User Manual

niji 虹

bluebox optics

niji 虹

Table of Contents

www.BlueBoxOptics.com V2.3

niji 虹

www.BlueBoxOptics.com V2.3

niji 虹

List of Figures

List of Tables

www.BlueBoxOptics.com V2.3

niji 虹

1 Preface

1.1 Warnings

⚠ Do not use this equipment without first consulting the operating manual.

⚠ To avoid risk of electric shock, this equipment must only be connected to a mains supply with protective earth.

⚠ Only the external power supply provided may be used.

⚠ Do not use this equipment should there be any visible damage to cables and/or connectors.

⚠ Electrical installations used in the same environment as this equipment must comply with the applicable IEC standards.

⚠ Do not look directly into the light output.

⚠ Ensure that the output end of the light guide is safely directed into an enclosed optical path.

⚠ Do not drop this equipment.

⚠ Modification of this equipment will invalidate the warranty and may render the unit inoperable.

⚠ Switch off the unit when not in use.

⚠ Do not allow liquids to enter the housing.

⚠ Do not cover air vents.

⚠ Do not stand the device on its side, upside down or on its rear side.

⚠ High power UV (HPUV) mainframe is NOT backwards compatible with the standard UV module. This module should not be fitted and may damage the module and mainframe.

1.2 Emissions Certificate

This equipment has been tested and found to comply with the limits of EMC directive 2004/108/EC. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and emits radio frequency which may cause harmful interference to radio communications if not installed and used in accordance with the instruction manual.

4

niji 虹

1.3 Safety Certification
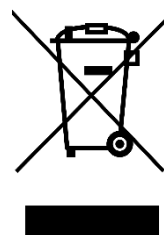
CE Declaration of Conformity

EMC Directive 2014/30/EC

Low Voltage Directive 2014/35/EC

RoHS Directive 2011-65-EU

UL, CSA and TUV Certified power supply

IEC/EN 62471, Photobiological Safety of Lamps and Lamp Systems

WEEE - Under the WEEE directive the niji should be disposed of at recycling facilities where these exist. Registration WEE/BU4061XA.

1.4 Static Sensitivity

Appropriate precautions should be taken to prevent damage from static electricity discharge.

1.5 Technical Support

For technical support and advice, please contact Bluebox Optics Ltd.

This equipment contains no user serviceable parts. For any maintenance or for any concerns regarding function, please notify your supplier or Bluebox Optics Ltd at the point of contact below.

Bluebox Optics Ltd.
Unit 9,
Avro Court, Ermine Business Park,
Huntingdon,
Cambridgeshire,
UK,
PE29 6XS

niji 虹

2   Introduction

Bluebox Optics are proud to present the niji light engine, a modular system providing up to seven spectrally discrete light outputs. All outputs are controlled via our software, designed and developed for maximum efficiency and ease of use. The unit can also be controlled via 3rd party interface using the command protocols provided. The supplied software controls light source selection, on/off switching, TTL configuration and output intensity. The output level can be set with a sliding graphic controlled by mouse, keyboard, touch screen (when using a windows tablet PC) or any combination of the above. Preset values can be saved and loaded at any time to ensure a smooth and accurate setup.

With all modules in position, the niji comprises seven discrete solid state light sources whose outputs are defined by user-exchangeable filters. All modules are optimised during the manufacturing process to ensure the highest quality and precision. Light output can be coupled into a liquid light guide (LLG).

The niji system also comprises a TTL port whereby a TTL signal can trigger light output switching on/off.

The niji multi-wavelength light engine is Mercury free and has been designed for use in a laboratory environment. The intended user will have basic lab experience and an understanding of good working practice as a minimum. The equipment's primary function is to provide a defined set of wavelengths for fluorescence microscopy and for contrast illumination. Each channel of the niji is discrete and can be controlled independently.

2.1 Preventative Inspection

Visually inspect the equipment before each use, paying attention to the cables and connectors. In the event of any cable damage, please notify the equipment supplier and do not use the equipment.

Although the niji does not need regular servicing, care should be taken to ensure the air filters are clean and dust free. These can be replaced if required, please contact your distributor or Bluebox Optics.

2.2 Minimum Computer Requirements

Windows PC with 1 x USB 2.0 Port

USB cable (A-B)

MCP2221 Windows Driver – supplied with equipment

3 System Set-Up and Operating Instruction

3.1 Unpacking and Inspection

The system comprises the following:

- niji Unit
- Filter paddles
- Power Supply
- Power Cable
- USB or RS232 Cable
- USB stick with Software and user manual
- Interlock keys
- 3mm Hex Key for fastening Liquid light guide
- 1.5mm Hex Key for filter paddle grub screw
- Optional accessories
    - Liquid Light guide
    - Microscope Collimator
    - Collimator adapter rings
    - TTL BNC breakout cable

Any inconsistencies or damage should be reported to your supplier immediately. Carefully remove all packing material and check that the above system components are present and undamaged. Any screws that have loosened in transit should be re-secured with the appropriate tool.

3.2 Software

The niji PC application allows the user to control each individual channel, software is provided with each unit and written exclusively for Bluebox Optics.

3.3 Driver Setup (USB control only)

The drivers for this unit will compile automatically when running Windows 10. Any previous version of Windows will require a manual driver install.

The required driver is the [MCP2221 Windows Driver](#) from microchip. Once installed the equipment should be connected to a free USB port.

A driver is not required for RS232 control unless using a USB serial dongle. Refer to the operation manual for the dongle.

3.4 Software Setup

The niji software is a self-contained executable and does not require installation. A copy should be made and transferred to the control PC to allow the software to operate.

3.5 Hardware Placement and Ventilation

Place the equipment on a clean, clear and even surface, ensuring reasonable free space for rear and underside ventilation. Air intake vents are located on the underside

niji 虹

of the equipment and these should remain free from obstruction. A low dust environment with allow longer usage before the air filters need to be serviced. Any significant reduction in air flow may damage this equipment which will impact on its performance and functionality. Internal temperature probes are installed to monitor the equipment temperature and this data is displayed via the software interface.

3.6 Hardware Set-Up

Connect the liquid light guide (LLG) to the device via the input port at the front of the unit (Figure 1).

