

Feature Summary

- 1 to 4 axes of servo motor drive
- Integrated Galil motion controller
- Ethernet or RS-232 interface
- 48 & 60 VDC motor supply option
- Integrated motor power control system
- Compatible with all Primatics positioning stages as well as 3rd party motors and stages
- Easy to program with support for DOS, Linux and all versions of Windows
- 110 or 220 VAC, 50/60 Hz input

Overview

The Primatics MDC2100 is a highly integrated multi-axis motion control system. A Galil high performance motion controller is embedded, offering advanced features such as PID compensation with velocity and acceleration feed-forward, program memory with multitasking for simultaneously running up to four programs, and uncommitted I/O for synchronizing motion with external events. Modes of motion include point-to-point positioning, jogging, linear and circular interpolation, contouring, electric gearing and ECAM. The MDC2100 uses a simple, English-like command language which makes it easy to program. Communication drivers are available for DOS, Linux and all current Windows operating systems. RS232 & Ethernet 10-base-T are standard communication interfaces.

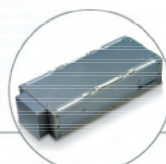
Operation

The MDC2100 combines a programmable multi-axis motion controller with 1 to 4 servo motor drives and all necessary power supplies into a small, efficient package. The unit is further enhanced by a STOP system that removes power from the motors under fault or emergency conditions.

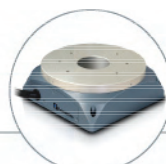
The MDC2100 is ordered with 1 to 4 axes of control and drive. Each drive operates a closed loop servo for brushless or brush motors.

The integrated controller can execute simple and complex movement algorithms in a multi-tasking environment. Ethernet communication supports the use of the MDC2100 in distributed control applications.

For mixed motor types of stepper and servos, use the MDC1400 Series product. Visit www.primatics.com for more information.



Linear Positioning



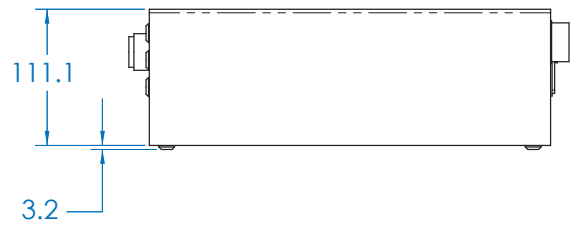
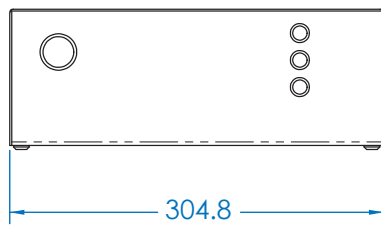
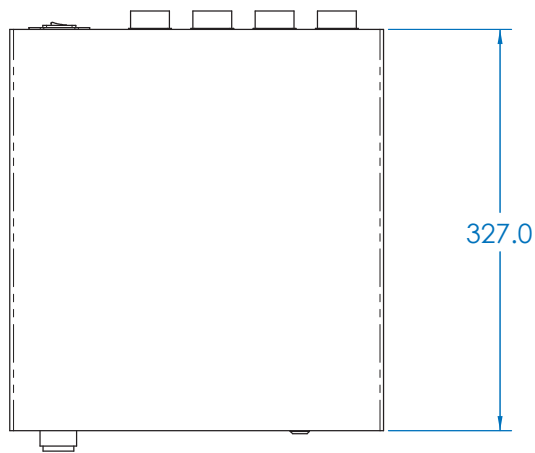
Rotary Positioning



Motion Controls



OEM Solutions



BACK OF CHASSIS



| MDC Drive Chassis | MDC2100 |
|---------------------------------|--|
| Number of Motion Axes | 1 to 4 |
| Motor Compatibility | Brush & Brushless Rotary & Linear, Servo |
| Motion Controller | Galil 21 x 3 Series |
| Output Voltage (VDC) | 48 or 60 |
| Continuous Output Power (Watts) | 700 |
| AC Power | 110 VAC, 50 / 60 Hz, Option for 220 VAC |
| Dimensions (H x W x D) (mm) | 111.1 x 304.8 x 327.0 |
| Operating Temperature (deg C) | 0 to 45 |
| Storage Temperature (deg C) | 0 to 75 |
| Weight (kg) | 15 |

| Drive | MDC-x-x-x-x-D1 |
|---------------------------------|----------------------------------|
| Motor Compatibility | Brush or Brushless Servo |
| Continuous Output Current (A) | 7 |
| Peak Output Current (2 sec) (A) | 12 |
| Bus Voltage (Volts) | 20-60 |
| Continuous Output Power (Watts) | 350 |
| Peak Output Power (Watts) | 700 |
| Switching Frequency (kHz) | 60 |
| Amplifier Gain | Programmable: 0.4, 0.7 & 1.0 A/V |

