Please read this instruction manual carefully and follow all installation, operating and safety guidelines.
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WARRANTY

Terms and Conditions applying to all PACE Technologies Products

1. LIMITED WARRANTY AND DISCLAIMER:
PACE Technologies Products are warranted for one year from the purchase date to be free from defects in material and workmanship under correct use, normal operating conditions, and proper application. PACE Technologies obligation under this warranty shall be limited to the repair or exchange, at PACE Technologies option, of any PACE Technologies Product or part which proves to be defective as provided herein. PACE Technologies reserves the right to inspect the product at Buyer’s location or require it to be returned to the factory for inspection. Buyer is responsible for freight to and from factory on all warranty claims. The above warranty does not extend to goods damaged or subjected to accident, abuse or misuse after release from PACE Technologies warehouse, nor goods altered or repaired by anyone other than specifically authorized PACE Technologies representatives. PACE Technologies shall not in any way be responsible for the consequences of any alteration, modification or misuse unless previously approved in writing by an officer of PACE Technologies.

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2. LIABILITY CAP:
PACE Technologies maximum aggregate liability for loss and damage arising under, resulting from or in connection with the supply or use of the Equipment and Consumables provided under this purchase, or from the performance or breach of any obligation (s) imposed hereunder, whether such liability arises from any one or more claims or actions for breach of contract, tort, (including negligence), delayed completion, warranty, indemnity, strict liability or otherwise, unless otherwise limited by the terms hereof, shall be limited to one hundred percent (100%) of the purchase price.

3. DELIVERY:
Customer assumes and shall bear the risk of all loss or damage to the Products from every cause whatsoever, whether or not insured, and title to such Products shall pass to Customer upon PACE Technologies delivery of the Products to the common carrier of Pace Technologies choice, or the carrier specified in writing by Customer, for shipment to Customer. Any claims for breakage, loss, delay, or damage shall be made to the carrier by the Customer and Pace Technologies will render customer reasonable assistance in prosecuting such claims.

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4. ACCEPTANCE:
Customer shall inspect the Products promptly upon receipt of delivery. Unless customer objects in writing within thirty (30) business days thereafter, customer shall be deemed to have accepted the Products. All claims for damages, errors, or shortage in Products delivered shall be made by Customer in writing within such five (5) business day period. Failure to make any claim timely shall constitute acceptance of the Products.

5. PAYMENT:
Customer agrees to provide timely payment for the Products in accordance with the terms of payment set forth on the reverse side hereof or in any proposal submitted herewith. If any payment is not paid on or before its due date, Customer shall pay interest on such late payment from the due date until paid at the lesser of 12% per annum or the maximum rate allowed by law.

6. DEFAULT:
If Buyer is in default (including, but not limited to, the failure by Buyer to pay all amounts due and payable to Seller) under the work or purchase order or any other agreement between Buyer and Seller, Buyer’s rights under the warranty shall be suspended during any period of such default and the original warranty period will not be extended beyond its original expiration date despite such suspension of warranty rights.

7. MISCELLANEOUS PROVISIONS:
This agreement has been made in and shall be governed by the laws of the State of Arizona. These terms and conditions and the description of the Products on the reverse side hereof or in any proposal submitted herewith constitute the entire agreement and understanding of the parties with respect to this sale and supersede all prior and contemporaneous agreements or understandings, inducements or representations, expressed or implied, written or oral, between the parties with respect hereto. Any term or provision of this Agreement may be amended, and any observance of any term of this Agreement may be waived, only by a writing signed by the party to be bound. The waiver by a party of any breach shall not be deemed to constitute a waiver of any other breach. Should suit be brought on this Agreement, the prevailing party shall be entitled to recover its reasonable attorneys’ fees and other costs of suit including costs and attorneys’ fees incurred on appeal or in collection of any judgment.
1.0 Product Description

