



# LINEAR STAGE

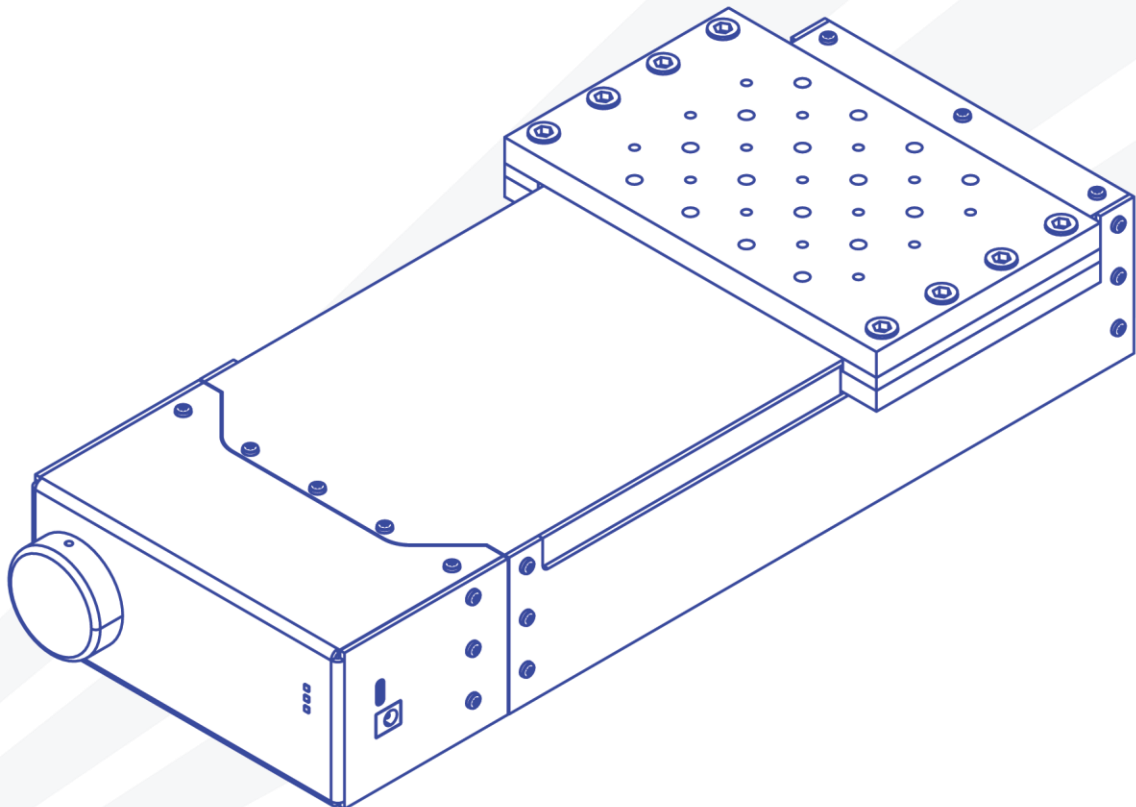
## USER MANUAL

Manual version: 1.0.0

Product codes: G2010A/B/C/D/E/F

Product Version: 1.0

Software version: 1.0



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# 1. EU Declaration of Conformity

## We

**Company Name:** Ossila BV

**Postal Address:** Biopartner 3 building, Galileiweg 8

**Postcode:** 2333 BD Leiden

**Country:** The Netherlands

**Telephone number:** +31 (0)71 3322992

**Email Address:** info@ossila.com

**declare that the DoC is issued under our sole responsibility and belongs to the following product:**

**Product:** Linear Stage (G2010A1/G2010B1/G2010C1/G2010D1/G2010E1/G2010F1)

**Serial number:** G2010A1-xxxx, G2010B1-xxxx, G2010C1-xxxx, G2010D1-xxxx, G2010E1-xxxx, G2010F1-xxxx

## Object of declaration:

Linear Stage (G2010A1/G2010B1/G2010C1/G2010D1/G2010E1/G2010F1)

**The object of declaration described above is in conformity with the relevant Union harmonisation legislation:**

EMC Directive 2014/30/EU

RoHS Directive 2011/65/EU

Machinery Directive 2006/42/EC

**Signed:**



**Name:** Dr James Kingsley

**Place:** Leiden

**Date:** 19/02/2024

**Декларация за съответствие на ЕС**

Производител: Ossila BV, Biopartner 3 building, Galileiweg 8, 2333 BD Leiden, NL.

