User Manual

Cbo, BRo, 2018-08-30
C863T0005, valid for C-863.20C885

C-863.20C885 Motion Controller Module for DC Motors, for C-885 PIMotionMaster

Contents

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About this Document

This document describes the C-863.20C885 controller module for the C-885 PIMotionMaster (p. 4) from PI.

See “Product Description” (p. 4) for detailed information on the C-863.20C885.

Symbols and Typographic Conventions

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

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. 2.	Action consisting of several steps whose sequential order must be observed
➢	Action consisting of one or several steps whose sequential order is irrelevant
▪	List item
p. 5	Cross-reference to page 5
RS-232	Labeling of an operating element on the product (example: socket of the RS-232 interface)

Other Applicable Documents

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

Description	Document
C-863 Mercury controller	MS205E user manual
C-885 PIMotionMaster (details see p. 4)	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).

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 C-863.20C885 is designed to be integrated in a laboratory 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 C-863.20C885 is intended for the operation of PI stages equipped with DC motors or voice coil drives.

The C-863.20C885 is intended for closed-loop operation using incremental position sensors. Furthermore, the C-863.20C885 can read out and process the reference point and limit switch signals from the stage connected.

The C-863.20C885 may only be used in compliance with the technical specifications and instructions in this manual.

The C-863.20C885 has no case and is designed to be integrated in the C-885 PIMotionMaster (p. 4) 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 C-863.20C885 in the PIMotionMaster.

Safety Precautions

NOTICE

Electrostatic hazard!

The C-863.20C885 contains electrostatically sensitive equipment (ESD) and can be damaged if handled improperly.

- Avoid touching assemblies, pins and PCB traces.
- Before you touch the C-863.20C885, discharge yourself of any electric charges. For example, wear an antistatic wrist strap.
- Only handle and store the C-863.20C885 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 C-863.20C885 is a controller module for the C-885 PIMotionMaster (p. 4) from PI. It is based on the standard C-863.11 controller. In comparison to the C-863.11 controller, the C-863.20C885 controller module has two channels (= two Sub-D 15 (f) motor sockets) instead of one, is not installed in a case and has a reduced number of features.

Product View

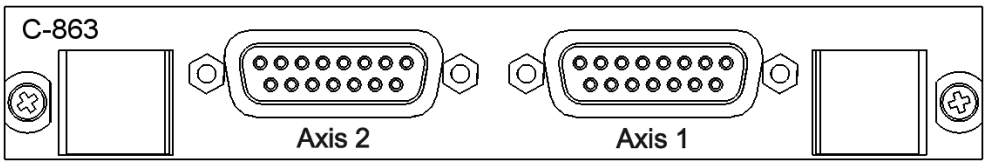

Figure 1: C-863.20C885 controller module (front view)

Scope of Delivery

Item ID	Description
C-863.20C885	Motion controller module for DC motors, 2 channels, for PIMotionMaster
C863T0005	User manual for C-863.20C885 (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 C-863.20C885. For pinout, see p. 10. Further details see the C885T0002 user manual of the C-885 PIMotionMaster.

Overview of C-885 PIMotionMaster

The C-863.20C885 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. 2).

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.

Order Number	Item	Remarks
C-885.Rx	Chassis for PIMotionMaster	One C-885.Rx chassis required per PIMotionMaster. There are chassis in two sizes: ▪ 9.5": provides card slots for up to 4 controller modules ▪ 19": provides card slots for up to 20 controller modules

Installation

The C-863.20C885 must be installed in the C-885 PIMotionMaster (p. 4) from PI. See the documentation of the C-885 PIMotionMaster (p. 2) for more information.

Power Source

The maximum power consumption of the C-863.20C885 is 144 W.

- Use a sufficiently dimensioned power supply for the C-885 PIMotionMaster in which the C-863.20C885 is to be installed.

Start-Up and Operation

Configuration of the C-863.20C885 and Normal Operation of the C-885 PIMotionMaster

At the first start-up of the C-885 PIMotionMaster, the C-863.20C885 controller module has to be configured for the connected stages. 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. 2) for details and instructions.

