USER MANUAL

Integra | Embedded Monitor for Power & Energy Detectors

gentec-eo
PARTNERS for ACCURACY

121-203008

WARRANTY

First Year Warranty

All Gentec-EO devices 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 battery leakage or misuse.

Gentec-EO Inc. will repair or replace, at Gentec-EO Inc.'s option, any device that proves to be defective during the warranty period, except in the case of product misuse.

Any attempt by an unauthorized person to alter or repair the product voids the warranty.

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

In case of malfunction, contact your local Gentec-EO distributor or nearest Gentec-EO Inc. office to obtain a return authorization number. The material should be returned to:

Contacting Gentec Electro-Optics Inc.

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

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

Website: www.gentec-eo.com

CLAIMS

To obtain warranty service, contact your nearest Gentec-EO agent or send the product, with a description of the problem, and prepaid transportation and insurance, to the nearest Gentec-EO agent. Gentec-EO Inc. assumes no risk for damage during transit. Gentec-EO Inc. will, at its option, repair or replace the defective product free of charge or refund your purchase price. However, if Gentec-EO Inc. determines that the failure is caused by misuse, alterations, accident or abnormal conditions of operation or handling, it would therefore not be covered by the warranty.

SAFETY INFORMATION

Do not use a Gentec-EO device, if the monitor or the detector looks damaged, or if you suspect that the device is not operating properly.

Appropriate installation must be done for water-cooled and fan-cooled detectors. Refer to the specific instructions for more information. Wait a few minutes before handling the detectors after power is applied. Surfaces of the detectors get very hot and there is a risk of injury if they are not allowed to cool down.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instructions, it may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, try to correct the interference by taking one or more of the following steps:

- Reorient or relocate the receiving antenna.
- Increase the distance between the equipment and receiver.
- Connect the equipment to an outlet that is on a different circuit than the receiver.
- Consult the dealer or an experienced radio/TV technician for help.

Caution: Changes or modifications not expressly approved in writing by Gentec-EO Inc. may void the user's authority to operate this equipment.

SYMBOLS

The following international symbols are used in this manual:

Refer to the manual for specific Warning or Caution information to avoid any damage to the product.

DC, Direct Current

TABLE OF CONTENTS

1. INTEGRA 1

1.1. Introduction 1
1.2. Specifications 1

2. Quick Start Procedure 3

3. User Interface 4

4. USB Serial Communication 4

4.1. Description 4
4.2. Setting up Communication to the INTEGRA 4
4.2.1. Verify the COM Port 4
4.2.2. Connect the INTEGRA 4
4.2.3. To Echo Commands 5
4.2.4. Test the Connection 5
4.2.5. HyperTerminal Settings Shortcut 5
4.3. Serial Command Format 5
4.3.1. Serial Protocol Rules: 5
4.3.2. Text Mode Rules: 5
4.4. Binary Mode OUTPUT Format 6
4.4.1. Description 6
4.4.2. Codification 6
4.5. List of Serial Commands for the INTEGRA (Summary) 8
4.6. List of Serial Commands for the INTEGRA (Complete) 9
4.6.1. Display 9
01 - Set Scale 9
02 - Set Scale Up 10
03 - Set Scale Down 10
04 - Get Current Scale Index 10
05 - Set Autoscale 10
06 - Get Autoscale 11
07 - Display Valid Scale 11
08 - Set Trigger Level 11
09 - Get Trigger Level 12
10 - Get Mode Display 12
4.6.2. Data Acquisition 12
11 - Query Current Value 12
12 - Send Continuous Transmission of Data 13
13 - Send Continuous Value with Period 13
14 - Sent Current Value with Frequency 13
15 - Stop the CAU Command 14
16 - Query New Value Ready 14
17 - Get Laser Frequency 14
18 - Set Binary Joulemeter Mode 15
19 - Get Binary Joulemeter Mode 15
4.6.3. Setup 15
20 - Set Personal Wavelength Correction 15
21 - Get Wavelength 16
4.6.4. Control 16
22 - Set Anticipation 16
23 - Get Anticipation Status 16
24 - Noise Suppression 17
25 - Set Zero Offset 17
26 - Clear Zero Offset 17
27 - Get Zero Offset 17
28 - Set Diode Zero Offset 18
29 - Set User Multiplier 18

30 - Get User Multiplier *18*
31 - Set User Offset *18*
32 - Get User Offset *19*
33 - Set Single Shot Energy Mode *19*
34 - Set Attenuator *19*
35 - Get Attenuator *20*
4.6.5. Instrument and Detector Information 20
36 - Query Version *20*
37 - Query Status *20*
38 - Query Extended Status *22*
4.7. Error Messages 23
5. USB Driver Installation 24
6. Maintenance 25
6.1. Free Software Upgrade 25
6.2. Troubleshooting 25
7. Declaration of Conformity 26
Appendix A: WEEE Directive 27

1. INTEGRA

1.1. INTRODUCTION

The INTEGRA is a series of All-in-One detectors that combine a detector and a meter in one convenient product. The small but powerful meter of the INTEGRA Series presents a direct USB connection so you can plug it into your PC. Simply use the PC-Gentec-EO software supplied with your product and be ready to make power or energy measurements within seconds! Each detector of the INTEGRA Series offers the same incredible performance as the usual detector and meter combination, from pW to kW and from fJ to J. And the good news is that all our most popular products are available with the INTEGRA option.

1.2. SPECIFICATIONS

The following specifications are based on a one-year calibration cycle, an operating temperature of 18 to 28ºC (64 to 82ºF) and a relative humidity not exceeding 80%. INTEGRA must be stored in an environment between 10°C to 45°C (50 to 113°F) and a relative humidity not exceeding 90%. Photodiodes are sensitive to temperature, especially at longer wavelength. It is the best to keep the temperature in the range of 25 °C (77 °F) close to the calibration temperature.

