ZMP-SynqNet Hardware Quick Start Guide







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Safety Warnings

During installation, solid electrical contact must be ensured at connectors; otherwise, noise and power problems will develop. (Connections should be verified through inspection and testing.)

Standard safety rules prevail during installation of any hardware. Some are summarized below for the ZMP. For more information, refer to local occupational safety regulations and the manufacturer of your motion drive.

Turn Off All Power Before Installing Equipment

Before installing any motion control equipment, including ZMP controllers, power should be switched OFF. Unplug all power plugs from their sources of power.









Unplug from source of power.

Observe ESD Precautions

To prevent damage to controller and drive electronics due to electrostatic discharge (ESD), service personnel are cautioned to observe proper grounding during handling of components.





Grounding straps should be worn at all times when handling ZMP-SynqNet electrical components and connection hardware.

Define and Clear a Safety Zone!

During installation and testing of motion control hardware-software, a safety zone should be defined around moving components and kept clear of personnel, hands, fingers and loose hardware. During repowering of the system, motion control components may behave erratically due to misconnected lines, or wrongly configured software settings. Sudden and unexpected moves by components can cause injury, property damage, or even death! Under NO circumstances, should a motion system be tested or operated while personnel are within the safety zone.

Additionally, beware of flying debris from unsecured hardware operating at high speeds. The use of safety shielding is highly recommended.





Install the MDK (software)

The MDK (software) can be accessed from MEI's ftp site (ftp://ftp.motioneng.com) or from the MDK InstallShield CD-ROM. By default, all of the files are copied to the following directory: C:\MEI. The InstallShield will install the following features and libraries:



- Motion Programming Interface (MPI)
- Motion Console
- Motion Scope
- VM3
- On-line Documentation

Installation Steps

Step 1

Click on the WinNTSetup.exe or Win32Setup.exe file.

InstallS	hield Wizard				
18	Motion Engineerin is preparing the Ins the program setup	stallShield	Wizard wh	ich will auide	: ToolKit Setup e you through
Configu	ring Windows Insta	ller			
				[Cancel



Step 2

The InstallShield Wizard for Motion Engineering's MPI-ZMP Motion Developer's Toolkit should appear. Click **Next**.



Step 3

If you are installing the MDK for the first time, select "Complete" and click **Next**. To change the default installation directory (C:\MEI), choose the "Custom" installation.





Step 4

The default directory for the installation of all files and settings is **C:/MEI**. If you wish to change the directory, click the **Change** button and select the desired directory. Click **Next**.

🔂 Motion E	ngineering's MPI-XMP Motion Developer's ToolKit - InstallShield Wizard 🔀
Destinati Click Nex	ion Folder At to install to this folder, or click Change to install to a different folder.
	Install Motion Engineering's MPI-XMP Motion Developer's ToolKit to: C:\MEI\
InstallShield -	< <u>B</u> ack <u>Next</u> Cancel

Step 5

The InstallShield is now ready to install all of the files and settings. Click Install.

🕞 Motion Engineering's MPI-XMP M	otion Develop	er's ToolKit - InstallS	hield Wizard 🗙
Ready to Install the Program The wizard is ready to begin installation	on.		C
Click Install to begin the installation.			
If you want to review or change any o Cancel to exit the wizard.	of your installatio	in settings, click Back. C	lick
InstallShield			
	< <u>B</u> ack	Instal	Cancel



Step 6

A series of windows will appear showing the progress of the installation.

🔂 Motion E	ngineering's MPI-XMP Motion Developer's ToolKit - InstallShield .	_ 🗆 🗙
Installing	Motion Engineering's MPI-XMP Motion Developer's ToolKit	-
The prog	ram features you selected are being installed.	
13	Please wait while the InstallShield Wizard installs Motion Engineering's MPI-XMP Motion Developer's ToolKit. This may take several minutes.	
	Status:	
]
InstallShield –		
	< <u>B</u> ack <u>M</u> ext >	ancel

The following confirmation window will appear if the installation was successful. Click Finish to exit the InstallShield.





Install Controller

Select the type of controller you are installing.



<u>PCI</u>

<u>PMC</u>



PCI

The standard ZMP-SynqNet-PCI motion controller has a "universal" PCI interface, which operates in either 3.3V or 5V signaling backplanes. The 120-pin edge connector plugs into the host PCI bus slot. All motion control I/O is through the RJ-45 and Micro-D connectors on the rear panel.



