

Programmable Multi-Axis Controller

Startup Guide for ZW Confocal Fiber Type Displacement Sensor (IDEv4)

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

Startup Guide

- NOTE -

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Contents

1.	Related Manuals	4
2.	Terms and Definitions	5
3.	Precautions	6
4.	Overview	7
5.	Applicable Devices and Device Configuration	8
5.1.	Applicable Devices	8
5.2.	Device Configuration	9
6.	EtherCAT Connection Procedure	10
6.1.	Workflow	10
6.2.	Preparation for the Controller Setup	.11
6.3.	Installation of ESI Files	16
6.4.	EtherCAT Communications Setup	17
6.5.	Controller Settings	25
7.	Appendix Saving and Loading a Project	30
7.1.	Saving a Project	30
7.2.	Loading and Downloading a Project	32
8.	Appendix Troubleshooting	35
8.1.	Factors Causing EtherCAT Communications To Be Unavailable, and	Corrective Actions
		35
8.2.	How to Check for Errors	36
9.	Appendix ECAT[i] Structure Elements	39
10.	Revision History	40

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	Z362-E1	Model ZW-8000□	Confocal Fiber Type Displacement
		Model ZW-7000□	Sensor User's Manual
		Model ZW-5000□	
DT	O014-E	-	Power PMAC User's Manual
DT	O015-E	-	Power PMAC Software Reference
			Manual
DT	O016-E	-	Power PMAC IDE Users Manual

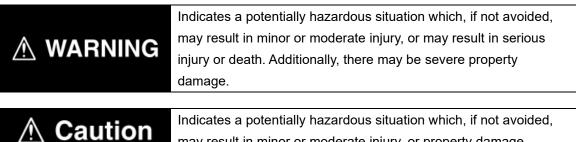
2. Terms and Definitions

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.
- (4) It is prohibited to copy, reproduce, or distribute a part or the whole of this document without the permission of OMRON Corporation.
- (5) The information contained in this document is current as of November 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 Confocal Fiber Type Displacement Sensor Controller Equipped with EtherCAT model ZW-5000 (hereafter referred to as the Slave) using OMRON Programmable Multi-Axis Controller model CK3E-/CK3M-CPU1_1/CK5M-CPU1_1 (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 Controller	Model CK3E-
OMRON	Programmable Multi-Axis Controller	Model CK3M-CPU1□1
		Model CK5M-CPU1⊡1
OMRON	Confocal Fiber Type Displacement Sensor	Model ZW-5000
	Controller Equipped with EtherCAT	

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



EtherCAT communications

Model ZW-5000

Manufacturer	Name	Model	Version
OMRON Programmable Multi-Axis Controller		Model CK3M-CPU1□1	Ver.2.7
OMRON Confocal Fiber Type Displacement Sensor Controller Equipped with EtherCAT		Model ZW-5000	Ver. 1.1
OMRON Ethernet cable (with industrial Ethernet connector)		Model XS5W-T421-⊡M⊡-K	
DT Power PMAC IDE		-	Ver.4.2

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

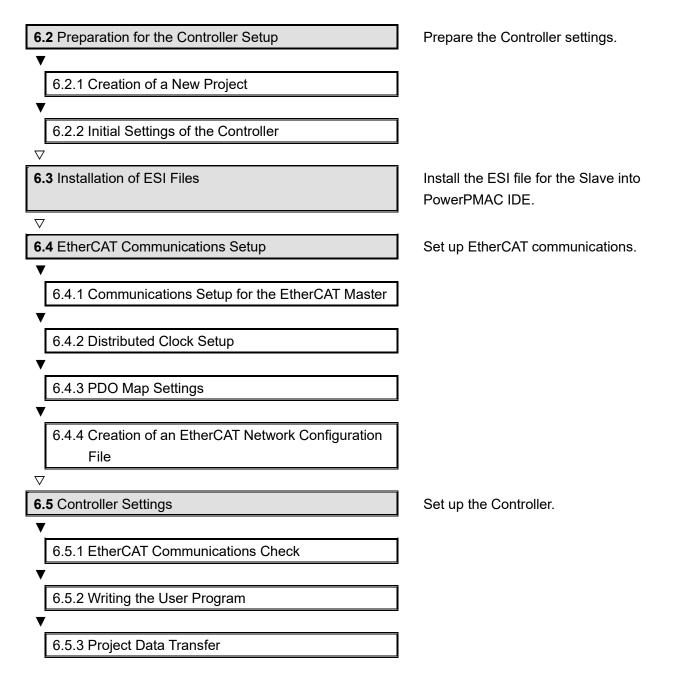
This document describes model CK3M-CPU1 1 as an example. The same procedures can apply to model CK3E-DDD/CK5M-CPU1D1.

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.

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 Connect . * The IP address of the Controller is set to "192.168.0.200" by default. * If necessary, change the Windows IP address to "192.168.0.X".	IDE Environment Communication IP Address Port 22 Protocol User root Password SelectDeviceAtStartup IP Address Set IP Address Set IP Address Connect Last Session IP No Device For detailed setup options go to Tools menu -> Options

