CHAPTER

2

HARDWARE OVERVIEW

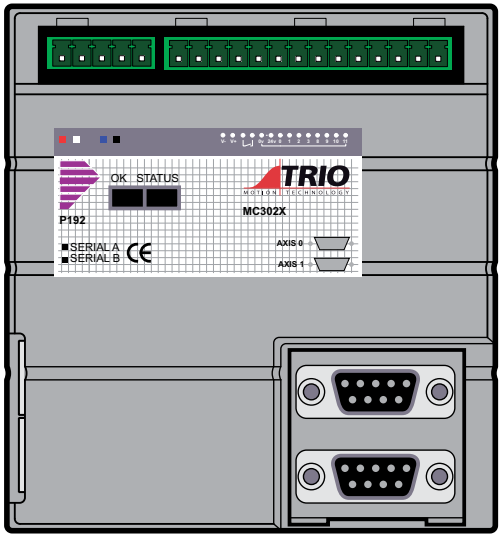
Motion Coordinator MC302X

Overview

The MC302X is a miniature stepper/servo positioner with the built-in ability to control one servo/stepper axis with additional synchronisation encoder, or two stepper axes.

The MC302X is designed to provide a compact, low cost, easy to use unit for OEM machine builders.

It is designed to be configured and programmed for the application with a PC running the *Motion* Perfect application, and then may be set to run "standalone" if an external computer is not required for the final system.



Programming

The Multi-tasking ability of the MC302X allows parts of a complex application to be developed, tested and run independently, although the tasks can share data and motion control hardware. On the MC302X up to 3 Trio BASIC programs can be run simultaneously.

I/O Capability

The MC302X has 4 built in 24v inputs and 4 built-in bi-directional input/output channels. These may be used for system interaction or may be defined to be used by the controller for end of travel limits, datuming and feedhold functions if required. The MC302X can have up 256 external Input/Output channels and up to 32 analogue input channels connected using DIN rail mounted I/O modules. These units connect to the built-in CAN channel of the MC302X

Communications

The MC302X has a built-in RS-232 programming port. A further serial channel is available at both RS-232 and RS485 levels. RS-232 port #1, or RS-485 port #1 may be configured to run the MODBUS protocol for PLC or HMI interfacing.

If the built-in CAN connection is not being use to for I/O modules it may be used for CAN communications.

Connections to the MC302X

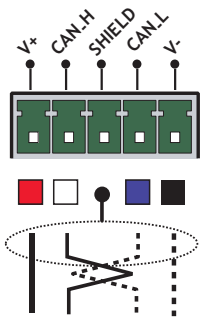
Wiring

All wires and cables should be of suitable size and type for the signals carried and the operating environment.

Suitable wires would include multi-core screened cable for encoder feedback and the serial links. The analogue output from the MC302X (if used) should be connected to the servo drive via a screened twisted pair. Drive enable outputs and 24v inputs do not have a large current requirement so the choice of wire is not critical.

Connectors

Top 5-Way Connector



This is a 5 way 3.81mm pitch connector. The connector is used both to provide the 24 Volt power to the MC302X and provide connections for I/O expansion via Trio's P316 and P325 CAN I/O expanders. 24 Volts must be provided as this powers the unit.

This 24 Volt input is internally isolated from the I/O 24 volts and the +/-10V voltage output. The MC302X has internal power supply filters for the 24v power supply. This supply should be isolated and independent from the I/O 24V.

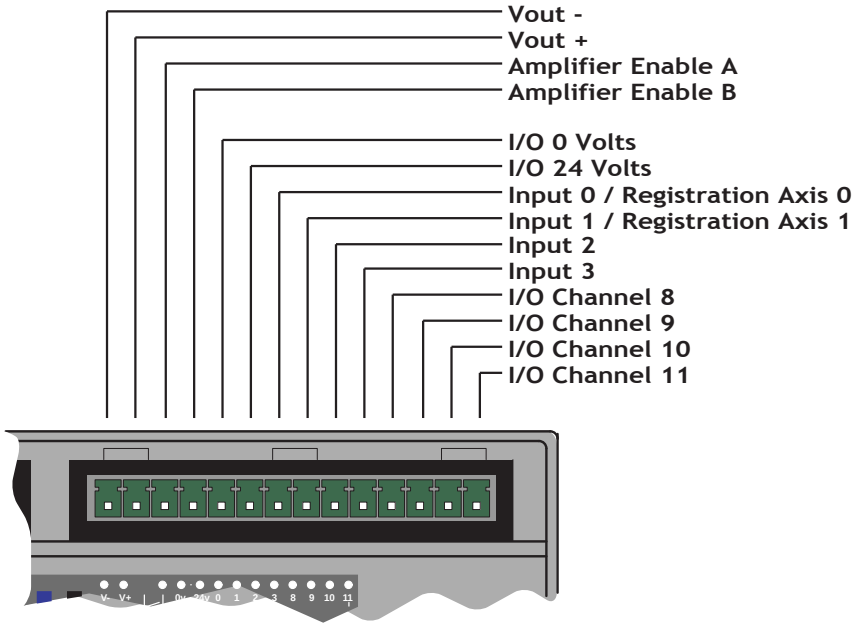
Note: *The CAN connections are optional, although the CAN Shield pin must be connected to Earth in all cases.*

The V+(24V) and V- MUST be connected as this powers the MC302X.

Power supply: 24V dc, Class 2 transformer or power source.

Top 14 Way Connector:

This is a 14 way 3.81 pitch connector. The connector provides for the +/-10Vvolt analogue output, the enable relay contacts, and the I/O connections.



Analogue Output

This feature when required is used to drive a servo drive or inverter connected to axis 0. The +/-10 Volt analogue output is isolated from the power input and the I/O modules of the MC302X and is powered via an internal DC-DC converter. The pair of connections should be connected by a screened cable to the drive input.

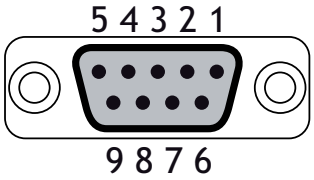
The drive enable pins are used to interlock the MC302X with a servo OR stepper drive and should be used in all cases. The connections are internally connected to a volt-free normally open solid-state relay which closes to enable the drive(s).

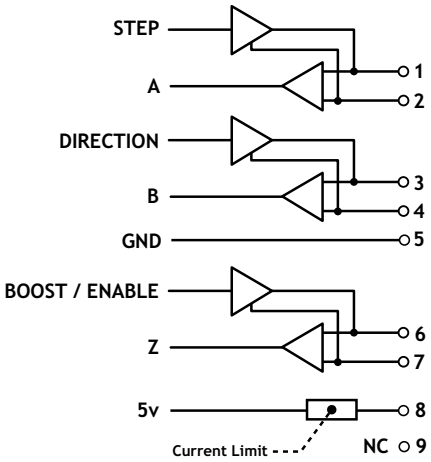
I/O Power Inputs

The I/O 0 Volts and I/O 24 Volts are used to power the 24 Volt inputs and outputs. The I/O connections are isolated from the module power inputs on the 5-way CAN connector. The I/O 0 Volts connection must be made if any inputs or outputs are used. The I/O 24 Volts is only required to power outputs and may be omitted if none are used. The I/O channels 8 to 11 are bi-directional and can be used either as an input or an output. They are numbered from 8 to 11 for greater compatibility with other Trio *Motion Coordinator*s. The inputs channels 0 to 3 are not bi-directional. Inputs 0 and input 1 can be used as registration inputs for axes 0 and 1 for use with the **REGIST** command.

Stepper Outputs/Encoder Inputs:

There are 2 x 9 pin D-type connectors which provide for 2 axes of 5V differential encoder inputs, 2 axes of step and direction outputs and a 5 Volt output for powering external encoder only.





Pin	Servo Axis	Stepper Axis
1	Enc. A	Step +
2	Enc. /A	Step -
3	Enc. B	Direction +
4	Enc. /B	Direction -
5	GND	GND
6	Enc. Z	Boost +
7	Enc. /Z	Boost -
8	5V	5V
9	Not Connected	Not Connected
shell	Screen	Screen

The function of the 9-pin 'D' connectors will be dependant on the specific axis configuration which has been defined. If the axis is setup as a servo, the connector will provide the encoder input. If the axis is configured as a stepper, the connector provides differential outputs for step/direction and boost/enable signals.

Special Stepper and Encoder Modes:

Either axis 0 or axis 1 can be put into a special mode to enable both stepper output and encoder input on the same axis. This allows the MC302X programmer to emulate most of the earlier MC202 axis configurations.

Atype Axis (0)=46 (Stepper encoder with external encoder input)
Atype Axis(1)=1 (stepper)

Pin	Axis 0 D-type	Pin	Axis 1 D-type
1	Step_0+	1	Step_1+
2	Step_0-	2	Step_1-
3	Direction_0+	3	Direction_1+
4	Direction_0-	4	Direction_1-
5	GND	5	GND
6	Enc. A0	6	Enc. B0
7	Enc. /A0	7	Enc. /B0
8	5V	8	5V

Atype Axis (1)=46 (Stepper encoder with external encoder input)
Atype Axis(0)=3 (encoder)

Pin	Axis 0 D-type	Pin	Axis 1 D-type
1	Enc A0	1	Enc A1
2	Enc /A0-	2	Enc /A1-
3	Enc B0	3	Enc B1
4	Enc /B0	4	Enc /B1
5	GND	5	GND
6	Step_1+	6	Direction_1+
7	Step_1-	7	Direction_1-
8	5V	8	5V

Note: *In the special mode there is no Z pulse or boost signal.*

Encoder Inputs:

When the axis type is set to **SERVO** or **ENCODER**, the D-type connector provides dedicated encoder inputs. The inputs are 5 Volt differential encoder inputs. The inputs must be connected to the encoder via a screened cable and the screen connected to the panel ground, and 0V wire connected to pin 5.

Encoder Power Supply:

Pins 8 and 5 provide a low power output at 5V (150mA maximum). This supply is provided for driving one or two encoders (if current consumption permits). The power supplies should be included within the encoder screened cable. Do not use the 0V as a screen ground point.

Stepper Outputs :

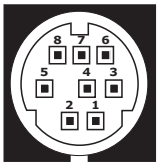
When the axis type is set to **STEPPER** or **STEPPER + ENCODER**, the connectors are used to provide stepper outputs. The outputs are 5 Volt differential line driver outputs and they must be connected to the stepper drive using screened cable with the screen connected to the panel ground, and the 0V wire to pin 5.

MC302X Serial Connections

The MC302X features a standard RS-232 serial port for programming (port 0), and an additional serial ports for external communications. The external communications Ports are available in both RS-232 (port 1) and RS-485 (port 1) standards.

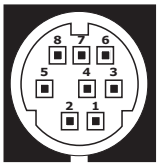
Note: *The MC302X uses high speed default setting in Motion Perfect.*

Serial Connector A:



Pin	Function	Note
1	Internal 5V	
2	Internal 0V	
3	RS232 Transmit	Serial Port #0
4	RS232 GND	
5	RS232 Receive	
6	Internal 5V	Serial Port #3 / #4
7	No Connection	
8	No Connection	
Note: Port 0 is the default programming port for connection to the PC running *Motion Perfect*.		

