Dometic is a customer driven, world-leading provider of innovative leisure products for the caravan, motorhome and marine markets. Dometic offers a complete range of air conditioners, refrigerators, awnings, cookers, sanitation systems, lighting, windows, doors and other equipment that makes leisure life more comfortable away from home.

Dometic also provides refrigerators for specific use in hotel rooms, offices, and for storage of medical products and wine along with comfort products designed for the over-the-road truck market. Dometic's products are sold in almost 100 countries and are produced mainly in Dometic's own production facilities around the world. Dometic has more than 4,400 employees.

Dometic

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PATENTS
7,171,822 • 7,234,315 B2 • 7,140,192 • 7,316,119 • 7,237,397 B2
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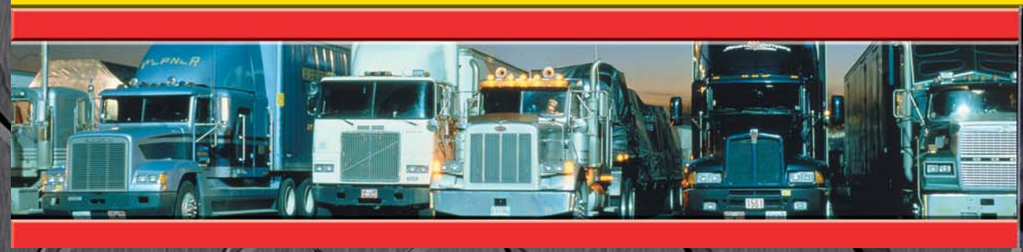
APU-POWERED AUXILIARY AIR CONDITIONING SOLUTIONS

How to Select, Specify, Operate and Maintain Dometic APU-Based Auxiliary Air Systems



Dometic

DOMETIC APU-BASED AUXILIARY AIR SOLUTIONS

- **7,000, 10,000 and 14,000 BTU capacities for all size sleepers**
  - **Self-contained package units**
  - **Patented split systems with reusable precharged refrigerant linesets**
- **Heating options**
  - **1- 4 KW built-in electric heat modules**
  - **Interface with installed diesel-fire heaters**
- **No special tools required to install**
- **Turnkey package includes all components needed to complete installation**
- **Backed by extensive application engineering support and nationwide service**
- **Designed and built for over-the-road conditions and thoroughly field-tested**

Dometic Environmental Corporation, with a 45+ year heritage in rugged HVAC technology for harsh-environment applications, has developed a range of auxiliary air conditioning and heating solutions to meet the increasing demand for engine-off comfort control in the trucking industry.

You can count on Dometic for thoroughly engineered products designed for the harshest over-the-road conditions backed by unmatched factory support and after-sale service. That's why so many leading APU manufacturers currently specify or recommend Dometic HVAC with their products for the trucking market.

In this booklet, we'll explain all aspects of selecting, specifying, operating and maintaining your APU-powered auxiliary air system from Dometic. We encourage you to read this information carefully to help you make decisions. If you have any questions, please call us and we'll be delighted to help you.

THE BASICS

The basic principle of an air conditioner is the transfer of heat from one place to another – in this case from the inside of your vehicle to the outside. This is accomplished by absorbing heat from the inside air into a refrigerant gas flowing through an evaporator coil. The refrigerant is then pumped to a condenser, where the heat is released to the outside air. The refrigerant, a chemical with a low evaporation temperature, flows around a closed loop, driven and pressurized by a compressor. As a part of the cooling process, the air conditioner also removes moisture from the inside air, which makes the area feel more comfortable and keeps the compartment dry and mildew-free.

A belt-driven compressor on the truck's engine supplies air conditioning whenever the engine is running. To keep the driver comfortable when the engine is shut down, it is necessary to have a separate auxiliary air conditioning system that uses an alternative source of power.

The auxiliary air system runs on 115 Volt AC power, which can be supplied by an onboard diesel genset, often referred to as an auxiliary power unit, from a shorepower connection when an external AC power source is available or in some cases from the truck's batteries using an inverter to convert the 12 Volt battery output into usable 115 Volt AC power. In this booklet we will focus on the APU-based solutions. In the next chapter we will provide an overview of your air conditioning choices.

