



BTC112E Fiber Coupled TE Cooled Linear CCD Array Spectrometer User Manual

Compass X

Introduction

BTC112E is a low cost and high performance TE cooled linear CCD spectrometer equipped with 2048 elements thermoelectric cooled (TEC) linear CCD array, with a built-in 16 bit digitizer with high speed USB 2.0/1.1 interfaces.

Compared with non-cooled CCD spectrometers the BTC112E offer a much higher dynamic range, greatly reduced dark counts and superior long term operation stability, thus is ideal for low light level detection and long term monitoring applications. Our accompanied software allows for an integration time multiplier, which supports up to a 16 minute integration time period to take the advantage of low dark counts in light starving applications.



BTC112E CCD Spectrometer

Specifications

Power Input	5V DC @ < 1.2A (external power supply)
Operating Temperature	15°C to 35°C
Detector	TE cooled 2048 element linear silicon CCD array
CCD Elements	2048 elements @ 14 µm x 200 µm per element
Effective Range	UV 200-400 nm, Vis 390-760 nm, NIR 750-1050 nm, UV/Vis 200-720 nm, UV/Vis/NIR 300-850 nm, Vis/NIR 350-1050 nm, or custom configurations
Cooling Temperature	10°C - 15°C factory default
Spectrograph f#	3.0
Spectrograph Optical Layout	Crossed Czerny-Turner
Spectrograph Optics	Aspherical optics with sensitivity enhancement option
Grating	600-2400 lines/mm available with different blaze wavelengths
Slit	10-800 µm width depends on resolution requirements (slit height 1000 µm)
Optical Resolution	0.3 to > 10 nm FWHM
Digitizer Resolution	65,535 to 1
Digitizer Speed	500 kHz
External Trigger	Aux. external triggering port built-in
Integration Time	BTC112E Series: 5 to 65,535 ms without multiplier, multiplier of 1-16 available
Data Transfer Speed	50 ~ 100 spectra per second
Computer Interface	USB 2.0/1.1 high speed
Weight	1.2 lbs
Dimensions	4.24(width) x 3.75(depth) x 1.65(height) inches
Trigger response delay	< 4 ms
Operating software	BWSpec for Windows Me, 2000 and XP

Check Contents

Before installation please check your system contents. These may include a BTC112E spectrometer unit, a USB interface cable, a BWSpec operating software CD, a unit specific parameter data disk, a wall plug-in power supply, plug kit, and this user manual. Other manuals, including the BWSpec Software User Manual will be included on the cd.

Installation

****Note****

You will need to Install the BWSpec software before connecting the BTC112E to your computer.

Software Installation

1. Insert the BWSpec spectrometer data acquisition software CD into the CD-ROM of your PC and follow the on screen instructions to complete the installation.
2. Use the Import Parameter File function to update the system settings by use of the included unit specific parameter data disk.

Spectrometer Hardware Installation

To install the BTC112E spectrometer, follow the procedures as described below.

1. Connect the 5V power supply into a AC outlet then connect the DC side into the “5V DC” receptacle on the spectrometer.
(LED will turn Red).
2. Connect the supplied USB cable from the “USB 2.0/1.1” port on the spectrometer to an available USB port on your computer.
(LED will turn Yellow).

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Accessories



BWSpec Installation CD



Step 1:
Connect the Power Supply



Step 2:
Connect the USB Cable

DRIVER INSTALLATION

If installing BWSpec on your computer for the first time there will be a total of 2 Driver Files that will need to be installed. These drivers will automatically be recognized by your computer when you first connect your spectrometer to you computer after installing the BWSpec software.

****IMPORTANT****

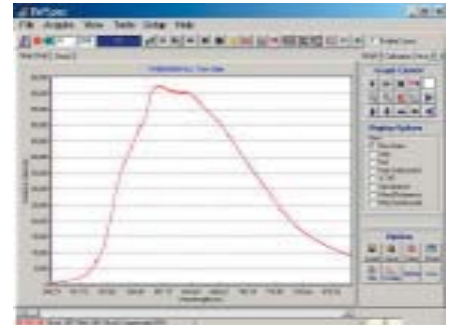
You must wait until all the necessary drivers install before opening the BWSpec software.

****IMPORTANT****

When installing the drivers and prompted that this software has NOT passed Windows Logo tests.....Click Continue Anyways.

Operating Software Quick Start Guide***Getting to know BWSpec graphic user interface***

The BWSpec operating software has a graphic user interface that consists of the menu bar, quick access bar, graphic area, message bar and control panel.



Sample Spectrum

Quick start

1. Run BWSpec from the icon on your desktop.
2. Point the spectrometer "Light Input" SMA port to a broadband light source; for example a tungsten bulb
3. From the toolbar select "Acquire Continuously"

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External Trigger/Aux Port

The BTC112E spectrometer has an Aux Port/External Trigger. The port uses a 16 pin connector and is located at the rear panel of the spectrometer. Pin 1 of the connector starts on the bottom right viewing from the rear of the spectrometer. Refer to the drawing insert at the end of this document for the pin definitions and triggering examples. External triggering of the spectrometer may be achieved by using the associated pins.



External Trigger / Aux Port

Enable the trigger option under the Acquire\External Trigger menu in the BWSpec software.

The trigger is falling edge effective. The maximum time delay between an arrival negative going trigger and the start of a new integration time is less than 4 ms. Within the specified short delay the spectrometer will begin a new integration period and it will last for a complete integration cycle per the current integration time setting in BWSpec. For a synchronized spectrum capturing the intended external event needs to be arranged to fall within the integration period.