Serial Connector B:

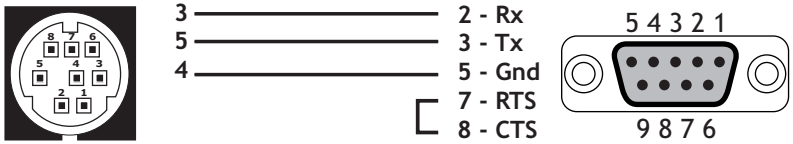


Pin	Function	Note
1	RS485 Data In A Rx+	Serial Port #1
2	RS485 Data In B Rx-	
3	RS232 Transmit	Serial Port #1
4	RS232 GND	
5	RS232 Receive	

Pin	Function	Note
6	Internal 5V	Serial Port #1
7	RS485 Data Out Z Tx-	
8	RS485 Data Out Y Tx+	

Serial Cables

Trio recommend the use of their pre-made serial cables (product code P350). If cables need to be made to connect to a PC serial port the following connections are required:



Motion Coordinator to 'AT' style PC with 9pin serial connector

MC302X - Feature Summary

Size	94 mm x 101 mm x 48mm Overall
Weight	200 g
Operating Temperature	0 - 45 degrees C
Control Inputs	Forward Limit, Reverse Limit, Datum Input, Feedhold Input.
Communication Ports	(1) RS232 Channel: 38400 baud. (1) RS-232/RS-485 serial Channel 38400 baud, (1) CAN channel.
Position Resolution	32 bit position count
Speed Resolution	32 bit. Speed may be changed at any time. Moves may be merged.
Interpolation modes	Linear 1-3 axes, circular, helical, CAM profiles, speed control, electronic gearboxes.
Programming	Multi-tasking Trio BASIC system, maximum 3 user tasks.
Servo Cycle	Programmable: 1ms, 500µs or 250µs.
Memory	512k user memory. Entire contents may be flashed to EPROM.
Power Input	24V dc, Class 2 transformer or power source. 18 ... 29V dc at 90mA.
Amplifier Enable Output	Normally open solid state relay contact Maximum voltage 24Vdc @ 100mA.
Analogue Output	1 Isolated 16 bit +/- 10V
Registration Inputs	2. One per axis shared with inputs 0 to 1.
Encoder Power Output	5v at 150mA total for 2 encoders.
Encoder Inputs	2 axes, Differential 5V inputs, 6Mhz maximum edge rate.
Stepper Outputs	2 Differential Step / Direction outputs 2MHz Max Rate
Digital Inputs	4 Opto-isolated 24V inputs, 2 may be used for high speed registration
Digital I/O	4 Opto-isolated 24V outputs. Current sourcing (PNP) 250mA. (max. 1A per bank of 8)

Motion Coordinator Euro205x

Overview The *Motion Coordinator* Euro205x is a Eurocard stepper/servo positioners with the built-in ability to control up to 4 servo or stepper motors in any combination. In addition a single Trio Daughter Board may be fitted to allow the control of a fifth axis or communications channel. The Euro205x is designed to provide a powerful yet cost-effective control solution for OEM machine builders who are prepared to mount the unit and provide the power supplies required. It is designed to be configured and programmed for the application with Multi-tasking Trio BASIC using a PC, and then may be set to run "standalone" if an external computer is not required for the final system. The Multi-tasking version of Trio BASIC for the Euro205x allows up to 7 Trio BASIC programs to be run simultaneously on the controller using pre-emptive multi-tasking.

Programming The Multi-tasking ability of the Euro205x allows parts of a complex application to be developed, tested and run independently, although the tasks can share data and motion control hardware.

I/O Capability The Euro205x has 16 built in 24v inputs and 8 built-in output channels. These may be used for system interaction or may be defined to be used by the controller for end of travel limits, datuming and feedhold functions if required. 8 status LEDs are available which can be set to display the status of banks of inputs or outputs;

(See **DISPLAY,** Chapter 8). The Euro205x can have up to 256 external Input/Output channels and up to 32 analogue input channels connected using DIN rail mounted I/O modules. These units connect to the built-in CAN channel of the Euro205x.

Communications The Euro205x has two RS-232 ports and one RS-485 built in, and one further serial channel available at TTL levels. An external adapter is available to allow the TTL port to be used with Trio Fibre Optic Network devices, e.g. P504 Membrane Keypad.

One of the RS-232 ports or the RS485 port may be configured to run the MODBUS protocol for PLC or HMI interfacing.

If the built-in CAN channel is not used for connecting I/O modules, it may optionally be used for CAN communications or DeviceNet.

Ethernet, USB and Profibus daughter boards may be fitted to provide additional communications options.

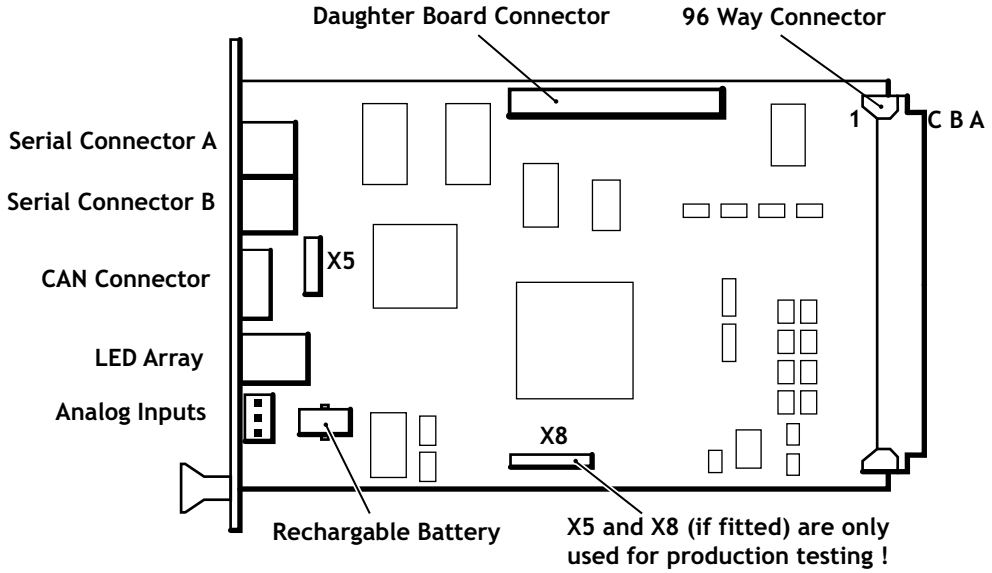
Axis Configuration

The default Euro205x configuration is as a single axis stepper base card (P151). Additional servo or stepper axes may be specified up to the 4 internal axis limit. In addition axes may be added in the field by the entry of "feature enable codes" into the controller. The codes can be purchased already installed into a new controller or may be ordered for controllers purchased earlier and added using Motion Perfect.

The gate array at the heart of the Euro205x design has facilities for 4 servo and 4 stepper axes built into every chip. The "feature enable codes" allow users to purchase only those facilities required for their configuration. Once entered onto the controller, the feature enable codes are stored in permanent flash memory. The feature enable codes are unique for each Euro205x.

The Euro205x features a total of 8 axes in software. Any axes not having a hardware interface can be used as a "virtual" axis.

Connections to the Euro 205x

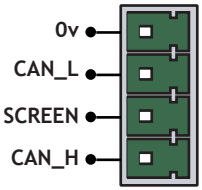


5 Volt Power Supply

The minimum connections to the Euro205x are just the 0V and 5V pins. The Euro205x is protected against reverse polarity on these pins. Application of more than 5.25 Volts will permanently damage the *Motion Coordinator* beyond economic repair. All the 0V are internally connected together and all the 5V pins are internally connected together. The 0V pins are, in addition, internally connected to the AGND pins. The Euro205x has a current consumption of approximately 500mA on the 5V supply. The supply should be filtered and regulated within 5%.

Built-in CAN Connector

The Euro205x features a built-in CAN channel. This is primarily intended for Input/Output expansion via Trio's P316 and P325 modules. It may be used for other purposes when I/O expansion is not required.



Euro 205x Backplane Connector

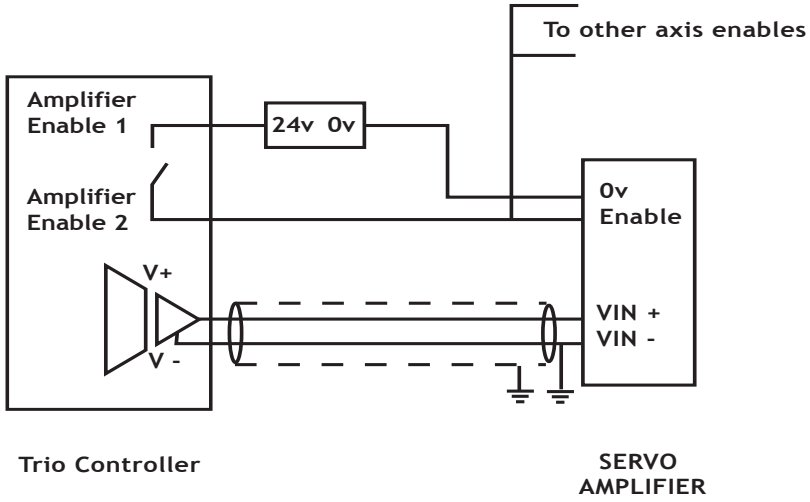
Most connections to the Euro205x are made via the 96 Way DIN41612 backplane Connector.

	C	B	A
1	5V	5V	5V
2	5V	5V	5V
3	0V	0V	0V
4	IO GND	OP13	OP10
5	OP9	OP12	OP15
6	OP8	OP11	OP14
7	IO 24V	IN0 / R0	IN1 / R1
8	IN2 / R2	IN3 / R3	IN4
9	IN5	IN6	IN7
10	IN8	IN9	IN10
11	IN11	IN12	IN13
12	IN14	0V	IN15
13	0V	DIR2	0V
14	STEP1	STEP2	DIR3
15	DIR0	DIR1	STEP3
16	STEP0	FAULT	RESET
17	ENABLE 1	ENABLE (OC)	AIN(0)
18	BOOST1	BOOST0	ENABLE 2
19	BOOST3	BOOST2	Z3- / BOOST3-
20	A3- / STEP3-	B3- / DIR3-	Z3+ / BOOST3+
21	A3+ / STEP3+	B3+ / DIR3+	Z2- / BOOST2-
22	A2- / STEP2-	B2- / DIR2-	Z2+ / BOOST2+
23	A2+ / STEP2+	B2+ / DIR2+	Z1- / BOOST1-
24	A1- / STEP1-	B1- / DIR1-	Z1+ / BOOST1+
25	A1+ / STEP1+	B1+ / DIR1+	Z0- / BOOST0-
26	A0- / STEP0-	B0- / DIR-	Z0+ / BOOST0+
27	A0+ / STEP0+	B0+ / DIR+	VOUT0
28	VOUT3	VOUT2	VOUT1
29	+12V	+12V	+12V
30	AGND	AGND	AGND
31	-12V	-12V	-12V
32	Earth	Earth	Earth

Amplifier Enable (Watchdog) Relay Output

An internal relay contact is used to enable external amplifiers when the controller has powered up correctly and the system and application software is ready. The amplifier enable is a solid-state relay on the Euro205x with normally open "contacts". The enable relay will be open circuit if there is no power on the controller OR a motion error exists on a servo axis OR the user program sets it open with the WDOG=OFF command.