AIR CONDITIONING CHOICES

There are two basic types of auxiliary air systems:

- Self-contained "package" units
- Split systems

Self-contained unit installed under bunk.

The self-contained unit is designed to be wholly mounted inside the truck, usually under a berth or seat or inside a side storage locker. All of the air conditioning components, including the compressor, condenser, evaporator, blower and power supply, are mounted on a single low-profile chassis with an aluminum cover. The system's closed refrigerant loop is precharged and sealed at the factory. Inside air is pulled across the evaporator coil, and cooled air is blown through a flexible duct to a discharge grill for discharge into the living area. Hot air is discharged from the condenser through cutouts in the floorboard.

Dometic's patented split systems consist of two separate modules. The outside unit contains the condenser and cooling fan. It can be bolted horizontally to the underside or vertically to the back of the sleeper. The inside unit contains the compressor, evaporator, blower, power-logic box and other associated components. The compressor is covered by a sheet-metal cover. The inside unit is mounted under a berth or seat or in a side storage locker. The two units are connected by reusable precharged quick-connect refrigerant linesets. The system is designed so that both units automatically charge to the correct refrigerant pressure as soon as the linesets are connected. No special tools are required.

Split system inside unit under bunk.

Each approach offers advantages and disadvantages. A self-contained unit is simpler to install and maintain, since it does not have any external refrigerant lines. It is also less expensive than a split system of the same BTU capacity. On the other hand, it takes more interior space, and it requires cutting holes in the floor for air to flow to and from the condenser. A split system, on the other hand, has more installation flexibility and uses less interior space. It also is quieter, since the condenser fan is located outside the truck.

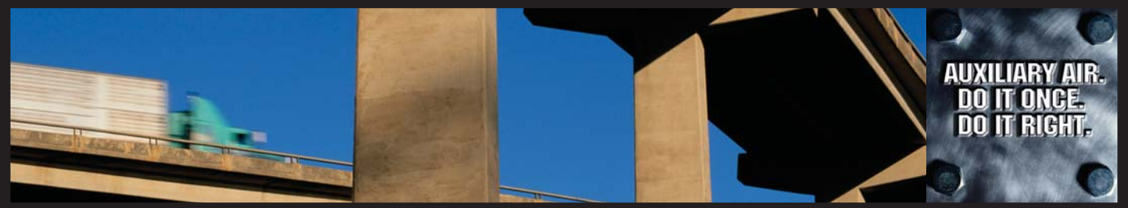
Split system external condenser.

Both types of air conditioning systems are available with a selection of built-in electrical heat modules. The heat is blown through the same ducts and grills and controlled by the same thermostat. They can also be used in conjunction with a diesel-fired heater if desired, under control of the same thermostat.

Heating Capacity	Application*
1.0 KW	48 in. sleeper
2.0 KW	60 in. sleeper
2.5 KW	72 in. sleeper
4.0 KW two stage	60 or 72 in. sleeper in cold climates

*Under normal conditions. Whichever type of system you select, it will come with ducts, grills, condensate drains, thermostat controls and electrical wiring.