Декларира с цялата си отговорност, че посоченото оборудване съответства на приложимото законодателство на ЕС за хармонизиране, посочено на предходната(-ите) страница(-и) на настоящия документ.

**[Čeština] Prohlášení o shodě EU**

Výrobce: Ossila BV, Biopartner 3 building, Galileiweg 8, 2333 BD Leiden, NL.

Prohlašujeme na vlastní odpovědnost, že uvedené zařízení je v souladu s příslušnými harmonizačními předpisy EU uvedenými na předchozích stranách tohoto dokumentu.

**[Dansk] EU-overensstemme Iserklæring**

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Erklærer herved, at vi alene er ansvarlige for, at det nævnte udstyr er i overensstemmelse med den relevante EU-harmoniseringslovgivning, der er anført på den/de foregående side(r) i dette dokument.

**[Deutsch] EU-Konformitätserklärung**

Hersteller: Ossila BV, Biopartner 3 building, Galileiweg 8, 2333 BD Leiden, NL.

Wir erklären in alleiniger Verantwortung, dass das aufgeführte Gerät konform mit der relevanten EU-Harmonisierungsgesetzgebung auf den vorangegangenen Seiten dieses Dokuments ist.

**[Eesti keel] ELi vastavusavaldus**

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Κατασκευαστής: Ossila BV, Biopartner 3 building, Galileiweg 8, 2333 BD Leiden, NL.

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**[Español] Declaración de conformidad UE**

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**[Latviešu] ES atbils tības deklarācija**

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Ar pilnu atbildību paziņojam, ka uzskaitītais aprīkojums atbilst attiecīgajiem ES saskaņošanas tiesību aktiem, kas minēti iepriekšējās šī dokumenta lapās.

**[Lietuvių k.] ES atitikties deklaracija**

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atsakingai pareiškia, kad išvardinta įranga atitinka aktualius ES harmonizavimo teisės aktus, nurodytus ankstesniuose šio dokumento

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Verklaart onder onze uitsluitende verantwoordelijkheid dat de vermelde apparatuur in overeenstemming is met de relevante harmonisatiewetgeving van de EU op de vorige pagina(s) van dit document.

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**[Polski] Deklaracja zgodności Unii Europejskiej**

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**[Română] Declarație de conformitate UE**

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**[Slovensky] Vyhlasenie o zhode pre EÚ**

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**[Slovenščina] Izjava EU o skladnosti**

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**[Suomi] EU-vaatimusten mukaisuusvakuutus**

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Vakuutamme täten olevamme yksin vastuussa siitä, että tässä asiakirjassa luetellut laitteet ovat tämän asiakirjan sivuilla edellisillä sivuilla kuvattujen olennaisten yhdenmukaistamista koskevien EU-säädösten vaatimusten mukaisia.

**[Svenska] EU-försäkran om överensstämmelse**

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Vi intygar härmed att den utrustning som förtecknas överensstämmer med relevanta förordningar gällande EU-harmonisering som finns på föregående sidor i detta dokument.

## 2. Safety

### 2.1 Warning

- Pinch points and entanglement hazards are present when in operation, keep hands, hair, and clothing clear of moving stage.

### 2.2 Use of Equipment

The Ossila Linear Stage is designed to be used as instructed. It is intended for use under the following conditions:



- Indoors in a laboratory environment (Pollution Degree 2)
- Altitudes up to 2000m
- Temperatures of 5°C to 40°C; maximum relative humidity of 80% up to 31°C.

The unit is supplied with a 24 VDC power adapter, in accordance with European Commission regulations and British Standards. Use of any other electrical power cables, adaptors, or transformers is not recommended.

### 2.3 Hazard Icons

The following symbols can be found at points throughout the rest of the manual. Note and read each warning before attempting any associated operations associated with it:

Table 2.1. Hazard warning labels used in this manual.

Symbol	Associated Hazard
	Pinch point or entanglement hazard
	Electrical shock

## 2.4 General Hazards

Before installing or operating the Ossila Linear Stage there are several health and safety precautions which must be followed and executed to ensure safe installation and operation.



Pinch point and entanglement hazards are present during operation of the linear stage. As a precaution, users should avoid handling or leaning over the equipment during operation to avoid possible crushing or entanglement of hair and/or clothing.

