# QMP SynqNet<sup>™</sup> Controller Quick Start Guide



Edition March, 2012

T131-0001 QMP-SynqNet-PCI-RJ-1200



Keep all manuals as a product component during the life span of the product. Pass all manuals to future users / owners of the product.

KOLLMORGEN

Because Motion Matters<sup>™</sup>

### **Record of Document Revisions**

Revision	Remarks
1/23/2012	Preliminary edition

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### March 2012

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## **1 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 QMP. For more information, refer to local occupational safety regulations and the manufacturer of the motion drive.

## 1.1 Turn Off All Power Before Installing Equipment

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





Switch OFF equipment.



Unplug from source of power.

## 1.2 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.



**NOTE:** Grounding straps should be worn at all times when handling QMP-SynqNet electrical components and connection hardware.

## 1.3 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!

*Warning!* 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.



# 2 INSTALL THE MDK SOFTWARE

The MDK software is accessed from the MDK InstallShield CD-ROM. By default, all of the files are copied to the following directory: C:\Program Files (x86)\MEI\MDK\04.02.xx\. The InstallShield installs the following features and libraries:

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



## 2.1 Installation Steps

The process of installing the MDK (software) is explained in following seven steps.

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

InstallSh	ield Wizard			
Motion Engineering's MPI Motion Developers Kit Setup is preparing the InstallShield Wizard, which will guide you through the program setup process. Please wait.				
Decompressing: Motion Engineering's MPI Motion Developers Kit.msi				
		Cancel		

2. The InstallShield Wizard for Kollmorgen's MPI-QMP Motion Developer's Kit displays. Click **Next**.



3. Read and accept the terms of the license agreement before continuing the installation. Select "I accept the terms in the license agreement" and click **Next**.

🔀 Motion Engineering's MPI Motion Developers Kit - 04.02.Dev04	×
License Agreement Please read the following license agreement carefully.	
Development Seat License:	<b>^</b>
ATTENTION: THIS IS A <u>SINGLE SEAT LICENSE</u> . PLEASE SCROLL DOWN AND READ THE TERMS OF THIS END USER LICENSE AGREEMENT BEFORE CLICKING "I ACCEPT THE TERMS IN THE LICENSE AGREEMENT" TO CONTINUE WITH THE SOFTWARE INSTALLATION.	
IMPORTANT: THIS AGREEMENT IS A LEGAL AGREEMENT BETWEEN THE PERSON, COMPANY, OR ORGANIZATION THAT HAS LICENSED THIS SOFTWARE ("YOU" OR "CUSTOMER") AND MOTION ENGINEERING, INC.	+
I accept the terms in the license agreement     Print     I do not accept the terms in the license agreement	
InstallShield Cancel	

4. The default directory for the installation of all files and settings is C:\Program Files (x86)\MEI\MDK\04.02.xx\. We recommend not changing the default installation directory unless directed to do so by an applications engineer. Click **Next**.

🛃 Motion E	Engineering's MPI Motion Developers Kit - 04.02.Dev04	3
Destinati Click Nex	ion Folder xt to install to this folder, or click Change to install to a different folder.	
	Install Motion Engineering's MPI Motion Developers Kit to: C:\Program Files (x86)\MEI\MDK\04.02.Dev04\ Change	]
InstallShield -	< Back Next > Cancel	]

5. Select the appropriate setup type for this environment and click Next.



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

📅 Motion Engineering's MPI Motion Developers Kit - 04.02.Dev04
Ready to Install the Program 🤳
The wizard is ready to begin 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.
Create Desktop Shortcut
InstallShield
< Back Install Cancel

A series of windows displays the progress of the installation.

🛃 Motion E	ngineering's MPI Motion Developers Kit - 04.02.Dev04 📃 🖃 🔜
Installing	Motion Engineering's MPI Motion Developers Kit 🛛 🔧 📥
The prog	ram features you selected are being installed.
12	Please wait while the InstallShield Wizard installs Motion Engineering's MPI Motion Developers Kit. This may take several minutes.
	Status:
InstallShield -	
	< Back Next > Cancel

7. The following confirmation window displays if the installation was successful. Click **Finish** to exit the InstallShield.



# **3 INSTALL THE MOTION CONTROLLER**

The standard QMP-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 HD15 connectors on the rear panel.



