Ingersoll Rand’s Climate Solutions sector delivers energy-efficient HVAC solutions for customers globally. Its world class brands include Thermo King, the leader in transport temperature control and Trane, a provider of energy efficient heating, ventilating and air conditioning systems, building and contracting services, parts support and advanced controls for commercial buildings and homes.
Disclaimer

This manual is published for informational purposes only. Thermo King Corporation makes no representations or warranties, express or implied, with respect to the information, recommendations and descriptions contained in this manual and such information, recommendations and descriptions should not be regarded as all-inclusive or covering all contingencies. In the event you have any questions or require further information, please contact your local Thermo King dealer.

The procedures described herein should only be undertaken by suitably qualified personnel. Failure to implement these procedures correctly may cause damage to the Thermo King unit or other property or personal injury.

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Introduction

There is nothing complicated about operating and maintaining your Thermo King unit, but a few minutes studying this manual will be time well spent.

Performing pre-trip checks and enroute inspections on a regular basis will minimize on-the-road operating problems. A regular maintenance program will also help to keep your unit in top operating condition. If factory recommended procedures are followed, you will find that you have purchased the most efficient and dependable temperature control system available.

All service requirements, major and minor, should be handled by a Thermo King dealer for four very important reasons:

- They are equipped with the factory recommended tools to perform all service functions
- They have factory trained and certified technicians
- They have genuine Thermo King replacement parts
- The warranty on your new unit is valid only when the repair and replacement of component parts is performed by an authorized Thermo King dealer.

IMPORTANT: This manual is published for informational purposes only and the information furnished herein should not be considered as all-inclusive or meant to cover all contingencies. If more information is required, consult your Thermo King Service Directory for the location and telephone number of the local dealer.
EPA Emission Control System Warranty Statement

Thermo King warrants to the initial owner and each subsequent owner that the certified, non-road diesel engine in your unit is:

1. Designed, built and equipped so as to conform, at the time of sale, with all applicable regulations adopted by the United States Environmental Protection Agency (EPA).

2. Free from defects in materials and workmanship in specific emission related parts for a period of five years or 3,000 hours of operation, whichever comes first, after date of delivery to the initial owner.

If an emission-related part or component fails during the warranty period, it will be repaired or replaced. Any such part or component repaired or replaced under warranty is warranted for the warranty period.

During the term of this warranty, Thermo King will provide, through a Thermo King authorized service dealer or other establishment authorized by Thermo King, repair or replacement of any warranted part at no charge to the non-road engine owner.

In emergency, repairs may be performed at any service establishment, or by the owner, using any replacement part. Thermo King will reimburse the owner for their expenses, including diagnostic charges for such emergency repair. These expenses shall not exceed Thermo King’s suggested retail price for all warranted parts replaced, and labor changes based on Thermo King’s recommended time allowance for the warranty repair and the geographically appropriate hourly labor rate.
Any replacement part can be used for maintenance or repairs. The owner should ensure that such parts are equivalent in design and durability to genuine Thermo King parts. However, Thermo King is not liable for parts that are not genuine Thermo King parts.

A part not being available within 30 days or repair not being completed within 30 days constitutes an emergency.

As a condition of reimbursement, replaced parts and received invoices must be presented at a place of business of a Thermo King authorized service dealer or other establishment authorized by Thermo King.

This warranty covers the following emission-related parts and components:
- Fuel Injection System
- Intake Manifold
- Exhaust Manifold
- Miscellaneous hoses, clamps, connectors and sealing devices used in the above systems.

If failure of one of these parts or components results in failure of another part or component, both will be covered by this warranty.

Responsibilities
This warranty is subject to the following:

Thermo King Corporation Responsibilities
During the emission warranty period, if a defect in material or workmanship of a warranted part or component is found, Thermo King will provide:
- New, remanufactured, or repaired parts or components required to correct the defect.

NOTE: Items replaced under this warranty become the property of Thermo King.
- Labor, during normal working hours, required to make the warranty repair. This includes diagnosis and labor to remove and install the engine, if necessary.
Owner Responsibilities

During the emission warranty period, the owner is responsible for:

- The performance of all required maintenance. A warranty claim will not be denied because the scheduled maintenance was not performed. However, if the lack of required maintenance was the reason for the repair, then the claim will be denied.
- Premium of overtime cost.
- Cost to investigate complaints that are not caused by defects in Thermo King material or workmanship.
- Providing timely notice of a warrantable failure and promptly making the product available for repair.

Limitations

Thermo King is not responsible for resultant damages to an emission-related part or component resulting from:

- Any application or installation Thermo King deems improper as explained in this Operator’s Manual, or any other manuals provided for the unit.
- Attachments, accessory items, or parts not authorized for use by Thermo King.
- Improper off-road engine maintenance, repair or abuse.
- Owner’s unreasonable delay in making the product available after being notified of a potential product problem.

This warranty is in addition to Thermo King’s standard warranty applicable to the off-road engine product involved. Remedies under this warranty are limited to the provision of material and services as specified herein. Thermo King is not responsible for incidental or consequential damages such as downtime or loss of engine powered equipment.
Safety Precautions

Thermo King recommends that servicing be done only by a Thermo King dealer. However, you should be aware of several safety practices. This chapter gives basic safety precautions for working with Thermo King units and describes the safety stickers on your unit that you should be familiar with.

General Safety Practices

WARNING: Keep hands and loose clothing clear of fans and belts at all times when the unit is operating with the doors open.

WARNING: Exposed coil fins can cause painful lacerations. Service work on the evaporator or condenser coils should be done by a certified Thermo King technician.

WARNING: Do not apply heat to a closed cooling system. Before applying heat to a cooling system, drain it. Then flush it with water and drain the water. Antifreeze contains water and ethylene glycol. The ethylene glycol is flammable and can ignite if the antifreeze is heated enough to boil off the water.

Automatic Start/Stop Operation

This unit is capable of automatic operation and could start at any time without warning.

WARNING: The unit can start at any time without warning. Press the Off key on the control panel and place the microprocessor On/Off switch in the Off position before inspecting or servicing any part of the unit.

Electrical Hazard

DANGER: Dangerous three phase AC electric power is present whenever the unit is operating in either Diesel Mode or Electric Mode and whenever the unit is connected to a source of external standby power. Voltages of this magnitude can be lethal. Exercise extreme caution when working on the unit.
Battery Installation and Cable Routing

**WARNING:** Improperly installed battery could result in a fire or explosion. A Thermo King approved battery must be installed and properly secured to the battery tray.

**WARNING:** Improperly installed battery cables could result in fire or explosion. Battery cables must be installed, routed and secured properly to prevent them from rubbing, chaffing or making contact with hot, sharp or rotating components.

**CAUTION:** Do not connect other manufacturer’s equipment or accessories to the Thermo King unit. This could result in severe damage to equipment and void the warranty.

**CAUTION:** Set all unit electrical controls to the OFF position before connecting battery cables to the battery to prevent unit from starting unexpectedly and causing personal injury.

**CAUTION:** Always wear protective clothing, gloves and eye wear when handling and installing batteries. Battery acid can cause serious burns when exposed to eyes or skin. If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters your eye, immediately flood it with running cold water for at least twenty minutes and get medical attention immediately.

**CAUTION:** Always cover battery terminals to prevent them from making contact with metal components during battery installation. Battery terminals grounding against metal could cause the battery to explode.
Safety Precautions

Refrigerant

Although fluorocarbon refrigerants are classified as safe, use caution when working with refrigerants or in areas where they are being used.

- **DANGER:** Fluorocarbon refrigerants can produce toxic gases. In the presence of an open flame or electrical short, these gases are severe respiratory irritants CAPABLE OF CAUSING DEATH.

- **DANGER:** Fluorocarbon refrigerants tend to displace air and can cause oxygen depletion which could result in DEATH BY SUFFOCATION. Provide adequate ventilation in enclosed or confined areas.

- **WARNING:** Fluorocarbon refrigerants evaporate rapidly, freezing anything they contact if accidentally released into the atmosphere from the liquid state.

Refrigerant Oil

Observe the following precautions when working with or around refrigerant oil:

- **WARNING:** Always wear goggles or safety glasses to protect eyes from refrigerant oil contact.

- **WARNING:** Protect skin and clothing from prolonged or repeated contact with refrigerant oil. Rubber gloves are recommended.

- **WARNING:** Wash thoroughly immediately after handling refrigerant oil to prevent irritation.
First Aid

First Aid–Refrigerant

**Eyes:** For contact with liquid, immediately flush eyes with large amounts of water. Get prompt medical attention.

**Skin:** Flush areas with large amounts of warm water. Do not apply heat. Wrap burns with dry, sterile, bulky dressing to protect from infection or injury. Get prompt medical attention.

**Inhalation:** Move victim to fresh air and restore breathing if necessary. Stay with victim until emergency personnel arrive.

First Aid–Refrigerant Oil

**Eyes:** Immediately flush eyes with large amounts of water for at least 15 minutes while holding the eyelids open. Get prompt medical attention.

**Skin:** Remove contaminated clothing. Wash thoroughly with soap and water. Get medical attention if irritation persists.

**Inhalation:** Move victim to fresh air and restore breathing if necessary. Stay with victim until emergency personnel arrive.

**Ingestion:** Do not induce vomiting. Immediately contact local poison control center or physician.

Safety Decals and Locations

Condenser and Evaporator Fans

Be aware of the warning nameplates near the condenser fans and evaporator fans (example in Figure 1).

![Figure 1: Fan Warning](AMA1581)
Safety Precautions

High Voltage Components
Various components on the Precedent unit operate using 220/3/60 or 460/3/60 high voltage and are identified by warning nameplates (examples in Figure 2). All high voltage wiring is identified by ORANGE conduit. Be aware of the locations of these components. Only certified, trained technicians can service them.

Figure 2: High Voltage Warning
NOTE: See Figure 3 and Figure 4 for high voltage component locations.

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<td>6. Electric Standby Motor &amp; Power Receptacle (SmartPower Option)</td>
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Figure 3: High Voltage Component Locations (Front)
Do Not Use Ether Starting Aids

![Warning Sign]

*WARNING*

Fire or Explosion may result if ether starting aids are used on this engine.

Figure 5: Do Not Use Ether Starting Aids (Near Engine)

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<th>9. High Voltage Junction Box</th>
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Figure 4: High Voltage Component Locations (Rear)
Unit Description

Figure 6: Precedent Multi-temperature Unit

Unit Overview

Thermo King Precedent multi-temperature refrigeration systems are designed to control temperatures in two or three compartments (zones). The system allows any compartment to be set at any temperature.

Precedent C-600M, S-600M and S-610M host units are equipped with a single evaporator that controls temperature in one compartment (Zone 1), and a remote evaporator that controls temperature in another compartment (Zone 2). A unit with three zones has additional remote evaporator(s), which controls temperature in a third compartment (Zone 3).

Precedent DE host units are equipped with dual evaporators: one evaporator controls temperatures in one compartment (Zone 1), the other evaporator controls the temperature in another compartment (Zone 2). DE-3 host units utilize an additional remote evaporator which controls temperatures in a third compartment (Zone 3).

These units feature all-new DDE (Diesel Direct Electric) architecture with a quiet running Thermo King diesel engine and a Thermo King X-430 reciprocating compressor.

The units are available in the following models:

Standard: Cooling and heating on diesel engine operation.

SmartPower™ Option: Cooling and heating on diesel engine operation and electric standby operation.
Diesel Engine

The four cylinder engine is a water cooled, direct injection diesel engine. The engine is coupled directly to the compressor on standard units. A centrifugal clutch transfers power from the engine to the compressor on Smart Power units. Belts transmit power to the AC generator, water pump, and alternator.

