

SVA direct-on-line, high performance servo systems

With the introduction of the SVA Series, Parker makes available a high-performance servo system which has been developed from the successful BL and BD series.

Incorporating all the innovative features of these models, the SVA offers direct-on-line operation at 230V AC, the high dynamic performance associated with encoder feedback and the option of a powerful built-in position controller.

The drive is designed to be used in conjunction with standard three-phase brushless servo motors using Hall-effect commutation and encoder feedback. Alternatively it is available with Parker's highly-acclaimed MD Series motors which provide exceptional torque output in relation to frame size together with a high torque-to-inertia ratio. High-resolution sinusoidal commutation guarantees smooth rotation over the full speed range.

The SVA Series is available with a choice of two power ratings and in two versions - an analogue-input velocity or torque servo (SVA) and a complete positioning system incorporating the latest version of the X150 controller (SVAHX). As well as being fully EMC-compliant, this controller offers the improved noise immunity of RS485 communication and is configurable entirely by software without the use of jumper links (configuration of the standard SVA drive is performed by front-panel switches). The X150 is compatible with almost any type of PLC - both NPN and PNP output drivers are included as standard, selectable by software and operating at 24V switching levels.

In addition to standard RS232 and RS485 serial communication, RS485 Fieldbus is available as a factory-fitted option. Interbus-S, CANbus and Profibus modules are under development.

SVA Series drives have comprehensive built-in monitoring systems to protect both the drive and the motor. A circuit is included which limits the time for which excessive motor current can flow before being clamped at the continuous rating of the drive. An additional monitor circuit guards against full drive current being delivered for long periods at very low speeds. As well as protecting against supply overvoltage or undervoltage, partial supply failure, excess output current and overheating of the drive or motor, the SVA also checks for overspeed conditions and loss of position feedback. With commutation data being derived from an incremental encoder, there is automatic protection against velocity feedback failure since loss of the encoder signal will prevent commutation and stop the motor.

SVA series drives comply fully with the requirements of the European Low Voltage Directive. They are housed in a rugged industrial casing providing a high degree of protection as well as effective electromagnetic shielding. The requirements of the EMC Directive may be met by the use of an appropriate AC input filter.



SVA & SVAHX Series features

- Direct operation from 230V AC supply
- External 24V DC logic supply
- Fully LVD and EMC compliant using external line filter
- Two power ratings - 1.2kVA and 2.5kVA continuous
- Peak torques up to 14Nm with MD series motors
- Speeds up to 5,000 rpm
- Commutation by incremental encoder, with initialisation by Hall-effect sensors or separate six-step encoder
- Accommodates 4, 6 or 8 pole motors
- High-efficiency recirculating PWM current control system
- Drive fully protected against overheating, short circuits and supply faults
- Velocity or torque mode operation (SVA)
- Industry-standard differential $\pm 10V$ analogue inputs (SVA)
- Built-in incremental encoder provides velocity and position feedback
- Velocity and torque monitor outputs
- Regenerative power dump circuit (using external dump resistor)
- Rugged industrial housing
- All configuration either by bit switches or software
- SVAHX positioner version with built-in indexer

SVA-S analogue input servo drive

Parker's SVA1200S and SVA2500S drives offer a compact, economic solution in applications requiring a traditional servo amplifier. They combine a high-efficiency power stage with established analogue servo technology, creating a system with outstanding performance yet one which is easy to set up and use.

The drive is designed to operate in conjunction with standard three-phase brushless servo motors using six-step commutation and encoder feedback. The commutation signals may be generated by an optical encoder or by Hall-effect devices. The six-step signals are only required for initialisation at power-up, since commutation is sinusoidal and is derived from the incremental encoder. This system gives smooth rotation at low speeds, together with high dynamic performance compared with resolver-based feedback. Parker's renowned MD Series motors are suitable for use with SVA drives - they provide exceptional torque output in relation to frame size together with a high torque-to-inertia ratio.

