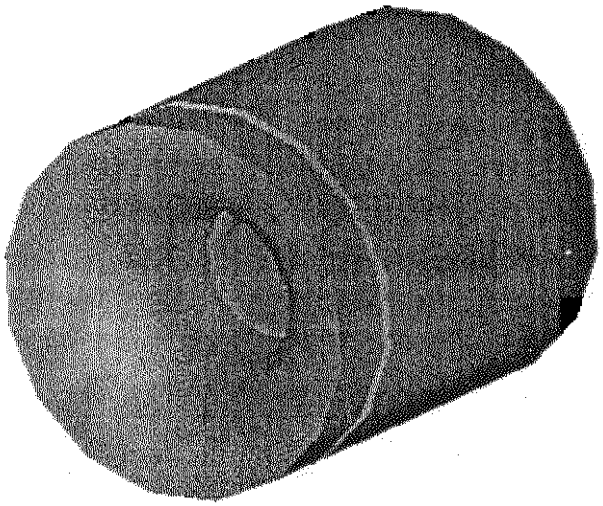
Section 1000
Bulletin 1973
Issued 11 / 00
Replaces: New

Penberthy®

Jet Pumps

Model GST



Installation/Operation/Maintenance Instructions

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PRODUCT WARRANTY

Penberthy warrants its products as designed and manufactured by Penberthy to be free of defects in 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. Penberthy 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 Penberthy and obtain written authorization to return the product. Thereafter, the product shall be returned to Penberthy in Prophetstown , Illinois, with freight prepaid.

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

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

THIS IS PENBERTHY'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 Penberthy, unless modified or made in writing and signed by the President or a Vice President of Penberthy.

1.0 About the Manual

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

Penberthy does not have any control over the manner in which its jet pumps are handled, installed or used. Penberthy cannot and will not guarantee that the jet pump is suitable or compatible for the user's specific application.

⚠ WARNING ⚠

Pressurized fluid streams for jet operation can unexpectedly exit pipelines or unusual mechanical stresses can cause material failure. Safety glasses should be worn when in the area of a GST jet installation. Failure to do so can result in personal injury and property damage.

2.0 Introduction

The GST (gas-operated solids transport) unit is a gas (usually air) operated jet pump used to move dry solids through a closed piping system. Penberthy's model GST jet pumps are recommended for use in applications where rapid transfer of solids and / or complete containment is desired.

2.1 System Description

The Penberthy GST jet pumps utilize the tendency of a moving stream of air to shear towards a fixed boundary. This is known as the Coanda effect. This shearing effect and the geometry of the jet pump cause entrainment of air and solid material in front of the GST. This entrained solid material is then transported down a length of pipe.

3.0 Available Models

The Penberthy GST jet pump is available in 1½", 2", 3", 4"and 6" sizes as standard. Standard materials of construction include aluminum, carbon steel, brass, stainless steel and PVC. Consult factory for other sizes or materials.

4.0 Inspection

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

The user should confirm that :

A. The unit delivered matches the size, material of construction and model on the purchase order.

B. The operating conditions originally described match the actual conditions at the installation site.

C. The unit delivered accommodates the actual operating conditions at the installation site.

CAUTION

If the size, model or performance data of the jet pump as received does not conform with any of the criterion above, do not proceed with installation. Contact an authorized Penberthy distributor for assistance. The incorrect jet pump can result in unacceptable performance and potential material failure.

5.0 Installation

Installation should only be undertaken by qualified personnel who are familiar with this type of equipment. They should have read and understood all of the instructions in this manual.

The user should refer to Penberthy dimension sheets to obtain dimensional information for the specific size and model.

Check the cut-away view on page 6, figure 4 for the location of air supply and discharge connections to insure correct hook up.

5.1 Effect of Related Piping and Precautions

A Penberthy GST jet pump can be installed and operated in any position. Two common methods of operation are:

1) The unit may be rigidly fixed to a discharge pipe and fed by a metering system such as a hopper as shown in *fig. 1*

2) The unit may be attached to a short length of flexible tubing allowing for greater user mobility (*fig. 2*).

