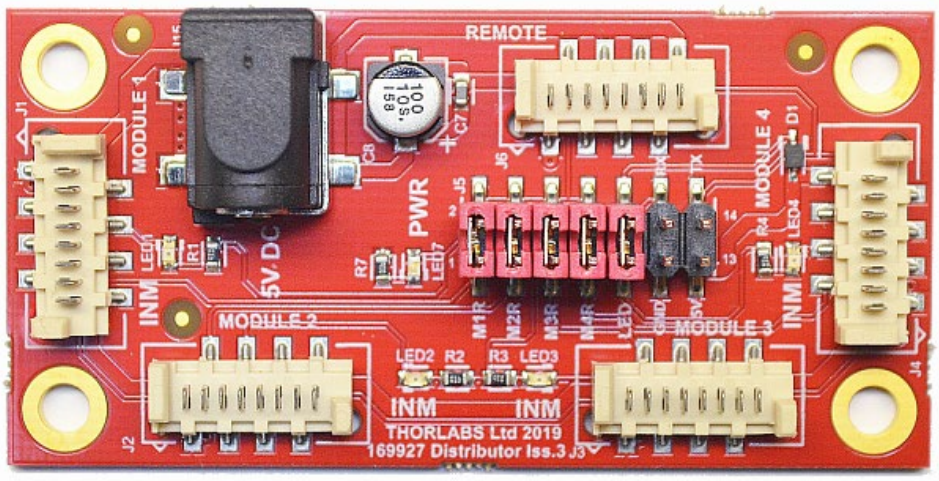
ELLB
Distribution Board for Resonant Piezo Motor Products

Operating Manual



Original Instructions

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Chapter 1 Introduction

The ELLB Distribution Board is part of the Thorlabs series of resonant piezo motor circuits and bare modules for OEM applications. The resonant piezo design of these motors offers fast response times and precise positioning and are therefore particularly useful in scanning applications.

The high-speed digital signal processing (DSP) architecture supports a multi-drop serial communication protocol, and a set of digital IO lines allows the user to control the movement and state manually by switching the lines high (5V) or low (0V).

The board is designed to allow up to four Elliptec resonant piezo motor devices to be controlled remotely via PC-based software, from a single GUI panel. The software can be downloaded from **www.thorlabs.com**. A compatible USB driver and source code are included in the software download package.

Connection to the host PC is via the USB interface board included with the Elliptec Evaluation Kits and power is supplied via an external 5V power supply.

Note

The module must be powered via an external 5V power supply unit (PSU). A suitable PSU is supplied in the ELL evaluation kits. For customers wanting to use a third-party PSU, the Connector on the interface board is a DC Jack connector, 6.3mm OD (GND), 2.1mm ID (+5V).

Chapter 2 Safety Information

For the continuing safety of the operators of this equipment, and the protection of the equipment itself, the operator should take note of the Warnings, Cautions and Notes throughout this handbook and, where visible, on the product itself.



Warning: Risk of Electrical Shock

Given when there is a risk of electrical shock.



Warning

Given when there is a risk of injury to users.



Caution

Given when there is a possibility of damage to the product.

Note

Clarification of an instruction or additional information.

2.1 General Warnings and Cautions

Warning

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. Excessive moisture may impair operation.

The equipment is susceptible to damage from electrostatic discharge. When handling the device, anti-static precautions must be taken, and suitable discharge appliances must be worn.



Spillage of fluid, such as sample solutions, should be avoided. If spillage does occur, clean up immediately using absorbent tissue. Do not allow spilled fluid to enter the internal mechanism.

Do not bend the PCB. A bending load more than 500 g applied to the board may cause the PCB to deform, which will degrade the performance of the controller.

During use do not place the PCB directly onto electro-conductive material e.g., an optical tabletop or breadboard.

Chapter 3 Installation

3.1 Environmental Conditions



Warning

Operation outside the following environmental limits may adversely affect operator safety.

The unit is designed for indoor use only.

To ensure reliable operation, the unit should not be exposed to corrosive agents or excessive moisture, heat, or dust.

The unit is not designed to be used in explosive environments.

If the unit has been stored at a low temperature or in an environment of high humidity, it must be allowed to reach ambient conditions before being powered up.

3.2 Getting Started



Warning

The safety of any system incorporating this equipment is the responsibility of the person performing the installation.



Caution

Although the module can tolerate up to 8kV of air discharge, it must be treated as an ESD sensitive device. When handling the device, anti-static precautions must be taken, and suitable discharge appliances must be worn.

When power is applied, do not connect or disconnect the ribbon cable connecting the interface board to the distribution board. Always remove power before making connections.

