



Paragon stepper drive system

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The fast-track solution to multi-axis motion control



A totally new approach

The Paragon system from Parker represents a revolutionary approach to motion control. It combines the benefits of rack based multi-axis systems with the simplicity of DIN rail mounting, reducing installation time and cost without sacrificing flexibility.

Rather than a conventional rack system which requires both front and rear access, Paragon is based on stackable docking stations requiring only access from the front. Drives and power supply modules are simply plugged into the docking stations as required. The system features DIN rail mounting which is compatible with a wide range of ancillary control equipment and is now the preferred system for many electrical panel and cabinet builders.

Stackable docking stations

Configuring a multi-axis system is simplicity itself using docking stations which mechanically and electrically interlock. This automatically interconnects both power and communication lines, so external connections only need to be made at one point. The need for additional wiring is eliminated and installation costs are greatly reduced. This approach also allows for future expansion with minimal disruption, since additional docking stations may simply be attached to the existing system.

Standard DIN rail mounting

Paragon's DIN rail mounting system guarantees straightforward, economic installation in the minimum time.

No additional drilling of the cabinet is necessary, but an optional screw fixing is provided for installations where positive retention is required.

Plug-in modules with quick release fixing

A simple quarter-turn fastener retains each module in place, holding each unit securely yet allowing rapid removal for access to bit switches on the rear of the module.

Clean, ergonomic styling

The moulded housings used in the Paragon system are not only easy to handle, they also enhance the appearance of the finished installation, creating an impression of efficiency which is reassuring to the customer and end user. The design of the docking station permits full vision of screw terminal connectors from the front, simplifying commissioning and troubleshooting.

The fast-track solution

Paragon offers a quick, simple and economic solution for multi-axis stepper applications. With a choice of four power ratings covering both high and low voltage operation, and the option of an integral indexer with powerful programming features, Paragon can be tailored to suit every application. Add to this the ease of installation and provision for straightforward upgrading, and the result is a system which will meet the needs of OEMs and system builders well into the next century.

Full range of advanced drives



Paragon drive modules represent the pinnacle of stepper drive technology. They combine outstanding performance with exceptional durability, and the use of HALT (Highly Accelerated Life Testing) ensures that the product is extremely rugged and reliable.

Paragon drives come in two ranges - the low-voltage L series, which operate at 75V DC, and the high-voltage H series which operate at 170V DC. Alternative ratings within each range mean that peak continuous motor currents between 1.25A and 12A can be accommodated. Both L and H series modules are available either as a step/direction drive or as an intelligent version with a built-in indexer.

Features of all drives include programmable motor current, automatic current reduction at standby and a current boost facility to improve acceleration performance. There is a choice of four resolution settings from 400 to 4000 steps/rev, and all the usual short-circuit and overvoltage protection is incorporated as well as ambient temperature monitoring. The drives are EMC compliant when installed according to instructions and with the addition of an external filter unit.

The low-voltage L series drives have a built-in power supply and can operate from either an AC or DC input. High-voltage H series drives are used in conjunction with a P60 or P200 power supply module and transformer. All versions use an external 24V DC logic supply (this is not necessary if the internal step pulse generator on L series base drives is not used).

Intelligent drive models incorporate an all-new indexer with a host of advanced features including pre-defined move profiles, event driven program functions, high-speed registration and a CANbus option. The programming language combines the best features of Parker's existing languages and the result is a powerful, user-friendly system capable of providing a wide range of application solutions.

The docking station concept

The basis of all Paragon installations is the docking station. This unit accepts Paragon plug-in drive modules together with all electrical connections to and from the system.

The precision-moulded docking station attaches to a standard 35 x 7.5mm DIN rail using a spring-loaded retainer which allows it to be attached and removed easily. Docking stations may be stacked horizontally by plugging them together, which automatically links through both power and communication signal connections. To overcome the relatively high insertion force of the power connectors, a simple rack-and-pinion system draws adjacent docking stations together and holds them in place.

