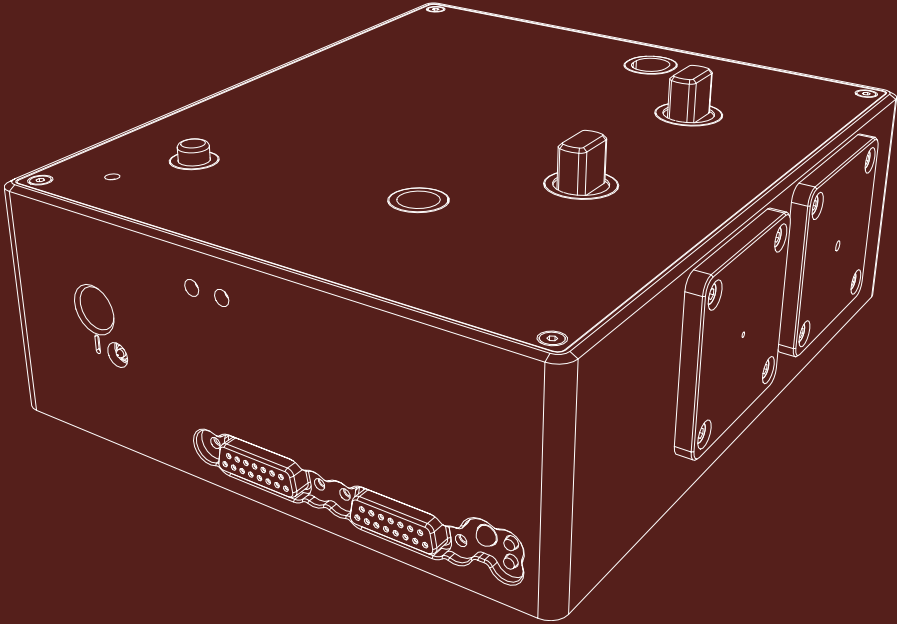


# SuperK SPLIT

Product Guide

Revision 1.2 10-2023



# PRODUCT GUIDE

This guide includes information for the following NKT Photonics products:

## **SuperK SPLIT**

Broadband filter with split VIS/NIR and NIR/IR optical outputs A301-100-000



**CAUTION:** Do not open the device chassis. All chassis are equipped with warranty labels (see [Figure 40](#)) on their covers. The warranty is void if a device is opened.

Manufactured by:

**NKT Photonics A/S**

Blokken 84, Birkerød-3460 Denmark

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Specifications are listed as metric units. Imperial units listed are conversions.

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# Guide Overview

This product guide is intended to provide functional, operational and installation information for the SuperK SPLIT.



**WARNING:** Do not operate a laser with the SPLIT before first reading and understanding all warnings, cautions and handling information stated within the document:

*SuperK Split Safety, Handling and Regulatory Information*

The paper copy of this guide is included with your accessory; it can also be downloaded from:

<https://www.nktphotonics.com/lasers-fibers/support/product-manuals/>

**Documentation** A USB memory stick is included. It contains documentation for all NKT Photonics products including this accessory.



**Terminology** The guide may refer to the SuperK SPLIT as the SPLIT, device or accessory.

**Target Audience** This guide is for technical personnel involved in the selection, planning and deployment of lasers and photonic equipment in laboratory and industrial settings. The guide assumes a reasonable knowledge level of lasers, photonic principles and electrical interface connectivity.

**Chapters Inside** This guide includes the following chapters:

- Chapter 1 “**Description**” — Describes the accessory including its general operational principles, electrical and optical interfaces, status LEDs, and safety labeling.
- Chapter 2 “**Installation**” — Includes information and procedures on how to correctly install the accessory chassis.
- **Specifications** — Appendices include specifications, servicing information, and support contact details.

**Added information and Safety Notices** Lasers with their accessories are highly dangerous devices that can cause serious injury and property damage. This guide use the following symbols to either highlight important safety information or provide further information in relation to a specific topic.



**NOTE:** Highlights additional information related to the associated topic and/or provides links or the name of the NKTP guides describing the additional information.



**CAUTION:** Alerts you to a potential hazard that could cause loss of data, or damage the system or equipment.



**WARNING:** The laser safety warning alerts you to potential serious injury that may be caused when using a laser with the accessory.

**Revision** This section records the document revision details.

Release date	Revision number and changes
2020-October	1.0 Updated from earlier manual.
2021-January	1.1 Updated support contact details in appendix B.
2021-April	1.0 Revision rolled back to 1.0 for internal system reasons.
2022-February	1.1 Updates include minor grammar corrections and improvements in language clarity. Some figures have also been modified for clarity.
2023-October	1.2 Updated the style of the document.

