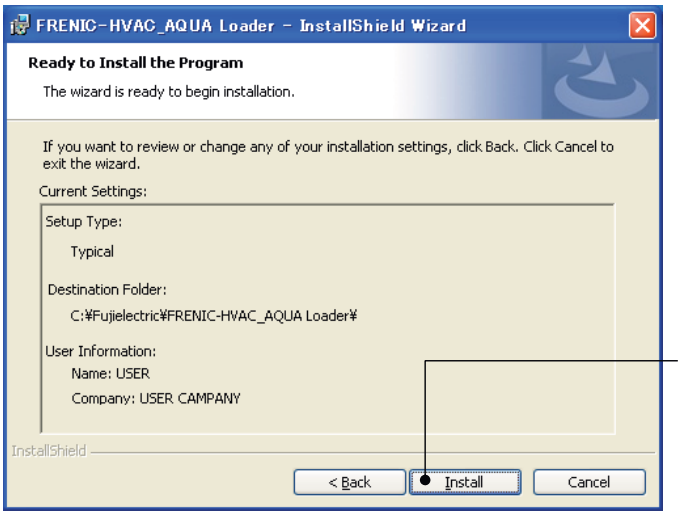


Select the destination folder to install. A default folder has appeared.

In the case of OS drive is “C”, a default folder is ”C:¥Fujielectric¥FRENIC-HVAC_AQUA Loader”

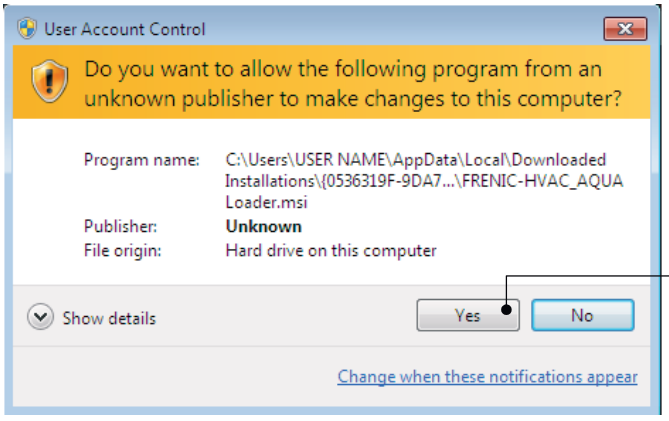
To select a different folder, click **Change…**.

Click **Next** to proceed.



The screen confirming your selection appears.

Click **Install** to proceed.



To continue, click **Yes**.

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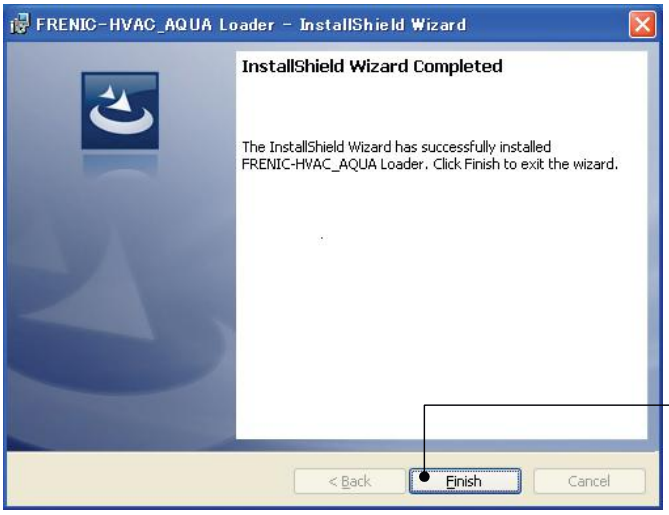
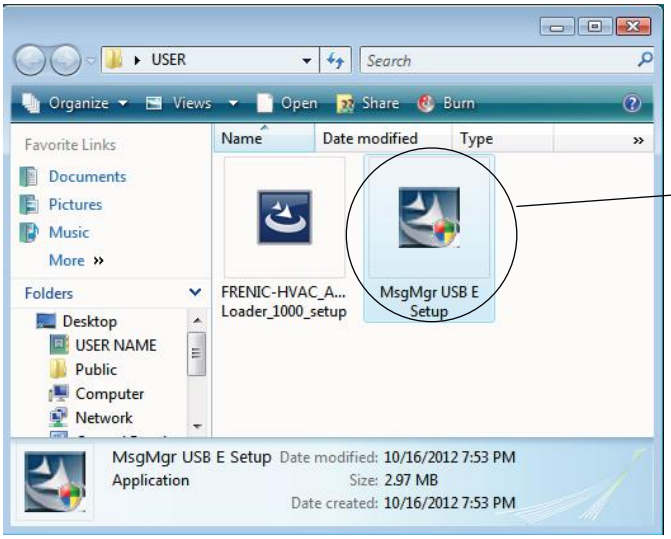


Upon completion of the installation, the screen at left appears.

Click **Finish**

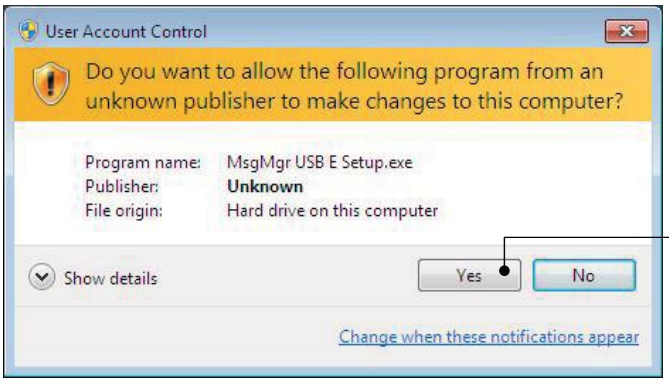
[2] Installing Message Manager

Follow the wizard and install Message Manager as shown below.



Double-click the MsgMgr USB E Setup.exe icon.

The exe automatically starts the installation wizard.



To continue, click **Yes**.

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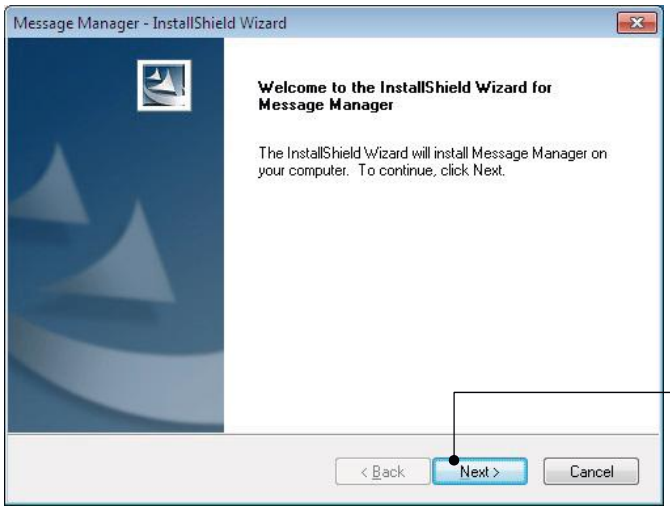
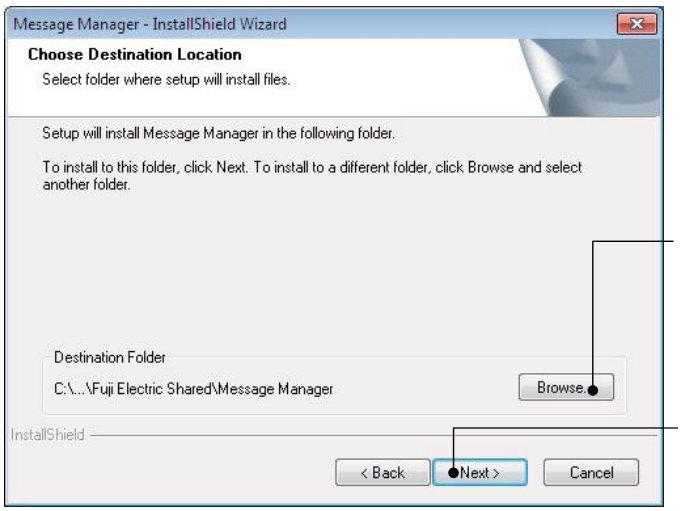


To continue, click **Next**.

Carefully read the license agreement.

If you agree, click **Yes** to proceed.



Select the destination folder to install. A default folder has appeared

In the case of OS drive is “C”, a default folder is“C:¥Program Files ¥Common Files¥Fuji Electric Shared¥Message Manager”

To select a different folder, click **Browse…**.

Click **Next** to proceed.

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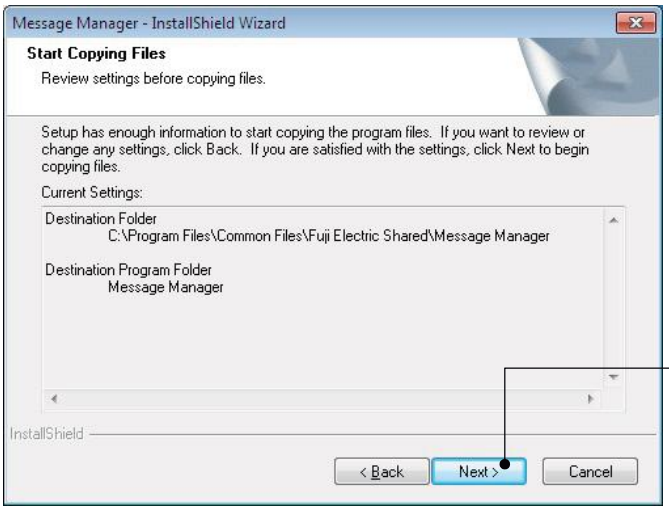
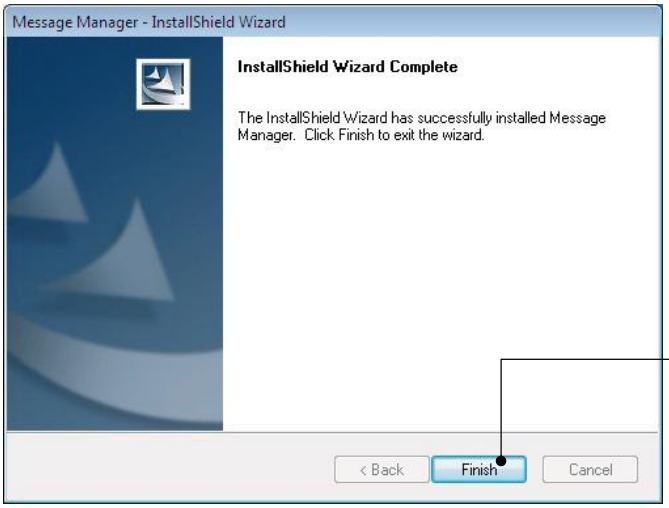
Select the start menu folder that the shortcut to FRENIC Loader is to be added to.

After entry, click **Next** to proceed.



Select the start menu folder that the shortcut to FRENIC Loader is to be added to.

Click **Next** to proceed.



Upon completion of the installation, the screen at left appears.

Click **Finish**.

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[3] Installing USB driver

Using the USB interface for accessing the inverter(s) requires installing the USB driver to your PC. The driver installation is required only once at the first use of the USB interface.

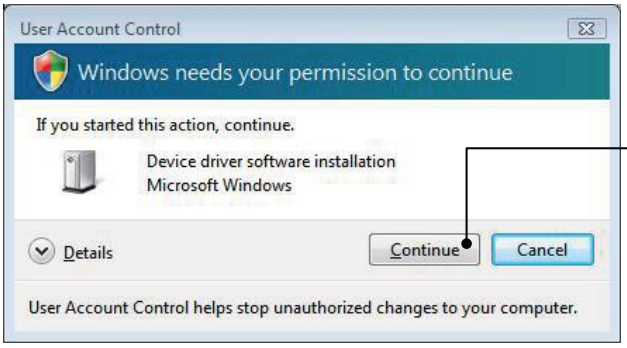
Note If the USB driver has not been installed correctly, no communication via the USB interface is possible.

First of all, connect the USB connector (A) on the PC and the USB connector (mini B) on the inverter's keypad with each other using a USB cable.

Note Before installation of the USB driver, install Loader and Message Manager.

When the OS finds a USB device of the Loader, it displays the following. Follow the wizard and install Loader as shown below.

Click **Locate and install driver software**.



Click **Continue** to proceed.

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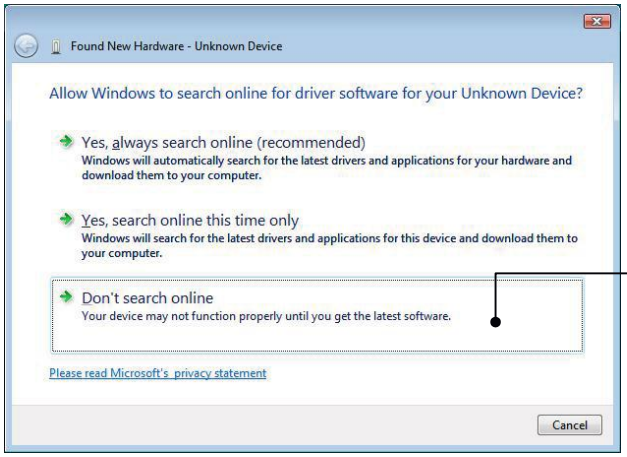
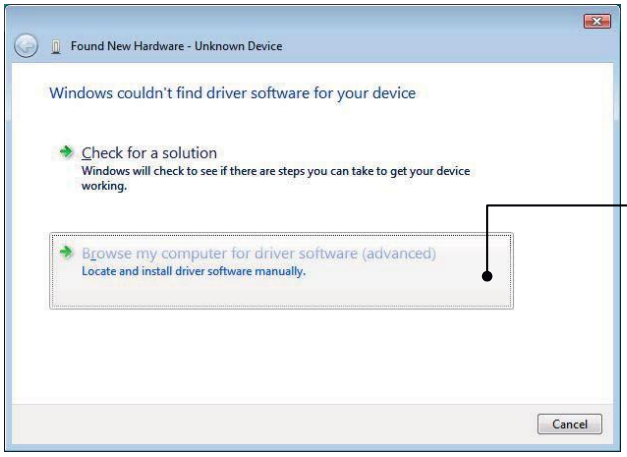
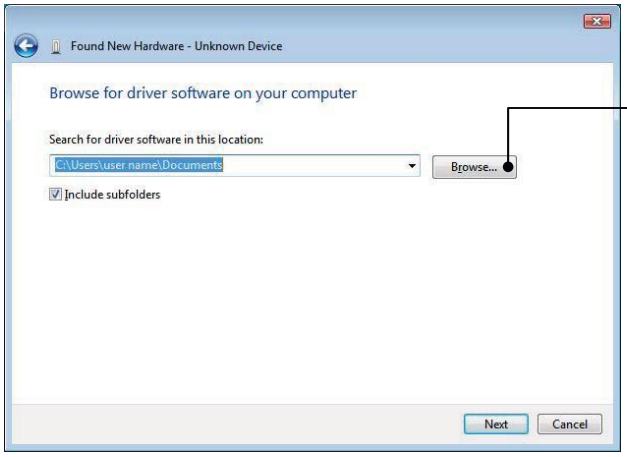


Click **Don't search online**.



Click **Browse my computer for driver software (advanced)**.



Click **Browse…**

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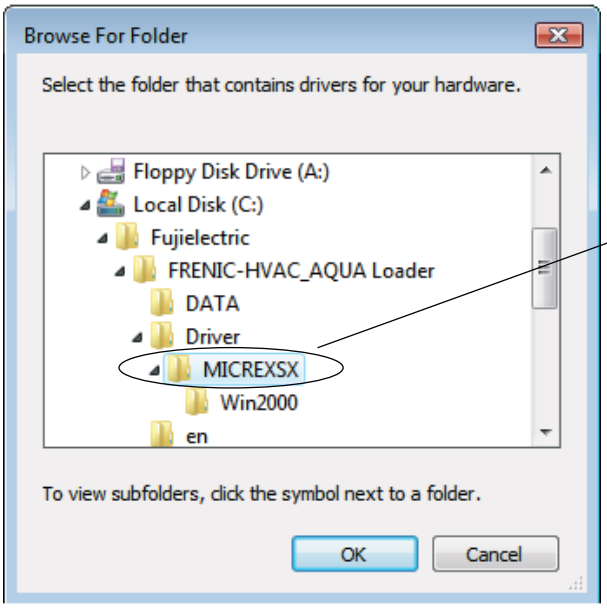
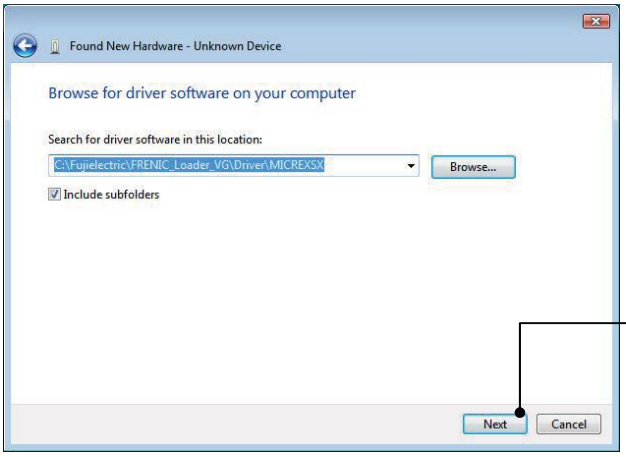


In the folder in which FRENIC-HVAC_AQUA Loader has been installed, select ¥Driver¥MICREXSX and then click **OK**.
The default folder is C:¥ Fuji Electric ¥ FRENIC-HVAC_AQUA Loader¥Driver¥ MICREXSX when the OS drive is C



To continue, click **Next**.

Click **Install this driver software anyway**.

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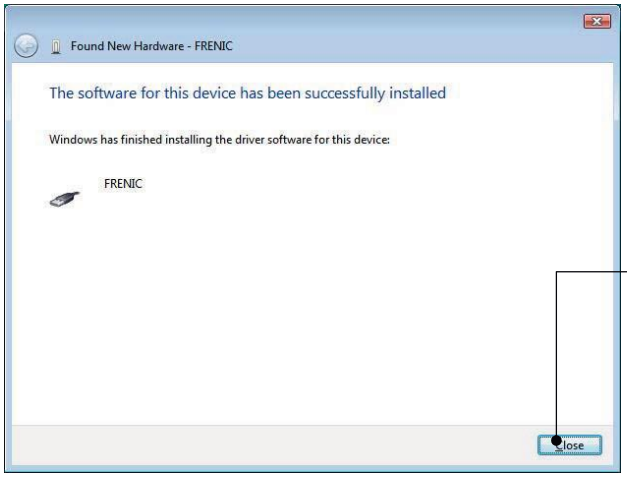
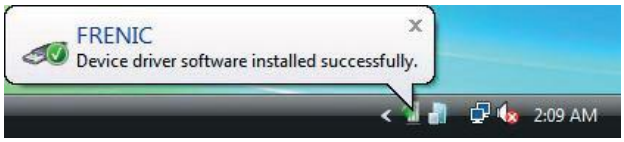


Upon completion of the installation, the screen at left appears.

Click **Close**.



This message appears when the USB driver has been successfully installed.

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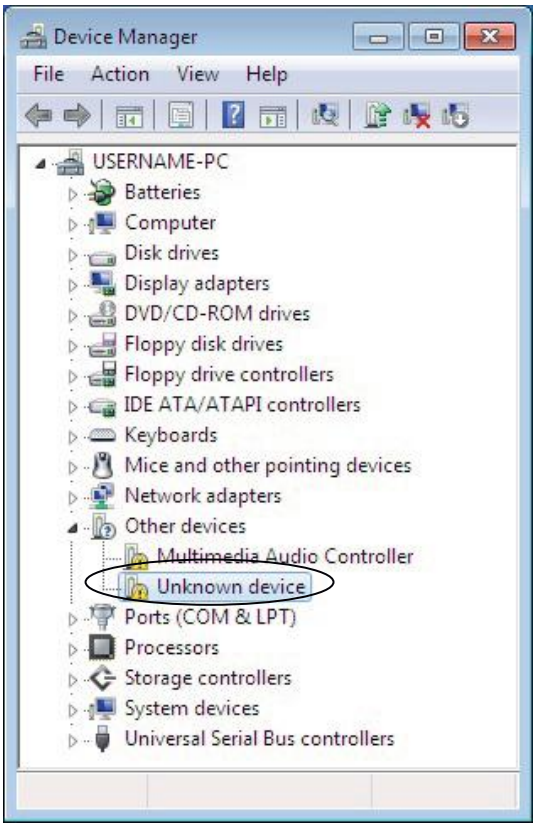
[4] Checking the installation of the USB driver

To check whether the USB driver has been installed correctly, open “Device Manager”. If “**FRENIC**” is added to the sub-tree of Loader USB device, the driver has been installed correctly.