	Power Meter Specifications
Power Range	4 pW to 30 kW
Power Scales: **Photo Detectors** **Thermal Detectors**	 21 scales: 300 pW to 3 W 16 scales: 300 µW to 30 kW
Pyroelectric in Power Mode (UM-B)	8 scales : 100 µW, to 300 mW
Accuracy[1]	±2.5%[1] ±5 µV best scale[1]
	Energy Meter Specifications
Energy Range	2 fJ to 30 kJ
Energy Scales: **Photo Detectors** **Pyroelectric Detector**	 22 scales: 300 fJ to 30 mJ 15 scales: 3 mJ to 30 kJ
Accuracy [2]	3.0%[2]±50 µV < 5.2 kHz best scale.
Trigger Level: **Default** **Software**	 2 % 0.1% to 99.9%, 0.1% resolution
Data Transfer Rate	No missing points throughput serial frequency(power and energy): 5200 Hz
Frequency Measurement	Accurate frequency measurement up to 5.2 kHz 0-5200 Hz: ±1%
	Software Specifications
	Please refer to the PC-Gentec-EO manual (202322)

[1] Including linearity, detector accuracy and is detector dependent.
[2] Excludes non-linearity.

1.1. OUTLINE DRAWING

2. QUICK START PROCEDURE

1. Install the **PC-Gentec-EO software** on your PC.
2. Install the power or energy detector head on its optical stand.
3. Connect the INTEGRA device to the PC with the appropriate USB cable.
4. Start the PC-Gentec-EO software.
5. Choose the appropriate display for your measurement:

a. 

Real time with bar graph

b.  Scope

c.  Needle

d.  Averaging

e.  Histogram

f. 

Statistics

6. Press the **Connect** button on the top left corner of the main window and change the measurement and display options in the appropriate tabs.

   a. Power heads will default to power measurement; energy heads will default to energy measurement. The display will default to a dual display in real time and scope (Fig 2-1) in auto range mode.

   b. Remove the head's protective cover and start the laser.
   Put the detector head into the laser beam path. Leave it there for a few minutes, until the detector has reached an equilibrium temperature. The entire laser beam must be within the sensor aperture. Do not exceed maximum specified densities, energies or powers. For the most accurate measurement, spread the beam across 60% to 80% of the sensor area.

   Warning: Power detectors can be used with both CW and pulsed lasers.
   Energy detectors can only be used with pulsed lasers.

7. Adjust the **Zero**:

   The power read by PC-Gentec-EO when no laser beam is incident on the detector may not be exactly zero. For power measures, this is because the detector is not thermally stabilized OR there was a heat source in the field of view of the detector when you connected the PC-Gentec-EO. As for photo detectors, zeroing will remove the detector's offset.

- **Thermal and Pyroelectric Detectors**: Block all laser radiation on the detector. To reset the zero, wait until the reading has stabilized and click **Set Zero** in the Main menu.
- **Photo Detectors:** You must block all form of radiation (cover the detector). Click **Set Zero** in the Main menu. In some software versions, a message will appear requesting you to put the black cover over your photo detector. Press the **OK** button after you have done so. The software passes through all the scales to determine the zero for each scale.

See Notes

Notes:

a. Refer to specific power detector documentation for complete installation and operating instructions.
b. Power detectors are thermal sensors and are thus sensitive to temperature variations.
c. For high-precision measurements, it is recommended to:
    i. Allow the power detector to thermally stabilize before zeroing the software.
    ii. Touch only the stand when handling the power detector. Do not touch the detector irtself. This is especially true for highly sensitive detectors.
    iii. Do not adjust the zero for energy detectors, such as the QE series.
    iv. Avoid forced airflow or drafts around the detector.

3. USER INTERFACE

Please refer to the PC-Gentec-EO manual for more information concerning the user interface. The manual can be downloaded on our website at https://gentec-eo.com/downloads/specsheets-manuals.

4. USB SERIAL COMMUNICATION

4.1. DESCRIPTION

The INTEGRA has two Communication Modes: the Binary Mode for fast data acquisition and the ASCII mode. Both modes will require text input commands which must follow rules stated in section 4.3. The output can be in binary mode or in ASCII mode. Section 4.6 describes all the commands in ASCII output mode, but keep in mind, it is also valid for Binary Mode as described in section 4.4.

The USB class used by INTEGRA is a CDC, or Communications Device Class. This means it shows up in the host PC as a COM port, but it is not a COM port, rather a true full speed USB port. You can talk to it like as if it were an RS232 port, but very fast when it comes to speed. Follow the Windows Prompts to install the USB drivers. The USB drivers are fully tested and digitally signed by Microsoft.

Open the appropriate port in your software with standard COM port tools. None of the port settings matter since they are not used, so leave them at whatever default they are in. It's a real USB connection.

Use the standard COM port writes and reads to control the INTEGRA.

4.2. SETTING UP COMMUNICATION TO THE INTEGRA

4.2.1. Verify the COM Port

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

Start → Settings → Control Panel → System → Device Manager

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 will need it for the next step.

4.2.2. Connect the INTEGRA

You may use any serial communications software that you are familiar with. Our instructions are for HyperTerminal because it is widely available on PCs with Windows™.

Select:

Start → Programs → Accessories → Communications → HyperTerminal

To save communication settings, enter a name for the connection. n the drop down menu for "**Connect using**" select the COM port that the USB driver was installed on (Section 4.2.1). Select **OK**.

Input the following settings into the communications parameter window that appears next.

INTEGRA COM Port Settings	
Bits per second	Any settings will work
Data bits	Any settings will work
Parity	Any settings will work
Stop bits	Any settings will work
Flow control	Any settings will work

Click **OK** to begin entering serial commands in the HyperTerminal window.

4.2.3. To Echo Commands

The commands you type will not appear in the HyperTerminal window unless you setup the HyperTerminal to do so. Only the response from the INTEGRA will be displayed. If you prefer to see the commands you are typing on the HyperTerminal window click the **File** menu and execute the following sequence:

File → Properties → Settings → ASCII setup → "**Echo typed characters locally**" **→ OK**

4.2.4. Test the Connection

In the HyperTerminal window, type ***VER.** If the response is the version of your INTEGRA, you are successfully connected and ready for serial command action.

