

XCDX1™

Controller Driver

Installation Guide



Copyright Notice

Copyright © 2020 by Nanomotion Ltd. All rights reserved worldwide. No part of this publication may be reproduced, modified, transmitted, transcribed, stored in retrieval system, or translated into any human or computer language, in any form or by any means, electronic, mechanical, magnetic, chemical, manual, or otherwise, without the express written permission of Nanomotion Ltd., Mordot HaCarmel Industrial Park, Yokneam, 20692, Israel.

This document contains proprietary information and shall be respected as a proprietary document with permission for review and usage given only to the rightful owner of the equipment to which this document is associated.

Limited Warranty

Nanomotion Ltd. (hereinafter NM) warrants the product (other than software) manufactured by it to be free from defects in material and workmanship for a period of time of one year (except those parts normally considered as consumable/expendable components such as motor conditioning brushes). The warranty commences thirty (30) days from the date of shipment.

NM warrants those parts replaced under warranty for a period equal to the remaining warranty coverage of the original part.

NM's sole and exclusive obligation under this warranty provision shall be to repair, or at its sole option exchange defective products or the relevant part or component, but only if: (i) the Purchaser reports the defect to NM in writing and provides a description of the defective product and complete information about the manner of its discovery within ten (10) days of its discovery; (ii) NM has the opportunity to investigate the reported defect and to determine that the defect arises from faulty material, parts or workmanship; and (iii) the Purchaser returns the affected product to a location designated by NM. These provisions constitute the exclusive remedy of the Purchaser for product defects or any other claim of liability in connection with the purchase or use of NM products.

This warranty policy applies only to NM products purchased directly from NM or from an authorized NM distributor or representative.

This warranty shall not apply to (i) products repaired or altered by anyone other than those authorized by NM; (ii) products subjected to negligence, accidents or damage by circumstances beyond NM control; (iii) product subjected to improper operation or maintenance (i.e. operation not in accordance with NM Installation Manuals and/or

instructions) or for use other than the original purpose for which the product was designed to be used.

NM shall not in any event have obligations or liabilities to the Purchaser or any other party for loss of profits, loss of use or incidental, increased cost of operation or delays in operation, special or consequential damages, whether based on contract, tort (including negligence), strict liability, or any other theory or form of action, even if NM has been advised of the possibility thereof, arising out of or in connection with the manufacture, sale, delivery, use, repair or performance of the NM products. Without limiting the generality of the preceding sentence, NM shall not be liable to the Purchaser for personal injury or property damages.

Patent Information

Nanomotion products are covered under one or more of the following registered or applied for patents.

7,439,652; 7,247,971; 7,211,929; 7,199,507; 7,183,690; 7,119,477; 7,075,211;
7,061,158; 6,979,936; 6,879,085; 6,747,391; 6,661,153; 6,617,759; 6,473,269;
6,384,515; 6,367,289; 6,247,338; 6,244,076; 6,064,140; 5,877,579; 5,777,423;
5,714,833; 5,696,421; 5,682,076; 5,640,063; 5,616,980; 5,453,653; 8,514,301;
8,351,104; 7,876,509; 8,760,037; 2,458,146; 2,458,758; 2,446,428; 1,721,346;
1,186,063; 1,800,356; 1,577,961; 6,993,2359; 1,186,063; 1,577,961; 4,317,508;
4,484,652; 4,813,708; 5,420,171; 5,591,754; 1,014,54917; 6,994,1195;
6,020,050,245,94; 0,633,616; 3,869,044; 1,127,380; 1,131,853; 3,869,162; 3,981,683;
1,049,829; 0,712,170; 6,983,8991; 2,980,541; 1,127,380; 6,942,974,4; 9,806,640;

Revision History

Ver/Rev	Date	ECO	Details
00/A	14.01.2020		Initial Release
00/B	16.03.2020		Updated table 1, added table 4.