The amplifier enable relay may, for example, be incorporated within a hold-up circuit or chain that must be intact before a 3-phase power input is made live.



Amplifier Enable Output

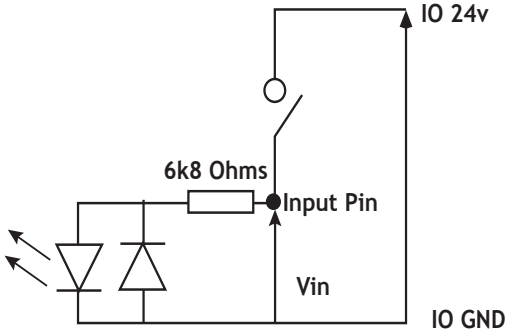
Note: *ALL STEPPER AND SERVO AMPLIFIERS MUST BE INHIBITED WHEN THE AMPLIFIER ENABLE OUTPUT IS OPEN CIRCUIT*

Amplifier Enable Open Collector Output

In addition to the relay, an open collector output is provided which goes on (pulls low) when the WDOG=ON command is executed. This output has the same specification as the step and direction OC signals and must be connected to a suitable pull-up or series resistor depending on the external circuit requirements.

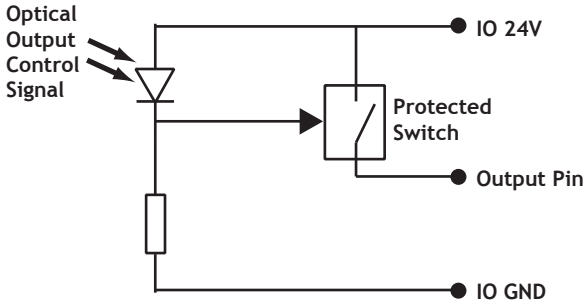
24V Input Channels

The *Motion Coordinator* has 16 24V Input channels built into the master unit. These may be expanded to 256 Inputs by the addition of CAN-16 I/O modules.



24V Output Channels

8 output channels are provided. These channels are labelled 8..15 for compatibility with other *Motion Coordinator*s, but are NOT bi-directional as on some *Motion Coordinator*s. Each channel has a protected 24V sourcing output. The output circuit has electronic over-current protection and thermal protection which shuts the output down when the current exceeds 250mA. Care should still be taken to ensure that the 250mA limit for the output circuit is not exceeded, and that the total load for the group of 8 outputs does not exceed 1 amp. Up to 256 further Outputs may be added by the addition of CAN-16I/O modules (P316).

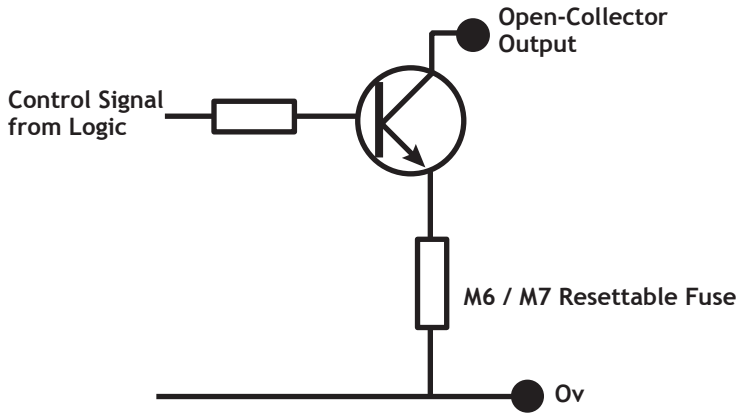


Open Collector Stepper Driver Outputs

The STEP, DIR, BOOST and ENABLE signals use open-collector outputs. These outputs are NOT opto-isolated from the processor logic. The open-collector outputs may be pulled up to any voltage in the range 5V...24V as required but a current limiting resistor MUST be provided externally to the Euro205x to limit the current in the output channel. Normally this current limiting resistor is built-in to the stepper amplifier circuit.

The BOOST output is provided for use in stepper motor systems, where the drive requires the controller to switch control of the motor current between a low holding torque current and the full step motion current. It is under the direct control of the BOOST command in Trio BASIC.

The open-collector outputs are protected by 2 resettable fuses. These fuse links will go high impedance if a total of more than 200mA is passed through a group of open-collector outputs. M6 protects STEP0, STEP1, STEP2, STEP3, DIR0, DIR1 and DIR2. M7 protects DIR3, BOOST0, BOOST1, BOOST2, BOOST3 and ENABLE. If any outputs are overloaded it is necessary to remove the power from the circuit in order to reset the fuses.



Fault and Reset Inputs

Fault is a non-isolated 5 Volt input for connection to stepper amplifier fault outputs. Signals connected to this input should NOT exceed 5 Volts.

The Reset input can be momentarily connected to 0V to reset the Euro205x. Signals connected to this pin must not exceed 5 Volts.

Registration Inputs

The registration inputs are 24 Volt isolated inputs that are shared with digital inputs 0 to 3. The Euro205x can be programmed to capture the position of an encoder axis in hardware when a transition occurs on the registration input.

Differential Encoder Inputs

The encoder inputs on the Euro205x are designed to be directly connected to 5 Volt differential output encoders. Incremental encoders can be connected to the ports.

The encoder ports are also bi-directional so that when axes are set to stepper, the encoder port for that axis becomes a Differential Stepper output.

Voltage Outputs

The Euro205x can generate up to 4 +/-10 Volt analogue outputs which are primarily designed for controlling servo-amplifiers. Note that for servo operation the necessary feature enable codes must have been entered into the Euro205x. However, the voltage outputs can be used seperately via the DAC command in Trio BASIC even when the axis is not enabled. To use the voltage outputs the +/-12 Volt supplies must be present.

Analogue Inputs

Two built-in 12 bit analogue inputs are provided which are set up with a scale of 0 to 10 Volts. In order to make external connection to these inputs, there is a 2 part molex connector behind the front panel. Pin 1 is nearest the CAN connector.

Pin 1	AIN(32)	Mating MOLEX connector part number
Pin 2	AIN(33)	Connector housing: 22-01-2035
Pin 3	0V	Crimp receptacles : 08-50-0032 (3 required)

In addition AIN(32) can be connected via pin A17 of the rear DIN41612 connector.

Using End of Travel Limit Sensors

Each axis of the *Motion Coordinator* system may have a 24V Input channel allocated to it for the functions:

FORWARD Limit	Forward end of travel limit
REVERSE Limit	Reverse end of travel limit
DATUM Input	Used in datuming sequence
FEEDHOLD Input	Used to suspend velocity profiled movements until the input is released

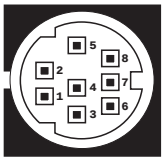
Switches used for the FORWARD/REVERSE/DATUM/FEEDHOLD inputs may be normally closed or normally open but the NORMALLY CLOSED type is recommended.

Each of the functions is optional and may be left unused if not required. Each of the 4 functions are available for each axis and can be assigned to any input channel in the range 0..31. An input can be assigned to more than one function if desired.

The axis parameters: **FWD_IN**,**REV_IN**, **DATUM_IN** and **FH_IN** are used to assign input channels to the functions. The axis parameters are set to -1 if the function is not required.

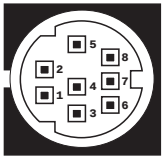
Euro 205x Serial Port Connections

Serial Connector A:



Pin	Function	Note
1	Internal 5V	
2	Internal 0V	
3	RS232 Transmit	Serial Port #0
4	RS232 GND	
5	RS232 Receive	
6	+5V output	Serial Port #3 / #4
7	Externally buffered output (TTL)	
8	Externally buffered input (TTL)	
On the MC224 pins 1,2,7 and 8 can be used to interface a fibre optic adapter. Note: Port 0 is the default programming port for connection to the PC running *Motion Perfect*.		

Serial Connector B:



Pin	Function	Note
1	RS485 Data In A Rx+	Serial Port #2
2	$\overline{\text{RS485 Data In}}$ B Rx-	
3	RS232 Transmit	Serial Port #1
4	RS232 GND	
5	RS232 Receive	
6	Internal 5V	Serial Port #2
7	$\overline{\text{RS485 Data Out}}$ Z Tx-	
8	RS485 Data Out Y Tx+	

Network Interconnection

The Euro 205x supports Trio's fibre-optic network with the optional P435 serial to fibre-optic adaptor connected to the appropriate serial connector.

The software for the network supports interconnection of up to 15 nodes in a token-ring network format. The nodes may consist of any combination of compatible master controllers and Trio Membrane Keypads.

Euro205x - Feature Summary

Size	170 mm x 129 mm Overall (160mm x 100 mm PCB) 25mm deep
Weight	170 g
Operating Temp.	0 - 45 degrees C
Control Inputs	Forward Limit, Reverse Limit, Datum Input, Feedhold Input.
Communication Ports	(2) RS232 channels: up to 38400 baud. (1) RS485 channel built in, (1) Serial adapter port. CANbus port (*DeviceNet* compatible).
Position Resolution	32 bit position count
Speed Resolution	32 bits. Speed may be changed at any time. Moves may be merged.
Interpolation modes	linear 1-5 axes, circular, helical, CAM Profiles, speed control, electronic gearboxes.
Programming	Multi-tasking Trio BASIC system, maximum 7 user tasks.
Servo Cycle	Programmable: 1ms, 500µs or 250µs.
Memory	512k battery-backed user memory. Entire contents may be flashed to EPROM.
Power Input	500mA at 5V d.c. (+/-12V at 50mA required for DAC output)
Amplifier Enable Output	Normally open solid-state relay. Maximim load 100mA, maximum voltage 29V.
Analogue Outputs	4 Isolated 16 bit +/- 10V
Analogue Inputs	2 x 12 bit 0 to 10V
Digital Inputs	16 Opto-isolated 24V inputs
Registration Inputs	4. One per axis shared with inputs 0 to 3.
Encoder Inputs	4 differential 5V inputs, 6MHz maximum edge rate
Stepper Outputs	4 differential (5V) or open collector (5 to 24V) step & direction outputs. Maximum frequency 500kHz (OC), 2MHz (Differential).
Digital I/O	8 Opto-isolated 24V current sourcing (PNP) 250 mA outputs

Motion Coordinator Euro209

Overview The *Motion Coordinator* Euro209 is a Eurocard stepper/servo positioners with the built-in ability to control up to 8 servo or stepper motors in any combination. In addition a single Trio Daughter Board may be fitted to allow the control of a ninth axis or communications channel. The Euro209 is designed to provide a powerful yet cost-effective control solution for OEM machine builders who are prepared to mount the unit and provide the power supplies required. It is designed to be configured and programmed for the application with Multi-tasking Trio BASIC using a PC, and then may be set to run "standalone" if an external computer is not required for the final system. The Multi-tasking version of Trio BASIC for the Euro209 allows up to 7 Trio BASIC programs to be run simultaneously on the controller using pre-emptive multi-tasking.

