

Programmable Multi-Axis Controller

# Startup Guide for GX-Series I/O Terminals (IDEv4)

CK5M-CPU1 1 CK3M-CPU1 1 CK3E-1 2

Startup Guide

#### - NOTE -

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## 1. Related Manuals

To ensure system safety, always read and follow the information provided in all *Safety Precautions* and *Precautions for Safe Use* in the manuals for the devices that are used in the system.

The following shows the manuals for OMRON Corporation (hereafter referred to as OMRON) and Delta Tau Data Systems, Inc (DT).

Manufacturer	Manual No.	Model	Manual name
OMRON	I610-E1	Model CK3E-1 10	CK3E-series Programmable
			Multi-Axis Controller Hardware
			User's Manual
OMRON	O036-E2	Model CK3M-CPU1□1	CK3M-series Programmable
		Model CK5M-CPU1⊡1	Multi-Axis Controller
			Hardware User's Manual
OMRON	W488-E1	Model GX-ID	EtherCAT® Slave Units User's
		Model GX-OD	Manual
		Model GX-OC	
		Model GX-MD	
		Model GX-AD	
		Model GX-DA	
		Model GX-ILM□□□	
		Model XWT-ID	
		Model XWT-OD	
DT	O014-E	-	Power PMAC User's Manual
DT	O015-E	-	Power PMAC Software Reference
			Manual
DT	O016-E	-	Power PMAC IDE Users Manual

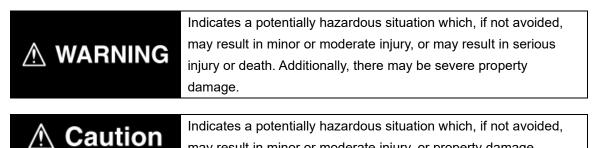
## 2. Terms and Definitions

Term	Explanation and Definition
Slave	Slaves are devices connected to EtherCAT. There are various types of
	slaves such as servo drivers handling position data and I/O terminals
	handling the bit signals.
Object	Represents information such as in-slave data and parameters.
PDO	One type of EtherCAT communications in which Process Data Objects
communications	(PDOs) are used to exchange information cyclically and in real time.
(Communications	This is also called "process data communications".
using Process Data	
Objects)	
PDO Mapping	The association of objects used for PDO communications.
PDO Entry	PDO entries are the pointers to individual objects used for PDO
	mapping.
ESI file	An ESI file contains information unique to the EtherCAT slaves in XML
(EtherCAT Slave	format.
Information file)	You can load ESI files into the Power PMAC IDE, to easily allocate
	slave process data and make other settings.
ENI file	An ENI file contains the network configuration information related to
(EtherCAT Network	EtherCAT slaves.
Information file)	
Power PMAC IDE	This computer software is used to configure the Controller, create user
	programs, and monitor the programs.
	PMAC is an acronym for Programmable Multi-Axis Controller.

### 3. Precautions

- (1) Understand the specifications of devices that are used in the system. Allow some margin for ratings and performance. Provide safety measures, such as for installing a safety circuit, in order to ensure safety and minimize the risk of abnormal occurrences.
- (2) To ensure system safety, always read and follow the information provided in all Safety Precautions and Precautions for Safe Use in the manuals for each device that is used in the system.
- (3) The user is encouraged to confirm the standards and regulations that the system must conform to.
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- (5) The information contained in this document is current as of September 2022. It is subject to change without prior notice for improvement purposes.

The following notations are used in this document.



### may result in minor or moderate injury, or property damage.

### Precautions for Correct Use

Precautions on what to do and what not to do to ensure correct operation and performance.

### Additional Information

Additional information to read as required.

This information is provided to increase understanding or make operations easier.

#### Symbols



The filled circle symbol indicates operations that you must carry out. The specific operation is shown in the circle and explained in text. This example indicates a "general precaution" for something that you must carry out.

### 4. Overview

This document describes the procedures used to connect the OMRON EtherCAT Remote I/O Terminal model GX-DDD (hereafter referred to as the Slave) using OMRON Programmable Multi-Axis Controller model CK3E-DDD/CK3M-CPU1D1/CK5M-CPU1D1 (hereafter referred to as the Controller) and EtherCAT, as well as for checking the connection. Refer to *Section 6. EtherCAT Connection Procedure* to learn about the setting methods and key points to perform PDO communications via EtherCAT.

### 5. Applicable Devices and Device Configuration

### 5.1. Applicable Devices

The applicable devices are as follows:

Manufacturer	Name	Model
OMRON	Programmable Multi-Axis	Model CK3E-
	Controller	
OMRON	Programmable Multi-Axis	Model CK3M-CPU1□1
	Controller	Model CK5M-CPU1⊡1
OMRON	EtherCAT Remote I/O Terminal	

### Precautions for Correct Use

In this document, the devices with models and versions listed in *Section 5.2* are used as examples of applicable devices to describe the procedures to connect the devices and check their connections.

You cannot use devices with versions lower than the versions listed in *Section 5.2*. To use the devices mentioned above with models not listed in *Section 5.2* or versions higher than those listed in *Section 5.2*, check the differences in the specifications by referring to the manuals before operating the devices.

#### **Additional Information**

This document describes the procedures to establish the network connections. It does not provide information on operations, installations, wiring methods, device functionalities, or device operations, which are not related to the connection procedures. For more information, refer to the manuals or contact your OMRON representative.

### 5.2. Device Configuration

The hardware components to reproduce the connection procedures in this document are as follows:

Power PMAC IDE

Model CK3M-CPU1□1



Model GX-ID1611

EtherCAT communications

Manufacturer	Name	Model	Version
OMRON	Programmable Multi-Axis Controller	Model CK3M-CPU1□1	Ver.2.7
OMRON	EtherCAT Remote I/O Terminal	Model GX-ID1611 Model GX-OD1611	Ver.1.1
OMRON	Ethernet cable (with industrial Ethernet connector)	Model XS5W-T421-⊡M⊡-K	
DT	Power PMAC IDE	-	Ver.4.6

### Precautions for Correct Use

Prepare the ESI file described in this section in advance. Contact your OMRON representative for information on how to procure the ESI file.