**QMP-SynqNet-PCI-RJ-1200** PN: T131-0001

UL Certification: File# E254128

**CAUTION!** This hardware is for use only with compatible UL listed personal computers that have installation instructions detailing user installation of card cage accessories.

## 3.1 Install PCB into the Host Machine

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



The following image displays an installed QMP-SynqNet-PCI controller in a standard PCI slot on a CPU.



# **4** CONNECT THE HARDWARE

This section covers the necessary requirements for connecting a SynqNet motion control system. The cables used to connect SynqNet components depends on the types of connectors on each piece of hardware.

## 4.1 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:



More information about the various topologies can be found on the Node, Cable, Motor, Drive Addressing website (<u>http://support.motioneng.com/Technology/SynqNet/addressing\_diag.htm</u>).

## 4.2 Cable Connections: Controller to Nodes

The type of cables needed to connect the controller to the nodes will vary based upon the type of controller, the particular hardware features, and the type of nodes being used in the SynqNet Network. However, regardless of these variables, the cables are wired the same way. For example, a cable from an OUT port will always connect into an IN port. The following diagram clearly illustrates this connection pattern. For more information about cables and connectors, see the SynqNet Interface Cable website

(http://support.motioneng.com/Hardware/Accessories/cables\_syng.htm).



**Ring Topology** 

### 4.2.1 Types of Connectors and Cables

Depending on the type of SynqNet ports (RJ45 or Micro-D) on the Controller and Drive, use one of the corresponding cables to connect them to each other. The following table lists some of the common connectors and their matching cables.

Feature	Connector	Cable	
Controllor I/O	HD-15	C001-0037	
	Micro D15	C001-0036	
SupaNat	Micro D9	C005-0002, C006-0001	
Synqiver	RJ-45	C007-0003, C006-0001	

### 4.2.2 Power On Nodes and Check LEDs

After all of the nodes are connected with the proper cables, power-up the system. To verify that the Nodes are connected correctly and that each node is receiving a network and power signal, inspect the LEDs at each connector.

Each controller has four LEDs:

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



QMP-SynqNet-PCI-RJ-1200

### SynqNet Connectors: RJ-45 For more information, see the Controller LEDs section. <u>http://support.motioneng.com/Hardware/SynqNet-</u> QMP/leds\_controller.htm

Each node has four green LEDs:

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



# Node LEDs on the RMB-10V2-SynqNet

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

The RMB-10V2-SynqNet is displayed above.

Each LED has a particular function. See the Node LEDs page for details. <u>http://support.motioneng.com/Hardware/SynqNet-XMP/leds\_node.htm</u>

# 5 MOTION CONSOLE

Before the QMP controller is ready to begin spinning a motor, the motion console must be properly initialized. This section describes how to configure a controller and set up a basic servo loop to test that the system works properly.

## 5.1 Download Controller Firmware

Kollmorgen's motion controllers are shipped with NULL firmware. Therefore, the first step is to download the proper firmware for the controller. When starting the Motion Console for the first time, it automatically prompts to download firmware to the controller and indicates which version should be downloaded. In the example below, firmware version 863 is downloaded. Click **Yes** to download the firmware.

MotionCo	insole 🛛 🛛 🕅
2	The version of firmware on controller Controller 0 is invalid. The firmware version must be 863. Download firmware now?
	Yes No

The next window requires locating the firmware file. Choose the **QMPxxxxx.bin** ("xxxxx" represents the firmware version) firmware file from the mei\controller directory. The standard software release includes one QMP controller firmware file. **QMP863A1.bin** is used in this example.

If custom software is installed, there will be an additional firmware file in the same directory. Each custom firmware file is numbered: Q1Pxxxxx.bin, Q2Pxxxxx.bin, etc. If custom firmware is required, select the proper custom QnPxxxxx.bin file from the same directory.

Select the appropriate firmware file and click **Open**.

Download Firmwa	re From File To Co	ontroller "Controller 0"			? ×
The necessary firm	nware version is 863.				
Look in:	Controller		•	← 🗈 💣 🎟-	
My Recent	📼 QMP863A1.bin 📷 ZMP863A1.bin				
Documents					
My Computer					
My Network	File name:	QMP863A1.bin		<b>•</b>	Open
Places	Files of type:	Firmware Files (*.bin)		•	Cancel

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



### 5.1.1 Troubleshooting

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

Once firmware is loaded onto the controller for the first time, the version can be changed manually 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\controller** directory.



