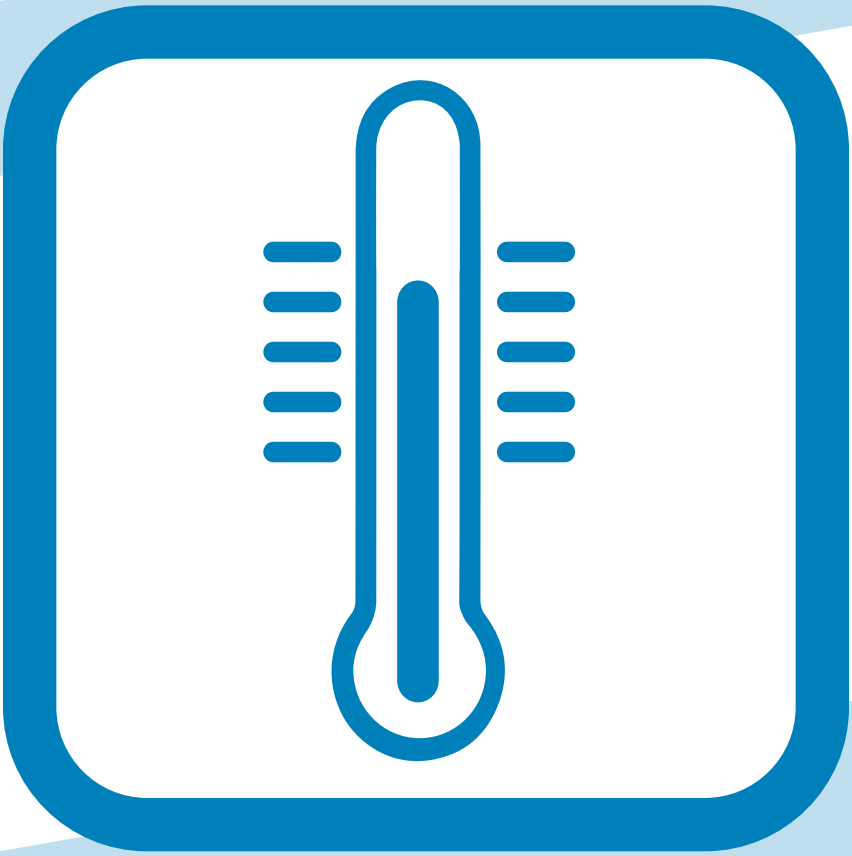
# Heating, Ventilating, and Air Conditioning



## Class A, B, and C Motorhomes

thormotorcoach.com

THOR MOTOR COACH

# About This Guide

Thank you for choosing Thor Motor Coach (TMC). This Heating, Ventilating, and Air Conditioning (HVAC) System Guide is intended to help you understand and operate these features of your new motorhome. It includes information provided by your selling dealer during your new motorhome pre-delivery inspection (PDI), and much more.

Made to fit.

This guide is not intended for use as a service manual, nor is it model specific. Although some information is specific to certain brands and models, it is of a general nature, and the illustrations and descriptions provided may differ from the components installed in your motorhome.

# Thor Motor Coach's Continuing Commitment

Thor Motor Coach's continuing commitment is to provide quality and value for our motorhome customers. Features, options, and components will constantly change as new and improved devices become available and designed into TMC's line-up, with the goal of always providing recreational vehicles that meet and exceed expectations.

# Contact Us

You are extremely important to us, and you can be assured Thor Motor Coach and your selling dealer will always strive to do everything possible to earn your trust and goodwill. Your selling dealer should be your first source for information regarding any questions or concerns you may have about your motorhome.

You can also contact TMC Customer Care anytime you have a question about your motorhome or the operation of any factory-installed appliance, equipment, or component.

TMC Customer Care representatives are available Monday through Friday, 8:00 am to 5:00 pm EST by telephone. If you call off-hours, leave a detailed message and a representative will contact you ASAP.

TMC Customer Care representatives are conveniently available via direct email or email through the Thor Motor Coach website. You can also send or fax written requests to the address and number listed below:

**Thor Motor Coach**
**Attn: Customer Care**
**PO Box 1486**
**Elkhart IN 46515-1486**

**Phone: 877-855-2867 (24/7 assistance)**
**Fax: 574-294-3618**
**Email: wsupport@tmcrv.com**
**Website: www.thormotorcoach.com**



TMC Part Number 0428788 Rev 11/18/2022

## Heating, Ventilating, and Air Conditioning Suppliers:

| | |
|---|---|
| Air Conditioner(s): | Airxcel: **http://www.airxcel.com/coleman-mach**<br>Dometic Corporation: **http://www.dometic.com/en-us/us** |
| Dash Heating & A/C (Class A): | ProAir, LLC: **http://www.proairllc.com** |
| Heat Pumps: | Airxcel: **http://www.airxcel.com/coleman-mach**<br>Dometic Corporation: **http://www.dometic.com/en-us/us** |
| Furnace: | Atwood Mobile Products: **https://www.dometic.com/en-us/us/rebranded/atwood**<br>Dometic: **https://www.dometic.com/en-us/us/**<br>Suburban: **https://www.airxcel.com/suburban/**<br>Truma: **https://www.truma.net/** |
| Hydronic Heating System: | Aqua-Hot: **http://www.aquahot.com** |
| Thermostats: | Atwood Mobile Products: **https://www.dometic.com/en-us/us/rebranded/atwood**<br>Dometic Corporation: **http://www.dometic.com/en-us/us**<br>Suburban: **www.airxcel.com/suburban/** |
| Ceiling Fans & Vents: | Ventline by Dexter: **www.ventline.com** |
| Fan Tastic®: | Dometic Corporation: **http://www.dometic.com/en-us/us** |
| MAXXFAN®: | Airxcel: **http://www.airxcel.com** |

## Other Resources:

Thor Motor Coach Customer Care: **877-855-2867**

Thor Motor Coach Customer Resources Web Site:
**https://www.thormotorcoach.com/owners**

Thor Motor Coach YouTube Site: **https://www.youtube.com/user/ThorMotorCoach**

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# Safety

## Labels, Alerts, and Symbols

Safety labels and decals are placed throughout the motorhome in locations where the potential for a hazardous condition is present. Make sure that you and your traveling companions understand and follow all safety instructions. Never remove safety labels and decals. If a safety label should become damaged, illegible, or removed, it should be replaced as soon as possible. Contact Thor Motor Coach Customer Care for a replacement.

Thor Motor Coach uses the following signal words to warn you of possible safety concerns and to provide information to help prevent personal injury and/or damage to the motorhome:

NOTE: Provides helpful information on the topic being covered in the section.

**This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death. This symbol may be used in conjunction with the following signal words and with a color that corresponds with the associated safety label.**

**⚠ DANGER**

**Danger indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. This alert information is limited to the most extreme situations.**

**⚠ WARNING**

**Warning indicates a potentially hazardous situation that, if not avoided, may result in death or serious injury.**

**⚠ CAUTION**

**Caution indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.**

***NOTICE***

**A Notice indicates a potential situation that, if not avoided, may result in property damage or damage to your motorhome.**

## Fire Safety

**⚠ DANGER**

**NO SMOKING**

**Before dispensing fuel, turn OFF all engines, fuel-burning appliances, and their igniters (see operating instructions).**

**Do not dispense fuel within 20ft (6.1m) of an ignition source.**

**Can cause ignition of flammable vapors, which can lead to a fire or explosion and result in death or serious injury.**

**⚠ DANGER**

**Vehicles and equipment powered by internal combustion engines and placed in recreation vehicles may cause carbon monoxide poisoning or asphyxiation, which could result in death or serious injury.**

**The flammable liquids used to power these items can cause a fire or explosion, which can result in death or SERIOUS INJURY.**

**TO REDUCE RISK:**

1. **Do not allow passengers to ride in the vehicle storage area when vehicles and fuel are present.**
2. **Close doors and windows in walls of separation (if installed) when any vehicle is present.**
3. **Run fuel out of engines or stored vehicles after shutting off fuel at the tank.**
4. **Do not store, transport, or dispense fuel inside this vehicle.**
5. **Open the windows, openings, or air ventilation systems provided for venting the transportation area when vehicles are present.**
6. **Do not operate propane appliances, pilot lights, or electrical equipment when motorized vehicles are present.**

**⚠ CAUTION**

**Always replace the fire extinguisher with a similar Class B-C type.**

- **Fire extinguishers must be replaced after any use, even if used briefly.**
- **Fire extinguishers have an effective service life. Replace expired fire extinguishers.**

## ⚠ CAUTION

**Ensure the smoke detector and alarm is always kept in good working order. Test this device regularly and immediately replace if it is not functioning properly.**

**The smoke detector operates on an internal battery. Immediately replace battery when needed and/or on an annual schedule.**

For the safety of you and your traveling companions, make sure that everyone traveling in the motorhome is familiar with the location of exits and operation of emergency exits, including emergency exit egress windows. The risk of fire can be reduced by following a few basic fire prevention rules:

Typical Class B-C fire extinguisher

- Know the location of your fire extinguisher(s) and keep them in a state of readiness.
- Never store flammable liquids inside the motorhome.
- Keep cooking surfaces clean and free of obstructions.
- Never use a flammable liquid or material as a cleaning agent.
- Never leave operational cooking appliances unattended.
- Never smoke in bed, around propane appliances and devices, and during fueling of the motorhome and/or propane system.
- Never allow children to play with propane gas or electrical equipment.
- Never use an open flame as an illumination device.
- Immediately repair or discard faulty or damaged wiring and electrical components.
- Never overload electrical circuits.
- Locate and repair propane gas leaks immediately.
- Don't allow rubbish to accumulate inside storage compartments, near or around appliances, propane, and electrical devices or equipment
- Apply flame retardant treatments to interior fabrics; renew treatment at manufacturers recommendations.
- Test and inspect circuit breakers and fuses on a regular basis.
- Maintain fresh batteries in the smoke alarm and perform regular tests to ensure proper operational condition.

NOTE: Know the location of the fire extinguisher installed in your motorhome, become familiar with its use, and keep it in good operating condition. Fire extinguishers have an effective service time-period; always replace expired fire extinguishers.

### If a fire does start or smoke is detected, follow these basic rules of safety:

1. IMMEDIATELY evacuate everyone (including pets) from the motorhome!
2. After everyone is accounted for, clear and at a safe distance from the motorhome, call emergency responders.
3. Check the fire or source of smoke to determine if you can attempt to put it out.
4. If it is too large for the fire extinguishing tools you have, or the fire is fuel fed, stay clear of the motorhome and have the fire department and/or emergency responders manage the emergency.
5. ONLY if you have safe access to the shore power stand, turn OFF the main 120/240 VAC circuit breaker at the shore power source and disconnect the shore power cord from this source.
6. ONLY if you have safe access to the Master Battery Switch, turn it OFF.
7. ONLY if you have safe access to the main propane valve located on the propane tank, CLOSE the main propane valve (clockwise direction).
8. ONLY if you have safe access to the battery compartment(s), disconnect the negative battery cable(s) at the house battery and chassis battery
9. DO NOT attempt to use water to put out an electrical or grease fire. Water can spread many types of flammable materials, and electrocution is possible when the fire has an electrical source.

NOTE: Please strictly follow the instructions and heed the warnings of all safety labels affixed to your motorhome.

## Electrical Safety

**⚠ DANGER**

**The potential of electrical shock and fatal electrocution is an ever-present danger when working with electricity and electrical components.**

**⚠ WARNING**

**Whenever electrical system maintenance is required and before working on the electrical system of the motorhome:**

- **Turn OFF the master battery switch**
- **Turn OFF shore power circuit breakers and disconnect the shore line power cord**
- **Turn OFF the generator**
- **Disable the automatic generator start functionality**
- **Disconnect the negative 12 VDC auxiliary (house) battery terminal(s)**
- **Attach an electrical lockout device to the electrical service panel**

**Before disconnecting your house and/or chassis batteries, always make sure the master battery switch is turned off, and the inverter/charger (if so equipped) is turned off.**

**Use extreme caution when using metal tools near electrical system terminals, connections, and components. Short circuits can occur when metal tools bridge between electrical terminals of opposite polarity, causing sparks, possible equipment damage, potential of fire, explosion, bodily injury and/or electrocution.**

**⚠ CAUTION**

**Safety precautions must always be observed when using any electrical device or working with electrical wires and connections. Careless handling of electrical components can be fatal. Never touch or use electrical components or appliances while feet are bare, while hands are wet, or while standing in water or on wet ground. Always remove jewelry and wear protective clothing and eye covering. Avoid creating sparks, which could ignite nearby flammable materials.**

All installations of the electrical system and components of your motorhome have been made in compliance with industry standards applicable on the date of manufacture. The electrical equipment and associated circuitry are designed and engineered into a dedicated system specific to your motorhome. Do not modify or make changes to the electrical system of your motorhome that are unauthorized by TMC Customer Care. Changes or modifications made after delivery may result in hazardous conditions, cause damage to factory-installed equipment, and may void TMC and equipment manufacturers warranties.

## Electrical System Maintenance

***NOTICE***

**The electrical system of the motorhome must be in good working condition; being able to supply 12 volts DC to control circuits of the furnace and other gas appliances; fans and vents. Additionally, 120 volts AC is needed for air conditioner(s), supplied by the generator or shore power.**

Always use extreme caution when performing maintenance or repairs on the electrical system, electrical components, and electrical devices of your motorhome. Service, maintenance, and/or modification of the electrical system should only be performed by qualified electrical technicians using approved materials, components, and installation methods that meet current safety and code requirements. Please consult your dealer's service department or TMC Customer Care for assistance.

### Welding and Chassis Repairs

**⚠ CAUTION**

**BEFORE performing welding repairs on the motorhome chassis, disconnect battery ground cables (negative) and ground lugs from all factory-installed wiring harnesses.**

If your motorhome's chassis should ever require welding repairs, it is imperative to disconnect the negative cables from the house and chassis batteries and ground lugs from all TMC-installed wiring harnesses BEFORE welding. Disconnecting these ground terminals from the chassis will help prevent damage to sensitive electrical circuits and devices due to arc-welding.

After the welding repairs are completed, ensure all wiring harness ground lugs are properly re-installed BEFORE re-attaching the battery cables.

Diagrams indicating the location of wiring harness ground lugs for the chassis of your motorhome model can be obtained from a TMC Customer Service representative.

NOTE: Your motorhome's electrical system is engineered and tested for safety. Circuit breakers and fuses are designed to protect the electrical circuits from overloading. If you plan to make modifications or additions to the electrical system, TMC strongly recommends consulting a qualified electrician for assistance to ensure continued integrity and safety of the electrical systems.

Please note that any modifications may void the TMC Limited Warranty or appliance and component manufacturers warranties.

## Propane System Safety

### ⚠ DANGER

**IF YOU SMELL PROPANE GAS**

1. **Extinguish any open flames and all smoking materials.**
2. **Shut off the propane supply at the container valve(s) or propane supply connection.**
3. **Do not touch or operate electrical switches.**
4. **Open doors and other ventilating openings.**
5. **Leave the area until the odor clears.**
6. **Have the propane system checked and leakage source corrected before using again.**

**Ignition of flammable vapors could lead to a fire or explosion and result in death or serious injury.**

### ⚠ DANGER

**Do not use gas cooking appliances for comfort heating. Can lead to carbon monoxide poisoning and/or depletion of oxygen, which can cause death or serious injury.**

### ⚠ DANGER

**All pilot lights, appliances, and their igniters (see operating instructions) shall be turned off before refueling of motor fuel tanks and/or propane containers.**

**Can cause ignition of flammable vapors, which can lead to a fire or explosion and result in death or serious injury.**

### ⚠ DANGER

**NEVER TRAVEL WITH, AND/OR STORE PROPANE (LP) CONTAINERS OR CYLINDERS INSIDE YOUR MOTORHOME.**

**Propane cylinders are designed to vent whenever internal pressures reach a certain threshold. Therefore, the potential of a venting propane cylinder presents a gas leak hazard, which, if ignited, could lead to an EXPLOSION, FIRE, AND SERIOUS BODILY INJURY OR DEATH.**

### ⚠ WARNING

**ALL PROPANE GAS IS CONTAINED UNDER PRESSURE. DUE TO THE DANGEROUS POTENTIAL OF ANY COMPRESSED GAS, IT IS MANDATORY THAT THE FOLLOWING REQUIREMENTS FOR THE USE OF THIS TANK BE FOLLOWED:**

**Tanks are to be installed, fueled, and maintained in accordance with the state and local codes, rules, regulations, or laws and in accordance with the NFPA Pamphlet 58, division IV.**

### ⚠ WARNING

**Do not fill propane container(s) to more than 80 percent of capacity. A properly filled propane tank contains approximately 80 percent of its volume as liquid propane.**

**Overfilling the propane container(s) can result in uncontrolled propane flow, which could lead to a fire or explosion and result in death or serious injury.**

### ⚠ WARNING

**THIS PROPANE PIPING SYSTEM IS DESIGNED FOR USE WITH PROPANE ONLY:**

- **Do not connect natural gas to this system.**
- **Securely cap inlet when not connected for use.**
- **After turning on propane, except after normal cylinder replacement, test propane piping and connections to appliances for leakage with soapy water or bubble solution.**
- **Do not use products that contain ammonia or chlorine to test for leaks. These substances may weaken piping components and cause gas leaks, leading to fire or explosion, which could result in death or serious injury.**

### ⚠ WARNING

**ROAD VIBRATION CAN LOOSEN PROPANE FITTINGS. It is important to check the Propane System for leaks at least every 5,000 miles, and whenever the tank is filled. It is also recommended to have the entire Propane System checked annually by a qualified propane service technician.**

### ⚠ WARNING

**Gas cooking appliances need fresh air for safe operation.**

**BEFORE OPERATING:**

- **Open vents or windows slightly or turn on exhaust fan prior to using cooking appliance.**
- **Gas flames consume oxygen, which should be replaced to ensure proper combustion.**
- **Improper use can result in death or serious injury.**

Warning labels are affixed throughout your motorhome to provide required information on propane safety. Read and follow the instructions listed, and exercise proper precautions when using propane and propane appliances.

Familiarize yourself and follow all propane gas safety procedures listed within this document, your Owner's Manual, and the documentation associated with all gas and electrical appliances of your motorhome.

