PRODUCT WARRANTY

Emerson warrants its Penberthy products as designed and manufactured to be free of defects in the material and workmanship for a period of one year after the date of installation or eighteen months after the date of manufacture, whichever is earliest. Emerson will, at its option, replace or repair any products which fail during the warranty period due to defective material or workmanship.

Prior to submitting any claim for warranty service, the owner must submit proof of purchase to Emerson and obtain written authorization to return the product. Thereafter, the product shall be returned to Emerson with freight prepaid.

This warranty shall not apply if the product has been disassembled, tampered with, repaired or otherwise altered outside of the Emerson factory, or if it has been subject to misuse, neglect or accident.

The responsibility of Emerson hereunder is limited to repairing or replacing the product at its expense. Emerson shall not be liable for loss, damage or expenses related directly or indirectly to the installation or use of its products, or from any other cause or for consequential damages. It is expressly understood that Emerson is not responsible for damage or injury caused to other products, buildings, personnel or property, by reason of the installation or use of its products.

This document and the warranty contained herein may not be modified and no other warranty, expressed or implied, shall be made by or on behalf of Emerson unless made in writing and signed by the company’s general manager or director of engineering.
2 INTRODUCTION

2.1 Features and specifications
Penberthy models GL and GH gas operated jet pumps are designed primarily for exhausting, evacuating and priming using steam or air as the operating medium; and for pumping water using steam as the operating medium. They can also be used with other gases as the operating medium.

2.2 Design ratings at maximum and minimum operating temperatures (see Table 1)
To determine the maximum allowable working pressure for a specific temperature within the design limits stated in Table 1, the user should refer to relevant data sheets or, when provided, the specifically stated design limits on a product proposal.

<table>
<thead>
<tr>
<th>Material</th>
<th>Bodies</th>
<th>Nozzles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50 psig [340 kPaG] at +350°F [177°C]</td>
<td></td>
</tr>
<tr>
<td>Bronze</td>
<td>125 psig [860 kPaG] at +400°F [204°C]</td>
<td>200 psig [1380 kPaG] at -20°F [-29°C] to +400°F [204°C]</td>
</tr>
<tr>
<td>316 SST</td>
<td>200 psig [1380 kPaG] at -150°F [-101°C] to +150°F [66°C]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>125 psig [860 kPaG] at +400°F [204°C]</td>
<td>200 psig [1380 kPaG] at -150°F [-101°C] to +400°F [204°C]</td>
</tr>
</tbody>
</table>

Note: For specific application data within the above ranges, the user should consult the product proposal for the specific model and size jet pump, or should request the supply of the applicable technical data sheet.

WARNING
Under no circumstances should these design ratings or application data be exceeded. Exceeding design ratings or application data may cause severe physical injury or property damage.
4 INSTALLATION

**Note:** The user should refer to the relevant technical data sheet or product proposal to obtain dimensional information for the specific size and model of jet pump.

Check the exploded view (Figure 3) for the location of operating, suction and discharge connections to ensure correct hook up.

### 4.1 Effect of related piping and precautions

1. Penberthy models GL and GH gas operated jet pumps may be installed and operated in any position.
2. Jet pumps should be installed with pipe and fittings which provide minimum resistance to fluid flow. Pipe line friction losses must always be a consideration when estimating jet pump performance.
3. It is recommended that provisions be made for pressure gauge connections near the inlet, suction and discharge connections of the jet pump. If operating difficulties are encountered at any time, it may become necessary to install pressure gauges to identify the problem.
4. Steam must not have over 20°F (-7°C) of superheat, or performance will differ from that published in the relevant technical data sheet or product proposal referred to above.
5. When pumping liquids, suction piping should be sized so that the velocity of the liquid does not exceed 4 feet per second. This is almost always obtained automatically when the suction line is the same pipe size as the suction connection.
6. Install a valve in the suction line if it is desirable to:
   a. Prevent contamination of suction fluid by the motive fluid at start up.
   b. Prime a centrifugal pump.
   c. Throttle suction flow.
7. When a gas operated jet pump is used to lift liquids by suction or vacuum, the jet pump should be located as close to the level of the liquid as practical. However, any liquid entrained into the jet pump, other than water when using steam as the operating medium, may cause the jet pump to stop pumping, resulting in a possible suction flow reversal.
8. Discharge piping should be sized as short as possible and with the least number of turns and restrictions. Discharge piping friction losses must always be considered when estimating jet pump performance. Increase discharge line pipe size if necessary to minimize loss.
9. Do not impose system piping loads on a jet pump. The unit is NOT designed to be a load-bearing fitting.
10. All piping should be clean and free of foreign materials which could clog the jet pump.

