VORTEX TUBES

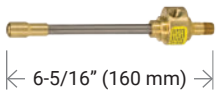
Sub-Zero Spot Cooling from Compressed Air

Vortex tubes produce up to 6000 BTU/hr (1757 watts) of refrigeration and temperatures as low as -40° to solve a variety of industrial spot cooling and process cooling needs. With no moving parts, a vortex tube is highly reliable and inexpensive; and requires no electrical connection at the cooling site. Vortex tubes cool instantly, relying only on compressed air spinning in the tube to separate the air into cold and hot air streams.

As an effective and low-cost solution to a wide variety of industrial spot and process cooling applications, Vortex tube performance is easily adjustable. While normally used for cooling, vortex tubes can also be used for heating applications, merely by channeling the exhaust hot air to the application.

Vortec was the first company to develop and apply the vortex phenomenon into practical and effective cooling solutions for industrial use in 1961. Since then, vortex tubes have been applied for a wide range of cooling applications on machines, assembly lines, in processes and for testing and measurements.

MODEL 106

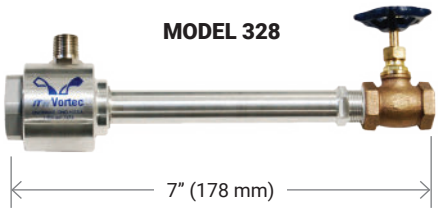


MODEL 208

MODEL 208 HSS

MODEL 308

MODEL 328



Model Number		106-2-H	106-4-H	106-8-H	208-11-H	208-15-H	208-25-H	208-11-HSS	208-15-HSS	208-25-HSS	308-35-H	328-100-H
Material of Construction		Brass / Stainless Steel			Aluminum			Stainless Steel			Aluminum	
Air Consumption	**SCFM**	2	4	8	11	15	25	11	15	25	35	100
	SLPM	57	113	226	311	425	708	311	425	708	991	2830
Cooling Capacity	**BTU/hr**	100	200	400	640	900	1500	640	900	1500	2650	6000
	kCal/hr	25	50	101	161	227	378	161	227	378	668	1512

Applications

Injection Moulding
Spot Cooling
Gas Sampling
Assembly Cooling
Heat Sealing Operations
Temperature Cycling

Vortec, an ITW Company

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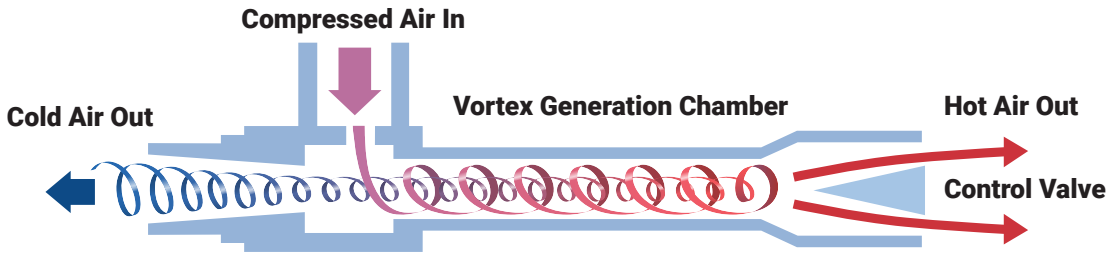
How It Works



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 by forcing compressed air through a generation chamber, spinning 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 vortex generation chamber's inner walls toward the control valve. A percentage of 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 back through the generation chamber. The chilled air continues back through the generation chamber, finally exiting the opposite end as extremely cold air. Vortex Tubes generate temperatures down to 100°F below inlet air temperatures. The control valve, located in the tube's hot exhaust end, can be used to adjust the temperature drop and rise for all Vortex Tubes. (See Cold Fraction chart below).

Cold Fraction

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

- Numbers on White Bar = Temperature Drop
- Numbers on Blue Bar = Temperature Rise

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	29	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	119	64	104	58	91	50	74	41	55	31	34	19
	13	8	27	14	46	26	69	38	84	52	123	68	156	87	195	108	257	142
140 / 9.7	139	78	135	75	129	72	127	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

Table Baseline

- Compressed air temperature: 70°F / 21°C
- Pressure Dew Point: -25°F / -32°C
- Compressed Air Pressure: 100 psig (6.9 bar)
- Backpressure: Temperature drops and rises in the chart are based on zero (0) backpressure on the hot and cold outlets of the vortex tube.
- Backpressure exceeding 5 psig (0.3 bar) will reduce the performance of the vortex tube.

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