Drive modules are simply plugged into each docking station and are retained by a quarter-turn fastener. This allows drive modules to be fitted and removed quickly and easily, providing rapid access to bit switches on the rear of the module. The positive retention system secures the module against vibration in harsh environments.

The same docking station is used for both low voltage and high voltage drive modules. When used with low voltage drives, connections from the supply transformer are made using a moulded connector which attaches to the left-hand docking station. In the case of a high voltage system, the P200 2kVA power supply module (also DIN rail mounting) attaches directly to the left-hand docking station.

Two main types of docking station are available - a basic version for step/direction drives and an intelligent version (suffix 'i') for drives with an integral indexer. Each docking station may be fitted with two drive modules. For single-axis applications requiring high-voltage drives, a separate docking station is available which can accommodate one drive module together with the P60 600VA power supply.



A powerful, all-new indexer

Paragon intelligent drives are equipped with a totally new indexer designed to meet the needs of a wide range of applications, with priority given to ease of programming, flexibility and robustness of the I/O. Parker has taken two well-established programming languages - X-Code and COMPAX language - each of which has its own particular advantages. By combining the user-friendliness and flexibility of X-Code with the outstanding power of parameter-driven programming, the result is a language having the familiar 'look and feel' of X-Code but which supports both sequential and event-driven code. More importantly, many programming operations may be carried out with far fewer commands.

Event-driven code reduces programming effort

In certain applications, individual external events must trigger specific motion programs. The event-driven functions of the Paragon language greatly simplify this type of programming. A typical program to execute two alternative move profiles in response to two trigger inputs takes only 10 commands, resulting in a dramatic reduction in program creation time and support costs.

Pre-defined profiles & labelled program blocks

A feature of the new Paragon indexer is the ability to store pre-defined move profiles which can then be accessed by a single program command. This allows for more efficient programming, and improves the response of the indexer by



reducing the execution time. In addition, blocks of program code may be allocated a 5-character label which uniquely identifies the block. This code may then either be called from the main routine, or it may be commanded to run directly from an external event via one of the digital inputs.

Indexer specification (applies to both L and H series drives)

Positioning range	±2,147,483,647 steps
Velocity range	0.01 to 50 revs/sec
Acceleration range	0.1 to 1024 revs/sec ²
Positioning modes	Incremental, absolute, registration, continuous run
Communication:	
Data format	8 data bits, 1 start bit, 1 stop bit, no parity, optional echoback; Xon/Xoff supported
Baud rate	9,600 or 19,200 selectable by bit switch
Address setting range	1 - 63 by bit switch, 1-255 by software
RS232 connection	2 wire plus ground
RS485 connection	2 wire or 4 wire
Digital inputs:	
User-programmable inputs	6 (home & limits can be used as additional user-programmable inputs but with limited functionality)
Dedicated inputs	Home, + limit, - limit, registration
Input levels	Logic high 12 - 30V, logic low 0 - 3.4V
Input impedance	2.3K to 0V
Analogue control inputs:	
Voltage range	±10V differential
Maximum input voltage	±20V, either input relative to 0V
Input impedance	200K
Resolution	10 bits (20mV)
Encoder inputs:	
Signal levels	Differential, TTL compatible; quadrature, step/direction or CW/CCW step (1µS min. pulse width)
Maximum frequency	100kHz pre-quadrature
Encoder power output	+5V DC, 150mA maximum
Digital outputs:	
User-programmable outputs	8, PNP current-sourcing
Output levels	0 - 0.4V (output off, with 2K load), 22 - 24V ±10% (output on)
Output current rating	60mA maximum per output

