Battery-Based, Engine-Off HVAC Solutions

How to Select, Install, Operate & Maintain a Dometic Air Conditioning System

Dometic

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DOMETIC BATTERY-BASED ENGINE-OFF AIR CONDITIONING FOR SLEEPERS AND DAY CABS

- CARB exempt
- EPA and SmartWay certified
- No federal excise tax
- Complies with all federal, state and local idling regulations
- Eligible for grant and loan programs
- Fully integrated turnkey package includes all components needed for complete installation
- 7,000 or 10,000 BTU 115V air conditioning system
- 2,000 Watt Modified Sine Wave (MSW) inverter with optional built-in charger
- Absorbed glass mat (AGM) batteries
- High-capacity alternator to recharge batteries quickly
- Optional shorepower connection
- Built-in low-voltage cutoff circuit to ensure sufficient battery power to restart engine
- Thoroughly field tested for the toughest over-the-road conditions
- Backed by nationwide service and support network

DOMETIC AIR CONDITIONING SOLUTIONS FOR TRUCKS

Dometic builds the industry's most rugged and reliable battery-based engine-off air conditioning solutions for trucks. Our systems are designed, engineered and tested to give you years of trouble-free performance under the toughest over-the-road conditions. They are based on more than 50 years of experience in designing, engineering, building and supporting HVAC systems for harsh environments, and they're backed by extensive technical assistance and nationwide service.

Our green systems are the best answer to today's environmental challenges. There is no diesel generator, no fuel consumed, no exhaust fumes to pollute the air, no oil to change, no noise, no vibration, no belts to tighten, and no worries about law-enforcement violations and fines. They are 100% CARB compliant, and they meet all federal, state and local clean-air laws. In addition, you don't need to worry about warranty issues with the truck's manufacturer, since our battery-based solutions do not break into the truck's fuel or cooling systems.

Our 7,000 and 10,000 BTU/hr sleeper systems provide ample cooling to keep you comfortable while meeting the federal hours of service (HOS) requirements, operating for 10-14 hours without recharging the batteries under normal duty-cycle conditions. The high-capacity alternator recharges the batteries in 5.5–6 hours while driving down the road.

Our 7,000 BTU/hr day-cab systems are designed to meet the usage patterns for day-route and terminal-to-terminal operations.

In this booklet, we'll explain how to select and specify the system that meets your needs, and provide a few tips on how to get the best results when operating the system. If you have any questions, please give us a call at +1-804-746-1313 or email us at sales@dometictruck.com.

THE BASICS

A belt-driven compressor on the truck's engine supplies air conditioning when you are driving or idling. When you shut down the engine, however, you need a separate air conditioning system that runs on an alternative source of power.

Dometic has developed an engine-off comfort-control solution that pulls 12V DC power from a bank of heavy-duty batteries and inverts it to 115V AC power, which drives the electric powered air conditioner. The batteries are recharged by a high-capacity alternator. When 115V AC shorepower is available, it can also be used to drive the air conditioner.

When looking at battery-based air conditioning, you should think of it as an engineered, integrated system comprised of several components which have been carefully chosen and tested to ensure reliable performance.

AIR CONDITIONING UNITS

There are two basic choices: split systems and self-contained "package" units. In most cases, the split system is preferred, since it uses less interior space and offers more installation flexibility. We will focus on the split system. However, if you are interested in a "package" unit solution, please contact our sales office at +1-804-746-1313 or visit our website at www.dometic.com/truck.

Outside condensing unit mounted on back of cab

Inside evaporator unit seen from the side compartment

Dometic's patented split-system design consists of an outside condensing unit and an inside evaporator/compressor unit. The outside unit can be mounted horizontally or vertically on the back of the cab, but may also be mounted horizontally on the undercarriage. The inside unit is usually mounted under the bunk or in a side storage locker for a sleeper, or between the seats in a day cab. The two units are connected by reusable precharged refrigerant linesets with quick-connect fittings. 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.

The air conditioning system also includes ducts, grills, condensate drain and electrical wiring, as well as a digital display/control panel.

The air conditioning systems can be ordered for cooling only with built-in electric heat elements.

Note that the Dometic system is not a "bunk cooler" that blows cool air on the driver, but a true compressor-driven air conditioning system that provides ample cooling capacity for the entire space.

