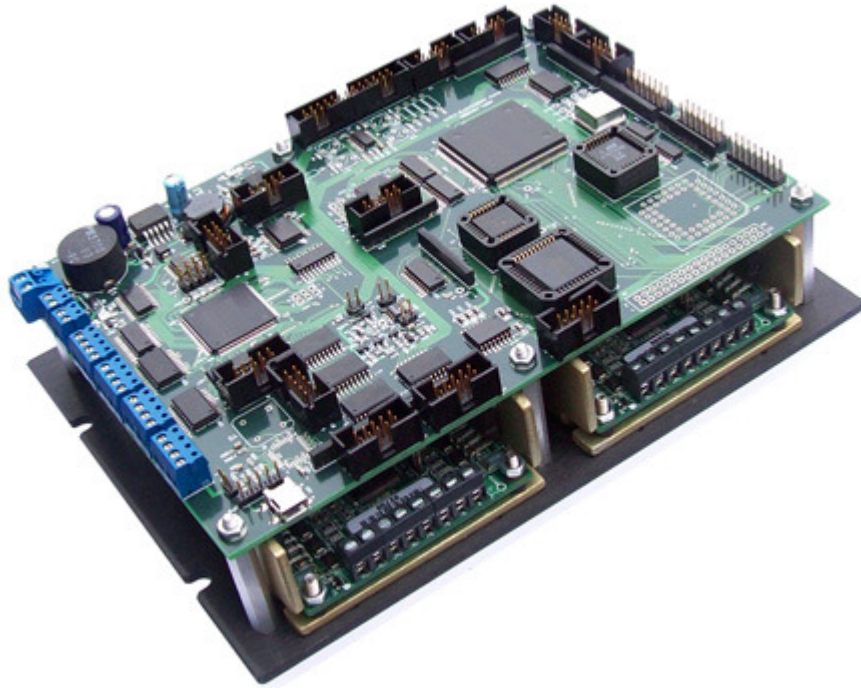


# *ICAD Series Reference Manual*



*Integrated Motion Controller and Driver*



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The **programmable ICAD** series of motion controllers is **stand-alone or externally controlled, easy-to-use and cost effective** solutions for motion control applications.

Each module includes the **stepper motor controller**, and the **micro-stepper and/or servo motor drivers**.

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

The module 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 system 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.

The system can also be operated using an analog joystick or a trackball. The speed of the motor is proportional to the tilt angle of the joystick or the rotational speed of the trackball.

## **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
- Optional Keypad and LCD Display

## **DC and Three Phase Brushless Motor Driver**

- Up to 15 Amps Phase Current
- +18 VDC to up to +80 VDC Power Supply
- LED Fault Indicator

## **Stepper Motor Driver**

- Up to 7A Phase Current
- +12 VDC to +80 VDC Power Supply
- 2 to 256 Micro-steps per Step Resolution
- Size 11 To 42 Motors
- Auto Current Reduction
- LED Power Indicator

## **Typical Applications**

- Automated Assembly Systems
- CNC Machines
- Inspection Systems
- Linear and Rotary Stages
- Machine Tools
- Medical Devices
- Pan-Tilt Gimbals
- PCB Assembly or Inspection
- Pick and Place
- Positioning Tables
- Scanner
- Time-lapse Photography

## TECHNICAL DATA

### Modes of Motion

- Point-to-Point Positioning
- Jogging

### Supported No. Of Axes

- Up to 4 Axes

### Range of Motion Parameters

- Position: +/- 2147483648 Steps
- Velocity: 200 - 200 KHz Step Rate
- Acceleration: 40,000 - 40 Million Steps / sec<sup>2</sup>

### Communication Interface

- RS-232 Interface

### Software

- Easy System Setup and Evaluation
- Menu Driven

### Power Requirement

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

### 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 Outputs<sup>2</sup>

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

### General Purpose Digital Input / Output

- Up to 32 TTL / CMOS Inputs
- 16 TTL / CMOS Outputs
- Up to Four Optical Encoder Inputs

