The ION® Digital Drive

ION® Digital Drives are compact, fully enclosed modules that provide high performance motion control, network connectivity and power amplification. Two power output levels are available, the ION 500 is rated at 500 Watts and the ION 3000 is rated at 3,000 Watts. All IONs can drive DC brush, brushless DC and step motors, and are ideal for medical, scientific, semiconductor, robotic, industrial and other automation applications.

Powerful Features
IONs provide very high power density in a rugged, flexible form factor. They perform profile generation, servo compensation, stall detection, field oriented control, digital torque control and many other motion control functions. Additional features include Ethernet, CANbus or serial communications, extensive general purpose digital and analog I/Os, and full programmability, for the ION 500 CME.

Easy To Use
Working with the ION Digital Drive, PMD’s powerful Pro-Motion® GUI makes it easy to graph and analyze axis performance, while C-Motion® and VB-Motion® allow users to develop their own applications using C/C++ or Visual BASIC. Programmable versions (ION/CME) include PMD’s C-Motion Engine, allowing users to directly run code on the ION, off-loading the system host or enabling standalone operation.

Built on the Magellan® Motion Processor
ION’s Magellan Motion Processor provides a powerful instruction set to control the motion application, monitor performance and synchronize overall drive behavior. User selectable profiling modes include S-curve, trapezoidal, velocity contouring and electronic gearing. Servo loop compensation utilizes PID control, velocity and acceleration feedforward, and dual bi-quad filters. Additional features include limit switches, breakpoints, secondary encoder input for master-slave and electronic gearing applications.

> FEATURES

- Magellan® instruction set
- DC brush, BLDC & step motor versions
- Ethernet, CANbus or serial communications
- S-curve, trapezoidal, velocity contouring, electronic gearing profiles
- Pulse & direction input
- 500 W or 3000 W power rating
- Up to 20 A continuous, up to 30 A peak current
- 12-56 V or 20-195 V single power source
- High-efficiency MOSFETs
- 40 kHz PWM frequency
- 102 usec servo loop rate
- Auxiliary encoder input supports gearing & dual loop applications
- Position and current loops

> CONFIGURATION

System Host*

Step Motor
(Encoder Optional)

ION 500 Digital Drive

DC Brush Motor

ION 3000 Digital Drive

Ethernet, CANbus or Serial Network

ION/CME 500 Digital Drive*

Brushless DC Motor

*System host optional for ION/CME
## Specifications

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<td>12-56 VDC</td>
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<td>9.8 ADC</td>
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<td>RS232/485, Ethernet</td>
<td>RS232/485, CANbus</td>
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<td>Sinusoidal, 6-step, field oriented control</td>
<td>Sinusoidal, 6-step, field oriented control</td>
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### Filters

**Filter parameters**

- Scalable PID with Vel + Acc feedforward, integration limit, offset bias, dual biquad filter, and settable derivative sampling time

**Position error tracking**

- Motion error window allows axis to be stopped upon exceeding programmable window.
- Tracking window allows flag to be set if axis exceeds a programmable position window.

**Digital current loop**

- Scalable PI with integration limit, torque control, I2t current limiting

### Additional I/Os

- 4 digital bidirectional I/Os, 2 digital outputs, 4 digital inputs
- +/- 10 V range and 16 bits resolution

### Mechanical Options

- Heat sink 4.4" (109 mm) x 2.9" (74 mm) x 1" (25 mm)
- DIN Rail
-Mounting adapter

### Compliance

- CE/RoHS: EN60204-1, EN50011, EN61000-6-1, EN61000-6-3 CE marked; RoHS compliant
- UL: Designed to UL508a, UL Recognized

### Environmental

- Operating Temperature: 0 degrees to 50 degrees C, 0 degrees to 40 degrees C

### Mechanical Dimensions

- ION 500: 4.3" (109.2 mm) x 3.03" (76.9 mm) x 1.63" (41.4 mm)
- ION 3000: 5.75" (146 mm) x 3.88" (98.5 mm) x 1.63" (41.4 mm)

### Weight

- ION 500: 0.6 lb (0.28 kg)
- ION/CME 500: 0.6 lb (0.28 kg)
- ION 3000: 1 lb (0.5 kg)

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Development Tools

1. EASY START-UP

Developers Kit

Includes
- ION 500, ION/CME 500, or ION 3000 Developer’s Kit board
- Pro-Motion CD and User’s Guide
- Development software CD with C-Motion and VB-Motion software
- Complete manual set
- Complete cable & prototyping connector set

2. TUNE & OPTIMIZE

Pro-Motion® GUI

Pro-Motion is a sophisticated, easy-to-use Windows-based exerciser program for use with PMD motion control ICs, modules, and boards.