ELC (Extended Life Coolant)

ELC is standard equipment. The maintenance interval for ELC is five years or 12,000 hours.

CAUTION: Do not add “GREEN” or “BLUE-GREEN” conventional coolant to cooling systems using “RED” Extended Life Coolant, except in an emergency. If conventional coolant is added to Extended Life Coolant, the coolant must be changed after 2 years instead of 5 years.

NOTE: The use of 50/50% pre-mixed ELC is recommended to assure that de-ionized water is being used. If 100% full strength concentrate is used, de-ionized or distilled water is recommended instead of tap water to insure the integrity of the cooling system is maintained.

EMI 3000

EMI 3000 is an extended maintenance interval package. It is standard equipment. The EMI 3000 package consists of the following key components:

- EMI 3000-Hour Cyclonic Air Cleaner Assembly and Air Cleaner Element
- EMI 5-Micron 3000-Hour Fuel Filter
- EMI 3000-Hour Dual Element Oil Filter
- API Rating CI-4 Mineral Oil
- Five Year or 12,000 Hour ELC (Extended Life Coolant)

The EMI package allows standard maintenance intervals to be extended to 3,000 hours, or 2 years, whichever occurs first.

NOTE: Units equipped with the EMI 3000 package do require regular inspection in accordance with Thermo King’s maintenance recommendations.

NOTE: EMI 3000 oil filters and EMI 3000 air cleaners are NOT interchangeable with older style oil filters and air cleaners.
Unit Description

Thermo King X430 Reciprocating Compressor

The C-600M, S-600M and the S-600DE are equipped with a four cylinder 30.0 cu. in. (492 cm³) displacement Thermo King X430 reciprocating compressor.

Electronic Throttling Valve

The ETV provides enhanced control of the refrigeration system as follows:

- Allows the refrigeration system to fully utilize the power capabilities of the engine under varying conditions
- Provides an additional measure of protection against high discharge pressures
- Protects the engine from high coolant temperature shutdowns
- Provides a means of precise temperature control.

Remote Evaporators

Remote evaporators (if equipped) are mounted on the ceiling of each remote compartment to provide temperature control for Zone 2 and Zone 3 (if used).

SMART REEFER 4 Multi-Temp (SR-4 MT) Control System

The SR-4 MT is a microprocessor control system designed for transport refrigeration. The SR-4 MT integrates the following functions: changing setpoint and operating mode, viewing gauge, sensor and hourmeter readings, initiating defrost cycles, and viewing and clearing alarms.

The microprocessor components are located inside the control box, which is located inside the lower roadside service door. It is used to operate the unit. The control panel is mounted on the face of the control box. It is clearly visible through an opening in the lower roadside service door.

See “Operating Instructions” in this manual for more information about the SR-4 MT Controller.

Depending on the air temperature in the trailer, as sensed by the microprocessor Base Controller, the unit will typically operate in one of the following modes:
**Diesel Operation**

In diesel operation the microprocessor will select the operating mode from the following:

- High Speed Cool
- Low Speed Cool
- Low Speed Modulated Cool
- Null (CYCLE-SENTRY operation only)
- Low Speed Modulated Heat
- Low Speed Heat
- High Speed Heat
- Defrost

**Electric Operation**

In electric operation the microprocessor will select the operating mode from the following:

- Cool
- Modulated Cool
- Null (CYCLE-SENTRY operation only)
- Modulated Heat (Hot Gas only)
- Hot Gas Heat
- Full Heat (Hot Gas and Electric Heat)
- Defrost (Hot Gas and Electric Heat)
Unit Description

CYCLE-SENTRY Start-Stop Controls

WARNING: The unit can start at any time without warning. Press the Off key on the control panel and place the microprocessor On/Off switch in the Off position before inspecting or servicing any part of the unit.

The CYCLE-SENTRY Start-Stop fuel saving system provides optimum operating economy.

When CYCLE-SENTRY Mode is selected the unit will start and stop automatically to maintain setpoint, keep the engine warm and the battery charged. When Continuous Mode is selected, the unit starts automatically and runs continuously to maintain setpoint and provide constant airflow.

Data Logging

There are two separate data loggers. The data is downloaded through the Flash Drive Only USB port on the front of the control box using a flash drive and ThermoServ software.

Flash Drive Only USB Port: Standard USB drives that have been programmed with ThermoServ can be used in the Flash Drive Only USB Port. Use of a USB drive eliminates the need for an on-site computer and does not require cables.

The Flash Drive Only USB port can be used to:

- Download the CargoWatch and ServiceWatch Data Loggers.
- Flashload the Base Controller and HMI Control Panel.
PC Only USB Port: The PC Only USB Port is a connector located on the base controller inside the control box. It is used to connect the controller to a PC with a standard USB to USB mini cable.

The PC Only USB port can be used to:

- Upload trailer ID and Unit Serial Number (Must be done on new units and if new controller is installed.)
- Data Logger setup.
- Download the CargoWatch and ServiceWatch Data Loggers.
- Flashload the Base Controller and HMI Control Panel.

ServiceWatch: ServiceWatch is standard equipment. It records operating events, alarm codes and compartment temperatures as they occur and at preset intervals. This information is typically used to analyze unit performance.

CargoWatch: CargoWatch data logging requires the installation of optional sensors. Up to six temperature sensor/probes and four door switches can be installed. CargoWatch also logs the setpoint. Use a USB port to downloaded the CargoWatch data. If optional temperature sensors are installed, their readings are displayed as Datalogger Sensor (1-6) Temperature in the sensor readings.
OptiSet Plus
OptiSet Plus is a group of programmable functions that control how the unit will operate with specific setpoints or named products. This assures that when a particular setpoint or named product is selected, the unit will always operate the same way. This allows an entire fleet to be configured to match the customers’ needs. Contact your Thermo King dealer for information about programming OptiSet Plus.

FreshSet
FreshSet is included in OptiSet Plus. FreshSet is a demand base temperature control for fresh products. FreshSet modifies and adjusts unit airflow operation to control temperature and to maximize protection of cargo, while keeping operating costs to a minimum. Contact your Thermo King dealer for information about programming FreshSet.

ECO Pulldown Mode
This programmable feature allows the unit to operate in low speed during initial pulldown until the temperature in any one zone inside the trailer reaches 30°F. At this point, it automatically switches the unit to high speed operation. For set points above 30°F, the unit will operate in ECO Pulldown mode until set point is achieved, possibly never operating in high speed mode.

Operating the unit in low speed pulldown can save up to 15% fuel during the initial pulldown without significantly increasing the overall unit run time.

All Thermo King Multi-Temperature units come factory set with the ECO Pulldown Mode enabled. Contact your Thermo King dealer for further information about ECO Pulldown Mode.

Defrost
Frost gradually builds-up on evaporator coils as a result of normal operation. The unit uses hot refrigerant to defrost the evaporator coil. Hot refrigerant gas passes through the evaporator coil and melts the frost. The water flows through collection drain tubes onto the ground. The methods of defrost initiation are Automatic, and Manual.

Automatic Defrost: The SR-4 MT automatically initiates timed or demand defrost cycles. The SR-4 MT microprocessor can be programmed to initiate timed defrost cycles at intervals of 2, 4, 6, 8, or 12 hours. Demand defrost cycles occur if the
differences between the return air temperature, discharge air temperature, and coil temperature exceed certain limits. The unit can enter defrost cycles as often as every 30 minutes if required.

**Manual Defrost:** In Manual Defrost Mode, the operator initiates a defrost cycle. See “Initiating a Manual Defrost Cycle.”

*NOTE:* The unit will not perform a Manual Defrost Cycle unless the unit has been turned on with the **On** key, the unit is running in Continuous or CYCLE-SENTRY Mode (or shut down in CYCLE-SENTRY Null Mode), and the coil temperature is below 45 F (7 C).

---

**Opening the Front Doors**

Pull the right door latch handle out at a 45 degree angle and turn it down (clockwise) 90 degrees (see Figure 8) to open the doors and access the engine compartment. Push the door closed while holding the door latch handle open and then turn it up (counterclockwise) 90 degrees to close the door.

*Figure 8: Door Latch Location*
Unit Description

Engine Compartment Components

WARNING: The unit can start at any time without warning. Press the Off key on the control panel and place the microprocessor On/Off switch in the Off position before inspecting any part of the unit.

The following maintenance items can be checked visually.

Engine Oil Dipstick Use the engine oil dipstick to check the engine oil level.

CAUTION: Make sure the engine is turned off before attempting to check the engine oil.

Unit Protection Devices

Coolant Level Switch The coolant level switch closes if the coolant level drops below an acceptable level. If it stays closed for a specified time, the microprocessor records alarm code 37.

Engine Coolant Temperature Sensor The microprocessor uses the engine coolant temperature sensor to monitor the engine coolant temperature. If the engine coolant temperature rises above an acceptable level, the microprocessor records alarm code 41 and possibly 18. The microprocessor might also shut the unit down.

High Pressure Cutout Switch: The high pressure cutout switch (HPCO) is located on the compressor discharge manifold. If the compressor discharge pressure becomes excessive, the switch opens the circuit to the run relay to stop the unit. The microprocessor will record Alarm Code 10.

High Pressure Relief Valve: This valve is designed to relieve excessive pressure in the refrigeration system. It is located on the receiver tank. If the high pressure relief valve opens, much of the refrigerant will be lost. Take the unit to a Thermo King dealer if this occurs.

Low Oil Level Switch: The low oil level switch closes if the oil drops below an acceptable level. If it stays closed for a specified time, the microprocessor shuts the unit down and records Alarm Code 66.

Low Oil Pressure Switch: The low oil pressure switch closes if the oil pressure drops below an acceptable level. If it stays closed for a specified time, the microprocessor shuts the unit down and records alarm code 19.

CAUTION: Make sure the engine is turned off before attempting to check the engine oil.
Preheat Buzzer: The preheat buzzer sounds when the base controller energizes the preheat relay. This warns anyone near the unit that the controller is about to start the engine.

Overload Relay—Automatic Reset (SmartPower): An overload relay protects the standby electric motor. The overload relay opens the circuit to the electric motor if the motor overloads for any reason (e.g., low line voltage or improper power supply) while the unit is on electric standby operation. The microprocessor will record Alarm Code 90.

Smart FETs: Smart FETs in the microprocessor protect some circuits and components from an overcurrent condition.

Fuses: A number of fuses are used to protect various circuits and components.

Base Controller Fuses
Fuses, located on the base controller protect various circuits and components. The base controller is located inside the control box.

Expansion Module Fuses
Fuses located on the expansion module protect various circuits and components.

ECU Interface Board Fuses
Fuses located on the expansion module protect various circuits and components.

Battery Fuses
A 100A fuse (FS2) protects the 2 circuit to the base controller. A 70A fuse (FS2) protects the 2 circuit to the ECU. A 70A fuse (FS3) protects the 2/8S circuit to the starter relay.
Manual Pretrip Inspection  
(Before Starting the Unit)

Pretrip inspections are an important part of a preventative maintenance program designed to minimize operating problems and breakdowns. Perform this pretrip inspection before every trip involving refrigerated cargo.

NOTE: Pretrip inspections are not intended to take the place of regular maintenance inspections.

Fuel: Make sure the diesel fuel supply is adequate to guarantee engine operation to the next check point. Allow for maximum fuel consumption of one gallon per hour of engine operation.

