



# USER MANUAL

UD Series | Thermal Sensor Disks

## WARRANTY

### First Year Warranty

The Gentec-EO thermal disk carry a one-year warranty (from date of shipment) against material and/or workmanship defects when used under normal operating conditions. The warranty does not cover damages related to misuse.

Gentec-EO will repair or replace at our option any disk which proves to be defective during the warranty period; except in the case of product misuse.

Any unauthorized alteration or repair of the product is also not covered by the warranty.

The manufacturer is not liable for consequential damages of any kind.

In the case of a malfunction, contact your local Gentec-EO distributor or the nearest Gentec-EO office to obtain a return authorization number. Return the material to the appropriate address below.

### Contacting Gentec Electro-Optics Inc.

To help us answer your calls more efficiently please have the model number of the disk you are using ready before calling Customer Support.

Gentec Electro-Optics, Inc.  
445, St-Jean-Baptiste, Suite 160  
Québec, QC  
Canada, G2E 5N7

Tel: (418) 651-8003  
Fax: (418) 651-1174  
E-mail: [service@gentec-eo.com](mailto:service@gentec-eo.com)  
Website: [gentec-eo.com](http://gentec-eo.com)

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## 1. ULTRA SERIES UD DISK

### 1.1. INTRODUCTION

The Gentec-EO UD power detector series includes five opto-thermal sensors (UD10, UD12, UD19, UD25 and UD55). The high power surface absorber sensors are designed for use at high average power densities.

Unit	Aperture	Power range
	mm	
UD10	10	0.1 mW to 2 W
UD12	12	1 mW to 70 W
UD19	19	0.2 mW to 200 W
UD25	25	10 mW to 250 W
UD55	55	5 mW to 700 W

For Gentec-EO's nearest office contact information, see p. ii, Contacting Gentec Electro-Optics Inc.

### 1.2. WARNINGS AND DISCLAIMER

In no event shall Gentec-EO or any of its affiliates be liable for any indirect, special, incidental or consequential injury to persons or damage to property caused by the use of any of our products, by purchasing from Gentec-EO or any of its affiliates, you hereby indicate that you understand and agree to the following:



#### Disclaimer

I am fully responsible for the safe application and use of this product and agreed to such by completing the sales process.

I will not use a laser device without wearing approved laser safety goggles designed for such purpose.

I am aware and responsible of safely dealing with any back reflections. I will not use the detector in violation of any local, state or federal law, and I understand that it is my responsibility to know and abide by those laws relating to the ownership and use of the product in my jurisdiction.

### 1.3. SPECIFICATIONS

The following specifications are based on an operating temperature of 15 to 28°C (59 to 82°F) and a relative humidity not exceeding 80%. Disks must be stored in an environment between 10°C to 65°C and a relative humidity not exceeding 90%.