Programming The Multi-tasking ability of the Euro209 allows parts of a complex application to be developed, tested and run independently, although the tasks can share data and motion control hardware.

I/O Capability The Euro209 has 16 built in 24V inputs and 8 built-in output channels. These may be used for system interaction or may be defined to be used by the controller for end of travel limits, datuming and feedhold functions if required. 8 status LEDs are available which can be set to display the status of banks of inputs or outputs; (See **DISPLAY,** Chapter 8). The Euro209 can have up to 256 external Input/Output channels and up to 32 analogue input channels connected using DIN rail mounted I/O modules. These units connect to the built-in CAN channel of the Euro209.

Communications The Euro209 has one Ethernet port for primary communications, one RS-232 port and one RS-485 built in.

The Ethernet port, RS-232 port or the RS485 port may be configured to run the MODBUS protocol for PLC or HMI interfacing.

If the built-in CAN channel is not used for connecting I/O modules, it may optionally be used for CAN communications or DeviceNet.

A profibus daughter board may be fitted to provide additional communications options.

Removable Storage A micro SD card can be used with the Euro209 allows a simple means of transferring programs without a PC connection. Offering the OEM easy machine replication and servicing. The Euro209 supports SD cards up to 2Gbytes. Each Micro SD Card must be pre-formatted using a PC to FAT32 before it can be used in the SD Card Adaptor.

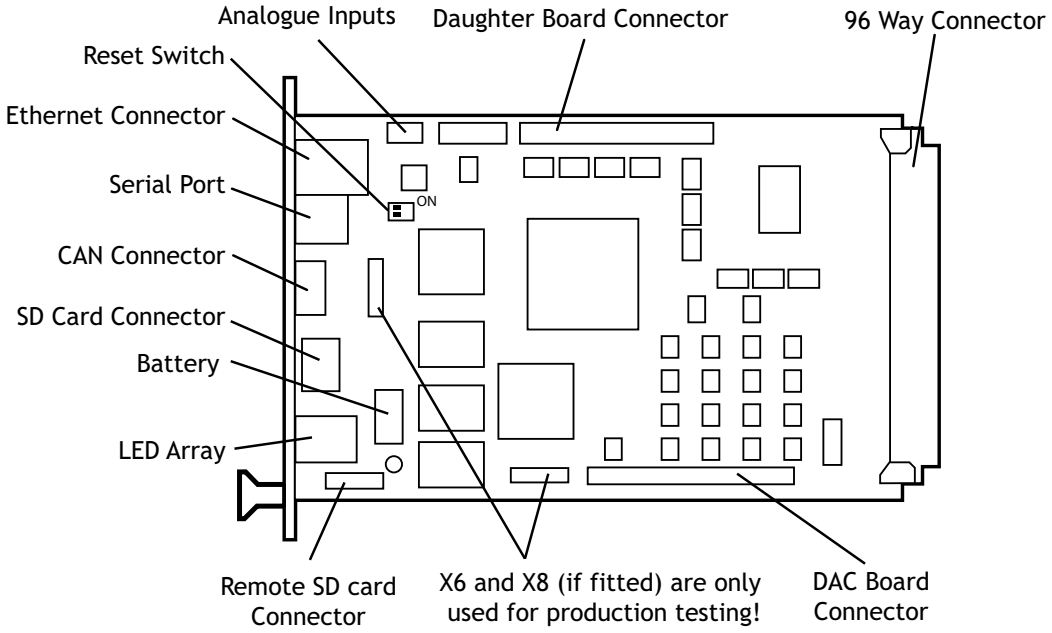
Axis Configuration

The default Euro209 configuration is as a two axis stepper base card. Additional servo or stepper axes may be specified up to the 8 internal axis limit. Four or eight axis DAC boards may be purchaced to enable servo outputs. In addition axes may be added in the field by the entry of "feature enable codes" into the controller. The codes can be purchased already installed into a new controller or may be ordered for controllers purchased earlier and added using Motion Perfect.

The gate array at the heart of the Euro209 design has facilities for 8 servo and 8 stepper axes built into every chip. The "feature enable codes" allow users to purchase only those facilities required for their configuration. Once entered onto the controller, the feature enable codes are stored in permanent flash memory. The feature enable codes are unique for each Euro209.

The Euro209 features a total of 16 axes in software. Any axes not having a hardware interface can be used as a "virtual" axis.

Connections to the Euro 209

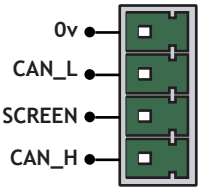


5 Volt Power Supply

The minimum connections to the Euro209 are just the 0V and 5V pins. The Euro209 is protected against reverse polarity on these pins. Application of more than 5.25 Volts will permanently damage the *Motion Coordinator* beyond economic repair. All the 0V are internally connected together and all the 5v pins are internally connected together. The 0V pins are, in addition, internally connected to the AGND pins. The Euro209 has a current consumption of approximately 500mA on the 5V supply. The supply should be filtered and regulated within 5%.

Built-in CAN Connector

The Euro209 features a built-in CAN channel. This is primarily intended for Input/Output expansion via Trio's P316 and P325 modules. It may be used for other purposes when I/O expansion is not required.



Euro 209 Backplane Connector

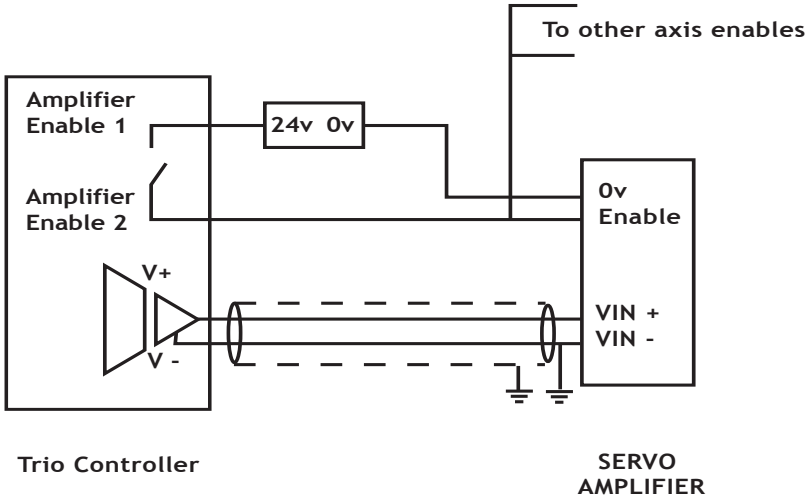
Most connections to the Euro209 are made via the 96 Way DIN41612 backplane Connector.

	C	B	A
1	5V	5V	5V
2	5V	5V	5V
3	0V	0V	0V
4	IO GND	OP13	OP10
5	OP9	OP12	OP15
6	OP8	OP11	OP14
7	IO 24V	IN0 / R0	IN1 / R1
8	IN2 / R2	IN3 / R3	IN4 / R4
9	IN5 / R5	IN6 / R6	IN7 / R7
10	IN8	IN9	IN10
11	IN11	IN12	IN13
12	IN14	0V	IN15
13	A7- / STEP7-	B7- / DIR7-	Z7- / BOOST7-
14	A7+ / STEP7+	B7+ / DIR7+	Z7+ / BOOST7+
15	A6- / STEP6-	B6- / DIR6-	Z6- / BOOST6-
16	A6+ / STEP6+	B6+ / DIR6+	Z6+ / BOOST6+
17	A5- / STEP5-	B5- / DIR5-	Z5- / BOOST5-
18	A5+ / STEP5+	B5+ / DIR5+	Z5+ / BOOST5+
19	A4- / STEP4-	B4- / DIR4-	Z4- / BOOST4-
20	A4+ / STEP4+	B4+ / DIR4+	Z4+ / BOOST4+
21	A3- / STEP3-	B3- / DIR3-	Z3- / BOOST3-
22	A3+ / STEP3+	B3+ / DIR3+	Z3+ / BOOST3+
23	A2- / STEP2-	B2- / DIR2-	Z2- / BOOST2-
24	A2+ / STEP2+	B2+ / DIR2+	Z2+ / BOOST2+
25	A1- / STEP1-	B1- / DIR1-	Z1- / BOOST1-
26	A1+ / STEP1+	B1+ / DIR1+	Z1+ / BOOST1+
27	A0- / STEP0-	B0- / DIR-	Z0- / BOOST0-
28	A0+ / STEP0+	B0+ / DIR+	Z0+ / BOOST0+
29	VOUT7 / AIN37	VOUT6 / AIN36	VOUT5 / AIN35
30	AGND	VOUT4 / AIN34	VOUT3
31	VOUT2	VOUT1	VOUT0
32	ENABLE1	ENABLE2	Earth

Amplifier Enable (Watchdog) Relay Output

An internal relay contact is used to enable external amplifiers when the controller has powered up correctly and the system and application software is ready. The amplifier enable is a solid-state relay on the Euro209 with normally open "contacts". The enable relay will be open circuit if there is no power on the controller OR a following error exists on a servo axis OR the user program sets it open with the WDOG=OFF command.

The amplifier enable relay may, for example, be incorporated within a hold-up circuit or chain that must be intact before a 3-phase power input is made live.

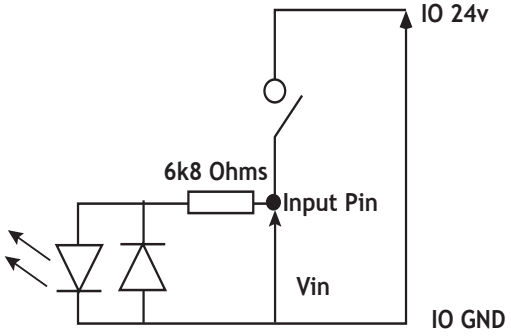


Amplifier Enable Output

Note: *ALL STEPPER AND SERVO AMPLIFIERS MUST BE INHIBITED WHEN THE AMPLIFIER ENABLE OUTPUT IS OPEN CIRCUIT*

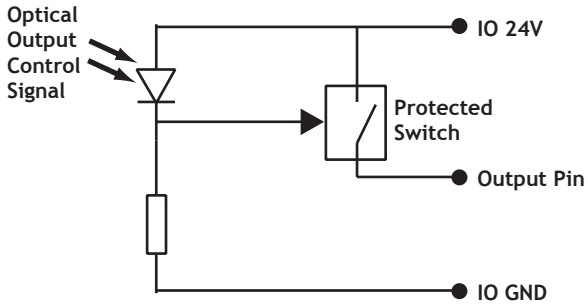
24V Input Channels

The *Motion Coordinator* has 16 24V Input channels built into the master unit. These may be expanded to 256 Inputs by the addition of CAN-16 I/O modules.