### Precautions for Correct Use

Do not share the connection line of EtherCAT communications with other Ethernet networks. Do not use devices for Ethernet such as a switching hub.

Use the Ethernet cable (double shielding with aluminum tape and braiding) of Category 5 or higher, and use the shielded connector of Category 5 or higher.

Connect the cable shield to the connector hood at both ends of the cable.

### Additional Information

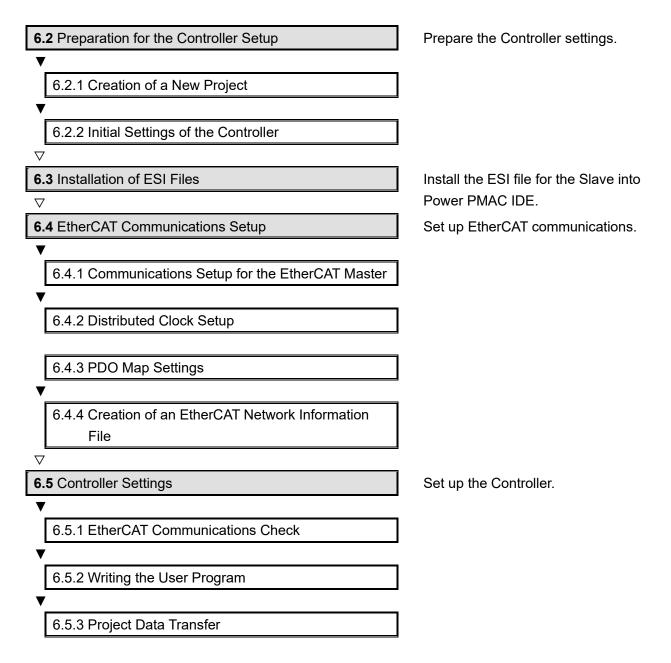
This document describes model CK3M-CPU1 1 as an example. The same procedures can apply to model CK3E-DDD/CK5M-CPU1 1.

### 6. EtherCAT Connection Procedure

This section describes the procedure for connecting the Controller with the Slave via EtherCAT. The description assumes that the Controller is set to factory default.

### 6.1. Workflow

Take the following steps to operate the PDO communications via EtherCAT after connecting the Controller with the Slave via EtherCAT.

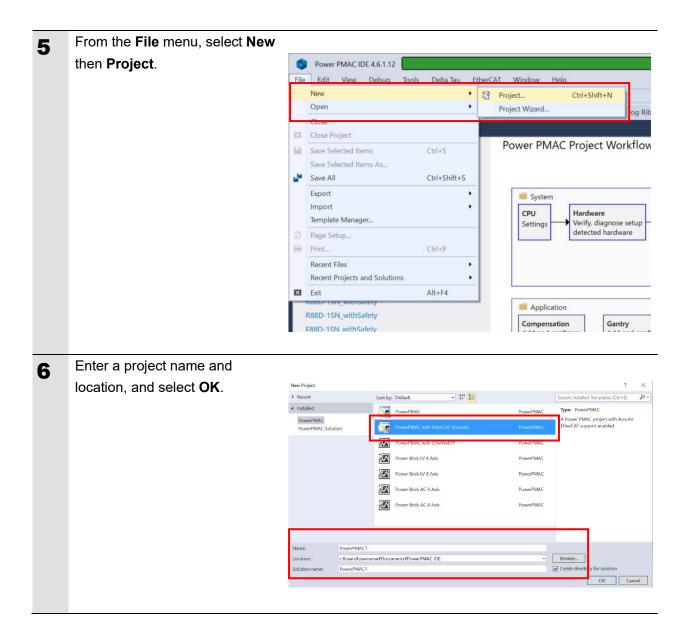


### 6.2. Preparation for the Controller Setup

Prepare the Controller settings. Install Power PMAC IDE and Acontis EC-Engineer on the computer in advance.

### 6.2.1. Creation of a New Project

1	Turn on the power to the	
	Controller.	
2	Start Power PMAC IDE. * If the dialog for confirming access rights appears upon start-up, select starting of Power PMAC IDE.	PowerPMAC IDE
3	The Communication screen appears. Specify the IP address of the destination Controller and click <b>Connect</b> .	Communication Setup × IP Address: 192.168.0.200  User: root Password: *******
	<ul> <li>* The IP address of the Controller is set to</li> <li>"192.168.0.200" by default.</li> <li>* If necessary, change the Windows IP address to</li> <li>"192.168.0.X".</li> </ul>	Connect Test No Device
4	Power PMAC IDE starts, and is online to the Controller.	<complex-block></complex-block>



### 6.2.2. Initial Settings of the Controller

Configure the initial settings for the Controller.

### Precautions for Correct Use

Configuring the initial settings clears all data in the Controller memory. Back up necessary data in advance.

