AiRTX STAINLESS STEEL VORTEX TUBES

Instant Cold Air — to -40°F — for Industrial Spot Cooling, or Hot Air — to 230°F for Heating, from Ordinary Compressed Air!

Reliable, Predictable, Easy to Control Without Tools

A Vortex Tube turns factory compressed air into two air-streams, one very cold and one hot, using no moving parts. Simple and low-cost, a Vortex Tube can produce:

- temperatures from -40°F (-40°C) to +230°F (+110°C) from 70°F compressed air
- up to 2500 BTU/H (630 Kcal/H) refrigeration
- air flow rates up to 35 cfm (990 lpm)

You just set the cold temperature output with the handy control knob and your thermometer. No tools are required.

Assuming your compressed air input pressure and temperature remain constant, a Vortex Tube will hold output temperatures ±1°F (±0.6°C).

Our unique temperature control knob lets you adjust the cold air discharge without tools.

A simple, interchangeable part — the Vortex Generator — allows our Vortex Tube to deliver five different air flows: 8, 10, 15, 25, 35 cfm (220, 280, 420, 700, 990 lpm) — each with two ranges of cooling performance (high or low).

The User-Friendly Vortex Tube from AiRTX — Precision Stainless Steel for the Price of the “Other Guys”’ Aluminum Tubes

Starting with corrosion-resistant, food-grade Stainless Steel as the principal material of construction, AiRTX designers have optimized every aspect of Vortex Tube design for convenience, dependable performance, and long-lasting service.

The AiRTX Vortex Tube is as good-looking as it is functional. No cheap aluminum or plated brass parts. It’s precision machined, assembled and tested.

Manufactured to exacting tolerances, AiRTX Vortex Tubes are produced under strict quality control to ensure years of reliable, maintenance-free operation.

Putting Vortex Tubes to Work: Packaged Systems, “Tube Only,” or an Application Development Kit

AiRTX offers Vortex Tubes in several ready-to-use packaged systems for common industrial applications. Packaged systems include the Model 60040 Air Gun and the Control Cooler — all described on subsequent pages.

We also offer an Application Development Kit for the system designer who needs a Vortex Tube for studies and design verification. By switching one interchangeable part supplied with the kit, you can produce the full range of air flows and cold fractions the tube is capable of. The Application Development Kit includes instructions, five-micron filter, and cold end muffler, and 8 generators

Lastly, you can purchase the Vortex Tube alone, or with other components to meet system requirements.

Two Sizes Available

▲ Model 20025

▲ Model 20008

▲ What is a Vortex Tube? It’s your answer for instant cold air, where and when you need it, using nothing but compressed air as a power source. There’s no maintenance, no mess, no explosion hazard, no electricity, no moving parts — just clean, cold air for industrial or laboratory spot cooling.

▲ The Model 20400 Application Development Kit includes all 8 generators, 12” Snap-Flex Hose, 5 micron filter, cold end muffler, and Stainless Steel AiRTX Vortex Tube.
What You Can Do with Vortex Tubes

- Cool manufacturing processes: machining plastics or metals, woodworking, soldering, adhesive application, heat sealing, sewing needles, mold making and many others
- In the laboratory: cool and dehumidify gas samples, cool environmental chambers
- “Temperature cycle” electronic components, instruments, switches, thermostats
- Air conditioning electronic control enclosures: CNC cabinets, industrial PCs, PLCs, motor controls
- Generate hot air to +230°F (+110°C), without a spark or explosion hazard to soften plastic, melt glues, seal packaging
- Cool workers wearing protective gear

...see some application ideas on page 7.

Convenient, Safe, Easy-to-Use

- No moving parts, portable, lightweight, low cost
- Uses no electricity, freon or chemicals; just filtered, factory compressed air
- No spark hazard, RF/EMI interference
- Instant on/off, easy to control, cools without waste
- No residue to clean up, no parts washing needed
- Reliable, maintenance-free, durable Stainless Steel construction
- Input air flows of 8, 10, 15, 25, and 35 cfm (220, 280, 420, 700, 990 lpm); up to 2500 BTU/H (630 Kcal/H) cooling capacity
- Two sizes available

Conversion Formulas

°F = 9/5 °C + 32°
°C = 5/9 (F - 32°)
BAR = psi ÷ 14.5
Kcal = BTU x .2520
LPM = cfm x 28.3
m./min. = ft./min. x 0.3048
oz = g x .035
BTU = WATTS x 3.41

Models of Stainless Steel ARTX Tubes Available — Two Sizes

 BTU conversion — HP to BTU/Hour
1 Hp = 42.44 BTU/min.
1 Hp = 2546 BTU/hr.
1 Hp = 746 WATTS
1 KWH = 3414 BTU/hr.