The ribbon cable connector is made of plastic and is not particularly robust. Do not use force when making connections. Unnecessary or repeated plugging in and unplugging should be avoided, or the connector may fail.

3.2.1 Distribution Board Description

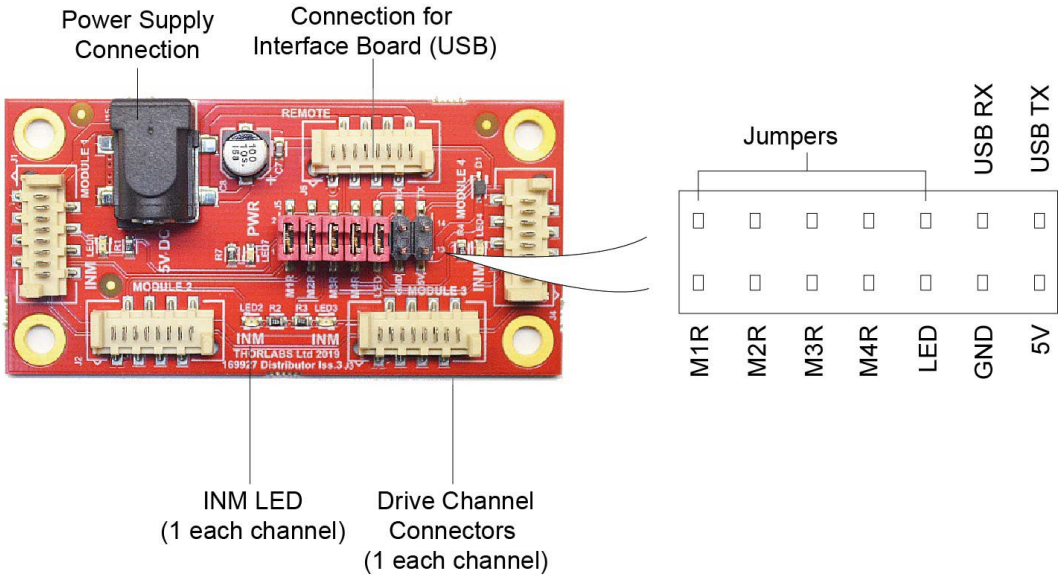


Figure 1 ELLB Distribution Board

Power Supply Connection – 5 V, 2 A, compatible with PSU supplied with ELLXXK kits. External diameter 6.3 mm, Internal diameter 2.1 mm.

Jumpers – *M1R to M4R* allow the reception of each of the four drive channels (M1R to M4R) to be enabled or disabled by the fitting or removal of the associated jumper. If the jumper is removed, the drive channel can still be addressed, but no response from the associated stage can be received.

LED allows the INM LEDs on the PCB to be enabled (jumper fitted) and disabled (jumper removed). If the jumper is fitted, the LED will be lit when the associated stage is moving.

USB RX and USB TX – These pins can be connected to a Raspberry or Arduino board instead of the USB Interface board to control the ELL stage modules connected to the distribution board.

GND and 5V are for use with an external power supply, 5 V 2 A.

Drive Channel Connectors (1 to 4) – These connectors allow either an interface board or a stage module to be connected to the distribution board.

INM LED – Lit when the associated stage is moving or busy.

3.2.2 Interface Board Description

The interface board supplied with the Elliptec Stage Evaluation Kits provides for USB connection to the host PC.

Caution

Moves cannot be initiated using the FW, BW and JOG buttons on the interface board. Moves must be performed using the Elliptec software running on a PC, or by writing a custom application using the messages described in the communications protocol document.

The PWR LED (LED1) is lit green when power is applied to the unit. The INM LED (LED2) is lit red when the device being driven is in motion.

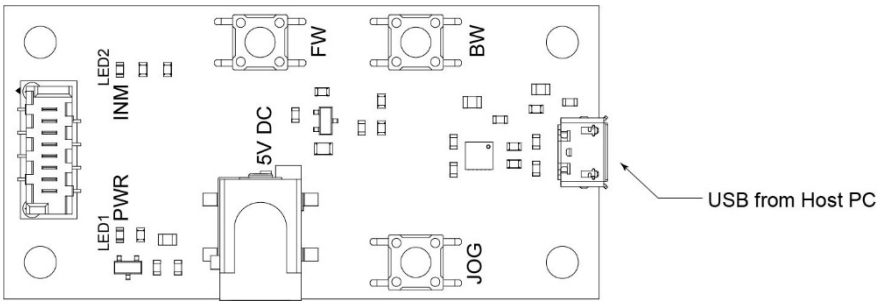


Figure 2 Handset Details

3.2.3 Power Supply Options

The distribution board is compatible with the power supply shipped with the ELLxx Evaluation Kits. These PSUs should be connected directly to the distribution. board. This allows simultaneous motion of up to 2 modules.