## 2.5 Power Cord Safety



Emergency power disconnect options: use the power cord as a disconnecting method and remove from wall. To facilitate disconnect, make sure the power outlet for this cord is readily accessible to the operator.

## 2.6 Servicing

If servicing is required, please return the unit to Ossila Ltd. The warranty will be invalidated if:

- Modification or service has been carried out by anyone other than an Ossila engineer.
- The Unit has been subjected to chemical damage through improper use.
- The Unit has been operated outside the usage parameters stated in the user documentation associated with the Unit.
- The Unit has been rendered inoperable through accident, misuse, contamination, improper maintenance, modification, or other external causes.

## 2.7 Health and Safety – Servicing



Servicing should only be performed by an Ossila engineer. Any modification or alteration may damage the equipment, cause injury, or death. It will also void your equipment's warranty.

## 3. Requirements

Table 3.1 details the requirements for the Ossila Linear Stage, and the minimum computer specifications for the Ossila Motion Control Console software.

Table 3.1. Ossila Linear Stage and Ossila Motion Control Console requirements.

Power	24 VDC (supplied with the system)
Operating Systems	Windows 10 or 11 (64-bit)
CPU	Dual Core 2 GHz
RAM	4 GB
Available Hard Drive Space	147 MB
Monitor Resolution	1440 x 960
Connectivity	USB-C

## 4. Unpacking

### 4.1 Packing List

The standard items included with the Ossila Linear Stage are:

- The Ossila Linear Stage.
- 24 VDC power adaptor.
- USB memory stick loaded with software installer, user manual, and test data.

### 4.2 Damage Inspection

Examine the components for evidence of shipping damage. If damage has occurred, please contact Ossila directly for further action. The shipping packaging will come with a shock indicator to show if there has been any mishandling of the package during transportation.



## 5. Specifications

The Ossila Linear Stage and Compact Linear Stage specifications are shown in **Table 5.1**, **Table 5.2** and **Table 5.3**.

Table 5.1. Ossila Linear Stage general specifications.

	Standard Travel	Long Travel
Drive	Precision ball screw with dual linear rails	Precision ball screw with dual linear rails
Travel	100 mm	200 mm
Maximum horizontal load	30 kg	30 kg
Maximum vertical load	10 kg	10 kg
Dimensions (L x W x H)	37 cm x 17 cm x 7 cm	47 cm x 17 cm x 7 cm
Weight	6 kg	7 kg

Table 5.2. Ossila Compact Linear Stage general specifications.

	Short Travel	Standard Travel
Drive	Precision ball screw with dual linear rails	Precision ball screw with dual linear rails
Travel	50 mm	100 mm
Maximum horizontal load	10 kg	10 kg
Maximum vertical load	3 kg	3 kg
Dimensions (L x W x H)	28 cm x 13 cm x 7 cm	32 cm x 13 cm x 7 cm
Weight	3 kg	4 kg

Table 5.3. Ossila Linear Stage motion specifications.

	Standard Accuracy	High Accuracy
Maximum Reversal Error	<40 $\mu\text{m}$	<20 $\mu\text{m}$
Mean Reversal Error	<20 $\mu\text{m}$	<10 $\mu\text{m}$
Bi-directional Repeatability	<40 $\mu\text{m}$	<20 $\mu\text{m}$
Forward Repeatability	<10 $\mu\text{m}$	< 5 $\mu\text{m}$
Backward Repeatability	<10 $\mu\text{m}$	< 5 $\mu\text{m}$
Mean Bi-directional Positioning Error	<20 $\mu\text{m}$	<20 $\mu\text{m}$
Bi-directional Positioning Error	<40 $\mu\text{m}$	<20 $\mu\text{m}$
Forward Positioning Error	<30 $\mu\text{m}$	<15 $\mu\text{m}$
Backward Positioning Error	<30 $\mu\text{m}$	<15 $\mu\text{m}$
Bi-directional Systematic Positioning Error	<40 $\mu\text{m}$	<20 $\mu\text{m}$
Forward Systematic Positioning Error	<30 $\mu\text{m}$	<15 $\mu\text{m}$
Backward Systematic Positioning Error	<30 $\mu\text{m}$	<15 $\mu\text{m}$

## 6. System Components

The Ossila Linear Stage is comprised of 2 items: the Ossila Linear Stage (**Figure 6.1**), and the Ossila Motion Control Console (**Figure 6.2**).



