Introduction to Espar Fuel-Operated Heaters

Espar Heaters...they just make sense
Espar Has Been Around……..

Espar Heater Systems has been in North America since the 1970’s and has been selling into the on-highway, bus, construction and energy market for some time.

In the energy market we have been a minor player, even though our lineup mirrors our competitors, because we lacked a 12 volt heavy duty coolant heater offering for the most critical large energy market applications.

Espar now offers a full line of 12 and 24 volt heaters, across the output range. Espar heavy duty heaters are now available in Arctic Fox arctic packages in a mounting footprint identical to units they currently supply.

Espar’s parent company is the owner and manufacturer of our full line of heating products so availability is assured – now and going forward.

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**AIR HEATER OFFERING CHART**

<table>
<thead>
<tr>
<th></th>
<th>ESPAR</th>
<th>WEBASTO</th>
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</thead>
<tbody>
<tr>
<td>Output</td>
<td></td>
<td></td>
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<tr>
<td>At 2000 ST</td>
<td>6,830</td>
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<tr>
<td>Airtronic D-2</td>
<td>7,500</td>
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<tr>
<td>Airtronic D-4</td>
<td>11,942</td>
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<tr>
<td>Airtronic D-5</td>
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</tr>
<tr>
<td>Airtronic D8LC</td>
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**COOLANT HEATER OFFERING CHART**

<table>
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<tr>
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<tr>
<td>Output</td>
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<tr>
<td>Hydronic D4</td>
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<tr>
<td>Hydronic D5</td>
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<td>TSL 17</td>
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<td>Hydronic M-8</td>
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<td>Hydronic M-10</td>
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<td>Hydronic M-12</td>
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<td>Hydronic L-16</td>
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<td>Hydronic L-35</td>
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</tr>
<tr>
<td>Hydronic L-35</td>
<td>120,000</td>
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*This presentation will go thru the basics of heater identification / operation, models offered & their specific benefits - and an overview of common applications*
Espar’s Environmental Commitment

The Espar Product Line

Espar Heaters are designed for mobile applications utilizing 12 or 24 volt battery systems and diesel or gasoline as a fuel source, these systems operate as furnaces with sealed combustion chambers. Espar’s air heaters use forced air as a heating medium while the Espar coolant heaters circulate engine coolant to transfer heat.

Espar has the most comprehensive range of heaters available in today’s marketplace:
- **Air heaters from 7,500 - 27,300 BTU/hr**
- **Coolant heaters from 17,000 to 120,000 BTU/hr.**

Espar heaters have a full warranty (parts & labor) from 1 - 2 years depending on model and application.

Espar represents the latest in technology and clean-burning fuel-operated heaters.

Complete installation packages and accessories are available from the factory for a number of applications. All heating systems are engineered for optimum safety and to provide an easy installation.

*Espar has the largest offering of EPA Verified heaters available in the marketplace*
Fuel-operated heaters come in two types - one for heating air (Airtronic) and one for pre-heating the engine (Hydronic) with models available for either gas (B) or diesel (D) fuel, and biodiesel to B5.

Espar classifications such as an Airtronic D2 or Hydronic D5 represent the approximate KW output – heaters may be referred to by KW or BTU output - $2 = 2\text{KW}$ or approximately 7,500 BTU of heat output.

Each are small furnaces, using fuel from the on-board tank to light the furnace and voltage from the batteries to run either the fan (Airtronic) or the coolant circulating pump (Hydronic).

Both are compact, lightweight and use a fraction of the fuel consumed by the equipments main engine – in Class 8 trucks typically .75 to 1 gph.

Airtronic D2 .02 to .07 gph  Hydronic D5 .08 to .16 gph

*Because they burn less fuel they also produce a fraction of the emissions - as much as 93% less than the main engine -*
As soon as the heater receives its starting pulse, these processes are triggered by the central control unit:

- Automatic safety check.
- The burner motor starts, the glow pin is warmed, the metering pump starts.
- The glow pin ignites the fuel-air mixture, the flame is formed and the glow pin is turned off.
- The hot combustion gases flow through the heat exchanger.
- The blower motor draws in air which is heated by the heat exchanger and returned to the cab.
- The four operating speeds can maintain a warm temperature longer without extinguishing the flame.

*Cutaway view of Airtronic D-2*
As soon as the heater receives its starting pulse, these processes are triggered by the central control unit:

- Automatic safety check.
- The glow pin is warmed up and the fuel metering pump starts.
- The burner motor starts as the fan delivers combustion air.
- The fuel-air mixture ignites, a flame is formed and the glow pin is turned off.
- The hot combustion gases are transferred by the heat exchanger thru the coolant system by the circulating pump.
- The heater is controlled electronically thru several stages according to heat requirements.
• Our four-speed heater provides a wider range of operator comfort levels to help eliminate engine idling – provides air circulation for those cooler nights
• Reduces operating costs through fuel savings, reduced engine wear and extended engine life – extends DOC/DPF maintenance intervals
• Provides better comfort for operators by maintaining heat comfort, eliminating vibration and engine noise, and improving air quality
• Qualify for government grant monies under many idle-reduction programs

Idling damages the engine from carbon deposits on valves and pistons, degradation of engine oil, and accumulation of water and sulfur in the engine.
AIRTRONIC - D2  Air Heater Advantages