## Combination Carbon Monoxide/ Propane Alarm

**⚠ WARNING**

**The carbon monoxide/propane (CO/LP) combination alarm installed is intended for use in ordinary indoor locations of recreation vehicles.**

**Actuation of this alarm indicates the presence of carbon monoxide and/or propane gas, which is a toxic gas that is colorless and odorless.**

**Do not disconnect the combination carbon monoxide/ propane alarm from its power source.**

**Individuals with medical problems may consider using warning devices that provide audible and visual signals for carbon monoxide concentrations under 30 PPM.**

**This alarm will only indicate the presence of carbon monoxide gas at the sensor. Carbon monoxide gas may be present in other areas.**

**⚠ WARNING**

**THE CO/LP COMBINATION DETECTOR OPERATES ON 12 VOLT HOUSE POWER; IT DOES NOT CONTAIN AN INTERNAL BACK-UP BATTERY. IT WILL BE DISABLED WHEN AUXILIARY BATTERIES ARE DISCONNECTED, OR SHORE POWER IS REMOVED, OR IF THE AUXILIARY BATTERY VOLTAGE DROPS BELOW THE OPERATING THRESHOLD VOLTAGE OF THE DETECTOR!**

**⚠ WARNING**

**Actuation of this alarm indicates the presence of propane gas and/or carbon monoxide. By displacing available breathable oxygen, the presence of these gases have the potential of causing death by suffocation.**

Your motorhome is equipped with a combination carbon monoxide/propane alarm that is listed for use in recreation vehicles. The combination carbon monoxide/ propane alarm will only provide its intended protection if it is maintained in operational condition.

Typical combination carbon monoxide/propane alarm

The combination carbon monoxide/propane alarm is wired directly to the motorhome's 12 volt DC electrical system, with continuous power being supplied by the auxiliary battery. There is not a back-up battery in the combination carbon monoxide/propane alarm. If the auxiliary battery cable is disconnected at the battery terminals, the combination carbon monoxide/propane alarm will not be powered, and therefore, will not function.

This alarm is designed to detect the toxic carbon monoxide gas that results from incomplete combustion, such as those emitted from appliances, furnaces, fireplaces, and auto exhaust, along with propane gas that may be present. A carbon monoxide/propane alarm is NOT A SUBSTITUTE for other combustible gas, fire or smoke detection alarms.

Please note that there are hazards against which carbon monoxide detection may not be effective, such as detection of natural gas and other harmful substances.

Although this alarm is designed to sense the presence of carbon monoxide and/or propane gas, there are other combustible fumes or vapors that may be detected by the sensor including, but not limited to: acetone, alcohol, butane, and gasoline.

These chemicals can be found in commonly used items such as deodorants, colognes, perfumes, adhesives, lacquer, kerosene, glues, wine, liquor, cleaning agents, and the propellants of aerosol cans. Be sure to read, understand, and follow the owner's information from the manufacturer of the combination carbon monoxide/propane alarm. This includes information regarding the limited service life of the alarm.

### What to do if the Alarm Sounds

1. Operate the RESET/SILENCE button.
2. Immediately move to fresh air (outdoors, or by an open door or window).
3. Call emergency services (911 in the United States or a local fire department).
4. Do not re-enter the motorhome or move away from the open door or window until the emergency service responders have arrived, the motorhome has been aired out, and the alarm remains in its normal (OFF) condition.

If the alarm reactivates within a 24-hour period, repeat steps 1-through-4 and call a qualified appliance technician to investigate for sources of carbon monoxide and inspect for proper operation of this equipment. An inspection for propane leaks must also be performed. Make sure that motorized vehicle(s) and equipment are not, and have not been operating adjacent to the motorhome.

Have all identified problems corrected immediately. Note equipment inspected by the technician and the repairs that were made. Consult the manufacturer's instructions or contact the manufacturer directly for more information about carbon monoxide safety and this alarm.

## Test

**⚠ WARNING**

**Test the combination carbon monoxide/propane alarm after the motorhome has been in storage, before each trip, and at least once per week during motorhome use.**

**Failure to do so can result in an undetected faulty CO/LP alarm, which could lead to death or serious injury.**

With the LP/CO detector ON (powered by the motorhome's 12 volt system), simply press the TEST switch located on the front of the detector. The LED should flash red and the alarm should trigger. Release the switch. This is the only and proper method of testing the detector. The test feature checks the full operation of the detector. If this detector does not test properly, have it repaired or replaced immediately.

The LP/CO detector has a self-check circuit that initiates when the detector is powered. In the event the detector senses an internal fault, a failure alarm will trigger. It is a continuous series of short beeping tones between long intervals and is distinctively different from the gas alarm. Repair or replace the detector if the failure alarm is triggered.

## Maintenance

Vacuum the alarm cover at least once a year. Clean the cover by hand using a cloth dampened in clean water. Dry with a soft cloth. Do not spray the front panel of the alarm with cleaning agents or waxes. This action may damage the sensor causing an alarm or cause the alarm to malfunction. Do not paint the face of the alarm.

## Replacement

**⚠ CAUTION**

**Be sure to replace your LP/CO detector(s) by the "replace by" date on the cover, or according to the time-frame listed in the detector's user's manual.**

The combination carbon monoxide/propane alarm has a limited service life and must be replaced following the alarm manufacturer's instructions and/or the expiration date listed on the device.

## Conditions That May Trigger the LP/CO Detector

### NEW COACH ODOR

The glues and other materials used in manufacturing the motorhome produce vapors which may be detected when the motorhome is stored for an extended period. Air out the motorhome thoroughly after it has been stored for an extended period of time.

### HAIR SPRAY

Most aerosol hair sprays use butane gas as a propellant. Butane, like propane, is heavier than air and will settle to the floor level where it may be detected.

### OTHER GASES

Other gases that can cause the detector to trigger an alarm include vapors from any fuel, liquor, alcohol, deodorants, colognes, perfumes, adhesives, lacquer, and solvent-based cleaning agents.

### BEEPING NOISE

If you hear beeps about once every minute, even if power to the LP/CO detector is turned off, the source of the beeps may be the smoke alarm, not the LP/CO detector. Unlike the LP/CO detector, which is powered from the house (auxiliary) battery, the smoke alarm operates on an internal 9 volt battery. Replace the battery in the smoke alarm.

### SLOW BEEP RATE

This could be the LP/CO detector's built-in failure warning alarm. It is a continuous series of short beeping tones between long intervals and is distinctively different from the alarm. This sound indicates that the LP/CO detector is not working properly and needs to be replaced.

If problems continues with the LP/CO detector, see your RV dealer or qualified propane service center for detector service or replacement.

## Common Causes of Apparent LP/CO Detector Malfunctions

Some conditions do exist where the LP/CO detector will produce apparent false alarms. However, your **FIRST** response when an alarm is activated is to **ALWAYS AND IMMEDIATELY, HAVE ALL OCCUPANTS EVACUATE THE MOTORHOME**. Remember, although propane gas has a distinct order, carbon monoxide gas is odorless, and both are deadly.

Check for possible sources of carbon monoxide gas, such as a malfunctioning furnace, clogged furnace or gas refrigerator vents, exhaust fumes from generators or vehicle engines. **NEVER ASSUME THAT THE ALARM IS FALSE, UNTIL ALL POSSIBLE SOURCES OF DEADLY GAS HAVE BEEN THOROUGHLY CHECKED AND DEEMED SAFE.**

# Heating and Cooling System Introduction

Your motorhome's heating and cooling system consists of equipment sourced from a variety of manufacturers, yet the individual components are designed to function as an integrated system. Components may have manufacturer's warranties and registrations. Your dealer can assist you with completing component registrations.

Due to the wide variety of Thor Motor Coach models and floor plans, heating and cooling information that is uniquely specific to your particular motorhome is not included in this manual. Please review and retain all manufacturer's instruction manuals and documentation that is included with your TMC Owner's Packet. The manufacturers of the heating and cooling equipment installed in your motorhome are the best source for information regarding component features, operation, and maintenance.

Always refer to the manufacturer's documentation if you have questions regarding your heating and cooling system that are not covered in this manual. TMC Customer Care representatives are also available to answer any question you may have. Call toll free:

**877-855-2867**

The heating, ventilation, and air conditioning (HVAC) functions of your motorhome consist of two separate systems: the dash (vehicle) and house (living space). Much like the heating and air conditioning systems in passenger cars, the dash system is designed to heat and cool the front driver and passenger compartment, along with providing windshield defrosting. Although the dash heating and air conditioning system of your motorhome is generally more powerful than standard automobile systems, it is not designed to heat and cool the entire motorhome, even while the vehicle is in motion.

If cooling of the living space is needed while the vehicle is in motion, it is possible to operate the house air conditioner(s), however, to do so, the on-board generator must be in operation, supplying 120 volts AC to the air conditioning units. The Master Battery Disconnect Switch must also be ON, providing power to HVAC control devices.

**DO NOT OPERATE THE PROPANE GAS FURNACE, OR ANY OTHER PROPANE APPLIANCE, WHILE THE VEHICLE IS IN MOTION.**

Regardless of the outside temperature, your motorhome's heating and cooling system will keep you and your traveling companions comfortable.

# Dash Heater and Air Conditioner

**⚠ CAUTION**

**The vehicle air conditioning system contains refrigerant 134a under high pressure and should only be serviced by qualified technicians. Improper service methods could cause serious personal injury.**

The heating, ventilation, and air conditioning (HVAC) functions of your motorhome consist of two separate systems: the dash (vehicle) and house (living space). Much like the heating and air conditioning systems in passenger cars, the dash system is designed to heat and cool the front driver and passenger compartment, along with providing windshield defrosting. Although the dash heating and air conditioning system of your motorhome is generally more powerful than standard automobile systems, it is not designed to heat and cool the entire motorhome, even while the vehicle is in motion.

If cooling of the living space is needed while the vehicle is in motion, it is possible to operate the house air conditioners, however to do so, the on-board generator must be in operation, supplying 120 volts AC to the units. See Cooling the Motorhome Section.

DO NOT OPERATE THE PROPANE GAS FURNACE, OR ANY OTHER PROPANE APPLIANCE, WHILE THE VEHICLE IS IN MOTION.

## Control Panels

The heater and air conditioner dash controls for most TMC Class C motorhomes is similar to what is found in many passenger and light commercial vehicles and is installed by the chassis manufacturer. For Class C dash control operation, refer to the chassis manufacturer's instructions provided in your Owner's Packet.

Class A dash heating and air conditioning units differ in that they are installed by the motorhome manufacturer. Both operate similarly in controls and functions, and both require the vehicle's engine to be running in order to heat or cool the cockpit of the motorhome.

The typical control panel consists of three rotary dials, which regulate FAN SPEED, TEMPERATURE, and VENTING. The configuration of these controls may differ from model-to-model, but the functions are similar. Motorhomes may be equipped with touch-panel dash temperature controls.

The heater/air conditioner unit is located beneath the dash or on the firewall. In most modes of operation, the unit takes fresh air from outside of the vehicle and heats or cools it before discharging into the cockpit area. Only when operated in the MAX A/C mode does the system recirculates air from inside the cockpit area, thus maximizing the cooling effect of the air conditioner.


Typical Class A (right) and Class C (above) heating and air conditioning dash controls

## Operating Features

The air conditioning system is designed to operate in all modes except VENT, FLOOR and OFF. Operating the air conditioner provides significant moisture, dust, and pollen removal for enhanced passenger comfort. Use MAX A/C and HI Fan for quick cool down. To assist with cooling, close all windows and vents to hot, humid outside air.

To achieve the maximum comfort in the motorhome, the air must be directed where it is needed. Some dash units may feature a mode switch, which gives the driver the ability to select where the air will flow; floor, dash vents, or a blend.

### GENERAL MAINTENANCE

Keep the condenser and radiator free of bugs and debris. During periods of little use, operate the A/C system monthly to keep the compressor lubricated. Periodically inspect belts and hoses for wear and proper tension.

### Warranty/Service

If repairs are necessary during the terms of the motorhome warranty, please contact the nearest authorized Thor Motor Coach dealer for service. In the event repairs are necessary during your travels, contact Thor Motor Coach Customer Care. Certain individual parts of the Heating and Air Conditioning System such as the compressor, dryer and condenser are covered under the chassis manufacturer's warranty.

NOTE: Components covered under the TMC Limited Warranty must be Original Equipment Manufacturer (OEM) parts. The installation of after market components or unauthorized repairs may void the warranty.


Typical multiplex control panels depicting climate control display


# HVAC Controls

## Heating/Cooling with Multiplex Integration

Your motorhome may be equipped with a programmable multiplex system that, among other features, will include integrated control of the motorhome's interior climate (both heating and cooling), and all HVAC-related devices. Your multiplex system panel may look different than the illustrations below, but will function similarly.

### TO OPERATE:

1. Turn ON the Master Battery Disconnect Switch , providing 12 volt DC power to the HVAC control unit(s).
   a. If heat is desired, ensure the main propane valve is ON prior to selecting HEAT.
   b. If cooling is desired, ensure 120 volts AC is available for the air conditioner(s).
2. Select the Temperature-setting feature by either touching the temperature icon along the edge of the multiplex panel, or touching the temperature icon on the panel screen.
3. Select the zone you wish to control. Depending on motorhome configuration, there may be one, two, or three temperature zones.
4. Select cooling or heating by pressing the appropriate area on the screen.
5. Select the desired temperature setting by either touching the UP or DOWN arrows.

   If desired, select the fan speed by touching the HIGH, LOW, or AUTO areas on the screen.
6. For total automation, select AUTO, which will turn on the air conditioner(s) or if needed, the furnace depending on selected temperature setting.
7. Return to the MAIN MENU by touching the 'House-shaped' icon on the panel or touching return arrows on the screen.

## Wall-mounted Thermostats

Unless equipped with a multiplex control system, your TMC motorhome will have a wall-mounted thermostat for convenient control of the heating and air conditioning functions. Although different in appearance, RV thermostats offer the basic functions of:

- Selecting between Heat, Cool, or Fan Only;
- Selecting a fan speed range;
- Selecting the temperature set point.

The thermostat remotely operates both the furnace and the air conditioner(s) of your motorhome and depending on thermostat model, may offer other control features. Wall mounted thermostats may be analog or feature a digital display. Both models operate similarly. If your air conditioning units are equipped with the optional Elect-A-Heat function, this selection will be indicated as electric heat on the front of the thermostat.


Typical RV thermostats illustrating Analog and Digital temperature setting


### TO OPERATE:

1. Turn ON the Master Battery Disconnect Switch, providing 12 volt DC power to the HVAC control unit(s).
   a. If heat is desired, ensure the main propane valve is ON prior to selecting HEAT.
   b. If cooling is desired, ensure 120 volts AC is available for the air conditioner(s).
2. On the thermostat, select Heat, Cool, or Auto.
3. Set the desired temperature. Depending upon the selection, the furnace or air conditioner(s) will begin operation.

If a wall-mounted thermostat or multiplex system is not installed in the motorhome, then air conditioner functions are controlled from a panel on the unit itself (ceiling panel).

## Operation, Analog Model

### CHOOSING A MODE

Use the system selector to select Fan, Cool, Heat or turn the HVAC system OFF.

### FAN CONTROL

Use the FAN selector to select AUTO or ON as well as FAN SPEED.

### SETTING TEMPERATURE

Use the slider on the temperature display to select the desired cabin air temperature.

NOTES:

- 120 volts AC must be present in order to operate air conditioners or heat pumps. The energy can be supplied by Shore Power or the on-board generator.
- Do not operate air conditioners with inverters (if equipped). Typical inverters do not have an adequate power rating to operate high-energy use appliances like air conditioners.
- If your air conditioning units are equipped with the optional Elect-A-Heat function, this feature will be available on the thermostat and will be indicated by the selection option of electric heat.
- For complete information regarding the particular HVAC control device installed on your motorhome, refer to the information contained with your TMC Owner's Packet, supplied with your motorhome or through your on-line Owners Resource account.

NOTE: When the AUTO COOL mode is selected on the thermostat, the fan cycles ON and OFF with the air conditioner's compressor as needed. When the ON COOL mode has been selected, the fan runs continuously and the air conditioner's compressor cycles ON and OFF as needed.

## Operation, Digital Model

### CHOOSING A MODE

Use the system selector to select Cool, Heat or turn the HVAC system OFF.

### FAN CONTROL

- Use the Fan Mode selector to select AUTO or ON.
- Use the Fan Speed selector to set the fan speed to HI or LO.

### SETTING TEMPERATURE

Use the up and down arrow to the right of the digital display to set the desired cabin air temperature.

## Single-Zone Thermostat

TMC motorhomes that are equipped with brand-specific air conditioners and/or heat pumps may be furnished with a similarly-branded single-zone thermostat, as illustrated below.

## Thermostat Operation

### MODE SELECTION

- Press and release the ON/OFF Mode button to cycle through the available modes. All Dometic single zone LCD thermostats have COOL and FURNACE modes. Some models include a HEAT mode, for control of electric heating via heat pump or heating elements contained within the air conditioning unit.
- Select models will have an additional mode, either HEAT PUMP or HEAT STRIP. When desired mode has been selected, the LCD will display the temperature set-point and the green LED will be lit next to the selected mode. To change the set-point, press the '+' button to increase the set point and the '-' button to decrease the set-point.

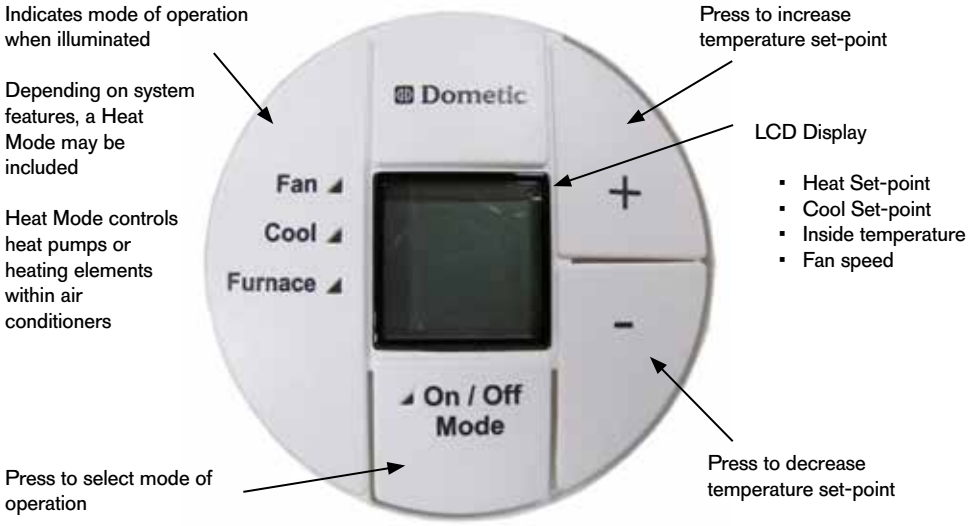
### FAN MODE SETTING

Press and release the ON/OFF Mode button. Press and release the '+' or '-' button to cycle through the fan speed options; LO (Low), HI (High), AU (Auto).

### INSIDE TEMPERATURE

To display the Inside Temperature, the Single Zone LCD thermostat must be in the OFF Mode. Press either the '+' or '-' button to display the Inside Temperature.

