



Handheld Optical Power Monitor

HIGHLIGHTS

- Fast switching 1 μ s max.
- Fast settling 25 μ s max. to 0.1%
- Output integrating analogue
- Keypad control

APPLICATIONS

- Sensitive optical power measurement
- Optical pulse energy measurement
- Signal recovery

MEASUREMENT PRINCIPLE

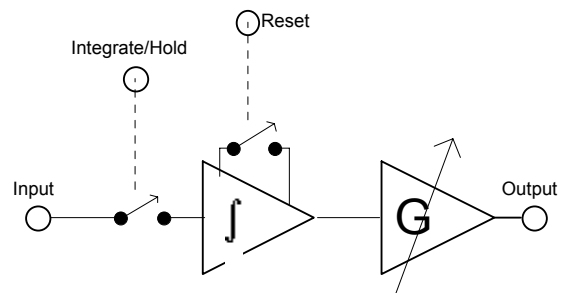
The OPM700 optical power monitors employ dual monolithic switched integrator input stages. This design results in very low leakage error, charge injection error and pickup. For CW power measurement, the integrated output with accurate integration timing is equivalent to transimpedance amplification with high gains.

FIELDS OF APPLICATION

The OPM700 gated integrating power monitor is useful for signal processing in a wide range of applications such as low signal fibre optical signal analysis. The output is a voltage linearly proportional to the integral of the input during the gated integrating period. Between gates, the output is held constant for readout or digital conversion via an external A/D-converter or I/O-card (not included).

The OPM700 is designed for use in free running mode. That is, there is no provision for a user supplied timing input for the gating. Instead, the unit is controlled via an internal microcontroller with a precision quartz crystal oscillator for accurate and stable timing. Fine control of the integration timing may be effected via the keypad.

The OPM700 is insensitive to electromagnetic interference by design, an important factor when working in „dirty“ industrial environments. Case wings may be provided for mounting on optical table tops and for OEM applications.



ABSOLUTE MAXIMUM RATINGS

Average input	5 mW (Si, InGaAs) or 50mW (Ge)
Temperature Range	0 – 60 °C

SPECIFICATIONS

Parameter	Conditions	Min	Typ	Max	Units
Input					
Power range		10 pW		10 μW	
Connectors		BNC or BR2 ¹			
Output					
Function		Integrating analogue $V_{out} = \frac{1}{100 pF} \int I_{in} dt$			
Effective transimpedance gains	Integration times: 100μs 1ms 10ms 100ms		1V/μW 10V/μW 0.1/nW 1V/nW		
Connectors		DB9			
Settling time (0.1%)			25		μs
Accuracy		± 1			%
Linearity				± 0.1	% FSR
Logic					
Switching time (integrate / hold, reset, gain)				800	ns
Power Supply					
Type		Wall plug style (supplied)			
Dimensions		30 x 60 x 50			mm
Dimensions					
	2 channels	118 x 44 x 165 mm (w x h x l)			mm

¹ Adapters for other connector systems available

INSTRUCTIONS FOR MEASUREMENT

The OPM700 gated integrating amplifier comprises pairs of independent measurement channels.

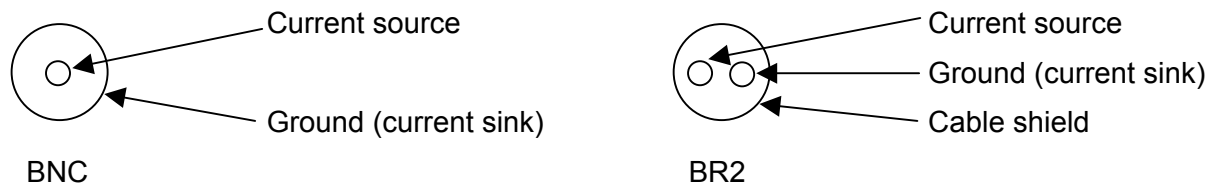
To make a measurement, proceed as follows:

1. Turn the unit on. After a few seconds, the introduction "Welcome to Artifex OPM-2" will exit automatically leading to the start menu. For the most accurate measurement, please allow for a 15 minute warm up before using.
2. Connect an electrical source to the desired channel via the corresponding receptacle. Caution: see „Absolute Maximum Ratings“ on page 2 for maximum allowed input values.
3. Using the ↓ and ↑ buttons, select operation from the front panel („Local“) or from the Interface („Remote“) and confirm the selection by pressing the ✓ button.
4. The output may be taken from the "Outputs" receptacle. The pinning of this receptacle is described under "Outputs" on page 5.
5. Select the appropriate range setting for the expected signal (see „Range“, page 5).
6. In "Local" mode, the integration time may be fine tuned via the ↓ and ↑ buttons. When the fine tuned integration time is accepted by pressing the ✓ button, the value chosen is stored in a non-volatile memory and will be loaded upon all subsequent restarts until a new fine tuning has been made.
7. Read the voltage output.

INPUTS

There are two types of input receptacles: BNC and BR2. The BR2 receptacle should be used when shielding of the signal source is required.

The connections of these two connectors is as follows:



Note that when connecting photodiodes as the signal source, the photodiode anode is the current source and the cathode is the current sink.

Range

The output of the unit is defined by the transfer function:

$$V_{\text{out}} = \frac{1}{100 \text{ pF}} \int I_{\text{in}} dt$$

The range is therefore set by selecting the internally controlled integration time. Standard values are 100µs, 1ms, 10ms and 100ms corresponding to transimpedance gains of 10⁶, 10⁷, 10⁸ and 10⁹ Ω respectively.