Connect the equipment to mains power using the power supply provided and connect one end of the USB cable (A-B) to the USB port on the device, and the other to the computer (Figure 2).
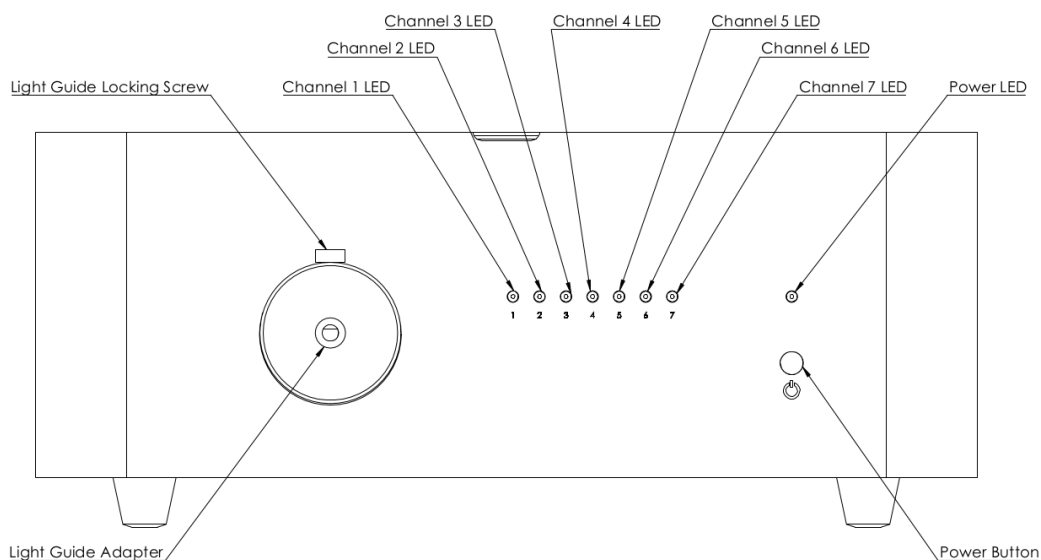
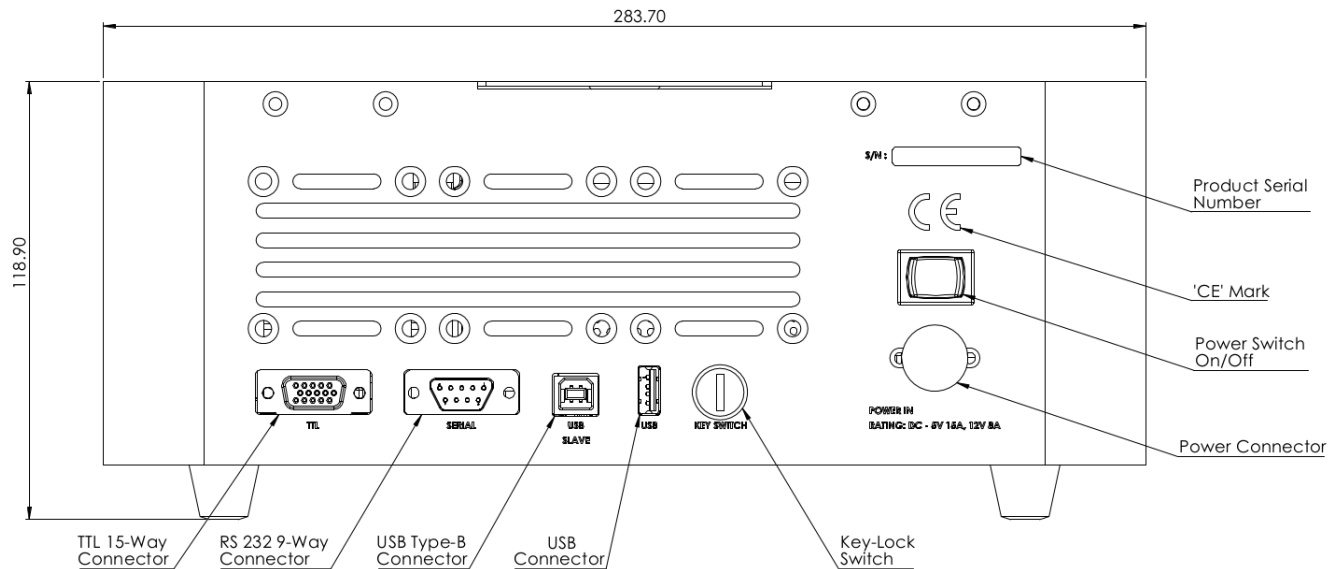⚠ Keep trailing cables tidy to minimise the risk of tripping

Figure 1: Front View Panel

www.BlueBoxOptics.com V2.3

niji 虹

Figure 2: Rear View Panel

3.7 Connect to the niji

Ensure that the niji is connected to the PC via the USB-B cable supplied. The niji should be connected to mains power via the power supply provided and switched on at the power supply unit and at the rear of the unit (Figure 2). The power LED indicator at the front of the niji will show one of the following conditions:

Green	The unit is ready for use.
No Colour/Off	Press and hold the small blue power button at the front of the unit for 5 seconds. The channel LEDs will run through a short start up sequence before the power indicator changes to a constant green.
Red (Flashing)	One or more of the built-in safety Lockout requires action – please see below.

The niji has several built-in safety conditions which must be satisfied before any light is emitted. When the power indicator at the front of the unit flashes red, the following actions should be taken:

- Ensure that the key provided has been inserted into the keyhole at the rear of the unit and turned 90° counter-clockwise.
- Ensure that the lid to the unit is closed.
- Ensure that a light guide has been inserted into the designated light guide input at the front of the unit

Once the niji unit is connected, launch the software application. The software will attempt to seek the correct com port for the niji (See Figure 3). If this is unsuccessful, it will display an "Awaiting Connection" status until a connection is established.

Once a connection has been established, the software is now ready to use and all possible outputs will be displayed along with a slider control for channel setup and configuration (Figure 4, Figure 5). Those not fitted will remain greyed out.

Failure to adhere to all the safety conditions during operation will initiate lockout mode. In lockout mode, no light will be emitted and the power indicator will flash red. Should any combination of lockout conditions occur during operation then the lockout warning in Figure 3 will be displayed in the software.

Figure 3: Lockout Screen Examples

3.8 Software Control

The very top of the software window shows the light status. This will read either "LIGHTS ON" or "LIGHTS OFF". The "LIGHTS OFF" status will only occur if all channels are turned off as they are in Figure 4. When a single or multiple channels are switched on, the status will change to "LIGHTS ON". This is an integral safety feature by design.

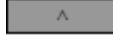See Table 1 for all available light source control commands:
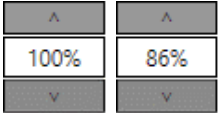
Action	Response
Right mouse click over a channel	Channel On/Off
Select the "Off" button OFF	Channel On
Select the "On" button ON	Channel Off
Mouse scroll up/down within the enabled channel	Intensity up/down respectively
Channel slider up/down for enabled channels	Intensity up/down respectively
Arrow keys on keyboard up/down	Intensity up/down respectively
Arrow keys on screen up/down ∨ ∧	Intensity up/down respectively
Overtype numerical values in the intensity selector ∧ ∧ 100% 86% ∨ ∨	Intensity up/down
LIGHTS ON	All Channels On
LIGHTS OFF	All Channels Off

Table 1: Light Source Controls

niji 虹

When the channel has been switched on, the "Off" button changes to "On" and the column of colour will change from dark to bright. It is possible to adjust the light intensity while in the "Off" mode however, the channel will not switch on unless a "channel on" action is taken. This is an inherent safety feature. Figure 4 and Figure 5 demonstrate the difference in the software display when all channels are off and on respectively.
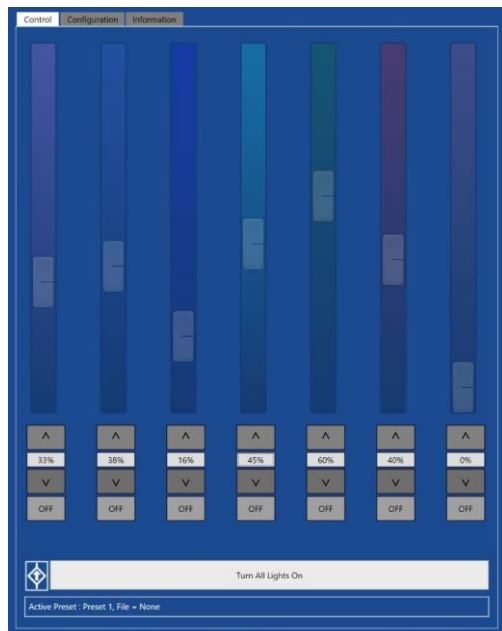

