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OGKL2 - September 8, 2016

Item # OGKL2 was discontinued on September 8, 2016. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

- **Complete Fiber Optics Kit for Optogenetics**
- **470 nm LED Light Source**
- **Ø1.25 mm or Ø2.5 mm Ferrule Fiber Optic Cannulae and Cables**
- **Patch Cable with Optional Rotary Joint**

OGKR2
Kit with Rotary Joint, Ø200 µm Core Fiber, and Ø2.5 mm Ferrules

Hide Overview

OVERVIEW

Features

- Complete Fiber Optics Setup Including LED, Patch Cable, Cannulae, and Accessories
- Ferrule Options:
  - Ø1.25 mm Ferrules (Ø200 µm Core)
  - Ø2.5 mm Ferrules (Ø200 or Ø400 µm Core)
- Patch Cable Options:
  - Standard Lightweight Patch Cable, 1 m Long
  - Patch Cable with Integrated Rotary Joint, 3 m Long
- 20 Cannulae Included (5 each of 4 Different Lengths)
- 5 Mating Sleeves Included

Key Specifications						
Kit Item #	**OGKL2**	**OGKRL2**	**OGK2**	**OGKR2**	**OGK4**	**OGKR4**
Light Source	M470F1 470 nm Fiber-Coupled LED w/Pulse Modulation					
LED Driver	DC2200					
Fiber Core Size	Ø200 µm				Ø400 µm	
Cannula Ferrule Size	Ø1.25 mm		Ø2.5 mm			
Patch Cable	Standard	Integrated Rotary Joint	Standard	Integrated Rotary Joint	Standard	Integrated Rotary Joint
Cannulae	2 mm, 5 mm, 10 mm, and 20 mm Long (5 Each)					
Cannula Output Power[a]	2.3 mW	1.5 mW	2.6 mW	1.6 mW	10.8 mW	6.8 mW
Variation in Output Power[b]	N/A	±7%	N/A	±7%	N/A	±7%

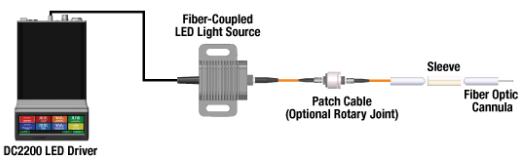
- Approximate value, tested with the LED driven at maximum current (1 A).
- Output power variation during rotation of the rotary joint.

Thorlabs' optogenetics equipment is available in a complete, ready-to-use kit. Our optogenetics kit includes a 470 nm Fiber-Coupled LED with driver, lightweight patch cable with optional rotary joint, five mating sleeves, and 20 stainless steel ferrule cannulae. Kits are available with Ø200 µm or Ø400 µm core fiber components with 0.39 NA. Ø200 µm core size cables are less invasive, making them ideal for smaller animals. Ø400 µm core size cables offer a stiffer more robust solution for larger animals and higher power light sources. These kits are offered at a 10% discount over the individual component pieces.

We also offer custom kit options and custom fiber components for optogenetics. For more information, contact Tech Support.

Thorlabs Optogenetics Equipment Selection Guide							
Fiber Optic Cannulae	Rotary Joint Patch Cables	Standard Patch Cables	Interconnect and Mating Sleeves	2x2 Fiber Couplers	LED Light Sources	Laser Light Source	Optogenetics Starter Kit

Click to Enlarge
The OGKL2 Kit has Ø200 µm Core Fiber and Ø1.25 mm Ferrules



Kit Components: Click on Each Component for More Information.