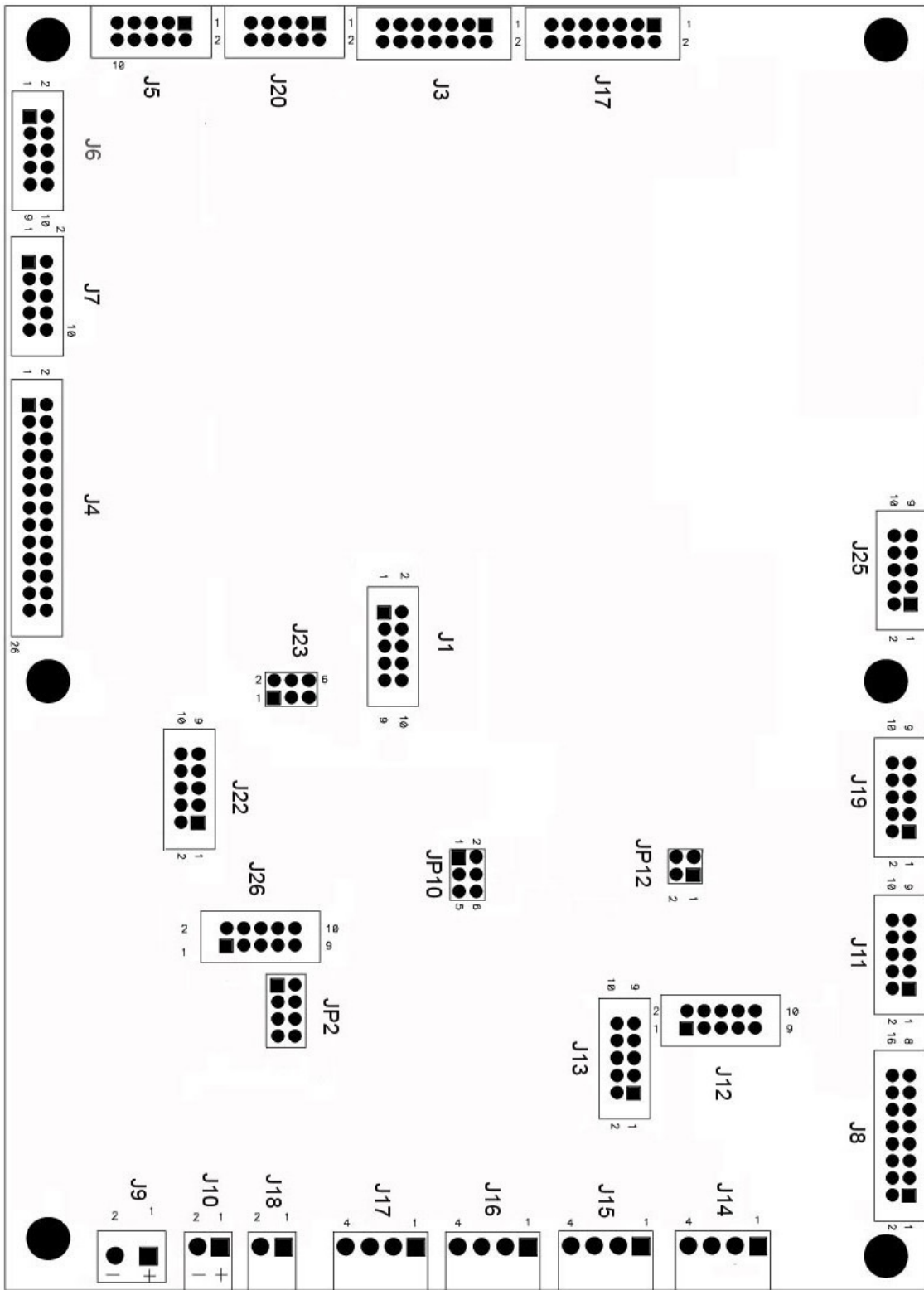
### General Purpose Analog Input

- 4 Inputs
- 10 Bits of Resolution
- Adjustable Gain

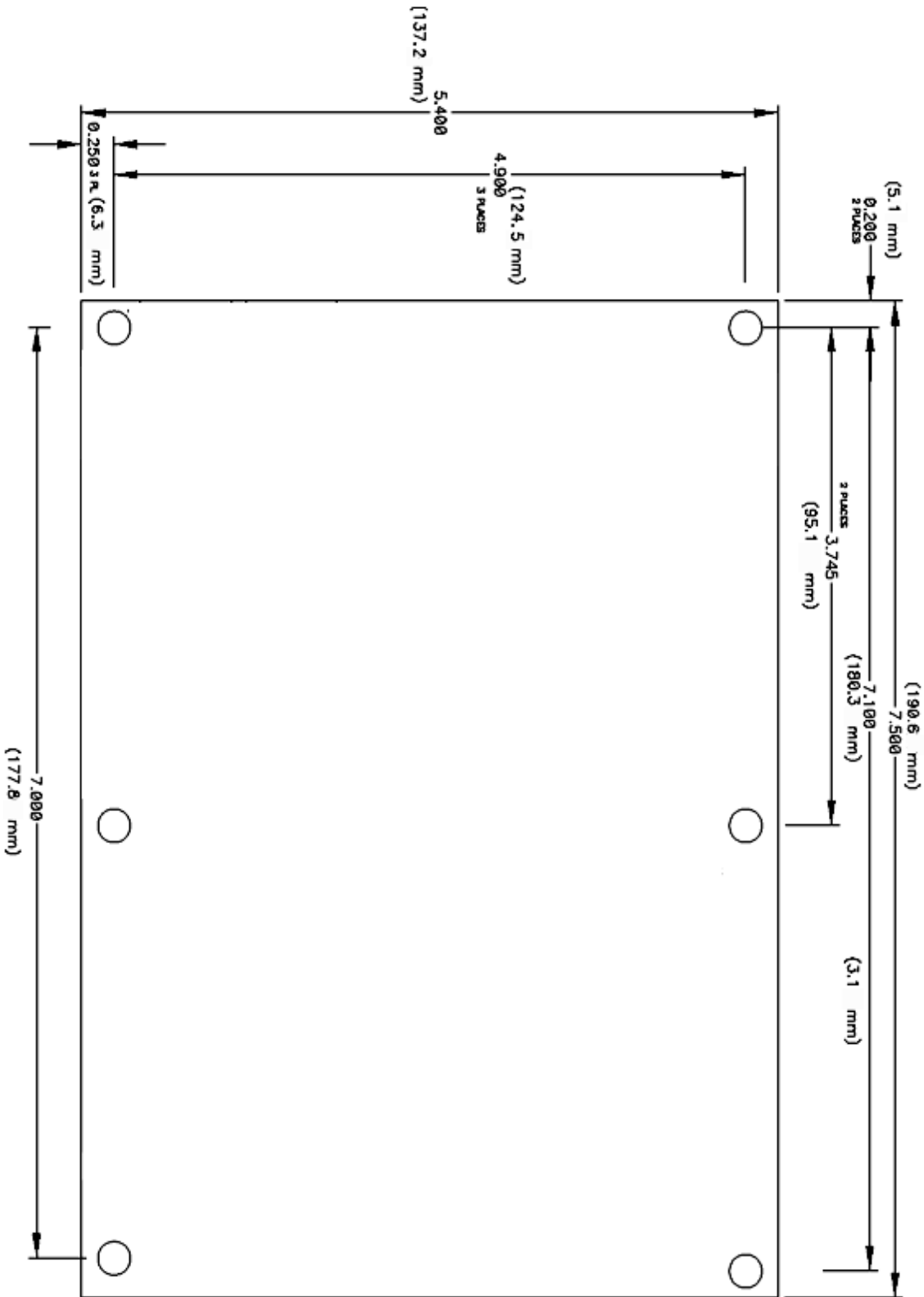
### Memory

- Up to 384 Kbytes of Non-volatile Memory
- 22 General Purpose Variables, 32 Bits of Resolution

## Connections



**Mechanical Specifications**



## Pin Assignment and Description

### **J10, +5 VDC Input / Output**

Screw Terminal Type

<b>PIN</b>	<b>NAME</b>	<b>DESCRIPTION</b>
<b>1</b>	<b>+5 VDC</b>	+5 VDC Input @ 400 ma
<b>2</b>	<b>GND</b>	+5 VDC Return

### **J9, +7.5 to +40 VDC Input**

Screw Terminal Type

<b>PIN</b>	<b>NAME</b>	<b>DESCRIPTION</b>
<b>1</b>	<b>HIGHVOLT</b>	+7.5 to +40 VDC Input
<b>2</b>	<b>HIGHVOLT-RTN</b>	+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

<b>PIN</b>	<b>NAME</b>	<b>DESCRIPTION</b>
<b>1</b>	<b>+5 VDC</b>	+5 VDC Output
<b>2</b>	<b>STATUS-LED</b>	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

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

<b>PIN</b>	<b>NAME</b>	<b>DESCRIPTION</b>
<b>1</b>	<b>POS-LIMIT-Z *</b>	Positive Limit Switch Input, Active High
<b>2</b>	<b>+5 VDC</b>	+5 VDC
<b>3</b>	<b>GND</b>	+5 VDC Return
<b>4</b>	<b>HOME-Z **</b>	Home Switch Input, Active High
<b>5</b>	<b>+5 VDC</b>	+5 VDC
<b>6</b>	<b>GND</b>	+5 VDC Return
<b>7</b>	<b>NEG-LIMIT-Z *</b>	Negative Limit Switch Input, Active High
<b>8</b>	<b>+5 VDC</b>	+5 VDC
<b>9</b>	<b>GND</b>	+5 VDC Return
<b>10</b>	<b>NC</b>	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.