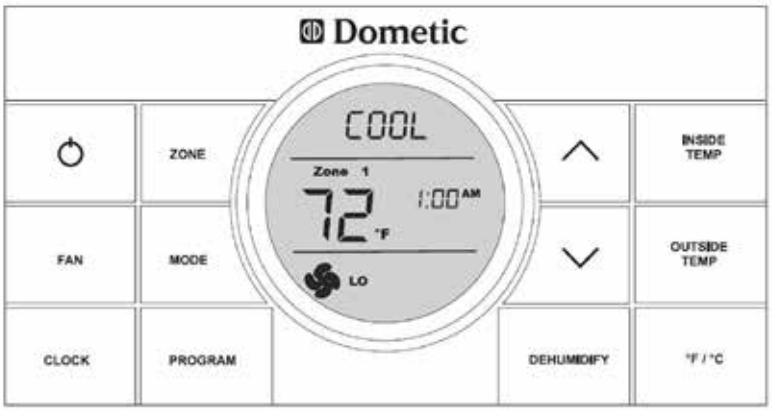
NOTE: The Dometic Single-zone Thermostat can be cleaned with a moist, soft cloth. DO NOT spray water directly on the unit. DO NOT use solvents for cleaning.



## Digital Comfort Control Center II Thermostat

Select TMC motorhomes may be equipped with programmable multi-zone climate controls, and if so equipped, the Programmable Comfort Control Center II (CCCII) thermostat may be installed in your motorhome.

For detailed programming and operational information, refer to the manufacturer's owner's manual included with your TMC Owner's Packet, supplied with your motorhome.




### CCCII THERMOSTAT FEATURES:

- Mode of Operation
- Temperature Set-point
- Zone Identification (up to 4 Zones)
- Program (Select between 1 or 2)
- Outside Temperature
- Clock
- Degrees displayed in F or C
- Compressor Delay
- Auxiliary Heat (heat pump models)
- Control for multiple air conditioners
- Filter Maintenance
- Auto Generator Start (with AGS installed)
- Load Shed
- Humidity Set-point (with de-humidifier installed)

# Cooling the Motorhome

The motorhome is equipped with one or more roof mounted air conditioners. Select models are equipped with roof-mounted heat pumps/air conditioners (see Heat Pumps). The compressors and fans of all roof-mounted air conditioners operate on 120 volts AC only, either from shore power or from the on-board generator, while the control circuits usually operate on 12 volts DC. All roof-mounted air conditioners are rated in British Thermal Units (BTU's), which is a measure of their cooling capacity. The higher this number, the higher the unit's cooling ability. Ensure that the shore power source is adequate for the power needed to operate the air conditioner(s).

With some TMC motorhomes, the air conditioner functions are controlled by a conveniently located wall-mounted control panel, much like the thermostat found in your home. Motorhomes with multiplex control systems have the heating and air conditioning functions integrated into the user control panel of the multiplex system. If a wall-mounted control panel is not installed, then air conditioner functions are controlled from a panel on the unit itself (ceiling panel).

The ability of the air conditioner to maintain the desired inside temperature depends on the heat gain of the motorhome. The size of the vehicle, amount of window area, amount of insulation, amount of direct exposure to the sun, outside temperature, and the number of people occupying the inside space are factors that may increase the heat gain to such an extent that the capacity of the air conditioner is exceeded. Under most operating conditions, you can expect a 15-to-20 degree temperature differential between the intake and discharge air of the air conditioner.

As long as this temperature differential is being maintained, the air conditioner is operating at its capacity. If the desired inside temperature (normally 75°-80° F) cannot be maintained, then the heat gain within the motorhome is too great for the capacity of the air conditioner.

To increase the effectiveness of the house air conditioner, try reducing the heat gain of the motorhome by:

- Park the motorhome in a shaded location.
- Use window and patio awnings when outside ambient temperature is above 95° F to help deflect the heating effects of the sun. If window awnings are not installed or cannot be used, cover windows with shades or blinds.
- Try to avoid using the cook top or oven when the ambient temperature is over 95° F.
- When parked, keep windshield covered when facing the afternoon sun.
- Minimize opening exterior doors when the air conditioner is running.

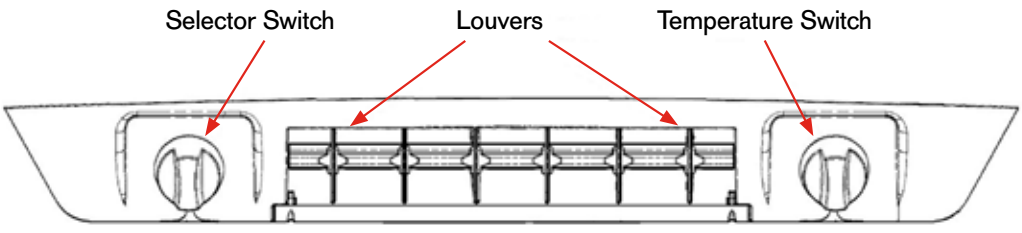
Typical Roof-mount Air Conditioner

NOTE: Some air conditioners are supplied with an optional Elect-A-Heat heating assembly, which is intended to take the chill out of the indoor air when the air is a few degrees too cool for comfort. This heating assembly is an effective 'chill chaser,' but is not a substitute for a furnace.

## Control Panel (on the ceiling-mounted air conditioner)

There are three controls on the air conditioner's ceiling assembly that operate the air conditioner's functions. The three controls are:

Air Conditioner Ceiling Mounted Control Panel



### THE SELECTOR SWITCH

The selector switch determines which mode of operation the air conditioner will be in. By rotating the selector switch, the operator can obtain any system function desired. System functions vary depending upon options of the air conditioning unit.

### THE THERMOSTAT (TEMPERATURE CONTROL)

In the cooling mode, the thermostat regulates the ON and OFF temperature setting at which the compressor will operate. For 'Heat/Cool' models (heat pumps and units with built-in heating coils), the thermostat also controls the ON and OFF temperature setting of the heater assembly.

### LOUVERS

The louvers are located at both ends of the ceiling assembly shroud and are used in directing the discharge air from the air conditioning unit.

## Air Conditioner Operation

1. Turn ON the master battery switch. This will provide 12 volts DC to the control system of the air conditioner
2. Turn ON the generator OR connect the motorhome to a shore power source (refer to the TMC Electrical System Guide, if needed). This will provide 120 volts AC to the air conditioner's compressor and fan.

### Cooling

- Turn the selector switch to the LOW COOL or HIGH COOL positions
- Rotate the thermostat (temperature control) to the position that is the most comfortable for you. The thermostat will turn the compressor on when the temperature of the air entering the air conditioner rises a few degrees above the setting you have selected. The thermostat will continue to cycle the compressor on and off in the above mentioned fashion until the selector switch is turned to another mode of operation.
- Position the louvers to the desired direction of air flow.

### Operation During Cooler Nights

It is important, when the outdoor temperature drops in the evening or during the night to below 75 degrees F., that the thermostat (temperature control) be set at a midpoint between WARMER and COOLER. If the setting is at COOLER, the evaporator coil may become iced-up and stop cooling. During the day when the temperatures have risen above 75 degrees F., reset the thermostat switch to the desired setting.

NOTE: Should icing-up occur, it is necessary to let the cooling (evaporator) coil defrost before normal cooling operation is resumed. During this time, operate the unit in the 'High Fan' position with the system at maximum air flow. When increased or full air flow is observed, the cooling coil should be clear of ice.

### Air Circulation Only

- Turn the selector switch to LOW FAN or for maximum air flow, HIGH FAN.
- Position the louvers to the desired direction of air flow.

### Short Cycling

When an air conditioner is in operation, its compressor circulates refrigerant under high pressure. Once off, it will take two to three minutes for this high pressure to equalize.

The air conditioning compressor is unable to start against high pressure. Therefore, once the air conditioner is turned off, it is important to keep it off for two to three minutes before restarting.

Short cycling the compressor (or starting it before pressures have equalized), will in some instances, trip the circuit breaker.

### Optional Elect-A-Heat

The optional Elect-A-Heat heating coil is intended to take the chill out of the indoor air when the air is a few degrees too cool for comfort. The heating assembly is an effective 'chill chaser.' It is not a substitute for a furnace.

Do not expect the heating coil to glow. The coil will not turn red because the fan draws in cold air and forces it over the coil. A hint of red may occur where the moving air does not directly touch the coil.

- Turn the selector switch the 'LOW HEAT' position. At LOW HEAT, the fan operates on low speed with heat output at maximum.
- Rotate the thermostat (temperature control) switch to the position that is the most comfortable to you. The thermostat will turn the heater on when the temperature of the air entering the air conditioning unit drops below this setting and automatically turn off when the air entering the air conditioner rises a few degrees above this setting.
- Position the louvers to the desired direction of air flow. Discharge air temperature can be controlled to some extent by opening or closing the louvers.

## Maintenance

**⚠ CAUTION**

**Do not operate the air conditioner for an extended period of time without the filter installed. Debris can collect on the cooling coil, resulting in serious damage to the operating components of the air conditioner.**

**NOTICE**

**Air conditioners and heat pumps using R410A refrigerant utilize a factory installed High Pressure Switch Safety Circuit. In the event of an abnormal condition (failure of fan motor, dirty condenser coil, dirty filters), the high pressure switch will prevent the compressor from continuing to run.**

**Once the high pressure switch has tripped, this safety circuit will 'lock-out' the compressor, preventing it from trying to restart and run until the 120 volts AC supply power has been turned off and then back on to reset the High Pressure Switch Safety Circuit. If repeated trips of the high pressure switch lock-out occur, then the unit needs to be serviced by a qualified technician.**

## Air Filters

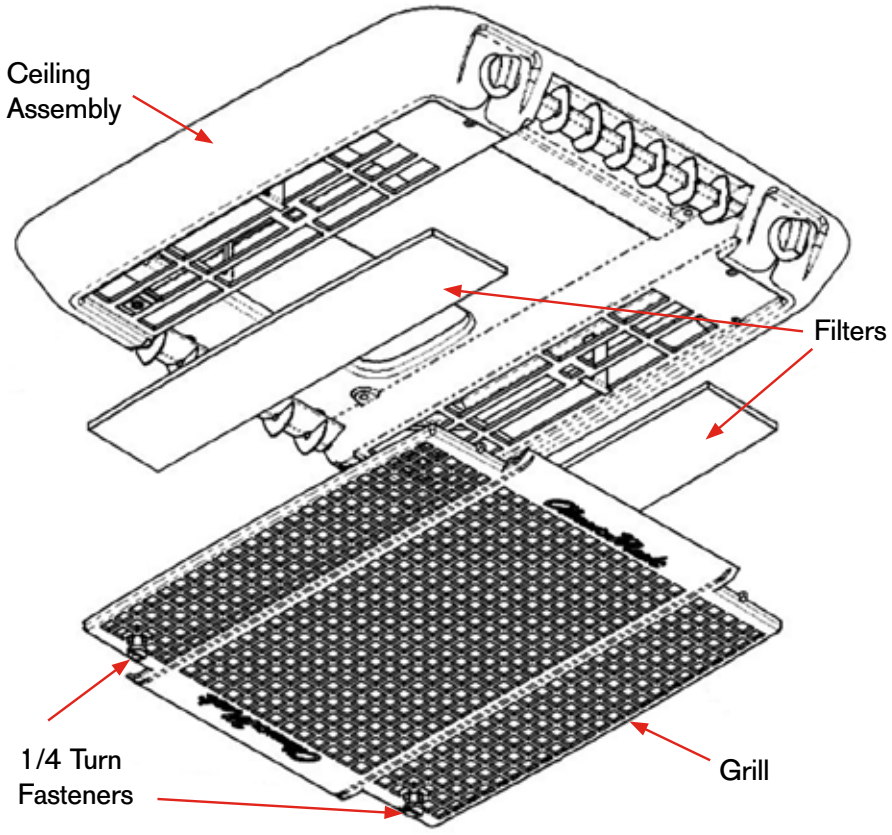
Filters are made from long-life non-allergenic natural fibers which can be cleaned and reused, and which completely filter the circulated air when the air conditioner is in operation. If the filters are not cleaned at regular intervals, they may become partially clogged with lint, dirt, grease, etc. A clogged filter will produce a loss of air volume and may eventually cause an icing-up of the cooling (evaporator) coil.

## Cleaning the Filter

**NOTICE**

**Clean the filters at least every two weeks during times when the air conditioner is in frequent operation.**

**If replacement filters are necessary, the filters can be purchased from most RV Authorized Service Centers. The manufacturer recommends that spare filters are carried with the motorhome so that worn or damaged filters can be immediately replaced.**




1. Disengage the two 1/4-turn fasteners that secure the ceiling assembly grille to the ceiling assembly.
2. Lower the grille and filters from the ceiling assembly.
3. Take filters out and either clean or exchange with new filters. Clean filters with warm soapy water, rinse and allow to dry before re-installing.
4. If the motorhome is equipped with a flush mount ceiling assembly, remove the four return air grille screws. Remove the filter from the grille and either clean or exchange with new filters.

NOTE: DO NOT use harsh chemicals or solvents to clean the filter.

NOTE: For additional information regarding the operation and maintenance of your motorhome's air conditioner(s), please refer to the manufacturer's owner's manuals, supplied with your TMC Owner's Packet or visit the appliance manufacturer's web site listed in this guide.

## Heat Pumps

Select TMC motorhomes are equipped with roof-mounted heat pumps. Heat pumps provide both cooling and supplemental cabin heating. When the cabin temperature rises to where air conditioning is needed, the heat pump provides cool, comfortable air. If the cabin temperature drops to where heat is required, the heat pump provides heated air to maintain cabin comfort. The controller will automatically turn on the LP gas furnace (or hydronic heating system, if installed) when the outside air temperature reaches a level where the heat pump can no longer efficiently heat the cabin.

The advantage of a heat pump system is that when connected to shore power, the heating needs of the cabin are supplemented by the heat pump, therefore, reducing the heating demands of the furnace, which conserves LP usage (or diesel fuel, with a hydronic heating system).

The roof-mounted heat pump installed on your motorhome has a low-profile design, for reduced wind resistance while underway. 120 volts AC Shore Power or on-board generated power must be available in order to operate the heat pump.

NOTE: For complete information regarding the operation and maintenance of your motorhome's heat pump(s), please refer to the manufacturer's owner's manuals, supplied with your TMC Owner's Packet or visit the appliance manufacturer's web site listed in this guide.

## Heat Pump Operation

**NOTICE**

**NEVER operate the heat pump without filters. Doing so will clog the evaporator coil and may substantially degrade the performance of the unit.**

The operation and maintenance of the heat pump is similar to the roof-mounted air conditioner mentioned in the previous section. Refer to the HVAC Control Section, Single-Zone or Dual-Zone Thermostats for heat pump/ furnace control information.

Motorhomes with multiplex control systems, climate control may be integrated with the multiplex control panel(s).


Roof-mounted low-profile heat pump. Exterior cover may be white or black.

## Heat Pump Maintenance

As with air conditioners described in the previous section, filters on heat pump units need to be cleaned every two weeks of operation.

### TO CLEAN HEAT PUMP FILTER(S):

1. Remove the return air filter located behind the return air vent grille.
2. Wash filter with warm soapy water, rinse with clean water, then let the filter dry completely and re-install.
3. Replace all worn or damaged filters.

Refer to the manufacturer's manual included with your TMC Owner's Packet for complete operational and maintenance information.

## Garage Air Conditioning

**⚠ CAUTION**

**Turn the selector switch slowly, allowing the unit to adjust. When using THERMOSTAT, be sure to allow three minutes before changing the temperature. Adjusting too quickly may cause compressor to overload (trip breaker).**

Due to their height, TMC motorhomes with a garage (toy hauler), are equipped with a thru-wall air conditioner to cool the garage and the above-garage Skybunk area (if equipped). Depending on model and floor plan, the air conditioner installed may be a 5,000 or 6,000 BTU unit.

### 5,000 BTU Unit

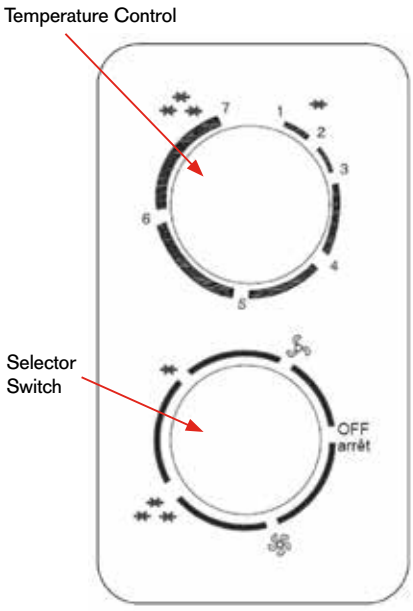
#### SELECTOR SWITCH

- LOW FAN will circulate air at minimum speed without cooling
- HIGH FAN will circulate air at maximum speed without cooling
- LOW COOL provides cooling with minimum air circulation. Recommended for night-time use.
- HIGH COOL provides cooling with maximum air circulation. Recommended for quick cooling or for extremely hot days. Once room is cooled, reduce setting to LOW COOL.
- OFF shuts the unit down completely. Always allow 3 minutes before switching from one mode to another.

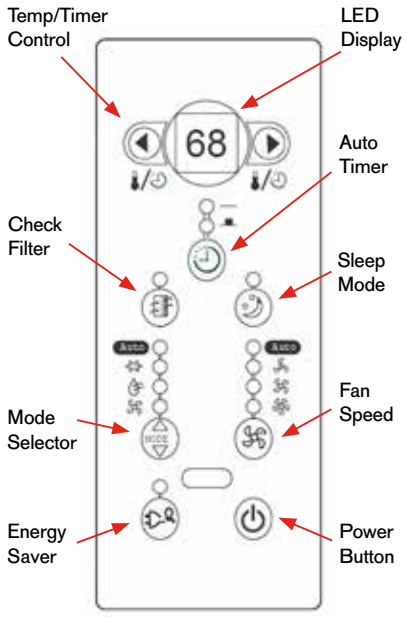
Wall-mounted 5,000 BTU Unit

Wall-mounted 6,000 BTU Unit

NOTE: Replacement filters can be obtained from most RV Authorized Service Centers. Carry spare filters so that worn or damaged filters can be immediately replaced.




5,000 BTU Unit Control Panel




6,000 BTU Unit Control Panel

### TEMPERATURE CONTROL

- The THERMOSTAT automatically controls the cooling cycle and maintains the selected room temperature. To set the temperature, rotate the thermostat knob to the desired cooling setting (1; warmest - 7; coldest).

NOTE: To change the temperature display to either Celsius or Fahrenheit, press both the TEMP/TIMER adjust arrows simultaneously to alternate between C and F.

## 6,000 BTU Unit

### LED DISPLAY

Displays the following information independently; Set Temperature, Ambient Room Temperature, Auto Timer ON/OFF Settings.

### MODE

Allows you to scroll through and select the desired operating mode: Cool, Dry, Fan Only and Auto. The selected mode will be denoted by the adjacent indicator light. Auto mode is a pre-set factory program that automatically defines the mode (Cool or Dry) and fan speed, based on the set temperature. The unit will automatically launch the Energy Saver function when it is in Cool, Dry, or Auto modes.

