

# User Manual

CBo, ASt, BRo, 2018-08-30

E873T0002, valid for E-873.10C885



## E-873.10C885 Motion Controller Module for Q-Motion®, for C-885 PIMotionMaster



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## About this Document

This document describes the E-873.10C885 motion controller module for the C-885 PIMotionMaster (p. 5) from PI.

## Symbols and Typographic Conventions

The following symbols and typographic conventions are used in this document:

### CAUTION



#### Dangerous situation

If not avoided, the dangerous situation will result in minor injury or damage to the equipment.

- Actions to take to avoid the situation.

### NOTICE



#### Dangerous situation

If not avoided, the dangerous situation will result in damage to the equipment.

- Actions to take to avoid the situation.

Symbol/Label	Meaning
1.	Action consisting of several steps whose sequential order must be observed
2.	
	Action consisting of one or several steps whose sequential order is irrelevant
	List item
p. 5	Cross-reference to page 5
<b>Status</b>	Labeling of an operating element on the product (example: status LED)
	Warning signs on the product which refer to detailed information in this document

## Other Applicable Documents

The devices which are mentioned in this document are described in their own manuals.

Description	Document
E-873 Single-Axis Q-Motion® Controller	PZ273 user manual
C-885 PIMotionMaster (details see p. 5)	C885T0002 user manual
PIMikroMove	SM148E software manual

## Downloading Manuals

The latest versions of the user manuals are available for download on our website ([www.pi.ws](http://www.pi.ws)).

For products that are supplied with software (CD in the scope of delivery), access to the manuals is protected by a password. Protected manuals are only displayed on the website after entering the password. The password is included in the Release News on the CD of the product.

## Safety

### Intended Use

The E-873.10C885 is designed to be integrated in a device as defined by DIN EN 61010-1. It is intended to be used in interior spaces and in an environment which is free of dirt, oil and lubricants.

In accordance with its design, the E-873.10C885 is intended for the operation of stages with piezo inertia drives.

The E-873.10C885 is intended for closed-loop operation with incremental or absolute measuring position sensors. In addition, it can read and process the reference point and limit switch signals from the stage connected.

The E-873.10C885 may only be used in compliance with the technical specifications and instructions in this manual. In particular, the E-873.10C885 must not be used to drive ohmic or inductive loads.

The E-873.10C885 has no case and is designed to be integrated in the C-885 PIMotionMaster (p. 5) from PI. The operator is responsible for electrical safety according to EN 61010-1:2010 and electromagnetic compatibility according to EN 61326-1:2013 when integrating the E-873.10C885 in the PIMotionMaster.

### Safety Precautions

#### CAUTION



#### Risk of electric shock during operation without case!

If the E-873.10C885 is operated without a case, live parts will be accessible. Touching the live parts can result in minor injuries due to electric shock.

- Only operate the E-873.10C885 when it is installed in a suitable case (p. 5) that is connected to the protective earth conductor.

#### NOTICE



#### Electrostatic hazard!

The E-873.10C885 contains electrostatically sensitive equipment (ESD) and can be damaged if handled improperly.

- Avoid touching assemblies, pins and PCB traces.
- Before you touch the E-873.10C885, discharge yourself of any electric charges. For example, wear an antistatic wrist strap.
- Only handle and store the E-873.10C885 in environments that dissipate existing static charges to earth in a controlled way and prevent electrostatic charges (ESD workplace or electrostatically protected area, in short EPA).

## Product Description

The E-873.10C885 is a controller module for the C-885 PIMotionMaster (p. 5) from PI. It is based on the standard E-873.1Ax single-axis controller (E-873.1Ax stands for E-873.1A1, .1AT, .1AR). In comparison to the E-873.1Ax controller, the E-873.10C885 controller module is not installed in a case and has a reduced number of features. The E-873.10C885 only features a Sub-D 15 (f) socket for motor and sensor, and a status LED.

