optogenix

Tapered fibers for Neuroscience

GalvoStation

User Manual

Contents

Chapter 1 Warning symbol definition

Below is a list of warning symbols you may encounter in this manual or on your device.

NOTICE
Information considered important but not hazard related.

CAUTION
Instructions for use that, if disregarded, might result in product damage.

WARNING
Instructions for use that, if disregarded, might result in personal injury or death.

⎓	Direct Current
~	Alternating Current
	Warning: Risk of Electric Shock
	Warning: Laser Radiation

Chapter 2 Safety

NOTICE

All statements regarding safety of operation and technical data in this instruction manual will only apply when the unit is operated correctly.

WARNING

Do not open housings. Do not operate without covers installed.

WARNING

Do not operate in wet or damp conditions.

WARNING

Before assembling the system ensure that all the ON/OFF switches are on the OFF position.

WARNING

Do not stare into the laser beam. Avoid direct eye exposure. Wear protective laser eyewear. Use proper laser safety procedures. Consult with your organization's laser safety officer for recommendations.

WARNING

Remove the fiber patch cords only when the system is turned off. When turning on the system be sure that fiber patch cords or caps are plugged to the receptacles.

Chapter 3 Definitions and abbreviations

NA – numerical aperture.
Active length – Axial length of the Lambda fiber cannula able to deliver (collect) light to (from) the surrounding medium.
Active sub-site – Sub-portion of the Lambda fiber active length selectively activated through the GalvoStation.
Sub-site length – Axial length of an active sub-site.
Probe patch cord – Fiber patch cord connecting the GalvoStation to the Lambda fiber cannula.
Sensor patch cord – Fiber patch cord connecting the GalvoStation to the photodetector.
DAQ – "DAQ (**D**ata **A**c**Q**uisition) is the process of measuring an electrical or physical phenomenon, such as voltage, current, temperature, pressure, or sound. A DAQ system consists of sensors, DAQ measurement hardware [e.g. a **DAQ board**], and a computer with programmable software[1].

[1] https://www.ni.com/it-it/shop/data-acquisition.html

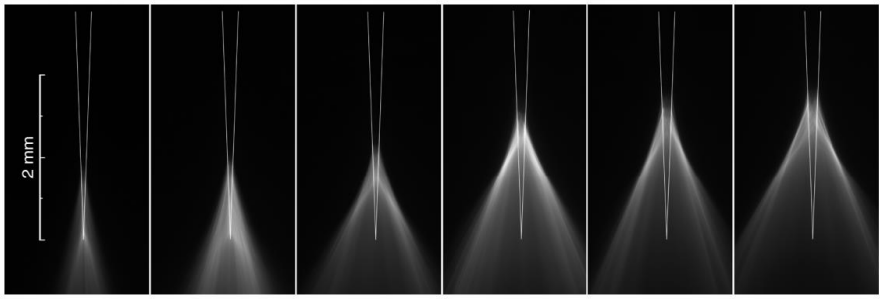
Chapter 4 Description

4.1 Introduction

GalvoStation is a single channel opto-electronic Laser device designed to perform *spatial selective* light delivery and collection with OptogeniX Lambda fibers[2]. GalvoStation can include up to two laser sources and a light collection path for dual color light delivery and/or fluorescence recording through a single Lambda fiber.

4.2 Spatial selective light delivery with Lambda fibers

GalvoStation allows to confine the light emitted by a Lambda fiber at sub-sites of its active length as shown in Figure 1. The active sub-site can be scanned arbitrarily along the fiber axis within the active length. In an optogenetics experiment this allows to selectively stimulate multiple brain regions with a single probe and without probe movements.



[2] https://www.optogenix.com/applications/

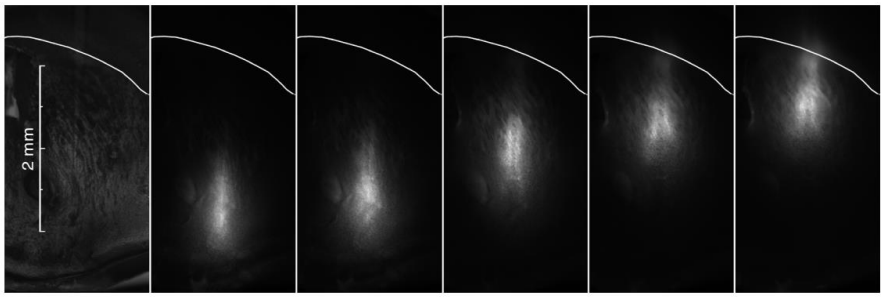


Figure 1. Spatial selective light emission from a Lambda fiber at specific sub-sites within the 2mm active length: in fluorescein solution (top), and in brain tissue (bottom).[3]

NOTICE
Spatial selective light delivery is compatible with the use of rotary joints. An additional patch cord is required.

4.3 Spatial selective fiber photometry with Lambda fibers

Spatial selective fiber photometry is the combination of spatial selective light delivery and full taper light collection with a single Lambda fiber.
In a fiber photometry experiment, the light delivered by the GalvoStation through a Lambda fiber is used to stimulate fluorescence into the brain tissue at different depths within the Lambda fiber active length. The elicited fluorescence is then collected by the Lambda fiber and sent through the GalvoStation to an external photodetector.

4.4. Resolution of light delivery and collection

Axial resolution of site selective light delivery/collection with Lambda fibers is represented by the *sub-site length* (see Figure 1).