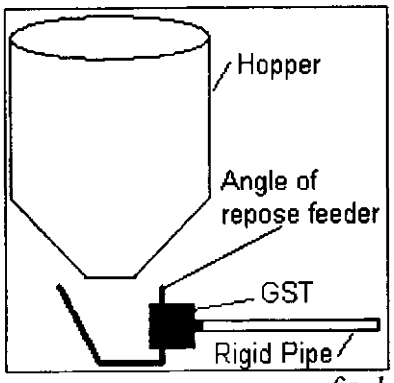


fig. 1

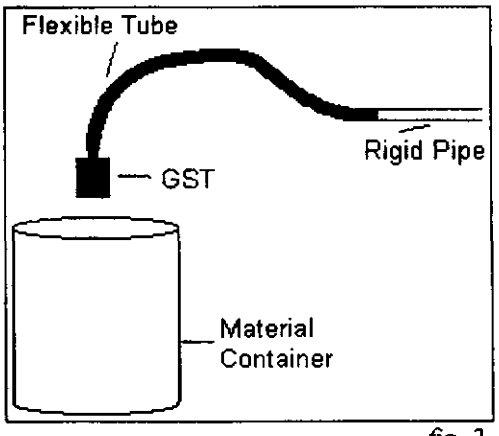


fig. 2

The GST jet pump should be installed with pipe and fittings which provide minimum resistance to flow. On long piping runs, pipeline friction losses must always be a consideration when estimating jet performance.

A. All piping should be free of foreign materials and internal irregularities or discontinuities. Their presence could contribute to clogging of the transport line.

B. When moving particulate solids in piping, static electrical charges will accumulate. Non-conductive piping (eg. PVC or other polymer) must be effectively earth grounded by a helical pattern winding of bare metal wire or conductive tape with multiple ground taps. Electrically conductive piping should be grounded at both ends. This is to prevent static electricity from building up that may result in a potentially hazardous spark discharge.

C. The unit should be installed with pipe and fittings which provide minimum resistance to flow. When considering piping runs, design such runs with a minimum number of turns and restrictions so as to limit the impediment to the direct flow of the solids involved. When turns are required, a bend with a relative bend ratio of 3 - 5 or flow bends should be used rather than typical elbows. All joints and / or pipe couplings should be as smooth in transition from one length of pipe to another as is possible. This will insure more efficient operation by reducing piping restrictions or irregularities and allowing the solids to flow freely in the pipe run.

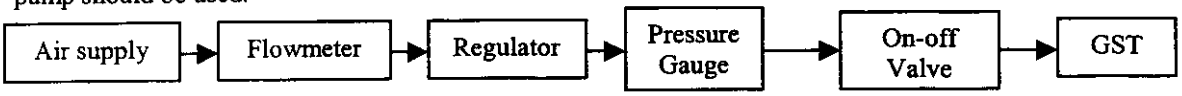
D. Do not impose mechanical piping loads on the jet itself. The unit is NOT designed to be a load-bearing fitting. Support the jet pump to avoid excessive mechanical loads.

DANGER

IT IS IMPERATIVE THAT THE SYSTEM BE EARTH GROUNDED TO PREVENT STATIC DISCHARGE. FAILURE TO DO SO MAY LEAD TO A "DUST EXPLOSION" RESULTING IN SEVERE PERSONAL INJURY, DEATH AND / OR EXTENSIVE PROPERTY DAMAGE.

5.2 Pneumatic Requirements

Penberthy suggests that provisions be made for the installation of a flow meter, a pressure regulator, and a pressure gauge in the air supply line. This will allow for easier control and adjustment of the unit during start-up, while in operation and aid in troubleshooting. An on-off valve (ball type suggested) near the jet pump should be used.



6.0 Operation

6.1 Pre-Operational Check

Before start-up, the operator should assure that:
A. all installation procedures have been completed.

B. any irregularities in the discharge line have been eliminated.

C. no mechanical stress is applied to the unit.
D. the entire system is effectively earth grounded.

6.2 Start-Up

A. Set pressure regulator to desired operating air pressure.

B. Open the operating air valve.

C. Adjust intake of jet to achieve desired flow rate by rotating the intake section (see page 6, fig 4) of the GST. Turn intake clockwise to decrease air flow rate, and counterclockwise to increase air flow rate.

D. For a hopper feed application, adjust the material feed rate to avoid exceeding the jet pump intake rate. This will prevent the possible bridging of the material which may choke the intake of the unit.

E. For manual feed application, place the jet into the material, being sure to avoid burying the jet. Some types of materials (especially those that tend to compact like fine powders) may need to be "skimmed" from the top of the material being moved. An optional coaxial fluidizer unit can also be used in tandem with a GST to aid in entrainment and transport of fine powders.

