USER MANUAL

HP Series

High Power Detectors

gentec-eo

121-101761

Warranty

First Year Warranty

The Gentec-EO thermal power and energy detectors 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 recalibration, or damages related to misuse.

Gentec-EO will repair or replace at our option any wattmeter or joulemeter 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 the 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 detector you are using ready before calling Customer Support.

All customers:

Gentec-EO, Inc.
445 St-Jean-Baptiste, Suite 160
Quebec, QC, G2E 5N7
Canada

Tel: (418) 651-8003
Fax: (418) 651-1174
Email: info@gentec-eo.com
Web: www.gentec-eo.com

Lifetime Warranty

Gentec-EO will guarantee any thermal power and energy detector head for its lifetime, as long as it has been returned for recalibration annually, from the shipment date. This warranty includes parts and labor for all routine repairs including normal wear under normal operating conditions.

Gentec-EO will inspect and repair the detector during the annual recalibration. Repairs at other times will be at Gentec-EO's option.

The cost of annual recalibration, or consequential damages from using the detector is not included.

The only condition is that the detector head must not have been subject to unauthorized service or damaged by misuse. Misuse would include, but is not limited to: laser exposure outside Gentec-EO's published specifications, physical damage due to improper handling, and exposure to hostile environments. Hostile environments would include, but are not limited to: excessive temperature, vibration, humidity, or surface contaminants; exposure to flame, solvents or water; and connection to improper electrical voltage.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

1. HP SERIES POWER DETECTORS

1.1. INTRODUCTION

The Gentec-EO HP Series power detector family includes HP100A-3KW-HE, HP60A-10KW-GD and HP100A-12KW-HD.

- The HP100A-3KW-HE detector has dimensions of 127 mm x 127 mm and an aperture of 100 mm.
- The HP60A-10kW-GD detector has dimensions of 127 mm x 127 mm and an aperture of 60 mm.
- The HP100A-12KW-HD detector has dimensions of 127 mm x 127 mm and an aperture of 100 mm.
- The high power surface absorber sensors are designed for use at high average power densities.

The HP detectors can measure between

- ±3 W (noise equivalent power) and 3 KW of average power for HP100A-3KW-HE,
- ±10 W (noise equivalent power) and 10 KW of average power for HP60A-10KW-GD.
- ±10 W (noise equivalent power) and 12 KW of average power for HP100A-12KW-HD.

The HP-D0 detectors are supplied with a 180 cm length flexible cable with output connection options of a DB-15 "intelligent" male connector.

NOTE: To eliminate possible damage, do not carry the detector using the connector cable.

Some HP detectors are supplied with a stand (optional).

For cases where Gentec-EO's monitors don't automatically read the wavelength correction factor, you can use your detector's "*Personal wavelength correction™ Certificate*" to adjust the power you read to a power corrected for a particular wavelength.

Call your nearest Gentec-EO distributor to replace the sensor disk and/or to recalibrate the head. For Gentec-EO's nearest office contact information, see p. ii, **Contacting Gentec Electro-Optics Inc.**

1.2. POWER DETECTOR CONNECTORS

1.2.1. DB-15 “intelligent” connector

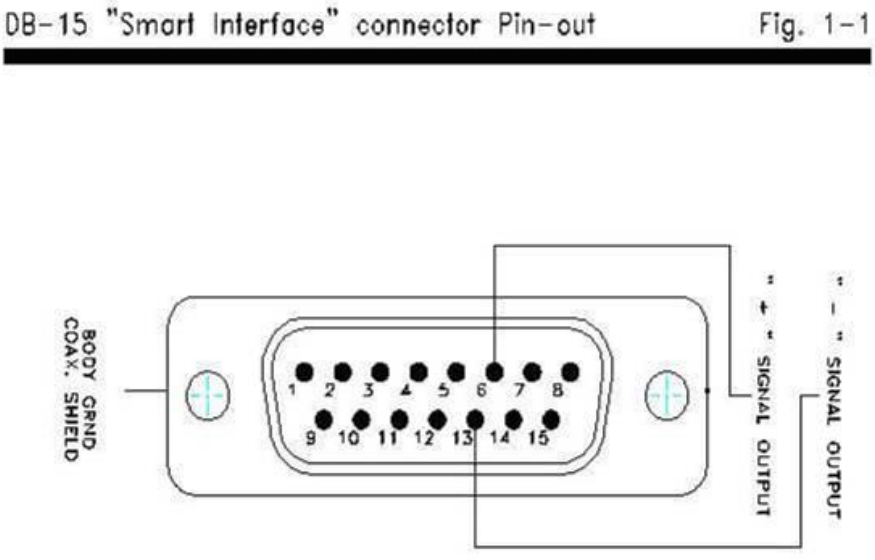
The DB-15 male "intelligent" connector contains an EEPROM (Electrically Erasable Programmable Read-Only Memory) with different information related to the HP Series detector head in use: detector model, calibration sensitivity, applicable scales and wavelength correction factor for up to 20 wavelengths.

This connector, available in the HP, allows the DUO, P-LINK, S-Link, SOLO 2, SOLO PE, TPM-300CE, UNO (detector model, calibration sensitivity, scale and wavelength correction factor) monitors to adjust their characteristics automatically to the power sensor being connected. No calibration procedure is required when installing the power heads, allowing for faster set-up.

The DB-15 connector pin-out is composed of (see Fig. 1-1):

1-	USED BY MONITOR	
2-	" " " " "	
3-	" " " " "	
4-	" " " " "	
5-	" " " " "	
6-	**SIGNAL +**	
7-	USED BY MONITOR	
8-	" " " " "	
9-	" " " " "	
10-	" " " " "	
11-	" " " " "	
12-	" " " " "	
13-	**SIGNAL -**	
14-	USED BY MONITOR	
15-	" " " " "	
SHELL	**-**	**BODY GROUND**

FIG. 1-1 DB-15 CONNECTOR PIN-OUT



1.2.2. USB connector

The USB connector allows using the HP on a PC. The PC interface, *PC-HP*, features statistical calculation, graphics displays and data logging options. It also gives real time measurement of the cooling flow rate and temperature.