4.4.1 Lambda-plus fibers

Regular Lambda fibers are provided with strict tolerance (5%) on the active length, while coarser tolerance is allowed on the taper

[3] From F. Pisanello, G. Mandelbaum, *et* al., https://www.nature.com/articles-nn.4591, Nature Neuroscience (2017).

profile. Although taper profile variability has no practical influence on light emission/collection properties in full taper operation, it does affect the variability of the sub-site length both within (*intra*) the single Lambda fiber and among (*inter*) fibers with the same nominal active length. Lambda-plus fibers are Lambda fibers selected with strict tolerance on both taper length and taper profile, and optimized for use with the GalvoStation with guaranteed constant sub-site length both *intra* and *inter* fibers[4]. Each Lambda-plus fiber batch is shipped with a calibration slide (see Section 4.4.2). Visit the GalvoStation shop page for an updated specs list of Lambda-plus fibers currently available.

4.4.2 Calibration slide

Calibration slides are tools useful to measure the light emission profiles of tapered fibers, and are provided for each Lambda-plus fiber batch. Calibration slides consist of a specified tapered fiber cannula attached on a microscope slide, with the surface of the slide close to the fiber covered with hydrophobic material to help formation of a drop of fluorophore solution.

Figure 2. Calibration slide.

[4] Control on the position of the emission site is guaranteed with a ±100µm tolerance within the same batch of Lambda-plus fibers.

4.5 TaperScan – GalvoStation control software

TaperScan software is available for full control of the GalvoStation. It allows to select the active sub-site of the Lambda fiber, the operating laser source and its optical power level. Two modes of operation are implemented: *manual mode* for direct manual control of the spatial selective light emission from a Lambda fiber, and *protocol mode*, with which it is possible to program both single source (e.g. for Optogenetic stimulation) and dual source (e.g. for Fiber Photometry with isosbestic control) stimulation routines. TaperScan support the input from two digital TTL ports to record the occurring of event. Refer to *TaperScan User Manual* for further information.

Chapter 5 Configuration guide

5.1 GalvoStation

GalvoStation can be equipped with one or two laser sources and optionally includes an optical path for combined light delivery and collection with a single probe. Examples of options sets with related applications are listed in the following table.

Laser wavelengths [nm]	Collection band [nm]	Application
405 + 473	500 – 550	GCaMP based spatial selective Fiber Photometry with isosbestic control
473	N/A	ChR2 based spatial selective optogenetics
405 + 561	600 – 650	RCaMP based spatial selective Fiber Photometry with isosbestic control

Visit the GalvoStation shop page for an updated list of available options for source wavelength and output powers.

5.2 DAQ Board

A suitable DAQ board can be optionally purchased together with the GalvoStation to guarantee full compatibility with TaperScan. Please visit the GalvoStation shop page for an updated list of available options.

5.3 Photodetector

As fiber photometry is a low light level application, an ideal photodetector should have high-sensitivity, high-gain and low noise. Importantly, the spectral sensitivity of the detector must match the peak emission of the fluorescent reporter (e.g. 500-550nm for green reporters).
Photomultiplier tubes (PMT) typically used in microscopy are a common choice in custom fiber photometry setups. These detectors generate an amplified current or voltage signal in response to the incoming light, and require high-voltage supply[5].
Silicon-based battery-powered *photoreceivers* that can achieve femtowatt sensitivity (e.g. femtowatt Photoreceiver by Newport[6]) represent an alternative, popular option.
A suitable photodetector can be optionally purchased together with the GalvoStation. Please visit the GalvoStation shop page for an updated list of available options.

5.4 Probe patch cord

Probe patch cords provided with the equipment are recommended for optimal use with Lambda-plus fibers and TaperScan software. Contact OptogeniX support to re-order probe patch cords if needed.

5.5 Sensor patch cord

The sensors patch cord provided with the GalvoStation is based on a high Numerical Aperture fiber for suitable use with the photodetector optionally included. In case of use with your own photodetector, please consult manufacturer's guidelines for selection and purchasing of the photodetector patch cord.

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[5] www.hamamatsu.com
[6] https://www.newport.com/p/2151

Chapter 6 Setup and operation

6.1 Overview

The complete GalvoStation system, shown in Figure 3, consists of the GalvoStation (1), its power supply (2), two laser drivers (3), a DAQ board (4), and a photodetector (5).[7] A set of patch fibers and all the cables needed are supplied with the system, accordingly to the chosen configuration.

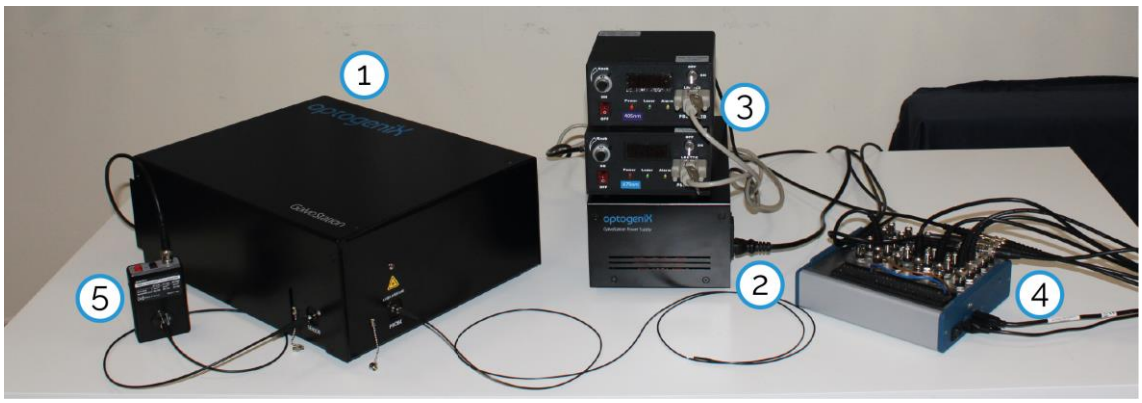


Figure 3. Overview of the GalvoStation system.

