

600 Series Hardware Reference Manual



Motion Controller Card

This card is an easy-to-use, plug-and-play and cost effective solution for single and multi-axis motion control applications. It may be used as a stand-alone unit or may be commanded by an external device.

These series supports up to 4 axes of motion, 16 TTL / CMOS compatible inputs, 16 TTL / CMOS compatible outputs, 3 analog inputs, and up to five optical encoder inputs. The command port is provided for stand-alone operation.

The powerful programming instructions with more than 120 commands include motion control, system configuration, data flow, program flow commands, 32-bit logical and mathematical operations, and other miscellaneous instructions.

These cards can also be operated using an analog joystick or a trackball with quadrature outputs. The speed of the motor is proportional to the tilt angle of the joystick or the rotational speed of the trackball. The joystick has three speed selection keys; fast, medium and slow speed.

The card may be controlled in different ways;

1) Stand-alone

In this mode, the controller does not need an external device such as a PC to operate. The controller is programmed in a simple programming language. The code is developed, downloaded to the controller, run and saved in the controller's non-volatile memory using the supplied Integrated Development Environment (IDE) software.

2) Externally Controlled

In this mode, the external host such as a PC, micro-controller or PLC sends a series of commands to the controller via the RS-232 serial port. The controller processes and performs the incoming commands and responds with proper messages.

3) Control Panel

The supplied user friendly Control Panel software allows the user to set-up the module quickly. The operator is able to move the mechanism to different positions by pressing the corresponding buttons of the Control Panel or by using the joystick and/or trackball.

Modes of motion include point-to-point positioning, jogging, contouring, electronic gearing, and electronic cam.

Features

- Compact
- Plug-and-Play
- Quick and Easy to Install
- Very Compact and Easy to Use
- Low Power Consumption, High Torque Motors, High Speed Capability
- Easy Programming Language, No Compiler or Assembler Required
- Programmable, Teachable or Manual Control
- Different Modes of Operation:
 - 1) Host Controlled
 - 2) Stand-alone, No PC Required to Operate
 - 3) Joystick / Trackball Controlled
- Optical Encoder Feedback

Software

- Easy System Setup and Evaluation
- Menu Driven
- Free Software Included

TECHNICAL DATA

Modes of Motion

- Point-to-Point Positioning
- Jogging

Supported No. Of Axes

- Up to 4 Axes

Range of Motion Parameters

- Position: +/- 2147483648 Counts
- Velocity: 200 - 200 KHz
- Acceleration: 40,000 - 40 Million Counts / sec²

Communication Interface

- RS-232 Interface

Software

- Easy System Setup and Evaluation
- Menu Driven

Joystick

- Single Handed 2 or 3-axis Control
- Motor Speed Proportional to the Tilt Angle
- Three Speed Selection Keys
- Long Life

Trackball

- Precision Positioning
- Long Life

Dedicated Inputs

- Positive and Negative Limit Switches per Axis
- Home Switch per Axis
- CONTINUE, END, RUN, STOP, and UPLOAD-and-RUN for Stand-alone Mode Operation

Dedicated Outputs²

- Step, Direction, and Driver Enable Outputs per Axis
- Status LED Output

General Purpose Digital Input / Output

- 16 TTL / CMOS Inputs
- 16 TTL / CMOS Outputs
- Up to Five Optical Encoder Inputs

General Purpose Analog Input

- 3 Inputs
- 8 Bits of Resolution
- Adjustable Gain
- Offset Adjustment Potentiometer for each Input

