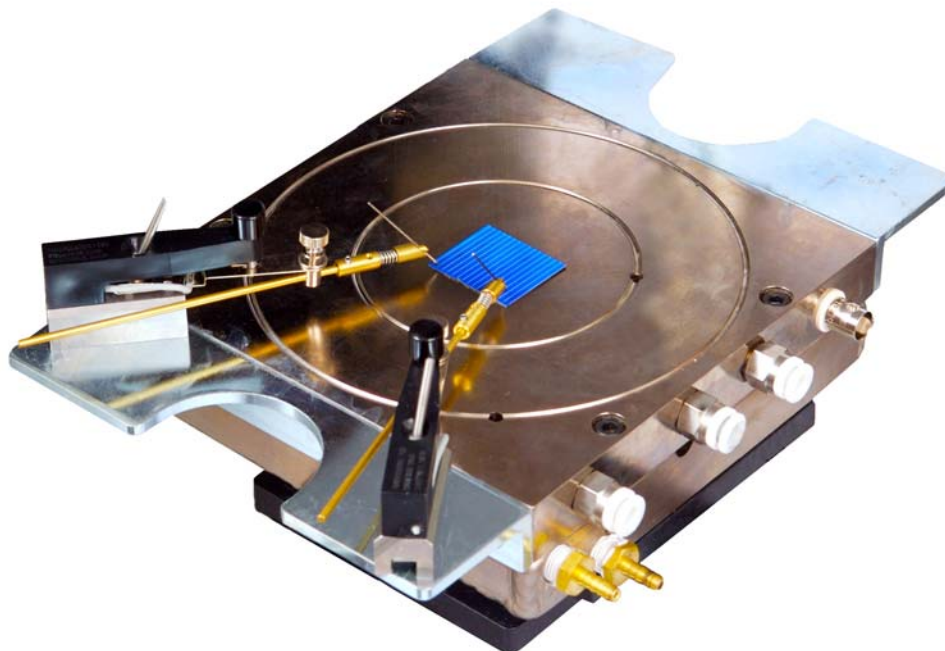


Model IQE(-200B)-TC-VAC

Temperature Controlled Vacuum Chuck for IQE-200(B) & QuantX QE Systems



User's Manual

DRIEL
INSTRUMENTS
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1 INTRODUCTION

The IQE-TC-VAC is a temperature controlled vacuum chuck assembly for use with Newport Oriel's IQE-200 quantum efficiency (QE) systems. A micrometer-driven stage provides precise sample positioning in the XY plane, which can be mounted on the sample stage rod.

The IQE-200B-TC-VAC is a modified version of this temperature controlled vacuum chuck assembly which positions and holds a variety of sample sizes for testing. This assembly can be readily mounted under the IQE-200B or QuantX systems and has been designed to easily incorporate a chiller, vacuum pump, and electrical contact probes.

A thermistor incorporated into the vacuum plate may be used for temperature monitoring of the sample. The cooling plate's temperature range allows for testing to be performed under a variety of conditions. When used with a controlled cooling system such as the Oriel PVIV-CHILLER, highly accurate and repeatable test results may be obtained.

Prior to installation, read this instruction manual and all other documentation which pertains to the system. Check to ensure that all parts have been included. If there are any questions or concerns, contact Oriel Instruments before incorporating this assembly into the QE system. Refer to Section 10.1 for contact information.

Included items (refer to Section 8 for more information):

- Temperature controlled vacuum chuck assembly
- Pipe to hose fitting
- Shoulder Screws, 8-32 x 1-3/8"
- Tubing, 1/8" ID x 1/4" OD PVC
- Hex wrench 3/32
- Cable, BNC male to male
- Cable, BNC to mini-grabbers

The following are sold separately (refer to Section 6 for more information):

- Chiller
- Vacuum Pump
- Electrical Contact Probes
- Hardware for table mounting and height adjustment

The end user is responsible for providing a chiller line relief valve and filtration, as well as the cooling liquid. A relief / shut off valve is included with Oriel vacuum pumps, Model PVIV-VAC-PUMP (-220).

2 BASIC INSTALLATION

2.1 LOCATION OF ACCESSORIES

Position the vacuum pump and chiller in locations where the AC mains can be reached and air can flow freely over them. Blocking air flow in any way can cause overheating which will damage the equipment. The vacuum pump case will get very warm during use, so it must not be located in areas where personnel may come into contact with it. Refer to the instruction manuals that came with the pump and chiller, and follow their guidelines for installation and operation of these products.

2.2 MOUNTING THE CHUCK

This vacuum chuck has been designed to operate in an upright position. The sample under test must be located at the correct working distance from the QE system output. The vacuum chuck may need to be raised vertically to achieve this.

A variety of mounting configurations are possible, based upon the system setup. The mounting configuration chosen, besides positioning the sample at the correct working distance from the QE light source, must be able to support the weight of the vacuum chuck. It must not interfere with test probes, wiring or tubing for the vacuum pump and chiller. As examples, Figures 1 and 2 shows the vacuum chuck assembly mounted on the respective QE system.

Refer to Figure 3 for overall product dimensions. Five #1/4-20 threaded holes are provided for mounting to a base. Figure 4 details the mounting hole pattern.