Detailed list of accessories:[7]

- Two 2m long D-Sub15 cables.
- One probe patch cord (SMA905 to ferrule).
- One sensor patch cord (SMA905 to FC/PC).
- Three 0,5m long BNC cables.
- Four 2,0m long BNC cables.
- Three BNC-Tee adapters.
- One 2m long 3 pin DIN cable.
- Three C13 AC cable.
- One DAQ power supply.
- A starter kit composed by: one 5pack of Lambda-plus fibers (fiber type and stub specifications as defined by the customer, including one calibration slide); one probe patch cord

[7] Depending on the chosen configuration some of these items might not be included or might be different in quantity.

(same fiber type of the Lambda-plus fibers); one sensor patch cord.

If the GalvoStation is to be used with a rotary joint an additional patch cord with connectors specified by the customer during the order will be provided.

6.2 Panels and cables description

GalvoStation and GalvoStation power supply panels are shown in Figure 4 and 5, respectively. The key elements of the system are enumerated as follows:

1. Laser 1 port. D-Sub 15 connector.
2. Laser 2 port. D-Sub 15 connector. Present only in dual laser version.
3. Galvo driver port. BNC connector.
4. Power supply input port. 3 pins DIN connector.
5. Laser emission red LED.
6. Probe port. SMA905 receptacle.
7. Sensor port. SMA905 receptacle. Present only in version equipped with a light collection path.
8. Power supply voltage selector.
9. AC inlet. C14 receptacle.
10. Power ON/OFF switch with green LED.
11. Power supply output port. 3 pins DIN connector.

Representative images of the cables supplied with the GalvoStation are shown in Figure 6:

A. D-Sub 15 cable.
B. 3 pin DIN cable.
C. Interlock plug.

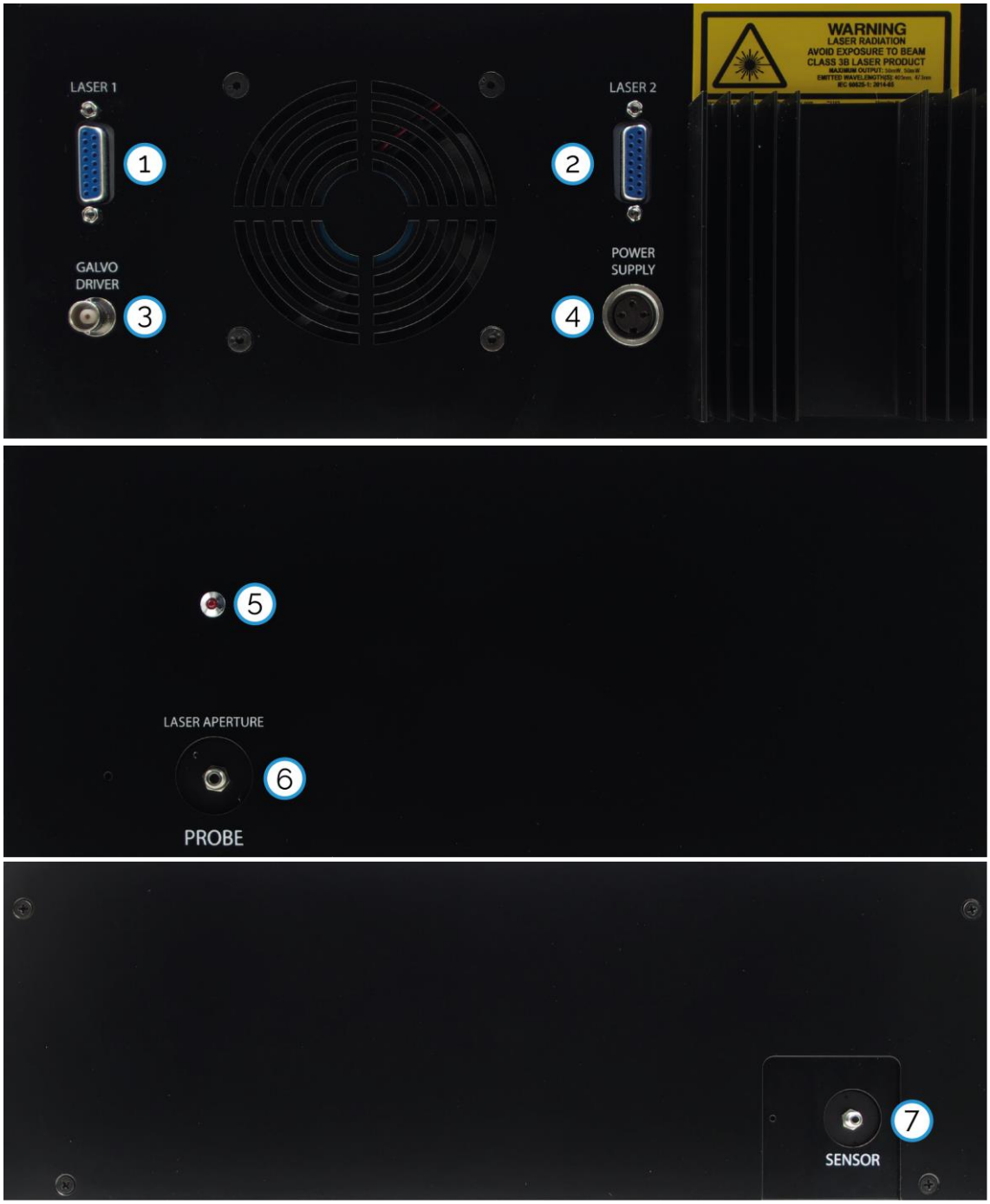


Figure 4. GalvoStation rear, front, and side panels (top, middle, and bottom figures, respectively).