1	In the Terminal tab page, type the \$\$\$*** command to reset the Controller to factory default.	Terminal Welcome to PowerPMAC terminal Select Device to start communication SSH communication to PowerPMAC at 192.168.0.200 successful
		\$\$\$***
		Terminal Terminal Output
2	Select System – CPU – System	
2	Select <b>System – CPU – System</b>	Solution Explorer
2	Select <b>System – CPU – System</b> in the Solution Explorer.	ⓒ ◎ ⓓ │ ☜ - ☞ │ №
2		Image: Search Solution Explorer (Ctrl+:)
2		Image: Search Solution Explorer (Ctrl+:)         Image: PowerPMAC1         Image: System
2		Image: Solution Explorer (Ctrl+:)         Image: PowerPMAC1         Image: System         Image: System         Image: Spytem         Image: Spytem         Image: Spytem
2		Image: Search Solution Explorer (Ctrl+:)         Image: PowerPMAC1         Image: System         Image: System </th
2		Image: Solution Explorer (Ctrl+:)         Image: PowerPMAC1         Image: System
2		Search Solution Explorer (Ctrl+:)   PowerPMAC1   System   System   Hardware   EtherCAT   Motors   Coordinate Systems
2		Search Solution Explorer (Ctrl+:) PowerPMAC1 System CPU EtherCAT Motors Coordinate Systems Encoder Tools
2		Search Solution Explorer (Ctrl+:) PowerPMAC1 System System CPU Bystem Hardware EtherCAT Motors Coordinate Systems Encoder Coolinate Systems Coolinate System Coolinate System
2		Search Solution Explorer (Ctrl+:)  PowerPMAC1  System  CPU  System  Hardware  Hardware  Encoder  Coordinate Systems  Encoder  Coordinate Systems
2		Search Solution Explorer (Ctrl+:) PowerPMAC1 System CPU Bystem Hardware EtherCAT Motors Coordinate Systems Encoder Coordinate Systems Coordinate Systems Encoder Coordinate Systems Coordinate System Coordinate System Coord
2		Search Solution Explorer (Ctrl+:) PowerPMAC1 System CPU System Hardware Hardware EtherCAT Motors Coordinate Systems Encoder Encoder Coordinate Systems Coordinate System Coordinate System

*
-
Advanced System Elements
00 Milliseconds 🕕
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1
<b>-</b> ₽ ×

7	Click Delta Tau –	File Edit View Project Build Debug Tools Delta Tau Ether/AT Mindow Help
-	Communication Setupon the	📽 Start Page 🖈 Communication Setup   🖻 Terminal 🖻 Terminal n 🖽 Task Man
	•	System * X   Position  Watch
	toolbar to display the	Clock Settings  V Status Phase Frequency: 1.000 kHz  Power PMAC Error
	Communication Setupdialog	Servo Frequency: 1,000 V kHz O Jog Ribbon
	box.	Real-Time Frequency: 1.000 × kHz 0 Power PMAC Messages
		Existing N 👱 Update Firmware
		Servo Period: 1.000 👱 Install Package
		Phase Over Servo Period: 1.000 Backup Restore
		Only EtherCAT detected. Troubleshooters
		PWM Frequency Part Managers
		No Gates detected using Software Clock on Power PMAC Kill Motors Ctrl+Alt+K
		Structure Element: Sys.RtIntPeriod
8	In the Device Properties dialog	Communication Setup
U	box, click the <b>No Device</b> button.	
		IP Address: 192.168.0.200 ~
	This operation sets the	User: root
	Controller to the offline state.	Password: ******
		Connect Test No Device
	Restart the Controller.	
9	Restart the Controller.	
	The servo frequency that has	
	been set is reflected.	
10	Wait until the startup process of	Communication Setup X
	the Controller is complete. Then	IP Address: 192 168 0 200
	click Delta Tau –	IP Address: 192.168.0.200 ×
	Communication Setup on the	User: root
	toolbar to display the Device	Password: *******
	Properties dialog box.	
	In the Device Properties dialog	Connect Test No Device
	box, return the IP Address to the	
	previous setting, then click the	
	Apply button.	
	This operation sets the	
	Controller to the online state.	

### 6.3. Installation of ESI Files

Install the ESI file for the Slave into Power PMAC IDE.

### Precautions for Correct Use

Prepare the ESI file described in this section in advance. Contact your OMRON representative for information on how to procure the ESI file.

1	From the EtherCAT menu of	
	Power PMAC IDE, select ESI	Project Build Debug Tools Delta Tau
	Manager.	ロ - 🏫 🗎 🎽 👗 🗗 🙃 🛛 ツ - ペ - 🛛 🗗 ESI Manager 🔹 🕨 S
		Communication Setup   🏳 Terminal 🕀 Position 💿 Watch 🔽 Status 💽 Jog Ribbon 🖽 Tune
2	Confirm that Omron GX-Digital	# ESI Manager X
_	IO.xml is registered in the ESI	ESI Files Select an ESI file which should be deleted or exported or add new ESI files.
	file list of ESI Manager.	Copley Controls     P     Plata Tau Data Systems, Inc.
		P 🚍 Omron Corporation
	If it is not yet registered, click	
	Add File and register Omron	
	GX-Digital IO.xml	
		Number of ESI files: 94 Number of devices: 648
		Add File Add Folder Delete Export Close
		Omron GX-Digital IO.xml
		Omron NX_Coupler.xml
		Omron R88D-1SNxxx-ECT.xml
		Omron R88D-KNxxx-ECT.xml
3	Click Close to close the ESI	
J	Manager page.	

### 6.4. EtherCAT Communications Setup

Set up EtherCAT communications.

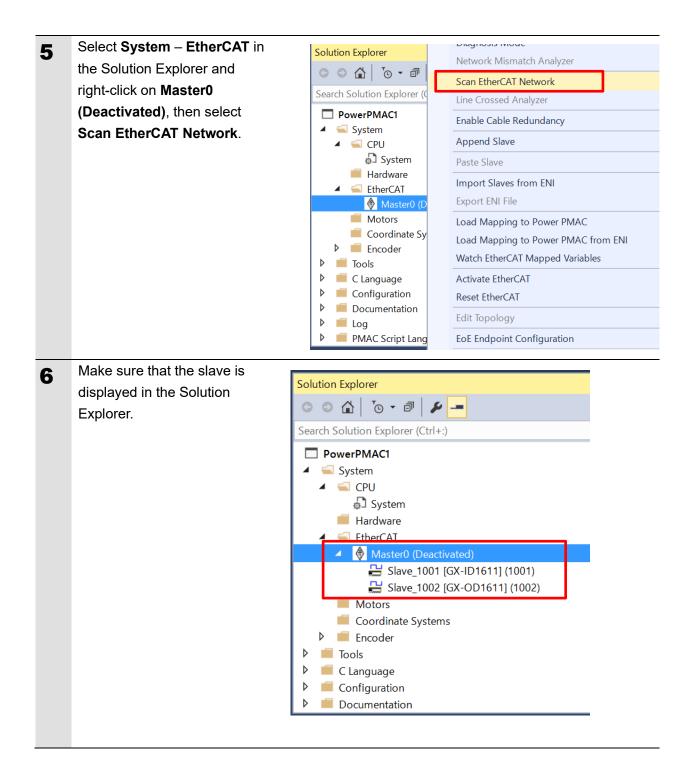
### Precautions for Correct Use

Before taking the following steps, make sure that the devices are connected via an Ethernet cable. If they are not connected, turn OFF the power to the devices, and connect the Ethernet cable.