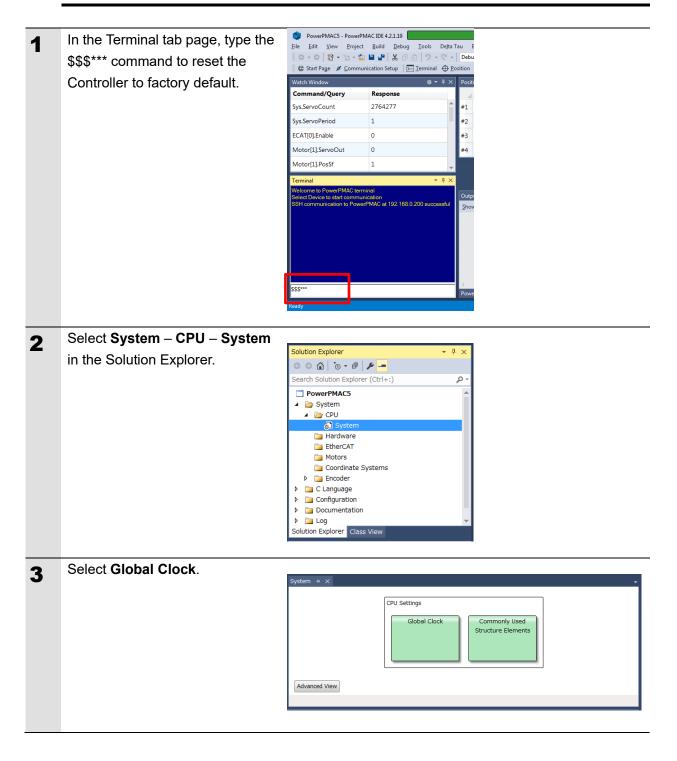
5 From the File menu, select New then Project. File the View Deby Tool Deta Tau EterCAT Window Help File the View Deby Tool Deta Tau EterCAT Window Help File the View Deby Tool Deta Tau EterCAT Window Help File the View Deby Tool Deta Tau EterCAT Window Help File the View Deby Tool Deta Tau EterCAT Window Help File the View Deby Tool Deta Tau EterCAT Window Help File the View Deby Tool Deta Tau EterCAT Window Help File the View Deby Tool Deta Tau EterCAT Window Help File the View Deby Tool Deta Tau EterCAT Window Help File the View Deby Tool Deta Tau EterCAT Window Help File the View Deby Tool Deta Tau EterCAT Window Help File the View Deby Tool Deta Tau EterCAT Window Help File the View Deby Tool Deta Tau EterCAT Window Help File the View Deby Tool Deta Tau EterCAT Window Help File the View Deby Tool Deta Tau EterCAT Window Help	• 0 X
5 From the File menu, select New then Project. File Edit View Debug Tools Delta Tau EtherCAT Window Help View Debug Tools Delta Tau EtherCAT Window Help View Ctrl Nick Ctrl Nic	• 1 4
5 From the File menu, select New then Project. File Lick Ctd+Shift+N Close	a 3 a a
5 From the File menu, select New then Project. Fie Edit View Debug Tools Delta Tau EtherCAT Window Help Fiele Ctrl+N	and Henry
5 From the File menu, select New then Project. FileCtrl+N	• I •
5 From the File menu, select New then Project. File Edit View Debug Tools Delta Tau EtherCAT Window Help File Edit View Debug Tools Delta Tau EtherCAT Window Help FileCtrl+N	• 1 a
5 From the File menu, select New then Project.	< 9 a
5 From the File menu, select New then Project. File Edit View Debug Tools Delta Tau EtherCAT Window Help New Open File Ctrl+Shift+N Open Close	ing Agents
5 From the File menu, select New then Project. File Edit View Debug Tools Delta Tau EtherCAT Window Help New + Sproject Ctrl+Shift+N Open	lar flares
5 From the File menu, select New then Project. File Edit View Debug Tools Delta Tau EtherCAT Window Help New	iae Marro
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New then Project.	
New then Project. PowerPMAC IDE 4.2.1.19 File Edit View Debug Tools Delta Tau EtherCAT Window Help New Open	
File Edit View Debug Tools Delta Tau EtherCAT Window Help New Image: Constraint of the second se	
New tightstress Project Ctrl+Shift+N Open tightstress tightstress tightstress Close tightstress tightstress	
Close	
Close	Jc
Close Solution Position	
Upload Project From PowerPMAC	
Save Selected Items Ctrl+S #1	
Save Output As #2	
Save All Ctrl+Shift+S #3	
Export + #4	
Page Setup Start Page +> ×	
Print Ctrl+P	
Recent Files Recent Projects and Solutions	клл
Recent Projects and Solutions POWERP Exit Alt+F4	
6 Enter a project name, and	
select OK.	х
Installed PowerPMAC PowerPMAC Pyper PowerPMAC	
PowerPMAC A basic PowerPMAC project. PowerPMAC Solution PowerPMAC with EtherCAT (Acontin) PowerPMAC project.	
PowerBick_LV PowerBMAC	
	_
Name: PowerMACS Lotation: Elwerthomen.jpc,1\DocumentsPowerPMACIDE Bronse	
	el

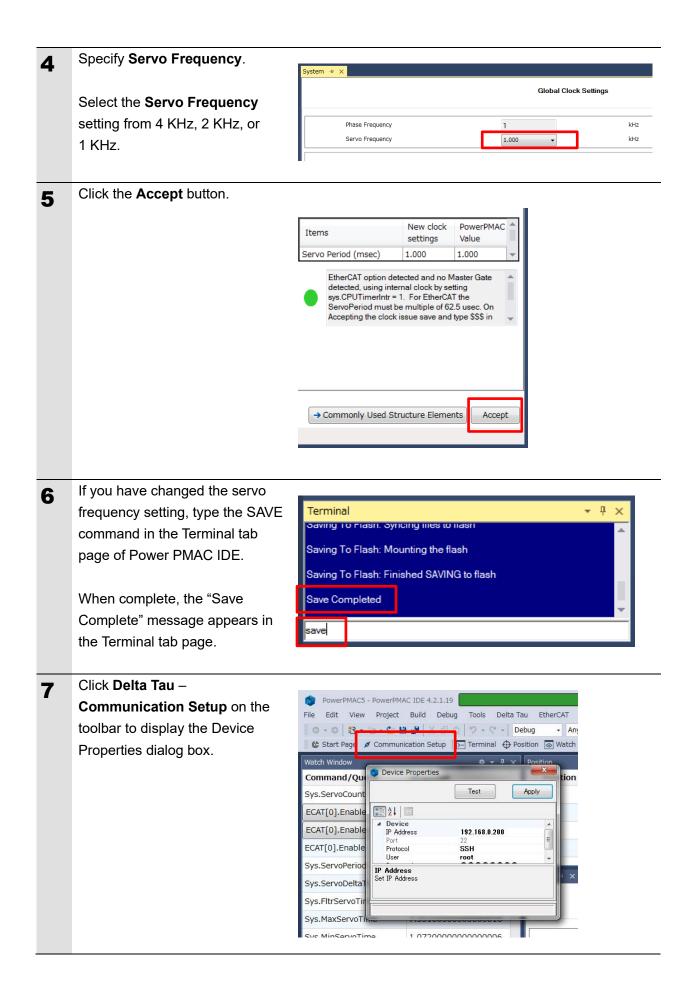
6.2.2. Initial Settings of the Controller

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.