A standard USB cable of 5 meters is supplied with the HP. If a longer cable is required, please contact Gentec-EO for more information.

A USB power adapter (201221) can be ordered with the required AC plug ; USA (201222), UK (201223), European (201224) and Australian (201225).

1.2.3. Cooling water

The fluid used to cool the HP must be clean water.

Water Fittings and tubing :
- The HP is equipped with 3/8'' (OD) tube compression fittings.
- It can be used with plastic pressure tube systems (like PE tubes) or Copper tubes.
- The brass fittings and ferrules are not compatible with stainless steel tubes.

Water Quality:
- Use filtered (< 10µm) water to avoid any residue.
- Distilled water can be used, but it is not recommended to use highly deionized ultra-pure water because the water cavity is not completely inert. .

Water temperature:
- Water temperature stability is very important since variations (1 to 60 seconds) in the temperature can be interpreted as laser power fluctuation.
- Regulate the temperature with a chiller or a re-circulator.
- The water temperature can be monitored with the PC interface *PC-HP*.

Water Flow rate:
- Flow rate stability is very important since the measured power is directly proportional to the flow. Variation (1 to 60 seconds) in the flow rate can be interpreted as laser power fluctuation.
- The flow rate must be adjusted with a valve. A lower flow rate causes a slower response while increasing the signal to noise ratio. A higher flow rate causes a faster response, reducing signal to noise ratio.
- The water flow rate can be monitored with the PC interface *PC-HP*.

Note: All these parameters should remain in the range stated in the specifications.

1.3 HP SERIES SPECIFICATIONS

HP…	**HP100A-3KW-HE**
Aperture Diameter	100 mm
Spectral Range	0.19 - 20 µm
Power Noise Level	± 3 W
Typical Rise Time (0 – 95 %)	7 s
Sensitivity	0.5 mV/W
Calibration Uncertainty	± 5 % @ 1.064 µm
Linearity with Power	± 2%
Repeatability (Precision)	± 2%
Max. Average Power (continuous)	3 000 W
Max. Average Power (5 min.)	4 000 W
Max. Average Power Density [12]	10 kW/cm² (0.5 kW) 3 kW/cm² (3 kW)
Dimension (mm)	127 (H) x 127 (W) x 74 (D)
Weight (head only)	1.8 kg
Cooling	Water
Required cooling flow	4 – 6 LPM < ± 1 LPM/min [3]
Temp of cooling water	15 - 25 °C < ± 3 °C/min [3]
Pressure Drop	< 6 psi
Recommended load Impedance	> 100 kΩ
Output Impedance	< 70 Ω
Linearity vs beam dimension [4]	± 1.0 %
Linearity vs beam position [5]	± 1.5 %
PCB electrical supply	USB or Gentec-EO monitors
Maximum current consumption	30 mA
Max output signal	2.0 V

HP…	**HP60A-10KW-GD**	**HP100A-12KW-HD**
Aperture Diameter	60 mm conical Optimized for 35 mm	100 mm
Spectral Range	0.8 - 12 µm	0.19 - 20 µm
Power Noise Level	± 10 W	± 10 W
Typical Rise Time (0 – 95 %)	11 s	9 s
Sensitivity	0.2 mV/W	0.15 mV/W
Calibration Uncertainty	± 5 % @ 1.064 µm	
Linearity with Power	± 2%	
Repeatability (Precision)	± 2%	
Max. Average Power (continuous)	10 000 W	12 000 W
Max. Average Power (5 min.)	10 000 W	12 000 W
Max. Average Power Density [1] [2]	< Ø 35 mm: 10 kW/cm² (10 kW) > Ø 35 mm: 3.5 kW/cm² (10 kW)	16 kW/cm² (0.5 kW) 6.5 kW/cm² (5 kW) 3.5 kW/cm² (10 kW)
Dimension (mm)	127 (H) x 127 (W) x 90 (D)	127 (H) x 127 (W) x 70 (D)
Weight (head only)	≈5 kg	3.3 kg
Cooling	Water	
Required cooling flow	6 – 10 LPM < ± 1 LPM/min [3]	
Temp of cooling water	15 - 25 °C < ± 3 °C/min [3]	
Pressure Drop	< 11 psi	
Recommended load Impedance	> 100 kΩ	
Output Impedance	< 675 Ω	
Linearity vs beam dimension [4]	< Ø 35 mm: ± 0.5 % > Ø 35 mm: ± 1.5 %	± 1.0 %
Linearity vs beam position	± 3.0 % [5]	± 1.5 % [6] ± 3.0 % [5]
PCB electrical supply	USB or Gentec-EO monitors	
Maximum current consumption	30 mA	
Max output signal	2.0 V	

[1] : Refer to section 3 for more details on the appropriate beam size in function of measured power.
[2] : 1.064, 1.07-1.08 & 10.6 µm.
[3] : On a period > 1 minute.
[4] : For a centered beam size from 10% to 80% of the aperture area.
[5] : For a beam size of 20% of the aperture area, moved across 80% of the aperture area.
[6] : For a beam size of 10% of the aperture area, moved across 40% of the aperture area.

Specifications subject to change without notice.

2 OPERATING INSTRUCTIONS

- In order to ensure a long lifetime of accurate measurements, it is recommended that HP is held within the following ambient conditions:

    - Storage environment temperature: 10 to 65°C, RH < 90%
    - Operating environment temperature: 15 to 28ºC, RH < 80%.

  It is possible to store and operate your Gentec-EO UP wattmeter beyond this range. For any specific requirement, please contact your local Gentec-EO representative**.**

- Connect the detecting head (equipped with 3/8'' tube fittings) to a water cooling supply.

  NOTE: Ensure that the connection is water-tight by cutting the end of the tube perpendicular to the tubing. The portion of the outer tubing wall that slips into the fitting must not be deformed or damaged.