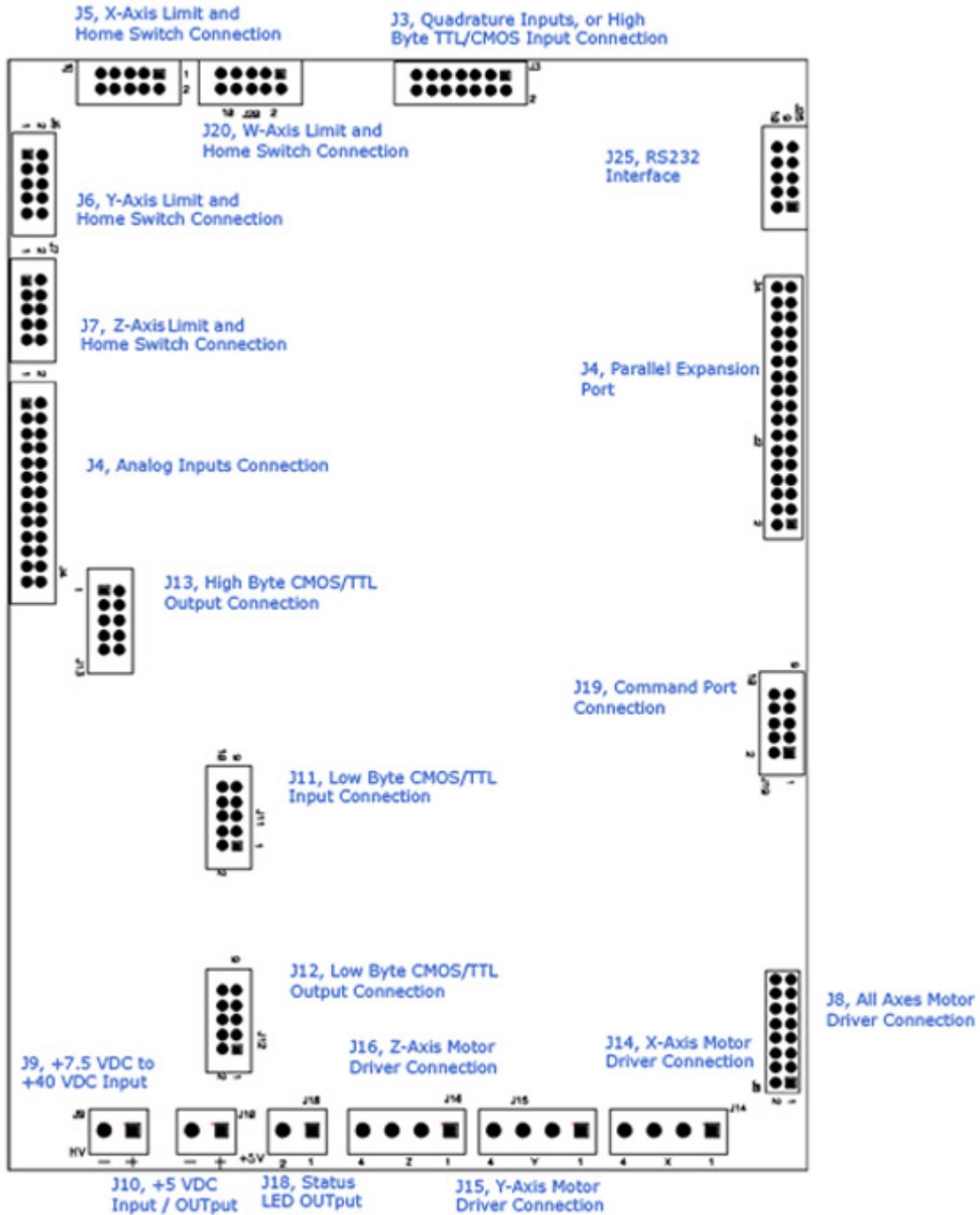
Memory

- Up to 448 Kbytes of Non-volatile Memory
- 22 General Purpose Variables, 32 Bits of Resolution
- 7500 Bytes of Program Memory

Power Requirement

- +5 VDC **or** +7.5 to +40 VDC
- 2 Watts Power Consumption

Connections



Pin Assignment and Description

J10, +5 VDC Input / Output

Screw Terminal Type

PIN	NAME	DESCRIPTION
1	+5 VDC	+5 VDC Input @ 400 ma
2	GND	+5 VDC Return

J9, +7.5 to +40 VDC Input

Screw Terminal Type

PIN	NAME	DESCRIPTION
1	HIGHVOLT	+7.5 to +40 VDC Input
2	HIGHVOLT-RTN	+7.5 to +40 VDC Return

Please note that that only one of the above voltages is required for operation of the module.