OPTIONAL ACCESSORIES

BATTERIES

Dometic systems use absorbed glass mat (AGM) batteries, which can be deeply discharged and rapidly recharged without damaging the batteries. They are capable of up to 500 discharge-recharge cycles. The number of batteries will depend on the capacity of the air conditioner, size of the space to be cooled and user profile of the truck. Dometic offers a range of choices in external battery boxes that can be mounted on one of the side rails or between the rails behind the cab. Replacement AGM batteries are readily available through battery distributors across North America.

Group 31 AGM deep-cycle batteries replace house batteries

INVERTER

Dometic specifies a 2,000 Watt inverter with a Modified Sine Wave (MSW) output designed for extended periods of operation. This high-performance inverter is designed to handle the extra load requirements of the air conditioner as well as house loads. It also protects the unit from electric spikes that can occur when the compressor cycles on and off. The inverter can also be ordered with an optional built-in charger. Most importantly, the inverter has a low-voltage cutout that automatically turns off 115V AC power whenever the batteries drop below a preset voltage. This ensures you will always have sufficient battery power to restart the truck. The inverter is approximately the same size as a Group 31 battery and is normally mounted inside the battery box.

High-capacity alternator replaces standard alternator

ALTERNATOR

Dometic's system uses a high-capacity 270 or 300+ amp alternator to recharge the batteries when the engine is running. This alternator replaces the standard alternator on the engine. High capacity is required in order to recharge the batteries in a reasonable period of time, 5.5–6 hours. In day-cab applications, recharge must take place within typical point-to-point runs.

SHOREPOWER

The Dometic system may be ordered with an optional shorepower connection, allowing you to run the air conditioner on an external 115V power source when available. If the optional combination inverter/charger unit is installed, you can also recharge the batteries when plugged into shorepower. TMC recommends a minimum of one 20 amp circuit for shorepower connections. You should use a heavy-duty cord with a minimum of 12-gauge wire (50 ft.). Remember there will be a voltage drop across the cord, so use the minimum length necessary to reach your outside power source.

Shorepower plug

SPECIFYING A SYSTEM FOR SLEEPERS

Dometic's engine-off air conditioning systems for sleepers are designed to keep the entire sleeper cooled for a minimum of 10 hours to meet the HOS requirements.

System capacity depends on a number of factors, such as the size and shape of the space to be cooled, the amount of insulation, the size and location of windows, the color of the truck and the ambient temperature outside. Dometic offers 7,000 and 10,000 BTU/hr systems.

The number of batteries needed will depend on the capacity of the air conditioner and the length of time you will need to run the air conditioner between recharges. The table below offers general guidelines. Note that the air conditioner normally will not run continuously, but will cycle on and off as needed to maintain the selected setpoint. The 60% duty cycle in the table means that the air conditioner runs 60% of the time, and is off 40% of the time. Typically, sleeper systems are specified with 7 to 8 batteries. Day-cab systems will operate to spec with 3 batteries.

If you are specifying optional built-in electric heat, use the following table to size the electric heat modules. Electric heat uses a tremendous amount of power. Each KW of heat requires about 8.2 amps of alternating current. When using electric heat, Dometic systems will only get approximately 50-60% of the run time compared to the cooling cycle.

Dometic offers a selection of prewired battery boxes that will save time and money on installation. The box can be mounted on either side rail, or between the rails behind the sleeper. To calculate your return on investment for a Dometic engine-off sleeper air conditioning system, refer to the following table:

72" High Rise		
Batteries	8 Group 31 AGM	Replace existing 4 lead-acid batteries with AGM batteries and add 4 more AGM batteries. Check on Dometic's selection of prewired battery boxes to save time and money on installation.
Alternator	320 amp high output	Replace existing alternator on truck engine.
Inverter	2,000 Watt Modified Sine Wave (MSW)	Specify optional inverter/charger combination for charging batteries from shorepower.
HVAC System	10,000 BTU/hr	It includes ducts, grills, electric wiring and digital control/ display panel.
48"– 60" Sleeper		
Batteries	7–8 Group 31 AGM	Replace existing 4 lead-acid batteries with AGM batteries and add 3–4 more AGM batteries. Check on Dometic's selection of prewired battery boxes to save time and money on installation.
Alternator	320 amp high output	Replace existing alternator on truck engine.
Inverter	2,000 Watt Modified Sine Wave (MSW)	Specify optional inverter/charger combination for charging batteries from shorepower.
HVAC System	7,000 BTU/hr	It includes ducts, grills, electric wiring and digital control/ display panel.