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# PROCEDURES

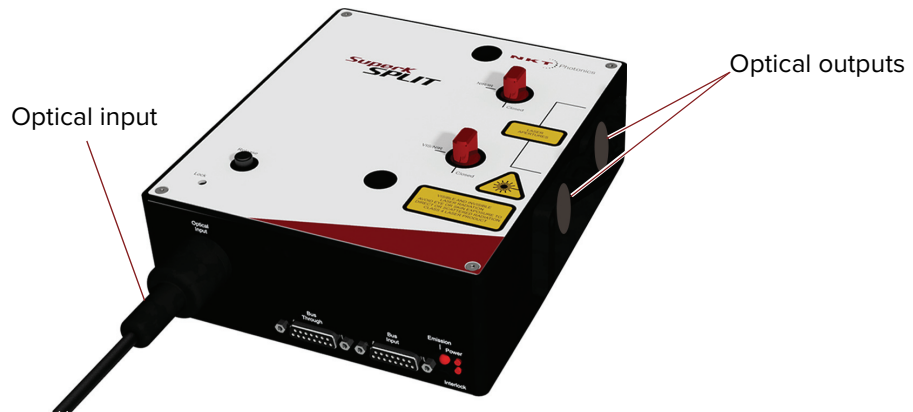
Procedure 1: Inserting a SuperK output collimator ..... 24



# 1 Description

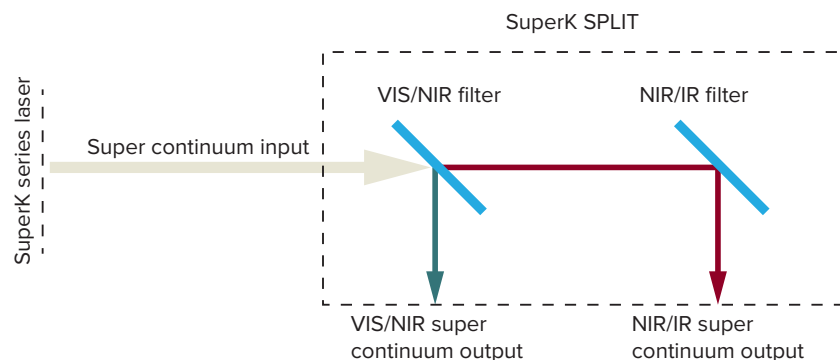
A SuperK SPLIT is a passive filter accessory for SuperK lasers. It divides the super continuum spectral emission from a SuperK laser into two separate wavelength ranges emitted from separate optical output ports. Each output emits a broadband subset of the original super continuum beam source.

**Figure 1 SuperK SPLIT general view**



The diagram in [Figure 2](#) shows two output channels each consisting of a broadband emission subset of the original super continuum wavelengths. The optical output of one channel is in the visible (VIS) and near-infrared (NIR) range and the other channel's output is a broadband subset in the NIR and infrared (IR) range.

**Figure 2 SuperK SPLIT functional view**



**NOTE:** See [Table 3 on page 29](#) for SuperK SPLIT model specifications.

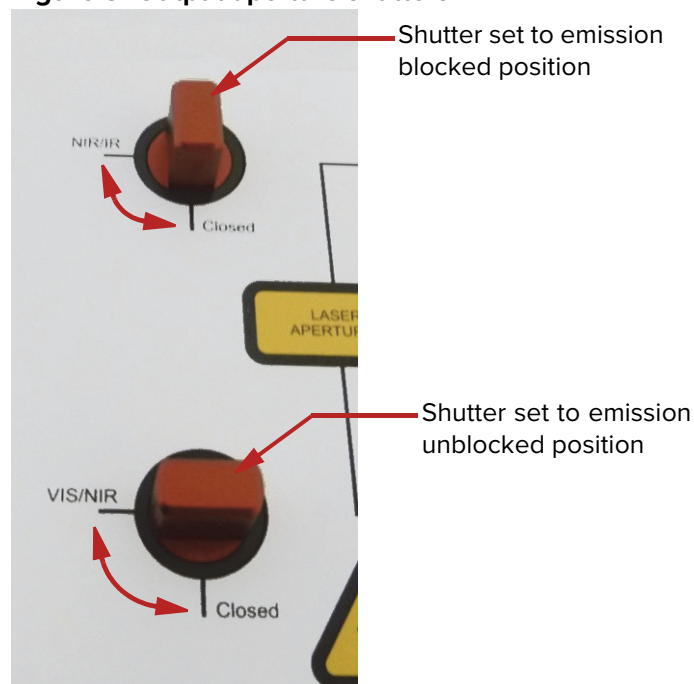
**Output options** The SuperK SPLIT filter block may be combined with a SuperK CONNECT and SuperK Fiber Delivery (FD) to form a Fiber Delivery System (FDS).

**Additional filtering** An External Filter Holder add-on can be fitted before any fiber coupling. Using the holder any standard 1-inch filter can be placed in the beam path.

## Features

- Output** Emission from both SuperK SPLIT output ports are free space beams. To deliver the two bands of supercontinuum spectrum, a Fiber Deliver System (FDS) consisting of dual SuperK Connect and SuperK Fiber Delivery (FD) accessories can be fitted to the SPLIT.
- Interlock** The SuperK SPLIT is equipped with a safety interlock. The interlock interconnects with a SuperK laser's interlock system. The interlock system is setup to disable emissions immediately when the interlock circuit is broken, such as an interconnected safety door switch. Refer to [“Electrical Connections”](#) on page 26.
- Shutters** As a safety feature, each optical output of the SuperK SPLIT is equipped with a mechanical shutter. When the shutter is closed, it blocks all optical emission. The shutters are manually operated by turning the shutter knob between the Open and Closed positions as shown in [Figure 3](#).