F. Refer to bulletin #1210 for suggested starting operating parameters

7.0 Maintenance

Maintenance should only be undertaken by qualified personnel who are familiar with this type of equipment and have read and understood all the instructions in this manual.

WARNING

Do not proceed with any maintenance on a GST unit still at operating pressure. Relieve the unit of pressure. Failure to do so could result in personal injury or property damage.

7.1 Preventive Maintenance

The user must create maintenance schedules, safety manuals and inspection details for each specific jet installation.

On all installations, the following items should be regularly evaluated by the user for purposes of maintenance:

A. Jet pumps for corrosion or debris build up.
B. Piping or fittings for corrosion or debris build up.
C. All connections for tightness.
D. Units for wear.

The GST jet pump may be disassembled for periodic cleaning and inspection. Turn the intake section counterclockwise to remove it from the body. Check the o-ring for excessive wear or damage and replace if necessary. New o-rings should be lubricated with a silicone oil or equivalent or o-ring seizure may occur.
The user must determine upon evaluation of his or her own operating experience an appropriate maintenance schedule necessary for his or her specific application. Realistic maintenance schedules can only be determined with full knowledge of the services and application situation involved.

7.2 Troubleshooting

Problem:	Cause:	Remedy:
Material flow is less than expected	Insufficient air flow	Increase air flow Increase air supply line size
	Excessive air flow	Decrease air flow by turning intake clockwise
	Discharge head is too great for current intake setting	Increase pressure within tabled limits
	Material not well fluidized	Implement feed control / metering
Transfer rate too low	Insufficient air supply pressure	Increase air pressure
Discharge piping clogged	Feed rate too high	Implement feed control / metering
	Material not well fluidized	Increase air flow

Table 1

8.0 Telephone Assistance

If you are having difficulty with your GST jet pump, notify your local Penberthy distributor. You may also contact the factory direct at (815) 537-2311 and ask for jet product team. So that we may assist you more effectively, please have as much of the following information as possible when you call:

. Model #
. Name of the company from whom you purchased your GST jet pump
. Invoice # and date
. Motive fluid
. Type of solid involved along with its bulk density and maximum particle size and shape
. Total run description including bends, constrictions, etc.
. Operating pressure
. A brief description of the problem
. Troubleshooting procedures that failed

If attempts to solve your problem fail, you may be requested to return your unit to the factory for intensive testing. You must obtain a Return Authorization (R.A.) number from Penberthy prior to 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

We recommend that you return the entire unit for testing. There is a minimum charge assessed 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 that is covered by the warranty, but is not defective, the minimum charge will apply.

