

Servo & Stepper Controllers for Precision Actuators

Digital, Compact, Affordable

COMPACT



FLEXIBLE



DIGITAL

C-863 Servo Motor Controller for Closed-Loop Linear Actuators

High Performance, Low Cost Controller & Driver with Network Feature



The C-863 Mercury DC servo controller features USB and RS-232 interfaces and incremental encoder signal processing at 20 MHz bandwidth

- High Performance at Low Cost
- DC Servo-Motor Controller Supplies up to 30 W
- 20 MHz Encoder Input for High Speed & Resolution
- Macro Programmable Stand-Alone Functionality
- Data Recorder
- Network Capability for Multi-Axis Applications
- Non-Volatile EEPROM for Macros and Parameters
- Digital I/O Lines (TTL)
- Motor-Brake Control
- USB and RS-232 Interface
- Optional Joystick for Manual Control

The latest generation Mercury C-863 servo motor controller is even more powerful and versatile than its predecessors. Easy data interchange with laptop or PC is possible via the USB in-

terface. The RS-232 interface provides for easy integration in industrial applications. The compact design with its integrated amplifier makes it ideal for building high-performance, cost-effective micropositioning systems.

Application Examples

- Fiber positioning
- Automation
- Photonics / integrated optics
- Quality assurance testing
- Testing equipment

Flexible Automation

The Mercury offers a number of features to achieve automation and handling tasks in research and industry in a very cost-effective way. Programming is facilitated by the high-level mnemonic command language with macro and compound-

command functionality. Macros can be stored in the non-volatile memory for later recall.

Stand-alone capability is provided by a user-programmable autostart macro to run automation tasks at power up (no runtime computer communication required!).

For easy synchronization of motion with internal or external trigger signals four input and four output lines are provided.

Multi-Axis Control

Up to 16 Mercury class controllers can be networked and controlled over a single PC interface.

Such daisy chain networks are flexible, can be extended at any time and are compatible with other PI controllers for DC servo-motors or stepper motors, PISLine® ultrasonic piezomotor drives or piezo stepping drives.

Easy Programming

All servo and stepper motor controllers of the Mercury family can be operated using the PI general command set (GCS). PI-GCS allows networking of different controller units, both for piezo-based and motorized positioning units, with minimal programming effort.

Cost-Saving Due to Integrated Amplifier and PWM Outputs

The unique Mercury concept combines a high-performance motion controller and an integrated power amplifier in a small package. Additional PWM control outputs allow the direct operation of any DC-motor-driven PI micro-positioning system—even high-speed stages such as the M-500 ActiveDrive Translation Stages—reducing costs, increasing reliability and simplifying the setup.

Ordering Information

C-863.11
Mercury DC-Motor Controller, 1 Channel, with Wide-Range Power Supply

C-819.20
2-Axis Analog Joystick for Mercury Controller

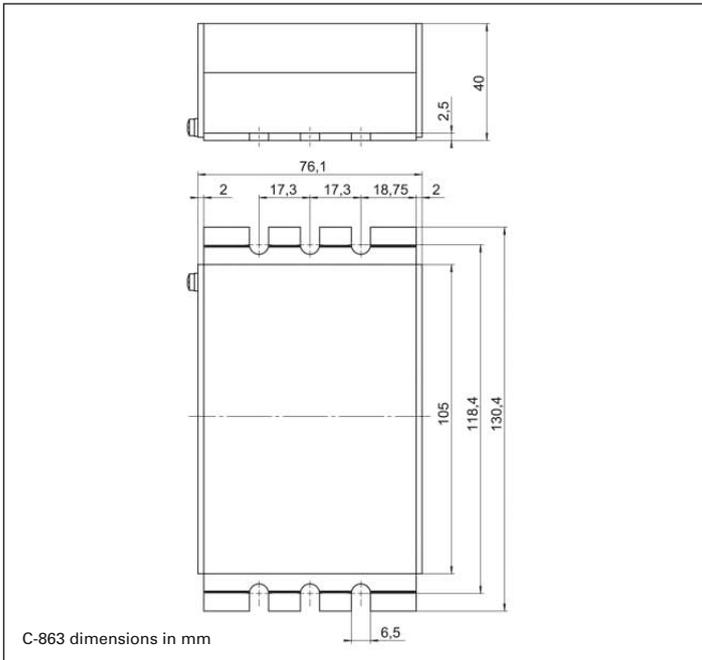
C-819.20Y
Y-Cable for Connecting 2 Controllers to C-819.20

C-170.IO
I/O Cable, 2 m, Open End

C-170.PB
Push Button Box, 4 Buttons and 4 LEDs

Contents of Delivery

Each controller is delivered with a wide-range power supply, USB and RS-232 communication cable, a daisy-chain network cable and a comprehensive software package.

