
Name Diffuse reflection Light source

Type number : L16462-01

INSTRUCTION MANUAL



Read this instruction manual carefully before using this product.

Improper handling and operation that does not comply with the instructions in this manual may result in serious accident including injury or death.

Keep this instruction manual handy so that you can easily refer to it when needed.

使用本产品前请仔细阅读本说明书。

不按照本手册的说明进行处理和操作可能会导致严重的事故，包括人身伤害甚至死亡。

请将本说明书放在手边，以便在需要进行参考。



Introduction / 概述

Please read carefully / 请仔细阅读

- Please carefully read the “Precautions” before using.
使用前请仔细阅读“注意事项”。
- Please read this manual carefully and use the product correctly.
请仔细阅读本说明书，并正确使用本产品。
- Please keep this manual and read when it is necessary.
请妥善保存本说明书，在必要时进行阅读。

This manual uses the following safety alert symbols and signal words.

本说明书使用以下安全警示符号和信号词。

 DANGER/危险	<p>Indicates an imminently hazardous situation which if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.</p> <p>用于警示紧急的危险情形，若不避免，将会导致人员死亡或严重的人身伤害。这一信号词仅限于在最极端的情况下使用。</p>
 WARNING/警告	<p>Indicates a potentially hazardous situation which if not avoided, could result in death or serious injury.</p> <p>用于警示潜在的危险情形，若不避免，可能会导致人员死亡或严重的人身伤害。</p>
 CAUTION/注意	<p>Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.</p> <p>It is permitted for property damage only accidents.</p> <p>用于警示潜在的危险情形，若不避免，可能会导致人员受到轻微或中等伤害。</p> <p>这一信号词仅允许在发生财产损失事故的情况下使用。</p>

	<p>Indicates a note to help you get the best performance from the system. Read the contents of the note carefully to ensure correct and safe use. Failure to observe one of these notes might impair the performance of the system.</p> <p>本注意事项用于帮助您从系统中获得最佳性能。请仔细阅读注意事项内容，以确保正确、安全地进行使用。未遵循其中任何一项注意事项都可能会影响系统性能。</p>
	<p>Indicates a cautionary item that should be obeyed when handling the system. Read the contents carefully to ensure correct and safe use.</p> <p>表示操作本系统时应遵守的注意事项。请仔细阅读其中内容，以确保正确、安全地进行使用。</p>
	<p>Indicates an action that is forbidden. Read the contents carefully and be sure to obey them.</p> <p>表示禁止的操作。请仔细阅读其中内容并予以遵守。</p>
	<p>Indicates a compulsory action or instruction. Read the contents carefully and be sure to obey them.</p> <p>表示强制性操作或注意事项。请仔细阅读其中内容并予以遵守。</p>

Safety consideration / 安全考虑

Make sure you follow the instructions/ 确保遵守以下说明

This product is intended for use in general electronic equipment (Measurement equipment, office equipment, information and communications equipment, home appliances, etc.). Do not use this product for special purposes (Nuclear control equipment, Aerospace equipment, Medical equipment and Transport equipment that directly affect human life, disaster prevention and safety equipment, etc.) that require extremely high reliability and safety, except as described in the individual product documentation. In order to use this product correctly and safely, make sure to follow the safety notices below when operating this product. Hamamatsu Photonics is neither responsible nor liable for damages caused by using this product contrary to the safety notices.

本产品适用于一般电子设备（测量设备、办公设备、信息通信设备、家用电器等）。除非个别产品文档中另有说明，否则请勿将本产品用于需要极高可靠性和安全性的特殊用途（核控制设备、航空航天设备、直接影响人类生命的医疗设备和运输设备、防灾和安全设备等）。为了正确、安全地使用本产品，操作产品时请务必遵守以下安全注意事项。对于违反安全注意事项使用本产品所造成的损害，Hamamatsu Photonics 不负任何责任。



WARNING/警告

● In case an abnormality has occurred / 在发生异常情况时

Do not use this product if smoke, unusual odor, abnormal noise, or heat is generated during operation. Continuing operation may cause a fire or electrical shock. In this case, immediately turn off the PC (personal computer) connected to this product, and then unplug the USB cable. After making sure that the abnormal condition has disappeared, contact our sales office.

Never attempt to repair this product yourself since it can be dangerous.

如果操作过程中出现烟雾、异味、异常噪音或发热情况，请勿使用本产品。继续操作可能会引发火灾或触电。在这种情况下，请立即关闭连接本产品的 PC（个人电脑），然后拔下 USB 线。确认异常情况消失后，请与我们的销售办公室联系。切勿尝试自行维修本产品，因为这样做可能十分危险。

● Do not use this product above its absolute maximum ratings / 使用本产品时，切勿超过其绝对最大额定值

Do not use this product above values stated in the absolute maximum ratings. Using this product beyond its absolute maximum ratings may cause damage or fires.

使用本产品时，切勿超过其标注的绝对最大额定值。使用本产品时超过其绝对最大额定值可能会造成产品损坏或导致火灾。

● Absolutely do not make mistaken connections / 严禁出现连接错误

Doing so may cause overcurrent, causing damage or fires in parts and devices.

这样做可能会引起过电流，从而导致零件和设备损坏或起火。

● Do not damage cords and cables / 不要损坏电线和电缆

Do not scratch, damage, modify, or place heavy objects on top of cords. Doing so can break cords and cause electric shock or fire.

不要划伤、损坏、修改或将重物放在电线上。这样做会破坏电线，引起触电或火灾。

● **Make sure to handle the power cable / 确保处理好电源线**

Make sure to correctly connect the power cable to this product and the power cable to an external power supply. Improper handling or connection may cause electric shock or fire, which is extremely dangerous.

确保将电源线正确连接到本产品，电源线正确连接到外部电源。 不正确的操作或连接可能导致电击或火灾，这是非常危险的。

● **Make sure to connect a compatible cable / 确保连接兼容的电缆**

Make sure to use a compatible cable when using this product. This product is designed to connect with a power cable using LEMO connector FGG.00.302.CLAD35. Using an inappropriate connector or inappropriate cable may cause electric shock or fire, which is extremely dangerous.

使用本产品时，请务必使用兼容电缆。 本产品设计用于使用 LEMO 连接器 FGG.00.302.CLAD35 与电源线连接。 使用不当的连接器或不适当的电缆可能会引起电击或火灾，这是非常危险的。

● **Make sure to install in the correct location / 确保安装在正确的位置**

Make sure to install this product in the correct location, such as away from dust, away from splash water, and in a well-ventilated area, to prevent fire or power failure.

确保将产品安装在正确的位置，如远离灰尘，远离飞溅的水，并在通风良好的地方，以防止火灾或停电。

● **Do not use in gas / 不要使用煤气**

Do not use this product in the presence of flammable or explosive gases or vapors. Using this product in such an environment is extremely dangerous.

请勿在存在易燃或爆炸性气体或蒸汽的情况下使用本产品。 在这种环境下使用这种产品是非常危险的。

● **Do not vibrate or impact / 不要振动或撞击**

Excessive vibrations or impacts may cause damage or misalignment to parts, resulting in fire, electric shock, or failure.

过度的振动或撞击可能会导致零件损坏或错位，导致火灾、触电或故障。

● **Do not enter foreign objects or water / 不要进入异物或水**

It may cause fire or electric shock if flammable objects, metals, or moisture enter this product, which is extremely dangerous.

如果易燃物、金属或湿气进入本产品，可能引起火灾或触电，这是非常危险的。

● **Do not disassemble / 不要拆卸**

Do not disassemble this product. Adjusting or modifying the equipment may cause fire, electric shock, burns, or malfunction, etc.

请不要拆卸这个产品。 调整或改造设备可能引起火灾、触电、烧伤或故障等。

● **Do not look directly at the emitted light** / 不要直视发出的光

This product uses a tungsten lamp system. Light in the wavelength range visible to near-infrared is emitted. Emitted light is classified as exempt in the light risk group: EN 62471 / IEC 62471, but it does not guarantee that there will be no impairment of visual function when viewed directly or at close range. Do not look directly at the emitted light.

本产品采用钨灯系统。发出近红外可见波长范围内的光。发光被归类为豁免在光风险组:EN 62471/IEC 62471,但它不保证不会有视觉功能损害时,直接或近距离观看。不要直视发出的光。

● **Beware of high temperature** / 注意高温

The temperature of this product rises after the lamp on. If you touch this product directly for a long time after the lamp on, it may cause redness, itching, rashes, etc. on your skin, or it may cause burns. Before handling this product, turn off the lamp and make sure this product is sufficiently cooled.