The distribution board also features GND and 5V terminals (see section 3.2.1) for use with an external 5 V 2 A power supply like those available in most labs. If more current is needed (e.g., to move more than 2 devices at the same time) then a 5V 4A external power supply is available from Farnell (Part No 2815881).

Caution

As more devices are connected, simultaneous control of the units will require more current to be provided by the power supply.

Although the ELL6 can be operated standalone via USB power, when it is used with the ELLb then an external power supply is required.

3.2.4 Connecting Devices

When a device is first connected to the PC, it is assigned the default address '0'. The software can run multiple devices; however, before more than one device can be recognized, each device must be assigned a unique address. See below for a brief overview; detailed instructions are contained in the help file supplied with the software.

1. Switch ON the PC.
2. Connect an interface board (supplied with the individual ELL stage kits) to the distribution board.

Caution

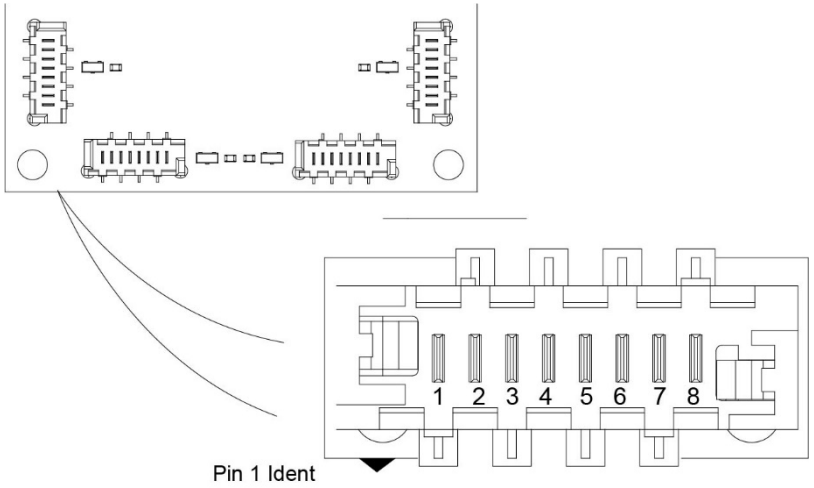
The unit is easily damaged by connections with incorrect polarity. Pin 1 of the connector on the PCB is marked with an arrow (see Figure 4 and Figure 5.) which should be adjacent to the red wire in the connecting cable.

3. Connect the Interface Board to your PC.
4. Connect the first device to the distribution board.
5. Connect the distribution board to a 5V supply and switch ‘ON’. (A 5V PSU is supplied with the ELL series stage kits). Wait for the drivers to be installed.
6. Run the Elliptec software and load the device.
7. Change the address of the first device.
8. Save the address of the first device.

9. Connect the next device to the distribution board.
10. In the ELL software GUI , press the “Disconnect” and “Connect” buttons to allow the software to see the new module.
11. Repeat steps 6 to 9 for the new module just connected.

Multiple devices can be controlled individually, either via the Elliptec software or by a third party application written using the messages detailed in the protocol document. Control via the handset is not possible when using the distribution board. When powering down, remove power from the distribution board, before disconnecting the USB from the PC.

3.2.5 Stage Connector Pin Out



PIN	TYPE	FUNCTION
1	PWR	Ground
2	OUT	ODTX - open drain transmit 3.3 V TTL RS232
3	IN	RX receive - 3.3V TTL RS232
4	OUT	In Motion, open drain active low max 5 mA
5	IN	Not Connected
6	IN	Not Connected
7	IN	Not Connected
8	PWR	VCC +5V +/-10% 800 mA (per module connected)

Connector model number MOLEX 90814-0808 Farnell order code 1518211

Mating connector model number MOLEX 90327-0308 Farnell order code 673160

Figure 3 Stage Connector Pin Out Details

3.3 Controlling the Stage

The stage can be controlled by the Elliptec software running on a PC, or by writing a custom application using the messages described in the communications protocol document. The modes of control are described in the following sections.

Caution

Moves cannot be initiated using the FW, BW and JOG buttons on the interface board.