ZMP-SynqNet-PCI-RJ PN: T015-0001

CAUTION

This hardware is for use only with compatible UL listed personal computers that have Installation Instructions detailing user installation of card cage accessories.

Install PCB into the host machine

Push the 120-pin edge connector into the mating connector on the host machine.





Below is a photo of an installed ZMP-SynqNet-PCI controller in a standard PCI slot on a CPU.





PMC

PMC stands for PCI Mezzanine Card. It is an ultra-compact motion controller that provides a direct connection to SynqNet motion control networks and can be readily customized to fit the requirements of most applications. On the ZMP-SynqNet-PMC controllers, the bussing occurs via the mezzanine connectors, which are mounted at one corner of the card (see photo below). PMC and CPCI adapter cards are also available, which allow the installation of the PMC card into a standard PCI or CPCI slot.



ZMP-SynqNet-PMC PN: T018-0001

PMC to PCI Adapter Card



PMC to PCI Adapter Card MEI PN: 8001-0031

Dynamic Engineering PN: PCI2PMC www.dyneng.com



When mating a ZMP-SynqNet-PMC card to a compatible PCI converter card, be sure that the mezzanine connectors and stand-offs all line-up correctly. Secure the two boards with the screws provided.



Below is a picture of a properly installed PMC card on a PCI adapter card. It can now be installed into any standard PCI slot.





PMC to CPCI Adapter Card

When mating a ZMP-SynqNet-PMC card to a compatible CPCI converter card, be sure that the mezzanine connectors and stand-offs all line-up correctly. Secure the two boards with the screws provided.



PMC to CPCI Adapter Card Catalyst Enterprises, Inc. PN: 384-0040-001 www.catalyst-ent.com

Here is a properly installed ZMP-SynqNet-PMC card on a CPCI adapter card. It can now be installed into any standard CPCI slot.





PMC to Motherboard

You can also install the ZMP-SynqNet-PMC card directly onto a motherboard that has mezzanine connectors.



Here is a picture of a properly installed ZMP-SynqNet-PMC card on a motherboard.





Connect Hardware

Pick a Topology

The next step is to set up the hardware of the system based upon the selected topology. Currently, SynqNet supports the following three topologies:



For more information about the various topolgies, please see the <u>Node, Cable, Motor, Drive</u> <u>Addressing</u> section under the SynqNet Technology page.



Cable Connections: Controller to Node(s)

The type of cables needed to connect the controller to the node(s) will vary based upon the type of controller, the particular hardware features, and the type of nodes you are using in the SynqNet Network. However, regardless of these variables, the cables will be wired the same way. For example, you will always connect a cable from an OUT port and into an IN port. The following diagram will clearly illustrate this connection pattern. For more information about cables and connectors, see the <u>SynqNet Hardware</u> section.



Types of Connectors and Cables

Depending on the type of SynqNet ports (RJ45 or Micro-D) on your Controller and Drive, you will need to use one of the corresponding cables to connect them to each other. Please see the <u>Cables</u> section for a list of the various cables.

Feature	Connector	Cable
Controller I/O	<u>HD-15</u>	N/A
Micro-D	<u>Micro-D</u>	<u>C005-0002, C006-0001</u>
RJ-45	<u>RJ-45</u>	<u>C007-0003, C006-0001</u>

The following table lists some of the common connectors and their matching cables.



Power On Nodes and Check LEDs

After all of the nodes have been connected with the proper cables, power-up the system. To verify that the Nodes have been connected correctly and that each node is receiving a network and power signal, inspect the LEDs at each connector. Each **controller** will have four green LEDs:

- Two LEDs (3 and 4) at the IN port.
- Two LEDs (1 and 2) at the OUT port.



For more information, please see the Controller LEDs section.

Each node will have four green LEDs:

Node LEDs on theRMB-10V2

LED4 - Repeater LED5 - FPGA

Status

the Node LEDs section.

- Two LEDs (1 and 2) at the IN port.
- Two LEDs (3 and 4) at the OUT port.



The RMB-10V2-SynqNet is shown above. Each LED has a particular function. See the <u>Node LEDs</u> page for details.

•



Motion Console

Download Controller Firmware

Motion Engineering's motion controllers are shipped with NULL firmware. Therefore, the first step is to download the proper firmware for the controller. When you start Motion Console for the first time, it will automatically prompt you to download firmware to the controller and will also tell you which version should be downloaded. In the example below, you should download firmware version 531.

