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A Powerful Lineup of Controllers & Software—6000 Series

A Proven Lineup of Bus-Based Controllers and Software

The 6000 Series consists of 2 and 4-axis ISA based controllers with step and direction or +/- 10V output to control step motors or servo motors. All 6000 Series controllers share the following features:

- The powerful and proven 6000 programming language
- Circular interpolation
- Cam profiling
- Position following
- Registration
- Non-volatile program memory
- 28 programmable inputs
- 26 programmable outputs
- Dedicated registration triggers for position capture
- Analog inputs for joystick and variable input
- End-of-travel and home limits per axis
- Incremental encoder feedback
- Motion Architect™ programming environment
- DLLs for use with C++ and Visual Basic™ development
- Optional Software
- CAD-to-motion (CompuCAM)
- DDE Server (DDE6000)
- OCX Controls (Motion OCX Toolkit)
- Graphical servo tuning (Servo Tuner)

The 6000 Series family consists of the following products:

AT6250/AT6450

- 2 or 4 axis PC/AT based +/- 10V controller
- Compatible with industry standard +/- 10V torque or velocity servo drives

AT6200/AT6400

- 2 or 4 axis PC/AT based step & direction controller
- Compatible with industry standard step motor drives
- Compatible with industry standard position based digital servo drives

VM24

- 24V I/O Module
- Compatible with all 6000 Series products
- Compatible with all industry standard PLC I/O

VM50

- Screw terminal breakout for 6000 Series I/O
- Compatible with all 6000 Series products

OEM versions of these products are available. Please call 1-800-358-9070 for more information.

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AT6250/AT6450 Servo Controllers

Multi-Processor-Based, Two-Axes or Four-Axes Servo Controllers

The AT6250 and AT6450 are multi-processor-based, two-axes and four-axes servo controllers designed to be inserted into a single open ISA expansion slot. They provide sophisticated control of any Compumotor servo motor/drive or any standard +/-10V analog input servo drive system. In addition to the controller, a separate auxilliary board simplifies connections with encoders, motor drives, joystick, limits, and programmable I/O.

The AT6250 and AT6450 come standard with Motion Architect™ support software for Microsoft® Windows™. Motion Architect™ allows easy creation and implementation of motion programs. DLLs are provided for Microsoft® Windows™ development.

The AT6250 and AT6450 use the proven 6000 Series command language. The 6000 command language is powerful enough to solve the most complex applications yet its basic-like structure will not overwhelm a novice programmer.

Features

Motion

- 1 to 4 axes of optically isolated servo control (+/- 10V)
- Incremental encoder feedback
- Analog input option provides one 14-bit +/-10VDC input per axis
- Controls servo drives in torque or velocity mode
- Update rates for servo control as fast as 200 microseconds per axis.
- 1.2 MHz post-quadrature position feedback frequency

I/O

- Home, positive and negative end-of-travel limits per axis
- 24 programmable inputs and 24 programmable outputs
- Dedicated trigger interrupts provide high-speed position capture and registration capability to ±1 encoder count at maximum frequency
- Drive enable relay outputs
- Drive fault inputs

Programming

- Soft operating system for 6000 Series command language
- Multi-axis teach capability using data arrays
- Position-based following
- Cam profiling
- 2- to 4-axes linear interpolation
- 2-axes circular interpolation with proportional or tangential control of a third axis
- Compiled motion for shorter move execution times
- S-curve or trapezoidal motion profiling
- Numeric, binary and string variable storage
- User-configurable error condition interrupts
- Program debug tools - trace mode, step mode and break points
- 150K of RAM for program storage and path storage

Software Provided

- Motion Architect™ for Windows programming environment
- DLL (Dynamic Link Libraries) for Windows™ software development in Visual C++ and Visual Basic

Optional Software

- Servo Tuner for graphical tuning of torque or velocity servo drives
- CompuCAM for CAD-to-motion
- Motion OCX Toolkit to create Microsoft® Visual Basic™ controls
- DDE Server provides data exchange with DDE capable applications

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Specifications AT6250/AT6450