4.2.5. HyperTerminal Settings Shortcut

When you end the session, HyperTerminal asks if you want to save your settings. To avoid inputting the communication parameters again in the future, save by clicking **Yes**. The next time you execute the string of commands, the name of your session will appear after HyperTerminal. Clicking on the session name will open the connection using the saved settings. To avoid re-entering the string of commands, put a shortcut to this file on your desktop: search for the file name, select the file. Right click and select **Shortcut** in the drop down menu.

4.3. SERIAL COMMAND FORMAT

4.3.1. Serial Protocol Rules:

Commands are sent as text strings. The response will either be data or an empty string.

4.3.2. Text Mode Rules:

All text commands must begin with a trig character (*). You do not need to end with a line-feed and/or a carriage-return. Parameters must NOT be separated by spaces. Characters do not have to be capitals, mixed upper and lower cases is ok. Replies to all text mode commands are also in text mode, and end with a carriage-return and a line-feed.

In case of an error, the reply string is in the following format:

> **Error X: reason** [enter]
> Where **X** is the error code, and **reason** is an explanation. See Error Codes at the end of this section.

Because all Text Mode replies end with a carriage return **<CR>** or line-feed **<LF>** (or both), a text reply contains tabulations when many elements need to be separated in the string. This is useful when exporting data to a spreadsheet.

4.4. BINARY MODE OUTPUT FORMAT

4.4.1. Description

The resolution of both is 12-bit in Joulemeter mode. A 14-bit value is sent for compatibility with other meters, but the two LSB's are not significant.

Only the Joulemeters support the binary mode. Thermopiles in energy mode, thermal heads in standard mode and photo detectors are coded in ASCII.

The value in binary mode is coded in two bytes.

4.4.2. Codification

When retrieving a measurement with either *cau or *cvu command the output is decoded as follow:

Byte 1
OXXX XXXX
Byte 2
OXXX XXXX

Where O is the byte Order bit, and X is the binary data. If O is 0, the byte is the MSB. If O is 1, the byte is the LSB

See the table below for examples on how to use binary commands.

How to Use Binary Commands

Example 1: Out of Scale Condition when Using *CEU or *CTU

If the value of these bytes is 0xFE7F, an out of scale condition exists.
INTEGRA is measuring 151 mJ in a 30 0mJ scale. The data sent by INTEGRA will be: 0x40B6

Decode this as follows.

1. Look at bit 7 of each byte to determine the high and low bytes.
2. Keep bits 0 to 6 of each byte. Shift the High byte left by 7 bits (multiply by 128)
3. Add the high and low bytes
4. Divide the result by the full scale value, 16382.
5. Multiply the result by the set scale, 300mJ.

The two data bytes are 0x40 and 0xB6. In Binary they are: 0100 0000 and 1011 0110.
The byte order bit is 0 for the high byte and 1 for the low byte. The high byte is therefore 0x40, and the low byte is 0xB6.
The data is the lower 7 bits of each byte, or high byte of 0x40 and low byte of 0x36.
Shifting the high byte 7 by its results in 0x40 x 128 = 0x2000.
Adding this value to the low byte results in 0x2036, or 8246 decimal: 8246 / 16382 * 300mJ = 151mJ.

If you send *ceu INTEGRA will send continuous data with 9 bytes per pulse.
If you send *ctu INTEGRA will send the current measurement with 9 bytes per pulse.

The 9 bytes are decoded as follows:

Byte 8	Always 0X02, or STX. Let the host know this is the start of data.
Byte 7	The scale index, or with 0x80. This is done so that it can never be the STX or ETX byte. So if the scale was set to 29, then this byte would be hex (29) = 0x1D. Or this with 0x80 and the value sent is 0x9D.
Byte 6	The upper 7 data bits of the energy, or with 0x80. If the pulse is over range, this byte is 0xFE.
Byte 5	The lower 7 data bits of the energy, or with 0x80. If the pulse is over range, this byte is 0x7F.
Byte 4	The upper 7 bits of the pulse period timer or with 0x80. (28 bits total)
Byte 3	The next 7 bits of the pulse period timer or with 0x80. (28 bits total)
Byte 2	The next 7 bits of the pulse period timer or with 0x80. (28 bits total)
Byte 1	The lower 7 bits of the pulse period timer or with 0x80. (28 bits total)
Byte 0	Always 0X03, or ETX. Let the host know this is the end of data.

Example 2: *CEU and *CTU with Out of Scale

INTEGRA is measuring 151 mJ in a 300 mJ scale. The pulse frequency is 1531 Hz. The data sent by INTEGRA will be: 0x0297A0B68080FABC03.

Decode this as follows.

1. The valid data is between the 0x20 (Start of Text) and 0x03 (End of Text) codes.
2. Valid data is 0x97A0B68080FABC
3. The first byte is the scale, or'd with 0x80
4. The second and third bytes are the data, each or'd with 0x80.
5. The remaining 4 bytes are the pulse period counts, each or'd with 0x80

Valid data is 0x97A0B68080FABC
The scale byte is 0x97. Mask off bit 7 resulting in 0x17, or 23 decimal. The scale is 23, or 300 mJ.
The energy data bytes are 0xA0B6. If the value of these bytes is 0xFE7F, an out of scale condition exists.
If no out of scale condition exits, mask off bit 7 of each byte: 1010 0000 1011 0110 ≥ 0010 0000 0011 0110
Resulting in 0x2036, or 8246 decimal: 8246 / 16382 * 300 mJ = 151 mJ.

The pulse period bytes are 0x8080FABC. Mask off bit 7 of each byte resulting in 0x003D3C, or 15676 decimal.
The period timer is based on a 24E6 Hz clock, so the period is found as:

- If you send *ceu it will be 15676 counts / 24E6 Counts per second = 653.17us.
- If you send *ctu the pulse frequency will be 1 / 653.17us = 1531Hz.