    - To connect the detector head fittings to the water supply tubing: unscrew the two parts of the fitting, push the tubing into the part not connected to the detector until it comes to the end of the fitting, then screw in the two parts of the fitting.
    - **The direction of flow through the head is very important. The measured power will be negative if the direction is inverted.**
    - Once you have connected the fittings, check them for leaks. If you find a leak, check to see if the tubes are pushed in far enough and that the tubing has not been damaged.
    - To disconnect the detector head fittings, remove the water pressure and drain the water from the tubing. Unscrew the two parts of the fitting and pull out the tubing.

  NOTE: Water will usually remain in the detector head after it is disconnected. It is possible to remove it by blowing it out, but be careful not to blow the water on yourself or on the detector aperture. Dry the detector body and absorber off before storing it.

    - Be sure that flow rates satisfy the minimum values, as indicated on the specifications page.
    - Time variations in water flow rates or water temperature will cause corresponding oscillations in measurements.
    - **The water temperature and flow rate can be monitored with the PC interface *PC-HP*.**

- For the most accurate measurements, center the beam on the sensor face. The beam diameter on the sensor should ideally be the same size as the beam diameter of the original calibration, which corresponds to >98% encircled power centered on 70-90% of the sensor's surface (this complies with the International Electrotechnical Commission standard #1040: "Power and Energy Measuring Detector..."). Refer to the calibration certificate for the exact calibration beam diameter.

WARNING:
Be careful not to exceed the maximum levels and densities stated in the specifications, refer to section 4, *Damage to the optical absorber material*, for detailed informations.

Strong fluctuations in the zero level are usually caused by one of the following :

1) Rapid fluctuations in water temperature.
2) Rapid fluctuations in the water flow rate.

WITH ANY GENTEC-EO MONITOR

- To operate the HP detector, connect the detector head to the input socket of the monitor (see the monitor's instruction manual).

Compatibility	Powered by the monitor	Optional USB power adapter required
Monitor	Maestro, SOLO 2, UNO, P-LINK USB, S-LINK, TPM-300CE and S-LINK ETHERNET (if only one HP is used). .	SOLO PE, DUO, P-LINK RS232 and, S-LINK ETHERNET (if more than one HP is used simultaneously).

- If a extension cable is used to connect the HP to a monitor, the HP must be powered from a PC via the USB port or with an optional USB power adapter.

- Before taking measurements, block off the detector head to prevent it from sensing heat from random sources. To obtain an accurate reading, the monitors must be zero adjusted.

- Allow the detector head to thermally stabilize before making any measurements. Let the signal stabilize for a few seconds before adjusting the offset. Refer to the monitor's operating instructions for further details.

2.1 WITHOUT A GENTEC-EO MONITOR

- The HP must be powered from a PC via the USB port or with an optional USB power adapter.
- Connect the power head to a precision microvoltmeter, or data acquisition system, with a load impedance that is >100 kΩ. Because of the very low voltages at lower power levels for some of these detectors, analog or digital filtration may be required to remove ambient electromagnetic interference.
- Put the power head into the laser beam path (the laser beam must be contained within the sensor area) for about a minute.
- Switch on the voltmeter and adjust its voltage range to the range required for the measurement. To determine the voltage range to be measured, refer to the detector head specifications:

  Vout = (expected power) x (sensitivity of power detector)
- Block off any laser radiation to the detector.
- Wait until the signal has stabilized, then measure the zero level voltage offset from the detector.
- Apply the laser beam to the power head.
- Wait until the signal has stabilized (between one to three minutes for optimum measurements), then measure the voltage output from the detector .

- The measured power is calculated as follows:

  Measured power [W] = (output voltage [V] - zero level voltage [V]) / sensitivity [V/W]

  = 1000 x (Vout [mV] - Vzero level [mV]) / sensitivity [mV/W]

2.2 WITH PC-HP

This section describes in detail the first group of menus essential to the PC-HP operation. The display menu lets you view the status and your measurement in various ways. Use the settings menu during setup to set the best parameters for the measurement task at hand. It provides the flexibility to accommodate a wide variety of measurement conditions.

The water temperature and flow rate are displayed in real-time at the bottom of the interface

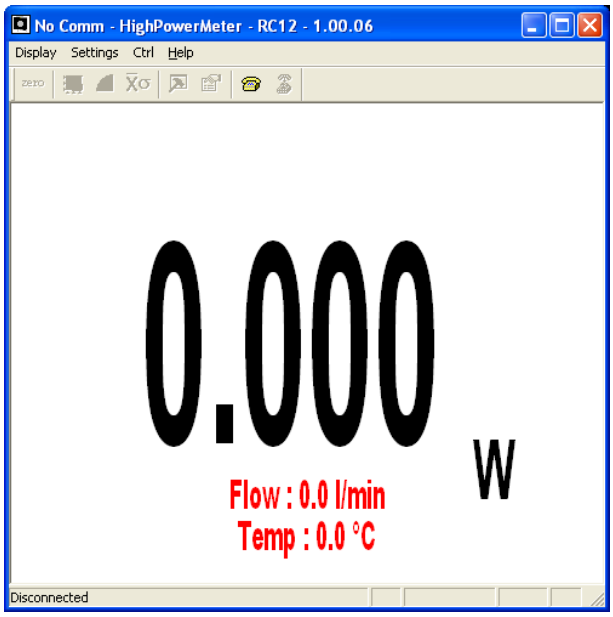


FIG. 2-1 PC-HP INTERFACE

2.2.1 PC-HP Warnings

The PC Interface show cooling water status in real time.

- The flow rate and temperature are shown in black fonts in normal conditions (FIG 2.2 A).
- If the water temperature is not stable a message will appear (FIG 2.2 B).
- If the flow rate (FIG 2.3 A) or temperature (FIG 2.3 B) are too high or low the fonts will change to red as a warning that the measurements will be affected.