### FAN SPEED

Select from four different fan settings: LOW, MEDIUM, HIGH, and AUTO during Cool and Fan Only Mode. NOTE: During Dry Mode the fan speed is automatically defined.

### ENERGY SAVER

Automatically cycles the fan on and off while the compressor is not in use. This function is available in Cool, Dry and Auto Modes (only Auto-Cool and Auto-Fan modes). The fan will continue to run for 3 minutes after the compressor shuts off. The fan then cycles on for 2 minutes at 10 minute intervals, until the room temperature is above the set temperature. At this point, the compressor automatically turns back ON and cooling restarts.

### TEMP/TIMER CONTROL

Used to increase or decrease the temperature setting in 1° C/1° F increments, and Auto-Timer ON/OFF settings in 30 minute/hour increments.

### CHECK FILTER

The adjacent indicator light will illuminate as a reminder to clean the air conditioner's filter. Once the filter has been cleaned and replaced, depress the Check Filter button in order to resume operation.

### SLEEP MODE

The selected temperature will increase (when in cooling mode) by 1° C/2° F one-half hour after Sleep Mode has been selected. The temperature will again increase another 1° C/2° F in an additional one-half hour. This new temperature setting will remain for 6 hours, then return to the original temperature setting. This ends the Sleep Mode cycle. Sleep Mode can be canceled at any time by pressing the Sleep Mode button.

### AUTO TIMER

Used to initiate the Auto ON/AUTO OFF Timer; programming the air conditioner to either automatically turn ON at a delayed time, or turn OFF at a delayed time. Time delay can be set for up to 24 hours.

NOTE: The Auto Timer only operates for one cycle. After the set time delay has been reached, the air conditioner will either turn ON or OFF depending on the setting, and remain that way, until a new selection is made.

### REMOTE CONTROL

Your unit may be supplied with a remote control. The functions on the remote control duplicate the functions on the main unit's control panel.

## Cleaning the Air Filter

The air filter resides behind the front intake grill. To remove the air filter, grasp the filter tab on the right side of the grill and slide it out to the right. If your air intake front grill has two indents, pull the grill forward and remove the air filter.

- Vacuum the air filter with a soft brush attachment.
- Wash the filter with lukewarm water and mild detergent.
- Rinse and let dry before re-installing.

NOTE: For complete details on the features and operation of this unit, refer to the manufacturer's manual included with your TMC Owner's Packet or available on-line through your TMC Owners Resource account.

## Operating Rooftop A/C While the Motorhome is in Motion

If needed, it is possible to operate the rooftop air conditioner(s) while the vehicle is in motion. To do so:

- Turn ON the master battery switch. The air conditioner control circuits need 12 volts DC to operate.
- Start and run the on-board generator. The air conditioners must have 120 volts AC in order to operate.
- Turn ON the air conditioner at the thermostat (or on the multiplex user interface panel, if equipped).
- Set the desired air temperature.
- Keep the on-board generator running as long as it is desired to operate the air conditioner.

NOTE: Energy Tips

- Select a thermostat setting that suits your comfort needs and leave at that chosen setting.
- The air filter is very effective in removing airborne particles. Keep the air filter clean at all times (usually clean every 2 week depending on indoor air quality).
- Use blinds or shades to keep direct sunlight from penetrating and heating the room, but do not allow drapes or curtains to obstruct the air-flow around the unit.
- Start the air conditioner before the outdoor air becomes hot; to avoid an initial period of discomfort while the unit is cooling the room.

## Air Conditioner Troubleshooting

If the A/C will not turn on or does not operate properly:

- Verify that the thermostat is set to COOL and turned ON.
- Check the 120VAC circuit breakers for the A/C to make sure it's turned ON and not tripped.
- Make sure the air conditioner filter is clean and unobstructed.
- The A/C may be low on refrigerant if not cooling properly.
- A blocked or damaged outside coil may cause the unit to not cool properly.
- If the condenser coil is dirty and needs cleaning, it may cause the unit to not cool properly.
- Close blinds, avoid heat-producing appliances, keep entry door closed, utilize awning to improve shading.

NOTE: For complete information regarding the operation and maintenance of your motorhome's air conditioner(s) and/or heat pump(s), please refer to the manufacturer's instruction manual, supplied with your TMC Owner's Packet, your on-line TMC Owners resource information service:

www.thormotorcoach.com/owner-resource/

or, visit the appliance manufacturer's web site.

# Heating the Motorhome

**⚠ DANGER**

**IF YOU SMELL PROPANE GAS**

1. **Extinguish any open flames and all smoking materials.**
2. **Shut off the propane supply at the container valve(s) or propane supply connection.**
3. **Do not touch or operate electrical switches.**
4. **Open doors and other ventilating openings.**
5. **Leave the area until the odor clears.**
6. **Have the propane system checked and leakage source corrected before using again.**

**Ignition of flammable vapors could lead to a fire or explosion and result in death or serious injury.**

**⚠ DANGER**

**All pilot lights, appliances, and their igniters (see operating instructions) shall be turned off before refueling of motor fuel tanks and/or propane containers.**

**Can cause ignition of flammable vapors, which can lead to a fire or explosion and result in death or serious injury.**

**⚠ DANGER**

**DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS APPLIANCE.**

**⚠ WARNING**

**CARBON MONOXIDE POISONING WARNING:**

- **Doors must be properly sealed and draft cap and assemblies must be adjusted and sealed correctly to prevent carbon monoxide from entering coach.**
- **Combustion air must NOT be drawn from within any living area.**
- **DO NOT vent exhaust into living area or outside into an enclosed porch area.**
- **DO NOT vent any other appliance with venting systems serving the furnace.**
- **DO NOT allow snow or any objects to block exhaust system of furnace.**

**⚠ WARNING**

- **DO NOT use the furnace cabinet area as a storage compartment.**
- **DO NOT block furnace outlet registers or return air grills.**
- **Keep all insulating materials away from furnace.**
- **Installation, repairs, and preventive maintenance should be done by a qualified service technician only.**
- **Failure to follow safety warnings exactly could result in dangerous operation, serious injury, death or property damage.**

**⚠ CAUTION**

**THIS APPLIANCE IS EQUIPPED WITH AN ELECTRONIC IGNITION DEVICE WHICH AUTOMATICALLY LIGHTS THE BURNER. DO NOT TRY TO LIGHT THE BURNER BY HAND.**

**⚠ CAUTION**

- **DO NOT touch exhaust grills when furnace is operating.**
- **Supervise young children in the same room as the furnace.**
- **Heat registers can reach high temperatures when the furnace is running and can cause a burn if skin is in contact with the register.**

## Heating Systems

Most TMC motorhome models are equipped with a propane-fired, forced-air furnace, appropriately sized for the living space of the motorhome. Also, depending on the size of the living space, the heating system may have multiple registers that facilitate even heating throughout. With a forced-air system, there will be one, centrally located thermostat used to control the air temperature of the motorhome.

Select Class A motorhomes are equipped with a hydronic heating system. This system uses a diesel-fueled, or with some models, a gas burner (with a supplemental electrical heating element) to heat a volume of fluid (which contains special properties), that is circulated to zoned heat exchangers located throughout the motorhome. The hot fluid enters the heat exchangers, where the fluid passes through a series of coiled tubing. As the coils rise in temperature (due to the hot fluid passing through), a fan blows

ambient air across coils, heating the air, which is directed to the living space of the motorhome. Heating zones are separately controlled by individual thermostats, so that the air temperature of specific areas of the motorhome can be individually adjusted.

The hydronic system is also an on-demand water heater. The system uses a separate set of coils (in the burner unit) in which cold water passes through and is heated, supplying the hot water needs of the occupants.

For safe heating system operation, please follow all safety warnings pertaining to the furnace, hydronic system (if installed), propane system and electrical system printed in all manufacturer's documentation and labels attached to your motorhome. It is also recommended that you read the Propane Systems Guide and become familiar with the entire propane system of your motorhome.

Typical forced-air furnace installation

## Furnace Operation (propane, forced-air type)

The furnace supplied with your motorhome is equipped with an electronic ignition. Never attempt to light the burner by hand.

Before operating the furnace, smell all around the appliance area for gas. If gas is detected, either by smell or by the CO/LP alarm, DO NOT attempt to operate the furnace. For your safety, gas leaks MUST be repaired before operating any gas or electrical appliance.

### What To Do If You Smell Gas

- Extinguish all open flames.
- Evacuate all persons and pets from the vehicle.
- Shut off the gas supply at the LP gas tank.
- Do not touch electrical switches or operate electrical devices.
- Contact nearest gas supplier or qualified service technician for repairs.
- Do not turn on gas supply or operate gas or electrical devices until the gas leak has been repaired.


Aqua-Hot hydronic system main unit, typically installed in a service bay of the motorhome

NOTES:

- During the initial operation of the furnace, you may detect slight fumes caused from the burning of residue and oils left from the manufacturing process. This is a normal occurrence and these fumes should subside within 10 minutes.
- If the outside temperature will drop below 32° F (0° C) AND your motorhome is remaining parked, AND is not winterized, allow the furnace to operate in order to prevent the possibility of on-board water freezing and causing damage to the motorhome's water system.
- For detailed information regarding the furnace and heating system installed in your motorhome, refer to the manufacturer's owner's manual included with your TMC Owner's Packet or visit the manufacturer's web site listed in this guide.

## Turning the Furnace ON

**NOTICE**

**Use ONLY your hands to open and close the gas supply valve at the propane Tank.**

**NEVER use tools to turn the main gas valve. The use of tools could create a spark. If the valve seems to be stuck, do not force it; contact a service repair technician for repairs.**

- Ensure the motorhome's 12 volts DC electrical system is ON by turning on the house master battery switch, connecting to shore power or operating the generator.
- Turn ON LP gas supply at the propane tank. Counterclockwise rotation opens the valve, clockwise rotation closes the valve.
- Turn ON power to the furnace. Check that power to the furnace is ON at the main power distribution panel.
- Set the thermostat selector switch to HEAT.
- Set the desired temperature on the thermostat. The furnace should automatically come on if the temperature setting on the thermostat is higher than the ambient air temperature.

## Shutting the Furnace OFF

- Reduce the temperature setting on the thermostat to its minimum level.
- Set the selector switch on the thermostat to OFF.
- If you are preparing to travel, turn off the LP gas supply at the tank.

## Furnace Care and Maintenance

**⚠ DANGER**

**The combustion of any hydrocarbon-based fuel creates carbon monoxide (CO) gas, which is extremely poisonous to humans and pets. Carbon monoxide gas is tasteless and odorless!**

- **Inspect furnace burners annually for proper combustion. Inspect for holes or cracks in combustion chambers, that if exist, could allow carbon monoxide gas into living space of the motorhome.**
- **Inspect propane (LP) system annually for cracks, leaks and worn components.**
- **Repair or replace faulty furnace and/or propane (LP) system components promptly.**
- **Do not block or restrict furnace air intakes and/or exhausts.**
- **Test the LP/CO detector regularly to ensure proper operation.**
- **Know and practice evacuation procedures if LP and/or CO gas is detected.**

**⚠ WARNING**

**DO NOT use this appliance of any part has been under water. A flood-damaged furnace is extremely dangerous. Attempts to use the furnace can result in fire or explosion.**

**A qualified service technician should be contacted to inspect the furnace and to replace all gas controls, control system parts, electrical parts that have been wet or replace the entire furnace, if deemed necessary.**

**⚠ WARNING**

**ROAD VIBRATION CAN LOOSEN PROPANE FITTINGS. It is important to check the Propane System for leaks at least every 5,000 miles, and whenever the tank is filled. It is also recommended to have the entire Propane System checked annually by a qualified propane service technician.**

**⚠ WARNING**

**DO NOT install screens over the intake air or exhaust vents for any reason. Screens will become restricted and cause unsafe furnace operation.**

**For your safety, only factory authorized parts are to be used on your furnace and venting system.**

Listed below are several safety related instructions that you, the owner, should follow each heating season to assure continued safe operation of the furnace. A periodic inspection of the furnace by a qualified service technician is also recommended.

- Inspect furnace venting. Venting must be free of obstructions, void of soot and properly terminated to the atmosphere. Make sure that the vent assembly is positioned tight against outer door.
- Periodically inspect the vent for soot. Soot is formed whenever combustion is incomplete. This is your visual warning that the furnace is operating in an unsafe manner. If soot is present, immediately shut furnace down and arrange for repairs by a qualified service center or technician.
- Keep furnace clean. More frequent cleaning may be required due to excessive lint from carpeting, bedding material, pet hair, etc. It is imperative that the control compartment, burners, and circulating air passageways of the appliance be kept clean and unobstructed.
- The furnace motor is permanently lubricated and requires no oiling.
- Keep the furnace area clear of any combustible materials, gasoline, or other flammable vapors or liquids.
- Before operating furnace, check the location of the furnace vent to make sure it will not be blocked by the opening of any door or obstacle. Do not operate the furnace if the vent is blocked or obstructed in any way.
- Do not restrict the flow of combustion air or the warm air circulation of the furnace. To do so could cause personal injury and/or death.
- Never operate the furnace if you smell gas. Do not assume that the smell of gas in your motorhome is normal. Any time you detect the odor of gas in you motorhome, consider it life threatening and correct the problem immediately. Extinguish all open flames; evacuate the motorhome; shut off the LP gas supply at the tank.
- Immediately shut furnace down and call a service technician for repairs if the furnace cycles erratically or delays on ignition.
- Never attempt to repair the furnace by yourself or by an unqualified person.
- Never restrict the ducting installed by the RV manufacturer. To do so could cause improper furnace operation.
- Do not install air boosters (fans) in the duct system. Such devices will cause the furnace to cycle on limit and to have erratic operation.
- Do not place clothing or other flammable materials on or near the furnace.
- Always follow operating instructions. Do not deviate from step-by-step instructions.
- Do not use petroleum or citrus type cleaner on plastic parts, as damage may occur.

## Furnace Troubleshooting

If the furnace does not ignite or cycles frequently:

- Ensure the master battery disconnect switch is ON.
- Make sure battery is charged and there is sufficient 12 volt DC power. Plug into shore power or operate the generator if necessary.
- Verify that propane tank is not empty and that the valves are turned ON.
- Verify that thermostat is set to HEAT and is turned ON.
- Check the 12-volt furnace fuse in power load center. Replace if necessary and ONLY with a fuse of the same rating.
- Make sure that return air grill is unobstructed. Remove anything that is stored in furnace compartment that could block airflow.
- Remove any obstruction over furnace exhaust.
- Inspect furnace exhaust port and remove any obstructions.
- Check that heat outlet registers are open and that register openings are unobstructed.

# Aqua-Hot® 400-D Hydronic Heating System

## ⚠ DANGER

**The heaters (both diesel and electric) must be switched OFF when refueling.**

**DO NOT operate the Aqua-Hot's diesel-burner inside an enclosed building.**

## ⚠ WARNING

**Read and follow all safety warnings affixed to the Aqua-Hot boiler unit and published in the manufacturer's manual.**

## ⚠ CAUTION

- **The hot water temperature is set at the mixing valve to 120°F/48.9°C at the factory.**
- **DO winterize the heating system when freezing temperatures are expected to avoid serious damage to the hot water system.**
- **DO NOT operate the burner or electric heating element without antifreeze or water heating solution in the boiler tank, to avoid damage to the heater.**
- **Aqua-Hot's exhaust is HOT. DO NOT park in dry areas when operating to avoid fire and injury to persons.**
- **At maximum operating temperatures, the coolant will be very hot and scalding hot vapor or coolant may result in serious burns or injury.**
- **Before cleaning or servicing disconnect all power supplies.**
- **The heater must be switched OFF when refueling.**
- **Read the manufacturer's instructional guide before using your Aqua-Hot heating system to reduce the risk of injury to persons or damage to equipment.**
- **Have your dealer show you the location and operation of all switch operations and valve settings.**
- **DO NOT repair or service the system, unless specifically recommended in the literature accompanying the Aqua-Hot product. All service should be referred to a qualified technician.**
- **An interlock switch prevents the Aqua-Hot heater from operating when the cover is not installed in the correct position.**
- **Propylene glycol based antifreeze; generally recognized as safe by the FDA, must be utilized for antifreeze and water heating solution.**
- **Interior heat can still be used even after the water heating system has been drained and winterized.**
- **Use propylene glycol; generally recognized as safe RV and marine antifreeze specifically for winterizing application ONLY.**


## *NOTICE*

**The hydronic system uses 12 volts DC for control circuitry and 120 volts AC for the supplemental electric heating element.**

**Be sure that the electrical system is operational before attempting to operate the hydronic system.**

Select TMC diesel motorhomes may be equipped with an Aqua-Hot® Hydronic Heating System. This is a low-emissions system that uses hot water to heat the cabin and bay areas of the motorhome. The Aqua-Hot Heating System is three systems in one:

- Interior Heating System: provides quiet, comfortable interior heat with independent temperature zones that provide cabin-wide even temperature control.
- Bay Heating System: keeps pipes and tanks from freezing in the bay storage area.
- Tank-less Hot Water System: provides a steady flow of continuous hot water.

The Aqua-Hot Heating System is powered by TribridHot™ technology and uses one or a combination of the following energy sources:

- The 120 volts AC Electric Element: When plugged into shore and/or on-board generated power, the electric element provides heat and meets light-duty hot water needs.
- The Diesel Burner: This is the Aqua-Hot's most powerful heat source and provides all the heating and hot water needs in cold temperatures and dry camping.

NOTES:

- When installed, the Aqua-Hot system is both the source for warm air for the living space and hot water for washing, bathing, and food preparation.
- The labels affixed to the Aqua-Hot control panel and unit provide a ready reference to specifications, test standards, and important safety notices.
- The living space heat and heat exchangers are described in this system guide, while water heating is described in the TMC Water System Guide.

## System Controls

### SWITCHES

The Aqua-Hot heating system is controlled by two switches, the burner switch and the electric element switch. When one or both of these switches are in the ON position, it will supply the necessary heat to the boiler tank. Keep in mind that the Aqua-Hot unit must be at operating temperature for the heating zones and hot water to function properly.


Aqua-Hot Switch Panel.

NOTE: For Thor Class A motorhomes, Aqua Hot system controls are integrated into the Firefly Multiplex control system.

### THERMOSTATS

The interior room thermostat(s) can be set at the desired cabin temperature; therefore, whenever the thermostat 'calls for heat,' the Aqua-Hot's circulation pump and interior heat exchanger fans will be activated. The fresh water thermostat controls the bay heating area and should NOT be set below 40°F to prevent freezing of the on-board water storage system.

Aqua-Hot Main Unit, top view

### CONTROL/BALANCING HEATING ZONES

Set the interior room thermostat for each independent heating zone at the desired temperature. This feature allows you to customize various temperatures on each heating zone throughout your motorhome.