4.5. LIST OF SERIAL COMMANDS FOR THE INTEGRA (SUMMARY)

#	Command Name	Command	Description
DISPLAY			
01	Set Scale	SCS	Manually sets the scale
02	Set Scale Up	SSU	Changes scale to the next higher scale
03	Set Scale Down	SSD	Changes scale to the next lower scale
04	Get Current Scale Index	GCR	Returns scale index between 0 and 41
05	Set Autoscale	SAS	Sets the autoscale
06	Get Autoscale	GAS	Returns autoscale status
07	Display Valid Scale	DVS	Displays the valid scales for the connected head
08	Set Trigger Level	STL	Sets the internal trigger level when measuring pulse energy
09	Get Trigger Level	GTL	Returns trigger level value
10	Get Measure Mode Display	GMD	Returns the current measure mode on INTEGRA
MEASUREMENT			
Data Acquisition			
11	Query Current Value	CVU	Gets the value currently displayed on the screen
12	Send Continuous Transmission of Data	CAU	Sends the values in ASCII to the serial port with the data sampling setting
13	Send Continuous Value with Period	CEU	Sends continuous value with period
14	Send Current Value with Frequency	CTU	Sends current value with frequency
15	Stop the CAU Command	CSU	Stops the CAU Command
16	Query New Value Ready	NVU	Determines if a new reading is available
17	Get Laser Frequency	GRR	Sends the laser rep rate frequency in ASCII to the serial port
18	Set Binary Joulemeter Mode	SS1	Sets the binary joulemeter mode or ASCII mode
19	Get Binary Joulemeter Mode	GBM	Returns the binary joulemeter mode or ASCII mode
Setup			
20	Set Personal Wavelength Correction	PWC	Specifies the wavelength
21	Get Wavelength	GWL	Returns the wavelength in nm
Control			
22	Set Anticipation	ANT	Turns the anticipation on or off
23	Get Anticipation Status	GAN	Returns the anticipation status
24	Noise Suppression	AVG	Applies the noise suppression algorithm
25	Set Zero Offset	SOU	Zeroes the reading
26	Clear Zero Offset	COU	Undoes the zeroing of the reading
27	Get Zero Offset	GZO	Returns the zero offset status
28	Set Diode Zero Offset	SDZ	Zeroes the reading for all the scales for a photodiode
29	Set User Multiplier	MUL	Sets the multiplier value
30	Get User Multiplier	GUM	Returns the current multiplier value
31	Set User Offset	OFF	Sets the offset value
32	Get User Offset	GUO	Returns the current offset value
33	Set Single Shot Energy Mode	SSE	Sets the Single Shot Energy mode
34	Set Attenuator	ATT	Sets the attenuator
35	Get Attenuator	GAT	Returns the attenuator status
INSTRUMENT AND DETECTOR INFORMATION			
36	Query Version	VER	Gets firmware version of the monitor
37	Query Status	STS	Retrieves the detector information and monitor settings
38	Query Extended Status	ST2	Returns the extended status

The Serial Commands Format is:

All text commands must begin with a trig character (*) and DO NOT end with a line-feed or a carriage-return. All parameters must NOT have a space between the command and the list of parameters, nor between the parameters themselves. The characters do not have to be capitals and mixed case is ok. Replies to all text mode commands are also in text mode, and end with a carriage-return and line-feed.

*MUL+8 character numerical value Ex: « *MUL1.000000 » or « *MUL-1.34e-3 » or «*MUL0.000543 »
*OFF+8 character numerical value like above
*STL+4 character numerical value like « *STL10.2 » or « *STL0.22 »
*SSE1 **/** ***SSE0 : Single Shoot Energy ON or OFF
*ATT1 / *ATT0: Attenuator ON / OFF (When available)

4.6. LIST OF SERIAL COMMANDS FOR THE INTEGRA (COMPLETE)

This section describes all the commands in ASCII output mode, but keep in mind, it is also valid for Binary Mode as described in section 4.4.

4.6.1. Display

01 - Set Scale

This command is used to force the display of the current data into a specific scale. The lower scale is always zero, the higher scales can be found in the table below. The Autoscale mode applies the best scale for the current values in real time. The parameter must be one of the identifiers in the table below and have 2 digits.

Command	Parameters	Answer
SCS	Range index	

Range Identifiers:

Index	Value	Index	Value
00	1 picowatt or picojoule	21	30 milliwatts or millijoules
01	3 picowatts or picojoules	22	100 milliwatts or millijoules
02	10 picowatts or picojoules	23	300 milliwatts or millijoules
03	30 picowatts or picojoules	24	1 watt or joule
04	100 picowatts or picojoules	25	3 watts or joules
05	300 picowatts or picojoules	26	10 watts or joules
06	1 nanowatt or nanojoule	27	30 watts or joules
07	3 nanowatts or nanojoules	28	100 watts or joules
08	10 nanowatts or nanojoules	29	300 watts or joules
09	30 nanowatts or nanojoules	30	1 kilowatt or kilojoule
10	100 nanowatts or nanojoules	31	3 kilowatts or kilojoules
11	300 nanowatts or nanojoules	32	10 kilowatts or kilojoules
12	1 microwatt or microjoule	33	30 kilowatts or kilojoules
13	3 microwatts or microjoules	34	100 kilowatts or kilojoules
14	10 microwatts or microjoules	35	300 kilowatts or kilojoules
15	30 microwatts or microjoules	36	1 megawatt or megajoule
16	100 microwatts or microjoules	37	3 megawatts or megajoules
17	300 microwatts or microjoules	38	10 megawatts or megajoules
18	1 milliwatt or millijoule	39	30 megawatts or megajoules
19	3 milliwatts or millijoules	40	100 megawatts or megajoules
20	10 milliwatts or millijoules	41	300 megawatts or megajoules

Default: Autoscale.

Example

The following example sets the scale to 3 nanowatts or nanojoules:

Command: *SCS08	Answer:

02 - Set Scale Up

This command is used to force the display of the current data into a higher scale.