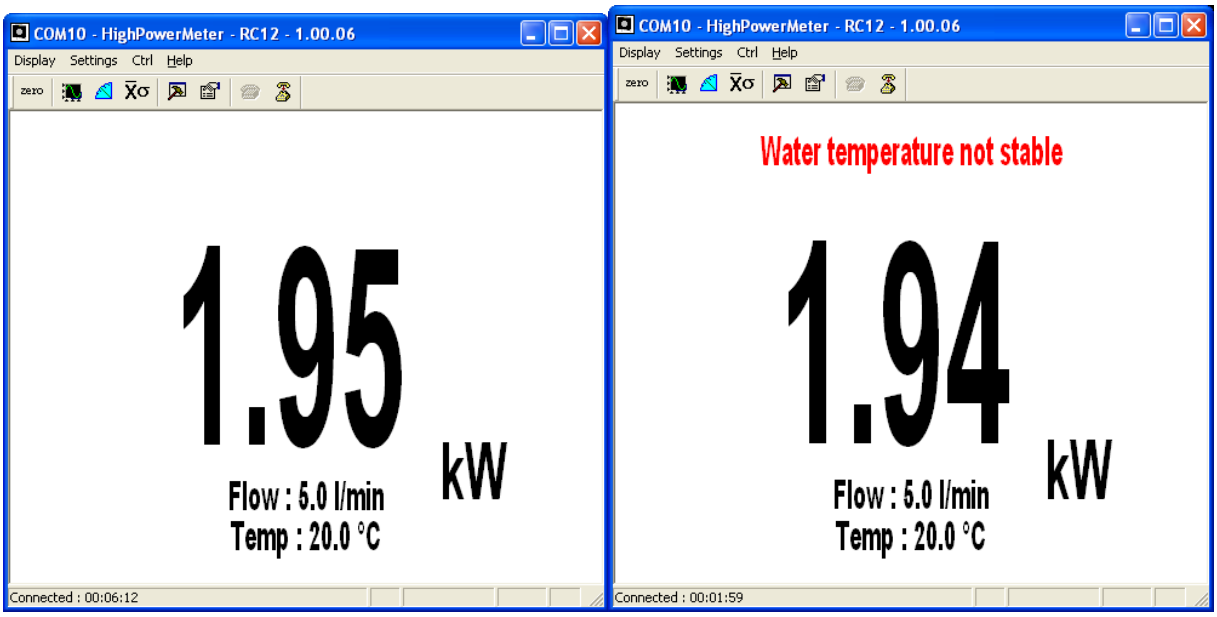


FIG. 2-2 A & B PC-HP INTERFACE WARNINGS

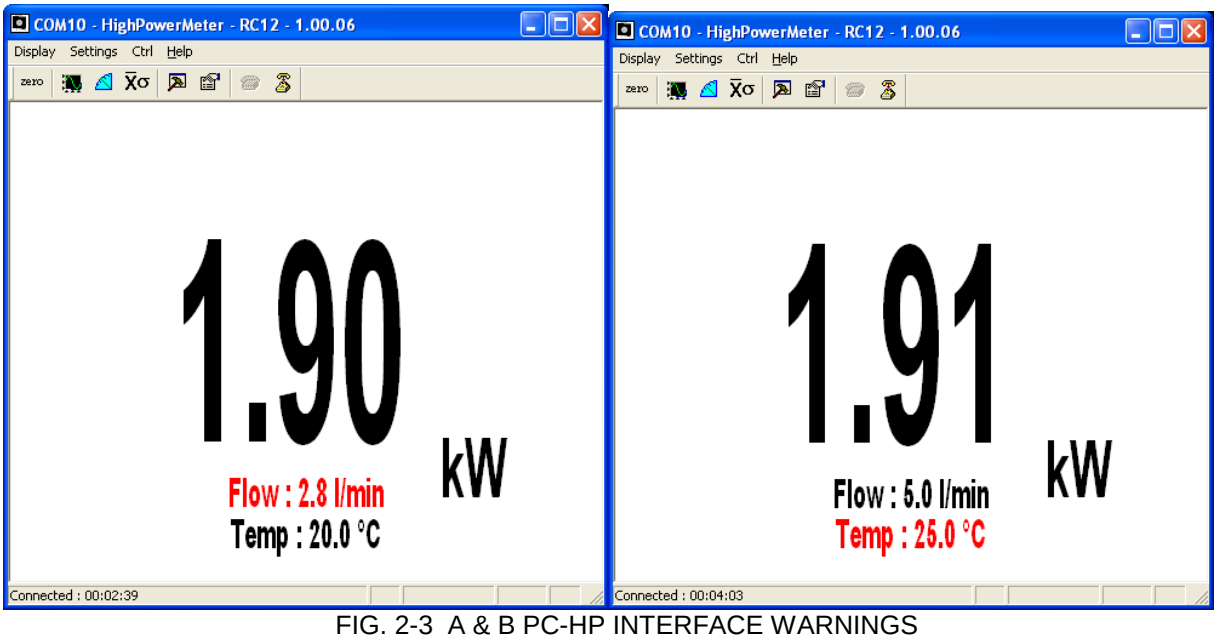


FIG. 2-3 A & B PC-HP INTERFACE WARNINGS

2.2.2 PC-HP Shortcut Buttons

To access certain features with a single click instead of having to enter the menus, PC-HP has 8 shortcut buttons on its main window. From left to right, those buttons access: *Zero Offset*, *Display - Histogram*, *Display - Tuning Needle*, *Display - Statistics*, *Display - Status*, *Settings - Data Sampling*, *Ctrl - Communication - Connect, Ctrl - Communication-Disconnect*.

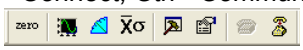


FIG. 2-4 PC-HP SHORTCUT BUTTONS

2.2.2.1 Zero

This feature resets the zero reading level to compensate for electronic offsets in the HP and thermal noise in the environment of the detector. When the HP receives the associated command, it subtracts the power reading on all its internal hardware scales. Subsequent measurements will be relative to this zero power level. Use this function once your power meter has achieved thermal equilibrium to ensure accurate measurements.

For instructions on the proper way to adjust the offset to zero your detector see section 2, *Operatings Instructions*.

