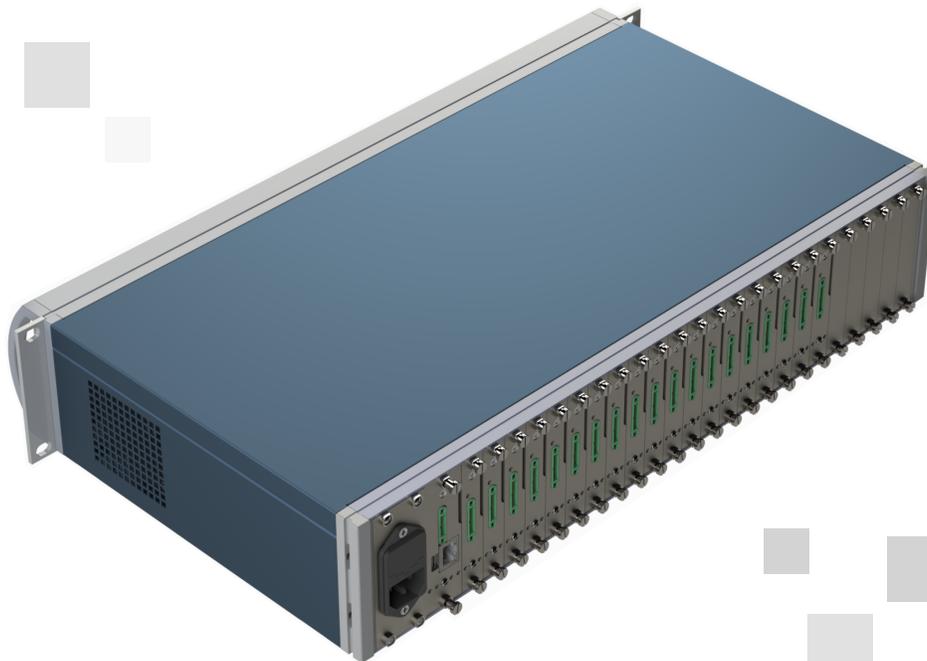


MMX-RACK

Series



Multi-axis Rack Controller Reference Manual

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CER	Clear Errors	19
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IDN	Identification Name	22
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1. Introduction

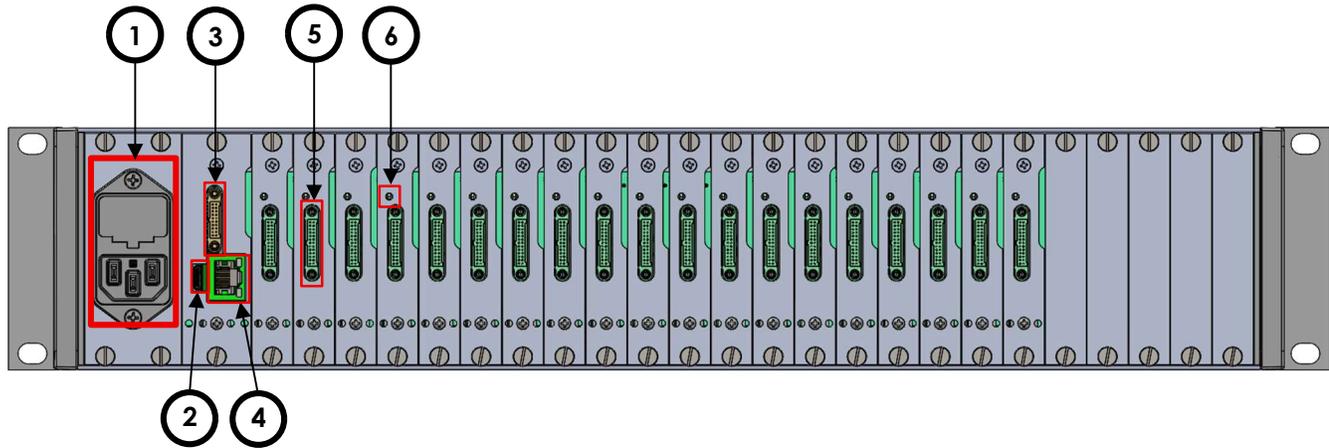
1.1 Product Description

The MMX-RACK is a 2U rack mountable motion controller capable of operating up to 24 axis simultaneously. The capabilities of an MMX-RACK is dependent on the type and amount of MMX cards loaded into a system. Each axis is operated by individual MMX cards.

MMX Cards	Description	Part Number
MMX-Ethernet	Communication Module <ul style="list-style-type: none">- USB-C and Ethernet RJ45- GPIO 5 Digital Inputs 5 Digital Outputs 6 Analog Inputs 2 Analog Outputs	
MMX-120	Piezo Motor Controller <ul style="list-style-type: none">- Support for 2-phase piezo, stepper, 3-phase brushless, and DC brushed motors- Analog or Digital Incremental Encoder- Absolute (BiSS-C) Encoder	

*All MMX cards will use ASCII protocol for all communication networks.

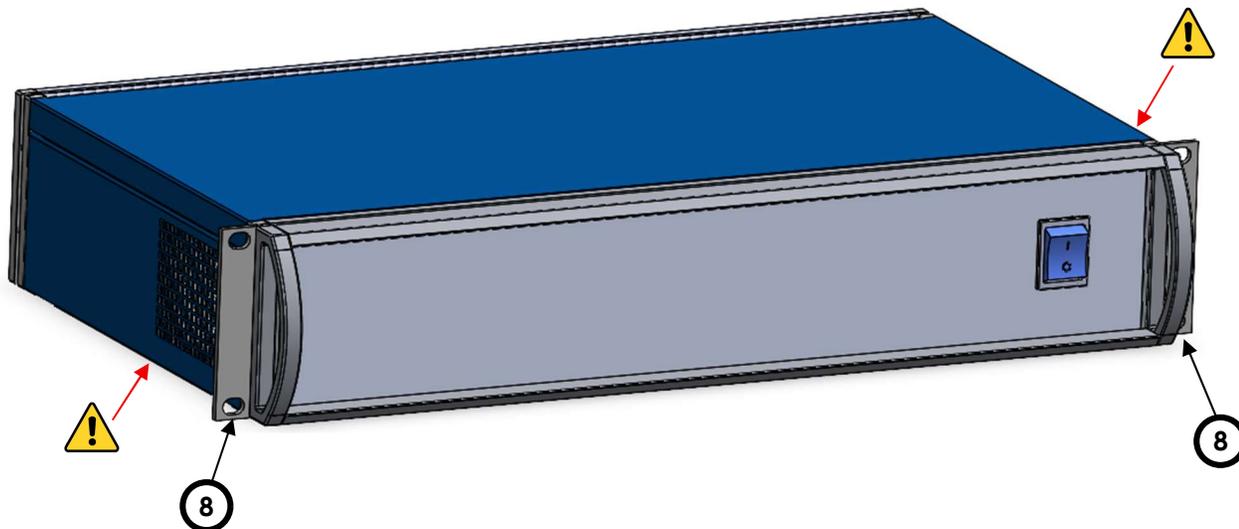
1.2 MMX-RACK Overview



1. A/C Power Inlet, 80 - 264VAC (Fused Protected)
2. USB-C Connector (MMX-Ethernet)
3. GPIO, 20-Pin Harwin Gecko Connector (MMX-Ethernet)
4. Ethernet IN, RJ45 (MMX-Ethernet)
5. Motor, Encoders, and Limits - Male 26-Pin Harwin Gecko Connector (MMX-120)
6. Power LED, RGB (MMX-120)
 - a. Teal – Addressing
 - b. Blue – Initializing
 - c. Green – Operational
 - d. Red - Error