8	In the Device Properties dialog	TN
U	box, select <i>No Device</i> for IP	S Device Properties
	Address, then click the Apply	Test Apply
	button.	
	This operation sets the Controller to the offline state.	Device IP Address No Device Port Z2 Protocol SSH User root IP Address Set IP Address
9	Restart the Controller.	
	The servo frequency that has	
	been set is reflected.	
10	Wait until the startup process of	
10	Wait until the startup process of the Controller is complete. Then	S Device Properties
10	••	Device Properties Test Apply
10	the Controller is complete. Then	Test Apply
10	the Controller is complete. Then click Delta Tau –	Test Apply
10	the Controller is complete. Then click Delta Tau – Communication Setup on the	Test Apply
10	the Controller is complete. Then click Delta Tau – Communication Setup on the toolbar to display the Device	Test Apply
10	the Controller is complete. Then click Delta Tau – Communication Setup on the toolbar to display the Device Properties dialog box.	Test Apply
10	the Controller is complete. Then click Delta Tau – Communication Setup on the toolbar to display the Device Properties dialog box. In the Device Properties dialog	Test Apply
10	the Controller is complete. Then click Delta Tau – Communication Setup on the toolbar to display the Device Properties dialog box. In the Device Properties dialog box, return the IP Address to the	Test Apply Image: Apply and the second sec
10	the Controller is complete. Then click Delta Tau – Communication Setup on the toolbar to display the Device Properties dialog box. In the Device Properties dialog box, return the IP Address to the previous setting, then click the	Test Apply Image: Apply and the second sec
10	the Controller is complete. Then click Delta Tau – Communication Setup on the toolbar to display the Device Properties dialog box. In the Device Properties dialog box, return the IP Address to the previous setting, then click the	Test Apply Image: Apply and the second sec
10	the Controller is complete. Then click Delta Tau – Communication Setup on the toolbar to display the Device Properties dialog box. In the Device Properties dialog box, return the IP Address to the previous setting, then click the Apply button.	Test Apply Image: Apply and the second sec

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	PowerPMAC5 - PowerPMA	C IDE 4.2.1.19	∯ IP: 192
•	PMAC IDE, select ESI Manager.	File Edit View Project	Build Debug Tools Delta T	경고 EtherCAT Window Help epuc [] ESI Manager - > Star
		Watch Window	¢ - 4 ×	Position
		Command/Query Sys.ServoCount	Response 577552	Position #1
		ECAT[0].Enable=1	577552	#2
				1 /2
2	Confirm that Omron ZW-7.xml is	🛹 ESI Manager		
_	registered in the ESI file list of ESI	ESI Files		
	Manager.	Select an ESI file which	should be deleted or exported	or add new ESI files.
	5	Omron Corpora		
		Omron 3G3AX	-MX2-ECT.xml	
		Omron 3G3AX	-RX-ECT.xml	Number of ESI files: 41
	If it is not yet registered, click Add			Number of devices: 360
	File and register Omron ZW-7.xml.	Add File Add	Folder Delete	Export Close
		Add ESI File		
		Computer >	Removable Disk (F:) 👻 😽	Search Removable Disk (F;)
		Organize 🔻 New folder	4	
		A Pavonites	ame	Date modified Type 5/24/2018 10:36 AM XML Doct
		Downloads Secent Places		
		Documents		
		Music		
		Videos 🔡		
		Computer		
		File <u>n</u> ame:	Omron ZW-7.xml	Supported Files (*.xml;*.zip)
				Open Cancel
3	Click Close to close the ESI			
•	Manager page.			

6.4. EtherCAT Communications Setup

Set up EtherCAT communications.