5 OPERATION

### 5.1 Pre-operational check

1. Ensure that all installation procedures have been completed.
2. Ensure that any restrictions in the discharge line have been removed.
3. Ensure that any discharge line valves are fully open.
4. Ensure that the suction line valve, if installed, is fully closed.

### 5.2 Operating

1. Open the motive valve quickly.
2. Open the suction line valve, if any.
3. Regulate the discharge pressure as desired to a value within the capability published in the relevant technical data sheet or product proposal referred to above.
4. For pump priming applications, when evacuation is completed, close the suction valve and immediately start the centrifugal pump. Then shut off the motive valve to the jet pump.
WARNING
Maintenance should only be undertaken by qualified, experienced personnel who are familiar with this equipment and have read and understood all the instructions in this manual. DO NOT proceed with any maintenance unless the jet pump has been relieved of all pressure or vacuum, has been allowed to reach ambient temperature and has been drained or purged of all fluids. Failure to follow these instructions may cause a sudden release of pressure resulting in personal injury or property damage.

6.1 Preventative maintenance
The following items should be evaluated regularly by the user for purposes of maintenance:
1. Jet pump units for corrosion or debris build up.
2. Piping and fittings for corrosion or debris build up.
3. All connections for tightness.
4. Strainers for debris build up.
5. Units for wear.

The user must determine an appropriate maintenance schedule most suitable for his or her specific application, upon evaluation of their own application and the factors stated above.

6.2 Troubleshooting (see Table 2)

<table>
<thead>
<tr>
<th>TABLE 2 - TROUBLESHOOTING</th>
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</thead>
<tbody>
<tr>
<td>Problem</td>
</tr>
<tr>
<td>The suction flow is less</td>
</tr>
<tr>
<td>than expected</td>
</tr>
<tr>
<td></td>
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<td></td>
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</tbody>
</table>

WARNING
Do not proceed with removal of the jet pump from connecting piping unless the jet pump has been relieved of all pressure or vacuum, has been allowed to reach ambient temperature and has been drained or purged of all fluids. Failure to follow these instructions may cause personal injury or property damage.

Models GL and GH jet pumps are made up of two parts (see Figure 3): a nozzle (61) and a body (11) which are held together by a straight right hand mechanical thread, closing the face seal between these parts.

To disassemble the unit, first attach a short piece of pipe to the suction connection as a handle, then grip the nozzle flats and rotate in a counterclockwise direction.

When ready to reassemble the unit, be sure the seal face of the nozzle and body are free of foreign material and raised metal due to nicks. A non-hardening pipe seal compound may be applied to the threads to promote sealing further. Thread the body back on to the nozzle turning in a clockwise direction.

Penberthy jet pumps are used in a variety of fluid applications. By following the appropriate federal and industry regulations, the user must determine the extent of preparation and treatment the jet pump must incur before its disposal. A Material Safety Data Sheet (MSDS) may be required before disposal services accept certain components.

Metal, glass and polymers should be recycled whenever possible. Refer to order and relevant technical data sheets for materials of construction.
9 TELEPHONE ASSISTANCE

If you are having difficulty with your jet pump, contact your local Penberthy distributor. So that we may assist you more effectively, please have as much of the following information available as possible when you call:
- Model number
- Name of the company from whom you purchased the jet pump
- Invoice number and date
- Process conditions (pressure, flow rates, tank shape, etc.)
- A brief description of the problem
- Trouble shooting procedures that failed

If attempts to solve your problem fail, you may request to return your jet pump to the factory for intensive testing. You must obtain a Return Authorization (R.A.) number from Emerson before returning anything. Failure to do so will result in the unit being returned to you without being tested, freight collect. To obtain an R.A. number, the following information [in addition to that above] is needed:
- Reason for return
- Person to contact at your company
- ‘Ship-to’ address

There is a minimum charge for evaluation of non-warranty units. You will be contacted before any repairs are initiated should the cost exceed the minimum charge. If you return a unit under warranty, but it is not defective, the minimum charge will apply.

10 EXPLODED PARTS DRAWING

FIGURE 3

PARTS LIST

<table>
<thead>
<tr>
<th>Ref. nr</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Body</td>
</tr>
<tr>
<td>61</td>
<td>Nozzle</td>
</tr>
</tbody>
</table>

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