▲ Model 20008

▲ Vortex Tubes Models 20010-21035
  *Available with 1/4” BSP
**Air Conditioning Power**

The cooling and heating power in BTU/H can be found by using these formulas.

For Cooling: \[ \text{BTU/H} = 1.0746 \times \left( \frac{\text{cfm c}}{\text{Ti-Tc}} \right) \]

For Heating: \[ \text{BTU/H} = 1.0746 \times \left( \frac{\text{cfm h}}{\text{Th-Ti}} \right) \]

Where: \( \text{cfm c} = \) Cold Air Flow, \( \text{cfm h} = \) Hot Air Flow, \( \text{Ti} = \) Cold Inlet Temperature, \( \text{Tc} = \) Cold Outlet Temperature, \( \text{Th} = \) Hot Outlet Temperature

**Heat Balance Formula**

Cold fraction can be computed from the temperature readings from the inlet temperature (\( \text{Ti} \)), the cold air outlet temperature (\( \text{Tc} \)), and the hot air temperature (\( \text{Th} \)), so that:

\[ \text{COLD FRACTION \% \ (CF)} = \left( \frac{\text{Ti} - \text{Tc}}{\text{Th} - \text{Ti}} \right) \times 100 \]

**Vortex Tube Capacities**

<table>
<thead>
<tr>
<th>Model</th>
<th>Inlet Pressure* (psi)</th>
<th>Cold Air Flow (cfm)</th>
<th>Hot Air Flow (cfm)</th>
<th>Capacity (BTU/H) (Kcal/H)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20008</td>
<td>100</td>
<td>7</td>
<td>8</td>
<td>220</td>
</tr>
<tr>
<td>20010</td>
<td>100</td>
<td>7</td>
<td>10</td>
<td>280</td>
</tr>
<tr>
<td>20015</td>
<td>100</td>
<td>7</td>
<td>15</td>
<td>420</td>
</tr>
<tr>
<td>20025</td>
<td>100</td>
<td>7</td>
<td>25</td>
<td>700</td>
</tr>
<tr>
<td>20035</td>
<td>100</td>
<td>7</td>
<td>35</td>
<td>990</td>
</tr>
</tbody>
</table>

*Inlet temperature 70°F/21.1°C

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**How Does a Vortex Tube Work?**

**How can** you get cold air and hot air from one compressed-air stream? Lots of people have tried to explain it, including the French physicist who invented the Vortex Tube in the 1930’s, Georges Ranque. Many different theories have been put forward.

Vortex Tubes behave in a very predictable and controllable way. When compressed air is released into the tube through the Vortex Generator, you get hot air out of one end of the tube and cold air out the other. A small valve in the hot end, adjustable on the handy control knob, lets you adjust the volume and temperature of air released from the cold end.

The Vortex Generator— an interchangeable, stationary part—regulates the volume of compressed air, allowing you to alter the air flows and temperature ranges you can produce with the tube.

“Cold Fraction”: an Important Term for Understanding Vortex Tube Performance

“Cold fraction” is the percentage of input compressed air that’s released through the cold end of the tube. As a rule of thumb, the less cold air you release, the colder the air will be. You adjust the cold fraction with the control knob. Cold fraction is also a function of the type of vortex generator that’s in the tube, i.e., a “high cold fraction” or “low cold fraction” generator.

Most industrial process applications use a high cold fraction (above 50%). A high cold fraction tube can easily give you cold outputs 50-90°F (28-50°C) below your compressed air temperature. High cold fractions give you a greater air flow, but they don’t give the lowest possible temperatures.

The high cold fraction combination of airflow and cold temperature produces the maximum refrigeration capacity, or greatest BTU/H (Kcal/H).

A low cold fraction (below 50%) means a smaller volume of air coming out that’s very cold (down to -40°F/-40°C). In short, the less air you release, the colder the air.

Just remember, your maximum BTU/H (Kcal/H) capacity (also called maximum cooling or refrigeration) occurs with a high cold fraction tube.

The chart to the left shows you the temperature drop (pink bar) and rise (grey bar) you can get at various inlet pressures and cold fraction settings.

**Two Tubes, Ten Levels of Performance**

ARTX’s modular design Vortex Tube gives you ten ranges of performance from a single tube, simply by changing the one-piece Vortex Generator. Both high and low cold fraction generators are available for 8, 10, 15, 25 and 35 cfm (220, 280, 420, 700, 990 lpm) input flows. You can purchase Vortex Generators individually or in a kit that includes all sizes.
Vortex Tubes at Work

Transportation — Spot Welding

Cooling this spot welding operation with a Vortex Tube virtually eliminates secondary smoothing operations and greatly improves the appearance of the product.

Foundry Operations

Cold air from a Vortex Tube is piped into a foundry worker’s protective suit. The Vortex Tube has a large control knob, allowing the cold air to be adjusted while wearing gloves.