J18, Status LED Output

Screw Terminal Type

PIN	NAME	DESCRIPTION
1	+5 VDC	+5 VDC Output
2	STATUS-LED	Status LED Output Open Collector

J14, X-Axis Motor Driver Connection

Screw Terminal Type

PIN	NAME	DESCRIPTION
1	+5 VDC	+5 VDC Output
2	STEP-X	Step Pulse Output, 50 % Duty Cycle CMOS level signals, 20 mA sink and source capability, +5 VDC
3	DIR-X	Direction Output CMOS level signals, 20 mA sink and source capability, +5 VDC
4	DIS-X	Disable Output, Active Low CMOS level signals, 40 mA sink and source capability, +5 VDC

J5, X-Axis Limit and Home Switch Connection

0.1" (2.54 mm) Pitch Header

PIN	NAME	DESCRIPTION
1	POS-LIMIT-X *	Positive Limit Switch Input, Active High
2	+5 VDC	+5 VDC
3	GND	+5 VDC Return
4	HOME-X **	Home Switch Input, Active High
5	+5 VDC	+5 VDC
6	GND	+5 VDC Return
7	NEG-LIMIT-X *	Negative Limit Switch Input, Active High
8	+5 VDC	+5 VDC
9	GND	+5 VDC Return
10	NC	No Connection

* A normally closed switch should be placed between this pin and GND.

** A normally closed switch should be placed between this pin and GND, if necessary.
A 10 KOHM pull-up resistor is placed between all inputs and +5 VDC.

J15, Y-Axis Motor Driver Connection

Screw Terminal Type

PIN	NAME	DESCRIPTION
1	+5 VDC	+5 VDC Output
2	STEP-Y	Step Pulse Output, 50 % Duty Cycle CMOS level signals, 20 mA sink and source capability, +5 VDC
3	DIR-Y	Direction Output CMOS level signals, 20 mA sink and source capability, +5 VDC
4	DIS-Y	Disable Output, Active Low CMOS level signals, 40 mA sink and source capability, +5 VDC

J6, Y-Axis Limit and Home Switch Connection

0.1" (2.54 mm) Pitch Header

PIN	NAME	DESCRIPTION
1	POS-LIMIT-Y *	Positive Limit Switch Input, Active High
2	+5 VDC	+5 VDC
3	GND	+5 VDC Return
4	HOME-Y **	Home Switch Input, Active High
5	+5 VDC	+5 VDC
6	GND	+5 VDC Return
7	NEG-LIMIT-Y *	Negative Limit Switch Input, Active High
8	+5 VDC	+5 VDC
9	GND	+5 VDC Return
10	NC	No Connection

* A normally closed switch should be placed between this pin and GND.

** A normally closed switch should be placed between this pin and GND, if necessary.
A 10 KOHM pull-up resistor is placed between all inputs and +5 VDC.

J16, Z-Axis Motor Driver Connection

Screw Terminal Type

PIN	NAME	DESCRIPTION
1	+5 VDC	+5 VDC Output
2	STEP-Z	Step Pulse Output, 50 % Duty Cycle CMOS level signals, 20 mA sink and source capability, +5 VDC
3	DIR-Z	Direction Output CMOS level signals, 20 mA sink and source capability, +5 VDC
4	DIS-Z	Disable Output, Active Low CMOS level signals, 40 mA sink and source capability, +5 VDC

J7, Z-Axis Limit and Home Switch Connection

0.1" (2.54 mm) Pitch Header

PIN	NAME	DESCRIPTION
1	POS-LIMIT-Z *	Positive Limit Switch Input, Active High
2	+5 VDC	+5 VDC
3	GND	+5 VDC Return
4	HOME-Z **	Home Switch Input, Active High
5	+5 VDC	+5 VDC
6	GND	+5 VDC Return
7	NEG-LIMIT-Z *	Negative Limit Switch Input, Active High
8	+5 VDC	+5 VDC
9	GND	+5 VDC Return
10	NC	No Connection

* A normally closed switch should be placed between this pin and GND.