UD10-2-H5-L											
Measurement Capability											
Effective Aperture Diameter	10 mm										
Spectral Range	0.19 – 20 $\mu\text{m}$										
Typical Power Noise Level <sup>1</sup>	0.1 mW										
Typical Rise Time (0-95%) <sup>12</sup>	3.0 s										
Typical Sensitivity <sup>2</sup>	2 mV/W										
Energy Mode											
Typical Sensitivity <sup>1</sup>	2.4 mV/J										
Maximum Measurable Energy <sup>3</sup>	3 J										
Typical Noise Equivalent Energy <sup>1</sup>	5 mJ										
Damage Thresholds & Laser Limits											
Max. Average Power	2 W										
Max Average Power (Fan Cooled)	2 W										
Maximum Average Power Density 1064 nm, 2 W, CW 10.6 $\mu\text{m}$ , 2 W, CW	36 kW/cm <sup>2</sup> 11 kW/cm <sup>2</sup>										
Pulsed Laser Damage Thresholds 1.064 $\mu\text{m}$ , 360 $\mu\text{s}$ , 5 Hz 1.064 $\mu\text{m}$ , 7 ns, 10 Hz 532 nm, 7 ns, 10 Hz 266 nm, 7 ns, 10 Hz	<table style="width: 100%; border: none;"> <thead> <tr> <th style="text-align: center; border-bottom: 1px solid black;"><u>Max. Energy Density</u></th> <th style="text-align: center; border-bottom: 1px solid black;"><u>Peak Power Density</u></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">5 J/cm<sup>2</sup></td> <td style="text-align: center;">14 kW/cm<sup>2</sup></td> </tr> <tr> <td style="text-align: center;">1.0 J/cm<sup>2</sup></td> <td style="text-align: center;">143 MW/cm<sup>2</sup></td> </tr> <tr> <td style="text-align: center;">0.6 J/cm<sup>2</sup></td> <td style="text-align: center;">86 MW/cm<sup>2</sup></td> </tr> <tr> <td style="text-align: center;">0.3 J/cm<sup>2</sup></td> <td style="text-align: center;">43 MW/cm<sup>2</sup></td> </tr> </tbody> </table>	<u>Max. Energy Density</u>	<u>Peak Power Density</u>	5 J/cm <sup>2</sup>	14 kW/cm <sup>2</sup>	1.0 J/cm <sup>2</sup>	143 MW/cm <sup>2</sup>	0.6 J/cm <sup>2</sup>	86 MW/cm <sup>2</sup>	0.3 J/cm <sup>2</sup>	43 MW/cm <sup>2</sup>
<u>Max. Energy Density</u>	<u>Peak Power Density</u>										
5 J/cm <sup>2</sup>	14 kW/cm <sup>2</sup>										
1.0 J/cm <sup>2</sup>	143 MW/cm <sup>2</sup>										
0.6 J/cm <sup>2</sup>	86 MW/cm <sup>2</sup>										
0.3 J/cm <sup>2</sup>	43 MW/cm <sup>2</sup>										
Physical Characteristics											
Dimensions	44 $\varnothing$ x 3D mm										
Weight (Head Only)	7 g										
Recommended Load Impedance	100 k $\Omega$										
Product Number	202832										

Specifications are subject to change without notice

<sup>1</sup> These characteristics depend on the thermal management and electronics provided by the user. Packaging, cooling and electronics similar to our UD Series will provide similar performances. See UD Series specifications sheets for more details. Actual performance depends on the tradeoffs in a user's design. It may be possible to enhance some performance parameters at the expense of others.

<sup>2</sup> Without anticipation algorithm or circuitry.

<sup>3</sup> For 360  $\mu\text{s}$  pulses. Higher pulse energy possible when customized for long pulses (ms), less for short pulses (ns).

UD12-70-H5											
Measurement Capability											
Effective Aperture Diameter	12 mm										
Spectral Range	0.19 – 20 $\mu\text{m}$										
Typical Power Noise Level <sup>1</sup>	1 mW										
Typical Rise Time (0-95%) <sup>12</sup>	1.6 s										
Typical Sensitivity <sup>2</sup>	0.53 mV/W										
Energy Mode											
Typical Sensitivity <sup>1</sup>	0.84 mV/J										
Maximum Measurable Energy <sup>3</sup>	5 J										
Typical Noise Equivalent Energy <sup>1</sup>	20 mJ										
Damage Thresholds & Laser Limits											
Max. Average Power	70 W										
Max Average Power (Fan Cooled)	30 W										
Maximum Average Power Density 1064 nm, 10 W, CW 10.6 $\mu\text{m}$ , 10 W, CW	36 kW/cm <sup>2</sup> 11 kW/cm <sup>2</sup>										
Pulsed Laser Damage Thresholds 1.064 $\mu\text{m}$ , 360 $\mu\text{s}$ , 5 Hz 1.064 $\mu\text{m}$ , 7 ns, 10 Hz 532 nm, 7 ns, 10 Hz 266 nm, 7 ns, 10 Hz	<table style="width: 100%; border: none;"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;"><u>Max. Energy Density</u></th> <th style="text-align: left; border-bottom: 1px solid black;"><u>Peak Power Density</u></th> </tr> </thead> <tbody> <tr> <td>5 J/cm<sup>2</sup></td> <td>14 kW/cm<sup>2</sup></td> </tr> <tr> <td>1.0 J/cm<sup>2</sup></td> <td>143 MW/cm<sup>2</sup></td> </tr> <tr> <td>0.6 J/cm<sup>2</sup></td> <td>86 MW/cm<sup>2</sup></td> </tr> <tr> <td>0.3 J/cm<sup>2</sup></td> <td>43 MW/cm<sup>2</sup></td> </tr> </tbody> </table>	<u>Max. Energy Density</u>	<u>Peak Power Density</u>	5 J/cm <sup>2</sup>	14 kW/cm <sup>2</sup>	1.0 J/cm <sup>2</sup>	143 MW/cm <sup>2</sup>	0.6 J/cm <sup>2</sup>	86 MW/cm <sup>2</sup>	0.3 J/cm <sup>2</sup>	43 MW/cm <sup>2</sup>
<u>Max. Energy Density</u>	<u>Peak Power Density</u>										
5 J/cm <sup>2</sup>	14 kW/cm <sup>2</sup>										
1.0 J/cm <sup>2</sup>	143 MW/cm <sup>2</sup>										
0.6 J/cm <sup>2</sup>	86 MW/cm <sup>2</sup>										
0.3 J/cm <sup>2</sup>	43 MW/cm <sup>2</sup>										
Physical Characteristics											
Dimensions	36 $\varnothing$ x 2D mm										
Weight (Head Only)	4 g										
Recommended Load Impedance	100 k $\Omega$										
Product Number	200382										

