

A range of universal ministep drives including fully EMC-compliant versions

The PD Series, featuring 4000-step/rev resolution and a universal 'go anywhere' power supply, comprises four basic models and a number of variants. Drives are available for step-direction input using an external controller, together with combined indexer-drives in both standard and EMC-compliant versions.

All models in the PD range feature a bus voltage of 70VDC, peak output current of 3A or 5A/phase and resolution up to 4000 steps/rev to give smooth rotation at all speeds. The drives operate from all AC supply voltages in the 105-240V range without adjustment. This is achieved using an integral switch-mode power supply which incorporates power factor correction. There is extensive built-in protection to guard against overheating, short circuits and supply faults. For applications requiring rapid deceleration of high-inertia loads, the 5A drives are available in alternative versions with a built-in regenerative power dump.

The PD-E series EMC-compliant versions are designed to comply fully with the European EMC Directive. They incorporate all necessary screening, optical isolation and AC line filter components - no external add-on units are required. These models take the guesswork out of drive installation since they are guaranteed to meet the EMC standards when installed according to the instructions.

PDS drives for step-direction input

Designed primarily for use with an external controller, the PDS range has fully opto-isolated inputs for TTL-level step and direction signals. Separate non-isolated inputs are provided for single-ended control signals operating at 12V levels.

PDS models are available with two current ratings - 3A (PDS13) and 5A (PDS15). The 5A version can also be supplied with a built-in power dump circuit - information on the choice of version will be found later in this section.

Both the 3A and 5A variants are available in EMC-compliant versions. With the simplified installation, reduced external wiring and guaranteed compliance, this version represents a cost-effective alternative to the use of external filters and signal conditioning.

All PDS models incorporate a dual-speed clock generator with adjustable ramping for manual positioning or simple on-off control. The clock generator is controlled by logic inputs for the slow and fast speed ranges, the speed in each range being preset by multi-turn potentiometers. A separate potentiometer controls the slope of the linear acceleration and deceleration ramp used in the fast range.



PD series general features

- Single-axis packaged drive with switch-mode power supply and optional built-in indexer
- Standard and EMC-compliant versions available
- 4 selectable resolutions between 400 and 4000 steps/rev
- Alternative 3A and 5A current ratings (5A only on PDHX-E with high-performance indexer)
- Operation directly from 110V or 230V AC supplies without adjustment
- Selectable standby function for 80% or 50% of programmed current at standstill
- Short-circuit & overtemperature protection
- Optional regenerative power dump on 5A versions

PDS & PDS-E drive features

- Designed to operate from external step-direction controller
- TTL-level step-direction inputs with optical isolation
- Built-in clock generator with dual speed ranges and adjustable linear ramping
- Compatible with Parker 6000-series indexers
- Self-test feature to check motor & drive function

A complete positioning system

The PDX and PDHX-E models form a complete digital positioning system in a single package. They combine a PD series drive with an integral processor-based position controller. The command language is based on Parker's popular X-Code which is user-friendly and easy to learn yet extremely versatile. Programming is simplified using X-Ware, an IBM PC™ compatible development package offering terminal emulation, tutorial and editing functions.

The PDX indexer-drive

The low-cost PDX package incorporates the OEM010 indexer module described later in this catalogue. This unit is capable of a range of standard positioning tasks including step-and-repeat indexing, incremental or absolute positioning and automatic homing. It can store up to 7 motion sequences in its non-volatile memory, and is equipped with programmable inputs and outputs to interface with external equipment.

The PDHX15E EMC-compliant indexer-drive

The fully EMC-compliant PDHX15E is equipped with the high-performance X150E controller which can accept motion commands via either RS232C or RS485 serial links. The indexer is capable of storing up to 64 complete motion programs in its non-volatile memory, and offers advanced programming features such as conditional branching and maths functions using up to 50 variables.

The X150E indexer has extremely flexible input and output facilities to ensure that integration into a PLC-controlled system is straightforward. The ten programmable inputs can be set for either 5V or 24V switching levels, active-high (for connection to PNP outputs on the PLC) or active-low (for NPN outputs). Six programmable outputs are available incorporating both NPN and PNP output drivers which are selected by software.