MotionCo	nsole									×
⚠	The version of	firmware on c	ontroller C	ontroller 0 is in	valid. The I	îrmware v	version must be 531	. Downloa	ad firmware	now?
			[Yes	No					

ownload Firn	nware From File To Controller "Controller 0"	? ×
The necessary	y firmware version is 531.	
]		
Look jn: 隘) bin 🔽 🗲 🗈 📸 🎫 -	
🛅 Linux		_
🚞 WinNT		
🔟 XMP531A7		
DIZMP531A7	/.bin	
	7	
File neme:		_
File <u>n</u> ame:	ZMP531A7.binpen	
Files of type:	Firmware Files (*.bin) Cancel	
		_

The next window will ask you to browse for the firmware file. Choose the **ZMPxxxxx.bin** ("xxxxx" represents the firmware version) firmware file from the **mei\xmp\bin** directory. The standard software release includes one XMP controller firmware file. In this example, we will download **ZMP531A7.bin**.

If you have installed custom software, there will be an additional firmware file in the same directory. Each custom firmware file is numbered: Z1Pxxxxx.bin, Z2Pxxxxx.bin, etc. If you are using custom firmware, select the proper custom ZnPxxxxx.bin file from the same directory.

Select the proper firmware version and click **Open**.





When the verification window appears, click **Yes**. It will take approximately 30 seconds to download the firmware to the controller.

Troubleshooting

What if I accidentally downloaded the wrong version or need to change the firmware version on the controller?

Once you have loaded firmware onto the controller for the first time, you can also manually change the version of firmware on the controller in Motion Console's Controller Summary window. Under the Action tab, click the **FW Download** button and then select the correct firmware file from the **mei\xmp\bin** directory.

Controller Sur	nmary 💶 🗆 🗙
Action Config	Version Stats
	Controller 0
Reset	<u> </u>
Refresh	
FW Upload	1017
FW Download	1011
Save Topology	
Remove	
4	



Add New Controller

The first step is to add a new controller in Motion Console. Click on the **Add New Controller** icon on the toolbar. The window that pops-up will allow you to give the controller a unique identification in the Name field. For this example, we will use the default name, Controller 0.



Add Control	ler		×
<u>N</u> ame:	Controller 0		
	ddress (by Type)		
Default	Device Client		
	evice r Number: 0 \\.\MEIXMP		
		OK	Cancel

The Controller Summary window will appear next.

Controller Sun	nmary 💶 🗆 🗙
Action Config	Version Stats 🔺
	Controller 0
Reset	<u> </u>
Refresh	
FW Upload	10114
FW Download	1011
Save Topology	
Remove	
•	



Check Network Information

After the proper firmware has been downloaded for the controller, check the Network

Information to make sure that the proper number of blocks were found. Click on the button to open the SynqNet Summary Window. Under the Info tab, it shows 1 node since the SynqNet Network that was used for this example had one RMB-10V2 installed.

A node refers to any SynqNet node, such as a SynqNet Drive or an RMB-10V2 (for analog) that is installed on a SynqNet network.

👩 SynqNet Summary: Con 💶 🗵 🗙		
Config Info	_	
hà	SynqNet 0	
Network Type	String	
Node Offset	0	
Node Count		
Status	<u></u>	
	SynqNet 0	
State	SYNQ	
ead Event		



Check Node Information

Click on the button to view the SqNode Summary window. This window provides specific information about the nodes installed on the system. SynqNet will find the nodes in the order that they are connected. The hardware setup used for this example had two nodes. Therefore, the SqNode Summary Window shows two nodes: SqNode 0 and SqNode 1. This window also shows the address information of each node.