Command	Parameters	Answer
SSU	None	

03 - Set Scale Down

This command is used to force the display of the current data into a lower scale.

Command	Parameters	Answer
SSD	None	

04 - Get Current Scale Index

This command returns the scale index between 0 and 41. Please refer to Set Scale command (SCS) details for the complete scale index table.

Command	Parameters	Answer
GCR	None	Index from 0 to 41

Example

Command: *GCR	Answer: Range : 10 \r\n

05 - Set Autoscale

This command is used to force the display into autoscale.

Command	Parameters	Answer
SAS	1: On 0: Off	

06 - Get Autoscale

This command returns whether or not the autoscale option is activated.

Command	Parameters	Answer
GAS	None	1: On 0: Off

Example

Command: *GAS	Answer: Autoscale : 1 \r\n

07 - Display Valid Scale

This command is used to display all of the valid scales the connected head supports. The scales are displayed in scale index. Please refer to the Set Scale section for the table correspondence.

Command	Parameters	Answer
DVS	None	The valid scale index.

The following example is for a UP19K INTEGRA, which can have the following scales:

- 100 mW
- 300 mW
- 1 W
- 3 W
- 10 W
- 30 W

Example

Command: *DVS	Answer: [22] : 100.0 m <CR> <LF> [23] : 300 m <CR> <LF> [24] : 1.000 <CR> <LF> [25] : 3.00 <CR> <LF> [26] : 10.00 <CR> <LF> [27] : 30.0 <CR> <LF>

08 - Set Trigger Level

This command sets the internal trigger level when using the device in energy mode.

Command	Parameters	Answer
STL	Trigger Level (in percentage) must be 4 numerical values	

Default: 2%

The value should be set between 0.1 and 99.9.

Example

Command: *STL15.4 (15.4%) *STL0.20 (.2%)	Answer:

09 - Get Trigger Level

This command returns the trigger level in %. The value is between 0.1% and 99.9%.

Command	Parameters	Answer
GTL	None	Returns the trigger level in %.

Example

Command: *GTL	Answer: Trigger Level : 2.0 \r\n

10 – Get Measure Mode Display

This command returns the INTEGRA's measurement mode. Depending on the head, it can be Power Mode in W, Power Mode in dBm (DBM), Energy Mode in J or Single Shot Energy Mode in J (SSE).

Command	Parameters	Answer
GMD	None	POWER = 0 ENERGY = 1 SSE = 2 DBM = 6

Example

Command: *GMD	Answer: Mode : 0 \r\n

4.6.2. Data Acquisition

11 - Query Current Value

This command is used to query the value that is currently being displayed by the monitor. The value is displayed in watts or in joules.

Command	Parameters	Answer
CVU	None	Current value

Example

For example, a 12 milliwatts reading would be displayed like this:

Command: *CVU	Answer: 0.012 <CR> <LF>

12 - Send Continuous Transmission of Data

This command is used to send data to the serial port according to the data sampling setting. The maximum transfer speed is 200 Hz.

Command	Parameters	Answer
CAU	None	Data in ASCII

13 - Send Continuous Value with Period

INTEGRA will send continuous energy data and the pulse period in timer counts. They are comma separated.

Command	Parameters	Answer
CEU	None	Continuous value with pulse period in timer counts

Example

This example is for a 32 Hz laser:

Command: *CEU	Answer: 5.066E-01,32.0<CR> <LF> ….

14 - Sent Current Value with Frequency

INTEGRA will send the current measurement and the pulse repetition rate in Hz. They are comma separated.

Command	Parameters	Answer
CTU	None	Current value with frequency

Example

This example is for a 32 Hz laser:

Command: *CTU	Answer: 5.066E-01,32.0<CR> <LF>

15 - Stop the CAU Command

This command is used to stop the real time transfer enabled by the CAU Command.

Command	Parameters	Answer
CSU	None	

16 - Query New Value Ready

This command is used to check whether a new value is available from the device. Though optional, its use is recommended when doing single pulse operations.

Command	Parameters	Answer
NVU		Available/Not Available <CR> <LF> 1/0

Example

Command: *NVU <enter>	Answer: New Data Not Available <CR> <LF>

Note that the **Query Current Value** command will return the current values from the device even if they have not been updated since the last query.

17 - Get Laser Frequency

This command is used to get the laser frequency.

Command	Parameters	Answer
GRR	None	Data in ASCII

18 - Set Binary Joulemeter Mode

This command is used to set the monitor in binary or ASCII mode. Refer to section 4.4 for the INTEGRA binary mode description.

Command	Parameters	Answer
SS1	0= ASCII 1= Binary	

Example

Command: *SS11	Answer: The INTEGRA is set in binary mode

19 - Get Binary Joulemeter Mode

This command returns whether or not the binary joulemeter mode is activated for serial communication. Refer to section 4.4 for the INTEGRA binary mode description.

Command	Parameters	Answer
GBM	None	1: On 0: Off

Example

Command: *GBM	Answer: Binary Joulemeter Mode : 0 \r\n

4.6.3.Setup

20 - Set Personal Wavelength Correction

This command is used to specify the wavelength in nm being used on the detector. The EEPROM in the detector contains measured spectral data for a wide range of wavelengths. If the wavelength input by the user is different from the predefined list of wavelengths on the device, a custom value is interpolated. Specifying zero as a wavelength or providing an out-of-bound value as a parameter restores the default settings. A valid value is set between the lowest and highest wavelengths supported by the device, and it should not be a floating point value. The input parameter must have 5 digits. If the desired wavelength does not have 5 digits you must enter a zero-padded number. For example, to set the wavelength at 514 nm, you must enter 00514.

Command	Parameters	Answer
PWC	Wavelength	

Default: Calibration wavelength, (typically 1064 nm, varies with the detector model)

Example

The following example sets the wavelength to 1550 nm.

Command: *PWC01550	Answer:

21 - Get Wavelength

This command returns the wavelength in nm.