Figure 6.1. Ossila Linear Stage.

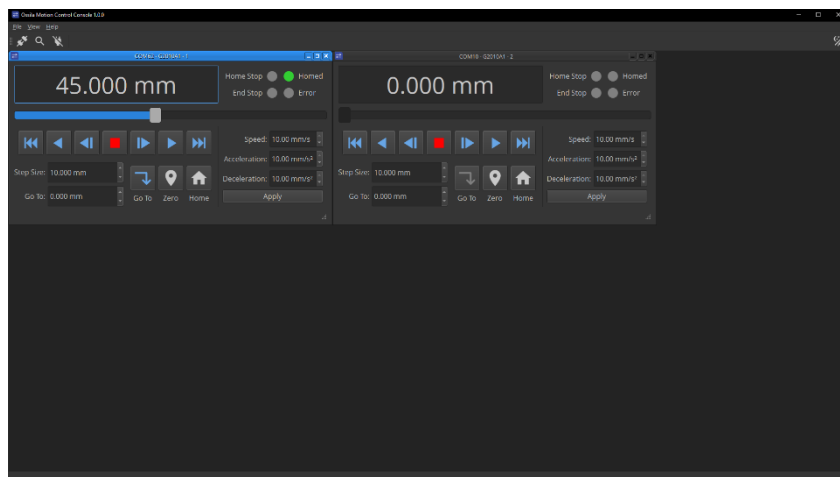


Figure 6.2. The Ossila Motion Control Console.

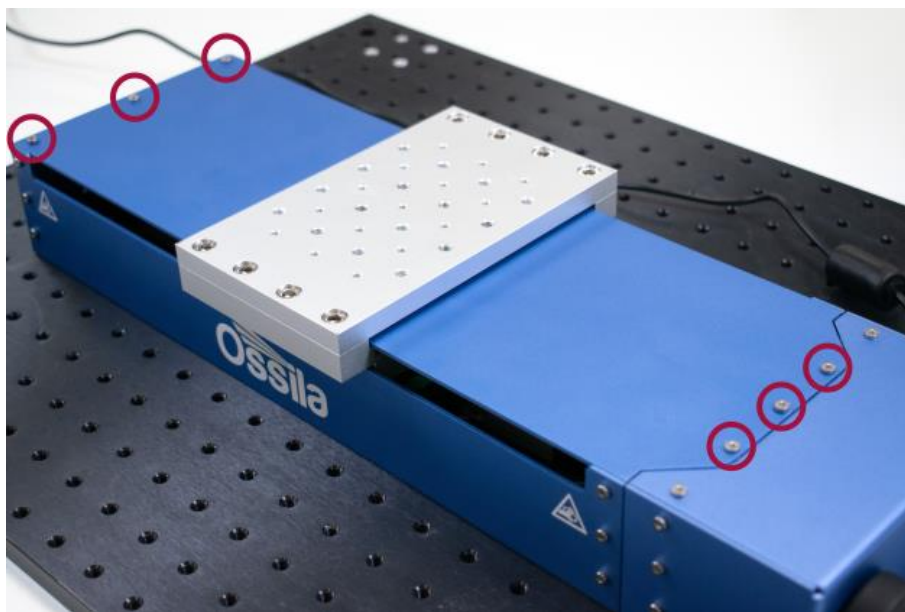
## 7. Installation

The Ossila Linear Stage can be used free-standing, mounted to an optical table or breadboard, or mounted to another linear stage to provide multiple axis movement.

### 7.1 Mounting Procedure

There are several holes in the base of the stage to allow for mounting. These are spaced for both metric and imperial systems, with 25 mm and 1 inch spacing, sized for M6 screws.

1. Remove the cover by unfastening the screws shown in **Figure 7.1** and sliding it out.



**Figure 7.1.** Screws to unfastened to remove the stage cover.

2. Align the holes in the base or end of the stage with those of the mounting surface.
3. Affix the stage using at least 4 screws.
  1. You may need to move the platform to access some of the holes.
4. Slide the cover back into place and reattach with the screws.

## 7.2 Computer Control

1. Connect the 24 VDC power adaptor to the power socket on the rear of the unit.
2. Connect the unit to your PC using the provided USB-C cable.
3. Install the Ossila Motion Control Console software onto your PC.
  - I. Run the file 'Ossila-Motion-Control-Console-Installer-X-X-X.exe' on the USB memory drive provided.
  - II. Follow the on-screen instructions to install the software.