** A normally closed switch should be placed between this pin and GND, if necessary.
A 10 KOHM pull-up resistor is placed between all inputs and +5 VDC.

J8, All Axes Motor Driver Connection

0.1" (2.54 mm) Pitch Header

PIN	NAME	DESCRIPTION
1	+5 VDC	+5 VDC Output
2	STEP-X	Step Pulse Output, 50 % Duty Cycle
3	DIS-X	Disable Output, Active Low
4	DIR-X	Direction Output
5	+5 VDC	+5 VDC Output
6	STEP-Y	Step Pulse Output, 50 % Duty Cycle
7	DIS-Y	Disable Output, Active Low
8	DIR-Y	Direction Output
9	+5 VDC	+5 VDC Output
10	STEP-Z	Step Pulse Output, 50 % Duty Cycle
11	DIS-Z	Disable Output, Active Low
12	DIR-Z	Direction Output
13	+5 VDC	+5 VDC Output
14	STEP-W	Step Pulse Output, 50 % Duty Cycle
15	DIS-W	Disable Output, Active Low
16	DIR-W	Direction Output

J20, W-Axis Limit and Home Switch Connection

0.1" (2.54 mm) Pitch Header

PIN	NAME	DESCRIPTION
1	POS-LIMIT-W *	Positive Limit Switch Input, Active High
2	+5 VDC	+5 VDC
3	GND	+5 VDC Return
4	HOME-W *	Home Switch Input, Active High
5	+5 VDC	+5 VDC
6	GND	+5 VDC Return
7	NEG-LIMIT-W *	Negative Limit Switch Input, Active High
8	+5 VDC	+5 VDC
9	GND	+5 VDC Return
10	NC	No Connection

* A normally closed switch should be placed between this pin and GND.

** A normally closed switch should be placed between this pin and GND, if necessary.
A 10 KOHM pull-up resistor is placed between all inputs and +5 VDC.

J4, Analog Joystick Interface

0.1" (2.54 mm) Pitch Header

PIN	NAME	DESCRIPTION
1	ANALOG-X	Analog-X Input
2	NC	No Connection
3	ANALOG-Y	Analog-Y Input
4	ANALOG-Z	Analog-Z Input
5	HIGH-SPEED	High Speed Selection Input
6	GND	+5 VDC Return
7	MEDIUM-SPEED	Medium Speed Selection Input
8	GND	+5 VDC Return
9	LOW-SPEED	Low Speed Selection Input
10	GND	+5 VDC Return
11	SPARE	SPARE key of Joystick
12	+5 VDC	+5 VDC
13	NC	No Connection
14	+5 VDC	+5 VDC
15	NC	No Connection
16	+5 VDC	+5 VDC
17	NC	No Connection
18	OUTBIT9	Discrete Output 9
19	OUTBIT10	Discrete Output 10
20	OUTBIT11	Discrete Output 11
21	OUTBIT12	Discrete Output 12
22	OUTBIT13	Discrete Output 13
23	OUTBIT14	Discrete Output 14
24	OUTBIT15	Discrete Output 15
25	OUTBIT16	Discrete Output 16

26**NC**

No Connection

All outputs are CMOS level signals, 10 mA sink and source capability, +5 VDC.

J13, Discrete Output Connection

0.1" (2.54 mm) Pitch Header

PIN	NAME	DESCRIPTION
1	OUTBIT9	Discrete Output 9
2	OUTBIT10	Discrete Output 10
3	OUTBIT11	Discrete Output 11
4	OUTBIT12	Discrete Output 12
5	OUTBIT13	Discrete Output 13
6	OUTBIT14	Discrete Output 14
7	OUTBIT15	Discrete Output 15
8	OUTBIT16	Discrete Output 16
9	GND	+5 VDC Return
10	+5 VDC	+5 VDC

All outputs are CMOS level signals, 10 mA sink and source capability, +5 VDC.