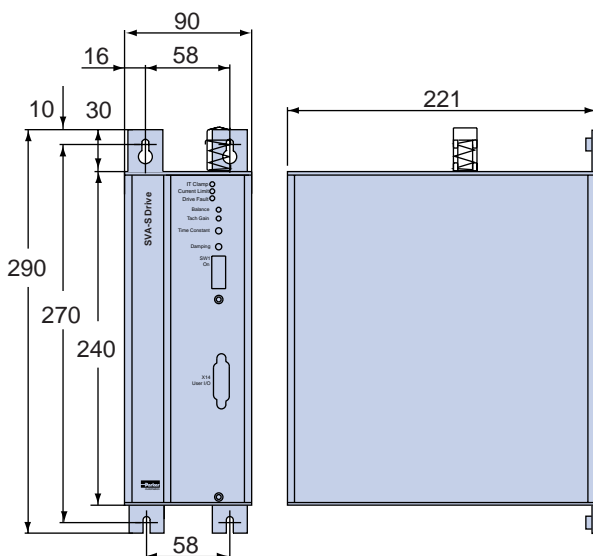
The SVA's $\pm 10V$ analogue input may be used to control either torque or velocity. A speed signal is derived from the motor encoder to provide velocity feedback, and the tuning adjustments for velocity mode have been kept very simple and straightforward. All configuration is carried out entirely by front panel controls with no internal jumper links.

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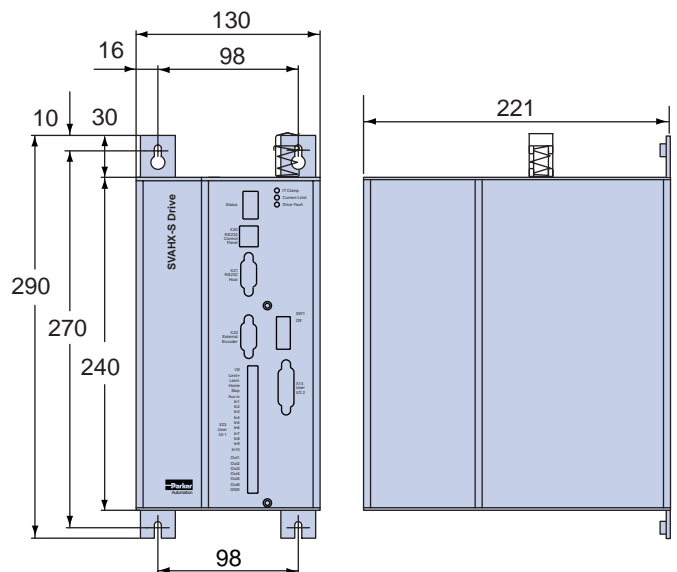


- Speeds up to 5,000 rpm
- Velocity or torque mode operation
- Accommodates 4, 6 or 8 pole motors
- $\pm 10V$ analogue inputs
- All configuration and setup by front panel adjustments and bit switches
- Monitor outputs provided for velocity and torque to simplify tuning

SVA-S dimensions (mm)



SVAHX-S dimensions (mm)



SVAHX-S positioning system

The SVAHX is a complete digital positioning system in a single package. Based on an SVA Series drive, SVAHX models incorporate the powerful X150 indexer configured and programmed via a standard serial link. Once programmed, the SVAHX can execute internally-stored motion programs, follow motion from an external encoder or accept streamed commands via RS232C or RS485. In many applications the serial link is not needed after initial configuration and program storage.

SVAHX drives utilise the same power stage as the equivalent SVA unit and have identical electrical characteristics. The same range of motors may be used offering peak torques up to 14Nm and speeds to 5000 rpm.

Simplified programming

Parker's user-friendly X-Code command language offers a wide range of motion control facilities together with an extensive on-line help system. Programming is simplified using X-Ware, a PC-compatible development package offering terminal emulation, tutorial and editing functions.