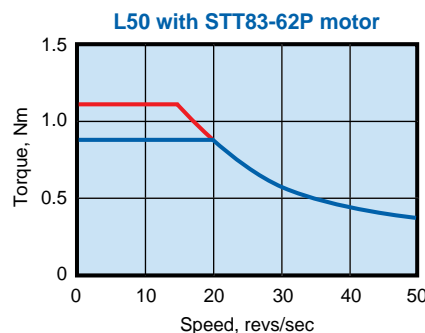
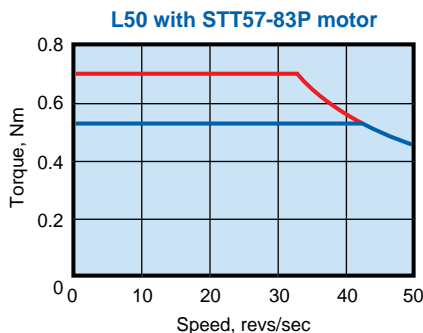
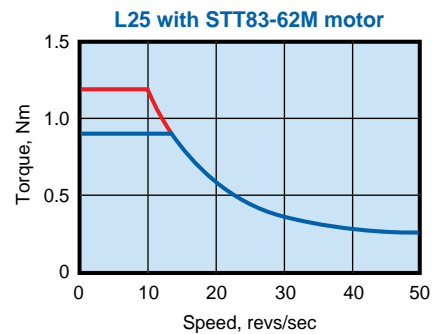
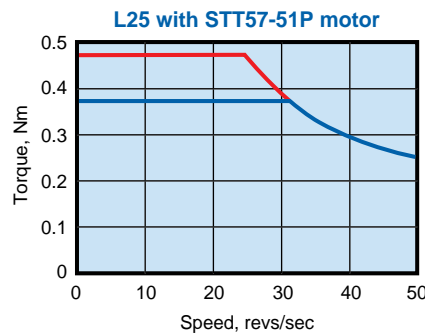
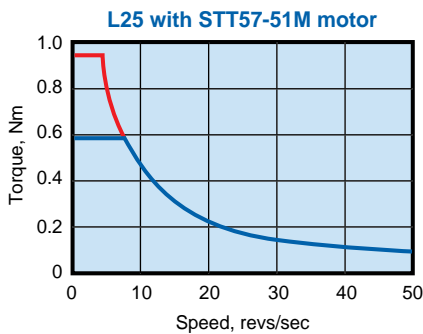
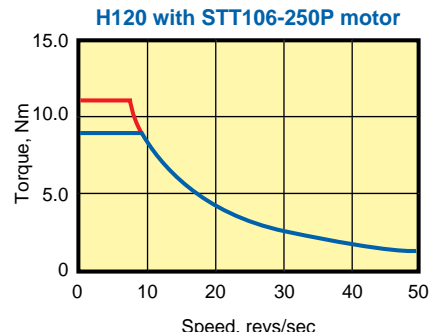
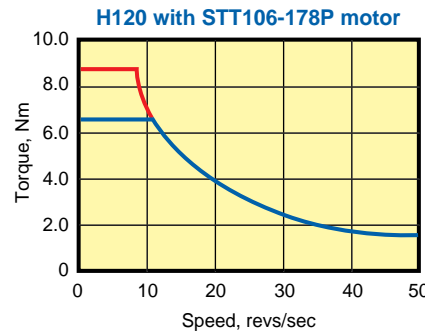
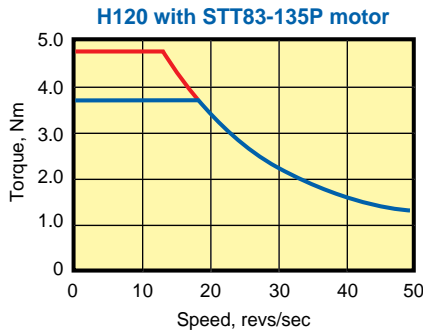
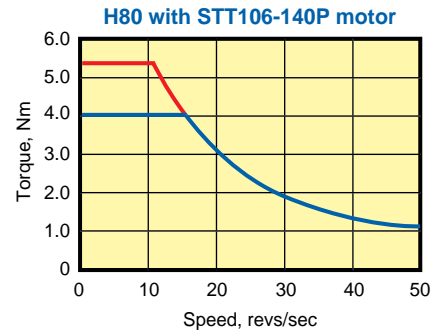
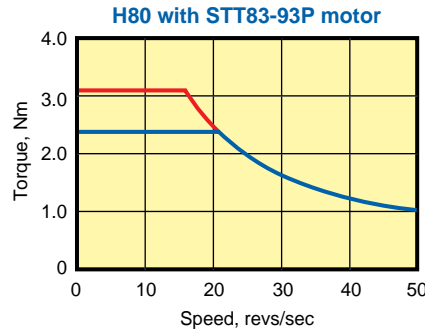
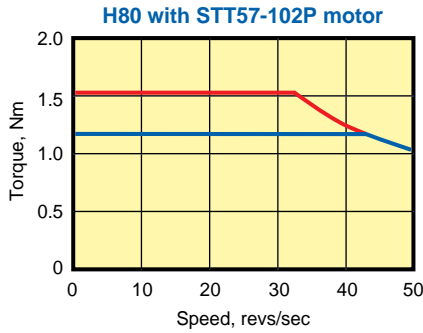
Paragon H series 170V drive specifications