Installation finished successfully

Installation failed



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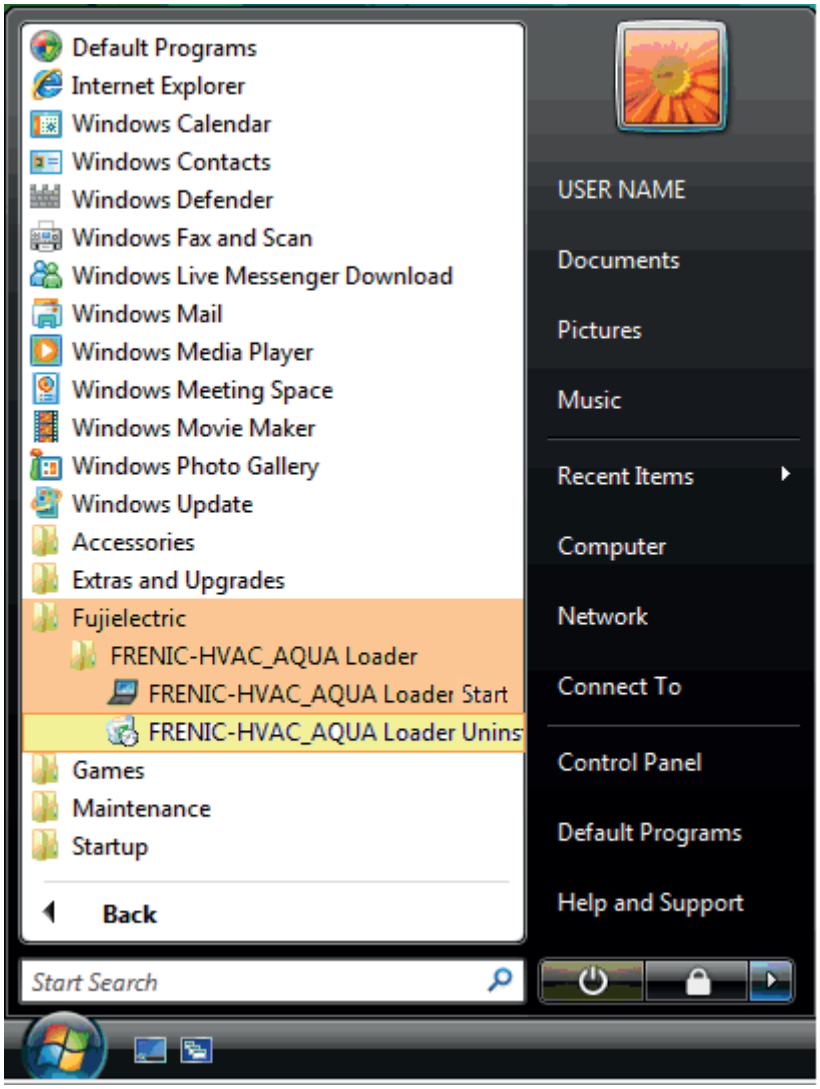
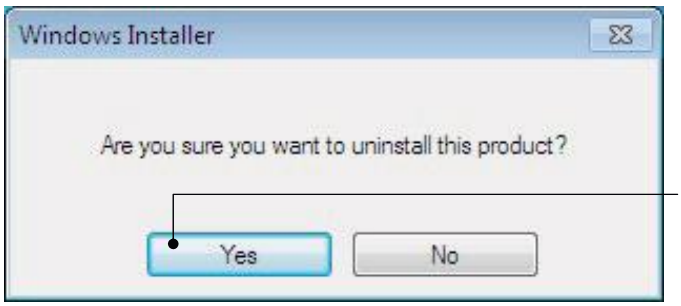
1.3.2. Uninstallation

1.3.2.1. Uninstalling Windows 7

[1] Uninstalling loader

From Windows “Start”, select All Programs [FRENIC-HVAC_AQUA Loader | [FRENIC-HVAC_AQUA Loader Uninstall





Click **Yes**

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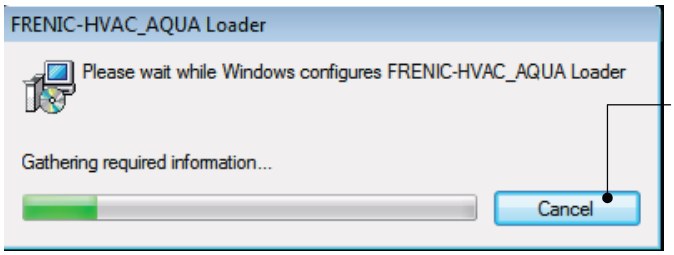
The confirmation screen at left appears.

Click **Yes**.



The uninstallation progress bar appears.
To abort the uninstallation, click **Cancel**.

In the above procedure, perform the uninstallation.

[2] Before uninstalling Message Manager

Before uninstalling Message Manager, be sure to quit both Loader and Message Manager.

Note **Quitting Message Manager**

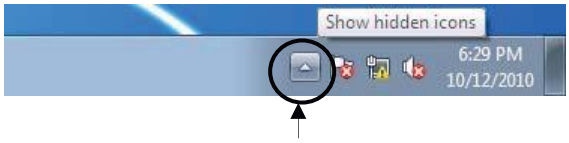
Message Manager is software that manages communication between the PC and inverters. To make sure that Message Manager has quitted, check that no Message Manager icon is displayed in the task tray. If the icon is displayed, right-click it to quit Message Manager. If doing so cannot quit it, shut down or log off Windows.

Once you uninstall Loader when Message Manager is running, a new version of Loader installed after that cannot run properly, that is, it may no longer be able to recognize inverters. If this happens, first delete the folder (including its contents) named Fuji Electric Shared in the file path as shown below, and then reinstall Loader.

```
C:¥Program Files¥Common Files¥Fuji Electric Shared
```

(In the file path shown above, "C" represents the drive letter of the partition or hard disk where Windows is installed. If Windows is installed on a different drive in your system, replace "C" with the letter corresponding to that drive.)

Quitting Message Manager



Click this to display the hidden icons as shown below.

Right-click this icon to display **Exit MessageManager**, then click it. The confirmation window appears. Click **Yes** to quit Message Manager

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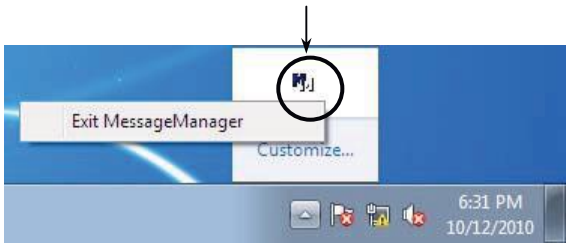

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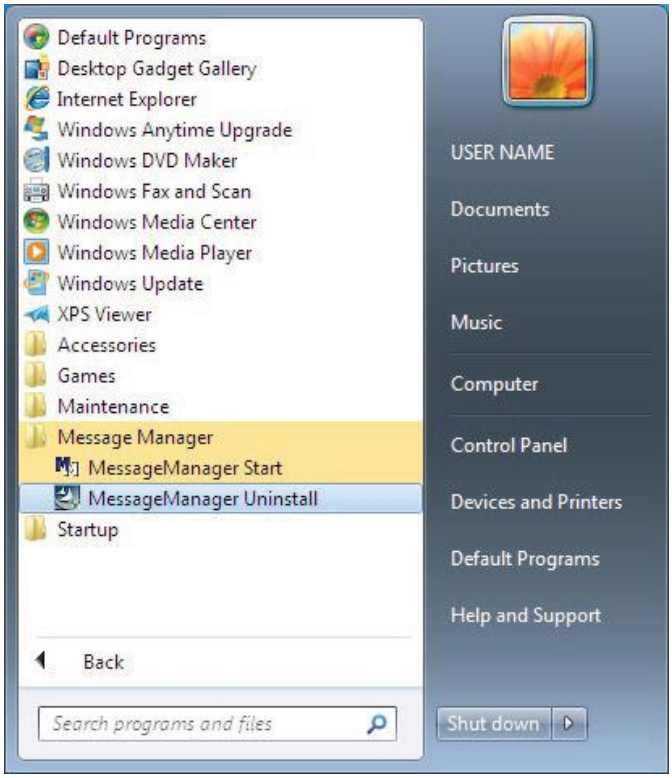
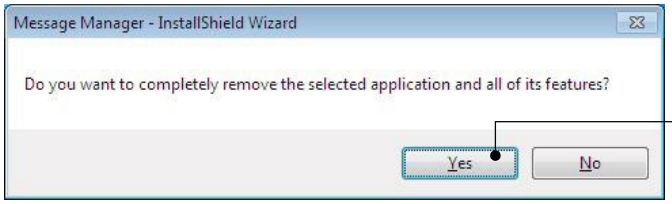
[3] Uninstalling Message Manager

From the **Start** menu, select **All Programs** | **Message Manager** | **Message Manager Uninstall**.



To continue, click **Yes**.



The confirmation screen at left appears.

To continue the uninstallation procedure, click **Yes**.

In the above procedure, perform the uninstallation.

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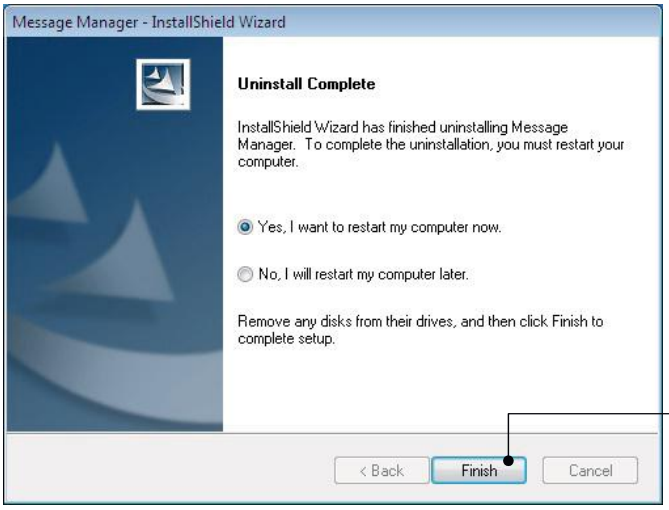

When it is ready to restart, click **Finish**.

1.3.2.2. Uninstalling Windows XP

[1] Uninstalling loader

From the **Start** menu, select **All Programs** | **FRENIC-HVAC_AQUA Loader** | **FRENIC-HVAC_AQUA Loader Uninstall.**

The uninstallation confirmation screen appears as shown left.

To proceed and uninstall Loader, click **Yes**.

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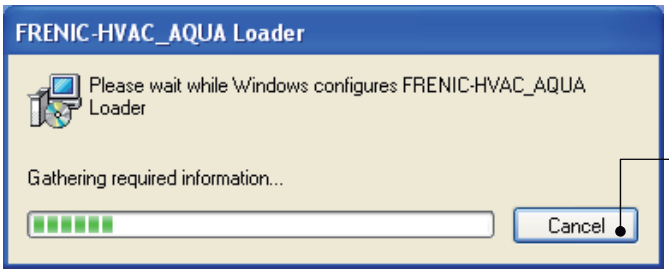


The uninstallation progress bar appears.

To abort the uninstallation, click **Cancel**.

In the above procedure, perform the uninstallation.

[2] Before uninstalling Message Manager

Before uninstalling Message Manager, be sure to quit both Loader and Message Manager.

Note **Quitting Message Manager**

Message Manager is software that manages communication between the PC and inverters. To make sure that Message Manager has quitted, check that no Message Manager icon is displayed in the task tray. If the icon is displayed, right-click it to quit Message Manager. If doing so cannot quit it, shut down or log off Windows.

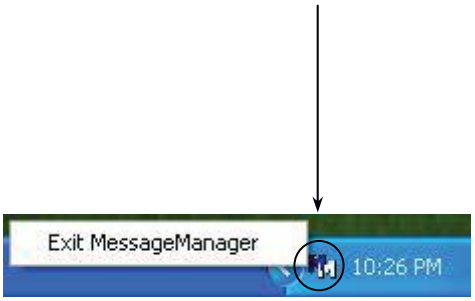
Once you uninstall Loader when Message Manager is running, a new version of Loader installed after that cannot run properly, that is, it may no longer be able to recognize inverters. If this happens, first delete the folder (including its contents) named Fuji Electric Shared in the file path as shown below, and then reinstall Loader.

```
C:¥Program Files¥Common Files¥Fuji Electric Shared
```

(In the file path shown above, "C" represents the drive letter of the partition or hard disk where Windows is installed. If Windows is installed on a different drive in your system, replace "C" with the letter corresponding to that drive.)

Quitting Message Manager

Right-click the Message Manager icon to display **Exit MessageManager**, then click it.
The confirmation window appears. Click **Yes** to quit Message Manager.



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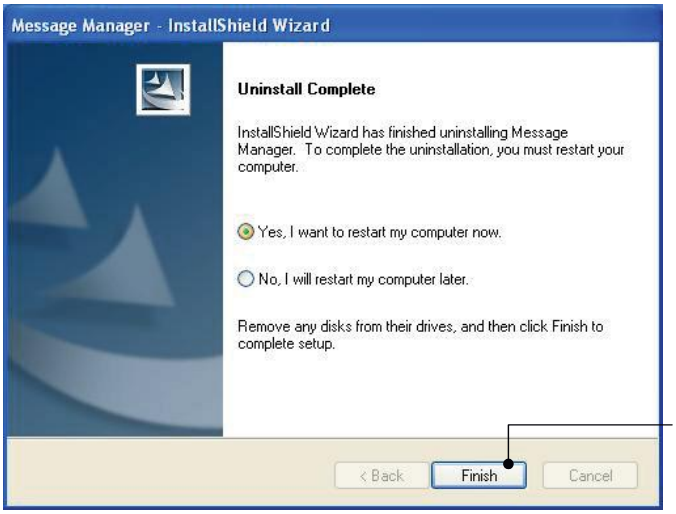
[3] Uninstalling Message Manager

From the **Start** menu, select **All Programs** | **Message Manager** | **Message Manager Uninstall**.

The uninstallation confirmation screen appears as shown left.

To proceed and uninstall Loader, click **Yes**.

In the above procedure, perform the uninstallation.



When it is ready to restart, click **Finish**.

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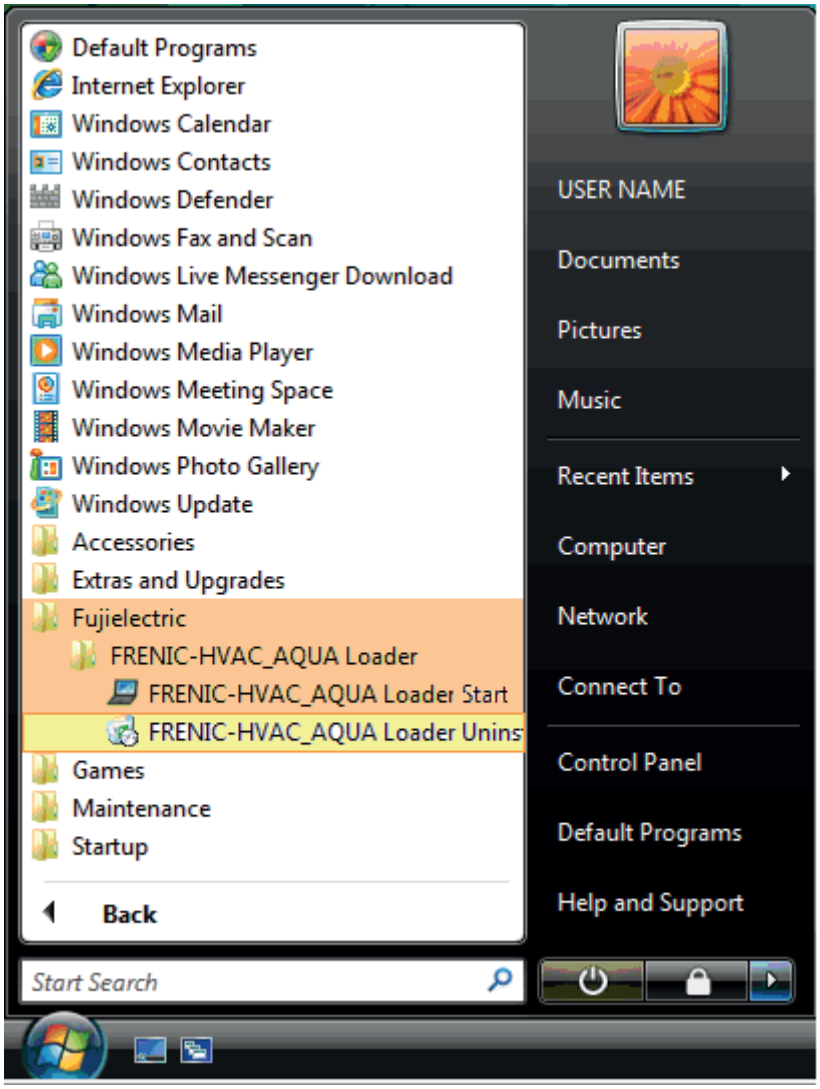
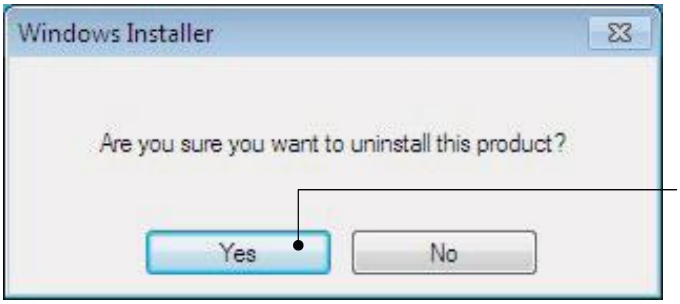
1.3.2.3. Uninstalling Windows Vista

[1] Uninstalling loader

From the **Start** menu, select All Programs **| FRENIC-HVAC_AQUA Loader | FRENIC-HVAC_AQUA Loader** Uninstall.





The confirmation screen at left appears.

Click **Yes**.

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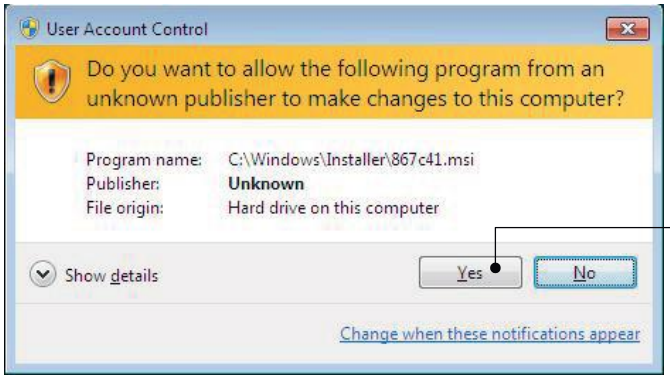
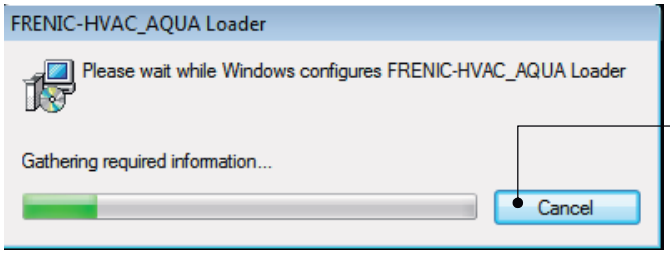


The confirmation screen at left appears.

Click **Yes**.



The uninstallation progress bar appears.

To abort the uninstallation, click **Cancel**.

In the above procedure, perform the uninstallation.

[2] Before uninstalling Message Manager

Before uninstalling Message Manager, be sure to quit both Loader and Message Manager.

Note **Quitting Message Manager**

Message Manager is software that manages communication between the PC and inverters. To make sure that Message Manager has quitted, check that no Message Manager icon is displayed in the task tray. If the icon is displayed, right-click it to quit Message Manager. If doing so cannot quit it, shut down or log off Windows.

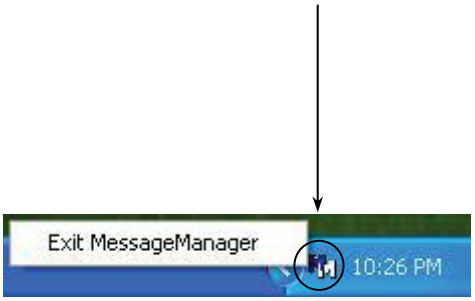
Once you uninstall Loader when Message Manager is running, a new version of Loader installed after that cannot run properly, that is, it may no longer be able to recognize inverters. If this happens, first delete the folder (including its contents) named Fuji Electric Shared in the file path as shown below, and then reinstall Loader.

```
C:¥Program Files¥Common Files¥Fuji Electric Shared
```

(In the file path shown above, "C" represents the drive letter of the partition or hard disk where Windows is installed. If Windows is installed on a different drive in your system, replace "C" with the letter corresponding to that drive.)

Quitting Message Manager

Right-click the Message Manager icon to display **Exit MessageManager**, then click it.
The confirmation window appears. Click **Yes** to quit Message Manager.



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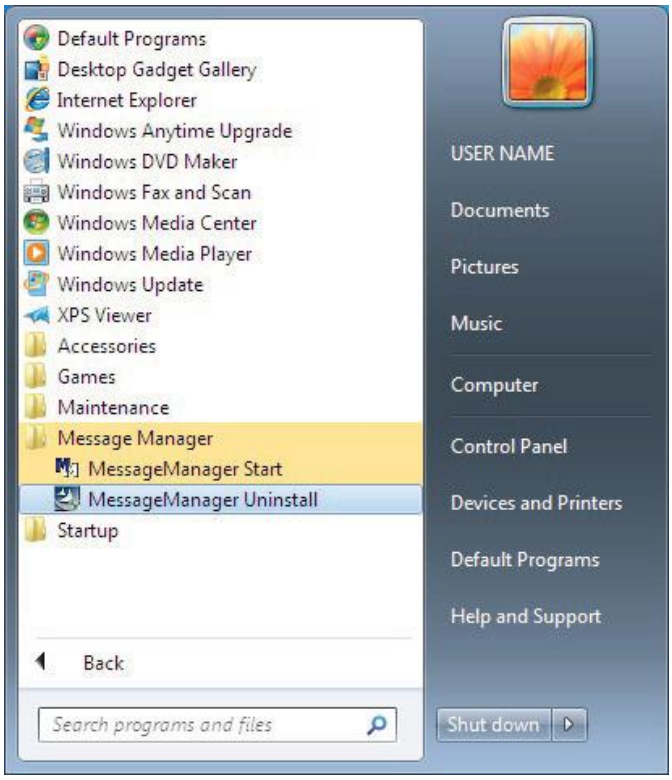
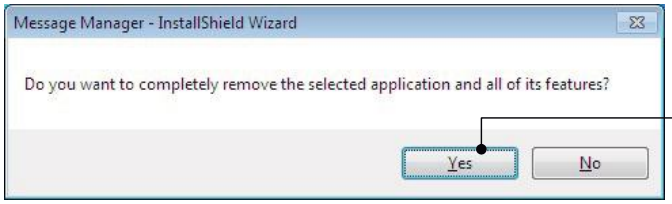
[3] Uninstalling Message Manager

From the **Start** menu, select **All Programs** | **Message Manager** | **Message Manager Uninstall**.



Click **Yes**.



The confirmation screen at left appears.

To continue the uninstallation procedure, click **Yes**.

In the above procedure, perform the uninstallation.

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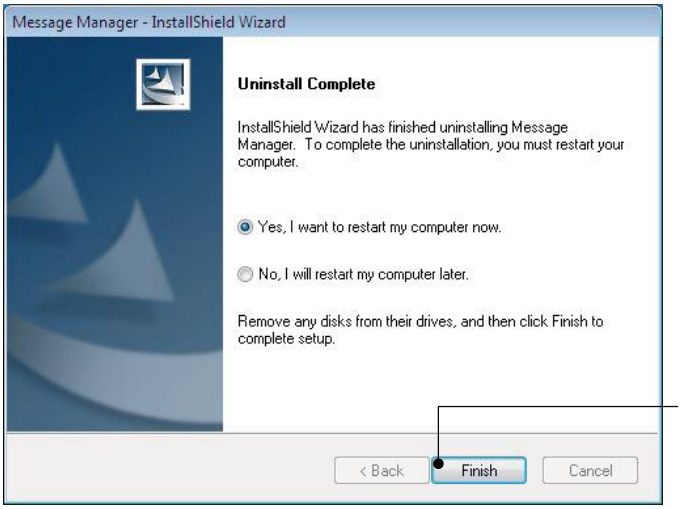

When it is ready to restart, click **Finish**.