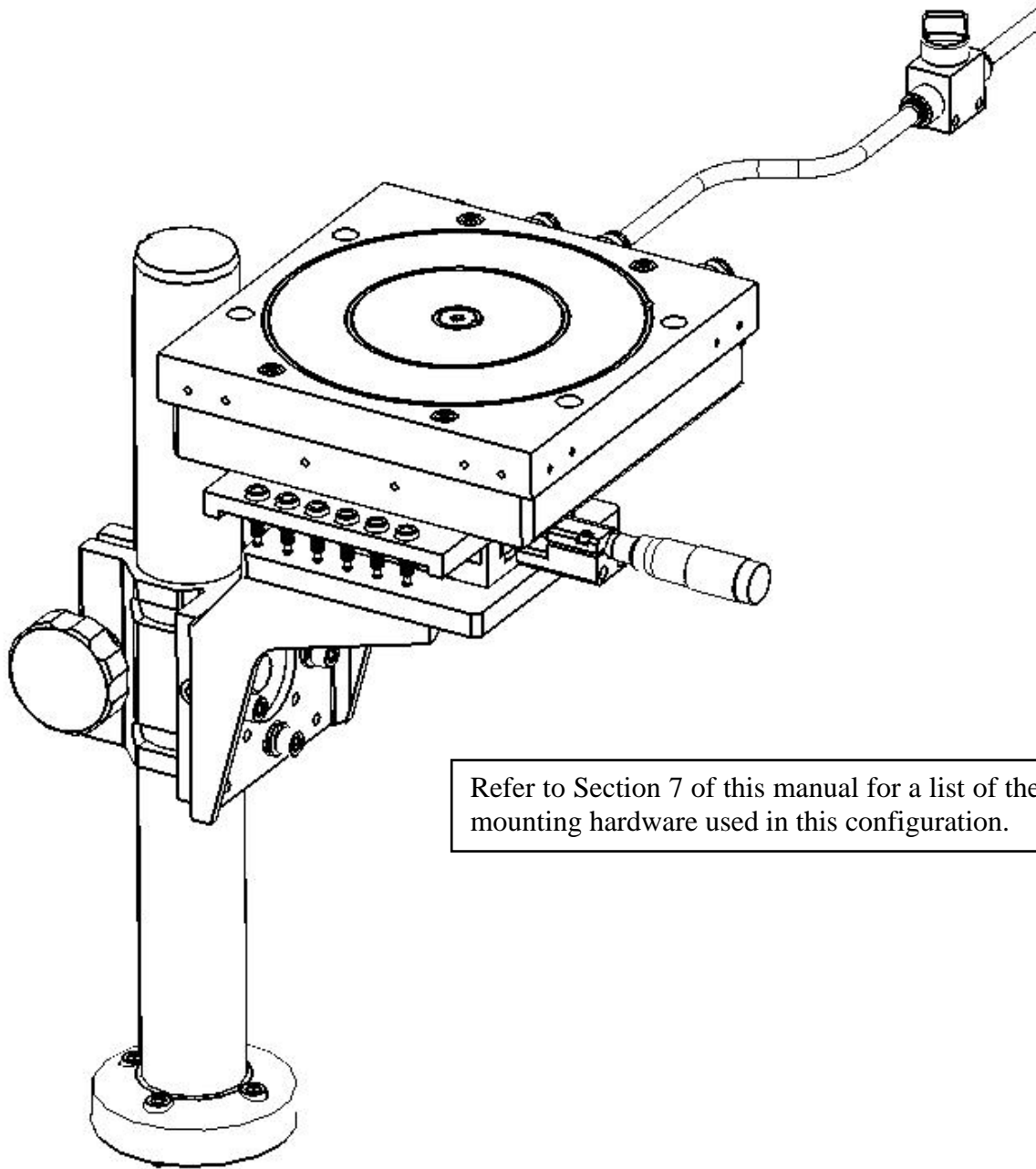


FIGURE 1: MOUNTING SUGGESTION ON IQE-200 QE SYSTEMS

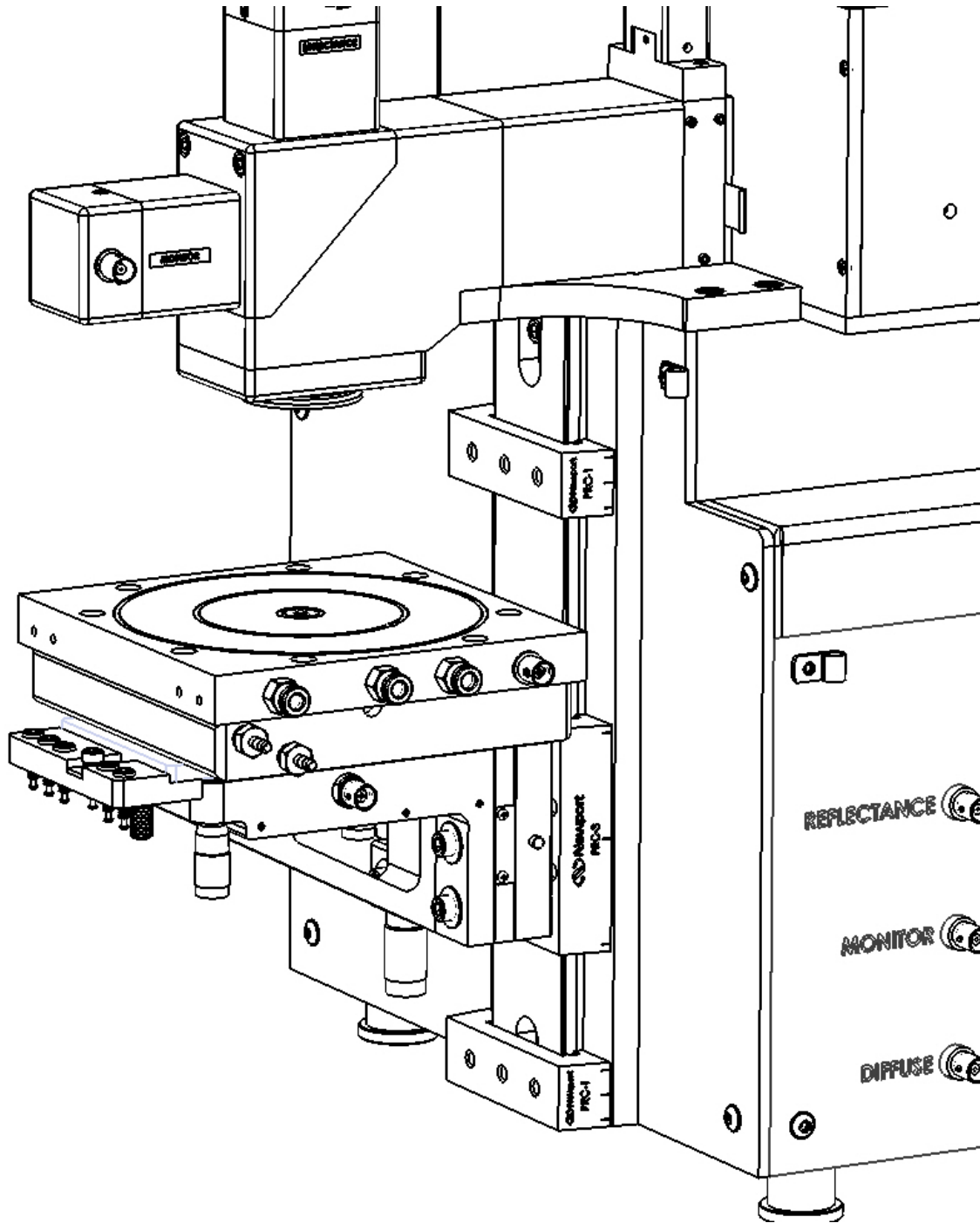


FIGURE 2: MOUNTING SUGGESTION ON IQE-200B OR QUANTX QE SYSTEM

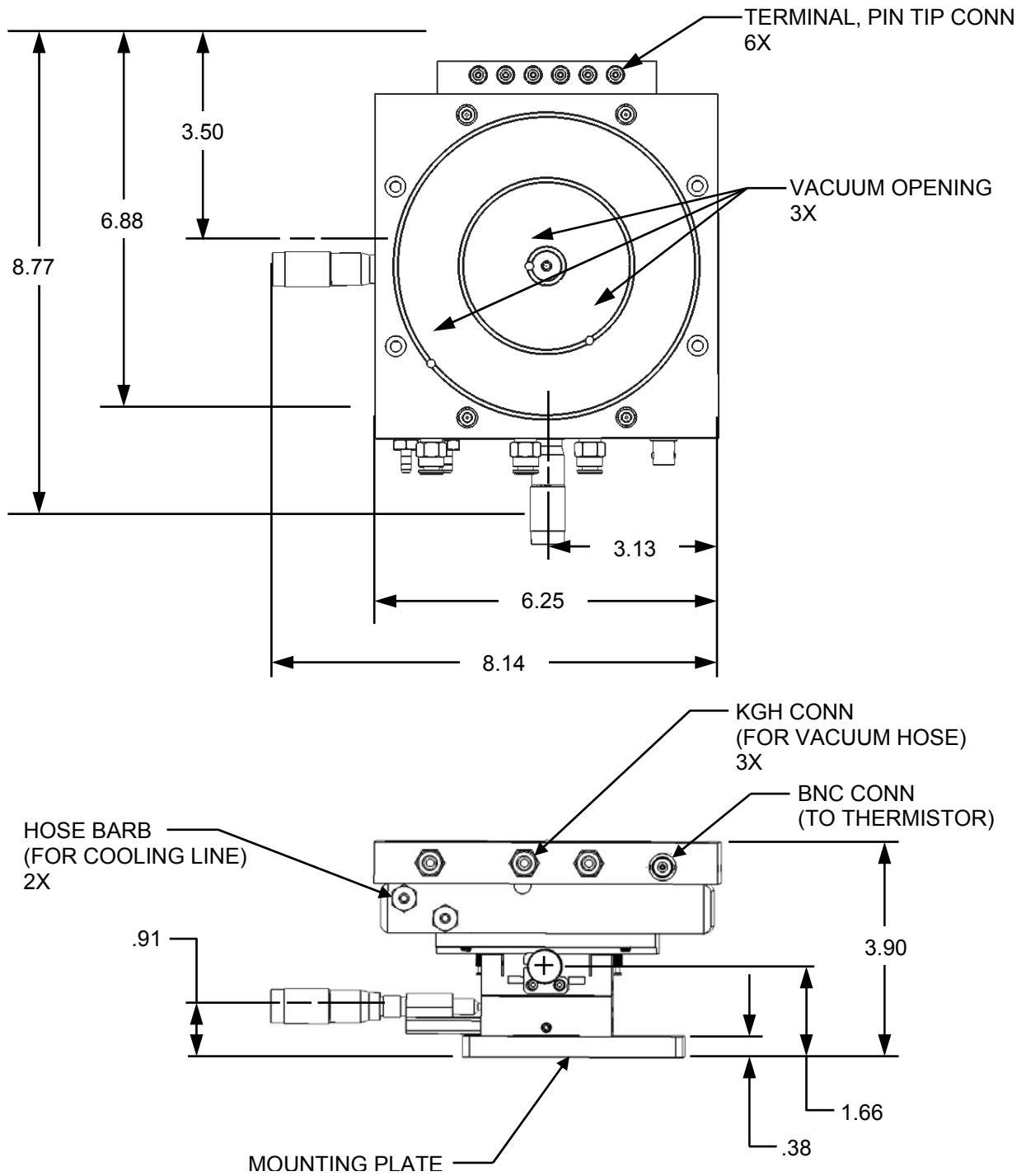


FIGURE 3: VACUUM CHUCK DIMENSIONS

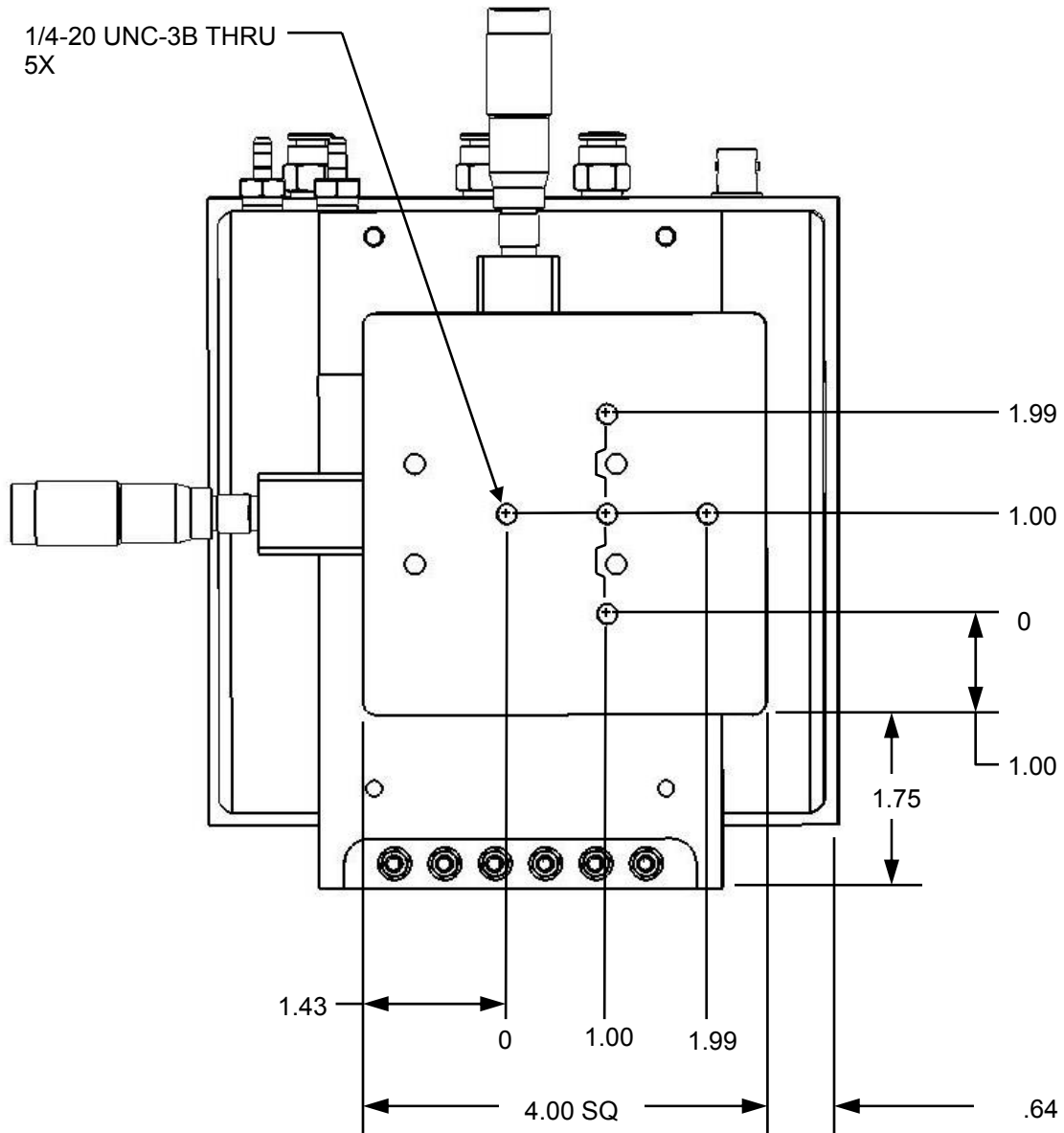


FIGURE 4: MOUNTING PLATE DIMENSIONS

2.3 COOLING PLATE CONNECTIONS

The types of fluids that can be used in a chiller can vary, based upon manufacturer recommendations and the end user's specific application. It is the customer's responsibility to ensure that all tubing and valves purchased for the chiller line are compatible with the cooling fluid being used.