## J21, W-Axis Motor Driver Connection

Screw Terminal Type

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

## 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.

## J8, All Axes Motor Driver Connection

0.1" (2.54 mm) Pitch Header

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

## J20, W-Axis Limit and Home Switch Connection

0.1" (2.54 mm) Pitch Header

<b>PIN</b>	<b>NAME</b>	<b>DESCRIPTION</b>
<b>1</b>	<b>POS-LIMIT-W *</b>	Positive Limit Switch Input, Active High
<b>2</b>	<b>+5 VDC</b>	+5 VDC
<b>3</b>	<b>GND</b>	+5 VDC Return
<b>4</b>	<b>HOME-W *</b>	Home Switch Input, Active High
<b>5</b>	<b>+5 VDC</b>	+5 VDC
<b>6</b>	<b>GND</b>	+5 VDC Return
<b>7</b>	<b>NEG-LIMIT-W *</b>	Negative Limit Switch Input, Active High
<b>8</b>	<b>+5 VDC</b>	+5 VDC
<b>9</b>	<b>GND</b>	+5 VDC Return
<b>10</b>	<b>NC</b>	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

<b>PIN</b>	<b>NAME</b>	<b>DESCRIPTION</b>
<b>1</b>	<b>ANALOG-X</b>	Analog-X Input
<b>2</b>	<b>ANALOG-W</b>	Analog-W Input
<b>3</b>	<b>ANALOG-Y</b>	Analog-Y Input
<b>4</b>	<b>ANALOG-Z</b>	Analog-Z Input
<b>5</b>	<b>HIGH-SPEED</b>	High Speed Selection Input
<b>6</b>	<b>GND</b>	+5 VDC Return
<b>7</b>	<b>MEDIUM-SPEED</b>	Medium Speed Selection Input
<b>8</b>	<b>GND</b>	+5 VDC Return
<b>9</b>	<b>LOW-SPEED</b>	Low Speed Selection Input
<b>10</b>	<b>GND</b>	+5 VDC Return
<b>11</b>	<b>SPARE</b>	SPARE key of Joystick
<b>12</b>	<b>+5 VDC</b>	+5 VDC
<b>13</b>	<b>NC</b>	No Connection
<b>14</b>	<b>+5 VDC</b>	+5 VDC
<b>15</b>	<b>NC</b>	No Connection
<b>16</b>	<b>+5 VDC</b>	+5 VDC
<b>17</b>	<b>NC</b>	No Connection
<b>18</b>	<b>NC</b>	No Connection
<b>19</b>	<b>NC</b>	No Connection
<b>20</b>	<b>NC</b>	No Connection
<b>21</b>	<b>NC</b>	No Connection
<b>22</b>	<b>NC</b>	No Connection
<b>23</b>	<b>NC</b>	No Connection
<b>24</b>	<b>NC</b>	No Connection
<b>25</b>	<b>NC</b>	No Connection
<b>26</b>	<b>NC</b>	No Connection

## J13, Discrete Output Connection

0.1" (2.54 mm) Pitch Header

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

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

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

<b>PIN</b>	<b>NAME</b>	<b>DESCRIPTION</b>
<b>1</b>	<b>STOP *</b>	STOP Motion on all axes
<b>2</b>	<b>END *</b>	END the running program
<b>3</b>	<b>RECALL-and-RUN *</b>	RECALL and RUN the code
<b>4</b>	<b>RUN *</b>	RUN the code
<b>5</b>	<b>CONT *</b>	CONTInue execution of the code
<b>6</b>	<b>TERMINAL</b>	Start the terminal mode on power-up
<b>7</b>	<b>HI / LO *</b>	Select the states of the outputs on power-up
<b>8</b>	<b>JON / JOFF *</b>	Select the state of joystick on power-up
<b>9</b>	<b>GND</b>	+5 VDC Return
<b>10</b>	<b>+5 VDC</b>	+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

<b>PIN</b>	<b>NAME</b>	<b>DESCRIPTION</b>
<b>1</b>	<b>+5 VDC</b>	+5 VDC
<b>2</b>	<b>GND</b>	+5 VDC Return
<b>3</b>	<b>+5 VDC</b>	+5 VDC
<b>4</b>	<b>GND</b>	+5 VDC Return
<b>5</b>	<b>+5 VDC</b>	+5 VDC
<b>6</b>	<b>GND</b>	+5 VDC Return
<b>7</b>	<b>YA INBIT9</b>	Phase-YA Quadrature Input Discrete Input 9
<b>8</b>	<b>XA INBIT10</b>	Phase-XA Quadrature Input Discrete Input 10
<b>9</b>	<b>YB INBIT11</b>	Phase-YB Quadrature Input Discrete Input 11
<b>10</b>	<b>XB INBIT12</b>	Phase-XB Quadrature Input Discrete Input 12
<b>11</b>	<b>WA INBIT13</b>	Phase-WA Quadrature Input Discrete Input 13
<b>12</b>	<b>ZA INBIT14</b>	Phase-ZA Quadrature Input Discrete Input 14
<b>13</b>	<b>WB INBIT15</b>	Phase-WB Quadrature Input Discrete Input 15
<b>14</b>	<b>ZB INBIT16</b>	Phase-ZB Quadrature Input Discrete Input 16