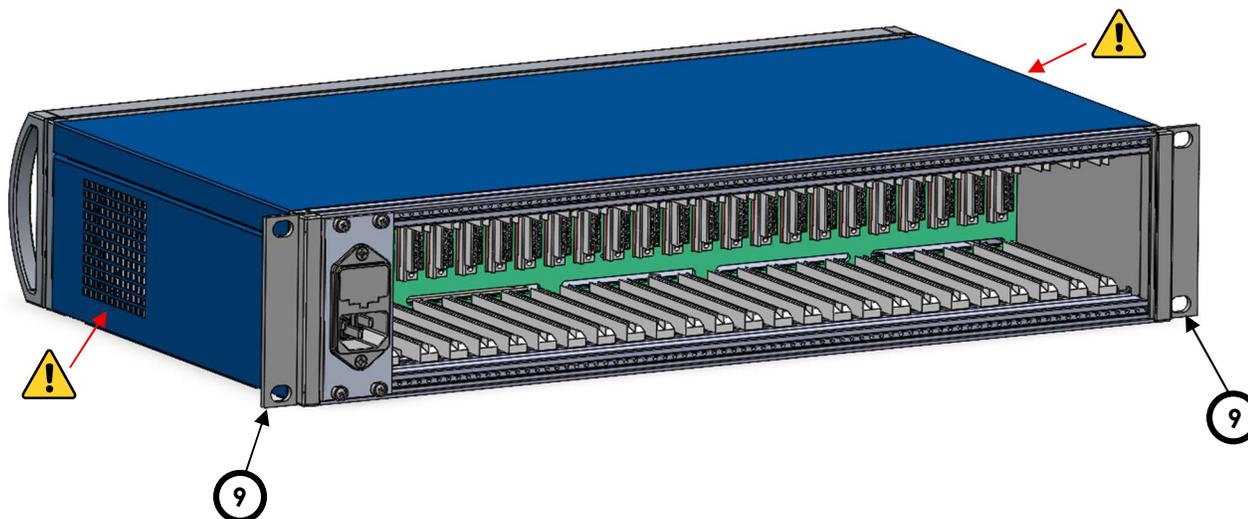


7. Main Power Switch



8. Front mount configuration

! DO NOT OBSTRUCT EXHAUST VENTILATION. BLOCKING THE EXHAUST COULD CAUSE THE MMX-RACK TO OVERHEAT.



9. Reverse mount configuration

! DO NOT OBSTRUCT EXHAUST VENTILATION. BLOCKING THE EXHAUST COULD CAUSE THE MMX-RACK TO OVERHEAT.

1.3 Features

- +80-264VAC through AC Power Inlet
- USB 2.0
- Ethernet, 10/100 Mbps
- Digital and Analog Input/Output through 20-pin Harwin Gecko Connector

1.4 Package Contents

If product is damaged or there are missing components, contact MICRONIX USA immediately. Do not discard product packaging in case of return shipment.

Package Contents:

- MMX- Rack
- AC Power Cord
- USB-C to USB-A cable
- Any other previously agreed upon components such as additional MMX cards

2. Quick Start Guide

2.1 Quick Start Guide Overview

The following Quick Start Guide is intended to provide a basic set-up of the MMX-RACK in the least amount of time. The following paragraphs will provide a walkthrough of the steps needed to set-up the controller and verify that the system is working correctly.

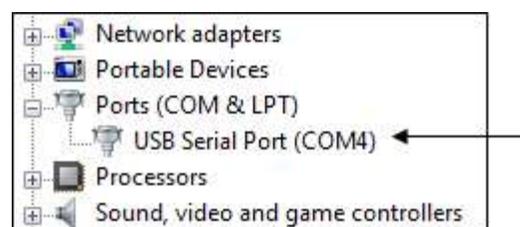
*This Quick Start Guide assumes that at least one MMX-Ethernet card and one MMX-120 card have been purchased along with the MMX-Rack.

1. Installation Overview

- a. Follow the order below to make the connections that are typical of the MMX-RACK setup.
 - i. Ensure that the Power Switch is set to the OFF position before any connections are made.
 - ii. Connect an 80-264 VAC power source to the AC Power Inlet.
 - iii. Connect either the USB (USB Type C) or Ethernet (CAT5 or CAT6) cable to their respective port on the MMX-Ethernet card.
 - iv. Connect any available stages/cabling to the Harwin Gecko 26-Pin connectors on the MMX-102 cards.
 - v. Ensure that all connections are securely fastened to any standoff.
- b. Once all the connections are properly connected, power on the MMX-RACK by setting the Power Switch to the ON position.
- c. Wait for all axes to address and initialize. A green LED on each MMX-120 cards will indicate if that axis is operational.

2. Install USB Drivers

- a. This is only applicable if the MMX-Ethernet is being connected via USB.
- b. For Windows 10 and beyond, the native USB driver will automatically be installed once the powered MMX-Ethernet device is connected to the PC upon first-time USB connection.
- c. For OS versions prior to Windows 10 (e.g. Windows 7 and Windows 8), users will need to manually install ST's STM32 Virtual COM Port Driver (STSW-STM32102). The software/drivers can be downloaded from ST website:
<https://www.st.com/en/development-tools/stsw-stm32102.html>
- d. It is necessary to note the COM Port assigned to the MMX-Ethernet when connecting to a PC.
- e. After powering up the controller (Step 1c), note the USB Serial Port assigned. See the figure below showing a snapshot of the Device Manager window:



3. Continue to Quick Start MMX-RACK Motion Controller Platform

- a. The following section will help you get running with the MMX-RACK Motion Controller Platform program.

