



The difference is measurable

DIGITAL SERVO CONTROLLER AC-04-2370



The 2370 Series digital controllers are engineered to fulfill the diverse and demanding requirements of mechanical testing across materials, components, and structures. Our unified hardware and firmware architecture supports system configurations compatible with nearly all industry-standard analog and digital transducers and drives. Built with cutting-edge analog, digital, and hybrid integrated circuits, the 2370 Series offers exceptional performance, versatility, safety, and ease of use.

These controllers feature a robust control engine with ample memory and high-speed processors, enabling a unified control platform across all models for a broad range of applications. Up to 128 control channels, 256 feedback channels, and configurable up to 8 stations by vertically stacking multiple 2370 control systems with provisions for interchanging the control boards. High-speed applications, such as a 32 kHz loop update rate, 2500 Hz sine frequency, and 3 MHz burst DAQ rate, are now easily achievable.

Notable features of the 2370 Series include IoT compatibility for up to 128 external device connections, fast bulk data transfer between controllers and PCs or between controllers in master-slave configurations, non-contact strain measurement (>250 fps and <0.5 μm accuracy) for real-time measurement and optimized control for strain-controlled applications., and Modbus communication, allowing seamless integration of up to 128 third-party devices without additional hardware.

*Refer the stacked controller image in Page 4.

KEY FEATURES

SERVO CONTROL UPDATE:

Up to 32kHz

TEST CONTROL MODES:

Force/ Position / Strain along with bump-less transfer between modes.

SYNCHRONOUS ADC SAMPLING RATE:

Up to 8 MHz.

DATA ACQUISITION:

Up to 32 kHz from all feedback and control channels.

HIGH-RESOLUTION DATA:

32-bit data acquisition, 24-bit digital encoder inputs, 24-bit DC & AC signal conditioning, 16-bit DAC and data logging with 40-bit digital servo-loop updates.

ADAPTIVE CONTROL:

Auto-tuning features including mean/amplitude, error/gain matrix, stiffness, servo-differential feedback ratio correction, sine profile tracking, amplitude/phase correction, and effective disturbance rejection.

AUTOMATIC TRANSDUCER CALIBRATION: Digital auto-calibration and zeroing with transducer auto-identification.

ACCURACY:

≤ ±0.5% of readout for all control feedback channels.

DIGITAL INERTIAL FORCE COMPENSATION:

For accurate load measurement.

SYNCHRONIZATION:

Ensures smooth real-time synchronization of the actuators during start-up and test.

OPEN API:

Library calls available for third-party application development.

MULTI-STAGE SERVO-VALVE CONTROL:

Fully digital control, supporting multi-stage valves and programmable PID settings.

CONNECTIVITY:

Communication with PC via Gigabit Ethernet. LAN or wireless interface for remote control and monitoring.

TEST-BY-WIRE READY:

Local and remote control via internet or smartphone, with test control from remote computers.

UNIFIED HARDWARE AND SOFTWARE:

Modular design for easy expansion, with a unified software platform across all systems.

DATA INTEGRATION:

Export to MS Word, Excel, csv or text.

Playback of exported data files.

FIRMWARE UPGRADES:

Easy downloadable firmware for future updates.

POWER SUPPLY:

Operates on 100-260 V, 50/60 Hz single-phase mains.

TIMEOUT PROTECTION:

LAN or wireless command/data buffer to withstand a 30 second timeout, ensuring uninterrupted operation and safe shutdown during communication failures.

SAFETY FEATURES:

Thumbwheel and E-Stop on the Operator Control Panel for fine control adjustments and emergency shutdown.

WATCHDOG TIMER:

Ensures hydraulic safety trip in case of power loss or system crash.

REMOTE HEALTH MONITORING:

Transmits machine usage data, fault logs, and service history for remote monitoring and preventive maintenance.

CROSS-PLATFORM SUPPORT:

Web and LAN-based interface for transmitting live online readouts (e.g., stroke, force, computed channels) and remote test monitoring.

LIVE MONITORING FEATURES:

Strip charts, video streaming, and text chatting for real-time interaction during tests.

USER INFORMATION: Capability to store and manage data related to specimen, batch, operator, etc.

DASHBOARD MONITORING:

Option to monitor the machine health on a dashboard.

USER ACCESS:

Supports connectivity for up to two users.

SERVO OUTPUT CONTROL:

Two analog servo-output lines for voltage or current-loop operation to drive up to two single/dual stage servo valves, or a 3-stage valve under full digital control (6 kHz loop update or better).

PROGRAMMABLE PID SETTINGS:

Multi-component PID settings and programmable limits for safe specimen mounting/dismounting.

HIGH-FREQUENCY PRECISION CYCLING:

Adaptive control for error correction at up to 2000 Hz cycling frequency.

GAIN BIAS OPTION:

Differential direction-dependent servo-tuning for gravity compensation or single-ended actuators.