1.4. Configuring the Settings for Inverter(s) and Loader

1.4.1. Configuring communication-related function codes in the inverter (Case of RS-485 connection)

The table below lists inverter's function codes related to Loader. Configure those codes before connecting Loader to the inverter

Function code	Name	Setting range	Factory default
y01/y11	Station address	0 to 255	1
y04/y14	Baud rate	0 : 2400 bps 1 : 4800 bps 2 : 9600 bps 3 : 19200 bps 4 : 38400 bps	3
y 10/y20	Protocol	0 : Modbus RTU protocol 1 : SX protocol (Loader protocol) 2 : Fuji general-purpose inverter protocol 3 : Metasys N2 protocol 5 : BACnet protocol 50 : Communication link pump protocol (AQUA/y20 only)	y10 : 1 y20 : 0

y01/y11 : Station address

Set the H31 data to the same value as the RS-485 Station address. setting made in Loader's Device connection list.

y04/y14 : Baud rate

Set the H34 data to the same value as the baud rate setting made in Loader's Communication Setting window.)

y10/y20 : Protocol

Set the y10/y20 data to "1" (FRENIC Loader protocol).

Note In the case of USB connection, the above function code setting is not required.

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1.4.2. Checking the COM port on the PC (when using a communications level converter)

Loader running on the PC uses the RS-232C communications port (COM) to interface with inverters.

When an **RS-232C / RS-485 converter** is connected to the PC, check what COM port number (COM#) on the PC is assigned to the RS-232C / RS-485 converter.

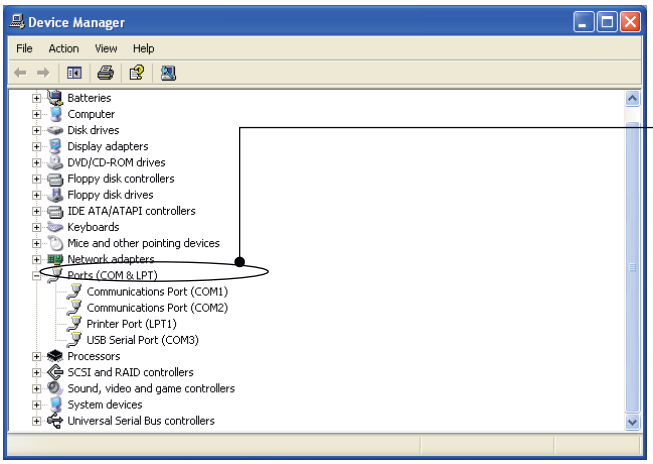
To use the USB interface, select a **USB / RS-485 converter** that functions as a virtual RS-232C communications port (COM). When a USB / RS-485 converter is connected, Windows automatically assigns a free COM port on the PC to the converter. To check the assignment, follow the procedure below.

Windows 7 / Windows Vista

From the **Start** menu, select **Control Panel** | **Hardware and Sound** | **Device Manager**.

Windows XP

From the **Start** menu, select **Control Panel** | **System** | **Hardware** | **Device Manager**.



Click + preceding **Ports (COM & LPT)** to show details.

Check the number "n" in **USB Serial Port (COMn)**.
This example shows that **COM3** is assigned to the **USB Serial Port**.

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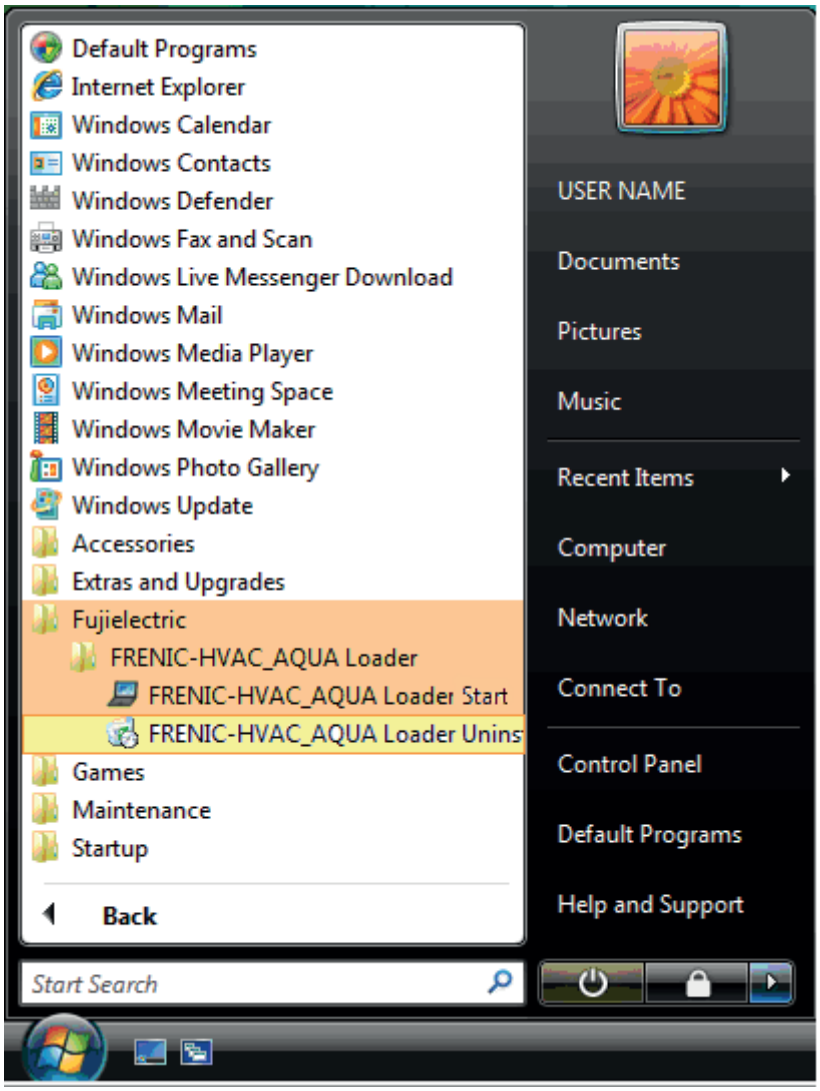
1.4.3. Configuring Loader

When Loader has been installed on your PC, selecting **All Programs** | **FRENIC-HVAC_AQUA Loader** | **FRENIC-HVAC_AQUA Loader Start** from the **Start** menu starts Loader.



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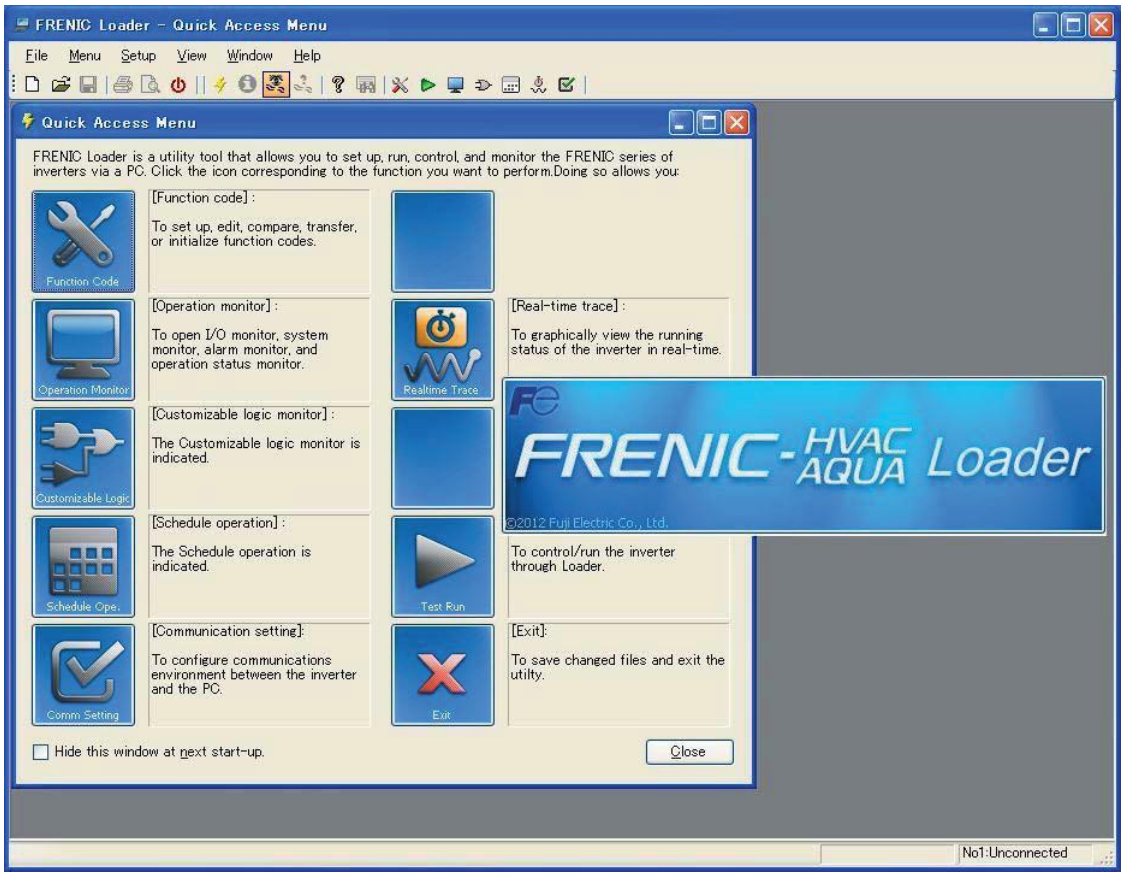
If Loader starts, the **Quick Access Menu** first appears as shown below.

This menu contains the 8 quick-start icons for the programs contained in Loader. To start a program, simply click the corresponding icon. If Loader starts, the **Quick Access Menu** first appears as shown below.



Tip To switch the Loader language, select the main menu | **Setup(S)** | **Language**| **Japanese**| or | **English**|, close the Loader. When opening the Loader again, the language is switched.

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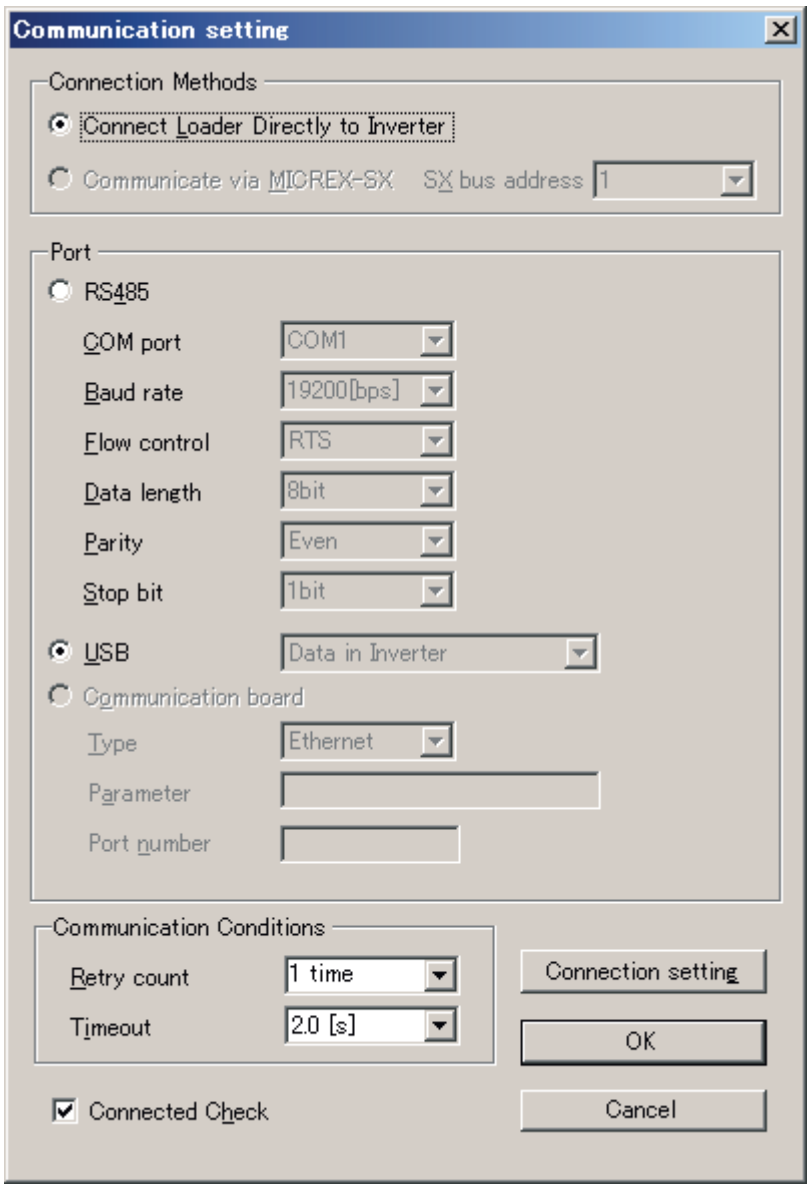
1.4.4. Communication Settings

Click [**COM.Setting.**] icon in the left row in Simple Menu to display the screen which sets the methods to connect the loader, targets to be connected and communication conditions. Enter the data by referring to the following descriptions. Alternatively, by selecting **Setup** | **Communication Settings** from Main Menu, you can display the communication setting screen without using Simple Menu.



[1] Connection Methods

Select the method to connect the loader.

Connect Loader Directly to Inverter

Select this method when connecting your PC to the inverter directly, not via MICREX-SX Controller.

(You can select one of the two communication types: RS485 or USB.)

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[2] Port

You can do settings on communications. (Since the original setting match with COM setting of inverter,communication can fix without any change in the original condition.)

RS-485

Select this method when connecting your PC to the inverter via RS-485.

- **Port setting**

  Select the communication port of the PC to which the RS-232C / RS-485 converter is connected.

- **Baud rate**

  Set the transmission rate. You must select the transmission rate same as the one for the inverter.

- **Flow control**

  Since the recommended converter manages the flow control by automatic switching through transmission data monitoring, you do not have to change this setting. The flow control is a method that uses RS-232C control signals to control RS-485 transmission/reception switching.

- **Data length** : No setting
- **Parity** : No setting
- **Stop bit** : No setting

USB

Select this method when connecting your PC to the inverter directly via USB.

[3] Communication Conditions

Do the settings on the communication retry.

- **Retry count**

  This sets how many times communication allows retry in case of failure. As the retry count increases, the possibility to succeed communications may increase. However, it will take time until the error dialog appears. The count of one or so is recommended.

- **Timeout**

  If no response is received from the inverter within the time limit set here, the communication error dialog will open. A shorter timeout setting allows sooner display of the error dialog. However, an extremely short timeout may cause a communication error even during normal operation, for example, when taking long time to handle the inverter rather than the communication errors.

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[4] Perform Connection Check

Connection Check is a function to always monitor the communication status between your PC and the inverter that is registered through the connection settings. By clicking the check box to the left of [Perform Connection Check] and checking the box, the PC will automatically check the status of connection with the inverter and displays the communication status on the status bar. If one of the previously registered inverters disables to communicate due to disconnection or other problem, the response performance will become very slow. Be sure to remove the disabled inverter from the connection settings.

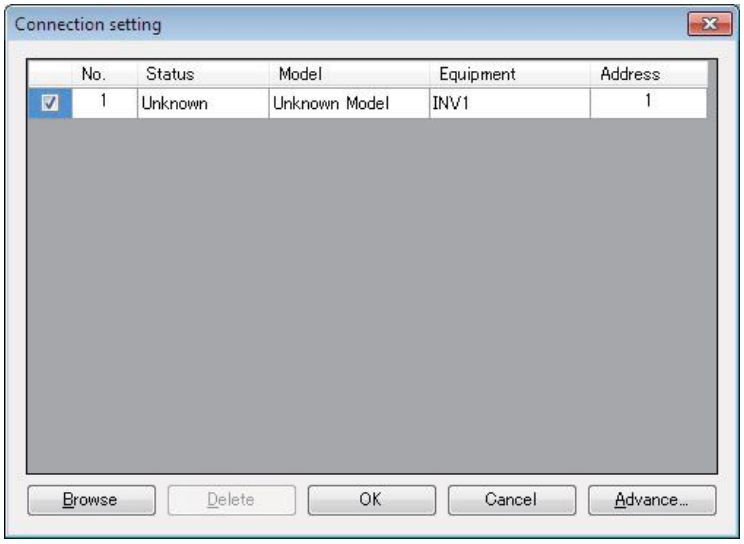
1.4.5. Connection settings

Click **COM setting** | **Connection Setting** to display the Connection Settings screen.

[1] For connection to USB port

When "USB: Data in inverter" is selected

Only a single line appears as shown below. After making sure that the equipment name and RS-485 num. (station address) are correct, click the **Browse** button to monitor the current communications link status.



Selection of inverters to be monitored

To make an inverter enable to be monitored, put a check mark (✓) in the box located at the left end column of the list.

Browse

Clicking this button checks whether a link between Loader and the inverter is established. The result appears in the Status column.

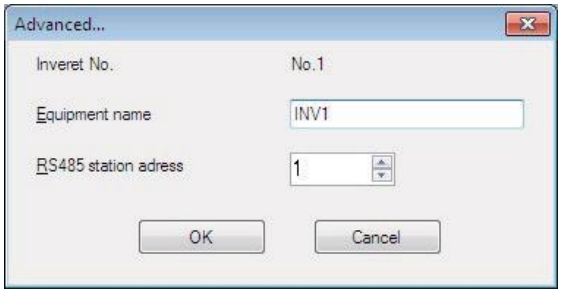
Status column

- Unknown : The communications status has been unknown.
- Connecting : The communications link has been established.
- Disconnected : The communications link has not yet been established.

Advance…

Clicking the row to be modified and clicking this **Advance** button calls up the **Advanced** dialog shown at the right.

Clicking the **OK** button returns to the **Device connection list** window.



After completion of data entry, check the settings again and click **OK** to exit the device connection operation.

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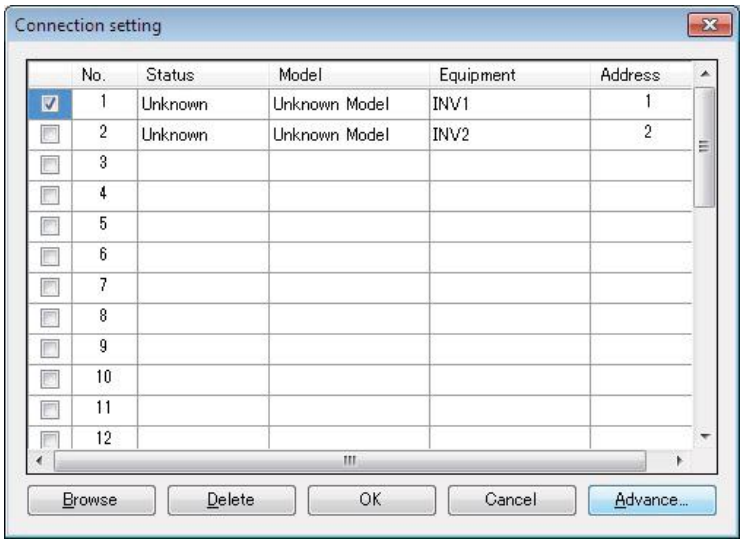
[2] For connection to RS-485 port

When "RS-485: Data in inverter" is selected

The **Device connection list** window shows the inverters available for RS-485 communication.

Double-clicking (or use the **Advance…** button) the row where the inverter to be modified or added is listed calls up **Advanced** dialog shown below.



Selection of inverters to be monitored

To make an inverter enable to be monitored, put a check mark (✓) in the box located at the left end column of the list.

Delete

Clicking the row to be deleted and clicking this **Delete** button deletes the inverter listed in that row. Use this for the inverter(s) that has been disconnected from Loader.

Browse

Clicking this button checks whether a link between Loader and the inverter(s) (marked with ✓) is established. The result appears in the Status column.

Status column

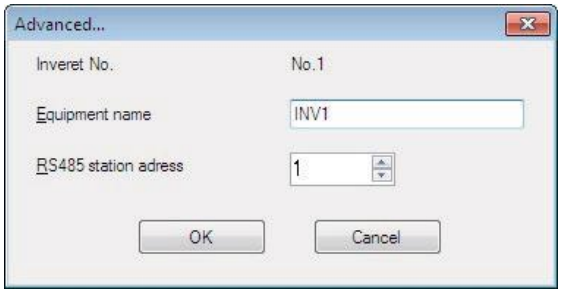
- Unknown : The communications status has been unknown.
- Connecting : The communications link has been established.
- Disconnected : The communications link has not yet been established.

Advance…

Clicking the row to be modified or added and clicking this **Advance** button calls up the **Advanced** dialog shown at the right.

Fill in the **Equipment name** and **RS-485** address (station address) boxes in the dialog and click **OK**. To cancel your entry or selection, click **Cancel**.

Clicking the **OK** button returns to the **Device connection list** window.



After completion of data entry, check the settings again and click **OK** to exit the device connection operation.

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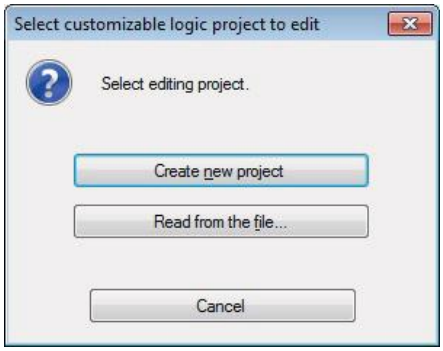
Chapter 2 Description of Functions

2.1. Customizable function

The customizable function on an inverter can be managed and settings specified with simple operations

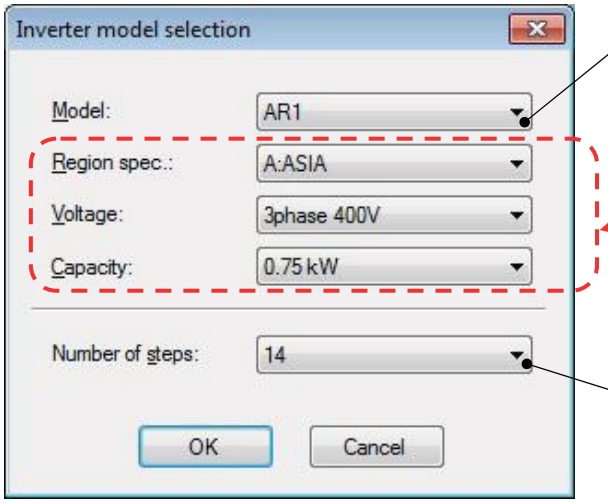
2.1.1. Selecting Project

The following window (Project selection) appears first when the software is launched.



• **Create**

Creates a new customizable function project file.



Function selection tab
This tab displays the type of the Inverter model selected.

These are auxiliary formation and are not affect the operation.
Do not need to change the value.

Do not need to change the value.

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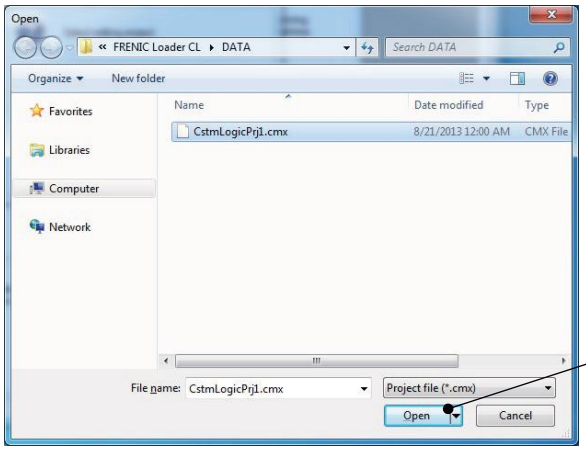
• **Loading file from PC**

Loads a customizable function project file that has already been created and saved to the PC, and then opens a window allowing the file data to be edited.