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

## J1, External Step and Direction Inputs

0.1" (2.54 mm) Pitch Header

<b>PIN</b>	<b>NAME</b>	<b>DESCRIPTION</b>
<b>1</b>	<b>ESTEPX</b>	External Step Signal - X
<b>2</b>	<b>EDIRX</b>	External Direction Signal - X
<b>3</b>	<b>ESTEPY</b>	External Step Signal - Y
<b>4</b>	<b>EDIRY</b>	External Direction Signal - Y
<b>5</b>	<b>ESTEPZ</b>	External Step Signal - Z
<b>6</b>	<b>EDIRZ</b>	External Direction Signal - Z
<b>7</b>	<b>ESTEPW</b>	External Step Signal - W
<b>8</b>	<b>EDIRW</b>	External Direction Signal - W
<b>9</b>	<b>GND</b>	+5 VDC Return
<b>10</b>	<b>SELECT</b>	Select Input

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

## J26, SPI Port, LCD Interface

0.1" (2.54 mm) Pitch Header

<b>PIN</b>	<b>NAME</b>	<b>DESCRIPTION</b>
<b>1</b>	<b>DATA</b>	Serial Data Out
<b>2</b>	<b>NC</b>	Not Connected
<b>3</b>	<b>CS1</b>	Chip Select 1
<b>4</b>	<b>NC</b>	Not Connected
<b>5</b>	<b>CLK</b>	Serial Clock
<b>6</b>	<b>+5 VDC</b>	+5 VDC
<b>7</b>	<b>CS2</b>	Chip Select 1
<b>8</b>	<b>+5 VDC</b>	+5 VDC
<b>9</b>	<b>GND</b>	+5 VDC Return
<b>10</b>	<b>NC</b>	Not Connected




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

## JP2, Joystick Speed Selection

JP2 1	JP2 2	JP2 3	JP2 4	Micro- Stepper Resolution	Maximum Slow Speed (RPS) *	Maximum Medium Speed (RPS) *	Maximum Fast Speed (RPS) *
IN	IN	IN	IN	10	0.44	1.33	4.00
OUT	IN	IN	IN	10	0.56	1.67	5.00
IN	OUT	IN	IN	10	0.67	2.00	6.00
OUT	OUT	IN	IN	10	0.78	2.33	7.00
IN	IN	OUT	IN	50	0.02	0.30	6.00
OUT	IN	OUT	IN	50	0.02	0.30	7.00
IN	OUT	OUT	IN	50	0.02	0.30	8.00
OUT	OUT	OUT	IN	50	0.02	0.30	9.00
IN	IN	IN	OUT	125	0.03	0.50	1.00
OUT	IN	IN	OUT	125	0.03	0.50	2.00
IN	OUT	IN	OUT	125	0.03	0.50	3.00
OUT	OUT	IN	OUT	125	0.03	0.50	4.00
IN	IN	OUT	OUT	250	0.03	0.50	2.50
OUT	IN	OUT	OUT	250	0.03	0.50	4.00
IN	OUT	OUT	OUT	250	0.03	0.50	5.50
OUT	OUT	OUT	OUT	250	0.78	2.33	7.00