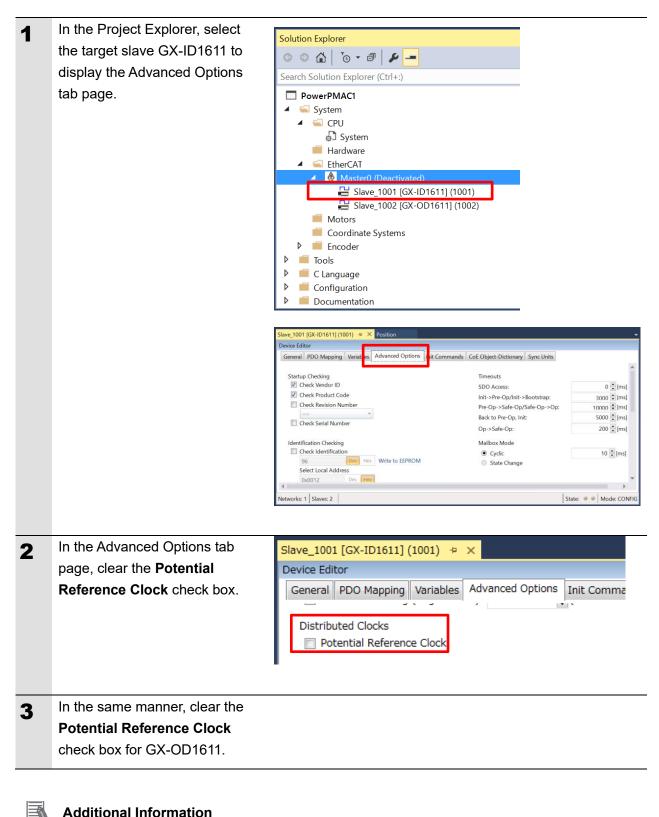
### 6.4.1. Communications Setup for the EtherCAT Master

1	Connect the Controller with slave devices using an Ethernet cable. * Refer to the manuals for slave devices to configure them.		
2	Select System – EtherCAT in the Solution Explorer and right-click on EtherCAT, then select Add EtherCAT Master(Acontis).	Solution Explorer Search Solution Explorer (Ctrl+:) PowerPMAC1 System Grue System Hardware CPU System Hardware Coordi New Solution Explorer View Delete Delete Del Properties Alt+Enter Add EtherCAT Master (Acontis) Documentation Delete Properties Delete Properties Alt+Enter Delete Properties Delete Properties Alt+Enter Delete Properties Delete Delete Properties Delete Delete Properties Delete Properties Delete Delete Delete Properties Delete D	

3	Master0 (Deactivated) is added	Solution Explorer
J	to Solution Explorer.	
		Search Solution Explorer (Ctrl+:)
		PowerPMAC1
		🔺 📹 System
		🔺 🛁 CPU
		🗗 System
		📕 Hardware
		EtherCAT
		Master0
		Motors
		Coordinate Systems
		▶ Encoder
		<ul> <li>E C Language</li> <li>Configuration</li> </ul>
		<ul> <li>Econgulation</li> <li>Documentation</li> </ul>
		Log
		PMAC Script Language
4	In the Master tab page, specify	Master0 9 X Device Editor
_	a communication period for	Master Topology View
	Cycle Time [us].	General
	- ,	Linit Name Ether (ATSuite Master
		Cycle Time [us]         I000           Frequency [Hz]         1000
	* You must specify the	Source MAC address 00-00-0A-BC-04-25
	communication period in	Slaves connected to local system
	accordance with the servo	Network Adapter イーザネット (Intel(R) Ethernet Connection (6) I219-V )
	frequency of the Controller.	
		Slaves connected to remote system
	1000 us is set in this document.	Protocol RAS IP Address 192 , 168 , 0 , 200
		Port 6000
		Master-Instance 0
		Correspondence between the convertige frequencies of the
		Correspondence between the servo frequencies of the
		Controller and communication periods is as follows:
		4 kHz : 250 us
		2 kHz : 500 us
		1 kHz : 1000 us