## 5.2 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 displays allows the controller to be uniquely identified by updating the Name field. For example, the default name, Controller 0 is used. Enter a name for the controller and click **OK**.

Add Controlle	r X
Name:	Controller 0
	dress
C Default	
O Device	
Controller	Number: 0
C Client	
Port:	3300
Server:	
O File	
	Browse
	OK Cancel

The Controller Summary window displays.

Controller Summa		_ 🗆	х		
Action Config Coun	ts	Version	Stats	Recorders	
	Co	ontroller (	I		
Reset Controller	4	9			
Refresh All		وگ ا			
Reset Dynamic Memory	E				
Save All to Flash	9	<b></b>			
Reset Flash	۷	<b>&gt;</b>			
Download Firmware	10	17			
Upload Firmware	10	174			
Remove					닅
•				•	Ċ

## 5.3 Check Network Information

After the proper firmware is downloaded for the controller, check the Network Information to verify

that the proper number of blocks were found. Click on the witton to open the SynqNet Summary Window. Under the Info tab, the value for node count is 1 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: Contr 💶 🗖 🗙				
<b>_</b>				
SynqNet 0				
Ring				
0				
1				
SqNode 0				
SqNode 0 🧧 🛫				
<u> </u>				
SYNQ				
No				

## 5.4 Check Node Information

Click on the with the view the SqNode Summary window. This window provides specific information about the nodes installed on the system. SynqNet finds the nodes in the order that they are connected. The hardware setup used for this example had one node. Therefore, the SqNode Summary Window displays one node: **SqNode 0**. This window also displays the address information of each node.

😽 SqNode Summary: Controller 0 🛛 🗖 🗙			
Config IO Abort Info	I/O Info		
	SqNode 0		
Node Name	MEI RMB-10V2		
Exact Match	Yes		
Unique ID	0×00000000		
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	0×04010501		
FPGA Default Version	Yes		
Model Number	T010-0001		
Serial Number	0		
In Port Next Object	SynqNet 0		
Out Port Next Object	SynqNet 0		
Status			
Upstream Err. Rate	0		
Upstream Err. Count	0		
Downstream Err. Rate	0		
Downstream Err. Count	0		
CRC Err. IN 0	0		
CRC Err. OUT 0	0		
IOAbort	No		
Node Disable Input	🔰 Yes		
Node Alarm Output	No		
Analog Power Fault	No		
User Fault	No		
Node Failure	No		
I/O Fault	No	-	
•	•	$\Box$	

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

### 5.4.1 Troubleshooting

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

If the Link LEDs are not turned ON, verify 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 is verified, check that the cables are connected to the right ports.

If the Link LEDs still do not turn ON, the power is 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 see the Controller LEDs and Node LEDs 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. Proceed to the next step, Download Node FPGAs.

### A node is improperly ordered...

SynqNet finds 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, 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 only displays the nodes which are 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.

## 5.5 Download Node FPGAs

Kollmorgen'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, first download the appropriate FPGA (runtime) image.

To find the appropriate FPGA (runtime) image that should be downloaded for each node, refer to the Node Binary Files: Product Table (<u>http://support.motioneng.com/Hardware/Drives/FPGA/fpga\_feat\_tbl.htm</u>).

There are two ways to download the Node FPGA. By using:

- Motion Console
- Command Prompt

### 5.5.1 Motion Console Download

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

🙀 SqNode Summary: Controller 0 🛛 🗖 🔀			
Config IO Abort Info	I/O Info		
	SqNode 0		
User Label			
Binary Download	1017		
View Sub-objects			
Clear Status			
Alarm Mask	0×00000000		
Alarm Not Cyclic	Enabled		
Alarm ioAbort	Freehed		
Eex E- m			

The Download Binary Image to SqNodes window displays, Click Browse.

Download Bin	ary Image to SqNode(s)
Select file(s) to SqNode 0, C	o download to the following SynqNet node(s): ontroller 0: C0FE0029_0501.sff
	<u> </u>
Channel	File
NODE FPGA	U: YProgram Files YMETYMDK, YU4, U2, UU Yhode YUUFEUU23_UOUT, str
Clear Selecto	ed Clear All Browse

Find the appropriate FPGA file and select **Open**. In this example, we are downloading the **C0FE0029\_0501.sff** file for an RMB-10V2.