3.3.1 Software Control

1. When connected to the host PC, the stage can be controlled remotely, via the Elliptec software.
2. Download the Elliptec software from the Downloads section at www.thorlabs.com. Double click the saved .exe file and follow the on-screen instruction.
3. Connect the hand-held controller to the stage unit.
4. Connect the hand-held controller to the 5V Power Supply and switch on.
5. Connect the hand-held controller to the PC USB port and wait for the drivers to be installed.
6. Run the Elliptec software.
7. In the top left of the GUI panel displayed, select the COM port to which the device is connected (refer Figure 4, and click 'Connect'. The software will search the comms bus and enumerate the device.

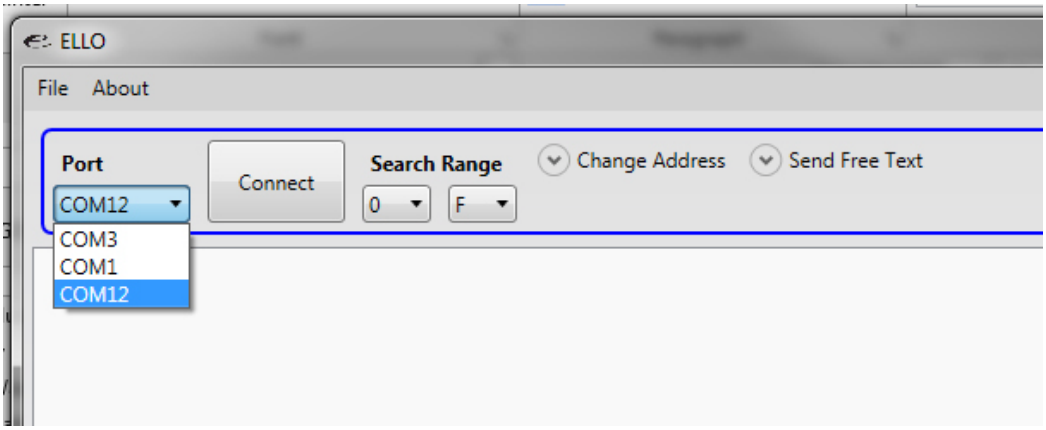


Figure 4 COM port Drop Down Menu

8. Click the 'Home' button to home the stage.
9. The GUI and device are now ready for use. See the helpfile supplied with the software for more information.