Specifications are subject to change without notice

<sup>1</sup> These characteristics depend on the thermal management and electronics provided by the user. Packaging, cooling and electronics similar to our UD Series will provide similar performances. See UD Series specifications sheets for more details. Actual performance depends on the tradeoffs in a user's design. It may be possible to enhance some performance parameters at the expense of others.

<sup>2</sup> Without anticipation algorithm or circuitry.

<sup>3</sup> For 360  $\mu\text{s}$  pulses. Higher pulse energy possible when customized for long pulses (ms), less for short pulses (ns).

UD19-50-W5											
Measurement Capability											
Effective Aperture Diameter	19 mm										
Spectral Range	190 nm – 10 $\mu$ m										
Typical Power Noise Level	1 mW										
Typical Rise Time (0-95%) <sup>12</sup>	5 s										
Typical Sensitivity <sup>2</sup>	0.65 mV/W										
Energy Mode											
Typical Sensitivity <sup>1</sup>	0.33 mV/J										
Maximum Measurable Energy <sup>3</sup>	200 J										
Typical Noise Equivalent Energy <sup>1</sup>	23 mJ										
Damage Thresholds & Laser Limits											
Max. Average Power	50 W										
Max Average Power (Fan Cooled)	50 W										
Maximum Average Power Density 1064 nm, 10 W, CW	100 kW/cm <sup>2</sup>										
Pulsed Laser Damage Thresholds 1.064 $\mu$ m, 150 $\mu$ s, 5 Hz 1.064 $\mu$ m, 7 ns, 10 Hz 532 nm, 7 ns, 10 Hz 266 nm, 26 ns, 10 Hz	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;"><u>Max. Energy Density</u></th> <th style="text-align: left; border-bottom: 1px solid black;"><u>Peak Power Density</u></th> </tr> </thead> <tbody> <tr> <td>100 J/cm<sup>2</sup></td> <td>667 kW/cm<sup>2</sup></td> </tr> <tr> <td>1.1 J/cm<sup>2</sup></td> <td>157 MW/cm<sup>2</sup></td> </tr> <tr> <td>1.1 J/cm<sup>2</sup></td> <td>157 MW/cm<sup>2</sup></td> </tr> <tr> <td>0.7 J/cm<sup>2</sup></td> <td>27 MW/cm<sup>2</sup></td> </tr> </tbody> </table>	<u>Max. Energy Density</u>	<u>Peak Power Density</u>	100 J/cm <sup>2</sup>	667 kW/cm <sup>2</sup>	1.1 J/cm <sup>2</sup>	157 MW/cm <sup>2</sup>	1.1 J/cm <sup>2</sup>	157 MW/cm <sup>2</sup>	0.7 J/cm <sup>2</sup>	27 MW/cm <sup>2</sup>
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100 J/cm <sup>2</sup>	667 kW/cm <sup>2</sup>										
1.1 J/cm <sup>2</sup>	157 MW/cm <sup>2</sup>										
1.1 J/cm <sup>2</sup>	157 MW/cm <sup>2</sup>										
0.7 J/cm <sup>2</sup>	27 MW/cm <sup>2</sup>										
Physical Characteristics											
Dimensions	44 $\varnothing$ x 3D mm										
Weight (Head Only)	7 g										
Recommended Load Impedance	100 k $\Omega$										
Product Number	200761										

