



OPERATING MANUAL

PCCU1

Peltier Control and Cooling Unit

The Peltier Control and Cooling Unit is shipped with programming for the Single Cell Peltier Accessory. If you will use it with the Single Cell Peltier Accessory you do not need to change the programming.

To use the control unit with the 8-Cell Peltier Accessory, you must select the appropriate program before connecting the Peltier Control and Cooling Unit to the accessory.

For use with the 8-Cell Peltier Accessory:

- 1. Switch on the Control and Cooling Unit. The screen will show “TC-24”**
- 2. Immediately press and hold the left button on the control pad on the front of the unit until a beep sounds.**
- 3. Release the left button. The display shows “Machine Type = 1”**
- 4. Press the left button one time. The display shows “Machine Type = 0”**
- 5. Press the right button to exit. Your Peltier Control and Cooling Unit is now programmed for use with the 8-Cell Peltier Accessory.**

Table of Contents

1. GENERAL INFORMATION	3
1.1 General warnings	3
1.2 Quality, reliability and safety	4
1.3 Safety markings	4
2. INSTRUMENT DESCRIPTION	5
2.1 Instrument description	5
2.2 Peltier Control and Cooling Unit front and rear panel	5
2.3 Specifications	5
2.4 User interface	7
3. INSTALLATION	8
3.1 Checking the serial number	8
3.2 Checking main supply and fuses	8
3.3 Instrument set-up	9
4. OPERATING INSTRUCTIONS	13
4.1 Manual operation	13
5. MAINTENANCE	14
5.1 Cleaning the instruments	14
6. TROUBLESHOOTING	
6.1 Audible alarm	15

1. GENERAL INFORMATION

1.1. General Warnings

- A. Check the voltage selector before plugging in the device. The unit is shipped configured for use with 220v or 240v electricity. Follow the directions on the sticker over the power receptacle to re-configure the unit for use with 100 – 120v supply voltage.

- B. Always disconnect the mains plug before starting any work inside the instrument

- C. Set the temperature to the required values immediately after power-on

- D. Set the stirring speed to the required values immediately after power-on

- E. If using substances dangerous for health and the environment, observe all laws and the standards in force in the laboratory where this instrument is used

- F. If using flammable or explosive substances take all necessary precautions

Quality, Reliability and Safety

This equipment has been designed with emphasis on QUALITY, RELIABILITY and SAFETY, and DBS will accept responsibility for these aspects only if the following conditions are met:

- a) Electrical installation of the room or building in which the equipment is to be used must comply with regulations specified in the country where the equipment is to be used.
- b) The equipment must be used in accordance with the instructions for use provided by DBS.
- c) All modifications and repairs to the equipment must be carried out by DBS or its authorised agents.
- d) Modifications must not be carried out unless they conform to approved Engineering Service Information issued according to the appropriate DBS procedure.
- e) The equipment installation must be carried out in accordance with local requirements for responsibility and warranty.

1.3. Safety Markings

CE mark

The "CE" mark for this product makes reference to the directives

- 89/336/EEC amended by 93/68/EEC for electromagnetic compatibility
- 73123/EEC amended by 93/68/EEC for low voltage

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2. INSTRUMENT DESCRIPTION

2.1. Instrument description

The Peltier Control and Cooling Unit allows spectrophotometric measurements at controlled temperatures between 0°C and 100°C. Measurements can be made at constant temperatures. The Peltier Control and Cooling Unit can be connected to an Evolution 200, 300 or 600 Series spectrophotometer equipped with a 1 or 8 position cell holder.

- For the Single Cell Peltier Accessory, a temperature range of 0°C to 100°C is possible.
- For the 8-Cell Peltier Accessory a temperature range of 5°C to 100°C is possible.

Note that cooling the block below the *dew point* of the air in the sample compartment will cause condensation to form on the block and the spectrophotometer cells. It may be necessary to flush the sample compartment with dry air or nitrogen to achieve the lowest temperature range and avoid condensation.

The Peltier Control and Cooling Unit can be controlled using the front panel on the unit itself or controlled via a USB cable from a computer running Thermo Scientific INSIGHT software. Heating and cooling is performed thermoelectrically using the Peltier effect. The sample can be stirred by placing a magnetic stirrer in the cuvette.

