HITACHI

INDUSTRIAL CONTROLLER FOR 10T APPLICATIONS HF-W100E/10T

STARTUP GUIDE



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STARTUP GUIDE

Read and keep this manual.

 Read safety instructions carefully and understand them before starting your operation.

• Keep this manual at hand for reference.

USER'S MANUAL

First Edition, September 2017, HIOT-63-0002-01 (out of print) Second Edition, November 2017, HIOT-63-0002-02 (out of print) Third Edition, April 2018, HIOT-63-0002-03

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SAFETY INSTRUCTIONS

• Product Safety Precautions

Carefully read and fully understand the safety precautions below before operating the equipment.

- Operate the equipment by following the instructions and procedures described in this manual.
- Pay attention especially to safety precautions displayed on the equipment or in this manual. Make sure you follow them. Otherwise, personal injury and property damage including damage to the equipment may result.
- A safety precaution is indicated by a heading as shown below. A heading is either a safety alert symbol; a word such as "DANGER", "WARNING", "CAUTION", or "NOTICE"; or a combination of both.

This is a safety alert symbol. This symbol is used to signify potential hazards that may result in personal injury or death. Make sure you follow the safety message that follows this symbol in order to avoid possible injury or death.

DANGER: This symbol is used to indicate imminent hazards that will highly likely result in serious personal injury or death.

WARNING: This symbol is used to indicate potential hazards that may result in serious personal injury or death.

CAUTION: This symbol is used to indicate potential hazards that may result in minor or moderate personal injury.

NOTICE: This symbol is used to indicate hazards that may result in equipment or property damage but not personal injury.

The heading "NOTE" is used to indicate a cautionary note about handling and operation of the equipment.

- Do not attempt to perform any operation that is not described in this manual. If there is any problem with the equipment, call your maintenance personnel.
- Read this manual carefully and fully understand the directions and precautions written in this manual before operating the equipment.
- Keep this manual nearby so that you can reference the manual anytime you need it.
- Every effort has been made to specify the best precautions on the equipment and in the manual. Nevertheless, unexpected incidents may occur. When you use the equipment, you are asked not only to follow the instructions but also to use your own judgment on safety.



• Common Safety Precautions

Carefully read and fully understand the following safety precautions.

< 🕂 WARNING>

- This equipment is not designed and manufactured to be used for a life-critical system that requires extreme safety. If there is a possibility that the equipment may be used for this purpose, contact relevant sales representatives.
- In case of smoke, a burning smell, or the like, turn off the power to the equipment, disconnect the power cord from the outlet, and contact your supplier or maintenance personnel. Using the faulty equipment without repair may result in a fire or an electric shock.
- This equipment has built-in hard disk drives. Do not hit the equipment or give a shock or vibration to the equipment because that may cause the equipment to fail. Should you drop the equipment or damage its chassis, disconnect the power cord from the outlet and contact your maintenance personnel. Using the faulty equipment without repair may result in a fire or an electric shock. Do not give a shock to the equipment when unpacking or carrying the equipment.
- Never disassemble or modify this equipment. Failure to do so may result in death or serious injury. In addition, note beforehand that Hitachi is not responsible for the results caused by modification.

SAFETY INSTRUCTIONS (Continued)

< AUTION>

- If the equipment drops or is tipped over, personal injury may result. Pay full attention when transporting the equipment.
- Make sure you do not catch or hit your fingers to cause personal injury when unpacking or carrying the equipment.
- There may be a danger of injury or damage to this equipment. Do not use this equipment for purposes other than its original usage.
- Do not touch this equipment directly during operation or immediately after shutting off the power because the equipment may become hot. There is a fear of burn. Install the equipment where the user does not touch the equipment in operation directly by hand.
- This equipment alone cannot guarantee the system safety. In order to ensure sufficient safety of your system even when this equipment should fail, malfunction, or have program bugs, you must add systemic protections such as building external protective/safety circuits to facilitate safety measures to prevent personal injury and serious accidents.
- An emergency stop circuit must be provided externally to this product. Disregarding this rule may result in a damage to the equipment or a hazard to the user if this product fails.
- Perform the operation such as the change pf the program, the forced output, and stop during online (during system operation) after confirming the safety thoroughly. Otherwise, it may result in a damage to the equipment or an accident by wrong operation.

SAFETY INSTRUCTIONS (Continued)

<NOTICE>

- When you work on installation or replacement of hardware, wear an antistatic wrist strap to prevent the buildup of static electricity.
- When you tighten or remove a screw, use a screwdriver that fits the size and type of the head of the screw to avoid stripping the head. When you tighten a screw, drive a screw along the axis of a tapped hole without adding too much torque in order to avoid damaging the thread.
- Do not use the equipment in the environment full of dust or with corrosive gas because that may cause the equipment to fail.
- Do not give a shock to the equipment when unpacking or carrying the equipment. If you do, that may cause the equipment to fail.
- Make sure sufficient clearance is provided for air intake and exhaust in front of and behind the equipment. Otherwise, the temperature inside the equipment may rise and that may cause a failure or short life span of the equipment. In addition, you need to ensure sufficient clearance for maintenance work.
- Use an operating system specified by the Manufacturer. The Manufacturer cannot guarantee proper operation of the equipment if you use an operating system not specified by the Manufacturer.
- Performing emergency shutdown (that is, unplugging the power cord from the outlet or shutting off the breaker without proper shutdown of the OS) may cause the OS or applications not to work properly or may cause saved data to be corrupted. Do not perform emergency shutdown unless you must stop the system immediately due to some kind of error.
- Stop this device (OS shutdown, power-off) after confirming a peripheral equipment is in stop or not influenced.
- When using this device which the equipment targeted for control is connected to, read carefully the attached instruction manual of this equipment and inspect the movement thoroughly.
- Keep in mind that if the power supply is cut, the system may not be able to recover automatically.

PREFACE

This manual mainly describes how to use the software programmable logic controller (PLC) for the industrial controller HF-W100E/IoT (hereinafter denoted as HF-W100E/IoT).

<Organization of this manual>

This manual is organized as follows.

- CHAPTER 1 INTRODUCTION TO HF-W100E/IoT
- CHAPTER 2 SETUP
- CHAPTER 3 CREATING A PLC PROGRAM
- CHAPTER 4 CONFIGURATION OF EtherCAT CONNECTION
- CHAPTER 5 CONFIGURATION FOR USING OPC
- CHAPTER 6 RAS FEATURES IN HF-W100E/IoT

For information about the instructions and cautionary notes related to using devices (hardware) and about how to use the basic RAS features already built into the Hitachi industrial computers, download the electronic manuals for the HF-W100E from the following home page.

http://www.hitachi.co.jp/hfw/

Titles of the electronic manuals	Manual number
HITACHI INDUSTRIAL COMPUTER HF-W100E INSTRUCTION MANUAL	WIN-62-0069
HITACHI INDUSTRIAL COMPUTER HF-W100E RAS FEATURES MANUAL	WIN-63-0095

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- EtherCAT® is licensed and patented by and a registered trademark of Beckhoff Automation GmbH, Germany.
- PLCopen® is a registered trademark of PLCopen.
- All other product names (software and hardware) not from Hitachi described in this manual are registered trademarks, trademarks, or products of their respective owners.

<Note for storage capacity calculations>

- Memory capacities and requirements, file sizes and storage requirements, etc. must be calculated according to the formula 2ⁿ. The following examples show the results of such calculations by 2ⁿ (to the right of the equals signs).
 - 1 KB (kilobyte) = 1,024 bytes
 - 1 MB (megabyte) = 1,048,576 bytes
 - 1 GB (gigabyte) = 1,073,741,824 bytes
 - 1 TB (terabyte) = 1,099,511,627,776 bytes
- Disk capacities, however, must be calculated using the formula 10ⁿ. Listed below are the results of calculating the above example capacities using 10ⁿ in place of 2ⁿ.
 - 1 KB (kilobyte) = 1,000 bytes
 - 1 MB (megabyte) = $1,000^2$ bytes
 - 1 GB (gigabyte) = $1,000^3$ bytes
 - 1 TB (terabyte) = $1,000^4$ bytes

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CHAPTER 1 INTRODUCTION TO HF-W100E/IoT

1.1 Overview

The HF-W100E/IoT is a Hitachi industrial computer HF-W100E equipped with a software PLC. It has the features of both an industrial computer and a programmable logic controller (PLC).

A software PLC is a development environment/runtime environment that executes PLC functions on a computer with a general-purpose OS. HF-W100E/IoT uses CODESYS®, a software PLC developed by 3S-Smart Software Solutions GmbH, Germany (hereinafter denoted as 3S).

About CODESYS

CODESYS is a software PLC developed by 3S. It consists of a development environment that supports programming languages defined in the international standard IEC 61131-3 and a realtime execution environment (runtime environment) that runs control applications developed by the development environment.

In HF-W100E/IoT, the following CODESYS packages are pre-installed. (You can download the development environment from the Web site of 3S, but note that only the following version is verified to work with the HF-W100E/IoT.)

• Development environment: CODESYS Development System (V3.5 SP10 Patch 1)

• Runtime environment: CODESYS Control Softmotion RTE (V3.5 SP10 Patch 1)

■ Using CODESYS

For information about the instructions on how to use CODESYS not described in this manual, refer to the online help for the development environment. You can start the online help on the help menu in CODESYS.

In addition to the online help, CODESYS original manuals (PDF format in English) from 3S are available and stored in the following locations. Refer to them when needed. Note that Adobe® Reader® from Adobe Systems Incorporated is required to read a PDF file.

No.	File name	Storage folder	Description
1	CODESYS Installation and Start.pdf	C:\Program Files (x86)\3S CODESYS \CODESYS\Documentation	Creating a project, executing a task, and debugging in the CODESYS development environment
2	CODESYSControlRTEV3_ Manual.pdf	C:\Program Files\3S CODESYS \CODESYS Control RTE3\Documentation	Mechanism and the settings of the CODESYS runtime environment
3	CoDeSys_OPC_Server_V3 _User_Guide.pdf	C:\Program Files (x86)\3S CODESYS \CODESYS OPC Server 3	Instructions for using OPC Config, which is a configuration tool for the OPC server and for the communication interface between the CODESYS development environment and the PLC.
4	AeConfigurator_UserGuide .pdf		Instructions for using AeConfigurator, which is a tool for adding and setting up alarm events when you use OPC AE.
5	WebServerSSL_en.pdf	C:\Program Files (x86)\3S CODESYS \GatewayPLC\Documentation	Procedure for deploying WebServer with safe connections when Web Visualization is used.

1.2 Specifications

The instruction manual of the HF-W100E, base hardware of HF-W100E/IoT, (hereinafter denoted as HF-W instruction manual) describes the specifications of the industrial computer, and this section supplements them with HF-W100E/IoT-specific specifications.

1.2.1 Software specifications

This manual describes the software specifications only. The hardware specifications are the same as those of the HF-W100E. For details about the hardware specifications, refer to "5.1 Equipment Specifications" in the HF-W instruction manual.

Item		Specifications		
	Item	Motion model	CNC model	
Model		HJ-100E-PAMM	HJ-100E-PBMM	
WIGGET		HJ-100E-PGMM HJ-100E-PHMM		
Pre-inst	alled OS	See "(1)Pre-	installed OS"	
Develop	oment environment	CODESYS® Development	System (V3.5 SP10 Patch1)	
	Programming languages	IEC 61131-3 standard programming	g languages	
		• LD: Ladder diagram		
		• FBD: Function block diagram (including CFC)		
		SFC: Sequential function chart		
		• ST: Structured text		
Runtime environment		CODESYS® Control SoftMotion RTE (V3.5 SP10 Patch1)		
	I/O control Software PLC		re PLC	
	Motion control	SoftMotion (PLCopen® compliant)	SoftMotion (PLCopen® compliant) CNC (G-code)	
	Field network	EtherCAT	ſ® master	
Data exchange standard		OPC server		
	HMI features	Visualization features		

(1) Pre-installed OS

HJ-100E-PAMM	Microsoft® Windows® 10 IoT Emterprise 2016 LTSB (64bit)
HJ-100E-PBMM	Microsoft® Windows® 10 IoT Emterprise 2016 LTSB (64bit)
HJ-100E-PGMM	Microsoft® Windows® Embedded Standard 7 SP1 (64bit)
HJ-100E-PHMM	Microsoft® Windows® Embedded Standard 7 SP1 (64bit)

1.2.2 LAN interface specifications

(1) EtherCAT connection

Built-in LAN port are handled as follows.

I	tem	Default factory setting	EtherCAT capable	Remarks
Duilt in LAN	LAN A	Ethernet	Yes	
Built-in LAN port	LAN B	EtherCAT	Yes	(*)
port	LAN C	EtherCAT	Yes	(*)

(*) CODESYS EtherExpress driver for EtherCAT is installed at the factory.

To use different interfaces than the ones set up at the factory, update the network driver. For information about how to update the driver, see "2.3 Updating the Network Driver". For information about the location of the LAN port connectors, refer to "1.5 Name and Function of Each Part" in the HF-W instruction manual.

(2) LAN cables

In "5.8 Interface Specifications" in the HF-W instruction manual, UTP cables are recommended for use in connection to LAN ports. In spite of that, we recommend using cables with the following specifications if the cables are used for EtherCAT connection on HF-W100E/IoT.

Cable specification: STP cable (shielded twisted-pair cable) category 5e or better

[Caution]

When an STP cable is used, the grounds of the devices at both ends must be at the same voltage level.

1.2.3 BIOS settings

The factory default BIOS settings for HF-W100E/IoT are as follows. Do not change these settings. If you do, it may affect the processing of realtime control.

BIOS settings other than those below are the same as the default settings for the HF-W100E. For details about the setup menu, refer to "5.3 BIOS Setup" in the HF-W instruction manual.

Top menu	Setting item		Value	Caution	
Chipset	South Bridge	USB Configuration	Legacy USB Support	Disabled	Do not change these settings.

[Caution]

If you use **Restore Defaults for Windows 7** (in the case of Windows® Embedded Standard 7) or **Restore Defaults for Windows 10** (in the case of Windows® 10) in the setup menu, the BIOS settings go back to the initial settings of the HF-W100E. After you use this menu, restore the BIOS settings to the factory default settings of HF-W/IoT (as in the above table).

1.3 Changes to the HF-W Instruction Manual

This section explains the changes you must make to the HF-W instruction manual.

- 1.3.1 Time required for restoring the factory condition with the recovery DVD In "7.1 Overview of Restoration Procedure" in the HF-W instruction manual, the time required for restoring the factory condition is approximately 30 minutes for HF-W100E/IoT.
- 1.3.2 Recovery DVD name

The name of the recovery DVD described in "7.2 Preparation" and "7.3 Restoring the System Drive Back to the Factory-Shipped Condition" in the HF-W instruction manual must be replaced as follows.

 Before
 HITACHI <u>HJ-100E-****</u> Product Recovery DVD (The underlined part is the model number of the device you purchased.)

 After
 HITACHI HF-W/IoT <u>HJ-100E-****</u> Product Recovery DVD (The underlined part is the model number of the device you purchased.)

<Name to replace>

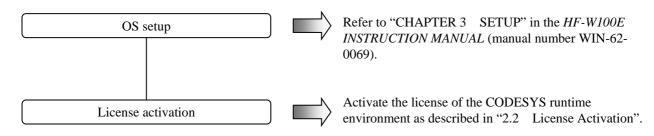
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CHAPTER 2 SETUP

This chapter describes how to set up the HF-W100E/IoT.

- After setting up the OS, activate the license of the CODESYS runtime environment. However, since devices shipped after September 2018 will be automatically licensed, it is not necessary to perform the activation process. Please check to "2.2.1 Confirmation of Activation Status" to see if license activation is being done.
- The CODESYS development environment and the runtime environment are pre-installed. You do not have to install or set them up.

2.1 Setup Items



2.2 License Activation

Product activation is required for the CODESYS runtime environment (CODESYS SoftMotion RTE) installed on this device. You must go through license authentication (product activation) against 3S, the manufacturer.

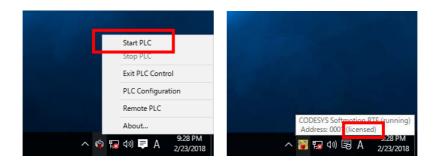
2.2.1 Confirmation of Activation Status

You can check if license activation is done by the following procedure.

1. Click the CODESYS Control RTE V3 icon in notification area on the taskbar. (The icon is hidden by default, and you must click "^" to find it. (Note)) Then click **Start PLC** to start the CODESYS Softmotion RTE.

(Note)You can set it to display an icon in the notification area by the following procedure.

- Right-click " \land " in the notification area and click **Properties** from the displayed menu.
- · Click **Customize** on the displayed screen.
- · Click Select which icons appear on the taskbar.
- Set the icon of [CODESYS "Control RTE V3" RTE SysTray] to ON.
- 2. After the icon turns yellow, point the CODESYS Control RTE V3 icon again and check the display contents(last string of "Address:" line in lower row).



Display contents	Meaning and Action	
(licensed)	License activation has already been done.	
	License activation procedure is unnecessary.	
(DEMO)	License activation has not been done yet.	
	Please perform license activation by the method	
	described in "2.2.2 License activation method"	

NOTE

Make sure you activate the license. If the license is not activated, the runtime environment stops after running two hours.

2.2.2 License activation method

(1) Online activation

Activate the license on this device. In this case, you must connect to the Internet.

- Using the CODESYS development environment
- Using a Web browser
- (2) Offline activation

Activate the license on the environment (PC with Internet access) outside this device. You can activate the license without connecting this device to the Internet.

For the procedure, refer to "2.2.3 License activation procedure" in the next section.

2.2.3 License activation procedure

(1) Online activation

- (a) Using the CODESYS development environment
 - 1. Start the CODESYS development environment in the following steps. Wait until the startup process is complete. Be aware that it may take dozens of seconds.
 - If the OS is Windows[®] Embedded Standard 7, click **Start**, and click **All Programs** > **3S CODESYS** > **CODESYS** > **CODESYS V3.5 SP10 Patch1**.
 - If the OS is Windows® 10, click Start, and click 3S CODESYS > CODESYS > CODESYS V3.5 SP10 Patch1 from the list of applications.

(Alternatively, double-click the **CODESYS V3.5 SP10 Patch1** icon on the desktop.)

- 2. The CODESYS development environment starts. Click **New Project**. Create a new project as follows.
 - Categories: Projects
 - Templates: Standard project
 - Name: Any
 - Location: Any
 - Device: Different depending on the model you purchased. Select as follows.

Model name	Device name
Motion model	HJ-100E RTE SoftMotion 64bit (Hitachi Industry & Control Solutions, Ltd.)
CNC model	HJ-100E RTE CNC 64bit (Hitachi Industry & Control Solutions, Ltd.)

• PLC_PRG in: Any

CODESYS		- 0	×
File Edit View Project Build	<u>Online D</u> ebug <u>T</u> ools <u>Wi</u> ndow <u>H</u> elp		
	b®×IM41©11111111111111111111111111111111111	*[[] 9] 4 4 8 4 [] 2 []	
Devices - 4 ×	Start Page X		•
	CODESYS V3.5 SP10 Patch 1		
	Pacia Operations	Latest News	
	Basic Operations	Latest News	
	New Project	The current news channel might not be valid or your Internet connection might be unavailable. To change the news channel, go to the Options dialog and select the	
	Open Project	Unavailable. To change the news channel, go to the Options dialog and select the Load&Save category.	
	open Project nom P.C		
	Recent Projects		
	· · · · · - j		
	Close page after project load		
Sevices POUs	Show page on startup		
Messages - Total 0 error(s), 0 w	varning(s), 0 message(s)		
		Last build: 😳 0 🕐 0 Precompile: 🗸 Current user: (nobody)	0

3. Click the CODESYS Control RTE V3 icon in notification area on the taskbar. (The icon is hidden by default, and you must click "^" to find it.) Then click **Start PLC** to start the CODESYS Softmotion RTE. Before the activation, the CODESYS Softmotion RTE runs in DEMO mode.

	Start PLC		
	Stop PLC		
	Exit PLC Control		
	PLC Configuration		
	Remote PLC		
	About		CODESYS Softmotion RTE (running Address: 0001;(DEMO)
^ 🏟 🌄	⊲») 📮 A 11:13 AM 6/8/2016	^	🛐 🈨 🕼 🗟 A 🛛 11:13 AM 6/8/2016

4. Double-click **Device** (*****) in the **Devices** window. ((*****) shows the selected device name.) Then click **Scan network**.