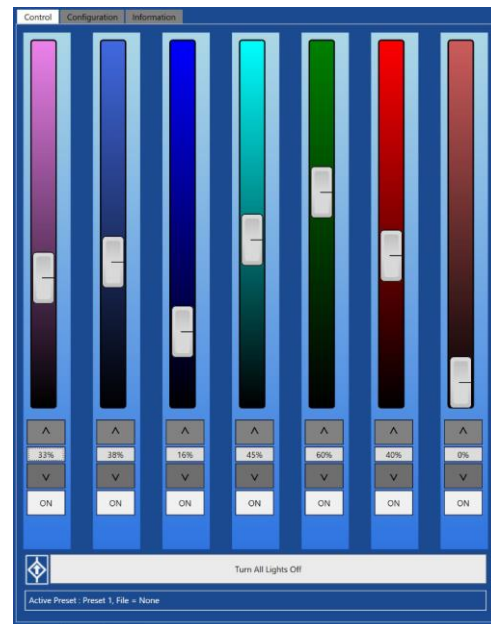Figure 4: Lights OFF - All Channels OFF

Figure 5: Lights ON- All Channels On

Seven channels are available. Channel 5 delivers highly broadband light and as standard, is configured in the broadest band and referred to as Amber. As an option, the emission can be restricted to the green band by changing the LED filter. Selecting either "Amber" or "Green" tells the software which filter has been used to configure the LED and this change will be reflected in the colour of channel 5 as displayed in the software (See Figure 6)*: Selecting Green or Amber in the software does not change the filter or spectral output of the LED. This is a manual process and must be*

www.BlueBoxOptics.com V2.3

niji 虹

completed by the end user. See section 5, "Filter Removal", for further details on manual filter removal.
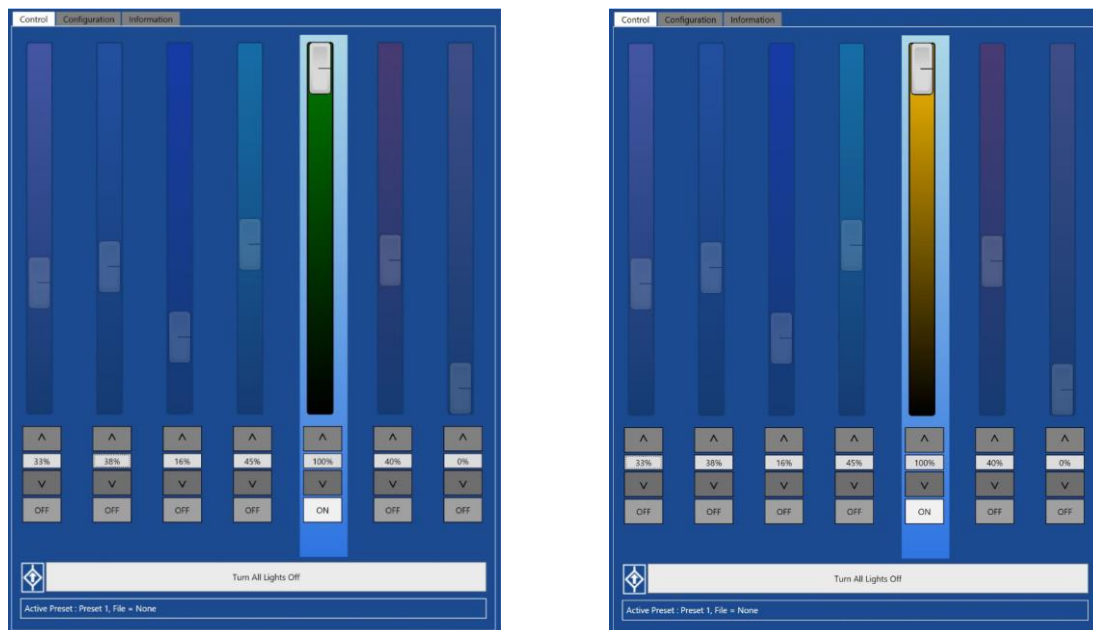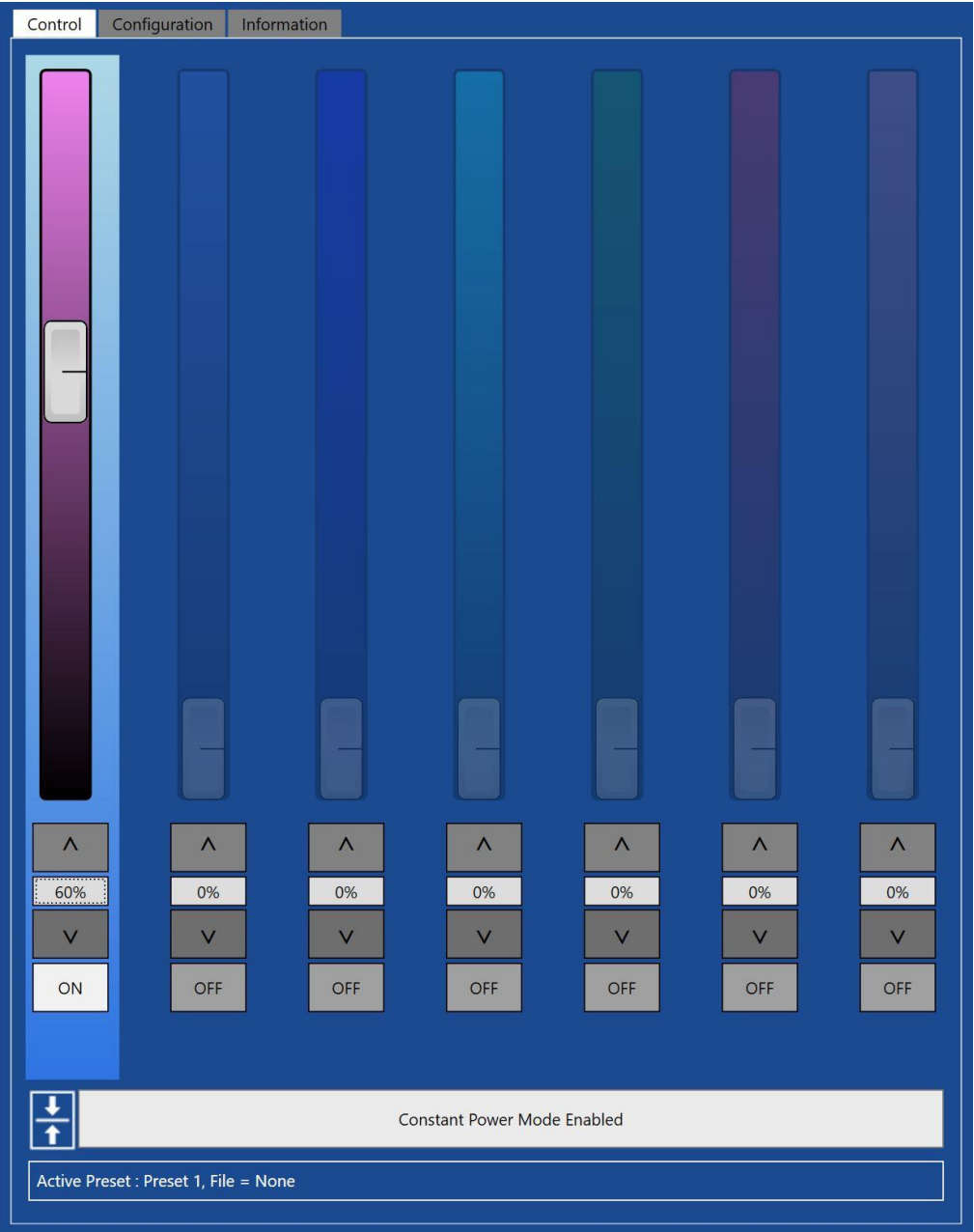

Figure 6: Channel 5 Wavelength Select

3.9 Constant Optical Power Mode

The niji has a constant optical power mode which increases the light power stability of each channel for more precise illumination. It is primarily design for medium to low optical power applciations. This can be enabled in the "Configuration" window.