	Parameter	Value
Performance		
	Position range	±2,147,483,648 counts
	Velocity range	0.001 to 1,200,000 counts/sec
	Acceleration range	0.001 to 2,147,483,648 counts/sec^2
	Motion trajectory update period	Default: 1.6 ms for AT6250; 3.0 ms for AT6450
	Servo sampling update period	Default: 400 µs for AT6250; 785 µs for AT6450
	System update period	Default: 1.6 ms for AT6250; 3.0 ms for AT6450
Input Power		
	AT6250 and AT6450 PC Card	5VDC @ 3.5A from the PC-AT bus
	ANI Card	5VDC @ 0.75A for each card from PC-AT bus
	120V Auxiliary Board (AC or DC input)	90 - 132VAC, 50/60Hz, 1.5A @ 120VAC, single phase; or power from an external source of 5VDC, ±10%
	240V Auxiliary Board (AC or DC input)	90 - 264VAC, 50/60Hz, 0.75A @ 240VAC, single phase; or power from an external source of 5VDC, ±10%
	DC Auxiliary Board	+5VDC @ 1.6A and ±15VDC @ 50mA, ±10% from an external source
Inputs		
	Home, Pos/Neg limits, drive fault, joystick trigger, joystick release, joystick axes select, joystick velocity	HCMOS*-compatible; internal 6.8 KΩ Pull-ups to 5V; voltage range is 0-24V
	Encoder	Differential comparator accepts two-phase quadrature incremental encoders with differential (recommended) or single-ended outputs (+5VDC TTL-compatible*), Maximum frequency = 1.6 MHz, post quadrature.
	24 programmable	HCMOS*-compatible with internal 6.8KΩ pull-up (Connect IN-P to +5V -24 to source current or connect IN-P to GND to sink current). Voltage range = 0-24V 50-pin plug is compatible with OPTO-22™ signal conditioning equipment.
	Trigger Inputs	AT6250 has 3 & AT65450 has 4 TTL compatible* high speed inputs for position capture & general purpose functions. Internal 6.8KΩ pull ups to +SV; voltage range is 0-24V.
	Analog (Joystick)	Voltage range = 0-2.5VDC, 8-bit A/D converter. Input voltage must not exceed 5V.
	Analog (ANI option)	Voltage range = ±10VDC, 14-bit A/D converter. one per axis. Requires an 8-bit slot.
Outputs	(See also I/O pin outs & circuit drawings)	
	24 programmable and OUT-A through OUT-D	Open collector output with 4.7KΩ pull-ups. Can be pulled up by connecting OUT-P to +5V on the auxiliary board, or to user-supplied voltage of up to 24V. Max. voltage in OFF state (not sinking current) = 24V, max. current in ON state (sinking) = 30mA. 50-pin plug is compatible with OPTO-22™ signal conditioning equipment.
	Command Out	±10V analog output. 12-bit DAC. Load should be >2KΩ impedance.
	Shutdown	Shutdown relay output. Max. rating: 175VDC, 0.25A, 3W
	Auxiliary Analog Output (ANA)	±10V analog output. 8-bit DAC. Load should be >2KΩ impedance. Accuracy is ±5%.
	Board Monitor Alarm (BMA)	Detects unrecoverable faults in hardware and software. When BMA detects fault, status light on AT6n50 card turns off and status light on auxiliary board turns red.
Environmental		
	Operating temperature	32° to 122°F(0° to 50°C)
	Storage temperature	–22° to 185°F(–30° to 85°C)
	Humidity	0% to 95% non-condensing
Physical		
	120 VAC and 240 VAC AUX Boards	
	• Height	10.10 in (256.54 mm)
	• Width	6.10 in (154.94 mm)
	• Depth	2.00 in (50.80 mm)
	DC Input AUX Board	
	• Height	11.60 in (294.64 mm)
	• Width	6.10 in (154.94 mm)
	• Depth	1.75 in (44.45 mm)

* HCMOS-compatible voltage levels: low ≤1.67v, High ≥3.3v
* TTL-compatible voltage levels: low ≤0.4v, High ≥2.4v

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AT6200/AT6400 Step & Direction Controllers

Two and Four Axes of Bus-Based Step & Direction Control

The AT6200 and AT6400 are two-axes and four-axes step and direction controllers designed to be inserted into a single open ISA expansion slot. They provide sophisticated control of any Compumotor step motor or digital servo or any standard step motor or digital step and direction servo system. In addition to the controller, a separate auxilliary board simplifies connections with encoders, motor drives, joystick, limits, and programmable I/O.

The AT6200 and AT6400 come standard with Motion Architect™ support software for Microsoft® Windows™. Motion Architect™ allows easy creation and implementation of motion programs. DLLs are provided for Microsoft® Windows™ development.