Untitled1.project - CODESYS		- 0	×
			^
Eile Edit View Project Build Online D			
1 🖆 🖬 🎒 🗠 🖓 🌆 🖪 X		\$\$\$ \$\$\$ ▶ ■ \$ % 〔≡ \$∃ ± \$ \$ \$ 8 8 \$	
Devices 👻 🖣 🗙	Device 🗙		-
Untitled1 Device (HJ-204x RTE CNC 64bit)	Communication Settings	Scan Network Gateway - Device -	
PLC Logic	Applications		
Library Manager PLC_PRG (PRG)	Backup and Restore		
🖹 🧱 Task Configuration	Files	Gateway	
PLC_PRG SoftMotion General Axis Pool	Log	Gateway-1 V DESKTOP-NQJ6EQU	$\overline{}$
	PLC Settings	IP-Address: localinost	
	PLC Shell	Port 1217	
	Users and Groups		
	Task Deployment		
	Status		
	Information		
Sevices POUs			
Messages - Total 0 error(s), 0 warning(s), 0	message(s)		
		Last build: 😲 0 🕐 0 Precompile: 🧹 Current user: (nobody)	Ø:

5. The **Select Device** window opens. Select the device you want to select, and click **OK**.

Gateway-1	Device Name: DESKTOP-NQJ6EQU Wink
	Device Address:
	Number of channels: 8
	Target ID: 1671 0002
	Target Name: HJ-204x RTE CNC 64bit
	Target Type: 4102
	Target Vendor: Hitachi Industry & Control Solutions, Ltd.

- Note: If no devices are shown under **Select the network path to the controller**, repeat clicking **Scan network**. If you still cannot find any devices, the CODESYS Softmotion RTE may not have started yet. Do the following.
 - Check that the settings in Step 2 are all correct.
 - Stop and then restart the CODESYS Softmotion RTE. To stop the CODESYS Softmotion RTE, click **Stop PLC** in Step 3.
- 6. Click **PLC Settings** in the **Device** tab. Then click **Edit License**.

Untitled1.project - CODESYS		- 🗆 X
Eile Edit View Project Build Online		
1 🖉 🖪 📾 🗠 🖉 🖷 🗶 🖉		\$\$\$ \$\$\$ ▶ = \$ % [≡ ?∃ ?⊒ ?∃ *∃ \$ \$ ₩ ₩
Devices 👻 🕂 🗙	Device X	
Untitled1 Device (HJ-204x RTE CNC 64bit)	Communication Settings	Application for 1/0 handling: Application
PLC Logic Application	Applications	PLC settings
Library Manager	Backup and Restore	Behaviour for outputs in Stop: Keep current values V
🖹 🎆 Task Configuration 🖹 🕸 MainTask	Files	Always update variables: Disabled (update only if used in a task) Edit Licenses
DIC_PRG	Log	
	PLC Settings	Bus cycle options Bus cycle task: <unspecified></unspecified>
	PLC Shell	Additional settings
	Users and Groups	Generate force variables for IO mapping EnableDiagnosis for devices Show J/O warnings as errors
	Task Deployment	
	Status	
	Information	
😤 Devices 🗋 POUs	_	
Messages - Total 0 error(s), 0 warning(s),	0 message(s)	
		Last build: 😳 0 🕐 0 Precomplie: 🧹 Current user: (nobody) 🔇

oducts		oad Dongle(s)	-
empty	Name:	empty	
	Company:	3S Smart Software Solutions	
	Units:	-	
	Number of licenses:	-	
	Usage:	-	
	Feature map:	-	
	Activation time:	-	
	Deactivation time:	-	
	Firm code:	5000304	
	Product code:	0	
	Description:		
			1
Valid license on dongle			

7. The Edit Licenses window is displayed. Click Install licenses.

8. The **Select Operation** window is displayed. Select **Activate license**, and then click **Next**.

Install Licenses	i	
What do you want	to do?	a star
Activate license	e	
Use this option if license activation		d the software vendor has supplied a
O Request licens	e	
dongle, which car	es not have internet access, you can be activated over internet on anot en be installed on this machine using	ther machine. The resulting license
upuate file can tr		
O Install license		
O Install license	license update file, use this option i	in order to install it to your dongle.
O Install license	license update file, use this option i	in order to install it to your dongle.
O Install license	license update file, use this option i	

9. The Active License window is displayed. Enter the ticket ID shown on the license certificate (included with the product) in the Ticket ID box. Then click Next.

Install Licenses -	Activate License	\times
Install Licen Activate a lice	ses over the internet	k
	r ticket ID and select the license server. Both values have been provided vendor during the order process.	
License server:	3S-Smart Software Solutions GmbH (http://license.codesys.com) 🗸	
Ticket ID:]
	Select ticket from repository	
	Cancel < Back Next > Finish	i

 The Select Licenses window is displayed. Select the checkbox for CODESYS Control SoftMotion RTE SL, and then click Next. When the authentication process is finished, click Finish.

Install Licenses - Select Licenses			×
Install Licenses Select Licenses to activate			
The ticket contains the following licenses which can be activate you want to activate.	ed. Please s	elect the	ones
Name	Availlable	Taken	Total
CODESYS Control SoftMotion RTE SL (Full)	1	0	1
Cancel < Back	Next >	E	nish

11. If the activation is successful, the following window appears. Click Finish.

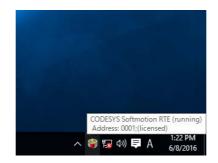
Install Licenses - License Activation Completed	×
Install Licenses	
License Activation Completed	
The license activation has been completed success	fully.
Cancel < Ba	ck Next > Finish

<Confirming the license activation status>

In the **Edit Licenses** window, you can check that the license for CODESYS Control SoftMotion RTE has been activated.

Edit Licenses			×
Dongle: Softcontainer: [1]: SN=128-4515421, Version= Products	1.19, Chip=0, Rev=0 V Re	load Dongle(s)	and the second s
CODESYS Control SoftMotion RTE SL	Name: Company: Units: Number of licenses: Usage: Feature map: Activation time: Deactivation time: Firm code: Product code: Description: Unlimited RTE for SoftMol	CODESYS Control S 3S-Smart Software - - 0001 - 5000304 309015	
Valid license on dongle Invalid license on dongle No license on dongle Install licenses			Close

You can also check the display status of the CODESYS Control RTE V3 icon in notification area on the taskbar to see whether the mode has been changed from DEMO to licensed.



- (b) Using the Web browser
 - Click the CODESYS Control RTE V3 icon in notification area on the taskbar. (The icon is hidden by default, and you must click "^" to find it.) Then click Start PLC to start the CODESYS Softmotion RTE. Before the activation, the CODESYS Softmotion RTE runs in DEMO mode.

	Start PLC	
	Stop PLC	
	Exit PLC Control	
	PLC Configuration	
	Remote PLC	
	About	CODESYS Softmotion RTE (run Address: 0001;(DEMO)
^ 🕸 🖪	ਡ ⊲≫) 厚 A 11:13 AM 6/8/2016	へ 🛐 🗔 🕼 🗟 A 🛛 👬 😽

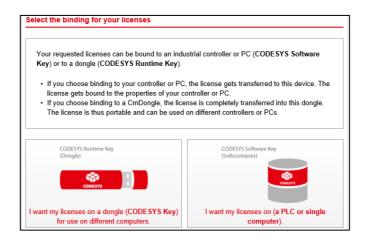
2. Visit the CODESYS license activation site (<u>http://license.codesys.com</u>). Enter the ticket ID shown on the license certificate (included with the product) in the **License key** box. Then click **Next**.

co	DESYS Lie	ense Central			
	Get licenses		YS products	English	*
To activate		product please e	ntime Key or CO		
License key: Next	7				

3. The activation status of the license is displayed. Click Activate licenses.

My Licenses			
Name CODESYS Control SoftMotion RTE SL (Full)	Activated on	License container	Status Available
Activate licenses			

4. Click **CODESYS Software Key** (Softcontainer) as the binding for the license.



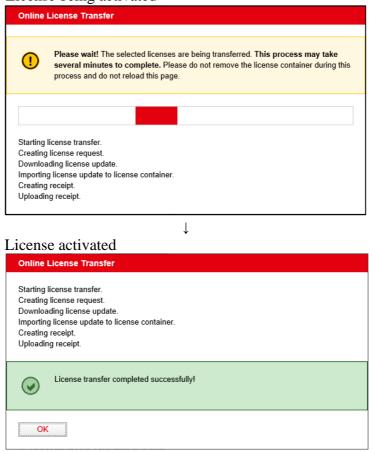
Note: Do not select **CODESYS Runtime Key (Dongle)** (not supported by this device).

5. Select the license container, and click Activate selected licenses now.

To activate your licenses: 1. Select the licenses you want to activate. 2. Select the local license container where you want to trans 3. Click "Activate selected licenses now". ✓ Name Activat ✓ CODESYS Control SoftMotion RTE SL (Full) Select license container 128-9750234 (3S-Smart Software Solutions Softlicenses) ✓		icenses. License contair	ner Status Available
2. Select the local license container where you want to trans 3. Click "Activate selected licenses now". Name Activat CODESYS Control SoftMotion RTE SL (Full) Select license container			
Name Activat CODESYS Control SoftMotion RTE SL (Full) Select license container	ted on	License contai	
CODESYS Control SoftMotion RTE SL (Full) Select license container	ted on	License contai	
Select license container			Available
128-9750234 (3S-Smart Software Solutions Softlicenses) V			
	3		
Activate selected licenses now		Offline	license transfer
Select binding			
My Licenses			

↓

License being activated



A window is displayed to indicate that license activation was successful. Click **OK**.

<Confirming the license activation status>

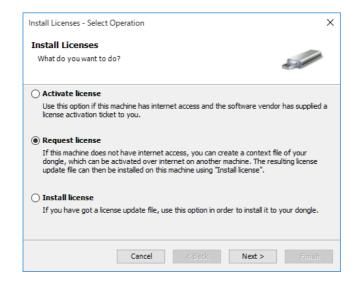
In the window in Step 2, enter the ticket ID in the **License key** box again, and click **Next**. Then you can confirm that the license status has changed to "Activated". (You cannot reactivate using the same ticket ID.)

My Licenses			
Name	Activated on	License container	Status
CODESYS Control SoftMotion RTE SL (Full)	2017-03-10 21:54:36	128-9750234	Activated

You can also check the display status of the CODESYS Control RTE V3 icon in notification area on the taskbar to see whether the mode has been changed from DEMO to licensed.



- (2) Offline activation
 - 1. Execute Steps 1 to 7 in "(1) Online activation (a) Using the CODESYS development environment".
 - 2. The **Select Operation** window is displayed. Select **Request license**, and then click **Next**.



3. The **Request License** window is displayed. Create a request file (WibuCmRaC) to be used in license activation. Specify the Software vendor and the file save location, and click **Finish**.

Install Licenses - Re	quest License	×
Install License Create a dongle (es context file to be activated on another computer.	,
activate the license	ibing your dongle will be generated. Using this file, you will be able to over the internet on another computer. file will not contain information from any other than the selected software to share this file with the selected software vendor.	2
Software vendor:	3S-Smart Software Solutions GmbH (Firm Code=5000304)	-
Context file:	C:¥Users¥HF-W IoT¥Desktop¥Dongle_4515421.WibuCmRaC	
	Cancel < Back Next > Finish	

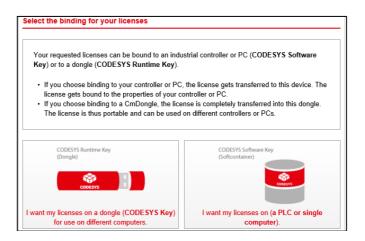
4. Use a PC with Internet access to visit the CODESYS license activation site (<u>http://license.codesys.com</u>). Enter the ticket ID shown on the license certificate (included with the product) in the **License key** box. Then click **Next**.

cc	DDESYS	xense Central	
For the ac Home	Get licenses	e platform our CODESYS products English CODESYS Runtime Key or CODESYS SoftContai	ner
	e your CODESYS	product please enter your license key and click "Next" to	
	ense activation pro	cess.	

5. The activation status of the license is displayed. Click Activate licenses.

My Licenses			
Name	Activated on	License container	Status
CODESYS Control SoftMotion RTE SL (Full)			Available
Activate licenses			

6. Click CODESYS Software Key (Softcontainer) as the binding for the license.



Note: Do not select **CODESYS Runtime Key (Dongle)** (not supported by this device).

7. To jump to the window for online activation, click the **Offline license transfer** link near the lower right corner. In the following examples, CODESYS is not installed, and therefore, an error message is shown to indicate that the license activation system (CodeMeter) is not supported.

If you are prompted to install a CodeMeter add-on, you do not have to install the addon because offline activation is still possible.

To activate your licenses:		
 Select the licenses you want to activate. Select the local license container where y Click "Activate selected licenses now". 	you want to transfer the licenses.	
Name	Activated on License container	Status
CODESYS Control SoftMotion RTE SL (Full))	Available
ActiveX is not enabled. Please ena 0x1808810B CodeMeter License Central WebD	able ActiveX or use Offline license transfer.	
0x1808810B		
0x1808810B CodeMeter License Central WebD		nse transfer
0x1808810B CodeMeter License Central WebD 2017-03-25 06:59:30 (UTC))epot v16.03.165.500.le	nse transfer
0x1808810B CodeMeter License Central WebD)epot v16.03.165.500.le	nse transfer

8. In **Select license request file**, specify the path of the request file created in Step 3. Click **Upload request and continue now** to upload the request file.

Upload request Download	l update	Upload recei	ipt
To activate your licenses offline - First step "U	pload request":		
 Create a license request file with Firm Code 5 want to transfer the licenses. This file can be o Select the licenses you want to activate. Select the created license request file. Click "Upload request and continue now". 			
Name	Activated on I	icense container	
CODESYS Control SoftMotion RTE SL (Full)			Available
lect license request file (*.WibuCmRaC)			
Browse			
Upload request and continue now		Online lice	nse transfe
Select binding			

9. Click **Download license update file now** to obtain the license update (WibuCmRaU) file.

Download License Update File	
Upload request 🗸 Download update	Upload receipt
To transfer your licenses offline - Second step "Download Update"	:
 Click "Download license update file now" and save the file on your c Import this license update file to the license container with Serial 12 be imported with the CODESYS. How it works After you have successfully transferred the license update file to the "Next" to confirm the license transfer. 	8-9750234. This file can
Download license update file now Next	Online license transfer
My Licenses	

10. The following window is displayed for uploading the result of the license activation, but first execute the following Steps 11 to 13.

	Upload request	/	Download update	Upload receipt
To tr	ansfer your lice	nses offline - Th	ird step "Upload receij	pt":
1. C	reate a license re	eceipt file from the	e license container with	Serial 128-9750234 and Firm
C	ode 5000304. T	nis file can be cre	ated with the CODESYS	. How it works 🛨
		license receipt fil	e.	
3. C	lick "Upload rece	ipt now".		
	u have not import oceed to the dow		date file yet, then you ca	an download it again. Click "Back"
<u> </u>				
		le (*.WibuCmRaC	C)	
		le (*.WibuCmRa	C)	
lect li		le (*.WibuCmRa	C)	Online license transf
lect li	cense receipt fi	le (*.WibuCmRaC	C)	Online license transf

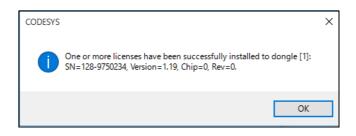
11. In the **Select Operation** window of HF-W100E/IoT, select **Install license**, and then click **Next**.

Install Licenses		
What do you want	to do?	a start
O Activate license	•	
Use this option if t license activation		s and the software vendor has supplied a
O Request license	•	
dongle, which can		ou can create a context file of your another machine. The resulting license using "Install license".
Install license		
If you have got a	license update file, use this opt	tion in order to install it to your dongle.

12. The **Install License** window is displayed. Specify the path of the license update file you obtained in Step 9, and then click **Finish**.

Install Licenses - Install	License		×
Install Licenses			
Update your dongle	with a license up date file.		and the second
Please specify the path activation over the inte	to the license update file whic met.	h has been downloade	d during software
	Cancel < Ba	nck Next >	Finish

13. If the activation is successful, the following message is displayed. Click OK.



- 14. In order to report the successful license activation to the license activation site, follow Steps 1 to 3 again and create a new request file (WibuCmRaC).
- 15. Go back to the PC with Internet access. In **Select license receipt file** in the window in Step 10, specify the path of the request file created in Step 14. Click **Upload receipt now** to upload the result of the license activation.
- 16. A message is displayed to indicate that the result of the license activation has been reported. Click **OK**.

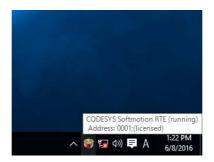
License Transfer Successfully Completed	_
The license transfer has been completed successfully.	
ОК	

<Confirming the license activation status>

In the window in Step 4, enter the ticket ID in the **License key** box again, and click **Next**. Then you can confirm that the license status has changed to "Activated". (You cannot reactivate using the same ticket ID.)

All licenses are activated.	
Product Name	Status
CODESYS Control SoftMotion RTE SL (Full)	Activated

You can also check the display status of the CODESYS Control RTE V3 icon in notification area on the taskbar to see whether the mode has been changed from DEMO to licensed.



2.3 Updating the Network Driver

In the factory settings of HF-W100E/IoT, the Intel® Network driver is used for the built-in LAN (LAN A), and the CODESYS EtherExpress driver is used for the built-in LAN (LAN B and LAN C) to support EtherCAT.

To use the built-in LAN (LAN A) as EtherCAT, or to use the built-in LAN (LAN B and LAN C) as Ethernet (TCP/IP), update network drivers. To update a network driver, follow the procedure below:

NOTE

This product may record the following events in the event log during update the CODESYS EtherExpress driver to the Intel® Network driver. These events do not affect the operation of the system.

Event ID	Source	Туре	Description
10317	NDIS	Error	Miniport (*1), {(*2)}, had event Fatal error: The
			miniport has detected an internal error

(*1) shows the network adapter name.

(*2) shows the GUID.

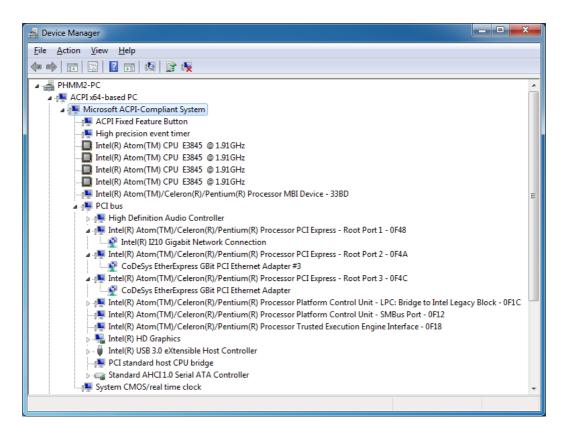
1. Log on to the computer as an administrator account.

- 2. Open Control Panel.
 - If the OS is Windows® Embedded Standard 7, click **Start**, and click **Control Panel**.
 - If the OS is Windows® 10, right-click Start, and click Control Panel from the menu.
- 3. Click Start > Control Panel > System and Security. Click the System icon, and then Device Manager.
- 4. The **Device Manager** window appears. Click the **View** menu, and select **Devices by connection**.
- 5. If the OS is Windows® Embedded Standard 7, expand ACPI x64-based PC > Microsoft ACPI-Compliant System > PCI bus.

If the OS is Windows® 10, expand ACPI x64-based PC > Microsoft ACPI-Compliant System > PCI Root Complex.

6. As in the following example, right-click on the network adapter where you want to update the driver. Then a menu appears. Click **Update Driver Software**.

The following screenshot is just an example. Be aware that network adapter names are displayed differently for the HF-W100E/IoT.



<To update the driver for built-in LAN (LAN A)>

Click Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor PCI Express – Root Port1 – 0F48. Then, right-click on the network adapter displayed below (in the example above, Intel(R) I210 Gigabit Network Connection (*)).

<To update the driver for built-in LAN (LAN B)>

Click Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor PCI Express – Root Port2 – 0F4A. Then, right-click on the network adapter displayed below (in the example above, CoDeSys EtherExpress GBit PCI Ethernet Adapter #3 (*)).

<To update the driver for built-in LAN (LAN C)>

Click Intel(R) Atom(TM)/Celeron(R)/Pentium(R) Processor PCI Express – Root Port3 – 0F4C. Then, right-click on the network adapter displayed below (in the example above, CoDeSys EtherExpress GBit PCI Ethernet Adapter #2 (*)).

(*) Network adapter names are displayed differently for the HF-W100E/IoT.

- 7. The **Update Driver Software** window appears. Click **Browse my computer for driver software**.
- 8. Click Let me pick from a list of device drivers on my computer.
- 9. Select a new driver you want to update, and then click Next.
 - <To use a port as Ethernet (TCP/IP)>

Select Intel(R) 210 Gigabit Network Connection, and then click Next.

Note: If the OS is Windows® 10, two [Intel (R) 210 Gigabit Network Connection] are displayed, select the upper side.

<To use a port as EtherCAT> Select **CoDeSys EtherExpress GBit PCI Ethernet Adapter**, and then click **Next**.

10. A message is displayed to indicate that the driver has been successfully updated. Confirm the message, and then click **Close**.

This completes the installation of the driver. Restart the HF-W100E/IoT.

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CHAPTER 3 CREATING A PLC PROGRAM

3.1 PLC Program Creation Procedure

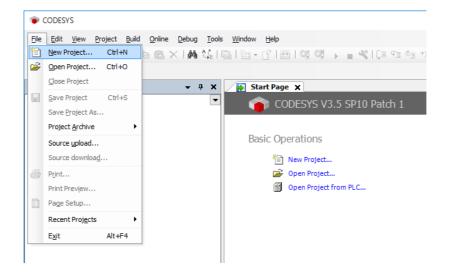
3.1.1 Creating a project

The following shows how to create a new project.

