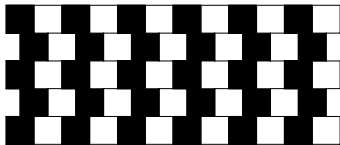


HOT-ONE

High Temperature Transmission Cell

User's Guide

S/N _____ & _____



CIC Photonics

INSERT

FOREWORD

Thank you for purchasing a CIC Photonics sampling accessory. We strive to build the best sampling accessories available and believe that you will be pleased with the performance of this long path gas cell. Should you have any difficulties at all please call 505-343-1489 for technical assistance. We should be able to help you immediately.

If you have any comments on this or any of our other products we would like to hear from you. We can be reached at the address, telephone numbers or E-mail address as given below. Thank you again for your business.

Sincerely,

Richard T. Meyer
CEO & President
CIC Photonics, Inc.

CIC Photonics, Inc.
3825 Osuna Rd., N.E. #6
Albuquerque, NM 87109

505-343-9500
505-343-9200 fax
505-343-1489 technical support
800-635-3051 sales
info@cicp.com
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OUR WARRANTY

- I. Since CIC Photonics builds its products to last, we warrant them that way. If you have a problem with our accessory, within the first year of ownership, that is a result of a defect in workmanship or the wearing out of a component that should not wear out, we shall fix it.
- II. Parts that normally wear out or are consumed or can be damaged in the normal operation of the accessory, such as fragile optical elements (lenses, windows, crystals, mirrors, filters, etc.) are warranted against original defect in manufacture for a period of 30 days after original delivery to the purchaser.

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1.0 USER GUIDELINES

The Hot One™ FT-IR transmission cell is designed for sample study at elevated temperatures. If you have purchased a CIC Photonics temperature controller with your unit you should have received separate instructions and the temperature controller has already been tuned to your unit.

1.1 UNPACKING

Unpack the instrument from its shipping container and set it into the sample compartment of your spectrometer. Your unit should have been custom baseplated and should drop right into the compartment and be at the correct beam height. Secure the transmission cell using the locating pins or hold down screws depending on your particular unit. If there appears to be a problem with the fit, the beam height or the hold down configuration please call 505-343-1489 and we will correct it immediately.

Your unit has been supplied with window blanks that can be used for storing or transporting your unit. These must be removed for window installation and operation.

1.2 WINDOW INSTALLATION

Install the windows of your choice by removing the four 6-32 socket head caps screws with the ball driver provided. Place the O-rings provided into the grooves on the window holder and place your window on top of the inner o-ring. Carefully put the window mount in place and then tighten the cap screws applying uniform pressure successively on each so as to achieve a tight even seal. When not in use for an extended period the windows should be removed and stored with desiccant as most IR windows are hygroscopic and will tend to haze if exposed to moisture in the atmosphere.

1.3 PURGE AND COOLANT LINES

Prior to operation you must supply purge gas and coolant (tap water will do nicely) to the instrument. All supply and return lines should be labeled. If your unit did not arrive with labeled lines or you want clarification please feel free to call 505-343-1489. The copper lines (1/4" Swagelok fittings) on the side of the unit are for the coolant while the stainless lines (1/8" Swagelok fittings) on top are for purge. Although labeled supply and return, the flow can go in either direction for both the purge and coolant. Connections can be made easily with Swagelok type compression fittings. In both cases (purge gas and coolant), flow of a few liters/minute will be adequate.

ALERT: An inert gas such as dry nitrogen should be used as the purge gas. The unit needs to be purged when at elevated temperatures to prevent oxidation of the OFHC copper sample holder.

1.4 LOADING A SAMPLE

Remove the eight 6-32 socket head cap screws from the top of the unit using the same ball driver provided. Remove the top plate from the unit. The heater, thermocouple and the sample holder are attached to the top plate and will be removed as well. Slide the copper sample holder out of its mounting sleeve. Remove the three 4-40 socket head cap screws from the sample holder and pull it apart. Place a window in the sample holder followed by a sample and then a second window. Some samples may not require the windows or may be applied to only one window in the sample holder. Reinstall the screws in the sample holder again applying uniform pressure. As a precaution against seizing of the sample core assembly, the **supplied boron nitride** may be applied to the sample holder prior to re-assembly into the sleeve. Be sure that the thermocouple is engaged in the sleeve. It should extend through the sleeve wall and rest just adjacent to or, preferably, in direct contact with the sample holder. Replace the top plate being sure that the orientation allows the beam to pass through the cell. If, during the course of use, the sample core assembly becomes misaligned with the optical axis of the windows, the heater unit may be reshaped slightly to again get the sample on axis. Only small adjustments should ever be required. Re-install the top plate screws and tighten to seal.

2.0 OPERATION

Attach the connectors to the temperature controller. The yellow connector is the thermocouple and the black is the heater. **Begin flow of purge gas at a moderate rate (a few liters/minute) for a few minutes prior to powering the heaters.** Begin flow of the coolant through the cooling jacket. Turn on the temperature controller and set the desired temperature using the arrow keys. Additional information about the temperature controller is included in Appendix A.

After a sample has been analyzed and you wish to terminate the experiment, turn the temperature controller off but allow the coolant and purge gas to flow until the registered temperature inside the device drops below 200 °C. (The temperature may be monitored without re-powering the heaters by unplugging the black heater cable from the controller.)

3.0 MAINTENANCE

The inside of the unit and all internal components can be cleaned with common solvents such as acetone or alcohol if necessary. If the unit is heated without purge flowing, the sample holder may seize and can be loosened with the boron nitride compound that was enclosed in the package. Replacement O-rings and windows can be provided by CIC Photonics if required. Please inquire for pricing.