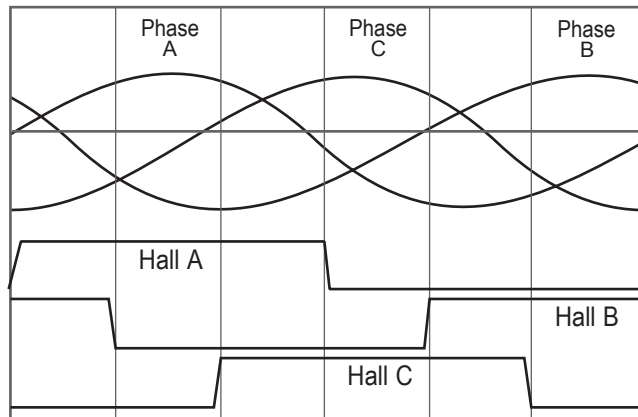
CONTROLLER SPECIFICATIONS

| MDC Drive Chassis | MDC2100, 1-4 axis |
|-------------------------------------|--|
| Communications Interface | Ethernet 10-base-T, RS232 port, up to 19.2 Kb |
| Modes of Motion | Point to point positioning, jogging, linear and circular interpolation, tangential following, helical, electronic gearing, gantry mode, electronic cam, counterering & teach |
| Memory | Program size; 1000 lines x 80 characters, 254 variables, 8000 array elements for up to 30 arrays |
| Filter | PID (Proportional Integral Derivative) |
| Kinematic Range: Position | 32-bit (+/- 2.15 billion counts per move; automatic rollover; no limit in jog or vector modes) |
| Kinematic Range: Velocity | Up to 12 million counts/sec for servo motors |
| Kinematic Range: Acceleration | Up to 67 million counts/sec ² |
| Minimum Send Update Rate (µm/sec) | 1-2 axis: 125 ms, 3-4 axis: 250 ms |
| Maximum Encoder Feedback Rate (MHz) | 12 |
| Maximum Stepper Rate (MHz) | 3 |
| User I/O In | 4 Buffered |
| User I/O Out | 3 TTL |

| Environmental Performance | MDC |
|-------------------------------|---------------------------|
| Operating Temperature (deg C) | 0-45 (AMP specific) |
| Humidity | 20-80% RH, non-condensing |

| Encoder Specifications | Specification |
|-----------------------------|--|
| Power (ma) | 5 VDC +/- 5%, 150 ma |
| Input | Square wave differential line driver |
| Reference (Z channel) | Synchronized pulse, duration equal to one resolution bit |
| Limit & Home Specifications | Specification |
| Power | +12 VDC, 100 ma |
| Input | NC Current Sinking, Sink current minimum of 10 ma |
| Hall Effect Specifications | Specification |
| Power | +5 VDC, 30 ma |
| Input | Open collector, Current sinking, 20 ma Max |
| Rotary Brake Specifications | Specification |
| Power to Release | 24 VDC, 0.5 A |

Commutation Chart



FEATURES & ACCESSORIES

Safety

To ensure the safety of both system operators and equipment, all MDC Series drive chassis include a STOP system that removes power from the motors if a fault condition occurs. In addition to pressing the STOP button, other faults within the chassis, including loss of power or motor temperature faults, will also cause a STOP. You also have the option of expanding the STOP circuit with external switches or circuits.

Cables

Many different cable options are available for use with the MDC2100. Standard cables are 12 feet long, but cables up to 50 feet are available. The standard cables are:

- Pigtail cables: Unterminated at one end for connection to user's equipment
- Servo stage cables: Different assemblies for connecting the MDC2100 to Primatics positioning stages
- Custom cables: Contact us for cable assemblies to meet your specification

Customization

We can customize the MDC2100 for your application. Typical customization includes power supply voltages, preset communication parameters, or pre-loaded programs. Contact us for more information.

Standard Servo Axis

The standard servo axis is defined by:

- Brush- or brushless-type motor (rotary or linear)
- Incremental encoder feedback with index marker
- Commutation feedback (Hall sensors) for brushless motors
- Forward travel limit
- Reverse travel limit
- Home flag
- Motor over-temperature switch
- Fail-safe brake (optional)

Servo Axis connector

Connector: FCI (Burrndy) Receptacle, with sockets, circular connector, 28 contacts, size 20 shells.