- 1. Start the CODESYS development environment in the following steps. Wait until the startup process is complete. Be aware that it may take dozens of seconds.
 - If the OS is Windows® Embedded Standard 7, click Start, and click All Programs > 3S CODESYS > CODESYS > CODESYS V3.5 SP10 Patch1.
 - If the OS is Windows® 10, click **Start**, and click **3S CODESYS** > **CODESYS** > **CODESYS V3.5 SP10 Patch1** from the list of applications.

(Alternatively, double-click the CODESYS V3.5 SP10 Patch1 icon on the desktop.)

2. Click the File menu, and on the menu, click New Project.



3. The **New Project** window is displayed. Select **Standard project** under **Templates**. Specify a project name for **Name** and a save location for **Location**, and then click **OK**.

Categories	•	Templates:		
	raries ojects	Empty project	HMI project	Standard project
		Standard project with Applicatio		
	ontaining one device, d	one application, and an empt	y implementation for	PLC_PRG
A project c Name:	sample			

- 4. Select a device to run and a programming language (language for PLC_PRG) to use, and then click **OK**.
 - The device differs depending on the model you purchased. Select one of the following. A device not described in the following table can be selected but it will not be supported in HF-W100E/IoT.

Model	Device
Motion model	HJ-100E RTE SoftMotion 64bit (Hitachi Industry & Control Solutions, Ltd.)
CNC model	HJ-100E RTE CNC 64bit (Hitachi Industry & Control Solutions, Ltd.)

- For **PLC_PRG in**, specify a language to use.
 - In the figure below, **Structured Text (ST)** is selected as an example.

Standard Project							
You are about to create a new standard project. This wizard will create the following objects within this project: - One programmable device as specified below - A program PLC_PRG in the language specified below - A cyclic task which calls PLC_PRG - A reference to the newest version of the Standard library currently installed.							
	Device:	vice: HJ-100E RTE CNC 64bit (Hitachi Industry & Control Solutions, Ltd.)					
	PLC_PRG in:	Structured Text (ST)	\sim				
		Continuous Function Chart (CFC) - page-oriented Function Block Diagram (FBD) Ladder Logic Diagram (LD) Sequential Function Chart (SFC) Structured Text (ST)					

3.1.2 Creating a PLC program

(1) Task configuration

1. Double-click **MainTask** in the **Devices** window to display a window for setting up the task configuration.

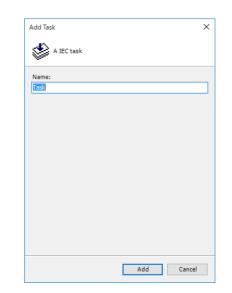
In the **MainTask** tab, you can set task priority, type, and interval.

<u>File E</u> dit <u>Vi</u> ew <u>P</u> roject <u>B</u> uild <u>O</u> nline <u>D</u> ebug <u>T</u> ools	s <u>W</u> indow <u>H</u> elp
🎦 🖆 🔚 🕘 🗠 🗠 🍐 🖻 🛍 🗙 🖬 🕼 I	🛍 🏧 • 🗗 🕮 🥰 🧐 → 📲 🛠 (⊒ 🕾 🔄 🏷 ◇ 🛒 ╤.
Devices 👻 🕈 🗙	🛞 MainTask 🗙
🖃 🏠 sample 💌	Configuration
Device (HJ-204x RTE CNC 64bit) Device (HJ-	Priority (031): 1 Type

■ Adding a task

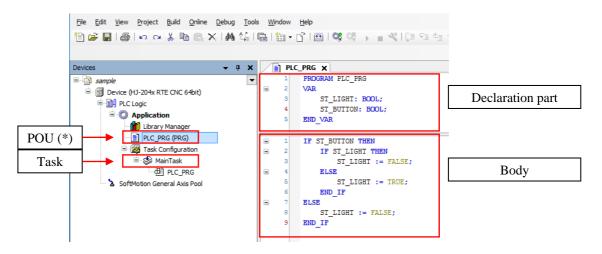
1. If you want to add a task, in the right-click menu on **Task Configuration** in the **Devices** window, click **Add Object** > **Task**.

Devices		- ₽	×				
□ 🗿 sample			•				
🖮 🔟 Device (HJ-204x RTE CNC 64bit)							
PLC Logic							
🖹 🧔 Application							
👘 📶 Library Manager							
PLC_PRG (PRG)							
🖃 🌃 Task Configuration	Ж	Cut	_				
🖹 🍪 MainTask							
PLC_PRG		Сору					
🍐 💧 SoftMotion General Axis Pool	Ē	Paste					
	\times	Delet	e				
		Brow	se		۲		
	e	Prope	rties.				
	*	Add C	Objec	t	•	٩	Task
	\bigcirc	Add F	older				
	ſ	Edit C	bject	t			
		Edit C	bject	t With			



2. The Add Task window is displayed. Enter the task name, and then click Add.

- (2) Creating a program
 - 1. Double-click **PLC_PRG** (**PRG**) in the **Devices** window to display a window for creating a program. You can create a program in the **PLC_PRG** tab. In the declaration part in the upper pane, define variables. In the body in the lower pane, describe an algorithm.



(*) POU is a program unit. Each POU is made of a declaration part and a body. Only one programming language can be used in one POU. If you want to use multiple programming languages, you must add a POU for each language. ■ Adding a POU

To add a POU, follow the procedure below.

1. In the right-click menu on **Application** in the **Devices** window, click **Add Object** > **POU**.

Devices	•	д х	-	
B isample		-	1	
Device (HJ-2	204x RTE CNC 64bit)			
	Cut			
E-(😭				
×	-			
Soft	Browse	•		
	Refactoring	•		
C.	Properties			
と	Add Object	•		Alarm configuration
<u></u>) Add Folder		0	Application
Ľ	Edit Object		Ø	Axis Group
	Edit Object With		8	Cam table
Q	Login		8	CNC program
	Delete application from dev	/ice		CNC settings
			5	Data Sources Manager
			*	DUT
				External File
			۵	Global Variable List
			۵	Image Pool
			~	Interface
			۵	Network Variable List (Receiver)
			3	Network Variable List (Sender)
			T	Persistent Variables
			Ð	POU

2. The **Add POU** window is displayed. Enter the POU name, configure the type and the implementation language, and then click **Add**.

Add POU X	
Create a new POU (Program Organization Unit)	
Name:	
POU	
Туре	
• Program	
○ Function <u>B</u> lock	
✓ E <u>x</u> tends:	
✓ Implements:	
Access specifier:	
~	
Method implementation language:	
Continuous Function Chart (CFC)	
○ <u>F</u> unction	
Return type:	
Implementation language:	
Structured Text (ST)	
	-
Add Cancel	

■ Creating global variables

To add global variables, follow the procedure below.

1. In the right-click menu on **Application** in the **Devices** window, click **Add Object** > **Global Variable List**.

Devices			-	ą	×		
sample					•		
		14x RTE CNC 64bit)					
🖹 🗐 PLC							
=- O		ication					
	1 %	Cut					
	1	Сору					
B	ß	Paste					
	\times	Delete					
👌 Sof	t	Browse			•		
		Refactoring			•		
	G.	Properties					
	***	Add Object			۲	<u> </u>	Alarm configuration
		Add Folder				Ô	Application
	Dĩ	Edit Object				2	Axis Group
		Edit Object With				8	Cam table
	СŞ	Login				8	CNC program
		Delete application from	n devi	ice			CNC settings
						-	Data Sources Manager
						¢\$	DUT
							External File
						٨	Global Variable List
							Image Pool

2. The Add Global Variable List window is displayed. Enter a name, and then click Add.

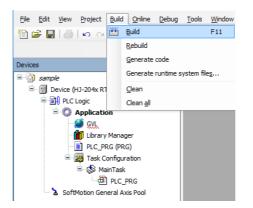
Add Gl	lobal Variable List	×
۵	Create a new global variable list	
<u>N</u> ame	:	_
	Add Cancel	

3. You can add global variables in the new Global Variable List.

GVL	×
1	VAR_GLOBAL
2	ST_BUTTON : BOOL;
3	END_VAR

3.1.3 Building a PLC program

1. After you finish creating a program, click the **Build** menu, and on the menu, click **Build**. (Alternatively, click the build icon on the toolbar.)



3.1.4 Starting PLC

Start PLC to run a PLC program.

For information about how to start PLC automatically when the device starts, see "(2) Starting PLC automatically".

(1) Starting PLC manually

1. Click the CODESYS Control RTE V3 icon in notification area on the taskbar. (The icon is hidden by default, and you must click "^" to find it.) Then click **Start PLC**.

	Start PLC
	Stop PLC
(FR)	Exit PLC Control
	PLC Configuration
4	Remote PLC
1	About

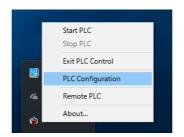
- Notes 1: Wait until the startup process is complete. Be aware that it may take dozens of seconds.
 - 2: To stop PLC, click **Stop PLC**.

NOTE

When you start PLC by clicking **Start PLC** or stop PLC by clicking **Stop PLC**, the process may take dozens of seconds to complete.

Because of that, after you start (or stop) PLC, wait at least one minute before you stop (or start) PLC.

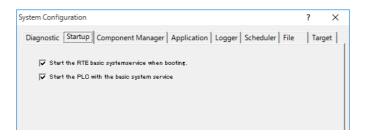
- (2) Starting PLC automatically
 - If you enable the following settings, PLC will automatically start when the device starts.
 - 1. Click the CODESYS Control RTE V3 icon in notification area on the taskbar. (The icon is hidden by default, and you must click "^" to find it.) Then click **PLC Configuration**.



2. If a window is displayed to indicate that admin rights are required, click **OK** to obtain the admin rights. If the **User Account Control** window is displayed, click **Yes**. When the admin rights are granted, click the icon again, and then click **PLC Configuration**.

No Admin rig	jhts.	×
Admin righ	ts required, restart	tray menu?
	ОК	Cancel

3. The **System Configuration** dialog box is displayed. Click the **Startup** tab, select the **Start the PLC with the basic system service** checkbox and the **Start the RTE basic systemservice when booting** checkbox, and then click **OK**.



Setting item	Meaning
Start the RTE basic systemservice when booting	The RTE system service is started when Windows starts.
Start the PLC with the basic system service	PLC is started when the RTE system service starts.

Note: To cancel the PLC auto start, clear **Start the PLC with the basic system service** checkbox, and then click **OK**.

Then, PLC will start automatically when the device starts next time.

NOTE

In Windows® Embedded Standard 7, if the version of the CODESYS scheduler (file name: CmpDrvSchedulerAMP.sys) is "3.5.10.10" and you enable these settings in an attempt to start PLC automatically when Windows starts, a blue screen or a reset might occur in rare cases. This symptom occurs less frequently if the start timing of PLC is delayed. This is why "RTE system service auto start task" (delay: 3 minutes) is registered to Windows Task Scheduler to delay the start timing of PLC.

*The procedure for checking the CODESYS scheduler version is as follows.

- 1. Start Windows Explorer and open C:\Windows\System32\drivers.
- 2. Right-click the CmpDrvSchedulerAMP.sys file, and then click Properties.
- 3. Click **Details** tab.

2	CmpDrvSchedul	erAMP.sys Properties
0	General Digital Sig	natures Security Details Previous Versions
	Property	Value
	Description	
	File description	CmpDrvSchedulerAPIC
	Туре	System file
	File version	3.5.10.10
	Product name	3s CmpDrvSchedulerAPIC
	Product version	3.5.10.10

If you want to start the PLC automatically when the CODESYS scheduler version is "3.5.10.10", perform the following settings (a) and (b).

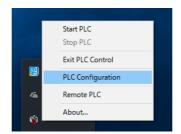
- (a) Enabling the CODESYS RTE system service auto start task
 - 1. Open Control Panel.
 - Click Start, click Control Panel.
 - 2. Click System and Security, click Administrative Tools.
 - 3. Double-click Task Scheduler.
 - 4. In the console tree, click **Microsoft** > **Windows** > **CODESYS Control RTE**.

5. In the console window, right-click the **Auto Start** task, and on the menu, click **Enable**.

Task Scheduler								- 0	Х
File Action View Help									
(+ +) 🖄 📰 👔									
Task Scheduler (Local) Task Scheduler Library	Name	Status	Triggers	Next Run Time	Last Run Time	Last Run Result	Act	ions	
 Insk Scheduler Library Microsoft 	Auto Start	Disabled	At system startup		·····	The task has not	CO	DESYS Control RTE	-
Vindows				Enable			1	Create Basic Task	
.NET Framework				Export			-	Create Task	
Active Directory Rights Market				Propertie	es		Ĭ	Import Task	
AppID				Delete					
Application Experience								Display All Running Tasks	
ApplicationData								Enable All Tasks History	
AppxDeploymentClient								New Folder	
Autochk								Delete Folder	
CertificateServicesClient	<					>	1		
Chkdsk								View	•
Clip	General Trig	gers Actions	Conditions Setti	ngs History (disable	ed)		Q	Refresh	
CloudExperienceHost	Name:	Auto Start				^	?	Help	
CODESYS Control RTE	Location: \Microsoft\Windows\CODESYS Control RTE			Sel	ected Item				
Data Integrity Scan	Author:	DESKTOP-NO	QJ6EQU\HF-W IoT					Enable	
Defrag	Description:						12	Export	
📔 Device Setup									
📔 Diagnosis							e	Properties	
📔 DiskCleanup							X	Delete	
DiskDiagnostic							?	Help	
DiskFootprint	Constant of								
EnterpriseMgmt	-Security opt								
Feedback File Classification Infrast		ing the task, u	se the following use	r account:					
FileHistory	SYSTEM								
LanguageComponentsir	Run onl	y when user is	logged on						
> Live	Run wh	ether user is lo	gged on or not						
Cocation	Do	not store passv	vord. The task will o	only have access to lo	ocal resources				
Maintenance	Run wit	h highest privi	leges						
iii Maps 🗸 🗸		3				×			
<	<					>			
							, 		

Note: To cancel the PLC auto start, right-click the **Auto Start** task, and on the menu, click **Disable**.

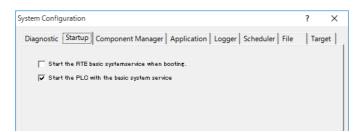
- (b) Changing the PLC configuration
 - 1. Click the CODESYS Control RTE V3 icon in notification area on the taskbar. (The icon is hidden by default, and you must click "^" to find it.) Then click **PLC Configuration**.



If a window is displayed to indicate that admin rights are required, click OK to obtain the admin rights. If the User Account Control window is displayed, click Yes. When the admin rights are granted, click the icon again, and then click PLC Configuration.

No Admin ri	ghts.	×
Admin righ	nts required, restart	tray menu?
	ОК	Cancel

3. The **System Configuration** dialog box is displayed. Click the **Startup** tab, select only the **Start the PLC with the basic system service** checkbox, and then click **OK**. Make sure that you clear the **Start the RTE basic systemservice when booting** checkbox.



Note: To cancel the PLC auto start, clear **Start the PLC with the basic system service** checkbox, and then click **OK**.

Then, PLC will start automatically when the device starts next time.

3.1.5 Running a PLC program

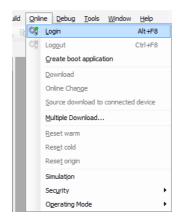
1. Double-click **Device** (*****) in the **Devices** window to display a window for setting up device configuration. ((*****) shows the selected device name.)

Ele Edit View Project Build Online Deb		■ ♥ 〔= ♀= ¢= += \$ ↓ 第
Devices 👻 👎	C Device X	
□ ample □ 1 Device (HJ-204x RTE CNC 64bit)	Communication Settings	Scan network Gateway - Device -
E BI PLC Logic	Applications	
GVL	Backup and Restore	
PLC_PRG (PRG)	Files	
🚊 🕪 MainTask	Log	Gateway-1
DEC_PRG SoftMotion General Axis Pool	PLC Settings	IP-Address: localhost

2. Click **Scan network** to display the **Select Device** window. In the **Select Device** window, select the device you want to connect to, and click **OK**.

Select Device		×
Select the network path to the controller:		
Gateway-1		 Scan network
DESKTOP-GE33V5A [0001]	DESKTOP-GE33V5A	Wink
	Device Address:	
	0001	
	Block driver:	
	UDP	
	Number of channels:	
	8	
	Target ID:	
	1671 0002	
	Target Name:	
	HJ-204x RTE CNC 64bit	
		~
		<u>O</u> K <u>C</u> ancel

3. After the device is connected, click the **Online** menu, and on the menu, click **Login**. (Alternatively, click the login icon on the toolbar.)



■ Selecting another device as a device to run

To connect another device and select the device as a device to run, follow the procedure below.

Note that, in order to connect to another device, PLC must be running on the device.

- 1. Double-click **Device** (*****) in the **Devices** window to display a window for setting up device configuration. ((*****) shows the selected device name.)
- 2. In the **Communication Settings** window, click **Gateway**. On the menu, click **Add new gateway** to open a window for adding a new gateway.

Device X	
Communication Settings	Scan Network Gateway - Device -
Applications	Add new gateway
Applications	Manage gateways
Backup and Restore	Configure the local Gateway
Files	
Log	Gateway
Log	Gateway-1 ~
PLC Settings	IP-Address: localhost
PLC Shell	
	Port:

3. In the **Select Device** window, select the device you want to connect to, and click **OK**. Enter **IP-Address** and **Port** for the new device, and click **OK**.

Note that, if you specify "localhost" for **IP-Address**, you can connect to a device connected as "localhost".

Gateway		×
<u>N</u> ame: <u>D</u> river:	Gateway-2 TCP/IP	~
IP-Addres Port	s localhost 1217	
gateway. on anothe	g 'IP-Address' can be used to specify an IP Address for the This is useful if you want to connect to a remote gateway runnin rC or device. , this setting is 'localhost' to directly connect to the gateway on OK Cancel	

4. In the **Communication Settings** window, click **Scan network** to display the **Select Device** window. Select the new device, and click **OK**.

- 3.1.6 Debugging a PLC program
 - (1) Setting a breakpoint

You can set a breakpoint to stop a program at any location.

- 1. To set a breakpoint, right-click on a line where you want to set a breakpoint, and on the menu, click **New Breakpoint**.
- 2. The **Breakpoint Properties** window is displayed. Under **Hit Count**, select a break condition. Select **Enable breakpoint immediately**, and click **OK**.

Condition	Location E	ecution point s	ettings				
		recurion point a	ecungs				
Tasks							
	Only break if th	e breakpoint is	hit in one	of the follow	ing tasks:		
1	MainTask						
L							
-Hit Co							
HITCO						~ ~	
	ak always					~	
Bre	ak always					Ť.	
Bre C Bre	ak always ak when the hi	t count is equa					
Bre Bre Brei Brei	ak always ak when the hi ak when the hi	t count is a mul	tiple of	equal to			
Bre Bre Brei Brei	ak always ak when the hi ak when the hi		tiple of	equal to			

- 3. Click the **Debug** menu, and on the menu, click **Start**. (Alternatively, click the start icon on the toolbar.)
 - <u>Online</u> <u>Debug</u> <u>Tools</u> <u>Window</u> <u>Help</u> Start F5 Stop Shift+E8 Single Cycle Ctrl+F5 - **v** - 1 Mew Breakpoint... 204x RTE 🐻 Edit Breakpoint... Toggle Breakpoint F9 **)**] O Disable Breakpoint Enable Breakpoint
 Image: Image of the state of the) tion ₫ Step Out Shift+F10 ٦G → <u>R</u>un to Cursor Axis Pool 🖇 Set ne<u>x</u>t Statement
- 4. The program stops at the line with the breakpoint.

(2) Writing a value

You can write a value to a variable while the program is running.

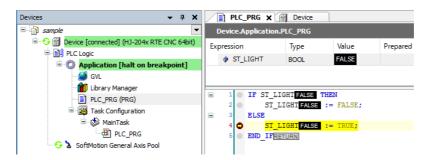
1. Enter a value (example: FALSE) in **Prepared value** while the program is running. In the body, the value is shown as "TRUE <FALSE>".

