The **100** series of motion controllers are **stand-alone** or **host controlled**, **easy-to-use**, **plug-and-play** and **cost effective** solutions for motion control applications.

Each system integrates the **power supplies**, **controller** and **motor drivers.**

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

The system may be controlled in different ways;

1) **Stand-alone**
In this mode, the controller does not need the PC to operate. The controller is programmed in a high level BASIC-like 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).

2) **Externally Controlled**
In this mode, the host sends a series of **ASCII 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 intuitive **Control Panel** 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 using the joystick and/or trackball. The motion parameters are manually recorded in the control panel by typing the desired values in the corresponding fields, or may be read from an ASCII file.

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

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

These systems 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
- BASIC-like 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 LCD Display
- Available also to Drive DC Servo, Brushless, and Voice Coil Motors
- Totally Integrated Solution
- Free Software Included

Typical Applications

- Animation
- Automated Assembly Systems
- CNC Machines
- Engraving
- Flight Simulation
- Inspection Systems
- Laser Marking
- Linear and Rotary Stages
- Machine Tools
- Medical Devices
- Motion Control Camera Boom Systems
- Optical Comparators and CMMs
- Pan-Tilt Gimbals
- PCB Assembly or Inspection
- Pick and Place
- Positioning Tables
- Robotics
- Scanner
- Security Cameras
- Telescope Drive Mechanism
- Time-lapse Photography
- Winders

TECHNICAL DATA

Modes of Motion

- Point-to-Point Positioning
- Jogging
- Contouring
- Electronic Gearing
- Electronic Cam

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^2

Communication Interface

- RS-232 Interface

Software

- Easy System Setup and Evaluation
- Menu Driven, No Programming Required

General Specifications

- LED Power Indicator
- High Performance Line Filter
- Compact Industrial Enclosure

Joystick

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

Mechanical

- Size: 10.0" (250 mm) W X 10.8" (265 mm) D X 4.875" (124 mm)H
- Weight: 10 lbs (4.50 Kg) with 80-Watt Power Supply
- Material: Aluminum, 0.09" (2.3 mm) Thickness

Dedicated Inputs

- Positive and Negative Limit Switches per Axis
- Home Switch per Axis
- CONTINUE, END, RUN, STOP, and Stand-alone Mode Operation
- External Step and Direction Signals per Axis

Dedicated Outputs

- Stepper, Single Phase or Three Phase Brushless DC Motor Driver Outputs per Axis

General Purpose Digital Input / Output

- 8 TTL / CMOS Inputs, Optional 16 TTL / CMOS Inputs, Expandable to 16 Inputs
- 8 TTL / CMOS Outputs, Optional 16 TTL / CMOS Outputs, Expandable to 16 Outputs

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

Trackball

- Precision Positioning
- Long Life

Stepping Motor Driver

- Up to 7 Amps Phase Current
- 2 to 256 Micro-steps per Step Resolution
- Size 8 to 42 Motors
- Auto Current Reduction

Power Supply

- 80-Watt, +24 VDC at Full Load
- Optional 160-Watt, +36 VDC at Full Load
- Optional 240-Watt, +48 VDC at Full Load
- Optional 400-Watt, +48 VDC at Full Load
- Optional 500-Watt, +48 VDC at Full Load

DC and Three Phase Brushless Motor Driver

- Up to 20 Amps Phase Current
- +20 VDC to up to +80 VDC Power Supply

Power Requirement

- 110 VAC, 50 ~ 60 Hz **or**
- 220 VAC, 50 ~ 60 Hz **or**
- Optional +12 VDC to +80 VDC

PIN ASSIGNMENT AND DESCRIPTION

X-MOTOR
8-pin Circular Connector

The X-axis motor should be connected to this connector.

PIN	NAME	STEPPING MOTOR	DC MOTOR	BRUSHLESS DC MOTOR
1	PHAX+	Phase A+	Arm+	Phase A
2	PHBX+	Phase B+	Not Connected	Phase B
3	PHBX-	Phase B-	Not Connected	Not Connected
4	PHAX-	Phase A-	Arm-	Phase C
5	CHSIS	Connected to the Chassis	Connected to the Chassis	Connected to the Chassis
6		Not Connected	Not Connected	Not Connected
7		Not Connected	Not Connected	Not Connected
8		Not Connected	Not Connected	Not Connected

Y-MOTOR
8-pin Circular Connector

The Y-axis motor should be connected to this connector.

PIN	NAME	STEPPING MOTOR	DC MOTOR	BRUSHLESS DC MOTOR
1	PHAY+	Phase A+	Arm+	Phase A
2	PHBY+	Phase B+	Not Connected	Phase B
3	PHBY-	Phase B-	Not Connected	Not Connected
4	PHAY-	Phase A-	Arm-	Phase C
5	CHSIS	Connected to the Chassis	Connected to the Chassis	Connected to the Chassis
6		Not Connected	Not Connected	Not Connected
7		Not Connected	Not Connected	Not Connected
8		Not Connected	Not Connected	Not Connected

Z-MOTOR

8-pin Circular Connector

The Z-axis motor should be connected to this connector.

