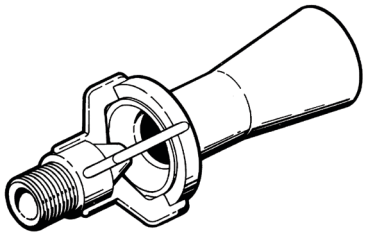
PENBERTHY MODEL TME MIXER

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

Before installation, these instructions must be read carefully and understood.



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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 is Emerson's sole warranty and in lieu of all other warranties, expressed or implied which are hereby excluded, including in particular all warranties of merchantability or fitness for a particular purpose.

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.

1 ABOUT THE MANUAL

This manual has been prepared as an aid and guide for personnel involved in installation or maintenance. All instructions must be read and understood thoroughly before attempting any installation, operation or maintenance.

Safety instructions
Emerson does not have any control over the manner in which its TME is handled, installed or used, and Emerson cannot and does not warrant or guarantee that a TME is suitable for or compatible with the user's specific application.

WARNING
Safety glasses should be worn when in the area of a TME installation. Failure to follow any instruction may cause a malfunction of the TME resulting in severe physical injury or property damage.

2 INTRODUCTION

2.1 Features and specifications
Penberthy TMEs are designed for in-tank mixing of liquids using a liquid as the motive fluid. Mixing is accomplished first within the TME as the motive liquid entrains the tank contents into the suction openings, and thoroughly mixes within the unit before being discharged. The discharge flow, or plume, provides further mixing and agitation within the tank. The motive liquid can be drawn from the tank, or it can be a second liquid drawn from another source.

2.2 Design ratings

TABLE 1

Size	Material	Maximum allowable working pressure
¾"	25% Glass-filled polypropylene	100 psig (690 kPaG) at 0°F [-18°C] to 220°F [104°C]
1½"	25% Glass-filled polypropylene	100 psig (690 kPaG) at 0°F [-18°C] to 220°F [104°C]

2.3 Application data
1. Mixing
   Minimum inlet pressure - 10 psig (70 kPaG)
   Maximum inlet pressure - 100 psig (690 kPaG)

Most efficient operation takes place when inlet pressure is within the range of 20 to 70 psig (140 to 480 kPaG). Four gallons of tank contents can be mixed for every gallon of operating fluid. For inlet pressures outside this range, tank contents mixed will be reduced.

Note: for specific application data within the above ranges, the user should consult the product proposal for the specific model and TME size 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.

3 INSPECTION AND PERFORMANCE CONFIRMATION

3.1 Receiving inspection
Upon receipt of the TME, check all components carefully for damage incurred in shipping. If damage is evident or suspected, do not attempt installation. Notify the carrier immediately and request a damage inspection.

3.2 User's rating inspection
The user should confirm that:
1. The TME size (molded on side of body) conforms to the description on the user's purchase order.
2. The operating conditions described in the purchase order agree with the actual conditions at the installation site.
3. The actual operating conditions at the installation site are within the application data shown on the applicable technical data sheet or product proposal referred to above.
4. The materials of construction of the TME are compatible with both the contained fluid and surrounding atmosphere in the specific application.

Safety instructions
If the size, model or performance data of the TME as received do not conform with any of the criteria above, do not proceed with installation. Contact an authorized Penberthy distributor for direction.

4 INSTALLATION

Installation should only be undertaken by qualified experienced personnel who are familiar with this equipment and have read and understand all the instructions in this manual. The user should refer to relevant technical data sheets or product proposal to obtain dimensional information for the specific size and model TME.
Check the TME cut-away view (Figure 1) for the location of the threaded inlet port.

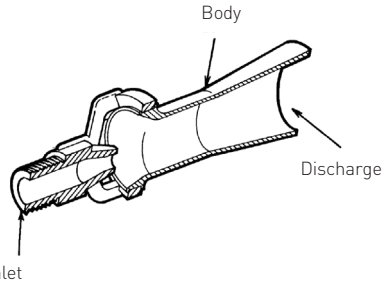

FIGURE 1

4.1 Mounting
A TME can be mounted in any position. The supply line and manifold piping to multiple TMEs must be sized to supply uniform pressure to each TME.

It is important that the TME be positioned within the tank so as to insure the free flow of liquid to be mixed into and out of the unit(s). The greatest agitation occurs within the discharge plume; therefore, the discharge end should be aimed towards the most remote part of the tank. On the other hand, the intake end of the unit must be far enough from the tank corner or wall to allow the free flow of liquid into the suction openings.