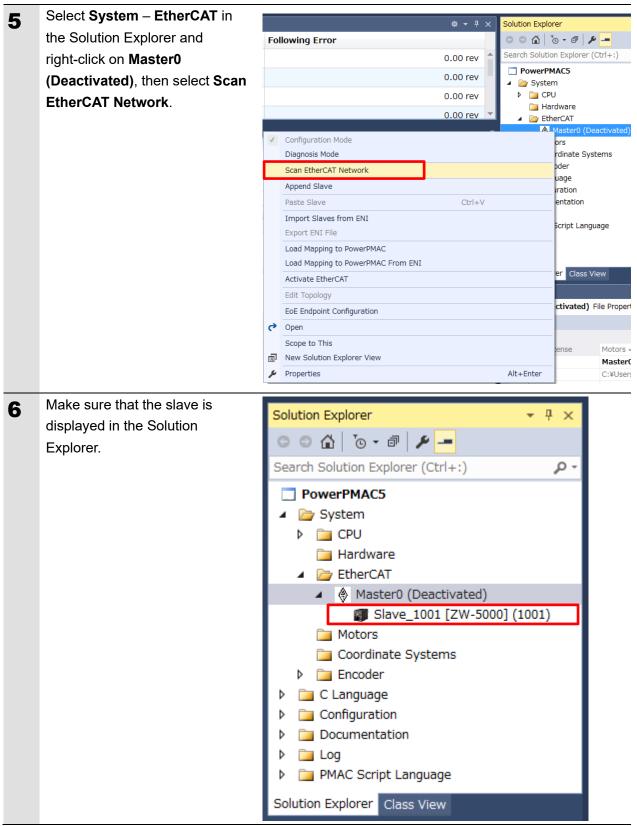
Precautions for Correct Use

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

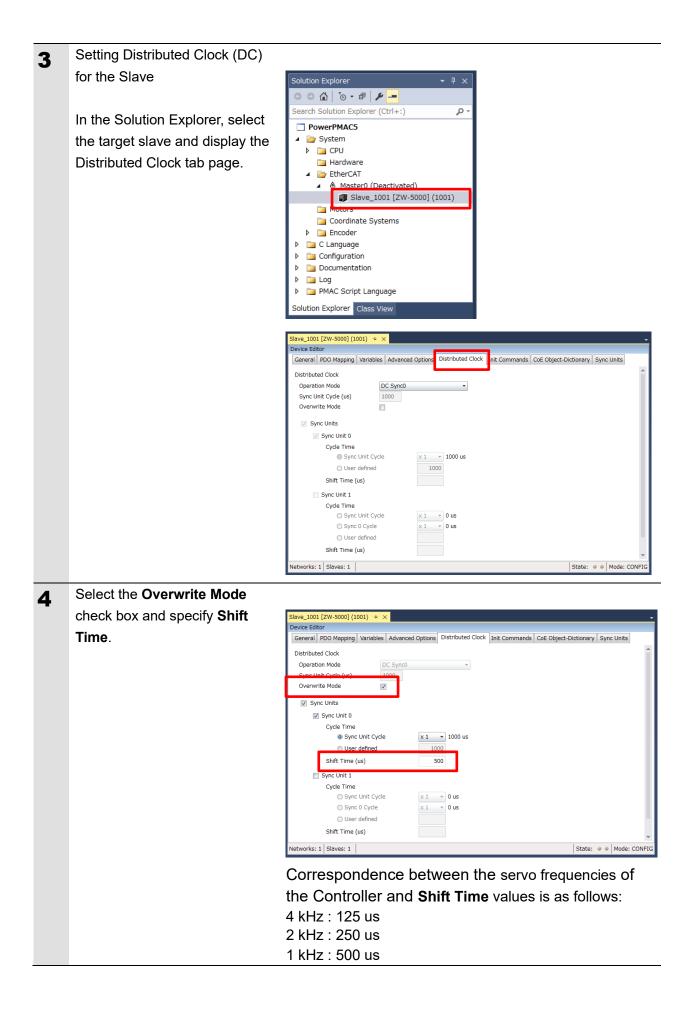
1	Connect the Controller with slave devices using an Ethernet				
	cable. * Refer to the manuals for slave				
	devices to configure them.				
2	Display Start Page of				
_	EC-Engineer, and select		¢ ◄ ₽	×	Solution Explorer
	EtherCAT Master Unit (Class	rror			G O 🟠 💽 - 🗗 🗡 🗕
	A) from Add Master Unit.		0.00 rev		Search Solution Explorer (Ctrl+:)
	,		0.00 rev		PowerPMAC5 System
			0.00 rev		CPU
			0.00 rev		Hardware EtherCAT
			Scope to This		Motors
		Ē	New Solution Explorer View		Coordinate Systems
		۷	· · · · · · · · · · · · · · · · · · ·	:+En	ter Dia Encoder
			Add EtherCAT Master (Acontis)		1 Configuration
					b Commentation

3	Class-A Master is added to the	Solution Explorer		• ₽ ×	
	Project Explorer.	© © ☆ ™ ≯			
		Search Solution Explorer (Ctrl+:)	<i>р</i> -	
		PowerPMAC5			
		 System 			
		CPU Hardware			
		 Hardware EtherCAT 			
		Master0 (De	activated)		
		Motors			
		🛅 Coordinate Sys	tems		
		Encoder			
		 C Language Configuration 			
		 Documentation 			
		🕨 🚞 Log			
		👂 🚞 PMAC Script Langu	lage		
		Solution Explorer Class V	iew		
4	In the Master page, specify a	Master0 (Deactivated) 😕 🗙			•
-	communication period for Cycle	Device Editor			
	Time [us].	Master Topology View			
	inne [us].	General			
		Unit Name	EtherCATSuite Master		
	* You must specify the	Cycle Time [us] Source MAC address	1000		•
	communication period in	Source MAC address			
	accordance with the servo	Slaves connected to local sys	tem		
		Network Adapter	ローカル エリア接続 5(Intel(R) I210 Gi	
	frequency of the Controller.				Select
	1000 us is set in this document.	Slaves connected to remote a	system		
		IP Address	192 168 0 200		
		Port	6000		
		Master-Instance	0		
				1	
		Networks: 1 Slaves: 0		St	ate: • • Mode: CONFIG
		Correspondence b	etween the serv	vo freque	ncies of the
		Controller and com		-	
				.545 10 40	
		4 kHz : 250 us			
		2 kHz : 500 us			
		1 kHz : 1000 us			