Specifications are subject to change without notice

<sup>1</sup> These characteristics depend on the thermal management and electronics provided by the user. Packaging, cooling and electronics similar to our UD Series will provide similar performances. See UD Series specifications sheets for more details. Actual performance depends on the tradeoffs in a user's design. It may be possible to enhance some performance parameters at the expense of others.

<sup>2</sup> Without anticipation algorithm or circuitry.

<sup>3</sup> For 360  $\mu$ s pulses. Higher pulse energy possible when customized for long pulses (ms), less for short pulses (ns).

UD19-...-Hx	UD19-150-H5	UD19-200-H9
	<b>Measurement Capability</b>	
Effective Aperture Diameter	19 mm	
Spectral Range	190 nm – 10 $\mu$ m	
Typical Power Noise Level <sup>1</sup>	1 mW	3 mW
Typical Rise Time (0-95%) <sup>12</sup>	2.8 s	4.5 s
Typical Sensitivity <sup>2</sup>	0.65 mV/W	0.23 mV/W
	<b>Energy Mode</b>	
Typical Sensitivity <sup>1</sup>	0.65 mV/J	0.23 mV/J
Maximum Measurable Energy <sup>3</sup>	15 J	25 J
Typical Noise Equivalent Energy <sup>1</sup>	20 mJ	60 mJ
	<b>Damage Thresholds &amp; Laser Limits</b>	
Max. Average Power	150 W	200 W
Max Average Power (Fan Cooled)	50 W	110 W
Max. Average Power Density 1.064 $\mu$ m, 10W CW 10.6 $\mu$ m, 10W CW	36 kW/cm <sup>2</sup> 11 kW/cm <sup>2</sup>	45 kW/cm <sup>2</sup> 14 kW/cm <sup>2</sup>
Pulsed Laser Damage Thresholds 1.064 $\mu$ m, 150 $\mu$ s, 5 Hz 1.064 $\mu$ m, 7 ns, 10 Hz 532 nm, 7 ns, 10 Hz 266 nm, 26 ns, 10 Hz	Max. Energy Density H5: 5 J/cm <sup>2</sup> , H9: 9 J/cm <sup>2</sup> 1.0 J/cm <sup>2</sup> 0.6 J/cm <sup>2</sup> 0.3 J/cm <sup>2</sup>	Peak Power Density H5: 14 kW/cm <sup>2</sup> , H9: 25 kW/cm <sup>2</sup> 143 MW/cm <sup>2</sup> 86 MW/cm <sup>2</sup> 43 MW/cm <sup>2</sup>
	<b>Physical Characteristics</b>	
Dimensions	44 $\varnothing$ x 3D mm	
Weight (Head Only)	7 g	
Recommended Load Impedance	100 k $\Omega$	
Product Number	200262	200576

Specifications are subject to change without notice

<sup>1</sup> These characteristics depend on the thermal management and electronics provided by the user. Packaging, cooling and electronics similar to our UD Series will provide similar performances. See UD Series specifications sheets for more details. Actual performance depends on the tradeoffs in a user's design. It may be possible to enhance some performance parameters at the expense of others.

<sup>2</sup> Without anticipation algorithm or circuitry.

<sup>3</sup> For 360  $\mu$ s pulses. Higher pulse energy possible when customized for long pulses (ms), less for short pulses (ns).