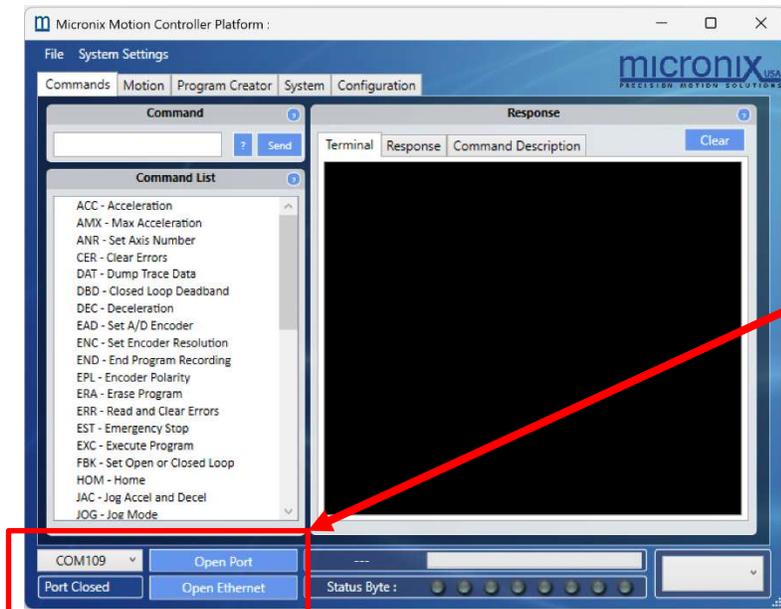
2.2 Quick Start MMX-RACK Motion Controller Platform

The following Quick Start Guide is intended to provide a basic set-up of the MMX-RACK MCP program. The following paragraphs will provide a walkthrough of the steps needed to install the program and verify that the system is working correctly.

1. Pre-Installation
 - a. This guide assumes you have already completed the previous Quick Start guide and that the controller is on and connected to a COM port on your computer.
2. Install
 - a. To install the Micronix Motion Controller Platform, run the installation file from the supplied USB and follow the onscreen instructions.
3. Run
 - a. The installer will place a shortcut to the Micronix GUI program on your desktop. Make sure that your MMX-RACK is powered on and connected to a valid COM port as discussed in section 2.1
 - b. Open the start menu
 - c. Open the 'All Programs' tab
 - d. Open the MICRONIX USA folder
 - e. Run the Micronix MCP program

2.3 Using the Micronix Motion Controller Platform

1. Connect to the MMX-RACK via USB or Ethernet



User should select the appropriate communication that controller is connected to.

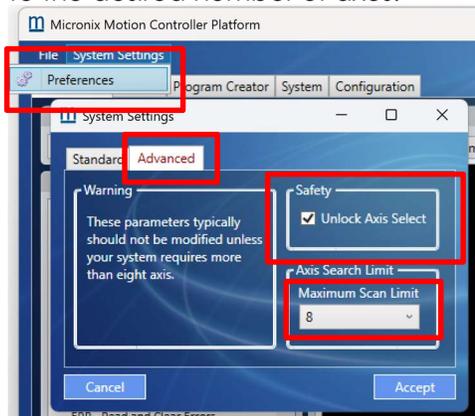
Once the communication is established, the terminal will populate with controller information. Once completed, the system is ready for use.

- a. For IP connection over Ethernet, click Open Ethernet enter the IP address of the MMX-RACK to connect.



2. Once connected to the MMX-RACK via USB or Ethernet, the MCP program will poll the number of available axes (up to 8 by default)

- a. To bypass the 8-axis limit, navigate to the System Settings menu → Preferences → Advanced tab → Check the "Unlock Axis Select" and adjust the Maximum Scan Limit to the desired number of axes.



The Commands tab allows the user to manually send MMC commands, query MMX parameters, and see command descriptions.

Appends the "?" character to the end of the command

Sends the command in the textbox. Likewise, the "Enter" key can be used to send the command

Can be used to send Micronix ASCII commands

List of some common Micronix ASCII commands. Refer to the Section 5 Command for the full list of available commands

Terminal Display of sent commands and received responses

Various flags signaling Drive Status Hover over the icons to understand their context.

Dropbox Menu to change Axis

Response subtab provides context to the commands sent.

Command Description subtab provides an explanation, and an example of the command selected from the Command List

- The Motion tab can be used to initialize and perform various types of motion. Note that MMX-RACK has no motion capabilities. The Motion tab will only be applicable to controllers such as the MMX-120.
- Other tabs of the Motion Controller Platform GUI are only applicable to motion controllers such as the MMX-120. Please refer to their manual for more details.

3. Technical Information

3.1 MMX-RACK Specifications

Parameter	Description
Control Interface	USB 2.0 compliant Ethernet 10/100 Mbps
Commands	ASCII Commands
Power Supply	Regulated 80-264VAC (Internal 36V DC Power Supply)
Software Interface	Micronix MCP GUI, LabVIEW VI's

3.2 Ethernet Port Setup

The RJ45 connector can be used to communicate via Ethernet using ASCII over TCP/IP. The MMX-RACK will auto negotiate 10/100 Mbps with an Ethernet client. Two TCP/IP ports with an integrated switch will be available for more flexible connections to an existing Ethernet network.

Static IP address assignment will be used with the default IP/sockets settings below

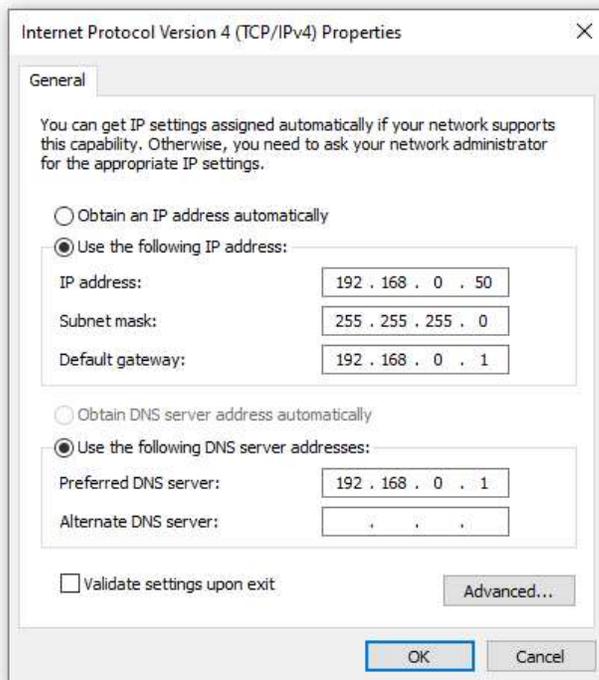
IP Address: 192.168.0.20
Gateway: 192.168.0.1
Port: 5000

To change the IP address, the IPA command should be used. See the IPA command section for details. Once the IP address is changed and settings are saved using the SAV command, the new IP address will be used on the next power up.

The gateway and port number can also be changed using the GWY and POR commands. See the GWY and POR command sections for details. Once the gateway or port number is changed, and settings are saved using the SAV command, they will be used on the next power up.