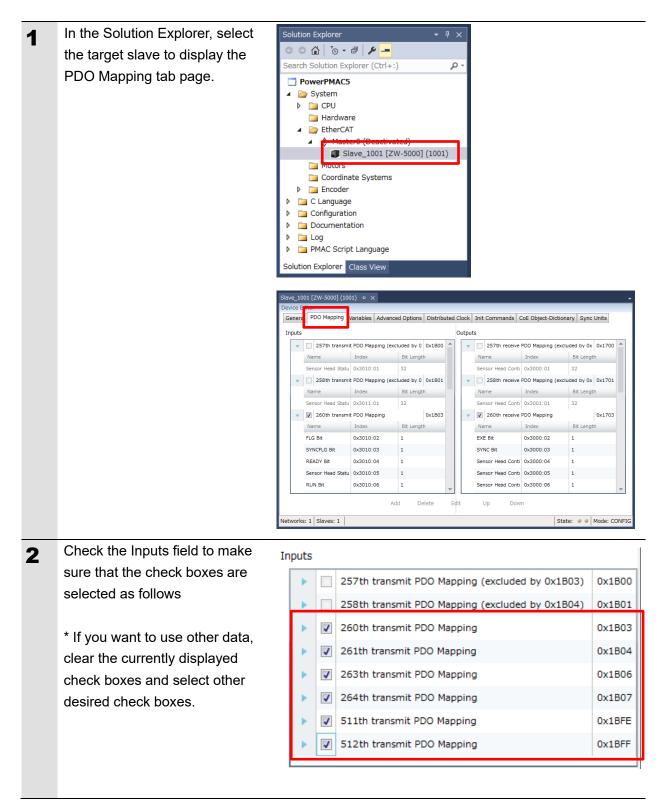


6.4.2. Distributed Clock Setup

1	Setting Distributed Clocks (DC)	Solution Explorer 👻 🤻 🗶
	for Master	Search Solution Explorer (Ctrl+:)
		PowerPMAC5
	In the Master0 (Deactivated)	 ▲ [20] System ▶ [20] CPU
	tab page, select Distributed	Hardware
	Clocks tab.	Master0 (Deactivated)
		□ Motors
		i⊒ Coordinate Systems in a constant of the system of
		C Language
		Configuration Documentation
		Cog Descript Language
		Solution Explorer Class View
		Master0 (Deactivated) * × Device Editor
		Master Topology View Process Data Image Variables Advanced Options Slave to State Distributed Clocks T sks + Sync Units Reference Clock
		Name Slave_1001 [ZW-5000] (1001)
		Clock Adjustment Master Shift (EtherCAT Master Time controlled by Reference Clock)
		Bus Shift (Reference Clock controlled by EtherCAT Master Time) External Mode (Reference Clock controlled by External Sync Device)
		•
		Options I Sync Window Monitoring
		Show 64Bit System Time
		Slaves with active DC Slave_1001 [ZW-5000] (1001)
		Networks: 1 Slaves: 1 State: • • Mode: CONFIG
2	Select Master Shift (EtherCAT	
_	Master Time controlled by	Master0 (Deactivated) + X
	Reference Clock).	Device Editor Master Topology View Process Data Image Variables Advanced Options Slave to Slave Distributed Clocks Tasks + Sync Units
		Reference Clock Name Slave 1001 (7:W-50001 (1001)
		Name Slave_1001 [ZW-5000] (1001)
		Master Shift (EtherCAT Master Time controlled by Reference Clock) Bus Shift (Reference Clock controlled by EtherCAT Master Time)
		External Mode (Reference Clock controlled by External Sync Device)
		Options
		Sync Window Monitoring Show 64Bit System Time
		Slaves with active DC
		Slave_1001 [ZW-5000] (1001)
		Networks: 1 Slaves: 1 State: • • Mode: CONFIG

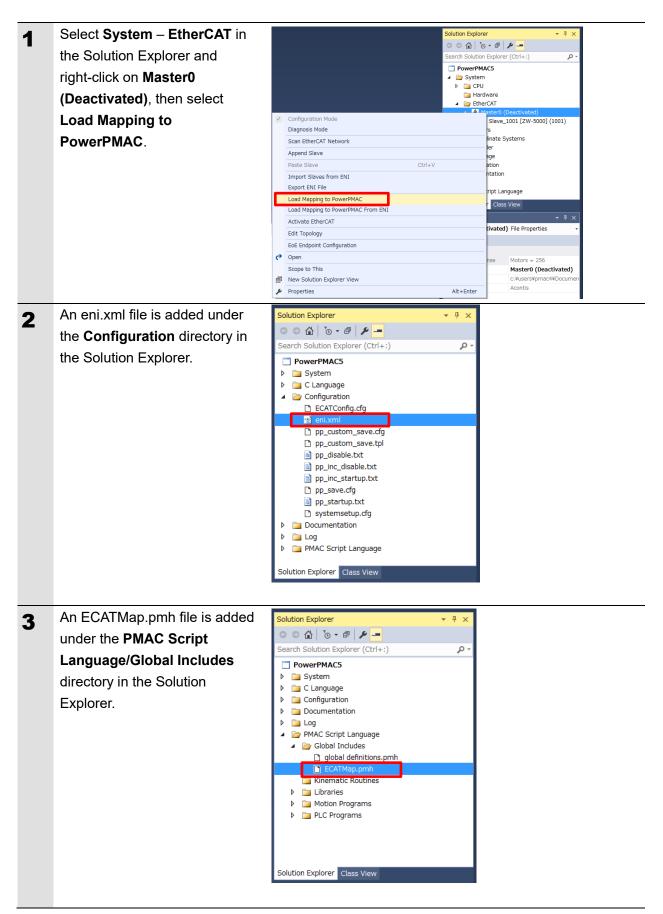


6.4.3. PDO Map Settings



3 Check the Outputs field to make sure that the check boxes are	Outputs	
selected as follows.	257th receive PDO Mapping (excluded by 0x1703)	0x1700
	258th receive PDO Mapping (excluded by 0x1704)	0x1701
* If you want to use other data,	260th receive PDO Mapping	0x1703
clear the currently displayed	261th receive PDO Mapping	0x1704
check boxes and select other desired check boxes.	263th receive PDO Mapping	0x1706