It is the customer's responsibility to provide a pressure relief valve on the chiller line for safety. This valve must be located where discharge will not harm any persons or equipment. The environment should be clean so that contaminants will not clog the discharge port. The pressure at which the valve provides relief must be selected with reference to the operating specifications of the chiller and the characteristics of the tubing material.

Filtration of the coolant line is the customer's responsibility. Clogging of the cooling plate by contaminants will void the product warranty.

2.4 VACUUM PLATE CONNECTIONS

Oriel supplies PVC tubing, a brass barb fitting and a shutoff valve for use with a vacuum pump (sold separately as PVIV-VAC-PUMP). It is the customer's responsibility to note the specifications of their vacuum pump and ensure that these items are compatible with that particular model of pump.

The shutoff valve should be located where it can be conveniently accessed for ease of sample removal from the vacuum plate.

The valve must be oriented so that the arrow is oriented as shown in Figure 5. When the valve knob is set to the SHUT position, the vacuum holding the sample in place is automatically released (there is no exhaust port).

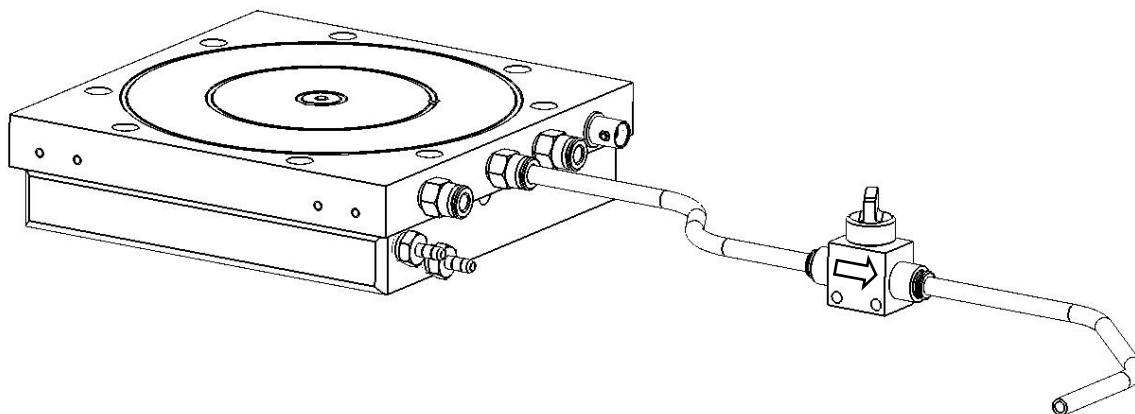


FIGURE 5: VALVE ORIENTATION

Ensure that the tubing is not kinked when connecting it from the vacuum pump to the vacuum plate. The connector which the vacuum line tubing is attached to on the vacuum plate depends upon the sample size being tested. Refer to Figure 5 for details.

