



SSt-1500-U

Digital Servo Drive

The SSt-1500 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 the control of a dedicated DSP per axis. The latest in a line of high performance drives, the SSt-U series 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, that 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 other digital servo drives or analog torque amplifiers. OEMs will realize tighter tracking, immediate settling, and smooth motion - all of which yields superior machine throughput and reliability.

The 1500 has an open control interface and will work with almost any servo controller or indexer with little to no software change. Moreover, it will elegantly control permanent magnet servomotors from virtually any manufacturer.



CUTTING EDGE SERVO CONTROL

The SSt-1500-U's servo performance is the product of two decades of algorithm refinement capitalizing on 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-U 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—even in high speed machines.

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-1500-U 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.

FLEXIBLE, LOW EFFORT INTEGRATION

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

Drop-in Controller Compatibility

U series SSt drives accept a digital trajectory command that is compatible with most indexers and servo controllers and requires little to no software change. This provides a performance upgrade for servos and allows for drop-in stepper replacement.

Universal Motor Interface

SSt drives control rotary and linear servomotors, brush motors, galvos, voice coils, etc. from virtually any manufacturer without electrical restriction on the motor.

Development/Assembly Feature Examples

- Robust PIV compensator eliminates production tuning.
- Compatible with QuickSet™, the 1500 provides diagnostics to production-qualify mechanical systems to reduce infant failure due to assembly errors and allows for quick trouble shooting.
- 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.
- Built-in systems detect faulty cables and sensors (including intermittent problem capture).
- OEM friendly cabling is robust, mass producible & testable. And with Teknic's motor CAD drawings available at no charge, economical to build.
- Daisy chain power avoids star pattern complexity.

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

ADDITIONAL CAPABILITIES...

Universal Motor Interface

The SSt-1500-U elegantly controls virtually any three-phase brushless or brush motor regardless of manufacturer with no electrical restrictions and no software impact.

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*.

Anti-Resonance Torque Loop

In Expert Mode, the digital torque loop is accessible for excellent resonance control. This provides optimal performance with axes that suffer from in-band resonances.

SmartSaturation™

Dynamic algorithm maintains elegant axis control in the event of voltage and/or current saturation.

Hardstop & Limit Homing

The SSt can accurately detect a hardstop and then automatically capture its position and ramp down torque. This can be used as a safety function or to initialize axes without using home sensors.

Torque Foldback & Clamping

Provides precise control for apps such as part insertion. Combined with customizable motion profiles and vector torque feedback, allows for effective contact force control.

Elimination of Motor Burn-out

Motor burn-out is eliminated using true RMS limiting and no added wiring or sensors. It is much more effective than I²t or thermostats.

Logic Power Backup

Even with main power removed, DSP logic will remain active. This mode allows for graceful recovery of machine position after e-stop events without re-homing.

Power Loss Position Recovery

For indexers without feedback, this user-definable feature returns the axis to the last physical encoder position just prior to drive power being removed. This prevents necessary re-homing.

SPECIFICATIONS

GENERAL	Dimensions, in (mm): Weight, oz (g):	7.31 (185) x 4.876 (124) x 1.156 (29). 17 (494).
ENVIRONMENTAL	Temperature: Humidity:	0-40 Degrees C. 0-95%, non-condensing.
COMPLIANCE	Electrical safety: EMI: Machine safety:	EN 61010. EN 50081-2, EN 50082-2. EN 954-1, with proper power control.
OUTPUT POWER	Current: PWM ripple frequency:	23 Amps Peak (3 seconds). 9 Amps RMS vertical on metal surface. 11.5 Amps RMS with forced air cooling. 28KHz, center balance vector type.
COMPENSATOR	TSPD (total servo phase delay): Position/Velocity control: Torque control:	35 uS. Enhanced PIV with proprietary velocity, acceleration and jerk estimators, Inertia Matching Technology (IMT), Regressive AutoSpline (RAS) and Anti-Hunt. User-definable velocity estimators. Has velocity, acceleration, jerk, friction feedforward, etc. Synchronous vector with dq decoupling, SmartSaturation, and auto calibration.
ENCODER	Interface: Max count rate: Features:	TTL or TTL differential, user selectable. 15MHz. Bad sequence detection, digital filtering.
MOTOR COMPATIBILITY	Requirements:	Any permanent magnet motor of any type.
LIMIT INPUTS	Interface:	TTL with 2K pull-up, digitally filtered.
HALL SENSOR INPUTS	Specifications: Features:	5K pull-up to +5V. Digitally filtered; used for setting torque vector upon initialization only; drive can also operate in hall-less mode.
DEDICATED INTERFACE INPUTS/OUTPUTS	Outputs: Inputs:	Drive ready; move done, in tracking range, all systems go; encoder and limit pass-through, +5V. Enable motor; Mode (engage/disengage drive features, such as torque foldback, hardstop homing, etc.); Digital Pulse and Direction; ±10V torque, encoder, limits, etc.
REAL-TIME MONITOR PORT	Features: Output variables:	Configurable filtering, sync pulse at move start, wide scaling/high zoom, non-volatile. 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	SSt-1500 protection: Motor protection: Mechanical safeguards:	Short circuit (phases-to-phase, phase-to-ground), over temp, over voltage, over current, protected for open windings, fused. True RMS torque limiting, automatic speed limit, motor jam detection, over temp. Hardstop detection, limit switch servoing, adjustable tracking error limits and shutdown, adjustable torque and speed limit.
± 10V ANALOG MODE	Format:	Differential input, ±10V range, greater than 10k impedance, 10% per volt scale.
INPUT SUPPLY	Input voltage: Input current:	20-75 VDC. Up to 5A RMS, 15A Peak (app dependant).
COUNTRY OF ORIGIN	Manufactured in:	USA.