In Constant Optical Power mode, the niji can be controlled using the sliders etc as it would normally be used but the user will be will be restricted to 80% optical power, allowing the device some overhead for power conpensation. It is programed to record the optical power at the level set and hold the LED stabily at this power level.

NOTE: In constant optical power mode the niji will only allow one channel to be illuminated at a time to restrict photodiode crosstalk between channels.

niji 虹

Control | Configuration | Information

niji 虹

^ ^ ^ ^ ^ ^ ^

60% | 0% | 0% | 0% | 0% | 0% | 0%

∨ ∨ ∨ ∨ ∨ ∨ ∨

ON | OFF | OFF | OFF | OFF | OFF | OFF

Constant Power Mode Enabled

Active Preset : Preset 1, File = None

niji 虹

3.10 Compatible Mode

The niji is compatible and programmable with many microscope systems. Custom configuration including intial power on settings can be achieved using the XML configuration file. If you wish to use the niji in compatible mode or with a custom configuration, please contact Bluebox Optics or your local distributor.

3.11 TTL Setup from Software

The 15 way TTL interface on the rear of the unit can be used to trigger from 1 to 7 channels independently and simultaneously.

To choose which channels you wish to control remotely, you will need to ensure that the relevant pins on the 15 pin connector are connected to a suitable signal generator and to the 15 way TTL interface at the rear of the niji. A BNC breakout cable is available from Bluebox Optics.

TTL settings can be found in the "Configuration" tab on the niji software. There are two ways to activate TTL mode. With the physical connections completed, either check the "TTL Light Control" in the niji software (Figure 10), or send a serial command (Page 27).

Active High or Active Low

TTL triggering can be configured in "Active High" or "Active Low" mode (see Table 2 below). "Active High" mode turns the specified channels "on" when a 5V logic level is applied to a channel pin (Table 3) and "off" when a 0V logic level is applied. An "Active Low" configuration turns the specified channels "on" when 0V is applied and "off" when 5V is applied. The level of emission of each channel is set either through the niji software or through serial commands.

Those channels that are not connected to the TTL interface will remain in their "on" or "off" state independent of the emission status of any TTL controlled channels.

Example: Setting the blue channel to deliver 50% max emission when TTL is at 5V using the software interface.

1. Connect pins 6,7,8,10 to the ground pin of your TTL generator
2. Connect pin 12 to the 0-5VDC output of your TTL generator
3. Set the emission level of the blue channel to 50% using the software interface
4. Activate the TTL Light Control by ticking the box on the software (Figure 8).
5. Select Active High Input from the drop down menu (Figure 8).
6. Select "100k Pull Up Enabled" (Figure 8).

When the TTL output is at 5V, the blue channel will emit 50% of maximum output power, and 0% when the TTL is at 0V. To increase or decrease the level of output emission of the channel, simply adjust the output whilst in TTL mode, and the channel output will change to the new setting in the next on/off cycle.

In this example, those channels that are not connected to the TTL interface will remain in their current "on" or "off" state independent of the TTL and emission status of the blue channel.

<u>100k Pull Up Enabled vs 100k Pull Down Enabled</u>

Enabling the 100k Pull Up/Down feature allows multiple channels to be set to emit synchronously and independently of the state of a switched TTL channel.

In "Active High" mode and with the "100k Pull Up Resistor" enabled, all channels will be in an "on" state, and only the TTL triggered channels will be controlled by the TTL interface. In this mode, only those channels which are tied to ground are in the "off" state.

With the 100k Pull Down resistor activated, all channels will be in an "on" state, and only the TTL triggered channels will be controlled by the TTL interface. In this mode, only those channels which are tied to 5V are in the "off" state.

Active High	Active Low	100k Pull Up	100k Pull Down	5V	GND	Function
●	-	●	-	ON	OFF	TTL and static channel control[1]
●	-	-	●	ON	OFF	TTL Active Only
-	●	●	-	OFF	ON	TTL Active Only
-	●	-	●	OFF	ON	TTL and static channel control[2]

Table 2: TTL Configuration

Pin Number	Description	Channel	Electrical
1	Red	6	Vmax = 5.0V
2	Green/Amber	5	
3	Cyan	4	
4, 5, 9, 14	Not Used	-	-
6,7,8,10	Ground	-	-
11	Royal Blue	2	Vmax = 5.0V
12	Blue	3	
13	Ultra Violet	1	
15	Far Red	7	

Table 3: 15 Way TTL Connector Pinout
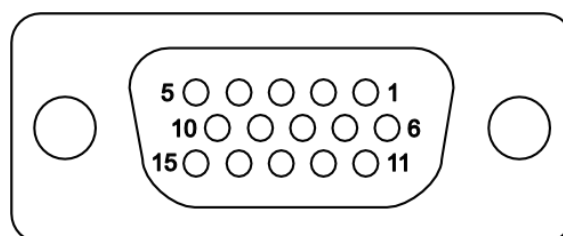
Figure 7: Rear view of TTL Connector

---

[1] In this mode, any unwanted channels must be tied to GND to turn the channel OFF.
[2] In this mode, any unwanted channels must be tied to 5V to turn the channel OFF.

