# 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.







### Step 2

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

🔀 Danaher Motion's MPI Motion Developer's ToolKit - InstallShield Wizard 🛛 🔀				
Welcome to the InstallShield Wizard for Danaher Motion's MPI Motion Developer's ToolKit				
	The InstallShield(R) Wizard will install Danaher Motion's MPI Motion Developer's ToolKit on your computer. Please click "Next" to continue.			
Software Installation				
DANAHER Www.DanaherMotion.com				
	< Back Next > Cancel			

### 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.

🛃 Danaher Moti	ion's MPI Motion Developer's ToolKit - InstallShield Wizard 🛛 🔀
Setup Type Choose the set	up type that best suits your needs.
Please select a	setup type.
⊙ Complete	All program features will be installed. (Requires the most disk space.)
Cu <u>s</u> tom	Choose which program features you want installed and where they will be installed. Recommended for advanced users.
InstaliShield ———	< Back Next > Cancel



#### Step 4

The default directory for the installation of all files and settings is **C:\MEI**. We recommend that you do not change the default installation directory unless directed to do so by an applications engineer. Click **Next**.

🛃 Danahei	• Motion's MPI Motion Developer's ToolKit - InstallShield Wizard 🛛 🔀
Destination Click Nex	on Folder It to install to this folder, or click Change to install to a different folder.
	Install Danaher Motion's MPI Motion Developer's ToolKit to: C:\MEI\hange
InstallShield –	< Back Mext > Cancel

#### Step 5

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

🙀 Danaher Motion's MPI Motion Developer's ToolKit - InstallShield Wizard 🛛	×
Ready to Install the Program     Image: Constallation installation.	
Click Install to begin the installation. If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.	
InstaliShield	)



#### Step 6

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

🙀 Danaher	r Motion's MPI Motion Developer's ToolKit - InstallShield 🔳 🗖 🔀					
Installing	Installing Danaher Motion's MPI Motion Developer's ToolKit					
The prog	ram features you selected are being installed.					
P	Please wait while the InstallShield Wizard installs Danaher Motion's MPI Motion Developer's ToolKit. This may take several minutes.					
	Status:					
InstallShield –	< Back Next > Cancel					

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.





### 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.





# CPCI-3U

Compact PCI (CPCI) utilizes a card-type computer chassis, having a multi-pin backplane. The main advantage is smaller sizing and simplified access to electronics. The installation of the CPCI-3U is described below.



ZMP-SynqNet-CPCI-3U PN: T127-0001

### Install PCB into the host machine

Push the backplane bus connector at J1 into the mating connector on the host machine.





# **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.



Terminated String Topology



### 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.

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



### 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 <u>Controller LEDs</u> section.

Each **node** will have four green LEDs:

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



- LED1 Link Activity
- LED2 Node State
- LED3 Link Activity
- LED4 Repeater
- LED5 FPGA
- LED6 FPGA Boot Status

For more information, please see the <u>Node LEDs</u> section.





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.

lotionLo	nsole					×
1	The version of firmwa	re on controller Controller 0 is	invalid. The firmwa	re version must be	531. Download fir	mware now?
	Download Firm The necessary Look in: Control Linux WinNT Control XMP531A7	ware From File To Co firmware version is 531. bin .bin	ntroller "Cont	roller 0"	?×	
	File <u>n</u> ame: Files of <u>t</u> ype:	ZMP531A7.bin Firmware Files (*.bin)		- L	<u>O</u> pen 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 Su	mmary 🔳 🗆 🗙
Action Config	Version Stats
	Controller 0
Reset	3
Refresh	
FW Upload	10114
FW Download	1011
Save Topology	©
Remove	
•	



# 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.

Controller Address (by Type) Default Device Client Type: Device Controller Number: 0 Device: \\.\MEIXMP

The **Controller Summary** window will appear next.

Controller Su	immary 💶 🗙
Action Config	Version Stats -
	Controller 0
Reset	3
Refresh	
FVV Upload	10174
FW Download	1011
Save Topology	
Remove	
4	



# **Check Network Information**

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

Information to make sure that the proper numbers 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.

<b>O</b> SynqNet Sum	imary: Con 💶 🔲	×
Config Info	Partie Content	*
4	SynqNet 0	
Network Type	String	
Node Offset	0	
Node Count	1	+
Status	<u>ht</u>	
and the second second	SynqNet 0	Î
State	SYNQ	
ead Event		



# **Check Node Information**

Click on the solution 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.

