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Vortex Tube Refrigeration

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ABSTRACT

Vortex Tubes are devices that work on a standard compressed air supply. Air enters the vortex tube and is literally split into two parts - cold air at one end, and hot air at the other - all without any moving parts. Vortex Tubes have an adjustable valve at the "hot" end which controls the volume of the air flow, and the temperature exiting at the cold end. By adjusting the valve, you control the "cold fraction" which is the percentage of total input compressed air that exits the cold end of the Vortex Tube. Our Vortex Tubes may also be supplied with a fixed preset "cold fraction" instead of an adjustable valve. Inside is the interchangeable brass "generator" which can alter the air used in the Vortex Tube, and control the temperature ranges you wish to have at the cold and hot ends. There are several ranges of generators for compressed air capacity. There are also two basic types of generators - one to produce the extreme cold temperatures (maximum cold temperature out called the C generator) and one type to produce the maximum amount of cooling (maximum refrigeration called the H generator).

KEYWORDS: *Advantages, types, methodology, references*

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1. INTRODUCTION:

Vortex Tube is constructed of stainless steel and uses a generator and valve made of brass and sealed with viton o-rings to allow their use in the widest range of environments. This also allows for greater life and better consistency between Vortex Tubes made. In addition, it is usable in high temperature environments AS IT COMES with NO extra charge unlike many of our competitors.

Most competitors use plastic generators and standard Buna N O-Rings and charge extra for brass and high temperature rings. The unique design and quality of materials used in Frigid-XTM products will deliver years of maintenance-free operation.

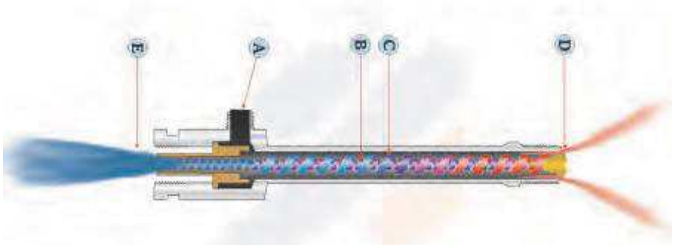
2. TYPES (ACCORDING TO SIZE)

3. ADVANTAGES

- No moving parts.
- Driven by air not electricity.
- Small and lightweight - portable.
- Low in cost compared to most others
- Superior design and performance
- Maintenance free operation
- Made of durable stainless steel and metal parts - no
- Adjustable temperature range
- Generators are interchangeable

4. METHODOLOGY

Compressed air enters at point (A). Inside the tube the compressed air is made to spin using a "generator". It travels in one direction along the small (hot end) tube and then back inside itself in the reverse direction creating one stream of air (B) and the second stream of air (C) in the opposite direction. The outside stream of air gets hot and exhausts at point (D). The center column of air gets cold and exists at point (E). Temperatures and capacities can vary by adjusting the hot end plug at (D) and by using different "generators".



5. USE OF VORTEX TUBE

Back pressures over 2 psig (0.1 bar) can reduce the performance of a Vortex Tube. Similarly it is important to use a minimum of 25 micron or less filtration to keep the air clean and dry. Vortex tubes alone without ducting can be noisy so mufflers are available for both the cold end and hot end. All of our Vortex Tubes are built to be used in even high temperature environments at no extra cost.

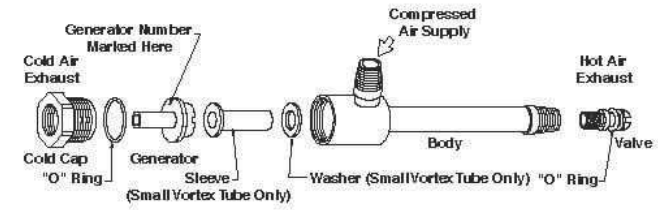
6. REASONS TO USE

Vortex Tubes normally come with an adjustable hot end that requires screwdriver to change the setting. If the application requires an easier adjusting mechanism the Hand Adjustable version is available. For the small and medium sized vortex tubes. It comes with a built in hot end muffler for noise reduction and is made if stainless steel. The Hand Adjustable assembly may also be purchased separately to convert the standard Vortex Tube into a hand adjustable version. Inside the vortex tube is the interchangeable brass generator which determines the air flow capacity. There are two types – one to product extreme cold temperatures (maximum cold temperature out call the C generator) and one type to produce the maximum amount of cooling (maximum refrigeration called the H generator). The Hand Adjustable units are used only with theH generators.

7. EASY TOOPERATE&ADVANTAGES

- easy adjustment – no screwdriver needed
- driven by air no electricity
- Small and lightweight – portable
- Low in cost compared to others
- Maintenance free operation
- Adjustable temperature range

8. SIMPLE PARTS



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