Config] 10 Abort [Info		
	SqNode 0	SqNode 1
Node Name	MEI_RMB_10V_2	MEI_RMB2
Exact Match	Yes	Yes
Unique	0xFFFFFFFF	0x000668B6
Drive Count	0	0
Motor Count	4	2
Motor Offset	0	4
Туре	0xC0FEA001	0xC0FEA001
Option	0×00000000	0×00000000
Switch ID	0×FFFFFFFF	0×FFFFFFFF
FPGA Type	Runtime	Runtime
FPGA Vendor/Device	0xC0FE0029	0xC0FE0021
FPGA Version	0x020A020A	0x020A020A
Model Number	T010-0007	T010-0001
Serial Number	421203	420022
Status		
	SqNode 0	SqNode 1
Upstream Err. Rate	0	0
Upstream Err. Count	0	0
Downstream Err. Rate	0	0
Downstream Err. Count	0	0
CRC Err. OUT 0	0	0
CRC Err. IN 0	0	0
IOAbort	No	No
Node Disable	Ves 🗸	Ves
Node Alarm	No	No
Analog Power Fault	No	No
User Fault	No	No
Node Failure	No	No

TIP: Before proceeding on to Step 9, it is helpful to first minimize the Motion Console window.

Troubleshooting

Some of the Link LEDs on my node/drive are not ON...

If the Link LEDs are not turned ON, make sure that the drive has power. If the drive has power and Link LEDs are not ON, disconnect and reconnect the connector.



If the LEDs are not ON and the power has been verified, check to make sure that the cables are connected to the right ports.

If the Link LEDs still do not turn ON, the power has been verified, and the connections are correct, replace the cable. Another way of verifying if the cable is bad is to switch the cables. If the ports' LEDs light up with one cable and not with the other, then that cable is bad. Also, after the cables have been replaced, be sure to reset the controller in order to reinitialize the network.

For more information about the locations and meanings of LEDs please see the <u>Controller</u> <u>LEDs</u> and <u>Node LEDs</u> sections.

The RMB/SynqNet Node does not work straight from the box...

All RMB nodes are supplied without any FPGA image and will need to be programmed before being used. Please proceed to the next step, <u>Download Node FPGAs</u>.

A node is improperly ordered...

SynqNet will find the nodes in the order that they are connected. If a node is improperly ordered, retrace the wiring from the controller to the last node. Use the serial number and address information to determine if a node is not in the correct order. Or, use the drive identification information (model number, serial number, address, etc) to determine if a node is not in the correct order. If the same node types are improperly ordered, the problem can be found during motor feedback verification.

SynqNet initialized successfully, but all of the nodes were not found...

SynqNet will only tell you which nodes it found on the network. The most common cause of a node not being found is a result of a bad cable connection or a bad cable. The first step is to verify that the LEDs on the SynqNet In/Out ports are ON. If they are not on, disconnect and reconnect the connector. If the LEDs still do not turn ON, replace the cable.



Download Node FPGAs

Motion Engineering's SynqNet nodes are shipped with boot FPGA images (*.sff). The boot image contains minimal functionality to allow the node to be accessed by the SynqNet controller. To use the node, you will first need to download the appropriate FPGA (runtime) image.

To find the appropriate FPGA (runtime) image that should be downloaded for your node, please refer to the <u>Node Binary Files: Product Table</u>.

There are two ways to download the Node FPGA:

- via Motion Console
- via Command Prompt

Motion Console Download

In the SynqNet Node Summary window, click on the Binary Download button.

📉 SqNode Summary: Controller 0 🗖 🗖 🗙		
Config 10 Abort Info		
	SqNode 0	
Binary Download	1017	
Save To Flash		
View Sub-objects		
Alarm Mask	0×00000000	
Alarm Not Cyclic	🔽 Enabled	
Alarm ioAbort	Enabled	

Another window will appear that shows ... Click Browse.



Download Binary Image to SqNode(s)	×
Select file(s) to download to the following SynqNet node(s): SqNode 0, Controller 0: C0FE0021_0311.sff	-
	~
Channel File	
Node FPGA C:\MEI\03.01.beta0\XMP\bin\C0FE0021_0311.sff	
Clear Selected Clear All Browse	se

Find the appropriate FPGA file and select Open. In this example, we are downloading the C0FE0021_0311.sff file for an RMB-10V2.