Features
- Motion oscilloscope graphically displays processor parameters in real-time
- Autotuning
- Ability to save and load settings
- Axis wizard
- Distance and time units conversion
- Motor-specific parameter setup
- Axis shuttle performs programmable motion between two positions
- Communications monitor echoes all commands sent by Pro-Motion to the board
- Advanced Bode analysis for frequency machine response

3. BUILD THE APP

C-Motion®

C-Motion is a complete, easy-to-use, motion programming language that includes a source library containing all the code required for communicating with PMD motion ICs, boards, and modules.

C-Motion features include:
- Extensive library of commands for virtually all motion design needs
- Develop embeddable C/C++ applications
- Complete, functional examples
- Supports serial, CAN, Ethernet, and SPI communications

Example C-Motion code for executing a profile and tracing processor variables:

```
// set the trace buffer wrap mode to a one time trace
SetTraceMode(hAxis1, PMDTraceOneTime);
// set the processor variables that we want to capture
SetTraceVariable(hAxis1, PMDTraceVariable1, PMDAxis1);
SetTraceVariable(hAxis1, PMDTraceVariable2, PMDAxis1);
SetTraceVariable(hAxis1, PMDTraceVariable3, PMDAxis1);
// set the trace to begin when we issue the next update command
SetTraceStart(hAxis1, PMDTraceConditionNextUpdate);
// set the trace to stop when the MotionComplete event occurs
SetTraceStop(hAxis1, PMDTraceConditionEventStatus, PMDEventMotionCompleteBit, PMDTraceStateHigh);
SetProfileMode(hAxis1, PMDTrapezoidalProfile);
// set the profile parameters
SetPosition(hAxis1, 200000);
SetVelocity(hAxis1, 0x200000);
SetAcceleration(hAxis1, 0x1000);
SetDeceleration(hAxis1, 0x1000);
// start the motion
Update(hAxis1);
```
## PMD PRODUCT OVERVIEW

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<th>ATLAS® DIGITAL AMPLIFIERS</th>
<th>PRODIGY® MOTION BOARDS</th>
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<td>Compact: 20-pin solderable module</td>
<td>Compact: 20-pin solderable module</td>
<td>Compact: 20-pin solderable module</td>
<td>Fully enclosed module</td>
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<td>PCI, PC/104</td>
<td>PCI, PC/104</td>
<td>PCI, PC/104</td>
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<td>12 - 56 V</td>
<td>12 - 56 V / 20 - 195 V</td>
<td>12 - 56 V / 20 - 195 V</td>
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<td>20 kHz – current</td>
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<td>50 – 75 μsec/axis</td>
<td>50 – 150 μsec/axis</td>
<td>10 kHz – position</td>
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### FOR ORDERING ION DIGITAL DRIVES

**ION Body Style:**
- Ion 500 and 300
- Ion 500 CME

**Motor Type:**
- DC Brush
- BLDC
- Step

**# of Axis:**
- 1

**Use Type:**
- D: Standard
- K: Development Kit

**Communication:**
- S: Serial
- D: Ethernet + Serial
- C: CANbus

**Power Selection:**
- 0056/25: Ion 500
- 0195/30: Ion 3000

To place an order or for additional information and questions, contact PMD customer service.

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**About Performance Motion Devices**

Performance Motion Devices (PMD) is a worldwide leader in motion control ICs, boards and modules. Dedicated to providing cost-effective, high performance motion systems to OEM customers, PMD utilizes extensive in-house expertise to minimize time-to-market and maximize customer satisfaction.

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