www.BlueBoxOptics.com V2.3

niji 虹
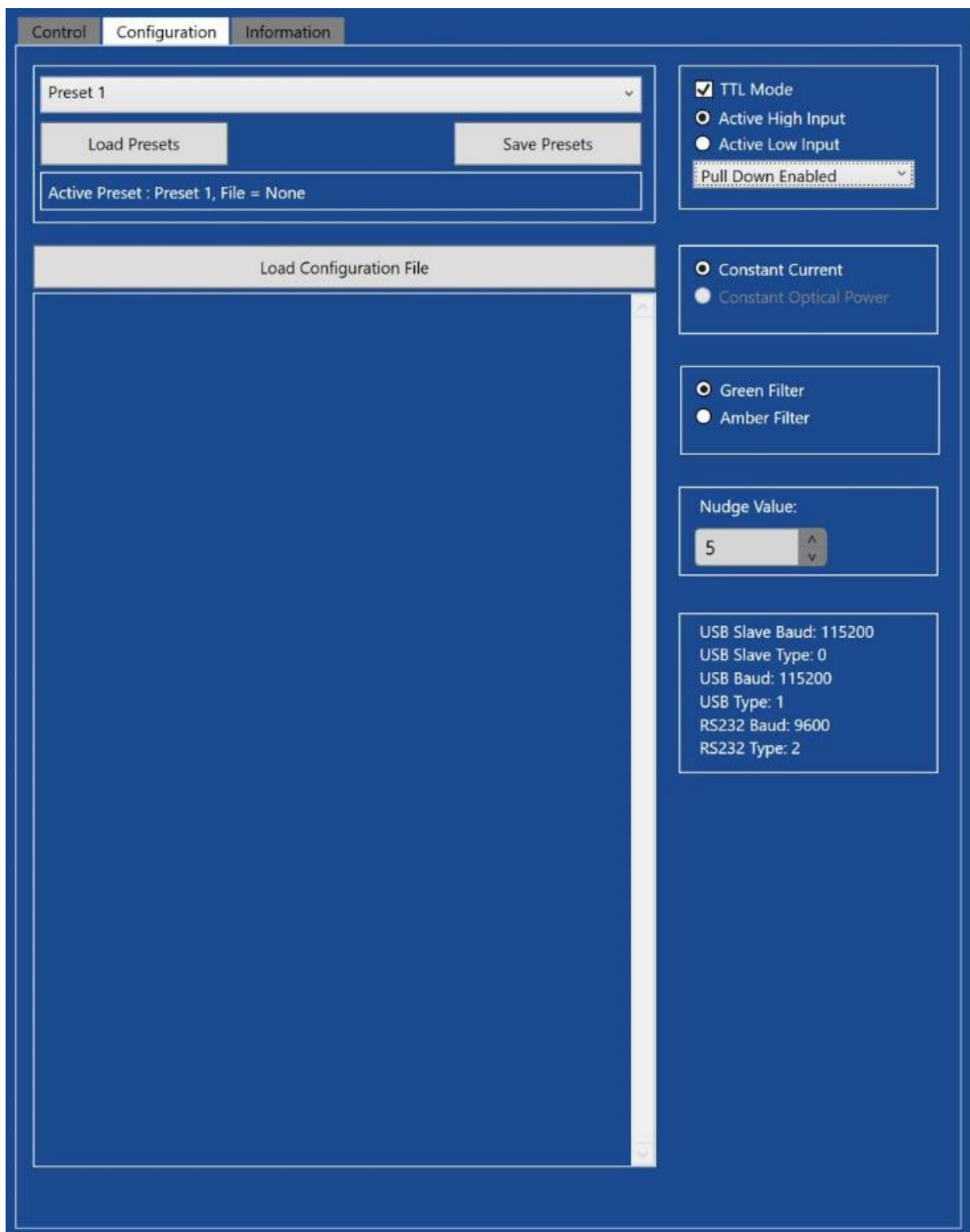
Figure 8: TTL Mode Active

niji 虹

3.12 Presets

After setting the channels, the set values and channel status (ON-OFF) can be saved to a preset found in the "Configuration" tab. This allows multiple users to save their individual configurations. Up to 10 preset configurations can be saved and recalled at any time however, an unlimited number of preset files can be saved if needed, see Figure 91.
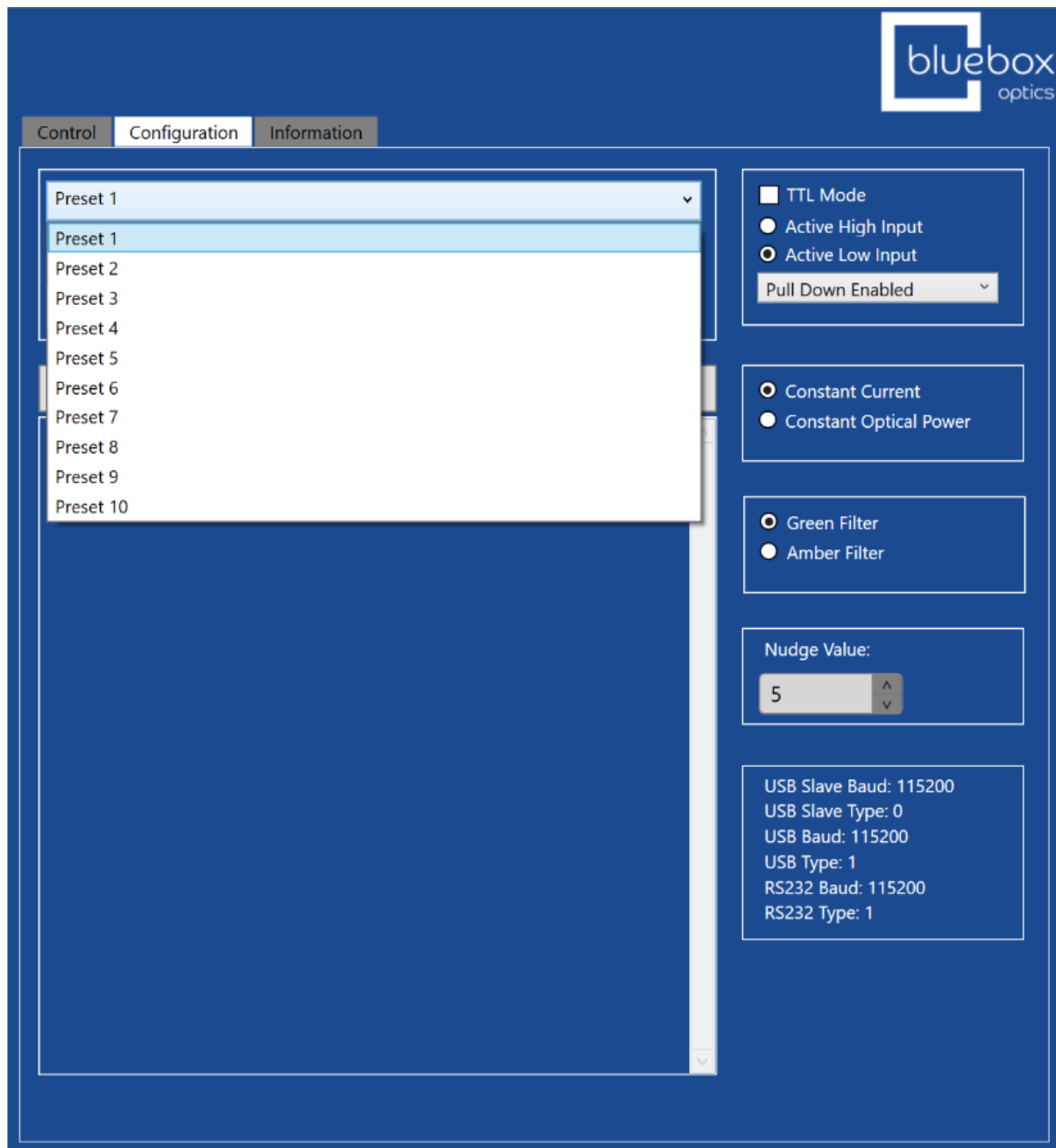
Figure 9: Preset Options

To save a preset, select your chosen preset identification name by right clicking your mouse in the preset box and typing over one of the 10 preset numbers. Hit "Enter" on the keyboard to save the preset name and return to the main screen. Once satisfied

www.BlueBoxOptics.com V2.3

niji 虹

with your preset configuration click "Save Presets" which will prompt you to choose a file name and save location for this preset file. This allows for unlimited saving of presets under unique file names/locations. The preset function retains the channel on/off and channel intensity values from the save point.

To load a preset, select "Load Preset" and select your chosen preset file from your specified location. The "Active Preset" box will then display your chosen preset filename and preset identification name. Figure 10 shows preset filename as "Test Presets" and preset identification name as "Test Preset ".
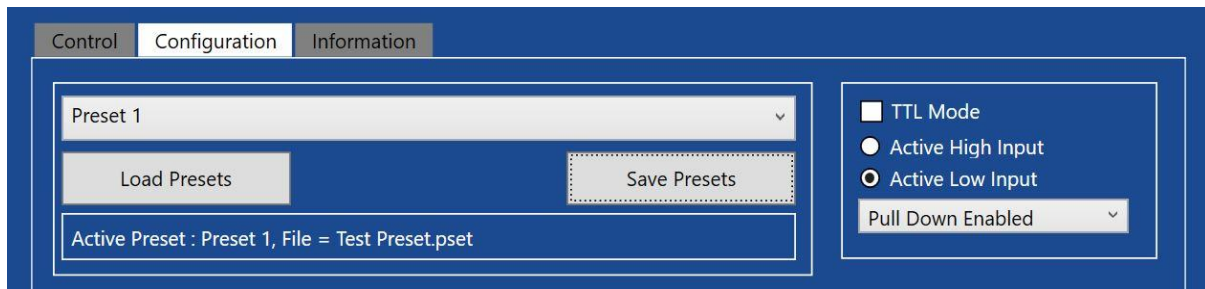
Figure 10: Preset Loaded

3.13 Software Dual Operation Mode

The niji can receive and send commands to multiple sources via the separate hardware connection ports (USB and RS232). For example, with the niji software running on a windows desktop and a windows tablet, both devices can control and monitor the current level settings. If a level is changed on one software instance the other instance of the software will mirror the change.

