Scalar Irradiance Fiber-Optic Light Collector

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Hōbi Instrument Services
www.hobiservices.com

Description

The Scalar Irradiance Collector gathers light uniformly from all directions (except for the portion of the sphere that is blocked by the black base and neck), and transmits it to a fiber-optic SMA connector in its base. When mated with an appropriate fiber-optic cable, the light collector is fully waterproof and can be immersed to depths of 200 meters.

- Globe diameter: 6.4 cm (2.5 in.)
- Length: 11 cm (4.4 in.) not including mating connector
- Usable wavelength range: 380 to 1000 nm

Precautions and Maintenance

- Handle the globe carefully. The plastic can be scratched or broken (but minor scratches will not degrade the measurement).
- If using the collector in salt water, rinse thoroughly with fresh water after use, before detaching the fiber optic.
- Do not clean with acetone, pure alcohol, or other harsh solvents. Purified water is best, with soap if necessary.
- Do not allow any moisture into the SMA connector. To avoid this, dry the collector and SMA connector before detaching a cable from it.
- Protect the SMA connector with a cap whenever it is not attached to a cable.
- When attaching an SMA connector, use **only your fingers** to tighten it. Use of tools could strip the threads.

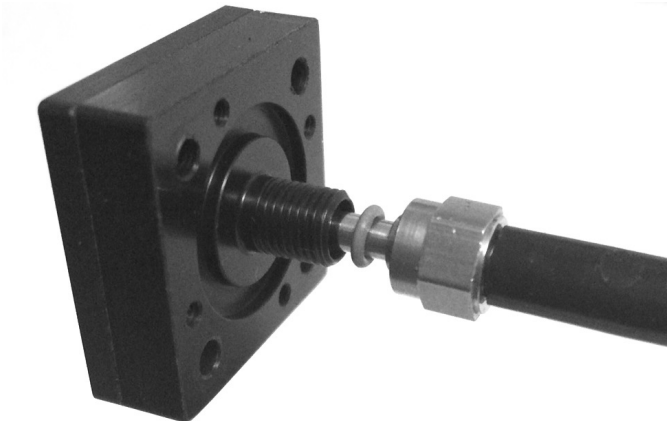
Underwater Use

The globe and its base are watertight and can withstand the pressure of depth. However, if you wish to immerse the light collector completely, including the SMA fiber-optic connection, you must ensure that the connection and fiber optic cable are also watertight.

The SMA connection seal requires an o-ring with 3 mm internal diameter and 1 mm width. The collector is provided with an o-ring in place, and with spare o-rings. When connecting a cable, place the o-ring around the end of the cable's SMA ferrule, as shown in the photograph below, before screwing it into place. For best results, tighten the connection by holding the end of the cable stationary and *rotating the*

collector. This help to work the o-ring into its groove without pinching it. The connector should be hand-tightened (rather than using a wrench) to avoid stripping the plastic threads.

IMPORTANT: when you remove the SMA, the o-ring will generally remain on the SMA ferrule, and it may be difficult to see!



Inserting SMA connector with o-ring in place

Fiber Optic Cable Construction and Waterproofing

Most off-the-shelf cables are constructed with a waterproof outer jacket, but this alone does not guarantee the assembly is watertight. The SMA connector on the end of the cable must also be properly sealed at the time of manufacture. Most high-quality cables are sealed in this way. Further, water entry into a cable will not necessarily cause problems. Nevertheless it is best avoided, and users should be aware of the following considerations.

The most likely entry point for water is where the cable's outer jacket enters the fiber optic connector. This is normally covered by a strain-relief "boot" as shown below. This boot may or may not form a seal by itself.

SMA termination with boot

SMA termination with boot removed

The lower picture shows the blue jacket entering the metal part of the connector. At some point inside the connector the jacket ends, at which point it must be sealed. In high-quality commercial cables the connector is typically filled with epoxy, encapsulating the jacket and providing an adequate seal. However since the seal is internal the only way to be sure is to consult the manufacturer.

If in doubt, you can provide extra protection by sealing the ends of the boot, or even encapsulating it entirely, with a waterproof adhesive such as the silicone caulking that is used for sealing aquarium tanks.

Calibration

To measure calibrated irradiance, the light collector, cable and spectrometer must be calibrated together as a system. Hobi Instrument Services provides this service.

The light collector's throughput is different in water and air, because of the difference in index of refraction between the two media. Normally the system will be calibrated in air, then a correction factor applied for use in water.