Output current per phase (without boost)	H80, H80i: 8A peak $\pm 10\%$ H120, H120i: 12A peak $\pm 10\%$
Output current adjustment	By bit switch (H80, H120) or by software (H80i, H120i)
Current programming range	50% - 100% of peak current in 10% increments
Automatic standby reduction	50% or 70% of programmed current
Standby reduction time	30mS from last step pulse
Current boost	130% of full current at 25% max duty cycle, enabled by bit switch (when enabled, unboosted level is reduced by 10% at programmed currents above 80% of peak)
Current boost control	H80i, H120i: indexer-controlled; H80, H120: automatic after leaving standby, with additional external control input
Motor bus voltage	170V DC nominal; minimum 50V DC, absolute maximum 187V DC
Drive resolution	400, 800, 2000 or 4000 steps/rev
Minimum motor inductance	1mH (0.7mH if supply voltage less than 100V DC)
Recommended motor inductance range	1mH - 10mH
Switching frequency	20kHz
Motor supply input	From P60 or P200 power supply module
Logic supply input	24V DC +10% -15%
Logic supply current	H80, H120: 300mA; H80i, H120i: 800mA max.
Protection	Motor overcurrent/short circuit, over & under voltage, logic supply fault, over temperature, 24V reverse supply
Command input (H80, H120)	Step/direction, differential TTL levels
Ambient temperature range	0° - 50°C
Cooling	Integral fan
Humidity	0% - 95%, non-condensing

Paragon L series 75V drive specifications

Output current per phase (without boost)	L25, L25i: 2.5A peak $\pm 10\%$ L50, L50i: 5A peak $\pm 10\%$
Output current adjustment	By bit switch (L25, L50) or by software (L25i, L50i)
Current adjustment range	50% - 100% of peak current in 10% increments
Automatic standby reduction	50% or 70% of programmed current
Standby reduction time	30mS from last step pulse
Current boost	130% of full current at 25% max duty cycle, enabled by bit switch (when enabled, unboosted level is reduced by 10% at programmed currents above 80% of peak)
Current boost control	L25i, L50i: indexer-controlled; L25, L50: automatic after standby period
Motor bus voltage	75V DC at nominal input voltage
Drive resolution	400, 800, 2000 or 4000 steps/rev
Minimum motor inductance	0.5mH
Recommended motor inductance range	0.7mH - 10mH
Switching frequency	20kHz
Motor supply voltage, AC feed	L25, L25i: 24 - 48V AC RMS +10% -15%, 47 - 63Hz L50, L50i: 36 - 48V AC RMS +10% -15%, 47 - 63Hz
Motor supply voltage, DC feed	L25, L25i: 24 - 75V DC +10% -15% L50, L50i: 48 - 75V DC +10% -15%
Logic supply voltage	24V DC +10% -15%
Logic supply current	L25, L50: 200mA; L25i, L50i: 700mA max.
Protection	Motor overcurrent/short circuit, over & under voltage, logic supply fault, over temperature, 24V reverse supply
Optional power dump (L50, L50i only)	5W continuous rating
Command input (L25, L50)	Step/direction or step+/step-, selected by bit switch; differential TTL levels
Step pulse generator (L25, L50):	
Speed range	0.05 - 50rps (at 4000 steps/rev) for 0 - 10V on analogue input
Base speed	0.5rps or 2rps, selectable
Acceleration/deceleration	Two preset rates, selectable
Ambient temperature range	0° - 50°C
Cooling	Natural convection
Humidity	0% - 95%, non-condensing

