SSt-1000-K

DSP-Based Digital Servo Drive

The SSt-1000-K is a high bandwidth, digital vector servo drive. The seamless integration of position, velocity, and torque loops enables this drive to provide surprising performance enhancements.

For years, Teknic has proven the benefits of tightly integrating servo compensation with torque control under a dedicated DSP per axis. Borrowing technology from the latest in a line of high performance drives, the highly cost-effective SSt-1000-K advances the state of the art by utilizing this topology in such a way to allow all information to be shared in real time so all system functions cooperate in any situation. For example, if the torque loop senses voltage saturation, this information is instantly passed upstream to the servo compensator and the system delivers a coordinated response, maintaining elegant load control. The result is performance superior to steppers, other digital servo drives or analog torque amplifiers. OEMs will realize tighter tracking, immediate settling, and smooth motion—all of which yield superior machine throughput and reliability.

The SSt-1500-K improves on previous versions of the SSt by providing enhanced diagnostics which significantly reduce system engineering, integration and troubleshooting time. Mechanical or electrical troubles, as well as servo system configurations, can be easily diagnosed with the built-in oscilloscope. Other diagnostic modes reduce troubleshooting steps; quickly getting machines up and running with a minimum of effort and complexity.

CUTTING EDGE SERVO CONTROL

The SSt-1000-K's servo performance capitalizes on two decades of algorithm refinement and truly unique design architecture.

Superior Tracking Accuracy

Multi-derivative, state feedforward gains significantly improve tracking performance and do not create the audible noise and torque chatter of traditional implementations.

Zero Settling Time

For demanding point to point applications, the advanced technology of the SSt-1000-K provides zero settling time.[1]

Ultra Smooth Motion

Teknic's proprietary Regressive AutoSpline™ (RAS) technology produces ultra-smooth trajectories. The profiles are jerk and jerk-derivative limited, which reduces shock, vibration, noise, and wear.

Adaptive Tuning

The SSt utilizes an adaptive control algorithm (IMT) based on neural fuzzy logic. The IMT virtually eliminates the concern of inertia matching and allows for loads of large and varying inertia.

Anti-Hunt™

The SSt-1000-K uses small-signal, sliding-mode, automatic gain modulation to eliminate hunting even with extreme gains. Axes will be perfectly still and have no loss of accuracy.

Ease of Performance

Some systems are high performance and others easy to use. Few are both. The SSt's cascading PIV control structure provides cutting edge performance *with* ease of use. Even the sophisticated RAS, IMT, and Anti-Hunt are easy to set up.

[1] **≤1 msec (assuming mechanical system bandwidth ≥ required move bandwidth)**

FLEXIBLE, LOW EFFORT INTEGRATION

The SSt has OEM friendly features designed to make upgrading performance quick & painless.

Drop-in Controller Compatibility

The SSt-1000-K series drive accepts a digital trajectory command that is compatible with most servo controllers or stepper indexers. This provides a performance upgrade for servos and allows for drop-in stepper replacement with little to no software change.

Development/Assembly Feature Examples

- Robust PIV compensator eliminates production tuning.
- Through Teknic's QuickSet™ software, the SSt-1000-K provides a wealth of diagnostics to pinpoint failures due to assembly errors and allows for quick troubleshooting.
- Logic Power Backup, Encoder Power Backup and Position Recovery modes allow recovery from power-down situations with any controller/indexer.
- QuietDesign™ EMI reduction system eliminates shield clamps, ferrite slugs, etc. required to meet CE.
- OEM friendly cabling is robust, mass producible & testable. With CAD drawings available at no charge, they are also economical to build.
- Daisy chain power avoids star pattern complexity.

HIGH VALUE

While all SSt drives are the value leaders in their respective power classes, the SSt-1000-K is especially cost effective. In annual volumes of 200 pieces, this feature-rich digital servo drive is under $300.

ADDITIONAL CAPABILITIES...

Software Scope

Now engineers and technicians can view, configure and troubleshoot the entire motion system using nothing but QuickSet software. A built-in oscilloscope enables quick troubleshooting by providing detailed information about servo drive performance. Advanced triggering modes allow you to capture data related to the start or finish of a move or even a safety shutdown event. View any monitor port variable (tracking error, actual torque, etc.) alongside specific move status (in-range, move done, etc.), drive status (shutdowns, limits, saturation, etc.) or Mode line status (torque foldback, gear shift, etc.). This easy-to-use tool provides an effective method for system evaluation, configuration and diagnosis.

