

doric

**Neuroscience Console 500**

User Manual

Version 1.0.0

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## Overview

### 1.1 System Overview

The Neuroscience Console 500 (NC500) (Fig 1.1a) is a data acquisition hardware that supports multiple modalities in parallel with an increased number of ports, higher resolution, and faster sampling rate compared to the Doric Fiber Photometry Console. It has been developed in parallel with a new version of the Doric Neuroscience Studio to manage multiple data sources and visualize multiple data streams in a user-friendly and efficient interface.

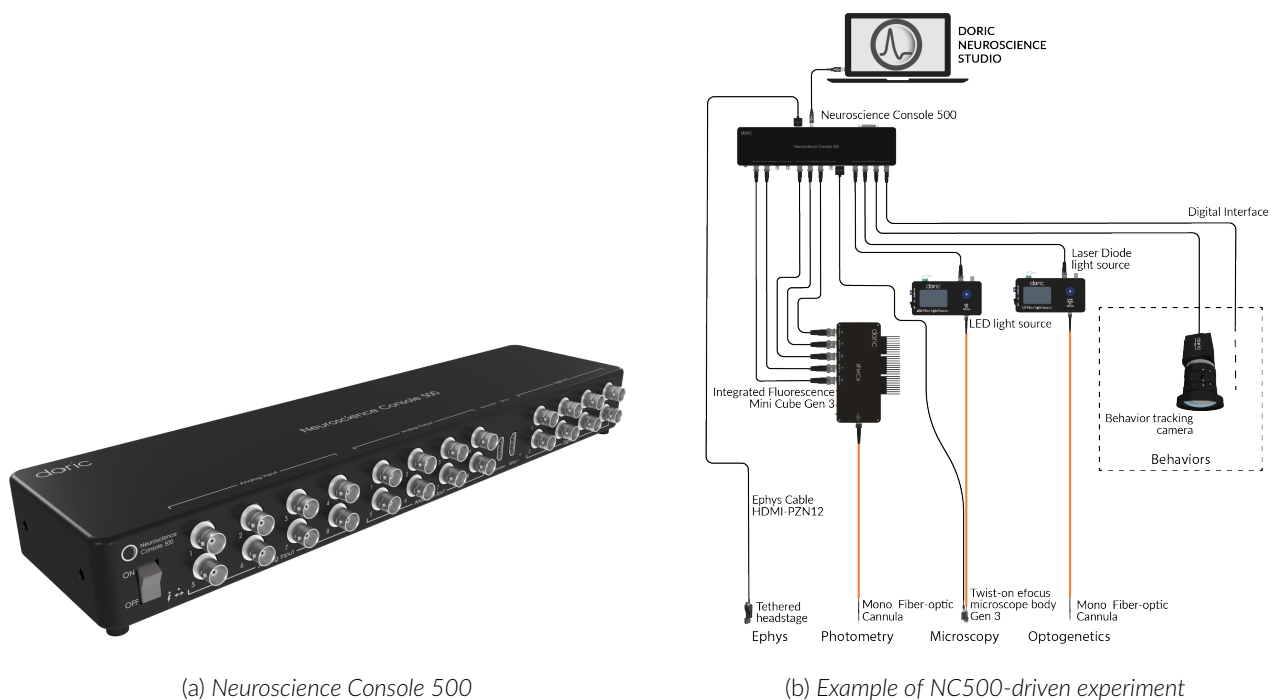


Figure 1.1: Neuroscience Console 500 overview

The main functionalities of the Neuroscience Console 500 are:

- High resolution analog voltage acquisition with pre-sets for lock-in and time interleaved detection for multi-color, multi-site fiber photometry recordings
- Doric miniaturized fluorescence microscope recordings
- Doric electrophysiology recordings
- Multiple digital input and output (TTL) for synchronization and closed-loop experiment with external devices such as behavior camera, operant conditioning chamber, video tracking software, optogenetic light sources... (Fig 1.1b)

- Keypress event for manual behavior event tagging during recording

## 1.2 Ports presentation

The Neuroscience Console 500 is equipped with different types of dedicated ports that can be used separately or in combination with one another for multi-modalities experiments (Fig 1.2a, 1.2b):