UD25-...-Hx	UD25-200-H9	UD25-350-H12
	<b>Measurement Capability</b>	
Effective Aperture Diameter	25 mm	
Spectral Range	190 nm - 20 $\mu$ m	
Typical Power Noise Level <sup>1</sup>	3 mW	10 mW
Typical Rise Time (0-95%) <sup>12</sup>	5 s	7.9 s
Typical Sensitivity <sup>2</sup>	0.23 mV/W	0.1 mV/W
	<b>Energy Mode</b>	
Typical Sensitivity <sup>1</sup>	0.14 mV/J	0.05 mV/J
Maximum Measurable Energy <sup>3</sup>	40 J	40 J
Typical Noise Equivalent Energy <sup>1</sup>	200 mJ	200 mJ
	<b>Damage Thresholds &amp; Laser Limits</b>	
Max. Average Power	200 W	350 W
Max Average Power (Fan Cooled)	150 W	250 W
Max. Average Power Density 1.064 $\mu$ m, 10W CW 10.6 $\mu$ m, 10W CW	45 kW/cm <sup>2</sup> 14 kW/cm <sup>2</sup>	
Pulsed Laser Damage Thresholds 1.064 $\mu$ m, 150 $\mu$ s, 5 Hz 1.064 $\mu$ m, 7 ns, 10 Hz 532 nm, 7 ns, 10 Hz 266 nm, 26 ns, 10 Hz	<u>Max. Energy Density</u> 9 J/cm <sup>2</sup> 1.0 J/cm <sup>2</sup> 0.6 J/cm <sup>2</sup> 0.3 J/cm <sup>2</sup>	<u>Peak Power Density</u> 25 kW/cm <sup>2</sup> 143 MW/cm <sup>2</sup> 86 MW/cm <sup>2</sup> 43 MW/cm <sup>2</sup>
	<b>Physical Characteristics</b>	
Dimensions	54 $\varnothing$ x 3D mm	
Weight (Head Only)	13 g	
Recommended Load Impedance	>100 k $\Omega$	
Product Number	200263	202378

Specifications are subject to change without notice

<sup>1</sup> These characteristics depend on the thermal management and electronics provided by the user. Packaging, cooling and electronics similar to our UD Series will provide similar performances. See UD Series specifications sheets for more details. Actual performance depends on the tradeoffs in a user's design. It may be possible to enhance some performance parameters at the expense of others.

<sup>2</sup> Without anticipation algorithm or circuitry.

<sup>3</sup> For 360  $\mu$ s pulses. Higher pulse energy possible when customized for long pulses (ms), less for short pulses (ns).

UD55-...-Hx	UD55-200-H9	UD55-500-H12	UD55-700-HD
	<b>Measurement Capability</b>		
Effective Aperture Diameter	55 mm		
Spectral Range	190 nm - 20 $\mu$ m		
Typical Power Noise Level <sup>1</sup>	5 mW	15 mW	45 mW
Typical Rise Time (0-95%) <sup>12</sup>	11 s	18 s	14 s
Typical Sensitivity <sup>2</sup>	0.12 mV/W	0.06 mV/W	0.03 mV/W
	<b>Energy Mode</b>		
Typical Sensitivity <sup>1</sup>	0.028 mV/J	0.015 mV/J	0.008 mV/J
Maximum Measurable Energy <sup>3</sup>	200 J	200 J	200 J
Typical Noise Equivalent Energy <sup>1</sup>	250 mJ	250 mJ	250 mJ
	<b>Damage Thresholds &amp; Laser Limits</b>		
Max. Average Power	200 W	500 W	700 W
Max Average Power (Fan Cooled)	150 W	300 W	400 W
Max. Average Power Density 1.064 $\mu$ m, 10W CW 10.6 $\mu$ m, 10W CW	45 kW/cm <sup>2</sup> 14 kW/cm <sup>2</sup>		
Pulsed Laser Damage Thresholds 1.064 $\mu$ m, 150 $\mu$ s, 5 Hz 1.064 $\mu$ m, 7 ns, 10 Hz 532 nm, 7 ns, 10 Hz 266 nm, 26 ns, 10 Hz	<u>Max. Energy Density</u> 9 J/cm <sup>2</sup> 1.0 J/cm <sup>2</sup> 0.6 J/cm <sup>2</sup> 0.3 J/cm <sup>2</sup>	<u>Peak Power Density</u> 25 kW/cm <sup>2</sup> 143 MW/cm <sup>2</sup> 86 MW/cm <sup>2</sup> 43 MW/cm <sup>2</sup>	
	<b>Physical Characteristics</b>		
Dimensions	85 $\varnothing$ x 4D mm		
Weight (Head Only)	39 g	39 g	180 g
Recommended Load Impedance	>100 k $\Omega$		
Product Number	200264	201220	203757