2.2. Peltier Control and Cooling Unit front and rear panel

The front panel features the display with keypad.

The rear panel features the mains power connection with mains voltage selector, the USB connector for remote control, the mains switch and the cell holder connectors for water line and electrical management.

2.3. Specifications

2.3.1. Keypad/Display Unit

The keypad/display unit has a LCD screen. All programmable parameters can be displayed in specific menus.

Three buttons are used to access the various functions and change the set parameters.

2.3.2. Programmable Parameters

- Temperature and stirring speed

2.3.3. Displayed Values

- The current thermostat temperature
- The set temperature
- The stirring speed
- The heating/cooling power

2.3.4. Operating Specifications

- Temperature range from 0 °C to 100 °C
- Temperature accuracy better than ± 0.15 °C from 0 °C to 100 °C
- Temperature repeatability typically ± 1 °C
- Temperature stability typically ± 0.1 °C
- Stirring speed up to 1800 rpm approx.
- Specifications valid for ambient temperatures from 15 °C to 35 °C

2.3.5. External Control Options

- USB-B connection as standard.

2.3.6. Dimensions

Width: 238 mm **Height:** 250 mm **Depth:** 485 mm **Weight:** 12 kg

2.3.7. Electrical data

- Mains supply: 115/120 V or 220/240 V $\pm 10\%$ (factory setting 220/240 V)
- Frequency: 50/60 Hz
- Power: 130 VA
- CE marked

2.3.8. Description of Symbols



Caution (refer to accompanying documents).

Symbol identifying the use of substances dangerous for health and environment. For these substances reference must be made to the laws and standards in force in the laboratory where this instrument is used. If using flammable or explosive substances take the necessary precautions.

Note: Connection to a protective ground is ensured through the power supply cable which has to be in accordance with CEE 7 (IEC 23-5). Always power the device from a properly grounded power outlet.

2.3.9. Environmental conditions

Performance and safety of the Peltier Control and Cooling Unit are guaranteed at all times if it is operated under the following environmental conditions:

- Installation category II with low transient over voltages (standard IEC 664)
- Pollution degree 2 (standard IEC EN 61010-1)
- The instrument is designed for internal use and altitudes below 2000 m
- Mains voltage fluctuations must not exceed 10% of the nominal voltage
- In locations where the relative humidity is lower than 80%
- In locations free from dust or vapours of solvents and acids
- Room temperature between 10°C and 35°C

2.4. User interface

The menu-driven interface of the Peltier Control and Cooling Unit allows the user to set the temperature, to set the stirring speed, and to view the configuration.

Three buttons are used to access the various functions and change the set parameters.

The multi-functional controller with its display is described below under manual operation.



3. INSTALLATION

3.1. Checking the serial number

The plate containing the serial number is located on the rear panel at the base of the unit. Check that this number is identical to the serial number on the delivery note. If not, please inform DBS immediately.

3.2. Checking mains supply and fuses

The Peltier Control and Cooling Unit is factory set to operate at 220 VAC. For operation at a voltage of 120 VAC, the voltage selector at the rear of the controller unit must be reset as described below.

Power supply	Type of fuse - 250 V
240 V	T 1A, slow-blow
120 V	T 2A, slow-blow

Adjustment for frequency change between 50 and 60 Hz is not necessary.

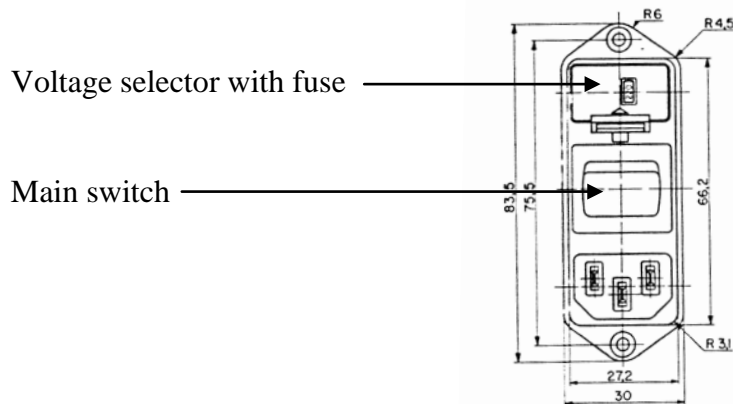


Fig. 3-1: Selecting the voltage

3.2.1. Changing the Mains Voltage Setting and Fuses

The voltage selection is shown in the window of the voltage selector above the mains input connection. To change this setting switch off the unit at the mains switch, remove the mains cable and proceed as follows:

1. Slide out the fuse holder by inserting a small screwdriver alternatively into the two slots at the left and right and pulling it out of the housing.
2. Remove the original fuses and replace with those of correct rating (see above) and push the holder back into position.
3. Move the slider of the voltage selector with a screwdriver to the desired value. The new selected voltage will now be visible.

3.3. Instrument set-up

3.3.1. Start up

The Peltier Control and Cooling Unit is supplied completely assembled. It is only necessary to make the appropriate connections.

Before starting the Peltier Control and Cooling Unit you should familiarize yourself with the key functions as described in section 4.

The thermostatted cell holder used with the Peltier Control and Cooling Unit accepts 12.5 mm (10 mm pathlength) square cuvettes. The temperature of the sample is regulated using a water-cooled Peltier system. A reaction taking place in the cell can be stirred using a magnetic stirrer. The cell requires 3 ml of solution for analysis.

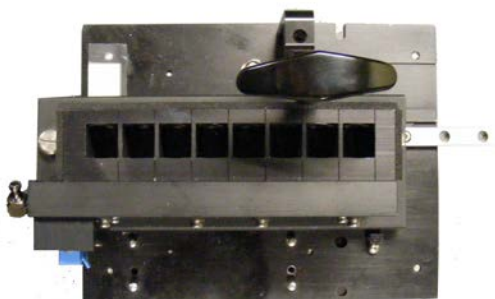
Caution: never connect or disconnect any cables while the spectrometer is switched on. Damage may occur to the printed circuit boards.

3.3.2. Assembly of the 8-cell holder

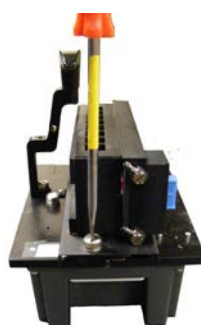
- Configure the linear cell holder base with only the left side handle (see the picture).



- Place the 8-Cell Peltier Accessory sled onto the base and tighten the two thumb screws located at the front and back of the sled. (See pictures)



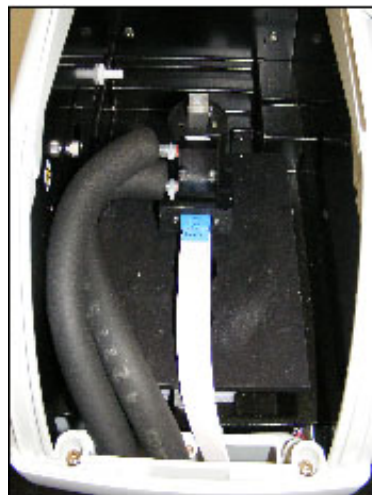
8 cells holder



1 cell holder

3.3.3 Insertion of the cell holder into an Evolution 201, 220 or 260 Bio spectrophotometer

1. Open the sample compartment cover, remove the front panel and remove any existing accessories
2. Remove the access panel below the front of the sample compartment
3. Remove the black sheet metal plate with the two hose nipples and the foam cover
4. Lower the Peltier Cell Holder into position in the sample compartment of the spectrometer
5. Route the ribbon cable and the ends of the insulated water tubes *without* quick-connects up through the opening at the front of the sample compartment. (see picture)
6. Connect one end of the flat connecting cable to the blue connector on the side (8-cell) or front (1-cell) of the cell holder
7. Connect the two insulated water tubes to the hose nipples on the cell-holder and clamp them tightly in place using the supplied cable ties.
8. Route the other end of the flat connecting cable to the rear of the Peltier Control and Cooling Unit and connect it to the blue cable connector.
9. Route the two water tubes from the cell holder to the Outlet and the Inlet connectors in the rear of the instrument and connect them.
10. Replace the front panel of the sample compartment
11. Follow the instructions in section 3.3.5 to fill the Control and Cooling unit with water.