Open
This button opens the selected file.

File type

Customizable function project data : [*.cmx]

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2.1.2. Main Window

The following window appears when the software is started.

Project management window
Manages project files and function properties.

Select Inverter
Inverter to be connected is selected.

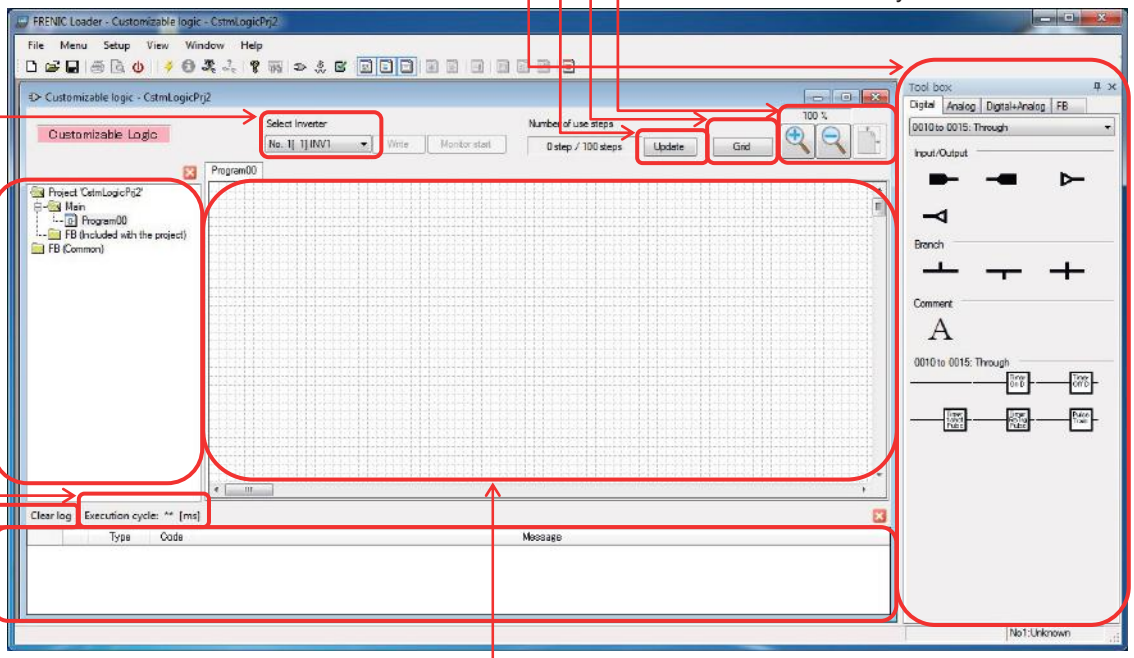
Execution cycle
Displays the cycle time of executing customizable functions.

Toolbox
Selects function symbols used in the layout.

Update
Update the latest number of steps.

Grid
Change grid size.

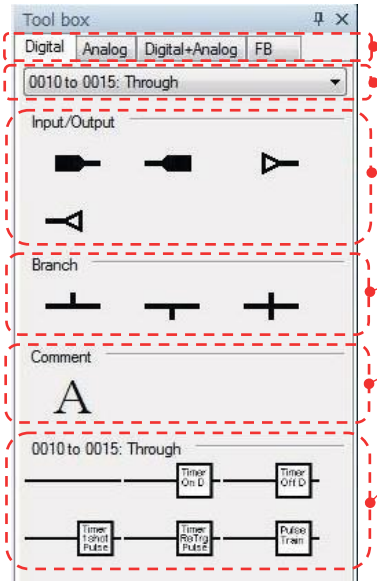
Zoom in / out
Zoom in / out the layout window.



Message window
Displays information such as the results of function code automatic assignment.

Layout area
Draws functions with symbols added to the layout area.

Clear log
Clear log of Message window.



Symbol selection tab
This tab select the function type grupe of the symbol.

Symbol selection combo box
This combo box displays the type of the symbol.

Input / Output
These symbols used for input and output terminal.

Branch
These symbols used to branch line.

Comment
These symbols used to write the comment.

Function symbols
The function symbols selected in the tabs and the combo box are displayed.

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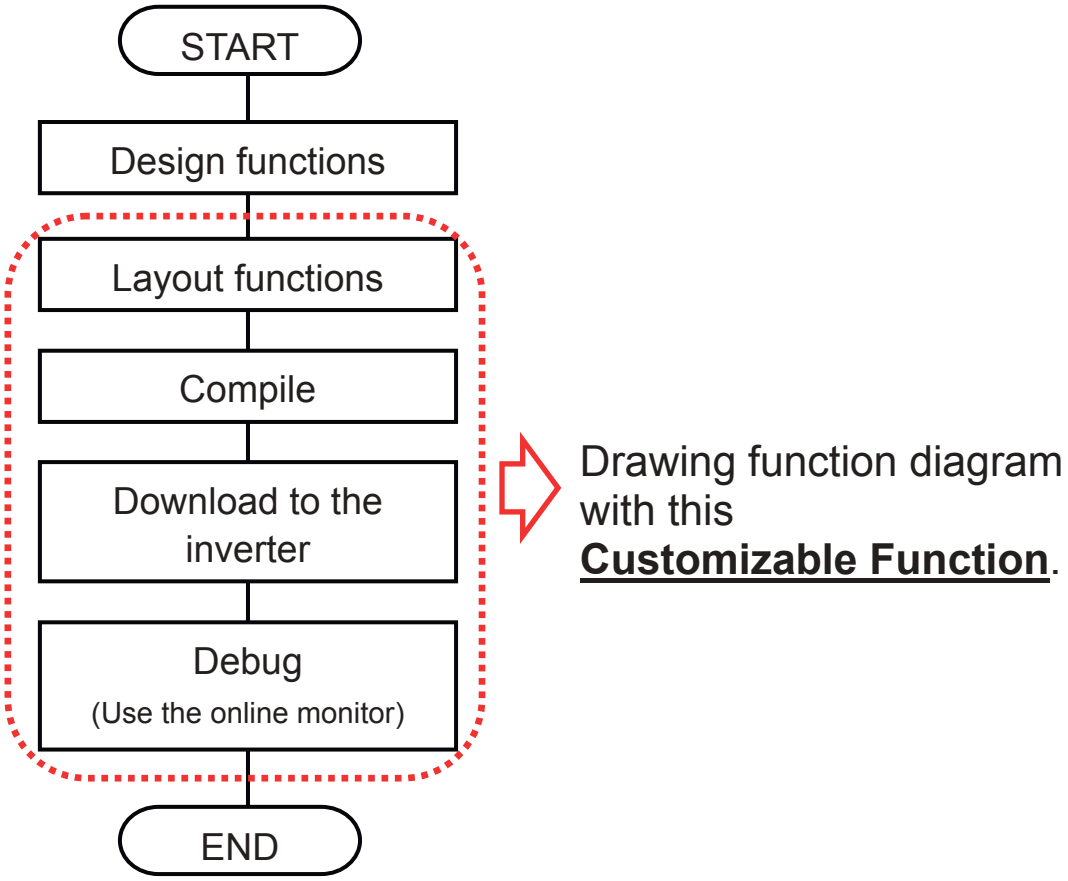
2.1.3. Customizable Function Creation Procedure

This section describes the customizable function editing procedure.



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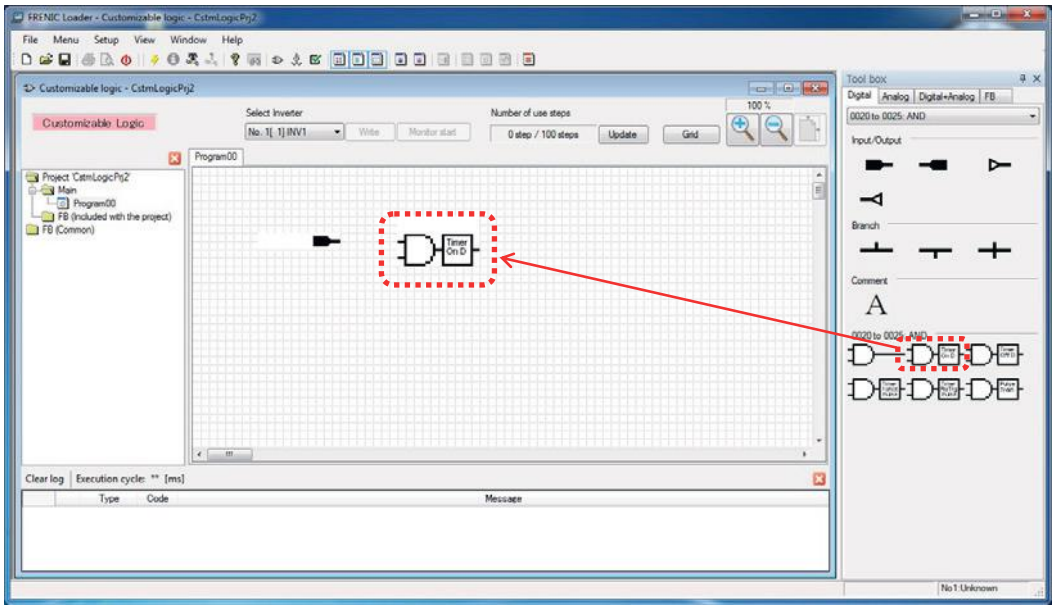
2.1.4. Layout function symbols

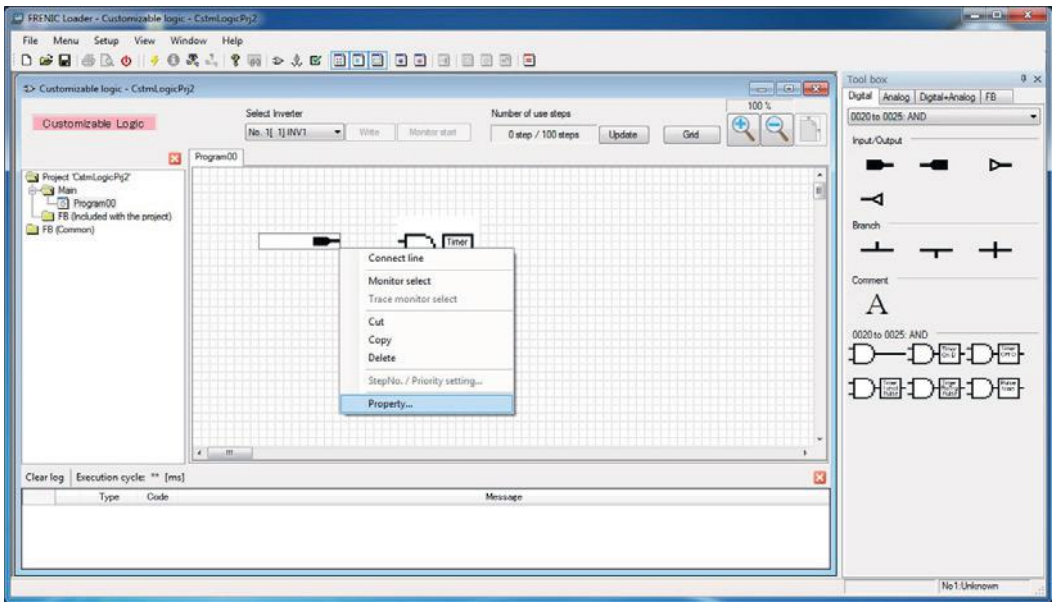
Select symbols from the toolbox and drag and drop them onto the layout.



Note The execution order of the functions is determined by the layout position.
Refer to Section 2.4.5 "Assigning Step Numbers".

2.1.5. Parameters of Function Symbols

Some function symbol has thier parameters (timer, limiter and so on). In order to these parameters, select a symbol with left-click and open the menu windows with right-click, and then select "**Propertiy**" from the context menu that appears to display a dialog box.



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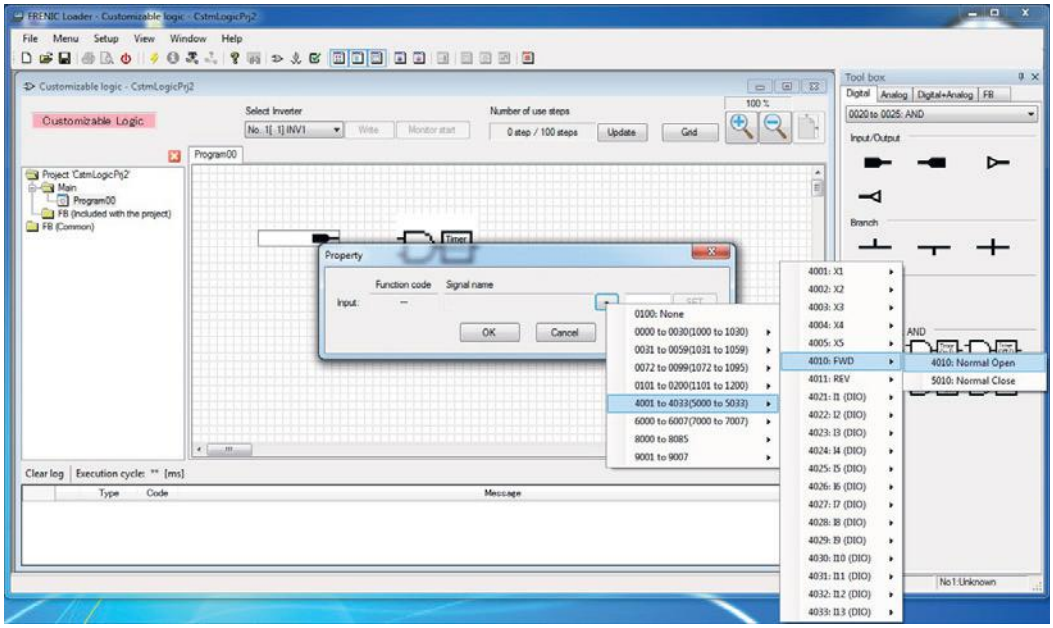
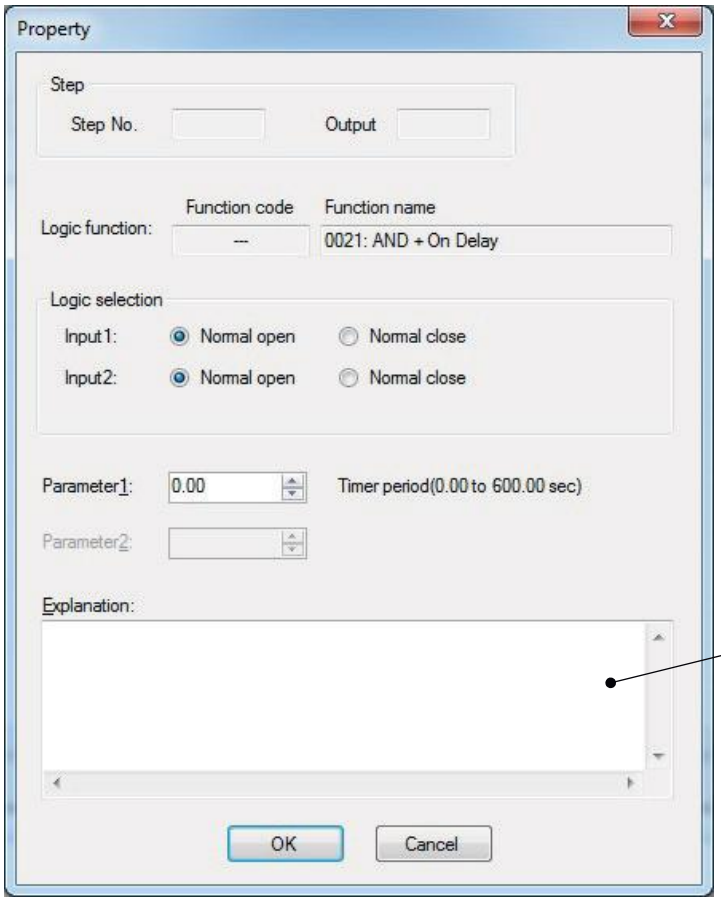
• **Assign the terminal function**

The Input / Output terminals are available to be assigned a specified function which an inverter has.



• **Set the parameters of Function symbol**

Some Function symbol refers to their parameters. You should open the property window with right-click and set those.



You can write the words freely.

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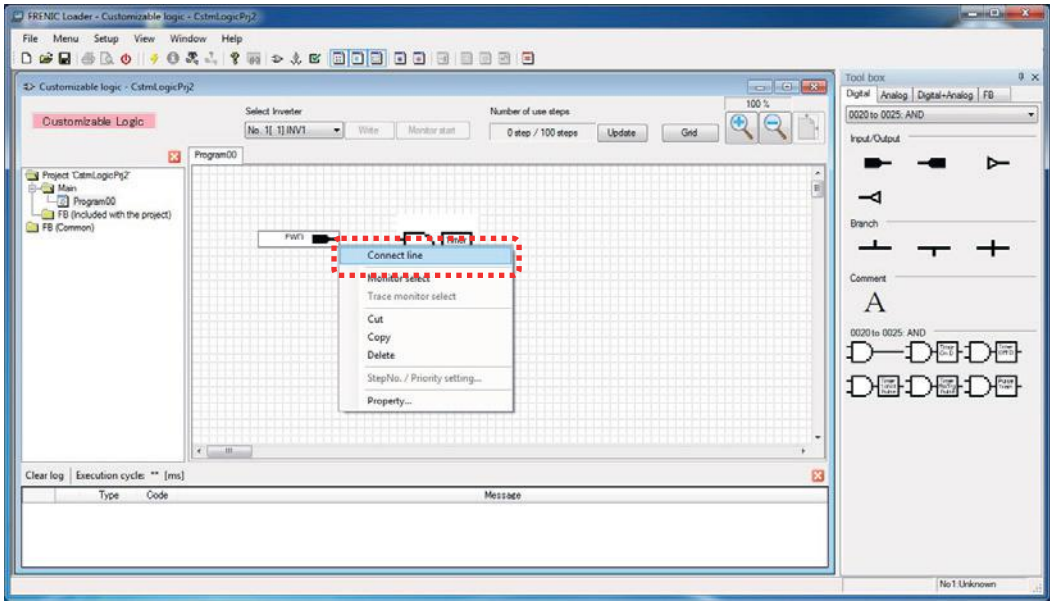
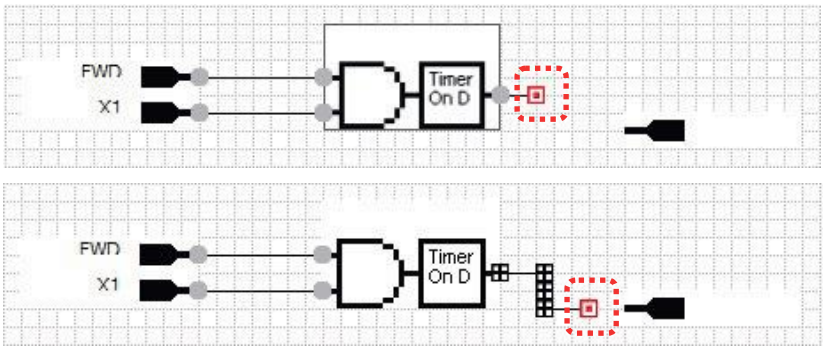
2.1.6. Connecting Function symbols

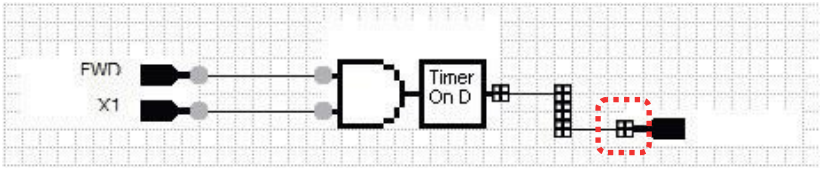
In order to connect function to function, select a symbol and open the property window with right-click. And then select "**Connection line**" from the context menu that appears.



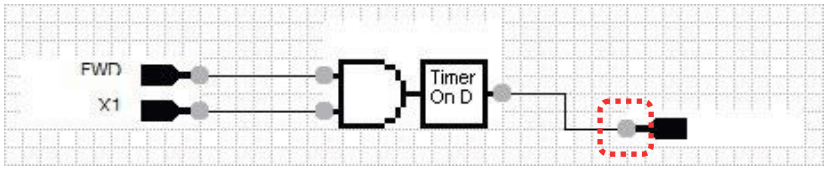
Wire connection appears. Put the cursor on the red box at the end of the wire connection, and then move the red box to the target function symbol with holding down the left button of the mouse.



When the connection is succeeded, the red box at the end of the wire connection changes to a black box.



By releasing the left button of the mouse, the black box at the end of the wire connection changes to a gray circle, and connection is fixed.



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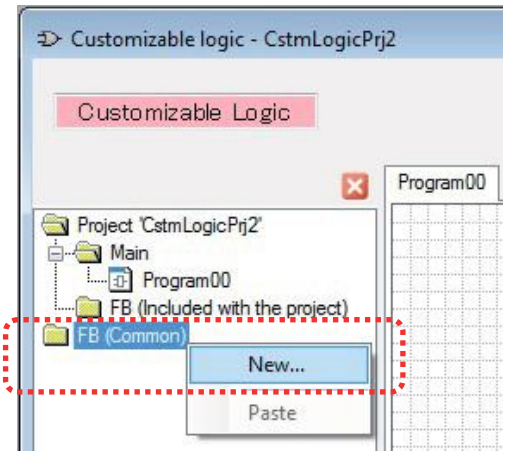
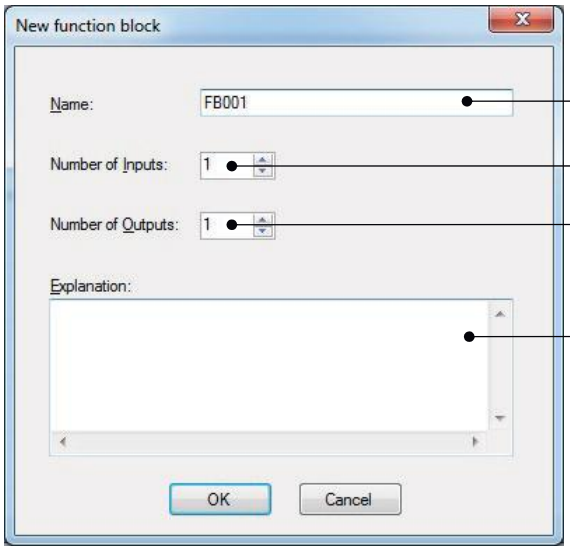
2.1.7. Creating Function Blocks (FB)

A function block (FB) is that can integrate multiple function block symbols into one symbol.