Engine Oil: Check the engine oil level. It should be at the Full mark when the dipstick is threaded all the way into the oil pan. Do not overfill.

CAUTION: Turn the engine off before checking the engine oil level.

Engine Coolant: The engine coolant must have antifreeze protection to -30 F (-34 C). Add coolant if Alarm Code 37 is active. Check and add coolant to the expansion tank.

WARNING: Do not remove the expansion tank cap while the coolant is hot.

Battery: Make sure the battery terminals are tight and free of corrosion.

Belts: Make sure belts are in good condition and adjusted to the proper tension. Refer to the unit Maintenance Manual for the correct procedure.

Electrical: Check the electrical connections to make sure they are securely fastened. Wires and terminals should be free of corrosion, cracks, and moisture.

Structural: Visually inspect the unit for leaks, loose or broken parts, and other damage.
**Coils:** Make sure the condenser and evaporator coils are clean and free of debris.

**Cargo Box:** Check the interior and exterior of the cargo box for damage. Any damage to the walls or insulation must be repaired.

**Cargo Doors:** Make sure that the cargo doors and weather seals are in good condition. The doors should latch securely and the weather seals should fit tightly.

**Defrost Drains:** Check the defrost drain hoses to make sure they are open.
Operating Instructions

SMART REEFER 4 (SR-4 MT) Controller Overview

Thermo King has applied the latest advances in computer technology to develop a device that controls temperature and unit function, and displays operating information quickly and accurately.

There is nothing complicated about learning to operate the SR-4 MT Controller, but you will find that a few minutes studying the contents of this manual will be time well spent.

**WARNING:** Do not operate the SR-4 MT until you are completely familiar with the location and function of each control.

The microprocessor components are located inside the control box, which is located inside the lower roadside service door. The microprocessor is connected to a Human Machine Interface (HMI) Control Panel. It is used to operate the unit. The USB port is used to retrieve data from the data logging system.
**Microprocessor On/Off Switch:** This switch supplies or removes electrical power to the microprocessor. The Microprocessor Power Switch is located above HMI Control Panel. It is hidden when the lower roadside body panel surrounding the Control Box is closed. If the unit is not going to be used for an extended period of time, turn the Microprocessor On/Off Power Switch to the OFF position to maximize battery life.

**WARNING:** The unit can start at any time without warning. Press the Off key on the control panel and place the microprocessor On/Off switch in the Off position before inspecting or servicing any part of the unit.

**Control Panel**

The control panel has a display and eight touch sensitive keys. The display is capable of showing both text and graphics. The four keys on the left and right sides of the display are “hard” (dedicated) keys. The four keys under the display are “soft” keys. The function of “soft” keys change depending on the operation being performed. If a soft key is active, its function will be shown in the display directly above the key.

**Control Panel Display**

The display presents information to the operator. This information can include setpoint and temperature for each zone, unit or zone operating information, gauge readings, temperatures and other information as selected by the operator. The default display is called the Standard Display. It is shown in Figure 10 and will be described in detail later in this chapter.

![Control Panel Display and Keys](image)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>On Key (Hard Key)</td>
</tr>
<tr>
<td>2.</td>
<td>Off Key (Hard Key)</td>
</tr>
</tbody>
</table>

**Figure 10: Control Panel Display and Keys**
Operating Instructions

The Standard Display of box temperature and setpoint for 3 zones is shown in Figure 11. The unit is running in Continuous Mode. Zone 1 has a setpoint of -10°F, and a return air temperature of -8.2°F. The downward pointing arrow shows this zone is cooling. Zone 2 has a setpoint of 35°F, and a return air temperature of 35.1°F. The absence of an arrow indicates that this zone is in null. Zone 3 has a setpoint of 50°F, and a return air temperature of 48.8°F. The upward pointing arrow shows this zone is heating.

NOTE: The zone temperature shown is always return air temperature.

Pressing the soft key under each zone allows the setpoint for that zone to be changed. In addition, the soft keys under Zone 2 and Zone 3 are used to turn those zones on and off. Pressing the soft key under MENU accesses the MAIN MENU.

NOTE: Zone 1 is always on when the control system is powered up.

Display Icons

Display Icons are used to indicate the following:

- If a zone is cooling, heating or null
- If the unit is operating in Cycle Sentry or Continuous Mode
- If the unit is operating in ECO-Pulldown Mode.
- If unit level or zone level alarm conditions have occurred.
Zone Cooling, Heating or Null

Arrows are used to indicate if a zone is cooling, heating or in null.

Arrows: (At the left side of the display) Figure 12 shows Zone 1 is cooling. If the arrow were pointing upward Zone 1 would be heating. The absence of an arrow indicates that a Zone is in Null.

Figure 12: Cooling, Heating, Null Arrows

CYCLE SENTRY/Continuous Mode Key

If the Cycle Sentry Icon is present as shown in Figure 13, the unit is operating in Cycle Sentry Mode. Absence of the Cycle Sentry Icon indicates the unit is operating in Continuous Mode.

If the Standard Display is shown, the Cycle Sentry Icon will appear in the upper right corner of the display as shown in Figure 13.

Figure 13: Cycle Sentry Icon
If the TemperatureWatch Display is shown, the Cycle Sentry Icon will appear in the lower part of the display as shown in Figure 14.

![Figure 14: Three Zone TemperatureWatch Display - Unit in Cycle Sentry Mode](image)

**ECO-Pulldown Mode**

This programmable feature allows the unit to operate in low speed during initial pulldown until the temperature in any one zone inside the trailer reaches 30°F. At this point, it automatically switches the unit to high speed operation.

Operating the unit in low speed pulldown can save up to 15% fuel during the initial pulldown without significantly increasing the overall unit run time.

For set points above 30°F, the unit will operate in ECO Pulldown mode until set point is achieved, possibly never operating in high speed mode.

All Thermo King Multi-Temperature units come factory set with ECO Pulldown Mode enabled. When the Standard Display is shown, the ECO Pulldown Icon will appear in the upper right corner of the display. Contact your Thermo King dealer for further information about ECO Pulldown Mode.

![Figure 15: ECO Pulldown Mode Icon](image)
Zone Level or Unit Level Alarm Codes

Alarm Icon: The Alarm Icon is used to indicate the presence of one or more alarm codes. If the Alarm Icon is present, an alarm condition has occurred and an Alarm Code has been set. Absence of the Alarm Icon indicates no Check, Prevent or Shutdown Alarm Codes exist.

If a zone level Alarm condition exists, the Alarm Icon will appear in the offending zone as shown in Figure 16. A Zone Level Alarm exists in Zone 2.

Figure 16: Zone Level Alarm

If a unit level Alarm condition exists, the Alarm Icon will appear at the right side of the display as shown in Figure 17.

Figure 17: Unit Level Alarm

Hard Keys

The keys on either side of the display are dedicated or “hard” keys (Figure 18). Their function always remains the same.

Figure 18: Hard Keys
Operating Instructions

On Key: The ON Hard Key is used to turn the unit on. First the display will briefly show the Thermo King Logo and then the statement "Configuring System - Please Wait". When the power-up sequence is complete the display shows the Standard Display of box temperature and setpoint. For more information see “Turning the Unit On and Off” later in this section.

Off Key: The OFF Hard Key is used to turn the unit off. First the display will briefly show "System is Powering Down - Please Wait. Press On to Resume" and then "Off" will appear momentarily. When the power-down sequence is complete the display will be blank. For more information see "Turning the Unit On and Off" later in this chapter.

Defrost Key: The DEFROST Hard Key is used to initiate a manual defrost cycle. For more information see "Initiating a Manual Defrost Cycle" later in this chapter.

CYCLE SENTRY: Used to select Cycle Sentry Mode or Continuous Mode operation if allowed by OptiSet Plus. For more information see “Selecting Cycle Sentry or Continuous Mode” later in this chapter.

IMPORTANT: If the Hard Keys are lighted the HMI Control Panel is powered up, even if the display is off. Typically, this indicates the CargoWatch Data Logger is active, even when the unit is turned off.

Soft Keys

Figure 19: Soft Keys
The four “soft” keys under the display are multi-purpose keys (Figure 19). Their function changes depending on the operation being performed. If a soft key is active the key function is shown in the display directly above the key. The keys are numbered from left to right, with Key 1 on the far left and Key 4 on the far right.

**Typical soft key applications:**

- ZONE ON/OFF and SETPOINT CHANGE
- MENU  CLEAR  NO
- NEXT  HOURMETERS  SENSORS
- + OR -  GAUGES  EXIT
- SELECT  BACK  HELP

**Display Heater**

The HMI control panel is equipped with a display heater. This heater is needed to make the display visible in cold ambient temperatures.

The HMI has its own internal temperature sensor for the display heater. The heater is energized when the unit is turned on and the ambient temperature is below 29.4°F (-2°C). The heater turns off when the temperature sensed by the internal sensor rises above 37.4°F (+3°C). The heater draws from 1.4 to 1.7 amps when energized.

The colder the ambient temperature the longer it will take for the heater to make the display visible on a cold startup. It may take 10-15 seconds for the display to appear with very cold temperatures.

**Turning Unit On and Off**

The unit is turned on by pressing the ON hard key (Figure 20) and off by pressing the OFF Key. When the On Key is pressed the display briefly shows the THERMO KING Logo as the display initializes.

**NOTE:** With Multi-Temp applications, Zone 1 is turned on any time the host unit is turned on. Zone 1 is turned off when the host unit is turned off.

**NOTE:** With extremely cold ambient temperatures it may take up to 15 seconds for the display to appear on initial startup.
Then the startup screen (Figure 21) appears while communications are established and the unit prepares for operation.

When the unit is ready to run the Standard Display appears. The 2 Zone display is shown in Figure 22.

Pressing the OFF hard key stops unit operation. The controller shuts down immediately and the display briefly shows the power down message as shown in Figure 23.
The display briefly shows OFF (Figure 24) and then goes blank. To start the unit again, press the ON hard key.

![Figure 24: OFF Displayed](image)

**Two Zone Standard Display**

The Standard Display is the default display that appears if no other display function is selected. A 2 Zone Standard display is shown here. The 2 Zone Standard Display in Figure 25 shows the return air temperature and setpoint for two zones. The absence of the Cycle Sentry Icon at the top of the display shows that the unit is operating in Continuous mode. The return air temperature for Zone 1 is -8.2°F with a -10°F setpoint. The down-pointing arrow indicates that Zone 1 is cooling. The return air temperature for Zone 2 is 35.8°F with a 35°F setpoint. The down-pointing arrow indicates that Zone 2 is also cooling. The soft key under each zone allows the Setpoint for that zone to be changed. In addition, the soft key under Zone 2 is used to turn that zone on and off. The soft key labeled MENU allows the Main Menu to be selected.

![Figure 25: Two Zone Standard Display](image)
Three Zone Standard Display

The 3 Zone Standard Display adds a third zone. The 3 Zone Standard Display functions the same way as the 2 Zone Standard Display, but with another temperature controlled zone. The absence of the Cycle Sentry Icon at the top of the display in Figure 26 shows that the unit is operating in Continuous mode. The return air temperature for Zone 1 is \(-8.2^\circ\)F with a \(-10^\circ\)F setpoint. The down-pointing arrow indicates that Zone 1 is cooling. The return air temperature for Zone 2 is \(35.8^\circ\)F with a \(35^\circ\)F setpoint. The absence of an arrow indicates that Zone 2 is in Null. The return air temperature for Zone 3 is \(48.8^\circ\)F with a \(50^\circ\)F setpoint. The up-pointing arrow indicates that Zone 3 is heating. The soft key under each zone allows the Setpoint for that zone to be changed. In addition, the soft keys under Zone 2 and Zone 3 are used to turn those zones on and off. The soft key labeled MENU allows the Main Menu to be selected.