## Product View

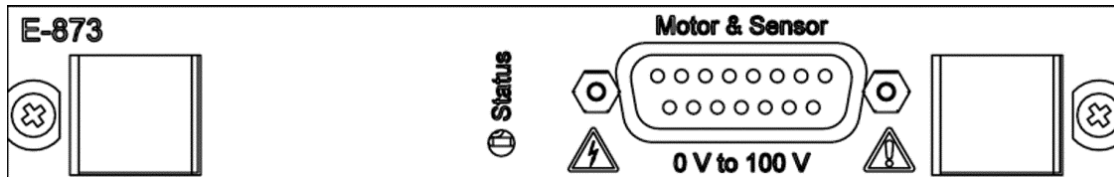


Figure 1: E-873.10C885 controller module (front view)

## Scope of Delivery

Item ID	Description
E-873.10C885	Motion controller module for Q-Motion® systems with piezoelectric inertia drive, 1 axis, for PIMotionMaster
E873T0002	User manual for E-873.10C885 (this document)

## Accessories

Order Number	Description
C-885.iD	Digital interface module, gives access to the four input lines (digital/analog) and four output lines (digital) of the E-873.10C885. For pinout, see p. 11. Further details see the C885T0002 user manual of the C-885 PIMotionMaster.

## Overview of C-885 PIMotionMaster

The E-873.10C885 is designed to be integrated in a C-885 PIMotionMaster from PI. The C-885 PIMotionMaster is a customizable, modular multi-axis controller with card slots. In order to be functional, the C-885 PIMotionMaster requires a chassis with one C-885.M1 digital processor and interface module and at least one controller module. See the table below for the available system components. For the supported controller modules see the documentation of the C-885 PIMotionMaster (p. 3).

Order Number	Item	Remarks
C-885.Mx	Digital processor and interface module for PIMotionMaster with Ethernet interface, USB	One C-885.Mx module required per PIMotionMaster. The C-885.Mx controls up to 20 controller modules with the largest chassis.

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Order Number	Item	Remarks
C-885.Rx	Chassis for PIMotionMaster	One C-885.Rx chassis required per PIMotionMaster. There are chassis in two sizes: <ul style="list-style-type: none"><li>▪ 9.5": provides card slots for up to 4 controller modules</li><li>▪ 19": provides card slots for up to 20 controller modules</li></ul>

## Installation

The E-873.10C885 must be installed in the C-885 PIMotionMaster (p. 5) from PI. See the documentation of the C-885 PIMotionMaster (p. 3) for more information.

## Power Source

The maximum power consumption of the E-873.10C885 is 30 W.

- Use a sufficiently dimensioned power supply for the C-885 PIMotionMaster in which the E-873.10C885 is to be installed.

## Start-Up and Operation

### Configuration of the E-873.10C885 and Normal Operation of the C-885 PIMotionMaster

At the first start-up of the C-885 PIMotionMaster, the E-873.10C885 controller module has to be configured for the connected stage. Configuration of the controller module requires direct communication with the controller module.

In normal operation, the C-885 PIMotionMaster behaves like a “conventional” multi-axis controller, and the parameter settings for the axes cannot be changed.

See the documentation of the C-885 PIMotionMaster (p. 3) for details and instructions.

### Command Set of E-873.10C885

The E-873.10C885 is fully GCS 2.0 compatible.

The commands of the E-873.10C885 are accessible via direct communication with the controller module. See the documentation of the C-885 PIMotionMaster (p. 3) for details.

The range of commands and parameters available on the E-873.10C885 may be different from that of the E-873.1Ax controller.

- To get a list of available GCS commands, send `HLP?` to the E-873.10C885.
- To get a list of available parameters, send `HPA?` to the E-873.10C885.

See the PZ273 user manual for the E-873.1Ax controller for more information on GCS commands and parameters.

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## Updating the Firmware

If a firmware update is necessary for the E-873.10C885:

- For information on how to perform firmware updates, contact our customer service department (p. 7).

## Customer Service

For inquiries and orders, contact your PI sales engineer or send us an email ([service@pi.de](mailto:service@pi.de)).

If you have questions concerning your system, have the following information ready:

- Product codes and serial numbers of all products in the system
- Firmware version of the controller (if present)
- Version of the driver or the software (if present)
- Operating system on the PC (if present)

The latest versions of the user manuals are available for download on our website ([www.pi.ws](http://www.pi.ws)).

