

C-880

Automation Platform

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Fiber alignment configuration example. Top: C-880.00D equipped with F-206.iRU IR-photometer card, 2 x C-842.40 servo-motor control cards and E-760.3S0 piezo controller card. Bottom left: M-511.DD precision translation stage with 0.1 µm linear encoder for rapid loading/unloading; F-131.3SD hybrid fiber alignment system with 15 mm travel range in XYZ and 1 nm resolution. Bottom right: M-501.1PD precision vertical stage with 0.008 µm encoder resolution; M-061.PD rotation stage and the discontinued F-210 fiber rotator.

- Seamless Control of up to 18 Axes with Piezo Actuators, Servo-Motors, Voice Coil Drives
- Integrated High-Level Command Set Performs Scans, Alignments, etc.
- Plug-and-Play Configuration
- Integrated Amplifiers
- Large Variety of Accessories: I/O Cards, Photometers, Manual Control Pad
- Optional IEEE 488 Interface
- Software Libraries and High-Level Drivers
- Powerful Macro Command Language

Flexibility from the Ground up

The C-880 Automation Platform is a modular and highly versatile system for complex multi-axis positioning and automation tasks. It was conceived for applications ranging from photonics alignment and packaging to biotechnology.

Based on a rugged, industrial PC, it offers the flexibility expected in today's demanding prototyping and high-precision production environment.

Several basic versions and upgrades are available to coordinate combinations of up to 18 micro- and nanopositioning channels. Servo-motors, voice coil-drives and piezo actuators/stages can be controlled in almost any combination. Available options include photometer cards for fully automated fiber alignment, a relay board for flexible automation, an integrated screen and keyboard for stand-alone operation, and a manual control pad.

Up to 273 Channels

A special version of the C-880 Controller was developed for

the SALT telescope in South Africa (www.salt.ac.za). This telescope, the largest in the southern hemisphere, is controlled by 9 modified and networked C-880 controllers which in turn control 273 precision linear actuators based on the M-235 DC-Mike (see p. 7-82).

Ease of Operation, System Integration and Upgrade

All C-880s are delivered fully configured to your requirements and with all installed options tested and ready to run your positioning equipment. The sophisticated configuration engine allows you to upgrade the system at any time, change the assignment of the individual axes and replace or add controller cards easily.

Operating the system, alone or as part of a larger complex, is

Ordering Information

C-880.00
Automation Platform, Chassis with Power Supply, RS-232 Interface

C-880.00D
Automation Platform, Chassis with Power Supply, RS-232 Interface, Front-Panel Keypad and LCD Monitor

Options

C-842.20
DC-Motor Controller Card, 2 Channels

C-842.40
DC-Motor Controller Card, 4 Channels

V-820.20
Voice Coil Controller, 2 Channels

E-760.3S0
Piezo Controller for NanoCube®

Options and Accessories

F-206.iRU
Photometer Card, IR Range

F-206.00U
Photometer Card, Visible Range

F-206.i3E
GPIB/IEEE 488 Interface Card

F-206.MC6
Manual Control Pad

C-880.R8
Relay Board with 8 Relays

Additional Options:
See Description!

facilitated by the C-880's open software architecture. A powerful and comprehensive high-level-language command set, including complete scan and alignment routines, reduces both the programming effort and the communications bandwidth usage.

Technical Data

Models	C-880.00, C-880.00D
Axes	Up to 18 axes with (servo-motors, voice coil drives), or piezo actuators (max. 6 piezo axes)
Processor	32-bit AMD
Interfaces	RS-232, IEEE 488/GPIB, optional
Command set	PI General Command Set, ASCII communications
Dimensions	19-inch case, 450 mm x 460 mm x 180 mm
Operating voltage	100 to 250 VAC, 50 / 60 Hz

Application Examples

- Photonics
- Fiber alignment
- Micro-assembly
- Flexible automation
- Quality control
- Semiconductor test equipment
- Biotechnology

Integration of Nano- and Micropositioning Drives



The F-130.3SD Hybrid Fiber Alignment System permits rapid XYZ alignment of optical fibers and other optical components with nanometer precision. Two F-130 systems can be controlled in parallel with other devices by a single C-880 controller.

The C-880 controller can be equipped with servo-controllers and power amplifiers for the following drive types:

Fast Piezo Nanopositioning Stages

Frictionless, stictionless piezo-nanopositioning systems provide sub-nanometer accuracy combined with very short settling times. The high acceleration of piezo drives makes possible precision scans like those

used in scanning microscopy or for characterizing fiber optic devices in significantly shorter times than with motor-driven stages.

The C-880 can accommodate up to two P-611 NanoCube® XYZ piezo nanopositioners.