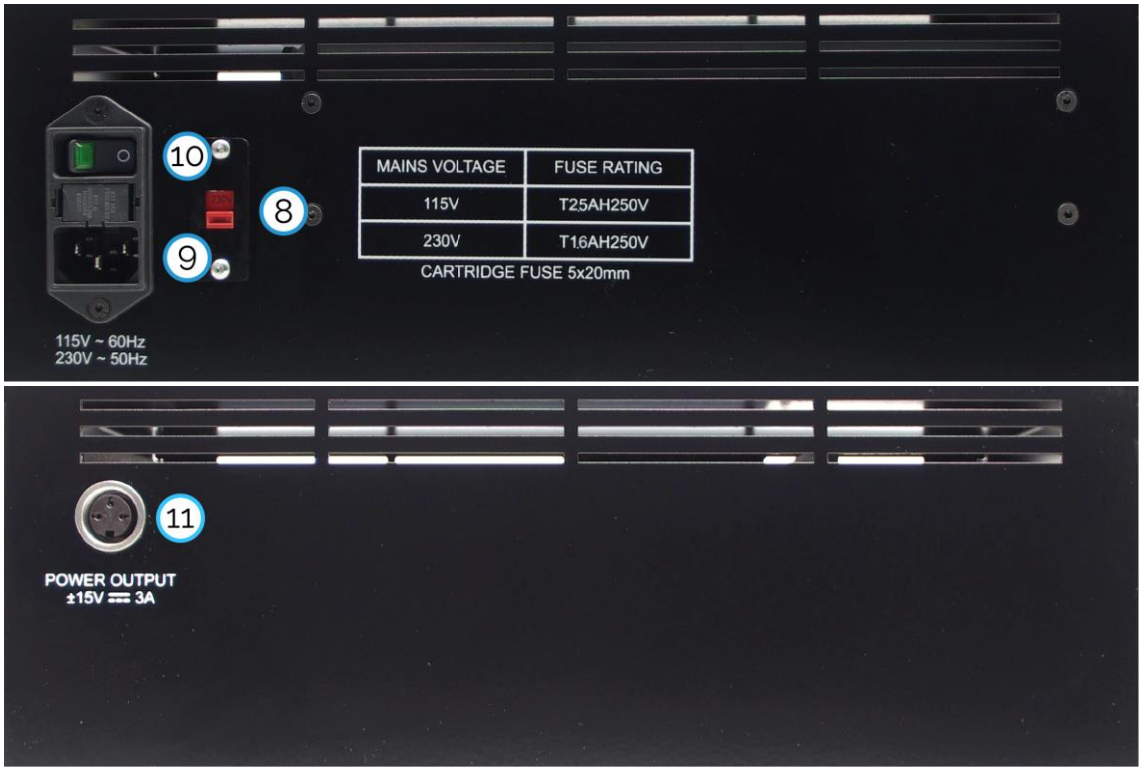


Figure 5. GalvoStation power supply rear and front panels (top and bottom figures, respectively).

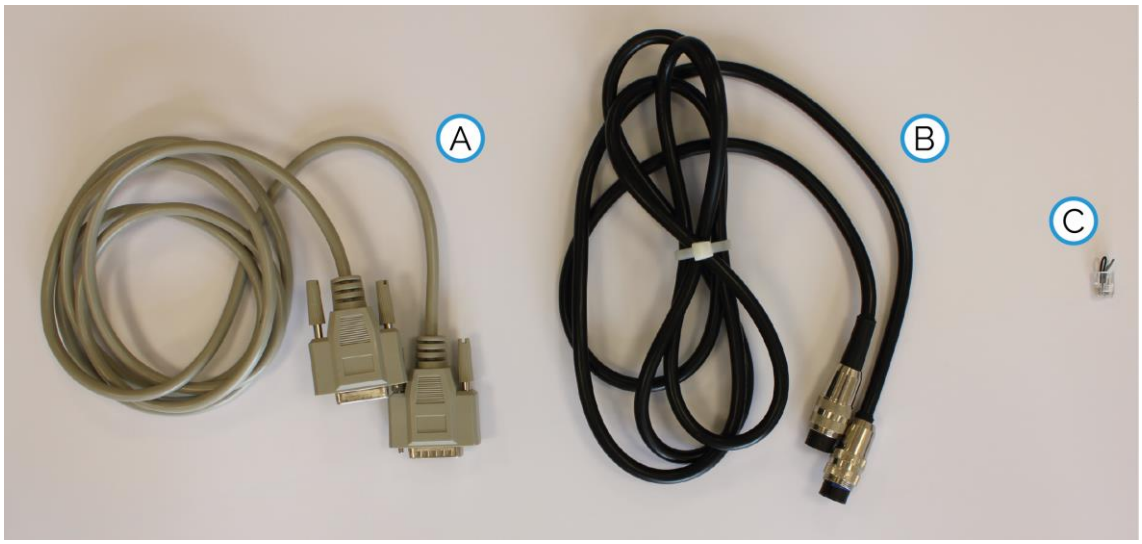


Figure 6. Cables supplied with the GalvoStation.

For laser drivers and DAQ board panels description please refer to the respective user manuals.

6.3 Connection guide

1) Unbox both the GalvoStation and the accessories boxes and remove all packaging material.
2) Place the GalvoStation on a flat horizontal surface.

3) Ensure that there are no obstructions within 10cm from the GalvoStation ventilation fan and that the environmental requirements listed in Section 7.6 of this manual are met.

WARNING

Obstructions on the ventilation fan can lead to overheating of the instrumentation, which can cause hazardous situation.

4) Connect the GalvoStation Power Supply output port (11 in Figure 5) to the GalvoStation (port 4 in Figure 4) by using the DIN cable (B in Figure 6).
5) Connect the provided interlock plug (C in Figure 6) or the interlock system of the room where the GalvoStation will be operated, accordingly to the regulation applicable in your area, to the interlock port of the laser driver marked as LASER 1.
6) **For dual laser version only:** connect the provided interlock plug (C in Figure 6) or the interlock system of the room where the GalvoStation will be operated, accordingly to the regulation applicable in your area, to the interlock port of the laser driver marked as LASER 2.
7) Check that the CW/MODULATION switch on the laser driver marked as LASER 1 is on the MODULATION position.
8) **For dual laser version only:** check that the CW/MODULATION switch on the laser driver marked as LASER 2 is on the MODULATION position.
9) Connect the laser driver marked as LASER 1 to the corresponding port on the GalvoStation (1 in Figure 4) by using the D-SUB15 cable (A in Figure 6).