**Figure 3 Output aperture shutters**



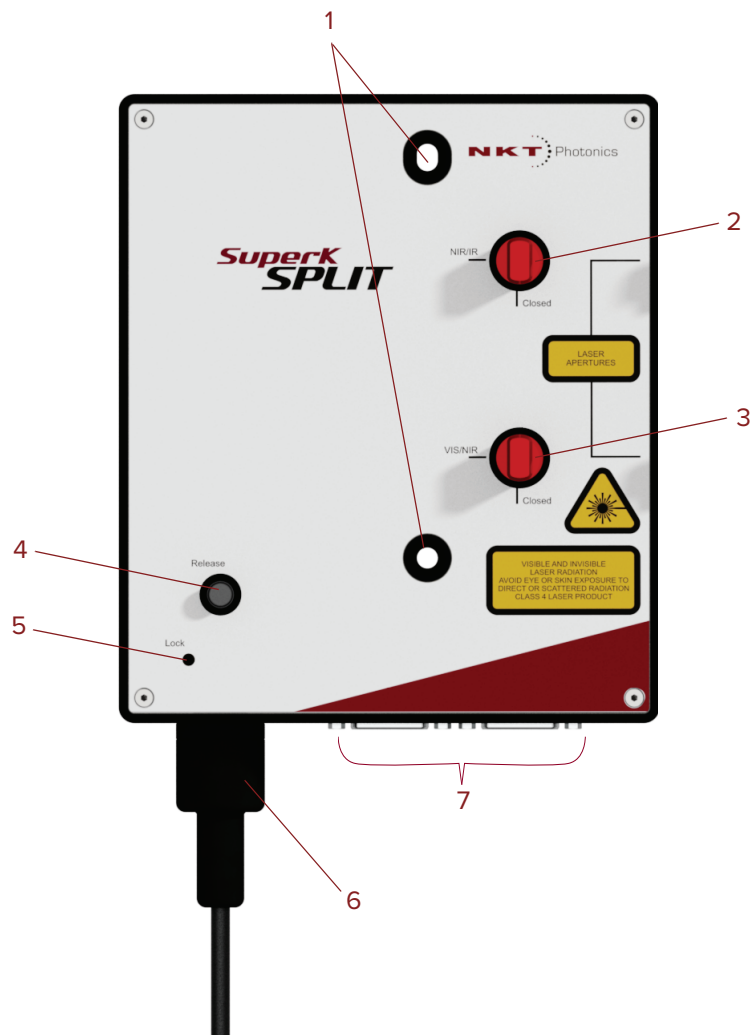
**CAUTION:** When the laser outputs are not in use, NKTP recommends to CLOSE the shutters.

## Interfaces

**Top panel** The top panel shown in [Figure 4](#) includes the following:

- Input and output aperture indicators
- Output shutter control knobs
- Collimator release button with locking screw
- Mounting hole access

**Figure 4 Top panel**



- |   |                           |   |   |
|---|---------------------------|---|---|
| 1 | Mounting holes            | 5 | Collimator locking screw                    |
| 2 | NIR/IR output shutter     | 6 | SuperK output collimator - inserted         |
| 3 | VIS/NIR output shutter    | 7 | Electrical interfaces and LEDs <sup>i</sup> |
| 4 | Collimator release button |   |   |

i. See “[Electrical Interfaces](#)” on page 17

**Mounting holes**

The two mounting holes (1) are designed to fasten the SuperK SPLIT to either metric or imperial optical tables that have screw holes spaced at either a 25 mm or a 1” pitch.

**NIR/IR output shutter**

This shutter can be set to block or unblock the NIR/IR emission output aperture. Turn the shutter to the “Closed” position to block emission. Turn the shutter to the “NIR/IR” position to unblock emission from the aperture.

**VIS/NIR output shutter**

This shutter can be set to block or unblock the VIS/NIR filtered output emission from the aperture. Set the shutter to the “Closed” position to block emission. Set the shutter to the “VIS/NIR” position to unblock emission from the aperture.

**Collimator release button and locking screw**

SuperK laser outputs are provided with a barrel shaped collimator. When the barrel is inserted into an SPLIT optical input receptacle, it is automatically retained by a locking mechanism that securely holds the barrel in place. To release the collimator from the input receptacle, press the collimator *Release* button (4).



**NOTE:** You can lock the collimator barrel in the optical input by tightening the collimator locking screw (5).

**Optical apertures** Optical apertures are located on the side panels of the SPLIT as shown in [Figure 5](#) and described in the following.

**Figure 5 Optical Interfaces**



- 1. Optical input aperture
- 2. VIS/NIR optical output aperture – with Connect mounted
- 3. NIR/IR optical output aperture – with Connect mounted



### Optical input aperture

The Optical input aperture is a receptacle that houses the output collimator of a SuperK laser. The laser's output collimator is inserted into the aperture until it clicks and locks in place. To remove the collimator, press the release button. The laser's collimator barrel can be secured by tightening the lock screw.

The optical input includes an interlock switch. If a SuperK collimator is not inserted in the input receptacle, the switch detects this and prevents emission (refer to [Figure 6](#)).