In order to entry a function block (FB), select "FB (common)" in the tree view, right-click, and then select "**New**" from the context menu that appears.

A dialog box for creating a new function block appears. Entry the necessary information and click [OK].





You can provide favorite name freely.

Entry number of FB input.

Entry number of FB output.

You can describe words freely.

Note: These parameters are available to change even if after registration.

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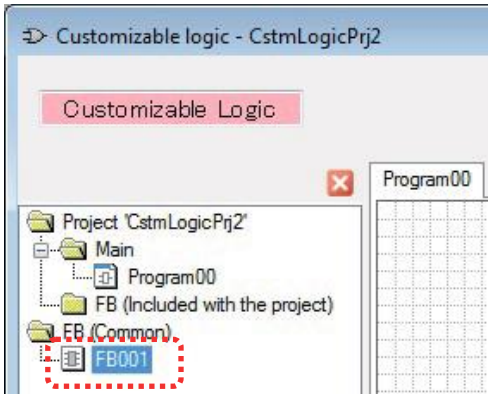
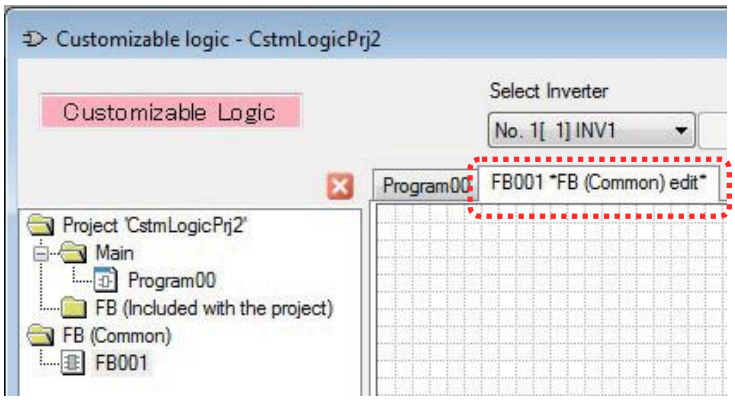
If you select the "**FB001**" (or Name of arbitrary) added to project tree, double-click "**FB001**" on the tree, then "**FB001 *FB (common) edit***" tab appears.





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To edit the internal function block of new function block, the next procedure is required.

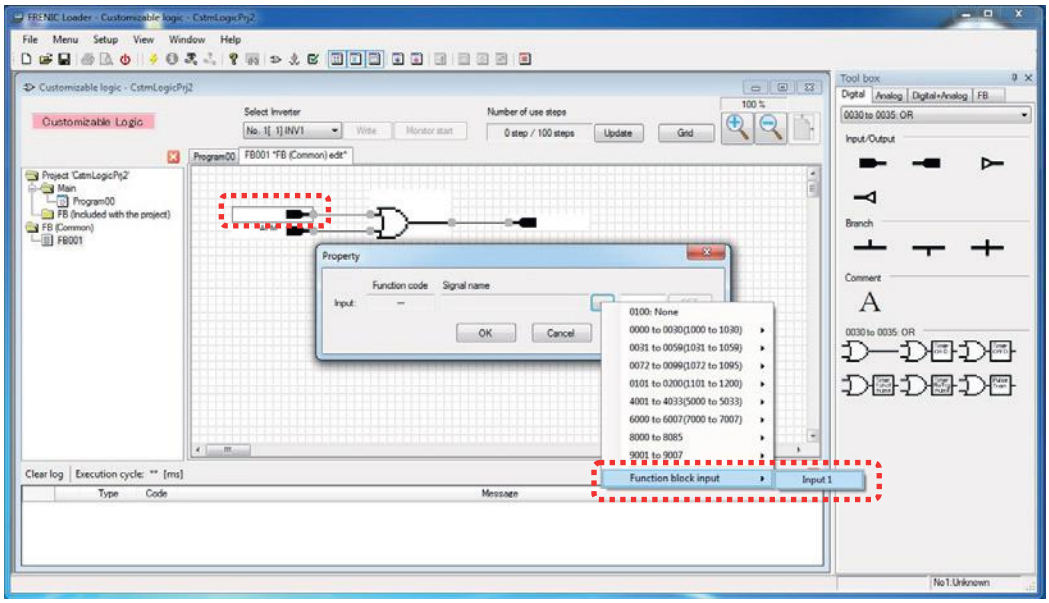
(1) Entry Input/Output symbol.

(2) Assign the function which you request to input/output symbol.

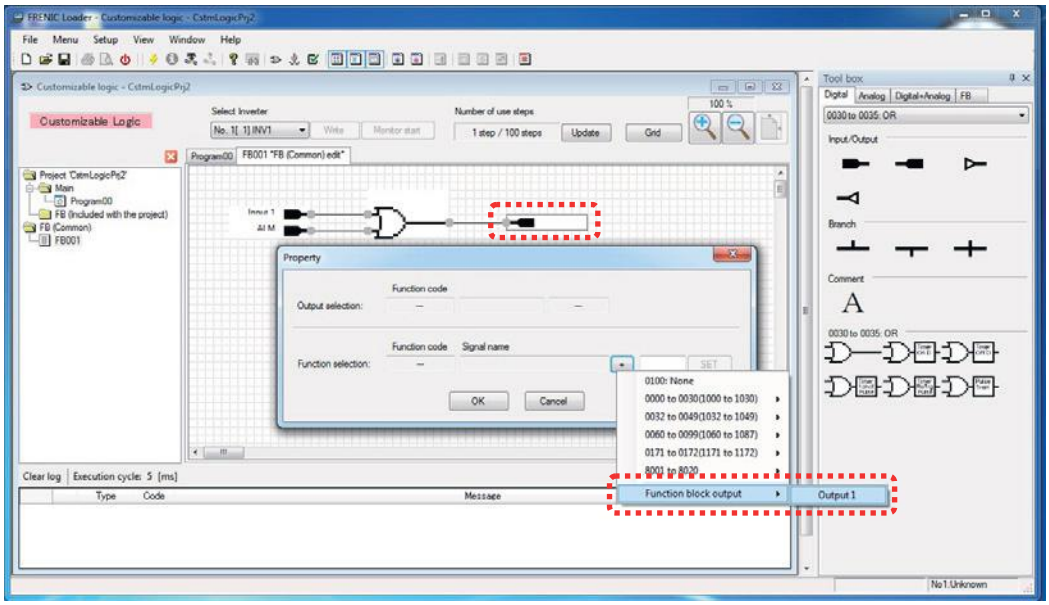
(3) Draw function blocks with symbols from tool-box and connect them.

An example is shown below.

Entry input symbol and select "Function block input" → "Input1".



Entry output symbol and select "Function block output" → "Output1".



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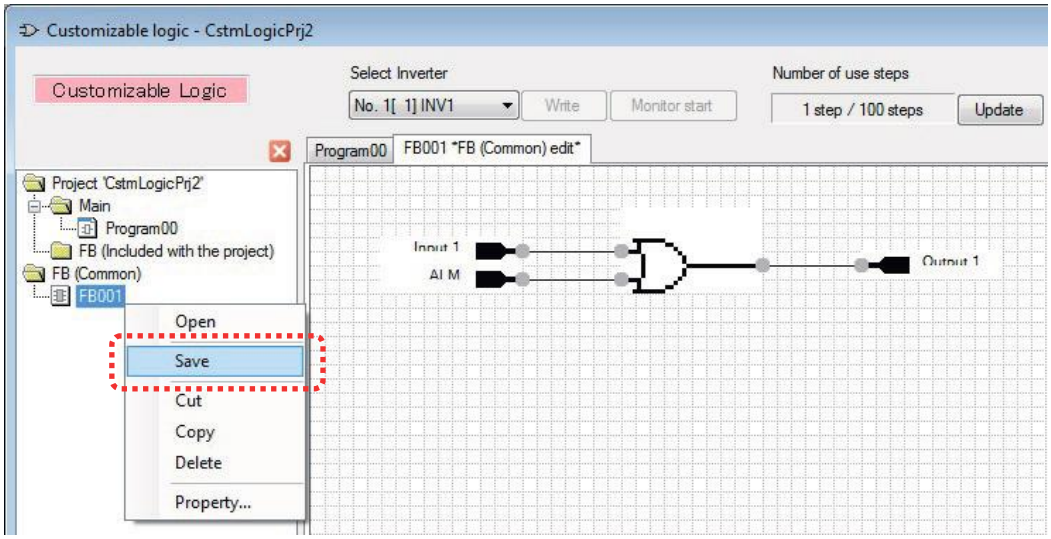
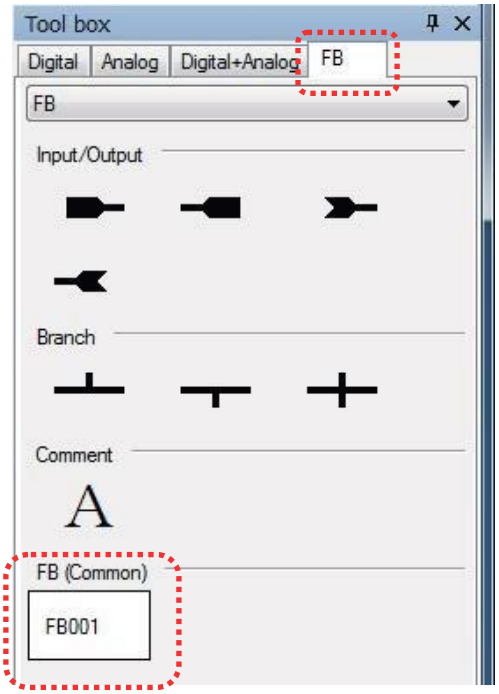
After editing function block, select "FB (common)" in the tree view, right-click, and then select "**Save**" from the context menu that appears.



If the function block (common) is succeeded to store, the function block symbol appears in the toolbox "FB" tab.



Tip The stored function blocks (FBs) are available to use as a template for other projects.

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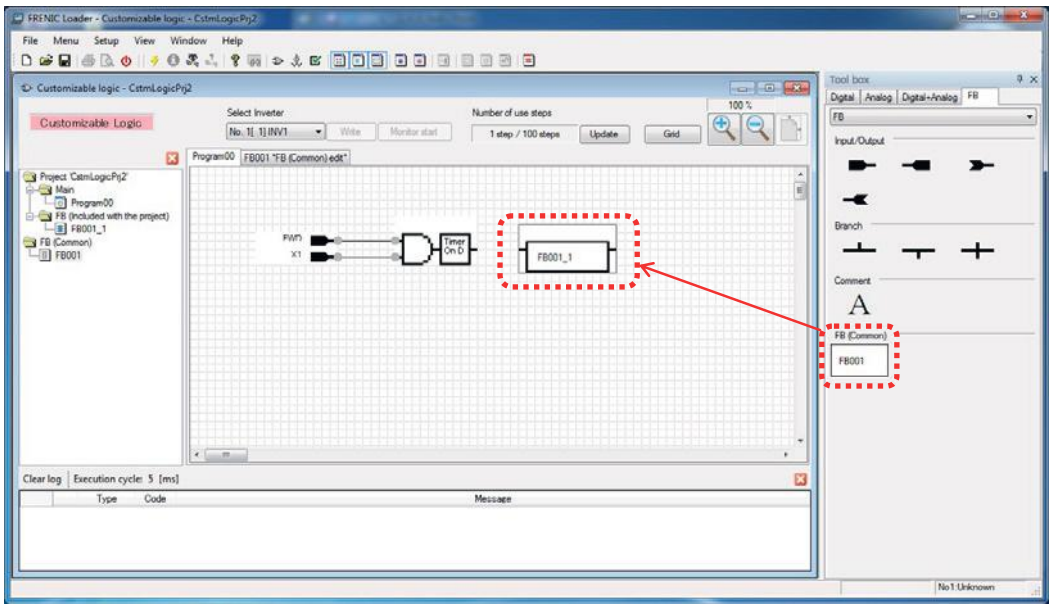
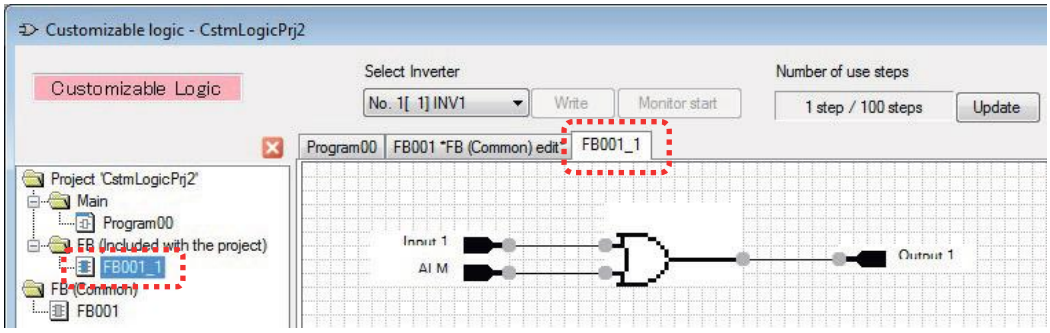
Return to the "Program00" sheet, select function block symbols from the toolbox, and then drag and drop them onto the function block layout.



By laying out "**FB001_1**", "**FB001_1**" is added to the tree view under target project. By then double-clicking, a tab for editing "**FB001_1**" appears.



Note "**FB001_1**" is a copy of the template function block (common) "**FB001**" and it belongs to the target project.

The changes for this function block are not applied to template FB and vice versa.

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2.1.8. Assigning Step Numbers

After function layout, you should assign each function symbol or FB to the step of the customizable function. There are two methods for assignment and shown as follows.

Note The execution order of functions are executed in the ascending order of step number.

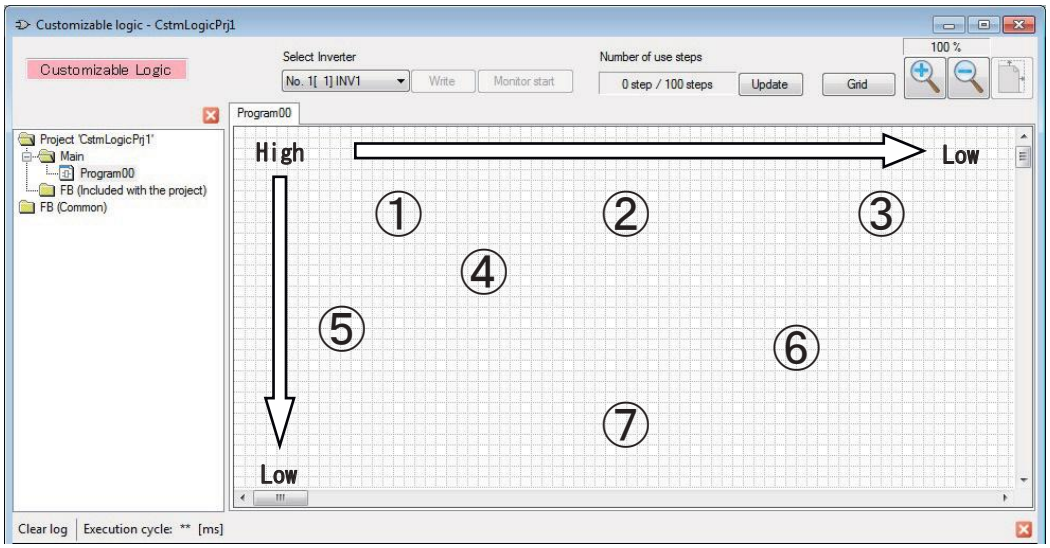
2.1.8.1. Rules of number assignment

The basic rules of number assignment are as follows.

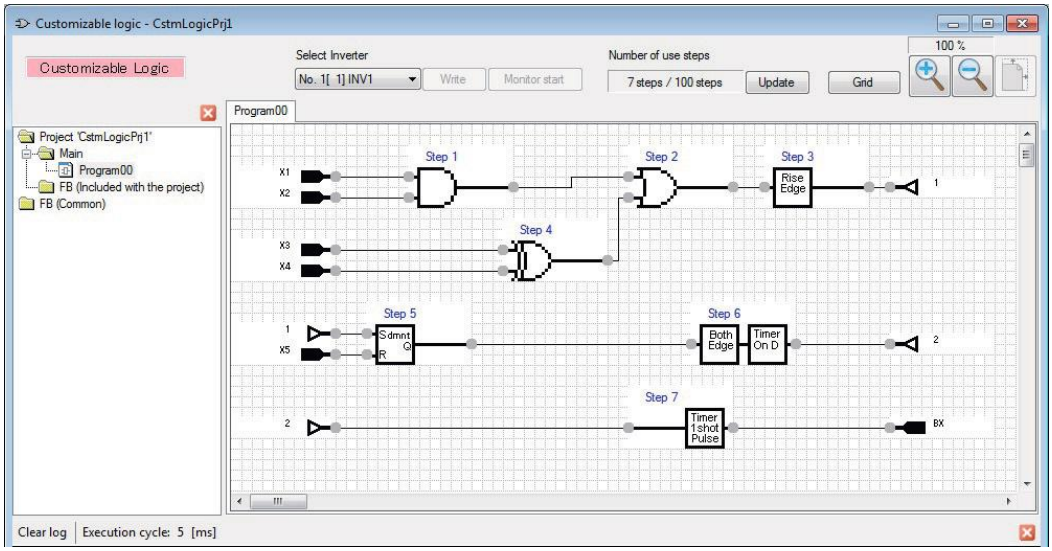
(1) The upper side of the layout area has higher priority than the lower side.

(2) The left side of the area has higher priority than the right side.

(3) The upper side has higher priority than the left side.



Show example in the following.



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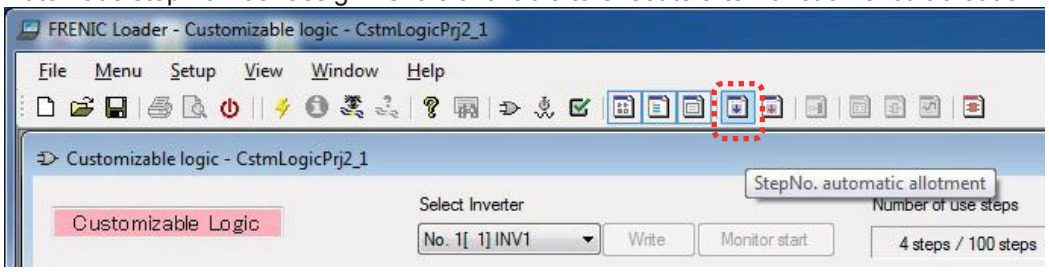
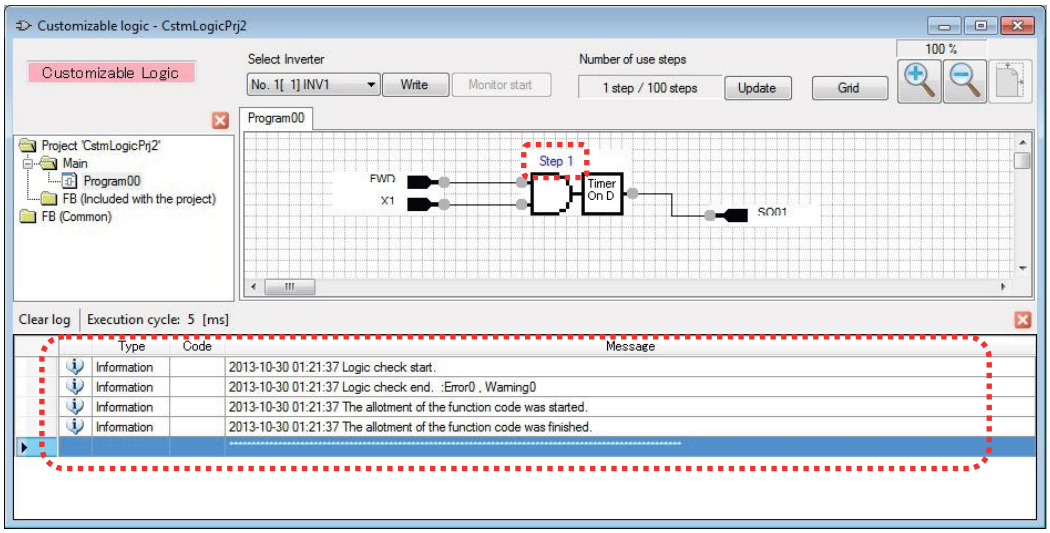
2.1.8.2. Automatic Step No. Assignment (Function Check)

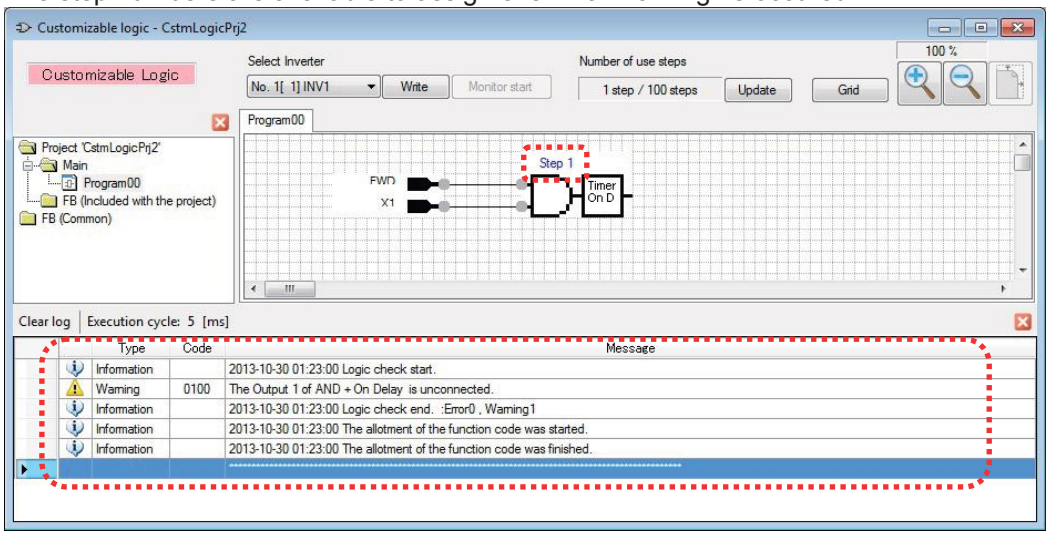
Automatic step number assignment is available to execute after function circuit creation.



The step numbers are only available to assign if no errors have occurred after the function check.



The step numbers are available to assign even if a “warning” is occured.