Single Zone Control Standard Display

See Figure 27. This feature, if enabled in Guarded Access, allows Single Zone Control operation to be selected by choosing the Main Menu and then selecting Single Zone Control from the Mode submenu. When this feature is selected, all zones will be forced on and will control to the same selected setpoint. The Single Zone Control Standard Display functions the same way as the other Standard Displays. The absence of
the Cycle Sentry Icon at the top of the display shows that the unit is operating in Continuous mode. The box temperature for all zones is 35.8°F and all zones are controlling to a 35°F setpoint. The down-pointing arrow indicates that all zones are cooling. The soft key labeled Setpoint allows the setpoint for all zones to be changed. The soft key labeled Menu allows the Main Menu to be selected.

Operating the Unit in Single Zone Mode

The following differences exist when operating the unit in Single Zone Control Mode.

- Single Zone Control Mode will appear in the Mode Menu only if the Single Zone Control feature has been enabled in the Guarded Access/Main Menu Configuration menu. If the feature is enabled then Single Zone Control will appear in the Main Menu/Mode Menu.
- If Single Zone Control operation is selected then all zones will be forced on and will control to the same setpoint. The Zone 1 sensors are used to determine box temperature. All bulkheads should be taken down to create one large compartment. With the exception of defrost the operating mode of each zone evaporator(s) will be same when in this mode. Unit control is based on the temperature sensors of one zone (usually Zone 1).
- If Single Zone Control operation is selected the Single Zone Standard Display provides only one soft key labeled Set Point. This allows the setpoint for all zones to be changed simultaneously.
- If Single Zone Control operation is selected the individual zones cannot be turned off. The unit and all zones are turned On and Off simultaneously using the On and Off hard keys at the left side of the display.

TemperatureWatch Display

If there is no key activity and no check, prevent, or Shutdown Alarms are present the TemperatureWatch Display appears 2½ minutes after the last key entry from the Standard Display. The TemperatureWatch screen (Figure 28) will remain on until any key is pressed or a check, prevent, or Shutdown Alarm occurs. The TemperatureWatch Display shows the return air temperature and setpoint for each zone. Tenths of a degree are not shown by the TemperatureWatch display. The large
Operating Instructions

numbers allow unit conditions to be checked from a distance. Pressing any soft key returns the display to the Standard Display.

**Figure 28: Two Zone TemperatureWatch® Display**

If an alarm condition (other than a Log Alarm) is present the TemperatureWatch Display will not appear. If an alarm condition occurs while the TemperatureWatch Display is present the display will return to the Standard Display. If the Defrost or Cycle Sentry keys are pressed the display will return to the TemperatureWatch Display after defrost is initiated or the operating mode is changed.

In the Three Zone TemperatureWatch display the Menu soft key label covers the Zone 3 label as shown in Figure 29.

**Figure 29: Three Zone TemperatureWatch® Display**

If the unit is operating in Cycle Sentry mode the Cycle Sentry icon will appear near Zone 2 as shown above. If the unit is operating in Continuous Mode the Cycle Sentry icon will not be present.

**Changing the Setpoint**

If the TemperatureWatch display is shown, press any soft key to return to the Standard Display. From the Standard Display, press the ZONE soft key for the desired zone. ZONE 1 is shown below.
The setpoint display appears as shown in Figure 31.

The "-" and "+" soft keys are used to increase or decrease the setpoint until the desired setpoint is shown. Here the setpoint has been changed to 0°F using the "+" soft key.

The YES and NO soft keys confirm the setpoint change (Figure 33). When the desired setpoint has been selected using the "+" and/or "-" soft keys, press the YES soft key to confirm and load the new setpoint. If the setpoint is changed using the "+" or "-" soft keys, the change must be confirmed or rejected by pressing the YES or NO soft key within 10 seconds of changing the setpoint. A warning beep will sound after 5 seconds as a reminder. Failure to confirm the new setpoint by pressing Yes or No within 10 seconds of changing the setpoint.
will result in no setpoint change. If the setpoint is not confirmed, then Alarm Code 127 Setpoint Not Entered is set, to indicate that the setpoint change was not completed.

Figure 33: YES and NO Keys

After the YES soft key has been pressed, the display will briefly show PROGRAMMING NEW SETPOINT - PLEASE WAIT. The display then confirms the new setpoint for two seconds (Figure 34).

Figure 34: New Setpoint Confirmation

If the NO soft key is pressed the display will briefly show SETPOINT NOT CHANGED and return to the Standard Display. The Standard Display will show the old setpoint.

The display then returns to the Standard Display showing the new setpoint. Notice in Figure 35 that the Zone 1 arrow now points up, to indicate that Zone 1 is heating.
Figure 35: Standard Display, New Setpoint

**IMPORTANT:** If the setpoint is changed using the "+" or "-" soft keys, the change must be confirmed or rejected by pressing the YES or NO soft key within 10 seconds of changing the setpoint.

- If the YES soft key is pressed, the setpoint change made with the "+" or "-" soft key is accepted, the setpoint changes, and the display returns to the Standard Display.
- If the NO soft key is pressed, the setpoint change made with the "+" or "-" soft key is not accepted, the setpoint is not changed, and the display returns to the Setpoint Display.
- If the YES or NO soft key is not pressed within 10 seconds of making a change with the "+" or "-" soft key, the setpoint is not changed and the display returns to the Setpoint Display. The display briefly shows [SETPOINT NOT CHANGED] and Alarm Code 127 Setpoint Not Entered is set, to indicate that the setpoint change was started but not completed.

**Turning a Zone ON and Off**

Zone 1 will always be turned on any time the unit is turned on. Zone 2 and Zone 3 (if present) can be turned on and off as desired.

The state of each zone is retained when the unit is turned off and on. For example, on a three zone unit if Zone 2 is turned off and Zone 3 is turned on and the unit is turned off, the zone states remain as they were. When the unit is turned back on Zone 2 will still be off and Zone 3 will still be on.

**NOTE:** Units equipped with a remote control may operate in a slightly different manner. See Optional Flush Mount Remote Control Panel for additional details.
Operating Instructions

To turn Zone 2 or Zone 3 on or off, press the soft key under the desired zone. Zone 2 is selected in Figure 36.

The Zone 2 setpoint display appears as shown in Figure 37. If the zone is turned on, the third soft key will be labeled TURN ZONE OFF. If the zone is turned off, the third soft key will be labeled TURN ZONE ON. In this case TURN ZONE OFF is shown.

Press the TURN ZONE OFF soft key to turn the zone off. (Figure 38)
The display briefly shows PROGRAMMING ZONE ON/OFF - PLEASE WAIT (Figure 39). The display then confirms the new Zone 2 setting for several seconds.

![Figure 39: New Zone 2 Setting](image)

The display then returns to the Standard Display showing Zone 2 is off. The setpoint for Zone 2 has been replaced with OFF as shown in Figure 40 to indicate that the zone is now off.

![Figure 40: Zone Off](image)

---

**Starting the Diesel Engine**

Diesel engine preheating and starting is automatic in both Continuous Mode and Cycle Sentry Mode. The engine will preheat and start as required when the unit is turned on. If any keys are being pressed on the HMI control panel prior to the engine start, the engine preheat and start will be delayed until 10 seconds after the last key is pressed.

**NOTE:** If the unit is equipped with optional SmartPower there may be some additional prompts before the engine will start. See STARTING THE ELECTRIC MOTOR on the following pages for details.

**WARNING:** The engine mat start automatically any time the unit is turned on.

**WARNING:** Never use starting fluid.

When the engine is preparing to start the HMI control panel will display the engine start screen, as shown in Figure 41. The preheat buzzer sounds during the engine preheat and crank sequence.
Starting the Electric Motor

Units equipped with the SmartPower option only.

When standby power is connected, electric motor starting is automatic in both Continuous Mode and Cycle Sentry Mode. The motor will start as required when the unit is turned on. If any keys are being pressed on the HMI control panel prior to the motor start, the motor start will be delayed until 10 seconds after the last key is pressed. **CAUTION: The motor may start automatically any time the unit is turned on.**

Switching from Diesel to Electric

Units equipped with the SmartPower option only.

If the Electric to Diesel Autoswitch Enabled feature in Guarded Access is set YES then the unit will automatically switch to Electric Mode operation when standby power is connected and available.

When the motor is preparing to start the HMI control panel will display the motor start screen, as shown in Figure 42. The preheat buzzer sounds for 20 seconds before the electric motor starts.
If the Electric to Diesel Autoswitch Enabled feature in Guarded Access is set NO then the prompt screen shown in Figure 43 will appear when standby power is connected and available.

![Figure 43: Electric to Diesel Autoswitch Enabled feature in Guarded Access Set to NO](image)

Electric Mode operation will briefly be confirmed. If unit operation is required the electric motor will start as shown in Figure 44 STARTING THE ELECTRIC MOTOR.

![Figure 44: Electric Motor Start](image)

### Switching from Electric to Diesel

*Units equipped with the SmartPower option only.*

If the Diesel to Electric Autoswitch Enabled feature in Guarded Access is set YES then the unit will automatically switch to Diesel Mode operation when standby power is turned off or is no longer available.

If the Electric to Diesel Autoswitch Enabled feature in Guarded Access is set NO then the prompt screen shown in Figure 45 will appear when standby power is turned off or is no longer available. Alarm Code 91 Check Electric Ready Input and Alarm Code 84 Restart Null will both be set.
Operating Instructions

Figure 45: Electric to Diesel Autoswitch Enabled feature in Guarded Access Set to YES

Turn the unit off and back on using the OFF and ON Keys. This will clear Alarm Code 91 Check Electric Ready Input and Alarm Code 84 Restart Null.

NOTE: The CLEAR Soft Key will not clear these two alarms. Then the prompt screen in Figure 46 in will appear.

Figure 46: Prompt Screen

If YES is selected then the display will briefly show the screen in Figure 47. Then Diesel Mode will briefly be confirmed. If unit operation is required the diesel engine will start as shown previously in STARTING THE DIESEL ENGINE.

Figure 47: YES Selected
Initiating a Manual Defrost Cycle

Defrost cycles are usually initiated automatically based on time or demand. Manual defrost is also available.

Manual defrost is only available if the zone is running and the zone evaporator coil temperature is less than or equal to 45°F (7°C). Other features such as door switch settings may not allow manual defrost under some conditions.

**NOTE:** If the Rail Alternate feature is set ENABLED then a manual defrost cycle is available with temperatures less than or equal to 55°F (13°C).

To initiate a manual defrost cycle, press the Defrost Key as shown in Figure 48.

The display will briefly show [DEFROST]. Then the Zone Select display appears. Zone 1 selected shown in Figure 49.

The display briefly shows [DEFROST], [PROGRAMMING DEFROST - PLEASE WAIT] and then [DEFROST STARTED] (Figure 50).
The display then shows the Defrost display. The bar indicator shows approximately the percentage of time remaining to complete the defrost cycle. The bar indicator in Figure 51 shows that the Zone 1 defrost cycle is approximately 25% complete.

![Figure 51: Bar Indicator](image)

See summary of “Initiating a Manual Defrost Cycle” displays in Figure 52.

**Terminating a Defrost Cycle**

The defrost cycle terminates automatically when the coil temperature is greater than or equal to 58°F (14.5°C) or the defrost timer expires. Defrost can also be terminated by turning the unit off and back on.