### VIS/NIR optical output aperture

This is a free space output aperture for the filtered visible emission.

### NIR/IR optical output aperture

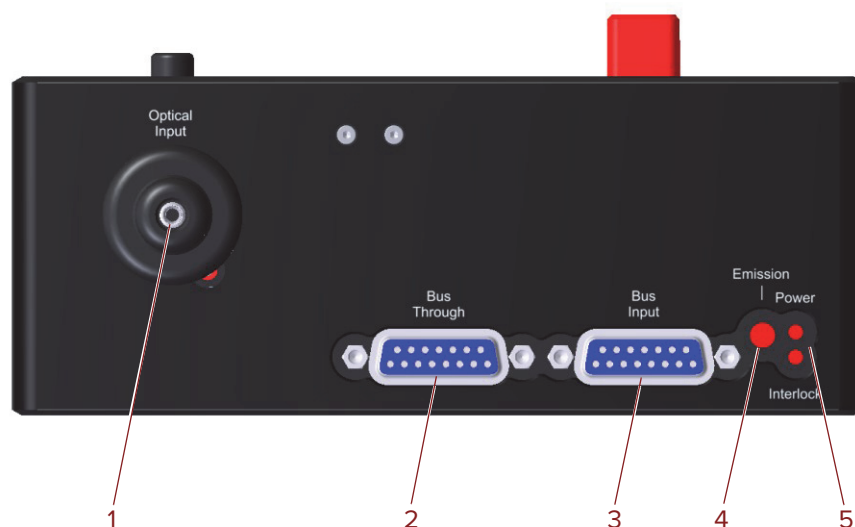
This is a free space output aperture for the filtered IR emission.



**NOTE:** All output apertures include 4 screw holes for mounting, for example, a fiber coupler such as an FDS consisting of a SuperK CONNECT and FD.

**Electrical Interfaces** The electrical interfaces are located on the same side panel where the optical input aperture is located. [Figure 6](#) shows the panel, all electrical interfaces are located along the bottom right side of the panel.

**Figure 6 Electrical Interfaces and optical input**



- |   |  |   |                                       |
|---|--|---|---------------------------------------|
| 1 | Optical input aperture (collimator receptacle) | 4 | Emission LED <sup>i</sup>             |
| 2 | Bus through output port                        | 5 | Power and Interlock LEDs <sup>i</sup> |
| 3 | External bus input port                        |   |                                       |

i. See [“Status LEDs”](#) on page 18

### External bus port

The External bus port electrically connects the SPLIT to a SuperK laser. SuperK lasers connect to accessories using the NKTP External bus protocol. The bus carries data communications, DC power and the interlock signal from the laser to any accessories connected on the bus.

### Optical input aperture

See “Optical input aperture” on page 17.

### Bus through port

Connects additional accessories to the External bus in a daisy chain configuration. A bus defeater is connected to this port if no other accessories are used with the SuperK laser. When no bus defeater is placed at the end of the External bus daisy chain, the interlock loop circuit is left open and emission disabled at the SuperK laser.

---

## Status LEDs

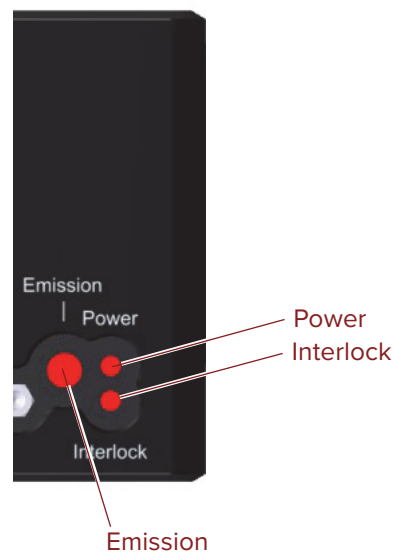
The SPLIT includes three status LEDs as described in Table 1. The LEDs are located on a side panel next to the External bus ports and shown in Figure 7.

The emission LED is lit ON RED when the connected SuperK laser’s emission is enabled. When ON RED, laser emission is present at the primary and auxiliary optical output ports.




**WARNING:** If any of the SPLIT aperture shutters are closed, emission is blocked. The position of the shutters does not affect the status of the emission LED, only the emission status of the connected SuperK laser.

**Figure 7 Status LEDs**



**Table 1 Status LEDs**

LED Name	Condition	Description
Emission	ON RED	Emission enabled <sup>i</sup>
		The SuperK laser system emission is ON and class 4 emission is present at the primary and auxiliary optical output ports.
		The position of the mechanical shutters at each output port does not change the status of the emission LED.
	OFF	Emission disabled
Power	ON GREEN	The SPLIT is powered ON; the External bus 12V DC power is OK.
	ON RED	DC supply voltage is low.
	FLASHING GREEN/ AMBER	Indicates data transmission on the External bus.
	OFF	The SPLIT is OFF; no DC power connected.
Interlock	ON GREEN	Interlock safety circuit is closed; laser emission permitted.
	ON RED <sup>ii</sup>	Interlock safety circuit is open; laser emission is disabled.

- i. **Warning:** SuperK emissions are rated Class 4.
- ii. Check the SuperK laser for interlock error information.