3.3.4 Insertion of the cell holder into an Evolution 300 spectrophotometer

1. Open the sample compartment cover, remove the front panel and remove any existing accessories
2. Lower the Peltier Cell Holder into the sample position in the sample compartment of the spectrometer
3. Connect one end of the flat connecting cable to the blue connector on the side (8-cell) or front (1-cell) of the cell holder
4. Connect the ends of the two insulated water tubes that do not have quick-connects on them to the hose nipples on the cell-holder and clamp them tightly in place using the supplied cable ties.
5. Route the other end of the flat connecting cable to the rear of the Peltier Control and Cooling Unit and connect it to the blue cable connector.
6. Route the two water tubes from the cell holder to the Outlet and the Inlet connectors in the rear of the instrument and connect them.
7. Replace the front panel of the sample compartment. The panel has a foam-rubber seal along its base with two slits in the rubber over access holes. Route the water lines and the ribbon cable through these slits and access holes. Reattach the front panel using the screw fitting to hold it tightly in place.
8. Follow the instructions in section 3.3.5 to fill the Control and Cooling unit with water.

3.3.5. How to fill the Cooling and Control Unit

The Peltier Control and Cooling Unit must be filled with demineralised water before use. A bottle of demineralised water and a squeeze bottle are provided in the package.

To fill the water line inside the instrument please follow these steps:

1. Fill the squeezable bottle (red top) with demineralised water.



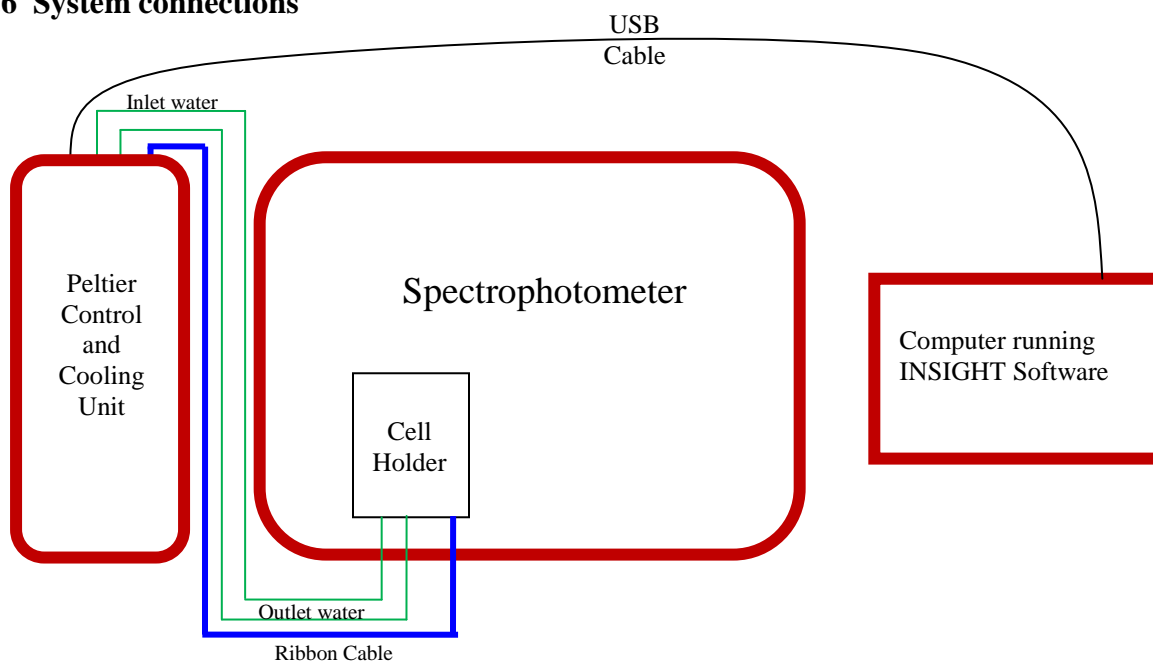
2. Plug the squeeze bottle into the Outlet water connector as shown.
3. Loosen the vent tube approximately one full turn.



4. Squeeze the bottle until it is empty or you see a small amount of water coming out from the vent. Refill the bottle if necessary.
5. Tighten the vent tube.