MANIFOLD CONTROL UNIT:

Supports up to four station control units with the capability to activate 16 solid-states relays, operating at 24V and a maximum current of 1A.

WAVEFORM CONTROL:

32-bit command generation with sine, ramp, pulse, or arbitrary point waveforms, and seamless switching between waveform segments with no latency.

APPLICATIONS

- Automotive, aerospace, biomedical, civil, defense, electronics, energy, education, nuclear, railways, marine, R&D, quality control and process control
- Materials, components, structures
- Metals, ceramics, plastics, composites rubber, biomaterials, medical devices, micro-electronics
- Tension, compression, torsion, bending
- Static, cyclic, dynamic, endurance, impulse
- Fatigue, fracture, and residual strength
- Zero to 500 Hz cycling
- Uniaxial, biaxial, multi-axial load control
- Uniaxial, multi-axial shake tables

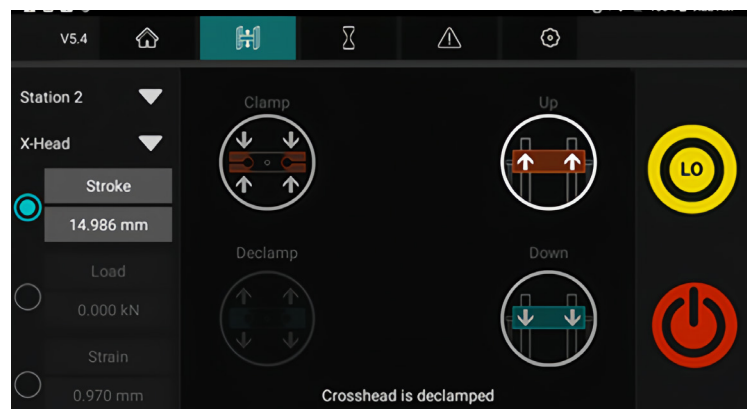
SOFTWARE FEATURES

Software safety settings	High and low level of all feedback channels of machine or specimen, error limits on control channels, programmable action to hold/stop waveform generation or trip machine if safety limits are exceeded, switch control modes and continue a test if a specified limit is hit.
Auto-tuning	Automatic stiffness driven adjustment of system gain settings.
Test-by-Wire/Wireless	All operator controls concentrated onto a single device with context sensitive touchscreen display.
Intelli-Mount	Safe specimen mounting to preclude inadvertent damage to specimen or fixtures. Suitable for inexperienced operators.
Tablet Interface	Windows/Android compatible touch screen interface
Remote Access	View and control tests through Network connections Machine operations within Wi-Fi range of router.
Email Notifications	Automated test status updates through email.

T/W® (Test-by-Wire or Test-by-Wireless or Test-by-WiFi)

WHAT THIS MEANS FOR THE USER:

A streamlined operator experience, with all controls integrated into a single device featuring a context-sensitive touchscreen display. The proprietary single-point-of-action tablet console allows the operator to efficiently manage all machine control functions, including test setup, monitoring, and specimen handling, from one centralized interface.



CONTROLLER VARIANTS	AC-04-2370-XX							
								
	2370 SS LITE		2370 SS		2370 OCTA			2370 MS
LAST TWO DIGITS OF MODEL NO.	01	05	10	20	25	26	27	30
NO. OF CONTROL CHANNELS	1	1	1	4	8	1	1	20
NO. OF STATIONS	1	1	1	4	2	1	1	Up to 4
ENCODER	2	2	2	4	8	4	4	20
DC CONDITIONER (*1) (*3)	1	2	4	8	12	8	4	40
AC CONDITIONER (*2) (*3)	1	0	4	4	4	4	3	24
DAC (*4)	1	1	2	4	8	4	4	64
DIO (*5)	4	4	8	8	16	8	8	64
DAQ Rate (kHz)	3	3	6	6	6	24	3000 (~2 ch.)	1kHz with 20 control channels (10 kHz with 1 control channel)
Loop Update (kHz)	3	3	6	6	6	24 / 32	6	

*

(*1) The DC Signal Conditioning cards that can be connected to this channel is Load, Strain (Optionally excitation voltage up to $\pm 24V$ is also supported).

(*2) The AC Signal Conditioning cards that can be connected to this channel is LVDT, and High Level($\pm 10V$). (Optionally excitation voltage up to $\pm 24V$ is also supported).

(*3) The configuration in (*1) and (*2) can be customized based on application.

(*4) DAC output can be configured as Servo output or signal output with voltage range being $\pm 10V$ or $\pm 100mA$.

(*5) DIO channels, digital output channels are potential free contact with voltage in the range of 0 to 24V can be switched. Digital input channels are active low (GND) as input. Configurable channels for hydraulic interface(HSM) controls, supporting a maximum current of 1A with a solid-state relay.

(*6) Images are for reference purposes only.



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