The programming language itself is simple and straightforward to use, yet powerful enough to satisfy the needs of complex applications. Basic motion commands are easy to learn and remember as the following examples illustrate:

V10	Set velocity to 10 revs/sec
A120	Set acceleration to 120 revs/sec ²
D2000	Set distance to 2000 motor steps
L10	Loop 10 times
G	Go (make a move)
T2	Time delay of 2 seconds
N	End of loop
S	Stop motion

Comprehensive I/O facilities

The indexer has extremely flexible input and output facilities to ensure that integration into a PLC-controlled system is straightforward. Inputs and outputs are compatible with 24V switching levels, and can be made active-high (for connection to PNP outputs on the PLC) or active-low (for NPN outputs). Both NPN and PNP output drivers are incorporated and are selected by software.

Flexible communications

An RS232 serial interface provides complete programming and diagnostic facilities using an external computer or terminal. RS485 serial communication is available as a standard option. In addition, the drive may be fitted with an RS485 Fieldbus card allowing communication in ASCII or binary format. Interbus-S, Profibus and CANbus communication options are under development.

Simplified tuning

Servo loop setup in the SVAHX is aided by a self-tuning algorithm incorporated in the controller software. With the motor connected to its load, the controller will generate an optimised response which is suitable for the vast majority of industrial applications.



Wide choice of operating modes

- Incremental & absolute indexing
- Continuous run mode
- Registration moves
- Velocity profiling during preset moves
- Scaled following (electronic gearbox)
- Following with superimposed indexing
- Jogging & homing functions

Full range of inputs & outputs

- User-definable input & output functions
- 6 programmable outputs, 10 inputs
- Full optical isolation on inputs & outputs
- NPN and PNP outputs, software selected
- Directional limit switch inputs
- Inputs for external step/direction source
- High-speed (15µS) registration input

Additional features

- Up to 32 drives via one RS232 or RS485 port
- 8K sequence memory, 64 savable sequences
- Conditional branching commands
- Maths functions using up to 50 variables
- Optional Fieldbus communication modules
- 7-segment diagnostic display

Drive specifications - all models

	<i>Units</i>	<i>SVA/SVAHX1200S</i>	<i>SVA/SVAHX2500S</i>
Continuous output current	A rms	3.1	6.3
Peak output current	A rms	6.2	12.6
Continuous output rating	kVA	1.2	2.5
Weight	4.2 Kg (SVA) 4.7Kg (SVAHX)		
AC supply input, 1 or 3 phase	115/230V RMS, 45-65Hz		
Supply voltage tolerance	+10% -15%		
DC bus voltage at nominal input	325V		
Logic supply input	24V DC at 600mA +/-10%, <1V p-p ripple (plus motor brake current if fitted)		
Storable regenerated energy	19Ws (capacity = 1000µF)		
Max. continuous dump power	1000W (external resistor required, resistance 56Ω or greater)		
Peak dump power	2.5kW (2 secs max duration, 10 secs min cooling time)		
Current control	10kHz recirculating PWM		
Current limit	Switch-selectable to 40% of peak (SVA), software-programmable (SVAHX)		
Motor pole count	4, 6 or 8 poles		
Encoder resolution	1000, 1024 or 2000 lines/rev		
Max. encoder frequency	100KHz (pre quadrature)		
Operating temperature	0°C to 45°C ambient		
Humidity	0-95% non-condensing		
Housing	Closed aluminium, protection class IP20		

SVA-S analogue input servo drive

Operating modes	Velocity & torque, switch-selected
Velocity mode gain	5000
Torque mode gain	10V input gives peak current
Inputs -	Analogue command ±10V differential, impedance 30KΩ Reset/disable switch-configurable N/C to +15V or N/O to Gnd Brake control input NC to ±15V to release brake
Outputs -	Motor encoder TTL line drivers, 100kHz max. freq. Drive fault NPN open-collector, max. OFF 40V, max. ON 80mA at 0.2V.
Aux DC out	±15V (reference only)