Open			<u>? ×</u>
Look in:	inode	•	← 🖻 📸 🎹 •
	a.svn	COFE0019_0501.sff	COFE0044_0501.sff
	Eeprom	2 COFE0021_0501.sff	2 COFE0045_0501.sff
My Recent	2 PLD	🛃 C0FE0024_0501.sff	2 COFE0046_0501.sff
Documents	936-030003-1A.isc	🔊 COFE0026_0501.sff	DOFE0047_0501.sff
	9000-3411-200-B.hex	🗖 C0FE0027_0501.sff	Z0FE0048_0501_00_04.sff
	9000-3411-201-D.hex	C0FE0029_0501.sff	DOFE0049_0501_00_03.sff
Desktop	C0FE002C_0501.sff	C0FE0030_0501.sff	COFEB02A_0346.sff
	C0FE002D_0501.sff	COFE0031_0501.sff	COFEB02A_0501.sff
	COFE002E_0501.sff	COFE0032_0501.sff	COFEB02B_0501.sff
	C0FE002F_0501.sff	🔊 COFE0033_0501.sff	COFEB02C_0501.sff
My Documents	COFE003A_0501.sff	COFE0034_0501.sff	COFEB02D_0501.sff
	COFE003B 0501.sff	COFE0035 0501.sff	COFEB02E 0501 00 02.sff
	COFE003D 0501.sff	COFE0036 0501 00 01.sff	COFEB02F 0503 00 02.sff
	COFE003E 0501.sff	COFE0037 0501.sff	COFEB014 0346.sff
My Computer	COFE003F 0501.sff	COFE0038 0501.sff	COFEB014 0501.sff
30AW30HW3	COFE004A 0503.sff	COFE0040 0501.sff	COFEB022 0346.sff
	COFE004A 0503 00 02.sff	COFE0042 0501.sff	COFEB022 0501.sff
	COFE0018 0501.sff	COFE0043 0501.sff	COFEB026 0346.sff
Places		<b>W</b>	
Tidees			Ľ
	File name: C0FE0029_0	501.sff	
	Files of type:		Cancel
	All Files ( . )		

Once the appropriate FPGA file has been selected, click download.

Download Bir	nary Image to SqNode(s)	X
Select file(s) to SqNode 0, C	o download to the following SynqNet node(s): controller 0: C0FE0029_0501.sff	*
		¥
Channel	File	
l Clear Select	ed Clear All Browse Download Verify	Close

The downloading Firmware to SqNodes window displays the status of the download.

Downloading Firmware to SqNode(s)	ι Ε	<
Item	Error	ſ
SqNode 0, Controller 0: Node FPGA		I
	Cancel after this action completes	

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

-

SqNo	de Summ	ary: Co	ontroller (		×
Config	IO Abort	Info	I/O Info	1	
			SqNa	de O	
Node Nar	ne		MEI RMB-	10V2	
Exact Ma	tch		Yes		
Unique ID	)		0×000000	)00	
Drive Cou	unt		0		
Motor Co	unt		4		
Motor Of	fset		0		
Туре			0xC0FEA	001	
Option			0×000000	)00	
Switch ID	)		0×FFFFFF	FFF	
FPGA Ty	ре		Runtime		
FPGA Ve	ndor/Devic	е	0xC0FE0	029	
FPGA Ve	rsion		0x040105	501	
FPGA De	fault Versio	n	Yes		
Model Nu	mber		T010-000	1	
Serial Nu	mber		0	$\sim$	
- Ale	ext Object				

### 5.5.2 Command Prompt Download

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

 $\label{eq:c:Program Files} \end{tabular} C:\Program Files\MEI\MDK\04.02.00\win32\sqNodeFlash.exe -node 0 -file ..node\c0fe0029\_0501.sff$ 



The selected FPGA file is downloaded after all of the pages have been counted.

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

📉 SqNo	de Summa	ary: Co	ntroller 0	_ 🗆	x
Config	IO Abort	Info	I/O Info		
			SqNoo	de O	
Node Nar	ne		MEI RMB-1	0V2	
Exact Ma	tch		Yes		
Unique ID	)		0×000000	00	
Drive Cou	unt		0		
Motor Co	unt		4		
Motor Of	fset		0		
Туре			0xC0FEA0	)01	
Option			0x000000	00	
Switch ID	)		0xFFFFFFFF		
FPGA Ty	pe		Runtime		
FPGA Ve	ndor/Devic	е	0xC0FE0029		
FPGA Ve	ersion		0x040105	01	
FPGA De	fault Versio	)n	Yes		
Model Nu	mber		T010-0001		
Serial Nu	mber		0	$\sim$	
- t Nie	ovt Obie	_			

## 5.6 Check Node Configuration

After the proper drive firmware is downloaded, click on the without to open the SqNode Summary window and verify that the proper number of drives were found.