Open			? ×
Look in: 🔁 bin		- 🗧 🖻	* ⊞-
WinNT 218_9201.fpg 218_9601.fpg 218_A102.fpg COFE0014_0311.sff COFE0018_0311.sff COFE0019_0311.sff COFE001A_0311.sff	 COFE0024_0311.sff COFE0026_0311.sff COFE0027_0311.sff COFE0029_0311.sff COFE0028_0311.sff COFE002C_0311.sff COFE002C_0311.sff COFE002D_0311.sff COFE002D_0311.sff COFE002D_0311.sff COFE002D_0311.sff 	 COFE0030_03 COFE0031_03 COFE0033_03 CAN002B1.ou drives.dm F21_A101.fpg F22_A101.fpg 	:11.sff
COFE0021_0311.sff Image: COFE0021 File name: COFE0021 Files of type: All Files (*.	COFE002F_0311.sff _0311.sff		▶ <u>O</u> pen Cancel



ownloading Firmware	to SqNode(s)	×
Item	Error	
SqNode 0, Controller 0: N	lode FPGA	

Refresh Motion Console by maximizing the screen. The following screen should appear. Notice that the "FPGA Vendor/Device" now reflects the downloaded FPGA: 0xC0FE0029.

🙀 SqNode Summary: Controller 0 📃 🗆 🗙		
Config IO Abort Info		
	SqNode 0	
Node Name	MEI_RMB_10V_2	
Exact Match	Yes	
Unique ID	0x00066EC6	
Drive Count	0	
Motor Count	4	
Motor Offset	0	
Туре	0xC0FEA001	
Option	0x0000000	
Switch ID	0xFFFFFFFF	
FPGA Type	Runtime	
FPGA Vendor/Device	0xC0FE0029	
FPGA Version	0x020C020C	
Model Number	T010-0006	
Serial Number	421574 👻	

Command Prompt Download

Open a Command Prompt window and go to the following directory to download the proper *.sff file:

C:\MEI\XMP\bin\WinNT\sqNodeFlash -node 0 -file ..\cofe0029_0206.sff



CMD.EXE	<u>- 0 ×</u>
C:\mei\XMP\bin\WinNT>sqnodeflash -node 0 -file\c0fe0029_0206.sff WARNING: Network will be disabled and the controller will be reset	F
Downloading file\c0fe0029_0206.sff to Syngnet Node #0 Page 768 of 768	
C:\mei\XMP\bin\WinNT>	▼ //

The selected FPGA file has been downloaded after all of the pages have been counted. Refresh Motion Console by maximizing the screen. The following screen should appear. Notice that the "FPGA Vendor/Device" now reflects the downloaded FPGA: 0xC0FE0029.

😽 SqNode Summary: Controller 0 💶 🗵		
Config IO Abort Info		
	SqNode 0	
Node Name	MEI_RMB_10V_2	
Exact Match	Yes	
Unique ID	0×00066EC6	
Drive Count	0	
Motor Count	4	
Motor Offset	0	
Туре	0xC0FEA001	
Option	0×00000000	
Switch ID	0×FFFFFFFF	
FPGA Type	Runtime	
FPGA Vendor/Device	0xC0FE0029	
FPGA Version	0x020C020C	
Model Number	T010-0006	
Serial Number	421574	•



Check Node Configuration

After the proper drive firmware has been downloaded, click on the <u>N</u> button to check the SqNode Summary window to make sure that the proper number of drives were found. This window provides the node configuration for each drive installed on the system. SynqNet will find the drives in the order that they are connected. The hardware setup used for this example had two drives.

😽 SqNode Summary: Controller O 📃 🗖		
Config 10 Abort Info		
	SqNode 0	SqNode 1
Binary Download	1017	1017
Save To Flash		
View Sub-objects		
Alarm Mask	0×00000000	0×00000000
Alarm Not Cyclic	🗹 Enabled	🗹 Enabled
Alarm ioAbort	🗹 Enabled	🗹 Enabled
Upstream Err. Fault Limit	4	4
Upstream Err. Fail Limit	16	16
Downstream Err. Fault Limit	6	6
Downstream Err. Fail Limit	12	12
User Fault Address	0x0002322C	0x0002322C
User Fault Mask	0×00000000	0×00000000
User Fault Pattern	0×00000000	0×00000000



Map the Axes

Click on the Supervisor window and click the Actions tab. Before you can control and move a motor, it must first be mapped to a Motion Supervisor. If the buttons are faded out under the Actions tab (shown below), it means that no axes have been mapped (assigned) to a Motion Supervisor.

MS Summary:	Contr 💶 🗙
Config Actions	<u> </u>
	MS 0
Repeat Mode	Enabled
Move Pos. 1	
Move to Further	
Move Pos. 2	
Stop	
E-Stop	
Abort	
Zero Position	0
Clear Fault	_
Status	
State	
Amp Fault	No
Home Limit	No
Position Err. Limit	No
HVV Neg. Limit	No
HW Pos. Limit	No -1
•	Ŀ

To use the default mapping of axes (map Axis 0 to Motion Supervisor) click on the Config tab and **Shift + Left-Click on the Axis Map button**. This will automatically map Axis 0 to Motion Supervisor 0.