Table of Contents

About this Guide	6
Contact Information	7
1 Safety	8
2 Overview	8
3 Technical Data	8
4 User Interface	9
4.1 Mechanical Interface	9
4.2 Electrical Interface	10
5 Communication and Control	13
6 Installation Guidelines	13

About this Guide

Scope

This guide provides the XCDX1™ Controller Driver mechanical interface information, electrical interface, software interface information, and installation guidelines of the XCDX1 Controller Driver.

Intended Users

This user guide is intended for engineers or technicians directly involved in installation, operation and maintenance of positioning systems and control systems.

Reference Documentation

XCD Software User Manual – (D/N XCD0458004-XX USER MANUAL, XCD FW VER 1.6).

Glossary

COM	Common
D/N	Document Number
IIC (I ² C)	Inter-Integrated Circuit
GND	Ground
NM	Nanomotion
LED	Light-Emitting Diode
P/N	Part Number
XCDX1	XCDX1 Controller Driver

Contact Information

Website: www.nanomotion.com

Customer Service

Contact your local distributor or email Nanomotion Ltd. Technical Support Department at techsupport@nanomotion.com, with detailed problem description, additions, corrections or suggestions.

Nanomotion Ltd. Worldwide Headquarters

Mordot HaCarmel Industrial Park

HaYetsira Street, PO Box 623

Yokneam 20692

Tel: +972-73-249-8000

Fax: +972-73-249-8099

Email: nano@nanomotion.com

Nanomotion Inc - US Headquarters

1 Comac Loop, Suite 14B2

Ronkonkoma

NY 11779

Tel: +1-800-8216266

Fax: +1-631-5851947

Email: nanoUS@nanomotion.com

1 Safety



Before operating the XCDX1, verify it is grounded.

For safe usage of the XCDX1, carefully read the following instructions:

1. Do not open the XCDX1 box.
2. Turn off power before connecting or disconnecting any of the XCDX1 cables.
3. Do not cover the ventilation holes on the top panel of the XCDX1 box.

2 Overview

Nanomotion's XCDX1 Controller Driver redefines the art of miniaturized drive and control electronics with the smallest available hardware for operating piezo ceramic servo motors. The XCDX1 provides a complete servo control solution, including the power stage and drive electronics in a single compact enclosure.

It has interfaces for connecting the motor, position sensor, communications and power.

The XCDX1 is provided as a single axis solution, which can drive the HR1,HR2 or HR4 motor and operate in Linear mode, or in the more traditional Normal mode. It accepts a differential quadrature encoder signal and is programmed via an RS232 interface and the NanoCommander Software application.

3 Technical Data

Dimensions:

130mmx140mmx45mm.

Electrical:

Input power supply voltage: 12V±5%.

Maximum power consumption:

Controller/Driver	Max power consumption
XCD-HR-1	7.5W
XCD-HR-2	15W
XCD-HR-4	30W

Motor Cable:

Cable length limits <10m default over 10m contact supplier

Operating Temperature:

0°C to +50°C.

Storage Temperature:

-40°C to +50°C.