J11, Discrete Input Connection

0.1" (2.54 mm) Pitch Header

PIN	NAME	DESCRIPTION
1	INBIT1	Discrete Input 1
2	INBIT2	Discrete Input 2
3	INBIT3	Discrete Input 3
4	INBIT4	Discrete Input 4
5	INBIT5	Discrete Input 5
6	INBIT6	Discrete Input 6
7	INBIT7	Discrete Input 7
8	INBIT8	Discrete Input 8
9	GND	+5 VDC Return
10	+5 VDC	+5 VDC

A 10 KOHM pull-up resistor is placed between all inputs and +5 VDC.

J12, Discrete Output Connection

0.1" (2.54 mm) Pitch Header

PIN	NAME	DESCRIPTION
1	OUTBIT1	Discrete Output 1
2	OUTBIT2	Discrete Output 2
3	OUTBIT3	Discrete Output 3
4	OUTBIT4	Discrete Output 4
5	OUTBIT5	Discrete Output 5
6	OUTBIT6	Discrete Output 6
7	OUTBIT7	Discrete Output 7
8	OUTBIT8	Discrete Output 8
9	GND	+5 VDC Return
10	+5 VDC	+5 VDC

All outputs are CMOS level signals, 10 mA sink and source capability, +5 VDC.

J19, Command Port Connection

0.1" (2.54 mm) Pitch Header

PIN	NAME	DESCRIPTION
1	STOP *	STOP Motion on all axes
2	END *	END the running program
3	RECALL-and-RUN *	RECALL and RUN the code
4	RUN *	RUN the code
5	CONT *	CONTInue execution of the code
6	Spare	SPARE Input
7	HI / LO *	Select the states of the outputs on power-up
8	Spare	SPARE Input
9	GND	+5 VDC Return
10	+5 VDC	+5 VDC

* A normally open switch should be placed between this pin and GND, if necessary. A 10 KOHM pull-up resistor is placed between all inputs and +5 VDC.

J3, Quadrature Encoder Interface

0.1" (2.54 mm) Pitch Header

PIN	NAME	DESCRIPTION
1	+5 VDC	+5 VDC
2	GND	+5 VDC Return
3	+5 VDC	+5 VDC
4	GND	+5 VDC Return
5	+5 VDC	+5 VDC
6	GND	+5 VDC Return
7	YA INBIT16	Phase-YA Quadrature Input Discrete Input 16
8	XA INBIT14	Phase-XA Quadrature Input Discrete Input 14
9	YB INBIT15	Phase-YB Quadrature Input Discrete Input 15
10	XB INBIT13	Phase-XB Quadrature Input Discrete Input 13
11	YSELECT INBIT11	Y-axis Select, , Active Low Discrete Input 11
12	ZSELECT INBIT9	Z-axis Select, , Active Low Discrete Input 9
13	XSELECT INBIT10	X-axis Select, , Active Low Discrete Input 10
14	INBIT12	Discrete Input 12









A 2.2 KOHM pull-up resistor is placed between all inputs and +5 VDC.

J25, RS232 Interface

0.1" (2.54 mm) Pitch Header

PIN	NAME	DESCRIPTION
3	DATA-XMT	Data Transmit to PC
4	RESET	RESET Signal from PC to Controller
5	DATA-RCV	Data Receive from PC
9	GND	+5 VDC Return

Mating Pin and Housings

	Mfr. Part #	DESCRIPTION
	86016-5	AMPMODU MOD. IV Receptacle Contact, 24-20 AWG, gold
	87456-6	AMPMODU MOD. IV Connectors Non-Polarized Housing, 5x2
	1-87456-0	AMPMODU MOD. IV Connectors Non-Polarized Housing, 7x2
	1-87456-2	AMPMODU MOD. IV Connectors Non-Polarized Housing, 8x2
	102387-1	AMPMODU MOD. IV Connectors Center Polarized Housing, 5x2
	102387-2	AMPMODU MOD. IV Connectors Center Polarized Housing, 7x2
	102387-3	AMPMODU MOD. IV Connectors Center Polarized Housing, 8x2
	102387-6	AMPMODU MOD. IV Connectors Center Polarized Housing, 13x2

Mfr: Tyco Electronics / AMP

Specifications are subject to change without notice.

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