10) **For dual laser version only:** connect the laser driver marked as LASER 2 to the corresponding port on the GalvoStation (2 in Figure 4) by using the D-SUB15 cable (A in Figure 6).

NOTICE

Follow steps 11-19 and 22-24 as reported here if you purchased a DAQ board together with the GalvoStation; otherwise connect the electrical input ports to your third-party system.

11) Connect the BNC Tee adapters on the AI0, AI1, and AI2 ports on the DAQ board.
12) Using a 1m long BNC cable connect one arm of the BNC Tee adapter on the AI0 port of the DAQ board to the AO0 port of the DAQ board.
13) Using a 1m long BNC cable connect one arm of the BNC Tee adapter on the AI1 port of the DAQ board to the AO1 port of the DAQ board.
14) **For dual laser version only:** using a 1m long BNC cable connect one arm of the BNC Tee adapter on the AI2 port of the DAQ board to the AO2 port of the DAQ board.
15) Connect one arm of the BNC Tee adapter on the AI0 port of the DAQ board to the Galvo Driver port on the GalvoStation (3 in Figure 4).
16) Connect one arm of the BNC Tee adapter on the AI1 port of the DAQ board to the Trigger port on the laser driver marked as LASER 1.
17) **For dual laser version only:** connect one arm of the BNC Tee adapter on the AI2 port of the DAQ board to the Trigger port on the laser driver marked as LASER 2.
18) **For version with light collection path only:** connect the photodetector output to the AI3 port of the DAQ board.

19) If needed, connect USER1 and USER2 ports of the DAQ board to the digital signal sources.
20) Connect the Probe Patch cord (the SMA-ferrule patch cord) to the PROBE port of the GalvoStation (6 in Figure 4).

CAUTION
Plug the Probe Patch cord gently to avoid the chance to misalign the optical receptacle.

21) Connect the Sensor Patch cord (the SMA-FC fiber patch cord) to the SENSOR port of the GalvoStation (7 in Figure 4) and on the optical input of the photodetector.

CAUTION
Plug the Sensor Patch cord gently to avoid the chance to misalign the optical receptacle.

22) Connect the USB cable of the DAQ board to a computer where the hardware driver and TaperScan were successfully installed (please refer to TaperScan user guide).
23) Connect the DAQ board to its power supply.

WARNING

Ensure that all the ON/OFF switches are on the OFF position before connecting equipment to power outlets.

24) Connect the DAQ board power supply to a power outlet.
25) Ensure that the voltage selector on the GalvoStation Power Supply is on the appropriate position for your area.

26) Connect the GalvoStation Power Supply to a power outlet.
27) Connect the laser drivers to a power outlet.

6.4 System start up

WARNING

During system start up always use protective laser eyewear and use proper laser safety procedures.

1) **For version with DAQ board only:** turn the ON/OFF switch on the DAQ board on the ON position.
2) Turn the ON/OFF switch on the laser driver marked as LASER 1 on the ON position; the red POWER indicator should light up.
3) Turn the key switch on the laser driver marked as LASER 1 on the ON position; after a few seconds the green LASER indicator should light up and laser emission will be enabled.
4) **For dual laser version only:** turn the ON/OFF switch on the laser driver marked as LASER 2 on the ON position; the red POWER indicator should light up.
5) **For dual laser version only:** turn the key switch on the laser driver marked as LASER 2 on the ON position; after a few seconds the green LASER indicator should light up and laser emission will be enabled.
6) If the red ALARM indicator on the laser driver light up turn both the ON/OFF switch and the key switch to the OFF position. After a few minutes turn the switches to the ON position: if the ALARM condition persist, do not use the GalvoStation system and contact OptogeniX support.
7) Turn the ON/OFF switch on the back of the GalvoStation power supply (10 in Figure 5) on the ON position. The green

indicator placed on the switch and the laser emission LED on the front panel of the GalvoStation should light up. If either one of these LED indicator fails to light up, do not use the GalvoStation system and contact OptogeniX support.

WARNING

Do not disconnect any cable when the system is turned on.

6.5 Operation

After system startup, the GalvoStation is ready for operation. When TaperScan is used, please refer to *TaperScan user manual* for detailed instructions on how to operate the GalvoStation with software control. To directly drive the GalvoStation with third-party systems follow the indications below.

WARNING

During laser warm-up and system operation always use protective laser eyewear and use proper laser safety procedures.

6.5.1 Laser warm-up

1) Send a modulation signal between 2V and 5V on the Trigger port of the laser driver marked as LASER 1. Laser emission will be turned on.

2) **For dual laser version only:** send a modulation signal between 2V and 5V on the Trigger port of the laser driver marked as LASER 2. Laser emission will be turned on.
3) The laser will operate stably after 10 minutes of light emission at room temperature.

6.5.2 System operation

The GalvoStation and laser drivers support the driving voltage signals shown in the table below. Full technical specifications of the inputs are given in section 8.3.

GALVO DRIVER port (3 in Figure 4)	±6,5V. Never exceed ±10V.
Trigger port (laser driver)	0V – 5V. Never exceed 5,2V nor use negative values.

CAUTION
Exceeding the voltage intervals reported in the previous table might result in irreversible damage of the equipment.

1) After the laser warm-up procedure send a modulation signal of 0V to the Trigger port of the laser driver marked as LASER 1.
2) **For dual laser version only:** After the laser warm-up procedure send a modulation signal of 0V to the Trigger port of the laser driver marked as LASER 2.
3) Remove the cap from the Probe patch cord and plug the ferrule end to the Lambda fiber cannula.
4) The system control routine can now be started.