## Heating Operation

**⚠ WARNING**

**DO NOT operate the diesel-burner and/or electric element without the antifreeze and water heating solution in the Aqua-Hot's boiler tank. Failure to do so will cause serious damage to the heater.**

### DIESEL BURNER

Locate the Control Switch Panel and turn the burner switch ON. This action will activate the diesel-burner and the indicator light will glow. Allow 10-20 minutes for the Aqua-Hot system to reach operating temperature.

**NOTICE**

**The diesel-burner is the primary heat source for heating the cabin interior and hot water. Use the diesel-burner when there is a high demand for hot water and/or when the outside temperatures are below 50° F., and when dry parking/camping.**

### ELECTRIC ELEMENT

To operate the electric heating element, turn the electric switch ON. This action will activate the electric heating element and the indicator light will glow. Allow 1-2 hours for the Aqua-Hot system to reach operating temperature. Be sure to activate the electric element for maximum water capacity.

**NOTICE**

**The electric element is the secondary heat source and is used when plugged into shore power. The electric element provides heat when the outside temperature is above 50° F and/or when there is low demand for hot water. With both control panel switches ON, the electric element supplements the heating capacity of the diesel-burner for maximum cabin heating and hot water heating.**

## Operating the Hydronic Heating System While in Motion

To provide heat to the cabin while the motorhome is in motion, it is possible to operate the hydronic heating system. To do so:

- Turn ON the house master battery switch
- Turn ON the diesel burner switch (on the multiplex control panel)
- Set the desired temperature at the zone(s) control panel

DO NOT OPERATE THE HYDRONIC HEATING SYSTEM WHILE FUELING THE VEHICLE. TURN OFF THE DIESEL BURNER SWITCH. THE DIESEL BURNER HAS AN ELECTRONIC IGNITER, WHICH COULD IGNITE FUEL VAPORS WHILE FUELING.

## Maintenance and Other Important System Information

**⚠ DANGER**

**When the Aqua-Hot is at maximum operating temperature, the coolant will be very HOT! If the Aqua-Hot's heating system is accessed, scalding hot vapor or coolant could result. Before cleaning or servicing, disconnect all power and turn off burners.**

**⚠ WARNING**

**Not winterizing the Aqua-Hot when freezing temperatures are present will result in SERIOUS damage to the Aqua-Hot's domestic Water Heating System.**

**Only use anti-freeze solution approved by the manufacturer in the Aqua-Hot system. NEVER use automotive antifreeze/coolant in the Aqua-Hot system.**

**NOTICE**

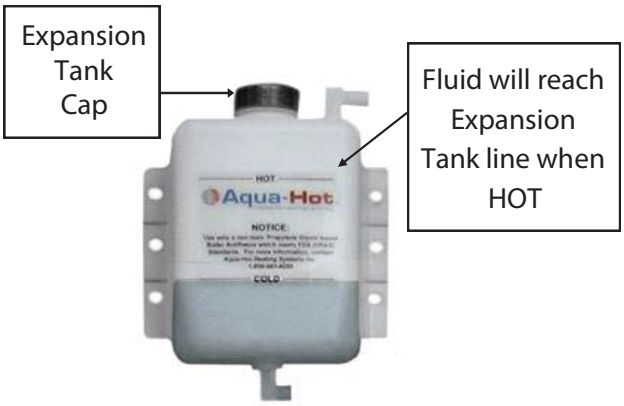
- **DO NOT operate the diesel-burner and/or electric element without the antifreeze and water heating solution in the Aqua-Hot's boiler tank. Failure to do so will cause serious damage to the heater.**
- **The Aqua-Hot system contains copper tubing which is not compatible to prolonged exposure to sodium hypochlorite (bleach or liquid bleach). Using products containing bleach for sanitization of the water heater may cause corrosion of the water coil, resulting in catastrophic failure of the Aqua-Hot system, by creating leaks that cannot be repaired.**
- **For complete operation and maintenance information, refer to the manufacturer's owner's manual, included with your Owner's Packet.**
- **Questions regarding the operation and/or maintenance of the Aqua-Hot hydronic system can be directed to TMC Customer Care or to the manufacturer.**

The Aqua-Hot system requires minimal maintenance if monthly, annual, and proper winterization procedures are followed accurately. It is extremely important to follow the instructions precisely and carefully to receive the best results and promote the longevity of your Aqua-Hot system.

### MONTHLY MAINTENANCE

It is particularly important to check the Aqua-Hot's antifreeze and water heating solution to ensure it is at the proper level for operation. This can be easily accomplished by visibly checking the coolant level in the Aqua-Hot's expansion tank.

At maximum operating temperature, the antifreeze and water heating solution should be at the level marked HOT on the expansion tank. The coolant level should be checked ONLY when the Aqua-Hot is at MAXIMUM OPERATING TEMPERATURE. Therefore, this procedure should be done immediately after the diesel-burner cycles OFF. If the system needs fluid, reference the FLUIDS section of the Aqua-Hot's owners manual.




Aqua-Hot System Fluid Level. Check monthly and top off when necessary with approved fluid.

## ANNUAL MAINTENANCE

In order to keep the Aqua-Hot running at its full potential, it is highly recommended to have the diesel-burner tuned-up on an annual schedule. This tune-up consists of replacing these two components:

- Fuel nozzle
- Fuel filter

Always use OEM parts. Reference the Aqua-Hot owner's manual for ordering information, or contact your dealer's service department to schedule a service appointment.

NOTE: The labels affixed to the Aqua-Hot control panel and unit provide a ready reference to specifications, test standards, and important safety notices.

## Aqua-Hot Winterization

**NOTICE**

**The Aqua-Hot closed-loop heating system uses a solution with anti-freeze properties that IS NOT the same as the RV antifreeze used to winterize the water system of your motorhome.**

**Only use Aqua-Hot approved solution in the fluid reservoir of the Aqua-Hot system and ONLY USE RV antifreeze for winterizing the water system of the motorhome.**

When it is time to store your motorhome for the winter months or when freezing temperatures are expected, it is crucial to properly winterize the Aqua-Hot system AND the water system of your motorhome. Damage due to improper cold weather storage or preparation is not covered under the manufacturers warranty. The process of winterization consists of completely draining the domestic water from the water system and pumping RV winterization antifreeze throughout to flush and purge the system of water.

- Refer to the Winterization Section of the TMC Water System guide to winterize the water system of your motorhome. Only use RV winterizing antifreeze solution for the plumbing and fixtures of the water system.
- To ensure your Aqua-Hot closed-loop heating system is properly winterized, only used approved antifreeze solution with the Aqua-Hot system and add antifreeze solution to the expansion tank as needed. Refer to the manufacturer's recommendations for Aqua-Hot antifreeze solution.

## Aqua-Hot De-winterization

To de-winterize the Aqua-Hot system, completely fill the fresh water storage tank. Open and close the interior and exterior faucets, one at a time, until only clear water is present.

# Aqua-Hot® 250 and 250P Hydronic Heating System

## ⚠ DANGER

**THE Aqua-hot's exhaust is hot!**

**The heaters (both GAS and electric) must be switched OFF when refueling.**

**DO NOT operate the Aqua-Hot's GAS-burner inside an enclosed building.**

**DO not park in areas where dry conditions exist (i.e., grassy, dry fields)**

## ⚠ DANGER

**WHAT TO DO IF YOU SMELL GAS (LP):**

- **Evacuate all persons from the vehicle**
- **Shut off the gas supply at the gas (LP) source (propane tank)**
- **Do not touch any electrical switch or use any phone or radio in the vehicle**
- **Do not start the engine or electric generator (if equipped)**
- **Contact the nearest gas supplier or qualified service technician for repairs**
- **If you cannot reach a gas supplier or qualified service technician, contact the nearest fire department**
- **Do not turn on the gas supply until the gas leak(s) has been repaired**
- **Installation and service must be performed by a qualified installer, service agency, or gas supplier**

## ⚠ WARNING

**Observe all warning and caution labels printed in the manufacturers owners manual and affixed to the aqua-hot hydronic heating system. Failure to follow proper operation and maintenance procedures could lead to serious personal injury and severe property damage.**

## ⚠ CAUTION

**DO NOT activate the burner until the antifreeze and water heating solution has been added to the boiler tank to avoid serious damage to the heater.**

NOTE: The labels affixed to the Aqua-Hot control panel and unit provide a ready reference to specifications, test standards, and important safety notices.


## NOTICE

- **This appliance operates on both AC and DC power.**
- **Use only nontoxic propylene glycol-based boiler antifreeze with additives generally recognized as safe (GRAS) by the FDA.**
- **Failure to winterize your heater, when stored in freezing temperatures, will result in serious damage to the product's domestic hot water heating system.**
- **Air pressure applied to the tank must not exceed 20 psi. Excess pressure will result in internal damage.**
- **It is imperative that you read and follow all the operation and maintenance instructions printed by the manufacturer for your Aqua-Hot 200P or 250P hydronic system.**
- **For detailed information, reference the owner's manual or contact Aqua-Hot Heating Systems, Inc. at 1-800-685-4298.**

## SAFETY INSTRUCTIONS

**A. This appliance does not have a pilot. It is equipped with an ignition device, which automatically lights the burner. Do not try to light the burner by hand.**

**B. BEFORE OPERATING: smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.**

**IF YOU SMELL GAS, follow the instructions listed in the Safety 'DANGER' Warning Label printed on the previous page.**

**C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push or turn by hand, don't try to repair it; call a qualified service technician. Forced or attempted repairs may result in a fire or explosion.**

**D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.**

Functioning similarly to the 400-D system, Aqua-Hot 250 hydronic unit uses diesel fuel for the burner, while the Aqua-Hot 250P use a LP gas-fired burner. Both 250 systems have a supplemental electric element to augment heat and hot water generation. To supply heat for the motorhome, a solution of water and antifreeze is heated in the unit's boiler tank and circulated to heat-exchangers located throughout the motorhome. Most floor plans will have two or more heat (air temperature) zones that can be individually controlled.

On-demand hot water is heated in the same boiler tank, but is pumped through a separate coil contained within the boiler tank. Heat is conducted to this water coil by the water/antifreeze solution contained in the boiler tank, but as it is plumbed separately, the antifreeze solution will not contaminate the hot water being pumped to the hot water fixtures.

Motorhomes that are equipped with LP-fired hydronic systems will have an on-board LP gas tank, that not only supplies fuel for the hydronic system, but may also supply LP to other gas appliances. Be sure you have an adequate supply of LP gas on-board while traveling.

The Aqua-Hot Heating System is two systems in one:

1. Interior heating system: Provides quiet, comfortable interior heat and even temperatures.

2. Tank-less hot water system: Provides a steady flow of continuous hot water.

The Aqua-Hot System is powered by TribridHot™ technology and uses one or a combination of the following heat sources:

1. The LP Burner: This is the Aqua-Hot's most powerful heat source. The LP burner must be ON for the Aqua-Hot to provide continuous hot water. The LP burner must also be ON for the Aqua-Hot to provide interior heat.

2. The 120 volt AC Electric Element: When plugged into shore power, the electric element provides heat in mild conditions and meets light duty hot water heating needs

### OPERATING CONTROLS:

The operating controls for the Aqua-Hot system are integrated into the Multiplex System Control Panel. On this panel:

1. The Aqua-Hot unit (LP burner and electric element) can be turned ON and OFF

2. Control the temperature settings for all heat zones

### BRING THE AQUA-HOT UP TO OPERATING TEMPERATURE:

Your Aqua-hot hydronic heating system heats a water and antifreeze solution that is stored in the Aqua-Hot's boiler tank. This water and antifreeze solution must be up to operating temperature before the Aqua-Hot will provide interior heat or continuous hot water. To bring the Aqua-Hot up to operating temperature, turn the burner switch to the ON position. Depending on the ambient temperature, it may take up to ten minutes for the Aqua-Hot's water and antifreeze solution to reach operating temperature.

Once the tank is up to operating temperature, the electric element may be used to maintain the operating temperature and provide light duty hot water and interior heat. For continuous hot water, or heat in colder conditions, the burner must be ON.

### OPERATING INSTRUCTIONS:

1. STOP! Read all safety and warning labels affixed to the unit and printed in the manufacturers owner's manual.

2. This appliance is equipped with an ignition device, which automatically lights the burner. Do not try to light the burner by hand

3. Ensure that the gas control valve is turned ON. Follow 'B' in the SAFETY INFORMATION panel, printed above. If you don't smell gas, go to the next step.

4. Refer to the manufacturers owner's manual for information regarding normal operation of this heating system.

5. If the appliance will not operate, follow the instructions, 'To Turn Off Gas To Appliance,' listed below, or refer to the manufacturers owner's manual troubleshooting section, or call Aqua-Hot's technical support department at 1-800-685-4298.

### TO TURN OFF GAS TO THE APPLIANCE:

1. Turn OFF all electric power to the appliance if service is to be performed.

2. Set all interior thermostats to their lowest setting.

3. Turn the gas control knob located on the heater's propane inlet port clockwise to the OFF position.

### CONTROLLING HEAT LEVELS WITH ROOM THERMOSTAT:

When the Aqua-Hot is ON and up to operating temperature, and the interior room thermostat is set to HEAT, adjust the room thermostat to the desired temperature and Aqua-Hot's heating function will automatically function to maintain the desired interior temperature.

## USING HOT WATER:

When the Aqua-Hot is ON and up to operating temperature, simply open a hot water faucet and a continuous supply of hot water will be present within a few seconds.

The Aqua-Hot system is known as a tankless, continuous water heating system because hot water is not stored in a tank. Instead, when the burner and/or electric element is ON and the Aqua-Hot is at operating temperature, the water is automatically heated as it is being used.

NOTE: The LP burner must be ON for continuous hot water.

## MONTHLY MAINTENANCE:

1. Check the Aqua-Hot's antifreeze and water heating solution to ensure that it is at the proper level. This can be accomplished by visually checking the coolant level in the Aqua-Hot's Expansion Tank. Note that the coolant level should be checked ONLY when the Aqua-Hot is at maximum operating temperature. This should be done IMMEDIATELY after the burner cycles OFF.

   At maximum operating temperature, the antifreeze and water heating solution should be at the level marked HOT on the Expansion Tank.

2. Cycle the interior heating zones until you feel warm air blowing out the heat exchangers.

3. Cycle the LP burner once a month. This will ensure proper operation of the burner.

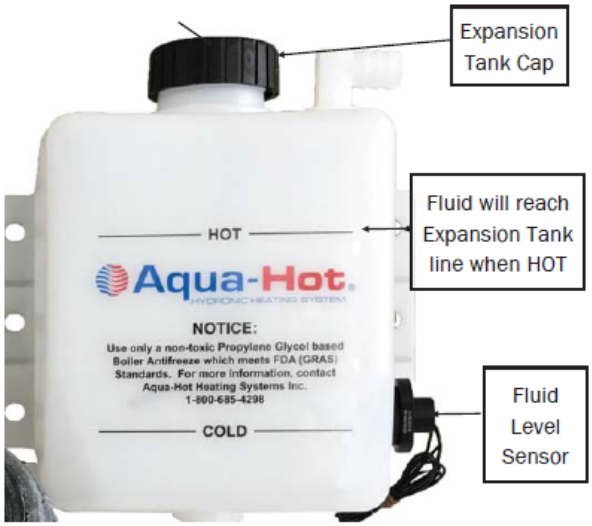
## REPLENISHING THE ANTIFREEZE AND WATER HEATING SOLUTION:

If the antifreeze and water heating solution needs replenishing, remove the Expansion Tank's cap and fill the Expansion Tank the HOT level mark. Replace the cap on the Expansion Tank.

## ANNUAL MAINTENANCE:

Remove and clean the flame detector with a Scotchbrite pad. Reference the Aqua-Hot's Service and Parts manual for spare parts information and detailed replacement instructions. Contact the Aqua-Hot Heating System Technical Support Department at 1-800-685-4298 for assistance. Otherwise, locate the nearest Aqua-Hot Service Center, or visit the website at:

**www.aquahot.com**




Aqua-Hot Expansion Tank

NOTE: For additional information regarding the propylene glycol-based, boiler-type antifreeze that has been 'Generally Recognized as Safe' by the FDA, reference the Aqua-Hot owner's manual, or contact Aqua-Hot's Heating Systems Technical Support Department at 1-800-685-4298, or visit the Aqua-Hot website at www.aquahot.com.

## Truma Combination Furnace/Water Heater

**⚠ WARNING**

**CARBON-MONOXIDE POISONING HAZARD!**

**Failure to follow instructions could result in severe personal injury or death due to carbon-monoxide poisoning if combustion gases enter the RV.**

**Check that all openings in the outside wall around the vent (and air intake) pipe(s) are sealed to prevent combustion gases entering the RV.**

**Check that furnace vent and air intake are not obstructed in any way.**

**Never operate the combination furnace/water heater when the vehicle is parked in an enclosed or confined space.**

**This combination furnace/water heater presents danger of hot surfaces and hot gases. Do not touch the area around the wall cowl and do not lean any objects against the wall cowl (furnace exhaust).**

**IMPORTANT! Read and follow the manufacturer's instructions regarding safety, operation, maintenance, and winterization of the furnace/water heater.**


Truma Combi Furnace/Water Heater

TMC Class B motorhomes (camper-vans) are equipped with a factory-installed LP-fired combination furnace and water heater, designed specifically for small recreational vehicles. The furnace/water heater combination unit is a tank design and holds a volume of 2.6 gallons of water. Some models use a combination of LP gas and electric to rapidly heat water and provide warm air.

For complete safety, operational, and maintenance information on the furnace/water heater unit installed in your motorhome, please refer to the manufacturer's instructions contained in your Owner's Packet or visit the water heater manufacturer's website. Product information is also available in the TMC Water System Guide and from the on-line TMC Owners Resource document service. TMC Customer Care representatives are also available to answer any question you may have; call, toll free at:

**(877) 855-2867**

NOTE: Do not allow water to freeze within the furnace/water heater unit. When winterizing the water system, the water tank of the unit MUST be drained. DO NOT use compressed air to drain the unit. Do not place anti-freeze solutions in the tank of the water heater/furnace unit.

Freeze damage is not covered under either the manufacturer's or TMC warranty!

### Safe operation while moving the RV

- Shut OFF gas and the LPG tank when moving the RV. This disables all gas appliances and pilot lights. Gas appliances must never be operated while vehicle is in motion.
- Shut OFF the Combi furnace when refueling or pumping gas.
- To avoid damage, make sure no spray water enters the Combi furnace when cleaning the RV, e.g., do not spray directly into the wall cowl.

### Safe handling of malfunctions

- Switch OFF the gas supply and the Combi furnace if anything seems to be out of the ordinary.
- Danger of fire or explosion when attempting to use a flood-damaged Combi furnace or if the RV has been involved in an accident! A qualified service technician must inspect the furnace. In the case of moisture damage, the qualified service technician must replace damaged gas controls, control system parts and/or electrical parts, or provide a new furnace.
- Only a qualified service technician may perform repairs.
- Have a qualified service technician immediately remedy any malfunctions.
- Remedy a malfunction yourself only if a remedy is specified in the troubleshooting chart, included with the manufacturer's instructions.
- After any misfire, a qualified service technician must inspect the Combi furnace and the exhaust tube.

