

Mini-spectrometers

This document describes general precautions for using HAMAMATSU mini-spectrometers.

If the product comes with special precautions on the delivery specification sheet, then be sure to strictly comply with those instructions.

1. All models

- Mini-spectrometers (hereafter “the product”) are high precision optical components. Do not apply excessive vibration and shock to the product. Avoid operating and storing it in dusty locations or in areas exposed to water, high temperature or high humidity.
- When cleaning the enclosure, wipe it with a clean, soft, dry cloth. Do not use organic solvents such as thinner and acetone.
- Do not apply excessive force to the connector. Doing so may cause a poor connection or damage the connector.
- Use the product at incident light levels that do not cause the A/D count of each pixel to become saturated. Correct measurement may not be possible when some pixels become saturated. Set a shorter integration time if the A/D count is saturated. If the integration time cannot be shortened, we recommend you use a neutral density filter.
- Even when no light is input, the product generates an output consisting of an offset component and dark signal. The offset component is not dependent on integration time, but the dark signal is dependent on it.
- Coefficients for converting image sensor pixel numbers into wavelengths are described in the final inspection sheet that comes with each product. For module types, those coefficients are also written into the EEPROM in the mini-spectrometer. However, we do not provide coefficients for converting the output value of each pixel to a value proportional to the incident light level.

2. Module type

- The optical connector is exposed to outside air, so when not using the product for extended periods, place a cap on the optical connector or connect the input optical fiber to the connector. When connecting the optical fiber, clean the ferrule on the optical fiber as needed.
- Power supplied through a USB port from a PC is limited to 5 V/500 mA per port due to USB specifications. So power exceeding this limit cannot be supplied to the product. If connecting two or more products to one USB port via a hub, use a hub with a power supply.
- Evaluation software differs according to the product model. Be sure to install the evaluation software that supports the product you will be using.

- Never connect the product to the PC before installing the evaluation software into the PC. This might prevent correctly installing the evaluation software.
- The supported OS is Microsoft® Windows®. Refer to the datasheet or operation manual for details on versions and platforms.
- Depending on the PC model, the power-saving mode or screensaver might interrupt power supplied from the USB port. Interruption of power supplied from the USB port will also stop the product operation and might cause problems when power is later resupplied from the PC after recovering from power-saving or screensaver mode. If the PC causes this problem, then please disable the power-saving mode and screensaver. (See the PC operation manual to find PC functions and settings.)

(1) TG-CCD/TM-CCD series

An external power supply is required to operate the internal image sensor. Use the AC adapter that comes supplied with the product.

(2) TG-cooled series

- An external power supply is required to operate the internal thermoelectric cooler and cooling fan. Please prepare a low noise power supply and connect it to the product using the connector that came supplied with it. Use caution when turning on the power supply because an inrush current flows at that time. Table 1 shows the maximum current in steady state and typical inrush current.

[Table 1] Maximum current in steady state and typical inrush current (TG-cooled series)

Power supply	Mini-spectrometer type	Supply voltage (V)	Maximum current in steady state (A)	Typical inrush current (A)
For thermoelectric cooler	TG-cooled NIR-I	5	1.8	5
	TG-cooled NIR-II		2.8	
	TG-cooled NIR-III			
For cooling fan	All models	12	0.2	0.4

[Power supply examples]

Multi-output power supply: PW18-1.3ATS (Nikke Techno System Co., Ltd.)

Unit type power supply (+12 V): R10A-12 (Cosel Co., Ltd.)

- When the cooling fan filter becomes dirty, replace it by following the procedure described in the product operation manual.
- Do not block the air intake and exhaust ports for the cooling fan during use. If the temperature inside the product rises too high, the internal safety circuit acts to stop product operation. However, high temperatures may cause a malfunction. If product operation stopped due to the safety circuit, then immediately turn off the external power supply and disconnect this product from the USB port of the PC. Then, check and eliminate the cause of the problem. Resume operation after making sure that the product temperature has dropped to room temperature.

3. Head type

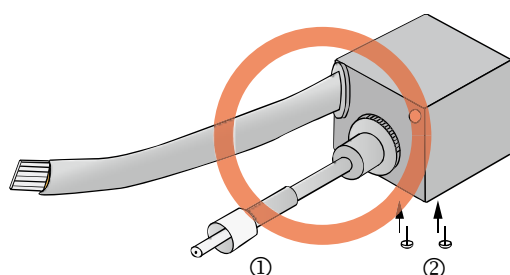
The electrical terminal of the head type is connected to the internal image sensor signal terminal. Precautions for static electricity and circuit board design are identical to those for the image sensor (electrostatic sensitive device). To find further information see "4. Electrostatic sensitive devices" and "6. Circuit board design precautions" in our document "Precautions (Image sensors)."

(1) RC series

- Avoid excessive or repeated bending and stretching of the flexible board, which may cause an open-circuit fault. Do not bend the flexible board to the point where folds or creases occur.
- Avoid pulling, twisting or excessive bending of the optical fiber, which may damage the optical components in the mini-spectrometer or the optical fiber itself. To prevent applying stress to the optical fiber, provide slotted mounting holes in the equipment enclosure where the head-type mini-spectrometer is to be installed. Make sure these slotted holes are aligned along the same direction as the optical fiber. When installing the mini-spectrometer, first clamp the optical fiber SMA connector and then use the slotted holes to secure the mini-spectrometer at a position where the optical fiber is free from stress.

[Figure 1] Precautions when connecting input optical fiber

[Correct connection]

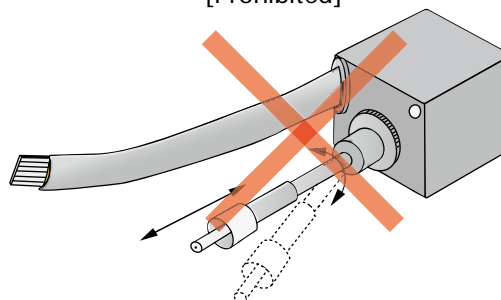


① Connect the SMA connector.

② Secure in place while making sure no stress is applied to the optical fiber.

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[Prohibited]



Do not bend, push, pull, turn or twist the optical fiber.

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(2) MS series

- Repeatedly applied external force might damage the leads. If the product must be installed in a location subject to vibration, then secure it in place using adhesive resin or clamps.
- To prevent the product from being damaged during soldering, check the soldering temperature and time. As a general guide, solder at 370 °C or less within 3.5 seconds when using a soldering iron, or solder at 260 °C or less within 10 seconds when using a solder pot.
- If the light input window becomes dirty, gently wipe it off with a cotton swab, etc. moistened with alcohol.
- As an option, HAMAMATSU provides the C11351 evaluation circuit for the MS series. Using the C11351 allows controlling the MS series and acquiring data using a PC. DLL function specifications for the C11351 evaluation circuit are not available to users.

4. Input optical fibers (option)

- When connecting the input optical fiber, clean the ferrule on the optical fiber as needed.
- Do not bend the HAMAMATSU input optical fibers to a radius smaller than that shown in Table 2. Doing so may break the optical fiber.

[Table 2] Minimum bend radius of input optical fiber

Type no.	Minimum bend radius (mm)
A9762-01	75
A9762-02	100
A9763-01	66
A9763-02	88

HAMAMATSU

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