Hide Specs

Kit Components and Specifications

Kit Specifications						
Kit Item #	**OGKL2**	**OGKRL2**	**OGK2**	**OGKR2**	**OGK4**	**OGKR4**
Light Source	M470F1 470 nm Fiber-Coupled LED					
LED Driver	DC2200					
Fiber Core Size	Ø200 µm				Ø400 µm	
Cannula Ferrule Size	Ø1.25 mm		Ø2.5 mm			
Patch Cable	M89L01 (1 m Long)	RJPSL2 (3 m Long with Rotary Joint)	M77L01 (1 m Long)	RJPSF2 (3 m Long with Rotary Joint)	M79L01 (1 m Long)	RJPSF4 (3 m Long with Rotary Joint)
Cannula Mating Sleeve	5 x ADAL1		5 x ADAF1			
Light Source Cannulae	5 x CFML12L02 (2 mm) 5 x CFML12L05 (5 mm) 5 x CFML12L10 (10 mm) 5 x CFML12L20 (20 mm)		M470F1: 5 x CFM12L02 (2 mm) 5 x CFM12L05 (5 mm) 5 x CFM12L10 (10 mm) 5 x CFM12L20 (20 mm)		5 x CFM14L02 (2 mm) 5 x CFM14L05 (5 mm) 5 x CFM14L10 (10 mm) 5 x CFM14L20 (20 mm)	
Approx. Cannula Output Power[a]	2.3 mW	1.5 mW	2.6 mW	1.6 mW	10.8 mW	6.8 mW
Variation in Output Power[b]	N/A	±7%	N/A	±7%	N/A	±7%

- Tested with the LED driven at maximum current (1 A).
- Output power variation during rotation of the rotary joint.

LED Driver with Pulse Modulation Specifications*

LED Driver	**DC2200**[a]
Constant Current Mode	
LED Current Range	0 - 2 A
LED Current Resolution	0.1 mA
LED Current Accuracy	±(0.1% + 1 mA)
LED Forward Voltage	50 V (Up to 1.5 A) 35.0 V (Up to 2 A)
Pulse Width Modulation Mode	
PWM Frequency Range	0.1 Hz - 20 kHz
Duty Cycle	0.1% to 99.9%
Duty Cycle Resolution	0.1%
External Control Mode	
Modulation Frequency Range	DC - 250 kHz, Sine Wave
Modulation[b]	Arbitrary
Trigger Input (Max)	5.0 V
General	
Operating Temperature Range[c]	0 to 40 °C
Storage Temperature Range	-40 to 70 °C
Dimensions (W x H x D) w/ Operating Elements	112.0 mm x 85.0 mm x 190.3 mm (4.41" x 3.35" x 7.49")
Warm Up Time for Rated Accuracy	<10 min
Weight	0.9 kg

- The DC2200 has two inputs to accomodate LEDs with different connector styles. The M470F1 included in the kit uses the LED2 Terminal, for which the specifications above are given. For complete specifications, see the DC2200 webpage.
- If modulating with a waveform other than sine, the modulation bandwidth will be reduced.
- Non-Condensing

*Please refer to the DC2200 webpage for more information. Driver Software is available for download here for the DC2200.

Fiber Specifications

Item #	Fiber Type	NA	Core Diameter	Wavelength Range
OGKL2	FT200EMT Multimode	0.39	Ø200 µm	400 - 2200 nm
OGKRL2				
OGK2				
OGKR2				
OGK4	FT400EMT Multimode	0.39	Ø400 µm	400 - 2200 nm
OGKR4				

LED Specifications*

Item #	M470F1
Center Wavelength	470 nm
Typical FWHM	15 nm
Typical Output Spectrum (Click to Enlarge)	
CW Drive Current (Max)	1 A
LED Forward Voltage	3.6 V
Typical Lifetime	>50,000 Hours

*Please refer to the M470F1 web presentation or manual for complete specifications.

Hide User Guide

USER GUIDE

Setup

LED and Driver

All Optogenetics Starter Kits include an M470F1 Fiber-Coupled LED, and an LED Driver. The LED can be operated by connecting it to the “LED 2” jack in the back of the LED driver. The power supply for the LED driver should be plugged into the unit as well. The LED driver can then be powered on using the rocker switch on the back of the unit.

After the device is powered up, the display will show a “Welcome” screen for a few seconds. The LED driver is immediately ready for use after turning on. However, the rated accuracy is reached after a warm-up period of 10 minutes.

Click to Enlarge
The ADAF1 Mating Sleeve should be inserted 1/2 to 2/3 of the way onto the patch cable before cannula connection.