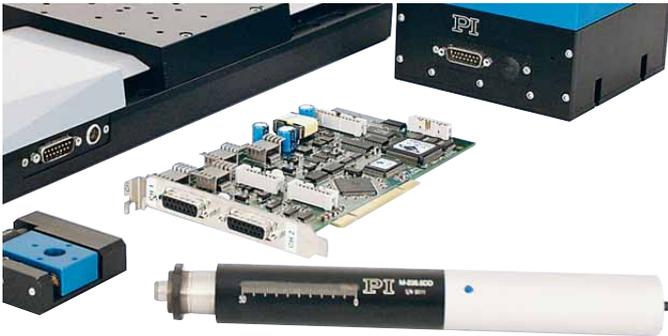


Technical Data

Model	C-863.11
Function	DC-servo-motor controller, 1 channel
Motion and control	
Servo characteristics	P-I-D servo control, parameter change on-the-fly
Trajectory profile modes	Trapezoidal, point-to-point
Encoder input	AB (quadrature) single-ended or differential TTL signal, 20 MHz
Stall detection	Servo off, triggered by programmable position error
Input limit switch	2 x TTL (pull-up/pull-down, programmable)
Input reference switch	1 x TTL
Motor brake	1 x TTL, software controlled
Electrical properties	
Output power	max. 30 W (PWM)
Output voltage	0 to 15 V
Current	80 mA + motor current (3 A max.)
Interfaces and operation	
Communication interfaces	USB, RS-232 (9-pin [m] sub-D)
Motor connector	15-pin (f) sub-D
Controller network	Up to 16 units on single interface
I/O ports	4 analog/digital in, 4 digital out (TTL)
Command set	PI General Command Set (GCS)
User software	PIMikroMove®
Software drivers	LabVIEW drivers
Supported functionality	Start-up macro, data recorder for recording parameters as motor input voltage, velocity, position or position error; internal safety circuitry: watchdog timer
Manual control (optional)	2-axis joystick, Y-cable for 2D motion, pushbutton box
Miscellaneous	
Operating voltage	15 to 30 V included: external power supply, 15 V / 2 A
Operating temperature range	+5 to +50 °C
Mass	0.3 kg
Dimensions	130 x 76 x 40 mm

C-843 Servo-Motor Controller / Driver for Closed-Loop Actuators

Servo Motion Controller/Driver PCI Board for 2 or 4 Axes



C-843.41 DC-motor controller board with M-110.DG linear stage, M-235.5DG heavy duty linear actuator, M-511.DD direct drive translation stage and M-501.1DG vertical stage. No external amplifier is required to drive any of these or other PI stages. Small motors are driven through the C-843's onboard linear amplifiers, direct-drive PI stages (e.g. M-511.DD) employ ActiveDrive™ controlled off the C-843's PWM outputs.

- **Two and Four Axis Version**
- **Very Cost-Effective: Servo Amplifiers On-Board**
- **Additional PWM Outputs for High-Power Motors**
- **Trapezoidal Curve, S-Curve and Velocity Profile**
- **32 kSamples RAM for High-Speed Buffer Operations**
- **16 I/O Lines for Flexible Automation**
- **Fast PCI Communication, 120 μs for Position Read**
- **Motor-Brake Control Output**
- **Extensive Software Support**
- **General Command Set (GCS) Compatible**

The C-843 PCI motion control controller card drives up to 4 axes of micropositioning equipment. Because there is no need for external servo-amplifiers, this new card is a very cost-effective, easy-to-set-up solution.

On-Board Servo-Amplifiers

Unlike other PCI controller cards, the new C-843 comes with on-board, low-noise linear amplifiers for the small DC motors used in most compact micropositioning stages and actuators.

In addition, PWM outputs are available to drive more powerful equipment (all direct-drive

translation and rotation stages from PI feature the integrated ActiveDrive™ PWM amplifiers, and also connect to the C-843 with no external power amplifiers).

The PWM mode and linear amplifier mode can be programmed individually for each of the 4 (or 2) channels.

High-Performance PID Control

The C-843 employs a fast DSP (digital signal processor) providing high-performance PID motion control with many options for trajectory generation and filter settings for superior positioning and tra-

cking accuracy. Position, velocity, acceleration and several other motion parameters can be programmed individually for each axis on-the-fly. High-bandwidth counters (5 MHz) support differential encoder feedback (incremental rotary encoders or linear scales) for fast and accurate positioning.

I/O for Flexible Automation

In addition to 3 TTL inputs per channel for limit and reference signals, 16 more I/O lines are available for flexible automation tasks (trigger functions, etc.). The C-843 also features motor-brake output lines (e.g. for M-531.DDB stages).