The AT6200 and AT6400 use the proven 6000 Series command language. The 6000 command language is powerful enough to solve the most complex applications yet its basic-like structure will not overwhelm a novice programmer.

Features

Motion

- 1 to 4 axes of step motor or digital step and direction servo control
- Incremental encoder feedback
- 1.6 MHz maximum step output frequency

I/O

- Home, positive and negative end-of-travel limits per axis
- 24 programmable inputs and 24 programmable outputs
- Dedicated trigger interrupts provide high-speed position capture and registration capability to ±1 encoder count at maximum frequency
- Drive enable relay outputs
- Drive fault inputs

Programming

- Soft operating system for 6000 Series command language
- Multi-axis teach capability using data arrays
- Position-based following
- Cam profiling
- 2- to 3-axes linear interpolation
- 2-axes circular interpolation with proportional or tangential control of a third axis
- Compiled motion for shorter move execution times
- Trapezoidal motion profiles
- Numeric, binary and string variable storage
- User-configurable error condition interrupts
- Program debug tools - trace mode, step mode and break points
- 1500K of RAM for program storage and path storage
- Stall detection for step motors

Software Provided

- Motion Architect™ for Windows™ programming environment
- DLL (Dynamic Link Libraries) for Windows™ software development in Visual C++ and Visual Basic™

Optional Software

- CompuCAM for CAD-to-motion
- Motion OCX Toolkit to create Microsoft® Visual Basic™ controls
- DDE Server provides data exchange with DDE capable applications

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Specifications AT6200/AT6400

	Parameter	Value
Performance		
	Position range	±2,147,483,648 steps
	Velocity range	1 to 1,600,000 steps/sec
	Acceleration range	1 to 24,999,975 steps/sec^2
	Motion Algorithm Update Rate	2 ms
Input Power		
	AT6200 and AT6400 PC Card	5VDC @ 1.8A max from the PC-AT bus
	120V Auxiliary Board (AC or DC input)	90-132VAC, 50/60Hz, 1.5A @ 120VAC, single-phase; or power from an external power source of 5VDC, ±10%
	240V Auxiliary Board (AC or DC input)	90-264VAC, 50/60Hz, 0.75A @ 240VAC, single-phase; or power from an external power source of 5VDC, ±10%
	DC Auxiliary Board	+5VDC (±5%) @ 1.6A
Inputs	(See also I/O pinouts & circuit drawings)	
	Encoder	Differential comparator accepts two phase quadrature incremental encoders with differential (recommended) or single ended outputs (+5VDC TTL compatible*). Maximum frequency = 1.6 MHz, post-quadrature.
	24 Programmable	HCMOS* compatible with internal 6.8 KΩ pull-up (connect IN-P to +5–24V to source current or connect IN-P to GND to sink current). Voltage range = 0–24V. 50-pin plug is compatible with OPTO-22™ signal conditioning equipment.
	Trigger Inputs	AT6200 has two and AT6400 has four high-speed inputs for encoder capture and registration. HCMOS* compatible with internal 6.8 KΩ pull-up to AUX-P (wired to +5V at factory). Voltage range = 0V-24V.
	Analog (Joystick)	Voltage range 0-2.5VDC, 8-bit A/D converter.
	Home, Pos/Neg Limits, Pulse Cut Off	HCMOS* compatible; internally 6.8KΩ pull-ups to AUX-P (wired to +5V at factory). Voltage Range = 0V-24V.
	Joystick Inputs (Axes and Velocity)	HCMOS and TTL compatible; internal 6.8 KΩ pull-up to +5V; voltage range is 0-24V. Select, Release, Trigger and Auxiliary)
	Drive Fault, In Position	HCMOS* compatible; internal 1.0 KΩ pull-up to 5V; voltage range = 0V–5V.
Outputs		
	Home, Pos/Neg Limits, Pulse Cut Off	HCMOS* compatible; internally 6.8KΩ pull-ups to AUX-P (wired to +5V at factory). Voltage Range = 0V-24V.
	24 Programmable	Open collector output with 4.7KΩ pull-ups. Can be pulled up by connecting OUT-P to +5V on the auxiliary board, or to user-supplied voltage of up to 24V. Max voltage in OFF state (not sinking current) = 24V, max current in ON state (sinking) = 30mA. 50-pin plug is compatible with OPTO-22™ signal conditioning.
	Step, Direction, Shutdown	Differential line driver output. Signal high > 3.5VDC @ +30 mA, signal low < 1.0VDC @ -30 mA. +output for each differential drive is active high; output for each driver is active low. Step pulse width is 0.3µs to 20 µs.
	Board Monitor Alarm (BMA)	Detects unrecoverable faults in hardware and software. When BMA detects fault, status light on AT6n00 card turns off and status light on auxiliary board turns red.
Environmental		
	Operating temperature	32° to 122°F (0° to 50°C)
	Storage temperature	-22° to 185°F (-30° to 85°C)
	Humidity	0% to 95% noncondensing
Physical		
	120 VAC and 240 VAC AUX Boards	
	• Height	10.10 in (256.54 mm)
	• Width	5.50 in (139.70 mm)
	• Depth	2.00 in (50.80 mm)
	DC Input AUX Board	
	• Height	11.60 in (294.64 mm)
	• Width	5.50 in (139.70 mm)
	• Depth	1.50 in (38.1 mm)