Plastics — Slitting

Cutting wheels on this slitter can work at top speed — and stay sharper longer — when cold air from Vortex Tubes eliminates the frictional heat buildup. The trim edge is also cleaner.

Metal Fabricating — Tapping

Tapping brass clips is completed without messy liquid coolants using 0°F (-18°C) air from a Vortex Tube to cool the tap. The brass does not have a chance to gum up, the cut is cleaner, and secondary cleaning operations are eliminated.

Metal-Working — Single-Point Threading

Heat buildup in this single-point threading operation can shorten tool life and produce a rough thread. Clean, dry, sub-zero air cooling allows increased speed, while eliminating tool microcracking and premature failure.

Parts Numbering System

- AiRTX Tubes series number 20000.
- 2nd digit 0 — Maximum cooling
  1 — Maximum cold temperature
- The last 2 digits of the part number indicate cfm usage at 100 psi.

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>CFM</th>
<th>LPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>20008</td>
<td>Maximum cooling, Stainless Steel Vortex Tube</td>
<td>8</td>
<td>226</td>
</tr>
<tr>
<td>20010</td>
<td>Maximum cooling, Stainless Steel Vortex Tube</td>
<td>10</td>
<td>283</td>
</tr>
<tr>
<td>21010</td>
<td>Maximum cold temperature Stainless Steel Vortex Tube</td>
<td>10</td>
<td>283</td>
</tr>
<tr>
<td>20015</td>
<td>Maximum cooling Stainless Steel Vortex Tube</td>
<td>15</td>
<td>425</td>
</tr>
<tr>
<td>21015</td>
<td>Maximum cold temperature Stainless Steel Vortex Tube</td>
<td>15</td>
<td>425</td>
</tr>
<tr>
<td>20025</td>
<td>Maximum cooling Stainless Steel Vortex Tube</td>
<td>25</td>
<td>708</td>
</tr>
<tr>
<td>21025</td>
<td>Maximum cold temperature Stainless Steel Vortex Tube</td>
<td>25</td>
<td>708</td>
</tr>
<tr>
<td>20035</td>
<td>Maximum cooling Stainless Steel Vortex Tube</td>
<td>35</td>
<td>991</td>
</tr>
<tr>
<td>21035</td>
<td>Maximum cold temperature Vortex Tube</td>
<td>35</td>
<td>991</td>
</tr>
<tr>
<td>20400</td>
<td>Application Development Kit containing:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

20015 Stainless Steel Vortex Tube
Model 90612 Single Point Snap-Flex
Model 90175 Air
Model 90275 Regulator
Model 20025 Stainless Steel Vortex Tube
Model 91175 Oil Filter
Model 90175 Air
AIRTX STAINLESS STEEL AIR GUNS

Sub-Freezing Air for Dry Machining and Spot Cooling Industrial Processes — Reliable, Non-Toxic, Non-Polluting, No Residue, Low Cost

Adjustable Models Now Available

Model 60015

Model 60051

Model 60061

Model 60071

The Air Gun produces temperatures approximately 75°F (41°C) below your compressed air temperature, providing residue-free, subfreezing air for dry machining or spot cooling industrial processes, tests, etc.

Several models to fit any job requirement

A Ready-to-Use, Portable Cold-Air Source

The Air Gun is your portable cold-air source for improving dry machining operations or spot-cooling a wide range of industrial processes.

Using only compressed air, the Air Gun produces a stream of cold air 75°F (41°C) below your compressed air temperature @ 80 psi.

It’s clean, convenient — put the gun where you need it, using the magnetic base — aim the cold air stream onto your work with the flexible hose — go to work!

The Air Guns are heavy-duty, built for the rigors of factory-floor service. Made of heavy-gauge Stainless Steel, they are precision-machined, assembled and tested under strict quality control. They will never pit or rust when subjected to coolants, water, or other corrosive materials.

The Tool Saver

- Air-cooled dry machining for metals, composites, plastic, rubber, wood
- Perfect for tapping operations
- Ideal for tool-room cutter grinders or production milling/drilling/grinding/tapping
- Increase feeds, speeds and quality
- Eliminates liquid coolant cost, contamination, skin irritation, mess on walls/floors/machines
- Finishes the job with a clean, dry part
- Improves tool life, production rates, finish, tolerances
- Eliminates microcracking and burning
- Reduces wheel loading and dressing

Spot Cooling

- No liquids, ozone-depleting chemicals or residue
- Cool solders, hot melts, adhesives
- Thermo-test electronic components, circuit boards and thermostats
- Shrink-fit parts
- Cool mold tooling, ultrasonic devices
- Cool needles to prevent thread breakage and heat cracking on synthetic threads