Micropositioning Stages and Actuators

The C-880 can control all DC-motor-drive translation, rotation, tip/tilt stages and linear

actuators offered by PI, without the need for external amplifiers. Examples are the highly compact M-110 / M-111 / M-112 translation stages with 50 nanometer minimum incremental motion, the high-load M-235 series and the high-precision M-605 translation stages with integrated linear encoder.

Voice Coil Drives: Fast Linear Drives for Scanning Applications

Voice coil drives offer high scanning rates with travel ranges in the centimeter range in a very small package. Standard systems like the V-106 can be controlled directly from the C-880.

Photonics Applications

The C-880 has its roots in the F-206 HexAlign Hexapod photonics alignment systems (see p. 8-8) and has integrated routines like fast scans conceived for aligning or scanning fiber optic components.

C-880 Drive Examples



P-611 NanoCube PZT NanoPositioning System. High-speed scanning, nanometer-level precision



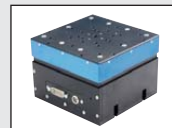
M-230 through M-235 Linear actuators. 50 nm min. incremental motion



M-110 series miniature translation stages. 60 x 62 mm foot print, 50 nm min. incremental motion



F-130 low-inertia hybrid photonics alignment system. PZT drives / servo motors



M-501 elevator stage. 12.5 mm vertical travel, < 0.1 µm min. inc. motion



V-106 Voice-Coil-driven XY scanner. 6 mm travel, up to 5 Hz scanning rate. Direct output metrology



M-500 series translation stages, 100 to 300 mm travel. High load, high resolution



M-605 compact translation stage. 50 mm travel, direct output metrology



M-060 to M-062 series rotation stages. Compact, high resolution



Pneumatic grabber

The high flexibility of the C-880 makes it the solution of choice for many automation and precision-positioning tasks. Here only a few examples can be given. Contact a PI Applications Engineer about your application.

Piezo Actuators

Nanopositioning & Scanning Systems

Active Optics / Steering Mirrors

Tutorial: Piezo-electrics in Positioning

Capacitive Position Sensors

Piezo Drivers & Nanopositioning Controllers

Hexapods / Micropositioning

Photonics Alignment Solutions

Motion Controllers

Ceramic Linear Motors & Stages

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Options and Accessories



Pneumatic grabber gripper on an XZ micro-positioning combination for high precision pick-and-place applications. The C-880 controls both the stages (M-505.4PD, 100 mm horizontal travel and M-605.2DD, 50 mm vertical travel) and the gripper with the C-880.R8 power-switch card.

Accessories for Flexible Automation

To live up to its name of "Automation Controller," a variety of options and high-level drivers are available for the C-880.

■ F-206.I3E

IEEE 488 interface card for operation of one or more C-880s from a single PC.

■ C-880.R8

Relay Board which can switch power on up to 8 channels. The high-power capacity (24 V, 1 A) can be used to directly drive loads like pneumatic valves, magnets, relays, etc.

■ F-206.MC6

Interactive manual control pad. This option allows easy manual control of any 6 motorized axes in the system using control knobs with programmable step-sizes.

■ F-206.iRU / F-206.00U

Photometer and A/D Cards. These cards are equipped with fiber-optic connectors, infrared or visible-light photodiodes and amplifiers. Both have integrated 12-bit A/D converters with inputs accessible via a BNC socket on the card bracket.

Technical Data C-880.R8 Power- Switch Card

Models	C-880.R8
Function	Power-switch card
Channels	8
Output power	60 W
Voltage per channel	24 V
Current per channel	1 A

Technical Data C-842 Servo Motion Controller Card

Models	C-842.20 / C-842.40
Function	DC servo-motor controller
Channels	2 / 4
Output power	Analog H-bridge +/-12 V, 5 W per channel, 12-bit PWM output, 10 bit, 24.5 kHz for external amplifiers (ActiveDrive™)
Encoder input	Quadrature encoder signals (single-ended or differential mode), max. 10° cts/s
I/O Ports	Limit and origin switches
Servo characteristics	32-bit programmable PID-ff filter
Connectors	2 x 15-pin D-sub on board 2 x 15-pin D-sub on bracket holder (C-842.40)
Dimensions	PC card (ISA)

Technical Data E-760 Piezo-Controller Card

Models	E-760
Function	Power amplifier & sensor/position servo-control of P-611 NanoCube® systems
Channels	3 LVPZT
Max. output power	9 W
Average output power	3 W
Peak output current	90 mA
Average output current	30 mA
Output voltage	-20 to +120 V
Sensor type	Strain gauge
Servo characteristics	P-I (analog), notch filter
Connector	25-pin sub-D
Dimensions	PC card (ISA)

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Software Tools

PI General Command Set (GCS)

The C-880 comprehensive command structure is based on the PI General Command Set (GCS). The GCS was developed by PI to facilitate coordinated operation of a variety of devices with a minimum of programming effort. Most PI piezo controllers and servomotor controllers can be commanded with GCS.