😽 SqNode Summary: (	Controller 0	_ 0	×
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	0x00000000	0×00000000	
Switch ID	0xFFFFFFFF	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	Ţ.
•		• [	

**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 🔳 🗖 🕨				х	
Config 10 Abort Info					
			SqNode 0		
Binary Do	wnload		1017		
Save To F	Flash				
View Sub	o-objects				
Alarm Ma	sk		0×00000000		
Alarm Not	t Cyclic		🗹 Enabled		
Alarm ioA	.bort	_			

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	E E
Channel File Node FPGA C:\MEI\03.01.beta0\XMP\bin\C0FE0021_0311.sff	
Clear Selected Clear All Browse	



Find the appropriate FPGA file and select Open. In this example, we are downloading the C0FE0021\_0311.sff file for an RMB-10V2.

Open			<u>?</u> ×
Look jn: 🔄 bin		💌 🖛 🗈 🚔 🎟	<b>-</b>
📄 WinNT	COFE0024_0311.sff	COFE0030_0311.sff	🔊 XMF
🔊 218_9201.fpg	🖻 COFE0026_0311.sff	🔄 COFE0031_0311.sff	🛋 ZMF
🔊 218_9601.fpg	🖻 COFE0027_0311.sff	🔄 COFE0033_0311.sff	
🔊 218_A102.fpg	🖻 COFE0029_0311.sff	🖻 CAN002B1.out	
COFE0014_0311.sff	COFE002B_0311.sff	폐 drives.dm	
COFE0018_0311.sff	🖻 COFE002C_0311.sff	🖻 F21_A101.fpg	
COFE0019_0311.sff	COFE002D_0311.sff	🖻 F22_A101.fpg	
COFE001A_0311.sff	COFE002E_0311.sff		
COFE0021_0311.sff	COFE002F_0311.sff		
4			
File name: C0FE0021	_0311.sff	<u>0</u>	pen
Files of type: All Files (*.	×)	▼ Ca	ncel

Downloading Firmware to SqNe	ode(s)			×
Item	Error			
SqNode 0, Controller 0: Node FPC	iA			
		 	 1	
			Cano	e



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	) <u> </u>
	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	0×0000000
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





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: Co	ontroller 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 **N** button to check the SqNode Summary window to make sure that the proper numbers 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		<b></b>		
	SqNode 0	SqNode 1		
Binary Download	1017	1017		
Save To Flash				
View Sub-objects				
Alarm Mask	0x00000000	0x00000000		
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	0x00000000		
User Fault Pattern	0×00000000	0×00000000		



### Map the Axes

Click on the button to open the Motion 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.

M5 Summary	: Contr 💶 🗖	х
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		ī
State		٦
Amp Fault	No	
Home Limit	No	
Position Err. Limit	No	
HVV Neg. Limit	No	
HVV Pos. Limit	No	-
	Ŀ	11.

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.

St. 12 201111101 2		$ \simeq $	
Config Actions	)		
	MS 0		
Save To Flash	<b></b>		
View Sub-objects			
Axis Map	MAA		
Motion Type	Trapez		Default Mapping 🛛 🕺
Attributes	0		
Stop Time	0.5		This operation will configure the sub-object list to the default manning.
E-Stop Time	0.05		mis operation will configure the sab object list to the derivate mapping.
Normal Feedrate	1		
Delay	0		Yes <u>N</u> o
Panic Action	None	•	

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



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 **Idle**.

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	
Clear Fault	<b>_</b>
	· · ·
Status	<u> </u>
State	
Amp Fault	No
Home Limit	No
Position Err. Limit	No
HVV Neg. Limit	No
HVV Pos. Limit	No
SW Neg. Limit	No
SVV Pos. Limit	No
Encoder Fault	No
Amp Warning	No
Motion Done	Ves
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 🐼 button to open the Motion Supervisor Summary window.

MS Summary:	Controlle 💶 🗖	x
Config Actions		
	MS 0	
Repeat Mode	Enabled	
Move Pos. 1		
Move to Further		
Move Pos. 2		
Stop		
E-Stop		
Abort	<b></b>	
Zero Position	0	
Clear Fault		Ŧ
Chabun ]	·\\	-
Status	O tata	-
State		
Amp Fault	No	
Home Limit	No	
Position Err. Limit	No	
HVV Neg. Limit	No	
HW Pos. Limit	No	
SVV Neg. Limit	No	
SW Pos. Limit	No	
Encoder Fault	Ves 🗸	
Motion Done	V Yes	
At Velocity	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 💶 🗖	х
Config Actions	]	
	MS 0	
Save To Flash	<b>) IIII</b>	
View Sub-objects		
Axis Map	MuA	
Motion Type	Trapezoidal	
Attributes	0 45	
Stop Time	0.5	
E-Stop Time	0.05	
Normal Feedrate	1	
Delay	0	
Panic Action	None	•
Status		
State	Oldle	
Amp Fault	No	
Home Limit	No	
Position Err. Limit	No	
HW Neg. Limit	No	
HW Pos. Limit	No	
SW Neg. Limit	No	
SW Pos. Limit	No	
Encoder Fault	No	
Motion Done	Ves Yes	
At Velocity	Ves Ves	-
4		1

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

📅 Filter Summary: Controller 0 📃 📃			
Config Coeffs			
	Filter Ø	Filter 1	Filter 2
Save To Flash	<b></b>		<b></b>
View Sub-objects			<u></u>
Motor Map	Fym	Fum.	Fym
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.