## Technical Data

### Specifications

<b>E-873.10C885</b>	
Function	Controller module for Q-Motion® systems with piezo inertia drives, for C-885 PIMotionMaster modular multi-axis controller system
Drive type	Piezo inertia drive
Channels	1
<b>Motion and control</b>	
Servo characteristics	PID controller, parameter changes on the fly
Trajectory profile modes	Trapezoid
Encoder input	Analog encoder input sin/cos, interpolation selectable up to 20000 Interpolation circuit for differential transmission, 1 V <sub>pp</sub> amplitude and 2.5 V offset of the encoder signal BiSS interface for absolute encoders
Stall detection	Servo off
Limit switches	2 x TTL (pull-up / pull-down, programmable)
Reference point switch	1 x TTL for integrated reference in the encoder
<b>Electrical properties</b>	
Max. output power	30 W
Output voltage	0 to 100 V, drive-dependent selection
<b>Interface and operation</b>	
Communication interfaces	USB or Ethernet, via C-885.M1 digital processor and interface module
Motor and sensor connector	Sub-D 15-pin (f)
I/O ports	Optional with C-885.iD digital interface module: 4 analog/digital in (0 to 5 V/TTL), 4 digital out (TTL)
Command set	PI General Command Set (GCS)
User software	PIMikroMove, PITerminal
Software drivers	LabVIEW driver, dynamic libraries for Windows and Linux
Supported functionality	Point-to-point motion; start-up macro, data recorder for recording parameters as motor input voltage, velocity, position or position error; internal safety circuitry: watchdog timer; ID chip detection
<b>Miscellaneous</b>	
Operating voltage	24 V DC via C-885 PIMotionMaster
Max. current consumption	1.5 A
Operating temperature range	10 to 40 °C
Mass	200 g
Dimensions	186.42 x 128.4 (3 RU) x 19.98 (4 HP)



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## Maximum Ratings

The E-873.10C885 is designed for the following maximum ratings:

Output on:	Maximum output voltage	Maximum output current	Maximum output frequency
Sub-D 15 (f) (pins 3 and 11)	100 V	$\pm 650$ mA	25 kHz

## Ambient Conditions and Classifications

See the documentation for the C-885 PIMotionMaster (p. 3) for details.

## Dimensions

Dimensions in mm. Note that the decimal places are separated by commas in the drawings.

