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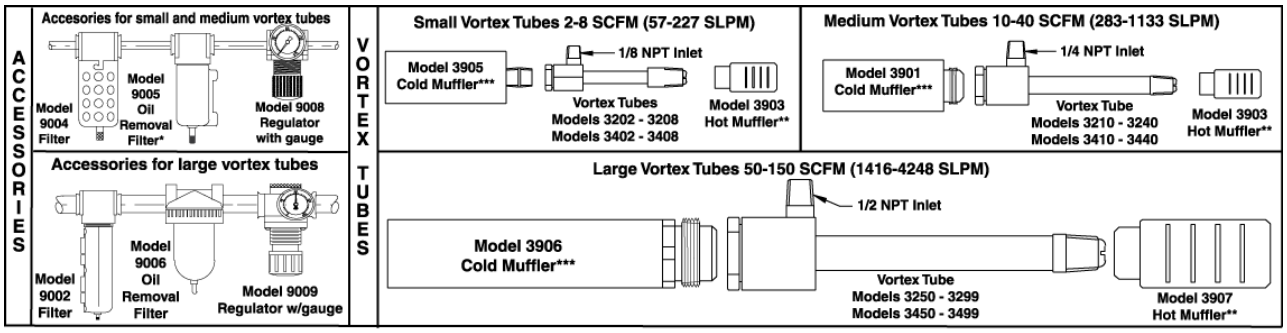
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EXAIR® Corporation
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VORTEX TUBE INSTALLATION & MAINTENANCE



*Use Model 9006 Oil Removal Filter for Vortex Tubes larger than 30 SCFM (860 SLPM)
**Max Pressure 300 PSIG (21 BAR). Operating temperature 35˚F-160˚F (2˚C-71˚C)
***Not to be pressurized. Max temperature 160˚F (71˚C)



- Surface of the vortex tube can become hot or cold after prolonged use. Allow to come to room temperature before touching.

COMPRESSED AIR LINE SIZES

Compressed air lines should be sized to hold pressure drops to a minimum. Do not use restrictive fittings such as quick connects. They can "starve" the Vortex Tube by causing excessive line pressure drop. The following chart gives suggested line sizes for pipe and hose.

Line Sizes for Runs Up To:	10 FT (3m)		10 – 50 FT (3 – 15 m)		50 – 100 FT (15.2 – 30.5m)	
	Pipe	Hose	Pipe	Hose	Pipe	Hose
Model 3202 thru 3208 Model 3402 thru 3408	1/8"	1/4"	1/4"	3/8"	1/4"	3/8"
Model 3210 thru 3240 Model 3410 thru 3440	1/4"	3/8"	3/8"	1/2"	1/2"	5/8"
Model 3250 thru 3299 Model 3450 thru 3499	1/2"	5/8"	3/4"	7/8"	1"	1-1/8"

COMPRESSED AIR SUPPLY

For best performance, use line pressure 80 to 100 PSIG (5.5 - 6.9 BAR). Vortex Tubes are rated in SCFM (SLPM) at 100 PSIG (6.9 BAR) supply pressure.

With proper filtration and separation of dirt, moisture and oil from the compressed air supply, the Vortex Tube will run for years with no maintenance required. Use a 25 micron or smaller filter separator that is sized to the SCFM (SLPM) rating of the Vortex Tube. The Model 9004 Automatic Drain Filter Separator is used for Vortex Tubes up to 40 SCFM (1133 SLPM), Model 9002 Automatic Drain Filter Separator for Vortex Tubes up to 150 SCFM (4248 SLPM).

To prevent problems associated with oil, use Model 9005 Oil Removal Filter for Vortex Tubes up to 30 SCFM (850 SLPM) or Model 9006 Oil Removal Filter for Vortex Tubes up to 150 SCFM (4248 SLPM). The oil removal filter should be used downstream from the automatic drain filter separator. Filters should be used within 10 to 15' (3 to 4.6m) of each Vortex Tube.

By regulating pressure, refrigeration produced can be matched to the application requirements. Use Model 9008 Pressure Regulator for Vortex Tubes up to 50 SCFM (1416 SLPM) or Model 9009 Pressure Regulator for Vortex Tubes up to 150 SCFM (4248 SLPM). Another method of temperature control is to supply the Vortex Tube with full line pressure, then cycle the air on and off with a solenoid valve controlled by a thermostat.

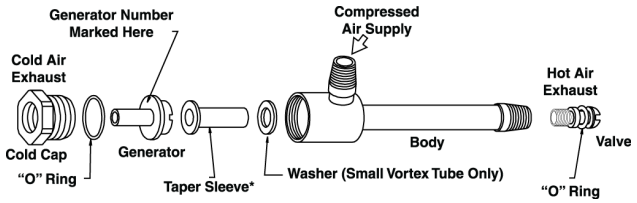
For replacement or repair filter and regulator parts, contact EXAIR at 1-800-903-9247 or techelp@exair.com. Call (513) 671-3322 for outside the US and Canada.

