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Find the *Newport ESP301-3G* at our website: *Click HERE*

ESP301

3 Axis Motion Controller/Driver



- **1 to 3 axis motion controller using universal driver technology for DC servo and 2-phase stepper motors up to 3A per axis**
- **ESP technology, Newport's exclusive "plug-and-play" compatibility with ESP stages for easy setup**
- **1000x programmable micro-step resolution for ultra-smooth low speed stepper positioning**
- **Synchronized circular/linear interpolation and continuous path contouring for complex motion profiling**
- **USB2.0, RS232 and optional GPIB communications link for easy computer interfacing**

The ESP301 controller/driver can drive and control up to three axis of motion using any combination of DC or 2-phase stepper motors up to 3A per axis. This capability enables driving a large selection of Newport stages and actuators. Featuring an integrated manual front panel interface and Newport's unique ESP stage auto-detection and auto-configuration, the ESP301 is the easiest to use controller with excellent functionality at an affordable price.

Technology

The ESP301 uses a 64-bit, floating point, DSP processor for high precision synchronized control. A digital PID-FF (feed-forward) servo loop ensures precise velocity profile tracking and accurate positioning. A 1000x programmable micro-step resolution provides ultra-smooth low-speed stepper positioning capability, and 18-bit DC motor command output ensures improved stability for precision applications.

Motion

The ESP301 provides several modes of positioning including synchronized and non-synchronized point-to-point, jogging, linear or circular interpolation, and continuous path contouring. With electronic gearing, any axis of the ESP301 can be "slaved" to any other axis, even if they have different motor/gear ratios or lead screw pitches. Other sophisticated motion features include on-the-fly position, velocity, or trajectory changes for complex motion and alignment routines. Software limits can be set to improve systems safety. An advanced origin search routine includes encoder index pulse consideration for precision homing. Backlash and linear error compensation eliminate repeatable system errors.

Inputs/Outputs

16 bi-directional digital I/O can be user programmed as either inputs or outputs for internal or external event synchronization. When configured as inputs, they can be used to execute a program or to stop a motion. When configured as outputs, they can monitor the status of a motion to provide a hardware interface for external equipment. An additional watchdog timer and remote interlock are supplied as an invaluable safety feature.

Programming

The ESP301 makes programming complex motions easy using a powerful programming language with over 100 commands. Each ESP301 features a standard USB and RS-232-C communication link for easy computer interfacing. An optional IEEE-488 (GPIB) interface is available for high speed parallel communication. Newport recommends using National Instruments GPIB hardware for full compatibility, as other GPIB products may not provide acceptable performance. 64kB Flash non-volatile user program memory allows for storage of up to 100 user-defined programs for computer independent usage. A complete library of LabVIEW™ drivers covering all ESP301 commands and communication DLL's covering the most popular Windows versions are available and continually updated and accessible at www.newport.com. Powerful software utilities reduce start-up time and support application development.

ESP Auto-Configuration

When used with ESP compatible motion devices, the ESP301 motion controller will automatically configure itself, providing true plug-and-play compatibility. PID parameters, motor types and gear ratios are automatically set for you at power up — there are no parameters to set and hence no risk of damage by inappropriate parameter settings. The ESP301 can also be configured to operate non-Newport stages that fit within the driver module specifications.

Front panel

ESP301 options include a user-friendly front panel interface providing an intuitive menu system from which you can execute motion programs, initiate manual moves, and configure operating parameters. The position of all axis is displayed in a LCD screen. A digital joystick can provide convenient jog control.

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Specifications

Number of Axis	1–3 axis of any combination of DC servo and 2-phase stepper motors
Computing Power	400 µs servo cycle up to 3 axis
	64 bits floating point DSP, with a peak performance of 1200 MFLOPS
	Digital PID servo loop with velocity and acceleration feed forward
Motion	Trapezoidal and s-curve velocity profile
	Synchronized and non-synchronized point-to-point
	Jogging, Continuous moves
	3D Linear interpolation, 2D Circular Interpolation
	Master-slave, Electronic gearing
	On-the-fly changes of target position, speed, acceleration, and PID
Contouring	2D Contouring with continuous buffer loading
External Event Synchronization	Program execution depending on TTL I/O status
Operating Modes	Real-time command execution via computer interfaces
	Stand-Alone Execution of Programs
	Front panel manual motion command execution
	Digital joystick (optional)
Programming	100+ intuitive, 2 letter ASCII commands
	Command set includes: User defined units, software limits, home search (with and w/o top zero), linear error and backlash compensation, etc.
	Typical time to send a command and to read the repsonse: RS-232-C: 7-30 ms; USB: 3.5 ms; IEEE-488-1: 1 ms
Software Drivers	Communication DLL for Windows 95/98/2000/NT/ME/XP, example.net (serial communication)
	Drivers for LabView
	Software development tools compatible with Windows 95/98/2000/NT/ME/XP: Setup, PID tuning program, Motion Wizard (used to configure non-ESP compatible stages)
Computer Interfaces	USB2.0, RS-232-C, IEEE-488-1 (optional)*, USB VCP
I/O	16 user programmable TTL I/O (programmed in groups of 8)
	"Watchdog" timer and remote interlock
Memory	64KB Flash Non-Volatile User Program Memory (last for approx. 6,000 commands)
Front Panel Display	Backlit LCD display, 4 lines x 20 characters, 21 mm x 70 mm
Motor Control	DC brush motors at 48 V, 3 A max.
	Closed-loop operation
	16-bit DAC resolution
	5 MHz max. encoder input frequency
Stepper Motor Control	2-phase stepper motors at 48 V, 3 A max.
	Open- or closed-loop operation
	10 kHz commutation rate
	1000x max. (programmable) micro-step resolution
Total Available Motor Power	150 W, 48 V, 3 A max per axis
Power Requirements	115/230 V, 50/60 Hz wide input range
Dimensions (W x D x H)	16.9 x 17.2 x 3.0 in. (429.5 x 436.0 x 76.2 mm)
Weight (kg)	6

*Newport recommends using National Instruments GPIB hardware for full compatibility. Other GPIB products may not provide acceptable performance.

Ordering Information

Model	Description
ESP301-1N	ESP301 Motor Controller/Driver, 1 axis, USB
ESP301-1G	ESP301 Motor Controller/Driver, 1 axis, and GPIB option USB
ESP301-2N	ESP301 Motor Controller/Driver, 2 axis, USB
ESP301-2G	ESP301 Motor Controller/Driver, 2 axis, and GPIB option USB
ESP301-3N	ESP301 Motor Controller/Driver, 3 axis, USB
ESP301-3G	ESP301 Motor Controller/Driver, 3 axis, and GPIB option USB
ESP300-J	Joystick (digital joystick)
ESP300-R	19 in. Rack Mount Brackets



ESP301 Rear Panel. All connections to motors, computer and other devices are found in the rear panel.



The digital joystick provide convenient manual jog control.

For a complete list of compatible Newport stage, refer to (page 568)

For Motorized Actuators see page 545

For Motorized Linear Stages see page 464

For Motorized Rotation Stages see page 516

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