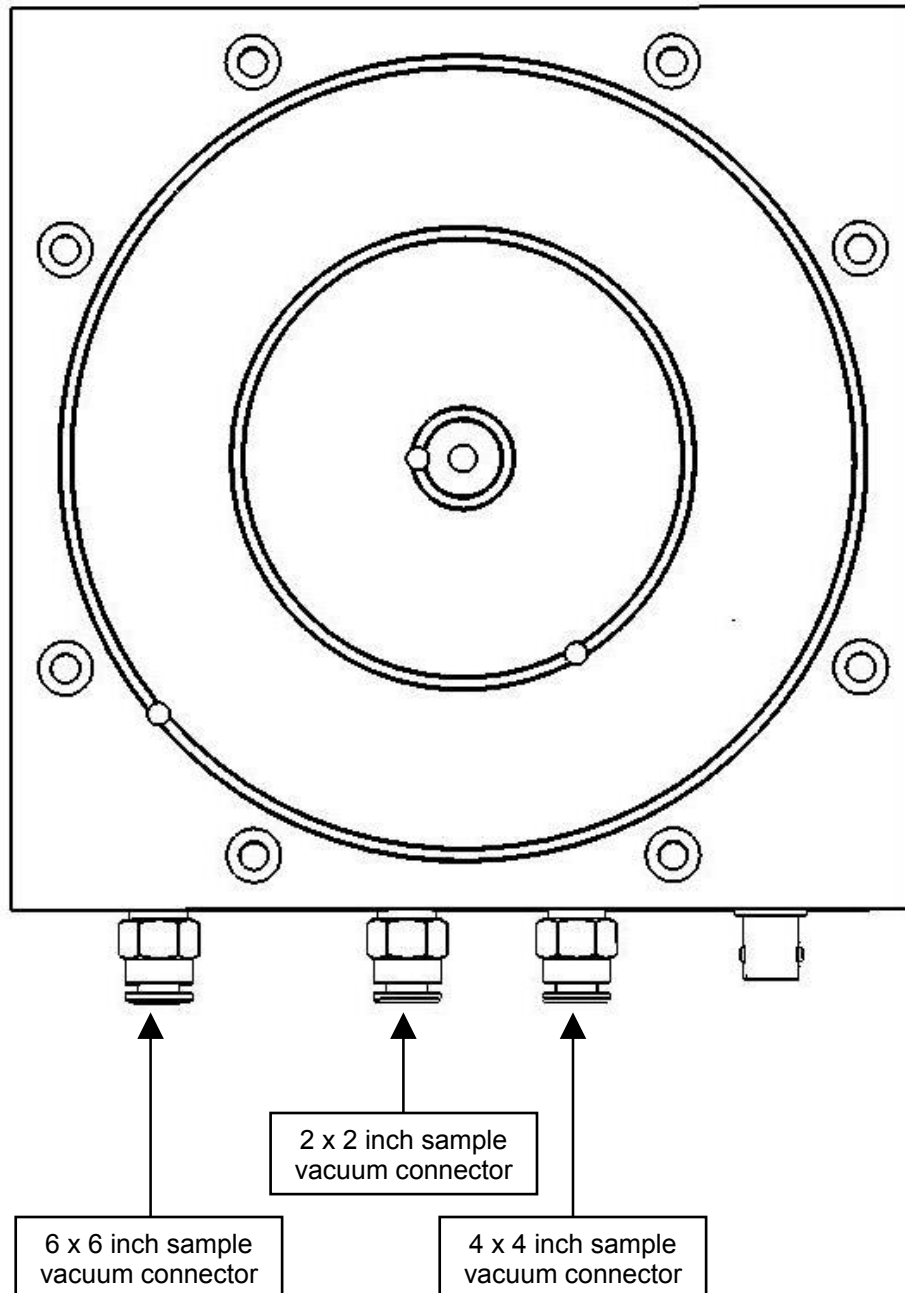


FIGURE 6: VACUUM PLATE CONNECTIONS

3 SAMPLE POSITIONING

Prior to use, ensure that the thermistor in the center of the vacuum chuck is able to move up and down freely when gently pressed with a finger. This NTC (negative temperature coefficient) thermistor has a value of 10K ohms at 25°C. It is wired to the female BNC connector located on the side of the vacuum chuck, as shown in Figure 6.

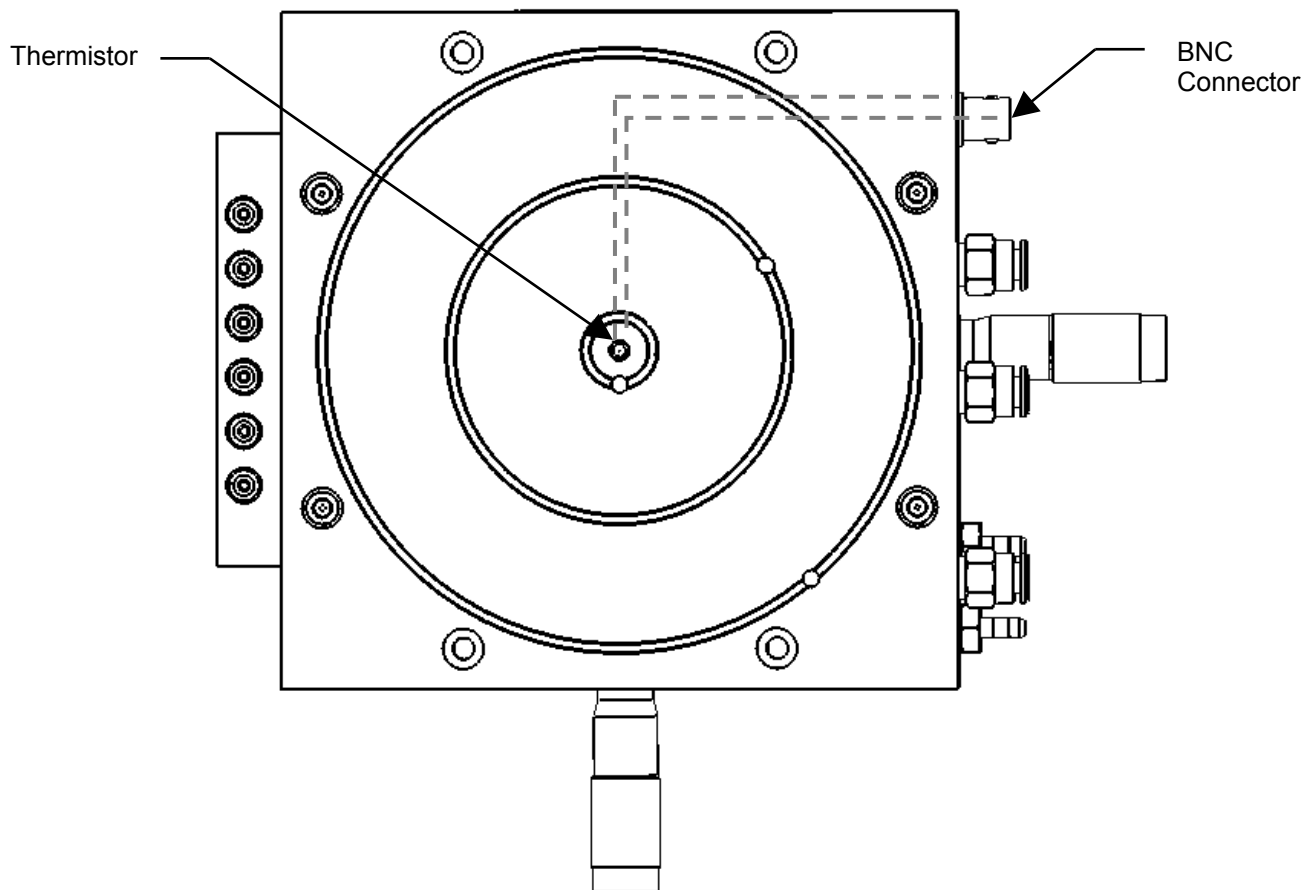


FIGURE 7: THERMISTOR CONNECTOR

With the valve knob set to SHUT, start the vacuum pump. Center the sample to be tested on the vacuum plate. When satisfied with its location on the plate, turn the valve knob to the OPEN position to allow the vacuum to hold the sample in place.

In order to remove the sample when testing is complete, turn the valve knob to the SHUT position. The vacuum will be released, allowing the sample to be removed from the plate.

Note that vacuum may be applied and released using the pump controls, if the vacuum pump being used is equipped with that feature.

4 TEST SETUP

Connection to the QE system is achieved using the BNC-Mini Grabber cable included with the temperature controlled vacuum chuck assembly. For IQE-200 models, the BNC connector is attached to the light bias amplifier port labeled 'DETECTOR'. For QuantX models, the BNC connector is attached to the port labeled 'SAMPLE' on the rear of the instrument. The mini-grabbers are attached to the vacuum chuck terminals, shown in Figure 8. The red connector corresponds to the BNC conductor and the black connector to the BNC ground.