High-Speed Buffering

The integrated 32 k-sample trace memory allows online buffering (read and write) at integer multiples of the servo-loop time of up to four independent system variables (positions, velocities, internal register contents, etc.) This allows the observation of the motion system and also performing customized trajectory profiles.

PI General Command Set (GCS)

The comprehensive command structure is based on the PI General Command Set (GCS). With GCS the development of custom application programs is simplified, because the commands for all supported devices are identical in syntax and function. PI controllers for nanopositioning systems, for piezomotors and servo or stepper motors can be commanded with GCS.

Software / Programming

In addition to the user software for setup, system optimization and operation, comprehensive LabVIEW and DLL libraries are

Ordering Information

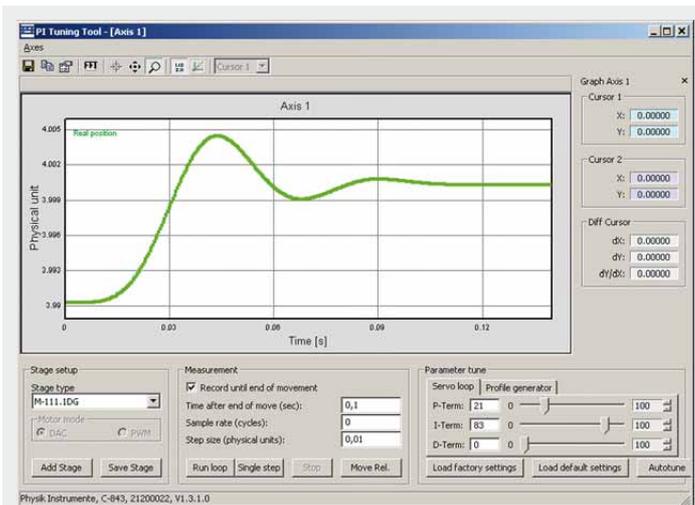
- C-843.21**
DC-Motor Controller PCI PC Board, 2-Axis
- C-843.41**
DC-Motor Controller PCI PC Board, 4-Axis
- C-843.JS**
Joystick and PCI Interface Board for C-843 Motor Controller

provided. The user friendly PI MikroMove™ provides a convenient interface for stage operation including tuning tool, joystick operation, terminal and macro editor.

Communications to/from the board consist of packet-based messages passed via memory access. An interrupt line is provided so that the chipset can signal the PC when special conditions arise, such as reception of an encoder index pulse. For system programmers the C-843 offers direct access to the DSP.

	Stage	Key	Target	Step size	Position	HALT	State	Velocity	Servo
1	M-235.5DD	[k] <	0.000000	0.100000	0.000000	HALT	on target	15.000000	<input checked="" type="checkbox"/>
2	M-605.2DD	[j] <	100.0000	0.1000	100.0000	HALT	unreferenced	25.000000	<input checked="" type="checkbox"/>
3	M-511.PD	[k] <	56.00000	1.0000	56.00000	HALT	on target	62.500000	<input checked="" type="checkbox"/>
4	M-110.1DG	[k] <	0.000000	0.010000	0.000000	HALT	on target	1.000000	<input checked="" type="checkbox"/>

PIMikroMove® tabular presentation of four connected axes with display of absolute and relative positioning input, current position, halt axis button, state and velocity setting.



The Tuning Tool which is integrated in PIMikroMove® demonstrates acquiring and displaying step and settle data of micropositioning systems. Controls allow adjustment of the PID parameters for best performance.

Technical Data

Model	C-843
Function	PC plug-in DC-servo-motor controller board, 32-bit plug-and-play PCI-bus interface, supported by main boards with 3.3 V and 5 V PCI bus connectors (universal card)
Axes	2 (C-843.21); 4 (C-843.41)
Servo characteristics	Programmable PID V-ff filter, parameter changes on-the-fly
Profile modes	Trapezoidal, S-curve, velocity profile
Output power / resolution	Analog 6 watts/channel (drawn directly from PC power supply), 12-bit D/A converters, PWM 10-bit, 24.5 kHz
Current limitation	500 mA per channel (short-circuit-proof)
Encoder input	AB (quadrature) differential TTL signals, 5×10^6 counts/s
Stall detection	Servo off, triggered by programmable position error
Limit switches	2 TTL / axis (active high/low, programmable)
Reference switches	1 TTL / axis (active high/low, programmable)
I/O ports	8 TTL inputs, 8 TTL outputs
Motor connectors	15-pin (f) sub-D per channel (2 on board + 2 on bracket for C-843.41)
Interface/communication	PC PCI bus
Command set	PI General Command Set (see p. A-11)