The Stainless Steel Air Gun — Cooling and Heating

The Stainless Steel Air Gun is an applied Vortex Tube to accommodate factory compressed air supplies. The range of temperature from the Stainless Steel Cold Gun is a 75°F (41°C) @80 psi drop from the incoming ambient air supply to a 140°F (77°C) increase of the compressed air supply. Since compressed air supply temperature is very close to the ambient, a 75°F day would yield a cold stream of air from the AirTX Air Gun of 0°F (-18°C).
## Cooling and Heating

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>60015</td>
<td>Stainless Air Gun with magnetic base, Snap-Flex Hose and generators (4)</td>
</tr>
<tr>
<td>60040</td>
<td>Stainless Air Gun with magnetic base, Snap-Flex Hose and generators (4) and</td>
</tr>
<tr>
<td></td>
<td>5 micron filter</td>
</tr>
<tr>
<td>90601</td>
<td>Y dual point application hose</td>
</tr>
</tbody>
</table>

### Stainless Steel Air Gun

- **Model 60015**: Stainless Air Gun with magnetic base, Snap-Flex Hose and generators (4)
- **Model 60040**: Stainless Air Gun with magnetic base, Snap-Flex Hose and generators (4) and 5 micron filter
- **Model 90601**: Y dual point application hose

### Adjustable Stainless Steel Air Gun

- same wide range of temperatures and flow as the 60015 but with adjustable cold air flow and temperature range with each generator

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>60050</td>
<td>Adjustable Stainless Steel Air Gun kit with magnetic base, 12&quot; Snap-Flex Hose,</td>
</tr>
<tr>
<td></td>
<td>generators (4), 5 micron air line filter</td>
</tr>
<tr>
<td>60051</td>
<td>Adjustable Stainless Steel Air Gun with magnetic base, 12&quot; Snap-Flex Hose,</td>
</tr>
<tr>
<td></td>
<td>generators (4)</td>
</tr>
</tbody>
</table>

### Adjustable Stainless Low Flow Air Gun

- smaller size with adjustable flows and temperature range of the 10 and 15 cfm generator

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>60060</td>
<td>Adjustable Air Gun with magnetic base, 5 micron air filter, dual point hose,</td>
</tr>
<tr>
<td></td>
<td>10 and 15 cfm generators</td>
</tr>
<tr>
<td>60061</td>
<td>Stainless Steel adjustable Air Gun with magnetic base, dual point hose, 10 and</td>
</tr>
<tr>
<td></td>
<td>15 cfm generators</td>
</tr>
</tbody>
</table>

### Compact Cold Air Gun

- small size and a miser on compressed air, 75°F drop in compressed air temperature

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>60070</td>
<td>Kit includes: 8 cfm compact cold air gun, Snap-Flex Hose, filter regulator</td>
</tr>
<tr>
<td></td>
<td>with gauge, magnetic base</td>
</tr>
<tr>
<td>60071</td>
<td>8 cfm compact cold air gun, Snap-Flex Hose, magnetic base</td>
</tr>
</tbody>
</table>
An Alternative to Dry Machining

Occasionally a milling operation comes along that cannot be done using coolants to dissipate the heat. Such is an operation at a machine shop in New Miami, Ohio. They have a job using 4140 steel with a 35 Rc rating. The inserts are so hard that coolants are not recommended because they can cause cracking. The operation is set up at a speed of 1350 RPM with a 5 inch per minute feed rate. The 2 inch cutter has three inserts.

The customer requires the end product to be mirror finished. Any discoloration from the heat results in a scrap product. For this reason, the inserts must be replaced after every eight pieces. At $8.00 per insert plus the operators’ time to replace the spent units, another method of machining had to be found.

Qualiturn contacted ARTX, Ltd, The Air Research Technology Company. They recommended the Stainless Steel Model 60040 that converts normal shop air into a sub-zero air stream and provides instant spot cooling. ARTX manufactures the only Stainless Steel cooler on the market which is very practical over aluminum units in hot areas with high speed chips involved.

Using the Model 60040, Qualiturn was able to increase production by 400% before changing the inserts.

According to Mike Barber, owner of Qualiturn Machining Center, “the ARTX Model 60040 at $275.00 was paid for during the first hour’s run of products”.

Compact, reliable, and maintenance free, the Stainless Steel Model 60040 provides a simple, clean, and coolant free solution to many machining operations. Just plug into a standard compressed air line (80-90 psi), aim the flexible 12” nozzle, and let it go to work. The magnetic base holds the Model 60040 in place on the machine. The same sub-zero air is available regardless of the position of the Model 60040.