3.14 Using the niji with Micromanager

The niji has a native Micromanager adapter which is available by downloading the nightly release. If running the niji with Micromanager using the RS232 connection, the baud rate should be set to 57600 using an XML configuration file. If you are not sure how

niji 虹

3.15 Internal Temperature

The internal temperature of the unit is displayed in the information tab. Case Temperature (2) monitors ambient case temperature. Case Temperature (1) monitors the temperature at board level.

Figure 11: Internal Temperature Display

niji 虹

4 General Use

4.1 Hardware Operation

The equipment has been designed to operate using a PC interface or Windows Tablet.

Power the device ON by pushing the blue on/off button. The LEDs will flash left to right and the standby LED with turn solid green. The system can be placed on standby if pressed again.

The niji unit is modular and comprises seven self-contained modules each with its own unique wavelength. Modules can be inserted and removed at any time should you require. Please refer to the "Module Operation" section for instructions on inserting and removing modules.

To isolate the equipment from the mains, use the dedicated power switch either on power supply unit or the rear of the niji. This is the suggested method of use when removing or installing a module.

Please note that the HPUV and the standard UV module are NOT compatible, they must only be fitted to the correct mainframe.

4.2 Channel Output Settings

Each channel of the light source is defined by percentage level where 100% represents the maximum available intensity and 1% represents the minimum emission of the system.

4.3 Light Guide Adapter and Interlock

To install the light guide, push the 3mm light guide in to the light guide adapter to its limit. Lock the ferrule in place with the locking screw using finger tight clamping force. Please do not over tighten the locking screw as this may damage the ferrule and light guide, and is likely to result in reduced performance.

The unit will remain in lockout mode and cease to emit light when the light guide is disconnected from the niji.

4.4 Lid Removal and Interlock

The unit will remain in lockout mode and cease to emit light while the lid is removed. The lid is magnetically coupled to the niji mainbox frame. If removal is required for filter and module changes, simply lift the lid upwards to break the magnetic coupling and set to one side. Removal of the lid will activate the lid interlock and prevent emission from all of the channels. With the lid removed, reduce the risk of contamination by making any changes in a dust free environment. Once the changes have been made, please replace the lid carefully to protect the niji interior and to deactivate the interlocks.

niji 虹

5 Removable Filters

⚠ Gloves should be worn when handling filters and filter paddles.

Remove the lid to expose the modules, take care to keep contaminants such as dust to a minimum to reduce the risk of contamination. All removable filters are labelled with their respective channel number and name. The filter is held in a plastic paddle-shaped material which is safe to handle (Figure 12).
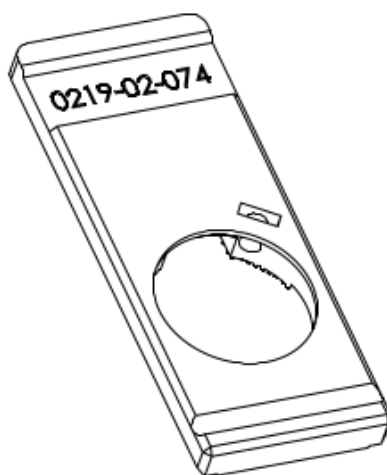
Figure 12: niji Filter Paddle

One side of the paddle is rough while the other is smooth. The smooth surface should face towards the module with the rough facing away. Each filter can be inserted one way only. As they are interchangeable, care should be taken to ensure that they are positioned correctly (Figure 13).

To remove a filter paddle simply grip and pull gently upwards. To insert a filter paddle, align then push down. The filter paddle will audibly click into place to indicate that it is aligned with the LED.

Figure 13: Filter Positioning

Note: Every effort should be made to avoid contaminating the surface of the optical filters. Should a filter become contaminated with dust or grease, it can be cleaned. Full instructions on cleaning are available on our website, www.blueboxoptics.com.

To replace a filter on any channel, with the exception of the Green/Amber channel, position the filter paddle rough side down on a smooth and clean surface. Remove the screw an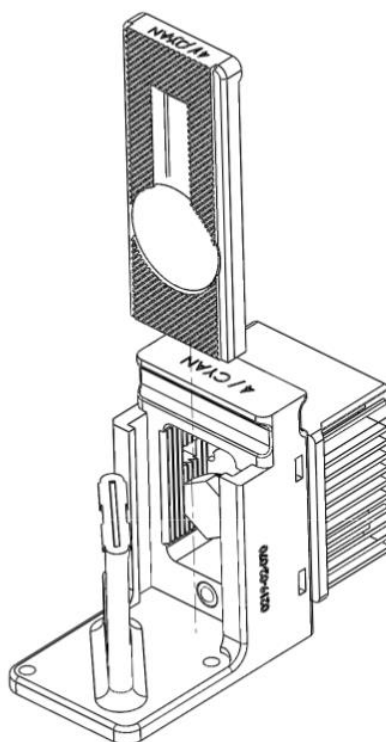d set to one side. Gently release the filter by pushing the filter from the smooth to the rough side of the paddle. Do not make contact with the surface of the filter itself, but instead apply force to the outer black mounting ring. Before inserting a filter, position the paddle rough side up on a smooth and clean surface. Each filter has a small arrow printed onto its edge, place the filter into the paddle with the arrow pointing towards the rough side. Avoid making contact with the coated surface of the filter and instead apply force to the outer black mounting ring. Replace the screw and tighten using the supplied 1.5mm hex key to secure the filter in the paddle (Figure 14).

www.BlueBoxOptics.com V2.3

niji 虹
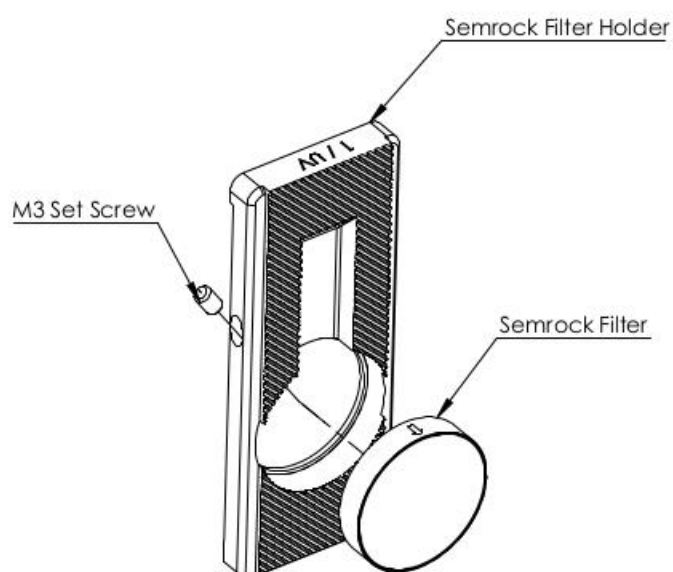
Figure 14: A Filter and Filter Paddle