1.1 General Description

The VACUUM MOUNTING CHAMBER is designed to fill voids in specimens by first pulling a vacuum, then pouring the resin, followed by slowly increasing the pressure in order to force or push the castable resin (epoxy, acrylic or polyester) into the void, pores, cracks or other crevices in the specimen.
1.2 Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical specifications:</td>
<td>110V or 220V pump</td>
</tr>
<tr>
<td>Weight:</td>
<td>Approx. 5 lbs (2.2 kg) without pump</td>
</tr>
<tr>
<td>Dimensions (WxDxH):</td>
<td>Approx. 12” x 12” x 12”</td>
</tr>
<tr>
<td></td>
<td>(300 mm x 300 mm x 300 mm)</td>
</tr>
<tr>
<td>Working temperature:</td>
<td>32° - 100°F (0 - 40°C)</td>
</tr>
<tr>
<td>Shipping temperature:</td>
<td>32° - 100°F (0 - 40°C)</td>
</tr>
<tr>
<td>Storage temperature:</td>
<td>32° - 100°F (0 - 40°C)</td>
</tr>
<tr>
<td>Maximum diameter sample</td>
<td>2.5” (65 mm)</td>
</tr>
<tr>
<td>Construction</td>
<td>Plastic</td>
</tr>
</tbody>
</table>
2.0 Unpacking, Shipping and Installation

2.1 Unpacking

Unit is delivered in a box. Unpack and check for completeness of parts.

Measures WxHxD: 12” x 12” x 12”

Weight: Approximately 5 lbs

2.2 Shipping

No special consideration
2.3 Installation

Install unit carefully! Improper installation voids warranty.

The **VACUUM MOUNTING CHAMBER** should be placed on a flat stable surface. Connect vacuum pump or vacuum source.

After connection to vacuum, the system is ready for operation.

2.3.1 Filter

Remove cap  
Install filter  
Replace cap
3.0 Safety Guidelines

3.1 Warning Sign

! This sign points to special safety features on the machine.

3.2 Safety Precautions

! Careful attention to this instruction manual and the recommended safety guidelines is essential for the safe operation of the VACUUM MOUNTING CHAMBER.

! Proper operator training is required for operation of the VACUUM MOUNTING CHAMBER. Any unauthorized mechanical and electrical change, as well as improper operation, voids all warranty claims. All service issues need to be reported to the

! Operate unit as specified in this manual.
4.0 Start-up and Operation

4.1 General

The VACUUM MOUNTING CHAMBER is for castable mounting resins.

4.2 Add oil to vacuum

4.3 Mix resin and position molds in chamber

Please read this instruction manual carefully and follow all installation, operating and safety guidelines.
4.3 Close valve and pull vacuum

Close valve and turn on vacuum (DO NOT POUR YET)

Pull vacuum for approximately 1 minute (do not let resin degass too much - turn off pump when resins starts to froth)

4.4 Pour resin under vacuum

Pour resin into molds while holding vacuum

When vacuum is reached, turn off pump and close valve to hold vacuum

4.5 Slowly open valve and let resin cure at room pressure

Open valve slowly.

NOTE: If the pressure is increased too fast the resin will splash all over the chamber creating a big mess.

Allow resin to cure at room pressure.

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4.4 Metallographic Castable Mounting Basics

Vacuum/Pressure Mounting

Vacuum impregnation is a very useful technique used to fill in pores or voids prior to specimen preparation. It is highly useful for thermal spray coatings and other porous samples.

The most effective technique is to pour the resin under vacuum and/or apply pressure during the curing cycle (advantages - better infiltration of pores and cracks, more transparent mounts, and fewer air bubbles) (see Figure 1).

For porous or cracked specimens, the resin can aid in supporting these features. Filling these voids can be difficult depending upon their size, with the smaller voids being much more difficult to impregnate than larger voids. This arises mainly because of the compressibility and volume of air within the void. By applying a vacuum to the specimen and pouring while under vacuum the total pressure of this air can be reduced significantly. Subsequent curing at increased pressures will force (or push) the resin into the voids. Note that the vacuum time on both the resin and specimen should be kept to a minimum in order to minimize degassing of the resin.

$$PV = nRT \text{ (gas law)}$$

P - Pressure
V - Volume
T - Temperature

$$V(\text{bubble size}) = \frac{nRT}{P}$$
Thus in order to decrease the air bubble size, impregnate at low pressures and cure at higher pressures.