When replacing the windows in the external shell, do not tighten screws beyond finger tight plus $\frac{1}{4}$ turn (approx 10-12 in-lbs torque); too much tightening may cause the windows to crack.

To remove the top plate and the inner attached sample holder, rotate the top fixture counterclockwise a few degrees before lifting out of the external shell.

It is recommended that the outer surface of the OHFC copper sample holder be coated with a thin layer of anti-seizing compound (e.g. boron nitride) to ease insertion and removal from the cylindrical stainless steel shell.

This unit has been leak-tested and temperature-cycled to 700 deg C in dry N₂ at the factory prior to shipment.

4.0 TEMPERATURE CONTROLLER

Instructions for tuning the CIC Photonics, Inc. **PACESETTER** temperature controller for the CIC Photonics, Inc. **HOT ONE** High Temperature Transmission Cell

Be sure the Pacesetter is plugged in and the power switch in the on position. Press and hold both arrows simultaneously. The letters “LOC” should appear on the green display. By using the up or down arrow keys set the value, which appears on the red display, at “0”. Press the M button and the next parameter will appear on the green display. You should see the letters “In”. Again set this value using the up and down arrows until the letter “H” appears. By continuing in the same fashion, set the following values.

<u>Parameter</u>	<u>Value</u>
C_F	C
rL	0
rH	700
Ot1	ht
HSC	3
Ot2	no
rt	350
rP	on
PL	100
dSP	nor

The next time you press the M button you should see temperature values in both displays. The following setting of the “operation” parameters must be performed with a thermocouple and heater attached to the unit. Check to be sure they are securely plugged in. Press the “M” button again. The letters “Pb1” will appear. Set the value at 25 using the arrow keys. Press the “M” key again and using the same method as above set the unit for the following operation parameters.

<u>Parameter</u>	<u>Value</u>
With Pbl	0
CAL	0
AUt	2

The unit has now been set and you can now heat test your accessory. Do this by selecting “700” as your operating temperature using the up and down arrows. The green display will flash a display altering from the temperature you have selected to the letters “Aut”. This process is called auto-tuning. After the controller has been auto-tuned, which may take several minutes, the heaters on your accessory should ramp smoothly until the device has reached the chosen temperature.

Key Features

- v Alphanumeric digital LED display shows key words to prompt and inform operator
- v Front keypad programming.
- No internal switches, pots or jumpers to set or adjust
- v Digital PID automatic self tuning of primary and optional secondary outputs
- v Percent power limit and set point range limiting protects components from operator errors and overheating
- v Full three-mode operation

Product Description

The CIC Photonics, Inc. Pacesetter is a microprocessor-based instrument that provides accurate and reliable control of an accessory’s temperature while you are performing your sample analysis.

If it accompanies an accessory, the Pacesetter comes pre-tuned to the accessory. The pre-tuned program can be overridden to perform special experiments with your accessory or for use with other lab equipment.

Operation: All calibration, tuning, operating values and control commands, as well as special function programming, are entered through keys on the front panel.

The controller is extremely versatile. It can control heating and cooling. You can change the controller’s setting from a Celcius to a Farenheit readout by entering the appropriate mode. Also, you have a wide selection of alarm settings, high and low temperature limits, process or deviation alarm with or without flashing alarm message.

A full three-mode controller, it allows the setting of proportional bandwidth, as well as the integral (reset) and derivative (rate). If desired, it may be used in a simple on-off mode.

The Pacesetter’s digital display shows key words to help you calibrate, tune or program the instrument. By scrolling through programmed sequences of displays, you can check that the necessary parameters

One of the most useful features of the Pacesetter is its self-tuning capabilities. From a cold start, the controller tests the response of your device by heating for a length of time and letting it cool down. It then calculates the appropriate values for bandwidth, integral and derivative. Cycle time is set manually.

Design: The Pacesetter is packaged in a compact enclosure with the power switch at the front. On the back panel is the removable power cord, dual fuses, temperature sensor input and device output. The standard controller uses a type K thermocouple, but other thermocouples, RTD’s or thermistors may be specified.

The temperature accuracy of the controller depends on the type of feedback used. With a type K thermocouple, the resolution is 1 C, and the accuracy is +/- 2 C. With an RTD input, resolution is 0.1 C, and the accuracy is +/- 1.3 C.

Display: Dual digital display provides simultaneous viewing of set point and actual temperature.

Output Indication: Indicator light(s) illuminated when either output L1 or L2 or both are on.

Touch Panel Keyboard: A 4-key (mode, increment, decrement and auto/manual) touch panel is your interface to perform tuning and programming. Internal programs prompt you step by step through all procedures. Security key codes prevent unauthorized changes.

Specifications:

Temperature Range	-200 to 1450 C
Temperature Sensor Input	Type K Thermocouple (standard) Type J, T, N, S, RTD, Process 4-20 ma or 0-5 VDC available
Resolution	1 C standard, 0.1 C available
Accuracy	Better than +/- 2 C over entire temperature range
Output	SSR up to 10A
Modes	Three mode (PID)
Tuning	Automatic self-tuning
Power	85-264 VAC, 50/60Hz (worldwide compatibility)
Power Consumption	5 watts typical
Repeatability	+/- 0.5 C
Ambient Temp. Range	0.0-65 C
Sensor Break Protection	Automatically de-energizes the output
Cycle time	0.1 to 999.9 seconds
Rate (derivative)	0.0 to 9.99 minutes
Reset (integral)	0.0 to 9.99 repeats per minute
Proportional Band (gain)	0 to 999% of span

Ordering Information

25B600	Single channel 110volts
25B601	Single channel 220 volts
25B700	Dual channel 110 volts
25B701	Dual channel 220 volts

Appendix A—Heater Controller Manual