Devices 👻 🕂 🗙] PLC_PRG	×	Device			
🖃 🎒 sample 💌	D	evice.Applic	ation.Pl	LC_PRG			
🖹 😏 👘 Device [connected] (HJ-204x RTE CNC 64bit)	Exp	ression		Туре	Value	Prepared value	Address
- D PLC Logic - C Application [halt on breakpoint]	1 2	ST_LIGHT	г	BOOL	TRUE	FALSE	
GVL Dubrary Manager LC_PRG (PRG) GMAINTask DUC_PRG MainTask DUC_PRG SoftMotion General Axis Pool		2 • 3 ELS 4 •	ST_LIG ST_LI E ST_LI IF <mark>RET</mark>	GHT <mark>TRUE</mark> GHT <mark>TRUE</mark>		FALSE; IRUE;	

2. Click the **Debug** menu, and on the menu, click **Write values**. (Alternatively, press **Ctrl + F7**.)

<u>D</u> eb	ug <u>T</u> ools	<u>W</u> indow	<u>H</u> elp
•	<u>S</u> tart		F5
	S <u>t</u> op	Shift	t+F8
	Single <u>C</u> ycle	Ctr	I+F5
譋	New Breakpo	oint	
B	Edit Breakpo	int	
	Toggle <u>B</u> real	point	F9
0	Disable Brea	kpoint	
•	Enable Bread	point	
Ç≣	Step Over		F10
€≣	Step <u>I</u> nto		F8
¢ _E	Step Out	Shift-	HF 10
•≣	Run to Curso	or	
8	Set ne <u>x</u> t Sta	tement	
¢	S <u>h</u> ow next S	tatement	
	Write values	Ctr	I+F7
	Eorce values		F7
	<u>U</u> nforce valu	es Alt	t+F7

3. At the next cycle, the "Value" is changed to the value shown as "Prepared value" (example: FALSE).



3.2 Programming Languages

In CODESYS, you can program using the programming languages defined in IEC 61131-3 (Structured Text (ST), Ladder Diagram (LD), Function block diagram (FBD), and Sequential Function Chart (SFC)) as well as the CODESYS proprietary language Continuous Function Chart (CFC).

Programming languages	Description
Structured Text	Language suitable for numerical calculation and logical expression
Ladder Diagram	Language that describes logic circuits
Function Block Diagram	Graphical language that combines multiple functions into one
Sequential Function Chart	Language that describes the chronological order of the control
Continuous Function Chart	Graphical programming language based on FBD

For details about each programming language, refer to the following topic in the online help.

• CODESYS Development System > Reference, Programming > Programming Languages and their Editors

3.3 Visualization Objects

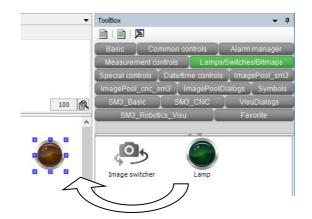
CODESYS offers visualization features for creating a graphical user interface.This section shows how to add and run a typical visualization object, Lamp.For details about visualization features, refer to the following topic in the online help.CODESYS Visualization

- (1) Creating a visualization object
 - 1. To add a visualization object, right-click **Application** in the **Devices** window, and on the menu, click **Add Object** > **Visualization**.
 - The Add Visualization window is displayed. Select the Active checkbox for VisuSymbols (System), and then click Add.
 After the visualization is added the TealBox window encours.

After the visualization is added, the **ToolBox** window appears.

Add Visualization			×
Creates a visualization ob	ject		
<u>N</u> ame:			
Visualization			
Symbol libraries	Active		
- 🕘 VisuSymbols (System)			
A visualization symbol library is			
graphics and graphical objects. I library is assigned the library is a manager. The graphics and grap toolbox when a visualization edit	idded into th hical objects	ne POUs library s are shown in th	he
[Add	Cancel	

3. In the **ToolBox** window, click **Lamps/Switches/Bitmaps**, and drag and drop the Lamp1 icon onto the visualization editor.



Select the created Lamp. The Properties window is displayed. In the Properties window, you can change the settings of the Lamp. For example, by clicking Position > Variable, you can specify a variable output to the Lamp.

Properties	~ ₽
🍸 Filter 🔹 🔀 So	ort by ▼ 2↓Sort order ▼ □ Expert
Property	Value
Element name	GenElemInst_1
Type of ele	Lamp
Position	
X	599
Y	71
Width	52
Height	53
Variable	PLC_PRG.ST_LIGHT
Texts	
Tooltip	
State variables	
Invisible	
Background	
Image	Yellow

<Running an object>

1. Build, login, and then run the object.

Whenever the variable is switched between FALSE and TRUE, the created Lamp turns on or off accordingly.

D	evice.Application.PLC_PRG				
хр	ression	Туре	Value	Prepared value	Addr ^
	ST_LIGHT	BOOL	FALSE		[
					>
-	1 IF ST_BUTTON FALSE THEN	_ ▼			1.
	2 IF ST_LIGHT FALSE THEN	Visualization			×
	3 ST LIGHT FALSE := FALSE;			~ ▼	
	4 ELSE				^
	5 ST_LIGHT FALSE := TRUE;				
	6 END_IF	BUTT			
	7 ELSE				
	8 ST_LIGHT FALSE := FALSE;				
	9 END_IFRETURN				
					100 % 🔍 🗸
1	PLC_PRG X	<	_		100 % 🕵 🗸
D	evice.Application.PLC_PRG				>
D	evice.Application.PLC_PRG ression	Туре	Value	Prepared value	Addr ^]
D	evice.Application.PLC_PRG		Value TRUE	Prepared value	Addr ^
D	evice.Application.PLC_PRG ression	Type BOOL		Prepared value	Addr ^
D	evice.Application.PLC_PRG ression	Туре		Prepared value	Addr ^ [
D	evice.Application.PLC_PRG ression	Type BOOL		Prepared value	Addr ^ []
D	evice_Application.PLC_PRG ression ST_LIGHT I IF ST_BUTION_TRUE_THEN I IF ST_LIGHT_TRUE_THEN ST_LIGHT_TRUE_:= FALSE;	Type BOOL		Prepared value	Addr A
D	evice.Application.PLC_PRG ression ST_LIGHT I IP ST_BUTION TRUE THEN I IP ST_LIGHT TRUE THEN ST_LIGHT TRUE = FALSE; ELSE	Type BOOL		Prepared value	Addr 1
D	evice Application.PLC_PRG ression ST_LIGHT I IF ST_BUTION TRUE THEN I IF ST_LIGHT TRUE THEN ST_LIGHT TRUE := FALSE; BLSE ST_LIGHT TRUE := TRUE;	Type BOOL Visualization	TRUE	Prepared value	Addr 1
D	evice_Application.PLC_PRG ression ST_LIGHT I IP ST_BUTTON_TRUE THEN I IF ST_LIGHT_TRUE THEN ST_LIGHT_TRUE := FALSE; ELSE ST_LIGHT_TRUE := TRUE; END_IF	Type BOOL	TRUE	Prepared value	Addr A
D	evice Application.PLC_PRG ression ST_LIGHT I IP ST_BUTION TRUE THEN IP ST_LIGHT TRUE THEN ST_LIGHT TRUE := FALSE; ELSE ST_LIGHT TRUE := TRUE; END_IP ELSE END_IP	Type BOOL Visualization	TRUE	Prepared value	Addr ^
D	evice_Application.PLC_PRG ression ST_LIGHT I IP ST_BUTTON_TRUE THEN I IF ST_LIGHT_TRUE THEN ST_LIGHT_TRUE := FALSE; ELSE ST_LIGHT_TRUE := TRUE; END_IF	Type BOOL Visualization	TRUE	Prepared value	Addr 1

3.4 Creating and Setting Up a G-Code

(1) Adding an object

1. In the right-click menu on **Application** in the **Devices** window, click **Add Object** > **CNC program**.

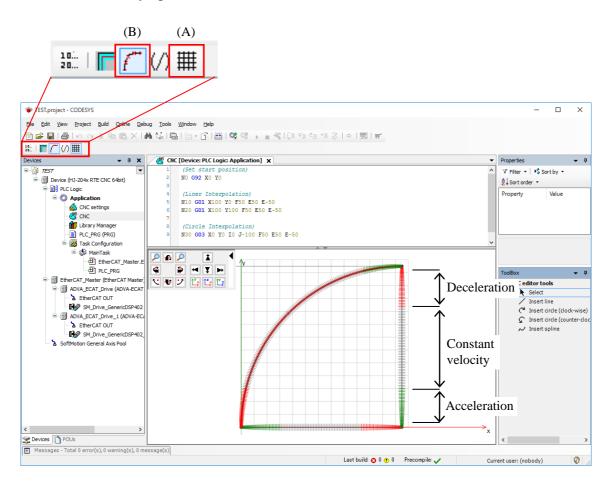
(In the following, the project created in "4.2 Configuration for Using Servo Amplifiers and Servo Motors" is used.)

Devices	•	4 X		
E TEST		•		
🖹 🕤 Device (HJ-204x RTE CNC 64bit)				
= · 🗐 PLC Logic				
Application	Ж	Cut		
Library Manager	B	Сору		
Task Configuration	Ē.	Paste		
🖹 🍪 MainTask	\mathbf{X}	Delete		
EtherCAT_Master.EtherCAT_Task PLC_PRG		Browse +		
EtherCAT_Master (EtherCAT Master)		Refactoring		
ADVA_ECAT_Drive (ADVA-ECAT EtherCAT Serve	¢.	Properties		
EtherCAT OUT SM Drive GenericDSP402 (SM Drive Gene	*::	Add Object 🕨		Alarm configuration
ADVA_ECAT_Drive_1 (ADVA-ECAT EtherCAT Ser		Add Folder	0	Application
EtherCAT OUT	D°	Edit Object	\bigotimes	Axis Group
SM_Drive_GenericDSP402_1 (SM_Drive_Ge		Edit Object With	8	Cam table
🔤 🏅 SoftMotion General Axis Pool	СŞ	Login	Ø	CNC program
		Delete application from device		CNC settings

2. The Add CNC program window is displayed. Select Din66025 for Implementation and SMC_CNC_REF for Compile mode. Then click Add.

Add CNC program	ı		×
	ram		
Name:			
CNC			
Implementation:	Din66025		~
Compile mode:	SMC_CNC_REF		~
	SMC_OutQueue		
	File		
	C	Add	Cancel

- (2) Creating a G-code
 - 1. Double-click CNC in the Devices window to display a window for creating a G-code.
 - 2. If you click a meshed icon ((A) in the following figure) on the menu near the upper left corner of the window, an auxiliary line is shown. Moreover, if you click an icon with a line and dots ((B) in the following figure), the acceleration, deceleration, and constant velocity sections of the track created by the G-code are shown color-coded. Note that if you make changes in either the G-code or the Graphic Editor, the other is automatically updated.



(3) CNC settings

- 1. Double-click **CNC settings** in the **Devices** window to display a window for CNC settings.
- Click the Path preprocessors tab to display a list of Available function blocks. Select the function block you want to use, and then click >.
 The function block is registered under Active function block instances.

The function block is registered under Active function block instances.

TEST.project - CODESYS				-	×
File Edit View Project Build Online Debug	ig <u>T</u> ools <u>W</u> indow <u>H</u> elp				
🖹 🖆 📕 🕼 🗠 🔉 🖿 🛍 🗶 🖬	k \$\$ @ @ + 6` @ \$\$ \$\$ → _ <\[[\$\$ \$= \$\][\$\$ \$= \$	\$ ¢ <u>≋</u> ≓			
Devices 👻 🕂 🗙	🔬 CNC settings [Device: PLC Logic: Application] 🗙				-
	Path preprocessors Preinterpolation Table editor				
Device (HJ-204x RTE CNC 64bit)			n block instances		
PLC Logic	Available function blocks	Active function	n block instances		
Applection CNC setings CNC setings CNC CNC DL Java / Nanager DLC_PRC (PRC) DL JARC Configuration CNC DL JARC Configuration DLC_PRC DLC_PR	SMC_Avad.op SMC_Extender/elotyCheds SMC_LimBOranics SMC_BotateQuev2D SMC_RotateQuev2D SMC_RotateQuev2D SMC_SnoothAddAves SMC_SnoothAddAves SMC_ToolCor SMC_TranslateQuev2D SMC_TranslateQuev2D SMC_RecomputeAdCSopes SMC_RecomputeAdCSopes SMC_RecomputeAdCSopes	> SMC_checkVel			× *
< >			Parameters		
2 Devices POUs					
Messages - Total 0 error(s), 0 warning(s), 0 mes	ssage(s)	Last build: 👩 0 😗 0	Precompile: 🗸 C	urrent user: (nobody)	Ø:

3. Select the registered function block, and click **Parameters**. The **Parameter editor** window for the function block is displayed. Set up the parameters as required.

🝊 Parameter	editor for SMC_	CheckVeloci	ties	×
d AngleTol	0.001	-	Maximum angle between elements that is consider smooth. Unit: degrees.	ed

For details about G-codes, CNC, and SoftMotion, refer to the following topic in the online help.

 $\bullet \ Add\text{-}ons > SoftMotion$

3.5 Reset Action When an Error Occurs

The CODESYS runtime environment stops executing a program when exceptions such as a watchdog timer timeout error are detected. You can reset these exceptions with a reset action. Reset actions include three types of resets: warm up reset, cold reset, and reset (PLC initialization).

For details about each reset action, refer to the following topic in the online help. • CODESYS Development System > Reference, User Interface > Commands > 'Online'

For information about the behavior of remanent variables at each reset action, refer to the following topic in the online help.

• CODESYS Development System > Reference, Programming > Variable Types and special Variables > Remanent Variables - RETAIN, PERSISTENT "Overview table for the behavior with RETAIN and PERSISTENT declared variables"

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CHAPTER 4 CONFIGURATION OF EtherCAT CONNECTION

This chapter explains how to configure EtherCAT. Use the procedure that fits your needs.

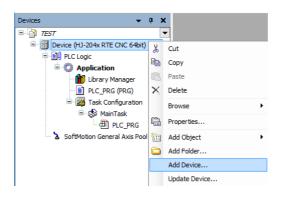
- When I/O modules are used
- When servo amplifiers and servo motors are used

4.1 Configuration for Using I/O Modules

4.1.1 Adding EtherCAT devices (I/O modules)

The following procedure shows how to add EtherCAT devices. This procedure uses I/O modules (EH-IOCA) from Hitachi Industrial Equipment Systems Co.,Ltd. as an example.

- (1) Adding EtherCAT masters
 - 1. Right-click on **Device** (*****) in the **Devices** window. ((*****) shows the selected device name.) On the menu, click **Add Device**.



2. The Add Device window is displayed. Select EtherCAT > Master > EtherCAT Master. Click Add Device, and then click Close.

	for a fulltext search in all devices	Vendor:	<all vendors=""></all>	
Name		Vendor		Version
E- M Field	ousses	venue.		TCI SIGIL
E - CAN (CANbus			
Bedr E	therCAT			
🖻 - a	ad Master			
	EtherCAT Master	3S - Sma	art Software Solutions GmbH	3.5.10.0
	EtherCAT Master SoftMotion	3S - Sma	art Software Solutions GmbH	3.5.10.0
🗷 - 🎫 E	thernet Adapter			
🗷 - 👄 E	therNet/IP			
🗄 - 📖 🖬 N	1odbus			
🖻 - 🛲 P	rofibus			
🗎 - 🛲 P	Profinet IO			
😟 - S s	ercos			
٢				
	category 🗌 Display all versions (f	or experts o	nly) 🗌 Display outdated ve	
Group by o	category 🗌 Display all versions (f	or experts o	nly) 🗌 Display outdated ve	
Group by Gro	category Display all versions (f		nly) 🗌 Display outdated ve	
Group by of Mam	category Display all versions (f e: EtherCAT Master lor: 35 - Smart Software Solutions Gr		nly) 🗌 Display outdated ve	
Group by of Mam Nam Vend Cate	category Display all versions (f		nly) 🗌 Display outdated ve	
Group by Mam Vend Cate Vers	category Display all versions (f e: EtherCAT Master lor: 35 - Smart Software Solutions Gm gories: Master		nly) 🗌 Display outdated ve	
Group by Group by Group by Group by Group Content of Grou	category Display all versions (f e: EtherCAT Master lor: 3S - Smart Software Solutions Gr gories: Master ion: 3.5.10.0		nly) 🗌 Display outdated vo	
Group by Group by Group by Group by Group Content of Grou	category Display all versions (f e: EtherCAT Master lor: 35 - Smart Software Solutions Gr gories: Master ion: 3.5.10.0 vr Number:		nly) 🗌 Display outdated ve	

(2) Adding EtherCAT slaves

1. Click the **Tools** menu, and on the menu, click **Device Repository**.

<u>D</u> ebug	Tool	s <u>W</u> indow <u>H</u> elp
144	ø	Package Manager
	1	Library Repository
	1	Device Repository
	-	Visualization Styles Repository
		License Repository
		License Manager
		Scripting
		<u>C</u> ustomize
		Options

2. The **Device Repository** window is displayed. Install the configuration file for the device you want to connect. In this example, click **Install**.

					×
System Repository (C:\ProgramData\CODESYS\Devices)					Edit Locations
vice descriptions:	Vendor	Version	Description		Install
ldbusses I devices Cs					<u>U</u> ninstall Export
ftMotion drives					
					Datate
					<u>D</u> etails Close
	(C:\ProgramData) gice descriptions: dbusses I devices	(C:\ProgramData\CODESYS\D vice descriptions: Vendor dbusses I devices 25	(C:\ProgramData\CODESYS\Devices) i/ce descriptions: Vendor Version dbusses I devices Is	(C:\ProgramData\CODESYS\Devices) i/ce descriptions: Vendor Version Description dbusses I devices Is	(C:\ProgramData\CODESYS\Devices) vice descriptions: Vendor Version Description dbusses t devices s

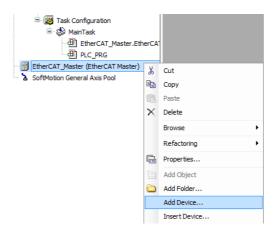
3. The **Install Device Description** window is displayed. Select the ESI file (EtherCAT Slave Information File) you obtained beforehand, and click **Open**.

Install Device Description	ption				×
← → • ↑ <mark> </mark> •	« HF-W	/ IoT > Documents > ESI file	v 0	Search ESI file	Q
Organize 🔻 New	folder			8==	• 🔳 🕜
🕋 OneDrive	^	Name	Date modified	Туре	Size
💻 This PC		🔮 EH_IOCA	8/28/2013 11:01 AM	XML Document	52 KB
E Desktop					
Documents					
🖶 Downloads					
Music					
Pictures Videos					
Local Disk (C:)					
igen Network					
F	ile <u>n</u> am	e: EH_IOCA	~	All supported descr Open	ription files (\checkmark Cancel

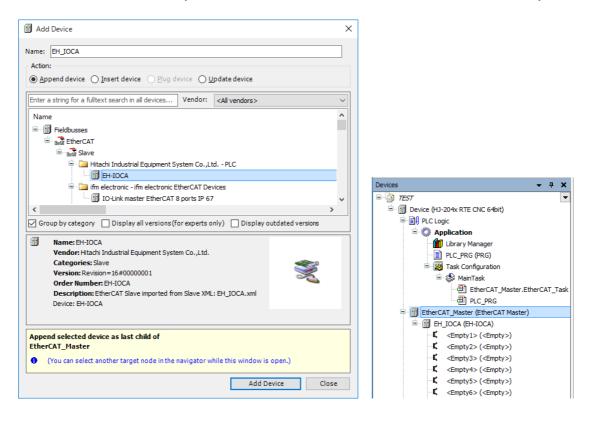
4. When installation is complete, **EH-IOCA** is added to the list of installed devices. Confirm that the device has been added to the list, and click **Close**.

ocation:	System Repository	~	Edit Locations.
	(C:\ProgramData\CODESYS\Devices)		
nstalled d	e <u>v</u> ice descriptions:		
Name		^	<u>I</u> nstall
🖃 - 👔 F	ieldbusses		Uninstall
	R CANbus		
	A CANopen		Export
🖨 - Bi	TetherCAT		
6	Burger Master		
6	Bur Bur Module		
6	Bud Slave		
	😑 🛅 Hitachi Industrial Equipment System Co. ,Ltd PLC		
	🚹 EH-IOCA		
	🗉 📴 ifm electronic - ifm electronic EtherCAT Devices		
	🗉 🛅 STOEBER ANTRIEBSTECHNIK GmbH _Co. KG - Antriebe	~	
<		>	Details
	the there are all a time of the second to		Details
	:¥Users¥HF-W IoT¥Documents¥ESI file¥EH_IOCA.xml	<u> </u>	
	Device "X16" installed to device repository.		
	 Device "X32" installed to device repository. Device "X64" installed to device repository. 		
	Device X64 installed to device repository. Device "X4Y4W" installed to device repository.		
	Device X4Y4W installed to device repository. Device "Y16" installed to device repository.		
	Device "Y32" installed to device repository.		
<	Device 152 installed to device repository.	> ×	

5. Right-click on **EtherCAT_Master** (EtherCAT Master) in the **Devices** window. On the menu, click **Add Device**.

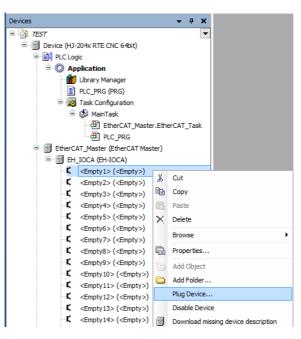


- 6. The Add Device window is displayed. Select EH-IOCA, and then click Add Device. EH_IOCA (EH-IOCA) is added under EtherCAT_Master (EtherCAT Master) in the Devices window.
 - Repeat this step for all the EtherCAT slaves you want to add.
 - Click Close after you confirm that the EtherCAT slaves were successfully added.



- (3) Adding devices (I/O modules) to connect
 - 1. Add devices to connect. In this example, an I/O module is added to an EtherCAT slave. Right-click on **<Empty1>** (**<Empty>**) under **EH_IOCA** (**EH-IOCA**). On the menu, click **Plug Device**.