This window provides the node configuration for each drive installed on the system. SynqNet finds the drives in the order that they are connected. The hardware setup used for this example had one drive.

SqNode Summary: Co	ontroller 0 📃 🗖 🔀
Config IO Abort Info	I/O Info 🔄
	SqNode 0
User Label	
Binary Download	1017
View Sub-objects	
Clear Status	
Alarm Mask	0x0000000
Alarm Not Cyclic	Enabled
Alarm ioAbort	Enabled
Upstream Err. Fault Limit	4
Upstream Err. Fail Limit	16
Downstream Err. Fault Limit	6
Downstream Err. Fail Limit	12
User Fault Address	0x00100288
User Fault Mask	0x0000000
User Fault Pattern	0x00000000

## 5.7 Map the Axes

Click on the **Section** button to open the Motion Supervisor window and click the **Actions** tab.

Before controlling and moving a motor, it must first be mapped to a Motion Supervisor. If the buttons are faded out under the Actions tab (displayed below), it means that no axes have been mapped (assigned) to a Motion Supervisor.

Config Action				
	MS 0	MS 1	MS 2	MS 3
Motion Type	Trapezoidal	Trapezoidal	Trapezoidal	Trapezoidal
Coordination	Start & Finish	Start & Finish	Start & Finish	Start & Finish
Relative	Enabled	Enabled	Enabled	Enabled
Repeat Mode	Enabled	Enabled	Enabled	Enabled
Delay	0	0	0	0
Move Pos. 1				
Move to Further				
Move Pos. 2				
Stop				
E-Stop				
Abort				
Zero Position	0	0	Ó	0
Clear Fault				
Status	1.2			
State	ldle	ldle	ldle	Idle
Amp Fault	No	No	No	No
Position Err. Limit	No	No	No	No
Torque Limit	No	No	No	No
HW Neg. Limit	No	No	No	No
HW Pos. Limit		No	No	Ne
SILL			No	

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.

MS Summary	: Controller 0				
Config Actions					
	MSO	MS 1	MS 2	MS 3	
User Label					
View Sub-objects					
Axis Map	MuA	MuA	MuA	MuA	
Stop Time	0.5 18	0.5	0.5	0.5	
E-Stop Time	0.05	0.05	0.05	0.05	
Normal Feedrate	1	1	1	1	
Panic Action	E-Stop	E-Stop	E-Stop	E-Stop	-

Click **Yes** to configure the default mapping.

Default Mapping			×
This operation will configure the su	ıb-object list I	to the defa	ult mapping.
Yes	No		

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. A motor cannot move if there are any errors that have not been cleared out. Be sure that the State under the Status tab displays **Idle**.

Config Actions	5			
	MS 0	MS 1	MS 2	MS 3
Motion Type	Trapezoidal	Trapezoidal	Trapezoidal	Trapezoidal
Coordination	Start & Finish	Start & Finish	Start & Finish	Start & Finish
Relative	Enabled	Enabled	Enabled	Enabled
Repeat Mode	Enabled	Enabled	Enabled	Enabled
Delay	0	0	0	0
Move Pos. 1				
Move to Further				
Move Pos. 2				
Stop				
E-Stop				
Abort				
Zero Position	0	0	0	0
Clear Fault				
Status	62			
State	Oldle	Oldle	ldle	Oldle
Amp Fault	No	No	No	No
Position Err. Limit	No	No	No	No
Torque Limit	No	No	No	No
HW Neg. Limit	No	No	No	No
HW Pos. Limit	No	No	No	No
SW Neg. Limit	No	No	No	No
SW Pos. Limit	No	No	No	No
Feedback Fault	No	No	No	No
Amp Warning	No	No	No	No
Motion Done	Ves	Ves	VYes	Ves
Motion Start	No	No	No	No
At Velocity	No	No	No	No
Out of Frames	No	No	No	No
Action Source	Controller	Controller	Controller	Controller

## 5.8 Tune the Servo Control Loop

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

Click on the solution to open the Motion Supervisor Summary window.