\* 200 Steps per Revolution Motor

## 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

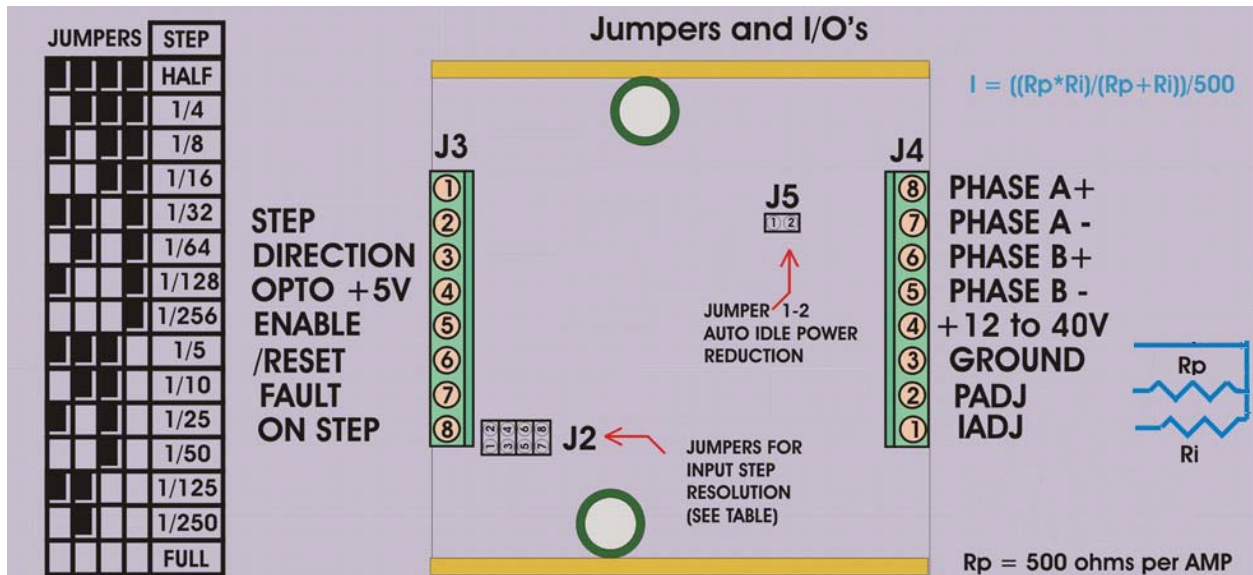
Mfr: Tyco Electronics / AMP

Specifications are subject to change without notice.

## Stepper Motor Connection, -250-01 Version



STPMDRV-404



## Current Set Resistor Value Table

Peak Output Current (Amp)	Resistor Value (Ohm)
0.66	330
0.94	470
1.12	560
1.36	680
1.64	820
2.00	1000
2.40	1200
3.00	1500
3.60	1800
4.00	2000

## JX, Stepper Motor Connection

Screw Terminal Type

PIN	NAME	DESCRIPTION
1	IADJ	This pin is used for connection to the idle current reduction programming resistor, the other end of which is connected to IADJ (J4-2). Idle Current (Amp) = $((R_i * R_p) / (R_i + R_p)) / 500$ where $R_i$ is the idle current resistor and $R_p$ is the programmed current resistor.
2	PADJ	
3	PGND	This pin is used for programming the current of the driver. The return pin for the resistor should be connected to the GND (J4-3) pin. Current (Amp) = $R_p / 500$ where $R_p$ is the programmed current resistor. Power Ground
4	POWER	+12 VDC to +40 VDC
5	PHB-	Motor Phase B-
6	PHB+	Motor Phase B+
7	PHA-	Motor Phase A-
8	PHA+	Motor Phase A+

## JY, Stepper Motor Connection

Screw Terminal Type

PIN	NAME	DESCRIPTION
1	IADJ	This pin is used for connection to the idle current reduction programming resistor, the other end of which is connected to IADJ (J4-2). Idle Current (Amp) = $((R_i * R_p) / (R_i + R_p)) / 500$ where $R_i$ is the idle current resistor and $R_p$ is the programmed current resistor.
2	PADJ	This pin is used for programming the current of the driver. The return pin for the resistor should be connected to the GND (J4-3) pin. Current (Amp) = $R_p / 500$ where $R_p$ is the programmed current resistor.
3	PGND	Power Ground
4	POWER	+12 VDC to +40 VDC
5	PHB-	Motor Phase B-
6	PHB+	Motor Phase B+
7	PHA-	Motor Phase A-
8	PHA+	Motor Phase A+

## JZ, Stepper Motor Connection

Screw Terminal Type

PIN	NAME	DESCRIPTION
1	IADJ	This pin is used for connection to the idle current reduction programming resistor, the other end of which is connected to IADJ (J4-2). Idle Current (Amp) = $((R_i * R_p) / (R_i + R_p)) / 500$ where $R_i$ is the idle current resistor and $R_p$ is the programmed current resistor.
2	PADJ	This pin is used for programming the current of the driver. The return pin for the resistor should be connected to the GND (J4-3) pin. Current (Amp) = $R_p / 500$ where $R_p$ is the programmed current resistor.
3	PGND	Power Ground
4	POWER	+12 VDC to +40 VDC
5	PHB-	Motor Phase B-
6	PHB+	Motor Phase B+
7	PHA-	Motor Phase A-
8	PHA+	Motor Phase A+