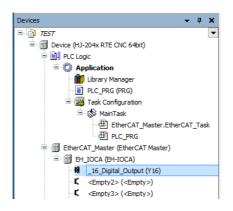
Repeat this action for each EtherCAT slave according to your needs.



2. In the **Plug Device** window, select the I/O module you want to plug in. **Y16** is selected as an example. Click **Plug Device**.

Name				
manne		Vendor	Version	1
	1 X64	Hitachi Industrial Equipment System Co.,Ltd.	0	
	1 x6Y2W	Hitachi Industrial Equipment System Co.,Ltd.	0	
	- 🔟 X7Y1W	Hitachi Industrial Equipment System Co.,Ltd.	0	
	🔟 x8w	Hitachi Industrial Equipment System Co.,Ltd.	0	
	- 🔟 Y16	Hitachi Industrial Equipment System Co.,Ltd.	0	
	1 Y32	Hitachi Industrial Equipment System Co.,Ltd.	0	
	🔟 Y4W	Hitachi Industrial Equipment System Co.,Ltd.	0	
	- 🚹 Y64	Hitachi Industrial Equipment System Co.,Ltd.	0	~
Ver Cat Ver	egories: Module sion: 0 ler Number: 16 Di	trial Equipment System Co.,Ltd. gital Output Thodule imported from Slave XML:	Ŵ	

3. **Y16** is added under **EH_IOCA** (**EH-IOCA**).

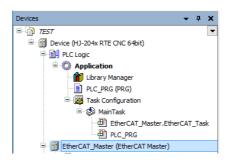


Add a plugged device to **<Empty2>** (**<Empty>**) and subsequent slaves according to your needs.

4.1.2 EtherCAT NIC setting

The following procedure shows how to configure the EtherCAT NIC setting. The PLC must be started and connected before starting the following procedure. • If the PLC has not been started

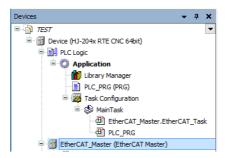
- See "3.1.4 Starting PLC", and start the PLC.
- If the PLC is not connected See Steps 1 and 2 in "3.1.5 Running a PLC program", and connect the PLC.
- 1. Double-click **EtherCAT_Master** (**EtherCAT Master**) in the **Devices** window to display a window for the EtherCAT_Master configuration.



2. In **Source Address (MAC)** under **EtherCAT NIC Setting** in the **General** tab, enter the MAC address of the LAN port used for EtherCAT. Alternatively, you can click **Browse** and select the MAC address.

_	EtherCAT_Master X		
	General	Autoconfig Master/Slaves	Ether CAT
	Sync Unit Assignment	EtherCAT NIC Setting	
	EtherCAT I/O Mapping	Destination Address (MAC) FF-FF-FF-FF-FF-FF	Broadcast 🗌 Enable Redundancy
	Status	Source Address (MAC) F8-0F-41-82-7E-68	Browse
	Information	Network Name Select Network by MAC Select Network by	/ Name

- 4.1.3 Setting cycle time for the EtherCAT master and interval for the task The following procedure shows how to set up the cycle time for the EtherCAT master and the interval for the task.
 - (1) Cycle time setting for the EtherCAT master
 - 1. Double-click **EtherCAT_Master (EtherCAT Master)** in the **Devices** window to display a window for EtherCAT_Master configuration.

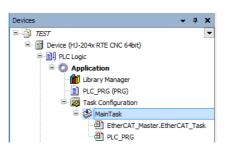


- 2. For **Cycle Time** under **Distributed Clock** in the **General** tab, specify **4000** (μs) (default setting).
- Note: The interval of the task (MainTask) might be automatically changed when the value of **Cycle Time** is changed. For information about how to configure the cycle time of the task, see "(2) Interval setting for the task".

General	Autoconfig Master/Slaves	Ether CAT
Sync Unit Assignment	EtherCAT NIC Setting	
EtherCAT I/O Mapping	Destination Address (MAC) FF-FF-FF-FF-FF B	roadcast 🗌 Enable Redundancy
Status	Source Address (MAC) F8-0F-41-82-7E-68 Bro	wse
Information	Select Network by MAC Select Network by Nar	ne
	■ Distributed Clock	15
	Cycle Time 4000 보 µs	
	Sync Offset 20 🔷 %	
	Sync Window Monitoring	
	Sync Window 1 🜩 µs	

- (2) Interval setting for the task
 - 1. Double-click **MainTask** in the **Devices** window to display a window for task configuration.

In the **MainTask** tab, you can set task priority, type, and interval.



2. In the task configuration window, select **Cyclic** for **Type**, and then specify **4000** (μs) (default setting) for **Interval**.

If **EtherCAT_Master.EtherCAT_Task** is inserted under the task, you must specify the same value as **Cycle Time** in the aforementioned EtherCAT_Master configuration window.

Note: The interval of the task might be automatically changed when the value of **Cycle Time** is changed in "(1) Cycle time setting for the EtherCAT master". If you change the cycle time setting of the EtherCAT master, check the interval setting of the task, and reconfigure the setting if necessary.

MainTask 🗙			
Ingulation			
riority (031): 0			
Туре			
Cyclic	 Interval (e.g. t#200n 	ns): 4000	µs ~
Watchdog			
Enable			
			ms $\!$
Sensitivity:	1		

If you want an I/O module to be controlled using a different cycle time than the EtherCAT master, create a control task for the I/O module as an independent task from the task where **EtherCAT_Master.EtherCAT_Task** is inserted. For information about how to create a task, see "■ Adding a task" in "(1) Task configuration" in "3.1.2 Creating a PLC program".

4.1.4 EtherCAT slave setting

(1) I/O mapping setting

The following procedure shows how to allocate variables to the module I/Os you configured.

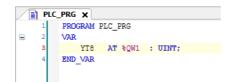
1. Double-click **EH_IOCA** (**EH-IOCA**) under **EtherCAT_Master** (**EtherCAT Master**) in the **Devices** window. Then, click **EtherCAT I/O Mapping**. As an example, a UINT variable is allocated to Output. (Alternatively, you can click ... and specify a variable you have already created.)

General	Find Filter Show all				-	
Process Data	Variable	Mapping	Channel	Address	Тур	
	💻 🍢		Control	%QW0	UIN	
Startup Parameters	🖨 - 🍫 YT8		_16_Digital_Output Y	%QW1	UIN	
	···· **		Bit0	%QX2.0	BOO	
EtherCAT I/O Mapping	🍫		Bit1	%QX2.1	BOO	
	*		Bit2	%QX2.2	BO	
Status	🍫		Bit3	%QX2.3	BO	
	*		Bit4	%QX2.4	BO	
Information	🍫		Bit5	%QX2.5	BO	
	*		Bit6	%QX2.6	BO	
	🍫		Bit7	%QX2.7	BO	
	*		Bit8	%QX3.0	BO	
	**		Bit9	%QX3.1	BO	
	**		Bit10	%QX3.2	BO	
	*>		Bit11	%QX3.3	BO	
	* ø		Bit12	%QX3.4	BO	
	*>		Bit13	%QX3.5	BO	
	**		Bit14	%QX3.6	BOO	
			Bit15	%QX3.7	BOO	
	🚊 🍫		Status	%IW0	UIN	

You can also allocate a BOOL variable to each Bit of the module you configured. If you do so, however, you cannot use the UNIT variable allocated above.

General	Find		Filter	r Show all		
Process Data	Variable	Mapping		Channel	Address	Туре
	🚍 🍢			Control	%QW0	UIN
Startup Parameters	- *			_16_Digital_Output Y	%QW1	UIN
	YT8_Output0 _			Bit0	%QX2.0	BOO
EtherCAT I/O Mapping	🍫			Bit1	%QX2.1	BOC
	*			Bit2	%QX2.2	BOC
Status	* @			Bit3	%QX2.3	BOC
	* ø			Bit4	%QX2.4	BOC
Information	* ø			Bit5	%QX2.5	BOC
	· · · · · · · · · · · · · · · · · ·			Bit6	%QX2.6	BOC

2. As VAR (variable), declare the Output variable and the address you configured in **EtherCAT I/O Mapping**.



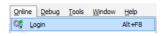
3. After you declare a variable for a device, confirm that the variable you declared for the device has been successfully allocated. If a strikethrough value is shown under **Address**, the variable has not been allocated. In such cases, double-click the icon under **Mapping** to allocate the variable.

General	Find	Filter S	Filter Show all			
Process Data	Variable	Mapping	Channel	Address	Тур	
			Control	%QW0	UIN	
Startup Parameters	🕀 🍢 YT8	°≱	_16_Digital_Output Y	%QW1	UI	
	😐 ··· 🍫		Status	%IW0	UIN	
FH_IOCA X		Ļ				
	Find	Filter S	Show all		•	
General	Find Variable	Filter S Mapping	ihow all	Address	• Ty	
General				Address %QW0		
General Process Data Startup Parameters	Variable		Channel		Tyi UII	

4.1.5 Checking the EtherCAT connection

The following procedure shows how to check the status of the EtherCAT connection.

1. Click the **Online** menu, and on the menu, click **Login** to log in to the PLC.



2. After you log in, click \triangleright at the top of the toolbar to run the PLC.



3. If EtherCAT connects successfully, the icons beside the devices become green.

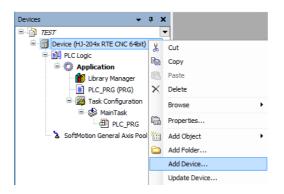
Devices 🗸 🕂 🗙	EH_IOCA X				
TEST Device [connected] (HJ-204x RTE CNC 64bit)	General	General Find I		Filter Show all	
E-D PLC Logic	Process Data	Variable IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	Mapping	Channel Control	Address %QW0
- 🎁 Library Manager - 📄 PLC_PRG (PRG)	Startup Parameters	⊕- ♥ YT8 ⊕- ♥ YT16	*** ***	_16_Digital_Output_YT8 Y _16_Digital_Output_YT16 Y	%QW1 %QW2
	EtherCAT I/O Mapping	🗉 🧖 AY4I	*	_8_Analog_Output_AY4I Y	%QW3
EtherCAT_Master.EtherCAT_Task	Status	B V AYG4M	*• *•	_8_Analog_Output_AYG4M Y Status	%QW1 %IW0
셴 PLC_PRG 루 🖓 🛐 EtherCAT_Master (EtherCAT Master)	Information	Module_RES Module_WDT	***	Module RES Module WDT	%ID1 %ID2
		🖲 👋 Module_FAIL	*	Module FAIL	%ID3
_ C III _ 16_Digital_Input_XD8 (X16)		Module_IDER PGA_Version	** **	Module IDER FPGA Version	%ID4 %IW10
- 〇頃 _16_Digital_Output_YT16 (Y16) - 〇頃 _16_Digital_Input_XDL16 (X16)		CPU_Version XD8	*** ***	CPU Version	%IW11
		🗷 🁋 XDL 16	*	_16_Digital_Input_XD8 X _16_Digital_Input_XDL16 X	%IW13
- CH _8_Analog_Input_AX8I (X8W) - CH _8_Analog_Output_AYG4M (Y8W)		AX8I AXG5M	** **	_8_Analog_Input_AX8I X 8 Analog Input AXG5M X	%IW14 %IW22
_ 🕄 🛱 _8_Analog_Input_AXG5M (X8W)					

In the **Devices** window, \triangle icons can be shown beside devices and modules. These icons are shown when the configuration is not consistent with the connected modules. Moreover, \triangle icons are sometimes shown even after you confirm that the connection of the devices and modules is OK. If this happens, log in to the PLC, click **Online** > **Cold reset**, and run the PLC again. Then the \triangle icons should disappear. If \triangle icons are still displayed, check the wire connections and power cycle the main power to the EtherCAT slaves.

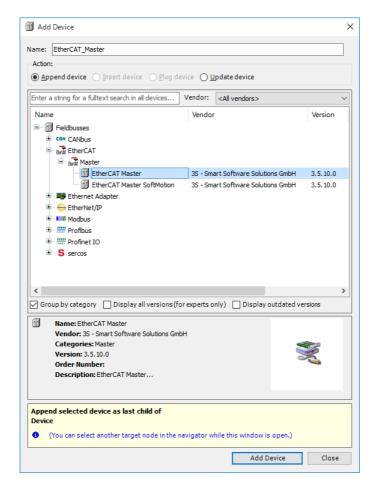
Devices 👻 🗸 🗙	EH_IOCA X				
7EST Image: Connected (HJ-204x RTE CNC 64bit)	General	The bus is not runni	ng. The shown v	values are perhaps not actual	
PLC Logic Application [run]	Process Data	Find		Filter Show all	
Library Manager	Startup Parameters	Variable	Mapping	Channel	Address
🖃 🧱 Task Configuration	EtherCAT I/O Mapping	Control F. * YT8	*** ***	Control _16_Digital_Output_YT8 Y	%QW0 %QW1
EtherCAT_Master.EtherCAT_Task	Status		*** ***	_16_Digital_Output_YT16 Y 8 Analog Output AY4I Y	%QW2 %OW3
PLC_PRG	Information	🗉 🦘 AYG4M	*	_8_Analog_Output_AYG4M Y	%QW1
		★ Status ★ Module_RES	*** ***	Status Module RES	%IW0 %ID1
-		Module_WDT	*** ***	Module WDT Module FAIL	%ID2 %ID3
		Module_FAIL Module_IDER	×.	Module IDER	%ID3 %ID4
		FPGA_Version POPU_Version	×	FPGA Version CPU Version	%IW10 %IW11
-▲崎 _8_Analog_Input_AX8I (X8W) -▲崎 8 Analog Output AYG4M (Y8W)			*	_16_Digital_Input_XD8 X	%IW12
		I → XDL16	***	_16_Digital_Input_XDL16 X	%IW13

4.2 Configuration for Using Servo Amplifiers and Servo Motors

- 4.2.1 Adding EtherCAT devices (servo amplifiers and servo motors) The following procedure shows how to add EtherCAT devices. This procedure uses servo amplifiers (ADVA-R5MSEC) and servo motors (ADMA-R5MF111) from Hitachi Industrial Equipment Systems Co.,Ltd. as an example.
 - (1) Adding EtherCAT masters
 - 1. Right-click on **Device** (*****) in the **Devices** window. ((*****) shows the selected device name.) On the menu, click **Add Device**.



2. The Add Device window is displayed. Select EtherCAT > Master > EtherCAT Master. Click Add Device, and then click Close.



(2) Adding EtherCAT slaves

1. Click the **Tools** menu, and on the menu, click **Device Repository**.

<u>D</u> ebug	Tool	s <u>W</u> indow <u>H</u> elp
144	ø	Package Manager
	1	Library Repository
	1	Device Repository
	-	Visualization Styles Repository
		License Repository
		License Manager
		Scripting
		Customize
		Options

2. The **Device Repository** window is displayed. Install the configuration file for the device you want to connect. In this example, click **Install**.

🌋 Device R	epository					×
<u>L</u> ocation:	System Repository (C:\ProgramData)	Edit Locations				
Installed d	e <u>v</u> ice descriptions:	Vendor	Version	Description		Install
т. 🗐 н	eldbusses MI devices .Cs oftMotion drives					Uninstall Export.
						<u>D</u> etails
						Close

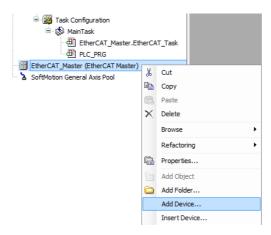
3. The **Install Device Description** window is displayed. Select the ESI file (EtherCAT Slave Information File) you obtained beforehand, and click **Open**.

Install Device Description	iption	n					×
← → • ↑ <mark> </mark>	« HF	F-W lo	oT > Documents > ESI file	~	Ō	Search ESI file	Q
Organize 🔻 New	folde	er				== -	
a OneDrive	^	Na	me	Date modified		Туре	Size
💻 This PC			HITACHI_IES_ADVA-Ecat_1.008	1/15/2016 4:00	PM	XML Document	710 KB
Desktop							
🔮 Documents							
👆 Downloads							
👌 Music							
Pictures							
Videos							
🏪 Local Disk (C:)							
💣 Network							
	~	<					>
I	File <u>n</u> a	ame:	HITACHI_IES_ADVA-Ecat_1.008		~	All supported descrip	tion files (∨ Cancel

4. When installation is complete, **HITACHI AC SERVO DRIVES ADV Series** is added to the list of installed devices. Confirm that the device has been added to the list, and click **Close**.

ocation:	Custom Descritory	~	Edit Locations
ocation:	System Repository (C:\ProgramData\CODESYS\Devices)	~	Late Eocacions
installed d	e <u>v</u> ice descriptions:		
Name		^	<u>I</u> nstall
9- 🗊 F	ieldbusses		Uninstall
<u>ا</u> (an CANbus		_
	A CANopen		Export
	di EtherCAT		
	Brodi Master		
	e _{Ba} ð Module		
	🖦 🕼 Slave 🚔 🕞 Hitachi Industrial Equipment System Co.,Ltd Servo Drives		
	HITACHI AC SERVO DRIVES ADV Series		
	ITTACHI AC SERVO DRIVES ADV-MEGA Series	_	
	🕮 🛅 ifm electronic - ifm electronic EtherCAT Devices	~	
<		>	Details
⊡() (:\HF-W IoT\ESI file\HITACHI_IES_ADVA-Ecat_1.008.xml		<u>D</u> econom
	Device "HITACHI AC SERVO DRIVES ADV Series" installed to device repository		
	Device "HITACHI AC SERVO DRIVES ADV-MEGA Series" installed to device repo	ository.	

5. Right-click on **EtherCAT_Master** (EtherCAT Master) in the **Devices** window. On the menu, click **Add Device**.

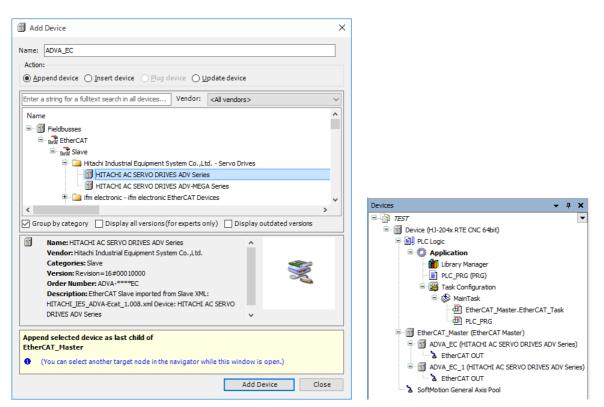


6. The Add Device window is displayed. Select HITACHI AC SERVO DRIVES ADV Series, and then click Add Device. Then, ADVA_EC (HITACHI AC SERVO DRIVES ADV Series) is added under EtherCAT_Master (EtherCAT Master) in the Devices window.

• Repeat this step for all the EtherCAT slaves you want to add.

In the following figure, Add Device was clicked twice to add two devices.

• Click Close after you confirm that the EtherCAT slaves were successfully added.

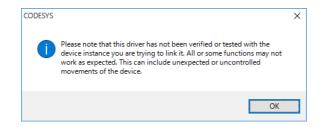


- (3) Adding devices (Axis) to connect
 - Add devices to connect. In this example, an Axis is added to an EtherCAT slave. Right-click on ADVA_EC (HITACHI AC SERVO DRIVES ADV Series). On the menu, click Add SoftMotion CiA402 Axis.

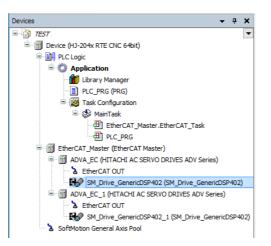
Repeat this action for each EtherCAT slave according to your needs.

Devices		, 4	×	
■ 🎒 TEST			•	
🖹 👔 Device (HJ-20				
🖻 📳 PLC Logic				
🖹 🔘 Appl				
	ibrary Manager			
	LC_PRG (PRG)			
	ask Configuration			
⊟ ~\$	MainTask			
	EtherCAT_Master.EtherCAT_T	ask		
	PLC_PRG			
	_Master (EtherCAT Master)			
	_EC (HITACHI AC SERVO DRIVES ADV	Series	s) _ {	Cut
	therCAT OUT C EC 1 (HITACHI AC SERVO DRIVES A	DV 0		
	therCAT OUT	Dv Ser	ie 4	
	n General Axis Pool			
a 3010-1000	IT GEHERALAXIS POOL		X	Delete
				Browse
				Refactoring
			C	Properties
				Add Object
			C	Add Folder
				Insert Device
				Disable Device
				Update Device
			Ó	* Edit Object
				Edit Object With
				Edit IO mapping
				Import mappings from CSV
				Export mappings to CSV
				Add SoftMotion CiA402 Axis

2. If the following message dialog box appears, click **OK**.



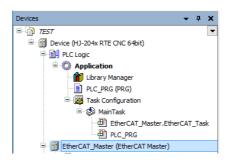
3. The **SM_Drive_GenericDSP402** you selected is added under **ADVA_EC** (**HITACHI AC SERVO DRIVES ADV Series**). In the following figure, two devices were added.