6.4.4. Creation of an EtherCAT Network Configuration File



6.5. Controller Settings

6.5.1. EtherCAT Communications Check

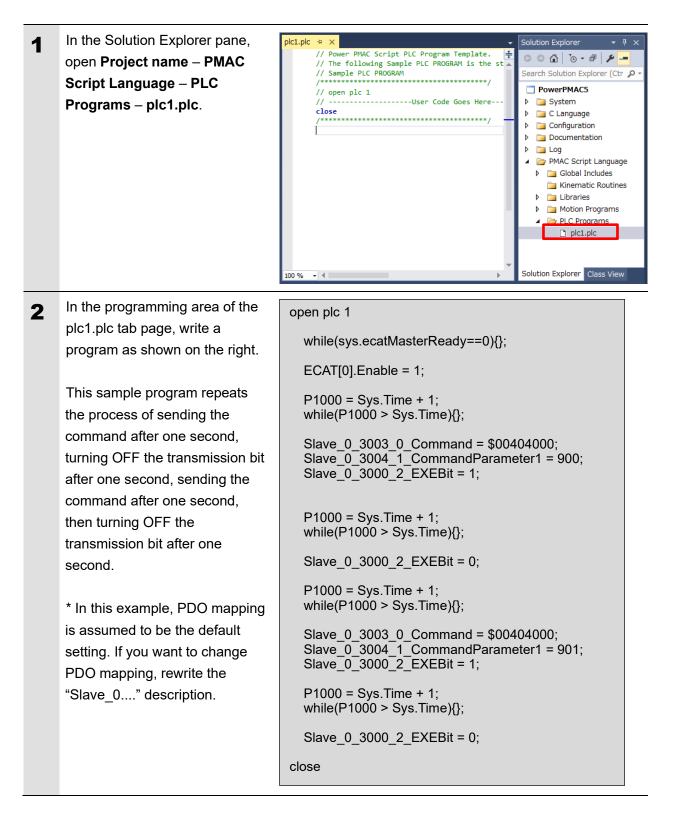
Take the following steps to ensure that EtherCAT communications are available.

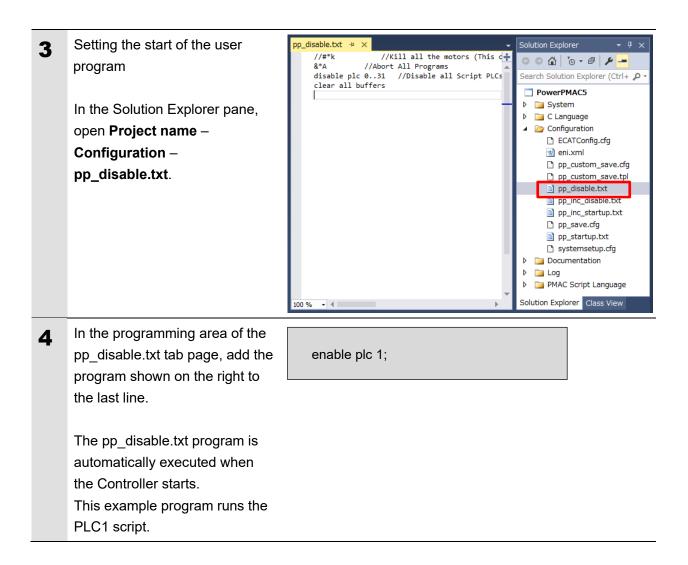
1	From the Terminal tab page, run the ECAT[0].Enable=1 command to start EtherCAT communications.	Terminal Welcome to PowerPMAC terminal Select Device to start communicati SSH communication to PowerPM/	ion
2	In the Terminal tab page or Watch Window, make sure that the ECAT[0].Enable value turns to <i>1</i> . * The OP mode is entered and EtherCAT communications are established.	Watch Window Command/Query Sys.ServoCount ECAT[0].Enable	
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 communicati SSH communication to PowerPMA ECAT[0].Enable=1	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.





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.





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.

0

In the Terminal tab page or				_	
Watch Window, make sure that	Watch Win				\$\$ • ₽ ×
the ECAT[0].Enable value is 0.	Commar	nd/Query	Resp	onse	
	Sys.Serve	oCount	1331	2872	
If the value is 1, run the	ECAT[0].	Enable	0		
ECAT[0].Enable=0 command					
from the Terminal tab page to					
stop EtherCAT					
communications.					
Downloading a project				Soluti	on Explorer 🔹 म 🗙
					◎ 습 ™ - ◎ ≁ -
Right-click the project name in					h Solution Explorer (C 🔎 - PowerPMAC5
the Solution Explorer pane on	📩 Build			P	System
the upper right of the IDE	Rebuild				C Language Configuration
screen, and select Build and	Clean New Solu	tion Explorer View			Documentation
Download All Programs to		Download All Programs			PMAC Script Language
run the build and download.		C Variables			
	Add Macro Export Pro	o Project oject with IP Protection			
		oject Template			
* The transferred project is not	χ Cut		Ctrl+X		
yet saved to the Controller at	Unload Pr				
this stage.	Properties	ler in File Explorer	Alt+En	ter	
If you turn OFF the power to				Calute	- Furthers of the
the Controller, the transferred					
project will be discarded.					
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.					