24V Output Channels

8 output channels are provided. These channels are labelled 8..15 for compatibility with other *Motion Coordinator*s, but are NOT bi-directional as on some *Motion Coordinator*s. Each channel has a protected 24v sourcing output. The output circuit has electronic over-current protection and thermal protection which shuts the output down when the current exceeds 250mA. Care should still be taken to ensure that the 250mA limit for the output circuit is not exceeded, and that the total load for the group of 8 outputs does not exceed 1 amp. Up to 256 further Outputs may be added by the addition of CAN-16I/O modules (P316).



Registration Inputs

The registration inputs are 24 Volt isolated inputs that are shared with digital inputs 0 to 7. The Euro209 can be programmed to capture the position of an encoder axis in hardware when a transition occurs on the registration input.

Differential Encoder Inputs

The encoder inputs on the Euro209 are designed to be directly connected to 5 Volt differential output encoders. Incremental encoders can be connected to the ports.

The encoder ports are also bi-directional so that when axes are set to stepper, the encoder port for that axis becomes a Differential Stepper output.

Voltage Outputs

The Euro209 can generate up to 8+/-10 Volt analogue outputs when fitted with the P184 or the P185 which are primarily designed for controlling servo-amplifiers. Note that for servo operation the necessary feature enable codes must have been entered into the Euro209. However, the voltage outputs can be used seperately via the DAC command in Trio BASIC even when the axis is not enabled.

Analogue Inputs

Two built-in 12 bit analogue inputs are provided which are set up with a scale of 0 to 10 Volts. In order to make connection to these inputs, there is a 2 part molex connector behind the front panel. Pin 1 is nearest the CAN connector. 4 additional 12 bit analogue inputs are available when the P184 expansion module is fitted to the PCB. These are accessed in software as AIN(34) to AIN(37) and the connections for the inputs are made through the DIN41612 main board connector.

Pin 1	AIN(32)
Pin 2	AIN(33)
Pin 3	0V

Mating MOLEX connector part number

Connector housing: 22-01-2035

Crimp receptacles : 08-50-0032 (3 required)

Using End of Travel Limit Sensors

Each axis of the *Motion Coordinator* system may have a 24v Input channel allocated to it for the functions:

FORWARD Limit	Forward end of travel limit
REVERSE Limit	Reverse end of travel limit
DATUM Input	Used in datuming sequence
FEEDHOLD Input	Used to suspend velocity profiled movements until the input is released

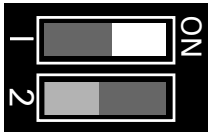
Switches used for the FORWARD/REVERSE/DATUM/FEEDHOLD inputs may be normally closed or normally open but the NORMALLY CLOSED type is recommended.

Each of the functions is optional and may be left unused if not required. Each of the 4 functions are available for each axis and can be assigned to any input channel in the range 0..31. An input can be assigned to more than one function if desired.

The axis parameters: **FWD_IN**,**REV_IN**, **DATUM_IN** and **FH_IN** are used to assign input channels to the functions. The axis parameters are set to -1 if the function is not required.

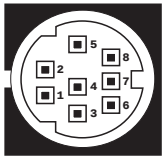
Ethernet Port Connection

Pysical layer: 10/100 baseT
Connector: RJ-45
Connection and activity LED indicators
Fixed IP address set up using the ETHERNET command (Chapter 8)
User settable subnet mask and default gateway
DHCP client: Not available (fixed IP only)



A switch is provided on the board to reset the IP address to a known value. To reset to the default value of 192.168.000.250, slide switch 1 to the right (ON) and power up the Euro209. Make connetion with the Euro209 using *Motion* Perfect on the default address and use the ETHERNET command to set the required IP address. e.g. for 192.168.000.123 set ETHERNET(1,-1,0,192,168,000,123). It also sets the following:
Subnet mask to 255.255.255.0
default gateway to 192.168.0.225
Once the IP address has been set, slide switch 1 to OFF and power down the Eurocard. The next time the Euro209 is powered up, the new IP address can be used.

Serial Connector B:



Pin	Function	Note
1	RS485 Data In A Rx+	Serial Port #2
2	$\overline{\text{RS485 Data In}}$ B Rx-	
3	RS232 Transmit	Serial Port #1
4	RS232 GND	
5	RS232 Receive	
6	Internal 5V	Serial Port #2
7	$\overline{\text{RS485 Data Out}}$ Z Tx-	
8	RS485 Data Out Y Tx+	

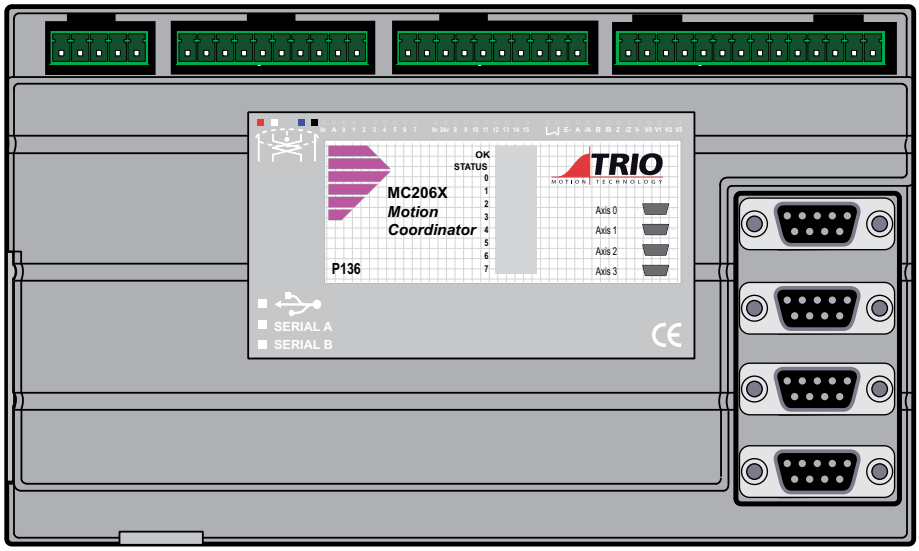
Euro 209 Serial Port Connections

Euro209 - Feature Summary

Size	170 mm x 129 mm Overall (160mm x 100 mm PCB) 25mm deep
Weight	160 g
Operating Temp.	0 - 45 degrees C
Control Inputs	Forward Limit, Reverse Limit, Datum Input, Feedhold Input.
Communication Ports	(1) RS232 channels: up to 38400 baud, (1) RS485 channel built in, CANbus port (*DeviceNet* compatible), (1) Ethernet 10/100baseT.
Position Resolution	32 bit position count
Speed Resolution	32 bits. Speed may be changed at any time. Moves may be merged.
Interpolation modes	Linear 1-16 axes, circular, helical, CAM Profiles, speed control, electronic gearboxes.
Programming	Multi-tasking Trio BASIC system, maximum 7 user tasks.
Servo Cycle	Programmable: 1ms, 500µs or 250µs.
Memory	1Mbyte battery-backed user memory. Entire contents may be flashed to EPROM.
Memory Stick	Socket for Micro SD Card. Used for storing programs and/or data.
Power Input	900mA at 5V d.c.
Amplifier Enable Output	Normally open solid-state relay. Maximim load 100mA, maximum voltage 29V.
Analogue Outputs	8 Isolated 16 bit +/-10V can be provided by P184 / P185
Analogue Inputs	2 x 12 bit 0 to 10V
Digital Inputs	16 Opto-isolated 24V inputs
Registration Inputs	8. One per axis shared with inputs 0 to 7.
Encoder Inputs	8 differential 5V inputs, 6MHz maximum edge rate
Stepper Outputs	8 Differential Step / Direction outputs 2MHz Max Rate
Digital Outputs	8 Opto-isolated 24V outputs. Current sourcing (PNP) 250 mA. (max. 1A per bank of 8)

Motion Coordinator MC206X

Overview The MC206X is based on Trio's high-performance 32-bit DSP technology and provides up to 4 axes of servo or stepper control, plus a master encoder axis. Trio uses advanced FPGA techniques to reduce the size and fit 4 axes of stepper and servo circuitry in a compact DIN-rail mounted package. The housing allows for a single daughter board to be mounted internally (with the optional P399 adaptor). This daughter board may provide additional axis control or communications functions.



User programs are written in Trio's established multi-tasking Trio BASIC language using the powerful *Motion* Perfect development software for the PC. Complex motion such as cams, gears, linked axes, and interpolation is made easy with the comprehensive Trio BASIC command set.

I/O Capability The MC206X has 16 opto-isolated digital I/O (8 in, 8 bi-directional). A high-speed hardware registration input is available on each axis for highly accurate control of print and packaging lines. A single 0..10V opto-isolated analogue input is built-in.

The I/O count can be expanded using Trio CANbus digital and analogue modules to provide a further 256 digital 24v I/O channels and 32 +/-10V analogue inputs.

Communications The MC206X offers wide communications capability with two RS-232 serial ports, an RS-485 port, a TTL serial port, a USB port and a CAN channel as standard. Adapters are available to convert the TTL port to Trio's fibre-optic network.

RS-232 port #1, or RS-485 port #2 may be configured to run the MODBUS protocol for PLC or HMI interfacing.

If the built-in CAN channel is not used for connecting I/O modules, it may optionally be used for CAN communications.

USB and Profibus daughter boards may be fitted to provide additional communications options.

Removable Storage

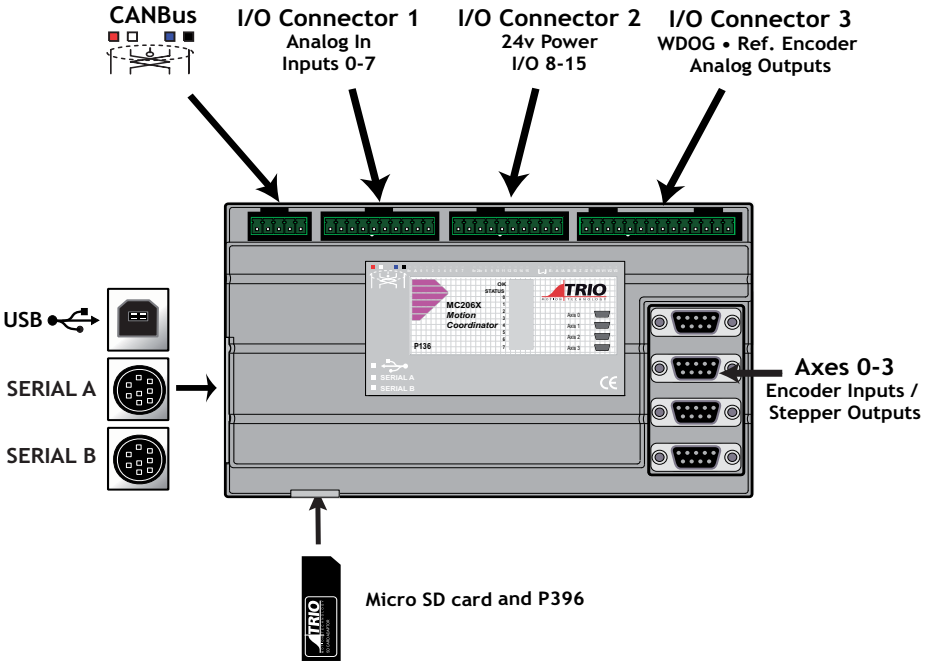
A memory adaptor used with the MC206X allows a simple means of transferring programs without a PC connection. Offering the OEM easy machine replication and servicing. The memory adaptor is compatable with a wide range of Micro SD cards up to 2Gbytes. Each Micro SD Card must be pre-formatted using a PC to FAT32 before it can be used in the SD Card Adaptor.
Order the SD Card Adaptor from a Trio supplier (order code: P396).
The adaptor does not include the Micro SD Card which must ne bought separately.