**Note:** The Ossila Motion Control Console software can also be downloaded from [www.ossila.com/pages/software-drivers](http://www.ossila.com/pages/software-drivers)

## 8. Operation

The Ossila Linear Stage can be controlled either through the Ossila Motion Control Console software, or programmatically using the serial commands in **Section 9**.

### 8.1 Motion Control Console

The Ossila Motion Control Console enables you to control multiple Ossila Linear Stages without having to use serial commands.

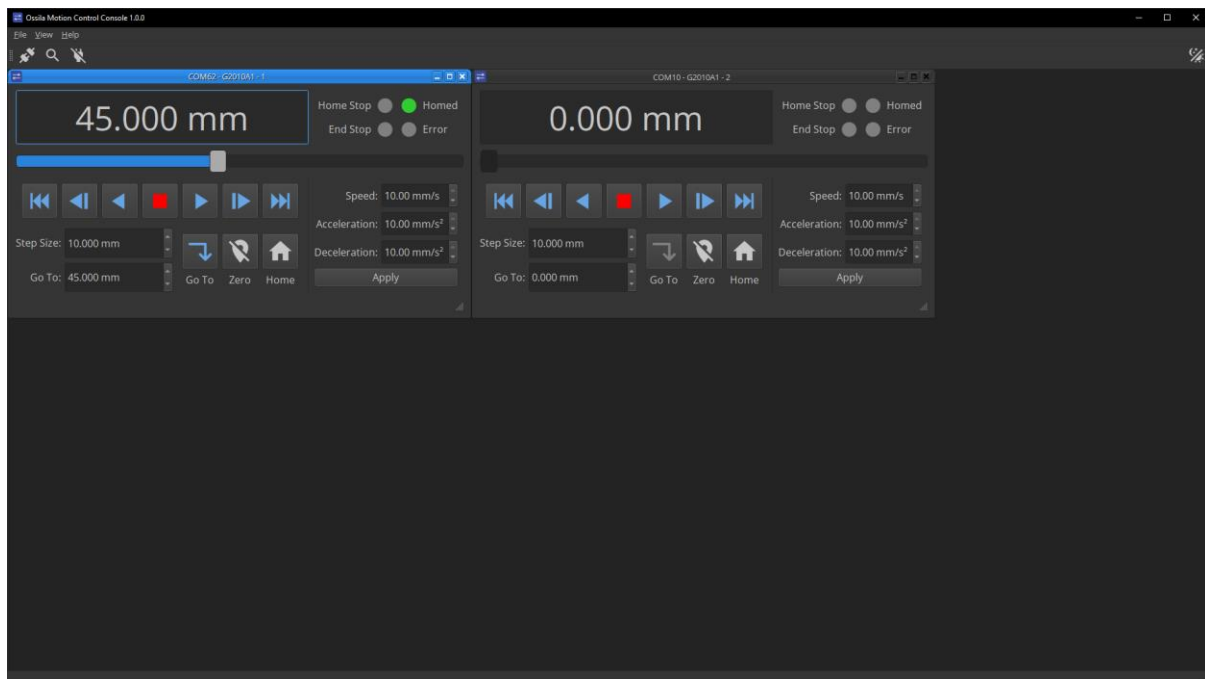


Figure 8.1. Ossila Motion Control Console software.

## 8.1.1 Tool Bar Controls

The tool bar at the top of the window contains controls for connecting to stages. These options are also available in the menu bar.



Search for and connect to all Ossila stages that are plugged into the computer.

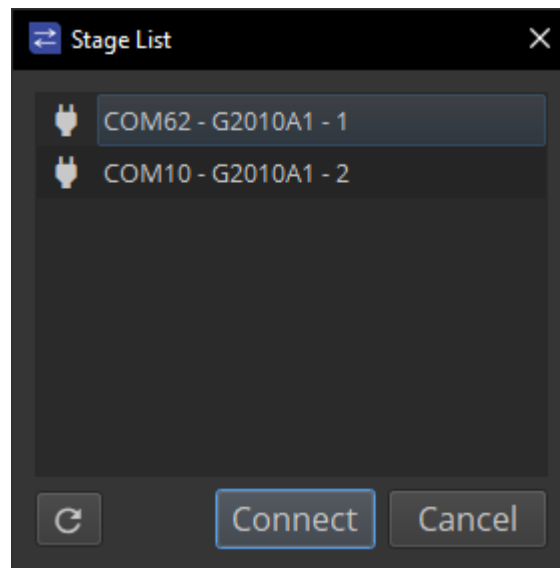


Open a dialog box (shown in **Figure 8.2**) to select stages to connect to.