Oriel offers an electrical contact probe; model PVIV-PROBE-KIT, which is designed to work with this vacuum chuck. Each assembly contains one (1) magnet-mounted electrical probe with X-Y micro-positioning control. Refer to the manual included with the probe kit for assembly and installation instructions.

The probe is terminated with a .080 pin tip connector. The probe connector may be stacked onto the appropriate cable connector. It may also be inserted into one of the terminals on the side of the vacuum chuck. In that case, the terminal used for the probe must be wired to the terminal which is used for the QE system cable connection.

If grounding directly to the vacuum plate is desired, a wire / lug arrangement (not provided) may be attached from a terminal to one of the #8-32 holes on the side of the vacuum plate.

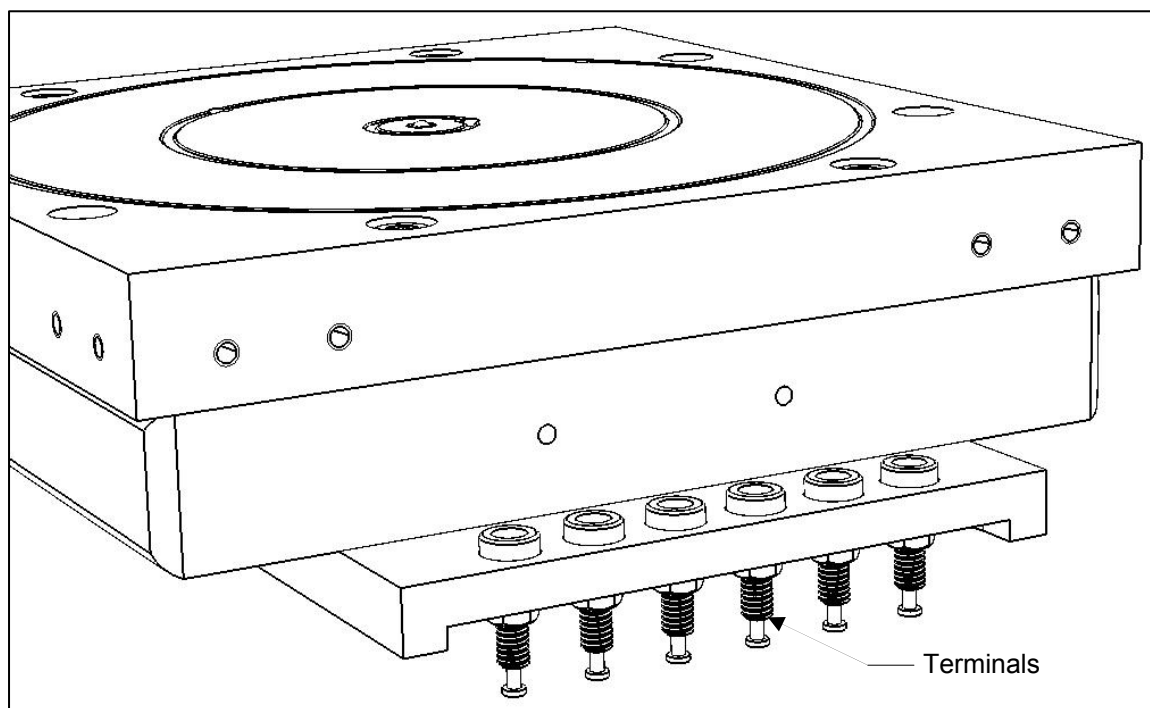


FIGURE 8: TERMINALS

5 CARE AND MAINTENANCE

This assembly is designed to support the weight of a test sample and the associated test equipment, such as probes and wiring. It is not intended to support heavy loads. Do not place any other items on top of the vacuum chuck assembly. Mechanical damage to the stage caused by overloading is not covered under warranty.

Monitor the condition of all tubing and wiring, particularly in the areas where they are exposed to light from the source. Replace these items if they begin to show signs of wear or UV degradation.

When the unit is stored, contaminants cannot be allowed to enter the cooling plate ports and tubing.

Refer to the manuals provided with the chiller, vacuum pump, probe kit and QE system for information regarding their usage, maintenance, and storage.

If the system is to be moved, put into storage, or needs to undergo maintenance, the tubing going to the chiller and vacuum pump will need to be removed. Turn off all equipment. Release the vacuum in the entire vacuum line by using the shutoff / relief valve.

Place a container to collect the cooling liquid. The tubes and cooling plate must be emptied. To ensure that all liquid has been removed from the cooling plate, it may be necessary to tilt it so that the hose barbs point downward. The stage is not designed to support the weight of the assembly when it is on its side; support the vacuum chuck assembly with one hand when it is in this position.

The IQE-(200B-)TC-VAC should NEVER be shipped with cooling liquid inside. It must be completely drained. Note that, just as with any container for coolant, this plate may be hazardous when empty since it may still retain product residues (vapors, liquid). Observe all warnings and precautions listed for the cooling liquid which is used.

If this product is to be shipped to Oriel Instruments for servicing or return, notify the person issuing the RMA number of the type of cooling liquid that was used in this unit. Material safety data sheets for this liquid must be provided. If any assembly is shipped to Oriel without this information, it will be returned, unopened, to the sender.

6 ACCESSORIES

The Oriel QE systems have been designed to operate with the accessories listed below. Oriel Instrument cannot guarantee system performance if other products are substituted. Refer to Section 9 for specifications.

| <u>Part Number</u> | <u>Description</u> |
|--------------------|------------------------------|
| PVIV-CHILLER | Chiller, Thermoelectric |
| PVIV-VAC-PUMP | Vacuum Pump, 110 VAC / 60 Hz |
| PVIV-VAC-PUMP-220 | Vacuum Pump, 220 VAC / 50 Hz |
| PVIV-PROBE-KIT | Electrical Contact Probe Kit |

7 MOUNTING HARDWARE for IQE-200 MODELS

The items listed securely hold the vacuum chuck when using an optical table as a base for the IQE-200 system, as well as provide a simple means to adjust vertical positioning (see Figure 1). Note that mounting hardware needs will vary based upon individual system configurations. As part of the Newport family of brands, Oriel offers a variety of solutions to meet different needs.

| <u>Part Number</u> | <u>Description</u> |
|--------------------|------------------------------------|
| 300-P | Rod Platform |
| 40 | Rod, Standard 14" (1/4-20 thread) |
| 70 | Rod, Short 7" (1/4-20 thread) |
| 40-M | Rod, Standard 14" (M6 thread) |
| 70-M | Rod, Short 7" (M6 thread) |

8 REPLACEMENT ITEMS

| <u>Part Number</u> | <u>Description</u> |
|--------------------|--|
| 84-40/114 | Pipe to Hose Fitting |
| 84-20-006 | PVC Tubing, 1/8" ID x 1/4" OD (available in 1 ft increments) |
| 301197 | Shoulder Screw, 8-32 x 1-3/8" |
| 90-11-044 | Hex Wrench 3/32 |
| 70018 | Cable, BNC male to male |
| 403246 | Cable, BNC to mini-grabbers |

For replacement connectors, please contact Oriel Instruments. Note that for installation, Teflon[®] tape will be required, which is not provided.