灯亮后,这款产品的温度会升高。开灯后如果长时间直接触摸,可能会导致皮肤发红、瘙痒、皮疹等,也可能导致烧伤。在处理该产品之前,请关闭灯并确保该产品足够冷却。

■ Notices on handling this product / 关于处理此产品的通知

CAUTION/注意



In order to use this product safely, Users should prepare the necessary peripheral equipment and follow the precautions regarding the handling of the products.

为了安全使用本产品，用户应准备必要的外围设备，并遵守有关处理产品的注意事项。



Use this product with in the absolute maximum ratings.

Exceeding the absolute maximum rating even momentarily may degrade the quality of this product. Make sure to use it within the absolute maximum ratings. When applying voltage to this product, be careful not to exceed the absolute maximum rating.

请使用绝对最高评级的产品。

即使暂时超过绝对最高等级，也会降低产品质量。请务必在绝对最高评级范围内使用。当对该产品施加电压时，注意不要超过绝对最大额定电压。



Use a suitable external power supply.

Use a DC stabilized power supply that the light intensity can be adjusted according to the measurement samples or measurement environments. Make sure to connect this product, the power cable, and the external power supply correctly.

使用合适的外部电源。

使用直流稳压电源，可根据测量样品或测量环境调节光强。确保正确连接本机、电源线和外部电源。



Attach a heatsink to this product to exhaust heat.

After the lamp on, the temperature of this product gradually rise, reaching around 60°C, when this product is used alone at room temperature. In order to suppress the temperature rise, make sure to use this product with a heatsink or cooling fan. It is recommended to insert a material with high thermal conductivity (grease, sheet, etc.) between this product and the heatsink.

在这款产品上安装散热片以排出热量。

灯点亮后，在室温下单独使用时，本产品的温度逐渐升高，达到 60°C 左右。为了抑制温度上升，请务必使用带有散热片或散热风扇的产品。建议在该产品和散热片之间插入导热系数高的材料(油脂，薄片等)。



Tighten this product correctly with screws.

There are two mounting holes for M3 screws on the rear panel of this product. Make sure to tighten with the specified torque for M3 screws. The specified screw torque is set according to the material of the receiving side. Also, tighten the two screws alternately that a uniform force is applied. Inappropriate screwing may cause problems such as fixing this product.

用螺丝把这个产品拧紧。

这款产品的后面板上有两个 M3 螺丝的安装孔。确保用指定的扭矩拧紧 M3 螺钉。根据接收端的材料设置指定的螺杆扭矩。同时，交替拧紧两个螺钉，使其受力均匀。不适当的螺丝可能会导致诸如固定产品等问题。



Do not apply overvoltage to this product.

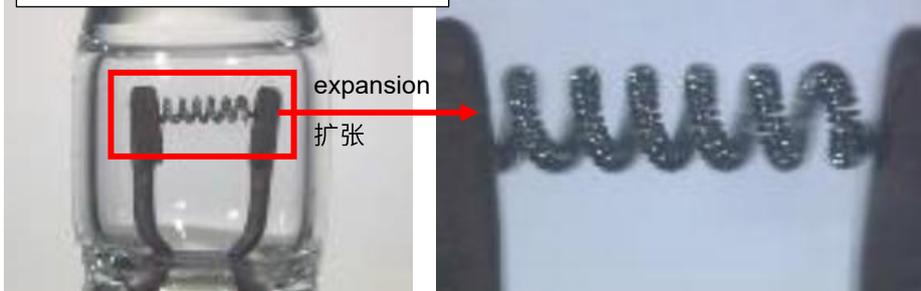
If a voltage exceeding the absolute maximum rating (6V) is applied to this product even momentarily, the filament of the built-in lamps will melt, deform, or short circuit, then it will cause the lamp not to light. Also set the limit of the absolute maximum rating (550mA) on the applied current to prevent overvoltage. If damage due to overvoltage is confirmed, repair will be charged even if it is within the product warranty period. Please contact us for lamps replacement.

请勿对此产品施加过电压。

如果将超过绝对最大额定电压 (6V) 的电压瞬间施加到该产品上, 则内置灯具的灯丝将熔化、变形或短路, 从而导致灯具不亮。还设置绝对最大额定电流 (550mA) 的限制, 以防止过压。如果确认过电压造成的损坏, 即使在保修期内也会收取修理费。请联系我们更换灯具。

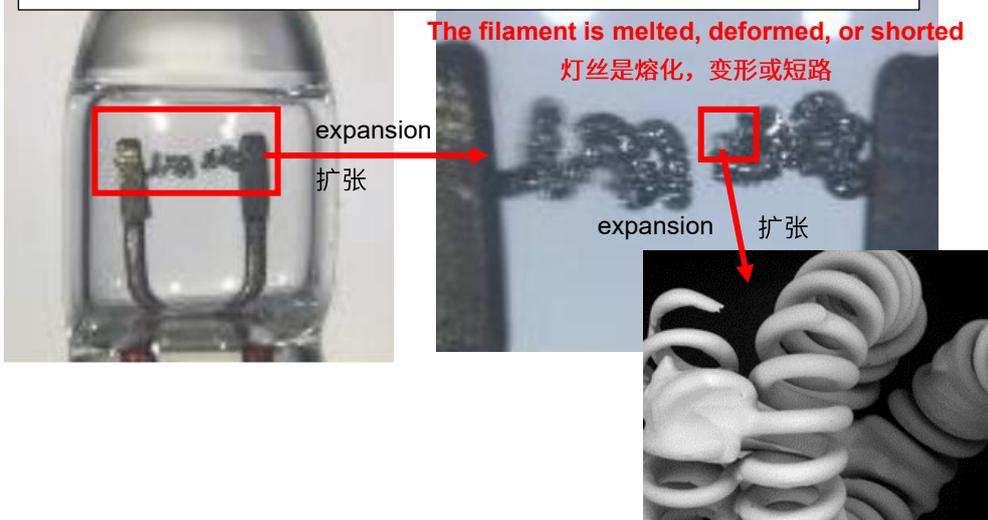
Example of normal lamp filament

普通灯丝示例



Example of damaged filament due to apply overvoltage (lamp does not light)

因过电压 (灯不亮) 而损坏灯丝的例子



Store this product in a clean environment.

Do not store or operate this product in the environment such as where is a dusty, watery, or condensation. Also, store this product with the protective cap which is attached at the time of shipment.

把这个商品保存在干净的环境里。

请勿在灰尘、水渍或凝结物等环境中存放或操作本产品。另外, 请将这款商品与发货时自带的保护帽一起保存。

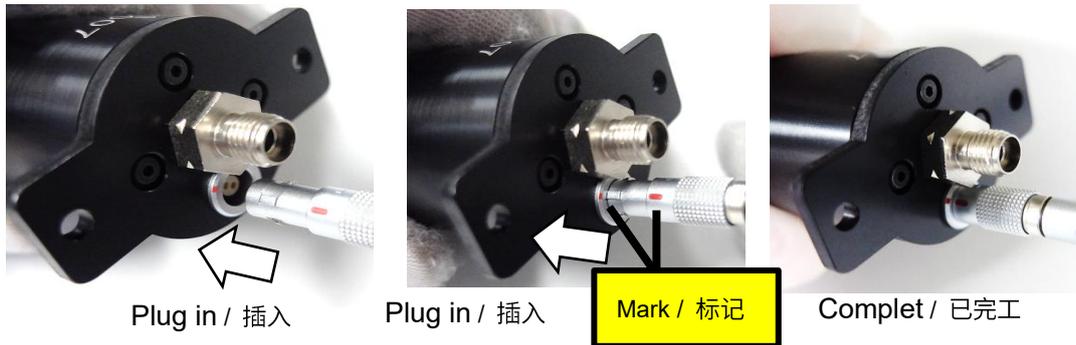
Connect the cable with moderate force.

Applying excessive force or any force in other direction may cause poor connection or damage to the connector. The connector of this product is EGG.00.302.CLL (LEMO). It is a two-core connector. Also make sure to use the connector: FGG.00.302.CLAD35 (LEMO) for the cable. For connection, use the red line as a mark, and inset all the way in. Make sure to refer to the LEMO catalog for details.