SVAHX-S positioning servo

Operating ranges	
Position	±1 to 268,435,455 steps
Velocity	0.0001 to 200 revs/sec (motor limited)
Acceleration	0.06 to 999,999 revs/sec ²
User resolution range	1 to 32,767 steps/rev
Co-ordinate system	Incremental or absolute
Operating modes	Preset (with speed change), continuous, scaled & preset following, registration
Indexer update time	2 milliseconds
Digital servo loop	
Update time	500 microseconds
Servo tuning	PIVF or PID, self tuning facility
Serial communication	
Type	RS232C: 3-wire. RS485: 2-wire (single-ended) or 4-wire (differential) optional
Data format	9600 baud, 8 data bits, 1 stop bit, no parity
Configuration	Up to 32 positioners may be controlled via a single RS232C or RS485 port. All commands may be preceded by a device address (address set by bit switches).
Motion program storage	
Memory	Battery-backed RAM, 8000 characters total
Number of programs	64, variable in length up to memory limit
Program selection	a) via RS232C/RS485, b) automatic on power up, c) via sequence select inputs
Optically-isolated inputs	
Input functions	Home, end-of-travel limits, aux (registration), stop, plus 10 user-definable
Configuration	Selectable pull-up or pull-down, 24V switching levels
Optically-isolated outputs	
Output functions	6 user-programmable, can also be assigned as watchdog, in-position and fault.
Configuration	PNP or NPN open-collector, software-selectable. 24V source for PNP outputs. Max OFF voltage 30V, max ON current 300mA per output.

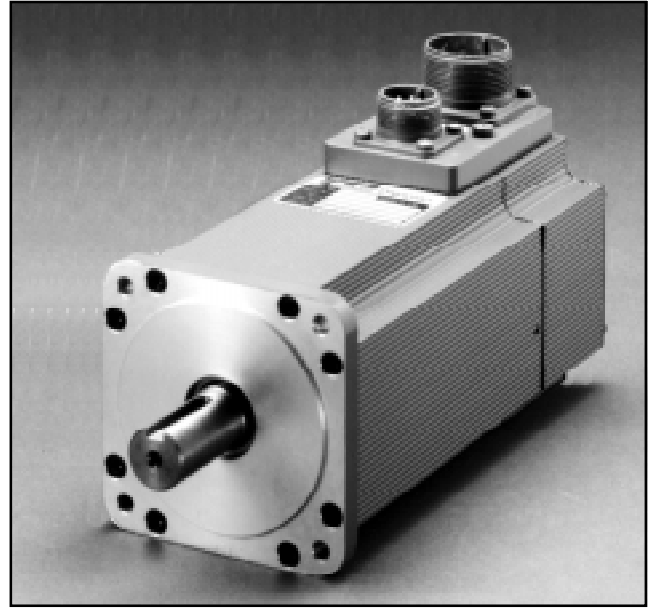
High-performance motors for use with SVA & SVAHX drives

Parker's MD series servo motors provide exceptional performance in relation to size and are a perfect match for the SVA drive range. Currently available with NEMA 34 size flanges and in two frame lengths, MD motors offer peak torques up to 14Nm and maximum speeds up to 5000 rpm.

MD motors use neodymium-iron-boron magnets in a 6-pole rotor design. An incremental encoder with a resolution of 1024 lines/rev (4096 counts/rev after decoding) provides feedback for position control and commutation. A separate six-step encoder is used for initial commutation at power-up.