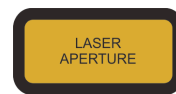
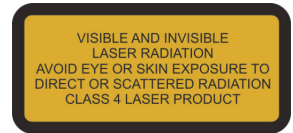
**WARNING:** DO NOT OPERATE the SuperK laser until you are familiar with the controls and have taken all precautions necessary as described in the laser’s safety handling and regulatory information document.

## Chassis labels

The SuperK SPLIT chassis includes multiple labels that indicate hazards and safety and product information. The labels are located on the panels as described in Table 2 with the panels shown in Figure 8 and Figure 9.

**Table 2 Chassis labels**

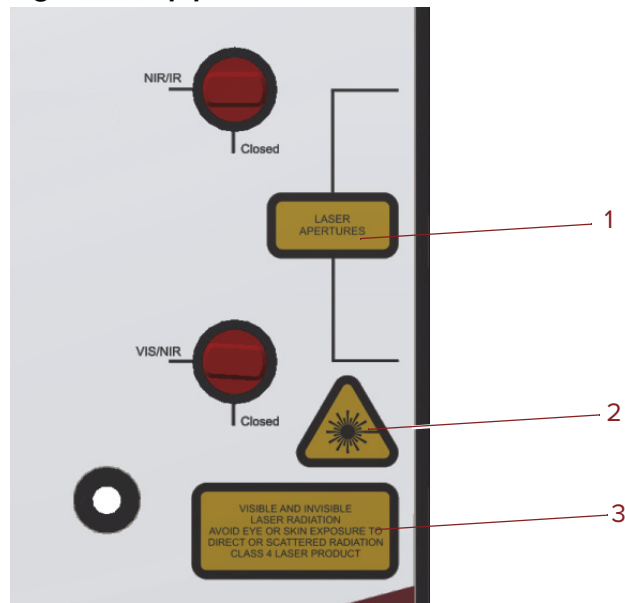
Label	Panel	Description
Class 4 Laser Classification	Top	Safety information indicating the laser emission radiation class and precautions to take when the laser is operating.
Laser Aperture	Top	Safety information alert indicating the location of the aperture where laser radiation is emitted from the device.
Manufacturing	Side	Manufacturing information including address, part and serial number, version, and date manufactured.
Laser Radiation Warning	Top	Safety information alert indicating this area of the device is near a source of dangerous laser emissions.



**Figure 8 Side panel manufacturing label (generic)**



Figure 9 Top panel labels



- 1. Laser Aperture<sup>i</sup>
  - 2. Laser Radiation Warning
  - 3. Class 4 Laser Radiation Warning
- i. **NOTE:** Laser apertures are located on the side panel below the label.



## 2 Installation



**CAUTION:** For reliable operation, the SuperK SPLIT should not be exposed to corrosive agents or excessive moisture, heat or dust.



**CAUTION:** Ambient operating environment specifications are listed in [Table 6](#).



**CAUTION:** This product is not UL-approved but all safety components are UL-approved.



**CAUTION:** The accessory contains electro-static discharge (ESD) sensitive components. To avoid permanent ESD damage, use ESD protection precautions when handling the accessory. Always connect the accessory's earth point to a ground earth within your facility.

**Installation process** The following steps outline the installation process:

1. Prepare a suitable installation platform for the SPLIT – see “[General](#)” below.
2. Place and fasten the SPLIT to the prepared installation platform ensuring the optical outputs are aligned with the intended application.
3. Turn both optical output shutters to the *Closed* position.
4. Insert the SuperK output collimator into the *Optical Input* receptacle. See “[Optical Connections](#)” on [page 24](#).
5. Using an External bus cable, connect the *External Bus* port of the SuperK laser to the *Bus Input* port of the SPLIT. See “[Electrical Connections](#)” on [page 26](#).
6. Place and connect the included bus defeater onto the SPLIT *Bus Through* port connector.
7. Turn the SuperK laser power ON.
8. Observe and ensure the power and Interlock LEDs are ON. See “[Status LEDs](#)” on [page 18](#) to interpret their status condition.

**General** All chassis types must be installed on a level surface that is free from vibrations. You can fasten the SuperK SPLIT to either metric or imperial optical tables. The ambient temperature surrounding the laser and SPLIT should be stable and free from anything that could cause temperature fluctuations. Temperature changes and vibrations may affect the device operation and result in abnormal operation.



**CAUTION:** The SuperK SPLIT is intended for use with a SuperK Class 3B and 4 laser system only. Using the SuperK SPLIT with a laser source other than a Su-

perK laser may result in hazardous radiation exposure.



**WARNING:** To operate these systems, you must be familiar with laser safety regulations and have received instruction in the safe use of lasers.