| Pin | Function |
|-----|---|
| A | Motor A |
| B | Motor B |
| C | Motor C |
| D | Motor Shield |
| E | Encoder 5V - power for encoder |
| F | Encoder A+ output |
| G | Encoder A- output |
| H | Encoder B+ output |
| J | Encoder B- output |
| K | Encoder Shield |
| L | 12VDC - for limit, home, and temp sensor |
| M | Power supply return for limit switches |
| N | Home - Switch to DCCOM when on forward side of home position |
| P | Brake release output (24VDC) |
| R | Brake return |
| S | Shield |
| T | Hall V+ |
| U | Hall V |
| V | Return for encoder power |
| W | Encoder Index + |
| X | Encoder Index - |
| Y | Forward Limit Switch - switch to DCCOM in normal operation |
| Z | Reverse Limit Switch - switch to DCCOM in normal operation |
| a | Not used |
| b | Hall A |
| c | Hall B |
| d | Temperature monitor - connect to DC Common for temperature OK |
| e | Hall C |

Safety Port

4-pin pluggable terminal strip

| Pin | Function |
|-----|----------|
| 1 | Loop-A |
| 2 | Loop-B |
| 3 | Stop-A |
| 4 | Stop-B |

A closed circuit must exist between Loop-A and Loop-B to enable power to the drives. Stop-A and Stop-B are the normally closed contacts of the stop switch on the front panel. Factory default connects Loop-A to Loop-B and Loop-B to Stop-A, thus the stop switch provides the normally closed loop circuit.

Servo Motor

| | |
|-----|----------------------------|
| AG* | Set AMP-20540 Gain |
| AU* | Set Current Loop Gain |
| AW* | Report AMP-20540 Bandwidth |
| DV | Dual Velocity |
| FA | Acceleration Feedforward |
| FV | Velocity Feedforward |
| IL | Integrator Limit |
| KD | Derivative Constant |
| KI | Integrator Constant |
| KP | Proportional Constant |
| NB | Notch Bandwidth |
| NF | Notch Frequency |
| NZ | Notch Zero |
| OF | Offset |
| PL | Pole |
| SH | Servo Here |
| TK* | Set AMP-20540 Peak Current |
| TL | Continue Torque Limit |
| TM | Sample Time |

Stepper Motor

| | |
|----|---------------------------|
| DE | Define Encoder Position |
| DP | Define Reference Position |
| KS | Stepper Motor Smoothing |
| MT | Motor Type |
| RP | Report Commanded Position |
| TD | Step Counts Output |
| TP | Tell Position of Encoder |

Brushless Motor

| | |
|----|-----------------------|
| BA | Brushless Axis |
| BB | Brushless Phase |
| BC | Brushless Calibration |
| BD | Brushless Degrees |
| BI | Brushless Inputs |
| BM | Brushless Modulo |
| BO | Brushless Offset |
| BS | Brushless Setup |
| BZ | Brushless Zero |

Servo Motor

| | |
|---------|---------------------------|
| AL | Arm Latch |
| CB | Clear Bit |
| CO | Configure I/O Points |
| II | Input Interrupt |
| OB | Define Output Bit |
| OC | Output Compare Function |
| OP | Output Port |
| SB | Set Bit |
| @IN[x] | State of Digital Input x |
| @OUT[x] | State of Digital Output x |
| @AN[x] | State of Analog Input x |

* For Use with AMP-20540

System Configuration

| | |
|------|------------------------------|
| BN | Burn Parameters |
| BP | Burn Program |
| BR* | Brush Motor Enable |
| BS* | Brushless Set-up |
| BV | Burn Variables and Arrays |
| CE | Configure Encoder Type |
| CF | Configure Serial Port |
| CN | Configure Switches |
| CW | Data Adjustment Bit |
| DE | Define Dual Encoder Position |
| DP | Define Position |
| DV | Dual Velocity (Dual Loop) |
| EO | Echo Off |
| IA | Set IP Address |
| IH | Internet Handle |
| IT | Independent Smoothing |
| LZ | Leading Zeros Format |
| MB | ModBus |
| MO | Motor Off |
| MT | Motor Type |
| PF | Position Format |
| QD | Download Array |
| QU | Upload Array |
| RS | Reset |
| ^R^S | Master Reset |
| VF | Variable Format |

Math Functions

| | |
|----------|-----------------------|
| @SIN[x] | Sine of x |
| @COS[x] | Cosine of x |
| @COM[x] | 1's Complement of x |
| @ASIN[x] | Arc Sine of x |
| @ACOS[x] | Arc Cosine of x |
| @ATAN[x] | Arc Tangent of x |
| @ABS[x] | Absolute Value of x |
| @FRAC[x] | Fraction Portion of x |
| @INT[x] | Integer Portion of x |
| @RND[x] | Round of x |
| @SQR[x] | Square Root of x |