用中等的力连接电缆。

在其他方向施加过大的力或任何力都可能导致连接不良或连接器损坏。本产品的连接器为 EGG.00.302.CLL (LEMO)。它是一个双核心连接器。也请确保使用连接器: FGG.00.302.CLAD35 (LEMO) 用于电缆。对于连接, 使用红线作为标记, 并一直插入。请务必参考 LEMO 目录以获取详细信息。



Use the optical fiber with handling precautions.

Clean the tip of the optical fiber before connecting this product. Absolutely avoid inserting a protruding object into the optical fiber connector. It may damage the optical fibers. Also, use a compatible optical fiber for connecting this product. If you use a non-compliant optical fiber, you may not be able to obtain the full characteristics of this product, or it may cause problems of this product.



使用光纤时要注意操作。

连接本产品前, 请清洁光纤的前端。绝对避免将突出的物体插入光纤连接器。可能会损伤光纤。另外, 使用兼容的光纤连接本产品。如果您使用不符合标准的光纤, 您可能无法获得该产品的全部特性, 或者可能会导致该产品出现问题。

Do not touch the light exit port with bare hands.

The light output intensity decreases due to devitrification such as burning of dirt, if lamp is on with dust or fingerprints on it. If the lamp is dirty with finger marks, etc., wipe it off with gauze or absorbent cotton that has been soaked in ethyl alcohol and tightly wrung out, before turning on the lamp.

请不要徒手触摸出口。

如果灯上有灰尘或指纹, 则由于非玻璃化 (如燃烧污垢), 光输出强度降低。如果灯上有指痕等污迹, 请用浸过乙醇液并拧紧的纱布或脱脂棉擦拭, 然后再开灯。



Do not apply excessive vibration, impact, or force.

Excessive vibration, shock, or force can cause such as misalignment of internal optics, damage to the window, damage to the internal lamps, break to the filament of lamps, or failure to the lamps.



不要施加过大的振动、冲击或力量。

过大的振动、冲击或力可导致内部光学装置错位、窗户损坏、内部灯具损坏、灯丝断裂或灯具失效。



Not designed for use in high places.

This device is not designed for use in high elevation places. Do not use it in places where the elevation is over 2,000 meters.

不适合在高处使用。

本装置不适用于高海拔地区。 请不要在海拔 2,000 米以上的地方使用。



Please contact our help desk to replace the lamp.

Using the lamp for a long time will consume the filament of the lamp and eventually cause it to burn out. Hamamatsu Photonics will do alignment and electrical connection required for lamp replacement, so please contact us to do replacement or repair of the lamp in this device. In order to obtain the full characteristics of this product, if even one of the four lamps in this product does not light up, please contact us for a repair request.

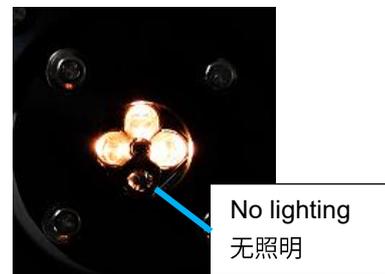
灯的更换请咨询服务台。

长时间使用灯管会消耗灯丝，最终导致灯管烧毁。 Hamamatsu Photonics 将进行灯具更换所需的校准和电气连接，因此请联系我们对此设备中的灯具进行更换或维修。 为了获得本产品的全部特性，如果本产品中的四个灯中有一个不亮，请联系我们要求修理。

Four lamps on
四盏灯



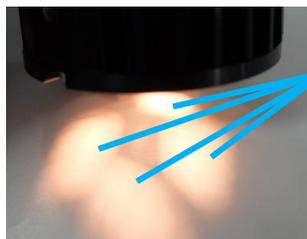
One lamp does not light
一盏灯不再点亮的状态



The lighting can be confirmed in the emission state.

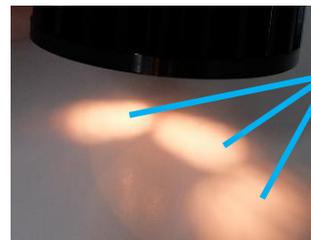
可以在发光状态下确认照明。

Four lamps on
四盏灯



Four lights
四个灯

One lamp does not light
一盏灯不再点亮的状态



Three lights
三个灯

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1. Check package contents

After unpacking, make sure to check that there are the following components: In the unlikely event that the delivered products are incorrect, incomplete, or damaged, do not operate the products, and make sure to contact Hamamatsu Photonics or our distributor.

Table 1 Packaged item list

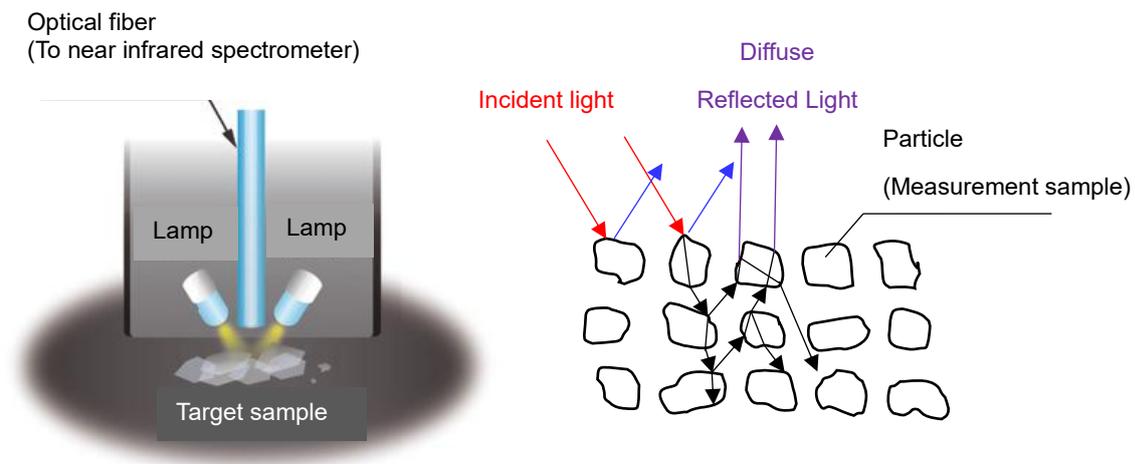
	Contents	Photo	Description
1	Main unit		Name : Diffuse reflection Light source Type number : L16462-01
2	CD-ROM		The CD-ROM contains: • Instruction manual (this document)

2. Overview

This product is a lamp unit that emits near infrared light on measurement samples, and receives the light which was subject to diffuse reflection inside the sample with an optical fiber. It does spectrophotometry of the target sample by connecting to a near infrared spectrometer with an optical fiber.

With diffuse reflection measurement, some of the light shone on the sample is reflected directly from the particle surface, while the rest of the light penetrates inside the sample. Light is repeatedly diffused inside the sample through refraction transmission, light scattering, and surface reflection, and finally, some of the light is emitted from the sample surface again.