PIN	NAME	STEPPING MOTOR	DC MOTOR	BRUSHLESS DC MOTOR
1	PHAZ+	Phase A+	Arm+	Phase A
2	PHBZ+	Phase B+	Not Connected	Phase B
3	PHBZ-	Phase B-	Not Connected	Not Connected
4	PHAZ-	Phase A-	Arm-	Phase C
5	CHSIS	Connected to the Chassis	Connected to the Chassis	Connected to the Chassis
6		Not Connected	Not Connected	Not Connected
7		Not Connected	Not Connected	Not Connected
8		Not Connected	Not Connected	Not Connected

W-MOTOR

8-pin Circular Connector

The W-axis motor should be connected to this connector.

PIN	NAME	STEPPING MOTOR	DC MOTOR	BRUSHLESS DC MOTOR
1	PHAW+	Phase A+	Arm+	Phase A
2	PHBW+	Phase B+	Not Connected	Phase B
3	PHBW-	Phase B-	Not Connected	Not Connected
4	PHAW-	Phase A-	Arm-	Phase C
5	CHSIS	Connected to the Chassis	Connected to the Chassis	Connected to the Chassis
6		Not Connected	Not Connected	Not Connected
7		Not Connected	Not Connected	Not Connected
8		Not Connected	Not Connected	Not Connected

COMMAND

9-pin DB-9, Male Connector

This port is used for stand-alone operation.

PIN	NAME	DESCRIPTION
1	STOP *	Connecting this pin to system ground will stop motion on all axes.
2	RECALL-and-RUN	Connecting this pin to system ground will run the code saved in the permanent memory of the controller.
3	CONT *	Connecting this pin to system ground will continue the execution of the code after execution of a PAUSE command.
4	HI – LO	Selects the state of the output ports on power-up or reset. Placing a jumper between this pin and system ground will cause the state of the output ports to be high upon power-up or reset.
5	GND	System Ground
6	END *	Connecting this pin to system ground will end the running program.
7	Spare	SPARE Input
8	TERMINAL	Connecting this pin to system ground will enable the desk top terminal operation
9	JOFF	Connecting this pin to system ground will disable the joystick upon power-up or reset.

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

INPUT
9-pin DB-9, Male Connector

This port is used to connect and read the state of a TTL / CMOS signal like a sensor, reed switch or other similar devices.

Related commands are IN, IFBIT and IFNOTBIT. Please refer to Operating and Programming Reference Manual.

PIN	NAME	DESCRIPTION
1	INBIT1	TTL / CMOS Input 1
2	INBIT3	TTL / CMOS Input 3
3	INBIT5	TTL / CMOS Input 5
4	INBIT7	TTL / CMOS Input 7
5	GND	System Ground
6	INBIT2	TTL / CMOS Input 2
7	INBIT4	TTL / CMOS Input 4
8	INBIT6	TTL / CMOS Input 6
9	INBIT1	TTL / CMOS Input 1

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

OUTPUT
9-pin DB-9, male Connector

This port is used to turn on or off other devices using a TTL / CMOS signal like an LED, solenoid, relay or other similar devices.

Related commands are OUT, SETBIT and CLRBIT. Please refer to Operating and Programming Reference Manual.

PIN	NAME	DESCRIPTION
1	OUTBIT1	Discrete Output 1
2	OUTBIT3	Discrete Output 3
3	OUTBIT5	Discrete Output 5
4	OUTBIT7	Discrete Output 7
5	GND	System Ground
6	OUTBIT2	Discrete Output 2
7	OUTBIT4	Discrete Output 4
8	OUTBIT6	Discrete Output 6
9	OUTBIT8	Discrete Output 8

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

JOYSTICK

25-pin DB-25, Female Connector

This port is used to connect an analog joystick. If a joystick is not used, three analog signals may be connected to this port.

Related commands are RSTSX, RSTSY and RSTSZ. Please refer to Operating and Programming Reference Manual

PIN	NAME	DESCRIPTION
1	ANALOG-X	Analog-X Input
2	ANALOG-Y	Analog-Y Input
3	HIGH-SPEED	High Speed Selection Input
4	MEDIUM-SPEED	Medium Speed Selection Input
5	LOW-SPEED	Low Speed Selection Input
6	W-SELECT	W-axis Selection Key
15	ANALOG-Z	Analog-Z Input
16	GND	System Ground
17	GND	System Ground
18	GND	System Ground
19	+5 VDC	+5 VDC
20	+5 VDC	+5 VDC
21	+5 VDC	+5 VDC

X-LIMITS
9-pin DB-9, Male Connector

The X-axis positive, negative and home switches should be connected to this port.