Specifications are subject to change without notice

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<sup>2</sup> Without anticipation algorithm or circuitry.

<sup>3</sup> For 360  $\mu$ s pulses. Higher pulse energy possible when customized for long pulses (ms), less for short pulses (ns).

## 2. MOUNTING AND COOLING RECOMMENDATIONS

**Important: Never touch directly the absorbing surface of the thermal disk**

### 2.1. COOLING

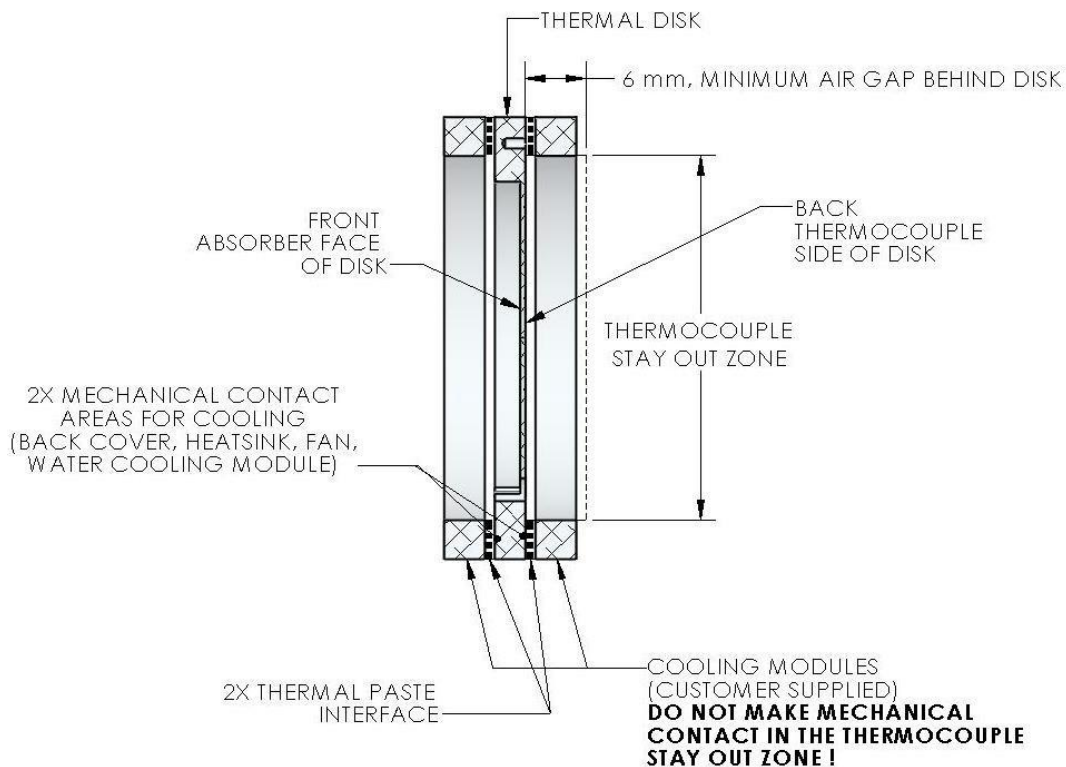
The type of cooling (back cover, heat sink, fan, water) and the size of the cooling plate depend on the power applied on the thermal disk. Contact Gentec-EO to discuss your specific application.