Verify that the Motion Type is set to **Trapezoidal** under the Actions tab.

Carla Action					_
Config Actions	MSO	MS1	MS2	MS 3	ň
Motion Type		Trapezoidal	Trapezoidal	Trapezoidal	-
Coordination	Start & Finish	Start & Finish	Start & Finish	Start & Finish	
Relative	Enabled	Enabled	Enabled	Enabled	
Repeat Mode	Enabled	Enabled	Enabled	Enabled	
Delav	Ó	0	0	0	
Move Pos. 1					
Move to Further					
Move Pos. 2					
Stop					
E-Stop					
Abort					
Zero Position					
Clear Fault					
Status					_
State	ldle	Idle	Idle	ldle	
Amp Fault	No	No	No	No	
Position Err. Limit	No	No	No	No	
Torque Limit	No	No	No	No	
HW Neg. Limit	No	No	No	No	
HW Pos. Limit	No	No	No	No	
SW Neg. Limit	No	No	No	No	
SW Pos. Limit	No	No	No	No	
Feedback Fault	No	No	No	No	
Amp Warning	No	No	No	No	
Motion Done	Ves	VYes	Ves	Ves	
1 OL	No	No	No	No	
Motion Start	No	No	No	No	
At Velocity					
At Velocity Out of Frames	No	No	No	No	

Config Actions	5			
	MSO	MS 1	MS 2	MS 3
Aotion Type	Trapezoidal	Trapezoidal	Trapezoidal	Trapezoidal
Coordination	Start & Finish	Start & Finish	Start & Finish	Start & Finish
Relative	Enabled	Enabled	Enabled	Enabled
Repeat Mode	Enabled	Enabled	Enabled	Enabled
Delay	0	0	0	0
love Pos. 1				
love to Further				
Nove Pos. 2				
Stop				
-Stop				
Abort				
Zero Position				0
lear Fault				
Status	L/F			
State	ldle	ldle	ldle	ldle
Amp Fault	No	No	No	No
osition Err. Limit	No	No	No	No
orque Limit	No	No	No	No
W Neg. Limit	No	No	No	No
W Pos. Limit	No	No	No	No
W Neg. Limit	No	No	No	No
W Pos. Limit	No	No	No	No
eedback Fault	No	No	No	No
mp Warning	No	No	No	No
lotion Done	Ves Yes	Ves	VYes	VYes
otion Start	No	No	No	No
t Velocity	No	No	No	No
ut of Frames	No	No	No	No
ction Source	Controller	Controller	Controller	Controller

Click the **Clear Fault** button to dismiss any errors.

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	Filter 3	
User Label		1			
View Sub-objects					
Algorithm	PID	PID	PID	PID	
Gain Switch Type	None	None	None	None	
Gain Table	0	0	0	0	
Gain Delay	0	0	0	0	
Gain Window	500	500	500	500	
P/PI Switch Type	None	None	None	None	
P/PI Mode	PI	PI	PI	PI	
P/PI Delay	0	0	0	0	
P/PI Window	500	500	500	500	
Reset Integrator	Enabled	Enabled	Enabled	Enabled	
Reset Int. Delay	0	0	0	0	-

|--|

	Filter 0	Filter 1	Filter 2	Filter 3
(p	0	0	0	0
(i	0	0	0	0
(d	0	0	0	0
(pff	0	0	0	0
(vff	0	0	0	0
Kaff	0	0	0	0
Cfff	0	0	0	0
ORate	0	0	0	0
maxMoving	0	0	0	0
MaxRest	0	0	0	0
Output Limit High	32767	32767	32767	32767
Output Limit Low	-32768	-32768	-32768	-32768
/el. Limit High	32767	32767	32767	32767
/el. Limit Low	-32768	-32768	-32768	-32768
Output Offset	0	0	0	0
Fest Signal Gain	0	0	0	0
V/A -	N/A	N/A	N/A	N/A
V/A -	N/A	N/A	N/A	N/A
V/A -	N/A	N/A	N/A	N/A
V/A	N/A	N/A	N/A	N/A
Gain Table 0		→ All Algor	rithms	
(f)		PID		
~)		PIV h	5	
		None		

*WARNING!* Before making any changes, determine what tuning parameters are safe to use. Otherwise, the motors could be damaged.