In addition to the basic control functions of the PDX, the PDHX-E can perform registration moves, following with superimposed indexing and profiled velocity moves.

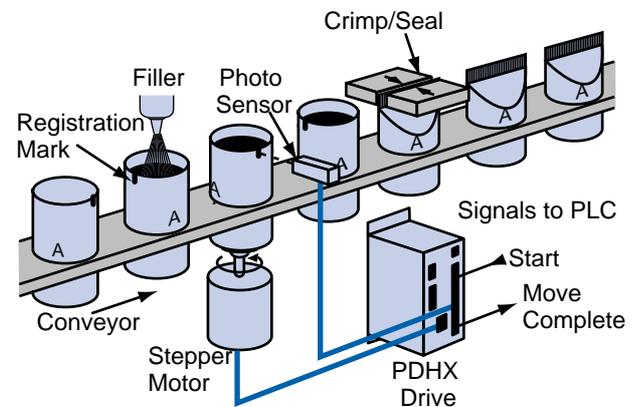
Fieldbus communications options

The PDHX-E may also be equipped with a Fieldbus card providing RS485 ASCII or binary communication up to 345.6 kbaud. Fieldbus systems offer the possibility of large inter-unit distances, reduced wiring cost using distributed I/O and very high noise immunity. Additional Fieldbus options having alternative protocols will become available in the future.

PDHX-E application example

Tube filling and sealing is a typical example of an industrial automation process in which the PDHX-E is ideally suited. It illustrates operation of the drive as a standalone controller using the registration function.

Tube filling application



This application is part of a production line for cosmetic products. Pre-printed tubes are to be filled with the product, then crimped and sealed. The printed image must appear in line with the sealed end, however the tubes are loaded from a hopper and the alignment at the filling station is therefore random.

A registration mark is printed on the tube along with the main image, and this mark should fall at the end of the sealed portion. The requirement is therefore to align the mark before sealing. The stepper motor rotates the steel housing containing each tube by means of a magnetic coupling, and an optical sensor detects the registration mark. From this point the motor continues to run for a preset distance and stops. The tube is then accurately aligned ready for sealing.

Fast registration for high throughput rates

The accuracy of alignment depends on the rotational speed of the tube and the response time of the sensor and controller. Fast rotation is essential for high throughput rates, however this frequently results in reduced alignment accuracy. The PDHX-E has a dedicated input which responds to signals from a registration sensor within 15µs. This ensures accurate and repeatable alignment even when the tube is rotated at high speed. The result is a higher production rate and better presentation of the product.

Simplified interfacing with host controller

The filling line will typically be under overall control of a PLC. This will issue a start command to the PDHX-E, initiating an internally-stored routine. Signals are returned to the PLC to indicate that the move is complete and to confirm that registration was successful. The exceptional flexibility of the opto-isolated I/O circuitry in the PDHX-E guarantees compatibility with all types of PLC.

PDS & PDS-E specifications

<i>Parameter</i>	<i>Value</i>
Output current range	PDS13 & PDS13E: 0.9A to 3A (peak), adjustable in 300mA steps PDS15 & PDS15E: 2.5A to 5A (peak), adjustable in 350mA steps
DC bus voltage	70V
Resolution	400, 1000, 2000 & 4000 steps/rev
Protection	Short-circuit, over/under-voltage, logic supply fault, overtemperature
Standby current level	80% or 50% of set value
Motor	
Type	2 phase hybrid; 4, 6 or 8 leads
Minimum inductance	1mH
Recommended induct. range	1 - 10mH
Power input	
Voltage range	105-240V AC $\pm 10\%$
Supply frequency	47 - 63Hz
Maximum supply current	PDS13 & PDS13E: 2A; PDS15 & PDS15E: 3A (at 105V AC input)
Step-direction inputs	
Differential	Opto-isolated, TTL levels. Min. pulse width 1 μ S, max. frequency 200kHz
Single-ended	Non-isolated, low $< +2V$, high 10-12V, internal 4K7 pull-up to +12V, min. pulse width 8 μ S, max. frequency 50kHz
Internal clock generator	
Speed range, slow	0.05 - 2 revs/sec
Speed range, fast	1 - 55 revs/sec, ramped
Accel/decel rate (linear)	20 - 500 revs/sec/sec
Physical	
Operating temperature range	0°C - 50°C
Humidity	0 - 95% non-condensing
Weights	PDS13 & PDS15: 1.7kg; PDS13E & PDS15E: 2.1kg