In addition to dry machining, the Stainless Steel Model 60040 can improve drilling, grinding, or tapping operations. Also cooling motors, parts, processors, and molds are easily achieved to increase production. You can even use the cold air to shrink shafts and the hot air for expanding a bearing’s race for easy fits in pressing bearings onto shafts.
AiRTX Stainless Steel Air Guns at Unique Woodworking Carving uses a Techno-Isel Series III PC-driven CNC router to cut the knife template into a strip of plastic. Owner Jay Bouxsein says that initially, working with the plastic was difficult because it melted — chips that were cut off would re-adhere to the piece, so the template would require significant cleaning before it could be used. Bouxsein found a solution by mounting an ARTX Model 60040 Air Gun to the router. The gun is a Stainless Steel Vortex Tube. When compressed air is spun in the tube, the air on one side cools while the other side heats up. "I thought, 'It's heat we're trying to avoid. I'll just get one of these tubes and blow cold air on the thing,'" he says. "It works like a champ. It cools [the plastic] just enough so that I don't get the meltback."

The cool air also helps protect the carbide router bits, which can soften under heat and wear out more quickly, he adds.
AiRTX POLAR STAINLESS STEEL CONTROL COOLERS
Low-Cost Air Conditioning for Controls in Hot, Hazardous, Corrosive or Washdown Environments — Without Freon!

COOLING UP TO 5000 BTU

Model 70008 and 70025

AIRTX Stainless Control Cooler

Advantages

• Maximum Cooling up to 5000 Btu’s
• Greater Cooling with the same CFM usage
• Higher BTU per CFM
• Eliminate lost production
• Heavy-gauge Stainless Steel Construction
• Use them anywhere — Stainless Steel constructed for hazardous, corrosive or washdown areas
• Low cost
• Variable cooling capacity — handles up to a 8’ x 8’ x 2’ (2.4 m x 2.4 m x 0.6 m) cabinet
• Compact for cramped factory areas
• No maintenance, no moving parts
• No electricity or explosion hazard
• No RF/EMI interference
• No vibration to affect CCTV cameras
• Thermostatically controlled units available
• No fans or filters
• Muffled for quiet operation

Use Them For

• NC/CNC cabinets
• Industrial PCs
• PLCs
• Measuring instruments and recording devices
• Closed-circuit TV cameras
• Motor controls and relays

Keep Factory-Floor Controls On-line with up to 2500 BTU/H of Cooling — Enough for a 8’ x 8’ x 2’ Cabinet

Dirt, moisture, hazardous or corrosive materials — a bad environment is the Achilles’ heel of industrial electronic systems. And it’s a real hazard when you have to open the cabinet door to prevent heat build-up.

Maybe you’ve experienced:

• Heat-induced tripping below rated loads
• Lost production
• OSHA violations and worsening dirt build-up due to cabinets left open
• Clogged air filters that have to be cleaned or changed frequently
• Damaged electronic components or shortened life
• Mis-reads from electronic measuring, weighing, counting or recording instruments
• Inability to washdown food areas due to freon-based control air conditioners
• Freon control air conditioners failing quickly due to high heat or harsh factory conditions

Compressed-Air-Operated Stainless Control Coolers for Hazardous Environments

Using a low-cost, reliable Vortex Tube, compressed-air-operated ARTX Control Coolers purge and cool electrical/electronic enclosures with filtered air that’s 50°F / 27°C colder than your compressed air supply. A built-in relief valve lets hot air escape from the control enclosure, while the cooler supplies clean, cold air.

They mount — in minutes — in a standard electrical knock-out to maintain your NEMA 4, 4X, or 12 rating. A built-in, heavy-duty muffler makes the Control Cooler extremely quiet for use in production areas.

Use Them Anywhere! Heavy-Gauge Stainless Steel Construction — FOR THE PRICE OF OUR COMPETITORS’ ALUMINUM COOLERS AND MORE BTU’S OF COOLING!

The ARTX POLAR Control Cooler is heavy-duty industrial equipment. It’s all Stainless Steel — no aluminum or plated-brass components. Corrosive environments and washdown won’t affect it. It’ll never pit, corrode or contaminate your product.

If you’re an OEM, you’ll find the fit and finish of our Control Coolers a complement to your own equipment. They’re available with or without an adjustable thermostatic control that’s factory set for 90°F (32°C). Thermostatic systems reduce compressed air consumption and are ideal for varying heat loads. All include an air distribution kit to ensure even cooling in the control enclosure.

All Kit Systems

All Kit Systems include one stainless cooler, 8’ ducting kit with muffler, solenoid valve, thermostat, and five-micron automatic filter.

All items are available separately.
POLAR Stainless Steel Control Coolers at Work

**Multiple-Face Machining**

The large investment in programming this horizontal/vertical machining center is protected by the Model 70325 Stainless Thermostatic Control Cooler, which eliminates heat build-up and coolant contamination of sensitive electronics.

**Bottling Plant**

ARTX Control Cooling Systems are Stainless Steel, so washdown of these leak testing and production controls in a bottling operation is easy. NEMA cabinets can be secured without concern for heat build-up.

**CNC Machining**

The Model 70325 Stainless Steel Control Cooling System protects against fluctuations in this precision grinding operation by cooling the control and allowing it to be sealed against mist contamination. Thermostatic control assures you of efficient compressed air usage.