C-663 Stepper Motor Controller with Integrated Driver

1-Axis Networkable Stepper-Motor Controller



C-663 Mercury Step stepper motor controller for cost-sensitive micropositioning tasks

- High Performance at Low Cost
- Stand-Alone Functionality
- Network Capability for Multi-Axis Applications
- Compatible and Networkable with Mercury DC-Motor Controllers
- Joystick Port for Manual Control
- Non-Volatile Macro Memory
- Data Recorder
- Parameters Changeable On-the-Fly

The Mercury Step stepper motor controller is the perfect solution for cost-effective and flexible motion control applications where a precision positioner is to be controlled by a

PC or PLC (programmable logic controller). The C-663 supplements the successful C-863 Mercury servo motor controller.

Microstepping of 1/16 full step (up to 6400 steps/rev. with PI stepper motors) provides for ultra-smooth, high-resolution motion.

Multi-Axis Control

Up to 16 Mercury class controllers can be networked and controlled over a single PC interface.

Such daisy chain networks are flexible, can be extended at any

time and are compatible with over PI controllers for DC servomotors or stepper motors, PLine® ultrasonic piezomotor drives or piezostepping drives.

Flexible Automation

The C-663 offers a number of features to achieve automation and handling tasks in research and industry in a very cost-effective way. Programming is facilitated by the high-level mnemonic command language with macro and compound-command functionality. Macros can be stored in the non-volatile memory for later recall.

For easy synchronization of motion with internal or external trigger signals four input and four output lines are provided. A joystick can also be connected for manual control.

Stand-alone capability is provided by a user-programmable autostart macro to run automation tasks at power up (no runtime computer communication required!).

User-Friendly: Comprehensive Software Package and Two Interface Options

Easy data interchange with laptop or PC is possible via the USB interface. To facilitate industrial applications, an RS-232 interface is also standard.

The included software supports networking of multiple controller devices. LabVIEW drivers and Windows DLLs allow for easy programming and integration into your system. Mercury Step controllers can be operated using the PI General Command Set (GCS). PI-GCS allows networking of different PI-controllers such as piezo drivers and multi-axis servo controllers with minimal programming effort.

Ordering Information

C-663.11
Mercury Step Stepper Motor Controller with Wide-Range Power Supply, 24 V

C-819.20
2-Axis Analog Joystick for Mercury Controller

C-819.20Y
Y-Cable for Connecting 2 Controllers to C-819.20

C-170.IO
I/O cable, 2 m, open end

C-170.PB
Push Button Box, 4 Buttons and 4 LEDs

Contents of Delivery

Each Mercury Step comes with a wide-range power supply, RS-232 communications cables, a USB cable and a comprehensive software package.

Application Examples

- Flexible automation
- Handling
- Quality control
- Testing equipment
- Photonics applications
- Fiber positioning



Mercury Step controller with M-403.62S precision translation stage

Technical Data

Model	C-663.11
Function	Stepper motor controller, stand-alone capability
Drive type	2-phase stepper motor
Channels	1
Motion and control	
Trajectory profile modes	Trapezoidal, point-to-point
Microstep resolution	1/16 full step
Limit switches	2 x TTL, programmable
Reference switches	1 x TTL, programmable
Motor brake	1 x TTL, programmable
Electrical properties	
Operating voltage	15 to 30 V
Current limitation per motor phase	1000 mA
Interface and operation	
Interface/Communication	USB, RS-232 (bus architecture)
Motor connector	Sub-D 15 (f)
Controller network	Up to 16 units* on single interface
I/O ports	4 analog/digital in, 4 digital out
Command set	PI General Command Set (GCS)
User software	PIMikroMove®
Software drivers	LabVIEW drivers
Supported functionality	Start-up macro, data recorder for recording parameters as motor input voltage, velocity, position or position error
Manual control	Joystick, Y-cable for 2D motion, pushbutton box
Miscellaneous	
Operating temperature range	0 to 50 °C
Mass	0.3 kg
Dimensions	130 x 76 x 40 mm ³

*16 with USB; 6 with RS-232 (depending on RS-232 output driver of PC)

Program Overview

- Piezo Ceramic Actuators & Motors
- Piezo Nanopositioning Systems and Scanners
- Active Optics / Tip-Tilt Platforms
- Capacitive Nanometrology Sensors
- Piezo Electronics: Amplifiers and Controllers
- Hexapod 6-Axis Positioners / Robots
- Micropositioning Stages & Actuators
- Photonics Alignment Systems, Solutions for Telecommunications
- Motor Controllers
- Ultrasonic Linear Motors

Request or download the complete PI Nanopositioning & Piezo Actuator Catalog



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