Then click **Yes** to configure the default mapping.

MS Summary	: Co 💶 🗆 🗙	
Config Actions	•	
	MS 0	
Save To Flash		
View Sub-objects		
Axis Map	Mua	
Motion Type	Trapez	
Attributes	0	Default Mapping
Stop Time	0.5	
E-Stop Time	0.05	This operation will configure the sub-object list t
Normal Feedrate	1	
Delay	0	Yes No
Panic Action	None 🚽	

Under the Actions tab, click the **Zero Position Button** to reset the position so that the current position is zero. Then click the **Clear Fault Button**. You cannot move a motor if there



are any errors that have not been cleared out. Be sure that the State under the Status tab shows $\ensuremath{\text{lde}}$.

🙀 MS Summary: Controll 💶 💌		
Config Actions)	
	MS 0	
Repeat Mode	Enabled	
Move Pos. 1		
Move to Further		
Move Pos. 2		
Stop		
E-Stop		
Abort	•	
Zero Position	0	
Clear Fault	_	
	·•	
Status	<u> </u>	
State		
Amp Fault	No	
Home Limit	No	
Position Err. Limit	No	
HVV Neg. Limit	No	
HVV Pos. Limit	No	
SVV Neg. Limit	No	
SVV Pos. Limit	No	
Encoder Fault	No	
Amp Warning	No	
Motion Done	🖌 Yes	
At Velocity	No	
Out of Frames	No 🗸	
•		



Tune the Servo Control Loop

After you have verified the hardware setup of the SynqNet Network using the various Motion Console summary windows, you can now tune the servo control loop in order to make a move.

Click on the Supervisor Summary window.

Config Actions	•
	MS 0
Repeat Mode	Enabled
Move Pos. 1	
Move to Further	
Move Pos. 2	
Stop	
E-Stop	
Abort	
Zero Position	0
Clear Fault	
	- NS
Chabus	
Status	
State	
State Amp Fault	No
State Amp Fault Home Limit	No No
State Amp Fault Home Limit Position Err. Limit	No No No
State Amp Fault Home Limit Position Err. Limit HWV Neg. Limit	No No No No
State Amp Fault Home Limit Position Err. Limit HVV Neg. Limit HVV Pos. Limit	No No No No No
State Amp Fault Home Limit Position Err. Limit HWV Neg. Limit	No No No No
State Amp Fault Home Limit Position Err. Limit HVV Neg. Limit HVV Pos. Limit	No No No No No
State Amp Fault Home Limit Position Err. Limit HVV Neg. Limit HVV Pos. Limit SVV Neg. Limit	No No No No No No
State Amp Fault Home Limit Position Err. Limit HVV Neg. Limit HVV Pos. Limit SVV Neg. Limit SVV Pos. Limit	No No No No No No

Verify that the Motion Type is set to Trapezoidal under the Config tab. Go to the Actions tab and click the Clear Fault Button.

MS Summary:	Controlle 💶 🗙
Config Actions) 🔺
	MS 0
Save To Flash	}
View Sub-objects	
Axis Map	MuA
Motion Type	Trapezoidal
Attributes	0 K
Stop Time	0.5
E-Stop Time	0.05
Normal Feedrate	1
Delay	0
Panic Action	None 🗸
Status	
State	ldle
Amp Fault	No
Horne Limit	No
Home Limit Position Err. Limit	No No
Position Err. Limit	No No No
Position Err. Limit HW Neg. Limit HW Pos. Limit SW Neg. Limit	No No No No
Position Err. Limit HW Neg. Limit HW Pos. Limit SW Neg. Limit SW Pos. Limit	No No No No No
Position Err. Limit HW Neg. Limit HW Pos. Limit SW Neg. Limit SW Pos. Limit Encoder Fault	No No No No No
Position Err. Limit HW Neg. Limit HW Pos. Limit SW Neg. Limit SW Pos. Limit Encoder Fault Motion Done	No No No No No Ves
Position Err. Limit HW Neg. Limit HW Pos. Limit SW Neg. Limit SW Pos. Limit Encoder Fault	No No No No No

Click on the **button** to open the Filter Summary window. Verify that the Algorithm is set to PID under the Config tab.