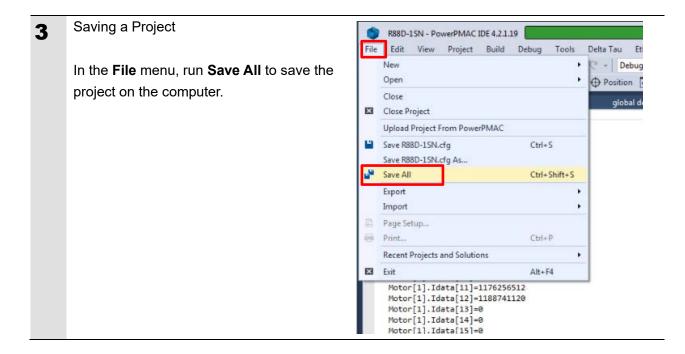
	T I 6 6 1	
4	The program starts running	Terminal 🝷 🕂 🗙
	when it has been downloaded	Welcome to PowerPMAC terminal
	successfully.	Select Device to start communication SSH communication to PowerPMAC at 192.168.0.200 successful
	EtherCAT communications are	
	in the OP state. Make sure that	
	the command is sent.	
		enable plc 1
	* If the command is not sent,	
	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	
5	After you have confirmed an appropriate operation, save the	Terminal · 무 ×
5	appropriate operation, save the	Available disk space = 3593208K 1472K
5		
5	appropriate operation, save the	Available disk space = 3593208K 1472K Required disk space = 1472K Saving To Flash: Syncing files to flash
5	appropriate operation, save the project to the Controller. Run the save command from	Available disk space = 3593208K 1472K Required disk space = 1472K Saving To Flash: Syncing files to flash Saving To Flash: Mounting the flash
5	appropriate operation, save the project to the Controller.	Available disk space = 3593208K 1472K Required disk space = 1472K Saving To Flash: Syncing files to flash
5	appropriate operation, save the project to the Controller. Run the save command from the Terminal tab page.	Available disk space = 3593208K 1472K Required disk space = 1472K Saving To Flash: Syncing files to flash Saving To Flash: Mounting the flash
5	appropriate operation, save the project to the Controller.Run the save command from the Terminal tab page.* The save command stores	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
5	 appropriate operation, save the project to the Controller. Run the save command from the Terminal tab page. * The save command stores the downloaded project in the 	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
5	 appropriate operation, save the project to the Controller. Run the save command from the Terminal tab page. * The save command stores the downloaded project in the Controller. This operation 	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
5	 appropriate operation, save the project to the Controller. Run the save command from the Terminal tab page. * The save command stores the downloaded project in the Controller. This operation saves the settings to be 	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
5	 appropriate operation, save the project to the Controller. Run the save command from the Terminal tab page. * The save command stores the downloaded project in the Controller. This operation saves the settings to be executed automatically when 	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
5	 appropriate operation, save the project to the Controller. Run the save command from the Terminal tab page. * The save command stores the downloaded project in the Controller. This operation saves the settings to be 	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

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 Create a Configuration File to save parameters you have changed. Right-click Configuration in the Solution Explorer pane, and select Generate Config File . A Configuration File is added to Configuration .	1 [F88D-15N01L-ECT] (100	Search S	Explorer Construction Explorer (Ctrl+:) BD-15N System C Language Configuration P ECATConfig.cfg enizml p p.cutom_save.cfg p p.cutom_save.tgl p p.cutom_save.	Add Scope to This New Solution Explorer View Properties Alt+E Upload Config Files Download Config Files Generate Config File	• Enter
2	Enter a file name in the textbox, then click the OK button.	Please ty	pe a name f	ior the Config	File.	
3	Right-click on the Configuration File, and from the menu, select Check To Download Config File to include it in files to be downloaded.	□ PF □ PF □ C 0 □ C	Open With View Code Scope to Ti New Soluti Exclude Fre Copy Oelete Rename Check To E Properties	his on Explorer View	Ctrl+C Del File Alt+Enter	×



7.2. Loading and Downloading a Project

1 2	Start Power PMAC IDE, and 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 \$SSH communication to PowerPMAC at 192.168.0.200 successful \$SS**** PowerPMAC Messages Terminal Output
3	In the File menu, Click Open – Project/Solution to load the project.	PowerPMAC IDE 4.2.1.19 P: 192.168.0.200 Type: MOTION CO File Edit View Debug Tools Delta Tau EtherCAT Window Help New New New Debug Any CPU Open Open File Ctrl+Shift+O Door Close Close File Ctrl+Shift+O Door Ctrl+Shift+O Door Save Selected Items Ctrl+Shift+S Export File Ctrl+Shift+S Export Print Ctrl+P Recent Projects and Solutions Print Print Ctrl+F4 Export Exit Alt+F4
4	Right-click Configuration in the Solution Explorer pane, and select Download Config Files to download the file to the Controller.	Solution Explorer