PIN	NAME	DESCRIPTION
1	POS-LIMIT-X *	X-Axis Positive Limit Switch Input
2	GND	System Ground
3	+5 VDC	+5 VDC
4	NEG-LIMIT-X *	X-Axis Negative Limit Switch Input
5	GND	System Ground
6	+5 VDC	+5 VDC
7	HOME-X **	X-Axis Home Switch Input
8	GND	System Ground
9	+5 VDC	+5 VDC

Y-LIMITS
9-pin DB-9, Male Connector

The Y-axis positive, negative and home switches should be connected to this port.

PIN	NAME	DESCRIPTION
1	POS-LIMIT-Y *	Y-Axis Positive Limit Switch Input
2	GND	System Ground
3	+5 VDC	+5 VDC
4	NEG-LIMIT-Y *	Y-Axis Negative Limit Switch Input
5	GND	System Ground
6	+5 VDC	+5 VDC
7	HOME-Y **	Y-Axis Home Switch Input
8	GND	System Ground
9	+5 VDC	+5 VDC

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

Z-LIMITS
9-pin DB-9, Male Connector

The Z-axis positive, negative and home switches should be connected to this port.

PIN	NAME	DESCRIPTION
1	POS-LIMIT-Z *	Z-Axis Positive Limit Switch Input
2	GND	System Ground
3	+5 VDC	+5 VDC
4	NEG-LIMIT-Z *	Z-Axis Negative Limit Switch Input
5	GND	System Ground
6	+5 VDC	+5 VDC
7	HOME-Z **	Z-Axis Home Switch Input
8	GND	System Ground
9	+5 VDC	+5 VDC

W-LIMITS
9-pin DB-9, Male Connector

The W-axis positive, negative and home switches should be connected to this port.

PIN	NAME	DESCRIPTION
1	POS-LIMIT-W *	W-Axis Positive Limit Switch Input
2	GND	System Ground
3	+5 VDC	+5 VDC
4	NEG-LIMIT-W *	W-Axis Negative Limit Switch Input
5	GND	System Ground
6	+5 VDC	+5 VDC
7	HOME-W **	W-Axis Home Switch Input
8	GND	System Ground
9	+5 VDC	+5 VDC

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

X-ENCODER
9-pin DB-9, Male Connector

The X-axis motor encoder and Hall effect sensors, if available, should be connected to this port.

PIN	NAME	DESCRIPTION
1	+5 VDC	+5 VDC
2	CHSIS	Connected to the Chassis
3	XCHB	X-Motor Channel-B Quadrature Input
4	XCHA	X-Motor Channel-A Quadrature Input
5	GND	System Ground
6	XHALL-B	X-Motor HALL-B Sensor Input
7	XHALL-C	X-Motor HALL-C Sensor Input
8	XHALL-A	X-Motor HALL-A Sensor Input
9		Not Connected

Y-ENCODER
9-pin DB-9, Male Connector

The Y-axis motor encoder and Hall effect sensors, if available, should be connected to this port.

PIN	NAME	DESCRIPTION
1	+5 VDC	+5 VDC
2	CHSIS	Connected to the Chassis
3	YCHB	Y-Motor Channel-B Quadrature Input
4	YCHA	Y-Motor Channel-A Quadrature Input
5	GND	System Ground
6	YHALL-B	Y-Motor HALL-B Sensor Input
7	YHALL-C	Y-Motor HALL-C Sensor Input
8	YHALL-A	Y-Motor HALL-A Sensor Input
9		Not Connected

Z-ENCODER
9-pin DB-9, Male Connector

The Z-axis motor encoder and Hall effect sensors, if available, should be connected to this port.

PIN	NAME	DESCRIPTION
1	+5 VDC	+5 VDC
2	CHSIS	Connected to the Chassis
3	ZCHB	Z-Motor Channel-B Quadrature Input
4	ZCHA	Z-Motor Channel-A Quadrature Input
5	GND	System Ground
6	ZHALL-B	Z-Motor HALL-B Sensor Input
7	ZHALL-C	Z-Motor HALL-C Sensor Input
8	ZHALL-A	Z-Motor HALL-A Sensor Input
9		Not Connected

W-ENCODER
9-pin DB-9, Male Connector

The W-axis motor encoder and Hall effect sensors, if available, should be connected to this port.

PIN	NAME	DESCRIPTION
1	+5 VDC	+5 VDC
2	CHSIS	Connected to the Chassis
3	WCHB	W-Motor Channel-B Quadrature Input
4	WCHA	W-Motor Channel-A Quadrature Input
5	GND	System Ground
6	WHALL-B	W-Motor HALL-B Sensor Input
7	WHALL-C	W-Motor HALL-C Sensor Input
8	WHALL-A	W-Motor HALL-A Sensor Input
9		Not Connected

RS-232
9-pin DB-9, Female Connector

This port should be connected to the RS-232 port of the host computer or PLC using the supplied cable.

PIN	NAME	DESCRIPTION
1		Not Connected
2	DATA-XMT	Data Transmit to PC
3	DATA-RCV	Data Receive from PC
4		Not Connected
5	GND	System Ground
6		Not Connected
7	RESET	RESET to Controller, Should Be Set to Clear
8		Not Connected
9		Not Connected

Specifications are subject to change without notice.