

Ventacon Series E Electrochemical Cells

Ventacon's Series E Electrochemical Cells consist of a borosilicate glass body carrying a platinum ring secondary electrode and a capillary connected side pocket for a standard electrode.

The working electrode consists of a high purity pellet held in a fluorocarbon sleeve and connected electrically to a rod passing down its axis. The position of the working electrode can be adjusted by moving it forward, towards the front optically flat window or back, closer to the secondary electrode.

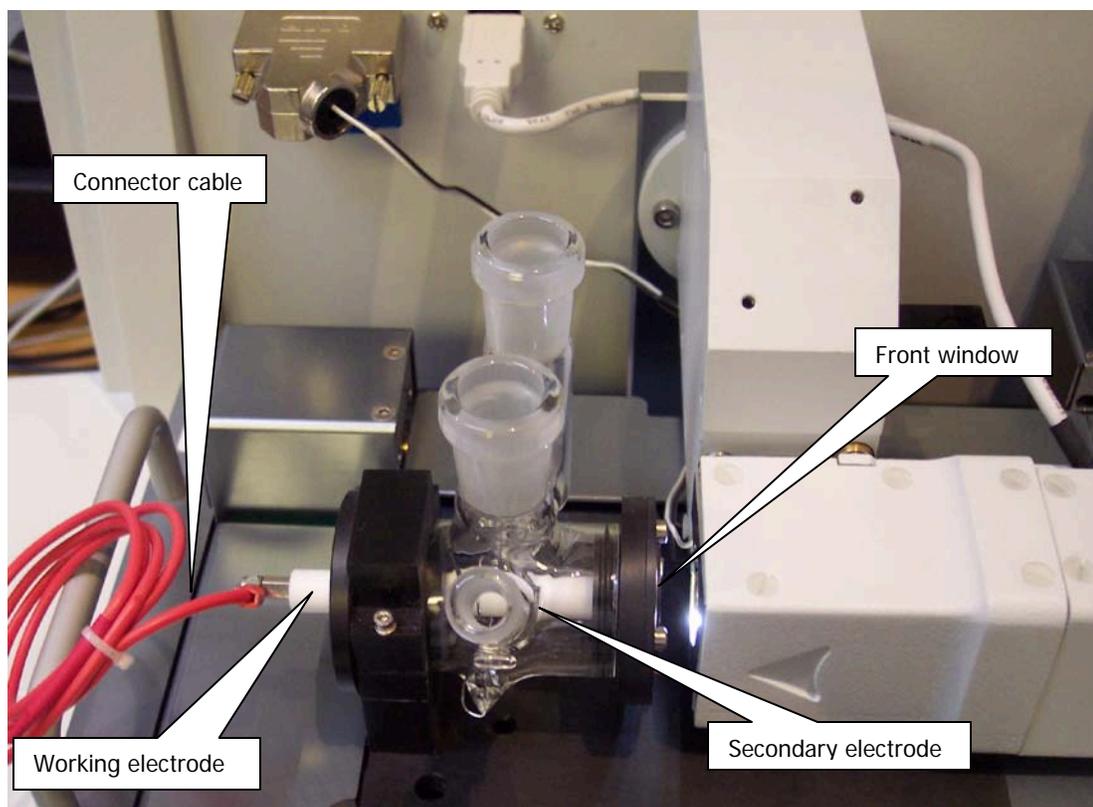


Figure 1 Ventacon cell, fitted in RamanStation 400 Series instrument

When in use, the cell is filled with electrolyte and connected, by cables passing through access holes in the sample compartment, to a standard electrochemical potentiostatic control unit.



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Produced in the UK.

Unpacking, Assembling and Installing the Cell



WARNING

If the cell is used in a manner not specified herein, then the protection provided by the equipment may be impaired and the warranty withdrawn.

Unpacking

Upon receipt, carefully unpack the cell and check for any damage that may have been caused in transit. If any damage is discovered, contact PerkinElmer Customer Care.

NOTE: Ventacon cells are EXTREMELY fragile.

Assembling the cell

Any standard electrode of your choice can be used in the standard cell pocket.

To insert and remove the working electrode, release the nut on the end of the electrode. Once freed, the electrode will slide easily in and out of the glass cell body. Tightening the nut expands the 'O' ring and seals the electrode to the glass cylinder.

1. Remove the cable assembly from the end of the electrode.
Be careful not to lose the stainless steel washer.
2. Leave the washer in place.
3. Fit the 'handle' very gently.
4. Slide the electrode into the sleeve, cable end outwards.
5. Replace the 'handle' with the cable assembly.

The cable assembly need never be tightened hard onto the electrode. Very gentle finger tightening will seal the electrode to the sleeve.

Installing the cell in your RamanStation 400 Series instrument

The cell is supplied on a mount which is designed to fit into the sample holder of a RamanStation 400 Series instrument. The cell should be fitted with the working electrode to the left hand side, as shown in Figure 1.