Axis Configuration

The MC206X initialises 8 axes in its software: up to four real axes of servo or stepper are built in, one daughter board axis may optionally be used, an encoder follower input axis is also built in to every MC206X. Any axis of the 8 not used in hardware can be used as a virtual axis for camming, on-the-fly registration adjustments, and linking motion.

The MC206X can be a servo or stepper controller by using a “feature enable code”. All necessary DAC and stepper circuitry is installed and ready for use. The controller can be supplied with any combination of servo or stepper axes pre-enabled, and has been designed to allow the user to upgrade at a later date by entering additional feature enable codes. Up to 4 axes can be enabled on the MC206X.

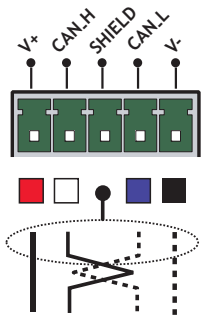
Connections to the MC206X



5-Way Connector

This is a 5 way 3.81mm pitch connector. The connector is used both to provide the 24 Volt power to the MC206X and provide connections for I/O expansion via Trio's P316 and P325 CAN I/O expanders. 24 Volts must be provided as this powers the unit.

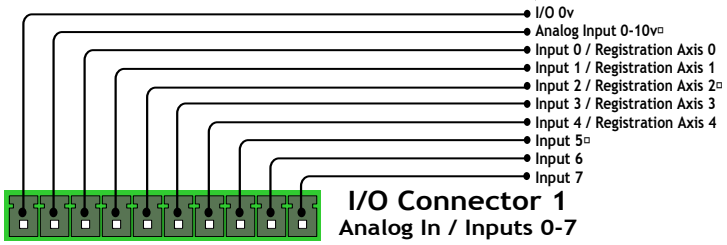
This 24 volt input is internally isolated from the I/O 24 Volts and the +/-10V voltage outputs.



Note: *The 24v (V+) and 0v (V-) MUST be connected as they power the MC206X. The Shield MUST also be connected as it provides the EMC screen for the Motion Coordinator. The CAN connections are optional.*

Power supply: 24V dc, Class 2 transformer or power source.

I/O Connector 1



Analogue Input

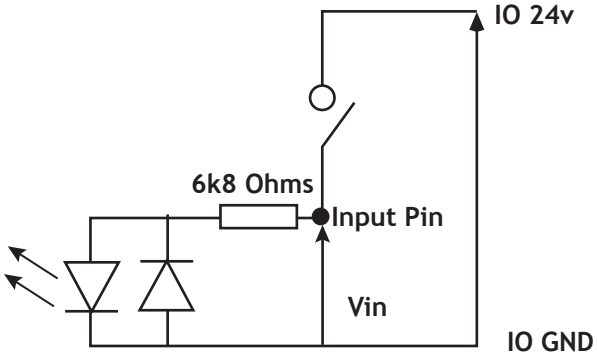
The MC206X provides a single 0-10v, 10-Bit analogue input as standard. The analogue input resolution is fixed and will return values 0..1023 to the system parameter **AIN0**. The input works "single ended" and is referenced to the IOGND pin alongside the AIN. Power must be applied to the 24V I/O power input in order for the analogue input to function.

It is possible to add further analogue inputs via the P325 CAN Analog modules. Each P325 module provides a further 8 single ended +/- 10V inputs with a 12 Bit resolution.

24V Input Channels

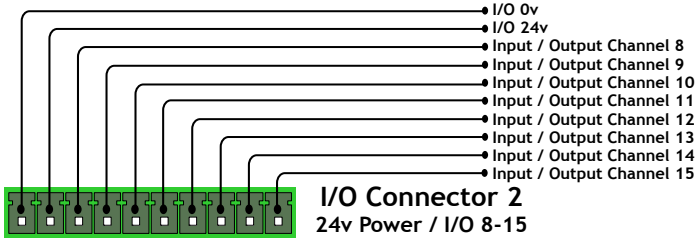
The MC206X has 8 dedicated 24V Input channels and 8 bi-directional 24V I/O channels built into the master unit. A further 256 inputs can be provided by the addition of CAN-16 I/O modules. The dedicated input channels are labelled channels 0..7.

Inputs 0 to 4 can be used as registration inputs for axes 0 to 4 for use with the **REGIST** command..



MC206X 24V Input Channel

I/O Connector 2



I/O Power Inputs

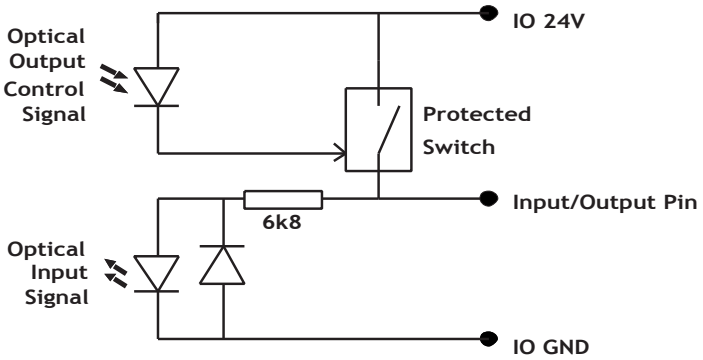
The I/O 0 Volts and I/O 24 Volts are used to power the 24 volt inputs and outputs.

The I/O connections are isolated from the module power inputs. The I/O channels are bi-directional and can be used either as an input or an output.

24V I/O Channels

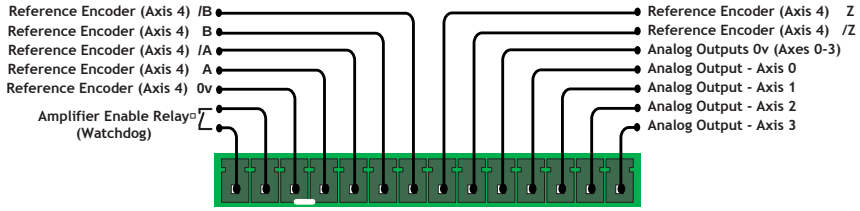
Input/output channels 8..15 are bi-directional. The inputs have a protected 24V sourcing output connected to the same pin. If the output is unused it may be used as an input in the program. The input circuitry is the same as on the dedicated inputs. The output circuit has electronic over-current protection and thermal protection which shuts the output down when the current exceeds 250mA.

Care should be taken to ensure that the 250mA limit for the output circuit is not exceeded, and that the total load for the group of 8 outputs does not exceed 1 amp.



MC206X 24V I/O Channel

I/O Connector 3

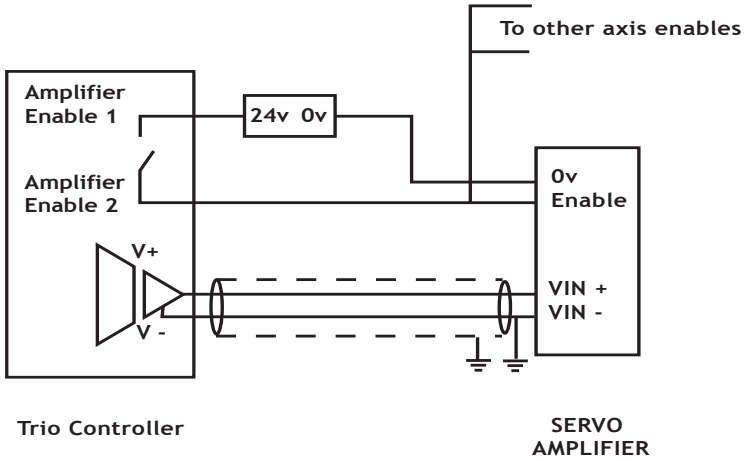


I/O Connector 3
WDOG / Ref. Enc. / Analog Outputs

Amplifier Enable (Watchdog) Relay Output

An internal relay contact is used to enable external amplifiers when the controller has powered up correctly and the system and application software is ready. The amplifier enable is a single pole relay with a set of normally open contacts. The enable relay contact will be open circuit if there is no power on the controller OR a following error exists on a servo axis OR the user program sets it open with the WDOG=OFF command.

The amplifier enable relay may, for example, be incorporated within a hold-up circuit or chain that must be intact before a 3-phase power input is made live.



Amplifier Enable Output

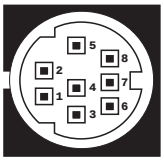
Note: *ALL STEPPER AND SERVO AMPLIFIERS MUST BE INHIBITED WHEN THE AMPLIFIER ENABLE OUTPUT IS OPEN CIRCUIT*

Reference Encoder Input

A reference encoder - axis 4, provides an encoder input facility for measurement, registration and synchronization functions on conveyors, drums, flying shears, etc. The encoder port features high speed differential receiver inputs.

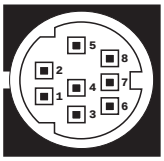
MC206X Serial Connections

Serial Connector A:



Pin	Function	Note
1	Internal 5V	
2	Internal 0V	
3	RS232 Transmit	Serial Port #0
4	RS232 GND	
5	RS232 Receive	
6	+5V output	
7	Externally buffered output (TTL)	Serial Port #3 / #4
8	Externally buffered input (TTL)	
On the MC206X pins 1,2,7 and 8 can be used to interface a fibre optic adapter. Note: Port 0 is the default programming port for connection to the PC running *Motion Perfect*.		

Serial Connector B:



Pin	Function	Note
1	RS485 Data In A Rx+	Serial Port #2
2	$\overline{\text{RS485 Data In}}$ B Rx-	
3	RS232 Transmit	Serial Port #1
4	RS232 GND	
5	RS232 Receive	
6	Internal 5V	Serial Port #2
7	$\overline{\text{RS485 Data Out}}$ Z Tx-	
8	RS485 Data Out Y Tx+	

Universal Serial Bus

The USB port provides a high-speed Universal Serial Bus link to a PC or other device supporting USB.