Oriel cannot guarantee field-repaired product performance. For guarantee, this item must be returned to Oriel for servicing.

9 SPECIFICATIONS

9.1 VACUUM CHUCK SPECIFICATIONS

| | |
|---------------------------|---|
| Sample Size | 6 inch square maximum |
| Sample Temp Sensing Range | -40°C to 125°C, ±1°C |
| Vacuum Plate Material | Nickel plated aluminum |
| Vacuum Requirement | 150 mm Hg minimum |
| Motion, Micrometer | 25 mm X-Y travel |
| Micrometer Sensitivity | 1 µm |
| Weight | 4.3 kg (does not include packaging) |
| Cable | BNC male to dual pin tip plugs, 5 feet long Operating Voltage: 30 VAC / 60 VDC maximum Operating Temperature: +50°C maximum |
| Tubing, Vacuum | 1/8 OD clear PVC, 10 feet long |
| Terminals | .080" pin tip jack, quantity (6) Operating Temperature: +115°C maximum Current: 5 amps maximum Operating Voltage: 33 Vrms / 70 Vdc |
| Connector, Thermistor | BNC female conn |
| Connectors, Vacuum | KGH conn accepts 1/4" OD tubing, quantity (3) |
| Connectors, Chiller | Hose barb accepts 1/8" ID tubing, quantity (2) |

9.2 PROBE SPECIFICATIONS

Specifications for the probe assembly are included for reference only. Refer to the instruction manual that come with this item for more details. In the event of discrepancies between this manual and the probe assembly manual, the probe assembly manual takes precedence.

Model PVIV-PROBE-KIT

| | |
|-----------------------------|--|
| Probe Quantity per kit | 1 |
| Probe base Quantity per kit | 1 |
| Positioning (coarse) | Magnetic |
| Positioning (fine) | X-Y joystick, Z adjustment knob |
| Positioner material | Delrin |
| Arm material | Brass |
| Probe tip material | Beryllium copper [other materials available as a special order] |
| Bracket material | Zinc plated steel |
| Arm length | 4.75" long x .087 diameter |
| Tip dimensions | .025" shank diameter, .75" long, 12 µm diameter tip |
| Magnetic mount dimensions | 1.75" long x .44" wide |
| Overall Dimensions | 3.75" high x .44" wide x 5" long at maximum arm extension |
| Wire length | 18" |
| Connector | Pin tip plug, .080 inch (2 mm) diameter |
| Maximum current | 3 amps per probe, when using the standard probe tip |
| Weight | 1 lbs (does not include packaging) |

9.3 THERMOELECTRIC CHILLER SPECIFICATIONS

Specifications for the chiller are included for reference only. Refer to the instruction manual that come with this item for more details. In the event of discrepancies between this manual and the vacuum pump manual, the chiller manual takes precedence.

Model PVIV-CHILLER

| | |
|----------------------------------|---|
| Set Point Range | 50°F to 113°F (10°C to 45°C) |
| Control Accuracy | ±2°C |
| Power Supply | 120 watt, 13.5 VDC; 85-265 VAC input, 100 – 240VAC output |
| Current | 15 Amps max |
| Maximum Coolant Outlet Pressure: | 25 psig (1.72 bar) |
| System Proof Pressure: | 50 psig (3.36 bar) |
| Coolant Fluid Connections: | Quick disconnect fittings for 1/4 OD tubing |
| Tank Volume: | 75 ml |
| Noise: | < 65 dBA with 25% propylene glycol/water |
| Dimensions: | 7.5" x 5" x 7" (L x W x H, plus fittings) |
| Weight: | 8.1 lbs (does not include packaging) |
| Operating Range | 2 – 45°C |
| Storage Environment | Less than 100°C |
| Alarm | 250 VAC 1 Amp dry contact relay |
| Communication | Top Panel or RS-232 |

9.4 VACUUM PUMP SPECIFICATIONS

Specifications for the vacuum pumps are included for reference only. Refer to the instruction manual that come with this item for more details. In the event of discrepancies between this manual and the vacuum pump manual, the vacuum pump manual takes precedence.

Model PVIV-VAC-PUMP

| | |
|-------------------|---|
| Motor | 110 VAC, 60 Hz, 1/8 HP |
| Vacuum | 650 mm Hg max |
| Power Consumption | 65 Watts |
| Current | 0.7 Amps max |
| Sound Level | 50 dB approx |
| Flow Rate | 20 lpm (at 0 mm Hg) to 2 lpm (at 600 mm Hg) |
| Port Thread | 5/16" |
| Coupler | Hose barb reducer from 5/16 ID to 1/8 ID tubing |
| Tubing | 5/16" ID PVC, 1 foot long |
| Dimensions | 11" x 6.5" x 6" |
| Weight | 7.7 lbs (does not include packaging) |

Model PVIV-VAC-PUMP-220

| | |
|-------------------|---|
| Motor | 220 VAC, 50 Hz, 1/8 HP |
| Vacuum | 650 mm Hg max |
| Power Consumption | 60 Watts |
| Current | 0.3 Amps max |
| Sound Level | 50 dB approx |
| Flow Rate | 17 lpm (at 0 mm Hg) to 1.5 lpm (at 600 mm Hg) |
| Port Thread | 5/16" |
| Coupler | Hose barb reducer from 5/16 ID to 1/8 ID tubing |
| Tubing | 5/16" ID PVC, 1 foot long |
| Dimensions | 11" x 6.5" x 6" |
| Weight | 7.7 lbs (does not include packaging) |

10 WARRANTY AND SERVICE

10.1 CONTACTING ORIEL INSTRUMENTS

Oriel Instruments belongs to Newport Corporation's family of brands. Thanks to a steadfast commitment to quality, innovation, hard work and customer care, Newport is trusted the world over as the complete source for all photonics and laser technology and equipment.

Founded in 1969, Newport is a pioneering single-source solutions provider of laser and photonics components to the leaders in scientific research, life and health sciences, photovoltaic, microelectronics, industrial manufacturing and homeland security markets.