PDX & PDHX15E common specifications

<i>Parameter</i>	<i>Value</i>
Output current range	PDX13: 0.9A to 3A (peak), adjustable in 300mA steps PDX15, PDHX15E: 2.5A to 5A (peak), adjustable in 350mA steps
DC bus voltage	70V
Resolution	400, 1000, 2000 & 4000 steps/rev
Protection	Short-circuit, over/under-voltage, logic supply fault, overtemperature
Standby current level	80% or 50% of set value
Motor	
Type	2 phase hybrid; 4, 6 or 8 leads
Minimum inductance	1mH
Recommended induct. range	1 - 10mH
Power input	
Voltage range	105-240V AC $\pm 10\%$
Supply frequency	47 - 63Hz
Maximum supply current	3A (at 105V AC)
Physical	
Operating temperature range	0°C - 50°C
Humidity	0 - 95% non-condensing
Weights	PDX13, PDX15: 1.7kg PDHX15E: 2.8kg

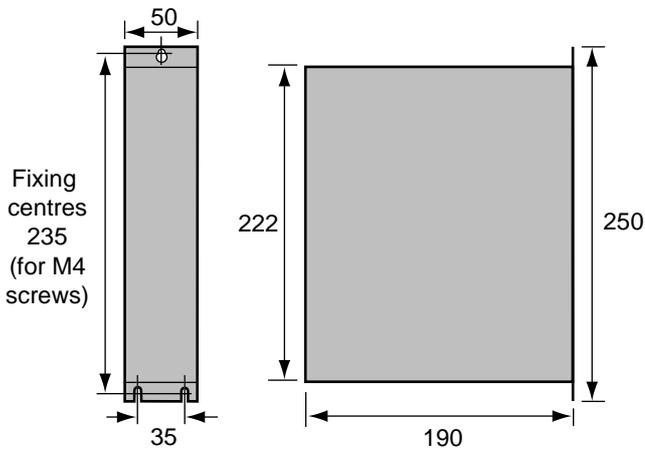
PDX indexer specifications

<i>Parameter</i>	<i>Value</i>
Operating ranges	
Position	±1 to 99,999,999 steps
Velocity	0.001 - 50 revs/sec
Acceleration	0.01 - 999 revs/sec/sec
Serial communication	
Type	RS232C: 3-wire (Tx,Rx, Gnd)
Data format	9600 baud, 8 data bits, 1 stop bit, no parity
Configuration	Up to 256 positioners may be controlled via a single RS232C port
Motion programs	7, max. 256 characters each (programs may be chained)
Programmable inputs	3, TTL levels
Programmable outputs	2, TTL levels, totem-pole (24mA source or sink)