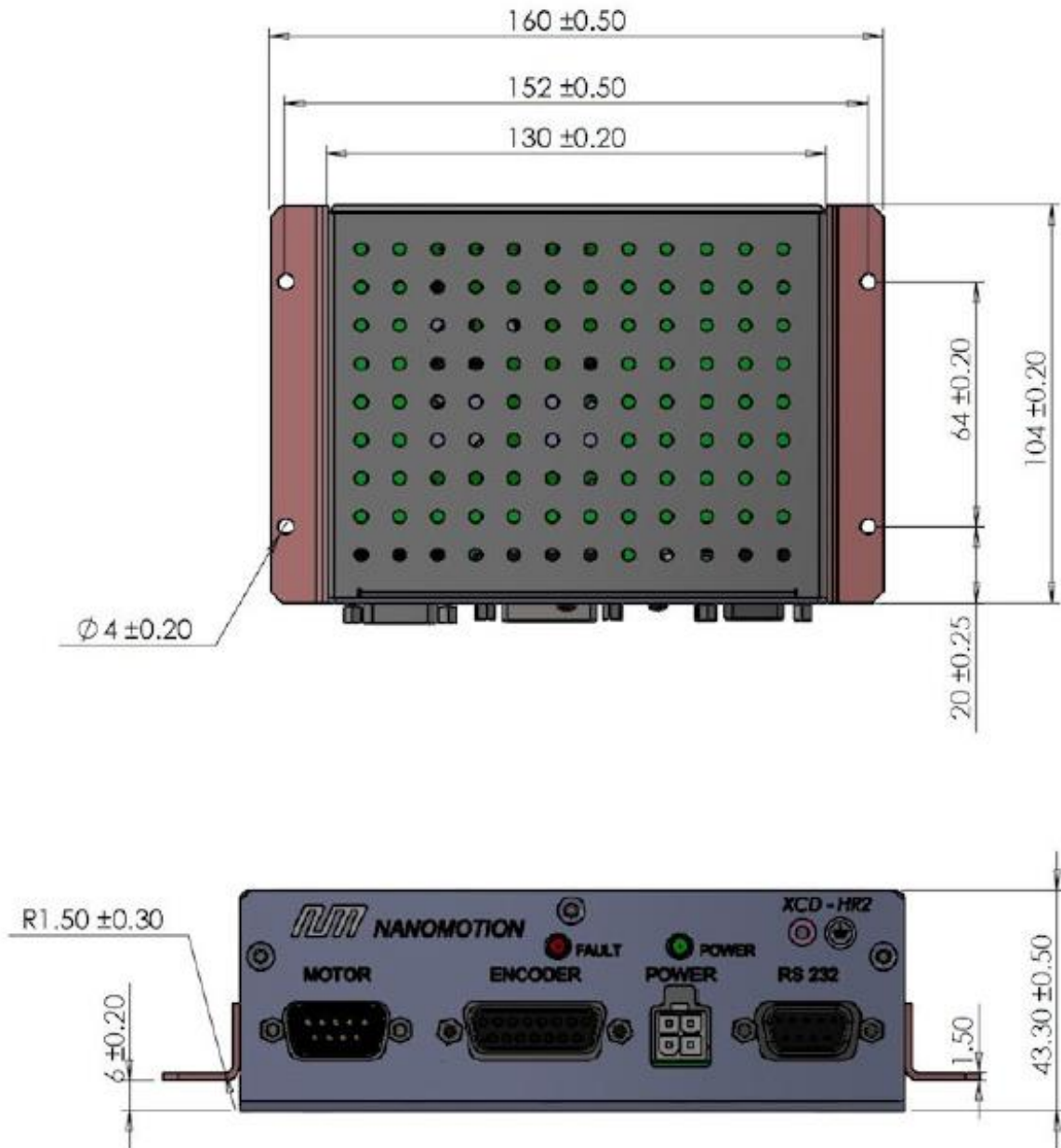
Regulatory Compliance

- Meets EN55022 class B Emission requirements.
- RoHS (Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment).

4 User Interface

4.1 Mechanical Interface

(all dimensions are in mm)



4.2 Electrical Interface



Fault LED Indicator

When a controller error is detected in the XCDX1, the Fault LED lights up (the LED is set to ON and error message can be read in Host communication channel).

Table 1: Controller Errors

Error Code	Error Description
101	Position Error
102	Software Limit Switch
103	Hardware Limit Switch
104	Emergency
105	Motor Not Connected
111	Encoder Error
115	Motion Timeout
120	Calibration Failure
121	Overvoltage
122	Overcurrent
123	Voltage
201	Illegal Command
202	Motion Queue Error
203	Illegal Function
204	Math Error
300	Illegal Calibration/Homing
301	Illegal Calibration/Homing Method
315	Calibration/Homing Timeout

Power LED Indicator

The Power LED indicator lights up when the XCDX1 is turned on.

Motor Connector

D-Sub, 9 pin, Male connector.