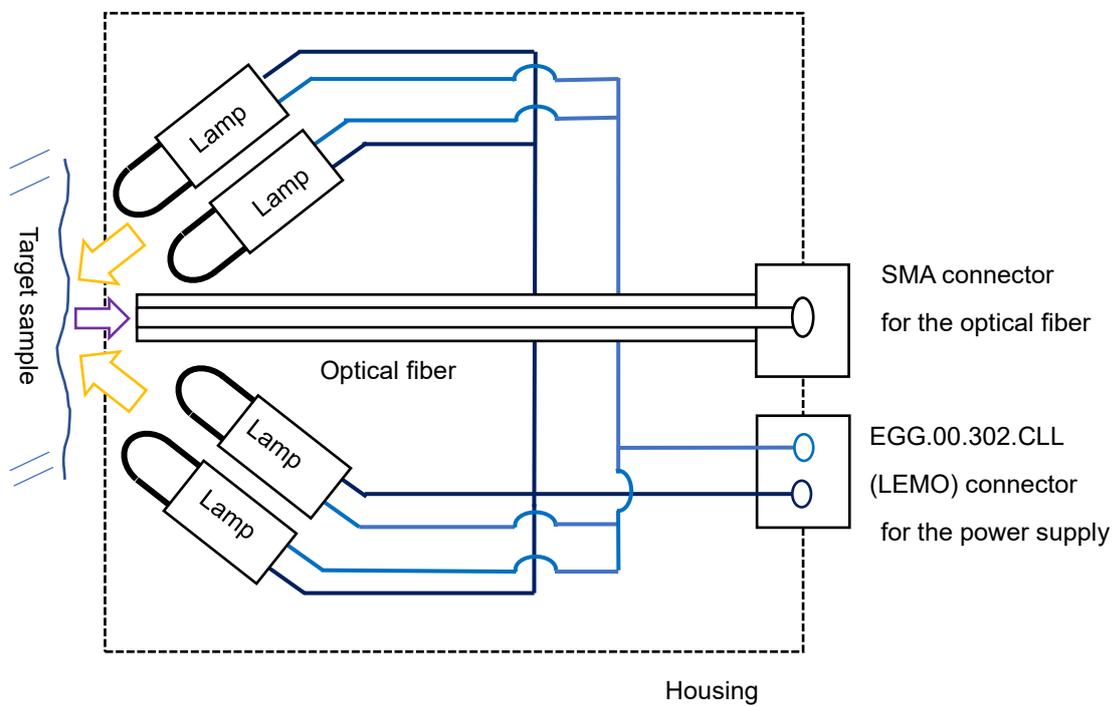
Light repeatedly transmits through the inside of the sample in the light diffusion process, so the diffuse reflection spectrum is measured similar to the absorption spectrum. The analysis method using absorbance [common logarithm of the ratio of incident light level I_0 (reference measurement) and transmitted light level I_1 (sample measurement)] can also be used for diffuse reflection measurement.



3. Structure

■ Block diagram

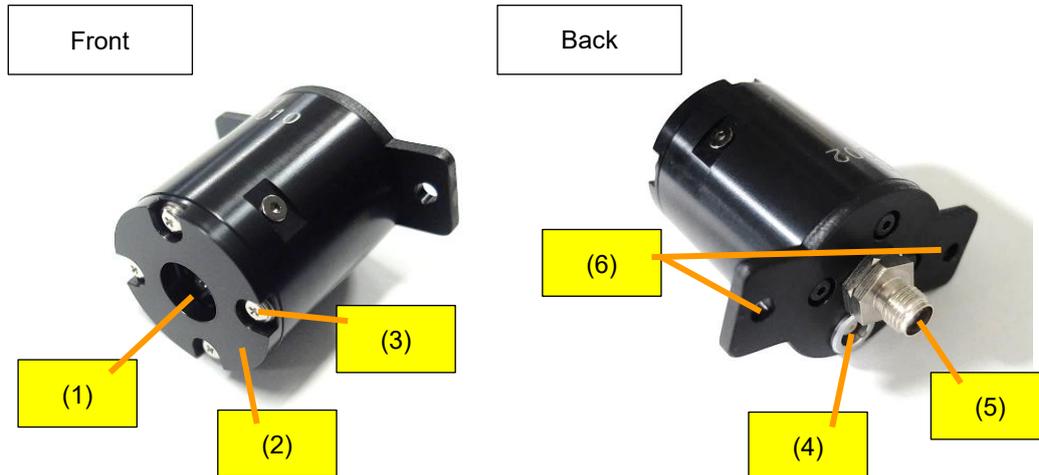
This is a block diagram of this product. This product is equipped with 4 tungsten lamps with lenses. The lamp lead wire is directly connected to the power connector, and the light output intensity of the lamp is controlled according to power supplied from the external power supply. The light emitted from the lamp is applied to the measurement sample, and the light diffusely reflected inside the sample is guided to the optical fiber.



4. Name and description of each section

■ Part names of this product

The names of various parts of this product are explained below.



(1) Light emission unit

Light is emitted from four lamps. The light diffusely reflected inside the measurement sample is guided to the built-in optical fiber.

(2) Spacer

The spacer adjusts focal distance. If a spacer is attached, measure by touching it to the measurement sample. With the spacer removed, the focal distance is about 3 mm.

(3) Spacer mounting screw

Spacers are attached with four M2 screws.

(4) Power connector

It is a connector for supplying the power supply voltage. EGG.00.302.CLL (LEMO) is used for the connector.

(5) Optical fiber connector

This is a connector for connecting optical fibers. SMA905 is used for the connector.

(6) Rear panel

There are two $\Phi 3.4$ mm mounting holes for installing this product and installing a heatsink. Do not fasten or install this product in other places.

5. Device connection

Here we explain the procedure for connecting/disconnecting this product.

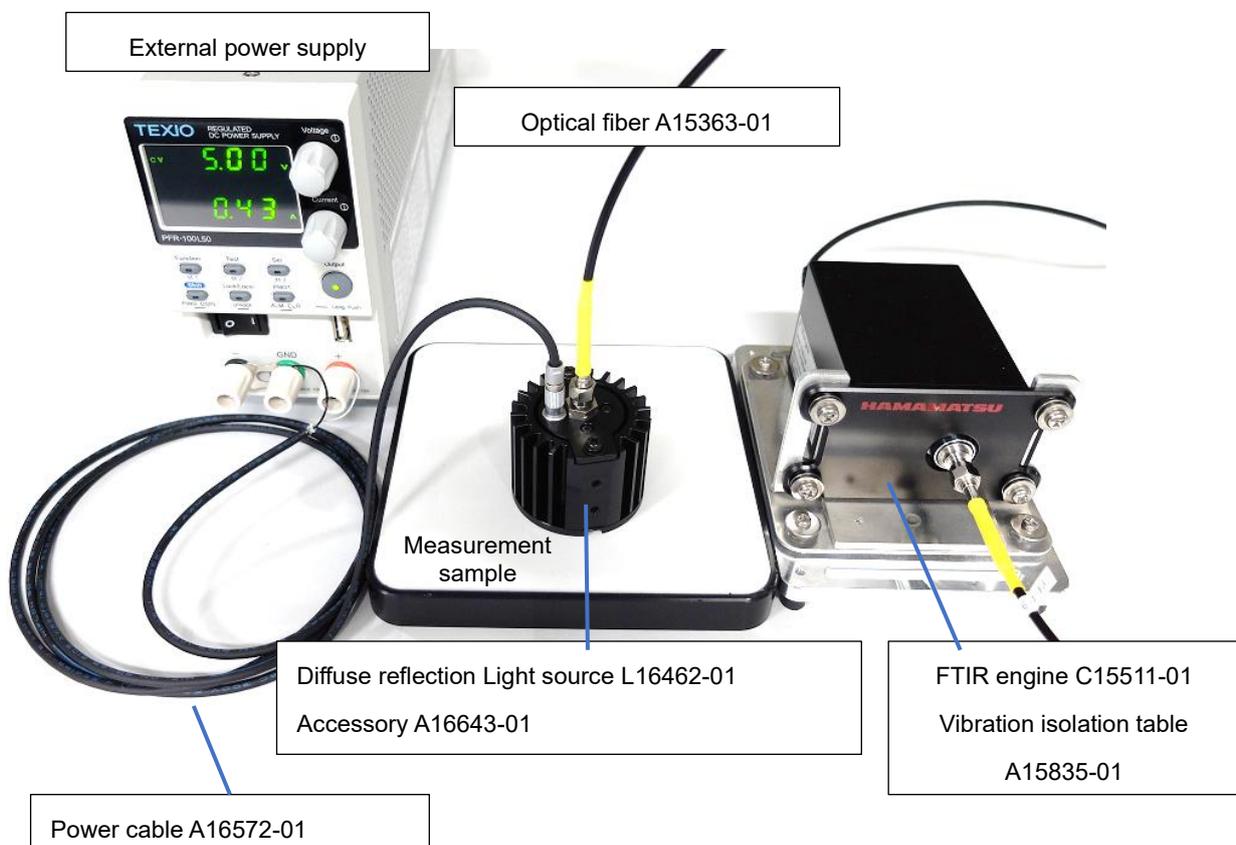
This product applies voltage from an external power supply to turn on the lamp. The light diffusely reflected from the measurement target is guided by connecting an optical fiber. For cables for connecting this product, see “Compatible Power Cables” and “Compatible Optical Fiber Cables” in this manual.

When a voltage of 5 V is applied to this product, a current of about 460 mA will flow and the lamp will turn on. At this time, the temperature of the product will **gradually rise to about 60°C**. Turn off the lamp and check that this product has cooled adequately before handling that involves connecting, disconnecting, or installing it.