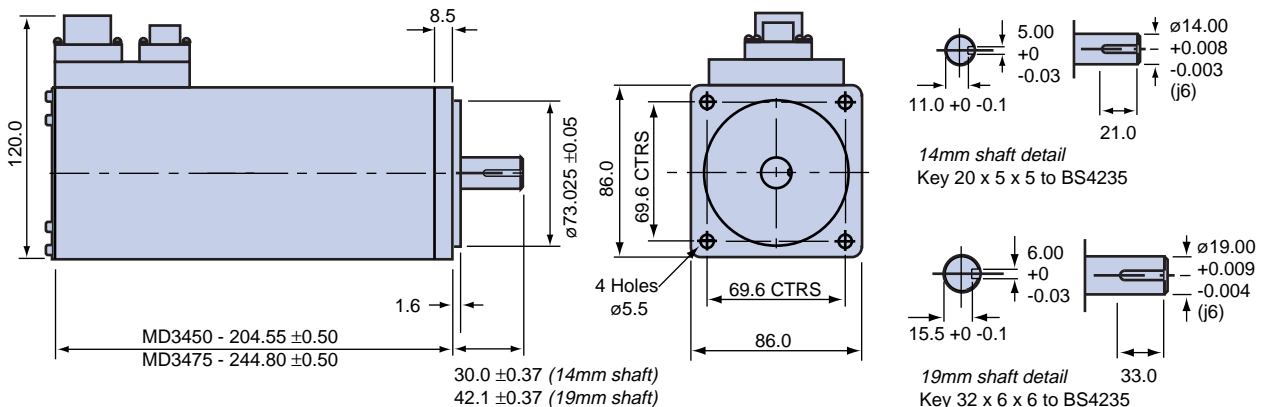
Separate MS-style connectors are used for the motor and encoder connections. Alternative shaft diameters provide additional applications flexibility, the larger 19mm shaft being recommended for toothed-belt applications where radial loads are higher. The motors are EMC and LVD compliant and are rated at IP54.

The SVA1200S drive may also be used in conjunction with the SM233AE motor. For further details and dimension drawings of the SM series motors, please see "SM, NeoMetric and J series motors" later in this catalogue.

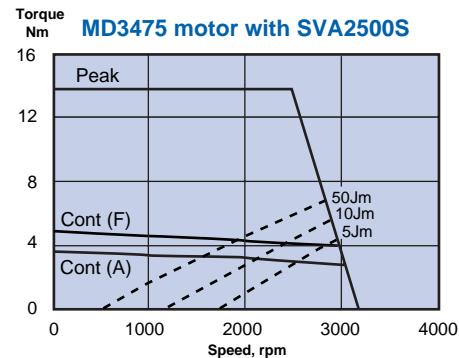
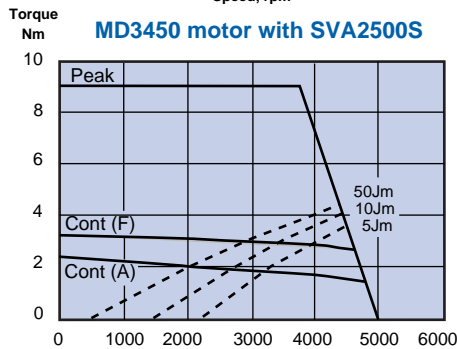
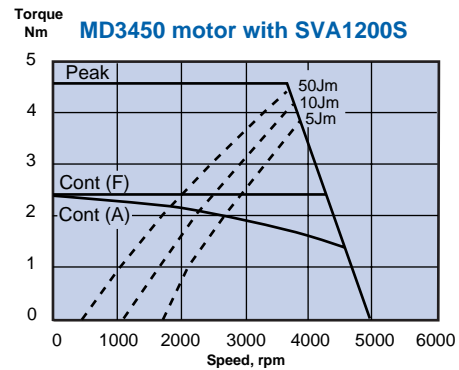
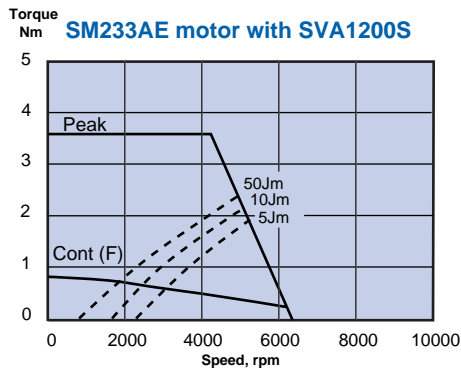