**NOTE:** If the Rail Alternate feature is set ENABLED then a defrost cycle will terminate with temperatures greater than or equal to 70°F (21°C).
Figure 52: Initiating a Manual Defrost Cycle
Selecting Cycle Sentry or Continuous Mode

When Cycle Sentry mode is selected the unit will start and stop automatically to maintain setpoint, keep the engine warm and the battery charged. When Continuous Mode is selected, the unit starts automatically and runs continuously to maintain setpoint and provide constant airflow. Cycle Sentry or Continuous may not be available from the Mode menu if OptiSet Plus is in use. The Cycle Sentry/Continuous selection affects all zones.

If the unit is operating in Cycle Sentry Mode, the Cycle Sentry Icon will appear in the display.

- The Cycle Sentry Icon appears in the upper right corner of the Standard Display (Figure 56).
- The Cycle Sentry Icon appears in the lower right of the TemperatureWatch Display (Figure 57).
- If the Cycle Sentry Icon is not shown, the unit is operating in Continuous Mode.

NOTE: Cycle Sentry or Continuous Mode operation can also be selected from the Main Menu > Mode Menu.

If allowed by OptiSet Plus, Cycle Sentry or Continuous Mode is selected by pressing the Cycle Sentry/Continuous Key (Figure 53). The unit is currently operating in Continuous Mode as shown by the absence of the Cycle Sentry Icon.

Figure 53: Cycle Sentry/Continuous Key

If the unit is operating in Continuous Mode, pressing the Cycle Sentry/Continuous Key changes the mode from Continuous Mode to Cycle Sentry Mode. The display confirms the change, as shown in Figure 54.
The new mode is confirmed for 2 seconds (Figure 55).

The display then returns to the Standard Display. In the example here the unit is running in Cycle Sentry Mode as shown by the presence of the Cycle Sentry Icon at the upper right corner of the display (Figure 56).
Operating Instructions

When the TemperatureWatch Display is shown, the Cycle Sentry Icon appears in the lower right corner (Figure 57).

![Figure 57: Cycle Sentry Icon, Lower Right Corner](image)

Pressing the Cycle Sentry/Continuous key again allows the operator to change back to Continuous Mode operation.

**IMPORTANT:** If the unit is in Cycle Sentry null and the mode is switched to Continuous Mode, the unit will start automatically.

See summary of “Selecting Cycle Sentry or Continuous Mode” displays in Figure 58.
Figure 58: Selecting Cycle Sentry or Continuous Mode

Cycle Sentry/Continuous Key
Using the Main Menu

The Main Menu contains submenus that allow the operator to view information and modify unit operation. To access the Main Menu press the MENU soft key (Figure 59).

The first Main Menu choice will appear. Press and hold the UP and DOWN Keys to scroll thru the menu choices (Figure 60). When the desired selection is shown on the display, press the SELECT Key to access it. The Pretrip submenu is shown here.

The Main Menu choices are shown below.

<table>
<thead>
<tr>
<th>Pretrip</th>
<th>Gauges</th>
<th>Hourmeters</th>
<th>Adjust</th>
<th>Brightness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language</td>
<td>Sensors</td>
<td>Mode</td>
<td>Time</td>
<td></td>
</tr>
<tr>
<td>Alarms</td>
<td>Data</td>
<td>Electric</td>
<td>Clear ECU</td>
<td></td>
</tr>
<tr>
<td>Logger</td>
<td>Standby</td>
<td></td>
<td>Faults</td>
<td></td>
</tr>
</tbody>
</table>

To return to the Standard Display press the EXIT Key.
Main Menu Features

Pretrip
A Pretrip Test verifies unit operation. This display allows a Pretrip Test to be selected and initiated by the operator. If the Pretrip Test is entered with the unit shut down a Full Pretrip Test with device amp checks will be performed. If the Pretrip Test is entered with the unit running in either diesel or electric mode a Running Pretrip Test is performed. Test results are reported as PASS, CHECK or FAIL when the Pretrip Test is completed.

Pretrip Test Conditions
- Current unit settings are saved and restored at the end of the Pretrip Test or if the unit is turned off and back on.
- Pretrip Test can be run in either Diesel or Electric Mode.
- The unit will auto switch from Diesel Mode to Electric Mode or from Electric Mode to Diesel Mode during a Pretrip Test if these features are enabled and the auto switch conditions occur.

Conditions where Pretrip Tests are not Allowed
- If any shutdown alarms are present. Pretrip tests are allowed with some Check and Log alarms.
- If the unit is in Sleep Mode.
- If the unit is in Service Test Mode, Interface Board Test Mode or Evacuation Mode.

Pretrip Test Considerations
When performing a Pretrip Test, the following issues should be considered.
- If running a Pretrip Test on a trailer loaded with dry cargo, insure that proper airflow can occur around the load. If the load restricts airflow, false test results may occur. Also, SR-4 units have high refrigeration capacity which results in rapid temperature changes. Sensitive dry cargo may be damaged as a result.
- If running a Pretrip Test on a trailer that has just been washed down, the extremely high humidity inside the trailer may result in false test results.
Operating Instructions

- If running a Pretrip Test on a trailer loaded with sensitive cargo, monitor the load temperature during the test as normal temperature control is suspended during pre-trip operation.
- Always perform Pretrip Tests with the trailer cargo doors closed to prevent false test failures.

Pretrip Test Sequence

Pretrip tests proceed in the order shown below. A Full Pretrip Test is started with the engine or motor not running and includes all tests. A Running Pretrip Test is started with the engine or motor running and does not include the Amp Checks or Engine Start Check.

- Amp Checks - Each electrical control component is energized and the current drawn is confirmed as within specification.
- Engine Start - The Engine will start automatically.
- Defrost - If the coil temperature is below 45°F (7°C), a defrost cycle is initiated.
- RPM Check - The engine RPM in high and low speed is checked during the Cool Check.
- Zone 1 Cool Check - The ability of the unit to cool in low speed is checked.
- Zone 1 Heat Check - The ability of the unit to heat in low speed is checked.
- Zone 1 Return to Cool Check - The ability of the unit to return to cool mode is checked
- Zone 2 Cool Check - The ability of the unit to cool in low speed is checked.
- Zone 2 Heat Check - The ability of the unit to heat in low speed is checked.
- Zone 2 Return to Cool Check - The ability of the unit to return to cool mode is checked
- Zone 3 Cool Check - The ability of the unit to cool in low speed is checked.
- Zone 3 Heat Check - The ability of the unit to heat in low speed is checked.
- Zone 3 Return to Cool Check - The ability of the unit to return to cool mode is checked
• Report Test Results - When the Pretrip Test is completed the test results are reported as PASS, CHECK or FAIL. If test results are CHECK or FAIL alarm codes will exist to direct the technician to the source of the problem.

Performing a Pretrip Test

If a Pretrip Test is initiated with the engine shut down a Full Pretrip Test will be performed. If a Pretrip Test is initiated with the engine or motor running a Running Pretrip Test is performed.

• Before initiating a Pretrip Test, clear all alarm codes.
• To stop a Pretrip Test at any time turn the unit off.

Pretrip Tests are initiated using the Pretrip Menu (or the Pretrip Key if present). From the Standard Display, press the MENU Key (Figure 61).

NOTE: If the Pretrip Key is used to start a Pretrip Test, the Main Menu is not shown when the key is pressed. The display will show [Programming Pretrip Mode] as shown in Figure 63.

The Main Menu will appear. Press the UP or DOWN Key as required to choose the Pretrip Menu. When the Pretrip Menu is shown press the SELECT Key to start a Pretrip Test (Figure 62).
The display will briefly show PROGRAMMING PRETRIP MODE (Figure 63). If the unit is not running a Full Pretrip Test will be initiated. If the unit is running in either diesel or electric mode a Running Pretrip Test will be performed.

If all alarms were not cleared a prompt appears as shown in Figure 64. Exit the Pretrip Test, clear all alarms and repeat the Pretrip Test.
Operating Instructions

- The top line of the display indicates the unit is performing the non-running portion of the Pretrip Test.
- The second line measures test progress. The number of tests completed of the total number of tests to be performed is shown. In the example above the unit is performing Test 1 of 26, Sensor Check.
- The soft keys may be used during the Pretrip Test to select the Hourmeter, Gauge or Sensor menus.
- To stop a Pretrip Test at any time turn the unit off. This will generate Alarm Code 28 Pretrip Abort. Other alarm codes may also be generated. This is normal when the Pretrip Test is halted before completion.

When the non-running tests are complete the unit will start automatically and continue with the Running Pretrip Test. In the example shown in Figure 66 the unit is in the Running Pretrip and is performing Test 21 of 26, Cool Test.

If all alarms were cleared, the Pretrip Test display appears (Figure 65).

Figure 64: Alarm Active

Figure 65: Pretrip Test
When all tests are complete, the results are reported as PASS, CHECK or FAIL (Figure 67). If the results are CHECK or FAIL, the accompanying alarm codes will direct the technician to the cause of the problem.

If the Pretrip Test results are CHECK or FAIL the problem should be diagnosed and corrected before the unit is released for service.

To return to the Main Menu press the EXIT Key. To return to the Standard display press the EXIT Key again.

See summary of “Performing a Pretrip Test” displays in Figure 68 and Figure 69.
Figure 68: Performing a Pretrip Test (1)

Alarms Cleared?

No  Yes

See Figure 69

Exit Pretrip Test, clear alarms, restart Pretrip Test.
Figure 69: Performing a Pretrip Test (2)
Languages (If Enabled)
If more than one language is enabled from the Guarded Access > Language Menu, this menu item will appear. If only one language is enabled, this menu will not appear. The Language Menu allows the operator to select a language from a list of enabled languages. All subsequent displays are shown in the selected language. English is the default language.

If Languages are not enabled from the Guarded Access Menu, this feature will not appear in the Main Menu.

**IMPORTANT:** Exercise care when changing languages, as once changed all HMI Control Panel displays will be in the new language.

Available Languages
The following languages are available:
- English (Enabled), Spanish (Disabled), French (Disabled)

Selecting an Alternate Language
To select an alternate language, press the MENU Key (Figure 70).

---

Figure 70: Select Languages - MENU Key
The Main Menu will appear. If more than one language is enabled, the Language Menu will appear as a main Menu selection. Press the UP or DOWN Key as required to choose the Language Menu. When the Language Menu is shown press the SELECT Key to select the Language menu (Figure 71).
The Language menu will appear as shown in Figure 72. Press the + or - Keys to select the desired language. Only languages enabled from the Guarded Access Menu are available. When the desired language is shown press the YES Key to confirm the choice.

The display will briefly show PROGRAMMING LANGUAGE - PLEASE WAIT in the new language. The display will then return to the Main Menu, but will show the new language. Spanish is shown in Figure 73.
Repeat the process to select a different language. To select a different Main Menu item press the NEXT (SIGUIENTE) Key. To return to the Standard Display press the EXIT (SALIDA) Key. All displays will now be in the new language. Español (Spanish) is shown in Figure 74.

See summary of “Performing a Pretrip Tes displays in Figure 75.
Language Menu Quick Access

Should it be necessary at any time to change to English or any other installed language, return to the Standard Display and then press and hold the first and last soft keys for 5 seconds as shown in Figure 76. The Standard Display here is shown in Español (Spanish).
After 5 seconds the Language Menu will appear in the current language as shown in Figure 77. Press the + or - Keys to select the desired language. When the desired language is shown press the SI (YES) Key to confirm the choice.