The cell must be connected to both an electrochemical power supply and the RamanStation. Cables from the cell can be passed through the light-trap built into the base of the sample chamber of your RamanStation, and then plugged into the external, bench mounted supply.

Safety Practices

General safety

The cell is subject to the following hazards:



There are no bio-hazardous materials within the unit; however, this unit could be used with bio-hazardous samples. Given the general-purpose nature of the cell and the wide variety of uses to which it can be put, it is not possible to define exact decontamination procedures for the many types of samples being tested. These should be established by the user, or their Health and Safety representative, before use of the cell. Guidance can be found in document M29-A3 Protection of Laboratory Workers from Occupationally Acquired Infections: Approved Guidelines published by the US Clinical and Laboratory Standards Institute. The sample compartment may be removed and cleaned by soaking in a disinfectant appropriate to the bio-hazard that has occurred, for at least 30 minutes. The compartment should then be rinsed in distilled water and allowed to dry. Similarly, the unit exterior can be wiped over with an appropriate disinfectant with a wipe or soft cloth. Any internal spills should be wiped up with absorbent material through the sample compartment aperture and similarly decontaminated using disinfectant soaked wipes.

Decontamination certificate

If the cell needs to be returned, a decontamination certificate is required. Decontamination certificates can be found at the following web address or be provided by PerkinElmer Customer Care.

<http://las.perkinelmer.com/InstrumentServices/DecontaminationProtocols.htm>

It is the responsibility of the user to ensure a safe working environment is provided to the engineer or staff by appropriate risk assessments and, if appropriate, decontamination procedures before work commences.

Electrical

Electrodes

Electrochemical cells consist of three electrodes:

- A working electrode.
- A secondary, unreactive (Pt) electrode.
- A reference electrode.

All three electrodes operate in a common electrolyte solution.

The reference electrode is usually toxic, for example Hg/Hg₂Cl₂, and is supplied by a specialist supplier. You provide your own electrolyte, which may be very toxic; for example, cyanide, thiocyanate, perchlorate, or biochemical material. The working electrode is typically one of the noble metals, such as gold.

Potentiostat or polarograph

The cell is intended for connection to a potentiostat or polarograph designed specifically for use with electrochemical cells (such as those from uniscan.co.uk or pineinst.com). The potentiostat provides a voltage to the working and secondary electrodes which is current insensitive. Potentiostats can supply significant currents but are themselves safe because they operate in the electrochemical voltage range, typically -3 to $+6$ V with respect to calomel, which is itself approximately $+1.5$ V with respect to the standard (H_2).

CAUTION

The potentiostat/polarograph must be used in accordance with the manufacturer's recommendations and local safety regulations. Connection to any other type of power supply source may damage the cell or cause a hazard to the user.

Chemicals

Use, store, and dispose of chemicals that you require for your analyses in accordance with the manufacturer's recommendations and local safety regulations.

Toxic fumes

If you are working with volatile solvents or toxic substances, you must provide an efficient laboratory ventilation system to remove vapors that may be produced when you are performing analyses.

Waste disposal

Waste containers may contain corrosive or organic solutions and small amounts of the substances that were analyzed. If these materials are toxic (for example if they contain mercury or cyanide), you may have to treat the collected effluent as hazardous waste. Refer to your local safety regulations for proper disposal procedures.

Personal protective equipment

No Personal protective equipment (PPE) is required for operation of the cell, although the samples under test may require the use of such PPE and should be covered by a risk assessment made by the user or the appropriate Health and Safety representative.

Intended user

This cell is intended for use by individuals trained in and familiar with the use of Raman spectroscopy, electrochemistry and their associated hazards as detailed above. In the event of a malfunction or hazard occurring, the user responsible shall disconnect the unit from power, and isolate the cell for decontamination by an appropriate means if biohazardous material is spilled on, in or around the cell.

Using the Cell

NOTE: Please read the *RamanStation 400 Series Getting Started Guide* (part number L1321801) before using the cell.

Ventacon cells are designed to work within a RamanStation sample area, with the sample area lid CLOSED. It is unsafe to operate Raman instruments with the lid open and interlocks operate to protect the user, by making it impossible for the laser emissions to enter the sample area with the lid open.

Cleaning the Cell

In order to clean the cell, undo the two stainless steel screws in the plastic clamp and carefully lift the cell body from the frame.

Loosen the nut securing the working electrode into the glassware and gently slide the electrode out of the sleeve.

CAUTION

You MUST remove the working electrode before cleaning the cell glassware.

The front surface of the working electrode can be kept clean by grinding and polishing with an abrasive and cloth.

After cleaning, re-insert the electrode into the sleeve and then remount the cell body on to the frame.

CAUTION

Do not over-tighten the screws.

Finally, the working electrode can be moved to its required operating position, between the window and the secondary electrode.