## Safe maintenance and repair

- Only a qualified service technician may clean and maintain the furnace.
- Any alteration to the Combi furnace or its controls can cause unforeseen serious hazards and will void the manufacturer's warranty.
- After a long period of winterizing: Flush all hot/cold water hoses and the Combi furnace thoroughly with drinking water before using it.

## Safety features

### THE COMBI FURNACE IS EQUIPPED WITH THE FOLLOWING SAFETY DEVICES:

- **Switch for gas shut-off valve**
  The switch (Fig. 2 – 4) shuts off the power to the safety gas valve and the gas supply to the furnace. If you want to make sure that the gas supply to the furnace is off, turn the switch to the OFF position.
- **Flame monitoring**
  If the flame goes out, the gas supply is switched off.
- **Low-voltage shut down**
  If the voltage drops below 10 volts DC, the gas supply is automatically switched off.
- **Over-current protection**
  If there is a short circuit in the Combi furnace (>10 amps), a fuse on the control unit is activated and the Combi furnace is automatically switched off.
- **Monitoring of hot water temperature**
  A water over temperature switch avoids excessively high water temperatures.
- **Monitoring of hot air temperature**
  An air over temperature switch avoids excessively high air temperatures.

## How the Combi furnace/water heater works

**NOTICE**

**DAMAGE TO THE COMBI FURNACE CAN BE CAUSED BY FREEZING!**

**The Combi furnace does not have a frost-protection function. If the heating is not used and there is a risk of freezing, all water must be drained from the water container (refer to "Draining the water container").**

The Combi furnace was developed exclusively for use in recreational vehicles (RVs). The Combi is a furnace with a supplementary, indirect hot water heater.

All Combi models are powered by propane and a 12 volt DC power supply.

- The Main Battery Disconnect Switch must be ON
- If 30 amp Shore Power is available, connect to it; this will eliminate auxiliary battery drain
- The Main Propane Valve must be ON

The Combi eco plus and Combi comfort plus models are also powered by electrical heating elements for operation with a supply voltage of 120 volts AC.

Room air is drawn into the furnace by a fan, heated up and conveyed via flexible ducts to the RV's interior.

The Combi furnace with supplementary water heating is installed between the RV's fresh water supply line and its hot water system.

A comfortable water temperature at all water spigots is reached by mixing both hot and cold faucets.

A wall cowl allows combustion air to flow into the furnace and exhaust gas to flow out. The wall cowl and the furnace are connected by a tube in the tube exhaust venting system: an exhaust tube inside and a combustion air intake tube outside.

**NEVER BLOCK OR OBSTRUCT THE INLET AIR AND EXHAUST VENT**

## System Layout

Illustrated here is a typical installation . The installation in your vehicle may vary.

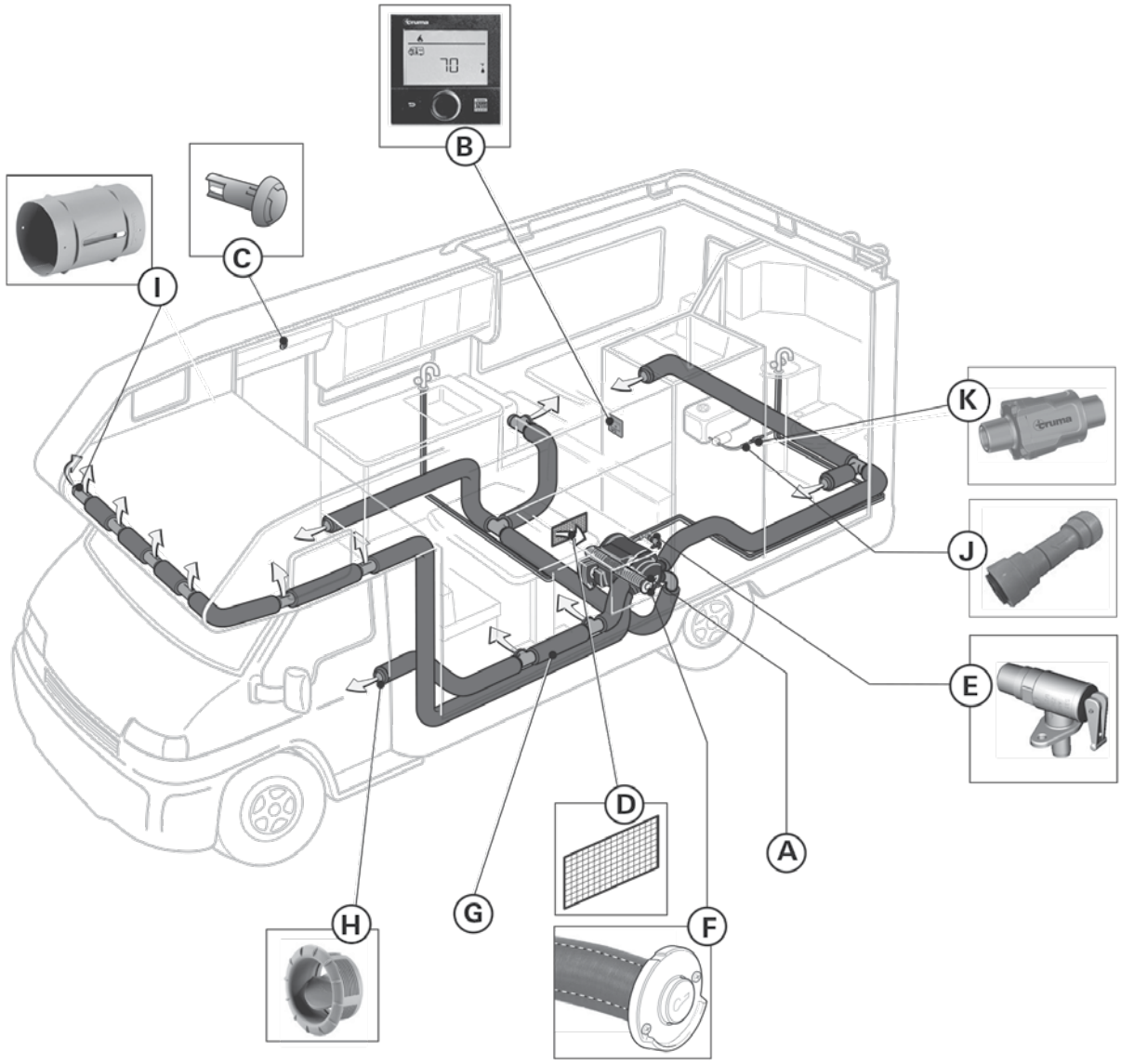


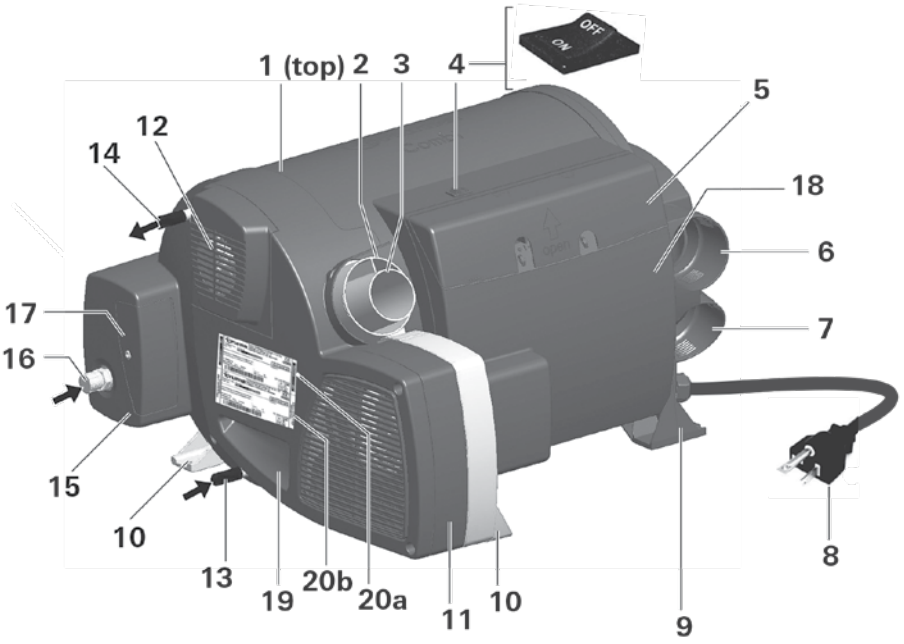

Figure 1

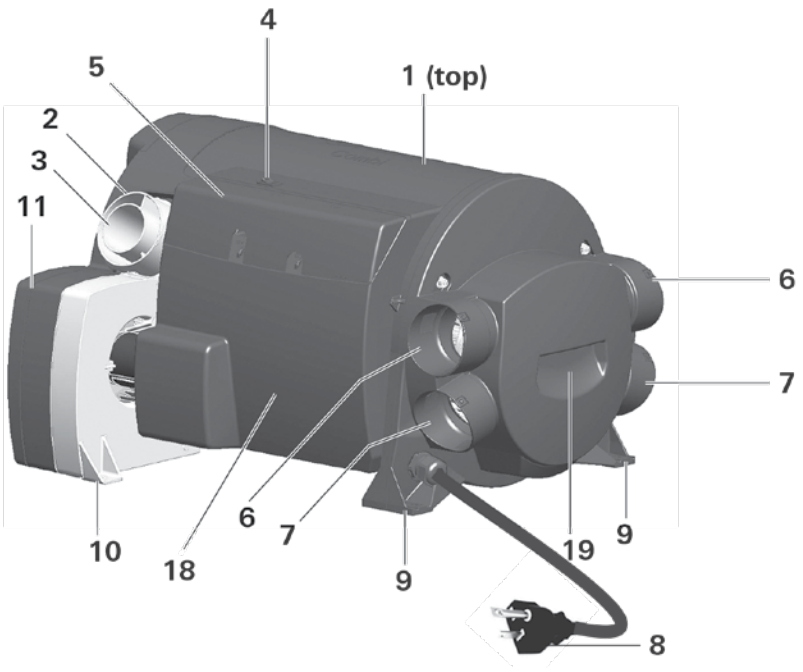
LEGEND:

A Combi furnace
B CP Plus control panel
C Room temperature sensor
D Opening for circulation air intake (with mounted grill)
E Truma Pressure relief/drain valve
F Wall cowl with exhaust venting system
G Warm air ducts with insulation sleeve
H Warm air end outlet with air throttle
I Wall outlet vent
J Non-return valve
K Truma water pressure regulator

# Furnace Diagram

## Figure 2 and 3




LEGEND:

1 Combi furnace with supplementary indirect water heating

2 Connection for combustion air supply tube

3 Connection for exhaust tube

4 Switch for gas shut-off valve

5 Connection cover

6 Warm air outlets (upper)

7 Warm air outlets (lower)

8 2-pole, 3-wire 120 volt electrical plug (only on Combi eco plus and Combi comfort plus models)

9 Plastic frame feet

10 Aluminum frame feet

11 Circulated air fan

12 Fan for combustion air

13 Cold water connection (inlet)

14 Hot water connection (outlet)

15 Gas shut-off valve (behind the cover)

16 Gas connection (inlet)

17 Test connection (gas) (behind the cover)

18 Electronics housing cover

19 Recessed grips

20a Original type plate

20b Duplicate type plate

**⚠ WARNING**

**SCALDING INJURIES CAUSED BY HOT WATER!**

**Water temperatures over 127° F (52° C) can cause severe burns or scalding and in extreme cases even death.**

**Water in the hot water container can become as hot as 162° F (72° C) during operation. If there is a malfunction, the water can reach 205° F (96° C).**

- **Always use potable water to fill the hot water container. The person operating the furnace is responsible for the quality of this water.**
- **Before using a hot water faucet or using the shower, allow the hot water to run until the water temperature no longer increases and mix with cold water.**
- **Test the temperature of the water before placing a child in the bath or shower.**
- **Do not leave a child or an infirm person in the bath unsupervised.**

**NOTICE**

**DANGER OF FAULTY OPERATION!**

**Always use the CP Plus control panel to operate the Combi furnace. Operating instructions for the CP Plus control panel are included in your Owner's Packet and available through the on-line TMC Owners Resource.**

**READ AND FOLLOW THE "CONSUMER SAFETY INFORMATION" (CONTAINED WITHIN THE MANUFACTURER'S INSTRUCTIONS) BEFORE OPERATING THE COMBI FURNACE.**

## Selectable modes of operation

The CP Plus control panel (Fig. 1 – B) is used to switch between modes of operation (refer to the CP Plus Controller manual for additional instructions).

1. **Heating mode**
   The furnace automatically selects the proper operating level based on the difference between the desired temperature set at the control panel and the current room temperature. If there is any water in the water container, it will be heated automatically. The water temperature will not be regulated, but it will reach a maximum of 162 °F (72 °C).

2. **Hot water mode**
   (Only if water container contains water)

   Hot water mode is ideal if only hot water is required. The lowest burner setting suffices for heating water. In hot water mode, the burner will switch off as soon as the water reaches the temperature selected in the CP Plus control panel.

   Both modes of operation can be combined.

## Selectable modes of power input

**NOTICE**

**To avoid damage to the Combi unit, only a 120 volt AC sine-wave generator may be used. 120/220 volt AC shore power is also acceptable.**

The CP Plus control panel is used to select various modes of energy for the Combi eco plus and Combi comfort plus models.

No Combi furnace operates in any mode without a 12 volt DC power source.

1. **LP gas for gas mode**
   All Combi furnaces run on LP gas (propane).

2. **Electricity for electric mode**
   The Combi eco plus and Combi comfort plus furnaces can be powered by electricity if the RV is connected to shore power or a generator.

3. **LP gas and electricity (mixed mode)**
   The Combi eco plus and Combi comfort plus furnaces run simultaneously on LP gas (propane) and electricity.

### IF THE SELECTED OPERATING MODE IS:

1. **Heating mode:** The Combi eco plus and Combi comfort plus run simultaneously with LP gas (propane) and electricity.

2. **Hot water mode:** The Combi eco plus and Combi comfort plus run in electric mode with a preselected power output setting of 850 W (Mix 1) or 1700 W (Mix 2).

When the RV is disconnected from a 120 volt AC source *, the furnace will automatically switch to LP gas (propane).

* as long as there is a sufficient supply of 12 volts DC and LP gas (propane).

## Switch for gas shut-off valve

The switch (Fig. 4) shuts off the power to the safety gas shut-off valve and with this the gas supply to the Combi furnace. To make sure that the gas supply to the furnace is off, turn the switch to the OFF position.

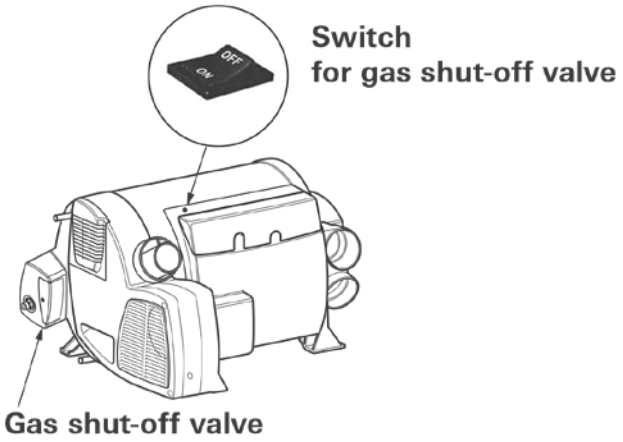



Figure 4

### SWITCH POSITIONS OF THE SWITCH FOR GAS SHUT-OFF VALVE:

**Off = gas shut-off valve is closed**

**On = gas shut-off valve is open**

NOTE: This switch does not affect gas supply to other gas appliances within the motorhome, nor does it affect the main gas valve switch of the motorhome.

## Room temperature sensor

A room temperature sensor (Fig. 1 – C) measures the temperature inside the RV.

The installation location for the room temperature sensor depends on the model and floor plan.

## Truma pressure relief/drain valve

**⚠ WARNING**

**RISK OF SCALDING INJURY FROM HOT WATER AND/OR TAMPERING WITH THE PRESSURE RELIEF/DRAIN VALVE!**

- **Never actuate the pressure relief/drain valve as long as the Combi furnace is still hot.**
- **Do not place a plug or reducing coupling on the outlet part of the valve. If you use a discharge line, allow**
- The Truma pressure relief/drain valve provides both the pressure relief function and a drain function.
- The pressure relief/drain valve is a safety component and must not be removed for any reason other than replacement.
- The pressure relief/drain valve is not serviceable; if defective, it must be replaced. It must be replaced by a certified service technician.
- It must only be replaced by the Truma pressure relief/drain valve rated for 65.25 psi (4.5 bar) which is CSA certified and registered.
- Tampering with the pressure relief/drain valve will void the warranty.

The Combi furnace with supplementary indirect water heating must be installed with the Truma pressure relief/drain valve (Fig. 5) that complies with the standard for Relief Valves for Hot Water Systems, ANSI Z21.22.

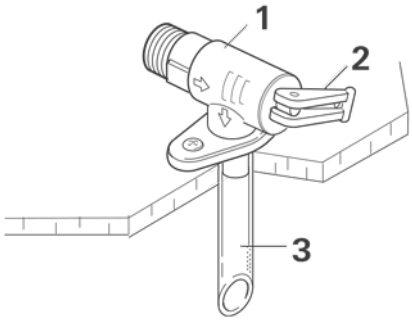



Figure 5

1. Truma pressure relief/drain valve
2. Lever
3. Drainage socket (extends through RV's undercarriage to outside)

### OPENING THE TRUMA PRESSURE RELIEF/DRAIN VALVE

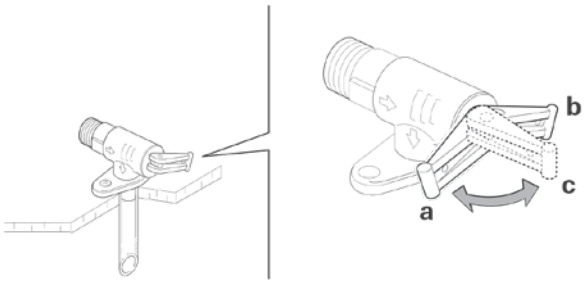



Figure 6

**NOTICE**

**DANGER OF DAMAGE TO THE COMBI AND THE RV DUE TO AN OBSTRUCTED DRAINAGE SOCKET!**

**The drainage socket (Fig. 5 – 3) must be unobstructed and kept clear of obstructions such as slush, ice, or leaves to ensure that water can drain properly. No warranty claims for frost damage will be accepted.**

- Move the lever so that it is in the "draining" position (Fig. 6 – c). Water will drain from the hot water container via the drainage socket (Fig. 5 – 3).