Command	Parameters	Answer
GWL	None	Returns the wavelength in nm

Example

Command: *GWL	Answer: PWC : 1064 \r\n

4.6.4. Control

22 - Set Anticipation

This command is used to enable or disable the anticipation processing when the device is reading from a wattmeter. The anticipation is a software-based acceleration algorithm that provides faster readings using the detector's calibration.

Command	Parameters	Answer
ANT	1: On 0: Off	

Default: On

Example

The following example sets the anticipation On.

Command: *ANT1	Answer:

23 - Get Anticipation Status

This command returns the anticipation status. If the anticipation is not available, it will always be at "off".

Command	Parameters	Answer
GAN	None	1: On 0: Off

Example

Command: *GAN	Answer: Anticipation : 0 \r\n

24 - Noise Suppression

Sets or Queries the sampling size of the noise suppression. *For pyroelectric detectors and UM detectors only*.

The INTEGRA Joulemeter Instrument has a special proprietary algorithm that can lower the noise-induced error when reading low energy levels, or energy readings of any level with noise present. This feature greatly reduces the effect of noise on the peak-to-peak measurement in Joulemeter mode. INTEGRA will need to measure the number of pulses selected in the Sampling Size before the algorithm will settle to the noise suppressed value. Once the readings have stabilized, any subsequent reading will be stable until the Sampling Size is changed. The system will then stabilize to the new value. Larger sampling sizes will result in more noise suppression. Noise suppression works best with the external trigger. This function will greatly improve the accuracy of the lowest scale or in any scale when used in a noisy environment.

Command	Parameters	Answer
AVG###	###: average size	None

Example

The following example sets the sampling size to 16 pulses.

Command: *AVG016	Answer: OK

25 - Set Zero Offset

This command subtracts the current value from all future measurements the moment the command is issued to set a new zero point.

Command	Parameters	Answer
SOU	None	

26 - Clear Zero Offset

This command undoes the Zero Offset command to set the zero point at zero.

Command	Parameters	Answer
COU	None	

27 - Get Zero Offset

This command returns whether the zero offset has been activated or not.

Command	Parameters	Answer
GZO	None	1: On 0: Off

Example

Command: *GZO	Answer: Zero : 0 \r\n

28 - Set Diode Zero Offset

This command subtracts the current value for all available scales from all future measurements the moment the command is issued to set a new zero point. *This is for photodiodes only*.

Command	Parameters	Answer
SDZ	None	DONE

29 - Set User Multiplier

This command is used to set the value of the multipliers.

Command	Parameters	Answer
MUL	8-character numerical value	

Default: 1

Example

The following example sets multiplier = 33

Command: *MUL0000033 Or *MUL3.3000e1	Answer:

30 - Get User Multiplier

This command returns the multiplier value.

Command	Parameters	Answer
GUM	None	Current multiplier value

Example

Command: *GUM	Answer: User Multiplier : 1 \r\n

31 - Set User Offset

This command is used to set the value of the offset.

Command	Parameters	Answer
OFF	8-character numerical value	

Default: 0

Example

The following example sets offset to 1.5 milli.

Command: *OFF0.001500 Or *OFF1.500e-3	Answer:

The other option available is the Zero Offset. The Zero Offset operation is done first, before the User Multipliers and Offsets

32 - Get User Offset

This command returns the offset value.

Command	Parameters	Answer
GUO	None	Current offset value

Example

Command: *GUO	Answer: User Offset : 0 \r\n

33 - Set Single Shot Energy Mode

This command is used to toggle to Single Shot Energy Mode when using a wattmeter.

Command	Parameters	Answer
SSE	1: On 0: Off	

Default: Off

34 - Set Attenuator

This command is used to adjust the processing of the monitor with the readings of the head, depending on whether the head is using an external attenuator or not.

Command	Parameters	Answer
ATT	1: On 0: Off	

Default: Off

Example

The following example sets the attenuator On, this means that the attenuator in on the detector:

Command: *ATT1	Answer:

35 - Get Attenuator

This command returns the attenuator status. If the attenuator is not available, it will always be off.

Command	Parameters	Answer
GAT	None	1: On 0: Off

Example

Command: *GAT	Answer: Attenuator : 0 \r\n

4.6.5. Instrument and Detector Information

36 - Query Version

This command is used to query the device to get information about the firmware version and the device type.

Command	Parameters	Answer
VER	None	Version and device type

Example

Command: *VER	Answer: INTEGRA Version 1.00.00 <CR> <LF>

37 - Query Status

This command is used to query the device to get information about the following characteristics:

- Measure Mode
- Maximum, minimum and current scale
- Maximum, minimum and current wavelength with and without attenuation
- Attenuator availability and status
- Detector model
- Detector serial number

Command	Parameters	Answer
STS	None	A hexadecimal structure described in the table below.

The first byte represents the validity of the structure: 0 represents a valid line while 1 is the end of the structure. The next 4 bytes represent the address line and the last 4 bytes are the actual value. The values are written on 32 bits, which means that all the values are written on two lines. The first line represents the LSB and the second line represents the MSB.

The following table shows the output WITH a XLP12-3S-H2-INT-D0 (s/n 199672)

