ISC-1700

Integrated, Networked, Servo Controller/Drive

The ISC-1700 is a full-featured motion trajectory generator integrated with a high-performance, sinewave vector servo drive, designed exclusively for OEM use. The integration of a trajectory generator and a servo drive gives you the benefits of lower cost, smaller size, less cabling, fewer components, and higher reliability. This integration also provides a surprising performance enhancement.

For years, Teknic has proven the performance benefits of integrating position/velocity servo compensation with torque (current) control. With the ISC-1700, not only are the position, velocity and torque loops fully integrated and synchronized under the control of a dedicated DSP, but now the motion trajectories are also fully integrated. This integration had to be very carefully architected to deliver its full promise, and in the ISC-1700 the performance benefits are immediately evident. Ultra-smooth and quiet motion, extraordinary tracking accuracy and zero settling time, coupled with the advantages of lower cost, smaller size and higher reliability makes the ISC-1700 an unbeatable choice for OEM motion control applications.

The ISC-1700 is fully compatible with ControlPoint™—Teknic's distributed, open-architecture machine control system. ControlPoint™ offers the OEM machine designer a wide array of control components to allow interconnectivity (with standard Category 5 cabling) to just about any digital or analog sensor, stepper motor, digital servo drive, brushless servo motor, etc. from any manufacturer.

CUTTING EDGE SERVO CONTROL

The ISC-1700's servo performance is the product of two decades of algorithm refinement and truly unique design architecture.

Superior Tracking Accuracy

Multi-derivative, state feedforward gains greatly 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 ISC 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 ISC utilizes an adaptive control algorithm (IMT) based on neural fuzzy logic. The IMT nearly eliminates inertia matching concerns while allowing for large *and* varying inertial loads.

Anti-Hunt™

The ISC-1700 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 ISC'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)

POWERFUL DEVELOPMENT TOOLS

The ISC-1700 (and ControlPoint™) provides rich software tools to enable rapid development of OEM machine application software. Included are:

Rapid Prototyping Capability

The ControlPoint Rapid Prototyping Environment (RPE) allows code to be written by software novices so they can get a machine cycling in a few hours or a single axis moving in a few seconds. This reduces the load on an OEM's software resources and allows mechanical and electrical testing to occur independently of software development. The RPE includes one-click control of the most common ISC functions and a powerful, interpretive scripting environment.

Application Development

The ISC-1700 contains an array of software tools, including:

- A Programmable Logic Array for creating configurable high-speed logic functions so each ISC in a system can swiftly and autonomously respond to user-defined inputs.
- Interrupt generation over the network allows simple, event-driven coding.
- A single software driver that tightly links machine motion and I/O, greatly simplifying development.
- Simple machine safety compliance: motor power can be off while sensor and comm. functions stay active.
- Dynamically latched inputs capture rising and falling edges to ensure transient events are captured.
- High speed encoder latching.
- True real-time monitor port for application software verification, timing verification, and debugging.
- Software trace utility helps automatically locate logic errors, reducing debugging time.

ADDITIONAL CAPABILITIES...

Universal Motor Interface
The ISC-1700 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 ISC 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.

IntelliStop™
The ISC-1700 has programmable, controlled stopping for machine safety/emergency events.

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 I^2t or thermostats.

Built-in SSR GPOs & GPIs
The two GPOs and two GPIs require no signal conditioning or breakout boards and wire directly to sensors or output devices.

Onboard Sensor Power
Eliminates external sensor powering needs and wiring complexity.

SPECIFICATIONS

GENERAL	Dimensions, in (mm):	7.10 (180) x 4.8 (122) x 1.23 (31).
	Weight, oz (g):	22.4 (635).
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:	33A Peak (3 sec), 12A RMS.
	PWM Type:	Center balanced vector PWM.
	PWM Ripple Frequency:	28KHz.
COMPENSATORS	TSPD (total servo phase delay):	35 uS.
	Position/Velocity control:	Enhanced PIV with proprietary velocity, acceleration and jerk estimators, Inertia Matching Technology (IMT), Regressive AutoSpline (RAS) and Anti-Hunt features. Includes velocity, acceleration, jerk & friction feedforward, user-definable velocity estimators, etc.
	Torque control:	Synchronous vector torque control with automatic dq decoupling, SmartSaturation, 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:	3-phase motor with encoder in any electrical configuration, such as linear, rotary, galvo, voice coil, etc. or DC brush motors.
GENERAL PURPOSE INPUTS	Interface:	Uncommitted 2-pin opto isolator inputs similar to a solid state relay. GPI-0 can capture the motor encoder to the count.
GENERAL PURPOSE OUTPUTS	Interface:	High current, uncommitted, opto isolated transistor outputs with active clamping. Will directly drive 24V inductive loads. Outputs can be triggered manually, from encoder counter or via user-definable logic functions.
	Maximum current:	500mA (up to a 12W, 24V coil).
LIMIT INPUTS	Interface:	TTL with 2K pull-up, digitally filtered.
HALL SENSOR INPUTS	Electrical:	Optically isolated; 475 ohm pull-up to +5V.
	Mode:	Used for setting vector control angle upon initialization, constantly monitored for bad states to detect cable noise issues.
	Filtering:	Digital filter avoids vector initialization inaccuracy.
PROTECTION & SAFETY FUNCTIONS	ISC-1700 protection:	Short circuit (phases-to-phase, phase-to-ground), over temp, over voltage, over current, protected for open windings, fuse.
	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, adjustable torque limit, adjustable speed limit.
INPUT POWER	Input voltage:	20-90 VDC.
	Input current:	Up to 5A RMS, 15A peak (app dependant).
COUNTRY OF ORIGIN	Manufactured in:	USA.