### CLOSING THE TRUMA PRESSURE RELIEF/ DRAIN VALVE

- Move the lever so that it is in the "closed" position (Fig. 6 – a or 6 – b)

a,b = lever in "valve closed during furnace operation" position

c = lever in "draining" position

## Starting the Combi furnace

**⚠ WARNING**

**DANGER OF OVER-TEMPERATURE AND TOXIC EXHAUST GASES!**

- **Use with LP gas (propane) only. Butane or any mixtures containing more than 10 % of butane must not be used.**
- **Keep the air inlet and exhaust gas outlet free of obstructions. Do not lean any objects against the wall cowl on the RV or place any objects within a range of 2 feet (61 cm) of the wall cowl.**

**⚠ WARNING**

**DANGER OF COMBUSTION AND DAMAGE TO PERSONS AND THE MOTORHOME!**

- **Keep the area around the Combi furnace free from combustible materials, gasoline, and other flammable vapors or liquids.**
- **Switch the gas supply and the Combi furnace off:**
  - **if anything seems to be out of the ordinary.**
  - **if you smell gas.**
  - **if you move the motorhome.**
  - **before entering a gas station.**
  - **before entering a tunnel.**
  - **before entering a ferry boat.**

### INSPECTIONS BEFORE EACH USE

Check the Combi furnace for the following points before each use. In case of damage, contact an authorized Truma service provider and do not operate the Combi furnace.

- Inspect the furnace (Fig. 1 – A), exhaust venting system (Fig.1 – F), and wall cowl (Fig.1 – F) for damage. Verify that connections are tight and fasteners are secure.
- The wall cowl (Fig. 1 – F) for drawing in combustion air and emitting exhaust must be free from obstructions such as slush, ice or leaves. The furnace will not function properly if the combustion-air inlet or exhaust tube is partially or completely obstructed.
- The warm air outlets (Fig. 1 – H), the wall outlet vents (Fig. 1 – I) and the openings for the circulated air intake (Fig. 1 – D and Fig. 2 – 11) must be free from obstructions to ensure that the furnace functions properly. Any obstructions might cause the furnace to overheat. If this happens, the built-in temperature limiter will interrupt the flow of gas to the furnace. Once the furnace has cooled, it will switch on again automatically.
- Access to adequate quantities of LP gas (fuel inlet pressure 11 – 13 in. wc (27.4 – 32.4 mbar)) and 12 volts DC power must be available.

### THE COMBI ECO PLUS AND COMBI COMFORT PLUS MODELS

**NOTICE**

**DANGER OF DAMAGE TO THE POWER CORD DUE TO OVERHEATING!**

**If you use an extension cord on a cable drum to connect the motorhome to the campground power system, make sure the cord is fully extended.**

- Make sure that the shore power voltage's fuse protection of the campground suffices for operating the furnace in electric mode. The furnace needs up to 1,700 watts (14.2 amps) in operating mode 2. If the supply voltage's fuse protection is not sufficient, the furnace can be operated in operating mode 1 with up to 850 watts (7.1 amps).

## Filling the water container

**NOTICE**

**DAMAGE TO THE WATER CONTAINER!**

**The water pressure on the inlet side must be limited to 40.6 psi (2.8 bar), otherwise internal components of the appliance will be damaged. On (city) water connections with a pressure higher than 40.6 psi (2.8 bar) a pressure regulator is strongly recommended.**

1. Close the pressure relief/drain valve, if open (refer to "Closing the Truma pressure relief/drain valve").
2. Close open bypass lines, if present.
3. Turn on the fresh water supply or switch on the water pump.
4. Fill the plumbing system:
   - Open all water-release points, e.g. cold and hot water faucets, showers, toilets.
   - Once water flows, the plumbing system is purged of air.

## Switching On the furnace

**⚠ WARNING**

**SCALDING INJURIES CAUSED BY HOT WATER!**

**Water temperatures over 127° F (52° C) can cause severe burns or scalding and in extreme cases even death.**

- **Before using a hot water faucet or using the shower, mix with cold water and allow the hot water to run until the water temperature no longer increases.**
- **Test the temperature of the water before placing a child in the bath or shower.**
- **Do not leave a child or an infirm person in the bath unsupervised.**

**⚠ WARNING**

**SCALDING INJURIES CAUSED BY HOT AIR!**

**Ventilation air can reach 250° F (121° C) at the warm air outlet and it can cause severe burns or scalding and in extreme cases even death.**

- **Always check the air temperature before varying the air throttle position (Fig. 1 – H).**

1. Switch ON the main battery disconnect switch.
2. If necessary, fill the water container with water (refer to "Filling the water container"). If no hot water is needed, the Combi furnace can be operated without being filled.
3. Make sure the supply of LP gas is turned on at the main gas valve.
4. Make sure the gas shut-off valve, on the Combi unit, is switched ON (refer to "Switch for gas shut-off valve").
   - Operation without gas supply is possible for the Combi eco plus and the Combi comfort plus (120 volt AC). The maximum heating power is then 1,700 watts.
5. Use the CP Plus control panel to switch on the Combi furnace (refer to the CP Plus manual for additional instructions).
   - There may be a variation between the temperature delivered from the Combi furnace and the temperature at the faucet due to water conditions or the length of pipe from the Combi furnace.
   - The presence of a flow restrictor in the hot water line may limit the water flow.
6. If using hot water:
   - Use the CP Plus control panel to select the desired water temperature level.
   - To obtain the desired water temperature at the faucet or in the shower, mix cold and hot water.
   - Make sure that the water temperature has stabilized before any person or animal enters the shower.
7. If using hot air:
   - Use the CP Plus control panel to set the desired room temperature.

NOTE: For the furnace to work properly, there must be enough LP gas (propane >11 in. wc) and 12 volts DC power. Optionally, for electric or mixed mode with the Combi eco plus and Combi comfort plus, an additional 120 volts AC power supply is needed.

## Switching Off the furnace

1. Switch off the Combi furnace using the CP Plus control panel. Due to internal processes, it may take some time until the furnace is completely shut down.
2. If the Combi furnace and any other gas-powered device is not needed anymore, turn OFF the LP main gas valve.
3. Switch off the Combi furnace's electrical power supply (main battery disconnect switch, unless other 12 volt devices are being used.
   - If you intend to put the RV into storage or if you switch off the Combi furnace during freezing temperatures, refer to the "Winterizing" section.

## Draining the water container

**NOTICE**

**DAMAGE TO THE COMBI FURNACE CAUSED BY FREEZING!**

**The Combi furnace does not have a frost-protection function. The water container must be drained if the motorhome will not be used whenever there is a risk of frost.**

**No warranty claims for frost damage are accepted by the manufacturer or Thor Motor Coach.**

To make sure that all water drains properly from the water container, place a big enough vessel underneath the drainage socket of the pressure relief/drain valve (> 2.64 gallons (10 liters)).

1. Use the main battery disconnect switch or pump switch to switch OFF the power to the water pump.
2. Turn off or disconnect the city water connection, if present.
3. Open all water release points, e.g. cold and hot water faucets, showers, toilets.
4. Open the pressure relief/drain valve (refer to "Opening the Truma pressure relief/drain valve").

The water container will drain via the drainage socket of the pressure relief/drain valve.

NOTE: This procedure will not drain the entire water system. Refer to Winterizing in the Water Section of your Owner's Manual, or the TMC Water System Guide.

## Winterizing

**NOTICE**

**SEVERE DAMAGE TO THE PLUMBING COMPONENTS AND THE COMBI FURNACE IS POSSIBLE!**

- **Damage due to freezing or an unsuitable winterizing fluid is not covered by warranty.**
- **Follow the recommendations below if the Combi furnace will be stored under freezing conditions or for an extended period of time.**
- **Winterize the Combi furnace at the start of the winter season or before traveling to a location where freezing conditions are likely.**

**NOTICE**

**DRAINING THE WATER HEATER/FURNACE DOES NOT FREEZE PROTECT OTHER WATER SYSTEM COMPONENTS!**

**To properly protect the entire water system from freezing temperatures, the fresh water tank, fresh water lines, drain lines, toilet, and waste water holding tanks must be winterized.**

**Refer to the winterizing section (page 149) of this manual, or the winterizing sections of your TMC Class B Owner's Manual or TMC Water System Guide.**

For winterizing, drain the Combi furnace, refer to "Draining the water container" on page 36.

After draining the water, the Combi furnace is protected against freezing conditions.

### OPTIONAL: WINTERIZING THE RV WITH A WINTERIZING FLUID

1. Drain the water container (refer to "Draining the water container" on page 36).
2. Turn the valves of the bypass kit according to the supplier's or RV manufacturer's guidelines.
3. Flush the water system with a suitable winterizing fluid according to the supplier's or RV manufacturer's guidelines.
   - Before using the Combi furnace again in hot water mode, remove the winterizing fluid and flush the water system with potable water.

NOTE: Winterizing the RV with a winterizing fluid is only possible with an installed bypass kit (not included in the scope of these instructions). Refer to the water system section of your Class B Owner's Manual.

## Winter operation

To operate the Combi furnace in potentially freezing conditions, the following requirements must be ensured:

- There must be sufficient LP gas (propane; fuel inlet pressure 11 – 13 in. wc (27.4 – 32.4 mbar)) in the tank.
- In addition, the Combi eco plus and Combi comfort plus models require a supply voltage of 120 V if they are to be operated in electric or mixed mode.
- For hot water operation, the water container must be filled (refer to “Filling the water container” on page 12). You must leave the furnace powered ON whenever freezing might occur.

Winter operation will not protect the RV’s entire plumbing system. The RV must be prepared for freezing conditions. Refer to 'Cold Weather Use of the Water System,' contained in the Water Section of your Owner's Manual.

## Maintenance and Service

Refer the manufacturer's instructions for maintenance and service details.

# Truma CP Plus Furnace/Water Heater Controller

**⚠ WARNING**

**Use the CP plus control panel only when it is in a technically sound condition.**

- **Have a specialist immediately remedy any malfunctions. Remedy the malfunction yourself only if a remedy is specified in the troubleshooting chart in these operating instructions.**
- **Have a defective CP plus control panel repaired only by the manufacturer or its service department.**
- **Any alteration to the appliance or its controls can be dangerous and will void the warranty.**

Water heater/ furnace wall-mount controller


Your Combi Furnace/Water Heater is operated by a panel-mounted controller, identified as the CP Plus Control Panel. Depending on the floor plan of the motorhome, this control panel is typically mounted on the kitchen cabinet.

**IMPORTANT! Read and follow the manufacturer’s instructions regarding safety, operation, maintenance, and winterization of the furnace/water heater and CP Plus Control Panel.**

## Description

- A rotary push button (8) is used to select menu items in the menu lines (3 + 4) and to adjust settings.
- Information is shown on a backlit display (1).
- The Back button (9) is used to go back to a previous menu.

## Display and operating elements

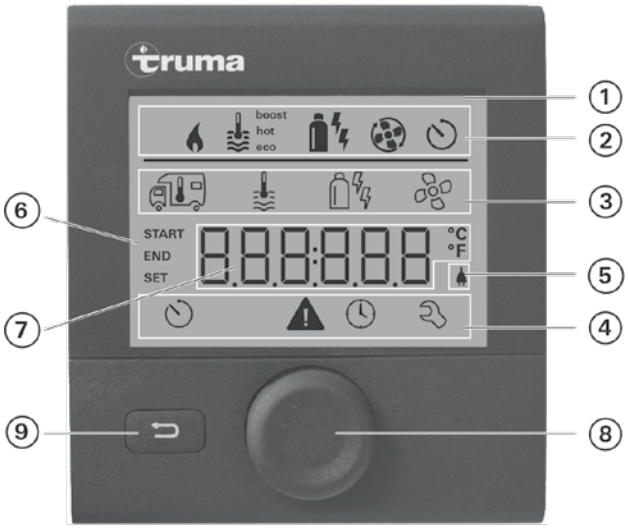



Figure 1

1 Display
2 Status line
3 Menu line (top)
4 Menu line (bottom)
5 Power supply display - 120 volts AC shore power
6 Time switch display
7 Settings/values
8 Rotary push button
9 Back button

### ROTARY PUSH BUTTON

The rotary push button (8) is used to select and change set-points and parameters; it is then tapped to save the values. Selected menu items flash.

**Turn clockwise**

- The menu is scrolled through from left to right
- Increase values (+)

**Turn counterclockwise**

- The menu is scrolled through from right to left
- Reduce values (-)

**Tap**

- Save a selected value
- Select a menu item, go to the setting level


**Press (3 seconds)**

- Main switching function – control panel on/off

### BACK BUTTON

Press the Back button (9) to go back to a previous menu and cancel settings. This means that the previous values remain unchanged.

NOTE:

- If there is an interruption to the power supply, the clock has to be reset.
- If a new furnace is connected to the bus system of the control panel, repeat the procedure described in “Initial start-up”.

## Initial start-up

### PERFORM THE FOLLOWING STEPS FOR INITIAL START-UP:

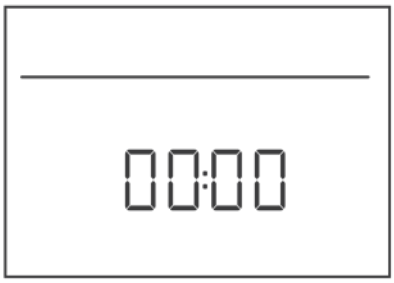
- Switch on the 12 VDC power supply of the control panel and the furnace. With Truma Combi eco plus and Truma Combi comfort plus, also switch on the 120 VAC power supply (mains supply).
- Start searching for the furnace in menu item “Settings” –> “RESET” –> “PR SET”.

When you have confirmed the selection, the control panel is initialized. During this process, “INIT ..” is shown on the display. The recognized furnace is recorded in the control panel.

## Start-up

### START/STAND-BY SCREEN

When the control panel is connected to the power supply, after a few seconds a start screen is displayed.




- After repairs or upgrades, the procedure described in “Initial start-up” has to be repeated.
- The first time you switch on the control panel, any Truma Combi device that is connected is not switched on automatically.

## Control panel on/off

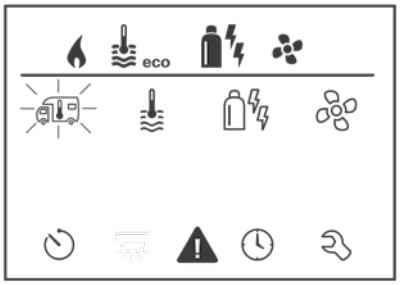
Press the rotary push button (8) for more than 3 seconds.

- Previously set values and operating parameters are active again when the panel is switched on.
- When you switch off the control panel, any Truma Combi device that is connected is also switched off automatically.
- Because of internal time lags for the heating, the switching-off process can take a few minutes.

## Select setting level

Tap the rotary push button (8).

- The display shows the setting level. The first icon flashes

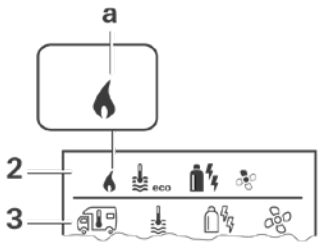



## Functions

The functions of menu lines (3, 4) of the CP plus control panel can be selected in any sequence. The operating parameters are shown in the status line or in the displays (5, 6).

## Change room temperature

- Use the rotary push button (8) to select the icon in the menu line (3).
- Tap the button to go to the setting level.
- Select the desired temperature with the rotary push button (8).
- Tap the rotary push button (8) to confirm the value.




Adjustable temperature range:

| Temperature display | Range | Increments |
|---|---|---|
| Fahrenheit | 40-86° F | 1° F |
| Celsius | 5-30° C | 1° C |

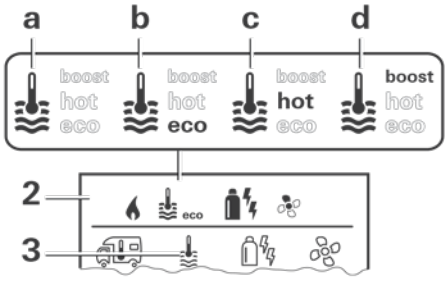
a = Furnace* is switched on

* This icon flashes until the desired room temperature is reached.

- The temperature can be changed quickly using the rotary push button (8) (on the stand-by screen).

## Change hot water level

- Use the rotary push button (8) to select the icon in the menu line (3).
- Tap the button to go to the setting level.
- Select the desired hot water level with the rotary push button (8).
- Tap the rotary push button (8) to confirm the value.




a = Boiler*
b = eco**
c = hot
d = boost*

- Hot water generator is ON.
- Water temperature 104º F (40º C).
- Water temperature 140º F (60º C).
- Boiler content is heated quickly (boiler priority) for up to 40 minutes. The water temperature is then kept at the higher level (about 144º F (62º C) for two subsequent heating cycles. When the water temperature is reached, the room is heated again.

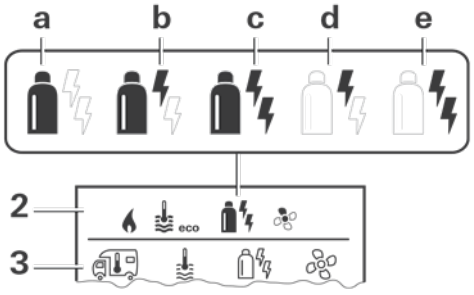
* This icon flashes until the desired water temperature is reached.

** The water temperature 104° F (40° C) can be kept in “Heating and hot water mode” for a limited time only (heating priority).

## Select energy mode

- Use the rotary push button (8) to select the icon in the menu line (3).
- Tap the button to go to the setting level.
- Select the desired energy mode with the rotary push button (8).
- Tap the rotary push button (8) to confirm the value.

* Mixed mode and electricity mode Possible only with Truma Combi eco plus and Truma Combi comfort plus furnaces with electric heating elements.




| Icon | Operating Mode | Energy Mode |
|---|---|---|
| a | LP gas | LP gas |
| b | MIX 1 * | Electricity 850 W + gas |
| c | MIX 2 * | Electricity 1700 W + gas |
| d | EL 1 * | Electricity 850 W |
| e | EL 2 * | Electricity 1700 W |

When the furnace is switched on (room temperature, hot water level active), the energy mode selected in the previous heating process is shown in the status line. The factory setting is gas.

### SPECIAL FEATURES IN MIXED MODE

- Interruption in the 120 VAC power supply:

  The furnace automatically switches to gas mode. When the 120 VAC power supply is restored, the furnace automatically switches back to mixed mode.

- Fault in combustion process (e.g. fuel shortage):

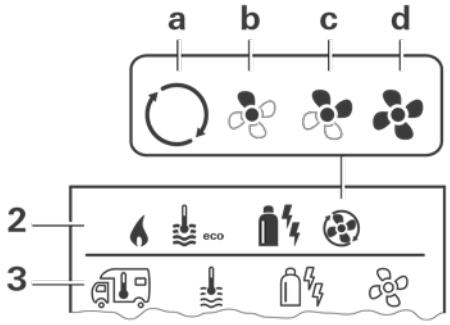
  The furnace automatically switches to electric mode. If the furnace is to run in mixed mode again, the cause of the malfunction must be remedied and the furnace has to be started again by going to the menu item 'Malfunction' and pressing the rotary push button. See Malfunction.