Disconnect from all connected stages and close their control windows.

### (I) Stage Selection



**Figure 8.2.** Stage selection dialog box.

- Clicking the  button will open the Stage List dialog box as shown in **Figure 8.2**.
- This will display a list of the stages that are plugged into the computer, showing their COM address, product ID, and serial number.
- To connect, select the desired stages and click the **Connect** button.
  - I. Hold **Shift** or **Ctrl** to select multiple stages.
  - II. Click a stage again to deselect it.
- To refresh the list of stages, click the  button.

## 8.1.2 Stage Controls

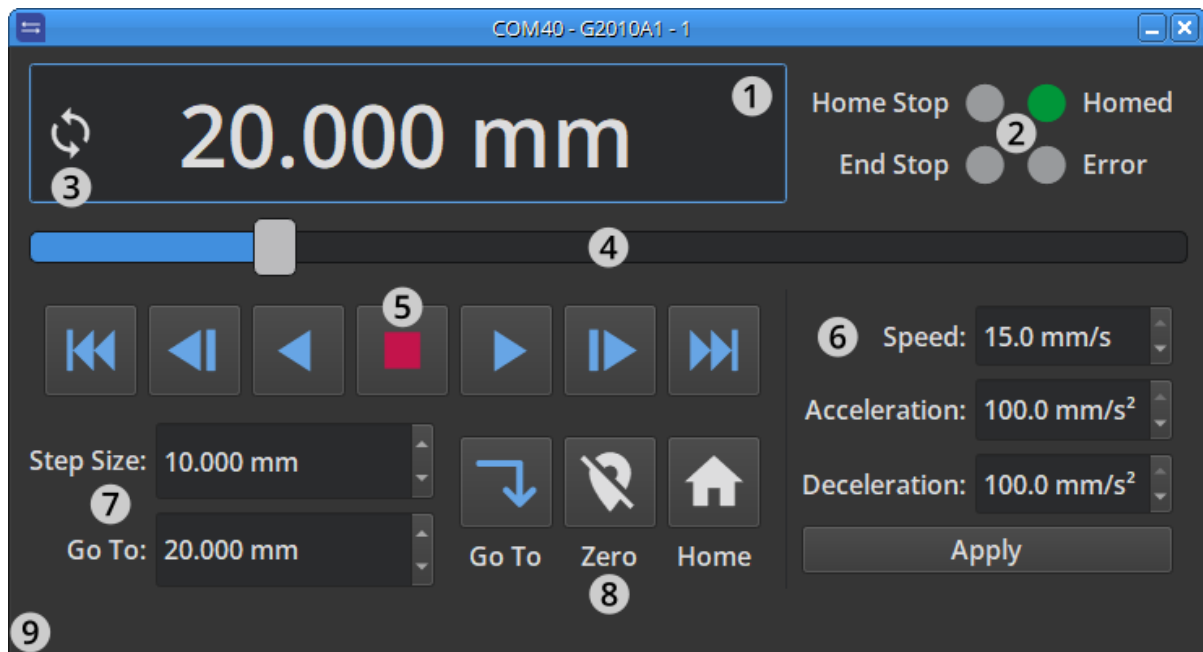


Figure 8.3. Controls for an individual stage.

### (I) Position

The current position of the stage in mm.

### (II) Indicators

- **Home Stop** – The stage is at the home position.
- **End Stop** – The stage is the maximum limit of its travel.
- **Homed** – The stage has been homed since powering on.
- **Error** – An error has occurred, hover the mouse over the indicator or label to see the error message.

### (III) Sync

Clicking this will read the position, acceleration, deceleration, and home status of the stage and update the display accordingly.

### (IV) Position Slider

Shows the current position of the stage. When the stage has been homed it can be used to move the stage.