Recommended Procedure:
1. Place mold and sample into impregnation chamber
2. Mix castable mounting resin
3. Place cover on chamber and pull vacuum
4. Close valve and turn off vacuum pump
5. Pull vacuum to –20 to –25 in Hg, close valve on pump to chamber and turn off pump
6. Pour resin into mount under vacuum
7. Slowly increase the pressure in chamber to room pressure
8. Allow the mount to cure at room pressure or apply an external pressure.

TIP: Do not pull vacuum for more than 60 seconds. Extended vacuum causes the dissolved gases in the liquid resin to degass and bubble (similar to opening up a carbonated beverage bottle).

TIP: To reduce the curing time, preheat resin, hardener and specimen to 30°C (85°F). Note: this will also increase maximum exotherm.

TIP: Slight preheating of the epoxy will also reduce the viscosity of the resin and allow it to flow better.
5.0 Maintenance

5.1 Introduction

The VACUUM MOUNTING CHAMBER requires very minimal maintenance.

5.2 Cleaning cover

The cover should be cleaned occasionally with a moistened cloth. Do not use any chemicals or cleaning abrasives.

6.0 Trouble Shooting

More extensive trouble shooting, repair guides, video’s, parts list are provided online at www.metallographic.com or

http://www.metallographic.com/PACE-service/Vacuum-service.html

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resin splattering</td>
<td>Increasing pressure too fast</td>
<td>Open valve slowly</td>
</tr>
</tbody>
</table>
7.0 Recommended Consumables

- Reusable rubber molds
- 2-piece reusable molds
- Specimen mounting clips, plastic or metal
- Epoxy resins
- Acrylic resins
- Polyester resins
8.0 Spare Parts

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electrical</strong></td>
<td></td>
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</tr>
<tr>
<td>VAC-PUMP-220</td>
<td>220V vacuum pump</td>
<td><img src="VAC-PUMP-220.png" alt="Image" /></td>
</tr>
<tr>
<td>VAC-PUMP-110</td>
<td>110 V vacuum pump</td>
<td><img src="VAC-PUMP-110.png" alt="Image" /></td>
</tr>
<tr>
<td><strong>Mechanical</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VAC-001</td>
<td>Cup Holder Ring</td>
<td><img src="VAC-001.png" alt="Image" /></td>
</tr>
<tr>
<td>VAC-P-PCH</td>
<td>Pouring cup holding bolt</td>
<td><img src="VAC-P-PCH.png" alt="Image" /></td>
</tr>
<tr>
<td>VAC-002</td>
<td>Pouring Rod</td>
<td><img src="VAC-002.png" alt="Image" /></td>
</tr>
<tr>
<td>VAC-SOR</td>
<td>Vacuum rod sealing O-rings</td>
<td><img src="VAC-SOR.png" alt="Image" /></td>
</tr>
<tr>
<td>VAC-003</td>
<td>Vacuum Release Valve</td>
<td><img src="VAC-003.png" alt="Image" /></td>
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</tbody>
</table>

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</tr>
</thead>
<tbody>
<tr>
<td>VAC-P-PRC</td>
<td>Pressure release cock</td>
<td></td>
</tr>
<tr>
<td>VAC-TOP</td>
<td>Vacuum impregnation cover</td>
<td></td>
</tr>
<tr>
<td>VAC-VBO</td>
<td>Vacuum bowl</td>
<td></td>
</tr>
<tr>
<td>VAC-VCFBO</td>
<td>Vacuum inside chamber flat bowl</td>
<td></td>
</tr>
<tr>
<td>VAC-RGFI</td>
<td>Pouring rod guide fitting</td>
<td></td>
</tr>
<tr>
<td>VAC-RGFN</td>
<td>Pouring rod guide fitting retaining nut</td>
<td></td>
</tr>
<tr>
<td>VAC-RING</td>
<td>Vacuum chamber O-ring</td>
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</table>
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