Command Set of C-863.20C885

The C-863.20C885 is fully GCS 2.0 compatible.

The commands of the C-863.20C885 are accessible via direct communication with the controller module. See the documentation of the C-885 PIMotionMaster (p. 2) for details.

The range of commands and parameters available on the C-863.20C885 may be different from that of the C-863.11 controller.

- To get a list of available GCS commands, send `HLP?` to the C-863.20C885.
- To get a list of available parameters, send `HPA?` to the C-863.20C885.

See the MS205E user manual of the C-863.11 controller for more information on GCS commands and parameters.

Updating the Firmware

If a firmware update is necessary for the C-863.20C885:

- For information on firmware updates, contact our customer service department (p. 6).

Customer Service

For inquiries and orders, contact your PI sales engineer or send us an email (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).

Technical Data

Specifications

	C-863.20C885
Function	DC servo-motor controller, for C-885 PIMotionMaster modular multi-axis controller system
Channels	2
Motion and control	
Servo characteristics	PID controller, parameter changes on the fly
Servo cycle time	50 µs
Profile generator	Trapezoid velocity profile
Encoder input	AB (quadrature) single-ended or differential TTL signal acc. to RS-422; 60 MHz
Stall detection	Servo off, triggered by programmable position error
Limit switches per channel	2 × TTL (polarity programmable)
Reference point switch per channel	1 × TTL
Motor brake per channel	1 × TTL, software controlled
Electrical properties	
Max. output voltage	0 to ±24 V for direct control of DC motor
Current limitation per channel	3 A
Interface and operation	
Communication interfaces	USB or Ethernet, via C-885.M1 digital processor and interface module
Motor connector	2 x Sub-D 15-pin (f)

	C-863.20C885
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
Software drivers	Driver for NI LabVIEW, 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
Miscellaneous	
Operating voltage	24 V DC via C-885 PIMotionMaster
Max. power consumption	144 W
Operating temperature range	10 to 40 °C
Mass	132 g
Dimensions	186.42 × 128.4 (3 RU) × 19.98 (4 HP)

Maximum Ratings

The C-863.20C885 is designed for the following maximum ratings:

Output on:	**Maximum Output Voltage**	**Maximum Output Current**	**Maximum Output Frequency**
Sub-D 15 (f) connector (pins 2 and 9)	24 V	3 A	30 kHz (PWM)
Sub-D 15 (f) connector (pins 3 and 11)	5 V TTL	10 mA	30 kHz (PWM)

Ambient Conditions and Classifications

See the documentation for the C-885 PIMotionMaster (p. 2) for details.

