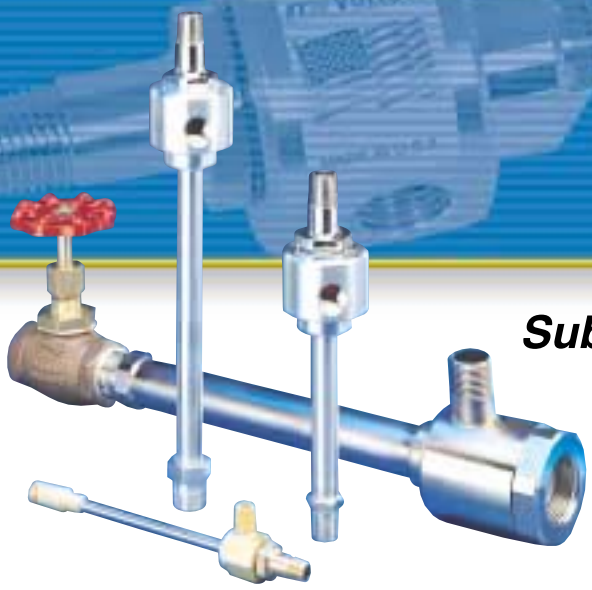
Vortex Tubes



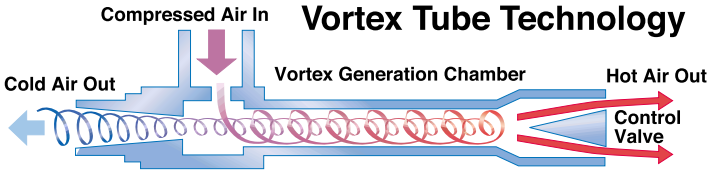
Sub-Zero Spot Cooling from Compressed Air

Vortex Tubes are an effective, low cost solution to a wide variety of industrial spot and process cooling needs. With no moving parts, a vortex tube spins compressed air to separate the air into cold and hot air streams. While French physicist Georges Ranque is credited with inventing the vortex tube in 1930, ITW Vortec was the first company to develop and apply this phenomenon into practical and effective cooling solutions for industrial use. Vortex Tubes have a very wide range of application for spot cooling on machines, assembly lines and processes.

Vortex Tubes have many applications:

- Cool machine operations
- Dry ink on labels and bottles
- Temperature cycle parts
- Keep electronics cool
- Set solders and adhesives
- Dehumidify gas samples
- Cool cutter blades
- Thermal test sensors
- Cool heat seal operations
- Cool plastic injection molds

How Vortex Tubes Operate



A vortex tube spins compressed air to produce hot and cold air streams, generating temperatures down to 100˚F below inlet temperature

Fluid (air) that rotates around an axis (like a tornado) is called a vortex. A Vortex Tube creates cold air and hot air by forcing compressed air through a generation chamber, which spins the air at a high rate of speed (1,000,000 RPM) into a vortex. The high-speed air heats up as it spins along the inner walls of the Tube toward the control valve. A percentage of the hot, high speed air is permitted to exit at the valve. The remainder of the (now slower) air stream is forced to counterflow up through the center of the high-speed air stream in a second vortex. The slower moving air gives up energy in the form of heat and becomes cooled as it spins up the tube. The chilled air passes through the center of the generation chamber finally exiting through the opposite end as extremely cold air. Vortex tubes generate temperatures down to 100˚F below inlet air temperature. The control valve located in the hot exhaust end can be used to adjust the temperature drop and rise for all Vortex Tubes.

MODEL	AIR CONSUMPTION (SCFM)	(SLPM)	CAPACITY (100 PSIG) BTUH	kCAL/hr
106-2-H	2	57	100	25
106-4-H	4	113	255	64
106-8-H	8	226	400	101
208-11-H	11	311	640	161
208-15-H	15	425	900	227
208-25-H	25	708	1500	378
308-35-H	35	991	2650	668
328-50-H	50	1415	3000	756
328-75-H	75	2123	4500	1134
328-100-H	100	2830	6000	1512

Specifications are at 100 PSIG (6.9 Bar).