Table 2: Motor Connector Pinout

Pin #	Pin Name	Description
1	GND	System ground
3	Motor_Up	Connected to the white motor terminal
4	Motor_Common	Connected to the black motor terminal
5	Motor_Down	Connected to the red motor terminal
6	Motor_Connected	Safety input: shorted to pin 1 in order to prevent controller driver's operation without the motor
7	Shield	Shorted to the shield
2, 8, 9	N.C.	Not connected

Encoder Connector on the BOX

D-Sub, 15 pin, Female connector.

Table 3: Encoder Connector Pinout

Pin #	Pin Name	Description
1	A+	Incremental signal
2,10	GND	System ground
3	B+	Incremental signal
4, 12	5V	Power out
7	I-	Reference mark
9	A-	Incremental signal
11	B-	Incremental signal
14	I+	Reference mark
5, 6, 8, 13, 15	N.C.	Not connected

Encoder Connector on the ADAPTER CABLE (S791CBL000-XX)

D-Sub, 15 pin, Female connector.

Table 4: Encoder Connector Pinout

Pin #	Pin Name	Description
14	A+	Incremental signal
2,9	GND	System ground
13	B+	Incremental signal
7,8	5V	Power out
4	I-	Reference mark
6	A-	Incremental signal
5	B-	Incremental signal
12	I+	Reference mark
1,3,10, 11,15	N.C.	Not connected

Power Connector

MiniFit, 4 pin connector (Molex P/N: 39-30-1042).

For the mating connector, use Molex connector P/N: 39-01-2045.

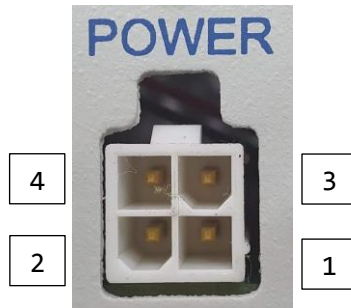


Table 5: Power Connector Pinout

Pin #	Pin Name	Description
1, 2	Vin RET	Voltage In Return
3, 4	12V±5%	Voltage In

RS232 Connector

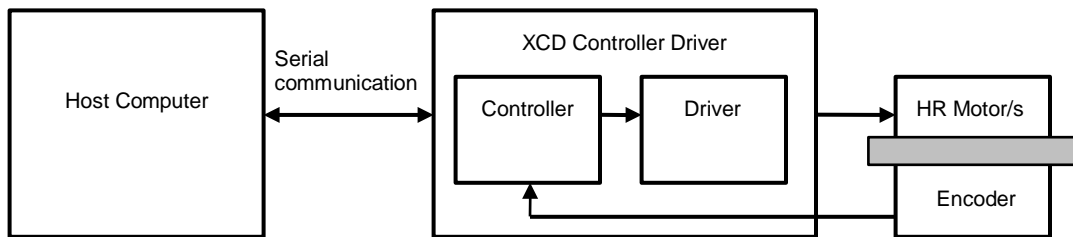
D-Sub, 9 pin, Female, Right angle connector.

Table 6: RS232 Connector Pinout

Pin #	Pin Name	Description
2	TXD	RS232 Transmit Signal
3	RXD	RS232 Receive Signal
5	GND	System ground
1,4,6,7,8, 9	N.C.	Not Connected

5 Communication and Control

Operating Nanomotion motor(s) requires the setup described below, and is achieved with the Nanocommander Software application (version 1.6.0.9).



Control of the XCDX1 is covered in the XCD Firmware 1.6.0.9 User Manual (D/N: XCD0458004-XX).

6 Installation Guidelines

1. Install the XCDX1 box using four M3 mounting screws to be inserted in the XCDX1 box mounting holes.
2. Connect Motor, Encoder and RS232 cables.
3. Connect Power cable.
4. Turn on the power supply.
5. Verify that the POWER LED indicator lights up.



6. Run XCD commander or Host application on PC.
7. System is ready to run.