Typical performance data with Parker ST series stepper motors



— Red lines indicate torque with boost applied



Paragon power supplies

Paragon L series low-voltage drives may be operated directly from a standard transformer delivering 48V RMS, or from DC supplies between 24V and 75V depending on model (see specifications). The DP1 power connector is used to make the connection to the first docking station.

H series high-voltage drives require the P200 2kVA power supply which can be operated from a transformer delivering 115V RMS or direct on line from 120V AC. For single axis applications, the P60 600VA power supply may be used with an 8A or 12A drive in a D1i docking station. No docking station is required for the P200 supply. Both P60 and P200 supplies incorporate a regenerative power dump.

All drives require an external 24V DC logic supply. However the L25 and L50 step/direction drives only need the 24V supply if the internal step pulse generator is being used.

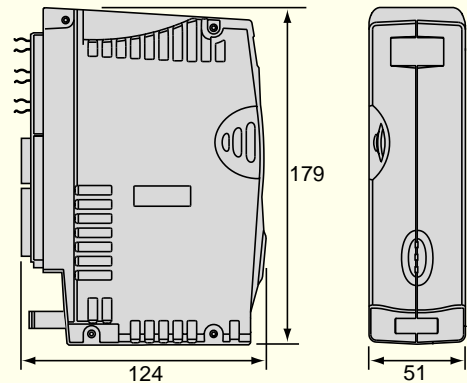
Paragon ordering codes

H80	170V 8A base drive
H120	170V 12A base drive
H80i	170V 8A intelligent drive
H120i	170V 12A intelligent drive
L25	75V 2.5A base drive
L50	75V 5A base drive
L25i	75V 2.5A intelligent drive
L50i	75V 5A intelligent drive
D2	2-axis base docking station
D2i	2-axis intelligent docking station
D1i*	1-axis PSU/intelligent docking station
P60	170V 600W power supply unit
P200	170V 2kW power supply unit
DP1	Power connector for 75V drives

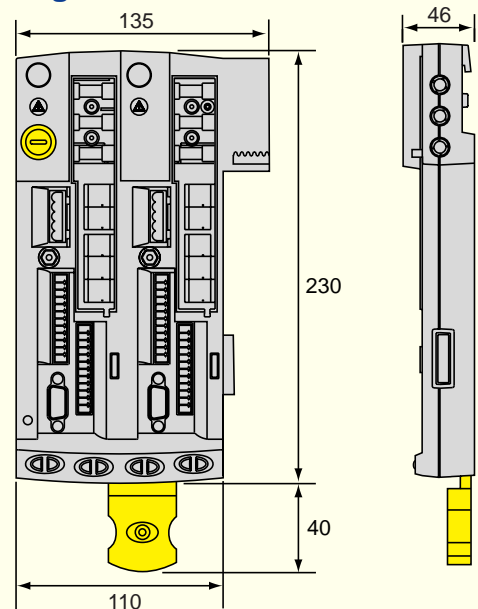
Please consult Parker for details of suitable EMC filters for use with the Paragon range.