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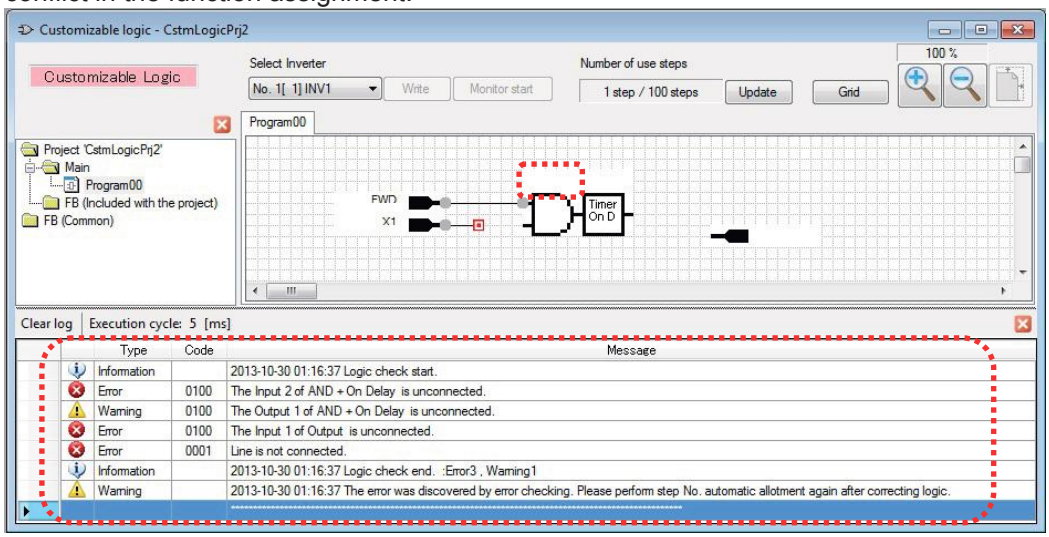
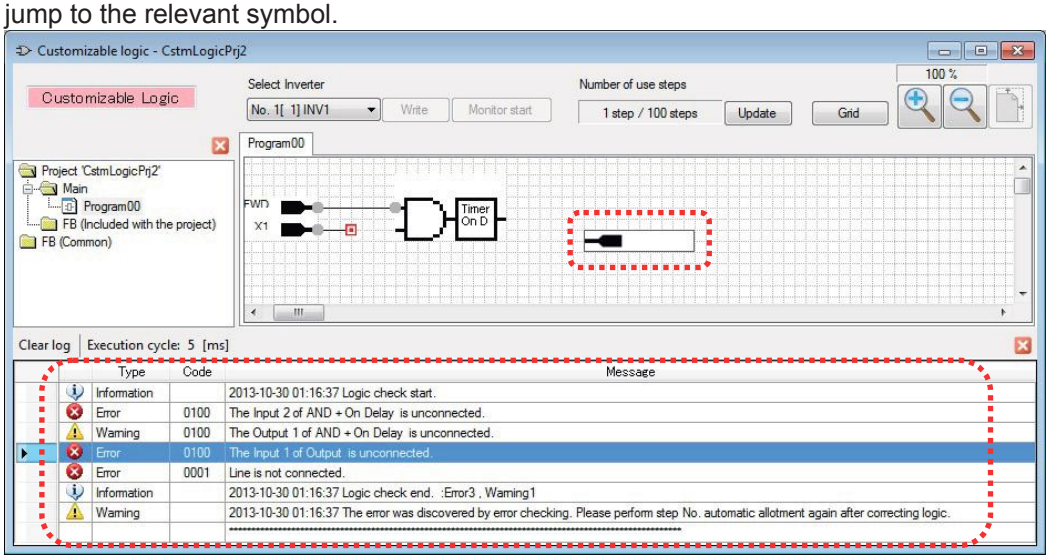
The step number fails to assign and an error occurs if there is a problem with the connection or a conflict in the function assignment.



Double-clicking an error or a warning line shown in message window makes the mouse pointer jump to the relevant symbol.



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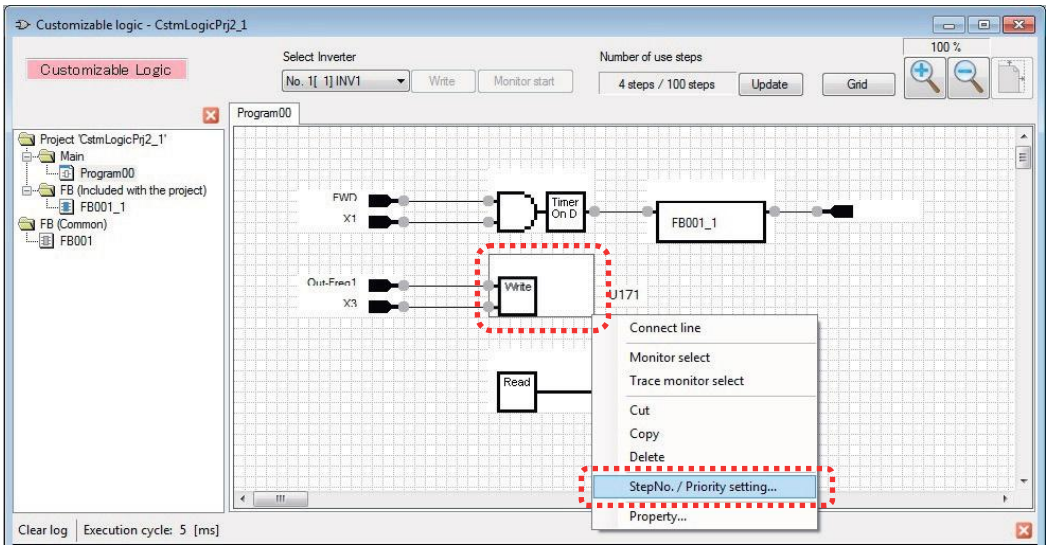
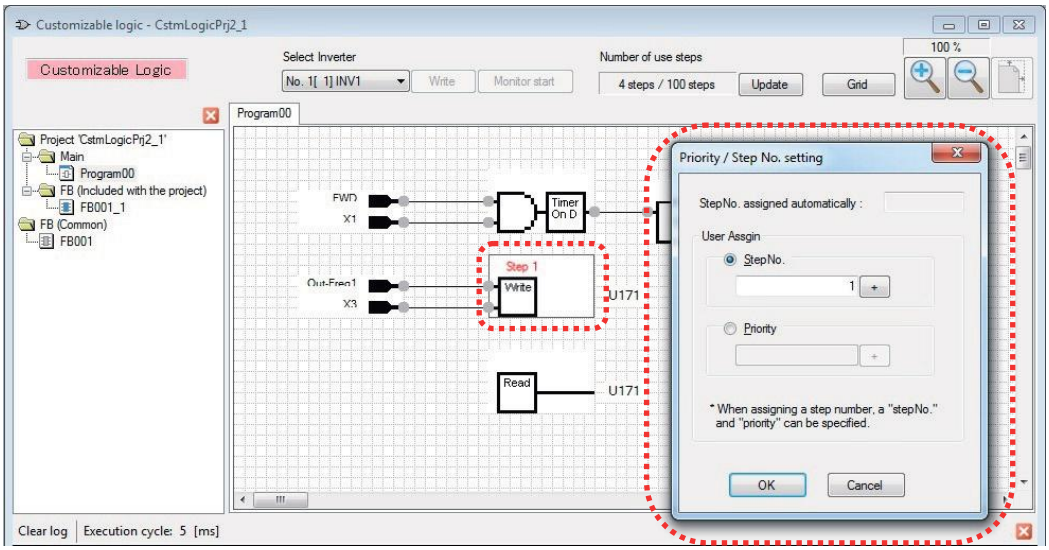
2.1.8.3. Manual Step No. Assignment

Manual step number assignment is also available to execute after function circuit creation. Select the symbols which you want to assign manually with right-click, and then select "**StepNo./Priority setting**" from the context menu that appears.





There are two types of manual step number assignment.

User Assign → **Step No.:** Step number is specified directly by the user.

User Assign → **Priority:** Step number are assigned automatically, however, the assignment priority is specified by the user.

The priority of step number assigmnent is shown as follows.

Automatic assignment < priority designation < direct step No. designation

Note Even if you want to assign the step number manually , it is recommended that you execute "step automatic number assignment" in order to check your function.

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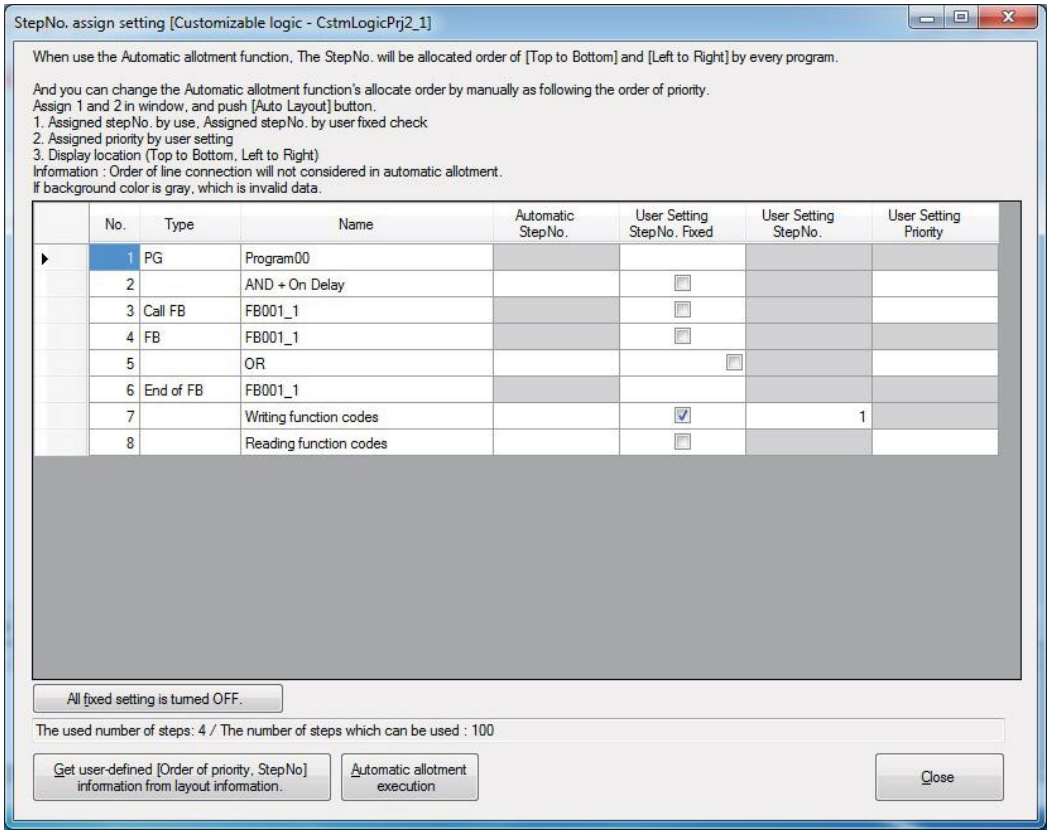
You can check the assignment status on the "Step No. Assignment" window.



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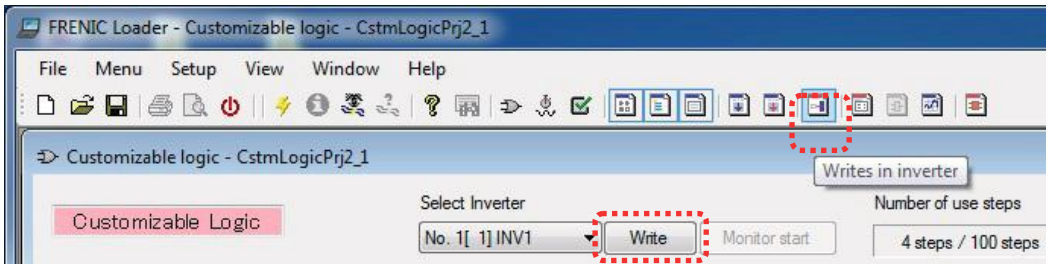
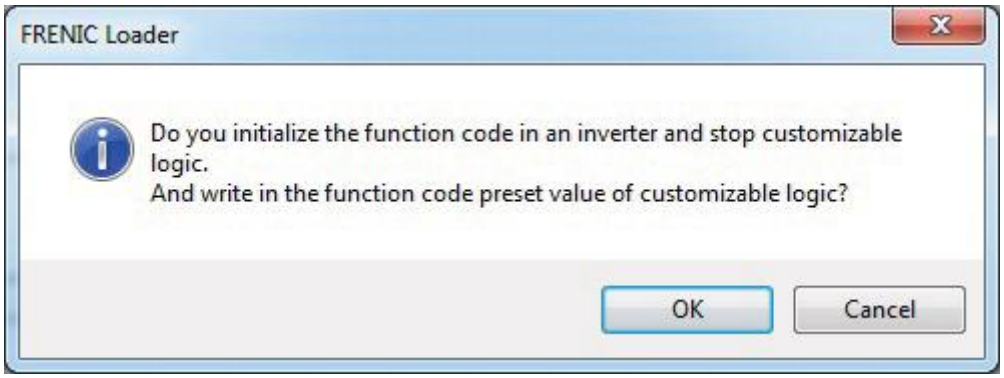
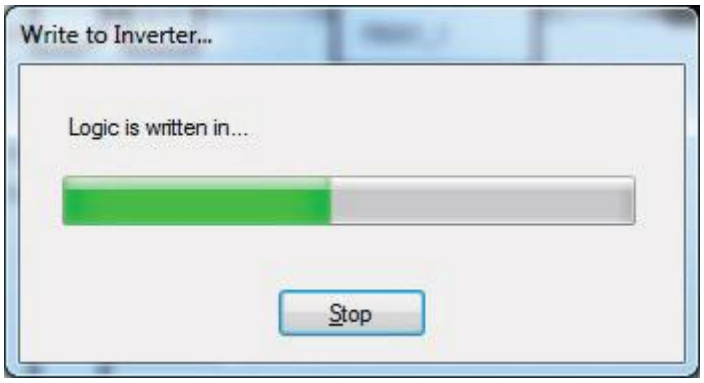
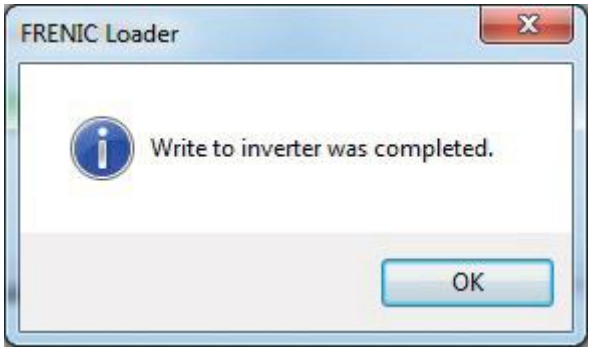
2.1.9. Downloading to the Inverter

The edited function can be converted to the function setting for the inverter function codes after step number assignment and checking functions are successfully finished.
If the conversion is succeeded, "Write" button turns selectable.
In order to download these settings to the inverter, push the "Write" button.









Note ・U code, U1 code is initialized once when writing to the inverter.

・"ECL: Customization logic abnormal" alarm occurs by downloading the program, when the customize logic is running.

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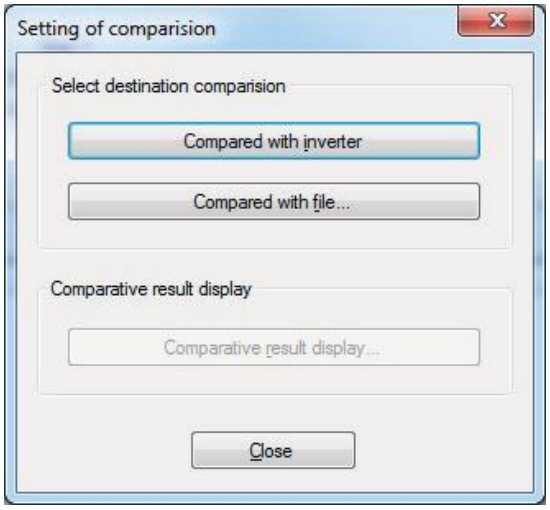
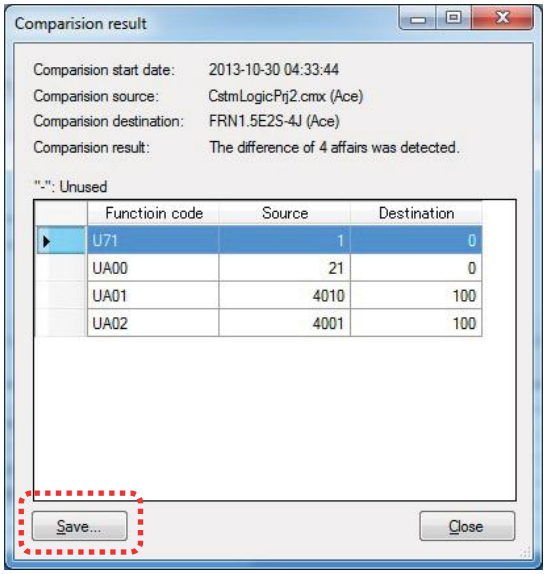
2.1.10. Comparison

The edited functions can be converted to the function codes for the inverter after step number assignment and checking functions are both successfully finished.
If the conversion is succeeded, "Compare" button turns selectable and the comparison is available.
In order to comare the current project to the function code settings of the inverter or the stored file that the conversion is succeeded, push the "Compare" button.



The comparison results shows inverter function codes which does not match, and it also can be saved in CSV format.



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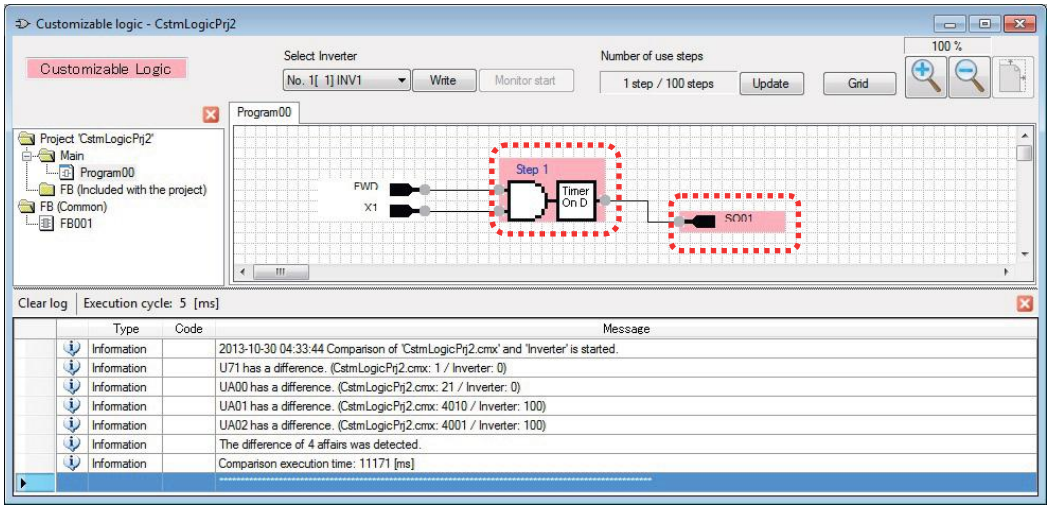
The symbols which have a difference are also highlighted.



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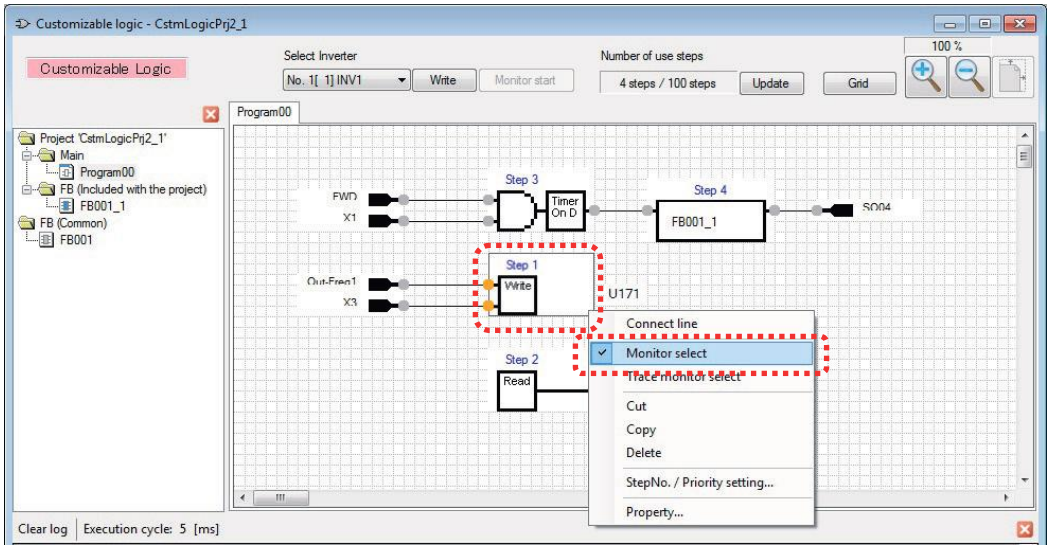
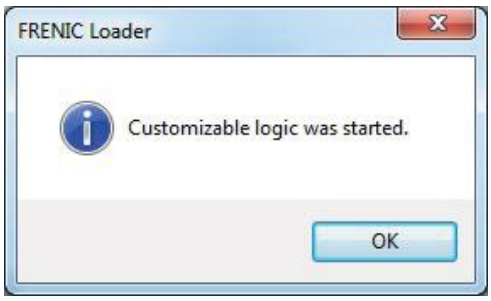
2.1.11. Debug

2.1.11.1. Online Monitor

The online monitoring is the function to monitor timer value or signals of a symbol as a number. The online monitor is available to select after downloaded the created function settings to the inverter or if the functions of an inverter are fully consistent with the functions on this software. In order to monitor input / output and status of target symbol,select an symbol with left-click and open the menu window, then select "**Monitor select**" from the context menu with right-click.



Before starting the online monitor, it is necessary to activate the customizable function.