🃅 Filter Summary: Controller 0 📃 🗖					
Config Coeffs					
	Filter 0	Filter 1	Filter 2		
Coefficient 0	0	0	0		
Coefficient 1	0	0	0		
Coefficient 2	0	0	0		
Coefficient 3	0	0	0		
Coefficient 4	0	0	0		
Coefficient 5	0	0	0		
Coefficient 6	0	0	0		
Coefficient 7	0	0	0		
Coefficient 8	0	0	0		
Coefficient 9	0	0	0		
Coefficient 10	32767	32767	32767		
Coefficient 11	32767	32767	32767		
Coefficient 12	-32768	-32768	-32768		
Coefficient 13	0	0	0		
Coefficient 14	0	0	0		
Coefficient 15	0	0	0		
Gain Table 0	*	All Algorithms	*		
•		PID			
	_	PIV VS			
		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 Summa	_ 🗆		
	Config Coeffs			
		Filter 0	Filter 1	Filter 2
ers Only.	Кр	800	800	800
ery system.)	Ki	8	8	8
	Kd	1200	1200	1200
onal Gain	Kpff	0	0	0
	Kvff	0	0	0
ain (Ki)	Kaff	0	0	0
ative Gain	Kfff	0	0	0
	ImaxMoving	0	0	0
Irator	IMaxRest	10000	10000	10000
, st (IMaxRest)	DRate	0	0	0
	Output Limit	32767	32767	32767
	Output Limit High	32767	32767	32767
	Gain Table 0	•	PID	•
	•			•

### (Example Parameters Only. Not to be used for every system.)

- 800 for Proportional Gain (Kp)
- 8 for Integral Gain (Ki)
- 1,200 for Derivative Gain (Kd)
- 10,000 for Integrator
   Maximum at Rest (IMaxRest)



Click on the kotton to open the Motor Summary window.

Verify that the motor Type is set to Servo under the Config tab.

就 Motor Summary: Contr 🔳 🔲 🗵				
Config Events I	/0 ] SinCom ]			
	Motor 0			
Save To Flash	<b></b>			
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.





Click on the  $\overline{\mathbf{k}}$  button to open 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 solution to open the Motion Supervisor window and click the Actions tab. If the buttons are faded out (as shown below), you will first need to map the Axes.

M5 Summary:	Contr 💶 🗙
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	<b>_</b>
[Ebabue]	
Status	
State	Na
Ampraut	NO
Horne Limit	No]
Position Err. Limit	No
HVV Neg. Limit	No
HW Pos. Limit	No 🔫
•	

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 💶 🔲	x	
Config Actions			
	MS 0		
Save To Flash	<b></b>		
View Sub-objects			
Axis Map	Mag		
Motion Type	Trapez		
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	<b>_</b>
(Charlows)	
Status	-
State	Oldle
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 💶 🗖 🗙				
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 jn: 🔎	MSVC	- 🗢 🖻	) 💣 🎟 -
iseqkill template sqApp.dsw sqApp.dsw	\$		
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.

• <mark>-</mark>	ClassView	FileView 📐
		10

- 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.



🚧 app - Microsoft Visual C++ - [C:\mpi\XMP\app\quickStart1.c]	
Eile Edit View Insert Project Build Tools	; <u>W</u> indow <u>H</u> elp
) 🎦 🕞 🖬 🕼 🗼 🖬 📾 🗠 🗸 🗠	👻 💽 🔁 🙀 🐕 🗸 meiPlatform
🛛 🕸 👗 其 🖑 🗍 (Globals)	💌 (All global members) 💌 💊 ba
Execute Program (Ctrl+F5)	💠 quic 🗲 🗧 💠 C:\mpi\XMP\app\quickStart
rt motorio1 files	/* quickStart1.c */
	/* Copyright(c) 1991-2004
庄 👜 probe2 files	* This software contains
in the pt1 files	* Motion Engineering Inc.
i in the pyt1 files	* in the license agreemen * disclosure on reprodu
📄 📳 quickStart1 files	* written consent of Moti
E Source Files	*/
quickStart1.c	
Header Files	/*
	:Simple point to point mot
	This is a simple program t
	motion on a single axis.
times record4 mes	This program presumes the
The seq 2 files	safely.
The sequences	Warning! This is a sample
teren seq4 files	MEI motion controller wit
+	of the logic and safety f
t → 🗐 segrec files	The magCHECK( ) macros u
	to convey our strong beli
tettle2 files	Actual application code s
庄 📲 shape files	than msgCHECKs) best suit
in the stoprate files	*/
🗼 🖅 👘 template files	

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