Newport Corporation proudly serves customers across Canada, Europe, Asia and the United States through 9 international subsidiaries and 24 sales offices worldwide. Every year, the Newport Resource catalog is hailed as the premier sourcebook for those in need of advanced technology products and services. It is available by mail request or through Newport's website. The website is where one will find product updates, interactive demonstrations, specification charts and more.

To obtain information regarding sales, technical support or factory service, United States and Canadian customers should contact Oriel Instruments directly.

Oriel Instruments
31950 Frontage Road
Bozeman, MT 59715

Telephone: 877-835-9620 (toll-free in United States)
949-863-3144

Fax: 949-253-1680

Sales: orielPV.sales@newport.com
Technical assistance: orielPV.service@newport.com

Customers outside of the United States must contact their regional representative for all sales, technical support and service inquiries. A list of worldwide representatives can be found on Oriel's website: <http://www.newport.com/b/oriel>.

10.2 REQUEST FOR ASSISTANCE / SERVICE

Please have the following information available when requesting assistance or service:

- Contact information for the owner of the product.
- Instrument model number (located on the product label).
- Product serial number and date of manufacture (located on the product label).
- Description of the problem.

To help Oriel's Technical Support Representatives diagnose the problem, please note the following:

- Is the system used for manufacturing or research and development?
- What was the state of the system right before the problem?
- Had this problem occurred before? If so, when and how frequently?
- Can the system continue to operate with this problem, or is it non-operational?
- Were there any differences in the application or environment before the problem occurred?

10.3 REPAIR SERVICE

This section contains information regarding factory service for this product. The user should not attempt any maintenance or service of the system beyond the procedures outlined in this manual. This product contains no user serviceable parts other than what is noted in this manual. Any problem that cannot be resolved should be referred to Oriel Instruments.

If the instrument needs to be returned for service, a Return Merchandise Authorization (RMA) number must be obtained prior to shipment to Oriel Instruments. This RMA number must appear on both the shipping container and the package documents.

Return the product to Oriel Instruments, freight prepaid, clearly marked with the RMA number and it will either be repaired or replaced it at Oriel's discretion.

Oriel is not responsible for damage occurring in transit. The Owner of the product bears all risk of loss or damage to the returned Products until delivery at Oriel's facility. Oriel is not responsible for product damage once it has left the facility after repair or replacement has been completed.

Oriel is not obligated to accept products returned without an RMA number. Any return shipment received by Oriel without an RMA number may be reshipped by Newport, freight collect, to the Owner of the product.

10.4 NON-WARRANTY REPAIR

For Products returned for repair that are not covered under warranty, Newport's standard repair charges shall be applicable in addition to all shipping expenses. Unless otherwise stated in Newport's repair quote, any such out-of-warranty repairs are warranted for ninety (90) days from date of shipment of the repaired Product.

Oriel will charge an evaluation fee to examine the product and determine the most appropriate course of action. Payment information must be obtained prior to having an RMA number assigned. Customers may use a valid credit card, and those who have an existing account with Newport Corporation may use a purchase order.

When the evaluation had been completed, the owner of the product will be contacted and notified of the final cost to repair or replace the item. If the decision is made to not proceed with the repair, only the evaluation fee will be billed. If authorization to perform the repair or provide a replacement is obtained, the evaluation fee will be applied to the final cost. A revised purchase order must be submitted for the final cost. If paying by credit card, written authorization must be provided that will allow the full repair cost to be charged to the card.

10.5 WARRANTY REPAIR

If there are any defects in material or workmanship or a failure to meet specifications, notify Oriel Instruments promptly, prior to the expiration of the warranty.

Except as otherwise expressly stated in Oriel's quote or in the current operating manual or other written guarantee for any of the Products, Oriel warrants that, for the period of time set forth below with respect to each Product or component type (the "Warranty Period"), the Products sold hereunder will be free from defects in material and workmanship, and will conform to the applicable specifications, under normal use and service when correctly installed and maintained. Oriel shall repair or replace, at Oriel's sole option, any defective or nonconforming Product or part thereof which is returned at Buyer's expense to Oriel facility, provided, that Buyer notifies Oriel in writing promptly after discovery of the defect or nonconformity and within the Warranty Period. Products may only be returned by Buyer when accompanied by a return material authorization number ("RMA number") issued by Oriel, with freight prepaid by Buyer. Oriel shall not be responsible for any damage occurring in transit or obligated to accept Products returned for warranty repair without an RMA number. Buyer bears all risk of loss or damage to the Products until delivery at Oriel's facility. Oriel shall pay for shipment back to Buyer for Products repaired under warranty.

WARRANTY PERIOD

All Products (except consumables such as lamps, filters, etc) described here are warranted for a period of twelve (12) months from the date of shipment or 3000 hours of operation, whichever comes first.

Lamps, gratings, optical filters and other consumables / spare parts (whether sold as separate Products or constituting components of other Products) are warranted for a period of ninety (90) days from the date of shipment.

WARRANTY EXCLUSIONS

The above warranty does not apply to Products which are (a) repaired, modified or altered by any party other than Oriel; (b) used in conjunction with equipment not provided or authorized by Oriel; (c) subjected to unusual physical, thermal, or electrical stress, improper installation, misuse, abuse, accident or negligence in use, storage, transportation or handling, alteration, or tampering, or (d) considered a consumable item or an item requiring repair or replacement due to normal wear and tear.

DISCLAIMER OF WARRANTIES; EXCLUSIVE REMEDY

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES. EXCEPT AS EXPRESSLY PROVIDED HEREIN, ORIEL MAKES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, EITHER IN FACT OR BY OPERATION OF LAW, STATUTORY OR OTHERWISE, REGARDING THE PRODUCTS, SOFTWARE OR SERVICES. NEWPORT EXPRESSLY DISCLAIMS ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE FOR THE PRODUCTS, SOFTWARE OR SERVICES. THE OBLIGATIONS OF ORIEL SET FORTH IN THIS SECTION SHALL BE ORIEL'S SOLE LIABILITY, AND BUYER'S SOLE REMEDY, FOR BREACH OF THE FOREGOING WARRANTY. Representations and warranties made by any person including distributors, dealers and representatives of Oriel / Newport Corporation which are inconsistent or in conflict with the terms of this warranty shall not be binding on Oriel unless reduced to writing and approved by an expressly an authorized officer of Newport.

10.6 LOANER / DEMO MATERIAL

Persons receiving goods for demonstrations or temporary use or in any manner in which title is not transferred from Newport shall assume full responsibility for any and all damage while in their care, custody and control. If damage occurs, unrelated to the proper and warranted use and performance of the goods, recipient of the goods accepts full responsibility for restoring the goods to their original condition upon delivery, and for assuming all costs and charges.

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Part No. IQE-TC-VAC