Tank shape and size influence the placement and number of TMEs required to maintain even agitation or temperature distribution. With a spherical tank, a single TME mounted as shown in Figure 2 makes the best use of the mixing characteristics of the TME. With no corners to impede liquid flow, the liquid circulates evenly.

In a cylindrical, square or rectangular tank, the angular intersection of surfaces can interrupt liquid flow patterns and cause liquid stagnation in these areas. A single TME mounted as shown in Figure 3 will minimize this. Whenever the ratio of length to diameter of the tank is greater than 2:1 (such as tank trucks or railroad cars), it is recommended that multiple TMEs be used.

In tanks where a critical velocity must be maintained on the tank bottom, a slight downward angle of the TMEs can be helpful. (See Figure 4).

4.2 Effect of related piping and precautions
1. For mixing
   a. Operating liquid supply line pressure loss must be taken into account when applying TMEs.
   b. The supply line must be clean and should be provided with a strainer to prevent foreign materials from clogging the mixer.
   c. TMEs must be fully submerged to prevent liquid from splashing and drawing atmospheric air and to promote maximum mixing.
   d. Clearance should be provided for removal of the TME.
   e. Provisions should be made for a pressure gauge connection at or near the TME inlet. It may become necessary to install a pressure gauge if operating difficulties are encountered.
   f. Inlet piping must be secured to the tank wall near the TME to keep strain off piping when in operation.
   g. Supply line and manifold piping must be sized to supply adequate pressure equally to each TME when multiple TMEs are used.

5 OPERATION

5.1 Pre-operational check
1. Ensure that all installation procedures have been completed.
2. Fill the tank with sufficient liquid for full submergence of the TME.

5.2 Operating
1. For mixing
   a. Turn operating fluid flow on (depending upon the application, this may be liquid drawn from the tank or it can be a second liquid drawn from another source).

6 MAINTENANCE

Maintenance should only be undertaken by qualified, experienced personnel who are familiar with this equipment and thoroughly understand all the instructions in this manual.

CAUTION
Do not proceed with any maintenance unless the TME 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 user must create maintenance schedules, safety manuals and inspection details for each specific installation of a TME Mixer.
On all installations, the following items should be regularly evaluated by the user for purposes of maintenance:
1. TME(s) for pitting or debris build up.
2. Piping and fittings for corrosion or debris build up.
3. All connections for tightness.
4. Units for wear.
5. Units for full submergence.

The user must determine an appropriate maintenance schedule necessary for his or her own specific application, upon evaluation of their operating experience. Realistic maintenance schedules can only be determined with full knowledge of the services and application situation involved.

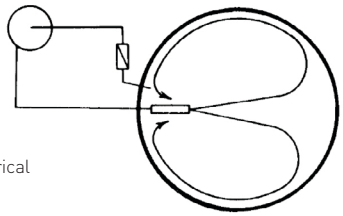
Spherical

FIGURE 2

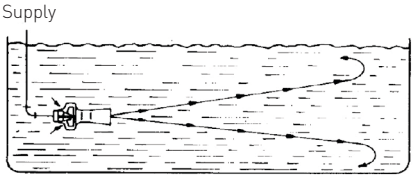

FIGURE 3

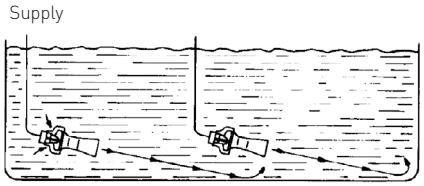

FIGURE 4

6.2 Troubleshooting

TABLE 2

Problem	Cause	Solution
No mixing	1. Inadequately sized TME	1. Obtain properly sized TME
	2. Debris blockage of inlet, suction or discharge	2. Remove debris
	3. Loss of operating fluid due to loose connections	3. Tighten connections
	4. Operating fluid pressure too low	4. Increase pressure
Partial mixing	1. Debris blockage	1. Remove debris
	2. Operating fluid pressure too low	2. Increase pressure

7 DISASSEMBLY - REASSEMBLY

CAUTION
Do not proceed with removal of the TME from connecting piping unless the TME 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 comply could cause an unexpected burst of liquid or steam with resulting personal injury or property damage.

8 DISPOSAL AT END OF USEFUL LIFE

Penberthy TMEs 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 TME 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 the applicable technical data sheet for materials of construction.

9 TELEPHONE ASSISTANCE

If you are having difficulty with your TME, 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 #
- Name of the company from whom you purchased the TME
- Invoice # 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 TME 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.