* HCMOS-compatible voltage levels: low ≤ 1.67V, high ≥ 3.3V
TTL-compatible voltage levels: low ≤ 0.4V; high ≥ 2.4V

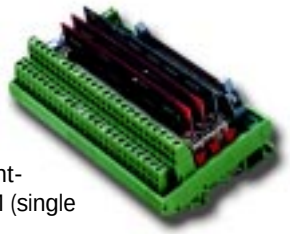
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VM24 and VM50

The VM24 and VM50 have been designed to work with the 6000 Series I/O to provide greater ease of use in your applications.

VM24



The VM24 provides 24 volt capability for the 6000 Series programmable I/O. The VM24 module consists of a DIN Rail mountable base and up to three 8-bit SIM (single in-line module) boards.

Features

Outputs

- 5-24 VDC capable
- Undervoltage lockout
- Thermal shutdown protection
- Sink or source current up to 300 mA

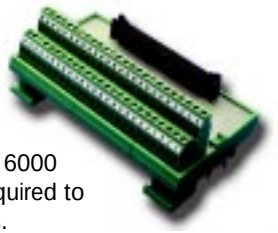
Inputs

- 5-24 VDC capable
- Sourcing or sinking jumper selectable per SIM
- 1/3 1/3 1/3 switching threshold
- Overvoltage clamp
- High frequency filter

Physical

- 5.215 in. wide x 2.84 in. high x 2.5 in. deep
- 132 mm wide x 72 mm high x 64 mm deep

VM50



The VM50 is a screw terminal adaptor that breaks out the connections for the 24 programmable inputs and 24 programmable outputs on the 6000 Series controllers. Two VM50s are required to break out both the inputs and outputs.

Features

General

- DIN Rail mountable
- Convenient screw terminal access to 6000 series progammable I/O
- Comes with 2 ft. ribbon cable

Physical

- 5.31 in wide x 3.03 in high x 2.28 in deep
- 135 mm wide x 77 mm high x 58 mm deep

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6000 Series Software

Motion Architect™

Motion Architect™ is designed for use with all 6000 Series products. It comes standard with each 6000 Series product and makes the implementation of the controllers remarkably easy.

Features

System Configurator and Code Generator

Automatically generate 6000 controller code containing basic setup system setup parameters (I/O definitions, encoder operations, drive setup etc.) based on dialog box entries

Program Editor

Create blocks or lines of 6000 programming code, or copy portions of code from another file. Save editor files for later use in a high-level program such as Visual Basic™ or C++.

Terminal Emulator

Download and upload 6000 programs to and from the controller. Download the soft operating system. Go on-line and determine controller status.

Test Panel

Create your own test panel to exercise your programs and check I/O, motion, system status and timers.

Context Sensitive Help

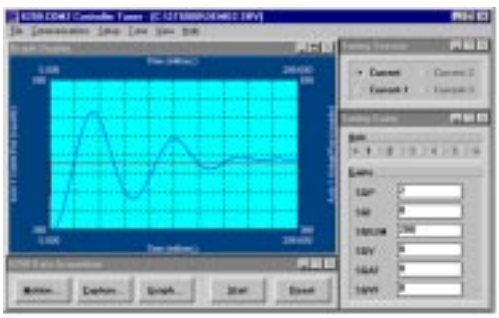
Access help on 6000 programming commands or how to use

Servo Tuner™

Servo Tuner is a graphical tuning software utility to reduce the time required to set up PID gains in a 6000 Series servo controller (AT6250/AT6450). Servo Tuner allows you to optimize your servo performance by adjusting overshoot, settling time, rise time and steady state error.