Model	Cool Capacity (BTU)	Heat Capacity	Control	Height (in.)	Width (in.)	Length (in.)	Weight (lb.)	Cool Amps	Heat Amps	Refrigerant
Split Systems										
Internal Unit - Evaporator/Heater/Compressor										
ECEQ7	7,000	Cooling only	Smart digital	11.75	10.25	19.25	53	7.3	n/a	R417a
EHCEQ7	7,000	1 KW	Smart digital	11.75	10.25	19.25	53	7.3	8.2	R417a
ECEQ10	10,000	Cooling only	Smart digital	11.63	11.12	20.19	60	11.8	n/a	R417a
EHCEQ10	10,000	7500 BTU	Smart digital	11.63	11.12	20.19	60	11.8	1.0	R417a
EHCEQ10	10,000	1.5 KW	Smart digital	11.63	11.12	20.19	62	11.8	13	R417a
EHCEQ10	10,000	2 KW	Smart digital	11.63	11.12	20.19	62	11.8	17	R417a
ECEQ14	14,000	Cooling only	Smart digital	11.69	13	22	64	14.5	n/a	R417a
EHCEQ14	14,000	1.5KW	Smart digital	11.69	13	22	65	14.5	13	R417a
EHCEQ14	14,000	2.5 KW	Smart digital	11.69	13	22	65	14.5	21	R417a
EHCEQ14	14,000	2.5 KW, 2-stage	Smart digital	11.69	13	22	65	14.5	11.4 + 10.4	R417a
EHCEQ14	14,000	4 KW, 2-stage	Smart digital	11.69	13	22	65	14.5	23.2 + 12.1	R417a
External Unit - Condenser										
ACCD7	7,000	n/a	n/a	6.125	11.3125	21.875	10	n/a	n/a	R417a
ACCE10	10,000	n/a	n/a	6.125	12.5	24.5	12	n/a	n/a	R417a
ACCE14	14,000	n/a	n/a	6.625	12.5	24.5	13	n/a	n/a	R417a
Self-Contained Units										
ASCF7	7,000	Cooling only	Mechanical	12.5	15.25	21.5	62	8.5	n/a	R22
ASCEQ7	7,000	Cooling only	Smart digital	11.94	17.75	24	70	8.9	n/a	R417a
ASCEQ7	7,000	7500 BTU Espar ready	Smart digital	11.94	17.75	24	70	8.9	1.8	R417a
ASCEQ7	7,000	1 KW	Smart digital	11.94	17.75	24	71	8.9	9.5	R417a
ASCEQ7	7,000	1.5 KW	Smart digital	11.94	17.75	24	71	8.9	13.4	R417a
ASCDQ10	10,000	Cooling only	Smart digital	12.5	20.87	28.25	91	12.9	n/a	R22
ASCDQ10	10,000	1.5 KW	Smart digital	12.5	20.87	28.25	92	12.9	13.9	R22
ASCDQ10	10,000	2 KW	Smart digital	12.5	20.87	28.25	92	12.9	18.2	R22
ASCDQ14	14,000	2 KW	Smart digital	12.5	20.87	31.5	104	15.7	19	R22
ASCDQ14	14,000	2.5 KW	Smart digital	12.5	20.87	31.5	104	15.7	23	R22



SPECIFYING THE SYSTEM

ABOUT INSULATION.

Before we go any further, let's talk briefly about insulation. Most truck sleepers today are insulated with a value of approximately R 1 to R 1.25. Compare this to the insulation of R 30 that is required in most new housing contruction. Even the "cold-weather packages" offered with some new trucks only have insulation values of R 2. TMC recommended practices call for R 4.2 as a standard insulation package and greater than R 4.6 in a premium package. This standard, once adopted by the industry, will go a long way toward improving the performance of auxiliary air conditioning and heating systems.

If you are buying a new truck, you should order it with additional insulation. There are also a number of measures you can take to reduce the heat load in your truck. If you have skylights, cover them. Insulate the floors with foam under the carpet. Add insulation to the doors. Get heavy-duty curtains to separate the sleeper from the cab. Cover the windshield and windows with reflective shades when parked. Park in the shade whenever possible. Switch off heat-producing appliances in the sleeper.

AIR CONDITIONING UNITS

Your first step will be determining the type of air conditioning units (split or self-contained) to meet your requirements and space constraints, then sizing the units to meet the expected heat load.

Sizing the system can be a complicated affair, since it depends on a number of factors, such as the size and shape of the sleeper, the amount of insulation (see above), the size and location of windows, the color of the truck (darker colors absorb more heat) and the ambient temperature outside. The following guidelines are based on TMC recommendations under "average" conditions. If you are operating in very hot regions, you may need to consider extra capacity.