3.3.6 System connections



3.3.7. External Connections

The Peltier Control and Cooling Unit has no special electrical external connections which would allow relay control, etc.

Operations are performed either manually or via remote control using the USB connections.

To control the system in remote, you need to connect the USB cable to a PC (Windows® operating system). As soon as you connect the USB to a PC, you will be asked to install the driver. Most Windows™ operating systems with a world wide web connection can identify and download the appropriate driver from the net.

The driver can be found in a specific folder of the CD supplied with the unit for installations on systems that are not networked. Note that the folder containing the drivers is compressed/zipped. You will need to copy it to your computer's hard-drive and unzip the folder to allow the Found New Hardware Wizard to access the driver files. You may need to save the drivers to a USB memory device in order to load them onto the built-in computer on certain Evolution 200 series spectrophotometers.

Note: At time of writing, it is necessary to use a COM port numbered 1 – 9 on the computer connected to the Peltier Control and Cooling Unit. If your computer assigns the device a COM port 10 or higher, you will need to manually reconfigure the port to a lower number in order for INSIGHT to communicate successfully with the unit.

4. OPERATING INSTRUCTIONS

4.1. Manual operation

Main page and functions of the buttons

Page		Display	L button	Middle button	R button
Stand by		Stand by		On	
Main	Normal status	Current temperature Set temperature Stirring speed (L) Heating / cooling power (R)	Menu	Off	Modify the temperature setpoint / stirrer rpm
	Temperature setpoint / Stirring speed	Flashing selected parameter	Down	Up	Change
	Alarm status	Alarm description	Menu	Beep on / off	Reset alarm / Change (L)
Menu		Menu selection	Scroll	Select	Exit

(1) only if the manual alarm reset option has been configured

Menu page and functions of the buttons

Menu	Description	L button	Middle button	R button
Parameter	User parameters	Scroll	Select	Exit
Configure	Configuration parameters	Scroll	Select	Exit
Diagnostic	Diagnostic values	Scroll	Select	Exit

Parameter settings

User parameters and functions of the buttons

Number	Description	Default value	L button	Middle button	R button
P-01	Temperature unit of measure	°C	Scroll	Select	Change
P-02	Auto start (after switching on)	NO	Scroll	Select	Change
P-03	Contrast	5	Scroll	Select	Change
P-04	Beep on/off	YES	Scroll	Select	Change
P-05	Manual alarm reset	NO	Scroll	Select	Change

Configure parameters

A password is required to enter this menu. CAUTION: all these parameters are correctly set in the factory: no changes should be made by the user!!!

Diagnostic parameters

Description	Unit of measure
Cell temperature	°C
Radiator temperature	°C
Water resistance	Kohm
Power	%
Cell voltage	Volt

5. MAINTENANCE

The Peltier Control and Cooling Unit requires very little routine maintenance by the user.



Any operation that requires the units to be opened must only be performed by DBS technicians or authorized personnel.

Always unplug from the mains when opening the unit

5.1. Cleaning the instrument

For normal cleaning operations on the instrument only use a cloth dipped in water or neutral detergent, do not use organic or abrasive solvents.

5.2. Topping off the water

Some loss of circulating water over time is typical and requires that the system be topped up periodically. Under constant use (24 hours per day, 7 days per week) loss of 20ml per week is typical. Lower levels of use will result in less water loss. Top off the water using the procedure in section 3.3.5. If the water level drops by more than 50ml the system may generate an error. Each laboratory should establish a top-off interval that is consistent with the use level of the instrument and include it in the laboratory's Standard Operating Procedures.

6. TROUBLESHOOTING

The Peltier Control and Cooling Unit is able to indicate malfunctions and incorrect use. The messages available are directly visible on the display, indicated audibly or transmitted via USB for remote communication.

6.1. Audible alarm

The Peltier Control and Cooling Unit will send an audible alarm if a failure occurs.

6.1.2. System Alarms

The following alarms are available:

- Cell temperature too high
- Radiator temperature too high
- Cell temperature sensor failure
- EPROM memory failure
- Water level too low

If one of these alarms is activated, the Peltier Control and Cooling Unit will signal the failure by an audible signal and display relative messages on the display.

Action: Switch off the instrument immediately!

If the failure does not disappear after the instrument is switched on again, contact service.