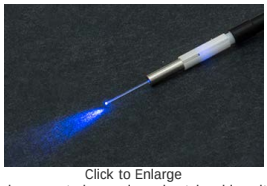
Patch Cable and Cannula

Insert the patch cable’s SMA connector into the LED unit by threading the connector’s rotating barrel onto the LED unit’s housing. Then, place the ADAL1 (Ø1.25 mm ferrules) or ADAF1 (Ø2.5 mm ferrules) mating sleeve onto the ferrule end of the patch cable. Leave approximately one third of the mating sleeve length exposed for the cannula connection (as shown in Figure 1). Then, connect the mating sleeve to the cannula. Note: To disconnect the cannula, grip the patch cable by the ferrule and mating sleeve (not the heat shrink tubing) and use a twisting motion.

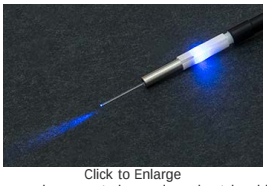
It is very important that the ends of the patch cable’s ferrule and the cannula’s ferrule are in physical contact. If they are not, the output power at the cannula tip will decrease significantly.

Rotary Joint Patch Cables

The OGKRL2, OGKR2, and OGKR4 kits include rotary joint patch cables. These cables operate exactly the same as the standard patch cables included in the other kits, but have an articulated joint that prevents tangling from specimen movement. SM05 (0.535"-40) mounting threads are present on the light source side of the joint. The joint can be mounted using Thorlabs’ extensive line of SM05-compatible optomechanics hardware such as the LMR05 lens mount. Alternatively, the rotary joint can be mounted directly to the wall or ceiling of a specimen enclosure. An SM05-tapped hole can be created using Thorlabs’ 83373 SM05 tap, or the joint can be glued into a ~Ø1/2" hole. Click here for more information about mounting the rotary joint.



Click to Enlarge
Properly connected cannula and patch cable, with the cannula and patch cable in physical contact.



Click to Enlarge
Improperly connected cannula and patch cable, showing an air gap and light leakage.

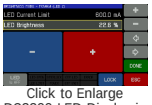
Operation

The LED can be operated using the front panel controls of the LED driver, or remotely via PC. The DC2200 driver can be controlled locally via a touch screen or remotely from a PC. It can be operated in one of the following modes: 'Constant Current', 'Brightness', 'PWM' (Pulse Width Modulation), 'Pulse', 'Internal Modulation', 'External Control', and 'TTL Modulation'. The LED driver can also be operated remotely via USB. Note: The LED must be switched off when switching between modes.

Click to Enlarge
DC2200 Main Menu

Constant Current Mode

While operating in constant current mode, the user controls the LED’s power by setting the drive current, and the “LED” button toggles the LED on/off.



Click to Enlarge
DC2200 LED Display in Brightness Mode

Brightness Mode

In Brightness Mode, the LED is operated at a user-set brightness from 0 to 100%. 100% brightness corresponds to either the current limit recorded in the LEDs EEPROM memory or a lower user-set current limit.

Pulse Width Modulation

In Pulse Width Modulation mode, the frequency, amplitude, duty cycle (pulse width), and number of pulses can all be defined. The main PWM Mode screen displays each parameter.

Pulse Mode

This mode operates using rectangular pulses to modulate the drive current, but allows the user to set the LED parameters in a different way. The pulse characteristics are controlled by a user-selected LED Brightness, ON Time, OFF Time, and Pulse Count.

External Control Mode

This mode allows the LED driver to be controlled by an external signal. The 'External Control Mode' has no parameter settings. The LED can only be controlled via the connector at the rear panel of the LED driver. The applied voltage is proportional to the LED current.

Remote Control via a PC

The LED driver can be controlled remotely by a Windows-based PC. Refer to the LED driver user's manual for software installation instructions.

TTL Mode

This mode allows simple ON/OFF modulation of the LED to be integrated with signals from other equipment in the lab via the SMA connector on the rear panel of the DC2200.

The LED driver is controlled with the LED driver software. All controls available on the front panel of the LED driver are also available using this application. The front panel controls of the LED driver can also be used when the device is connected to a PC, and the LED driver display automatically updates.