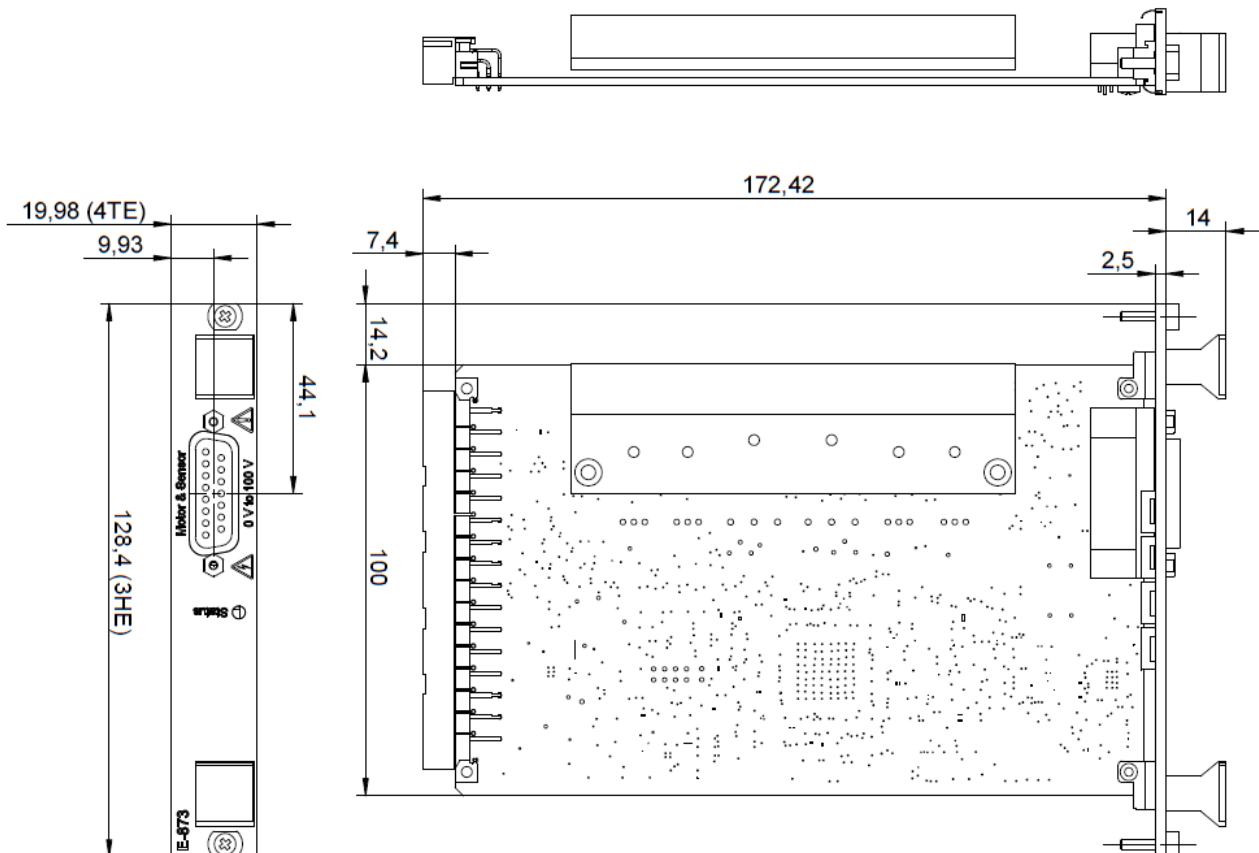


Figure 2: Dimensions of the E-873.10C885  
 HE = rack unit (RU)  
 TE = horizontal pitch (HP)

## Pin Assignment Motor and Sensor

Connector: Sub-D 15 (f)

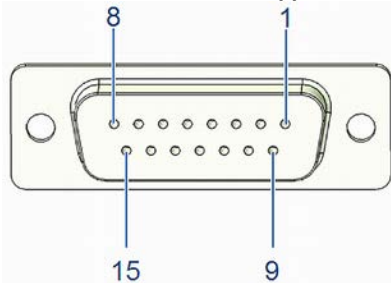


Figure 3: Front view of the Sub-D 15 (f)

Pin	Signal	Signal Direction	Function
1	REF-	Input	Reference point switch, differential (-)
2	PIEZO-	Output	Piezomotor ground
3	PIEZO+	Output	Piezomotor 100 V
4	VCC_ENC	Output	+5 V
5	PLIMIT	Input	Positive limit switch
6	ID-CHIP	Bidirectional	ID chip
7	ENCA-	Input	Encoder A, differential (-)
8	ENCB-	Input	Encoder B, differential (-)
9	PIEZO-	Output	Piezomotor ground
10	GND	-	0 V
11	PIEZO+	Output	Piezomotor 100 V
12	NLIMIT	Input	Negative limit switch
13	REF+	Input	Reference point switch, differential (+)
14	ENCA+	Input	Encoder A, differential (+)
15	ENCB+	Input	Encoder B, differential (+)

## Pin Assignment C-885.iD Digital Interface Module

The C-885.iD digital interface module is connected to the E-873.10C885 controller module via a ribbon cable and a 10-pin connector strip of the E-873.10C885. See the C885T0002 user manual of the C-885 PIMotionMaster for installation details.

### Connector: Sub-D 9 (f)

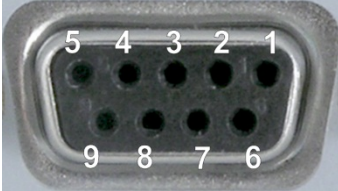


Figure 4: Front view of the Sub-D 9 (f)

Connector strip	Sub-D 9 socket	Function
1	1	Input 0 (analog: 0 to 5V / digital: TTL)
2	9	Input 1 (analog: 0 to 5V / digital: TTL)
3	2	Input 2 (analog: 0 to 5V / digital: TTL)
4	8	Input 3 (analog: 0 to 5V / digital: TTL)
5	3	Digital output 0 (TTL)
6	7	Digital output 1 (TTL)
7	4	Digital output 2 (TTL)
8	6	Digital output 3 (TTL)
9	5	GND
10		n. a.

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## Old Equipment Disposal

In accordance with the applicable EU law, electrical and electronic equipment may not be disposed of with unsorted municipal wastes in the member states of the EU.

When disposing of your old equipment, observe the international, national and local rules and regulations.

To meet the manufacturer's product responsibility with regard to this product, Physik Instrumente (PI) GmbH & Co. KG ensures environmentally correct disposal of old PI equipment that was first put into circulation after 13 August 2005, free of charge.

If you have old PI equipment, you can send it postage-free to the following address:

Physik Instrumente (PI) GmbH & Co. KG

Auf der Roemerstr. 1

D-76228 Karlsruhe, Germany