Config Coeffs			
	Filter 0	Filter 1	Filter 2
Save To Flash			
View Sub-objects			
Motor Map	Fym.	Fym.	Fum
Algorithm	PID	PID	PID
Gain Switch Type	None	None	None
Gain Delay	0	0	0
Gain Window	500	500	500
P/PI Switch Type	None	None	None
P/PI Mode	PI	PI	PI
P/PI Delay	0	0	0
P/PI Window	500	500	500
Reset Integrator	Enabled	Enabled	Enabled
Reset Int. Delay	0	0	0

Go to the Coeffs tab and select PID from the Algorithm drop-down menu.



Config Coeffs]		
	Filter 0	Filter 1	Filter 2
Coefficient 0	0	0	0
Coefficient 1	0	0	0
oefficient 2	0	0	0
oefficient 3	0	0	0
oefficient 4	0	0	0
oefficient 5	0	0	0
Coefficient 6	0	0	0
oefficient 7	0	0	0
oefficient 8	0	0	0
oefficient 9	0	0	0
oefficient 10	32767	32767	32767
oefficient 11	32767	32767	32767
oefficient 12	-32768	-32768	-32768
oefficient 13	0	0	0
Coefficient 14	0	0	0
Coefficient 15	0	0	0
kain Table 0		 All Algorithms 	
		PID	
		PIV ↓} None	
		None PIV 1	
		User	
		All Algorithms	

WARNING!

Before entering any tuning parameters, find out what are safe tuning parameters to use. Otherwise, you may damage your motors.

For our example we will use the following parameters:

	📅 Filter Summary: Controller 0			
	Config Coeffs			<u> </u>
		Filter 0	Filter 1	Filter 2
(Example Parameters Only.	Кр	800	800	800
Not to be used for every system.)	Ki	8	8	8
	Kd	1200	1200	1200
 800 for Proportional Gain 	Kpff	0	0	0
(Кр)	Kvff	0	0	0
 8 for Integral Gain (Ki) 	Kaff	0	0	0
1,200 for Derivative Gain	Kfff	0	0	0
(Kd)	ImaxMoving	0	0	0
10,000 for Integrator	IMaxRest	10000	10000	10000
Maximum at Rest (IMaxRest)	DRate	0	0	0
	Output Limit	32767	32767	32767
	Output Limit High	32767	32767	32767
	Gain Table 0	•	PID	• •
	•			

Click on the work of the motor to open the Motor Summary window. Verify that the motor Type is set to Servo under the Config tab.



Motor Summary	: Contr 💶 🗖	×
Config Events I.	/0 SinCom	٠
	Motor 0	
Save To Flash		
View Sub-objects		
Amp Enable	Enabled	
Туре	Servo	
Encoder Phase	Reversed	
Encoder Term.	Enabled	
Encoder Type	Incremental	
Encoder Cnts/Rev	0	
Amp Disable Delay	0	
Brake Mode	None	
Brake Enable Delay	0	
Brake Disable Delay	0	
Fault Config	0x1f	
DAC Offset	0	
Aux DAC Offset	0	
SIM4	Enabled	•

Verify that the Amp Polarity is set to Inverted and check the Amp Enable checkbox to Enabled.

🙀 Motor Summary: Contr 🔳 🗖 🗙				
Config Events 1/0 SinCom				
	Motor 0			
Save To Flash				
View Sub-objects				
Amp Enable	Enabled			
Туре	Seviço			
Encoder Phase	Reversed			
Encoder Term.	Enabled			
Encoder Type	Incremental			
Encoder Cnts/Rev	0			
Amp Disable Delay	0			
Brake Mode	None			
Brake Enable Delay	0			
Brake Disable Delay	0			
Fault Config	0x1f			
DAC Offset	0			
Aux DAC Offset	0			
SIM4	Enabled			

Click on the Click on the Click on the Axis Summary window. Under the Motion tab, enter the following parameters:



- 10000 for Position 2
- 0 for Position 1
- 10000 for Velocity
- 5000 for Acceleration
- 5000 for Deceleration

Motion Config] _
	Axis 0
Position 1	0
Position 2	10000
Relative Distance	0
Velocity	10000
Acceleration	5000
Deceleration	5000
Jerk Percent	0
AccelJerk	0
DecelJerk	0



Move a Motor

The final step will be to execute a basic move on the motor.