Electronic Gear Shift

A feature developed for OEMs that require high speed motion in addition to extremely high accuracy positioning. This feature provides a single input to switch between high speed/low resolution and low speed/high resolution motion. Now OEMs can provide the best of both worlds even with controller step output rate limitations.

Shutdown History

Quickly discover the root cause of machine problems: A historical view of recent fault activity is captured which allows engineers and technicians to retrace a series of safety shutdowns in a machine.

Low Total Servo Phase Delay

The total time from the moment the position feedback is read to the time torque is updated at the motor is fully deterministic and the fastest in the industry (35µs).

Extremely Fast Torque Response Time

Sinewave commutation with vector feed-forward and DQ decoupling provides near-zero torque response time *at any speed.*

Elimination of Motor Burn-out

Motor burn-out is eliminated using true RMS limiting and no added wiring or sensors. It is much faster and more effective than I^2t or thermostats.

Hardstop and Limit Homing

Upgrading from stepper motors may require you to initialize axes without using home sensors. The servo drive can accurately detect a hardstop and then automatically capture its position and ramp down torque; homing without sensors.

SPECIFICATIONS

GENERAL	Dimensions, in (mm):	7.31 (185) x 4.876 (124) x 1.156 (29).
	Weight, oz (g):	17 (494).
ENVIRONMENTAL	Temperature:	0-40 Degrees C.
	Humidity:	0-95%, non-condensing.
COMPLIANCE	Electrical safety:	EN 61010, UL508C.
	EMI:	EN 50081-2, EN 50082-2.
	Machine safety:	EN 954-1, with proper power control.
OUTPUT POWER	Current:	20 Amps Peak (3 seconds). 6 Amps RMS (global power limited)
	PWM ripple frequency:	28kHz, center balance vector type.
COMPENSATOR	TSPD (total servo phase delay):	35µS.
	Position/Velocity control:	Enhanced PIV with Inertia Matching Technology, AntiHunt, acceleration feedforward, etc. Expert modes onboard.
	Torque control:	Synchronous vector torque control with automatic DQ decoupling, Smart Saturation™, and automatic current sensor calibration.
ENCODER	Interface:	Single-ended or differential, user selectable.
	Max count rate:	15MHz.
	Features:	Bad sequence detection, digital filtering.
MOTOR COMPATIBILITY	Requirements:	Any permanent magnet motor of any type.
LIMIT INPUTS	Interface:	TTL with 2kΩ pull-up; digitally filtered.
HALL SENSOR INPUTS	Specifications:	Optically isolated; 5kΩ pull-up to +5V.
	Features:	Digitally filtered; used for setting torque vector upon initialization only; drive can run in hall-less mode.
DEDICATED INTERFACE INPUTS/OUTPUTS	Outputs:	Drive ready; move done, in-range, all-systems-go; encoder and limit pass-through, +5V.
	Inputs:	Enable motor; Mode (engage/disengage drive features, like torque foldback, hardstop homing, electronic gear shift, etc.); Digital pulse and direction, encoder, limits, etc.
REAL-TIME MONITOR PORT	Features:	Configurable filtering, sync pulse at move start, non-volatile.
	Output variables:	Position error, actual velocity, commanded velocity, velocity error, commanded torque, actual torque, SGN velocity, SGN position, measured position, jerk commanded, acceleration commanded, max phase voltage.
PROTECTION & SAFETY FUNCTIONS	Drive protection:	Short circuit (phase-to-phase, phase-to-ground), over temp, over voltage, over current, protected for open windings, fused.
	Motor protection:	True RMS torque limiting, automatic speed limit, motor jam detection, over temp.
	Mechanical safeguards:	Hardstop detection, limit switch servoing, adjustable tracking error limits and shutdown thresholds, adjustable torque and speed limit.
INPUT SUPPLY	Input voltage:	20-90 VDC.
	Input current:	Up to 3A RMS, 10A Peak (app dependant).
COUNTRY OF ORIGIN	Manufactured in:	USA.