If using a PC, the adapter options for the Ethernet port will likely need to be updated to establish communication. This can be done using the steps below.

1. Open Network and Internet Settings window
2. Navigate to "Change adapter options"
3. Right click the correct Ethernet port and select Properties
4. Select Internet Protocol Version 4 (TCP/IPv4) and click Properties
5. Select the option to "Use the following IP address" and enter in the IP address, subnet mask, and default gateway. These settings will vary depending on the configured IP address of the MMX-RACK. See an example of settings below for the default IP address.



3.3 USB Communication

The required USB drivers for the MMX-RACK are automatically built into Windows systems. When connected, the USB will create a virtual COM port to allow for communication with the MMX-RACK. Below are the virtual COM port configuration settings necessary for correct communication setup:

Software Parameter	Setting
Data Bits	8
Stop Bits	1
Parity	No
Handshake	No
Baud rate	Any

If the MMX-RACK is not automatically recognized by your computer, contact Micronix for support.

4. Operation

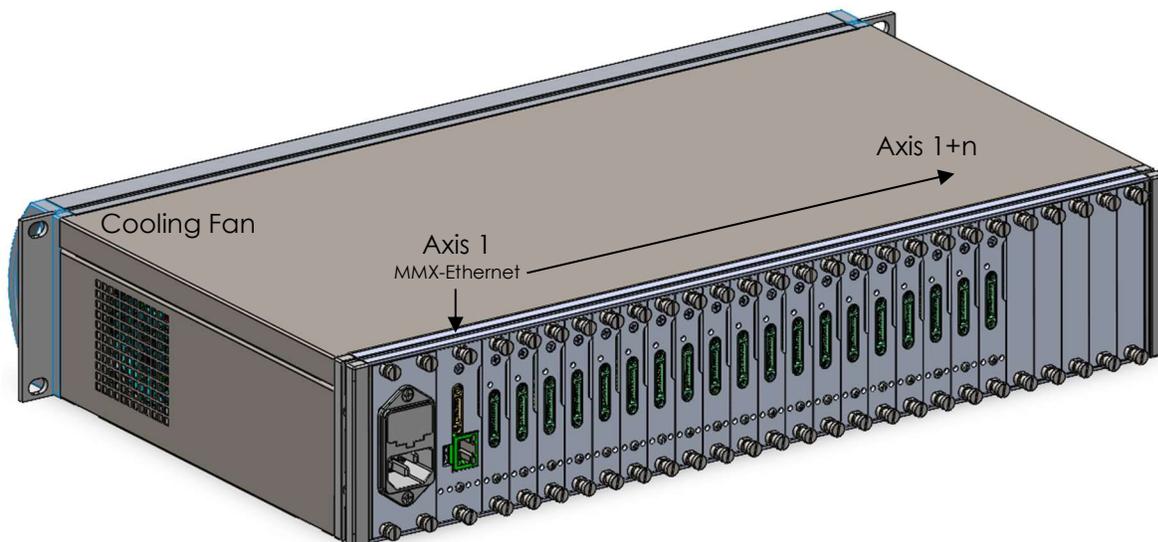
4.1 Axis Addressing

Auto Addressing is the default method of assigning axis numbers on start-up. Controllers are automatically assigned axis numbers on every power up, starting with axis 1 and increasing consecutively until reaching the last axis.

Manual axis numbers may be assigned to a controller using the ANR command. After an ANR assignment, a SAV command should be issued to save the configuration to flash. When manually assigning the axis number, care should be taken to ensure each axis number is unique to avoid communication conflicts. This overrides Auto Addressing, as the controller stores the axis number until reassigned or reset back to Auto Addressing. In the case of having a mix of manually assigned and auto addressed controllers, the Auto Addressed axis numbers increase consecutively after each manually assigned axis in the stack. For example, in a stack of 5 controllers with the third controller manually assigned to axis 10, the axis numbers will read: 1, 2, 10, 11, 12

If two controllers are accidentally assigned the same axis number, use the global command "0ANR0" to reset all controllers back to Auto Addressing.

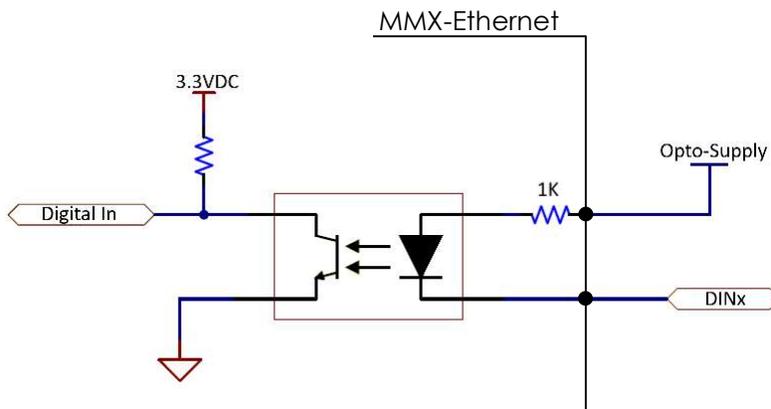
The figure shown below illustrates axis numbers for an MMX-RACK with Auto Addressing assigned. In the MMX-RACK, axis 1 is assigned to the MMX-Ethernet card on the left. The address increments by one for each MMX card to the right.



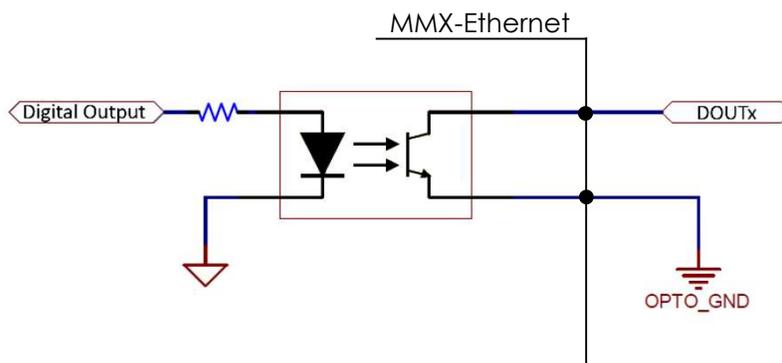
4.2 I/O Commands

The MMX-RACK has 5 digital inputs, 5 digital outputs, 6 analog inputs, and 2 analog outputs that can be used for general purpose. The I/O are located on the 20-pin Gecko connector, and its pinout is as described in section 6.3 of the Appendix.

Digital inputs are NPN and have the following connection diagram. Opto-supply voltage should not exceed 24VDC.



Digital outputs are NPN and have the following connection diagram. Collector current should not exceed 50mA.



The IOS command can be used to read and write to all available digital IO on the MMX-Ethernet. Each digital IO has a corresponding index for the IOS command.