- Maintenance free - no moving parts
- Cycle repeatability within ± 1˚
- Drops inlet temperature by up to 100˚F
- Cools without electricity or refrigerants
- Exceptionally reliable, compact and lightweight

The table below shows approximate temperature drop and rise achieved by vortex tubes when adjusted to various Cold Fractions. A Cold Fraction is the percentage of cold air produced versus total filtered compressed air consumed by any Vortex Tube.

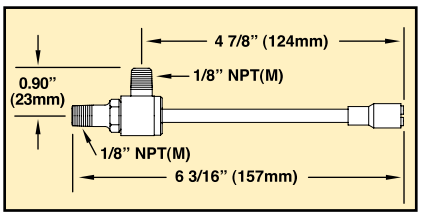
Table Baseline: Compressed air temperature: 70˚F/21˚C

Pressure Dew Point: -100˚F/-56˚C (dry air)

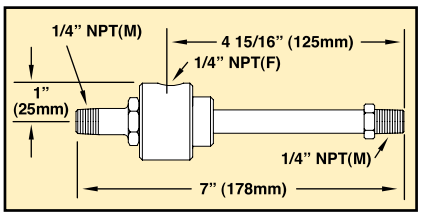
Backpressure: not to exceed 5 PSIG/0.4 Bar

Numbers on the Blue Bar: Temperature Drop

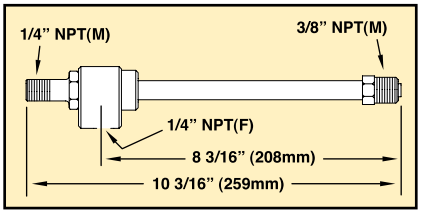
Numbers on the White Bar: Temperature Rise



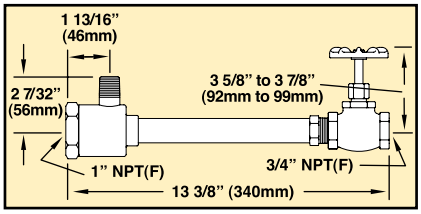
Model 106 Vortex Tube



Model 208 Vortex Tube



Model 308 Vortex Tube



Model 328 Vortex Tube

COLD FRACTION	10		20		30		40		50		60		70		80		90	
PSIG/BAR	F˚	C˚	F˚	C˚	F˚	C˚	F˚	C˚	F˚	C˚	F˚	C˚	F˚	C˚	F˚	C˚	F˚	C˚
20/1.4	63	35	62	34	60	33	56	31	51	28	44	24	36	20	28	15	17	9
	7	4	15	8	25	14	36	20	50	28	64	36	83	46	107	59	148	82
40/2.8	91	51	88	49	85	47	80	44	73	41	63	35	52	28	38	21	26	14
	9	5	21	11	35	19	52	29	71	39	92	51	117	65	147	82	220	122
60/4.1	107	59	104	58	100	56	93	52	84	47	73	41	60	33	45	25	29	16
	10	6	24	13	40	22	59	33	80	44	104	58	132	73	168	93	236	131
80/5.5	119	66	115	64	110	61	102	57	92	51	80	44	66	36	49	27	31	17
	11	7	25	14	43	24	63	35	86	48	113	63	143	79	181	101	249	138
100/6.9	127	71	123	68	118	66	110	61	99	55	86	48	71	39	53	29	33	18
	12	8	26	14	45	25	67	37	91	51	119	66	151	84	192	107	252	140
120/8.3	133	74	129	72	124	69	116	64	104	58	91	50	74	41	55	31	34	19
	13	8	27	14	46	26	69	38	94	52	123	68	156	87	195	108	257	142
140/9.7	139	78	135	75	129	72	121	67	109	61	94	52	76	42	57	32	35	20
	14	8	28	16	47	27	71	39	96	53	124	69	157	88	196	109	259	144

Air Flow - The total SCFM air consumption of any Vortex Tube is proportional to any particular absolute inlet pressure as follows:

$$\frac{\text{(PSIG + 15) x Generator Rating}}{115}$$ **= approximate total air consumption**

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