### 6.4.2. Distributed Clock Setup

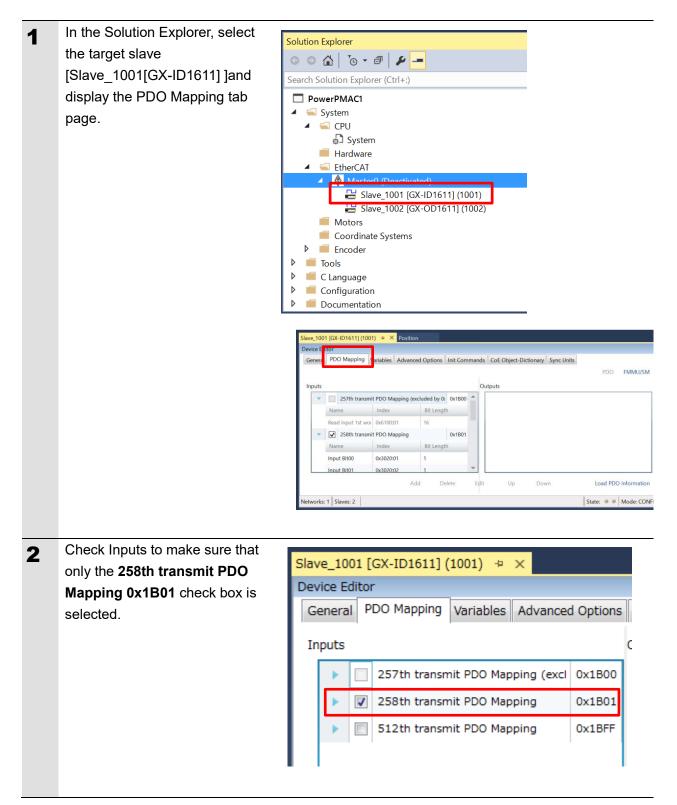


### **Additional Information**

Remote I/O Terminal model GX-

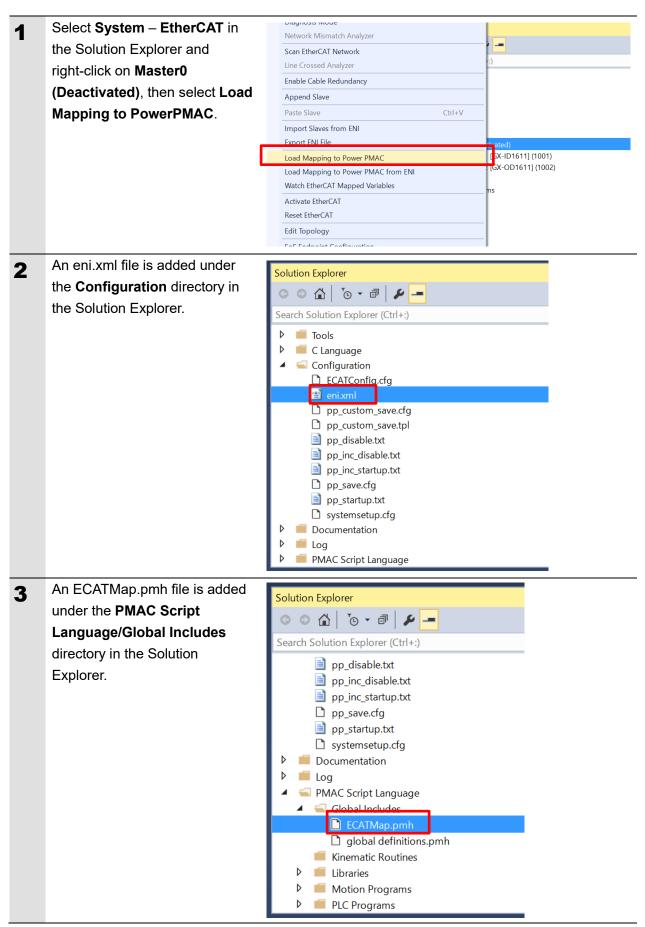
Disable the reference clock by taking the steps shown above.

### 6.4.3. PDO Map Settings



3	In the Solution Explorer, select the target slave [Slave_1002[GX-OD1611]] and display the PDO Mapping tab page.	Solution Explorer         Search Solution Explorer (Ctrl+:)         PowerPMAC1         System         System         Hardware         EtherCAT         Master0 (Deactivated)         Slave 1001 (GX-ID1611) (1001)         Slave 1002 (GX-OD1611) (1002)         Motors         Coordinate Systems         Encoder         Encoder         Tools         Configuration         Documentation
		General       PDO Mapping       Variables       Advanced Options       Init Commands       Code Dbject-Dictionary       Sync Units         Inputs       Outputs       Outputs       Index       Bit Length       Index       Bit Length
	Make sure that the check box in	to the second
4	the Inputs field is not selected.	Inputs
		512th transmit PDO Mapping 0x1BFF
		Name Index Bit Length
		Sysmac Error ( 0x2002:01 8
5	Make sure that only the <b>258th</b> receive PDO Mapping <b>0x1701</b> check box is selected in the Outputs field.	Outputs         257th receive PDO Mapping (exclu       0x1700         258th receive PDO Mapping       0x1701

### 6.4.4. Creation of an EtherCAT Network Information File



### 6.5.1. EtherCAT Communications Check

Take the following steps to ensure that EtherCAT communications are available.

1	From the Terminal tab page, run the ECAT[0].Enable=1 command to start EtherCAT communications.	Terminal Welcome to PowerPMAC terminal Select Device to start communicat SSH communication to PowerPM	ion
2	In the Terminal tab page or Watch Window, make sure that the ECAT[0].Enable value turns to <i>1</i> . *The OP mode is entered and EtherCAT communications are established.	Watch Window Command/Query Sys.ServoCount ECAT[0].Enable	☆ ▼ ₽ ×         Response         12960793         1
3	After making sure that correct communications are available, run the ECAT[0].Enable=0 command from the Terminal tab page to stop EtherCAT communications.	Terminal Welcome to PowerPMAC terminal Select Device to start communicat SSH communication to PowerPM ECAT[0].Enable=1 ECAT[0].Enable=0	ion
4	In the Terminal tab page or Watch Window, make sure that the ECAT[0].Enable value turns to <i>0</i> .	Watch Window Command/Query Sys.ServoCount ECAT[0].Enable	☆ ▼ ↓ ×         Response         13312872         0

### 6.5.2. Writing the User Program

Create programs to be used to check operations.

A specific language is used for the operation check programs. Refer to *Power PMAC User's Manual* and *Power PMAC Software Reference Manual* for details.

1	In the Solution Explorer pane, open <b>Project name – PMAC</b> Script Language – PLC Programs – pIc1.pIc.	Slave_1002 (GX-OD1611) (1002)       Position       plc1.plc % ×       Solution Explorer         /*For more information see notes.txt in the Documentation + <ul> <li>O O O</li> <li>O O</li> <li></li></ul>
2	In the programming area of the plc1.plc tab page, write a program as shown on the right. This sample program blinks the GX-OD1611 output indicator every second. * In this example, PDO mapping is assumed to be the default setting. If you want to change PDO mapping, rewrite the "Slave_1" description.	<pre>open plc 1 while(sys.ecatMasterReady==0){}; ECAT[0].Enable=1; P1000 = Sys.Time + 1; while(P1000 &gt; Sys.Time){} Slave_1002_GX_OD1611_1002_3220_1_OutputBit00 = 0; P1000 = Sys.Time + 1; while(P1000 &gt; Sys.Time){} Slave_1002_GX_OD1611_1002_3220_1_OutputBit00 = 1; close</pre>
3	Setting the start of the user program In the Solution Explorer pane, open <b>Project name</b> – <b>Configuration</b> – <b>pp_startup.txt</b> .	Slave_1002 (GX-OD1611] (1002)       pp_startup.txt       X       Solution Explorer         Search Solution Explorer (Ctrl+2)       Search Solution Explorer (Ctrl+2)         >       ©       Q       Q       P         >       ©       Q       Q       P       Image: P         >       ©       C       Image: P       Image: P       Image: P         >       ©       C       Image: P       Image: P       Image: P         >       ©       Image: P       Image: P       Image: P       Image: P         >       Image: P       Image: P       Image: P       Image: P       Image: P       Image: P         90 %       Image: P       Image: P       Image: P       Image: P       Image: P       Image: P         90 %       Image: P       Image: P       Image: P       Image: P       Image: P       Image: P         90 %       Image: P