Since the light emission on the Green / Amber channel is very broad in wavelength, the filter paddle channel has been designed to hold 2 filters for multiple fluorophores. To replace a filter on the Green/Amber channel, select the filter and paddle orientation as per Figure 15. Place the paddle on a smooth and clean surface, remove the screw and set to one side. Gently release the filter by pushing through from the smooth side of the paddle. Before inserting a filter, position the paddle rough side up on a smooth and clean surface. Each filter has a small arrow printed onto its edge, place the filter into the paddle with the arrow pointing away from the rough side. Replace the screw and tighten using a 1.5mm hex key to secure the filter in the paddle.
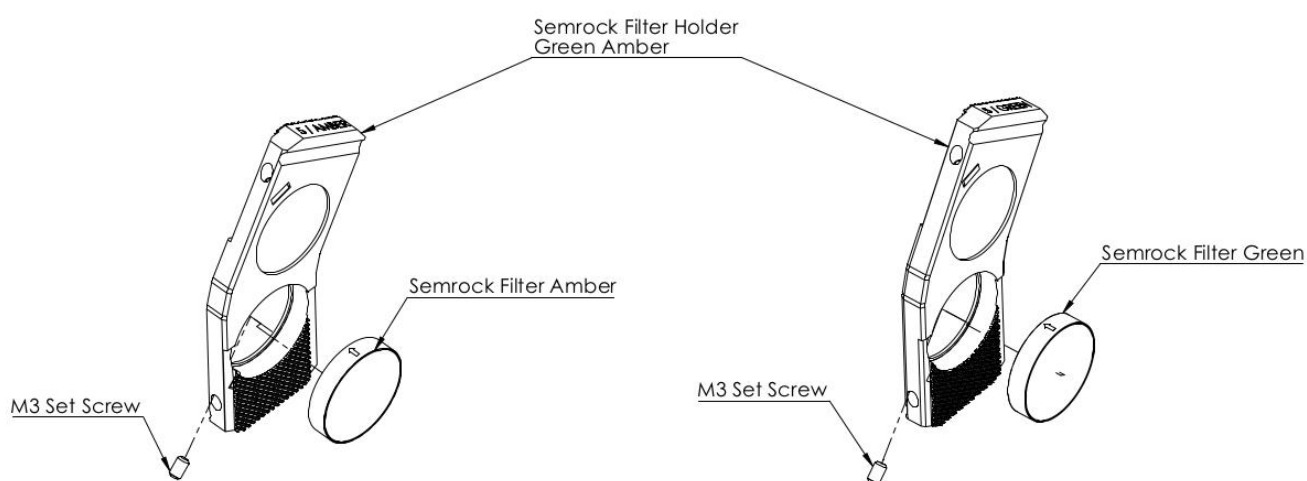

Figure 15: Green/Amber Channel Filter and Filter Paddle

niji 虹

⚠ Avoid contamination and scratching of the filter surface

6 Module Operation

Remove the lid to expose the modules. The lid of the niji is magnetically coupled to the main body and can be removed simply by lifting the lid and breaking the magnetic coupling. Whenever removing the lid of the niji, attention should be taken to ensure that contaminants such as dust are kept to a minimum.

Ensure that the lid of the niji is only removed in a dry, dust free environment, such as a clean room or laboratory space. Ensure that he niji is left open only for short intervals and replace the lid as soon as possible.

Each module is labelled with its channel number and name, indicating its location in the niji. This labelled area also acts as a grip for the removal and insertion of each module into the mainframe and is perfectly safe to handle.
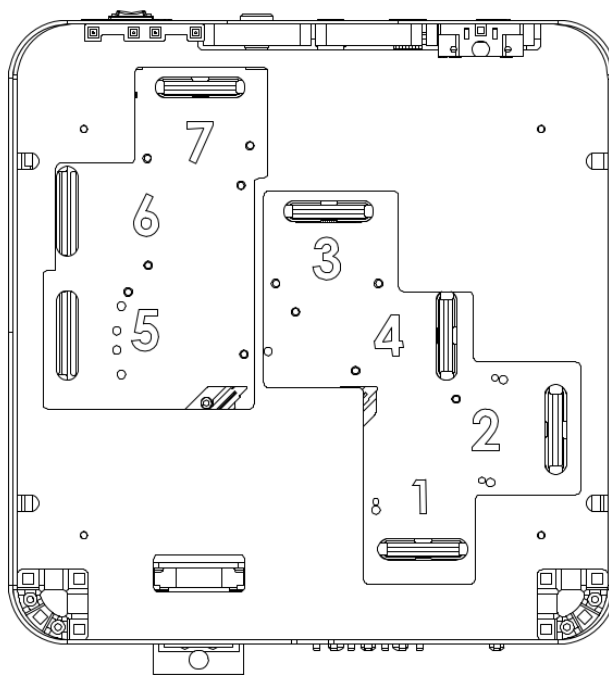
Figure 16: niji Unit without Modules

Each module is unique in shape and can only be positioned and secured in its designated position. The footprint also bears the module number for reference (Figure 16). Two thumb screws are used to secure the module in position. These can be loosened and tightened by hand or gently by means of a 5.5mm socket tool. They should be tightened to finger tightness only. Please take care when tightening these screws as overtightening them may result in damage to your system. Guidance pillars on the base plate assist in aligning the module.

⚠ Do not apply excessive force, modules are designed to fit in one position only.

niji 虹

Before removing or installing a module, isolate the equipment from the mains via the dedicated power switch at the rear of the unit.

To remove a module simply remove the two thumb screws and gently lift upwards holding on to the plastic labelled grip. The two closest thumb screws may not always relate to the module you wish to remove. Care should be taken to ensure that the correct thumbscrews have been identified. The electrical connection is made via a card edge connection, this will need to be gently eased out.

⚠ Do not allow thumb screws to roll into the unit from the top plate. Set them to the side once removed.

⚠ Store any unused modules in an anti-static bag/dust proof environment.

6.1 Module Installation

To install a module, locate the footprint and module orientation before gently lowering the module into the unit. Use the guidance pillars to aid alignment and ensure that the base of the module is seated in a flat position on the floor of the baseplate and the card edge connection is correctly aligned before securing it with the thumb screws.

Please note that the HPUV and the standard UV module are NOT compatible, they must only be fitted to the correct mainframe.
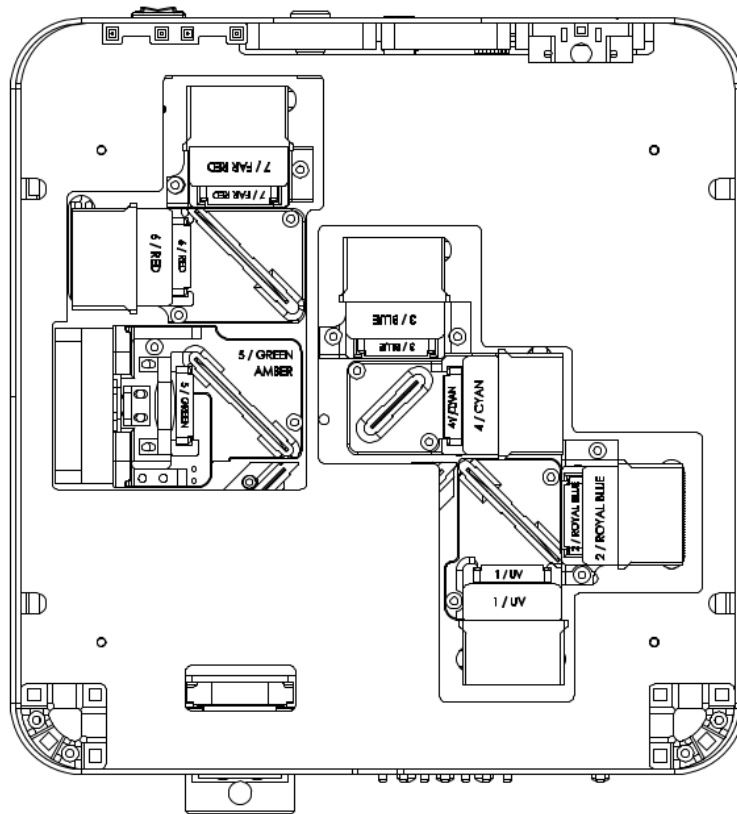
www.BlueBoxOptics.com V2.3

niji 虹

Figure 17: niji Unit with all Modules

7 Optics

Optics should be handled minimally and should not be exposed to contamination including dust, finger prints and solvents. We have a specified cleaning procedure should the surface of the filters be contaminated through handling, exposure to dust etc. Full instructions can be found on our website, www.blueboxoptics.com.