For more information on the DC2200 driver's operating modes, see the full web presentation.

Further Reading

1. Aravanis A, Wang LP, Zhang F, Meltzer L, Mogri M, Schneider MB, Deisseroth K. **An optical neural interface: *in vivo* control of rodent motor cortex with integrated fiberoptic and optogenetic technology.** J. Neural Eng. 2007 Sept; 4:S143-S156.
2. Gradinaru V, Thompson KR, Zhang F, Mogri M, Kay K, Schneider MB, Deisseroth K. **Targeting and readout strategies for fast optical neural control *in vitro* and *in vivo*.** J Neurosci. 2007 Dec 26;27(52):14231-8.
3. Zhang F, Gradinaru V, Adamantidis AR, Durand R, Airan RD, de Lecea L, Deisseroth K. **Optogenetic interrogation of neural circuits: technology for probing mammalian brain structures.** Nat Protoc. 2010;5(3):439-56. Epub 2010 Feb 18.
4. Yizhar O, Fenno LE, Davidson TJ, Mogri M, Deisseroth K. **Optogenetics in Neural Systems.** Neuron. 2011 July;72:9-34.
5. http://www.stanford.edu/group/dlab/optogenetics/
6. http://www.openoptogenetics.org/index.php?title=Main_Page

Hide Kit Components

KIT COMPONENTS

Kit Components

Kit Item #	OGKL2	OGKRL2	OGK2	OGKR2	OGK4	OGKR4
Light Source	M470F1					
LED Driver	DC2200					
Patch Cable	M89L01	RJPSL2	M77L01	RJPSF2	M79L01	RJPSF4
Cannula Mating Sleeve	5 x ADAL1		5 x ADAF1			
Cannulae	CFML12L02 (Qty 5) CFML12L05 (Qty 5) CFML12L10 (Qty. 5) CFML12L20 (Qty. 5)		CFM12L02 (Qty. 5) CFM12L05 (Qty. 5) CFM12L10 (Qty. 5) CFM12L20 (Qty. 5)		CFM14L02 (Qty. 5) CFM14L05 (Qty. 5) CFM14L10 (Qty. 5) CFM14L20 (Qty. 5)	

Hide Optogenetics Kits with Ø200 µm Core Fiber and Ø1.25 mm Ferrules

Optogenetics Kits with Ø200 µm Core Fiber and Ø1.25 mm Ferrules

Part Number	Description	Price	Availability
OGKL2	Optogenetics Starter Kit with Ø1.25 mm Ferrules and Ø200 µm Fiber	$2,910.00	Today
OGKRL2	Optogenetics Starter Kit with Rotary Joint, Ø1.25 mm Ferrules, and Ø200 µm, 0.39 NA Fiber Components	$3,100.00	Today

Hide Optogenetics Kits with Ø200 µm Core Fiber and Ø2.5 mm Ferrules

Optogenetics Kits with Ø200 µm Core Fiber and Ø2.5 mm Ferrules

Part Number	Description	Price	Availability
OGK2	Customer Inspired!Optogenetics Starter Kit with Ø2.5 mm Ferrules and Ø200 µm, 0.39 NA Fiber Components	$2,790.00	Today
OGKR2	Optogenetics Starter Kit with Rotary Joint, Ø2.5 mm Ferrules, and Ø200 µm, 0.39 NA Fiber Components	$3,010.00	Today

Hide Optogenetics Kits with Ø400 µm Core Fiber and Ø2.5 mm Ferrules

Optogenetics Kits with Ø400 µm Core Fiber and Ø2.5 mm Ferrules

Part Number	Description	Price	Availability
OGK4	Customer Inspired!Optogenetics Starter Kit with Ø2.5 mm Ferrules and Ø400 µm, 0.39 NA Fiber Components	$2,860.00	Today
OGKR4	Optogenetics Starter Kit with Rotary Joint, Ø2.5 mm Ferrules, and Ø400 µm, 0.39 NA Fiber Components	$3,070.00	Today

Visit the *Optogenetics Starter Kits* page for pricing and availability information:
https://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=6148