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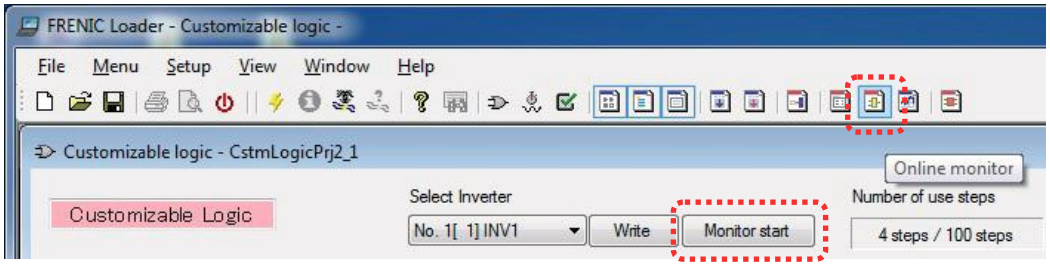
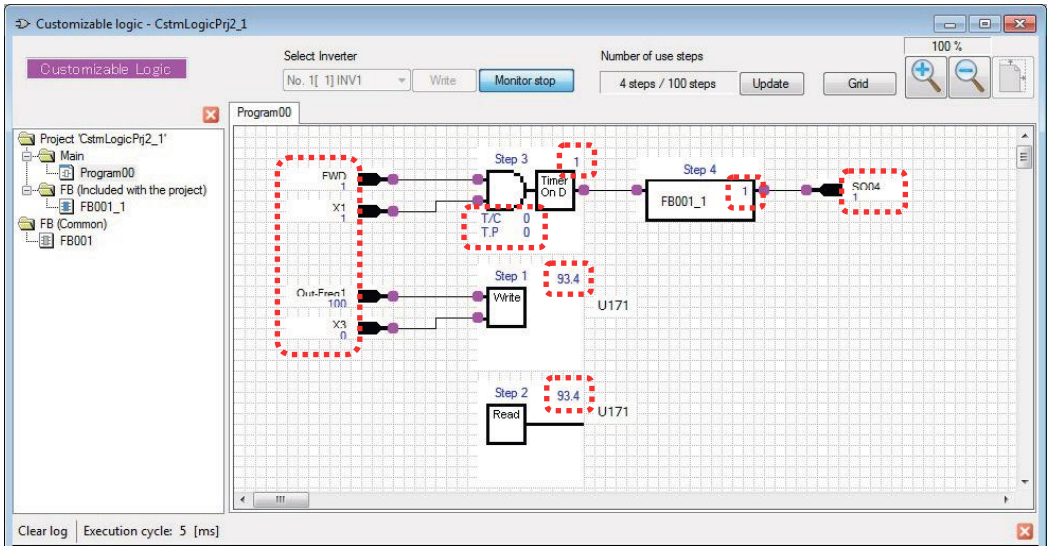
The online monitor starts after the customizable functions are executed in the inverter.





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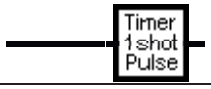
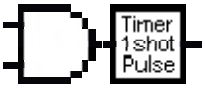
2.2. List of Customizable function Symbols

Block selection	Symbol	Function block	Description
10		Through output	This function is through output. No function block exists.
11		Through output + On-delay timer	Turning an input signal ON starts the on-delay timer. When the period specified by the timer has elapsed, an output signal turns ON. Turning the input signal OFF turns the output signal OFF.
12		Through output + Off-delay timer	Turning an input signal ON turns an output signal ON. Turning the input signal OFF starts the off-delay timer. When the period specified by the timer has elapsed, the output signal turns OFF.
13		Through output + One-shot pulse output	Turning an input signal ON issues a one-shot pulse whose length is specified by the timer.
14		Through output + Retriggerable timer	Turning an input signal ON issues a one-shot pulse whose length is specified by the timer. If an input signal is turned ON again during the preceding one-shot pulse length, however, the function block issues another one-shot pulse.
15		Through output + Pulse train output	If an input signal turns ON, the function block issues ON and OFF pulses (whose lengths are specified by the timer) alternately and repeatedly. This function is used to flash a luminescent device.
20		Logical AND + Through output	AND function with 2 inputs and 1 output, plus through output.
21		Logical AND + On-delay timer	AND function with 2 inputs and 1 output, plus Turning an input signal ON starts the on-delay timer. When the period specified by the timer has elapsed, an output signal turns ON. Turning the input signal OFF turns the output signal OFF.
22		Logical AND + Off-delay timer	AND function with 2 inputs and 1 output, plus Turning an input signal ON turns an output signal ON. Turning the input signal OFF starts the off-delay timer. When the period specified by the timer has elapsed, the output signal turns OFF.
23		Logical AND + One-shot pulse output	AND function with 2 inputs and 1 output, plus Turning an input signal ON issues a one-shot pulse whose length is specified by the timer.

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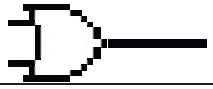
Block selection	Symbol	Function block	Description
24		Logical AND + Retriggerable timer	AND function with 2 inputs and 1 output, plus Turning an input signal ON issues a one-shot pulse whose length is specified by the timer. If an input signal is turned ON again during the preceding one-shot pulse length, however, the function block issues another one-shot pulse.
25		Logical AND + Pulse train output	AND function with 2 inputs and 1 output, plus If an input signal turns ON, the function block issues ON and OFF pulses (whose lengths are specified by the timer) alternately and repeatedly. This function is used to flash a luminescent device.
30		Logical OR + Through output	OR function with 2 inputs and 1 output, plus through output.
31		Logical OR + On-delay timer	OR function with 2 inputs and 1 output, plus Turning an input signal ON starts the on-delay timer. When the period specified by the timer has elapsed, an output signal turns ON. Turning the input signal OFF turns the output signal OFF.
32		Logical OR + Off-delay timer	OR function with 2 inputs and 1 output, plus Turning an input signal ON turns an output signal ON. Turning the input signal OFF starts the off-delay timer. When the period specified by the timer has elapsed, the output signal turns OFF.
33		Logical OR + One-shot pulse output	OR function with 2 inputs and 1 output, plus Turning an input signal ON issues a one-shot pulse whose length is specified by the timer.
34		Logical OR + Retriggerable timer	OR function with 2 inputs and 1 output, plus Turning an input signal ON issues a one-shot pulse whose length is specified by the timer. If an input signal is turned ON again during the preceding one-shot pulse length, however, the function block issues another one-shot pulse.
35		Logical OR + Pulse train output	OR function with 2 inputs and 1 output, plus If an input signal turns ON, the function block issues ON and OFF pulses (whose lengths are specified by the timer) alternately and repeatedly. This function is used to flash a luminescent device.

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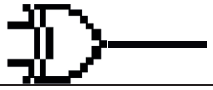
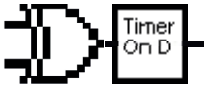
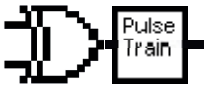
Block selection	Symbol	Function block	Description
40		Logical XOR + Through output	XOR function with 2 inputs and 1 output, plus through output.
41		Logical XOR + On-delay timer	XOR function with 2 inputs and 1 output, plus Turning an input signal ON starts the on-delay timer. When the period specified by the timer has elapsed, an output signal turns ON. Turning the input signal OFF turns the output signal OFF.
42		Logical XOR + Off-delay timer	XOR function with 2 inputs and 1 output, plus Turning an input signal ON turns an output signal ON. Turning the input signal OFF starts the off-delay timer. When the period specified by the timer has elapsed, the output signal turns OFF.
43		Logical XOR + One-shot pulse output	XOR function with 2 inputs and 1 output, plus Turning an input signal ON issues a one-shot pulse whose length is specified by the timer.
44		Logical XOR + Retriggerable timer	XOR function with 2 inputs and 1 output, plus Turning an input signal ON issues a one-shot pulse whose length is specified by the timer. If an input signal is turned ON again during the preceding one-shot pulse length, however, the function block issues another one-shot pulse.
45		Logical XOR + Pulse train output	XOR function with 2 inputs and 1 output, plus If an input signal turns ON, the function block issues ON and OFF pulses (whose lengths are specified by the timer) alternately and repeatedly. This function is used to flash a luminescent device.

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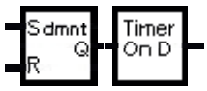
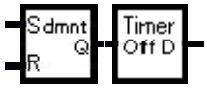
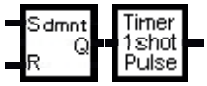
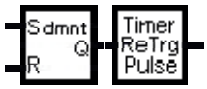
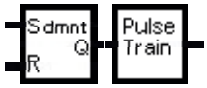
Block selection	Symbol	Function block	Description
50		Set priority flip-flop + Through output	Set priority flip-flop with 2 inputs and 1 output, plus through output.
51		Set priority flip-flop + On-delay timer	Set priority flip-flop with 2 inputs and 1 output, plus Turning an input signal ON starts the on-delay timer. When the period specified by the timer has elapsed, an output signal turns ON. Turning the input signal OFF turns the output signal OFF.
52		Set priority flip-flop + Off-delay timer	Set priority flip-flop with 2 inputs and 1 output, plus Turning an input signal ON turns an output signal ON. Turning the input signal OFF starts the off-delay timer. When the period specified by the timer has elapsed, the output signal turns OFF.
53		Set priority flip-flop + One-shot pulse output	Set priority flip-flop with 2 inputs and 1 output, plus Turning an input signal ON issues a one-shot pulse whose length is specified by the timer.
54		Set priority flip-flop + Retriggerable timer	Set priority flip-flop with 2 inputs and 1 output, plus Turning an input signal ON issues a one-shot pulse whose length is specified by the timer. If an input signal is turned ON again during the preceding one-shot pulse length, however, the function block issues another one-shot pulse.
55		Set priority flip-flop + Pulse train output	Set priority flip-flop with 2 inputs and 1 output, plus If an input signal turns ON, the function block issues ON and OFF pulses (whose lengths are specified by the timer) alternately and repeatedly. This function is used to flash a luminescent device.

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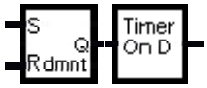
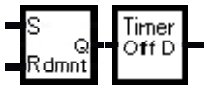
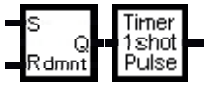
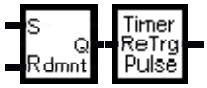
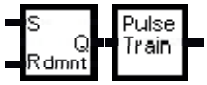
Block selection	Symbol	Function block	Description
60		Reset priority flip-flop + Through output	Reset priority flip-flop with 2 inputs and 1 output, plus through output.
61		Reset priority flip-flop + On-delay timer	Reset priority flip-flop with 2 inputs and 1 output, plus Turning an input signal ON starts the on-delay timer. When the period specified by the timer has elapsed, an output signal turns ON. Turning the input signal OFF turns the output signal OFF.
62		Reset priority flip-flop + Off-delay timer	Reset priority flip-flop with 2 inputs and 1 output, plus Turning an input signal ON turns an output signal ON. Turning the input signal OFF starts the off-delay timer. When the period specified by the timer has elapsed, the output signal turns OFF.
63		Reset priority flip-flop + One-shot pulse output	Reset priority flip-flop with 2 inputs and 1 output, plus Turning an input signal ON issues a one-shot pulse whose length is specified by the timer.
64		Reset priority flip-flop + Retriggerable timer	Reset priority flip-flop with 2 inputs and 1 output, plus Turning an input signal ON issues a one-shot pulse whose length is specified by the timer. If an input signal is turned ON again during the preceding one-shot pulse length, however, the function block issues another one-shot pulse.
65		Reset priority flip-flop + Pulse train output	Reset priority flip-flop with 2 inputs and 1 output, plus If an input signal turns ON, the function block issues ON and OFF pulses (whose lengths are specified by the timer) alternately and repeatedly. For example, this function is used to flash a luminescent device.

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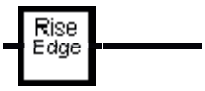
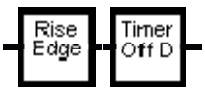
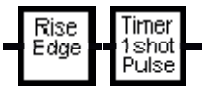
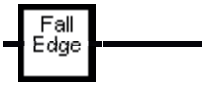
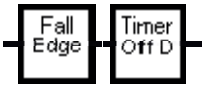
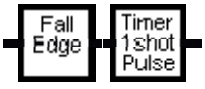
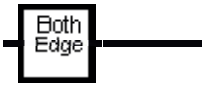
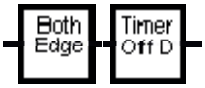
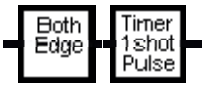
Block selection	Symbol	Function block	Description
70		Rising edge detector + Through output	Rising edge detector with 1 input and 1 output, plus general-purpose timer. This detects the rising edge of an input signal and outputs the ON signal for 5 ms (*1).
72		Rising edge detector + Off-delay timer	Rising edge detector with 2 inputs and 1 output, plus Turning an input signal ON turns an output signal ON. Turning the input signal OFF starts the off-delay timer. When the period specified by the timer has elapsed, the output signal turns OFF.
73		Rising edge detector + One-shot pulse output	Rising edge detector with 2 inputs and 1 output, plus Turning an input signal ON issues a one-shot pulse whose length is specified by the timer.
80		Falling edge detector + Through output	Falling edge detector with 1 input and 1 output, plus general-purpose timer. This detects the falling edge of an input signal and outputs the ON signal for 5 ms (*1).
82		Falling edge detector + Off-delay timer	Falling edge detector with 2 inputs and 1 output, plus Turning an input signal ON turns an output signal ON. Turning the input signal OFF starts the off-delay timer. When the period specified by the timer has elapsed, the output signal turns OFF.
83		Falling edge detector + One-shot pulse output	Falling edge detector with 2 inputs and 1 output, plus Turning an input signal ON issues a one-shot pulse whose length is specified by the timer.
90		Rising & falling edges detector + Through output	Rising and falling edge detector with 1 input and 1 output, plus general-purpose timer. This detects both the falling and rising edges of an input signal and outputs the ON signal for 5 ms (*1).
92		Rising & falling edges detector + Off-delay timer	Rising & falling edge detector with 2 inputs and 1 output, plus Turning an input signal ON turns an output signal ON. Turning the input signal OFF starts the off-delay timer. When the period specified by the timer has elapsed, the output signal turns OFF.
93		Rising & falling edges detector + One-shot pulse output	Rising & falling edge detector with 2 inputs and 1 output, plus Turning an input signal ON issues a one-shot pulse whose length is specified by the timer.

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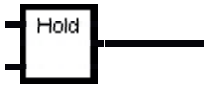
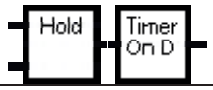
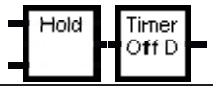
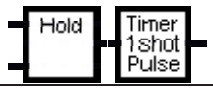
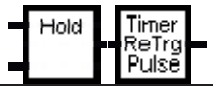
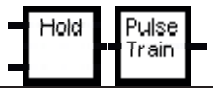
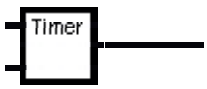
Block selection	Symbol	Function block	Description
100		Hold + Through output	Hold function of previous values of 2 inputs and 1 output, plus general-purpose timer. If the hold control signal is OFF, the function block outputs input signals; if it is ON, the function block retains the previous values of input signals.
101		Hold + On-delay timer	Hold function of previous values of 2 inputs and 1 output with on-delay timer.
102		Hold + Off-delay timer	Hold function of previous values of 2 inputs and 1 output with off-delay timer.
103		Hold + One-shot pulse output	Hold function of previous values of 2 inputs and 1 output with one-shot pulse output.
104		Hold + Retriggerable timer	Hold function of previous values of 2 inputs and 1 output with retriggerable timer.
105		Hold + Pulse train output	Hold function of previous values of 2 inputs and 1 output with pulse train output.
110		Increment counter	Increment counter with reset input. By the rising edge of an input signal, the function block increments the counter value by one. When the counter value reaches the target one, the output signal turns ON. Turning the reset signal ON resets the counter to zero.
120		Decrement counter	Decrement counter with reset input. By the rising edge of an input signal, the function block decrements the counter value by one. When the counter value reaches zero, the output signal turns ON. Turning the reset signal ON resets the counter to the initial value.
130		Timer with reset input	Timer output with reset input. If an input signal turns ON, the output signal turns ON and the timer starts. When the period specified by the timer has elapsed, the output signal turns OFF, regardless of the input signal state. Turning the reset signal ON resets the current timer value to zero and turns the output OFF.

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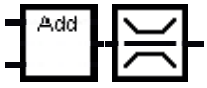
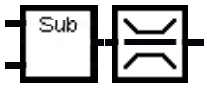
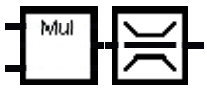
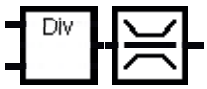
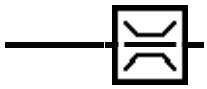
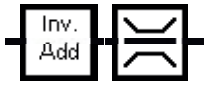
Block selection	Symbol	Function block	Description
2001		Adder with output limiter	Addition function with two inputs (input1 and input2). This function has output limiters (upper/lower) specified with two function codes. The 1st function code provides upper limit value and the 2nd one provides lower limit value.
2002		Subtracter with output limiter	Subtraction function with two inputs (input1 and input2). This function has output limiters (upper/lower) specified with two function codes. The 1st function code provides upper limit value and the 2nd one provides lower limit value.
2003		Multiplier with output limiter	Multiplication function with two inputs (input1 and input2). This function has output limiters (upper/lower) specified with two function codes. The 1st function code provides upper limit value and the 2nd one provides lower limit value.
2004		Divider with output limiter	Division function with two inputs (input1 and input2). Input1 is dividend and input2 is divisor. This function has output limiters (upper/lower) specified with two function codes. The 1st function code provides upper limit value and the 2nd one provides lower limit value.
2005		Limiter	Upper and lower limit functions of single input (input1). The 1st function code provides upper limit value and the 2nd one provides lower limit value.
2006		Absolute value of inputs with output limiter	Absolute value function of single input (input1). (Negative input numbers become positive.) This function has output limiters (upper/lower) specified with two function codes. The 1st function code provides upper limit value and the 2nd one provides lower limit value.
2007		Inverting adder with output limiter	Inverting addition function with single input (input1). This function adds input1 to the value specified with the 1st function code, inverts the result. And furthermore, the function adds the result to the value specified with the 2nd function code and outputs the result. Output = - (Input 1 - parameter 1) + parameter 2

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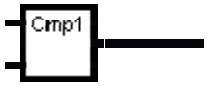
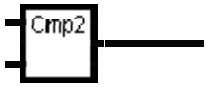
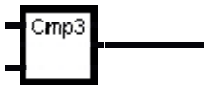
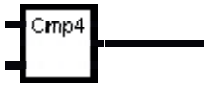
2051		Comparator 1	Comparison function with hysteresis. This function compares the differential value between input1 and input2 with the threshold value specified with the 1st function code. The 2nd function code provides hysteresis width. If input1 is (threshold value + hysteresis width) or bigger, this function outputs logical "1:True". On the other hand If the value is (threshold value - hysteresis width) or smaller, this function outputs logical "0:False".
2052		Comparator 2	Comparison function with hysteresis. This function compares the differential value between input1 and input2 with the threshold value specified with the 1st function code. The 2nd function code provides hysteresis width. If the differential value is bigger than (threshold value + hysteresis width), this function outputs logical "1:True".On the other hand If the value is smaller than (threshold value - hysteresis width), the function outputs logical "0:False".
2053		Comparator 3	Comparison function with hysteresis. This function compares the absolute differential value between input1 and input2 with the threshold value specified with the 1st function code. The 2nd function code provides hysteresis width. And this function works like as comparator 1
2054		Comparator 4	Comparison function with hysteresis. This function compares the absolute differential value between input1 and input2 with the threshold value specified with the 1st function code. The 2nd function code provides hysteresis width. And this function works like as comparator 2

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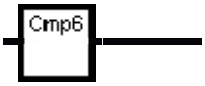
2055		Comparator 5	Comparison function with hysteresis. Input1 is the input value of this function and input2 is not used. The 1st function code provides threshold value and the 2nd one provides hysteresis width. If input1 is (threshold value) or bigger, this function outputs logical "1:True".On the other hand If input1 is smaller than (threshold value - hysteresis width), this function outputs logical "0:False".
2056		Comparator 6	Comparison function with hysteresis. Input1 is the input value of this function and input2 is not used. The 1st function code provides threshold value and the 2nd one provides hysteresis width. If input1 is (threshold value) or smaller, this function outputs logical "1:True".On the other hand If input1 is bigger than (threshold value + hysteresis width), this function outputs logical "0:False".
2071		Window comparator 1	Comparison function with limits. The output is determines when the input is within a preselected range specified with two function codes. Input1 is the input value of this function and input2 is not used. The 1st function code provides upper threshold value and the 2nd one provides lower threshold value. If input1 is within the range (defined with two function codes), this function outputs logical "1:True".On the other hand If input1 is out of range, this function outputs logical "0:False".
2072		Window comparator 2	Comparison function with limit. This function has the inverting function block of " Window comparator 1".
2101		High selector with output limiter	High selector function. This function receives two inputs (input1 and input2), selects the higher one automatically, and outputs it. This function has output limiters (upper/lower) specified with two function codes. The 1st function code provides the upper limit value and the 2nd one provides the lower one.

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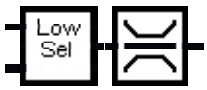
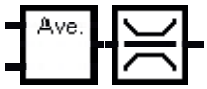
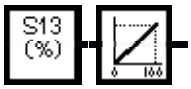
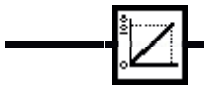
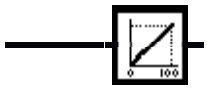
Block selection	Symbol	Function block	Description
2102		Low selector with output limiter	Low selector function. This function receives two inputs (input1 and input2), selects the lower one automatically, and outputs it. This function has output limiters (upper/lower) specified with two function codes. The 1st function code provides the upper limit value and the 2nd one provides the lower one.
2103		Average of inputs with output limiter	Average function. This function receives two inputs (input1 and input2), averages them, and outputs the result. This function has output limiters (upper/lower) specified with two function codes. The 1st function code provides the upper limit value and the 2nd one provides the lower one.
2151		Loading function from S13	Loading function from the function code S13 with scale conversion function. This function loads the setting value of the function code S13, maps the pre-selected range which is specified with two function codes, and outputs the result. The 1st function code provides the maximum scale value of the range and the 2nd one provides the minimum scale value of the range. The function code S13 is the PID process command value via communications in (%).
2201		Clip and map function	This function receives single input (input1), clips an pre-selected range which is specified with two function codes from it, maps 0.00 to 100.00%, and outputs. The 1st function code provides the upper limit value of the range and the 2nd one provides the lower limit value of the range. This function can be connected to analog outputs (8000 to 8085) only, and only two of these functions are allowed to use.
2202		Scale converter	Scale conversion function with single input (input1). This function receives single input (input1), maps an pre-selected range which is specified with two function codes, and outputs. The 1st function code provides the maximum scale value of the range and the 2nd one provides the minimum scale value of the range. This function can be connected to analog outputs (8000 to 8085) only, and only two of this function are allowed to use.