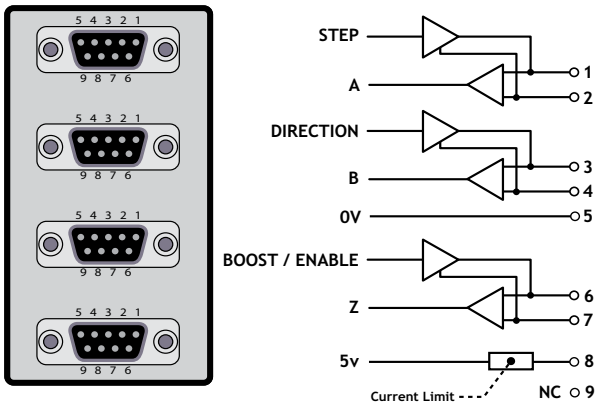
This port can be used for a high speed connection to *Motion* Perfect, or to a user program on the PC via Trio's ActiveX component.

MC206X - Stepper Outputs / Encoder Inputs

The MC206X controller is designed to support any combination of servo and stepper motors on the standard controller hardware. Each of the first four axes (0-3) can be enabled as either servo or stepper according to the users requirements.

The function of the 9-pin 'D' connectors will be dependant on the specific axis configuration which has been defined. If the axis is setup as a servo, the connector will provide the encoder input. If the axis is configured as a stepper, the connector provides differential outputs for step/direction and boost/enable signals.

The encoder port also provides a current-limited 5V output capable of powering most encoders. This simplifies wiring and eliminates external power supplies.



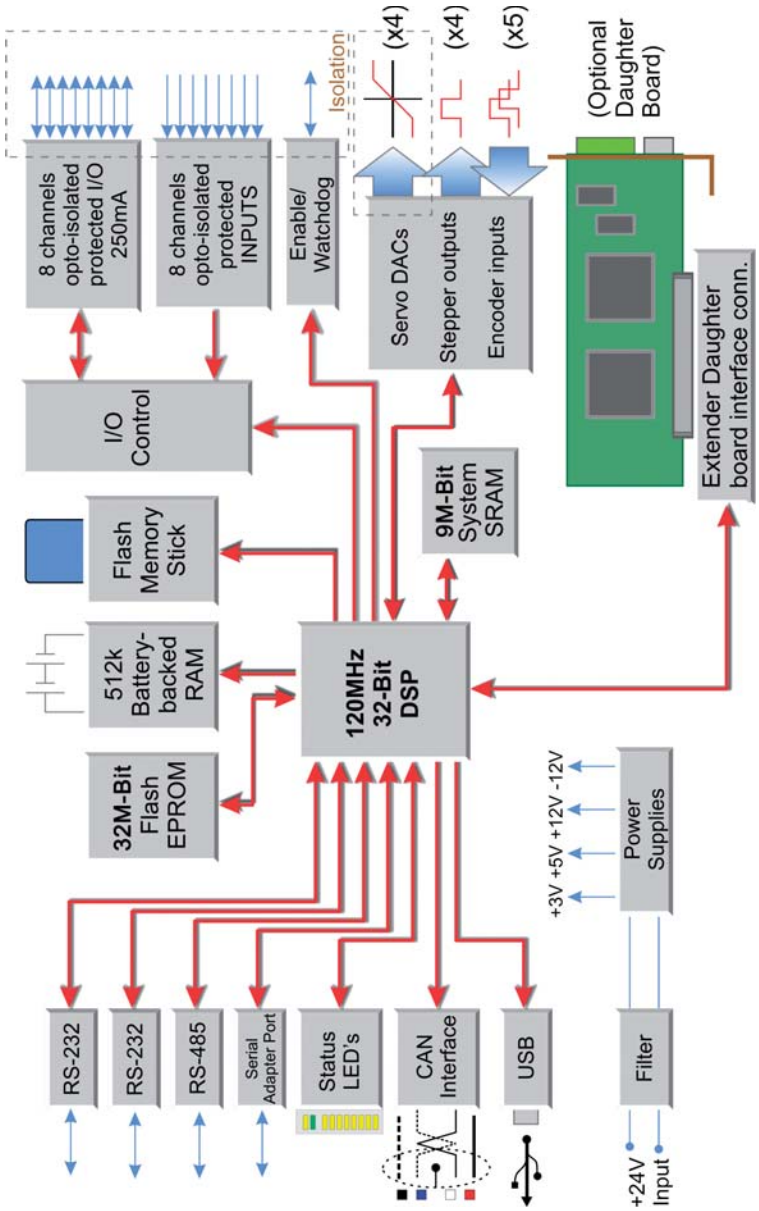
Once the axes have been enabled, using the **FEATURE_ENABLE** function, the controller will enable the appropriate hardware for each axis and the connector will function as below.

Pin	Servo Axis	Stepper Axis
1	Enc. A	Step +
2	Enc. /A	Step -
3	Enc. B	Direction +
4	Enc. /B	Direction -
5	GND	GND
6	Enc. Z	Boost +
7	Enc. /Z	Boost -
8	5V	5V
9	Not Connected	Not Connected
shell	Screen	Screen

MC206X - Feature Summary

Size	107mm(H) x 182mm(W) x 53mm(D)
Weight	325 g
Operating Temp.	0 - 45 degrees C
Control Inputs	Forward Limit, Reverse Limit, Datum Input, Feedhold Input.
Communication Ports	(2) RS232 channels: up to 38400 baud. (1) RS485 channel built in, (1) Serial adapter port. CANbus port (*DeviceNet* compatible), (1) USB 12Mb
Position Resolution	32 bit position count
Interpolation modes	linear 1-5 axes, circular, helical, CAM Profiles, speed control, electronic gearboxes.
Programming	Multi-tasking Trio BASIC system, maximum 8 user tasks.
Speed Resolution	32 bits. May be changed at any time. Moves may be merged for continuous motion.
Servo Cycle	250 µs minimum for all axes, 1 mS default
Memory	512k battery-backed user memory. Entire contents may be flashed to EPROM.
Memory Stick	Socket for plug-in "Nexflash Mediastick" or P396 Micro SD card adaptor. Used for storing programs and/or data.
Power Input	24V dc, Class 2 transformer or power source. 18 ... 29V dc at 300mA.
Amplifier Enable Output	Normally open solid state relay contact. Maximum voltage 24Vdc at 100mA.
Analogue Outputs	4 Isolated 16 bit +/- 10V
Analogue Input	Isolated 10 bit 0-10Vdc
Registration Inputs	4. One per axis shared with inputs 0 to 3.
Encoder Inputs	5 differential 5V inputs, 6MHz maximum edge rate
Digital Inputs	18 Opto-isolated 24V inputs.
Stepper Outputs	4 Differential Step / Direction outputs 2MHz Max Rate
Digital I/O	8 Opto-isolated 24V outputs. Current sourcing (PNP) 250 mA. (max. 1A per bank of 8)
Encoder Power Output	5v at 150mA total for 4 encoders plus daughter board

MC206X - Schematic



Motion Coordinator MC224

Overview The *Motion Coordinator* MC224 is Trio's most powerful modular servo control positioner with the ability to control servo or stepper motors in any combination by the insertion of "Axis Daughter Boards" to suit the application. Up to 24 axes can be controlled by means of Digital Bus links (e.g. SERCOS) or 16 axes via traditional analogue command / encoder feedback. It is housed in a rugged metal chassis and incorporates all the isolation circuitry necessary for direct connection to external equipment in an industrial environment. Filtered power supplies are included so that it can be powered from the 24V d.c. logic supply present in most industrial cabinets.

It is designed to be configured and programmed for the application using a PC running the *Motion* Perfect application software, and then may be set to run "standalone" if an external computer is not required for the final system.

The Multi-tasking version of Trio BASIC for the MC224 allows up to 14 Trio BASIC programs to be run simultaneously on the controller using pre-emptive multi-tasking.

Programming The Multi-tasking ability of the MC224 allows parts of a complex application to be developed, tested and run independently, although the tasks can share data and motion control hardware.

I/O Capability The MC224 has 8 built in 24v inputs and 8 bi-directional I/O channels. These may be used for system interaction or may be defined to be used by the controller for end of travel limits, datuming and feedhold functions if required. Each of the Input/Output channels has a status LED to make it easy to check them at a glance. The MC224 can have up 256 external Input/Output channels connected using DIN rail mounted CAN 16-I/O modules. These units connect to the built-in CAN channel.

Communications The MC224 has two built in RS-232 ports and one built in duplex RS-485 channel for simple factory communication systems. The TRIO fibre optic network system can be added with an optional adapter cable.

One of the RS-232 ports or the RS485 port may be configured to run the MODBUS protocol for PLC or HMI interfacing.

If the built-in CAN channel is not used for connecting I/O modules, it may optionally be used for CAN communications. e.g. DeviceNet, CANopen etc.

Ethernet, CANbus and Profibus daughter boards may be fitted to provide additional communications options.

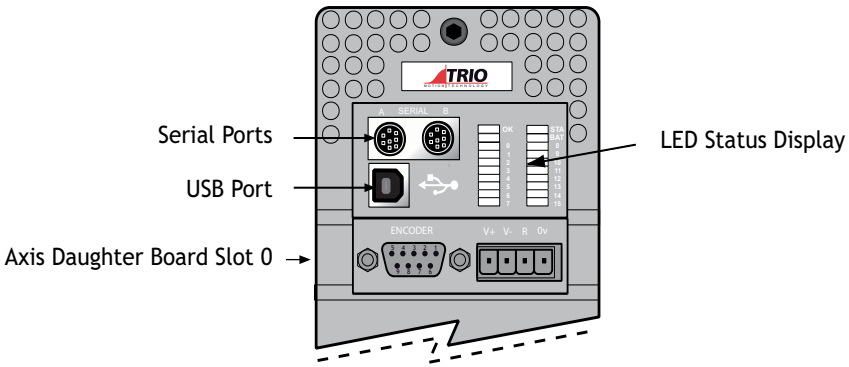
Removable Storage A memory adaptor used with the MC224 allows a simple means of transferring programs without a PC connection. Offering the OEM easy machine replication and servicing. The memory adaptor is compatable with a wide range of Micro SD cards up to 2Gbytes and is ordered separately from the MC224 if required (order code: P396).

Axis Positioning Functions The motion control generation software receives instructions to move an axis or axes from the Trio BASIC language which is running concurrently on the same processor. The motion generation software provides control during operation to ensure smooth, coordinated movements with the velocity profiled as specified by the controlling program. Linear interpolation may be performed in as many axes as the controller provides, and circular or helical interpolation in any two orthogonal axes. Each axis may run independently or they may be linked in any combination using interpolation, CAM profile or the electronic gearbox facilities.

Consecutive movements may be merged to produce continuous path motion and the user may program the motion using programmable units of measurement (e.g. mm, inches, revs etc.). The module may also be programmed to control only the axis speed. The positioner checks the status of end of travel limit switches which can be used to cancel moves in progress and alter program execution.

Note: The MC224 incorporates a user replaceable battery for the battery back-up RAM. For replacement, use battery model CR2450 or equivalent.