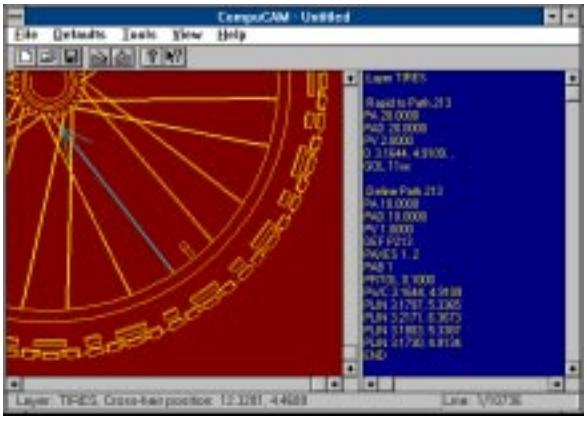
Features

- Tune analog velocity or digital position loops
- Calculate gain settings automatically based on inertia and motor drive constants
- Tune for step response, trapezoidal move or S-Curve move profiles
- Capture and display up to nine motion parameters
- Automatically stores the last four tuning sessions for iterative tuning.



CompuCAM

CompuCAM is a CAD-to-motion software package that converts .DXF, HP-GL or G-Code geometry files to 6000 programming code. From CompuCAM you can run your CAD program, import your geometry, generate and arrange your 6000 code and save it for download to your 6000 Series controller.



CompuCAM Features

- Types of positioning
  - 2-axis circular interpolation
  - Point-to-point, multi-axis linear interpolation
- Supports end of path operation (turning on and off I/O, moving a third axis)
- .DXF Filter supports
  - Lines and arcs, circles and polygons, polylines (ellipses, bezier curves, splines)
- HP-GL Filter Supports
  - Absolute/Relative arcs
  - Circles
  - Pen up/Pen down
  - Input P1/P2
  - Scale
- G-Code
  - F & G Codes
  - H, I, J, L, M Codes
  - N, O, P, X, Y, Z Codes
  - Customizable H&M codes

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Motion OCX Toolkit



Motion OCX Toolkit is a powerful standalone software package that allows the programmer to easily and effectively develop control interfaces for the 6000 Series controllers. Motion OCX Toolkit provides a quick and easy way to incorporate advanced functionality into their applications.

Motion OCX Toolkit includes the following three controls:

Communications Shell

Use Comm6000 to control basic communication with the 6000 product, including interrupt handling and sending/receiving files

Terminal OCX

Use Term6000 to interace to the 6000 Series controller online. Check status, execute commands immediately and view error messages.

Fast Status Polling OCX

Poll6000 is used to poll the 6000 Series controller fast status register and display quickly updated information such as motor position and system status.

Motion OCX Toolkit provides 32-bit OLE Custom Control extensions designed to run under Windows™ 95, 98 or NT and the following applications:

- Visual Basic™ 4.0 or later
- Delphi 2.0 or later
- Visual C++
- Any other 32-bit development environment containing OCX controls

DDE6000 (Dynamic Data Exchange Server)

DDE6000 is a software driver that enables communications between Microsoft Windows applications that support the DDE protocol and the 6000 Series controllers.

The DDE6000 supports NetDDE, allowing any computer on any Windows™ NT Server, which supports NetDDE, to control any 6000 Series controller connected to a networked computer.

DDE6000 not only supports all 6000 Series controllers but it also supports multiple 6000 Series controllers simultaneously.

DDE is a Microsoft® protocol that automatically updates data to and from Windows™ applications. The DDE servers send the 6000 Series fast status information to a DDE equipped windows application that requests it. Information provided via DDE6000 includes:

- Status Report
- Motor/Encoder Position
- Motor Velocity
- Axis Status
- System Status
- Interrupt Status
- User Status
- Timer
- Variables
- Following Status
- Phase Shift
- Inputs/Outputs
- End-of-travel Limits
- Home limits
- Analog inputs

The following are some applications that support the DDE protocol.

Intellution (FIX DMACS)
National Instruments (LabVIEW)
Wonderware Software Development Corp. (InTouch)
United States Data Corporation (Factory Link IV)

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