Hexadecimal Structure			Converted Value	Definition
Valid	Address	Value		
:0	0000	0003	3	Reserved
:0	0001	0000	0	Reserved
:0	0002	0003	3	Reserved
:0	0003	0000	0	Reserved
:0	0004	0000	0	Measure Mode LSB
:0	0005	0000	0	Measure Mode MSB
:0	0006	0015	21	Current scale LSB (refer to scale index *SCS)
:0	0007	0000	0	Current scale MSB (refer to scale index *SCS)
:0	0008	0019	25	Maximum scale LSB (refer to scale index *SCS)
:0	0009	0000	0	Maximum scale MSB (refer to scale index *SCS)
:0	000A	0011	17	Minimum scale LSB (refer to scale index *SCS)
:0	000B	0000	0	Minimum scale MSB (refer to scale index *SCS)
:0	000C	0428	1064	Current wavelength LSB (nm)
:0	000D	0000	0	Current wavelength MSB (nm)
:0	000E	2968	10600	Maximum wavelength LSB (nm)
:0	000F	0000	0	Maximum wavelength MSB (nm)
:0	0010	00C1	193	Minimum wavelength LSB (nm)
:0	0011	0000	0	Minimum wavelength MSB (nm)
:0	0012	0001	1	Is Attenuator available LSB (1= yes 0 = no)
:0	0013	0000	0	Is Attenuator available MSB (1= yes 0 = no)
:0	0014	0000	0	Is Attenuator on LSB (1= yes 0 = no)
:0	0015	0000	0	Is Attenuator on MSB (1= yes 0 = no)
:0	0016	2968	10600	Maximum wavelength with attenuation LSB (nm)
:0	0017	0000	0	Maximum wavelength with attenuation MSB (nm)
:0	0018	00C1	193	Minimum wavelength with attenuation LSB (nm)
:0	0019	0000	0	Minimum wavelength with attenuation MSB (nm)
:0	001A	4C 58	X L	Detector name (You must convert the hexadecimal values in ASCII characters)
:0	001B	31 50	P 1	
:0	001C	2D 32	2 -	
:0	001D	53 33	3 S	
:0	001E	- H		
:0	001F	2 -		
:0	0020	D 0		
:0	0021			0000 = Null termination character
:0	0022			The rest of the characters aren't valid until line 002A
:0	0023			
:0	0024			
:0	0025	40 03	@	
:0	0026	00 1A		
:0	0027	00 00		
:0	0028	E1 20	á	
:0	0029	00 3A	:	
:0	002A	39 31	1 9	Detector serial number (You must convert the hexadecimal values in ASCII characters)
:0	002B	36 39	9 6	
:0	002C	32 37	7 2	
:0	002D	00 00		0000 = Null termination character

:1	0000	00 00		End of structure

38 - Query Extended Status

This command is used to query the device to get information about the following characteristics:

- Measure Mode
- Maximum, minimum and current scale
- Maximum, minimum and current wavelength with and without attenuation
- Attenuator availability and status
- Detector model
- Detector serial number
- Trigger level (0.001 to 0.999)
- Autoscale mode
- Anticipation mode
- Zero offset mode
- User multiplier
- User offset

Command	Parameters	Answer
ST2	None	A hexadecimal structure described in the table below.

The first byte represents the validity of the structure: 0 represents a valid line while 1 is the end of the structure. The next 4 bytes represent the address line and the last 4 bytes are the actual value. The values are written on 32 bits, which means that all the values are written on two lines. The first line represents the LSB and the second line represents the MSB.

The following table shows the output WITH a XLP12-3S-H2-INT-D0 (s/n 199672)

Hexadecimal Structure			Converted Value	Definition
Valid	Address	Value		
:0	0000	3	3	Reserved
:0	0001	0	0	Reserved
:0	0002	3	3	Reserved
:0	0003	0	0	Reserved
:0	0004	0	0	Measure Mode LSB
:0	0005	0	0	Measure Mode MSB
:0	0006	11	17	Current scale LSB (refer to scale index *SCS)
:0	7	0	0	Current scale MSB (refer to scale index *SCS)
:0	0008	19	25	Maximum scale LSB (refer to scale index *SCS)
:0	0009	0	0	Maximum scale MSB (refer to scale index *SCS)
:0	000A	11	17	Minimum scale LSB (refer to scale index *SCS)
:0	000B	0	0	Minimum scale MSB (refer to scale index *SCS)
:0	000C	428	1064	Current wavelength LSB (nm)
:0	000D	0	0	Current wavelength MSB (nm)
:0	000E	2968	10600	Maximum wavelength LSB (nm)
:0	000F	0	0	Maximum wavelength MSB (nm)
:0	0010	00C1	193	Minimum wavelength LSB (nm)
:0	0011	0	0	Minimum wavelength MSB (nm)
:0	0012	1	1	Is Attenuator available LSB (1= yes 0 = no)
:0	0013	0	0	Is Attenuator available MSB (1= yes 0 = no)
:0	0014	0	0	Is Attenuator on LSB (1= yes 0 = no)
:0	0015	0	0	Is Attenuator on MSB (1= yes 0 = no)
:0	0016	2968	10600	Maximum wavelength with attenuation LSB (nm)
:0	0017	0	0	Maximum wavelength with attenuation MSB (nm)
:0	0018	00C1	193	Minimum wavelength with attenuation LSB (nm)

:0	0019	0	0	Minimum wavelength with attenuation MSB (nm)
:0	001A	4C 58	X L	Detector name (You must convert the hexadecimal values in ASCII characters)
:0	001B	31 50	P 1	
:0	001C	2D 32	2 -	
:0	001D	53 33	3 S	
:0	001E	48 2D	- H	
:0	001F	2D 32	2 -	
:0	0020	30 44	D 0	
:0	0021	0 0		0000 = Null termination character
:0	0022	0 0		The rest of the characters aren't valid until line 002A
:0	0023	0 0		
:0	0024	1F 0		
:0	0025	40 3	@	
:0	0026	0 1A		
:0	0027	0 0		
:0	0028	E1 20	Á	
:0	0029	0 3A	:	
:0	002A	39 31	1 9	Detector name (You must convert the hexadecimal values in ASCII characters)
:0	002B	36 39	9 6	
:0	002C	32 37	7 2	
:0	002D	0 0		0000 = Null termination character
:0	002E	D70A	0.0200	Trigger Level LSB (between 0.001 and 0.999)
:0	002F	3CA3		Trigger Level MSB (between 0.001 and 0.999)
:0	0030	0001	1	Is autoscale mode on? LSB
:0	0031	0000	0	Is autoscale mode on? MSB
:0	0032	0000	0	Is anticipation on? LSB
:0	0033	0000	0	Is anticipation on? MSB
:0	0034	0000	0	Is zero offset on? LSB
:0	0035	0000	0	Is zero offset on? MSB
:0	0036	0000	1.0000	Correction Multiplier LSB
:0	0037	3F80		Correction Multiplier MSB
:0	0038	0000	0.0000	Correction Offset LSB
:0	0039	0000		Correction Offset MSB
:1	0000	0000	0	End of structure