IOS Index	Digital IO
1	IN 1
2	IN 2
3	IN 3
4	IN 4
5	IN 5
6	OUT 1
7	OUT 2
8	OUT 3
9	OUT 4
10	OUT 5

Attempting to write to a digital input using the IOS command will result in an error.

The I/O Polarity (IOP) command (pg. 5-61) is used to change the polarity of the digital IO. Each digital IO has its own polarity setting, using the same index to digital IO table above. Setting the IOP to 0 will result in the digital IO being active low. Setting the IOP to 1 will result in the digital IO being active high.

Analog inputs can be read using the AIN command. The MMX-Ethernet has a voltage range of 0-10VDC for analog inputs. Each analog input has a corresponding index for the AIN command.

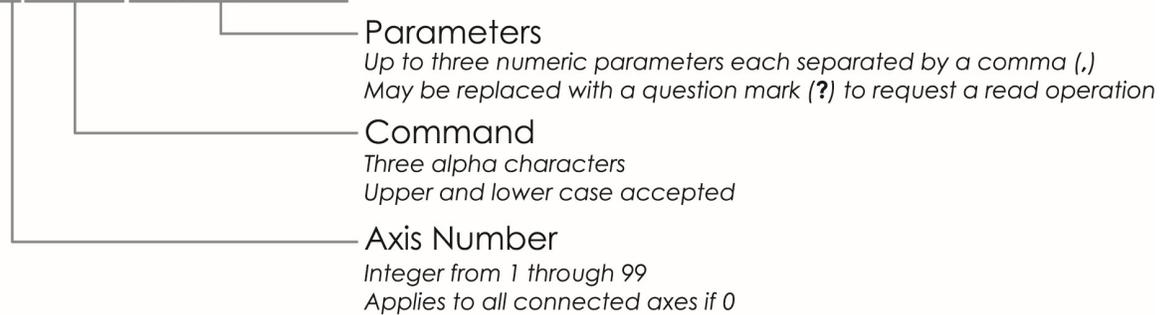
IOS Index	Analog Input
1	Input 1
2	Input 2
3	Input 3
4	Input 4
5	Input 5
6	Input 6

Analog outputs can be read using the AOT command. The voltage output range for analog outputs will be 0-5VDC.

5. Commands

5.1 Command Line Syntax

nAAAx1,x2,x3...



There are three components to every command prompt. The first is the "Axis Number" which designates which controller, or axis, will receive the command. If the "Axis Number" is 0, then the command will be sent globally to all connected controllers. It is possible to connect up to 99 controllers; therefore the "Axis Number" will be an integer value from 0 through 99.

The second component is the "Command", which is always comprised of three letters. Each command is outlined, along with its corresponding parameters, in the *Command Description* section 5.9 of this manual.

The third and final component is the "Parameter". This portion is command dependent, meaning that the parameter value will change depending on the specific requirements of the "Command". Where applicable, a question mark (?) may be substituted to initiate a read operation which will return information regarding the particular command. There may be up to three separate parameters for a particular command, each parameter value is separated by a comma (,).

All white space (blank spaces) are ignored in the command format. The following are examples of equivalent commands:

```
4TRM13,45
4 TRM 13 , 45
```

5.2 Command Line Format

Commands are first executed in the order that they are input, then line by line. This means that two commands on the same line are executed significantly closer to each other than if they were on two separate lines. Each command is separated by a semicolon (;) and every command line ends in a terminator (EX: carriage return). The following is an example of a command line entry:

```
1MVR16;3MVR12 | Axis 1, Move 16 mm [16 degrees]; Axis 3, Move 12 mm [12 degrees]
```

Using multiple commands on the same command line allows for synchronization of different commands to different axes. Up to 8 commands are allowed per command line.

Only one read operation is allowed per line. The controller will not send information unless requested to do so by a read operation.

5.3 Global Commands

Some commands have the option of being called globally. This means that you can send the same command to all available axes. To do this, replace the axis number of a global command with a '0'. For example; 0ACC 50 will set the acceleration of all available axes to 50 mm/s² [degrees/s²].

5.4 Multiple Parameters

When dealing with a command that has multiple parameters, it is possible to change a single parameter by omitting numbers for the parameters that will remain unchanged. For example; 4PID, , 3 will only change the third parameter to a new value, "3".

5.5 Synchronous Move

It is possible to execute multiple motions at the same time by setting up and executing a synchronous move. To set up a synchronous move, use the MSA and MSR commands. These commands can be written on the same command line (up to 8 allowed) or on separate lines followed by a line terminator. To execute the move, use the RUN command on the proceeding command line followed by a line terminator. For example;

1MSA4 ; 2MSA4 ; 3MSA4	Axis 1, Move 4mm; Axis 2, Move 4mm; Axis 3 Move 4mm
ORUN	Run Synchronous Move
Or	
1MSA4	Axis 1, Move 4mm
2MSA4	Axis 2, Move 4mm
3MSA4	Axis 3 Move 4mm
ORUN	Run Synchronous Move

5.6 Terminating Characters

When communicating with the controller via USB, it is necessary to note the terminating characters involved in transmitting and receiving data. Note that the terminating characters will be different when communicating through Ethernet or USB.

To send data to the controller via USB, enter the desired commands in the command line followed by the new line and carriage return terminating characters [\backslash n \backslash r], or just the carriage return terminating character [\backslash r]. When receiving, each line of data will be followed by the new line terminating character [\backslash n] and the final line will end in the new line and carriage return terminating characters [\backslash n \backslash r]. The ASCII value for new line [\backslash n] is 0X0A and for carriage return [\backslash r] is 0X0D. The following is an example of data transmission:

1VEL0.005 \n\r	Axis 1, Set velocity to .005 mm/s [degrees/s ²] [New line, Carriage Return]
----------------	---

These terminating resistors will be required for both USB and Ethernet communication.

5.7 Summary of Commands

Command	Description	During Motion		Real-time		Program		Global		Page
		Set	Read	Set	Read	Set	Read	Set	Read	
AIN	Read Analog Input		✓		✓					16
ANR	Set Axis Number		✓	✓	✓			✓		17
AOT	Analog Output	✓	✓	✓	✓					18
CER	Clear Errors	✓		✓				✓		19
ERR	Read Errors		✓		✓					20
GWY	Gateway		✓	✓						21
IDN	Identification Name	✓	✓	✓	✓			✓		22
IOP	I/O Polarity	✓	✓	✓	✓	✓	✓	✓		23
IOS	I/O Status	✓	✓	✓	✓	✓	✓	✓		24
IPA	IP Address		✓	✓	✓					25
MAC	MAC Address		✓		✓					26
POR	Port		✓	✓	✓					27
SAV	Save Axis Settings			✓				✓		28
SUB	Subnet Mask		✓	✓	✓					29
VER	Firmware Version		✓		✓					30

*If paired with another Micronix controller, then please see the corresponding reference manual for their respective commands.