Make sure to take measures such as installing a heatsink or cooling fan, so as to suppress heat generation from the product as much as possible. We offer an accessory as heatsink for evaluation. See “Accessory” in this manual.

■ Connection example

The following is a connection example for performing near infrared diffuse reflection spectroscopy. Diffuse reflected light guided to the optical fiber is connected to a near infrared spectrometer, FTIR engine, or other product to do spectrophotometry.



■ Preparation

Prepare a power supply, power cable, optical fiber, and heatsink in order to use this product. We offer the following accessories, so please use them as necessary. Prepare a power supply that can apply 5 V and 1 A.

Power cable: A16572-01

Optical fiber: A15363-01

Accessory: A16643-01

Near infrared spectrometer: FTIR engine (C15511-01), etc.

■ Connection procedure

- Install this product on the heatsink or the device to be used. Use the mounting holes on the rear panel for installation. This manual describes the procedure when it is attached to a dedicated accessory.**

(Ex.) Attach to a dedicated accessory.

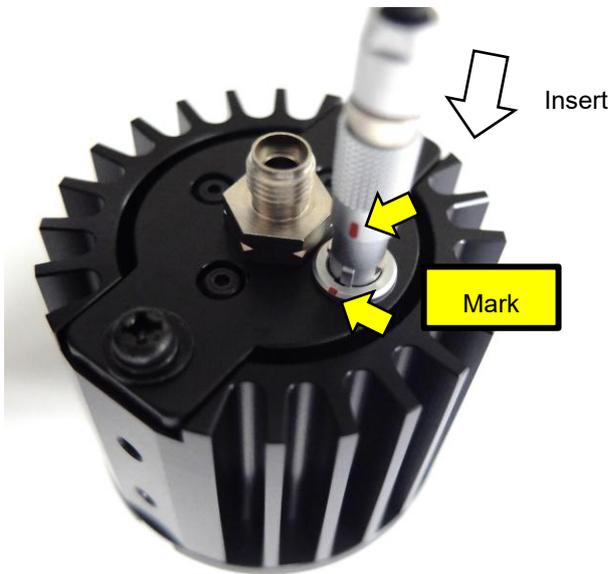
By adding a heat dissipation sheet or heat dissipation grease to the mounting part, or using a cooling fan, the function of the heat sink will be more fully demonstrated.



Diffuse reflection Light source
L16462-01

Accessory
A16643-01

- (2) Connect the power cable. Align the power cable using the red line of the connector as a mark, then connect it by inserting it into the connector.



- (3) Connect the optical fiber.



- (4) After connecting the power cable to the voltage source, turn on the supply voltage and turn on the lamp.

If excess voltage is applied to this product, the filament of the built-in lamp will melt, causing it to deform and short-circuit, and the lamp will not turn on. The recommended operating voltage for this product is 5V. Be sure to use this product within the absolute maximum ratings (6V, 550mA).

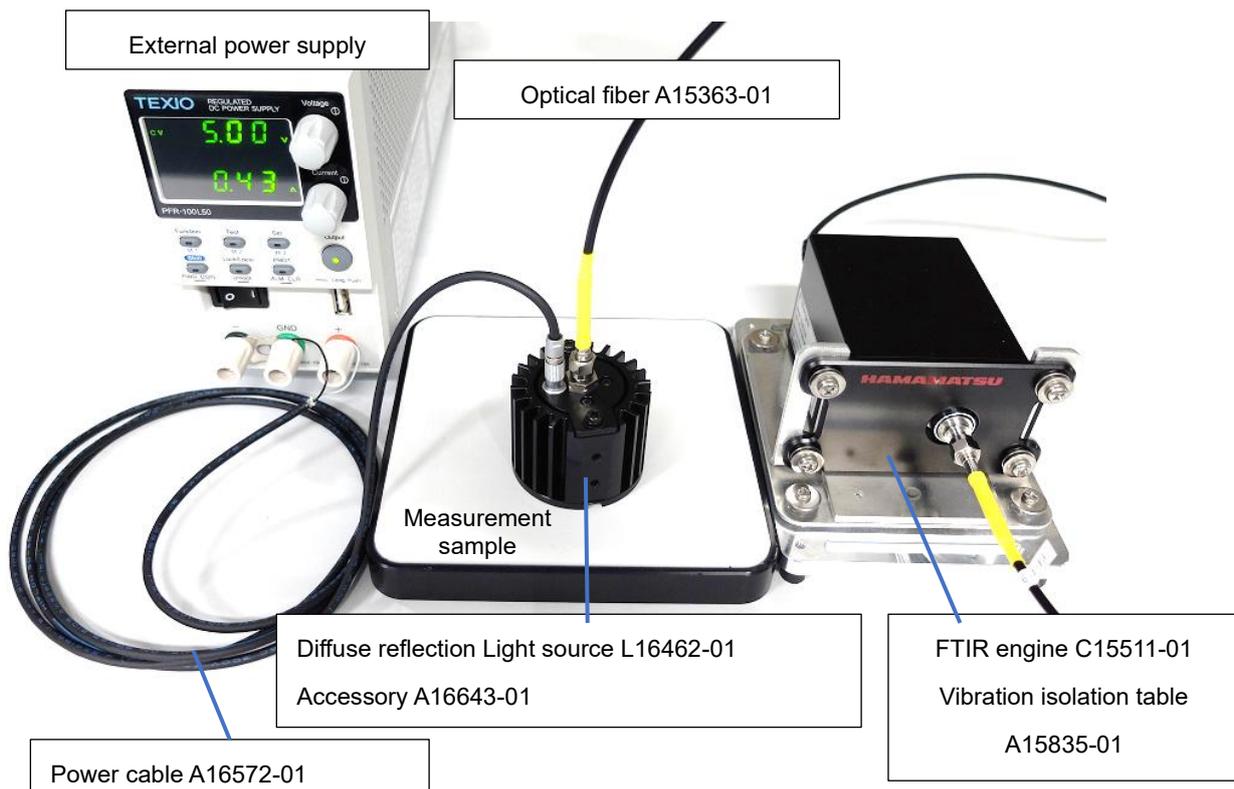


Lamp light on



Power supply on

- (5) Connect to a near infrared spectrometer such as an FTIR engine to do measurement. When making measurements, touch this product to the sample.

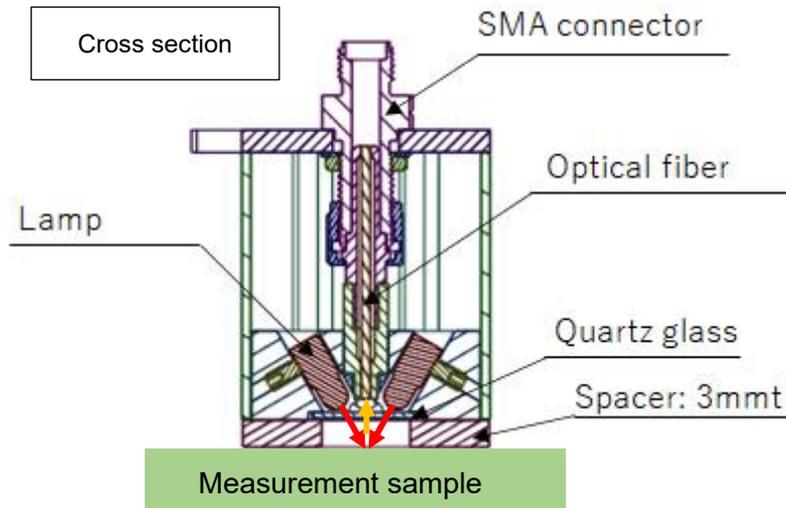


■ Disconnection procedure

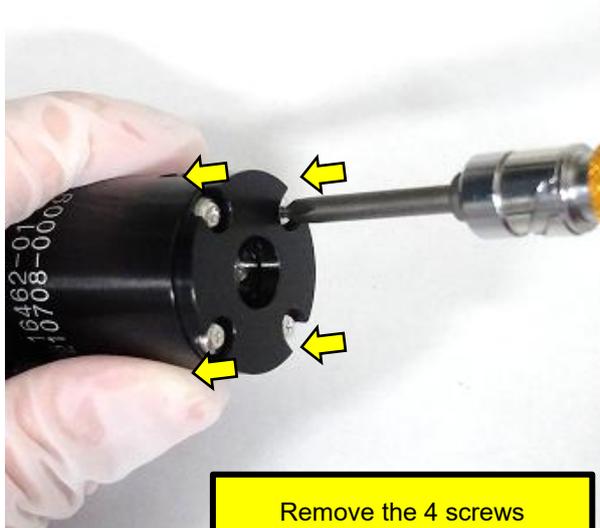
- (1) Turn off the power supply voltage to turn off the lamp.
- (2) After turning off the lamp, make sure that this product has cooled adequately.
- (3) Remove the optical fiber.
- (4) Remove the power cable.
- (5) Remove this product.
- (6) Attach a cap to the optical fiber connector and store it in a clean place.