Note that all languages available in the installed software can be selected using this method.
Alarms

The Alarm Menu allows the operator to view any active alarms, and allows most alarms to be cleared.

Log Alarms

Log Alarms are indicated for 30 seconds each time the unit is turned on. This level of alarm serves as a notice to take corrective action before a problem becomes severe. Maintenance items such as maintenance hourmeter time-outs are Log Alarms. The TemperatureWatch screen is not disabled if only Log Alarm(s) are active.

When the unit is turned on the display will show the Thermo King Logo and then the "Configuring System" message. If Log Alarm(s) are present the Log Alarm notice will appear on the display for 30 seconds as shown in Figure 78. The remote indicator alarm light (if installed) will also be on during this period. The Standard Display will appear and the remote indicator alarm light will go off after 30 seconds.

Check Alarms

Check Alarms are indicated by a steady alarm icon at the side of the display. If the alarm is specific to a zone then a smaller alarm icon will appear next to the affected zone. This level of alarm serves as a notice to take corrective action before a problem becomes severe. The unit will run with Check Alarms but some features and functions may be inhibited. The TemperatureWatch screen is disabled if a Check Alarm is active.

NOTE: The Alarm Icon does not appear on startup with Log Alarms present.
Unit Level Check Alarms

If the alarm is unit specific, the Alarm Icon will appear at the right side of the display as shown in Figure 79. Both Zone Specific and Unit Specific Alarms can exist at the same time.

Zone Level Check Alarms

If the alarm is zone specific, the Alarm Icon will appear in the offending zone as shown in Figure 80. An alarm exists in Zone 2.

Unit Level Prevent Alarms

Prevent Alarms are also indicated by a steady alarm icon at the side of the display. The unit will be temporarily shut down if a Prevent Alarm is active. The unit will remain shut down for a timed restart interval or until the fault conditions are corrected and then restart. If the unit is in a temporary shutdown, Alarm Code 84 Restart Null will be present along with the associated Prevent Alarm. In most cases the unit will restart with reduced performance to determine if continued operation is possible. If the alarm does not reoccur with reduced performance then the unit will then return to full performance. If the unit is operating with reduced performance Alarm Code 85 Forced Unit Operation may also be present under some conditions. In general, if the alarm condition re-occurs a defined number of times then the alarm is set as a Shutdown Alarm and no further restarts are possible. The TemperatureWatch screen is disabled if a Unit Level Prevent Alarm is active.

NOTE: If the Restart After Shutdown feature in the Guarded Access Menu is set for CONTINUOUS, then an unlimited number of restart attempts are allowed.
Zone Level Prevent Alarms

A Zone Level Prevent Alarm will force the affected zone into a temporary shutdown, but allow the unit to continue to run as required by the host unit or other zones. A small alarm icon will appear next to the affected zone. If zone Prevent Alarms occur in all zones then the unit will be forced into a unit level prevent shut down. The TemperatureWatch screen is disabled if a Zone Level Prevent Alarm is active.

Shutdown Alarms

If a Shutdown Alarm occurs while the unit is running it will be indicated by all of the following (Figure 81):

- The Alarm Icon will appear.
- The display, backlight and optional remote alarm light will flash on and off.
- The display will switch from normal video to reverse video and back to normal video. (Light areas become dark and dark areas become light.)

Unit Level Shutdown Alarms

Unit Level Shutdown Alarms will force the unit into shut down. The unit will remain in shutdown until the Shutdown Alarm is manually cleared. Exceptions are some engine and electric Shutdown Alarms that become Log Alarms when switched to the alternate operating mode (diesel to electric or electric to diesel). The TemperatureWatch screen is disabled if a Unit Level Shutdown Alarm is active.
Zone Level Shutdown Alarms

A zone Shutdown Alarm will force the affected zone to shutdown, but allow the unit to continue to run as required by the host unit or other zones. A small alarm icon will appear next to the affected zone and blink with a period of ½ second on - ½ second off. If zone Shutdown Alarms occur in all zones then the unit will shut down and Alarm Code 114 Multiple Alarms - Can Not Run will be set.

Pretrip Alarms

If an alarm occurs during a Pretrip Test the alarm code will be displayed as Pretrip Alarm XX, where XX is the alarm code.

Alarm Codes When Switching Between Diesel and Electric

If a shutdown alarm occurs that affects only diesel mode operation and the unit is switched to electric, the diesel mode shutdown alarm becomes an electric mode log alarm. This allows the unit to run in electric mode without clearing the shutdown alarm that is preventing diesel mode operation. If the unit is switched back to diesel mode, the alarm again become a diesel mode shutdown alarm and prevents unit operation.

In the same manner, if a shutdown alarm occurs that affects only electric mode operation and the unit is switched to diesel, the electric mode shutdown alarm becomes a diesel mode log alarm to allow diesel mode operation. If the unit is switched back to electric mode, the alarm reverts to an electric mode shutdown alarm and prevents unit operation. If the unit is configured for electric to diesel autoswitch, it automatically starts and runs in diesel mode if an electric shutdown occurs.

Clearing Alarm Codes

Most alarm codes can be cleared conventionally from the Alarm Menu using the CLEAR Key.

The following control and display sensor alarm codes can only be cleared from the Maintenance Menu or Guarded Access Menu:

- Alarm Code 03 Check Control Return Air Sensor
- Alarm Code 04 Check Control Discharge Air Sensor
- Alarm Code 203 Check Display Return Air Sensor
- Alarm Code 204 Check Display Discharge Air Sensor
Operating Instructions

The following alarm codes clear automatically:

- Alarm Code 64 Pretrip Reminder - Clears when a Pretrip Test is performed.
- Alarm Code 84 Restart Null - Clears when the unit is no longer in a restart null due to a Prevent Alarm.
- Alarm Code 85 Forced Unit Operation - Clears when the unit is no longer running in a forced mode due to a Prevent Alarm.
- Alarm Code 91 Check Electric Ready Input - Clears automatically when the unit starts running.
- Alarm Code 92 Sensor Grades Not Set - Clears when the sensor grade is changed from 5H.

If the Limited Alarm Restarts feature is enabled the following additional alarm codes may only be cleared from the Guarded Access Menu. If this is the case, the CLEAR soft key will not appear if the alarms are displayed from the Main Menu or the Maintenance Menu.

- Alarm Code 10 High Discharge Pressure
- Alarm Code 23 Cooling Cycle Fault
- Alarm Code 24 Heating Cycle Fault
- Alarm Code 32 Refrigeration Capacity Low
Displaying and Clearing Alarm Codes

Alarms are displayed and cleared using the Alarm Menu. From the Standard Display, press the MENU Key (Figure 82).

**Figure 82: MENU Key**

The Main Menu will appear. Press the UP or DOWN Key (Figure 83) as required to choose the Alarms Menu. When the Alarms Menu is shown press the SELECT Key to select the Alarms menu.

**Figure 83: SELECT Key**

The number of alarms (if more than one) and a list of the alarms with the most recent alarm first will be shown. In the example in Figure 84, there are two alarms. The most recent is Alarm Code 5 Check Ambient Temp Sensor.

**Figure 84: Two Active Alarms**
Operating Instructions

If necessary to view all alarms, scroll down using the DOWN Key (Figure 85).

![Figure 85: DOWN Key]

If the alarm situation has been resolved press the CLEAR Key to clear the alarm (Figure 86).

![Figure 86: CLEAR Key]

The display will briefly show CLEARING ALARM 5 - PLEASE WAIT. Then the Alarm Menu will reappear (Figure 87).

Note that Alarm Code 64 Pretrip Reminder cannot be cleared using the CLEAR Key. This alarm will clear automatically when a Pretrip Test is run.

![Figure 87: Alarm Menu]

If a serious condition occurs, the unit will be shut down to prevent damage to the unit or the load. If this occurs, the Alarm Icon will appear (Figure 88), the display and backlight will flash on and off.
The Alarm Menu display will display the Shutdown Alarm Code. For additional information regarding the alarm shown on the display, press the HELP Key (Figure 89).

A help message will appear. Press the EXIT Key (Figure 90) to return to the Alarms Menu. Check the oil level and add oil as required, clear the alarm and restart the engine.

To return to the Main Menu press the EXIT Key. To return to the Standard display press the EXIT Key again.

**Important Alarm Notes**

- If an alarm will not clear, it may still exist. If the alarm is not corrected, it will not clear or may be immediately set again.
- If an alarm cannot be cleared from the Main menu, the Clear Key will not appear. These alarms must be cleared from the Maintenance or Guarded Access Menus.
Figure 91: Displaying and Clearing Alarm Codes (1)
Figure 92: Displaying and Clearing Alarm Codes (2)
SR-4 Precedent Alarm Codes
For a complete list of SR-4 Precedent Alarm Codes see the table at the end of this chapter.

Gauges
The Gauges Menu allows the operator to view the unit gauges and I/O conditions. The unit gauges can be viewed from the Main Menu and Maintenance Menu.

Displaying Gauges
Gauges are displayed using the Gauges Menu. From the Standard Display, press the MENU Key (Figure 93).

The Main Menu will appear. Press the UP or DOWN Key as required to choose the Gauges Menu. When the Gauges Menu is selected, press the SELECT Key to choose the Gauges menu (Figure 94).

The first gauge display will appear. Press the NEXT and BACK Keys to scroll thru the gauges and I/O conditions. Pressing the LOCK Key will lock the current gauge on the display (Figure 95).
Operating Instructions

The gauges and I/O conditions available are shown below. Not all gauges or I/O conditions may appear depending on unit configuration and software revision.

To return to the Main Menu press the EXIT Key. To return to the Standard display press the EXIT Key again.

**Gauges Available**

*NOTE: Not all gauges may appear, dependent upon software revision, unit type and configuration.*

**Coolant Temperature** - Displays the temperature of the engine coolant.

**Coolant Level** - Displays the coolant level in the overflow tank as OK or LOW.

**Engine Oil Pressure** - Displays the engine oil pressure as OK or LOW.

**Engine Oil Level** - Displays the engine oil level as OK or LOW.

**Amps** - Displays the current flow in amps to or from the unit battery.

**Battery Voltage** - Displays the voltage of the unit battery.

**Engine RPM** - Displays the engine speed in RPMs.

**Fuel Level Sensor** - Display the fuel level if configured.

**Discharge Pressure** - Displays the unit discharge pressure.

**Suction Pressure** - Displays the unit suction pressure.

**ETV Position** - Displays ETV Position if configured.

**I/O (Input/Output State)** - Displays the current control state of the I/O devices listed below as ON or OFF.

*NOTE: Not all gauges may appear, dependent upon software revision, unit type and configuration.*
I/O (Input/Output) State Submenu - Displays the current control state of the I/O device listed below as ON or OFF:

- High Speed Relay
- Run Relay
- Run Relay Feedback
- Alternator Excite Output
- Fresh Air Exchange Output
- Fresh Air Exchange Feedback
- Spare Digital Input 1, 2, 3, 4
- Spare Analog Input 1, 2
- Spare Output 1, 2, 3, 4, 5
- Condenser Inlet Solenoid
- Receiver Tank Inlet Pressure Solenoid
- Purge Valve
- Liquid Line Solenoid Zone 1
- Hot Gas Solenoid Zone 1
- Suction Line Solenoid Zone 1
- Liquid Line Solenoid Zone 2
- Hot Gas Solenoid Zone 2
- Suction Line Solenoid Zone 2
- Drain Hose Heater Zone 2
- Liquid Line Solenoid Zone 3
- Hot Gas Solenoid Zone 3
- Suction Line Solenoid Zone 3
- Drain Hose Heater Zone 3
- Fan Output Zone 2
- Fan Output Zone 3
- Diesel/Electric Relay
- Electric Ready Input
- Electric Overload

Sensors

The Sensors Menu allows the operator to view the unit and CargoWatch Data Logger temperature sensors. The sensors can be viewed from the Main Menu or Maintenance Menu.
Displaying Sensors

Sensors are displayed using the Sensors Menu. From the Standard Display, press the MENU Key (Figure 96).