For our example we will use the following parameters:

### WARNING! 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)

	Filter 0	Filter 1	Filter 2	Filter 3
Кр	800	800	800	800
Ki	8	8	8	8
Kd	1200	1200	1200	1200
Kpff	0	0	0	0
Kvff	0	0	0	0
Kaff	0	0	0	0
Kfff	0	0	0	0
DRate	0	0	0	0
ImaxMoving	0	0	0	0
MaxRest	10000	10000	10000	10000
Output Limit High	32767	32767	32767	32767
Output Limit Low	-32768	-32768	-32768	-32768
Vel. Limit High	32767	32767	32767	32767
Vel. Limit Low	-32768	-32768	-32768	-32768
Output Offset	0	0	0	0
Test Signal Gain	0	0	0	0
N/A -	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A

Click on the 💀 button to open the Motor Summary window.

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

The second second second second second	<u>,                                     </u>			
Config Events Demand Info	SinCom			
	Motor 0	Motor 1	Motor 2	Motor 3
User Label				
View Sub-objects				
Amp Enable	Enabled	Enabled	Enabled	Enabled
Туре	Servo	Servo	Servo	Servo
Amp Disable Action	Cmd = Act	Cmd = Act	Cmd = Act	Cmd = Act
Primary Feedback Phase	Reversed	Reversed	Reversed	Reversed
Primary Feedback Filter	Disabled	Disabled	Disabled	Disabled
Primary Feedback Type	QUAD_AB	QUAD_AB	QUAD_AB	QUAD_AB
Secondary Feedback Phase	Reversed	Reversed	Reversed	Reversed
Secondary Feedback Filter	Disabled	Disabled	Disabled	Disabled
Secondary Feedback Type	QUAD_AB	QUAD_AB	QUAD_AB	QUAD_AB
Amp Disable Delay	0	0	0	0
Brake Mode	Delay	Delay	Delay	Delay
Brake Apply Delay	0	0	0	0
Brake Release Delay	0	0	0	0
Fault Config	0x00000011	0x00000011	0x00000011	0x00000011
User Fault Action	None	None	None	None
Step Pulse Width	5.6e-007	5.6e-007	5.6e-007	5.6e-007
Step Loopback	Enabled	Enabled	Enabled	Enabled
Pulse A Type	STEP	STEP	STEP	STEP

Set the Amp Enable checkbox to Enabled.

Motor Summary: Controlle	r 0				
Config Events Demand Info	SinCom				-
	Motor 0	Motor 1	Motor 2	Motor 3	
User Label					
View Sub-objects					
Amp Enable	Enabled	Enabled	Enabled	Enabled	
Туре	Sero	Servo	Servo	Servo	
Amp Disable Action	Cmd = Act	Cmd = Act	Cmd = Act	Cmd = Act	
Primary Feedback Phase	Reversed	Reversed	Reversed	Reversed	
Primary Feedback Filter	Disabled	Disabled	Disabled	Disabled	
Primary Feedback Type	QUAD_AB	QUAD_AB	QUAD_AB	QUAD_AB	
Secondary Feedback Phase	Reversed	Reversed	Reversed	Reversed	
Secondary Feedback Filter	Disabled	Disabled	Disabled	Disabled	
Secondary Feedback Type	QUAD_AB	QUAD_AB	QUAD_AB	QUAD_AB	
Amp Disable Delay	0	0	0	0	
Brake Mode	Delay	Delay	Delay	Delay	
Brake Apply Delay	0	0	0	0	
Brake Release Delay	0	0	0	0	
Fault Config	0x0000011	0x00000011	0x00000011	0x00000011	-
User Fault Action	None	None	None	None	
Step Pulse Width	5.6e-007	5.6e-007	5.6e-007	5.6e-007	
Step Loopback	Enabled	Enabled	Enabled	Enabled	
Pulse A Type	STEP	STEP	STEP	STEP	

Click on the kit 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

Licor Lipito	_
User Units	-
Axis 0	
0	
10000	
0	
10000	
5000	
5000	
0	
0	
0	Ŧ
	Axis 0 0 10000 0 10000 5000 5000 5000 0 0

### 5.9 Move a Motor

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

Click on the **solution** button to open the Motion Supervisor window and click the **Actions** tab. If the buttons are faded out (displayed below), first map the Axes.