2.2.3 Display menu

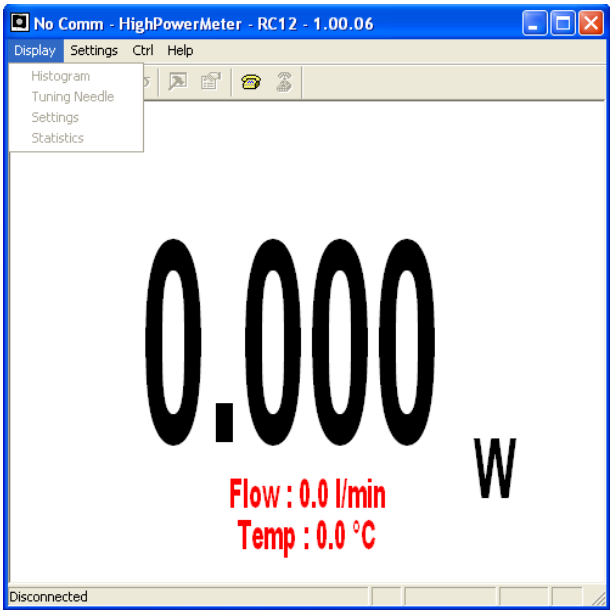


FIG. 2-5 PC-HP DISPLAY MENU

2.2.3.1 Display - Histogram

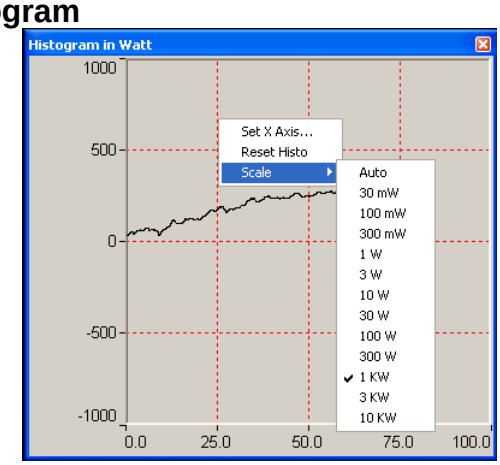


FIG. 2-6 PC-HP HISTOGRAM

Right-click on the histogram to set the time period to view(Set X Axis…), reset the display or select a scale. Note that the Auto-Scale on the histogram starts from the lowest scale and only does scale-ups. This is made to select the best scale for the user without frequent scale oscillations.

2.2.3.2 Display - Tuning Needle

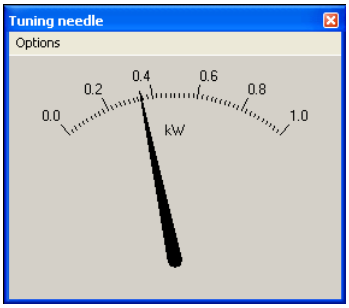


FIG. 2-7 PC-HP TUNING NEEDLE (TWO OPTIONS)

Right-click on the Tuning Needle to select a scale. The autoscale(default) mode is useful when the measurement variations are small, because it will zoom on the best possible scale, but will oscillate with large variations. Use a fixed scale in this case.

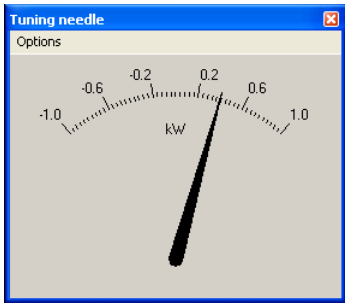


FIG. 2-8 PC-HP TUNING NEEDLE SETTINGS

2.2.3.3 Display - Status

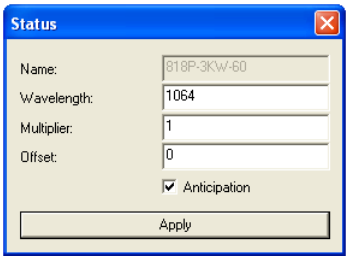


FIG. 2-9 PC-HP SETTINGS WINDOW

The Settings window displays various settings.

2.2.3.3.1 Status - Wavelength

Use The Wavelength menu to select the power wavelength at which the detector is to be used. It applies a correction to adjust for the variation in responsivity at different wavelengths. When a new thermal detector is plugged in, the calibration wavelength is the default selection.

PC-HP only allows you to choose values that fall within the detector's range. If you select or enter a value that is not valid, a menu pops up to signal the error and PC-HP automatically selects the default value. That is the wavelength used for calibration at Gentec-EO during manufacture or subsequent service.

The HP automatically recognizes every power detector, for accurate auto-calibration. More importantly, it takes advantage of our *Personal wavelength correction*™: it reads the memory in the *Smart Interface* connector to provide a wavelength correction based on spectral data measured from that specific detector. Your measurements across the band have never been this precise and easy.

When working at a wavelength not available in the Wavelength menu, use the custom option. If you choose custom, a dialog box appears where you can enter a wavelength. The wavelength you enter must be within the range of valid wavelengths. The HP interpolates a wavelength correction factor using the pre-programmed data in the detector's EEPROM.

2.2.3.3.2 Status - Corrections

The user can apply one multiplier and one offset to the detector reading. Correction factors are most useful when sampling a percentage of a powerful laser beam or correcting for absorption along an optical chain. The Status window displays the values of correction factors that are being applied to the measurements. To activate the correction factor, select Status in the Display Menu and then select Multiplier or Offset. A dialog box opens where you enter the correction value in percentage or as an absolute value. This number will then multiply, or add to the actual measured value to calculate the corrected value. PC-HP will then display the corrected value.

Note that the Statistics are computed for the corrected values only.

To disable the correction factor, do a Display – Status – 1 & 0.

2.2.3.3.3 Status - Anticipation

Thermal power detectors are inherently slow. The HP uses an algorithm to significantly accelerate the response. This is called "anticipation". By default, this option is enabled. The reasons for disabling the anticipation are to slow down the response and to lower the noise level.