5) The GALVO DRIVER signal is used to move the emission site along the Lambda fiber active length, with higher voltages in absolute value leading to emission site positions farther from the Lambda fiber tip. Refer to the Calibration section of this user manual for further details.
6) The Trigger signal on the laser driver is used to modulate the power of the light emitted by the Lambda fiber, with higher voltages leading to higher powers. A threshold values of ~1V should be exceeded to correctly activate laser emission.

WARNING

Do not disconnect any cable or optical fiber when the system is turned on and laser emission is active.

6.6 Probe patch cord alignment

After the assembling of the system an alignment procedure for the Probe patch cord is required to guarantee the proper functionality of the GalvoStation. When TaperScan is used, please refer to *TaperScan user manual* for detailed instructions on how to run this alignment procedure through TaperScan. To run the alignment procedure with third-party systems follow the indications below.

WARNING

Do not stare directly at the Probe patch cord when laser light is emitted.

1) Start up the system as described in section 6.4.
2) Send a modulation signal slightly above 1V on the Trigger port of the laser driver marked as LASER 1, in order to obtain a weak laser emission.
3) **For dual laser version only:** send a modulation signal of 0V on the Trigger port of the laser driver marked as LASER 2.
4) Send a modulation signal on the GALVO DRIVER port of the GalvoStation equal to the offset value specified in the GalvoStation test report attached to this user manual.
5) Remove the cap from the Probe patch cord.
6) Place the distal end of the Probe patch cord a few centimeter away from a piece of white paper.
7) Slightly unscrew the Probe patch cord from the PROBE receptacle of the GalvoStation.
8) Gently rotate the SMA connector, without re-engaging the thread, and find the position which minimize the radius of the light disk projected on the piece of white paper.
9) Gently tighten the SMA connector of the Probe patch cord to the PROBE receptacle of the GalvoStation, trying to keep the fiber in the position that minimized the light disk.
10) Plug the cap on the Probe patch cord.
11) Send a modulation signal of 0V on the Trigger port of the laser driver marked as LASER 1.

NOTICE
In the event that the Probe patch cord is replaced or unplugged, the alignment procedure needs to be repeated.

6.7 System shutdown

1) Turn the key switch on the laser driver marked as LASER 1 on the OFF position; the green LASER indicator should turn off and laser emission will be disabled.

2) Turn the ON/OFF switch on the laser driver marked as LASER 1 on the OFF position; the red POWER indicator should turn off.
3) **For dual laser version only:** turn the key switch on the laser driver marked as LASER 2 on the OFF position; the green LASER indicator should turn off and laser emission will be disabled.
4) **For dual laser version only:** turn the ON/OFF switch on the laser driver marked as LASER 2 on the OFF position; the red POWER indicator should turn off.
5) Turn the ON/OFF switch on the back of the GalvoStation power supply (10 in Figure 5) on the OFF position. The green indicator placed on the switch and the laser emission LED on the front panel of the GalvoStation should turn off.
6) **For version with DAQ board only:** turn the ON/OFF switch on the DAQ board on the OFF position.
7) Unplug the Probe patch cord from the Lambda fiber and place the protection cap on the Probe patch cord.

6.8 Calibration

Due to unavoidable variation in the assembling process of the GalvoStation, the patch cords, and the Lambda-plus fiber cannulae, a calibration procedure for each Lambda-plus fiber batch is needed to ensure that the light emitting region is scanned along the tapers active length with a positioning error as low as possible. When TaperScan is used, please refer to *TaperScan user manual* for detailed instructions on how to run the calibration procedure through TaperScan. To run the calibration procedure with third-party systems follow the indications below.

1) Place the Calibration slide under an epifluorescence microscope equipped with a camera and with an objective giving the system a field of view large enough to frame the full extension of the Lambda-plus fiber active length.

2) Immerse the Lambda-plus fiber in a solution of fluorophore suitable for the wavelength in use and place it under a microscope equipped with the corresponding emission filter (e.g. PBS:fluorescein solution and FITC filter for blue light).
3) Plug the Probe patch cord to the Lambda-plus fiber on the Calibration slide.
4) Start up the system as described in section 6.4.
5) Send a modulation signal slightly larger than ~1V on the Trigger port of the laser driver marked as LASER 1, in order to obtain a weak laser emission.
6) **For dual laser version only:** send a modulation signal of 0V on the Trigger port of the laser driver marked as LASER 2.
7) Send a modulation signal on the GALVO DRIVER port of the GalvoStation equal to the offset value specified in the GalvoStation test report attached to this user manual.
8) Acquire an image with the microscope camera. Be sure to have a sharp focus on the fiber.
9) Repeat steps 7-8 by changing the modulation signal on the GALVO DRIVER port of the GalvoStation, increasing it by a constant amount (e.g. 0.5V) up to 6.5V.
10) Open the saved images as a stack in ImageJ[8], and set the spatial scale in px/µm.
11) Using the *Straight* tool draw a line a few pixel away from the Lambda-plus fiber, following the taper surface, and starting at the tip position.
12) Run the "Lambda-plus fiber calibration" macro; you can download the macro code from OptogeniX website.
13) Save the result table in a folder of your convenience.
14) Run the Lambda-plus fiber calibrator software; you can download it from OptogeniX website.

[8] ImageJ is a Public Domain software for image processing and analysis. It can be downloaded at https://imagej.nih.gov/ij/download.html.

15) Load the result table and run the calibration analysis by clicking on the "Calibrate" button.
16) The Lambda-plus fiber calibrator will return a simple mathematical formula linking the value of the signal on the GALVO DRIVER port of the GalvoStation to the position of the light emission site along the active length of the Lambda-plus fiber.
17) This calibration can be used for every Lambda-plus fiber shipped together with the Calibration slide you used for the calibration procedure, and remains valid until the Probe patch cord alignment procedure is run again.