## JW, Stepper Motor Connection

Screw Terminal Type

<b>PIN</b>	<b>NAME</b>	<b>DESCRIPTION</b>
1	IADJ	This pin is used for connection to the idle current reduction programming resistor, the other end of which is connected to IADJ (J4-2). Idle Current (Amp) = $((R_i * R_p) / (R_i + R_p)) / 500$ where $R_i$ is the idle current resistor and $R_p$ is the programmed current resistor.
2	PADJ	This pin is used for programming the current of the driver. The return pin for the resistor should be connected to the GND (J4-3) pin. Current (Amp) = $R_p / 500$ where $R_p$ is the programmed current resistor.
3	PGND	Power Ground
4	POWER	+12 VDC to +40 VDC
5	PHB-	Motor Phase B-
6	PHB+	Motor Phase B+
7	PHA-	Motor Phase A-
8	PHA+	Motor Phase A+



## Stepper Motor Connection, -10 Version



- (TERM. 1) POWER GROUND** Connect the power supply ground to this terminal  
**(TERM. 2) +24 TO 80 VDC** Connect the power supply "+" to this terminal

The power supply voltage must be between 24 VDC and 80 VDC. The maximum power supply current required is 67% of the motor's rated phase current. An unregulated power supply may be used as long as the voltage stays between the limits; keep the ripple voltage to 10% or less for best results. The drive has a 2 second power-on reset time before the motor is energized.

**CAUTION!** Power supply voltage in excess of 80 VDC will damage the STPMDRV-807.

If the power supply is more than 1 foot (300 mm) away from the STPMDRV-807, a 470 UF capacitor must be connected across the STPMDRV-807's power supply terminals. Keep the capacitor lead length to 1 inch (25 mm) or less.

The choice of power supply voltage depends on the high speed performance required of the motor; doubling the voltage doubles the motor's high speed power. In all cases the power supply voltage should be no less than 4 times or no more than 25 times the motor's rated voltage. The motor may not run as smoothly as possible if the power supply voltage is less than 4 times the motor's rated voltage. A power supply voltage greater than 25 times the motor's rated voltage will overheat and damage the motor, even if it is not turning. Motor winding inductance should be 500 UH or greater.

- (TERM. 3) PHASE A** Connect one motor winding to this terminal  
**(TERM. 4) PHASE B** Connect the other end of the winding to this terminal  
**(TERM. 5) PHASE C** Connect the other motor winding to this terminal  
**(TERM. 6) PHASE D** Connect the other end of the winding to this terminal

Connect one motor winding to terminals 3 and 4. Connect the other winding to terminals 5 and 6. Turn the power supply off when connecting or disconnecting the motor. If the motor turns in the wrong direction, reverse the motor winding connections to terminals 3 and 4.

**CAUTION!** Do not short the motor leads to each other or to ground; damage will result to the STPMDRV-807.

4-wire, 6-wire and 8-wire motor may be used. When 6-wire motors are used, they may be connected in half winding or full winding. This is equivalent to an 8-wire motor connected in parallel or series. If a motor is connected in series or full winding, the motor's phase current rating is half of its parallel or unipolar rating. The choice depends on the high-speed performance required; a parallel-connected motor will provide twice the power of a series-connected motor at the same power supply voltage.

**(TERM. 11) CURRENT SET** Connect the current set resistor to this terminal

**(TERM. 12) CURRENT SET** Connect the other end of the current set resistor to this terminal

This input programs the STPMDRV-807A's current output to the motor windings. The STPMDRV-807 will accommodate motor winding currents from 1 to 7A. Use the following equation to calculate the value, (in kilo-ohms) of the current set resistor:

$$R \text{ (in kilo-ohms)} = 47 * I / (7 - I)$$

**HEATSINKING:** Additional heatsink may be required if the case temperature (measured on the bottom plate) exceeds 70 degrees C, and for best life should be kept to 50 degrees or less.

**AUTO CURRENT REDUCTION:** The STPMDRV-807 reduces motor phase current to 33% of the set value when the motor is stopped. This reduction occurs 1 second after the last step pulse is sent to the drive.

### Current Set Resistor Value Table (-10 Version)

Motor Peak Current	Resistor Value
1 Amp	8.2 KOhm
2 Amp	18 KOhm
3 Amp	36 KOhm
4 Amp	62 KOhm
5 Amp	120 KOhm
6 Amp	270 KOhm
7 Amp	OPEN

## JX, Stepper Motor Connection (-10 Version)

Screw Terminal Type

<b>PIN</b>	<b>NAME</b>	<b>DESCRIPTION</b>
1	PGND	Power Ground
2	POWER	+24 VDC to +80 VDC
3	PHA+	Motor Phase A+
4	PHA-	Motor Phase A-
5	PHB+	Motor Phase B+
6	PHB-	Motor Phase B-
7		Not Used
8	DIR-X	Direction Signal
9	STEP-X	Step Signal
10	+5 VDC	+5 VDC
11	CSR+	Current Set Resistor
12	CSR-	Current Set Resistor