- 1 port (HDMI connector) for a Doric miniature fluorescence microscope (Gen. 3)
- 2 ports (HDMI connectors, 1 at the front and 1 at the back) for Doric Ephys. tethered digital headstages
- 8 Analog Output ports
- 8 Analog Input ports
- 8 Digital Input/Output ports
- 1 DB25 port including 8 Digital Inputs/Outputs, 8 Digital Inputs and 8 Digital Outputs (DB25 adapter to wires included). (pinout described in Fig 1.3)

The Neuroscience Console 500 is also equipped with:

- At the front of the device: (Fig 1.2a)
  - An ON/OFF power switch
  - A light indicator that is ON and static when the NC500 is powered ON
  - A light indicator that is ON and static when the NC500 is connected to the Doric Neuroscience Studio software
  - A light indicator that is ON when Microscope is connected to the NC500 and initialized
  - A light indicator that is ON when an Ephys. headstage is connected to the NC500 and initialized
- At the back of the device: (Fig 1.2b)
  - A USB3.0 port to connect the console to the computer
  - A USB port for support
  - A 12V power input port

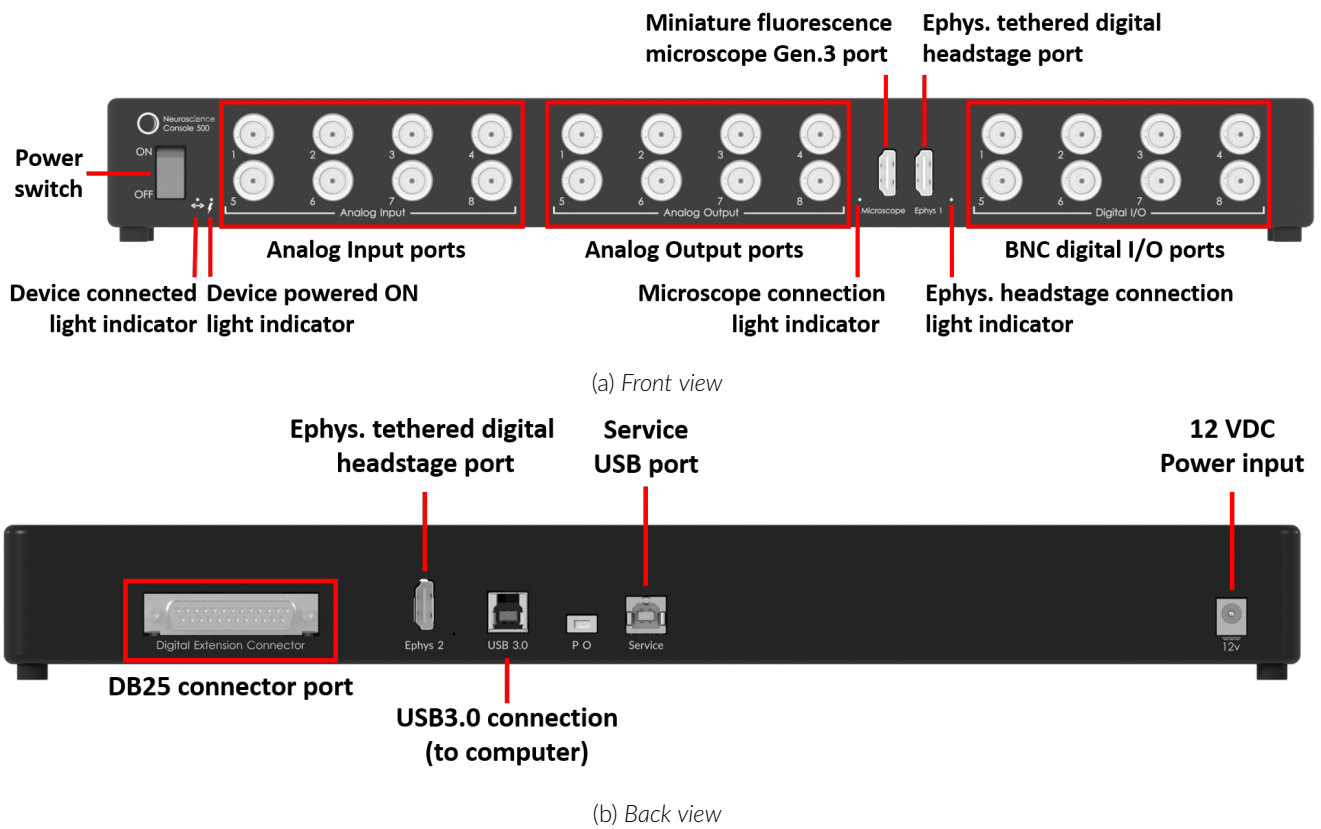


Figure 1.2: Neuroscience Console 500 connectivity

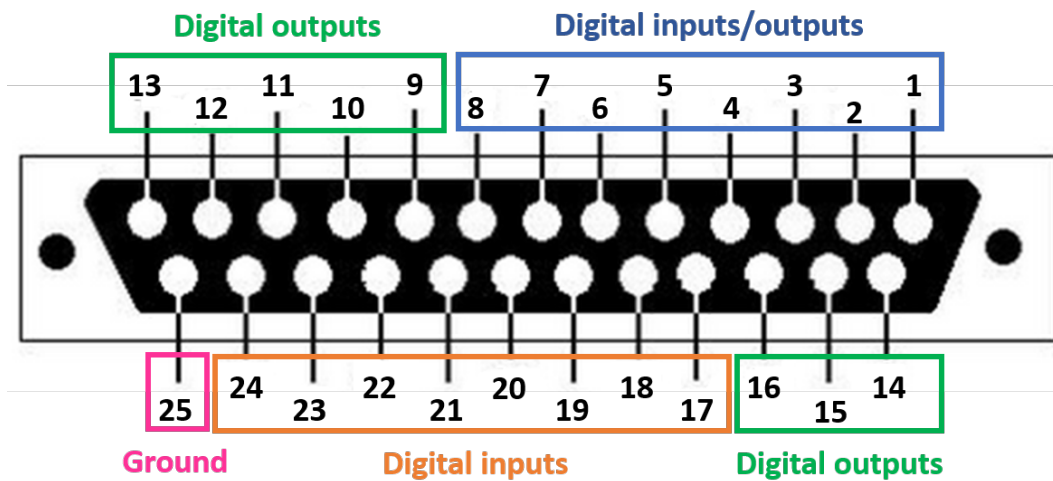


Figure 1.3: DB25 port pinout description

## Operations Guide

### 2.1 Connecting the Neuroscience Console 500

Follow this quick start procedure to install and connect the system. We recommend the following order to avoid device and driver detection problems.

- **Install Doric Neuroscience Studio software.** Follow the on-screen instructions to install the Doric Neuroscience Studio Software on the hard drive of your computer. For more details, refer to the [Doric Neuroscience Studio Software User Manual](#).
- **Connect the Neuroscience Console 500.** The console unit is powered with a 12 VDC power supply adapter. Then connect the console to the computer via the USB 3.0 cable.
- **Connect other devices (optional).** Connect to the NC500 other devices that may be needed depending on the experiment (microscope, Ephys. headstage...)
- **Connect outputs (optional).** The console can send TTL pulses or analog outputs to other devices. Connect these devices to the Digital I/O or Analog Out port of the *Neuroscience Console 500* with a BNC cable.
- **Connect inputs (optional).** Digital inputs receive TTL pulses while analog inputs receive analog signals ( $\pm 10$  V signals) that can be displayed and saved using the *Doric Neuroscience Studio*. Connect the devices to Digital I/O or Analog In ports of the *Neuroscience Console 500* with a BNC cable.
- **Launch Doric Neuroscience Studio software.**