In “Local” mode, the range is selected by the front panel keypad. Fine tuning of the integration period (for example, for user calibration of the instrument) is also possible. When “Local” mode is selected, the user will be prompted to “Choose Gain”. Use the ↓ and ↑ buttons to select the appropriate gain. Then the user will be prompted to “Tune Gain”. The integration time may then be fine tuned via the ↓ and ↑ buttons. When the fine tuned integration time is accepted by pressing the ✓ button, the instrument will begin measurement as indicated by “Running Local” on the LCD display. The fine tune value is stored in a non-volatile memory and will be loaded upon all subsequent restarts until a new fine tuning has been made.

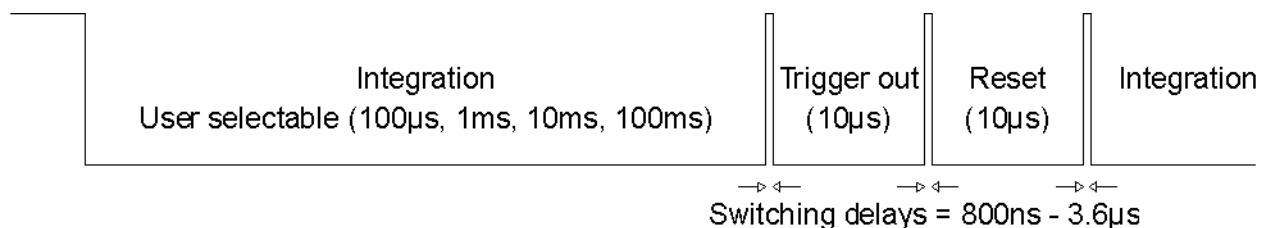
The fine tune step sizes are:

Range	Nominal Integration Pulse Width at Fine Tune = 000	Step Size
6	100 µs	188 ns
7	1 ms	1.0 µs
8	10 ms	10 µs
9	100 ms	100 µs

In “Remote” mode, the range is selected by the RS-232 interface. The ranges may be selected by sending the ASCII characters “6”, “7”, “8” or “9” on the RxD-line, corresponding to the transimpedance gains of 10⁶, 10⁷, 10⁸ and 10⁹ Ω respectively. The correct receipt of the command will be acknowledged by an echo from the instrument on the TxD-line in the form “sent character” + “carriage return (hex code 0x0D)”, for example “6 carriage return”. In “Remote” mode there is no provision for fine tuning. However, the values stored after fine tuning in “Local” mode are automatically loaded when selecting a range in “Remote” mode.

OUTPUTS

The analogue output is provided via a standard, male DB9 socket. The output is a voltage linearly proportional to the integral of the input during the selected time period. Between gates, the output is held constant for readout or digital conversion via an external A/D-converter or I/O-card (not included). A timing pulse available at the same socket indicates the period of time during which the output may be sampled (active = LO). The timing is depicted in the diagram below:



The switching delays have been implemented to ensure that the "Trigger Out" pulse may be used for direct control of an external I/O card or similar.

The pinning of the socket is as follows:

Pin No.	Function
1	n.c.
2	n.c.
3	DGND
4	Trigger out
5	DGND
6	Output Ch A
7	Output Ch B
8	AGND
9	AGND

The DGND (digital ground) lines should be used for referencing the Trigger out which is a TTL / CMOS compatible pulse. The AGND (analogue ground) lines should be used for referencing the analogue output signals. These two grounds are connected internally in the unit.

DAMAGE

The unit may be damaged by exceeding the maximum average inputs. Please read „Absolute Maximum Ratings“ for these maximum values before working with the instrument.

Use only the power supply provided with the unit.

RS-232 INTERFACE

The RS-232 interface (female DB9 socket) on the end panel allows control of the unit when switched in „Remote“ mode. The pin correlation follows the RS-232 standard as follows:

Pin No. Function

1	n.c.
2	TxD
3	RxD
4	n.c.
5	GND
6	n.c.
7	n.c.
8	n.c.
9	n.c.

The proper cable for controlling this unit from an RS-232 interface is a straight 1:1 cable.

The parameters for communication over this port are:

Baud rate = 9600
Data bits = 8
Parity = none
Stop bits = 1
Flow control = none

TROUBLE SHOOTING

In the event that a measurement is not successful, the following possibilities should be analysed:

Symptom	Possible Errors	Correction
No output and LCD display is not on	• System is not switched on	• Ensure the power cord is connected at both ends and switch the system on.
	• Fuse blown	• Secondary, internal self resetting fuses, only. In the event that a secondary fuse „blows“, shut off the power, correct the fault and wait a few minutes before switching the power back on.
No output and LCD display is on	• Input too low	• Switch to more sensitive range or increase input.
Output at full scale, independant of input	• Range too sensitive	• Switch to a less sensitive range or lower the input.

In the unlikely event that you are not able to obtain a measurement in spite of these trouble shooting measures, please contact us. We will be pleased to help you solve your problem.

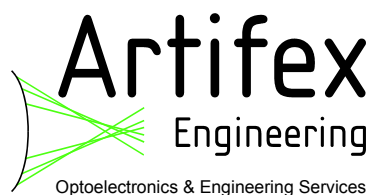
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