NOTICE

The calibration obtained through this procedure is valid for a given GalvoStation, a given Probe patch cord, and a given batch of Lambda-plus fiber.

Chapter 7 Specifications

7.1 GalvoStation mechanical specifications

Weight [kg][9]	12,0 – 15,0
Dimensions [mm]	455,2 × 330,0 × 165,0
Enclosure material	Aluminum 5052-H32

7.2 GalvoStation power supply mechanical specifications

Weight [kg]	3,5
Dimensions [mm]	334,8 × 179,3 × 127,8
Enclosure material	Aluminum 5052-H32

7.3 GalvoStation optical specifications

PROBE port receptacle	SMA905
SENSOR port receptacle	SMA905
Maximum output power (PROBE port) [mW][10]	100,0
Wavelength [nm][11]	405, 473, 488, 561

7.4 GalvoStation electrical specifications

Power supply [V]	±15
Current absorption [A RMS]	1,25
Current absorption [A peak MAX]	5
Galvo driver input resistance [Ω]	20±1%
Galvo driver input range [V]	±6,5
Galvo driver maximum input range [V][12]	±10

[9] Configuration dependent.
[10] Intended as combined power from two sources. Attenuators can be included during GalvoStation configuration to lower this value.
[11] Up to two laser sources, visit GalvoStation product page for an update list of available options.
[12] Although signals exceeding ±6,5V deflect the laser beam outside the optical path and no light is coupled to the Probe patch cord, signals in the range ±10V are supported by the driving electronics.

Laser trigger input range [V][13]	0 - 5
Laser trigger maximum input [V][13]	5,2V

7.5 GalvoStation power supply electrical specifications

IEC protection class	Class I
Input voltage receptacle	C14
Input voltage range (switchable)	115V AC 60Hz 230V AC 50Hz
Fuse ratings (input voltage dependent)	T2.5AH250V (115V input) T1.6AH250V (230V input)
Output voltage [V]	±15
Maximum output current [A]	3

7.6 Environmental requirements

Temperature	15˚C – 40˚C
Maximum humidity	80% non condensing
Maximum altitude	2000 m
Indoor use only	

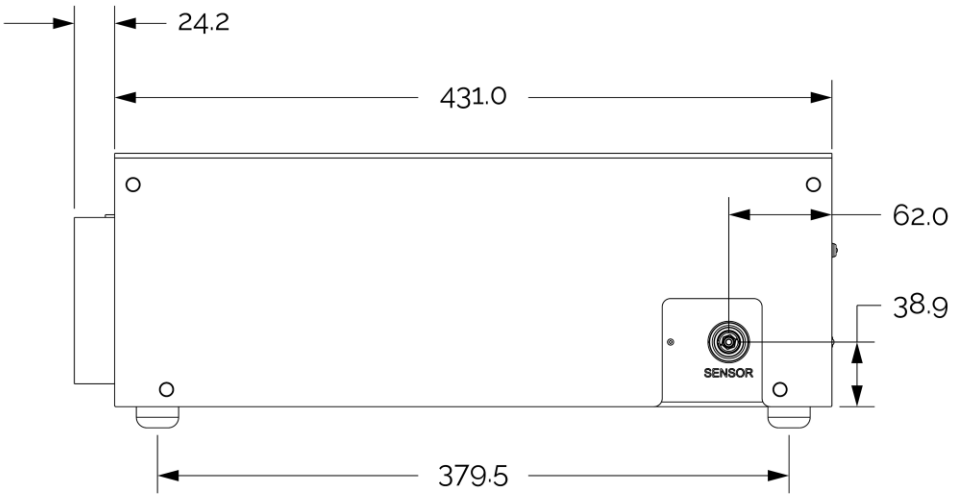
[13] This specification is proper of the laser driver and not of the GalvoStation. It is reported here for convenience.

Chapter 8 Drawings

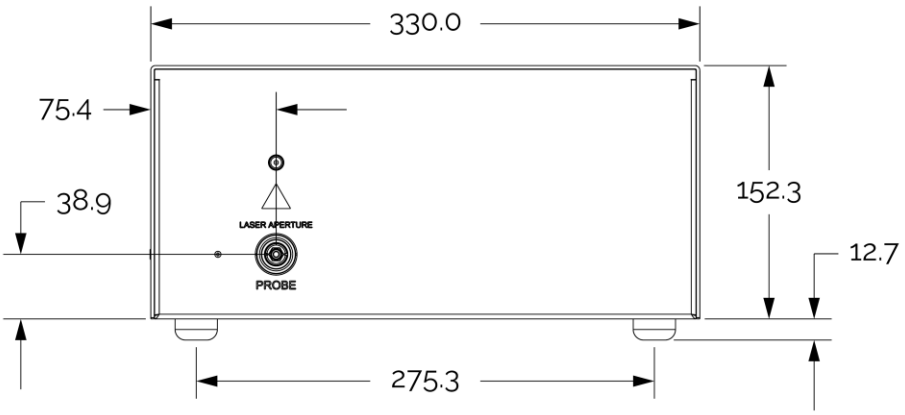
8.1 GalvoStation drawings

All dimensions are in millimeters (mm).

Side view



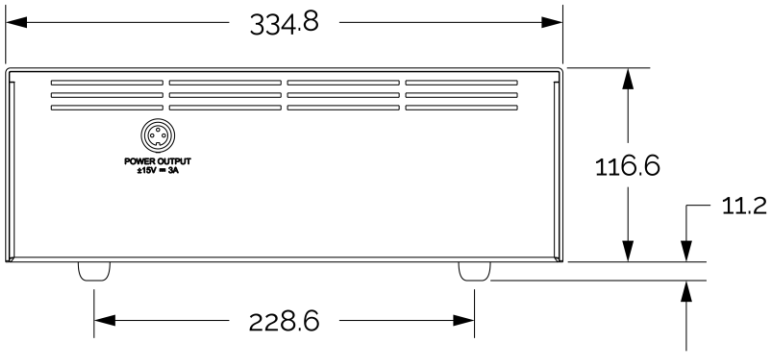
Front view



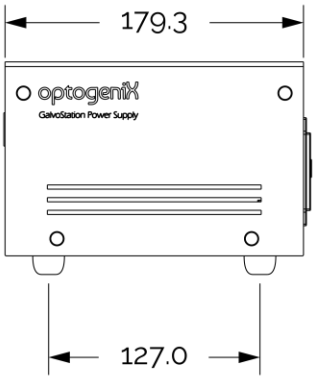
8.2 GalvoStation power supply drawings

All dimensions are in millimeters (mm).