USING THE VORTEX TUBE

Each size Vortex Tube can produce a number of flow rates as determined by an internal plastic part called a generator. Each generator is marked with a number and a letter. The number indicates the capacity (SCFM of air consumption) and the letter indicates the type of operation ("R" for maximum refrigeration or "C" for maximum cold temperature). The Vortex Tube has one generator installed. If a different capacity is desired, other generators are available.

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*2, 4 and 8 SCFM Vortex Tubes have a removable taper sleeve. 10, 15, 50, 75, 100 and 150 SCFM Vortex Tubes have taper sleeves that are permanently installed.

The "R" type generators are used for most applications (part cooling, enclosure cooling, tool cooling and in applications where complete heat exchange is desired). "R" type generators should be used for temperatures down to 0°F (-18°C). If the Vortex Tube is set for 50°F (28°C) below the supply air temperature, it will be at 80% cold fraction (80% of the air is directed to the cold end). This produces a combination of cold flow volume and temperature drop that gives the best performance in most applications.

"C" type generators are used for maximum cold temperature (cooling parts, liquids or gas samples to subzero temperatures, component testing, etc.). "C" type generators should be used for temperatures 80° to 120°F (44° to 67°C) below the supply air temperature. Any temperature drop greater than 50°F (28°C) may precipitate moisture that could freeze and plug the cold air exhaust (*see 4 under "Troubleshooting"*).

SETTING THE VORTEX TUBE

Hot and cold air temperatures produced by a Vortex Tube are infinitely variable by adjusting the slotted valve at the hot air exhaust. Opening the valve reduces the cold airflow and the cold air temperature. Closing the valve increases the cold airflow and the cold air temperature.

Set the Vortex Tube with a thermometer. To measure temperature accurately, it should be inserted into the cold muffler or a piece of tubing on the cold end exhaust.

NOISE MUFFLING

Normally, muffling is not required if the hot and cold air is ducted. Mufflers are available for both the hot and cold exhaust for all Vortex Tubes. (For model number, see drawing on other side.) **The cold cap on the medium and large Vortex Tubes must be removed to install the muffler.**

TROUBLESHOOTING & MAINTENANCE

If The Vortex Tube Does Not Perform Properly, check for these common problems:

1. ***Loose Cold Cap or Cold Muffler*** - A loose cold cap or cold muffler will cause poor performance. Make sure it is tight.
2. ***Inlet Pressure*** - Low inlet pressure supply will cause poor performance. Measure the pressure at the compressed air inlet of the Vortex Tube while it is operating. Restrictions in the compressed air supply line can cause excessive pressure drops and deteriorate performance.
3. ***Inlet Temperature*** - A Vortex Tube provides a temperature drop from supply air temperature. In some cases, the supply air is warmer than ambient air due to compressed air lines running across ceilings, near furnaces, direct sun, etc. In this case, the cold air may be warmer than anticipated and adequate refrigeration may not be available for the application.
4. ***No Cold Flow*** - If the Vortex Tube is operated continuously for an extended period of time and is set for more than a 50°F (28°C) drop from the compressed air temperature, the cold end may freeze, blocking the cold outlet. If this happens, any one of the following will correct the problem:
   (a) Blow air (use an air gun) into the cold end with the Vortex Tube off.
   (b) Turn the Vortex Tube off for a few minutes. It will thaw.
   (c) Use dry air with an atmospheric dew point of -40°F or less.
5. ***Back Pressure*** - The performance of a Vortex Tube deteriorates with back pressure on the cold air exhaust. Pressure up to 2 PSIG (.1 BAR) will not change performance. 5 PSIG (.3 BAR) will change performance by approximately 5°F (2.8°C). If cold air ducting is used, the total cross-sectional area should be equal to or greater than the area of the Vortex Tube cold air exhaust.

	IEC 60417-5041	Caution, hot surface
	ISO 7000-0434	Caution, risk of danger

If you have any questions or problems, please contact an EXAIR Application Engineer at:
Toll Free: 1-800-903-9247 (U.S. & Canada)
Telephone: 513 671-3322 outside of U.S. & Canada
Toll Free Fax: 866-329-3924 (U.S. & Canada)
FAX: 513 671-3363 outside of U.S. & Canada
E-mail: techelp@exair.com
Website: www.exair.com

For more information about this product, visit "Frequently Asked Questions" at www.exair.com
FAQ at www.EXAIR.com

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