**Chemical Processing**

The Model 70315 Thermostatic Control Cooling System mounts on the side of this control, out of the operator’s way, allowing free rotation of the control and clear view of the process. Thermostatic control minimizes air usage.

For double wide cabinets up to 10’W x 6’H x 2’D or cabinets in extreme hot conditions above 150°F, order Model 70370 for 5000 BTU/H of Cooling.

**Double Wide System Components Model 70370**

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 of Model</td>
<td>70035 Cooler with Ducting Kit</td>
</tr>
<tr>
<td>1 of Model</td>
<td>90302 Solenoid</td>
</tr>
<tr>
<td>1 of Model</td>
<td>90300 Thermostat and Capacitor</td>
</tr>
<tr>
<td>1 of Model</td>
<td>90175 Auto Drain Filter</td>
</tr>
</tbody>
</table>
AiRTX POLAR STAINLESS STEEL CONTROL COOLERS

Why Stainless Steel Control Coolers versus Freon Air Conditioners

Why Stainless Steel Control Cooling for Electronic Enclosure Versus Freon Air Conditioners?
• Less expensive to operate
• No freon leaks
• No costly repair calls
• Minimal if any maintenance
• Provide longer life to expensive controls
• No production down time waiting for repairs
• Maintain NEMA 4, NEMA 4x, and NEMA12 integrity
• All models are constructed of Stainless Steel

*Freon air conditioners must be deregulated by 65% at 90°F and 95% at 115°F. Therefore, the freon air conditioners must operate longer than the Control Cooler or be oversized to provide the same amount of cooling during warmer weather when the ambient temperature is higher.

The recommended thermostat setting is 90°F (32°C). This setting is within the safe operating limits of most components and reduces condensation on the outside of the cabinet during hot humid weather.

The Stainless Steel Coolers are very inexpensive insurance against premature replacement of a $2,000 to $3,000 electronic circuit board.

Temperature swings create connector stress, while excess heat dries circuit boards and result in life spans of the controls being cut in half for every 20°F (10°C) over normal operating temperatures of 100°F (38°C).

Control Coolers — Cost Comparisons

<table>
<thead>
<tr>
<th>ARTX Stainless Steel BTU Model 70325</th>
<th>Freon Air Conditioner 1500 BTU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Unit Cost</td>
<td></td>
</tr>
<tr>
<td>$495.00 (20 year life)</td>
<td>$1800.00 (5 year life)</td>
</tr>
<tr>
<td>$24.75/year</td>
<td>$360.00/year</td>
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<tr>
<td>Installation (one time cost)</td>
<td></td>
</tr>
<tr>
<td>$50.00/hour</td>
<td>$50.00/hour</td>
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<tr>
<td>$2.50/year</td>
<td>$10.00/year</td>
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<tr>
<td>Maintenance</td>
<td></td>
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<tr>
<td>No Maintenance</td>
<td>Maintenance</td>
</tr>
<tr>
<td></td>
<td>4 hours/year for charging freon,</td>
</tr>
<tr>
<td></td>
<td>cleaning and replacing filters,</td>
</tr>
<tr>
<td></td>
<td>leak checks $200 per year</td>
</tr>
<tr>
<td>Operation</td>
<td></td>
</tr>
<tr>
<td>5 hours/day, 9 months/year</td>
<td>7 hours/day, 9 months/year</td>
</tr>
<tr>
<td>Based on $0.25/1000 cu. ft. of air</td>
<td></td>
</tr>
<tr>
<td>$288.00/year</td>
<td>$72.00/year</td>
</tr>
<tr>
<td>Total Operation Cost</td>
<td></td>
</tr>
<tr>
<td>$315.25/year</td>
<td>$642.00/year (Not including downtime for repairs)</td>
</tr>
</tbody>
</table>

Standard NEMA

<table>
<thead>
<tr>
<th>Enclosure Rating</th>
<th>NEMA — National Electrical Manufacturers Association (NEMA Standard 250)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 4</td>
<td>Electrical and Electronic Manufacturers Association of Canada (EEMAC)</td>
</tr>
<tr>
<td>Type 4x</td>
<td>Enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, and hose directed water; undamaged by the formation of ice on the enclosure</td>
</tr>
<tr>
<td>Type 6</td>
<td>Enclosures are intended for use indoors or outdoors where occasional submersion is encountered. Limited depth; undamaged by the formation of ice on the enclosure; resists corrosion.</td>
</tr>
<tr>
<td>Type 12</td>
<td>Enclosures are intended for indoor use primarily to provide a degree of protection against dust, falling dirt, and dripping noncorrosive liquids.</td>
</tr>
<tr>
<td>Type 13</td>
<td>Enclosures are intended for indoor use primarily to provide a degree of protection against dust, spraying of water, oil, and noncorrosive coolant.</td>
</tr>
</tbody>
</table>
Cooling — Stainless Steel POLAR Control Coolers Maintain NEMA 4, 4X and NEMA 12 Integrity and are UL Listed