MS Summary	r: Controller 0			
Config Actions	3)			<u> </u>
	MS 0	MS 1	MS 2	MS 3
Motion Type	Trapezoidal	Trapezoidal	Trapezoidal	Trapezoidal
Coordination	Start & Finish	Start & Finish	Start & Finish	Start & Finish
Relative	Enabled	Enabled	Enabled	Enabled
Repeat Mode	Enabled	Enabled	Enabled	Enabled
Delay	0	0	0	0
Move Pos. 1				
Move to Further				
Move Pos. 2				
Stop				
E-Stop				
Abort				
Zero Position	0	0	0	0
Clear Fault				
Status	1			
State	ldle	ldle	ldle	
Amp Fault	No	No	No	No
Position Err. Limit	No	No	No	No
Torque Limit	No	No	No	No
HW Neg. Limit	No	No	No	No
HW Pos. Limit		No	No	No
SILL			No	

Click on the **Config** tab and **Shift + Lt-Click** on the **Axis Map** button.

MS Summary	: Controller 0			_	
Config Actions	]				
	MS 0	MS 1	MS 2	MS 3	
User Label	0				
View Sub-objects					
Axis Map	MyA	MuA	M <sub>4</sub>	M 4 A	
Stop Time	0.5 18	0.5	0.5	0.5	
E-Stop Time	0.05	0.05	0.05	0.05	
Normal Feedrate	1	1	1	1	
Panic Action	E-Stop	E-Stop	E-Stop	E-Stop	-

Click **Yes**, to configure the default mapping.

Default Mapping	X
This operation will configure the su	b-object list to the default mapping.
<u>Yes</u>	No

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

Config Actions				
	MSO	MS 1	MS 2	MS 3
Motion Type	Trapezoidal	Trapezoidal	Trapezoidal	Trapezoidal
Coordination	Start & Finish	Start & Finish	Start & Finish	Start & Finish
Relative	Enabled	Enabled	Enabled	Enabled
Repeat Mode	Enabled	Enabled	Enabled	Enabled
Delay	0	0	0	0
Move Pos. 1				
Move to Further				
Move Pos. 2				
Stop				
E-Stop				
Abort				
Zero Position	0	0	0	0
Clear Fault				
Status	N/			
State	Oldle	Oldle	Oldle	
Amp Fault	No	No	No	No
Position Err. Limit	No	No	No	No
Torque Limit		No	No	
HUMAN		No	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: Controller 0					
Config Action	s			-	
	MS 0	MS 1	MS 2	MS 3	
Motion Type	Trapezoidal	Trapezoidal	Trapezoidal	Trapezoidal	
Coordination	Start & Finish	Start & Finish	Start & Finish	Start & Finish	
Relative	Enabled	Enabled	Enabled	Enabled	
Repeat Mode	Enabled	Enabled	Enabled	Enabled	
Delay	0 43	0	0	0	
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.

Motion Console has successfully moved a motor using SynqNet.

## 6 MICROSOFT VISUAL C/C++

This section is an overview of running an executable C-program using Microsoft Visual C/C++. If MS VIsual C/C++ is not being used, this section does not apply. Even though the QMP 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\QMP\APP\WinNT\MSVC.

Open Works	pace			? 🛛
Look in: 🔯	MSVC	•	(÷ 🖻	) 💣 🎟 -
iseqkill template Bap.dsw BasqApp.dsw	\$			
File <u>n</u> ame:	app.dsw			<u>O</u> pen
Files of type:	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 displays. Open **app.dsw**. If asked whether the project should be converted to the current version of Visual C/C++ being run, click **Yes**.
- 4. Change to File View and select quickStart1 files.



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. Verify that there are no errors or warnings in the dialog box.

8. Click the execute button and the program will now be carried out. Motion can be stopped at any time by hitting any key.



9. Open Motion Scope and view certain parameters by selecting the **Trace** button and add additional parameters to graph.

#### About Kollmorgen

Kollmorgen is a leading provider of motion systems and components for machine builders. Through world-class knowledge in motion, industry-leading quality and deep expertise in linking and integrating standard and custom products, Kollmorgen delivers breakthrough solutions that are unmatched in performance, reliability and ease-of-use, giving machine builders an irrefutable marketplace advantage.

For assistance with your application needs, contact us at: 540-633-3545, contactus@kollmorgen.com or visit www.kollmorgen.com

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