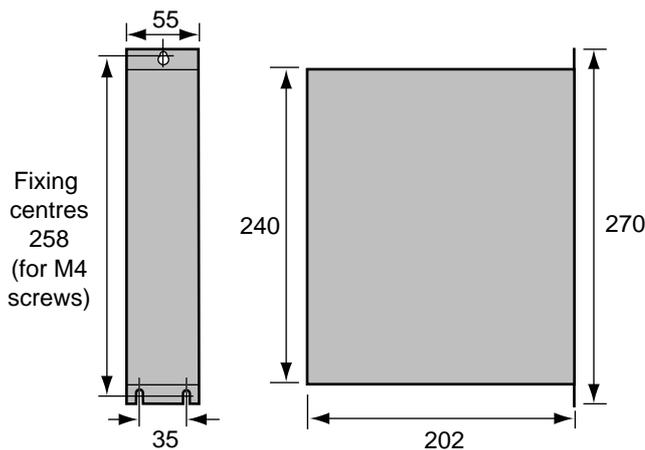
PDHX-E indexer specifications

<i>Parameter</i>	<i>Value</i>
Operating ranges	
Position	±1 to 268,435,455 steps
Velocity	0.0001 to 200 revs/sec
Acceleration	0.06 to 999,999 revs/sec ²
Maximum encoder frequency	100kHz (lines/sec before multiplication)
User resolution range	1 to 32,767 steps/rev
Co-ordinate system	Incremental or absolute
Operating modes	Preset, preset with speed change, continuous, scaled following, preset following, registration
Serial communication	
Type	RS232C: 3-wire (Tx,Rx, Gnd). RS485: 2-wire (single-ended) or 4-wire (differential)
Data format	9600 baud, 8 data bits, 1 stop bit, no parity
Configuration	Up to 31 positioners may be controlled via a single RS232C or RS485 port
Motion program storage	
Memory capacity	8000 characters total
Number of programs	64, variable in length up to memory limit
Program selection	a) via RS232C/RS485, b) automatic execution at power up c) binary address on 'sequence select' inputs
Optically-isolated inputs	Home, end-of-travel limits, aux (registration), stop; 10 user-definable inputs (also used for motion program selection). Selectable pull-up or pull-down, 5V or 24V switching levels
Optically-isolated outputs	6 user-definable; can also be assigned as watchdog, in-position and fault outputs. PNP or NPN open-collector, software-selectable. 5V or 24V source for PNP outputs. Maximum OFF voltage 30V, maximum ON current 300mA per output. Maximum total current from internal supply (PNP mode) 160mA. Use external supply for higher currents, up to 1A maximum
Fieldbus module option	
Baud rate	Up to 345.6k
Maximum line length	1.2km
Maximum no. of stations	31
Data format	RS485 ASCII or binary

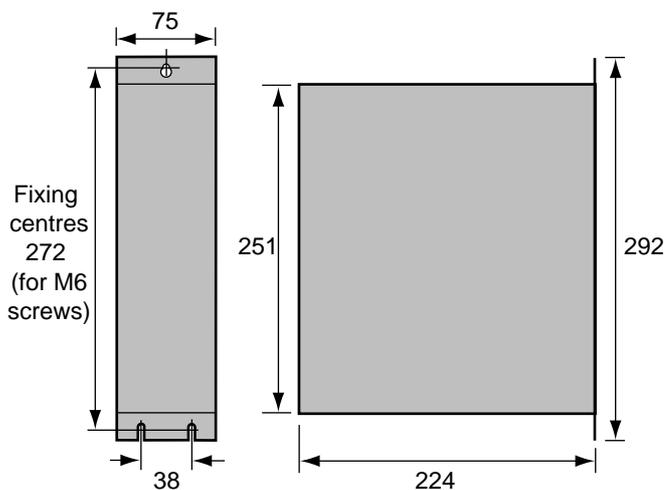
Dimensions in mm



PDS13, PDX13, PDS15 & PDX15



PDS13E & PDS15E



PDHX15E

Power dump option

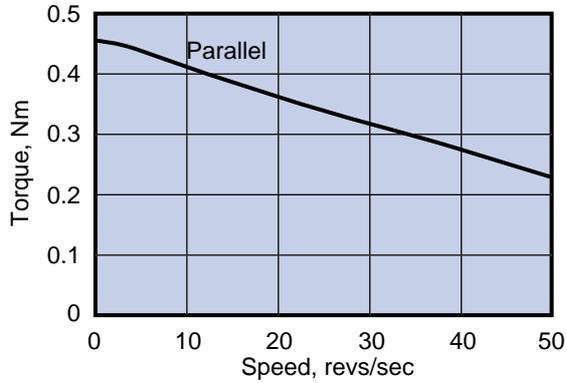
Applications involving rapid deceleration of high-inertia loads may require the addition of a circuit to dissipate the regenerated power. The need for a power dump will depend on the system inertia, the maximum speed and the deceleration time.

The -D versions of the PD Series incorporate a power dump with a continuous rating of 15 watts (170 watts peak). These versions are needed if the deceleration time in seconds from a maximum speed ω is less than $(J\omega^2 - 0.1)$, where J is the total system inertia in Kg-m^2 (including the motor) and ω is the maximum speed in revs/sec. If the expression in brackets is negative, no power dump is required. The dump option is strongly recommended with size 42 (metric 106) motors.