### SPECIAL FEATURES IN ELECTRICITY MODE

- When the 120 VAC power supply is interrupted and the 12 VDC supply is on, an error code is displayed on the control panel.
- When the 120 VAC power supply is reconnected, the furnace will restart automatically with the previous settings without any user interaction. The error code on the control panel will disappear.

## Select fan speed

- Use the rotary push button (8) to select the icon in the menu line (3).
- Tap the button to go to the setting level.
- Select the desired fan speed with the rotary push button (8).
- Confirm with the rotary push button (8).




| Icon | Operating Mode | Description |
|---|---|---|
| – | OFF | Fan is switched off (can be selected only if furnace is switched off) |
| a | VENT * | Circulating air, if furnace is switched off. Speed can be selected in 10 increments |
| b | ECO | Low fan speed |
| c | HIGH ** | High fan speed |
| d | BOOST | Fast room heating. Available if the difference between the selected and the current room temperature is > 18º F (10º C) |

* Can increase wear and tear on the motor, depending on how often it is used.

** HIGH fan speed uses more electricity, is louder, and increases wear and tear on the motor.

When the furnace is switched on (room temperature, hot water level set), the fan speed selected in the previous heating process is shown in the status line (2). The factory setting is ECO.

## Set the time switch

**⚠ WARNING**

**RISK OF CARBON MONOXIDE POISONING!**

**The enabled time switch turns the furnace on, even when the recreational vehicle (RV) is parked. The exhaust gas from the furnace can cause poisoning in enclosed spaces (e.g. garages, repair shops).**

**If you park the RV in an enclosed space:**

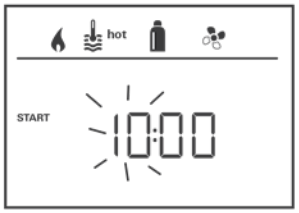
- **Shut off the gas feed to the furnace.**
- **Disable the time switch (OFF).**
- **Switch the furnace off. (On the Truma CP plus control panel, press the rotary push button (8) for 3 seconds.)**

- The time switch can be selected only if the clock was set on the control panel.
- If the time switch is ON, the “Disable time switch (OFF)” menu is displayed.
- Use the rotary push button (8) to select the icon in the menu line (4).
- Tap the button to go to the setting level.

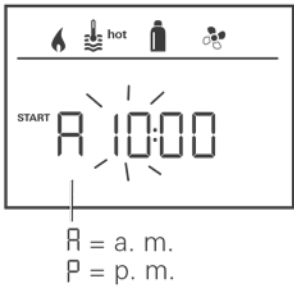
### ENTER THE START TIME

- Use the rotary push button (8) to set the hours and then the minutes.
- If the start/end time is later than the time when you entered the settings, the operating parameters are not active until the next start/end time is reached. Until then, the operating parameters set outside the time switch remain valid.

24 h mode



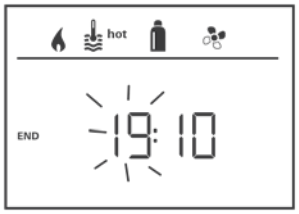

12 h mode



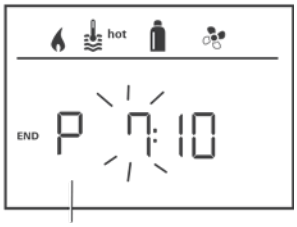
### ENTER THE END TIME

- Use the rotary push button (8) to set the hours and then the minutes.
- If the start/end time is later than the time when you entered the settings, the operating parameters are not active until the next start/end time is reached. Until then, the operating parameters set outside the time switch remain valid.

24 h mode



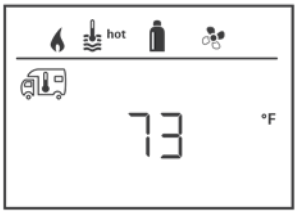

12 h mode




A = a. m.
P = p. m.

### SET THE ROOM TEMPERATURE

- Select the desired room temperature with the rotary push button (8).
- Tap the rotary push button (8) to confirm the value.



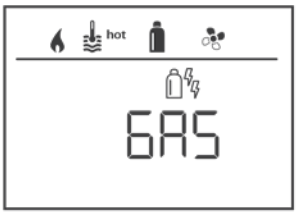

Example: Temperature display in ° F

### SET THE HOT WATER LEVEL

- Select the desired hot water level with the rotary push button (8).
- Tap the rotary push button (8) to confirm the value.


### SELECT ENERGY MODE

- Select the desired energy mode with the rotary push button (8).
- Tap the rotary push button (8) to confirm the value.
- The “Select energy mode” menu is displayed only if a furnace with electric heating elements is connected (Truma Combi eco plus or Truma Combi comfort plus).




### SELECT FAN SPEED

- Select the desired fan speed with the rotary push button (8).
- Tap the rotary push button (8) to confirm the value.
- The “Select fan speed” menu is displayed only if the room temperature was set.


### ENABLE THE TIME SWITCH (ON)

- Enable the time switch (ON) with the rotary push button (8)
- Tap the rotary push button (8) to confirm the value.
- The time switch remains enabled, even for several days, until it is disabled (OFF). If the time switch is programmed and enabled, the time switch icon is shown in the status line (2). If the time switch is active, the icon flashes.

### DISABLE THE TIME SWITCH (OFF)

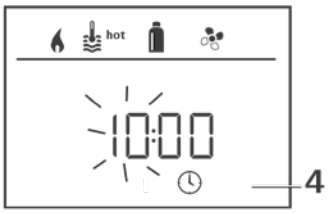
- Tap the rotary push button to go to the setting level.
- Disable the time switch (OFF) with the rotary push button (8)
- Tap the rotary push button (8) to confirm the value.


## Set clock

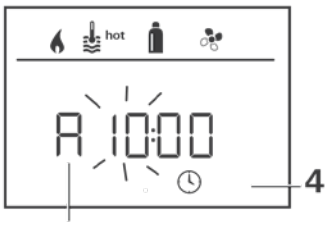
- Use the rotary push button (8) to select the “Set clock” icon in the menu line (4).

  The hour display flashes.
- Use the rotary push button (8) to set the hour.
- Tap the rotary push button (8) again and the minute display flashes.
- Use the rotary push button (8) to set the minutes.
- Tap the rotary push button (8) to confirm the value.

Display 24 h mode




Display 12 h mode




A = a. m.
P = p. m.

## Settings

- Use the rotary push button (8) to select the “Settings” icon in the menu line (4).
- Tap the button to go to the setting level.

### SHOW VERSION NUMBER OF CONNECTED DEVICES

Display the version number of furnace and control panel.


### BACKLIGHTING

Change the backlighting of the CP plus control panel in 10 increments.


### LANGUAGE

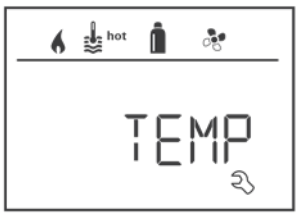
Select the desired language (English, German, French, Italian).


### 12 H / 24 H MODE

- Display in 12 h (a. m., p. m.) / 24 h mode.
- Default 12 h mode.

### 5°C / °F TEMPERATURE DISPLAY

- Select temperature display °C (Celsius) or °F (Fahrenheit).
- Default °F (Fahrenheit)




### CALIBRATE TEMPERATURE SENSOR (OFFSET)

The temperature sensor of the connected furnace can be adjusted individually to suit the size of the vehicle.

- Default ºF (Fahrenheit)


Setting the offset:

| Temperature display | Increments | Range |
|---|---|---|
| ° F (Fahrenheit) | 1 | ± 10° F |
| ° C (Celsius) | 1 | ± 5° C |

### FACTORY SETTING (RESET)

The reset function resets the control panel to the factory settings. All your settings are deleted. Newly connected devices are recognized and recorded in the control panel.

- Switch on the 12 VDC power supply of the control panel and the furnace. With Truma Combi eco plus and Truma Combi comfort plus, also switch on the 120 VAC power supply (mains supply).

### RESET

- Select RESET with the rotary push button (8).
- Tap the rotary push button (8).
- PR SET is shown in the display.
- Tap the rotary push button (8) to confirm.

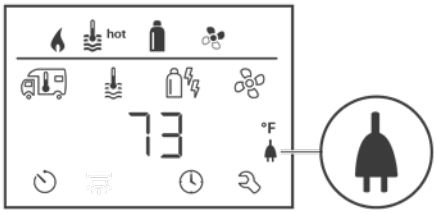
When you have confirmed the selection, the control panel is initialized.

During this process, INIT... is shown in the display.


### Display power supply 120 VAC

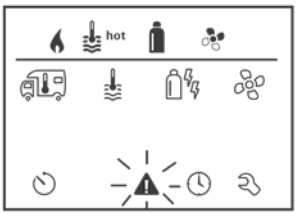
The icon shows that the 120 VAC power supply (mains supply) is available.

- The icon is displayed only in combination with a Truma Combi eco plus or Truma Combi comfort plus.




## Warning

This icon indicates that an operating parameter has reached an undefined status. In this case, the furnace continues to operate. When the operating parameter returns to the set range, this icon extinguishes automatically.



### DISPLAY WARNING CODE

- Select the icon with the rotary push button (8).
- Tap the rotary push button (8). The code of the current warning is displayed. The troubleshooting chart can be used to determine the cause of the warning and remedy the error.


W = Warning

42 = Error Code

H = Furnace

### CAUSE REMEDIED / RETURN TO SETTING LEVEL

Tap the rotary push button (8).

### CAUSE NOT REMEDIED / RETURN TO SETTING LEVEL

Press the Back button (9).In this case, the warning is not acknowledged in the control panel and the icon remains. The furnace remains in warning status.

## Malfunction

In case of a malfunction, the control panel immediately goes to the menu level “Malfunction” and displays the error code of the malfunction.

The troubleshooting chart can be used to determine the cause of the warning and remedy the error.


E = Malfunction

112 = Error Code

H = Furnace

### CAUSE REMEDIED / RETURN TO SETTING LEVEL

Tap the rotary push button (8).

The furnace is restarted. This may take a few minutes because of internal time lags of the connected furnace. If the cause was not remedied, the malfunction will occur again and the control panel will again go to the “Malfunction” menu level.

### CAUSE NOT REMEDIED / RETURN TO SETTING LEVEL

Press the back button. In this case, the malfunction is not acknowledged in the control panel and the icon remains. The furnace remains in the malfunction status.

## Maintenance

- This control panel is maintenance-free.
- To clean the front, you can use a non-abrasive cloth moistened with water (and a neutral soap solution).
- For additional operational and maintenance information, refer to the manufacturer's instructions regarding this controller.

# Radiant In-floor Heating

Select Class A diesel pusher models offer radiant in-floor heating as an option. This in-floor heating system is used to warm the ceramic tile floors of the motorhome.

The system uses a thin grid of 120 volt AC heating pads, installed underneath the ceramic tile, and operates from shore power or the on-board generator. It is controlled by an adjustable bar-graph thermostat (1-to-5 bars), integrated in the multiplex touch-panel. Floor temperatures typically reach 80-90 degrees Fahrenheit, depending on outside conditions, spreading a gentle warmth to the tile floor and interior.

Because it does not rely on circulating air, the system is hypoallergenic, does not affect the humidity level, and compliments the hydronic heating system of the motorhome.

When installed, the entire main floor of the motorhome is heated, other than the rear over-the-engine bay step-up.

### HEATED FLOORING PROVIDES SEVERAL BENEFITS:

- The heat is even and gradual.
- The system uses RUGGEDIZED wire, to withstand most common causes of wire breaks and ground faults. The RUGGEDIZED wire is encased in a stainless steel outer braid, making it incredibly tough and nearly unbreakable.
- The system uses a controller that regulates the floor temperature by means of a sensor built into the floor, thus ensuring that the temperature sensed by the controller and the owner are the same.
- The system produces 15 watts/square foot of heat.
- The system operates on 120 volts AC, shore power or generator.
- The system warms gradually, radiating heat to the surfaces above the floor. The the change in floor temperature is not easily noticed until the temperature has risen about 10 degrees. Full temperature rise takes about an hour and peak temperature is about 25-30° F above ambient. Under normal operation, owners will often set their central air thermostats down to about 65°, while the floor temperature of 85-90° keeps the room warm and the occupants comfortable.

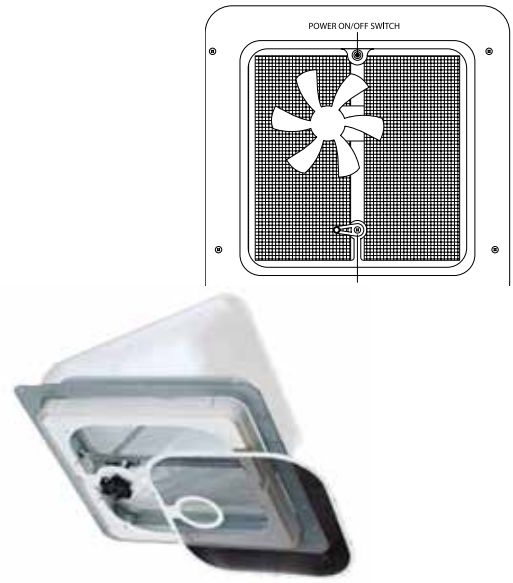
Select TMC Class A Diesel Pushers with ceramic tile floors offer radiant in-floor heating as an optional supplement to the motorhome's heating system.

# Ceiling Fans and Powered Vents

Vents (powered and non-powered) and ceiling fans are installed to circulate fresh air, draw in cool outside air, and help exhaust kitchen and bath moisture and odors. Your motorhome will usually be equipped with multiple ceiling vents and/or ceiling fans.

NOTE: For best exhaust venting results, close all other roof vents and open one window, or door the greatest distance from the exhaust vent.

Although the vent domes are designed to be open during travel, it is recommended to close all vent domes to reduce the possibility of travel-induced damage.




Powered Ceiling Vents

## Powered and Non-Powered Ceiling Vents

**⚠ CAUTION**

**When removing insect screen for cleaning, turn the fan motor OFF and remove vehicle 12 volts DC power to the fan.**

Non-powered ceiling vents are opened by a hand crank or knob. Rotate the knob to open and close the vent dome.

Powered ceiling vents include a 12 volts DC powered fan. A hand crank or knob controls opening, closing, and position of the vent cover, while a switch located on the inside flange, turns the exhaust fan ON and OFF. The fan only has one speed and air-flow direction.

- It is extremely important that you use the bath ceiling vent every time you use the shower or tub to eliminate excess condensation.
- Make sure to turn the fan OFF before closing the vent.
- ONLY OPERATE THE FAN MOTOR WHEN THE VENT DOME IS OPEN.

Ceiling vents are also equipped with a screen, which is removable for cleaning. Be sure to remove any debris that falls into the vent that may restrict air-flow or fan operation.

## MAXXFAN® Ceiling Fan

Select TMC motorhome models may be equipped with one or more MAXXFAN® ceiling fans. The MAXXFAN® can be operated as a powered vent; to draw in cool outside air, or as a ceiling fan; to circulate the inside air of the motorhome.

MAXXFAN® Ceiling Fan

## Basic Operation

### MANUAL OPENING

- PULL the knob to unlock prior to turning. Rotate knob clockwise to CLOSE vent lid. Rotate Knob counterclockwise to OPEN vent lid. Push Knob IN to lock the vent lid position. It may be necessary to slightly rotate the knob in order to align it while pushing it up to lock.
- Do not use excessive force to rotate the knob

### KEYPAD CONTROLS

Use the soft-buttons on the keypad to control fan ON/OFF and fan SPEED.

### CEILING FAN MODE

With the fan motor running, close the vent lid to enter Ceiling Fan Mode. The fan motor will continue to run and circulate air within the RV cabin.

### SCREEN RETAINERS

To remove the screen for cleaning, rotate all four screen retaining clips 1/2 turn and pop-off the screen. To re-install screen, align screen at opening and fasten by rotating retaining clips.

## Keypad Controls

### FAN ON 1-2-3-4

Turns the fan motor ON at the last selected speed. Press to turn ON the fan. With the fan running, pressing the soft keypad cycles between fan speeds of 1-2-3-4 (LOW to HIGH) and repeats this cycle with subsequent pressing of the soft-key.

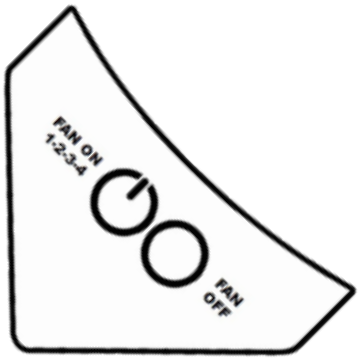
### FAN OFF

Press to turn OFF the fan motor at any selected speed.

## MAXXFAN® Plus

If your motorhome is equipped with MAXXFAN® Plus ceiling fan(s), these models may have features, such as auto opening, temperature sensing, rain sensing, or motor reverse For complete information on these features, please review the manufacturer's manual supplied with your TMC Owner's Packet.

Some motorhome models may be equipped with wall-mounted controls or remote controls for the ceiling fans and vents.




MAXXFAN® Motor Control Keypad

NOTE: When cleaning the fan or screen is necessary, only use a mild detergent solution; never use solvents. Solvents may discolor or damage plastic parts and painted surfaces.

## Fan Tastic® Vent Fan

Your motorhome may be equipped with Dometic Fan Tastic® ceiling fan(s). These fans function and operate similar to the MAXXFAN® and MAXXFAN® Plus models described in the previous section and may have remote, temperature sensing and other auto features. The manufacturer of the ceiling fan recommends the following:

- Keep the roof dome free of snow and ice
- Close the roof dome before placing the vehicle in motion
- With closed roof dome, do not exceed the maximum travel speed of 150 km/hr. (93 miles/hour).

For features, operational instructions, and recommended maintenance, refer to the manufacturer's information included with your TMC Owner's Packet.

Dometic Fan Tastic® Ventilation Fan

## Powered Paddle-type Ceiling Fan

**NOTICE**

**As with a residential installation of a paddle-type ceiling fan, be cautious of moving blades and the somewhat lower ceiling height of a motorhome as compared to a standard residential ceiling height.**

Select TMC motorhomes may have residential, paddle-type ceiling fans installed in the living quarters, typically in a bedroom. If equipped, fan controls may be located on a switch panel installed on a nearby wall, or could be incorporated in a nearby multiplex control panel. Fan controls may incorporate multiple motor speeds.

Due to the unique installations of paddle-type fans, your RV dealer is the best source for instructions regarding the operation of the fan.

Typically, paddle-type fan installed in the ceiling of a bedroom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