8 Serial Command Control

The equipment can be controlled via the software provided or through a serial connection over USB or RS232. Both interfaces are located at the rear of the unit (Figure 2). The equipment can be controlled using command strings.
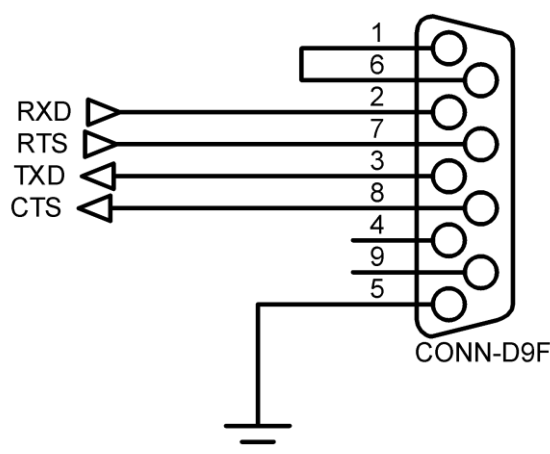
www.BlueBoxOptics.com V2.3

niji 虹

Figure 18: RS232 Communication Interface

Note: If a command string is sent to the equipment via serial connection, the software will not indicate the change in state.

8.1 Communication

When connecting the equipment via a serial connection, serial connection software such as Hyper terminal or Termite are recommended. The serial port should be configured as follows:

Port	<select COM>
Baud rate	115200
Data bits	8
Stop Bit	1
Parity	None
Flow control	RTS/CTS
Forward	None
Transmitted	CR and LF

Figure 19: Port Setup

8.2 Channel Level Command String

The serial command string is split into three parts. These are the command identifier, the channel and the channel level. The command string is constructed as follows:

$$d,1,0$$

<Command>, <Channel Select (1-7)>, <Channel Level (0-100)>

8.3 Channel Level Set: Example

Should we wish to set Channel 2 to 60%. The command string would be constructed as follows:

$$d,2,60$$

niji 虹

8.4 Channel On/Off

To set a channel On or Off use the following command structure.

D,1,0

<Command>, <Channel Select (1-7)>, <Channel On/Off (1 or 0)>

8.5 Channel Active Set: Example

Should we wish to set Channel 2 to Active. The command string would be constructed as follows:

D,2,1

8.6 Channel Identification

Channels of the equipment are referenced from the software, reading left to right. The channel allocations are as follows:

Channel	Wavelength
1	Ultra Violet
2	Royal Blue
3	Blue
4	Cyan
5	Green/Amber
6	Red
7	Far Red

8.7 TTL Command String

The TTL command string is split into four parts. These are the command identifier, function ON/OFF, Active state and logic state. The TTL string is constructed as follows:

TTL,0,0,0

<Command>, <ON/OFF>, <Active State)>, <Pull up/down>

Use the following logic level to set the Active State and the Logic State. The TTL active state can be defined as either High(1) or Low(0). The internal logic can be either Pull Up(1) or Pull Down(0).

8.8 TTL Set: Example

Should we wish to set TTL ON, with Active Low and a Pull Down. The command string would be constructed as follows:

TTL,1,0,0

niji 虹

9 Technical Specifications

Product Reference	niji
Weight	4.7 Kg
Line Voltage	90-264 Vrms
Line Frequency	47-63 Hz
Dimensions	315 mm x 288 mm x 107mm
Connectivity	USB-A (powered), USB-B, RS-232 (Serial) and TTL via a 15-way connector
Eye Safe	Yes
Mercury Free	Yes
Operating Conditions	10 to 40°C
Storage Temperature	-10 to 60°C
Humidity	40% to 70% RH
Warranty	12 Months, 3 year Optional

9.1 External Power Supply

Manufacturer	Bluebox Optics Ltd
Model	niji-PSU-2
IP	00
RoHS Compliance	Compliant
UL	UL Compliant power supply
CE	CE marked

9.2 Typical Wavelengths and Relative Power emission

www.BlueBoxOptics.com V2.3

niji 虹
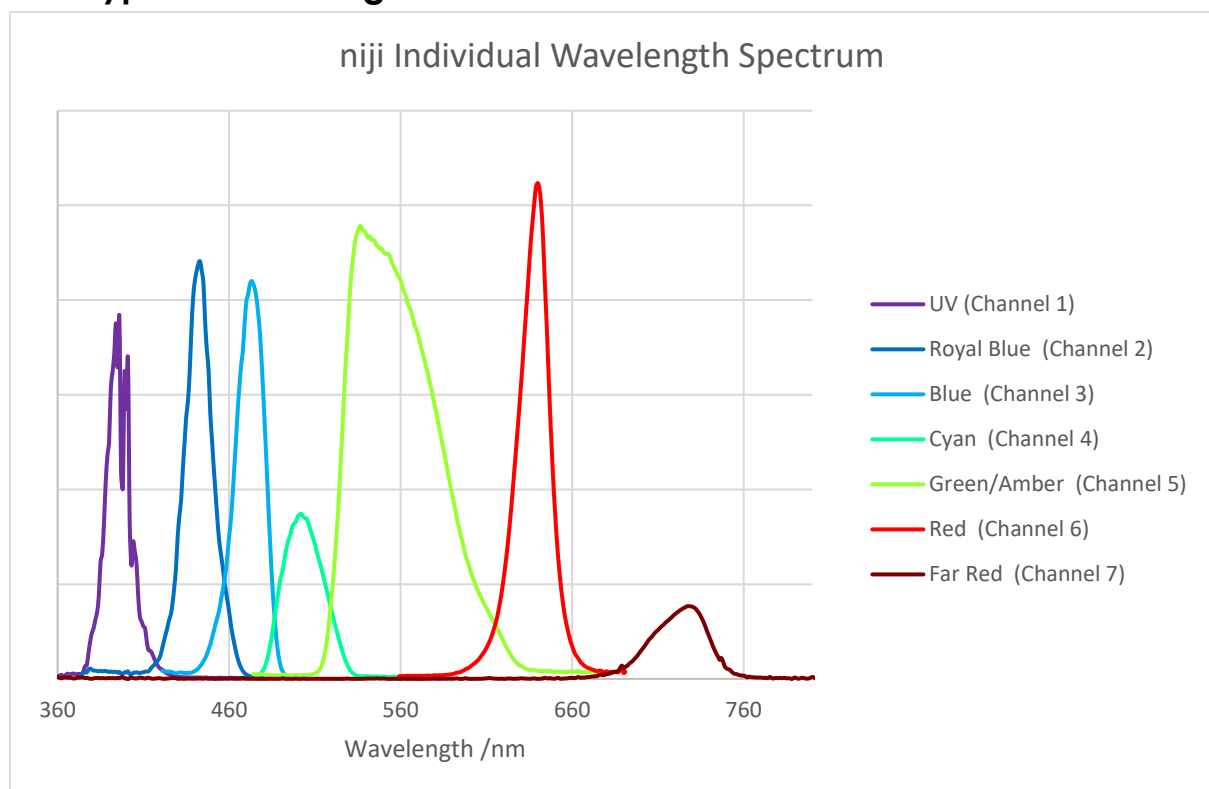
9.3 Classification

Type of protection against electric shocks: Class 1
Degree of protection against electric shocks: Applied part of Type B

niji 虹