Interrogation

| | |
|------|-------------------------------|
| LA | List Arrays |
| LL | List Labels |
| LS | List Program |
| LV | List Variable |
| MG | Message Command |
| QH* | Query Hall State |
| QR | Data Record |
| QZ | Return Data Record Info |
| RP | Report Command Position |
| RL | Report Latch |
| ^R^V | Firmware Revision Information |
| SC | Stop Code |
| TA* | Tell AMP-20540 Status |

Interrogation (cont.)

| | |
|----|-------------------|
| TB | Tell Status |
| TC | Tell Error Code |
| TD | Tell Dual Encoder |
| TE | Tell Error |
| TI | Tell Input |
| TP | Tell Position |
| TR | Trace Program |
| TS | Tell Switches |
| TT | Tell Torque |
| TV | Tell Velocity |

Programming

| | |
|-------|-----------------------------|
| DA | Deallocate Variables/Arrays |
| DL | Download Program |
| DM | Dimension Arrays |
| ED | Edit Program |
| ELSE | Conditional Statement |
| ENDIF | End of Cond. Statement |
| EN | End Program |
| HX | Halt Execution |
| IF | If Statement |
| IN | Input Variable |
| JP | Jump |
| JS | Jump to Subroutine |
| NO | No-operation - For Remarks |
| RA | Record Array |
| RC | Record Interval |
| RD | Record Data |
| REM | Remark Program |
| UL | Upload Program |
| ZS | Zero Stack |

Error Control

| | |
|----|-------------------------|
| BL | Backward Software Limit |
| ER | Error Limit |
| FL | Forward Software Limit |
| OE | Off-On-Error Function |
| TL | Torque Limit |
| TW | Timeout for In-Position |

Trippoint

| | |
|----|-------------------------|
| AD | After Distance |
| AI | After Input |
| AM | After Motion Profiler |
| AP | After Absolute Position |
| AR | After Relative Distance |
| AS | At Speed |
| AT | After Time |
| AV | After Vector Distance |
| MC | Motion Complete |
| MF | After Motion - Forward |
| MR | After Motion - Reverse |
| WC | Wait For Contour Data |
| WT | Wait For Time |

Independent Motion Commands

| | |
|----|-------------------------|
| AB | Abort Motion |
| AC | Acceleration |
| BG | Begin Motion |
| DC | Deceleration |
| FE | Find Edge |
| FI | Find Index |
| HM | Home |
| IP | Increment Position |
| IT | Smoothing Time Constant |
| JG | Jog Mode |
| PA | Position Absolute |
| PR | Position Relative |
| SP | Speed |
| ST | Stop |

Error Control

| | |
|----|-----------------------|
| CD | Contour Data |
| CM | Contour Mode |
| DT | Contour Time Interval |
| WC | Wait For Contour Data |

Trippoint

| | |
|----|-------------------------|
| EA | ECAM Master |
| EB | Enable ECAM |
| EC | ECAM Table Index |
| EG | ECAM Go |
| EM | ECAM Cycle |
| EP | ECAM Interval |
| EQ | Disengage ECAM |
| ET | ECAM Table Entry |
| GA | Master Axis For Gearing |
| GM | Gantry Mode |
| GR | Gear Ratio For Gearing |

Vector/Linear Interpolation

| | |
|----|----------------------------------|
| CA | Define Vector Plane |
| CR | Circular Interpolation Move |
| CS | Clear Motion Sequence |
| ES | Ellipse Scaling |
| LE | Linear Interpolation End |
| LI | Linear Interpolation Segment |
| LM | Linear Interpolation Mode |
| ST | Stop Motion |
| TN | Tangent |
| VA | Vector Acceleration |
| VD | Vector Deceleration |
| VE | Vector Sequence End |
| VM | Coordinated Motion Mode |
| VP | Vector Position |
| VR | Vector Speed Ratio |
| VS | Vector Speed |
| VT | Smoothing Time Constant - Vector |

MODEL NUMBER CONFIGURATION

OPTIONS :

SAMPLE MODEL NUMBER :

MDC2100 - 4 - 48VW1 - D1 - D1 - D1 - D1 - XXXX

Model Series

1-4 Axis Controller MDC2100

Number of Axes

1 Axis 1
 2 Axis 2
 3 Axis 3
 4 Axis 4

Amplifier Bus Voltage

48V, 700W 48VW1
 60V, 700W 60VW1

Driver Card*

Brushless Servo D1

Customization Code (optional)

Leave blank for 110VAC operation
 220VAC operation with a NEMA 6-15 plug 220US
 220VAC operation with a European (Schuko) plug ... 220EU
 220VAC operation with a British Standard plug ... 220BS

Other codes assigned by factory.

*Specify each axis

†Call factory for custom controller interfaces.



Last Updated 09/13/2007