4	In the programming area of the pp_startup.txt tab page, add the program shown on the right to the last line.	enable plc 1;	
	The pp_startup.txt program is automatically executed when the Controller starts. This example program runs the PLC1 script.		

### 6.5.3. Project Data Transfer

Transfer the created project data to the Controller.

## \land WARNING

When the user program and "configuration and setting" data are transferred from Power PMAC IDE, devices or the machine may perform unexpected operations.

Therefore, before you transfer project data, ensure the destination slave is operating safely.

## ▲ Caution

Transferring project data restarts the Controller and interrupts communications with slaves. The time that communications are interrupted depends on the EtherCAT network configuration.

Before you transfer project data, make sure that the slave settings will not adversely affect the devices.



**1** In the Terminal tab page or Watch Window, make sure that the ECAT[0].Enable value is *0*.

> If the value is 1, run the ECAT[0].Enable=0 command from the Terminal tab page to stop EtherCAT communications.

Watch Window 🕸 👻 🕂 🗙				
Command/Query	Response			
Sys.ServoCount	13312872			
ECAT[0].Enable	0			

2	Downloading a project							
~			Solution Explorer					
	Right-click the project name in							
	the Solution Explorer pane on	Search Solution Explorer (Ctrl+:)						
	the upper right of the IDE		٩,		Build			
	screen, and select <b>Build and</b>				Rebuild			
	Download All Programs to run	Þ			Clean			
	the build and download.	4	۹,		New Solution Explorer View			
			ſ	_	Build and Download All Programs			
					Map Power PMAC Variables			
	* The transferred project is not				Export Project with IP Protection			
	yet saved to the Controller at this				Export Project Template			
	stage.				Compare Project			
	If you turn OFF the power to the				Add EtherNet/IP			
	Controller, the transferred				Add Macro			
	project will be discarded.	Þ			Add Application			
	-				L			
3	Make sure that there are no							
	errors in the Output Window.							
	* If the transfer fails, check							
	details of the error in the Output							
	Window.							
	If the error is a program error,							
	you must review the program.							
	If the error is related to							
	EtherCAT settings, return to 6.4							
	EtherCAT Communications							
	Setup and check whether there							
	are any incorrect settings.							

4	The program starts running when it has been downloaded successfully. EtherCAT communications are in the OP state. Vary the GX-ID1611 input and make sure that the variable <i>P1001</i> changes in the Terminal or Watch pane.	Terminal Welcome to PowerPMAC terminal Select Device to start communication SSH communication to PowerPMAC at 192.168.0.200 successful ECAT[0] Enable = 1 ECAT[0] Enable = 0 enable plc 1 POWERPMAC Messages Terminal Terminal Output
	* If the variable does not change, check that the ECAT[0].Enable value is <i>1</i> in the Terminal tab page or Watch Window. If the value is <i>0</i> , run the following command from the Terminal tab page. enable plc 1	
5	After you have confirmed an appropriate operation, save the project to the Controller. Run the save command from the Terminal tab page.	Terminal       ▼ ♀ ×         Available disk space = 3593208K 1472K       ▲         Required disk space = 1472K       ▲         Saving To Flash: Syncing files to flash       ▲         Saving To Flash: Mounting the flash       ▲         Saving To Flash: Finished SAVING to flash       ▲         Save Completed       ▼
	<sup>^</sup> The save command stores the downloaded project in the Controller. This operation saves the settings to be executed automatically when the power to the Controller is turned on.	save

## 7. Appendix Saving and Loading a Project

The following describes the procedures to save a Power PMAC IDE project on the computer, and to reuse it.

### 7.1. Saving a Project

1	Creating a Configuration File	Solution Explorer	
-		◎ ◎ 🏠   ™ = 🖉 🗕	
	Create a Configuration File to save	Search Solution Explorer (Ctrl+:)	
		🕨 💼 Tools	
	parameters you have changed.	C Language	_
		Configuration	
	Right-click Configuration in the Solution	enixm Scope to This	<u> </u>
	Explorer pane, and select Generate	pp_cu Rew Solution Explorer View	
	Configuration File.	pp_cu	
		pp_dis Properties Alt+Enter pp_inc Upload Config Files	
	A Configuration File is added to	pp_inc Download Config Files	
	Configuration.	pp_sa	
		pp_sta	
		<ul> <li>Documentation</li> </ul>	
		Log	
	Enter a file name in the taythay, then aligh	A Script Language	
2	Enter a file name in the textbox, then click	Generate Config File X	
	the OK button.	Config File Name:	
		OK Cancel	
3	Right-click on the Configuration File, and		
3	from the menu, select <b>Check To Download</b>	Solution Explorer	
		Search Solution Explorer (Ctrl+:)	
	Config File to include it in files to be	p_startup.txt	_
	downloaded.	R88D-KN.cfg     Systemsetup.cfg     Open	
		Documentation     Open With	
		Elog     View Code     PMAC Script Language	
		Global Includes     Global Includes     ECATMap.pmh     Solution Explorer View	
		global definitions.pmh     Exclude From Project	
		Kinematic Routines     D Copy     Ctrl+     Copy     Ctrl+	C
		Motion Programs X Delete Del	
		PLC Programs     Check To Download Config File	
		Properties Alt+8	Enter