## (V) Movement Controls



**Move to Home** – Move the stage to the home position.



**Step Backwards** – Move the stage backwards a single step.



**Run Backwards** – Move the stage backwards whilst the button is held.



**Stop** – Stop the stage.



**Run Forwards** – Move the stage forwards whilst the button is held.



**Step Forwards** – Move the stage forwards a single step.



**Move to End** – Move the stage to the maximum limit of its travel.

## (VI) Step Size and Go To Selection

- **Step Size** – The distance to move the stage when clicking the **Step Forwards** or **Step Backwards** buttons.
- **Go To** – The position to move to relative to the home position when clicking the **Go To** button.



## (VII) Position Controls



**Go To** – Move the stage to the position entered in the **Go To** selection. Disabled if the stage has not been homed.



**Zero Position Off** – Click to set the current position as the zero position.



**Zero Position On** – Click to turn off zeroing, restoring the zero position to the home position.



**Home** – Home the stage, allowing the use of the **Go To** function.

## (VIII) Stage Settings


- **Speed** – The speed the stage will move at in mm/s.
- **Acceleration** – The rate of acceleration for the stage to reach the maximum speed in mm/s<sup>2</sup>.
- **Deceleration** – The rate of deceleration for the stage to stop in mm/s<sup>2</sup>.


Any changes to settings will be updated on the stage when a field has finished being edited (by pressing enter or clicking elsewhere). The currently entered settings can all be applied by clicking the **Apply** button.

## (IX) Status Bar

The status bar will display help messages for the controls when the mouse cursor is over them, and error messages if they occur.

### 8.1.3 Labelling Stages

Each stage control can be labelled by right-clicking on the control's title bar and selecting  **Label Stage** from the menu. This opens a dialog box where you can enter a custom label for the stage, which is displayed in the title bar with the stage information.

Labels can be removed by right-clicking on the control's title bar and selecting  **Remove Label** from the menu.

## 9. Command Library

The Ossila Linear Stage communicates with a host computer through a serial command library. When connected to a PC, the system will appear as a COM port, to which the serial commands can be sent. This section describes the command protocol and lists the available commands.

### 9.1 Command Format

Commands should be sent to the Linear Stage in ASCII format, and responses from the Linear Stage will also be in ASCII format.

All commands sent to the Linear Stage have a start and end delimiter, < and > respectively. Only commands enclosed by these delimiters will be acknowledged by the device. If any invalid commands are sent between delimiters, the system will return <Invalid Command>. Commands can be setting commands or query commands.

Movement and setting commands have the format <command value>, where parameter is the setting to be changed, and value is the new value. Movement commands take between 0 and 2 values, for multiple values, each value must be separated by a space. If a command is successfully implemented, it will be echoed back.

Values will be one of the following types depending on the command:

- Floating-point number
  - I. These can be sent in scientific notation (for example, 123e4 or 123E4).
- Integer
  - I. If a floating-point number is sent instead, it will be rounded down to an integer.
- Boolean (0 or 1)
  - I. Non-zero integers or floating-point numbers will be interpreted as 1.

For movement commands, positive values will result in movement towards the end of the stage and negative values will result in movement towards the home position.

Query commands have the format <command?>. These commands allow the user to find current system settings without modifying them. If a query command is successfully interpreted, the system will return <command value>.

## 9.2 Movement Commands

Command	Values	Function
<home>	None	Return the stage to the home position at a fixed speed, zeroing the position once home has been reached. Some commands require the stage to be homed before they can be used.  Homing can be cancelled using the <stop> command.  Returns <homing> immediately and <home> when homing is complete.
<move X>	X – float – distance to move in mm	Move the stage by X mm. X can be positive or negative. Will move at the stages' maximum speed.
<move X Y>	X – float – distance to move in mm Y – float – speed in mm/s	Move the stage by X mm with a speed of Y mm/s. X can be positive or negative.
<run X>	X – float – speed in mm/s	Start the stage moving with a speed of Y mm/s. Y can be positive or negative. The stage will continue moving until a stop command is sent or the home or end limit switches are triggered.
<goto X>	X – float – position to move to in mm	Move the stage to the position X at the stages' maximum speed. Will not execute if the stage has not been homed, instead returning <pos unknown>.
<goto X Y>	X – float – position to move to in mm Y – float – speed in mm/s	Move the stage to the position X with a speed of Y mm/s. Will not execute if the stage has not been homed, instead returning <pos unknown>.
<stop>	None	Decelerates the stage to a stop. Locks the stage to the stopped position.
<hardstop>	None	Immediately stop the stage. Locks the stage to the stopped position.
<stophiz>	None	Decelerates the stage to a stop. No holding torque applied to the stage.
<hardstophiz>	None	Immediately stop the stage. No holding torque applied to the stage.