**Warning: The thermal disk temperature should never exceed 150 °C**

### 2.2. COOLING PLATE

The thermal disk should be supported by the cooling plate only on the edge of the thermal disk. The cooling plate rim should be made out of a material with a high thermal conductivity. It should also be flat and smooth to allow a good thermal contact with the disk. There should be a gap of at least 6 mm between the back of the disk and any other surface.

#### THERMAL DISK CONFIGURATION

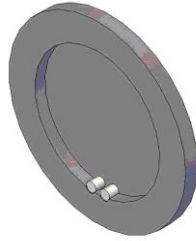


### 2.3. THERMAL DISK MOUNTING

Before mounting the thermal disk in place, a thin film of thermal paste (For example: Wakefield Engineering Inc. thermal paste part no. 120-2.) should be applied on the support rim. Put the disk in place and turn it gently so that a good thermal contact is made between the disk and the support rim. (Be careful not to damage the contact pins.) The thermal disk must be maintained in place from the front (do not apply thermal paste on the front of thermal disk).

### 2.4. LASER BEAM

The laser beam should always be centered with respect to the center of the thermal disk. The beam diameter should always be smaller than the optical aperture of the disk.



### 3. SAFETY INSTRUCTIONS

#### 3.1. GENERAL

To ensure a long lifetime of accurate measurements, the thermal disk should be maintained within the following ambient conditions:

Storage environment temperature: 10 to 60°C, RH < 90%  
Operating environment temperature: 15 to 28°C, RH < 80%.

**WARNING: Be careful not to exceed the maximum levels and densities stated in the specifications.**

It is possible to store and operate your thermal disk beyond this range. For any specific requirements, please contact your local Gentec-EO representative.

For the most accurate measurements, center the beam on the sensor.

#### 3.2. DAMAGE TO THE OPTICAL ABSORBER MATERIAL

Damage to the optical absorber material is usually caused by exceeding the manufacturer's specifications, such as:

- Incident Average Power Density
- Incident Pulse Energy Density

Refer to the specifications pages for the UD disk specifications. Damage may also be caused if the absorber surface is contaminated. A slight discoloration of the coating does not affect the calibration.

In any case, the beam's incident area should not be less than 10% of the disk's aperture. Please contact Gentec-EO to make measurements with such smaller beams.

In the event of significant damage to the coating, some UD Series disk can be recoated. Contact your local Gentec-EO representative for information on repair. See p. ii Contacting Gentec Electro-Optics Inc.

## DECLARATION OF CONFORMITY

### **WEEE compliance**

All Gentec-EO products comply with the European Directive 2012/19/EU – WEEE.

### **RoHS compliance**

All Gentec-EO products comply with the European Directive 2011/65/EU – Restriction of Hazardous substance (RoHS 2), except TPM-300.

## APPENDIX A: WEEE DIRECTIVE

### Recycling and separation procedure for WEEE directive 2002/96/EC

This section is used by the recycling center when the UD disk reaches the end of its life.

The complete thermal disk contains:

1 thermal disk

### Separation

Aluminum: Thermal disk Casing

# LEADER IN LASER BEAM MEASUREMENT SINCE 1972



POWER & ENERGY METERS



BEAM PROFILING



THZ MEASUREMENT

## CANADA

445 St-Jean-Baptiste, Suite 160  
Quebec, QC, G2E 5N7, Canada

T (418) 651-8003  
F (418) 651-1174

1 (888) 5GENTEC  
(Canada and USA only)

[info@gentec-eo.com](mailto:info@gentec-eo.com)

## UNITED STATES

5825 Jean Road Center  
Lake Oswego, OR, 97035, USA

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F (503) 697-0633

1 (888) 5GENTEC  
(Canada and USA only)

[info@gentec-eo.com](mailto:info@gentec-eo.com)

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F +81-3-5972-1291

[info@gentec-eo.com](mailto:info@gentec-eo.com)

## CALIBRATION CENTERS

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Quebec, QC, G2E 5N7, Canada
- Werner von Siemens Str. 15  
82140 Olching, Germany
- Office No. 101, EXL111 building,  
Takinogawa, Kita-ku, Tokyo  
114-0023, Japan