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## Optical Connections

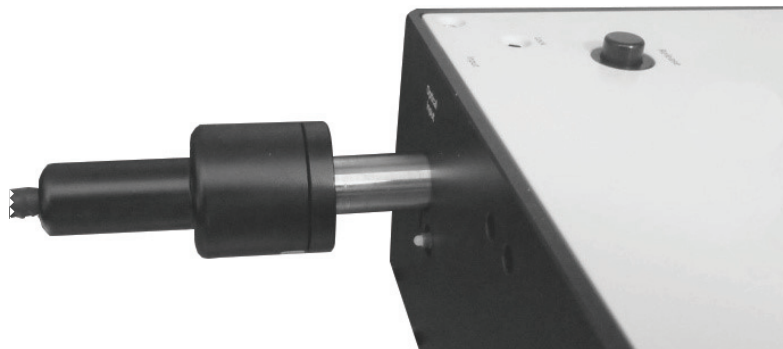
Following the steps in [Procedure 1](#), to insert the output collimator of the SuperK laser into the *Optical Input* receptacle of the SuperK SPLIT.

### Inserting the collimator

#### Procedure 1 Inserting a SuperK output collimator

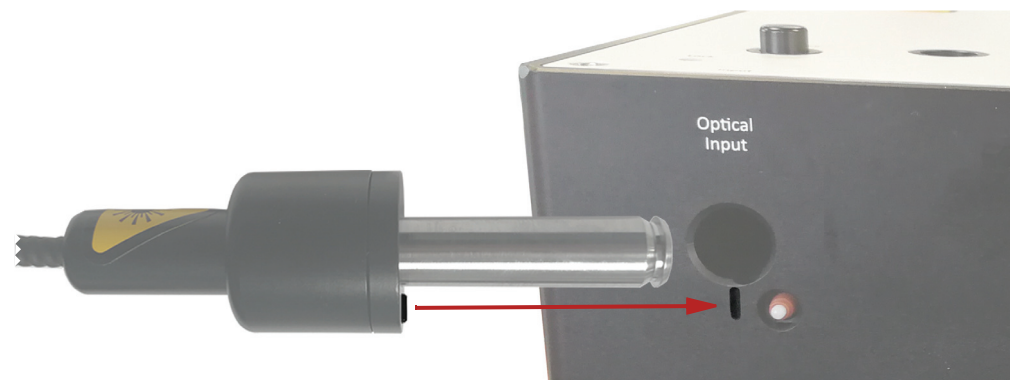
1. Disconnect power from the laser.
2. If not already installed, position the SuperK SPLIT at its final operating location and securing it to a suitable mounting surface.
3. Partially insert the laser's output collimator barrel into the Optical Input receptacle as shown in [Figure 10](#).

**Figure 10** Partially inserting the collimator



4. Holding the collar, rotate the collimator until the alignment key of the collimator aligns with the slot at the optical port of the chassis ([Figure 11](#)).

Collimator alignment key and slot





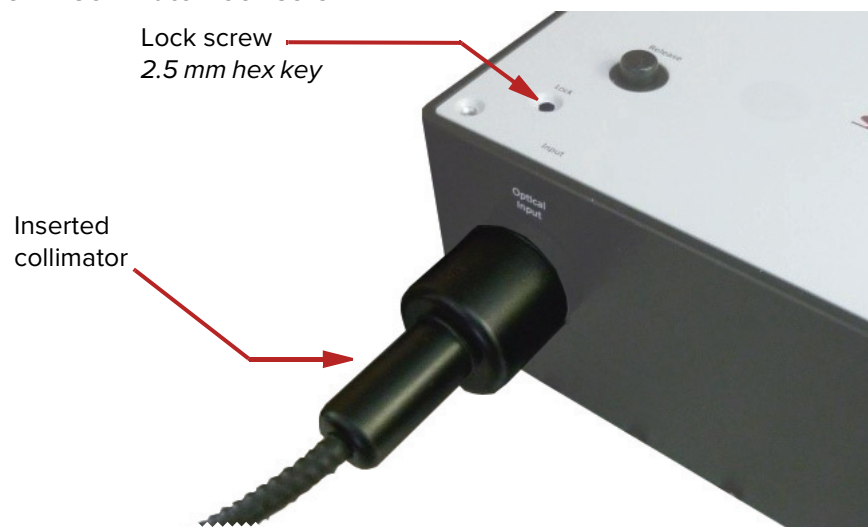
**i** **NOTE:** When the key is aligned with the slot, the axial orientation of the collimator is correctly aligned.

5. Push the collimator into the receptacle until its collar rests against the chassis. As you push it in, the collimator encounters some resistance, and two distinct clicks as it locks in place.

**i** **NOTE:** Again, you may need to turn the collar slightly to align the collimator key with the alignment slot.

6. To safely secure the collimator in the receptacle, tighten the lock screw shown in Figure 12 using a 2.5 mm hex key (Allen key).

**Figure 11 Collimator lock screw**



## Electrical Connections

**External bus** Connect the External bus of the SuperK laser to the Bus Input of the SPLIT. To connect the bus:

1. Disconnect power from the laser.

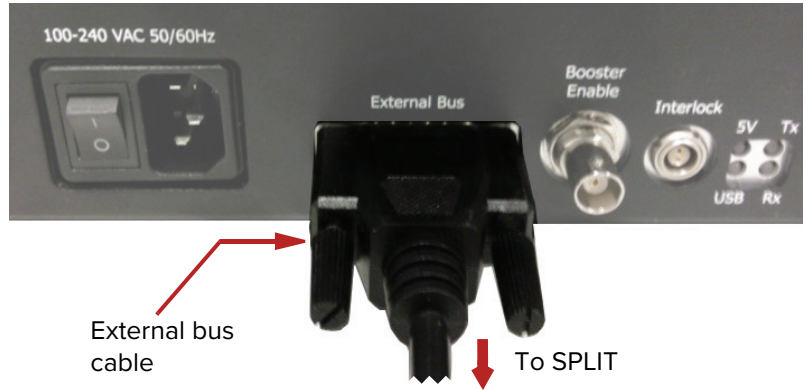


**CAUTION:** If the laser is powered ON when connecting the external bus cable, DAMAGE can occur to both the laser and the SPLIT.