Side view



Front view



Chapter 9 Cleaning and maintenance

GalvoStation and GalvoStation power supply can be cleaned using a soft (non-abrasive) cloth and some isopropyl alcohol, except from silkscreened portions of the enclosure. For these latter, use a soft (non-abrasive) cloth lightly dampened with water.

DANGER

Disconnect the system from accessories and from power outlets before any cleaning and maintenance operation.

Chapter 10 EU declaration of conformity

optogeniX

CE *EU Declaration of Conformity*

This declaration of conformity is issued for the following opto-mechanical instrument:

Model Name	Serial Number of GalvoStation covered by this EU DoC
GalvoStation	YYMMDDGSXX (YY = year, MM = month DD = day, GS = product code, XX = serial number)

We, Optogenix Srl, declare under our sole responsibility that the above named product conform to the essential requirements of the following European Union directives and normative documents:

- Direttive 2014/35/UE, Low Voltage (LVD)
- Directive 2014/30/UE, Electromagnetic Compatibility (EMCD)
- Directive 2011/65/UE, 2015/863/UE **R**estriction **o**f the use of certain **H**azardous **S**ubstances
- Directive 2012/19/UE, "RAEE"
- CEI EN 60825-1/EC, Equipment classification, requirements and user's guide
- IEC 61010-1:2010+AMDI:2016 CSV, Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements

Issued On: July 8, 2022

Leonardo Sileo
Sole administrator

OptogeniX Srl
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73010, Arnesano (LE) – ITALIA
VAT n°: IT04644390751

Chapter 11 Warranty

GalvoStation (the Product) is guaranteed to perform per advertised specifications and is covered against material, manufacturing or design defects for two (2) years following the date of delivery to buyer. If, prior to the expiration of the Warranty Period, the Buyer informs OptogeniX in writing of any breach of this limited warranty, then OptogeniX may repair or replace the Product that gave rise to the breach or, in OptogeniX's sole and exclusive discretion, refund the amounts that Buyer paid for the Product.
Buyer will bear the costs of access, de-installation, re-installation and transportation of the Product to OptogeniX and back to Buyer. Any repair or replacement pursuant to this limited warranty will not extend the Warranty Period. OptogeniX does not warrant the Product, or any repaired or replacement parts, against normal wear and tear or corrosion. This limited warranty and remedy are expressly conditioned upon: (i) Buyer's payment of the purchase price in full, (ii) Buyer giving written notice of the defect, reasonably described, to OptogeniX within ten (10) days of the time when Buyer discovers or ought to have discovered the defect, (iii) the storage, installation, operation, use, and maintenance of the Product in compliance with the Instructions, (iv) the existence of proper records of Buyer's operation and maintenance of the Product during the Warranty Period, (v) Buyer providing OptogeniX with a reasonable opportunity to examine the Product and the aforementioned records, and (vi) the absence of any unauthorized modification or repair of the Product, including without limitation the removal or alteration of any serial numbers or warranty date decals. Before any test may be used to evaluate the Products, Buyer will: (i) provide OptogeniX with reasonable written notification of the test, (ii) allow OptogeniX to be present during the test, and (iii) receive OptogeniX's consent to the conditions of the test, which consent will not be unreasonably withheld. If a test is performed

on the Products, and OptogeniX has not consented to the conditions of the test, then this limited warranty will be void.

Chapter 12 Terms of Use, Terms of Distribution and Copyright

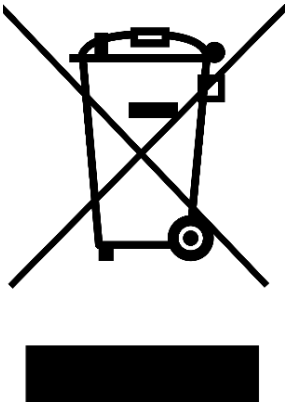
OptogeniX s.r.l. assumes no liability for the content, completeness or quality of the information contained in this document. The Product may be subject to changes and/or updates, and we will update the content of this document regularly to reflect the current status of the Product. OptogeniX s.r.l. does not guarantee that any particular objective can be achieved with the Product. We shall not be responsible in any way for direct or indirect damages that may arise from the Product. Furthermore, We shall not be responsible in any way that may relate to the effects of the results of using the Product.

Chapter 13 Regulatory

As required by the WEEE (Waste Electrical and Electronic Equipment Directive 2012/19/UE) of the European Community (EC) and the corresponding national laws, OptogeniX offers all end users in the EC the possibility to return "end of life" units without incurring disposal charges.

This offer is valid for OptogeniX equipment:

- Sold after July 8, 2022;
- Marked correspondingly with the crossed out "wheelie bin" logo (see right);
- Sold to a company or institute within the EC;
- Currently owned by a company or institute within the EC;
- Still complete, not disassembled and not contaminated.



If you wish to return an OptogeniX unit for waste recovery, please contact OptogeniX or your nearest dealer for further information.

Waste Treatment

If you do not return an "end of life" unit to OptogeniX, you must hand it to a company specialized in waste recovery. Do not dispose of the unit in a litter bin or at a public waste disposal site.

Chapter 14 Contacts

For technical support or sales inquiries, please write us at info@optogenix.com or visit www.optogenix.com.