4.2.2 EtherCAT NIC setting

The following procedure shows how to configure the EtherCAT NIC setting. The PLC must be started and connected before starting the following procedure. • If the PLC has not been started

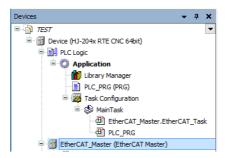
- See "3.1.4 Starting PLC", and start the PLC.
- If the PLC is not connected See Steps 1 and 2 in "3.1.5 Running a PLC program", and connect the PLC.
- 1. Double-click **EtherCAT_Master** (**EtherCAT Master**) in the **Devices** window to display a window for the EtherCAT_Master configuration.



2. In **Source Address (MAC)** under **EtherCAT NIC Setting** in the **General** tab, enter the MAC address of the LAN port used for EtherCAT. Alternatively, you can click **Browse** and select the MAC address.

_	EtherCAT_Master X		
	General	Autoconfig Master/Slaves	Ether CAT
	Sync Unit Assignment	EtherCAT NIC Setting	
	EtherCAT I/O Mapping	Destination Address (MAC) FF-FF-FF-FF-FF-FF	Broadcast 🗌 Enable Redundancy
	Status	Source Address (MAC) F8-0F-41-82-7E-68	Browse
	Information	Network Name Select Network by MAC Select Network by	/ Name

- 4.2.3 Setting cycle time for the EtherCAT master and interval for the task The following procedure shows how to set up the cycle time for the EtherCAT master and the interval for the task.
 - (1) Cycle time setting for the EtherCAT master
 - 1. Double-click **EtherCAT_Master (EtherCAT Master)** in the **Devices** window to display a window for EtherCAT_Master configuration.

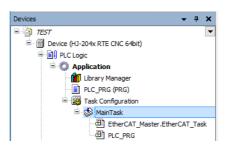


- 2. For **Cycle Time** under **Distributed Clock** in the **General** tab, specify **4000** (μs) (default setting).
- Note: The interval of the task (MainTask) might be automatically changed when the value of **Cycle Time** is changed. For information about how to configure the interval of the task, see "(2) Interval setting for the task".

General	Autoconfig Master/Slaves	Ether CAT.
Sync Unit Assignment	EtherCAT NIC Setting	
EtherCAT I/O Mapping	Destination Address (MAC) FF-FF-FF-FF-FF	roadcast 🗌 Enable Redundancy
Status	Source Address (MAC) F8-0F-41-82-7E-68 Bro Network Name	wse
Information	Select Network by MAC Select Network by Nar	ne
	■ Distributed Clock	15
	Cycle Time 4000 🜩 µs	
	Sync Offset 20 🔷 %	
	Sync Window Monitoring	
	Sync Window 1 📥 µs	

- (2) Interval setting for the task
 - 1. Double-click **MainTask** in the **Devices** window to display a window for task configuration.

In the **MainTask** tab, you can set task priority, type, and interval.



2. In the task configuration window, select **Cyclic** for **Type**, and then specify **4000** (μs) (default setting) for **Interval**.

If **EtherCAT_Master.EtherCAT_Task** is inserted under the task, you must specify the same value as **Cycle Time** in the aforementioned EtherCAT_Master configuration window.

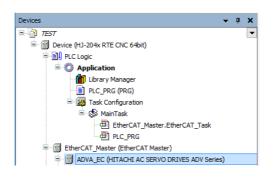
Note: The interval of the task might be automatically changed when the value of **Cycle Time** is changed in "(1) Cycle time setting for the EtherCAT master". If you change the cycle time setting of the EtherCAT master, check the interval setting of the task, and reconfigure the setting if necessary.

nfiguration			
riority (031): 0			
Туре			
Cyclic	✓ Interval (e.g. t#200ms):	4000	µs ~
Watchdog			
Enable			
Time (e.g. t#200ms):			ms 🗸
Sensitivity:	1		

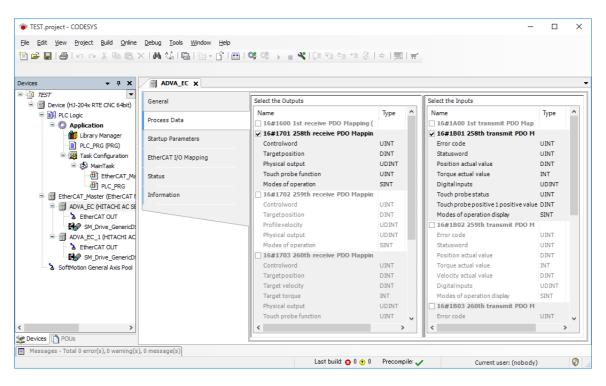
4.2.4 EtherCAT slave setting

(1) Process data setting

- In this example, a process data object (PDO) is selected.
- Repeat this action for each EtherCAT slave according to your needs.
- Select an appropriate PDO for your needs. PDOs are defined on a per EtherCAT slave basis. For details about the PDOs, refer to the user's manual of the EtherCAT slave you use.
- 1. Double-click **ADVA_EC** (**HITACHI AC SERVO DRIVES ADV Series**) in the **Devices** window to display a window for EtherCAT slave configuration.



2. Click **Process Data**, clear the checkboxes selected under **Select the Outputs** and **Select the Inputs**, and select the checkboxes for the PDO you want to use.



(2) Setting startup parameters

As startup parameters, you can specify parameter values that cannot be mapped to the PDO. You can use this feature to set up parameters that have to be set only once. For example, you can adjust the response frequency of the PID control and gain parameters.

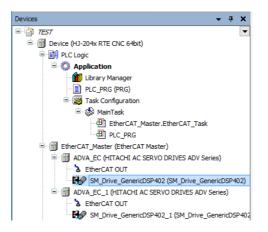
- Repeat this action for each EtherCAT slave according to your needs.
- Parameters are defined on a per EtherCAT slave basis. For details about the parameters, refer to the user's manual of the EtherCAT slave you want to use.
- 1. Double-click **ADVA_EC** (**HITACHI AC SERVO DRIVES ADV Series**) in the **Devices** window to display a window for the EtherCAT slave configuration.
- 2. Click Startup Parameters. Click Add to show a list of parameters.

TEST.project - CODESYS					-	×
	<u>D</u> ebug <u>T</u> ools <u>W</u> indow <u>H</u> elp					
¹ ∰ 🖆 🔚 🎒 ∽ ∼ Å 🖷 🖷 >	< 桷 偽 唱 徳 - 6* 鬯	I 🐝 👒 🕨 🗏 🤻 🛙	[= f= d= *= \$ ↔ ⊼ ≕ *			
Devices 👻 🕂 🗙	ADVA_EC X					•
■			elete 🕆 Move Up 🐥 Move Down			
🖹 📆 Device (HJ-204x RTE CNC 64bit)	General					
PLC Logic Gradient Strength PLC Logic Gradient Strength PLC Logic	Process Data	Select Item from Object	t Directory			
Library Manager		-				
PLC PRG (PRG)	Startup Parameters	Index:Subindex	Name	Flags	Туре	[^]
Task Configuration	EtherCAT I/O Mapping		Store parameters	RO	USINT	
🖹 🍪 MainTask		■ 16#1011:16#00	Restore default parameters	RO	USINT	-
EtherCAT_Ma	Status	± 16#10F1:16#00	Error Settings	RO	USINT	
PLC_PRG		I6#10F3:16#00	Diagnosis History	RO	UDINT	
EtherCAT_Master (EtherCAT I	Information	■ 16#1600:16#00	1st receive PDO Mapping	RW	USINT	
ADVA_EC (HITACHI AC SE		■ 16#1A00:16#00	1st transmit PDO Mapping	RW	USINT	
EtherCAT OUT		± 16#1C12:16#00	Sync manager 2 PDO assignment	RW	UDINT	
SM_Drive_GenericD		■ 16#1C13:16#00	Sync manager 3 PDO assignment	RW	UDINT	
B M ADVA_EC_1 (HITACHI AC		16#3101:16#00	Encoder wire breaking detection(FA-01)	RW	UINT	1
EtherCAT OUT		16#3103:16#00	Overspeed error detection level(FA-03)	RW	UINT	1
SM_Drive_GenericD		16#3104:16#00	Speed error detection value(FA-04)	RW	UINT	5
🔤 🚡 SoftMotion General Axis Pool		16#3107:16#00	DC bus power supply(FA-07)	RW	UINT	1
		16#3108:16#00	Regenerative brake resistor overload detection level(FA-08)	RW	UINT	5
		16#3109:16#00	Overload notice level(FA-09)	RW	UINT	8
		16#310A:16#00	Driving mode(FA-10)	RW	UINT	C ∨
			1			<u> </u>
		Name				
< >		Index: 16# 0	Bitlength: 8		ОК	
Sevices POUs		SubIndex: 16# 0	Value: 0		Cance	
Messages - Total 0 error(s), 0 warning(s)	, 0 message(s)		🗌 Byte Array			

4.2.5 SoftMotion Axis setting

In this example, an Axis setting is configured.

- Repeat this action for each Axis according to your needs.
- 1. Double-click **SM_Drive_GenericDSP402** (**SM_Drive_GenericDSP402**) in the **Devices** window to display a window for Axis configuration.



2. Click **General**, and configure **Axis type and Limits** and **Velocity ramp type**. In this example, default values are used.

General	Axis type and limits				Velocity ramp t	ype
Scaling/Mapping	☐ Virtual mode ○ Modulo	Software limits	Negative [u]: Positive [u]:	0.0	Trapezoid Sin ²	
Commissioning	Finite			1000.0	O Quadratic	
SM_Drive_ETC_GenericDSP402: I/O Mapping		Software error read	tion Deceleration [u/s²]:	0	Quadratic (smooth)
Status			Max. distance [u]:	0	ID:	0
nformation	Limits for CNC (SMC_	_ControlAxisBy*)	Positio	on lag supervision		
	Velocity [u/s]: A	cceleration [u/s ²] De	celeration [u/s ²] deact	ivated \checkmark		

■ If CNC is used

If CNC is used in your program, the function block that starts with "SMC_ControlAxisBy" must be used for the axis control. To use this function, you must define the upper limits of the velocity, acceleration, and deceleration under Limits for CNC (SMC_ControlAxisBy*) in the above screen.

3. Click Scaling/Mapping to configure Scaling.

In the following setting example, 360 counts in the CODESYS program correspond to one rotation of the motor. (This setting is for using a 17-bit encoder (16#0~16#1FFFF).)

2	₩ SM_Drive_GenericDSP402 ×]		
	General	Scaling Invert direction		
	Scaling/Mapping	16#20000	increments <=> motor turns	1
	Commissioning	1	motor turns <=> gear output turns	1
	commonly	1	gear output turns <=> units in application	360
	SM_Drive_ETC_GenericDSP402: I/O			

4. CONFIGURATION OF EtherCAT CONNECTION

4.2.6 Checking the EtherCAT connection For information about how to check the EtherCAT connection, see "4.1.5 Checking the EtherCAT connection".If EtherCAT is connected successfully, the icons beside the devices are shown in green in

If EtherCAT is connected successfully, the icons beside the devices are shown in green in the same way as for I/O modules.

4.3 Troubleshooting for EtherCAT Slave Connection Errors

When an error occurs, for example, an EtherCAT slave does not function, follow the procedure below to investigate and identify the cause.

1. Read the user's manual of the slave device, and check whether the symptom is listed in the manual.

If yes, troubleshoot according to the description in the manual.

- 2. Start the CODESYS development environment, and check the PLC log. For information about the PLC log, refer to the following topic in the online help.
 - CODESYS Development System > Reference, User Interface > Object > Object 'Device' and Generic Device Editor > Tab 'Log'

If you have any questions about the PLC log, contact the sales representatives.

3. Check the Windows event log to see if any errors from CODESYS are recorded.

If you have any questions after you go through all the steps above, contact the sales representatives.

CHAPTER 5 CONFIGURATION FOR USING OPC

5.1 Overview

CODESYS supports the OPC server and allows you to use OPC Classic (OPC DA/AE) and OPC UA. For information about an overview of the OPC server and how to use OPC server tools, refer to the CODESYS original manuals in the following locations.

■ Folder location

C:\Program Files (x86)\3S CODESYS \CODESYS OPC Server 3

■ List of manuals

File name	Description
CoDeSys_OPC_Server_V3_User_Guide.pdf	Instructions for using OPC Config, which is a configuration tool for the OPC server and for the communication interface between the CODESYS development environment and the PLC.
AeConfigurator_UserGuide.pdf	Instructions for using AeConfigurator, which is a tool for adding and setting up alarm events when you use OPC AE.

This chapter describes the setup procedure necessary for using OPC.

(1) Using OPC Classic (OPC DA/AE)

In addition to adding OPC objects, you must configure DCOM. See "5.2 Adding OPC Objects" and "5.3 DCOM Settings".

Moreover, configure the following items according to your needs.

• OPC server setting

CODESYS offers OPC Config, a tool for setting up the OPC server and the communication interface between the CODESYS development environment and the PLC. (Note that you can use OPC with the default settings.) For details about OPC Config, refer to CoDeSys_OPC_Server_V3_User_Guide.pdf.

• Alarm event setting

To use OPC AE, you must use AE Configurator to configure alarm events notified from CODESYS to OPC AE. For details about AE Configurator, refer to AeConfigurator_UserGuide.pdf.

(2) Using OPC UA

You can use OPC UA simply by adding OPC objects. For information about how to add OPC objects, see "5.2 Adding OPC Objects".

5.2 Adding OPC Objects

You must add a Symbol configuration object to disclose variables to the OPC client.

1. In the right-click menu on **Application** in the **Devices** window, click **Add Object** > **Symbol configuration**.

Devices		v 4 × bit) Cut Copy Paste Delete Browse Refactoring	•	
	Ē	Properties	·	
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	-	•	Alarm configuration Application Axis Group Cam table CINC program CINC settings Data Sources Manager
				DUT External Fie Global Variable List Image Pool Interface Network Variable List (Receiver) Network Variable List (Sender) Persistent Variables POU POU POU for implicit checks Recipe Manager Redundancy Configuration Symbol Configuration

2. The Add Symbol Configuration window is displayed. Click Add.
• If you want to use OPC UA, select Support OPC UA Features.

Add Symbol Configuration	×
Remote access symbol configuration.	
Name:	
Symbol Configuration	
Include Comments in XML	
Support OPC UA Features	
Client side data layout	
Compatibility Layout	
Optimized Layout	
Add Ca	ncel

- 3. Select the variables you want to disclose to the OPC client.
 - You can select variables after you build the PLC program.
 - If you want to use OPC UA, also select **Constants**.

Devices	- ₽ X	Symbol configuration	×				
B-∰ TEST	-	🛛 📉 View 👻 🎬 Build 🛛 🛱 Se	ttings 👻				
 		• There are 4 configured variab Changed symbol configuration w				-	
Library Manager Library Manager LorpRG (PRG) Symbol Configuration Konfiguration Konfiguration		Symbols	Access Rights	Maximal	Attribute	Туре	1
은 🥸 MainTask 스 렌 PLC_PRG 스 🔓 SoftMotion General Axis Pool		 ✓ Ø bOPCRead ✓ Ø bOPCWrite ✓ Ø iOPCRead ✓ Ø iOPCWrite ✓ Ø iOPCWrite 	9 9 9 9	\$ \$ \$ \$		BOOL BOOL INT INT	

5.3 DCOM Settings

DCOM is a technology used for communication between PC software components distributed in the network. If you want to use a remote connection to link an OPC client to the local device where the CODESYS OPC server is running, you must configure DCOM settings. To enable DCOM connection, a user of the OPC client PC must be authenticated on the local device. If workgroups are used in the system, you can authenticate a client user by creating the same user account with the same password on both the local device and the OPC client PC. When you start using the CODESYS OPC server, follow the procedure below to set up the DCOM configuration.

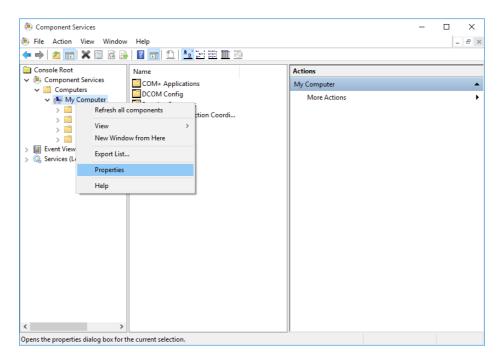
- Notes 1: Follow the setup procedure only when you use OPC Classic. If you use OPC UA instead, it is not necessary to do so.
 - 2: Follow the setup procedure on both the local device and the OPC client PC.

5.3.1 DCOM security settings

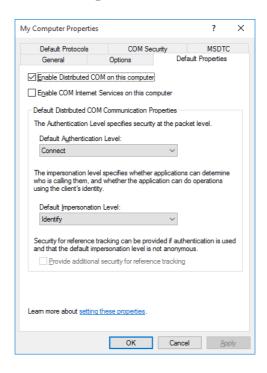
- 1. Sign in to the computer using an administrator account (Administrator).
- 2. Start the Component Services in the following steps.
 - If the OS is Windows® Embedded Standard 7, click **Start**, type the following in the **Search programs and files** box at the lower left corner on the Start menu, and then press **Enter**.
 - mmc comexp.msc /32
 - If the OS is Windows® 10, click search icon at the right on the Start button, type the following in the **Search Windows** box, and then press **Enter**.

mmc comexp.msc /32

3. The **Component Services** window appears. Select **Console Root** > **Component Services** > **Computers** > **My Computer** to expand trees, and then right-click on **My Computer**. On the menu, click **Properties**.



- 4. The **My Computer Properties** window is displayed. Select the **Default Properties** tab to configure as follows.
 - Select Enable Distributed COM on this computer.
 - Specify **Connect** for **Default Authentication Level**.
 - Note: On the OPC client PC, specify None for Default Authentication Level.
 - Specify Identify for Default Impersonation Level.



This completes the DCOM configuration on the OPC client PC. Click **OK** and proceed to "5.3.2 Firewall settings".

- 5. In the **My Computer Properties** window, select the **COM Security** tab. Under **Access Permissions**, click **Edit Limits**.
 - For **Permissions for ANONYMOUS LOGON**, select all **Allow** checkboxes, and then click **OK**.

Access Permission		? >	<
Security Limits			
Group or user names:			
Section 2017 Secti	KTOP-B13S67C\		
Distributed COM Users (DESK ANONYMOUS LOGON	CTOP-B13S67C\D	istributed C	
ANON TWO US LUGUN			
	A <u>d</u> d	<u>R</u> emove	
Permissions for ANONYMOUS LOGON	Allow	Deny	
Local Access Remote Access	X K		
	OK	Cancel	

6. The Launch and Activation Permission window is displayed. Click Edit Limits.
• For Permission for Everyone, select all Allow checkboxes, and then click OK.

Launch and Activation Permissio	n	? >	<
Security Limits			
Group or user names:			
Everyone ALL APPLICATION PACKAG Administrators (DESKTOP-81 Performance Log Users (DES Distributed COM Users (DES	3S67C\Administra KTOP-B13S67C\	Performance	
	A <u>d</u> d	<u>R</u> emove	
Permissions for Everyone	Allow	Deny	
Local Launch Remote Launch Local Activation Remote Activation			
	ОК	Cancel	

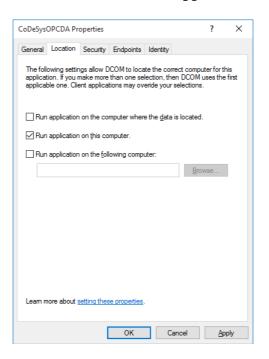
7. In the **My Computer Properties** window, click **Apply**, and then click **OK**. If the **DCOM configuration on the whole computer** dialog box is displayed, click **Yes**. 8. Select **My Computer** > **DCOM Config** to expand trees, and right-click on **CoDeSysOPCDA**. On the menu, click **Properties**.

le Component Services	– 🗆 X
le Action View Window Help	- <i>&</i> ×
🔶 🔶 📶 🖾 🕢 🛛 🖬 🗂 🖄 🔛 🏛 🏛	
> 🖀 BrowserBrokerServer	Actions
> CDP Reference Host	Component Services
> 🖀 CElevateWlanUi Computers	More Actions
> 🖀 CFmlfsEngine host > 🚔 Cloud Change Wnf Mc	More Actions
Cloud Change with Nic	
CloudExperienceHost (
> 👙 CloudStorageWizard	
> 🚔 CMLUAUTIL	
S 🚔 CMSTPLUA	
> 🚔 CnxtDSPdII	
> 嶜 CoDeSys 2.3 to 3.0 Con	
> 🖀 CoDeSysOPCDA	
> 🚔 Color Managem New Window from Here	
> 🖀 COM+ Event Sys Properties	
> 🖀 COM_SRS_HP360	
> 🖀 Com_SRS_TruSur Help	
> 🖀 COM_SRS_WOWHD2	
> 🖀 ComEvents.ComServic	
> 🖀 ComEvents.ComSyster	
> 🖀 Connected User Store > 🚔 COpenControlPanel	
> 🚔 COpenControlPanel	
> 🚔 CortanaExperienceFlow	
Contaniaviapineiper	
> 🚔 ctrapicuació class	
<	
Opens the properties dialog box for the current selection.	

9. The **CoDeSysOPCDA Properties** window is displayed. Select the **General** tab, and specify **Connect** for **Authentication Level**.