7,000 BTU	Day cab or small sleeper up to 48 in. with flat roof
10,000 BTU	Mid-size 60-in. sleeper with low or mid-height roof
14,000 BTU	Full-size 60-72-in. sleeper with high-rise roof

AUXILIARY POWER UNIT

When running the air conditioner from an APU, the genset must be large enough to start and run the air conditioning unit as well as any other electrical appliances you may wish to run at the same time. This can be complicated, since gensets from different manufacturers may vary considerably in their output characteristics. If you measure the output of two gensets rated by their manufacturers at 2.5 Kilowatts, you will observe them to be very different.

It's also important to allow for the surge capacity needed to start the air conditioning compressor. Each time the compressor cycles on, there is a short electrical surge that is equal to about four times the normal running amps for several hundred milliseconds. Most good-quality gensets are designed to support these short surges without tripping off the line.

Capacity BTU	Genset Minimum Output (Continuous KW)	Genset Minimum Surge Amps
7,000	2.0	38
10,000	2.5	60
14,000	3.0	70

SHOREPOWER

Although there are relatively few shorepower hookups available at truck stops, rest stops and terminals, these will become more readily available in the future.

TMC recommends a minimum 20-amp circuit for shorepower connections. You should use any heavy-duty power cord with a standard three-prong plug. Remember that there will be a voltage drop across the cord, so you should use the minimum length necessary to reach your outside power source.

12 gauge	Up to 25 ft.
10 gauge	Up to 50 ft.

INSTALLING, OPERATING AND MAINTAINING THE SYSTEM

INSTALLATION

Dometic will provide detailed installation instructions with your system. You should make sure you understand these instructions and follow them completely.

Note that the APU must be set to deliver 115 Volt 60 Hz output in order for the air conditioner to function properly. Check with your APU supplier.

CONTROLS

The Dometic auxiliary air system comes with a standard digital thermostat/display unit. Operation is intuitive and easy, with up and down arrows to adjust the setpoint and fan speed.

OPTIMIZING PERFORMANCE

To improve the air conditioner's performance on a hot day, you can reduce the heat load by parking in a shaded area, covering the windows with reflective shades to block out direct sunlight and pulling the curtain between the sleeper and cab. Make sure windows and doors are tightly closed, and turn off any other heat-producing appliances.

OPERATION AND MAINTENANCE

You should inspect and clean the air filter regularly to ensure good airflow across the evaporator coils. You will find the filter in the return air path, either directly behind the grill or in front of the evaporator coil.

Make sure you do not block the airflow between the return air grill and evaporator coil with pillows, blankets, papers or other objects.

Check the condensate drain often to make sure water is draining properly. Make sure the drain fittings do not get clogged. Note that the drain hose under the truck should be tied in a loop so as to form a natural trap. This will help prevent outside air and exhaust discharge from getting inside.

If you have a split system with external condensing unit, make sure you inspect and clean any debris from condenser coil area to ensure good air flow.

Dometic's auxiliary air systems, both self-contained and split, are designed so that you should never need to recharge the refrigerant loop under normal circumstances. If the refrigerant level ever needs to be adjusted, federal law requires that it must be done by an EPA-licensed HVAC technician with the proper tools to avoid accidental discharge of any refrigerant gas into the air.

Occasionally check for chafe on outside wires and refrigerant lines (split systems).

USEFUL LINKS

Dometic Environmental Corporation
www.DometicTruck.com

American Transportation Research Institute
www.atri-online.org

ATA Green Truck Intitiative
www.greentruck.com

ATA Technology and Maintenance Council (TMC)
www.truckline.com/issues/governmentpolicy/environment

California Air Resources Board
www.arb.ca.gov

Canadian Office of Energy Efficiency
http://oee.nrcan.gc.ca/transportation/fleetsmart.cfm

Environmental Protection Agency SmartWay Program
www.epa.gov/smartway

Pennsylvania Office of Energy and Technology Development
www.dep.state.pa.us

U.S. Department of Energy Clean Cities Program
www.eere.energy.gov/cleancities
West Coast Collaborative
www.westcoastdiesel.org