Aerial view of the inside system including ducts and grills

Profile	Heat Capacity
48"– 60" Sleeper	1.0 KW
72" High Rise	1.5 KW

Between the rails battery box, showing an inverter in the upper right corner

SPECIFYING A SYSTEM FOR DAY CABS

Day-cab trucks are also subject to clean-air regulations that restrict idling time, and there is an increasing demand for engine-off air conditioning solutions for these trucks as well as sleepers.

Dometic's day-cab systems are designed to meet the space constraints and capacity requirements of day cabs to meet typical usage patterns.

The day-cab system requires fewer batteries than a sleeper, since run times are shorter. It also uses a slightly smaller alternator than the sleeper system.

The number of batteries needed will depend on the length of time you will need to run the air conditioner between recharges. Note that the air conditioner normally will not run continuously, but will cycle on and off as needed to maintain the selected setpoint. The 60% duty cycle in the table means that the air conditioner runs 60% of the time, and is off 40% of the time.

The outside condenser mounts horizontally or vertically on the back of the cab. The inside unit, containing the compressor, evaporator and blower, is packaged in a molded composite cover and mounts between the seats in the cab. The cover contains multiple air outlets which can be pointed to discharge in different directions. The display/control and inverter control are mounted directly on the driver's side of the unit for easy accessibility.

Day-cab unit between the seats

The following table provides simplified guidelines to meet these user profiles:

Day route – Cools the cab during a typical 15-30 minute wait and recharges in 20-30 minutes

Terminal – Cools the cab for up to 2 hours, recharges in 1 hour of run time

Day Route		
Batteries	3 Group 31 AGM	Replace existing lead-acid batteries with AGM batteries.
Alternator	270 amp high output	Replace existing alternator on truck engine.
Inverter	2,000 Watt Modified Sine Wave (MSW)	
HVAC System	7,000 BTU/hr	All inside components are packaged in a molded plastic shell.
Terminal Operation		
Batteries	3 Group 31 AGM	Replace existing lead-acid batteries with AGM batteries.
Alternator	270 amp high output	Replace existing alternator on truck engine.
Inverter	2,000 Watt Modified Sine Wave (MSW)	
HVAC System	7,000 BTU/hr	All inside components are packaged in a molded plastic shell.

Hours Running on Battery Power (Approximate) 7,000 BTU/hr		
Number of Batteries	100% Run	60% Run
2	1.5 hours	2.25 hours
3	2.0 hours	3.0 hours

OPERATION AND MAINTENANCE

INSULATION

Most truck cabs and sleepers are insulated with a value of approximately R1 to R1.25. Even the cold-weather packages offered with some new trucks have an insulation value of only R2. By comparison, most new homes are insulated to R30. TMC recommended practices call for R4.2 as a standard insulation package and greater than R4.6 in a premium package. This standard, once adopted by the industry, will go a long way toward improving the cooling efficiency of your engine-off air conditioner.

If you are ordering a new truck, we strongly recommend requesting the upgraded insulation package. There are also measures you can take to reduce the heat load in your truck. Insulate the floors with foam under the carpet. Get heavy-duty blackout curtains between the cab and sleeper. Cover the skylights and windows with reflective shades when stopped. Park in the shade whenever possible, and switch off heat-producing appliances.

REPLACING BATTERIES

Major-brand replacement AGM batteries are available from distributors throughout North America. Do not mix battery types. Example: One would not have 4 typical wet-cell, lead-acid batteries and 4 agm batteries. Overall charging will not occur and battery life will be reduced.

MAINTENANCE

Voltage Drop: The voltage drop is measured between the charging point (alternator or battery charger) and the battery that is the farthest from the charging point and should be no more than 0.2V DC. (Any more will result in improper charging and run time will be shortened.)

Inspect the batteries frequently. Check for tight electrical connections and also check for corrosion at battery terminals.

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

Do not block the airflow path between the return-air grill and evaporator coil with pillows, blankets, papers or other objects.

Check the condensate drain to make sure water is draining properly. If the drain is clogged, clean it.

Periodically inspect for chafe on outside wires, cables and refrigerant lines.

Inspect and clean debris from the condenser unit mounted outside the truck.

Note that you should never need to recharge the refrigerant loop under normal operating conditions. If the refrigerant level needs to be adjusted, federal law requires that it must be done by an EPA-licensed HVAC technician with proper tools to avoid accidental discharge of refrigerant gas into the air.

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