* Houses P60 PSU and one base or intelligent drive; the P60 incorporates a 24V DC supply

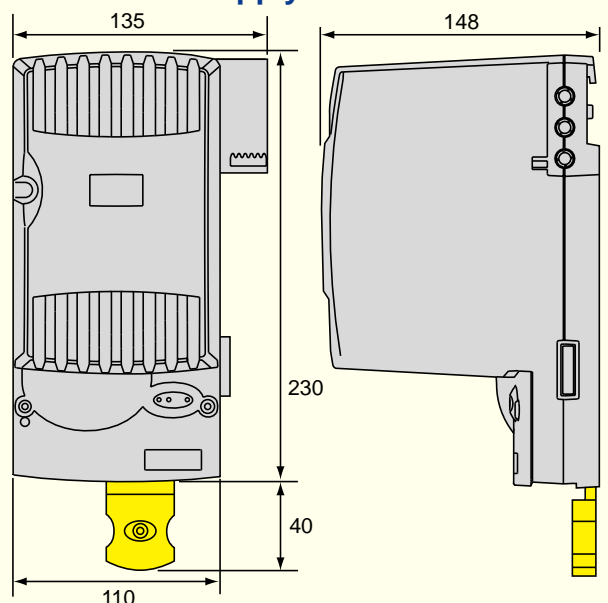
Drives & P60 Power Supply



Docking Stations



P200 Power Supply



Engineering solutions in motion control...

The performance requirements of today's automation tasks demand reliable, cost-effective solutions and the reassurance of competent technical backup. A comprehensive product range supported by highly-trained, experienced application engineers forms the basis of Parker's motion control capability.

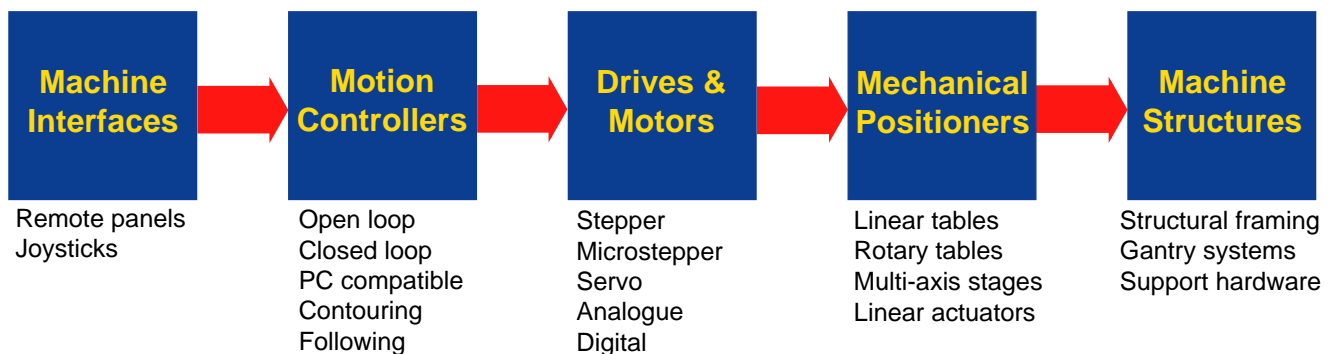
With the combined resources of world-class companies like Digiplan, Compumotor, Hauser and Daedal, Parker can offer a range of automation products which is second to none. High-performance stepper and servo systems combined with powerful, flexible controllers are complemented by a wide selection of mechanical positioning systems. This

equipment is supplied and supported through a worldwide network of Automation Technology Centres, each with factory-trained staff who specialise in the application of high-technology motion control systems.

Our aim is to give customers a competitive advantage by providing top-grade equipment and unrivalled technical support. Whether the application is in industrial automation, production machinery, instrumentation or research, you can be certain that your system will be precision-engineered and backed by the Parker guarantee of quality and reliability.



Parker - we engineer solutions in motion control



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