5.8 Command Descriptions

AIN

Read Analog Input

During Motion		Real-time		Program		Global	
Set	Read	Set	Read	Set	Read	Set	Read
	✓		✓				
Command Description:		This command is used to read the voltage on the selected analog input pin.					
Returns:		A read operation returns the voltage detected on the selected analog input pin (0 to 5V).					
Syntax:		nAINx? – Standard syntax Error [#]: AIN? – Read operation with missing axis number [27] nAIN? – Missing new axis number parameter [28] AINx? – Missing axis number [30]					
Parameter Description:		n[int] – Axis number x[int] – Analog Input Pin ? – Read pin voltage					
Parameter Range:		n – 0 to 99 x – 1 to 6					
Related Commands:		None					
Example:		1AIN3? Axis 1, Read analog input number 3					

ANR

Set Axis Number

During Motion		Real-time		Program		Global	
Set	Read	Set	Read	Set	Read	Set	Read
	✓	✓	✓			✓*	
Command Description:	<p>This command is used to override Auto Addressing by manually assigning an axis number to a controller. Auto Addressing is the default method of assigning axis numbers on power up and may be reassigned to an axis by substituting a "0" for the parameter value. Simultaneous axis swapping is possible by using multiple ANR commands on the same command line.</p> <p>*This command can be called globally by specifying a '0' for the axis number; however it will only work if the new axis number parameter is set to '0' for auto-addressing.</p>						
Returns:	<p>A read operation returns the following axis number values for the specified axis:</p> <p>0 – Auto Addressing assigned (default) 1-99 – Manually assigned, axis number displayed</p>						
Syntax:	<p>nANRx – Standard syntax nANR? – Read axis number value</p> <p>Error [#]: ANR? – Read operation with missing axis number [27] nANR – Missing new axis number parameter [28] ANRx – Missing axis number [30]</p>						
Parameter Description:	<p>n[int] – Axis number x[int] – New axis number, 0 for Auto Addressing ? – Read axis number value</p>						
Parameter Range:	<p>n – 0 to 99 x – 0 to 99</p>						
Related Commands:	None						
Example:	<p>5ANR1 ; 1ANR5 Simultaneous axis swapping: Axis 5, Set to axis 1; 1; Axis 1, Set to axis 5 - 4ANR0 Axis 4 Set to Auto Addressing, however it will remain axis 4 until the MMX-Ethernet is reset</p>						

AOT

Analog Output

During Motion		Real-time		Program		Global	
Set	Read	Set	Read	Set	Read	Set	Read
✓	✓	✓	✓				
Command Description:		This command is used to set output voltage on the desired analog output pin.					
Returns:		A read operation returns the set voltage on the selected analog output pin (0 to 5V).					
Syntax:		nAOTx1,x2 – Standard syntax Error [#]: AOT? – Read operation with missing axis number [27] nAOT? – Missing new axis number parameter [28] AOTx1,x2? – Missing axis number [30]					
Parameter Description:		n[int] – Axis number x1[int] – Analog Output Pin x2[float] – Desired Output Voltage ? – Read pin voltage					
Parameter Range:		n – 0 to 99 x1 – 1, 2 x2 – 0 to 5					
Related Commands:		None					
Example:		1AOT1, 3.2 Axis 1, set analog output 1 to 3.2V 1AOT1? Axis 1, Read analog output 1					

CER

Clear Errors

During Motion		Idle		Program		Global
Set	Read	Set	Read	Set	Read	Set
✓		✓		✓		✓
Command Description:		This command is used to clear all error messages without reading them.				
Returns:		A read operation cannot be used with this command.				
Syntax:		nCER – Standard syntax 0CER – All axes clear error messages				
Parameter Description:		n[int] – Axis number				
Parameter Range:		n – 0 to 99				
Related Commands:		ERR				
Example:		1CER Axis 1, clear error messages – 0CER All axes, clear error messages				

ERR

Read and Clear Errors

During Motion		Idle		Program		Global
Set	Read	Set	Read	Set	Read	Set
	✓		✓			
Command Description:		This command is used to read and clear any pending error messages.				
Returns:		A read operation returns a list of error messages for the specified axis in the following format. "AAA" signifies the specific command name that the error corresponds to. Error Number – Description [AAA]				
Syntax:		nERR? – Standard syntax Error [#]: ERR? – Read operation with missing axis number [123]				
Parameter Description:		n[int] – Axis number ? – Read error messages				
Parameter Range:		n – 1 to 99				
Related Commands:		None				
Example:		3ERR? Axis 3, Read error messages				



Gateway Address

During Motion		Real-time		Program		Global	
Set	Read	Set	Read	Set	Read	Set	Read
	✓	✓					
Command Description:		This command is used to set the desired gateway address of the controller. The controller will use an IPv4 format address. Each 8-bit segment of the gateway address are defined separately.					
Returns:		A read operation returns the full gateway address.					
Syntax:		nGWYx1 – Standard syntax nGWY? – Read gateway value Error [#]: GWY? – Read operation with missing axis number [27] nGWY – Missing parameter [28]					
Parameter Description:		n[int] – Axis number x1[int] – Gateway address ? – Read gateway address value					
Parameter Range:		n – 0 to 99 x1 – Format: nnn.nnn.nnn.nnn nnn must be less than 255					
Related Commands:							
Example:		1GWY192.168.0.1 Axis 1, Set gateway to 192.186.0.1 1SAV Axis 1, Save gateway address to flash					

IOP

Set IO Polarity

During Motion		Real-time		Program		Global	
Set	Read	Set	Read	Set	Read	Set	Read
	✓	✓	✓				
Command Description:		This command is used to select the polarity of an I/O pin.					
Returns:		A read operation returns the polarity values assigned to the I/O Pins.					
Syntax:		<p>nIOPx1,x2 – Standard syntax nIOP? – Read polarity value for all I/O nIOPx1? – Read polarity value for the specified IO</p> <p>Error [#]:</p> <p style="padding-left: 40px;">IOPx1,x2 – Missing axis number [30] IOP? – Read operation with missing axis number [27]</p>					
Parameter Description:		<p>n [int] – Axis number x1 [int] – I/O Pin x2[int] – I/O Polarity ? – Read all I/O pins polarity value</p>					
Parameter Range:		<p>n – 1 to 99</p> <p>x1 – 1 – Digital Input 1 2 – Digital Input 2 3 – Digital Input 3 4 – Digital Input 4 5 – Digital Input 5 6 – Digital Input 6 7 – Digital Input 7 8 – Digital Input 8 9 – Digital Input 9 10 – Digital Input 10</p> <p>x2 – 0 – Active Low 1 – Active High</p>					
Related Commands:		IOS					
Example:		2IOP2,1 Axis 2, Set IO2 to Active High					