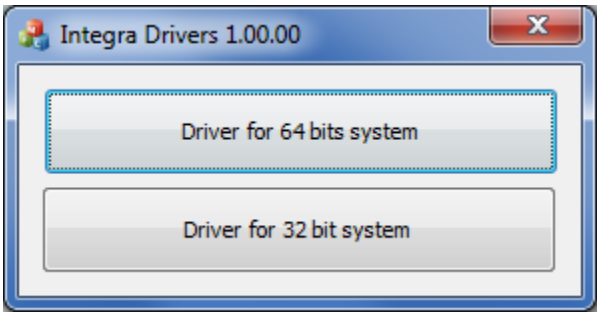
4.7. ERROR MESSAGES

#	Error	Comment
1	Command not found	Command is invalid

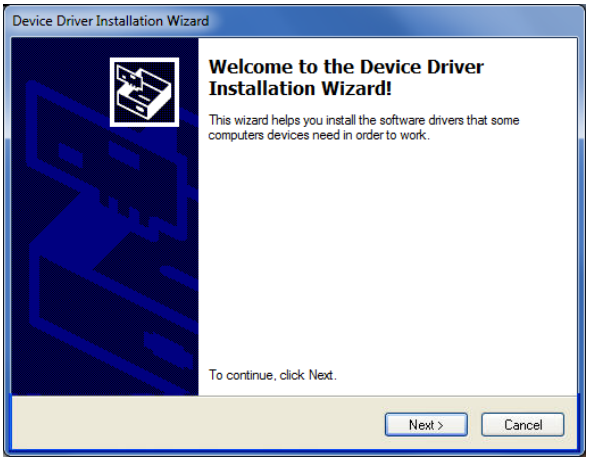
5. USB DRIVER INSTALLATION

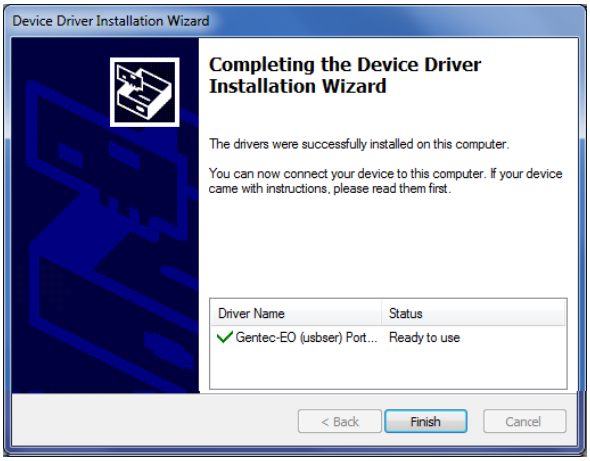
INTEGRA USB drivers will install a virtual COM port on your PC. Please download the USB driver at: https://gentec-eo.com/downloads.

1. Do not connect the INTEGRA to your computer
2. Choose the appropriate operating system corresponding to your computer



3. Follow the installation steps until you have the message INTEGRA ready to use.





4. You can now connect the INTEGRA and install the software.

6. MAINTENANCE

6.1. FREE SOFTWARE UPGRADE

Keep up to date with the latest versions of PC-Gentec-EO software to get the new features and options. As new and improved versions of the device's firmware are created, it is in your best interest to update your INTEGRA. The latest device firmware can be downloaded from the Gentec-EO website at https://gentec-eo.com/downloads. Go to the **Downloads** section. Find the file that corresponds to your INTEGRA and follow our simple, easy to use instructions.

6.2. TROUBLESHOOTING

When using the INTEGRA with serial commands, please ensure to always close the communication port after you are done using the INTEGRA. If you do not do so, the INTEGRA will not be recognized the next time you connect it to the computer.

7. 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 Name:	Laser Components S.A.S.
Representative's Address:	45 bis Route des Gardes 92190 Meudon (France)
Type of Equipment:	Embedded Monitor
Model No.:	INTEGRA Series
Year of test & manufacture:	2013

Standard(s) to which Conformity is declared:

Emissions:

Result	Product Standard	Test Standard	Description
Pass	EN 61326-1_Ed2:2013 (IEC		

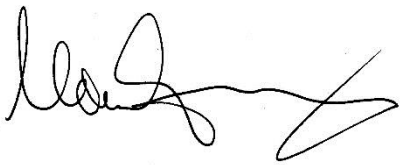
Immunity:

Result	Product Standard	Test Standard	Description	Performance Criteria
Pass	EN 61326-1_Ed2:2013 (IEC 61326-1_Ed2:2012)	IEC 61000-4-2:2008Ed.2	Electrostatic Discharge Immunity	Criteria B
Pass	EN 61326-1_Ed2:2013 (IEC 61326-1_Ed2:2012)	IEC 61000-4-3:2006+A1:2007+A2:2010	RF Conducted Immunity	Criteria A

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

Place: Québec (Québec)

Date : 11 September, 2013



1

APPENDIX A: WEEE DIRECTIVE

Recycling and Separation Procedure for WEEE Directive 2002/96/EC

This section is used by the recycling center when the monitor reaches its end of life. Breaking the calibration seal or opening the monitor will void the INTEGRA warranty. For the head please refer to the head's manual.

The complete Monitor contains

1 Monitor
1 USB cable

Separation

Plastic: INTEGRA enclosure.
Printed circuit board: inside the INTEGRA (no need to separate less than 10 cm^2)

LEADER IN LASER BEAM MEASUREMENT SINCE 1972

POWER & ENERGY METERS

BEAM PROFILING

TERAHERTZ MEASUREMENT

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445 St-Jean-Baptiste, Suite 160
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F (418) 651-1174
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F (503) 697-0633
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82140 Olching, Germany

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Tokyo 112-0003, Japan