Click on the Supervisor window and click the Actions tab. If the buttons are faded out (shown below), you will first need to map the Axes.

MS Summary:	Contr 💶 🗖	x
Config Actions]	•
	MS 0	
Repeat Mode	Enabled	
Move Pos. 1		
Move to Further		
Move Pos. 2		
Stop		
E-Stop		
Abort		
Zero Position	0	
Clear Fault		Ţ
		-
Status	~	-
State		
Amp Fault	No	
Horne Limit	No	
Position Err. Limit	No	
HVV Neg. Limit	No	
HVV Pos. Limit	No	-
•	Þ	11

Click on the Config tab and Shift + Lt-Click on the Axis Map button. Then click Yes, to configure the default mapping.

MS Summary	: Co 🔳 🗖	×	1
Config Actions]		
	MS 0		
Save To Flash		1	
View Sub-objects		1	
Axis Map	Mag		
Motion Type	Trapez	Ī	
Attributes	0		Default Mapping
Stop Time	0.5		
E-Stop Time	0.05		This operation will configure the sub-object list to the default mapping.
Normal Feedrate	1		
Delay	0		Yes No
Panic Action	None	•	

Under the Actions tab, click the Zero Position button and click the Clear Fault Button. Be sure the State under the General Status tab shows Idle.



MS Summary	: Co 💶 🗙
Config Actions	<u> </u>
	MS 0
Repeat Mode	Enabled
Move Pos. 1	
Move to Further	
Move Pos. 2	
Stop	
E-Stop	
Abort	
Zero Position	0
Clear Fault	_
Status	
State	ldle
Amp Fault	No
Home Limit	No
Position Err. Limit	No
HW Neg. Limit	No
HW Pos. Limit	No 👻
•	

Click on the Move Pos. 2 button Move Pos. 2 and the command will be executed on the motor (Axis 0) and move 10000 counts to Position 2.

Click on the Move Pos. 1 button Move Pos. 1 and the motor will move 10000 counts back to Position 1.

To continuously move back and forth from Position 1 to Position 2, check the Enabled check box.

MS Summary:	Co 🔲	x
Config Actions]	•
	MS 0	
Repeat Mode	Enabled	
Move Pos. 1		
Move to Further		
Move Pos. 2		
Stop		
E-Stop		
Abort		
Zero Position	0	
Clear Fault		-
		•

Click the Move Pos. 2 button Move Pos. 2 and the motor will move back and forth from Position 2 to Position 1.

Congratulations! You have successfully moved a motor using SynqNet.



Microsoft Visual C/C++

This section is an overview of running an executable C-program via Microsoft Visual C/C++. If you are not currently running MS VIsual C/C++, this section will not apply. Even though the XMP can be controlled by a C-program written on many different platforms, this section only covers MS Visual C/C++.

- 1. Open Visual C/C++ Version 6 or higher.
- 2. Go to File > Open Workspace. Browse for **app.dsw**.

Default location: C:\MEI\XMP\APP\WinNT\MSVC.

Open Works	pace		? 🔀
Look in: 🗀	MSVC 🔹 🕈	- 🗈	📸 🎫
i seqkill template Bapp.dsw BagApp.dsw	Ş		
File <u>n</u> ame:	app.dsw		<u>O</u> pen
Files of <u>type</u> :	Workspaces (.dsw;.mdp)	•	Cancel
Open a project	from source code control		Source Control

- 3. The file type should be set to display Makefile [.mak] and upon doing so, the app.mak file appears. Open **app.dsw**. If you are asked whether the project should be converted to the verson of Visual C/C++ you are running, click **Yes**.
- 4. Change to File View and select **quickStart1** files.

📲 ClassView 📄 FileView 📐

- 5. Right click on the **quickStart1** files and "Set as Active Project." (This should set the **quickStart1** files in bold.)
- 6. Click on **quickStart1.c** in the "Source Files" sub directory. Go to the **Build** menu and select **Build quickStart1.exe**.





- 7. Make sure that there are no errors or warnings in the dialog box.
- 8. Click the execute button and the program will now be carried out. At any time you can stop the motion by hitting any key.





9. Open Motion Scope and you can view certain parameters by selecting the Trace button and adding the parameters you want to graph.