



REDEFINING PRECISION

id100-MMF100 Single Photon Detection Module: Operating Guide

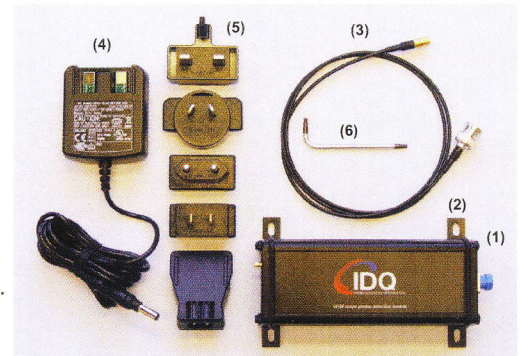
We thank you for choosing our product. For questions please contact: support@idquantique.com. This document explains how to use the id100-MMF100 single photon detection module and briefly introduces its mode of operation.

The id100-MMF100 is a modified version of our standard device id100-MMF50. The id100-MMF100 contains a multi-mode fiber with a core of 100 μm and a cladding of 140 μm . The typical coupling efficiency is 50%.

GETTING STARTED

Accessories supplied:

- single photon detection module (1) with
 - four mounting brackets (2)
- 1m coaxial cable with BNC and SMB connectors (3)
- power supply (4) with universal range of input plugs (5)
- this operating guide
- angled T10 Torx key (6)

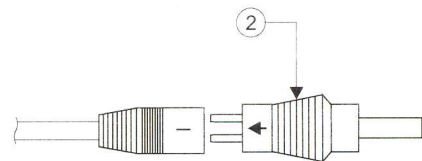
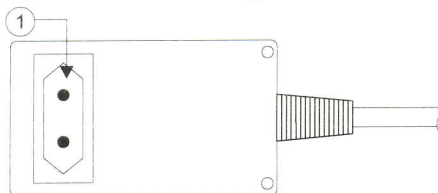


Warnings:

Use only the power supply delivered with the id100-MMF100. Please note that the power supply is for indoor use only. The power supply should be disconnected from the mains when not in use. Do not plug in the power supply in case of damaged cabinet or power plug. Never open the power supply.

Preparation for use and safety:

Before starting to use the id100-MMF100, the input plug (1) (corresponding to the mains) has to be placed on the power supply. The polarity inverter (2) must be connected as shown below.

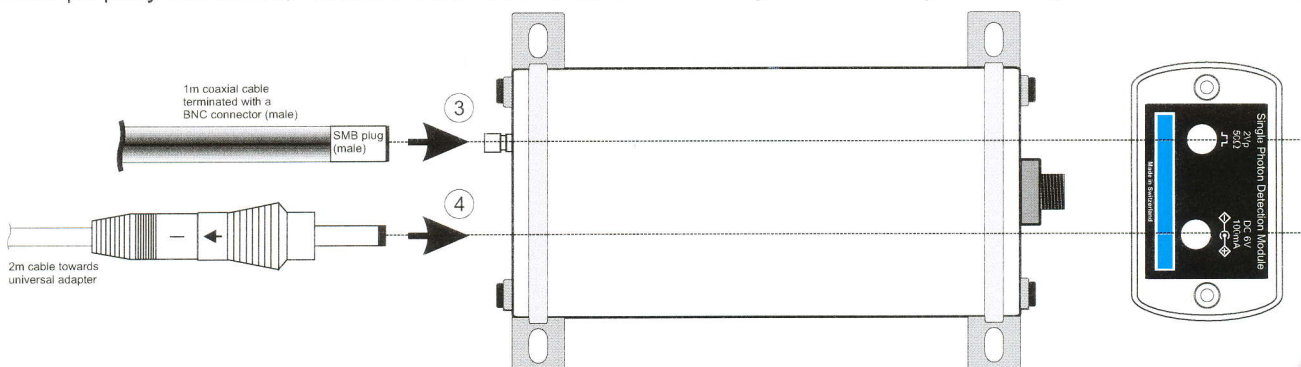


Connect the SMB coaxial cable termination to the id100-MMF100 single photon detection module (3). Connect the BNC termination to the measurement device: oscilloscope, counter, correlator, time-to-digital converter, time-to-amplitude converter, etc. To limit ringing and signal distortions, the id100-MMF100 output should be terminated with a 50 Ω load.

Connect the power supply jack to the DC6V input at the rear panel of the id100-MMF100 module (4).