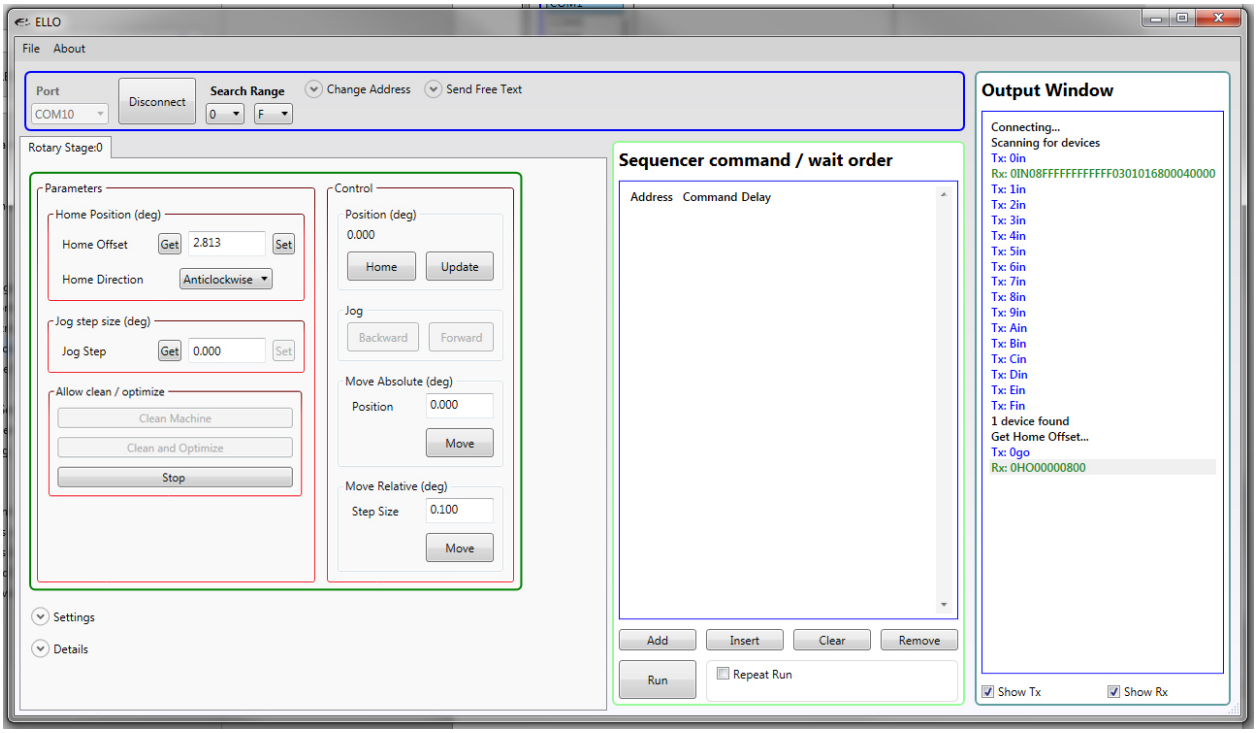


Figure 5 Main GUI Panel

3.3.2 Communications Protocol

Custom move applications can be written in languages such as C# and C++.

The communication bus allows multi-drop communication with speeds at 9600 baud, 8-bit data length, 1 stop bit, no parity.

Protocol data is sent in ASCII HEX format, while module addresses and commands are mnemonic character (no package length is sent). Modules are addressable (default address is “0”) and addresses can be changed and/or saved using a set of commands. Lower case commands are sent by user while upper case commands are replies by the module.

Please refer to the communications protocol manual for more detail about commands and data packet formats.

3.3.3 Connecting Multiple Devices

When a device is first connected to the PC, it is assigned the default address '0'. The software can run multiple devices, however before more than one device can be recognized, each device must be assigned a unique address. See below for a brief overview; detailed instructions are contained in the help file supplied with the software.

Connect the first device to the PC USB port, then run the Elliptec software and load the device.

Change the address of the first device.

Connect the next device to the first device.

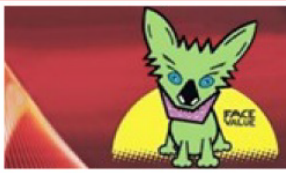
Change the address of the second device.

Multiple devices can be controlled individually, either via a remote handset connected to each device, via the Elliptec software or by a third part application written using the messages detailed in the protocol document.

Chapter 4 Specifications

General Specifications	
Rated Voltage	4.5 to 5.5 V
Typical Current Consumption During Movement (per module connected)	800 mA
Max Current (of board)	4.0 A
Standby Current (per module connected)	0.05 A
8 – Conductor Ribbon cable Length (Supplied)	250 mm
8 – Conductor Ribbon cable Length (Maximum)	500 mm
Operating Temperature Change	15 to 40 °C (59 to 104 °F)
Weight	0.011 kg

Chapter 5 Certifications and Compliance



THORLABS
www.thorlabs.com

EU Declaration of Conformity

in accordance with EN ISO 17050-1:2010

We: Thorlabs Ltd.

Of: 1 St. Thomas Place, Ely, CB7 4EX, United Kingdom

in accordance with the following Directive(s):

2014/35/EU	Low Voltage Directive (LVD)
2011/65/EU	Restriction of Use of Certain Hazardous Substances (RoHS)

hereby declare that:

Model: ***ELLB***

Equipment: ***ELLB***

is in conformity with the applicable requirements of the following documents:

EN 61010-1	Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use.	2010

and which, issued under the sole responsibility of Thorlabs, is in conformity with Directive 2011/65/EU of the European Parliament and of the Council of 8th June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, for the reason stated below:

does not contain substances in excess of the maximum concentration values tolerated by weight in homogenous materials as listed in Annex II of the Directive

I hereby declare that the equipment named has been designed to comply with the relevant sections of the above referenced specifications, and complies with all applicable Essential Requirements of the Directives.

Signed: Keith Dhese *On:* 18 September 2019

Name: Keith Dhese

Position: General Manager

EDC - ELLB -2019-09-18

CE

Chapter 6 Thorlabs Worldwide Contacts

For technical support or sales inquiries, please visit us at www.thorlabs.com/contact for our most up-to-date contact information.



USA, Canada, and South America
Thorlabs, Inc.
sales@thorlabs.com
techsupport@thorlabs.com

UK and Ireland
Thorlabs Ltd.
sales.uk@thorlabs.com
techsupport.uk@thorlabs.com

Europe
Thorlabs GmbH
europe@thorlabs.com

Scandinavia
Thorlabs Sweden AB
scandinavia@thorlabs.com

France
Thorlabs SAS
sales.fr@thorlabs.com

Brazil
Thorlabs Vendas de Fotônicos Ltda.
brasil@thorlabs.com

Japan
Thorlabs Japan, Inc.
sales@thorlabs.jp

China
Thorlabs China
chinasales@thorlabs.com



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www.thorlabs.com