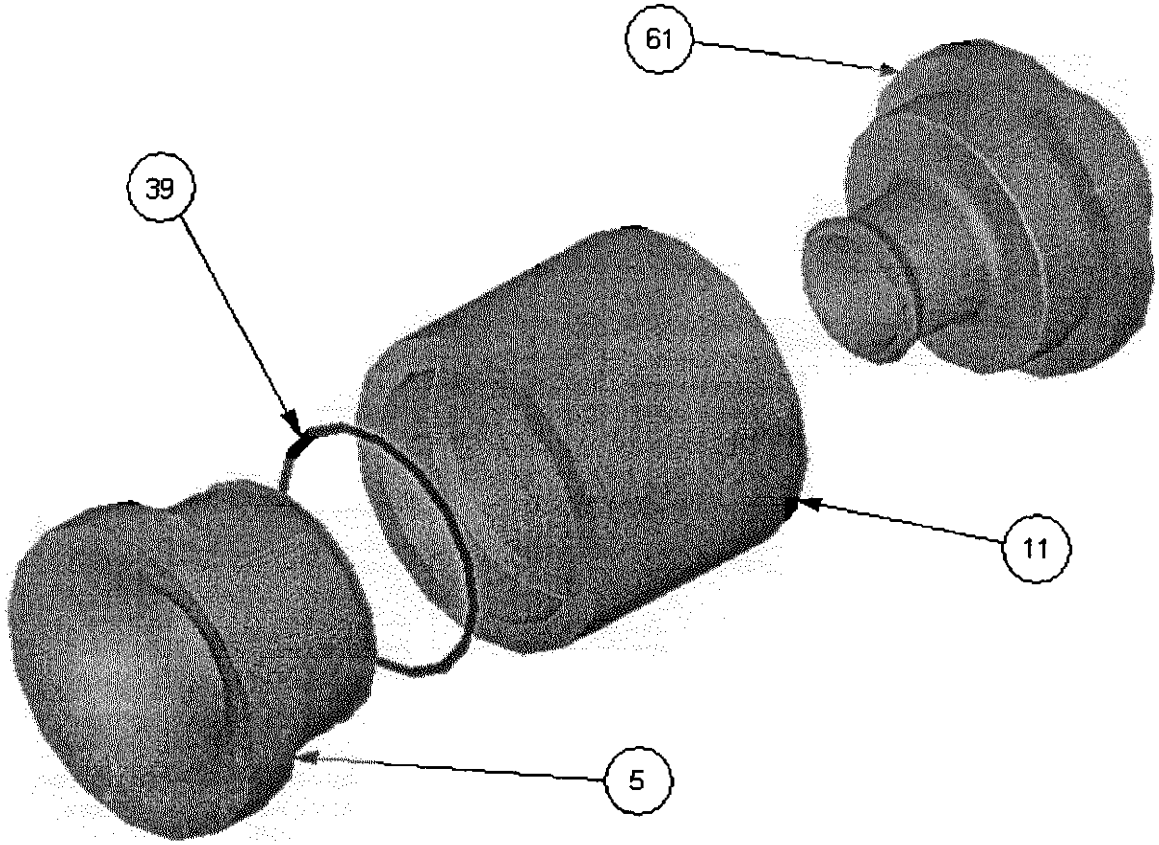


fig. 3

5-Intake
11-Body
39-O-Ring
61-Discharge Nozzle

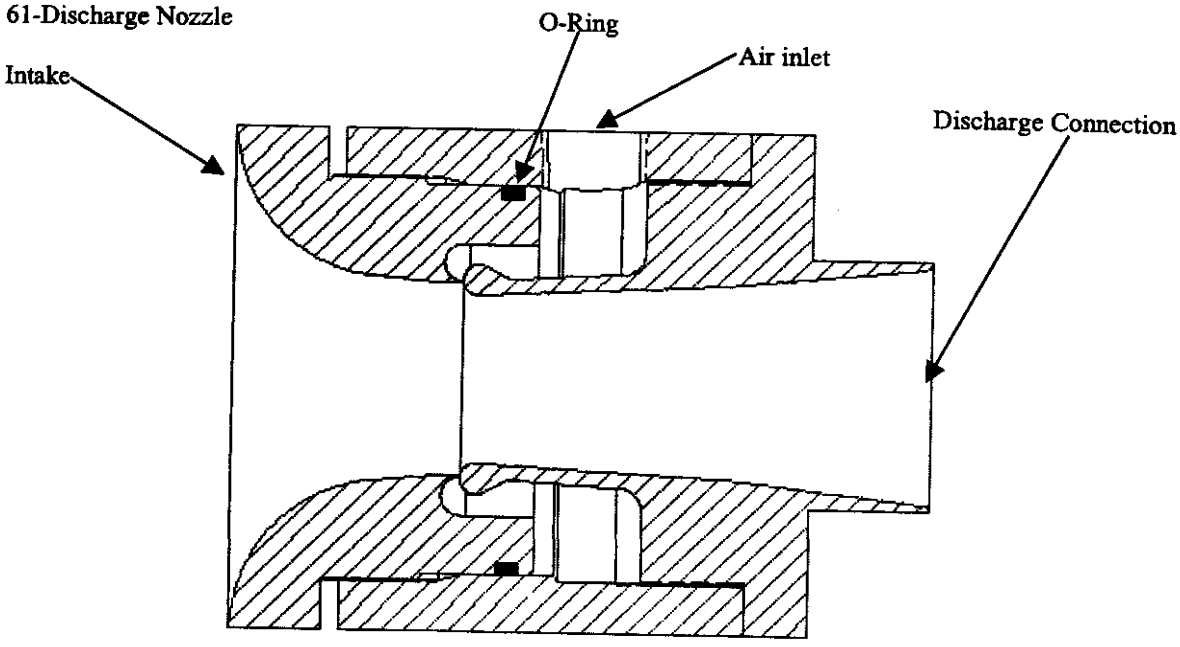


fig. 4

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