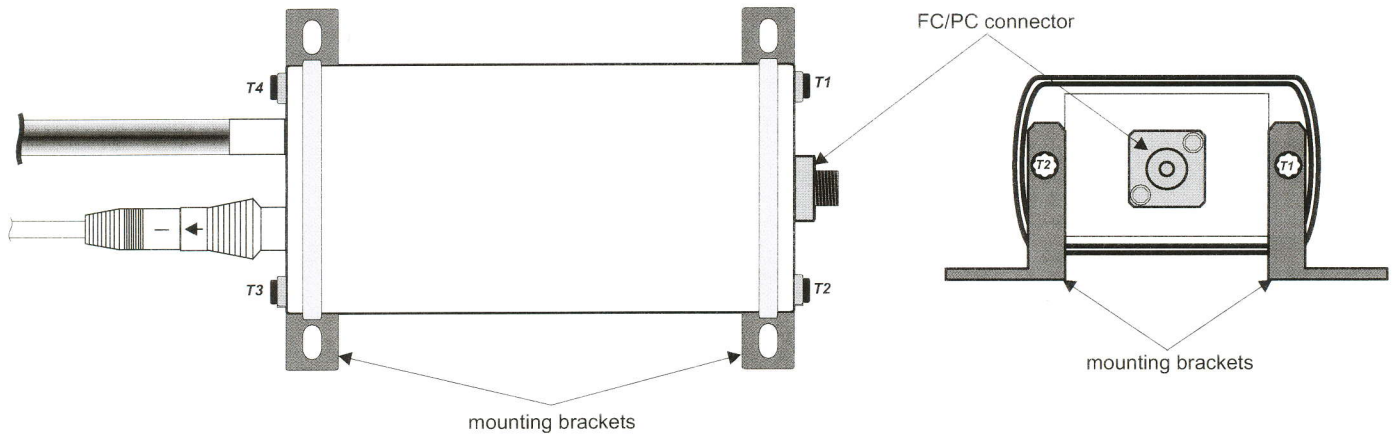
Connect the input plug to the mains.

When properly connected, the id100-MMF100 is usable immediately. No time delay for cooling or stabilization is required.



Your id100-MMF100 single photon detection module may slightly differ from this illustration.

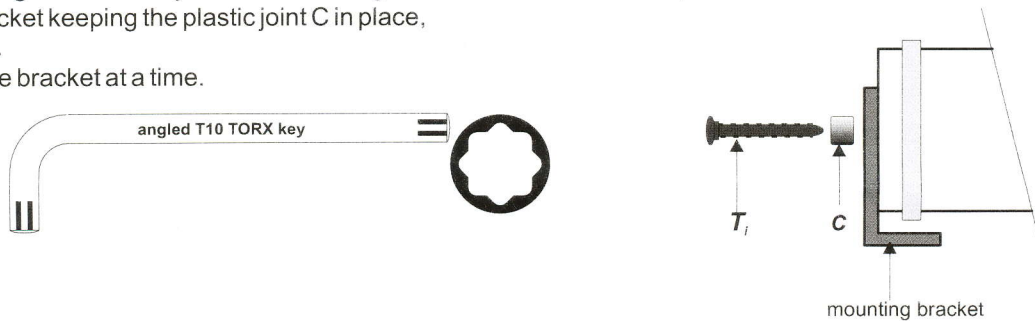
By default, the id100-MMF100 is equipped with four mounting brackets. The brackets accept screws with diameters up to 4mm.



However, a bracket can be removed by:

- unscrewing T_i using the TORX key while maintaining the id100-MMF100 closed,
- removing the bracket keeping the plastic joint C in place,
- screwing T_i back.

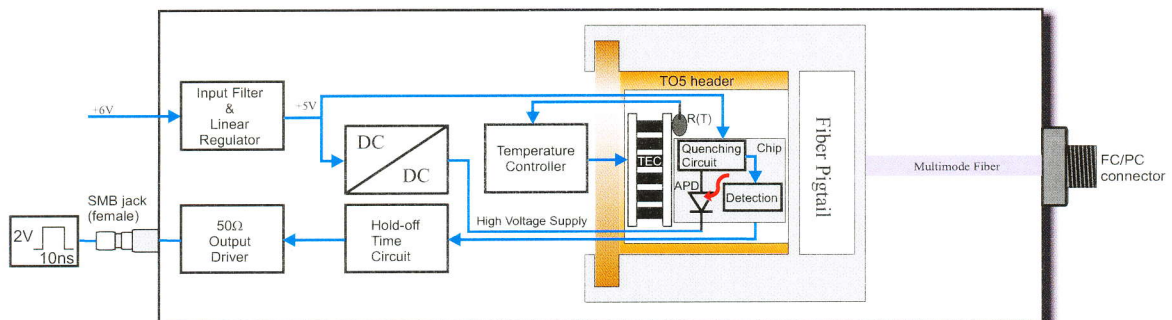
Please remove one bracket at a time.



When the module is not being used, the protective cap should be fitted over the detector port.

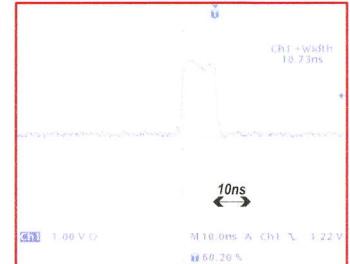
OPERATION

The id100-MMF100 consists of an avalanche photodiode (APD) and an active quenching circuit integrated on the same silicon chip. The chip is mounted on a thermo-electric cooler and packaged in a standard TO5 header with a transparent window cap. A multimode fiber is pigtailed on the TO-header. The fiber is terminated by a FC/PC connector. A thermistor is used to measure temperature. The APD is operated in Geiger mode, i.e. biased above breakdown voltage. A high voltage supply used to bias the diode is provided by a DC/DC converter. The quenching circuit is supplied with +5V. The module output pulse reflects the arrival of a photon with high timing resolution. The pulse is shaped using a hold-off time circuit and sent to a 50Ω output driver. All internal settings are preset for optimal operation at room temperature. No user adjustment is necessary.