To disable the external trigger mode, check off the option in the dialog box under Acquire\External Trigger menu.



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The table below provides cross reference between the CCD temperature monitoring sensor output voltages and the temperature values.

Temperature Monitor (V)	CCD Temp (°C)
1.8822	-5
1.8561	-4
1.8294	-3
1.8023	-2
1.7748	-1
1.7469	0
1.7187	1
1.6901	2
1.6613	3
1.6321	4
1.6027	5
1.5732	6
1.5434	7
1.5137	8
1.4836	9
1.4537	10
1.4237	11
1.3937	12
1.3640	13
1.3342	14
1.3045	15

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Table 1-1 Auxiliary Port Pin Assignment

PIN	Specification
2	Input, TTL Signal Sensing
3	Output, Multi-purpose Control Signal
4	Output, Cooler Current Monitoring
6,9	Ground, Digital Signal Terminal Return
8	Input, External Trigger Signal
10	Ground, Sensor Signal Terminal Return
11	Output, Temperature Monitoring
12	Output, Sensor Video Signal Monitoring
Other	Reserved

Figure 1-1 Plug Profile of Auxiliary Port



(Header in the Spectrometer)



Photo: Contact insertion status

Plug characteristics:

1. Current rating: 0.25A
2. Housing color: Black

Notes:

1. Technic Process: Hand Crimping Tool
HIROSE DF11-TA2428HC
2. Contact : Tin / Gold Lead

Figure 1-2 Plug Pin Designator Reference



[Front View]

Table 1-2 Bill of Materials

Item	BWT PN	Qty	Manufacturer & Model NO	Specification
1	000000195	1	HIROSE DF11-16DS-2C	SOCKET 16POS 2MM STRAIGHT LEAD FREE
2	000013723	SOME	HIROSE DF11-2428SCA	CONTACT CRIMP TIN / GOLD LEAD FREE

B&WTEK INC.		PIN ASSIGNMENT	
Part No:	310000012	Version:	1.2
Drawn:	JCH X.W	Date:	Jan 15, 07
Checked:		Date:	
Approved:		Date:	
Released:		Date:	
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All quotations written or verbal are valid for 30 days from the date of quotation unless stated otherwise. Prices are based on your requested specifications and quantities, and are subject to change if any changes are made from the original request. Unless otherwise specifically stated, all prices are quoted in U.S. Dollars and are based on delivery of the Diodes EXWORKS (INCOTERMS 1990) B&W TEK'S place of business in Newark, Delaware. Prices do not include applicable Federal, State or local excise, sales, use or other taxes. Special items will be individually priced per provided specifications. All published prices are subject to change without notice. An extra 20% handling fee on each item is applied to international orders.

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Purchase orders are accepted by mail, e-mail or fax. Verbal orders are generally not encouraged. Hard copies of the purchase orders are required. To minimize errors, please reference the B&W TEK quotation numbers. Provide the item model number, item description, purchase order number, ship-to address, bill-to address and shipping method desired. Open accounts of net 30 are granted upon approval of credit limit. Contact B&W TEK for further information. Orders placed with MasterCard or VISA card may be accepted. Please provide the type of card, account number, name, and expiration date that appears on the card. Orders may be shipped via UPS or Federal Express on a COD basis. Cash, money order or a bank or company check is required at the time of delivery. Prepayment by money order, wire transfers, bank check, company check or personal check may be accepted. In case a letter of credit (L/C) is required. The customer will be responsible for the charges incurred by the L/C.

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B&W TEK's end user products, OEM modules, and components are warranted to be free from defects in materials and workmanship for a period of 12 months, 6 months, and 90 days, respectively, from the date of initial shipment. B&W TEK'S liability under this warranty is limited to replacing any defective Diodes at its expense. B&W TEK shall warrant the replacement products for the remainder of the original warranty period. This warranty will not apply to those products which have been:

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- (ii) abused, misused, improper handling in use, or storage, or used in an unauthorized or improper manner or without following written procedures supplied by B&W TEK
- (iii) original identification markings or labels have been removed, defaced or altered
- (iv) any other claims not arising directly from material defects in material or workmanship.

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1. Product Model number and serial number
2. Date of shipment/purchase
3. Brief description of the problems encountered
4. Name of contact person and phone number(s) at your organization for further communication

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Safety Warnings

The laser products described in this catalog emit visible or invisible radiation power. They are safe to operate only when the users follow all safety measures:

1. Post warnings in the area where the laser's beam passes to alert those present.
2. Keep all unauthorized personnel out of the area where the laser is operated.
3. Whenever the laser is running and the beam is not in use, it is a good practice to mechanically block the radiation path.
4. Never look directly into the laser beam path or scattered laser light from any reflective surfaces,
5. Never look directly into the laser source.
6. Maintain experimental setup at lower level to prevent inadvertent beam-eye contact.
7. As a precaution against accidental exposures to the laser beam or its reflection, operators should wear laser safety glasses with sufficient attenuation at the laser emission wavelength.

For further information regarding laser safety issues, contact the following organizations:

Center for Device and Radiological
Office of compliance
2098 Gaither Rd.
Rockville, MD 20850
Tel: 301 594 4654
Fax: 3013 594-4672

Health Laser Institute of America
12424 Research Parkway, Suite 125
Orlando, FL 32826
Tel: 407 380 1553
Fax: 407 380 5588