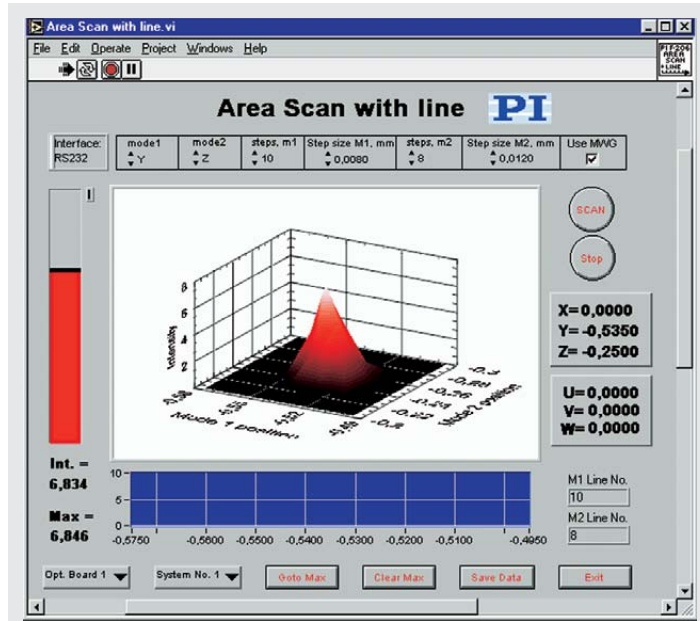
For more information on GCS, see p. 9-28.

Software

All C-880 controllers are delivered preconfigured for the intended application. All you need to do is connect the system components together and install and start the operating software. Later system changes or upgrades can be incorporated easily using the included configuration software.

DLL, COM and LabView™ Drivers for Custom Programming

A number of driver libraries are provided to make the full power of the C-880 available to the programmer. Custom programs have access to all features of the C-880, including internal routines like those designed for automated fiber alignment.

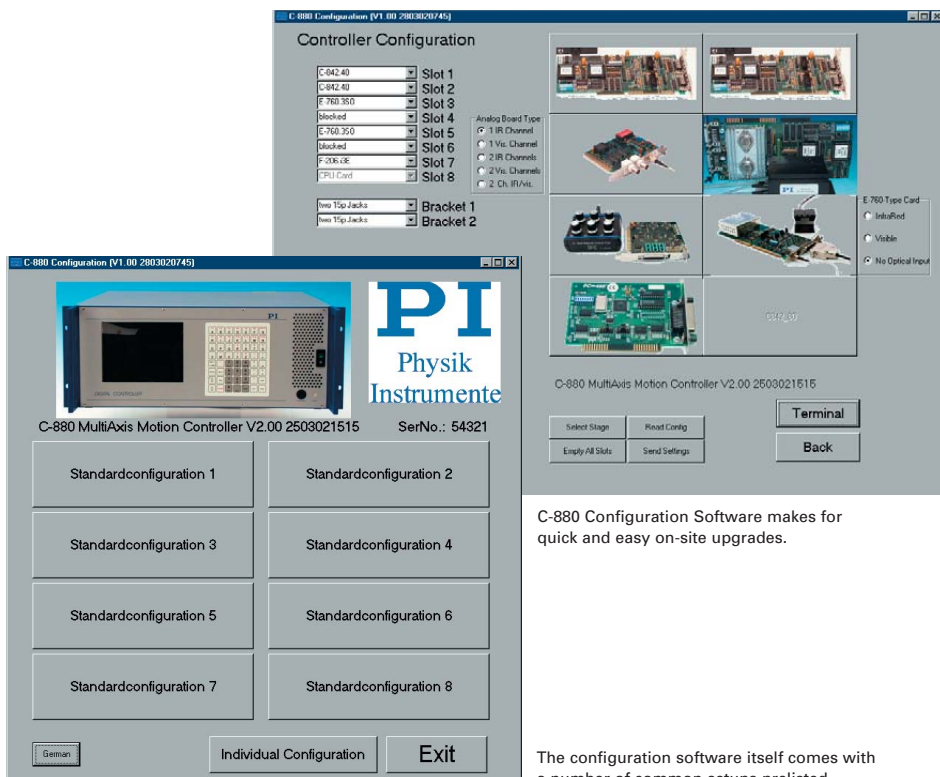


The versatile scan-and-align routines make the C-880 an ideal tool for photonics applications.

- Piezo Actuators
- Nanopositioning & Scanning Systems
- Active Optics / Steering Mirrors
- Tutorial: Piezo-electrics in Positioning
- Capacitive Position Sensors
- Piezo Drivers & Nanopositioning Controllers
- Hexapods / Micropositioning
- Photonics Alignment Solutions

Motion Controllers

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C-880 Configuration Software makes for quick and easy on-site upgrades.

The configuration software itself comes with a number of common setups prelisted.