The Main Menu will appear. Press the UP or DOWN Key as required to choose the Sensors Menu. When the Sensors Menu is selected, press the SELECT Key to choose the Sensors menu (Figure 97).

The first sensors display will appear. Press the NEXT and BACK Keys to scroll thru the gauges and I/O conditions. Pressing the LOCK Key will lock the current gauge on the display (Figure 98).
The sensors available are shown below.

To return to the Main Menu press the EXIT Key. To return to the Standard display press the EXIT Key again.

**Sensors Available**

**Zone 1 Return Air Temperature** - Displays the temperature of the Zone 1 Return Air Sensor.

**Zone 1 Discharge Air Temperature** - Displays the temperature of the Zone 1 Discharge Air Sensor.

**Zone 1 Temperature Differential** - Displays the Zone 1 Temperature Differential.

**Zone 1 Evaporator Coil Temperature** - Displays the temperature of the Zone 1 Evaporator Coil sensor.

**Zone 2 Return Air Temperature** - Displays the temperature of the Zone 2 Return Air Sensor.

**Zone 2 Discharge Air Temperature** - Displays the temperature of the Zone 2 Discharge Air Sensor.

**Zone 2 Temperature Differential** - Displays the Zone 2 Temperature Differential.

**Zone 2 Evaporator Coil Temperature** - Displays the temperature of the Zone 2 Evaporator Coil sensor.

**Zone 3 Return Air Temperature** - Displays the temperature of the Zone 3 Return Air Sensor.

**Zone 3 Discharge Air Temperature** - Displays the temperature of the Zone 3 Discharge Air Sensor.

**Zone 3 Temperature Differential** - Displays the Zone 3 Temperature Differential.

**Zone 3 Evaporator Coil Temperature** - Displays the temperature of the Zone 3 Evaporator Coil sensor.

**Ambient Air Temperature** - Displays the temperature of the ambient air temperature sensor.
Spare 1 Temperature - Displays the temperature of the Spare 1 temperature sensor.

Spare 2 Temperature - Displays the temperature of the Spare 2 temperature sensor.

Spare 3 Temperature - Displays the temperature of the Spare 3 temperature sensor.

Data Logger Sensor 1 Temperature - Displays the temperature of the CargoWatch Data Logger 1 temp sensor.

Data Logger Sensor 2 Temperature - Displays the temperature of the CargoWatch Data Logger 2 temp sensor.

Data Logger Sensor 3 Temperature - Displays the temperature of the CargoWatch Data Logger 3 temp sensor.

Data Logger Sensor 4 Temperature - Displays the temperature of the CargoWatch Data Logger 4 temp sensor.

Data Logger Sensor 5 Temperature - Displays the temperature of the CargoWatch Data Logger 5 temp sensor.

Data Logger Sensor 6 Temperature - Displays the temperature of the CargoWatch Data Logger 6 temp sensor.

Board Temperature Sensor - Displays the temperature of the HMI control panel PC board.

Data Logger (CargoWatch)

The CargoWatch Data Logger is physically located in the HMI Control Panel. It can support up to 6 optional temperature sensors.

When shipped from the factory, CargoWatch sensors 1 and 2 are turned on to be logged and CargoWatch sensors 3 through 6 are turned off. Also, digital input 1 is turned on to be logged and digital inputs 2 through 4 are turned off. Sensors and digital inputs can be turned on, off and configured using the CargoWatch menu in Guarded Access or with Wintrac. The CargoWatch Data Logger can also be configured using the USB Flash Drive OptiSet Plus Feature.

A Start of Trip can be sent to the unit ServiceWatch and CargoWatch Data Loggers. In addition, the CargoWatch Data Logger contents can be printed with a hand-held printer.

The ServiceWatch and CargoWatch Data Logger are accessed using the Data Logger Menu. From the Standard Display, press the MENU Key (Figure 99).
Operating Instructions

The Main Menu will appear. Press the UP or DOWN Key as required to choose the Data Logger Menu. When the Data Logger Menu is selected, press the SELECT Key to choose the Data Logger menu (Figure 100).

The Data Logger Menu will appear.

**Sending Start of Trip Marker to CargoWatch and ServiceWatch Data Loggers**

To send a Start of Trip marker to the CargoWatch and ServiceWatch Data Loggers press the SELECT Key. The display will briefly show START OF TRIP COMPLETE to confirm that a Start of Trip marker was set in the CargoWatch Data Logger (Figure 101).
NOTE: The start of trip marker is sent to both the CargoWatch and ServiceWatch data loggers.

Printing CargoWatch Data Logger Reports

Connect an appropriate printer to the printer port. Press the DOWN Key to select the PRINT / VIEW feature and press the SELECT Key to choose Print/View.

The Print Data Menu will appear (Figure 103). The first Print Data Menu allows the operator to print a Delivery Ticket using a hand held printer. Pressing the SELECT Key will print the ticket. The Delivery Ticket is a short ticket that shows delivery specific details including the current temperature.
Operating Instructions

Figure 103: Delivery Ticket

Pressing the DOWN Key allows the operator to print a Trip Ticket using a hand held printer. Press the SELECT Key to print the ticket. The Trip Ticket is a long ticket that shows details for the current trip including a temperature history. The Trip Ticket is also called a Journey Ticket.

Figure 104: Trip Ticket, SELECT

To return to the Main Menu press the EXIT Key. To return to the Standard display press the EXIT Key again.
Hourmeters

The Hourmeters Menu allows the operator to view the unit hourmeters that have the view feature enabled in the Guarded Access menu. If the view feature for a particular hourmeter is not enabled then that hourmeter will continue to accumulate time but cannot be viewed from the Main Menu. However, all hourmeters can be viewed from the Maintenance Menu, even if they are not enabled. The hourmeters shown below are implemented.

Viewing Hourmeters

Only Hourmeters that have been enabled in Guarded Access are shown from the Main Menu. The Hourmeters can be viewed only.

Hourmeters are displayed using the Hourmeter Display. From the Standard Display, press the MENU Key (Figure 105).

The Main Menu will appear. Press the UP or DOWN Key as required to choose the Hourmeter Menu. When the Hourmeter Menu is selected, press the SELECT Key to choose the Hourmeter Menu (Figure 106).
Operating Instructions

Press the NEXT or PREVIOUS Key to scroll through the hourmeters.

Figure 106: Hourmeter Menu

Hourmeter names and definitions are shown in the following table in the order they appear. Only hourmeters enabled in the Guarded Access Menu will be shown. To return to the Standard Display, press the EXIT Key.

When shipped from the factory, only these hourmeters are enabled for viewing from the Main Menu.

- Total Unit Run Hours
- Total Engine Run Hours
- Total Electric Run Hours

To return to the Main Menu press the EXIT Key. To return to the Standard display press the EXIT Key again.

Hourmeter Names and Definitions

Only configured hourmeters that have been enabled in the Guarded Access > Hourmeter Setup > Viewable Hourmeter Setup Menu will be shown.
### Hourmeter Name | Definition
--- | ---
Total Hours | Total number of hours the unit has been turned on (protection hours).
Total Run Time Hours | Total number of hours the unit has run in both diesel and electric mode.
Engine Hours | Total number of hours the unit has run in diesel mode.
Electric Run Hours | Total number of hours the unit has run in electric mode.
Total Run Reminder 1 | User Programmable - The number of hours before a Total Unit Run Time Maintenance Reminder 1 occurs.
Total Run Reminder 2 | User Programmable - The number of hours before a Total Unit Run Time Maintenance Reminder 2 occurs.
Controller Power On | Total hours the controller and HMI Control Panel have been turned on.
Pretrip Reminder | User Programmable - number of hours before a Pretrip Reminder occurs.

### Engine Reminder
- **Engine Reminder 1**
  - User Programmable
  - The number of hours before an Engine Run Time Maintenance Reminder 1 occurs.
- **Engine Reminder 2**
  - User Programmable
  - The number of hours before an Engine Run Time Maintenance Reminder 2 occurs.
- **Electric Reminder 1**
  - User Programmable
  - The number of hours before an Electric Run Time Maintenance Reminder 1 occurs.
- **Electric Reminder 2**
  - User Programmable
  - The number of hours before an Electric Run Time Maintenance Reminder 2 occurs.

**IMPORTANT:** If a programmable hourmeter is not enabled or the view for that hourmeter is not turned on it will not appear in the display sequence.
**Operating Instructions**

**Mode**

The Mode Menu allows the operator to change the unit operating modes that have been enabled in Guarded Access. Only Operating Modes that have been enabled from the Guarded Access > Main Menu Configuration Menu will be shown.

- Turns Off Cycle Sentry Mode/Turns On Cycle Sentry Mode (If Cycle Sentry is turned Off unit runs in Continuous). Note that selecting Cycle Sentry Mode or Continuous Mode can also be accomplished using the Cycle Sentry Hard Key to the right of the display.
- Allows Single Zone Control to be selected (if enabled from the Guarded Access > Main Menu Configuration Menu).
- Allows temperatures to be displayed in either Fahrenheit or Celsius degrees (if enabled from the Guarded Access > Main Menu Configuration Menu).
- Allows Keypad Lockout to be selected (if enabled from the Guarded Access > Main Menu Configuration Menu).
- Allows Sleep Mode to be set up and started (if enabled from the Guarded Access > Main Menu Configuration Menu).

When shipped from the factory, only the Cycle Sentry/Continuous Mode feature is enabled.

To return to the Main Menu press the EXIT Key. To return to the Standard display press the EXIT Key again.

**Using the Change Mode Menu**

Mode changes are made using the Mode Menu. From the Standard Display, press the MENU Key (Figure 108).

![Figure 108: MENU Key](image)
The Main Menu will appear. Press the UP or DOWN Key as required to choose the Mode Menu (Figure 109). When the Mode Menu is selected, press the SELECT Key to choose the Mode Menu.

**Figure 109: MODE Menu**

The first enabled Change Mode Menu selection will appear (Figure 110). To choose that function, press the SELECT Soft Key. To Scroll through the enabled features in the Change Mode Menu, press the UP and DOWN Soft Keys.

**Figure 110: Change Mode Menu**

- Possible mode selections are shown on the following pages.
- Only those modes that have been enabled in Guarded Access > Main Menu Configuration will appear. Only the Cycle Sentry/Continuous Mode is enabled on factory units.
- To return to the Standard Display press the EXIT Key.
Operating Instructions

Turn Cycle Sentry On or Off
Cycle Sentry can be turned on and off either by using the Cycle Sentry hard key at the lower right side of the display or from the Main Menu.

*IMPORTANT: If the unit is in Cycle Sentry Null and the mode is switched to Continuous Mode, the unit will start automatically.*

If the unit is operating in Cycle Sentry Mode, the Cycle Sentry Icon will be present in the upper right corner of the display as shown in Figure 111. If the Cycle Sentry Icon is not present the unit is operating in Continuous Mode.

Using the Cycle Sentry Key
If allowed by OptiSet Plus, Cycle Sentry Mode or Continuous Mode is selected by pressing the Cycle Sentry Key as shown in Figure 112.