• Four-speeds for a wider range of operator comfort
• Delivers 7,500 BTU of clean comfortable heat
• Air circulation mode is standard
• Can run up to 24 hours on a single gallon of fuel
• Uses about as much voltage as a marker light
• Easily serviced without removal from the vehicle
• Easy to operate and inexpensive to maintain
• Built in safety features for worry-free operation
• Reduces APU engine-on hours used for cab heating

Suitable to any equipment where compartment / workspace heating is desired

Airtronic small-medium range of heaters: D-2 @ 7,500 BTU – D-4 @ 13,600 BTU and D-5 @ 18,800 BTU
AIRTRONIC – D8LC  Air Heater Advantages

- The **only** high-output air heater available in the 27,300 BTU range
- Produces 640 CFM of heated air
- Excellent for cargo and large compartment heating
- Heating of exposed control panels
- Crew shelters, mobile workstations and operator compartments
- Available in both 12 and 24V models

*Suitable to any application where robust compartment / workspace heating is desired*

*From 7,500 to 27,300 BTU of clean reliable heat in the Airtronic Product Line*
HYDRONIC D5 - Pre-Heater Advantages

• Provides auxiliary heat for engine pre-heat and cab-warmth
• Circulates coolant so the entire system is warmed
• Delivers 17,000 BTU of clean comfortable heat
• Uses as little as .08 gallon fuel per hour for significant fuel savings versus engine idling
• Built in safety features for worry-free operation
• Timer controlled so the engine is at full operating temp when the operator arrives for duty
• No idling or plug-ins needed for winter warm-up and reliability
• Helps extend DOC life cycles and reduce cranking system wear

Suitable for any application where engine, equipment or fluid pre-heating is desired

From 17,000 to 130,000 BTU of Heat Available in the Hydronic Product Line
HYDRONIC M-II - Pre-Heater Advantages

- Technology decades newer than competitor legacy units
- Dual ceramic glow pins, brushless blower motor and brushless water pump for a long life
- Automatic altitude adjustment reduces maintenance
- With up to six operating speeds it uses less fuel and needs less operating power than competitive models
- Circulates coolant so the entire system is warmed
- Up to 42,000 BTU of clean comfortable heat
- No idling or plug-ins needed for winter warm-up and reliability
- Ideal for larger engines or systems heating multiple fluid options

Suitable for applications where a higher degree of engine, equipment or fluid pre-heating is desired

M-II Series is available in 8, 10 and 12KW output ranges – the 8KW is 100% biodiesel compatible
Benefits of **Warm** Engine Starts

*Lab tests have shown that 80 to 90 percent of engine wear occurs on cold starts*

When shut down the hot oil easily drains back into the oil pan, leaving unprotected surfaces. Upon restart, the crank must rotate through this thick oil while the pistons travel on dry surfaces. A warm engine start improves oil viscosity and reduces wear on moving parts.

**Time Savings = Fuel Savings**

Timer controls allow operators to start work immediately without having to wait for the engine to “warm-up” so related costs in driver time and fuel used are significantly reduced.

**Diesel engines are 5 times as hard to start at 0 F versus 80 F**

A fully charged battery has only 40 percent of its cranking power at 0°F and can be drained trying to start a cold engine in severe weather. Engine pre-heating produces a reliable start while saving wear & tear on cranking / charging system components.

**Lower emissions and operating costs**

On a cold start the cylinder temperatures are still too low to induce complete combustion. The resulting unburned fuel is exhausted as what is seen as white smoke which can accelerate the need for DPF regeneration cycles and premature plugging.
In the last five years Espar has delivered more ways to increase heater productivity in customer applications than our competitors have in over two decades as the energy sectors “standardized” heater.
### On-Highway Applications

<table>
<thead>
<tr>
<th>Applications</th>
<th>Airtronic Air Heaters</th>
<th>Hydronic Coolant Heaters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>D2*</td>
<td>D4*</td>
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<tr>
<td>Linehaul Tractors</td>
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<tr>
<td>Pickup &amp; Delivery Trucks</td>
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<tr>
<td>Day Cab Trucks</td>
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<td>x</td>
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<td>Dump Trucks</td>
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<td>Sucker / Vacuum Trucks</td>
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<td>School Buses</td>
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<td>Public Works Equipment</td>
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<td>Diesel Pickup Trucks</td>
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<td>Cargo Heating</td>
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<td>Recreational Vehicles</td>
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<td>Auxiliary Power Units</td>
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<td>Police Cars (gas)</td>
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<tr>
<td>Biodiesel Fuel Compatible</td>
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* Denotes CARB Approved models
Support After The Sale

Espar Website –

www.espar.com  Quick parts lookup, product info by market or heater model, heater installation videos and more

www.espar.com/help  For a downloadable library of catalogs, technical manuals, heater sizing calculators and more

Quality of Sleep, For Less Than a Dollar a Night

Cab Comfort and Engine pre-heating

Espar Heater Systems manufactures diesel-fired heating systems to provide cab and sleeper heat in trucks, eliminating the need to idle the engine for heat. Espar also supplies independent coolant systems for quick engine pre-heating. These systems require no electrical plugs-in and are ideal for cold weather starting.

Benefits include:
- cab preheat - a warm cab and sleeper without idling the engine
- engine preheat - safe, reliable cold weather starting
- no electrical plug-ins
Espar Heaters – They Just Make Sense.....

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