## 9.3 Settings Commands

Command	Values>Returns	Function
<acc <i>X</i> >	<i>X</i> – float – acceleration in mm/s <sup>2</sup>	Set the acceleration of the stage
<acc?>	<acc <i>value</i> >	Returns the set acceleration of the stage in mm/s <sup>2</sup> .
<dec <i>X</i> >	<i>X</i> – float – deceleration in mm/s	Set the deceleration of the stage
<dec?>	<dec <i>value</i> >	Returns the set deceleration of the stage in mm/s <sup>2</sup> .
<reset>	None	Reset the stage parameters to their turn-on values and set posmode to relative.

## 9.4 Other Commands

Command	Returns	Function
<status?>	<status <i>speed</i> <i>position home end</i> >	Returns the following in order: <ul style="list-style-type: none"> <li>• Current speed in mm/s as a float.</li> <li>• Current position in mm as a float.</li> <li>• Whether the home limit switch is triggered as a Boolean.</li> <li>• Whether the end limit switch is triggered as a Boolean.</li> </ul>
<posmode?>	<posmode <i>value</i> >	Returns the position mode of the stage: <i>relative</i> if the stage has not been homed since powering on, <i>absolute</i> if the stage has been homed. The <code>goto</code> command cannot be used when <code>posmode</code> is <i>relative</i> .
<pos?>	<pos <i>value</i> >	Returns the current position of the stage in mm.
<speed?>	<speed <i>value</i> >	Returns the current speed of the stage in mm/s.
<alarms?>	<alarms <i>values</i> >	Returns a list of the current alarms.
<clearalarms>	<clearalarms>	Clears the alarm list.
<device?>	<device <i>value</i> >	Returns the product code of the stage.
<length?>	<length <i>value</i> >	Returns the travel distance of the stage in mm.
<serial?>	<serial <i>value</i> >	Returns the serial number of the stage.
<firmware?>	<firmware <i>value</i> >	Returns the firmware version of the stage in the format <code>major.minor.patch</code> .

## 10. Troubleshooting

Most of the issues that may arise will be detailed here. However, if you encounter any issues that are not detailed here, then contact us by email at [info@ossila.com](mailto:info@ossila.com). We will respond as soon as possible.

Problem	Possible Cause	Action
No power	The power supply may not be connected properly.	Ensure the system is firmly plugged into the power supply, and that the plug is connected to both the adaptor and a working power socket.
	The power supply adaptor has a fault.	Contact Ossila for a replacement power supply adaptor.
Software does not start	The wrong version of Windows is installed on the computer.	Install the software on a computer with Windows Vista or newer.
	The software has not installed properly.	Try reinstalling the software.
Cannot connect to the system via USB	The USB cable may not be connected properly.	Ensure the USB cable is firmly plugged in at both ends.
	The USB cable may not be connected to a working USB port.	Try connecting the system to a different USB port on the computer. If using a USB hub, try plugging the unit into a port directly on the computer.
	The USB cable is defective.	Try using a different USB-C cable, and contact Ossila if necessary.

## 11. Related Products



### Optical Spectrometer

A low-cost and compact UV-Vis-NIR spectrometer suitable for a wide range of optical experiments.

Product code: G2001A1



### Optical Spectroscopy Bundle

A complete collection of equipment for performing optical spectroscopy.

Product code: G2001B2



### Broadband White Light Source

A USB-C powered LED device that outputs light over the wavelength range 360 nm - 900 nm

Product code: G2002A1



### Cuvette Holder

Hold cuvettes in position for optical transmission, absorption, or fluorescence measurements.

Product codes: G2003A1



### Spectroscopy Transmission Holder

Hold rigid samples or flexible films in position for optical transmission or absorption measurements

Product code: G2004A1



### Optical Fiber

400  $\mu\text{m}$  core, 1 meter length multimode optical fiber for the Ossila Optical Spectrometer.

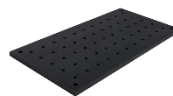
Product code: G2005A1



### Spectrometer Case

A tough but flexible rubber protective case for the Ossila Optical Spectrometer.

Product code: G2006A1



### Optical Breadboard Plate

Solid anodized metric aluminium optical breadboard plate.

Product codes: G2007A1