Dimensions

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

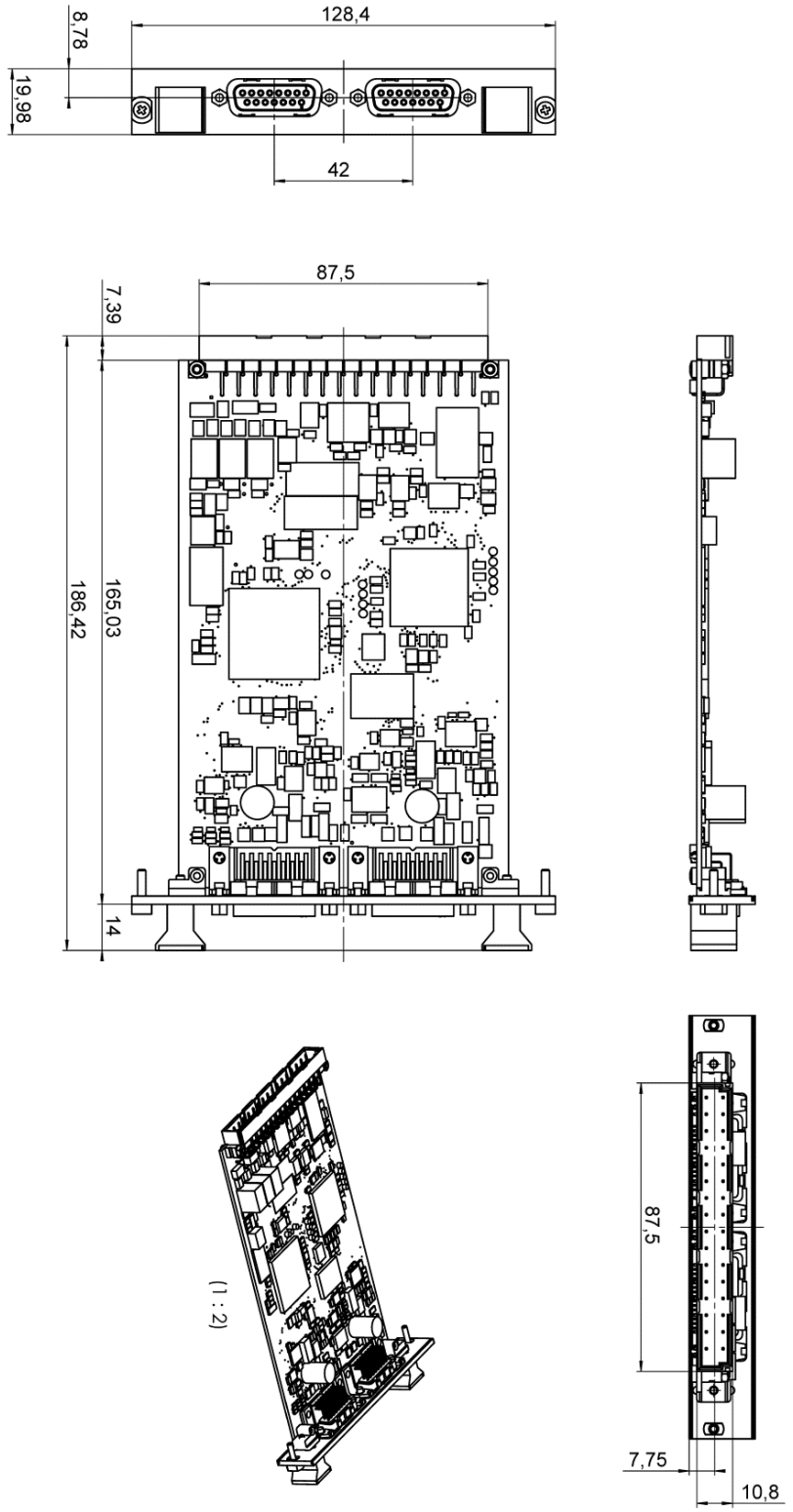

Figure 2: Dimensions of the C-863.20C885

Pin Assignment Axis 1 / Axis 2

Connector: Sub-D 15 (f)

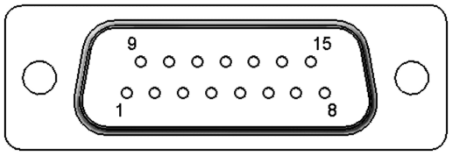

Figure 3: Front view of the Sub-D 15 (f) connector

Pin	Function
1	Programmable motor brake (0 or + 5 V)
2	Motor + (differential; power PWM); for stages without PWM amplifier
3	PWM magnitude (TTL); for stages with PWM amplifier
4	+5 V, 100 mA
5	Positive limit switch
6	ID chip
7	Encoder: A (-)
8	Encoder: B (-)
9	Motor – (differential; power PWM); for stages without PWM amplifier
10	GND
11	PWM sign (TTL); for stages with PWM amplifier
12	Negative limit switch
13	Reference point switch
14	A (+) / ENCA
15	B (+) / ENCB

Pin Assignment C-885.iD Digital Interface Module

The C-885.iD digital interface module is connected to the C-863.20C885 controller module via a ribbon cable and a 10-pin connector strip of the C-863.20C885. See the C885T0002 user manual of the C-885 PIMotionMaster for installation details.

Connector: Sub-D 9 (f)

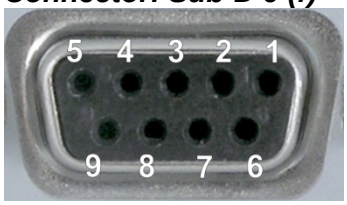

Figure 4: Front view of the Sub-D 9 (f) connector

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.