■ To measure samples that cannot be touched

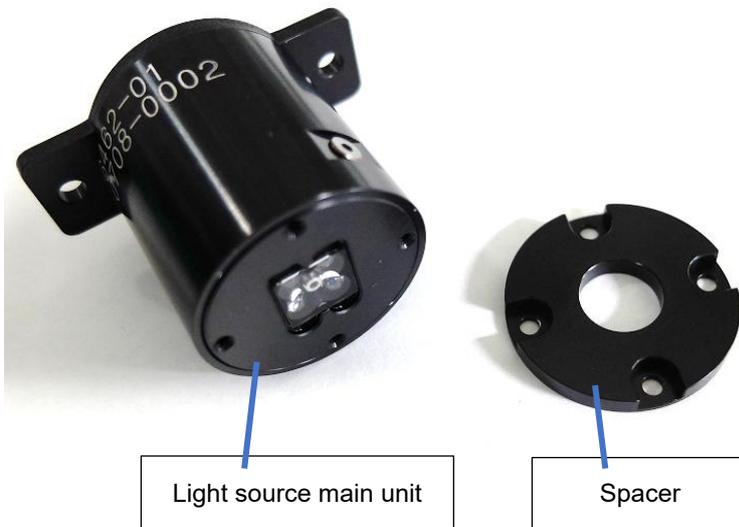
This product makes measurements by touching the sample. Removing the spacer attached to this device creates a space between the measurement sample and the device body, making it possible to measure samples that cannot be touched.



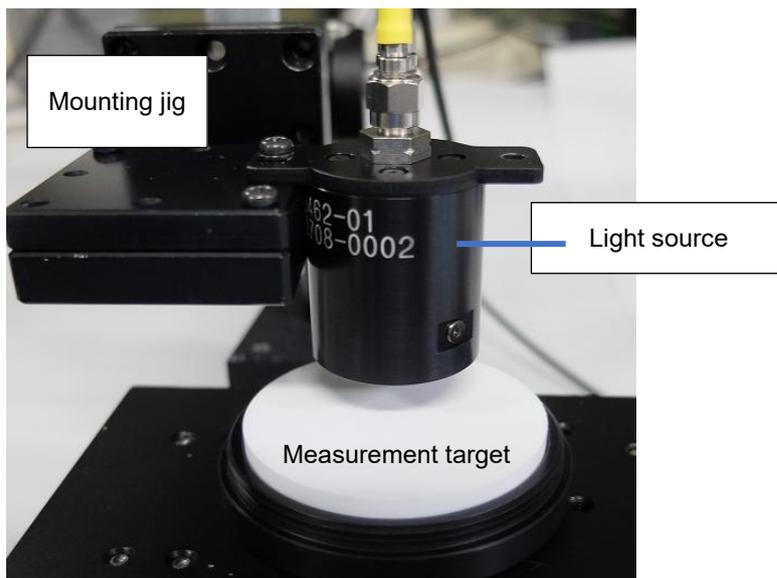
- (1) Use a screwdriver to remove the 4 screws at the light outlet.



(2) Remove the spacer.

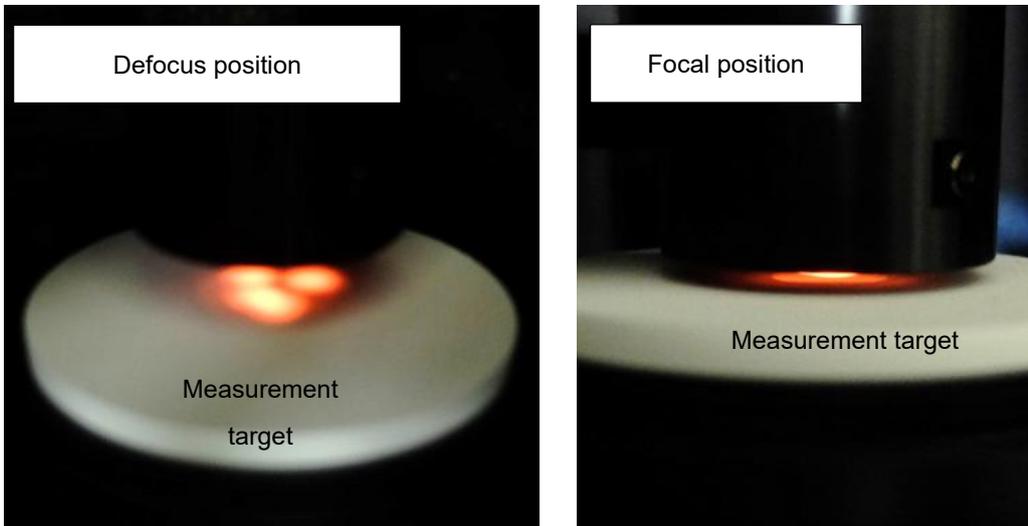


(3) Attach the light source to the device or jig.



(4) Adjust the focal position.

If the focal position is different, light emitted from the four lamps will split. Adjust the height of the light source and the measurement target so that the illuminated light overlaps. The focal position is approximately 3 mm from the outlet of this product.



(5) Fix the light source at the focal position, then do measurement according to the Connection procedure.

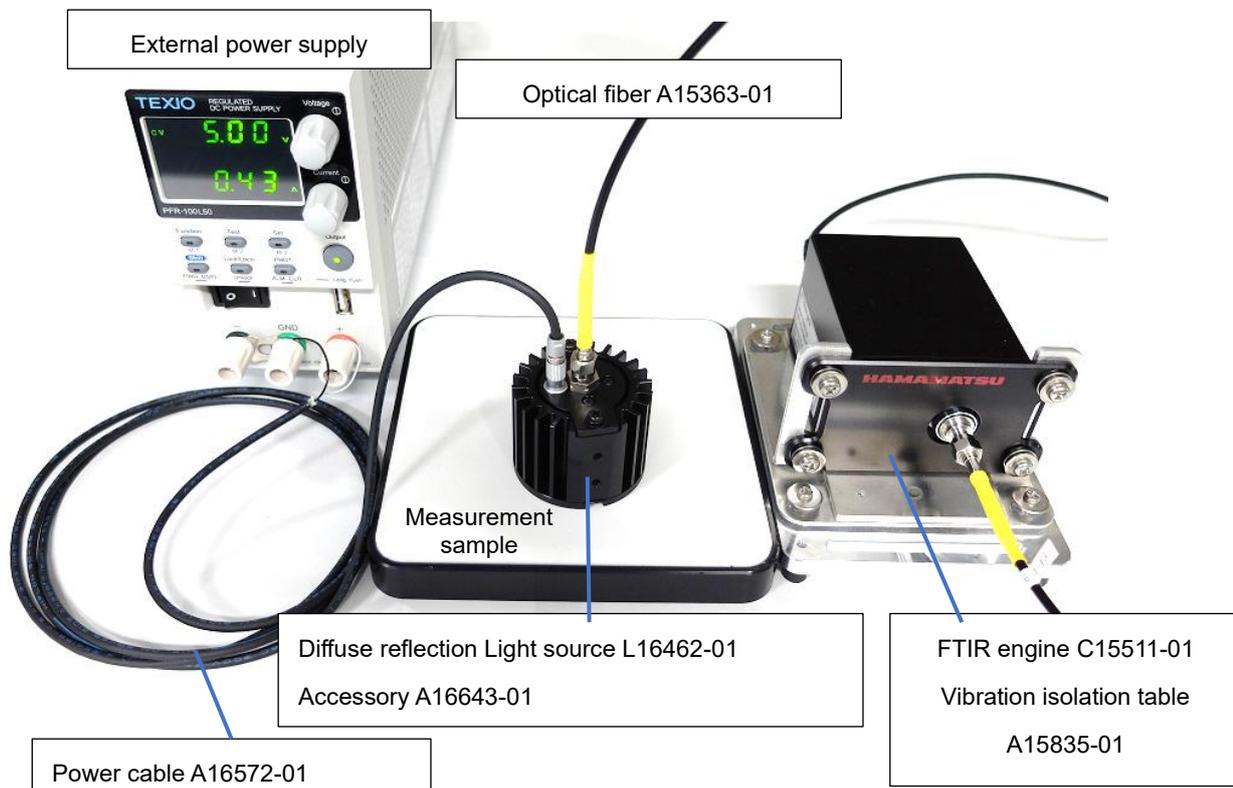
(6) After completing measurements, remove this product according to the Disconnection procedure, and store the device in a clean environment.