IOS

Set IO Status

During Motion		Real-time		Program		Global	
Set	Read	Set	Read	Set	Read	Set	Read
	✓	✓	✓				
Command Description:		This command is used to set the output or read the input of an I/O pin. Designated inputs can only be queried using the IOS command.					
Returns:		A read operation returns the output values assigned to the I/O Pins.					
Syntax:		nIOSx1,x2 – Standard syntax nIOS? – Read input/output value for all I/O nIOSx1? – Read input/output value for the specified I/O Error [#]: IOSx1,x2 – Missing axis number [30] IOS? – Read operation with missing axis number [27]					
Parameter Description:		n [int] – Axis number x1 [int] – I/O Pin x2[int] – I/O Status ? – Read input/output value					
Parameter Range:		n – 1 to 99 x1 – 1 – Digital Input 1 2 – Digital Input 2 3 – Digital Input 3 4 – Digital Input 4 5 – Digital Input 5 6 – Digital Input 6 7 – Digital Input 7 8 – Digital Input 8 9 – Digital Input 9 10 – Digital Input 10 x2 – 0 – Output Off 1 – Output On					
Related Commands:		IOP					
Example:		2IOS2,1 Axis 2, Set IO2 to output "on"					

IPA

Set IP Address

During Motion		Real-time		Program		Global	
Set	Read	Set	Read	Set	Read	Set	Read
	✓	✓					
Command Description:		This command is used to set the desired IP address of the controller. The controller will use an IPv4 format address. Each 8-bit segment of the IP address is defined separately.					
Returns:		A read operation returns the full IP address.					
Syntax:		nIPAx1 – Standard syntax nIPA? – Read IP address value Error [#]: IPA? – Read operation with missing axis number [27] nIPA – Missing parameter [28]					
Parameter Description:		n[int] – Axis number x1[int] – IP address ? – Read IP address value					
Parameter Range:		n – 0 to 99 x1 – Format: nnn.nnn.nnn.nnn nnn must be less than 255					
Related Commands:							
Example:		1IPA192.168.0.21 Axis 1, Set IP to 192.186.0.21 1SAV Axis 1, Save IP address to flash					

MAC

MAC Address

During Motion		Real-time		Program		Global	
Set	Read	Set	Read	Set	Read	Set	Read
	✓		✓				
Command Description:		This command is used to set media access control (MAC) address of the MMX-Ethernet. This is a 6-byte manufacturer assigned number.					
Returns:		A read operation returns the MAC address for the specified axis.					
Syntax:		nMACx1 – Standard Syntax nMAC\$ – Randomize MAC address nMAC? – Read MAC address Error [#]: MAC? – Read operation with missing axis number [27] nMAC – Missing acceleration parameter [28]					
Parameter Description:		n[int] – Axis number x1[int] – MAC address \$ – Sets a randomized MAC address ? – Read MAC address					
Parameter Range:		n – 0 to 99 x1 – XX-XX-XX-XX-XX-XX XX represents a number less than 255 in hexadecimal					
Related Commands:							
Example:		1MAC9B-FE-2D-23-C1-44 Axis 1, Set Manual MAC address 1SAV Axis 1, Save MAC address to flash 2MAC\$ Axis 2, Randomly set MAC address 2MAC? Axis 2, Read updated MAC address 2SAV Axis 2, Save MAC address to flash					

POR

Port Read/Write

During Motion		Real-time		Program		Global	
Set	Read	Set	Read	Set	Read	Set	Read
	✓	✓	✓				
Command Description:		This command is used to set the port address to connect to. The default value is 5000.					
Returns:		A read operation returns the port address for the specified axis.					
Syntax:		nPORx1 – Standard Syntax nPOR? – Read MAC address Error [#]: POR? – Read operation with missing axis number [27] nPOR – Missing Port parameter [28]					
Parameter Description:		n[int] – Axis number x1[int] – Port address ? – Read Port address					
Parameter Range:		n – 0 to 99 x1 – 0-65535					
Related Commands:							
Example:		4POR345 Axis 4, Set Port address to 345 4SAV Axis 4, Save Port address to flash					

SAV

Save Axis Settings

During Motion		Real-time		Program		Global	
Set	Read	Set	Read	Set	Read	Set	Read
		✓				✓	
Command Description:		This command is used to save all settings for the specified axis. This allows an axis to be configured on power up.					
Returns:		A read operation cannot be used with this command.					
Syntax:		nSAV – Standard syntax 0SAV – All axes save settings					
Parameter Description:		n[int] – Axis number					
Parameter Range:		n – 0 to 99					
Related Commands:		None					
Example:		16SAV		Axis 16, save settings			

SUB

Subnet Mask Read/Write

During Motion		Real-time		Program		Global	
Set	Read	Set	Read	Set	Read	Set	Read
	✓	✓	✓				
Command Description:		This command is used to set the desired subnet address of the controller. The controller will use an IPv4 format address. Each 8-bit segment of the subnet address are defined separately.					
Returns:		A read operation returns the full subnet address.					
Syntax:		nSUBx1 – Standard syntax nSUB? – Read subnet value Error [#]: SUB? – Read operation with missing axis number [27] nSUB – Missing parameter [28]					
Parameter Description:		n[int] – Axis number x1[int] – Subnet address ? – Read subnet address value					
Parameter Range:		n – 0 to 99 x1 – Format: nnn.nnn.nnn.nnn nnn must be less than or equal to 255					
Related Commands:							
Example:		1SUB255.255.255.0 Axis 1, Set subnet to 255.255.255.0 1SAV Axis 1, Save subnet address to flash					