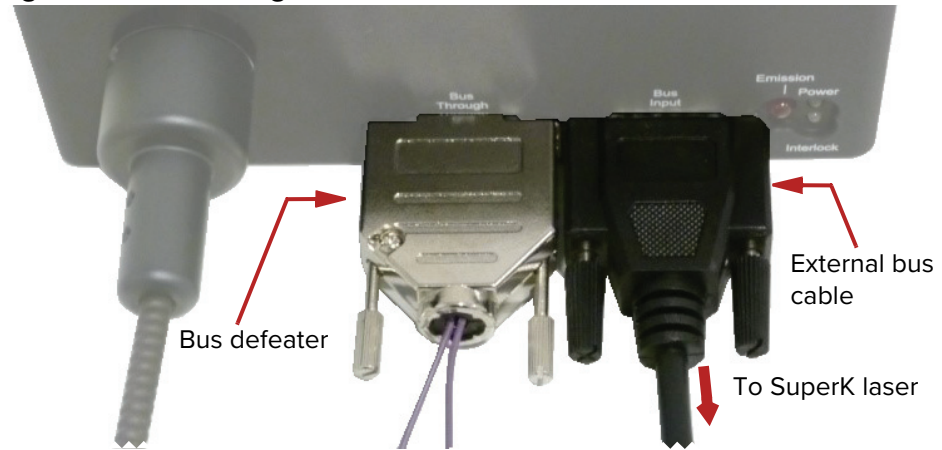
2. Using a DB-15 male to male External bus cable (included with your laser or accessory), connect the *External bus* connector of the SuperK laser to the *Bus Input* connector of the SPLIT.

Figures 13 and 14 show the connections for each of the devices.

**Figure 12 Connecting the External bus - SuperK laser**



**Figure 13 Connecting the External bus and bus defearer - SPLIT**



3. Place the *Bus Defeater* (included with your laser or accessory) on the *Bus Through* connector of the SPLIT - see Figures 14 and 15.

**Figure 14 Bus defeater**



**NOTE:** If you do not terminate the External bus with an NKT Photonics bus defeater, the interlock circuit remains open and laser emission cannot be enabled.

**Adding additional accessories**

1. If any additional accessories are to be connected to the SuperK laser, use an External bus cable to connect the *Bus Through* connector on the SPLIT to the *External bus* connection on the other accessory.

2. The last accessory of an External bus daisy chain requires the *Bus Defeater* to be placed on its *Bus Through* connector.



**NOTE:** To enable emission on a SuperK laser, the power supply and the door-switch interlock must be connected. For more information, refer to the instruction manual for the SuperK laser system.



**NOTE:** All bus cables used with a SuperK laser system must be shielded and no more than 3 meters in length.



# A Specifications

**Table 3 Optical**

Model	VIS/NIR output	NIR/IR output
A102-200-000	400-830 nm	915-2400 nm
A102-500-000	400-1120 nm	1180-2400 nm

**Table 4 Interfaces**

All Chassis Models	
Bus input	DB-15 Female
Bus through	DB-15 Female

**Table 5 Mechanical dimensions**

Specification	
Size (H x W x D)	68 x 195 x 170 mm (2.68 x 7.68 x 6.70 in)
Weight	~4 kg (~8.8 lb)