## Specifications

### 3.1 General specifications

Table 3.1: *General specifications for the Neuroscience Console 500*

SPECIFICATION	VALUE	NOTES
<b>Digital I/O</b>		
Number of ports	32	-
Maximum sampling rate	50 kSps	-
Maximum output frequency	20 kHz	-
Interface	8 BNC I/O + 1 DB25 (8 I/O + 8 Input + 8 Output)	DB25 adapter to wires included
<b>Analog Output</b>		
Number of ports	8	-
Output range	0-5 V	-
Maximum output frequency	10kHz	-
Resolution	16 bits	-
Interface	8 BNC ports	-
<b>Analog Input<sup>1</sup></b>		
Number of ports	8	-
Input range	+/- 10 V	-
Sampling rate	up to 50 kSps	-
Resolution	18 bits	-
Interface	8 BNC ports	-
<b>Computer requirement</b>		
Operating system	Microsoft 10, 64 bit	-
Memory	8 GB RAM minimum (16 GB recommended)	-
Processor speed	3 GHz and 8 cores	-
Hard drive	500 MB of free hard disk space	SSD recommended
Connection to computer	USB3.0	cable included
<b>Physical properties</b>		
Size	115x50x400 mm	-

<sup>1</sup>Chopping Enabled: This mode provides very low noise with lower output rates. Chopping does not eliminate the offset error and drifts caused by input resistors. Noise performance depends on the selected analog input range and the chopping mode. The analog input is always operated with chopping mode in order to optimize the offset drift and

to allow a better noise performance. When starting an acquisition, the input data rate (Samples per second) can be selected according to the needs of each test. Higher data rate provides higher RMS noise. Analog inputs are reversed and then calculated as an average of two conversions in order to reduce the offset error.

Table 3.2: *Analog input noise and resolution specifications with chopping mode enabled*

<b>Data rate</b>	<b>Real Rate</b>	<b>Time resolution</b>	<b>- 3dB Frequency</b>	<b>RMS noise</b>	<b>Effective resolution<sup>1</sup></b>
0.3 kSps *C	372 Hz	2686 $\mu$ s	200 Hz	9.6 $\mu$ V	20.0 bits (9.5 $\mu$ V/bit )
1.0 kSps *C	1 001 Hz	999 $\mu$ s	520 Hz	15.5 $\mu$ V	19.3 bits (15.5 $\mu$ V/bit )
2.5 kSps *C	2 534 Hz	395 $\mu$ s	1 300 Hz	26.1 $\mu$ V	18.5 bits (27.0 $\mu$ V/bit )
6.0 kSps *C	6 041 Hz	166 $\mu$ s	3 100 Hz	46.0 $\mu$ V	17.7 bits (47.0 $\mu$ V/bit )
12. kSps *C	12 166 Hz	82 $\mu$ s	6 300 Hz	120 $\mu$ V	16.3 bits (123.9 $\mu$ V/bit )

<sup>1</sup> Effective resolution for linear mode at  $\pm 10$  V input range. Input resolution is 16 bits (0.152 mV). Lower data rates provide higher effective resolution. The lock-in mode allows higher effective resolution. In this case, the effective resolution is higher than RMS noise for every listed frequency.

### 3.2 Environmental specifications

Table 3.3: *Recommended Environmental Specifications*

<b>DESCRIPTION</b>	<b>OPERATION</b>	<b>STORAGE</b>
Use	Indoor	Indoor
Temperature	0-40 ° C	0-40 ° C
Humidity	40-60% RH, non condensing	40-60% RH, non condensing



## Support

### 4.1 Maintenance

The product does not require any maintenance. Do not open the enclosure. Contact Doric Lenses for return instructions if the unit does not work properly and needs to be repaired.

### 4.2 Warranty

This product is under warranty for a period of 12 months. Contact Doric Lenses for return instructions. This warranty will not be applicable if the unit is damaged or needs to be repaired as a result of improper use or operation outside the conditions stated in this manual. For more information, see our [Website](#).

### 4.3 Disposition



Figure 4.1: WEEE directive logo

According with the directive 2012/19/EU of the European Parliament and the Council of the European Union regarding Waste Electrical and Electronic Equipment (WEEE), when the product will reach its end-of-life phase, it must not be disposed with regular waste. Make sure to dispose of it with regards of your local regulations. For more information about how and where to dispose of the product, please contact Doric Lenses.

### 4.4 Contact us

For any questions or comments, do not hesitate to contact us by:

**Phone** 1-418-877-5600

**Email** [sales@doriclenses.com](mailto:sales@doriclenses.com)

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