2.2.4 Display - Statistics

The statistics window displays the current statistics. See section 2.2.5.1 to set the data sampling parameters. See section 2.2.6.3 to learn how to start and stop the statistics.

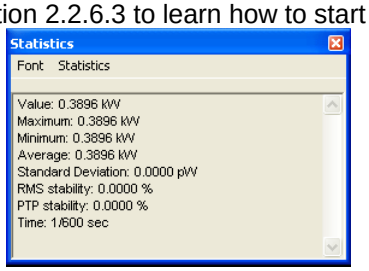


FIG. 2-10 PC-HP STATISTICS WINDOW

Table 2.1 Statistical values

Statistical Parameters	Definition
Maximum value	Highest value in the sample period, E_{max} or P_{max}
Minimum value	Lowest value in the sample period, E_{min} or P_{min}
Average value	Rolling average of values in the sample, E_{avg} or P_{avg}
Standard Deviation	A measure of the spread of the data around the average. $STD=\sqrt{\frac{n\sum x^2-\left(\sum x\right)^2}{n(n-1)}}$
RMS stability	Root mean square stability represents the standard deviation as a percent of the average. $RMS=\frac{STD}{E_{avg}}\times 100$, $RMS=\frac{STD}{P_{avg}}\times 100$
PTP Stability	Shows the spread between the highest and lowest point in the sample as a percent. $PTP=\frac{E_{\max}-E_{\min}}{E_{avg}}\times 100$, $PTP=\frac{P_{\max}-P_{\min}}{P_{avg}}\times 100$
Time	Time elapsed since beginning the sample.

2.2.5 Settings menu

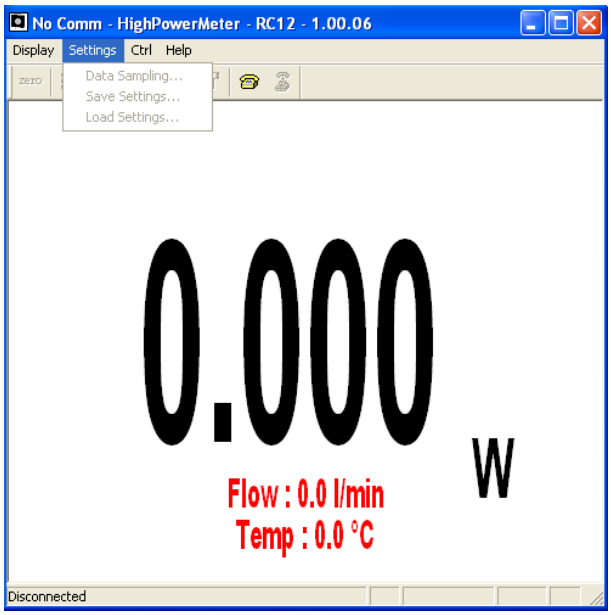


FIG. 2-11 PC-HP SETTINGS MENU

Items in the Settings menu define user-adjustable parameters.

2.2.5.1 Data Sampling

The Data Sampling parameters are used for calculating the statistics(see section 2.2.4) and for data acquisition(see section 2.2.6.2). PC-HP uses default sampling parameters unless you set them yourself. You can set PC-HP either to calculate the statistics for a single sample and stop or to repeat continuously. Take data for a few seconds or a few weeks. You have the flexibility to handle any application, from analyzing a single short pulse with high resolution to sampling performance over a period of months.
The statistical parameters that are calculated are listed in Table 2.2.

Figure 2.9 shows the window for setting the data sampling parameters. Table 2.2 describes the parameters. When finished setting them, click save to activate the parameters.

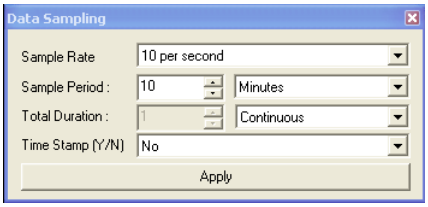


FIG. 2-12 PC-HP DATA SAMPLING PARAMETER WINDOW.

Table 2.2 Data Sampling Parameters

Parameter	Choices	Description
Sample Rate	10Hz to 1 per hour	Sets the number of points (measurements) per second: 10 per second, 1 per second, 1 per 10 seconds, 1 per minute, 1 per 10 minutes, 1 per hour.
Sample Period	Integer 1 to 1000000000	The time over which samples are to be averaged. Sets the number of samples used in the average and standard deviation *[for example, for each average to be based on 5 minutes of data, set to 5 minutes..].*
Sample period units	Second, Minute Hour, Day, Week	Sets the time period for the value entered above.
Total Duration	Integer 1 to 1000000000	The time period for which samples are reported (to the display and output). Select a time period or a number of points *[for example, report statistics for 24 hours].* Often the total duration and sample period will be the same. PC-HP automatically clears and recalculates the statistics at the end of each sample period unless you manually stop it.
Total Duration units	Continuous Periods	To make the statistics stop after one sample period, select “1” and “Period.”
Time Stamp	Yes No	To have a time stamp appear with the acquired data, select “yes” and click “save”. This is a relative time stamp that always begins at zero.

2.2.5.2 Settings - Save and Load User Settings

PC-HP can remember and recall the settings of any number of users. You can share the HP without the hassle of having to re-enter your settings. As an alternative, you can program it so that you can easily switch between different measurement applications without having to re-enter your settings. This option is activated under the Save Settings or Load settings menu items.

When you select settings, a dialog box appears so that you can save your settings to a file. Give the settings a file name and type. To use established settings, select Load Settings, a dialog appears. Select the file.

2.2.6 Ctrl menu

This section gives a complete description of the Control menu available on PC-HP.