## JY, Stepper Motor Connection (-10 Version)

Screw Terminal Type

<b>PIN</b>	<b>NAME</b>	<b>DESCRIPTION</b>
1	PGND	Power Ground
2	POWER	+24 VDC to +80 VDC
3	PHA+	Motor Phase A+
4	PHA-	Motor Phase A-
5	PHB+	Motor Phase B+
6	PHB-	Motor Phase B-
7		Not Used
8	DIR-Y	Direction Signal
9	STEP-Y	Step Signal
10	+5 VDC	+5 VDC
11	CSR+	Current Set Resistor
12	CSR-	Current Set Resistor

## JZ, Stepper Motor Connection (-10 Version)

Screw Terminal Type

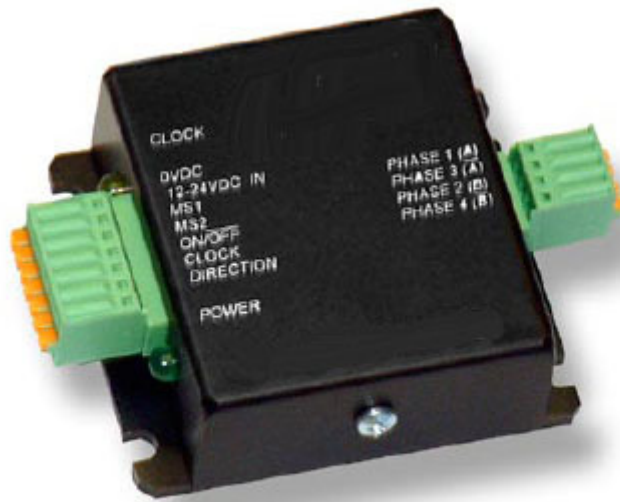
<b>PIN</b>	<b>NAME</b>	<b>DESCRIPTION</b>
1	PGND	Power Ground
2	POWER	+24 VDC to +80 VDC
3	PHA+	Motor Phase A+
4	PHA-	Motor Phase A-
5	PHB+	Motor Phase B+
6	PHB-	Motor Phase B-
7		Not Used
8	DIR-Z	Direction Signal
9	STEP-Z	Step Signal
10	+5 VDC	+5 VDC
11	CSR+	Current Set Resistor
12	CSR-	Current Set Resistor

## JW, Stepper Motor Connection (-10 Version)

Screw Terminal Type

<b>PIN</b>	<b>NAME</b>	<b>DESCRIPTION</b>
1	PGND	Power Ground
2	POWER	+24 VDC to +80 VDC
3	PHA+	Motor Phase A+
4	PHA-	Motor Phase A-
5	PHB+	Motor Phase B+
6	PHB-	Motor Phase B-
7		Not Used
8	DIR-W	Direction Signal
9	STEP-W	Step Signal
10	+5 VDC	+5 VDC
11	CSR+	Current Set Resistor
12	CSR-	Current Set Resistor

## Stepper Motor Connection, -8-01 Version



### JX, Stepper Motor Connection (-8 Version)

WIRE	NAME	DESCRIPTION
BLACK	PGND	Power Ground
RED	POWER	+12 VDC to +24 VDC

PIN	NAME	DESCRIPTION
1	PHA+	Motor Phase A+
2	PHA-	Motor Phase A-
3	PHB+	Motor Phase B+
4	PHB-	Motor Phase B-

## JY, Stepper Motor Connection (-8 Version)

WIRE	NAME	DESCRIPTION
BLACK	PGND	Power Ground
RED	POWER	+12 VDC to +24 VDC

PIN	NAME	DESCRIPTION
1	PHA+	Motor Phase A+
2	PHA-	Motor Phase A-
3	PHB+	Motor Phase B+
4	PHB-	Motor Phase B-

## JZ, Stepper Motor Connection (-8 Version)

WIRE	NAME	DESCRIPTION
BLACK	PGND	Power Ground
RED	POWER	+12 VDC to +24 VDC

PIN	NAME	DESCRIPTION
1	PHA+	Motor Phase A+
2	PHA-	Motor Phase A-
3	PHB+	Motor Phase B+
4	PHB-	Motor Phase B-



## JW, Stepper Motor Connection (-8 Version)

WIRE	NAME	DESCRIPTION
BLACK	PGND	Power Ground
RED	POWER	+12 VDC to +24 VDC

PIN	NAME	DESCRIPTION
1	PHA+	Motor Phase A+
2	PHA-	Motor Phase A-
3	PHB+	Motor Phase B+
4	PHB-	Motor Phase B-

Specifications are subject to change without notice.

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