CoDeSys	OPCDA Pr	operties			?	×
General	Location	Security	/ Endpoints	Identity		
Gene	ral propertie	es of this	DCOM applica	ation		
Арр	lication Nar	me: C	oDeSysOPCD	A		
Арр	lication ID:	{	137BB965-84I	3B-11D5-9FF1	-00105A4AE	1C6}
Арр	lication Typ	e: L	ocal Server			
Auth	entication	Level: (Connect			\sim
Loc	al Path:	"	C:\Program Fil	es (x86)\3S C	ODESYS\CC	DESY
Leam n	iore about ș	setting th	ese properties			
			ОК	Canc	el	Apply

10. Select the Location tab, and then select Run application on this computer.



11. Select the Security tab. Under Launch and Activation Permissions and Access Permissions, select Customize.

CoDeSysOPCDA Properties	?	×
General Location Security Endpoints Identity		
Launch and Activation Permissions		
<u>◯ U</u> se Default		
Customize	<u>E</u> dit	
Access Permissions		
◯ Use De <u>f</u> ault		
© Customize	E <u>d</u> it	
Configuration Permissions		
◯ Use Defau <u>l</u> t		
● Customize	Edit	
Learn more about setting these properties.		
OK Canc	el <u>A</u> pp	bly

- 12. Under Launch and Activation Permission, click Edit. Set all access permission for Everyone to "Allow" as follows.
 - Click Add.
 - The Select Users and Groups window is displayed. Click Advanced.
 - Click Search Now. Select Everyone under Search results, and then click OK.
 - In the Select Users and Groups window, click OK.
 - For Permission s for Everyone, select all Allow checkboxes, and then click OK.

aunch and Activation Permiss	sion	?	Х
Security			
Group or user names:			
SYSTEM			
Administrators (DESKTOP-	-NQJ6EQU\Administr	ators)	
R INTERACTIVE			
_			
	A <u>d</u> d	<u>R</u> emov	e
Permissions for Everyone	Allow	Deny	,
Local Launch	\checkmark		
Remote Launch	\checkmark		
Local Activation	\checkmark		
Remote Activation	\checkmark		
		_	
	OK		ncel

13. Also for **Access Permissions**, add **Everyone**, and select all **Allow** checkboxes in the same way as in Step 12.

Access Permission		? ×	
Security			
Group or user names:			
SELF SELF & SYSTEM & Administrators (DESKTOP-N	QJ6EQU\Administr	rators)	
	A <u>d</u> d	<u>R</u> emove	
Permissions for Everyone	Allow	Deny	
Local Access Remote Access	N		
	ОК	Cancel	

The following table shows the possible settings in addition to "Everyone" and shows which users are granted access rights for each.

Setting	Users granted with access rights
Everyone	All users
INTERACTIVE	Local access users
NETWORK	Remote access users
SYSTEM	Service applications
Specific domain group	All users belonging to the specific domain group
Specific user name	Specific user

Select a user according to the system security requirements.

14. Select the **Identity** tab, and select **The interactive user**.

General	Location	Security	Endpoints	Identity		
Which	user accour	nt do you w	vant to use to	run this appli	cation?	
The	interactive	user.				
() The	launching (user.				
() This	user.					
Us <u>e</u> r:					Browse	
Pass	word:					
Co <u>n</u> fi	rm passwor	d:				
() The	system acc	ount (servi	ices only).			
	nore about e	etting thes	e properties.			

15. Click **Apply**, and then click **OK**.

5.3.2 Firewall settings

Windows Firewall is enabled by default, and consequently, DCOM connection is not allowed with the default settings. Follow the procedure below to allow DCOM connections to pass through Windows Firewall.

If you already disabled Windows Firewall, this procedure is not necessary.

- 1. Sign in to the computer using an administrator account (Administrator).
- 2. Open Control Panel.
 - If the OS is Windows® Embedded Standard 7, click Start, and click Control Panel.
 - If the OS is Windows® 10, right-click Start, and click Control Panel from the menu.
- 3. The Control Panel window appears. Click System and Security.
- 4. The System and Security window appears.
 - Click Windows Firewall.
- 5. The Windows Firewall window appears.
- Click Advanced.
- 6. The Windows Firewall with Advanced Security window is displayed.
 - Click Inbound Rules or Outbound Rules.
 - In the Actions pane, click New Rule.

Note: Create a new rule using the same procedure for both **Inbound Rules** and **Outbound Rules**.

The following shows how to add a new rule when Inbound Rules is selected.

- 7. The Rule Type window of New Inbound Rule Wizard is displayed.
 - Select **Program**, and then click **Next**.

💣 New Inbound Rule V	Vizard	×
Rule Type		
Select the type of firewall ru	le to create.	
Steps:		
Rule Type	What type of rule would you like to create?	
Program		
Action	Program	
Profile	Rule that controls connections for a program.	
Name	⊖ P <u>o</u> rt	
	Rule that controls connections for a TCP or UDP port.	
	O Predefined:	
	AllJoyn Router	\sim
	Rule that controls connections for a Windows experience.	
	○ <u>C</u> ustom	
	Custom rule.	
	< <u>B</u> ack <u>N</u> ext > C	ancel
Í.		

- 8. The **Program** window of **New Inbound Rule Wizard** is displayed.
 - Select This program path.
 - Click **Browse**, select the following file, and then click **Next**. C:\Program Files (x86)\3S CODESYS\CODESYS OPC Server 3\WinCoDeSysOPC.exe

🔗 New Inbound Rule Wizard		×
Program		
Specify the full program path and e	executable name of the program that this rule matches.	
Steps:		
Rule Type	Does this rule apply to all programs or a specific program?	
Program		
Action	O All programs	
Profile	Rule applies to all connections on the computer that match other rule properties.	
Name	This program path:	
	Verogram Files % (x86)\3S CODESYS\CODESYS OPC Server 3\WinCoDeS Browse	
	Example: c:\path\program.exe %ProgramFiles%\browser\browser.exe < <u>Back</u> <u>Next</u> > Cancel	

- 9. The Action window of New Inbound Rule Wizard is displayed.
 - Select **Allow the connection**, and then click **Next**.

💣 New Inbound Rule Wizard		×
Action		
Specify the action to be taken wh	en a connection matches the conditions specified in the rule.	
Steps: Program Action Profile Name	What action should be taken when a connection matches the specified conditions?	
	< <u>B</u> ack <u>N</u> ext > Cancel	

10. The **Profile** window of **New Inbound Rule Wizard** is displayed.Select all checkboxes, and then click **Next**.

🔗 New Inbound Rule W	fizard	×	
Profile			
Specify the profiles for which	this rule applies.		
Steps:			
Rule Type	When does this rule apply?		
Program			
Action	✓ Domain		
Profile	Applies when a computer is connected to its corporate domain.		
Name	✓ Private		
	Applies when a computer is connected to a private network location, such as a home or work place.		
	Public		
	Applies when a computer is connected to a public network location.		
	< Back Next > Cancel		

11. The Name window of New Inbound Rule Wizard is displayed.Enter the rule name, and then click Finish.

	New Inbound Rule Wizard	l i		>	×
N	ame				
Sp	ecify the name and description	of this rule.			
St	eps:				
۲	Rule Type				
۲	Program				
۲	Action				
۲	Profile		Name: CoDeSysOPCDA		
۲	Name				
			Description (optional):		
			< <u>B</u> ack <u>F</u> inish	Cancel	

- 12. Confirm that the rule just created is registered in **Inbound Rules** in the **Windows Firewall with Advanced Security** window. Then close the window.
- 13. Close the **Windows Firewall** window.

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CHAPTER 6 RAS FEATURES IN HF-W100E/IoT

6.1 Overview

In addition to the standard RAS features on HF-W, HF-W100E/IoT offers additional HF-W100E/IoT's own RAS features. These include such functionalities as the ability to control hardware from the CODESYS runtime environment and to monitor the CODESYS runtime environment.

This section provides an overview of the HF-W100E/IoT's own RAS features.

Table 6-1	RAS Features in HF-W100E/IoT
-----------	------------------------------

Category	Item
Control functionality	Controlling the external general purpose I/O
Monitoring functionality	Monitoring the CODESYS runtime environment

<Control functionality>

(1) Controlling the external general purpose I/O

You can use the RAS library for the CODESYS runtime environment to control external general purpose I/O from applications running on the CODESYS runtime environment. If you use this functionality, you can input signals from and output signals to external devices. Seven input and eight output external general purpose I/O are available for a user.

<Monitoring functionality>

(2) Monitoring the CODESYS runtime environment

You can use a watchdog timer on HF-W100E/IoT to monitor whether the CODESYS runtime environment is running properly. If any abnormality is detected, it is recorded in the Windows event log and notified to user applications by using an event object.

This chapter describes functionalities (1), (2) offered by the HF-W100E/IoT's own RAS features.

For information about the standard RAS features on HF-W, see *HF-W100E RAS FEATURES MANUAL* (manual number WIN-63-0095).

For information about the hardware specifications of the Controlling the external general purpose I/O described in this chapter, see *HF-W100E INSTRUCTION MANUAL* (manual number WIN-62-0069).

6.2 RAS Library for the CODESYS Runtime Environment

This chapter describes the interface of the RAS library for the CODESYS runtime environment (hereinafter denoted simply as "RAS library") and how to use the library. By using the RAS library, you can control the external general purpose I/O.

6.2.1 RAS library interface

Table 6-2 shows a list of RAS library functions.

No.	Function name	Functionality
1	GendoControlN	Controls the output of the external general purpose outputs.
2	GetGendiN	Acquires the status of the external general purpose inputs.

- NOTE

• If the RAS features on HF-W are not functioning, the RAS library cannot be used for control.

• If the RAS library is used for controlling external general purpose I/O from the CODESYS runtime environment, control from Windows must be disabled.

(1) Control function for the external general purpose outputs (GendoControlN)

<Name>

GendoControlN - Controls the external general purpose outputs (output1 to 8)

<Syntax>

DWORD GendoControlN(USINT usiOutput, USINT usiMask);

<Description of the functionality>

This function controls the external general purpose outputs (output1 to 8). The parameters of this function are explained below.

- usiOutput: Sets the output level to the general purpose outputs. Table 6-3 shows how bits are allocated to each general purpose output. To set a general purpose output to the low level, set the bit to "0". To set the output to the high level, set the bit to "1".
- usiMask: Specifies a general purpose output to be controlled. The bit allocation is the same as usiOutput as shown in Table 6-3. If the parameter is to be controlled, set the bit to "1", Otherwise, set the bit to "0".

bit0	output1
bit1	output2
bit2	output3
bit3	output4
bit4	output5
bit5	output6
bit6	output7
bit7	output8

Table 6-3 Bit Allocation of usiOutput and usiMask for GendoContorlN

<Return value>

If this function completes successfully, the function returns RET_TRUE (0x01). If this function terminates with an error, the function returns a value as follows.

 Table 6-4
 Return Value from the GendoControlN Function (Error Cases)

Return value	Description
W2KRAS_INVALID_PARAMETER (0x2001)	There is an error in the specified arguments.
W2KRAS_INTERNAL_ERROR (0x2007)	An internal error has been generated.
W2KRAS_RESOURCE_LOCKED (0x2101)	Another process uses the same resources.
RET_FALSE (0x00)	An error other than W2KRAS_INVALID_PARAMETER, W2KRAS_INTERNAL_ERROR, or W2KRAS_RESOURCE_LOCKED has been generated.

<Explanation>

The GendoControlN function sets the output state of the general purpose output with usiOuput and specifies a control target with usiMask. Figure 6-1 shows an operation example to illustrate the relationship between usiOutput and usiMask.

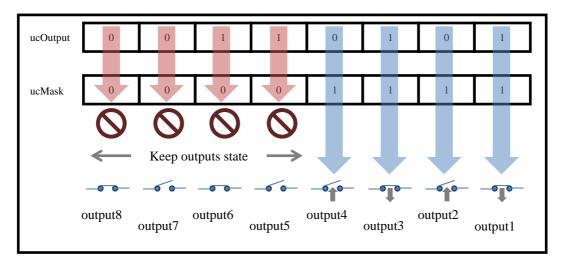


Figure 6-1 Operation Example of the GendoControlN Function

<Supplementary information>

Figure 6-2 shows the operation of the general purpose output1 when the GendoControlN function is used. The dashed lines show the general purpose output level, and the bold line show the transition of the general purpose output1.

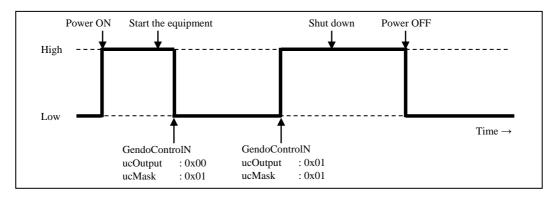


Figure 6-2 Operation Example of the External General Purpose Output1

<Program example>

For an example of a program using this function, see "6.2.3 Examples of using the RAS library".

NOTE

Do not use this function if you are using the RAS library in the HF-W RAS features to control the external general purpose I/O. In the presence of contention caused by simultaneous access, the output cannot be controlled properly.

(2) Get function for the external general purpose inputs (GetGendiN)

<Name>

GetGendiN - Acquires the status of the external general purpose inputs (generalpurpose input1 to 7)

```
<Syntax>
```

DWORD GetGendiN(POINTER TO USINT pusiInput);

<Description of the functionality>

This function acquires the status of the external general purpose inputs. The parameters of this function are explained below.

The parameters of this function are explained below.

pusiInput: The input state of external general purpose input is stored. Table 6-5 shows how bits are allocated to each general purpose input. If the input level of a general purpose input is low, "0" is stored to the corresponding bit, and "1" otherwise.

bit0	input1 input2 input3 input4 input5 input6	
bit1		
bit2		
bit3		
bit4		
bit5		
bit6	input7	
bit7	Not used	

Table 6-5 Bit Allocation of pusiInput for GetGendiN

<Return value>

If this function completes successfully, the function returns RET_TRUE (0x01). If this function terminates with an error, the function returns a value as follows.

Table 6-6Return Value from the GetGendiN Function (Error Cases)

Return value	Description
W2KRAS_INVALID_PARAMETER (0x2001)	There is an error in the specified arguments.
W2KRAS_INTERNAL_ERROR (0x2007)	An internal error has been generated.
W2KRAS_RESOURCE_LOCKED (0x2101)	Another process uses the same resources.
RET_FALSE (0x00)	An error other than W2KRAS_INVALID_PARAMETER, W2KRAS_INTERNAL_ERROR, and W2KRAS_RESOURCE_LOCKED has been generated.

<Program example>

For an example of a program using this function, see "6.2.3 Examples of using the RAS library".

- NOTE

Do not use this function if you are using the RAS library in the HF-W RAS features to control the external general purpose I/O. In the presence of contention caused by a simultaneous access, the correct input level cannot be obtained.

(3) List of enumeration types in the RAS library

The following table shows a list of enumeration types defined in the RAS library.

Tag name	Definition	Value	Description
	W2KRAS_INVALID _PARAMETER	0x2001	There is an error in the specified arguments.
W2KRAS_ERROR	W2KRAS_INTERNAL _ERROR	0x2007	An internal error has been generated.
	W2KRAS_RESOURCE _LOCKED	0x2101	Other process uses the same resources.
RET_VAL	RET_FALSE	0x00	Termination with an error (other than the predefined causes)
	RET_TRUE	0x01	Normal termination

Table 6-7List of Enumeration Types in the RAS Library

6.2.2 Adding the RAS library

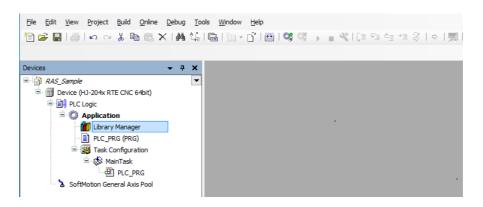
To use the RAS library in the CODESYS runtime environment, you must add the RAS library using the following procedures.

• Install the RAS library in the library repository.

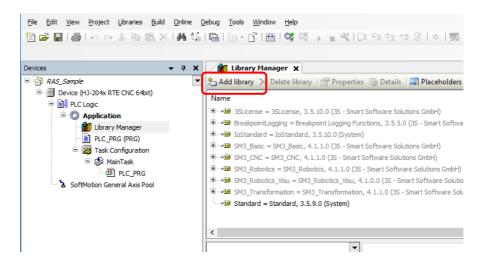
- Add the RAS library to the library manager.
- (1) Installing the RAS library in the library repository

If the RAS library has been installed at least once, this step is not necessary. In that case, go to "(2) Adding the RAS library to the library manager".

1. Double-click Library Manager in the Devices window.



2. Click Add library in Library Manager.



3. The Add Library dialog box appears. Click Advanced.

Add Library		×
Enter a string for a fulltext search in all libraries		
Library * Library * Use Cases *	Company	
Advanced	ок	Cancel

4. The Add Library dialog box appears. Click Library Repository.

🞁 Add Library	×
Enter a string for a fulltext search in all libraries	
Library Placeholder Company: (All companies)	~
Application Intern System	
Group by category Display all versions (for experts only)	
Details Library Repository	OK Cancel

5. The Library Repository dialog box appears. Click Install.

🞁 Library Re	pository	×
Location:	System (C: \ProgramData\CODESYS\Managed Libraries)	Edit Locations
	(Al companies) v pplication ttern stem	Install Uninstall Export
Group	ay category	Find Details Dependencies
Library Pr	ofiles	Close

6. Specify the CmpHIoTRAS.compiled-library file in the C:\Program Files\HIoTRAS\Library folder, and click **Open**.

Select Library					×
\leftarrow \rightarrow \checkmark \uparrow \frown This PC	> Local Disk (C:) > Program Files > HIoTRA	S > Library 🗸 ඊ	Search Library		P
Organize 🔻 New folder				•	?
🖈 Quick access	Name	Туре	Size		
a OneDrive	CmpHIoTRAS.compiled-library	COMPILED-LIBRARY File	26 KB		
💻 This PC					
Desktop					
Documents					
Music					
Pictures					
Videos					
Network					
<u> </u>					
File <u>n</u> ame:	CmpHloTRAS.compiled-library	~	Compiled library	r files]~
			<u>O</u> pen	Cancel	

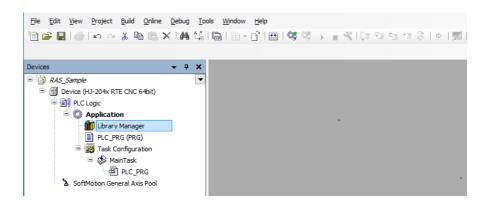
7. Confirm that CmpHIoTRAS is added in System\SysLibs. Click Close.

ocation:	System	~	Edit Locations
	(C: \ProgramData \CODESYS \Managed Libraries)		
Installed lib	raries:		Install
Company	(All companies)	\sim	Uninstall
	pplication	^	Crimito Cam
• 8 I			Export
B 🖁 S	vstem		
	Redundancy		
	SysLibs		
6	- •□ CmpApp System		
6			
8	- • CmpBinTagUtilIec System		
8			
6	• • CmpChannelClientIec System		
6	• CmpChecksum System		
6	CmpCodeMeter System		
	CmpCrypto System		
	• • CmpDynamicText System		
	* CmpErrors Interfaces System		
	• • CmpErrors2 Interfaces System		
	CmpEventMgr System		
	→ CmpHilscherCIFX System		
	CmpHIoTRAS Hitachi Industry & Control Solutions Ltd		
			Find
<	•• CmpIecTask System	~	Details
		,	Details
Group	by category		Dependencies

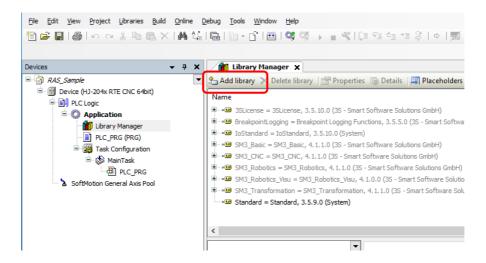
This completes installation of the RAS library.

Click the close button (×) at the upper right corner of the **Add Library** dialog box to close the dialog box.

(2) Adding the RAS library to the library manager1. Double-click Library Manager in the Devices window.



2. Click Add library in Library Manager.



3. The Add Library dialog box appears. Click Advanced.

Add Library		×
Enter a string for a fulltext search in all libraries		
Library ★ @= Application ★ @: Use Cases	Company	
Advanced	OK	Cancel

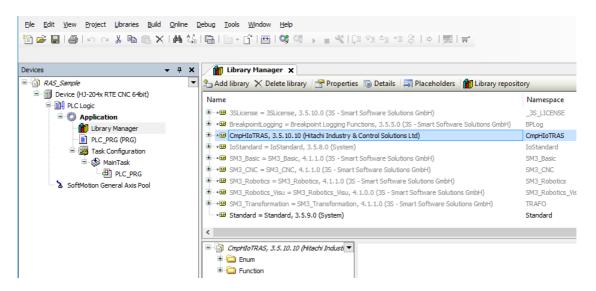
4. The **Add Library** dialog box appears. Click **System** > **SysLibs** > **CmpHIoTRAS**, and then click **OK**.