4	Saving a Project	1	R88D-KN - Power PMAC IDE 4.6.1	.12
	In the File menu, run Save All to save the	File	Edit View Project Build	Debug Too
	project on the computer.		New	•
			Open	•
			Close	
		x	Close Project	
			Save R88D-KN.cfg	Ctrl+S
			Save R88D-KN.cfg As	
		<b>.</b> ,	Save All	Ctrl+Shift+S
			Export	•
			Import	•
			Template Manager	
		₽	Page Setup	
			Print	Ctrl+P
			Recent Files	•
			Recent Projects and Solutions	•
		×	Exit	Alt+F4

### 7.2. Loading and Downloading a Project

1	Start Power PMAC IDE, and	
2	connect to the Controller. In the Terminal tab page, type the \$\$\$*** command to reset the Controller settings to factory default.	Terminal         Welcome to PowerPMAC terminal         Select Device to start communication         SSH communication to PowerPMAC at 192.168.0.200 successful         \$SS+***         PowerPMAC Messages         Terminal         Output
3	In the <b>File</b> menu, click <b>Open</b> – <b>Project/Solution</b> to load the project that you saved.	PowerPMAC IDE 4.21.19       IP: 192.168.0.200       Type: MOTION CO         File       Edit       View       Debug       Tools       Delta Tau       EtherCAT       Window       Help         New       IP: 192.168.0.200       Type: MOTION CO         Open       IP: Project/Solution       Ctrl+Shift+O       For         Close       IP: Project/Solution       Ctrl+Shift+O       For         Close       IP: File       Ctrl+O       File       Ctrl+O         Upload Project From PowerPMAC       IS       Save Selected Items As       Save Selected Items As       Import       Import       Page Setup         Page Setup       Print       Ctrl+P       Recent Projects and Solutions       Page         Exit       Alt+F4       Item       Item       Item       Item
4	Right-click <b>Configuration</b> in the Solution Explorer pane, and select <b>Download Config Files</b> to download the file to the Controller.	Solution Explorer         Search Solution Explorer (Ctrl+:)         Configuration         ECATCor         Add         Scope to This         pp_custo         pp_locusto         pp_inc_d         pp_inc_d         pp_inc_st         pp_save.         pp_start         Generate Config Files         pp_start         Generate Config File         Systemsetup.cfg         Documentation         End         PMAC Script Language         Global Includes

5	Right-click the project name in the							
5	Solution Explorer pane, and	Solution Explorer						
	select Build and Download All	G		> ☆   '⊙ - ₫   ≁				
	Programs to run the build and	Search Solution Explorer (Ctrl+:)						
	download.							
		⊿ 🛎						
	When the download process is			Rebuild				
	complete, make sure that there			Clean				
	are no errors in the Output							
	Window.			Build and Download All Programs				
	Window.			Map Power PMAC Variables r1				
				Export Project with IP Protection				
				Export Project Template				
				Compare Project				
				Add EtherNet/IP				
				Add Macro				
				Add Application				
	Champing a program							
6	Stopping a program	Terr	min	al				
				ne to PowerPMAC terminal Device to start communication				
	If a program is running, execute			ommunication to PowerPMAC at 192.168.0.200 successful				
	the following command from the							
	Terminal tab page to stop the							
	program.			-1-1				
	disable plc 1	<u> </u>		plc 1 MAC Messages Terminal Terminal Output				
	ECAT[0].Enable=0	POV	ver	WAC Wessages Terrinan Terrinan Output				
		Terr	mina	al				
				ne to PowerPMAC terminal Device to start communication				
		SSF	l co	mmunication to PowerPMAC at 192.168.0.200 successful				
		disa	ible	plc 1				
		For	TIC					
		<u> </u>		Enable = 0				
		POW	verp	MAC Messages Terminal Terminal Output				

7	Saving the downloaded settings	Terminal
	and programs	Welcome to PowerPMAC terminal Select Device to start communication
	After the download process is complete and you make sure that there are no errors in the Output Window, run the save command from the Terminal tab page.	SSH communication to PowerPMAC at 192.168.0.200 successful disable plc 1 ECAT[0].Enable = 0 save PowerPMAC Messages Terminal Terminal Output
	* The save command stores the	
	downloaded project in the	
	Controller. This operation saves	
	the settings to be executed	
	automatically when the power to	
	the Controller is turned on.	
8	Restarting after download	Terminal
_		Saving To Flash: Mounting the flash
	Run the following command from	Saving To Flash: Finished SAVING to flash
	the Terminal tab page to restart	Save Completed
	the Controller with the	
	downloaded project.	
	\$\$\$	sss
		PowerPMAC Messages Terminal Terminal Output

### 8. Appendix Troubleshooting

#### Factor Description **Corrective Action** The link is not established. The Ethernet cable is broken or If the Ethernet cable is broken the specified cable is not being or if the specified cable was not used. used, replace the cable. A connector on the Ethernet Reconnect the connector and cable used for EtherCAT make sure it is mated correctly. communications is disconnected, the contact is faulty, or parts are faulty. A slave within the EtherCAT Replace the slave. network configuration failed. EtherCAT communications do ECAT[0].Enable is set to 0. From the Terminal pane, run the not start. ECAT[0].Enable=1 command to start EtherCAT communications. The EtherCAT network Review the settings according configuration in the Controller to the procedures provided in 6.4 EtherCAT Communications does not agree with the physical network configuration. Setup. The Ethernet cable is broken at Connect the Ethernet cable a slave in the network, or a correctly. connector is disconnected. Some errors have occurred, Check the ECAT[0].error value. and the ECAT[0].error is set to a value other than 0. A synchronization error occurs The distribution clock is not set Review the settings according to the procedures provided in at a slave. correctly. A slave in Free-Run Mode is set 6.4.2 Distributed Clock Setup. to the reference clock. The servo task processing time Review the program or servo exceeds the set period. frequency to adjust it, so that the servo task processing time does not exceed the period.