6. Measurement example

It is an example of measurement using this product, standard diffuse reflector (100%) and FTIR engine C15511-01. Shown below were examples with this measurement system when the voltage applied to this product is changed. The obtained spectrum intensity changes according to the voltage applied to this product (lamp). Also, when the applied voltage is changed, this product life also changes. A reference formula for the estimated average life expectancy is shown. This reference formula is just a reference for the lamp itself, does not guarantee the estimated average life of this product.

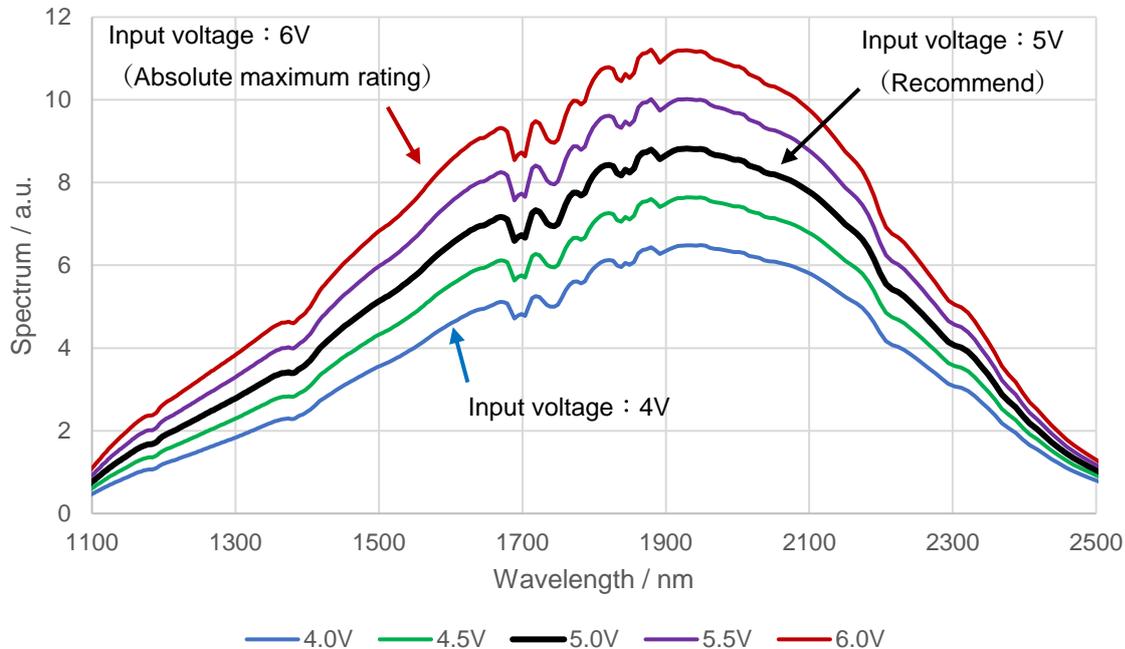
■ Measurement system example

An example of this measurement system is shown.



■ Spectrum measurement example

This is an example of spectrum measurement obtained with this measurement system. The obtained spectrum intensity changes according to the voltage applied to this product. Please use it within the range of the absolute maximum rating according to the measurement samples and measurement environment. Also, please keep in mind the changing estimated life expectancy when changing the voltage.



■ Reference: Estimated average life expectancy

It is a reference formula for the estimated average life expectancy when the voltage applied to this product is changed. This formula is just a reference for the lamp itself, does not guarantee the estimated average life of this product.

Reference formula for estimated average life expectancy:

$$L_1 = L_0 \times \left(\frac{V_1}{V_0} \right)^{-4}$$

L_1 : Estimated average life, L_0 : Average life (7,000hour)

V_1 : Input voltage, V_0 : Recommended voltage (5V)

7. Warranty, Repair / 保修、维修

● Warranty / 保修

- When using the product described in this manual, observe the maximum rating and precautions. Our company makes every effort to improve the quality and reliability of this product but does not guarantee the integrity of this product. When the product is used for equipment that may infringe on human life, body or property, it is dangerous unless appropriate safety measures are taken in consideration of possible defects. Our company assumes no responsibility for such use unless the prior written consent of our company such as specifications has been obtained.

使用本说明书中描述的产品时，请遵守最大额定值和注意事项。公司尽一切努力提高本产品的质量和可靠性，但不保证本产品的完整性。当产品用于可能危害人员生命、身体或财产的设备时，除非考虑到可能存在的缺陷，采取适当的安全措施，否则十分危险。除非事先取得本公司的书面同意（例如规格说明），否则本公司对此类使用不承担任何责任。

- When providing guidance on the operation of the product to end users, the reader is requested to carefully explain the function, performance, and handling of the product and equipment using the product, and to give appropriate warnings and indications.

在向最终用户提供产品操作指导时，应仔细解释产品以及使用该产品的设备的功能、性能和处理，并给予适当的警告和提示。

- The warranty of the product in this document is limited to repair of the device or delivery of a substitute if the defect is found within 1 year (Lamp is 2000 hours after delivery regardless of cumulative lighting time.) after delivery and our company is notified thereof. Our specifications (Modification and violation of various conditions concerning the environment, application field, usage, storage, disposal, etc., described in this document), even within the warranty period. In addition, if the product is found to be damaged due to overvoltage, it will be repaired for a fee even within the product warranty period.

本档所述的产品保修仅限于在发货后 1 年内发现缺陷并通知我公司的情况下，对设备进行维修或交付替代品。（灯具在交付后无论累计点亮时间，保修期为 2000 小时。）

即使在保修期内，本公司的规格（本档中所述的环境、应用领域、使用、储存、处置等各种条件的修改和违反）也不受此限制。

此外，如果发现产品因过电压而损坏，即使在产品保修期内，也将收取维修费用。

- Please do not reproduce or produce the contents of this document without our company's permission.

未经本公司许可，请勿对本档内容进行复制或制作。

- When disposing of this product, treat it as industrial waste according to the regulations of the national or local government.

在处置本产品时，请按照国家或地方政府的规定将产品作为工业废弃物进行处理。

- Repair / 维修

If you notice anything unusual, please contact Hamamatsu Photonics or your regional representative with the product name, serial number, and description of the fault (see the end of this document). We try to complete repairs as quickly as possible, but in the following circumstances, there is a possibility that it may be necessary to charge a repair fee or refuse repair:

如果您发现任何异常，请联系 Hamamatsu Photonics 或您所在地区的代表，并提供产品名称、序列号和故障描述（请参阅本文档末尾内容）。我们会尽力尽快完成维修，但在以下情况下，可能需要收取维修费用或拒绝维修：

(1) If a long period of time has passed since you purchased the product

如果您购买本产品已经很长时间

(2) If repair parts are no longer produced

如果维修所需零件已不再生产

(3) If you have mode modifications

如果您有模式修改

(4) If the damage is considered to be substantial.

如果认定存在实质性损害。

(5) When an abnormal phenomenon is not reproduced at Hamamatsu Photonics

当 Hamamatsu Photonics 无法再现异常现象时

(6) When it is caused by other devices used at the same time

因同时使用其他设备而引起的故障

8. Appendix

8-1. Product specifications

■ Structure

Parameter		Specification	Unit
Tungsten Lamp	Quantity	4	pcs
	Irradiation angle*1	Approx.60	degrees
	Recommended supply voltage	+5	V
	Average lifetime (Reference)*2	7,000	hr
	Warranty lifetime*3	2,000	hr
Focal position*4	With spacer attached	Approx. 0	mm
	With spacer detached	Approx. 3	mm
Built-in optical fiber angle*1		Approx. 90°	degrees
Built-in optical fiber		Core diameter=1000μm, NA=0.22	-
Optical fiber connector		SMA905	-
Power connector		EGG.00.302.CLL(LEMO)	-
Dimensions (excluding protrusions)		Φ 28 × 35.5	mm
Window material		Quartz glass	-

*1: Angle with the light emission surface of the case

*2: Average lifetime of lamp itself. Time until 50% of the lamps burn out, when the lamps are lit continuously at an ambient temperature of 25°C at the recommended supply voltage of 5 V.

