



INSTRUCTION MANUAL

VHW 150 SERIES SELF-CLEANING OPTICAL WINDOWS

Version 2

SERIAL # _____

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Preface

Congratulations! You have purchased a precision vacuum positioning device from Thermionics. This unit is capable of many years of use with minimal care and maintenance. This manual is a tool to aid you in obtaining this service.

We at Thermionics encourage your comments and suggestions on this manual.

Product Description

The VHW 150 series (formerly VHW550) windows are self-cleaning viewports for use in deposition environments. They consist of an in-vacuum heated quartz disc, thermally isolated behind a standard vacuum window. Material that would normally cloud or obscure the view through a vacuum window encounters the protective heated disc instead. The material will re- evaporate from the heated disc at a rate dependent upon its vapor pressure/temperature curve. The heated disk is operated at up to 550°C, depending upon the application requirements.

NOTE:

The standard window power supply requires 120 VAC 60 Hz. We can also supply units for 230 VAC at 50 or 60 Hz. The maximum temperature for the 230 VAC versions is approximately 530° C. The adjustment dial faceplates are calibrated accordingly.

The VHW series heated windows are available as follows:

Model #	Vacuum window
VHW550-G	7056 Glass
VHW550-Q	Quartz
VHW550-O	Without window

Each of the above models is fitted with a quartz heated element. The heater is a tungsten filament. This filament is open to the vacuum and **thus is not suitable of oxidizing environments.**

INSTALLATION:

*** WARNING ***

Shipping vibration can loosen screws. The user must check to verify the screw fasteners have not backed off on the unit during shipment.

The heated window assembly can be installed directly from the box. As usual, care should be exercised to protect the knife's seal edge. The standard unit has blind tapped holes in the mounting flange. Be careful to use correct length mounting bolts.

Proper tightening techniques should be observed whenever tightening a metal sealed flange. We recommend a small quantity of high temperature anti-seize lubricant be used on all mounting bolts. This is especially important if the unit will be subjected to bake-outs.

Normally, the VHW150 window is supplied with a variable power supply. This unit allows the user to set the approximate temperature of the heated element.

If the window is ordered without the associated power supply, the user must take care in the selection of the supply used. A current controlled power supply is preferred for a power source. AC or DC may be used.

WARNING

This must be a power supply electrically isolated from the AC power mains. DO NOT USE a Variac connected to 120 VAC power. This would be dangerous to the unit and a severe personnel hazard.

If the unit is ordered with the associated power supply, the proper connector is attached to the power supply cable. If the window is ordered separately, the mating vacuum cable connector is supplied. Be vigilant to use a proper three conductor cable with GROUND CONDUCTOR. Provide adequate protection to preclude electrical shorts or accidental human contact with conductors.

WARNING

Care must be used to protect personnel contact with electrical conductors. This unit operates at voltages and currents capable of causing serious injury.

FAN COOLING (IF SUPPLIED):

Operate the cooling fan whenever the window is heated and allow a 30-minute cool down after use before turning the fan off.

WARNING

The viewport vacuum window becomes hot during normal operation. DO NOT TOUCH the window or body during or after operation. Maintain forced air cooling at all times during use.

Water Cooling (if supplied) Operation Specifications:

The cooling supply requirements are <20°C water at >50 psi <100 psi. Minimum flow requirement is 0.25 GPM. The cooling water must be of high quality, either very low in salt and particulate or (preferably) a closed loop cooling system with de-ionized and treated water. The water should be filtered in all cases. If a closed loop system is used, it must be of the "open return" type, with the return line at atmospheric pressure. This is required for safety reasons.