Motor specifications	Units	SM233AE	MD3450	MD3475
Stall torque, flange mounted	Nm	1.13	3.1	4.3
Rated speed	rpm	5800	5000	3250
Rotor inertia	kg-mm ²	132	160	240
Mechanical time constant	mS	5.4	1.5	1.13
Thermal time constant	min	23	30	40
Torque constant	Nm/A rms	0.58	0.76	1.16
Voltage constant	V/1000rpm	50.68	65	99.4
Encoder resolution	lines/rev counts/rev	1000 4000	1024 4096	1024 4096
Weight	kg	1.8	4.6	6.0
Operating ambient temp. range	°C	0-40°	0-40°	0-40°
Sealing		IP54	IP54	IP54
Terminations		MS connectors	MS connectors	MS connectors

MD Motor dimensions Tolerances ±0.12mm unless otherwise stated



The 14mm shaft option is suitable for in-line coupling (e.g. leadscrew or gearbox) and for toothed belts up to 15mm wide. For toothed belt transmissions utilising the full motor power, the 19mm shaft is recommended.



Continuous curves: (A) in free air, (F) flange-mounted.

Data relates to operation in 20°C ambient and 230V supply, single phase for SVA1200S, three phase for SVA2500S. Peak torque knee speed will be reduced by approximately 15% for SVA2500S on single phase supply

Power dump curves are based on using the BRM05/01 dump with MD motors and no external dump with the SM233 motor

Power dump dissipation curves

In addition to torque-speed data, the performance graphs give an indication of the safe operating area of the power dump circuit in repetitive start-stop operation. The data is based on a 'worst case' system performing repeated trapezoidal moves with no dwell in between. The time at maximum speed is as short as the thermal rating of the motor will allow. Under these conditions, for any given load inertia, the power in the ballast resistor depends on the peak torque during deceleration and the maximum speed.

The broken lines represent different load inertias as a ratio of the motor inertia Jm. When the application requirements have been calculated, plot the point representing peak

torque and maximum speed on the performance graph. If this point lies to the left of the corresponding inertia line, the resistor rating will not be exceeded. If it lies to the right, there is not necessarily a problem but further calculation is required to establish the dump power more accurately - please consult your supplier. For example, a peak torque of 3Nm and a maximum speed of 2500rpm are acceptable with the MD3450 motor and SVA1200S drive when driving a load equal to 10 times the motor inertia.

Note that this information is for general guidance purposes only and will not apply to applications in which the duty cycle is light.

Ordering codes

Drives

SVA1200S	Analogue input drive, 3.1A continuous
SVAHX1200S/232	Drive/controller, 3.1A continuous, RS232 communications
SVAHX1200S/485	Drive/controller, 3.1A continuous, RS485 communications
SVA2500S	Analogue input drive, 6.3A continuous
SVAHX2500S/232	Drive/controller, 6.3 A continuous, RS232 communications
SVAHX2500S/485	Drive/controller, 6.3A continuous, RS485 communications

Power Dump Resistor

BRM 05/01 250W continuous, 2.5kW peak

Motors

SM233AE-NGSN	SM23 motor with encoder
MD3450/14/230V	3450 motor with encoder, 14mm shaft
MD3450/19/230V	3450 motor with encoder, 19mm shaft
MD3475/14/230V	3475 motor with encoder, 14mm shaft
MD3475/19/230V	3475 motor with encoder, 19mm shaft

Cables

SVAC-SM-0300	3 metre cable set for SM233 motor
SVAC-SM-0750	7.5 metre cable set for SM233 motor
SVAC-0300	3 metre cable set for MD motors
SVAC-0750	7.5 metre cable set for MD motors
SVAC-1500	15 metre cable set for MD motors
SVAC-3000	30 metre cable set for MD motors