5	Right-click the project name in the	-	Solution Explorer	- ₽ ×
	Solution Explorer, and select	+	◎ ● 씁 ఀ ● - @ ≁	
	Build and Download All		Search Solution Explorer (Ctrl+;)	- م
	Programs to run the build and		🕨 🧰 Sys 🏙 Build	
	•		CL Rebuild CC Clean Clean	
	download.		New Solution Explorer View	
			Build and Download All Programs	
	When the download process is		Map PMAC Variables Add Macro Project	
	•		Finant Design twith ID Destantion	
	complete, make sure that there		Export Project With IP Protection	
	are no errors in the Output		Cut	Ctrl+X
	Window.		Unload Project	
			Do Open Folder in File Explorer Do De De	10.5.
			Log Properties Properties PM-cocmpectinguage	Alt+Enter
			Solution Evolution Class View	
			Solution Explorer Class View	
	Stopping a program	Terminal	Solution Explorer Class View	
3	Stopping a program	Terminal Walaama ta Ba		
6		Welcome to Po Select Device to	werPMAC terminal start communication	
6	If a program is running, execute	Welcome to Po Select Device to	werPMAC terminal	successful
6	If a program is running, execute the following command from the	Welcome to Po Select Device to	werPMAC terminal start communication	successful
6	If a program is running, execute	Welcome to Po Select Device to	werPMAC terminal start communication	successful
6	If a program is running, execute the following command from the Terminal tab page to stop the	Welcome to Po Select Device to	werPMAC terminal start communication	successful
3	If a program is running, execute the following command from the Terminal tab page to stop the program.	Welcome to Po Select Device to	werPMAC terminal start communication	successful
6	If a program is running, execute the following command from the Terminal tab page to stop the program. disable plc 1	Welcome to Po Select Device to SSH communit disable plc 1	werPMAC terminal 9 start communication ation to PowerPMAC at 192.168.0.200 s	successful
6	If a program is running, execute the following command from the Terminal tab page to stop the program.	Welcome to Po Select Device to SSH communit disable plc 1	werPMAC terminal start communication	successful
6	If a program is running, execute the following command from the Terminal tab page to stop the program. disable plc 1	Welcome to Po Select Device to SSH communit disable plc 1	werPMAC terminal 9 start communication ation to PowerPMAC at 192.168.0.200 s	successful
6	If a program is running, execute the following command from the Terminal tab page to stop the program. disable plc 1	Welcome to Po Select Device to SSH communit disable plc 1 PowerPMAC M	werPMAC terminal 9 start communication ation to PowerPMAC at 192.168.0.200 s	successful
6	If a program is running, execute the following command from the Terminal tab page to stop the program. disable plc 1	Welcome to Po Select Device to SSH communit disable plc 1 PowerPMAC M	werPMAC terminal o start communication vation to PowerPMAC at 192.168.0.200 e essages Terminal Terminal Output	successful
6	If a program is running, execute the following command from the Terminal tab page to stop the program. disable plc 1	Welcome to Po Select Device to SSH communit disable plc 1 PowerPMAC M Terminal Welcome to Po Select Device to	werPMAC terminal o start communication cation to PowerPMAC at 192.168.0.200 s essages Terminal Terminal Output werPMAC terminal start communication	
6	If a program is running, execute the following command from the Terminal tab page to stop the program. disable plc 1	Welcome to Po Select Device to SSH communit disable plc 1 PowerPMAC M Terminal Welcome to Po Select Device to SSH communic	werPMAC terminal o start communication vation to PowerPMAC at 192.168.0.200 e essages Terminal Terminal Output verPMAC terminal	
6	If a program is running, execute the following command from the Terminal tab page to stop the program. disable plc 1	Welcome to Po Select Device to SSH communit disable plc 1 PowerPMAC M Terminal Welcome to Po Select Device to	werPMAC terminal o start communication cation to PowerPMAC at 192.168.0.200 s essages Terminal Terminal Output werPMAC terminal start communication	
6	If a program is running, execute the following command from the Terminal tab page to stop the program. disable plc 1	Welcome to Po Select Device to SSH communit disable plc 1 PowerPMAC M Terminal Welcome to Po Select Device to SSH communic	werPMAC terminal o start communication cation to PowerPMAC at 192.168.0.200 s essages Terminal Terminal Output werPMAC terminal start communication	
5	If a program is running, execute the following command from the Terminal tab page to stop the program. disable plc 1	Welcome to Po Select Device to SSH communit disable plc 1 PowerPMAC M Terminal Welcome to Po Select Device to SSH communic	werPMAC terminal o start communication cation to PowerPMAC at 192.168.0.200 s essages Terminal Terminal Output werPMAC terminal start communication	
6	If a program is running, execute the following command from the Terminal tab page to stop the program. disable plc 1	Welcome to Po Select Device to SSH communit disable plc 1 PowerPMAC M Terminal Welcome to Po Select Device to SSH communic	werPMAC terminal o start communication sation to PowerPMAC at 192.168.0.200 s essages Terminal Terminal Output werPMAC terminal start communication ation to PowerPMAC at 192.168.0.200 s	

7	Saving the downloaded settings	
1	and programs	Terminal
	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.	Welcome to PowerPMAC terminal Select Device to start communication 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 Run the following command from the Terminal tab page to restart the Controller with the downloaded project. \$\$\$	Terminal Saving To Flash: Mounting the flash Saving To Flash: Finished SAVING to flash Save Completed \$S\$ PowerPMAC Messages Terminal Output

8. Appendix Troubleshooting

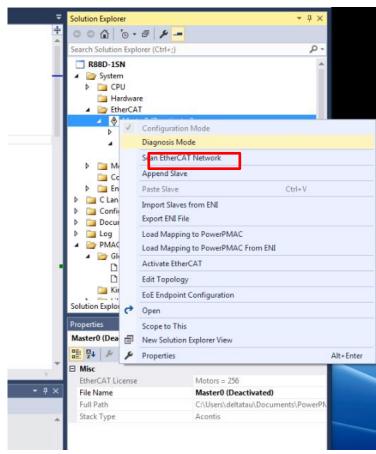
Factor Description **Corrective Action** The link is not established. The Ethernet cable is broken or If the Ethernet cable is broken the specified cable is not being or if the specified cable was not used. used, replace the cable. Reconnect the connector and A connector on the Ethernet cable used for 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. The distribution clock is not set Review the settings according A synchronization error occurs 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

8.2.1. 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 (Deac	<mark>:tivated) 👳 ×</mark> global de	finitions.pmh Syst	tem		-
Device Editor					
General Process Data Image Wate	ch list Performance Var	iables CoE Object-Dictio	nary History		
State Machine					
Current State	Pre-Op				
Requested State	Pre-Op				
	Init Bootstrap				
Change State	Pre-Op Safe-Op				
	Ор				
Information		Frame Counter			
Number of found slaves	2	Sent frames	55067		
Number of slaves in configuration	2	Lost frames	0		
Number of DC slaves	2	Cyclic frames	44678		
DC in-sync	Yes	Acyclic frames	10389		
1 37	Yes		Clear counters		
	Yes				
Slaves in Master State	Yes				
Networks: 1 Slaves: 2				State: 🔮 🜒	Mode: DIAGNOSIS

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.

Global Status			
Description	Status	Description	Status
AbortAll	False	HWChangeErr	False
BufSizeErr	False	NoClocks	False
ConfigLoadErr	False	ProjectLoadErr	False
Default	True	PwrOnFault	False
ileConfigErr	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.

i <mark>tatus</mark> 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		
FeWarn	False	SoftMinusLimit	False		
HomeComplete	False	SoftPlusLimit	False		
HomeInProgress	False	TimerEnabled	False		
I2tFault	False	TimersEnabled	False		
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
	network	(2 and 3 are not 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	Revised date	Revised content	
code			
01	Apr, 2019	First edition	
02	Jan, 2023	Made changes accompanying the addition of CK5M-CPU1	
		□1 Unit.	

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