*3: Time after delivery, not lamp lighting time

*4: Distance from the case light emission surface to the focal point. The focal point is the point where the light outputs of the four lamps overlap.

Note: There is a fee for replacement of burned out lamps. Please contact your local Hamamatsu sales office.

■ Absolute maximum ratings(Ta=25°C, unless otherwise noted)

Parameter	Symbol	Condition	Value	Unit
Operating temperature	Topr	No dew condensation*5	-5 to +50	°C
Storage temperature	Tstg	No dew condensation*5	-20 to +70	°C
Maximum supply voltage	Vin max		+6	V
Maximum input current	Iin max		550	mA

*5: When there is a temperature difference between a product and the surrounding area in high humidity environment, dew condensation may occur on the product. Dew condensation on the product may cause deterioration in characteristics and reliability.

Note: Exceeding the absolute maximum ratings even momentarily may cause a drop in product quality. Always be sure to use the product within the absolute maximum ratings.

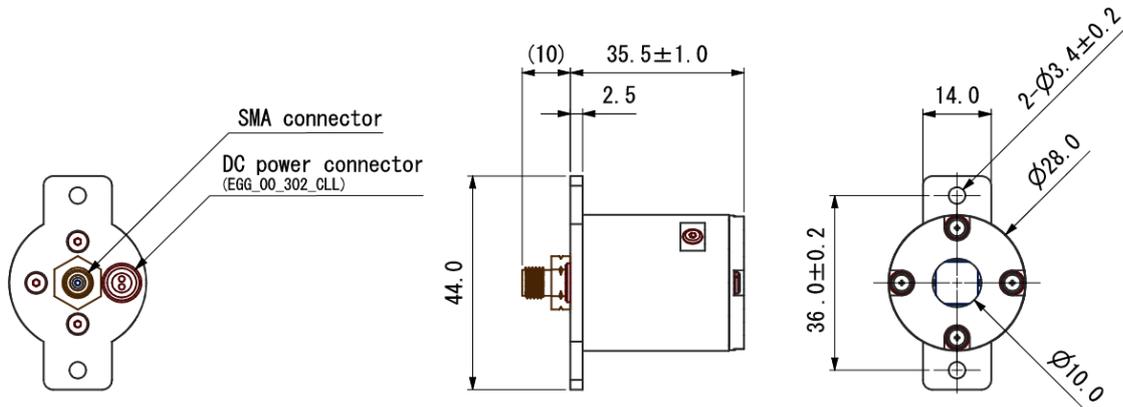
■ Electrical and optical characteristics(Ta=25°C, Vin=5V)

Parameter	Min.	Typ.	Max.	Unit
Current consumption	385	460	515	mA
Wavelength range	-	400 to 2500	-	nm

8-2. Dimensional Outline

■ L16462-01

(Unit:mm)

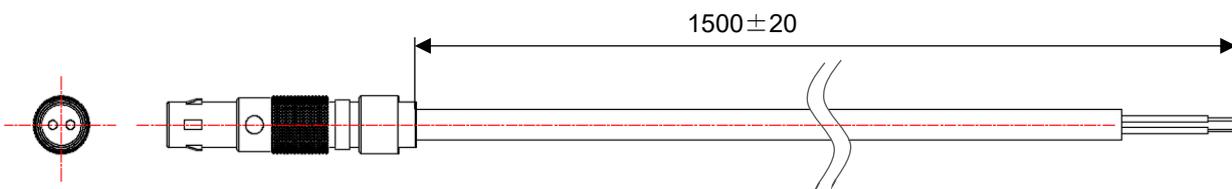


Tolerance unless otherwise noted: ± 0.5

Weight: approx..50g

8-3. Compatible Power Cables

Use the cable by attaching the connector FGG.00.302.CLAD35 (LEMO) that is compatible with the power connector EGG.00.302.CLL (LEMO) of this product. We offer a power cable with a compatible connector as an accessory for this product. One end of the lead wire is terminated by soldering, so please attach a connector according to your application.



Type Number	Name	Connector	Specifications
A16572-01	Power cable	FGG.00.302.CLAD35	Length:1.5m One End : Lead wire soldering Wire : AWG26

8-4. Compatible Optical Fiber Cables

The conditions for an optical fiber cable to be compatible with this device are as described below.

■ The fiber must have excellent transmittance in the sensitivity wavelength region of this device or the output wavelength region of the object to be measured (light). This makes it possible to do measurement efficiently.

■ Optical NA must be equivalent to 0.22, that is optically compatible with this device.

If the NA is extremely different, then this device cannot be used with its full performance.

■ The diameter of the core must be optically compatible with this device.

If the core diameter is extremely different, then this device cannot be used with its full performance.

The core diameter of the optical fiber to be connected must be smaller than the core diameter of optical fiber of this device. Use the specified core diameter on the spectrometer side.

■ The protective tube must have high light-shielding effect

If the light-shielding effect is low, then ambient light will enter from the outside of the fiber, and fluctuations in the ambient light will impact fluctuations in the measurement results.

■ We offer an optical fiber cable that meets the above conditions as an accessory for this device.

Type Number	Name	Core diameter (μm)	Specifications
A15363-01	Visible / near infrared optical fiber	600	NA = 0.22, length: 1.5 m With SMA905D connector on each end

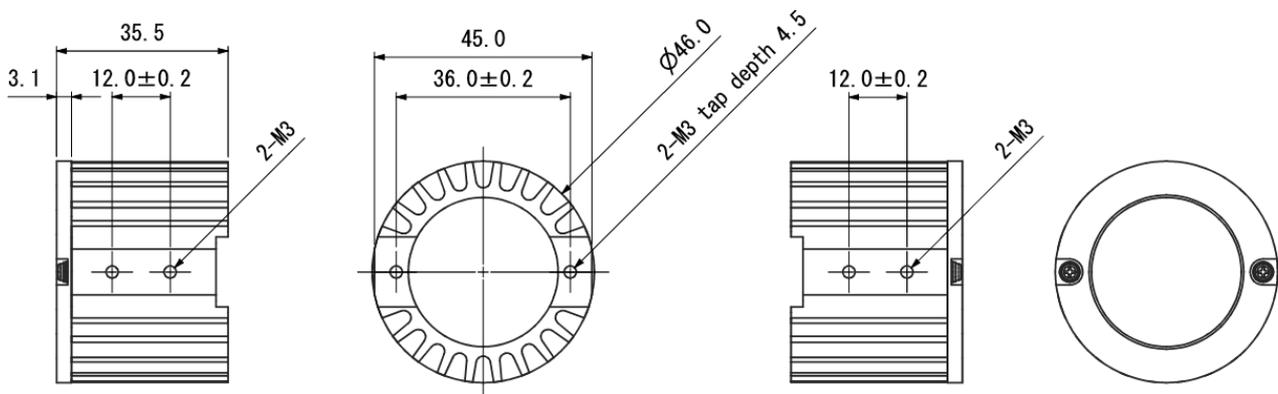
This optical fiber cable itself absorbs light slightly in the wavelength range of 2000 to 2500nm, although it is a near infrared optical fiber and it uses a low-OH quartz fiber. For more efficient measurements in the 2000nm to 2500nm range, use shorter optical fiber.

8-5. Accessory

It is recommended to attach a heat sink to suppress heat generation of this product. We offer an accessory that can be connected to this product. This accessory works better by adding a heat dissipation sheet or heat dissipation grease to the mounting part of this accessory, or using a cooling fan. This accessory (A16643-01) is made of aluminum, Tight this product with the specified torque of 0.371N · m for M3 screws.

A16643-01 Dimensions

(Unit: mm)



※Accessory items

M3 bolt x4, washer x4, spring washer x4

指定なき公差 : ±0.5
質量 : 55g

Revision history

Revision date	Revision	Revision details
February 16, 2023	E01	-

For questions or consultations about our products, please use the inquiry form or call the nearest sales office.

Inquiry: <https://www.hamamatsu.com/all/en/support/inquiry.html>

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