If the heater was to be operated without water flow, the window would become over heated, steam would be generated, causing high pressure. The equipment may be damaged, and a significant personnel hazard would be created. **DO NOT ALLOW THIS UNIT TO BE OPERATED WITHOUT CORRECT WATER COOLING.**

The following only applies to VHW-250 Viewports at this time:

The plumbing circuit should include an input shut off valve and an exit flow switch. The exit flow switch should be interlocked to the heater power supply, via the twist lock connector on the back of the supply. The 120VAC power for the supply passes through the interlock circuit, requiring the flow switch contacts to be rated for 120VAC and up to 7 amps. This interlock circuit does not allow the window to be powered unless cooling water is flowing. Check the operation of the protection system often.

WARNING

It is important the shut off valve is not on the exit line. The exit line must remain open to the atmosphere. Before bakeout, remove all water from the heater cooling lines. Any water left in the lines will boil, creating high temperature and pressure steam. Be certain the exit line is properly restrained. This equipment is not designed to handle pressures greater than 100 PSI. Equipment and personnel would be in great danger. Read and follow instructions for bakeout.

Operation:

This window is designed for operations in vacuums better than 1×10^{-4} torr. Do not operate this unit at higher pressures or in oxidizing environments.

Operate the cooling fan or water cooling as applicable whenever the window is heated and allow a 30-minute cool down period after use before turning off the cooling.

WARNING

The viewport vacuum window becomes hot during normal operation. DO NOT TOUCH the window or body during or after operation. Maintain forced air cooling at all times during use.

MAINTENANCE:

Element replacement/cleaning

We recommend dis-assembly of the unit on a bench in an appropriate environment. It is possible to disassemble the unit on the vacuum chamber, depending on its orientation, but significant difficulty may be encountered.

Refer to drawing for location of part numbers.

DISASSEMBLY

NOTE:

The included drawing references the Air-Cooled model, however the procedure and referenced parts are the same in both models. Rebuild kits and/or rebuild services are available from Thermionics.

The heating element is tungsten. Once heated, the element becomes brittle. Do not disturb the element unless you are replacing it.

While in a horizontal orientation, remove body bolts (14) and remove cover (13) (The half with the power feedthrough is the body, normally attached to the chamber).

Remove the viewing window (15). With a long screwdriver, loosen the clamp screw (4) at the supply end of the barrel electrical connectors (3).

Place a lint free wipe under the element as a cushion.

Slip the ring spacer (11) off the ends of the three ceramic tubes (5).

Remove the three notched ceramic tubes, allowing the element to rest on the wipe. Touch the element with gloves only, and by the edge only.

If necessary, clean the transparent center of the element, being mindful of the brittle nature of a used tungsten filament.

REPLACEMENT

Carefully place the new filament in the perimeter groove in the heated disc.

With the body (1) in the horizontal orientation with the viewport side facing down, measure the legs of the filament (9) and cut to the required length.

Place two heat shields (6) on position on top of the body (1). While holding the heated disc (8), position the filament leads through the large hole on the heat shields and attach the electrical connectors (3) to the power feedthrough leads (2).

Slide the three ceramic rods (5) through the holes in the heat shields (6). Suspend the disc in the notches of the three ceramics.

Place the ceramic jig (11) into position. Make certain that all three ceramic rods are perfectly seated in their proper locations. Place the jig shield (12) on top of the ceramic jig (11) and lower the cover (13) carefully onto the body (1). Make sure the gasket (7) is in place.

Install the cover (13) on the body (1). Carefully insert two lubricated bolts and hand-tighten. Placing the assembly over the edge of the work surface will facilitate this procedure.

Verify the assembly is not binding and is fully seated. Lubricate the remaining body bolts and install. Tighten bolts.

Install viewport (15).

Leak check the assembly.

BAKEOUT PROCEDURE

Disconnect the power leads and remove the fan (if installed) prior to bakeout. The fan mount is attached to the window assembly via two longer body bolts and double nuts. This is done to allow fan bracket removal for baking without releasing clamping upon the body gasket.

We recommend limiting the temperature of bakeouts to 200 C or less.

We at Thermionics have a large stake in your new equipment operating up to your expectations. If you experience difficulty with this unit, or any other aspect of your endeavor where our experience might be of value, we want to hear from you. We want to be part of your success.

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