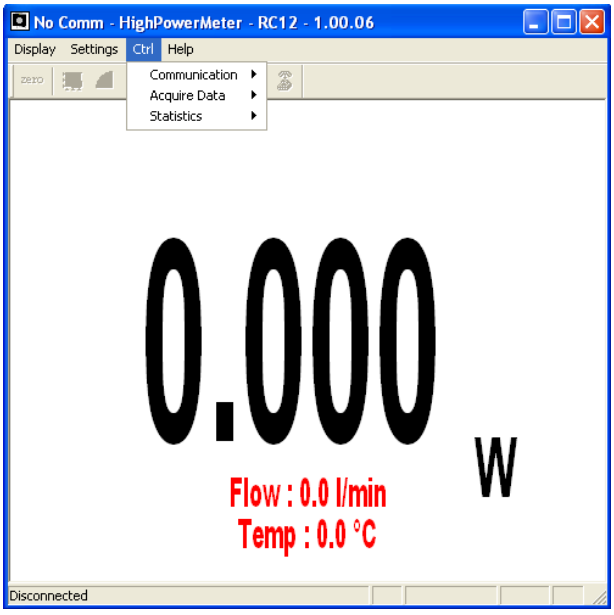


FIG. 2-13 PC-HP CTRL MENU

2.2.6.1 Ctrl - Communication

The communication item is mostly used to Connect to the HP after starting PC-HP. To use the COM port for another application without closing PC-HP, click Ctrl / Communication / Disconnect.

2.2.6.2 Ctrl - Acquire Data

This item is used to save raw data (only), statistics (only), or both raw data and statistics in an output file. When you select Start Saving Raw Data, a dialog box appears. Type in the filename that you choose, then select save. PC-HP begins storing raw data according to your Data Sampling settings (see section 5.2.2). If you will be putting the information into a spreadsheet, use the Save Both option. All the raw data will be at the top of the file, while all the statistical information will be at the bottom of each period. The Stop Saving command stops the data recording but the HP will continue to provide measurements to the display.

2.2.6.3 Ctrl - Statistics

-Select Start to start collecting statistics(when stopped) or to restart them when already in progress.

-Select Stop to freeze the statistics.

2.2.7 Help - About

This item is helpful to check the software version (About Application…). If you should need help or additional information on the HP or any Gentec-EO products, do not hesitate to contact us. We will be glad to help you.

2.2.8 USB driver Installation

Plug the HP into a USB port on the PC. If the PC supports USB 1.1, Windows detects the new device and prompts you for the software drivers. A window will open that says Found New Hardware – USB Device and after several seconds to a minute, the Found New Hardware Wizard will appear.

Insert the GENTEC-EO Software CD-ROM if not done already.

For Windows 2000, XP or Vista: Cancel the wizard and execute the Auto installer “USB driver installer-r2” in the USB Driver folder from the CD-ROM.

Please note that old monitors without the (R2) at the end of the product name need a different USB drivers which are available on our web site. They do not support Windows VISTA, unless noted on the web site.

At the end of this process, a new serial COM port will be added to the list of communication ports. It may be used as any other serial port. You will need to know the COM port number to set up the serial connection to the HP.

2.2.9 Verify COM Port

To verify the USB installation and find the COM port number click:

Start → Settings → Control Panel → System → Device Manager

(Instructions may vary a bit by operating system and version. For Win2000/XP there is an additional step (is there an extra step – if so what is it – or an extra click?- on my system it’s an extra click) between Control Panel and System.)

Scroll down to Ports (COM & LPT) and double click that line. One of the options should be USB-to-Serial Port (COM#)

Note the COM port number. You need it for the next step.

2.2.10 Serial commands

The HP Series are automatically sending data through serial port at 9.5 Hz (*push mode*).
There is no need to ask for readings.

The HP sends the following data:

Data	ID	Units
Power	Pw=	Watts
Water Temperature	Tin=	Celsius
Water Flow	F=	Liters per minute

Example) Pw= 0.0 Ti= 20.000 F= 0.000

HP communication parameters:

a. Bits per second: 57600
b. Data bits : 8
c. Parity: None
d. Stop bits: 1
e. Flow control: None

Serial Commands List:

The star (*) is part of each command and the commands are case sensitive.

Command	Description	Applies to
*RST	**Hardware Reset** The HP will return to default settings.	USB and DB-15 connector
*VER	**Returns information about HP type and firmware version** Example: HP__A-_KW-H_, Version X.XX.XX	USB only
*F01	**Returns information about HP** Serial number, calibration wavelength (nm), DB15 sensitivity (mV/W) Example: SerialNumber: 123456, Lambda : 1064, Sensitivity: 0.X00000	USB only
*F02	**Returns information about HP current status** Current wavelength (nm), Thermal offset (W), Offset factor (W), Multiplication factor and Anticipation status (On/Off). Example: Wavelenght: 1064, Thermal Offset : 0, Offset : 0, Multiplier : 1, Anticipation: On	USB only
*PWC	**To set the Wavelength** Wavelength correction command (5+ characters). Example : *PWC00808 to selects the wavelength 808 nm	USB only

*OFF	**Sets the thermal (zero) offset** See section 2.2.2.1	USB only
*MUL	**Modifies the multiplication factor (+ 8 characters)** Example : *MUL1.00E+01 selects a multiplication factor of 10 *MUL10.00000 selects a multiplication factor of 10	USB only
*ADD	**Modifies the offset factor (8 characters)** Example : *OFF2.00E+02 selects a user offset of +200 watts *OFF-200.000 selects a user offset of -200 watts	USB only
*ANE	**Enable the anticipation (default)** See section 2.2.3.3.3	USB and DB-15 connector
*AND	**Disable the Anticipation** See section 2.2.3.3.3	USB and DB-15 connector
*CVU	**Stop the HP to send data automatically (*push mode*) and returns a single measurement** Example : *CVU Pw= 0.0 Ti= 20.000 F= 0.000	USB only

Please note that you must type the exact number of characters or numerical values required and don't put any space between characters or numerical values.

3 SAFETY OPERATION NOTES

3.1.1 Diffusive surfaces

When using the HP be aware of the diffused back reflection ~ 10-15%.

As on any diffusive surface, the light on the sensor coating is scattered more or less uniformly as a Lambertian diffuser.

3.1.2 Detector temperature

Detectors can become hot enough during usage to cause burns.