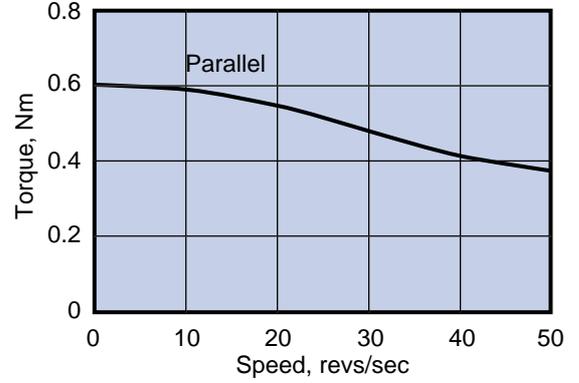
Ordering codes

PDS13-2	3A drive with internal clock generator
PDS15-2	5A drive with internal clock generator
PDS15-D-2	5A drive with clock & power dump
PDX13	3A drive with built-in indexer
PDX15	5A drive with built-in indexer
PDX15-D	5A drive with indexer & power dump
PDS13E	3A EMC drive with clock generator
PDS15E	5A EMC drive with clock generator
PDS15E-D	5A EMC drive with clock & power dump
PDHX15E/232	5A EMC drive, X150E/RS232 indexer
PDHX15E/485	5A EMC drive, X150E/RS485 indexer
PDHX15E-D/232	5A EMC drive, X150E/RS232 & dump
PDHX15E-D/485	5A EMC drive, X150E/RS485 & dump

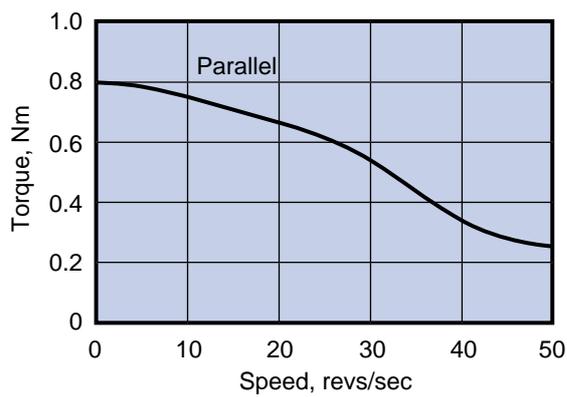
PDX13 with ST57-51P motor



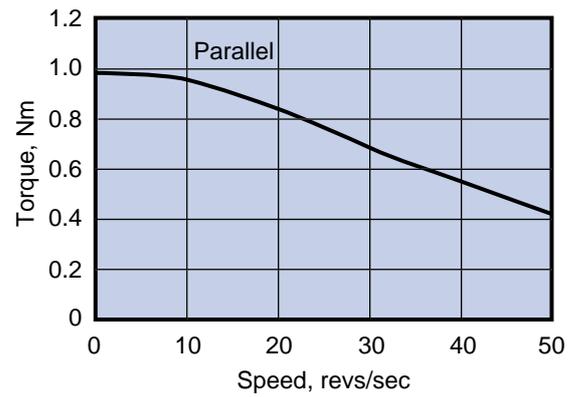
PDX13 with ST57-83P motor



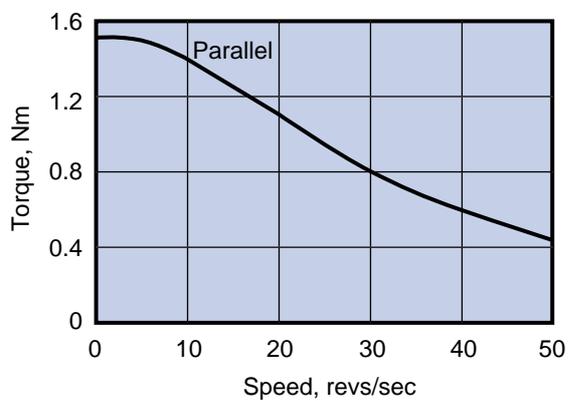
PDX15 with ST57-102P motor



PDX15 with ST83-62P motor



PDX15 with ST83-93P motor



PDX15 with ST83-135P motor