Note that you can use the search bar to search the libraries.

brary Placeholder	
Company: (All companies)	
Application	
Intern	
System	
Redundancy	
SysLibs	
CmpApp 3.5.9.0 System	
CmpAsyndMgr 3.5.10.0 System	
CmpBinTagUtilIec 3.5.5.0 System	
CmpBitmapPool 3.5.7.0 System	
CmpChannelClientIec 3.3.1.40 System	
• Cmp Checksum 3.5.5.0 System	
CmpCodeMeter 3.5.5.0 System	
• Cmp Crypto 3.5.10.0 System	
• CmpDynamicText 3.5.9.0 System	
CmpErrors Interfaces * System	
• CmpErrors2 Interfaces * System	
CmpErrors 3.3.1.40 System	
CmpEventMgr 3.5.8.0 System	
CmpHilscherCIFX 3.5.10.0 System	
CmpHIoTRAS 3.5.10.10 Hitachi Industry & Control Solutions Ltd	
CmpIecTask 3.5.9.0 System	
CmpKBus 3.5.8.0 3S-Smart Software Solutions GmbH	

5. If the following library is shown in library manager, the library was added successfully.

CmpHIoTRAS,*.*.* (Hitachi Industry & Control Solutions Ltd.) (Asterisks (*) denote the version information.)



6. RAS FEATURES IN HF-W100E/IoT

6.2.3 Examples of using the RAS library

This subsection describes how to control the external general purpose I/O from applications running on the CODESYS runtime environment.

■ Adding the RAS library

Add the RAS library. For information about how to add the RAS library, the library functions, see "6.2.2 Adding the RAS library".

- Implementation of a program using the RAS library Implement a program. "(1) General purpose external I/O" shows an example of using the RAS library.
- (1) General purpose external I/O

The following is an example of using the RAS library for the external general purpose I/O.

<Variables in use>

Table 6-8 shows a list of variables declared in VAR.

Туре	Name	Use
INT	uiState	Determines the execution state.
USIINT	dwDO_port	Specifies the output state for the external general purpose outputs.
USIINT	dwDO_cmd	Specifies which external general purpose outputs to control.
USIINT	dwDI_port	Variable used for acquiring the input state of the external general purpose inputs.
DWORD	dwResult_out	Result of the external general purpose output
DWORD	dwResult_in	Result of the external general purpose input

ruble o o variables esea in ale Enternar Ocherar rarpose r o ranetions	Table 6-8	Variables Used in the External General Purpose I/O Functions
--	-----------	--

<Functions to use>

Table 6-9 shows which external general purpose I/O functions are used.

 Table 6-9
 External General Purpose I/O Functions

Function name	Use
GendoControlN	Used for controlling the output of the specified external general purpose. (For details about the function interface, see "6.2.1 RAS library interface (1) Control function for the external general purpose outputs (GendoControlN)".)
GetGendiN	Used for getting the status of the input of the specified external general purpose. (For details about the function interface, see "6.2.1 RAS library interface (2) Get function for the external general purpose inputs (GetGendiN)".)

<Program>

In the example of Figure 6-3, the program outputs to the external general purpose output (output1) and obtains the input state of a external general purpose input.

PLC_PRG (declaration part)

```
PROGRAM PLC_PRG
VAR
uiState: INT;
usiOutput : USINT;
usiMask : USINT;
usiInput : USINT;
dwResult_out : DWORD;
dwResult_in : DWORD;
END_VAR
```

PLC_PRG (body)

```
IF uiState = 0 THEN
uiState := 1;
// GENDO output
usiOutput := 1;
usiMask := 1;
dwResult_out := GendoControlN(usiOutput, usiMask);
// GENDI input
dwResult_in := GetGendiN(ADR(usiInput));
END_IF
```

Figure 6-3 Example of External General Purpose I/O Control Program

6.3 Monitoring the CODESYS Runtime Environment

6.3.1 Overview

This function monitors whether the CODESYS runtime environment is running properly. The function consists of the WDT control component that periodically triggers the watchdog timer on HF-W100E/IoT from the CODESYS runtime environment and the CODESYS monitor service running on the Windows environment.

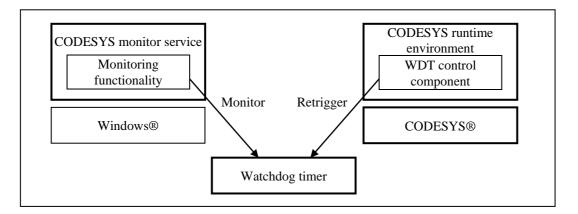


Figure 6-4 Block Diagram of the Monitoring Functionality

- (1) The WDT control component runs on the scheduler of the CODESYS runtime environment and periodically retriggers the watchdog timer.
- (2) The CODESYS monitor service periodically checks if a timeout is generated by the watchdog timer. A watchdog timer timeout is generated when the WDT control component is unable to retrigger and the time in the watchdog timer is less than the timeout threshold (*1).
- (3) When a timeout occurs, the CODESYS monitor service infers that some sort of error occurred in the CODESYS runtime environment and notifies user applications by means of the Windows event log and event objects. In addition, the CODESYS monitor service executes the predefined action at the time of time-out (*2).

(*1) The timeout threshold is 63 seconds minus the timeout.

For information about how to set the value, see "6.3.5 HIOTRAS setting command". The factory setting is 0 (seconds) because the timeout is set to 63 seconds.

- (*2) You can select one of the following for the action at the time of time-out.
 - Stop and restart the CODESYS runtime environment
 - Shut down and restart the device
 - Shut down and restart the device (forced)

For information about how to set the action, see "6.3.5 HIoTRAS setting command". No action is set in the factory setting.

The monitoring functionality can be disabled or enabled. For information about how to disable or enable this functionality, see "6.3.2 Enabling/Disabling the CODESYS runtime environment monitor".

NOTE

- When the monitoring functionality is used, **Not used** is selected for **Watchdog timer setting** in the **RAS Setup** window in the HF-W RAS features (factory setting). If **Automatic retrigger** or **Retriggered by application program** is selected, the monitoring functionality cannot function. For information about the **RAS Setup** window, see "3.1.3 Using the RAS Setup window" in the *HF-W100E RAS FEATURES MANUAL* (manual number WIN-63-0095).
- When the monitoring functionality is used, a watchdog timer cannot be used by the HF-W RAS features. If you want the HF-W RAS features to use a watchdog timer, disable the monitoring functionality as described in "6.3.2 Enabling/Disabling the CODESYS runtime environment monitor".
- When 63 seconds elapse without the state in which retriggering cannot be performed is canceled, 150 seconds after the value of the timer becomes 0, the blue screen (STOP code: 0x9231) is displayed by the HF-W RAS features to acquire a memory dump.

6.3.2 Enabling/Disabling the CODESYS runtime environment monitor

You can enable and disable the CODESYS runtime environment monitor by editing the CODESYS config file and changing the settings of the monitor service. The monitoring functionality is enabled in the factory setting. Note that, if the CODESYS runtime environment monitor is disabled, a shutdown of the CODESYS runtime environment will not be detected.

- (1) Disabling the CODESYS runtime environment monitor
 - (a) Editing the config file
 - 1. Launch Notepad as administrator.
 - If the OS is Windows® Embedded Standard 7, click **Start**, and then click **All Programs** > **Accessories**. right-click **Notepad**. On the menu, click **Run as administrator**.
 - If the OS is Windows® 10, click **Start**, and then click **Windows Accessories** from the list of applications. right-click **Notepad**. On the menu, click **More** > **Run as administrator**.
 - If the User Account Control window is displayed, click Yes.
 - 2. Notepad starts. Click the File menu, and on the menu, click Open.
 - 3. Select the CoDeSysControl.cfg file in C:\Program Files\3S CODESYS\CODESYS Control RTE3, and then click **Open**.
 - 4. The CoDeSysControl.cfg file opens. In the ComponentManager section, add "; (semicolon)" to the beginning of the following line to comment out the WDT control component (CmpHWdtControl).

Component.*=CmpHWdtControl

Note: The number added after "Component." is an index and different depending on the environment.

[CmpRouter] 0.MainNet=ether ×
[ComponentManager] Component.1=CmpDrvSchedulerAPIC Component.2=CmpCodeMeter
;Component.3=CmpHWdtControl
;Component.3=CmpSJACanDrv ;Component.3=CmpEt100Drv ;Component.3=CmpEt1000Drv ;Component.3=CmpRTL81x9Mpd ;Component.3=CmpRTL8169Mpd ;Component.3=CmpHilscherCIFX ;Component.3=CmpSercos3Master

Figure 6-5 Editing the Config File (Disabling the Monitor)

- 5. Click the **File** menu, and on the menu, click **Save**.
- 6. Close the CoDeSysControl.cfg file.

- (b) Stopping the monitor service
 - 1. Open Control Panel.
 - If the OS is Windows® Embedded Standard 7, click **Start**, and click **Control Panel**.
 - If the OS is Windows[®] 10, right-click **Start**, and click **Control Panel** from the menu.
 - 2. After the Control Panel window opens, click System and Security.
 - 3. After the **System and Security** window opens, click **Administrative Tools**.
 - 4. After the Administrative Tools window opens, double-click Services.
 - 5. In the **Services** window, double-click **HIoTRASService**. The **HIoTRASService Properties** dialog box opens.
 - 6. Change **Startup type** to **Manual**, click **Apply**, and then click **OK**. Then, restart the PC.

HIoTRAS	Service P	operties (Lo	ocal Co	mpute	r)				×
General	Log On	Recovery	Depen	dencies					
Service	name:	HIoTRASS	ervice						
Display	name:	HIOTRASS	ervice						
Descrip	tion:	RAS Softwa	are For	HF-W/I	oT COD	ESYS		$\hat{}$	
	executabl ram Files\	e: HloTRAS\bir	n\HloTf	RASSer	vice.exe				
Startup	typ <u>e</u> :	Manual						\sim	
Service	status:	Running		p	ause		Resume		
	-			_			_		
You car from he		ne start parar	neters th	nat appl	y when y	/ou stai	t the sen	/ice	
Start pa	ara <u>m</u> eters:								
		[0	ĸ	Ca	ncel	ļ	<u>}</u> oply	

- (2) Enabling the CODESYS runtime environment monitor
 - (a) Editing the config file
 - 1. Follow the Steps 1 to 3 in "(a) Editing the config file" in "(1) Disabling the CODESYS runtime environment monitor".
 - 2. The CoDeSysControl.cfg file opens. In the ComponentManager section, insert the following line to add the WDT control component (CmpHWdtControl) as a loading component.

Component.*=CmpHWdtControl

Note: The number added after "Component." is an index and different depending on the environment.

When you add CmpHWdtControl, add 1 to the index of the last component, and use that value as the index for the CmpHWdtControl. (The lines that start with "; (semicolon)" in the CoDeSysControl.cfg file are commented out and therefore disabled.)

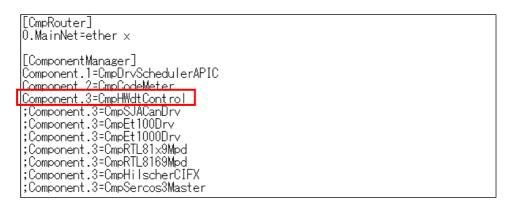


Figure 6-6 Editing the Config File (Enabling the Monitor)

- 3. Click the **File** menu, and on the menu, click **Save**.
- 4. Close the CoDeSysControl.cfg file.

- (b) Starting the monitor service
 - 1. Follow the Steps 1 to 5 in "(b) Stopping the monitor service" in "(1) Disabling the CODESYS runtime environment monitor".
 - 2. Change **Startup type** to **Automatic**, click **Apply**, and then click **OK**. Then, restart the PC.

HIoTRAS	Service P	roperties (L	.ocal Computer)	×
General	Log On	Recovery	Dependencies	
Service	name:	HIOTRASS	Service	
Display	name:	HIOTRASS	Service	
Descrip	tion:	RAS Softw	vare For HF-W/IoT CODESYS	
	executabl ram Files\		in\HloTRASService.exe	
Startup	typ <u>e</u> :	Automatic	· · · ·	
You car from he	itart n specify t	Running Stop he start para	<u>Pause Resume</u> meters that apply when you start the service]
			OK Cancel Apply	

6.3.3 Event notification

The CODESYS runtime environment monitor uses an event object and notifies an application when a watchdog timer timeout occurs.

The application can infer that a watchdog timer timeout has occurred when the event object is in the signaled state.

The event object is reset when the watchdog timer is retriggered once again after the action at the time of time-out is complete.

(1) Detecting the event

The application can detect when a watchdog timer timeout occurs using the following procedure.

- 1. Use the OpenEvent Windows API function to get the handle to the event object. If an event object is not created by executing the OpenEvent function, retry the function until the event object is created.
- 2. Use the WaitForSingleObject or WaitForMultipleObject Windows API function to monitor whether the event object is in the signaled state.

Table 6-10 shows the event object name used when a watchdog timer timeout occurs. When an event object is used in a program, you need to add "Global\" to the beginning of the name of the event object.

Table 6-10	Event Object

Event	Event object name
Watchdog timer timeout	HIOTRAS_WDT_TIMEOUT_EVENT

6.3.4 Recording the event log

Table 6-11 shows the data recorded in the Event Log by the CODESYS runtime environment monitor.

Event ID	Source	Туре	Description
1000	HIoTRAS_APP	Information	Watchdog timer monitoring has been started.
2000	HIoTRAS_APP	Information	Timeout occurs for the watchdog timer. Timeout action is executed.
2001	HIoTRAS_APP	Information	Timeout action is completed successfully.
1100	HIoTRAS_APP	Warning	Initialization of watchdog timer monitoring service terminates with an error. The service has been started with default value.
1200	HIoTRAS_APP	Error	Initialization of watchdog timer monitoring service terminates with an error. The service could not been started.
2100	HIoTRAS_APP	Error	Execution of timeout action terminates with an error.

Table 6-11 List of Events Recorded in the Event Log

Note: If the action at the time of time-out is either of the following, Event ID 2001 is not recorded.

• Shutting down and restarting the device

• Shutting down and restarting the device (forced)

6.3.5 HIoTRAS setting command

The HIoTRAS setting command can set the timeout threshold for the CODESYS runtime environment monitor and the action at the time of time-out.

Item	Setting	Description of the setting
Timeout threshold	0 to 62	Timeout threshold for the watchdog timer (in seconds) (Factory setting: 0)
Action at the time of time-out	0: Not performed the action at the time of time-out.	No action is executed when a timeout is detected (factory setting).
	1: Codesys Stop	Stops the CODESYS runtime environment.
	2: Codesys Restart	Restarts the CODESYS runtime environment.
	3: HF-W Shutdown	Shuts down the HF-W.
	4: HF-W Reboot	Restart the HF-W.
	5: HF-W Shutdown (Forced)	Shuts down the HF-W forcibly.
	6: HF-W Reboot (Forced)	Restart the HF-W forcibly.

Table 6-12	List of Items Set by the HIoTRAS Setting Command
1 able 0-12	List of items set by the mori KAS setting Command

– NOTE

If you want to set the action at the time of time-out to Codesys Stop or Codesys Restart, you must set the startup setting of the CODESYS runtime environment to **Start the PLC with the basic system service**. For information about how to configure the startup setting, see "6.3.6 Changing the startup setting".

If this option is not selected for the startup setting, the CODESYS runtime environment will not be stopped or restarted even if the action at the time of time-out is set to Codesys Stop or Codesys Restart.

(1) Using the HIoTRAS setting command

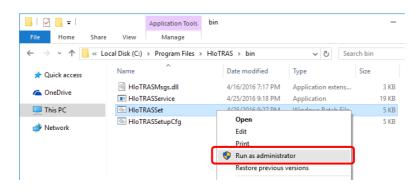
- 1. Start the Windows Explorer in the following steps.
- If the OS is Windows® Embedded Standard 7, click **Start**, type the following in the **Search programs and files** box at the lower left corner on the Start menu, and then press **Enter**.

C:\Program Files\HIoTRAS\bin

• If the OS is Windows® 10, click search icon at the right on the Start button, type the following in the **Search Windows** box, and then press **Enter**.

C:\Program Files\HIoTRAS\bin

2. When the Explorer window is opened, right-click the HIoTRASSet.bat file. On the menu, click **Run as administrator**.



3. When Command Prompt is opened, enter the timeout threshold (0 to 62), and press the **Enter** key.

Enter 63 seconds minus the timeout for the timeout threshold. For example, if you want to set the timeout to 20 seconds, enter 43 (64 seconds minus 20 seconds).

- The current value is displayed as **Current value**.
- If you just press **Enter** without entering a value, the current value is kept. Then, move to Step 5.

C:\windows\System32\cmd.exe	-	×
**** Setting the threshold to perform a time-out detection ******** * Current value : 0 *		^
* Range of values : 0 to 62 Second * * * NOTE: Retriggered value by CODESYS is 63 Second. * *		
Please enter the threshold (Default value=0) :_		
		~

4. As an example, enter **30** for the timeout threshold. If the setting is completed successfully, "The operation completed successfully." is displayed.



- 5. Next, enter the action at the time of time-out (0 to 6), and press Enter.
 - The current value is displayed as Current value.
 - If you just press **Enter** without entering a value, the current value is kept. If you press **Enter** again, the command exits.

C\windows\System32\cmd.exe	-	×
**** Setting the threshold to perform a time-out detection ********		^
* Current value : 0 *		
**		
* Range of values : 0 to 62 Second *		
* *		
* NOTE: Retriggered value by CODESYS is 63 Second.		

Please enter the threshold (Default value=0) :30		
The operation completed successfully.		
**** Setting the action at the time of time-out ********************		
* Current value : 0 *		
* *		
* Range of values: *		
 0 : Not performed the action at the time of time-out 		
* 1 : Codesys Stop *		
* 2 : Codesys Restart *		
* 3 : HF-W Shutdown *		
* 4 : HF-W Reboot *		
* 5 : HF-W Shutdown (Forced) *		
* 6 : HF-W Reboot (Forced) *		

Please enter the value of the time-out action (Default value=0) :_		

6. As an example, enter 1 for the action at the time of time-out. If the setting is complete successfully, "The operation completed successfully." is displayed.When "Press any key to continue..." is displayed, press any key to exit the batch file. Then, restart the device.

C:\windows\System32\cmd.exe			-	×
**** Setting the threshold to	perform a time-out detection ****	****		^
* Current value : 0				
* Range of values : 0 *	to 62 Second	* *		
* NOTE: Retriggered value	by CODESYS is 63 Second.	* ****		
Please enter the threshold (De The operation completed succes				
**** Setting the action at the * Current value : 0	time of time-out *****************	****		
* Range of values:		*		
 * 0 : Not performed the * 1 : Codesys Stop 	action at the time of time-out			
* 2 : Codesys Stop				
* 3 : HF-W Shutdown * 4 : HF-W Reboot		*		
* 4 : HF-W Rebool * 5 : HF-W Shutdown (Fo	red)			
* 6 : HF-W Reboot (Force		*		
Please enter the value of the f The operation completed succes: Press any key to continue		:1		
				~

If you do not launch the batch file as administrator, "ERROR: Access is denied." is displayed.

If this message is displayed, run the command as administrator.

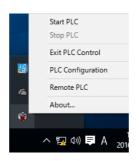
C:\windows\system32\cmd.exe		-	×
**** Setting the threshold to perform a time-out detection ****	****		^
* Current value : 0			
*			
* Range of values : 0 to 62 Second	*		
*			
* NOTE: Retriggered value by CODESYS is 63 Second.			
***************************************	****		
Please enter the threshold (Default value=0) :0			
ERROR: Access is denied.			
**** Setting the action at the time of time-out ******************	****		
* Current value : 0			
*			
* Range of values:			
* 0 : Not performed the action at the time of time-out	*		
* 1 : Codesys Stop			
* 2 : Codesys Restart			
* 3 : HF-W Shutdown			
* 4 : HF-W Reboot	*		
* 5 : HF-W Shutdown (Forced)	*		
<pre>* 6 : HF-W Reboot (Forced)</pre>	*		
***************************************	****		
Please enter the value of the time-out action (Default value=0)	:0		
ERROR: Access is denied.			
Press any key to continue			
			~

6. RAS FEATURES IN HF-W100E/IoT

6.3.6 Changing the startup setting

The following is a procedure to change the startup setting of the CODESYS runtime environment to **Start the PLC with the basic system service**. If this option is not selected for the startup setting, the CODESYS runtime environment will not be stopped or restarted even if the action at the time of time-out is set to Codesys Stop or Codesys Restart.

1. Click the CODESYS Control RTE V3 icon in notification area on the taskbar. (The icon is hidden by default, and you must click "^" to find it.) Then click **PLC Configuration**.



2. If a window is displayed to indicate that admin rights are required, click **OK** to obtain the admin rights.

No Admin rights.	×
Admin rights required, restart	tray menu?
ОК	Cancel

If the **User Account Control** window is displayed, click **Yes**. When the admin rights are granted, click the icon again, and then click **PLC Configuration**.

3. The **System Configuration** dialog box is displayed. Click the **Startup** tab, select the **Start the PLC with the basic system service** checkbox, and then click **OK**.