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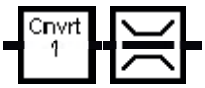
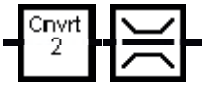
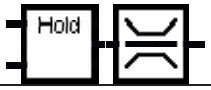
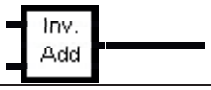
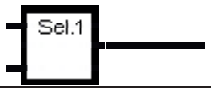
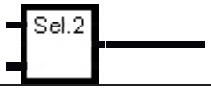
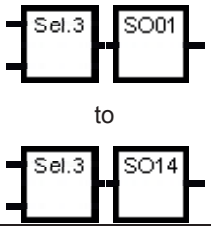
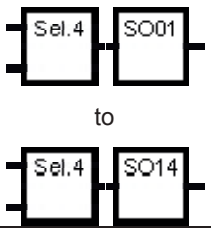
Block selection	Symbol	Function block	Description
3001		Quadratic function with output limiter	Quadratic function with limit. This function receives single input (input1), calclates pre-defined second-order polynomial represented by the following formula, limit, and outputs the result. $K_A \times (Input1)^2 + K_B \times (Input1) + K_C$ The 1st function code provides the upper limit value and the 2nd one provides the lower limit value. The coefficients of the polynomial are given by the function code U92 to U97. Either (3001) or (3002) is available to use, and only one of this function is allowed to use.
3002		Square root function with output limiter	Square root function with limit. This function receives single input (input1), calculates pre-defined square root function represented by the following formula, limit, and outputs the result. $\sqrt{\frac{Input1+K_A}{K_B}} \times K_C$ The 1st function code provides the upper limit value and the 2nd one provides the lower limit value. The coefficients of the polynomial are given by the function code U92 to U97. Either (3001) or (3002) is available to use, and only one of this function is allowed to use.
4001		Hold with output limiter	Function to hold analog 1 input based on digital 1 input.
4002		Inverting adder with enable	Function to reverse analog 1 input based on digital 1 input.
4003		Selector 1	Function to select analog 1 input and setting value based on digital 1 input.
4004		Selector 2	Function to select setting value 1/2 based on digital 1 input.
5001 to 5014		Selector 3-1 to 3-14	Function to select analog 2 input based on "SO01" to "SO14".
5101 to 5114		Selector 4-1 to 4-14	Function to select analog 1 input and "SO01" to "SO14" based on digital 1 input.

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2.3. Specifications of Customizable function

2.3.1. *FRENIC - HVAC/AQUA*

Item	Modes		
Terminal command	Digital 2 input	Analog 2 input	Analog 1 input Digital 1 input
Operation block	Logical operation, counter, etc.: 13 types Timer: 5 types	Numerical operation, comparator, limiter, etc.: 23 types	Selector, hold, etc.: 6 types
Output signal	Digital 1 output	Analog 1 output/ Digital 1 output	Analog 1 output
Maximum number of steps	14 steps		
Maximum number of output signals from customizable function	7 outputs		
Customizable function processing time	5 ms		

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Chapter 3 Frequently asked questions (FAQ)

3.1. Communication (Cannot communicate with inverter)

3.1.1. Message Manager not installed correctly

Message Manager is software that manages communication between the PC and inverter.

If Message Manager has not been installed correctly, your PC cannot communicate with the inverter. The installation state can be checked in the task bar of Windows OS (see the Message Manager icon sample given below). If no Message Manager icon is displayed in the task bar, Message Manager has not been installed correctly.

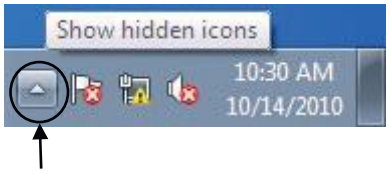
Delete the folder (including its contents) named Fuji Electric Shared in the file path as shown below, and then **Uninstall Loader**.

C:\Program Files\Common Files\Fuji Electric Shared

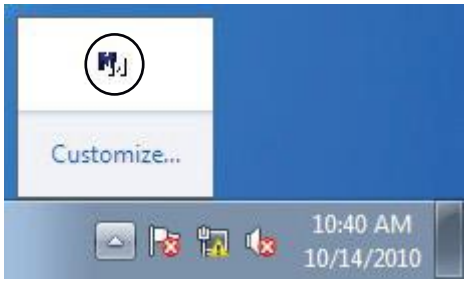
(In the file path shown above, "C" represents the drive letter of the partition or hard disk where Windows is installed. If Windows is installed on a different drive in your system, replace "C" with the letter corresponding to that drive.)

Message Manager icon sample

[1] Windows 7



Click here to show the hidden icon.



[2] Windows Vista/ Windows XP/ Windows 2000

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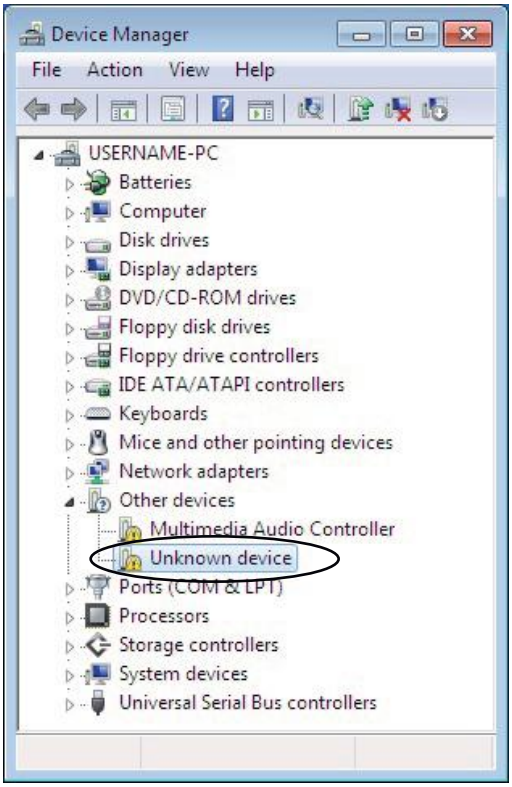
3.1.2. USB driver not installed correctly

To communicate with the inverter via the USB connector, the USB driver (Loader USB device) should be installed.

If the USB driver has not been installed correctly, **Unknown device** appears as shown below.

Installation finished successfully

Installation failed



[1] Windows 7

Refer to Section 1.3.1.1."Installing the USB driver, [3] Windows 7."

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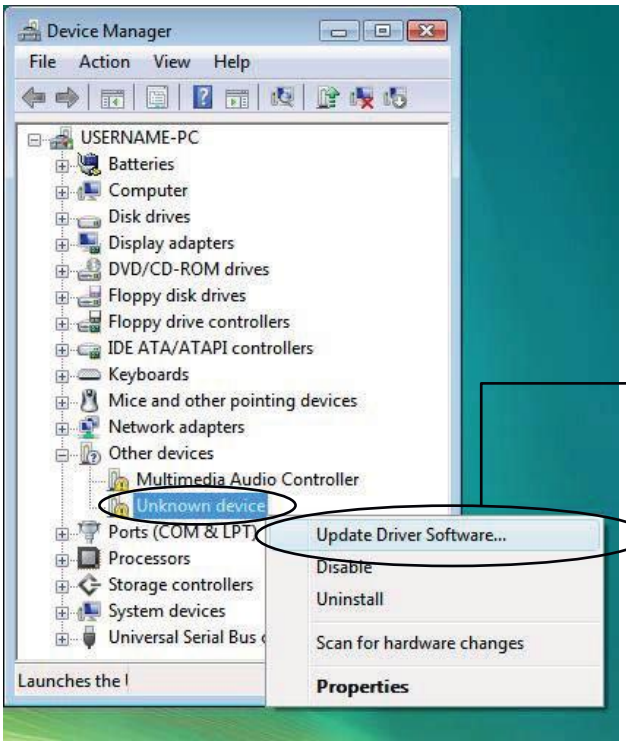
[2] Windows Vista

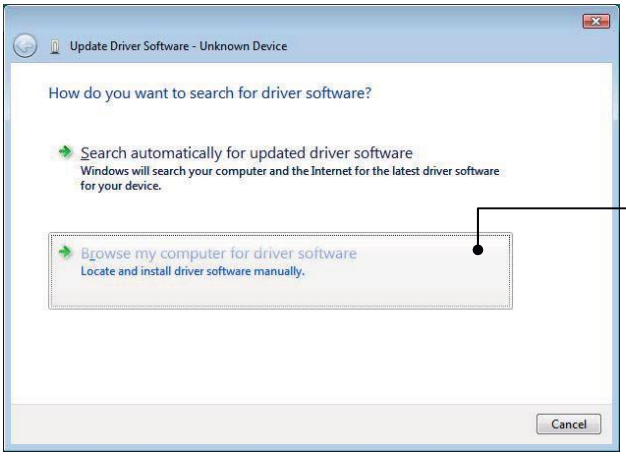
Follow the wizard and install the USB driver as shown below.



From the **Start** menu, select **Control Panel | Hardware and Sound | Device Manager** to open Device Manager as shown at left.

Right-click **Unknown device** to show the drop-down list.

Click **Update Driver Software…** to proceed.



Click **Browse my computer for driver software**.

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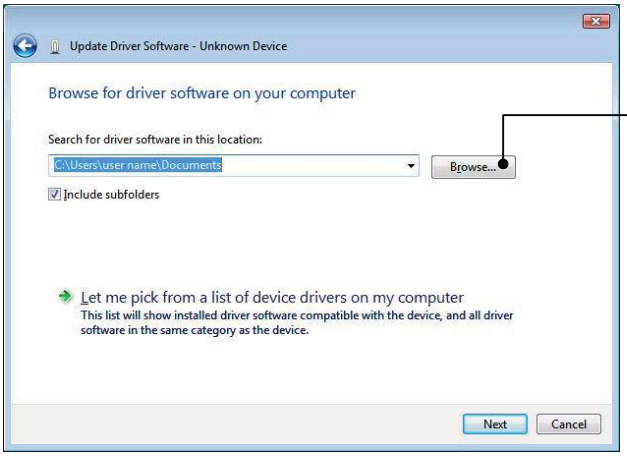
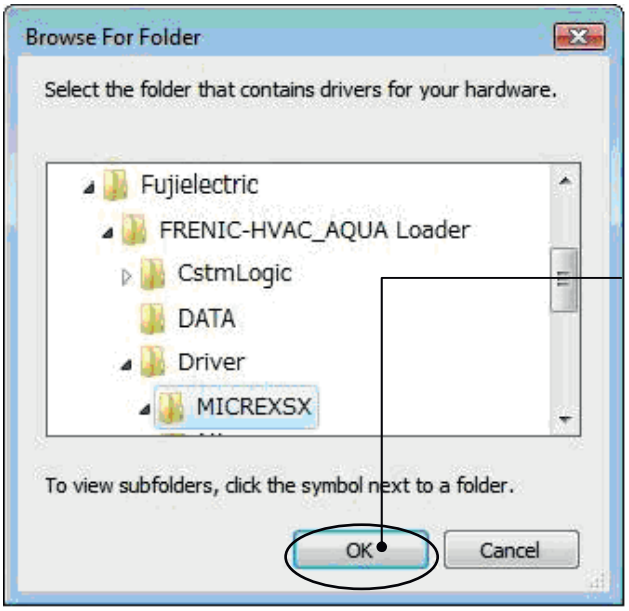
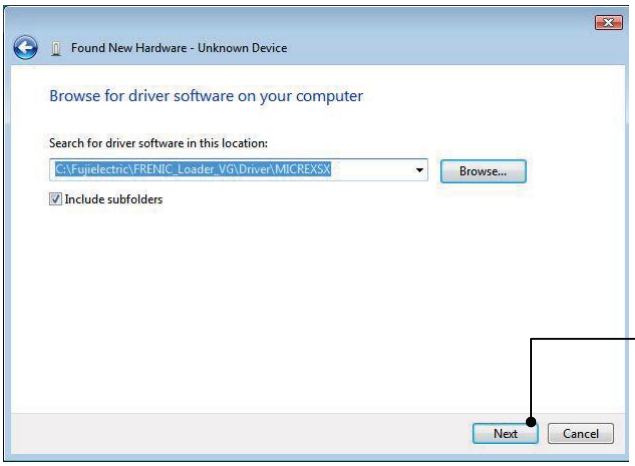


Click **Browse…**.



In the folder in which FRENIC HVAC/AQUA Loader has been installed, select ¥Driver¥MICREXSX and then click **OK**.

The default folder is C: ¥Fuji Electric ¥ FRENIC-HVAC/AQUA Loader ¥Driver¥MICREXSX when the OS drive is C.



To continue, click **Next**.

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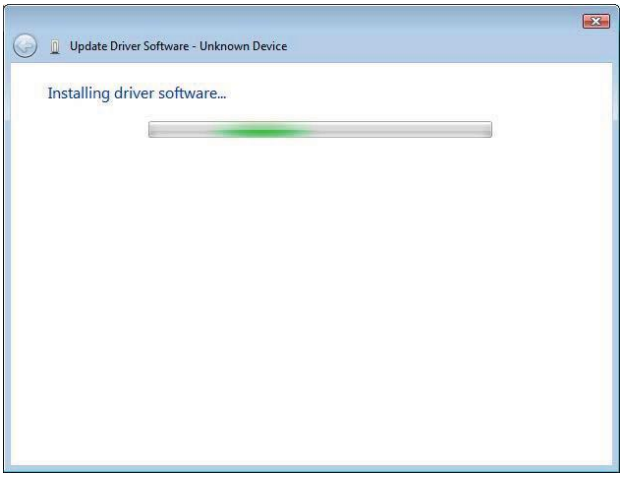
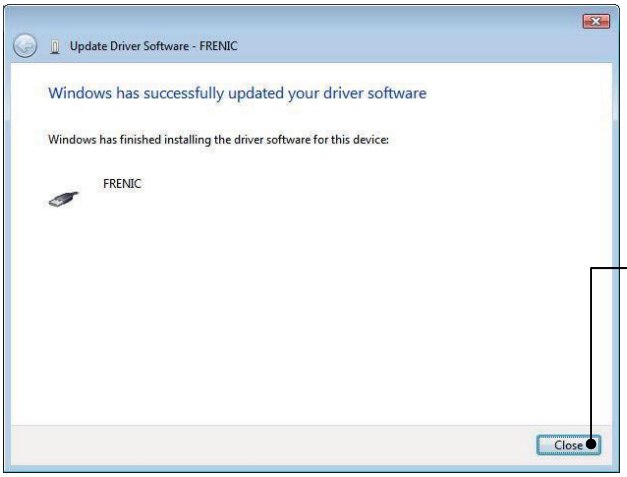
Click **Install this driver software anyway**.



Installation starts.



Upon completion of the installation, the screen at left appears.

To exit the installation wizard and return to Windows, click **Close**.

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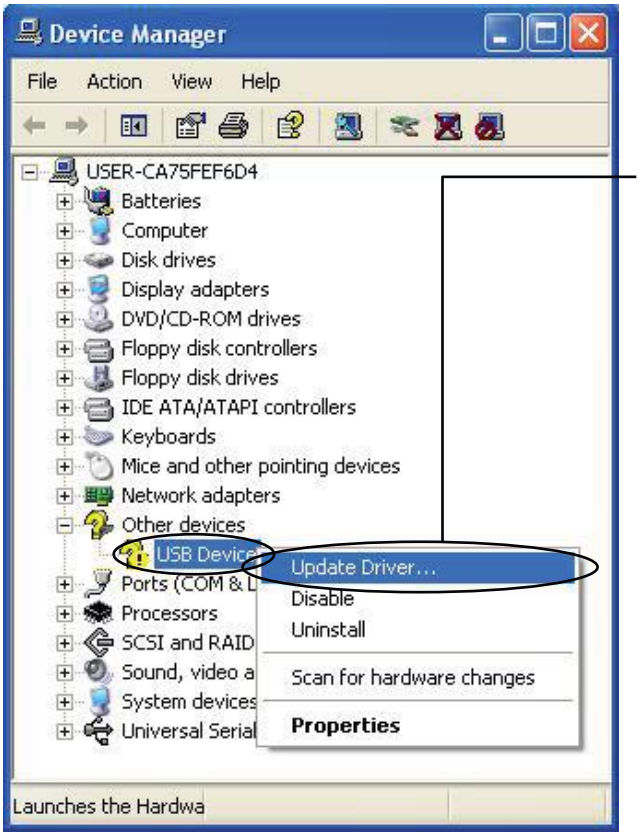
[3] Windows XP

Follow the wizard and install the USB driver as shown below.



From the **Start** menu, select **Control Panel** | **System** | **Hardware** | **Device Manager** to open Device Manager as shown at left.

On the sub-tree of **Other devices**, right-click **USB Device** to show the drop-down list.

Click **Update Driver…** to start the update wizard of the hardware. Install the USB driver, referring to Section 1.3.1.2."Installing the USB driver, [3] Windows XP."

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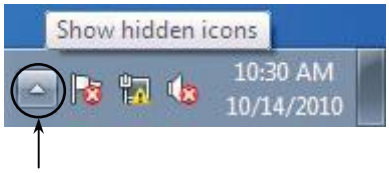
3.1.3. USB driver installed correctly

Although the USB driver has been installed correctly, Loader cannot communicate with the inverter. This problem is considered to be caused by installing the USB driver when Message Manager is running.

In this case, Message Manager is no longer able to recognize the USB driver, so it is necessary to quit both Loader and Message Manager and then start Loader again.

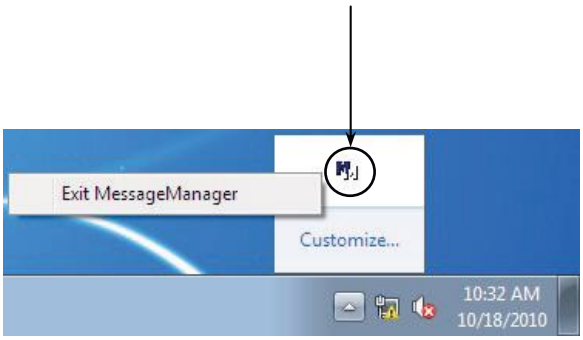
Quitting Message Manager

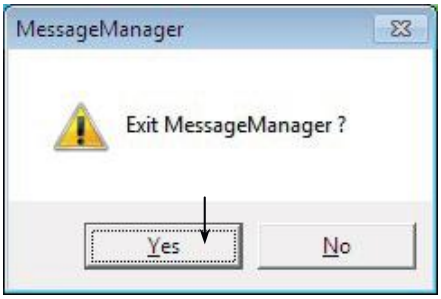
[1] Windows 7



Click this to display the hidden icons as shown below.

Right-click this icon to display **Exit MessageManager**, then click it. The confirmation window appears. Click **Yes** to quit Message Manager.





[2] Windows Vista / Windows XP

Right-click the Message Manager icon to display **Exit MessageManager**, then click it. The confirmation window appears. Click **Yes** to quit Message Manager.

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3.1.4. USB communication impossible after the PC has gone standby or to sleep)

If Windows 7 or Windows Vista goes standby or to sleep, Loader cannot recognize the USB driver so that it cannot communication with the inverter. Follow the instructions given below.

[1] Windows 7

Turn the PC power OFF and ON, then restart Loader.

Note: Unplugging and plugging the USB connector cannot enable the OS to recognize the USB driver again.

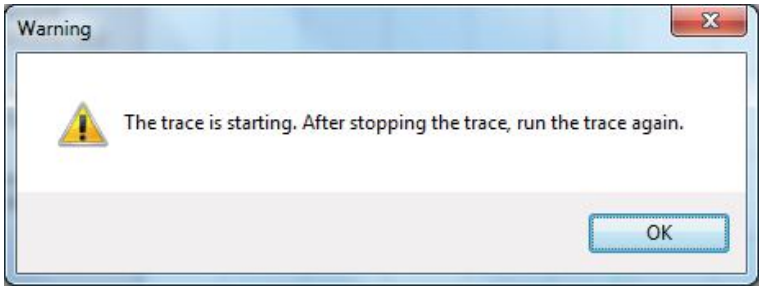
[2] Windows Vista / Windows XP

Unplug and plug the USB connector, then restart Loader.

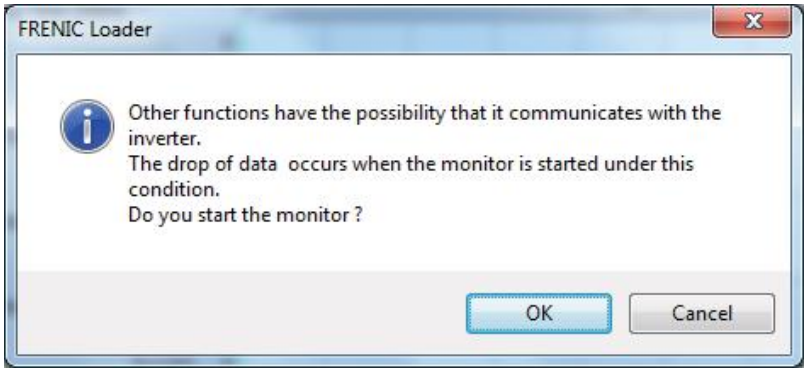
Note: Unplugging and plugging the USB connector enables the OS to recognize the USB driver again.

3.2. Trace

Trying to open other functions after starting the trace, flolowing mesaage is indicated. In that case, after stopping the trace, run the trace again.



Trying to start the trace to communicate with other functions, flolowing mesaage is indicated. To get data correctly, after completing other functions, run the trace again.



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Chapter 4 Specifications

Item		Specifications	Remarks
Name of software		Inverter Support Software (FRENIC-HVAC/AQUA Loader)	
Supported inverter		FRENIC-HVAC/AQUA	Note1)
No. of supported inverters		For USB connection: Only one inverter For RS-485 connection: Up to 31 inverters	
Recommended cable		Cable based on EIA568 (for 10BASE-T or more) RJ-45 connector	Communications support devices for RS-485
Operating environment	CPU	Intel Pentium Ⅲ 600MHz or later	Note2)
	OS	Microsoft Windows XP(SP3 or later) Microsoft Windows Vista(32bit/64bit*) Microsoft Windows 7(32bit/64bit*)	*64-bit version correspond to ver2.0.1.0 or later
	Memory	512MB or more RAM	1GB or more is recommended
	Hard disk	20 MB or more free space	
	COM port	RS-232C or USB	Conversion to RS-485 communications required to connect inverters
	Monitor resolution	800 × 600 or higher	XGA (1024 × 768)/32-bit color is recommended
Transmission requirements	COM port	COM1 to COM255	PC COM ports assigned to Loader
	Transmission rates	USB connection : 12 Mbps RS-485 connection : 38400, 19200, 9600, 4800 and 2400 bps	19200bps or more is recommended.
	Character length	8 bits	Prefixed
	Stop bit length	1 bit	Prefixed
	Parity	Even	Prefixed
	No. of retries	None or 1 to 10	No. of retry times before detecting communications error
	Timeout setting	100ms, 300ms, 500ms, 1.0s to 1.5s to 1.9s, 2.0 to 9.0s, 10.0 to 60.0s	This setting should be longer than the response interval time specified by the function code y09 / y19.

Note1) This Loader is not available for inverter that dosen't support Loader commando protocol (SX protocol).

Note2) In the case using low spec PC, drive monitor picture and test drive picture couldn't be renewed correctly. Use as high spec PC as possible.

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Inverter Support Software

FRENIC-HVAC/AQUA Loader

Instruction Manual

First Edition, October 2012

Third Edition, February 2014

Fuji Electric Co., Ltd.

The purpose of this instruction manual is to provide accurate information in handling, setting up and operating of the FRENIC-HVAC/AQUA series of inverters. Please feel free to send your comments regarding any errors or omissions you may have found, or any suggestions you may have for generally improving the manual.

In no event will Fuji Electric Co., Ltd. be liable for any direct or indirect damages resulting from the application of the information in this manual.

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2014-2