Block diagram of the id100-MMF100.

The figure opposite shows a typical pulse observed at the output of the id100-MMF100 terminated with a 50Ω load. A 2V amplitude and 10ns width is available. The recommended trigger level of the measurement device is 1V. For "pure" counting applications, the trigger slope can be negative or positive. For timing applications, the trigger slope must be positive in order to take full advantage of the id100-MMF100 timing resolution.



MAINTENANCE

Maintain a temperature range within specifications when transporting or storing the unit. Transportation damage can occur from improper handling. The following steps are recommended to minimize the possibility of damage:

- pack the unit in the original packing material when shipping.
- store unit at room temperature in a clean and dry area.
- avoid high humidity or large temperature fluctuations.
- keep the unit out of direct sunlight.
- avoid unnecessary shock and vibration.

The following safety precautions must be observed during the operation and servicing of the unit. Failure to comply with these precautions or with specific indications elsewhere in this manual violates safety standards of intended use of the unit. ID Quantique assumes no liability for the user's failure to comply with these requirements.

- This unit is intended for indoor use only.
- Unit covers cannot be removed during operation.
- Any adjustments, maintenance, and repair of opened unit under voltage should be avoided and carried out only by skilled personnel aware of the hazards involved. Do not attempt internal service or adjustment unless another person qualified in first aid is present. Do not replace any components while power cable is connected.
- Operation of any electrical instrument around flammable gases or fumes constitutes a major safety hazard.
- Installation of replacement parts or modification of the unit should be carried out by authorized personnel only.

There are no user-serviceable components in the id100-MMF100. The id100-MMF100 has been designed to require minimum maintenance and to provide reliable operation for many years to come.

To help ensure long, trouble-free operation,

- Keep the id100-MMF100 free of dust
- Do not spill liquids on or into the unit. If the unit does get wet, turn off the power immediately and let the unit dry completely.

To ensure optimum performance, the optical port should be kept as clean as possible. It is recommended to connect before the first use of the detector an optical fibre patchcord to the id100-MMF100 optical input port. This patchcord should then be used for all connections of the module to a device under test. In case of inappropriate insertion losses, the end connector of this patchcord can be easily cleaned by the user.

Nevertheless, if the optical port needs to be cleaned,

1. Remove the protective cap
2. Insert a lint-free stick dipped in isopropyl alcohol and gently wipe the receptacle
3. Dry using a dry lint-free stick.

The patchcord fibre ends connected to the id100-MMF100 optical input port must be kept clean at all times to ensure minimum loss and to reduce reflection.

1. Gently wipe the fibre end with a lint-free swab dipped in isopropyl alcohol (98% pure or better).
2. Dry using clean compressed air.



WARRANTY & LIABILITY

ID Quantique warrants this equipment against defect in material and workmanship for a period of twelve months from the date of original shipment. ID Quantique also warrants that this equipment will meet applicable specifications under normal use.

During the warranty period, ID Quantique will, at its discretion, repair, replace, or issue credit for any defective product.

The warranty can become void if:

the equipment has been tampered with, repaired, or worked upon by unauthorized individuals or non-ID Quantique personnel,

or if the case has been opened,

or if the equipment serial number has been altered, erased, or removed,

or if the equipment has been misused, neglected, or damaged by accident.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED, IMPLIED OR STATUTORY, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL ID Quantique BE LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

ID Quantique shall not be liable for damages resulting from the use of the purchased product, nor shall be responsible for any failure in the performance of other items to which the purchased product is connected or the operation of any system of which the purchased product may be a part.

ID Quantique reserves the right to make changes in the design or construction of any of its products at any time without incurring any obligation to make changes whatsoever on units purchased.

GENERAL SPECIFICATIONS AT ROOM TEMPERATURE

Parameters	Minimum	Typical	Maximum	Units
Spectral range	350		900	nm
Timing resolution [FWHM]		40	60	ps
Photon detection probability				
at 400nm	15	18		%
at 500nm	30	35		%
at 600nm	20	25		%
at 700nm	15	18		%
at 800nm	5	7		%
at 900nm	3	4		%
Afterpulsing probability			3	%
Output pulse width	9	10	15	ns
Output pulse amplitude	1.5	2	2.5	V
Dead time		45	50	ns
Maximum count rate (pulsed light)		20		MHz
Supply voltage	5.6	6	6.5	V
Supply current		100	150	mA
Storage temperature	- 40		70	°C
Cooling time			5	s

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Dark count rate: ID Quantique modules are available in two grades: **Standard** and **Ultra-Low Noise**, depending on dark count rate specifications.

	TE cooled	Standard	Ultra-Low Noise
<i>id100-MMF100</i>	yes	< 80Hz	< 20Hz

Disclaimer

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