4 DAMAGE TO THE OPTICAL ABSORBER MATERIAL

The HP series are high power meters that can measure up to 12KW. The beam diameter should always be as large as possible to avoid damage to the absorber. **We are recommending between 50% and 80% of the head aperture area,** e.g. 7 cm in diameter for the HP100A-3KW-HE, 2.5 cm in diameter for the HP60A-10KW-GD and 7 cm in diameter for the HP100A-12KW-HD.

The damage threshold is decreasing with the laser beam power. The following table calculates the diameter corresponding to the damage threshold for a Gaussian beam profile. The "minimum 1/e² beam diameter" is calculated to obtain a peak intensity 50% lower than the damage threshold and should be considered as the "safe" minimum diameter. If there are "hot spots" in the beam profile, they must be considered in the calculation of the peak intensity.

Laser	**HP100A-3KW-HE**		
Beam Power [kW]	Damage Threshold [1] [kW/cm²]	Damage 1/e² Beam Diam. [2,3] [cm]	Min. 1/e² Beam Diam. [2,3,4] [cm]
0.5	10	0.4	0.5
1	6	0.7	0.9
2	4	1.1	1.6
3	3	1.6	2.3
4			
5			
6			
7			
8			
9			
10			

[1] Peak Intensity.

[2] For Gaussian beam profile, the peak intensity is twice the beam power.

[3] Diameter of a circle corresponding to 86% of the entire beam power.

[4] Including a security factor of 50%

Laser	HP60A-10KW-GD (< Ø 35 mm)			HP100A-12KW-HD HP60A-10KW-GD (> Ø 35 mm)		
Beam Power [kW]	Damage Threshold [5] [kW/cm²]	Damage 1/e² Beam Diam. [6,7] [cm]	Min. 1/e² Beam Diam. [6,7,8] [cm]	Damage Threshold [5] [kW/cm²]	Damage 1/e² Beam Diam. [6,7] [cm]	Min. 1/e² Beam Diam. [6,7,8] [cm]
0.5	40	0.2	0.3	16	0.3	0.4
1	35	0.3	0.4	14	0.4	0.6
2	30	0.4	0.6	12	0.7	0.9
3	25	0.6	0.8	9.7	0.9	1.3
4	20	0.7	1.0	7.9	1.1	1.6
5	17	0.9	1.2	6.5	1.4	2.0
6	15	1.0	1.4	5.6	1.7	2.3
7	13	1.2	1.7	4.9	1.9	2.7
8	12	1.3	1.8	4.3	2.2	3.1
9	11	1.4	2.0	4.0	2.4	3.4
10	10	1.6	2.3	3.5	2.7	3.8
11				3.0	3.1	4.3
12				2.5	3.5	4.9

In the event of major damage to the coating, the HP Series sensors can be recoated. Contact your local Gentec-EO representative for information on repair and recalibration. See p. ii **Contacting Gentec Electro-Optics Inc.**

[5] Peak Intensity.

[6] For Gaussian beam profile, the peak intensity is twice the beam power.

[7] Diameter of a circle corresponding to 86% of the entire beam power.

[8] Including a security factor of 50%

5 CE MARK DECLARATION OF CONFORMITY

Application of Council Directive(s): 2004/108/EC The EMC Directive

Manufacturer's Name: Gentec Electro Optics, Inc.
Manufacturer's Address: 445 St-Jean Baptiste, suite 160
(Québec), Canada G2E 5N7

European Representative's Name: Laser Components S.A.S.
Representative's Address: 45 bis Route des Gardes
92190 Meudon (France)

Type of Equipment: Laser Power Detector
Model No.: HP Series
Year of test & manufacture: 2008

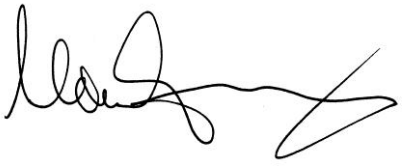
Standard(s) to which Conformity is declared:
EN 61326: 1997 Emission generic standard

Standard	Description	Performance Criteria
EN 61326 :1997	Limits and methods of measurement of radio interference characteristics of information technology equipment. Testing and measurements of conducted emission	Class A
EN 61326 : 1997	Limits and methods of measurement of radio interference characteristics of information technology equipment. Testing and measurements of radiated emission	Class A
EN 61000-4-2:1995 +A1:1998 A2:2001	Electromagnetic compatibility (EMC) – Part 4: Testing and measurements techniques- Section 4.2: Electrostatic discharge.	Class B
EN 61000-4-3:1996 +A1:1998	Electromagnetic compatibility (EMC) – Part 4: Testing and measurements techniques- Section 3: Radiated, Radio Frequency immunity.	Class A
ENV 50204: 1995	Radiated Electromagnetic field from digital radio telephones- immunity test 900MHz pulsed	Class A
EN 61000-4-4:1995 +A1:2001 A2:2001	Electromagnetic compatibility (EMC) – Part 4: Testing and measurements techniques- Section 4: Electrical fast transient/burst immunity.	Class B
EN 61000-4-6:1996 +A1:2001	Electromagnetic compatibility (EMC) – Part 4: Testing and measurements techniques- Section 6: Immunity to conducted Radio Frequency.	Class A

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s).

Place: Québec (Québec)

Date : December 1, 2008



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(President)

Appendix A: WEEE directive

- Recycling and separation procedure for WEEE directive 2002/96/EC:

This section is used by the recycling center when the detector reaches the end of its life. Breaking the calibration seal or opening the monitor will void the detector warranty.

The complete Detector contains

1 Detector with wires or DB-15.

1 instruction manual

1 calibration certificate

- Separation:

Paper : Manual and certificate

Wires: Cable Detector.

Printed circuit board:

inside the Detector,

DB-15, no need to separate (less then 10 cm^2).

Aluminum: Detector casing.

Plastic: parts inside the Detector.

gentec-eo

Laser Beam Measurement

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Calibration Centers

Québec City, CANADA
Olching (Munich), GERMANY