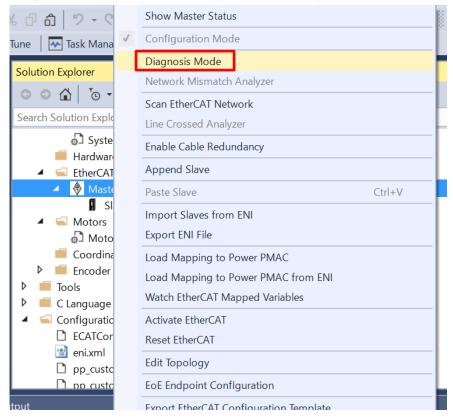
## 8.1. Factors Causing EtherCAT Communications To Be Unavailable, and Corrective Actions

### 8.2. How to Check for Errors

### 8.2.1. Checking the EtherCAT Status

You can check the EtherCAT status from Diagnosis Mode of Power PMAC IDE.

Right-click on **Master0 (Deactivated)** under **EtherCAT** in the Solution Explorer, then select **Diagnosis Mode** to open the Diagnosis Mode page



You can check the status of the slaves in the Diagnosis Mode page.

ECATMap.pmh 👳 🗙 Master0 (D	eactivated	<mark>l) ⇒ ×</mark> globa	al definition	s.pmh System			
Device Editor							
General Process Data Image V	Watch list	Performance	Variables	CoE Object-Dictionary	History		
State Machine							
Current State	Pre-O	р					
Requested State	Pre-Op						
	Init	Bootstrap					
Change State	Pre-Op Safe-Op						
	Ор						
Information			Fr	ame Counter			
Number of found slaves	2			Sent frames	55067		
Number of slaves in configurat	tion 2			Lost frames (	)		
Number of DC slaves	2			Cyclic frames 4	4678		
DC in-sync	Yes			Acyclic frames 1	10389		
Topology Ok	Yes				Clear counters		
Link Connected	Yes						
Slaves in Master State	Yes						
Networks: 1 Slaves: 2							State: 🜒 🜒 Mode: DIAGNOSI

### 8.2.2. Checking the Controller Status

In the Status page of Power PMAC IDE, you can check the status of the motor, coordinate system, and system.

To display the Status page, click **Status** on the toolbar.

#### Global Status

You can check system errors such as the WDT error.

Notor Status   Coordinate Status	Global Status MACRO	Status	
Global Status			
Description	Status	Description	Status
AbortAll	False	HWChangeErr	False
BufSizeErr	False	NoClocks	False
ConfigLoadErr	False	ProjectLoadErr	False
Default	True	PwrOnFault	False
FileConfigErr	False	WDTFault	NoFault
FlashSizeErr	False		

#### Motor Status

You can check deviation errors, limit errors, and other states of the motor.

False False False False False False
False False False
False False
False
False
False
False
Plus
False
False
False
0
False
False
MaxSpeed

#### Coordinate Status

You can check deviation errors, limit errors and other states of the coordinate system.

Motor Status Coordinate Stat	us Global Status MACR	O Status		
Coordinate System 0				
Description	Status	Description	Status	
AddedDwellDis	True	LinToPvtBuf	False	
AmpEna	False	LookAheadActive	False	
AmpFault	False	LookAheadChange	False	
AmpWarn	False	LookAheadDir	Forward	
AuxFault	False	LookAheadFlush	False	
BlockActive	False	LookAheadLookBack	False	
BlockRequest	False	LookAheadReCalc	False	
BufferWarn	0	LookAheadStop	False	
CC3Active	False	LookAheadWrap	False	
CCAddedArc	False	MinusLimit	False	
CCMode	Off	MoveMode	LineCircle	
CCMoveType	Dwell	PlusLimit	False	
CCOffReq	False	ProgActive	False	
ClosedLoop	False	ProgProceeding	False	
ContMotion	False	ProgRunning	False	
Csolve	False	SegEnabled	False	
DesVelZero	False	SegHaltReq	False	
EncLoss	False	SegMove	Off	
EndDelayActive	False	SegMoveAccel	False	
ErrorStatus	NoError	SegMoveDecel	False	
FeedHold	Off	SegStopReq	False	
FeFatal	False	SharpCornerStop	False	1
FeWarn	False	SoftMinusLimit	False	j.
HomeComplete	False	SoftPlusLimit	False	i
HomeInProgress	False	TimerEnabled	False	1
12tFault	False	TimersEnabled	False	1
InPos	False	TriggerMove	False	
InterlockStop	False	TriggerNotFound	False	,

## 9. Appendix ECAT[i] Structure Elements

The Controller uses motion controller technology developed by Delta Tau Data Systems, Inc., (hereafter referred to as DT) in the U.S., however, the ECAT[i] structure elements differ from those of DT controllers. The following table shows the major changes that have been made from DT controllers.

Element name	Description	Change
ECAT[i].Enable	Enabling the EtherCAT	0: Disable, 1: Enable (2 and 3 are not
	network	supported.)
ECAT[i].LPIO[k]	Elements of low priority	Not supported
	I/O module	
ECAT[i].Slave[j]	Slave elements	Not supported
ECAT[i].Error	Error code of enabling	\$ 9811000C: Invalid network
	EtherCAT network	configuration
		\$ 9811002E: Disconnected network
		connection
ECAT[i].LinkUp	Status data structure	Not supported
ECAT[i].LPDomainOutputState	elements	
ECAT[i].LPDomainState		
ECAT[i].LPRxTime		
ECAT[i].LPTxTime		
ECAT[i].MasterStat		
ECAT[i].RTDomainOutputState		
ECAT[i].RTDomainState		

## **10. Revision History**

Revision code	Revised date	Revised content
01	Apr, 2019	First edition
02	Jan, 2023	<ul> <li>Made changes accompanying the addition of CK5M-CPU1</li> <li>Unit.</li> <li>Made changes accompanying the modification of GUI of PowerPMAC IDE.</li> </ul>

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