**Installation of Thermostatic Control Cooler System**

<table>
<thead>
<tr>
<th>NEMA TYPE</th>
<th>NEMA 4, 4X, 12</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>70008X</td>
<td>70008</td>
<td>600 BTU/H Stainless Steel Cooler and ducting kit, muffler</td>
</tr>
<tr>
<td>70108X</td>
<td>70108</td>
<td>600 BTU/H Stainless Steel Cooler with ducting kit, muffler and 5 micron auto drain filter</td>
</tr>
<tr>
<td>70308X</td>
<td>70308</td>
<td>600 BTU/H thermostatic system includes: Stainless Steel Cooler, auto drain filter, ducting kit, muffler, thermostat, solenoid valve</td>
</tr>
<tr>
<td>70015X</td>
<td>70015</td>
<td>1100 BTU/H Stainless Steel Cooler and ducting kit, muffler</td>
</tr>
<tr>
<td>70115X</td>
<td>70115</td>
<td>1100 BTU/H Stainless Steel Cooler with ducting kit, muffler and 5 micron auto drain filter</td>
</tr>
<tr>
<td>70315X</td>
<td>70315</td>
<td>1100 BTU/H thermostatic system includes: Stainless Steel Cooler, auto drain filter, ducting kit, muffler, thermostat, solenoid valve</td>
</tr>
<tr>
<td>70025X</td>
<td>70025</td>
<td>1800 BTU/H Stainless Steel Cooler and ducting kit, muffler</td>
</tr>
<tr>
<td>70125X</td>
<td>70125</td>
<td>1800 BTU/H Stainless Steel Cooler with ducting kit, muffler, and 5 micron auto drain filter</td>
</tr>
<tr>
<td>70325X</td>
<td>70325</td>
<td>1800 BTU/H thermostatic system includes Stainless Steel Cooler, auto drain filter, ducting kit, muffler, thermostat, solenoid valve</td>
</tr>
<tr>
<td>70035X</td>
<td>70035</td>
<td>2500 BTU/H Stainless Steel Cooler and ducting kit, muffler</td>
</tr>
<tr>
<td>70135X</td>
<td>70135</td>
<td>2500 BTU/H Stainless Steel Cooler with ducting kit, muffler, and 5 micron auto drain filter</td>
</tr>
<tr>
<td>70335X</td>
<td>70335</td>
<td>2500 BTU/H thermostatic system includes Stainless Steel Cooler, auto drain filter, ducting kit, muffler, thermostat, solenoid valve</td>
</tr>
<tr>
<td>70370X</td>
<td>70370</td>
<td>5000 BTU/H thermostatic system includes: 2 Stainless Steel Coolers (Model 70035) auto drain filter, ducting kit, muffler, thermostat, solenoid valve</td>
</tr>
</tbody>
</table>

**Thermostatic Kit Includes:**
- Thermostat Model 90300
- 2 way normally closed solenoid Model 90301
- 5 micron automatic drain air filter Model 90175
- Ducting kit – 8 feet of ducting with 3 hold downs and muffler, Model 70000-14

**70000 Series Part Number System**
- 1st digit series Model 7 — indicates Stainless Steel Control Cooler Series
- 2nd digit 0 — indicates Stainless Steel
- 3rd digit 1— filter included, 3 thermostatic kit
- The 4th and 5th digits of the part number indicate cfm usage at 100 psi

\[
\text{BTU} \times 0.2520 = \text{Kcal} \\
\text{Kcal} \times 3.968 = \text{BTU}
\]
Determining Requirements for Sizing Correct Control

1. Size the heat load area of the cabinet using the following formula:

\[(2 \times W + 2 \times D) \times \text{Height} = \text{square feet of cabinet}\]

*Example:* 3’ wide, 1’ deep, 4’ high = 32 square feet

2. Determine inside temperature reading for maximum hotter outside temperatures

*Example:* If reading is taken on a 70°F day and the temperature reads 110°F, add 25°F if the electronics will be operating during a summer day temperature of 95°F or add more if it will get hotter.

3. 90°F (32°C) is a safe operating temperature for most electronics to reduce heat stress on the controls and drying of the wafer boards.

4. Subtract the temperature of 90°F as the desired temperature inside the operating cabinet from the temperature reading in step 2 to determine the temperature difference or Delta T.

5. Use the square area of your cabinet readings on the left side of the scale and match it with the temperature difference from step 4 on the top of the sizing chart.