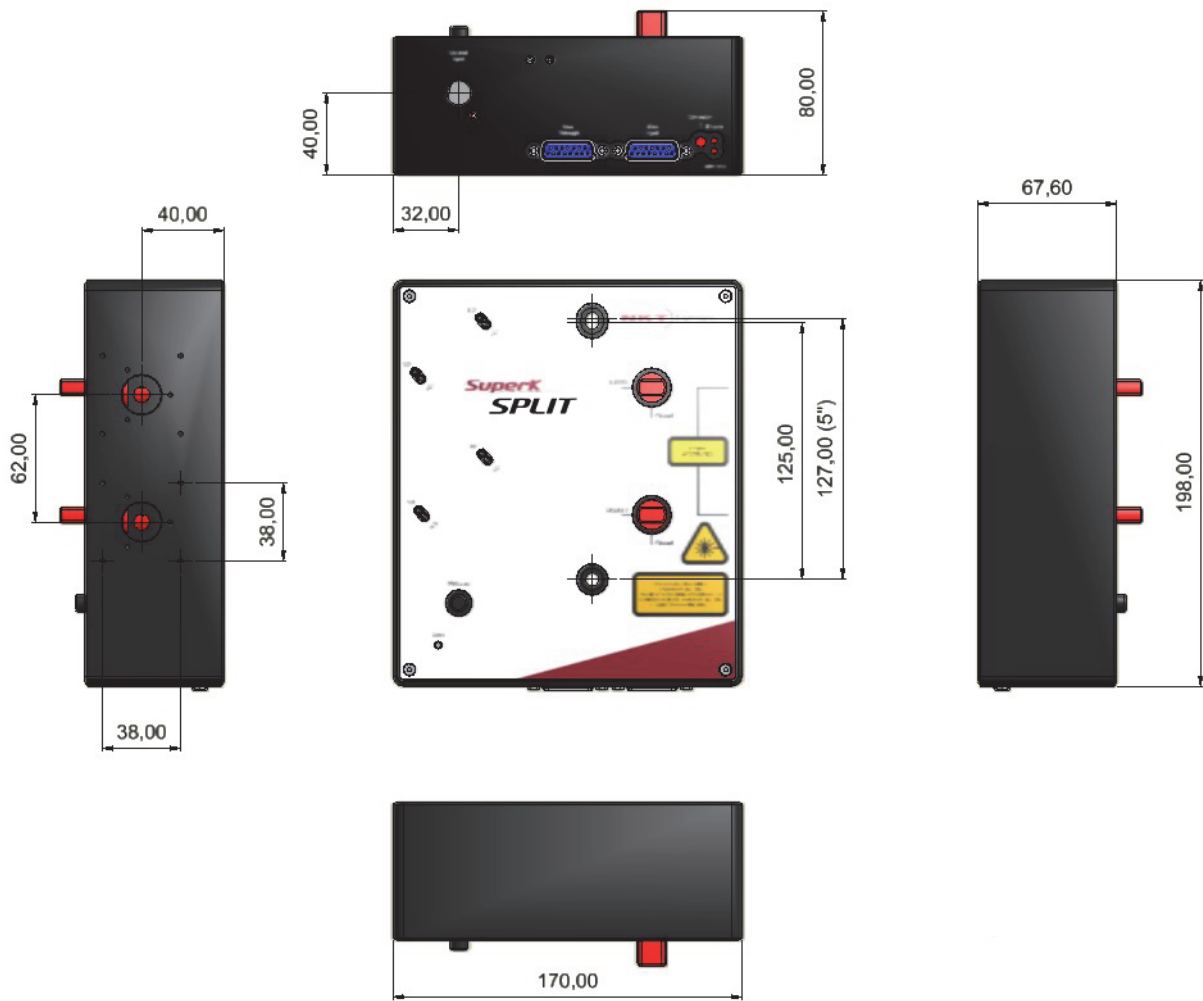
**Table 6 Operating and storage environment**

Specification	
Operating Temperature	18°C to 28°C (64°F to 82°F)
Storage Temperature	-20°C to 50°C (-4°F to 122°F)
Operating Humidity (non-condensing)	20 to 80%
Operating Altitude	3000 m maximum
Operating Air Pressure	700 hPa to 1060 hPa

**Table 7 Safety and regulatory compliances**

Safety	Regulatory
EN 60825-1:2014: Safety of laser products Part 1: Equipment classification and requirements [Laser Class 4]	2014/30/EU: EMC directive 2014/35/EU: Low Voltage directive
EN 61010-1:2010: Safety requirements for electrical equipment for measurement, control, and laboratory use Part 1: General requirements	EN 61326-1:2013: Electrical equipment for measurement, control and laboratory use EMC requirements – Part 1: General requirements

Figure 16 Mechanical dimensions



## B Service and Support Information

### Servicing

The accessory has no user serviceable components. In case of malfunction, contact NKT Photonics using the support channels in section “[Support Contact Details](#)”.



**CAUTION:** Do not open the accessory chassis. The accessory is equipped with warranty labels (see [Figure 17](#)) on the covers of the its chassis. The warranty is void if the system is opened.

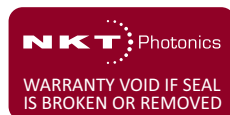


**CAUTION:** The accessory contains electro-static discharge (ESD) sensitive components. To avoid permanent ESD damage, use ESD protection precautions when handling the accessory. Always connect the accessory’s earth point to a ground earth within your facility.

**Opening the chassis** There are no user serviceable components inside the accessory chassis. Should your accessory malfunction, and it cannot be serviced on site, it must be shipped to the NKT Photonics office in Denmark.

**WARRANTY VOID IF REMOVED label** The unit is sealed with a label “WARRANTY VOID IF REMOVED”. It is strictly prohibited to remove the chassis cover

**Figure 17 Warranty seal**



### Support Contact Details

For technical or general support, NKT Photonics can be contacted for help regarding issues and questions with your accessory.

#### Online Support Web-page

1. Go to:

<https://www.nktphotonics.com/support/>

2. Scroll down and click or press:



Contact Support

3. Select the type of help required, fill in the form, and click or press *Submit*.

**Shipping Address** NKT Photonics A/S  
Blokken 84  
DK-3460 Birkerød  
Denmark





Item:  
Customer Revision:  
NKT Photonics Revision:  
Release Date:

800-616-01  
1.2  
2-0  
10-2023

**NKT Photonics A/S**  
Blokken 84, Birkerød-3460 Denmark

 [support@nktphotonics.com](mailto:support@nktphotonics.com)

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