Connections to the MC224



MC224 upper front panel

MC224 Serial Connections

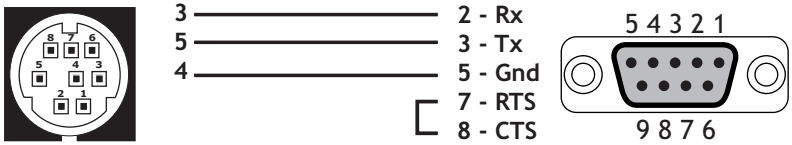
The MC224 features two serial connectors. Both connectors have a standard RS-232 serial interface. In addition, the left-hand connector (skt A) has connections for the Fibre-Optic Adapter and skt B contains the RS-485 multi-drop terminals (addressed as port 2).

Below the serial port connectors is the built in USB port.

Port 0 is the default connection between the *Motion Coordinator* and the host PC running *Motion* Perfect for programming. As an option, *Motion* Perfect may be connected via USB.

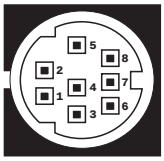
Serial Cables

Trio recommend the use of their pre-made serial cables (product code P350). If cables need to be made to connect to a PC serial port the following connections are required:



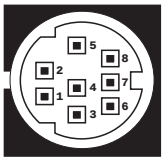
Motion Coordinator to 'AT' style PC with 9pin serial connector

Serial Connector A:



Serial Connector 0:		
Pin	Function	Notes
1	Internal 5V	
2	Internal 0V	
3	RS232 Transmit	Serial Port #0
4	RS232 Ground	
5	RS232 Receive	
6	+5V Output	Serial Port #3 / #4
7	Externally buffered output (TTL)	
8	Externally buffered input (TTL)	
On the MC224 pins 1,2,7 and 8 can be used to interface a fibre optic adapter. Note: Port 0 is the default programming port for connection to the PC running *Motion Perfect*.		

Serial Connector B:



Serial Connector 1		
Pin	Function	Note
1	RS485 Data in A Rx+	Serial Port #2
2	RS485 Data in B Rx-	
3	RS232 Transmit	Serial Port #1
4	RS232 Ground	
5	RS232 Receive	
6	+5V Output	Serial Port #2
7	RS485 Data out Z Tx-	
8	RS485 Data out Y Tx+	

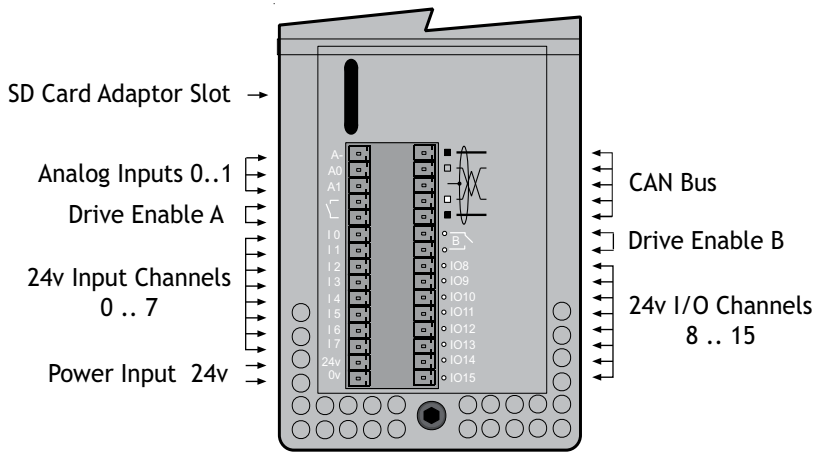
There is no hardware handshake on the serial ports. An XON/XOFF protocol is used.

Network Interconnection

The optional Fibre-Optic Network connection is designed for communication between the master modules and membrane keypads on large machines, or small workgroups of machines.

The software for the network supports interconnection of up to 15 nodes in a token-ring network format. The nodes may consist of any combination of compatible master controllers and Trio Membrane Keypads.

Note: Any membrane keypads connected must have software version 2.01 or higher.



MC224 lower front panel

24V Power Supply Input

The MC224 is powered entirely via the 24v d.c.supply connections. The unit uses internal DC-DC converters to generate independent 5V logic supply, the encoder 5V supply and other internal power supplies.

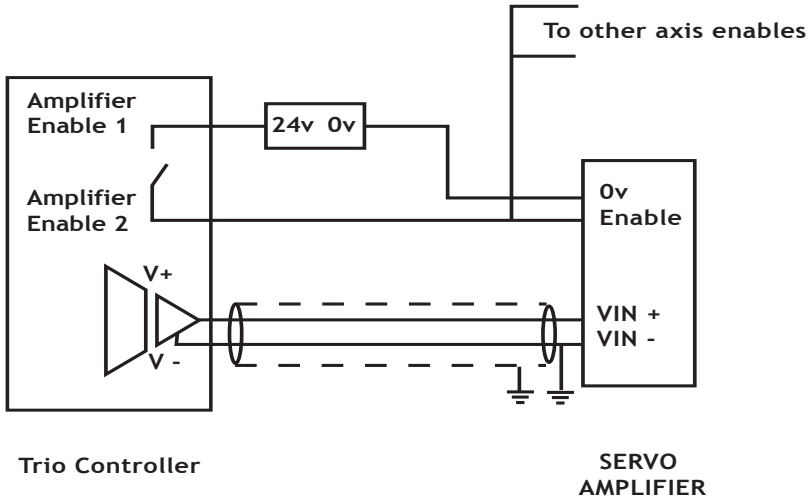
Note: *24V dc, Class 2 transformer or power source.*

Amplifier Enable (Watchdog) Relay Outputs

Two internal relay contacts are available to enable external amplifiers when the controller has powered up correctly and the system and application software is ready. The amplifier enables A and B are solid-state relays with an ON resistance of 25 ohms at 100mA. The enable relay will be open circuit if there is no power on the controller OR a following error exists on a servo axis OR the user program sets it open with the WDOG=OFF command.

The amplifier enable relay may, for example, be incorporated within a hold-up circuit or chain that must be intact before a 3-phase power input is made live.

Note: *ALL STEPPER AND SERVO AMPLIFIERS MUST BE INHIBITED WHEN THE AMPLIFIER ENABLE OUTPUTS ARE OPEN CIRCUIT*

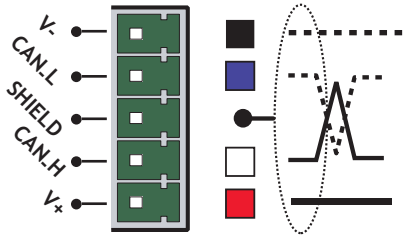


Amplifier Enable Output

CAN Bus:

The MC224 features a built-in CAN channel. This is primarily intended for Input/Output expansion via Trio's P316 and P325 modules. It may be used for other purposes when I/O expansion is not required.

The CANbus port is electrically equivalent to a *DeviceNet* node.



Analogue Inputs

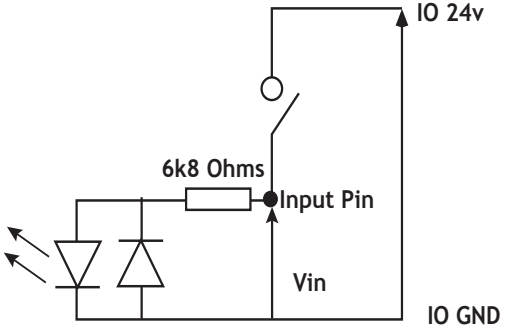
Two built-in 12 bit analogue inputs are provided which are set up with a scale of 0 to 10 Volts. External connection to these inputs is via the 2-part screw terminal strip on the lower front panel. The connections are labelled A-, A0 and A1.

24V dc must be applied to the CANbus port to provide power for the analogue input circuit.

24V Input Channels

The *Motion Coordinator* has 16 24V Input channels built into the master unit. These may be expanded to 256 Inputs by the addition of CAN-16 I/O modules.

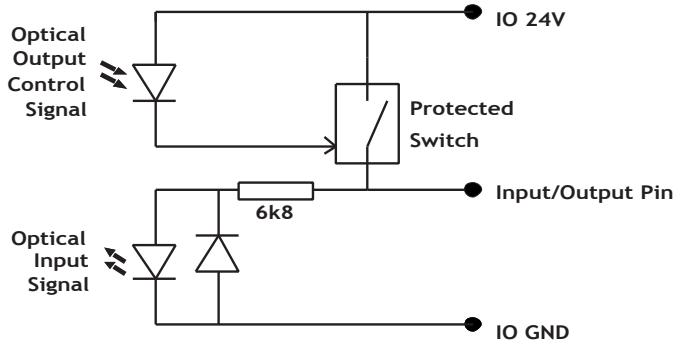
All of the 24V input channels have the same circuit although 8 on the master unit have 24V Output channels connected to the same pin. These bi-directional channels may be used for Input or Output to suit the application. If the channel is to be used as an Input the output should not be switched on in the program.



24V I/O Channels

Input/output channels 8..15 are bi-directional. The inputs have a protected 24V sourcing output connected to the same pin. If the output is unused it may be used as an input in the program. The input circuitry is the same as on the dedicated inputs. The output circuit has electronic over-current protection and thermal protection which shuts the output down when the current exceeds 250mA.

Care should be taken to ensure that the 250mA limit for the output circuit is not exceeded, and that the total load for the group of 8 outputs does not exceed 1 amp.



MC224 - Feature Summary

Size	262 mm x 68 mm x 198 mm (HxWxD)
Weight	750 g
Operating Temp.	0 - 45 degrees C
Storage Temperature	-20 - +65 degrees C
Control Inputs	Forward Limit, Reverse Limit, Datum Input, Feedhold Input.
Communication Ports	(2) RS232 channels: up to 38400 baud. (1) RS485 channel built in, (1) Serial adapter port. CANbus port (*DeviceNet* compatible), (1) USB 12Mb
Position Resolution	32 bit position count
Speed Resolution	32 bits. Speed may be changed at any time. Moves may be merged.
Servo Cycle	250 µs minimum for all axes, 1 mS default
Programming	Multi-tasking TRIO BASIC system, maximum 14 user tasks.
Interpolation modes	Linear 1-24 axes, circular, helical, CAM Profiles, speed control, electronic gearboxes.
Memory	1 Mbyte battery-backed user menory. 1 Mbyte TABLE memory. Flash EPROM program storage.
Memory Stick	Socket for plug-in “Nexflash Mediastick” or P396 Micro SD card adaptor. Used for storing programs and/or data.
Power Input	24V dc, Class 2 transformer or power source. 18..29V dc at 450mA typical. Maximum: 800 mA + digital output current.
Amplifier Enable Output	2 Normally open solid-state relays rated 24V ac/dc nominal. Maximum load 100mA. Maximum voltage 29V.
Analogue Inputs	2 isolated x 12 bit 0 to 10V.
Encoder Power Output	5v at 600mA total for 4 encoders via daughter boards. Maximum 150mA per daughter board.
Digital Inputs	8 Opto-isolated 24V inputs.
Digital I/O	8 Opto-isolated 24V outputs. Current sourcing (PNP) 250 mA. (max. 1A per bank of 8)