6. The intersection of these two numbers give you the BTUs required to maintain the desired 90°F inside temperature.

7. Match the BTU reading with the proper ARTX Cooler.

- All ARTX Control Coolers are constructed of Stainless Steel for long lasting use as well as for use in wash down areas, high heat or corrosive conditions.
- All ARTX Coolers are standard with ducting Kit that include 8’ of tubing to route the cold air from the ARTX Cooler evenly throughout the cabinet, hold downs for the tubing, and an internal muffler to insure noise free operation.
- Thermostatic systems are highly recommended as they produce a truly maintenance free cooling system. No forgetting to turn it on or off, increasing or decreasing air supply on hot days, consuming compressed air when cooling is not necessary, and no thermal hot and cold changes. A constant 90°F (32°C) to provide the electronics with a long life.

---

1. Size of cabinet? W ______ D ______ H ______
2. Hottest temperature inside cabinet? _______
3. Desired temperature inside cabinet? _______

*90°F is recommended*
### Sizing Chart

<table>
<thead>
<tr>
<th>Cabinet Size</th>
<th>Square Feet</th>
<th>90°F</th>
<th>70°F</th>
<th>50°F</th>
<th>30°F</th>
<th>10°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>2'H x 2'W x 2'D</td>
<td>16</td>
<td>500</td>
<td>350</td>
<td>150</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>3'H x 3'W x 2'D</td>
<td>30</td>
<td>1100</td>
<td>800</td>
<td>450</td>
<td>150</td>
<td>100</td>
</tr>
<tr>
<td>4'H x 3'W x 1'D</td>
<td>32</td>
<td>1300</td>
<td>900</td>
<td>550</td>
<td>150</td>
<td>100</td>
</tr>
<tr>
<td>5'H x 3'W x 1'D</td>
<td>40</td>
<td>1600</td>
<td>1100</td>
<td>700</td>
<td>150</td>
<td>100</td>
</tr>
<tr>
<td>5'H x 4'W x 1'D</td>
<td>50</td>
<td>2200</td>
<td>1400</td>
<td>900</td>
<td>300</td>
<td>150</td>
</tr>
<tr>
<td>5'H x 4'W x 2'D</td>
<td>60</td>
<td>2600</td>
<td>1800</td>
<td>1100</td>
<td>500</td>
<td>150</td>
</tr>
<tr>
<td>5'H x 5'W x 2'D</td>
<td>70</td>
<td>3000</td>
<td>2100</td>
<td>1300</td>
<td>600</td>
<td>200</td>
</tr>
<tr>
<td>6'H x 4'W x 2'D</td>
<td>72</td>
<td>3100</td>
<td>2200</td>
<td>1400</td>
<td>700</td>
<td>200</td>
</tr>
<tr>
<td>6'H x 5'W x 2'D</td>
<td>84</td>
<td>3600</td>
<td>2600</td>
<td>1600</td>
<td>750</td>
<td>200</td>
</tr>
<tr>
<td>6'H x 6'W x 2'D</td>
<td>96</td>
<td>4200</td>
<td>3000</td>
<td>1900</td>
<td>900</td>
<td>200</td>
</tr>
<tr>
<td>7'H x 6'W x 2'D</td>
<td>112</td>
<td>4800</td>
<td>3500</td>
<td>2200</td>
<td>1000</td>
<td>300</td>
</tr>
<tr>
<td>7'H x 7'W x 2'D</td>
<td>126</td>
<td>5800</td>
<td>4100</td>
<td>2600</td>
<td>1300</td>
<td>250</td>
</tr>
<tr>
<td>8'H x 7'W x 2'D</td>
<td>144</td>
<td>6500</td>
<td>4600</td>
<td>2900</td>
<td>1450</td>
<td>300</td>
</tr>
<tr>
<td>8'H x 8'W x 2'D</td>
<td>160</td>
<td>7000</td>
<td>5200</td>
<td>3300</td>
<td>1650</td>
<td>350</td>
</tr>
<tr>
<td>8'H x 10'W x 2'D</td>
<td>192</td>
<td>8800</td>
<td>6400</td>
<td>5200</td>
<td>2100</td>
<td>450</td>
</tr>
</tbody>
</table>

### BTU Requirements for Cooling

Inside temperature drop needed to safe 90°F (32°C)

**Kcal = BTU x .2520**

°F = 9/5 (°C + 32)

°C = 5/9 (°F - 32)

**BTU = Watts x 3.41**

---

### Stainless Steel Cooler Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 BTU/H Model</td>
<td>70008,70108,70308</td>
</tr>
<tr>
<td>1100 BTU/H Model</td>
<td>70015,70115,70315</td>
</tr>
<tr>
<td>1800 BTU/H Model</td>
<td>70025,70125,70325</td>
</tr>
<tr>
<td>2500 BTU/H Model</td>
<td>70035,70135,70335</td>
</tr>
<tr>
<td>5000 BTU/H Model</td>
<td>70070,70170,70370</td>
</tr>
</tbody>
</table>

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