VER

Firmware Version

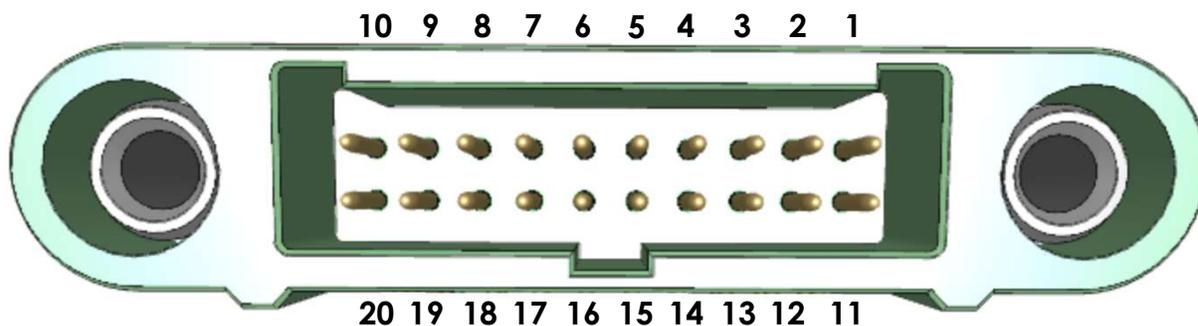
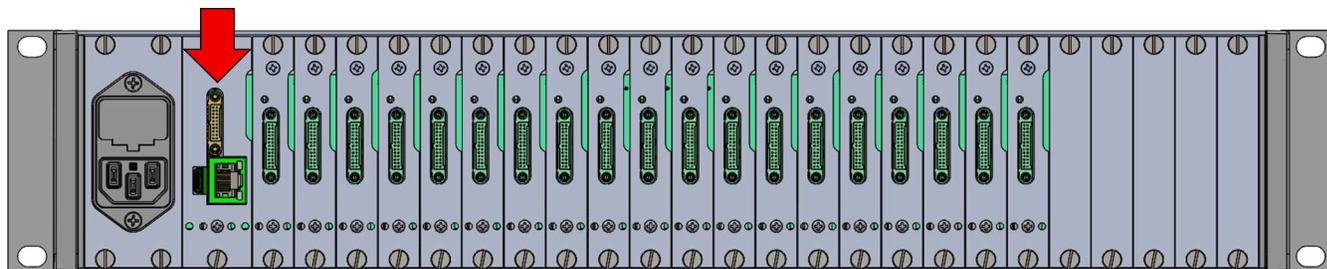
During Motion		Real-time		Program		Global	
Set	Read	Set	Read	Set	Read	Set	Read
	✓		✓				
Command Description:		This command is used to check the firmware version for the specified axis.					
Returns:		A read operation returns the firmware version for the specified axis.					
Syntax:		nVER? – Standard syntax Error(s): VER? – Read operation with missing axis number [27] nVER – Missing read operation parameter [28]					
Parameter Description:		n[int] – Axis number ? – Read firmware version					
Parameter Range:		n – 1 to 99					
Related Commands:		None					
Example:		11VER? Axis 11, Read firmware version					

5.9 Error Messages

Error Number	Name	Description
26	Invalid Command	The 3-letter instruction entered is not a valid command. Ensure that the 3-letter instruction is a recognizable command.
28	Invalid Parameter Type	<ol style="list-style-type: none">1. The parameter entered does not correspond to the type of number that the instruction requires. For example, the command may expect an integer value, therefore sending a floating point value will trigger this error.2. The allowable precision for a parameter has been exceeded. For example, velocity can be specified with a precision of 0.001 mm/sec. If a more precise velocity value of 0.0001 mm/sec is entered, this error will be triggered. Refer to the command pages for the type of parameter that each command expects.

6. Connector Pin-outs

6.1 GPIO Pin-out



Description	Pin		Description
Opto-Supply (24VDC Max)	1	11	Opto-Ground
Digital IN 1	2	12	Digital OUT 1
Digital IN 2	3	13	Digital OUT 2
Digital IN 3	4	14	Digital OUT 3
Digital IN 4	5	15	Digital OUT 4
Digital IN 5	6	16	Digital OUT 5
Analog OUT 1	7	17	Analog OUT 2
Analog IN 1	8	18	Analog IN 2
Analog IN 3	9	19	Analog IN 4
Analog IN 5	10	20	Analog IN 6

Mating Connector:

Manufacturer: Harwin

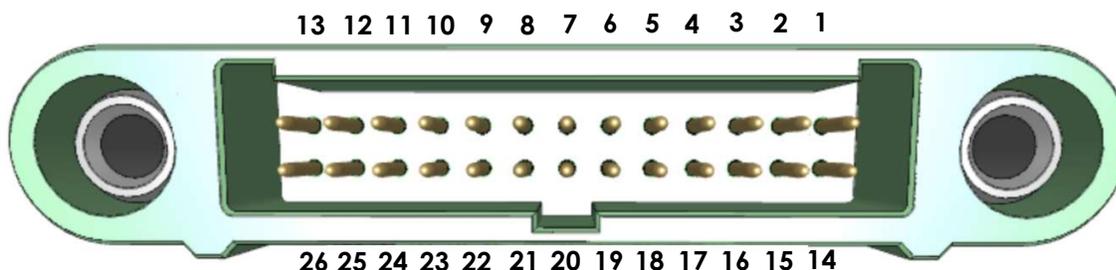
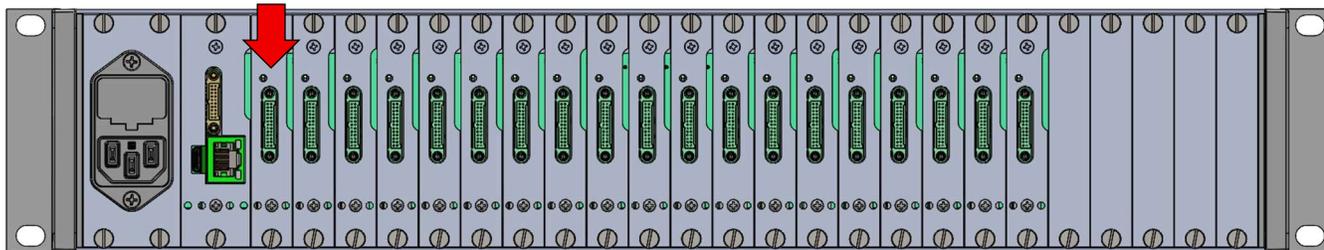
Part Number: G125-2242096F1

Contacts: G125-0010005 (for 26 AWG) or G125-0020005 (for 28-32 AWG)

Recommended Cable Assembly:

Harwin Gecko's G125-FC12005F1-xxxxL (xxxx is cable length in mm)

6.2 Motor & Encoder Pin-out



Description	Pin		Description
Absolute SLI+	1	14	Absolute SLI-
Absolute MA+	2	15	Absolute MA-
Absolute SLO+	3	16	Absolute SLO-
Incremental Index +	4	17	Incremental Index-
Incremental B+/Sin+	5	18	Incremental B-/Sin-
Incremental A+/Cos+	6	19	Incremental A-/Cos-
+5VDC Output	7	20	Ground
Reserved	8	21	Reserved
Limit Positive	9	22	Limit Negative
Motor Phase 3	10	23	Motor Ground
Motor Phase 3	11	24	Motor Phase 4
Motor Phase 1	12	25	Motor Phase 2
Motor Phase 1	13	26	Motor Phase 2

Mating Connector:

Manufacturer: Harwin

Part Number: G125-2242696F1

Crimps: G125-0010005 (for 26 AWG) or G125-0020005 (for 28-32 AWG)

Recommended Cable Assembly:

Harwin Gecko's G125-FC12605F1-xxxxL (xxxx is cable length in mm)