Using the Main Menu
From the Main Menu > Change Mode menu choose Turn On/Off Cycle Sentry Mode and press the SELECT Soft Key.
If the unit is running in Cycle Sentry Mode, press the SELECT Soft Key to turn off Cycle Sentry Mode as shown in Figure 114.

Confirmation screens will appear briefly, the unit will switch to Continuous Mode operation and the Cycle Sentry Icon will disappear.

- To turn Cycle Sentry back on press the SELECT Key again.
- To leave this menu without changing the setting, press the EXIT Soft Key. To return to the Standard Display press the EXIT Soft Key again.

**IMPORTANT:** If the unit is in Cycle Sentry Null and the mode is switched to Continuous Mode, the unit will start automatically.
Single Zone Control - Multi Zone Control

The following differences exist when operating the unit in Single Zone Control Mode.

- Single Zone Control Mode will appear in the Mode Menu only if the Single Zone Control feature has been enabled in the Guarded Access > Main Menu Configuration menu. If the feature is enabled then Single Zone Control will appear in the Main Menu > Mode Menu.

- If Single Zone Control operation is selected then all zones will be forced on and will control to the same setpoint. All bulkheads should be taken down to create one large compartment. With the exception of defrost, the operating mode of each zone evaporator(s) will be same when in this mode. Unit control is based on the temperature sensors of one zone (usually Zone 1).

- If Single Zone Control operation is selected the Single Zone Standard Display provides one soft key labeled Set Point as shown in Figure 115. This allows the setpoint for all zones to be changed simultaneously.

- If Single Zone Control operation is selected the individual zones cannot be turned off. The unit and all zones are turned On and Off simultaneously using the On and Off hard keys at the left side of the display.
Select Temperature Units

If this feature enabled in Guarded Access > Main Menu Configuration, the operator can select temperature units to be displayed as either degrees Fahrenheit or degrees Celsius. From the Main Menu > Change Mode menu choose Fahrenheit or Celsius and press the SELECT Soft Key.

Choose the desired Temperature Units using the UP and DOWN Soft Keys and press the SELECT Soft Key to select the choice.

Keypad Lockout

If enabled in Guarded Access > Main Menu Configuration, the keypad can be locked to prevent unauthorized use. If the keypad is locked, only the On Key and Off Key function. The keypad will remain locked even if the unit is turned off and back on. If Keypad Lockout is active, press and hold any soft key to unlock the keypad.
Operating Instructions

key for 5 seconds to deactivate the feature. To turn the feature on, from the Change Mode menu choose Keypad Lockout and press the SELECT Soft Key (Figure 118).

Figure 118: SELECT Soft Key

A Confirmation Request will appear. To activate Keypad Lockout press the YES Soft Key. To leave this menu without turning the Keypad Lockout feature on, press the NO Soft Key (Figure 119).

Figure 119: YES and NO Soft Keys

If the YES Soft Key was pressed Keypad Lockout is active. Repeat the process to turn the Keypad Lockout feature off.

- If the keypad is locked, only the On Key and Off Key function. The keypad will remain locked even if the unit is turned off and back on.
- If Keypad Lockout is active, press and hold any soft key for 5 seconds to deactivate the feature.
- To return to the Standard Display press the EXIT Soft Key again.
Start Sleep Mode

If this feature enabled in Guarded Access > Main Menu Configuration, the operator can set up and start set Sleep Mode from the Mode Menu. Sleep Mode is used to keep the engine warm and the battery charged when the unit is not in use. When the unit is Sleep Mode the display will show "SLEEP" and the current time. To turn the feature on, from the Change Mode menu choose Start Sleep Mode and press the SELECT Soft Key (Figure 120).

Figure 120: SELECT Soft Key

The following features are available in Sleep Mode. Follow the display prompts to select and set the features.

- **Program Wakeup Time** This feature allows a wakeup time to be specified. When the selected time is reached the unit will start and resume normal operation.

  If a Wakeup Time is selected the following features are available:

  - **Day to Wake Up** This feature allows the day the unit is to wake up to be specified.
  - **Hour to Wake Up** This feature allows the hour the unit is to wake up to be specified.
  - **Minute to Wake Up** This feature allows the minute the unit is to wake up to be specified.
  - **Run Pretrip on Wakeup** This feature allows a Pretrip Test to be automatically run when the unit wakes up.

Smart Power™ Electric Standby Option

The Diesel/Electric Standby selection from the Main Menu allows the operator to manually select diesel or electric mode operation on units equipped with the electric standby Smart Power option. The unit can also be programmed to automatically switch to Electric Mode operation when standby power is available and to automatically switch to Diesel Mode.
Operating Instructions

operation if standby power fails or is removed. If the unit is programmed to automatically switch from diesel to electric and/or electric to diesel the associated screens do not appear.

- If the unit is currently operating in Diesel Mode the ELECTRIC STANDBY selection will appear in the Main Menu.
- If the unit is currently operating in Electric Mode the DIESEL MODE selection will appear in the Main Menu.

Electric Mode Operation

If a unit equipped with the electric standby Smart Power option is running in Diesel Mode, the Diesel to Electric Auto-switch feature is set NO and the unit is connected to a source of standby power, this feature allows the operator to manually select electric mode operation. This feature does not appear if the electric standby Smart Power option is not installed or if the Diesel to Electric Auto-switch feature is set YES.

Diesel Mode Operation

If a unit equipped with the electric standby Smart Power option is running in Electric Mode and the Electric to Diesel Auto-switch feature is set NO, this feature allows the operator to manually select diesel mode operation. This feature does not appear if the electric standby Smart Power option is not installed or if the Electric to Diesel Auto-switch feature is set YES.

Switching from Diesel to Electric

If the unit is running in Diesel Mode and the Guarded Access > Diesel to Electric Autoswitch Enabled feature is set YES then the unit will automatically switch to Electric Mode operation when standby power is connected and available. The screens shown in Figure 121 and Figure  will not appear.

If the unit is running in Diesel Mode and the Guarded Access > Diesel to Electric Autoswitch Enabled feature is set NO, the unit can be switched to Electric Mode using the Electric Standby selection from the Main Menu.

From the Standard Display, press the MENU Key (Figure 121).
From the Main Menu choose Electric Standby and press the SELECT Soft Key (Figure 122).

If the unit has standby power available and is turned on, the electric standby run screen will appear. The new mode is confirmed for 10 seconds. The unit will start and run in Electric Mode. If electric standby power is not available or fails, the display will prompt for a return to Diesel Mode as shown below.

Any engine related Shutdown Alarms become Log Alarms when the unit is switched to Electric Mode operation. If the unit is switched back to Diesel Mode these alarms again become Shutdown Alarms.

**Electric Standby Power Fails or is Disconnected**

If the electric standby power source fails or is disconnected and manual switching to Diesel Mode is selected, the unit will prompt for a switch to Diesel Mode (Figure 123).
Operating Instructions

Figure 123: Prompt For Switch to Diesel Mode

- Pressing the YES Soft Key will switch unit operation back to Diesel Mode.
- Pressing the NO Soft Key will allow the unit to remain in Electric Mode even though standby power is not available.

The unit will not run and Alarm Code 91 Check Electric Ready Input will be set as a prevent alarm.

Switching from Electric to Diesel

If the unit is running in Electric Mode and the Guarded Access > Electric to Diesel Autoswitch Enabled feature is set YES then the unit will automatically switch to Diesel Mode operation when standby power is no longer available. The screens shown below will not appear.

If the Diesel to Guarded Access > Electric Autoswitch Enabled feature is set NO and standby power is disconnected or fails, the unit will not automatically switch to Diesel mode. This is primarily designed to prevent unauthorized diesel engine starts when the truck is indoors or on a ferry where engine operation is strictly prohibited.

From the Standard Display, press the MENU Key (Figure 124).
From the Main Menu choose Diesel Mode and press the SELECT Soft Key (Figure 125).

The new mode is confirmed for 10 seconds. The unit will start and run in Diesel Mode.

Any Electric Standby related Shutdown Alarms become Log Alarms when the unit is switched to Diesel Mode operation. If the unit is switched back to Electric Mode these alarms again become Shutdown Alarms.

**Adjust Brightness**

The brightness of the HMI Control Panel display can be adjusted to allow for changing ambient light conditions. The choices available to the operator are HIGH, MEDIUM, LOW and OFF. OFF actually results in a very dim screen suitable for low light conditions.

Display brightness is adjusted using the Adjust Brightness Menu. From the Standard Display, press the MENU Key.
Operating Instructions

The Main Menu will appear. Press the UP or DOWN Key as required to choose the Adjust Brightness Menu (Figure 127). When the Adjust Brightness is selected, press the SELECT Key to choose the Adjust Brightness.

The Display Brightness menu will appear as shown below. Press the UP or DOWN Soft Keys to select the desired display brightness. When the desired brightness is shown press the SELECT Soft Key to confirm the choice (Figure 128).
To return to the Main Menu press the EXIT Key. To return to the Standard display press the EXIT Key again.

**Time**

The Time and Date held by the HMI Control Panel can be checked. Time and Date cannot be changed from the Main Menu. The time and date is accessed using the Main Menu. From the Standard Display, press the MENU Key (Figure 129).

The Main Menu will appear. Press the UP or DOWN Key as required to choose the Time Menu (Figure 130). When the Time Menu is selected, press the SELECT Key to choose the Time Menu.
The date and time held in the HMI Control Panel will be shown on the display (Figure 131). Time and Date cannot be changed from the Main Menu.

To return to the Main Menu press the EXIT Key. To return to the Standard display press the EXIT Key again.

**Clear All ECU Faults**

Pressing this key will clear all existing Engine Control Unit (ECU) Fault Codes on units equipped with an ECU. This may allow continued unit operation should an ECU fault code result in engine shutdown.

"Any Thermo King Alarm Codes associated with the Engine Control Unit (ECU) Fault Codes will also be cleared."
"The Thermo King Alarm Codes and Engine Control Unit (ECU) Fault Codes that were cleared can be viewed in the ServiceWatch and ECU Data Loggers.

Engine Control Unit (ECU) Fault Codes are cleared using the Clear All ECU Faults Menu. From the Standard Display, press the MENU Key (Figure 132).

Figure 132: MENU Key

The Main Menu will appear. Press the UP or DOWN Key as required to choose the Clear All ECU Faults Menu. When the Clear All ECU Faults Menu is selected, press the SELECT Key to choose the Clear All ECU Faults Menu (Figure 133).

Figure 133: Clear All ECU Faults Menu

The Clear All ECU Faults Prompt will appear. To clear all Engine Control Unit (ECU) Faults and associated Thermo King Faults press the CLEAR Soft Key.

The Main Menu will appear. Press the UP or DOWN Key as required to choose the Clear All ECU Faults Menu. When the Clear All ECU Faults Menu is selected, press the SELECT Key to choose the Clear All ECU Faults Menu (Figure 133).
Operating Instructions

Figure 134: CLEAR Soft Key.

All Engine Control Unit (ECU) Faults and associated Thermo King Faults will be cleared.

To return to the Main Menu press the EXIT Key. To return to the Standard display press the EXIT Key again.
Loading and Enroute Inspections

This chapter describes pre-loading inspection procedures, single temperature loading procedures, post loading, and enroute inspection procedures for multi-temperature units. Thermo King refrigeration units are designed to maintain the required product load temperature during transit. Follow these recommended loading and enroute procedures to help minimize temperature related problems.

NOTE: When in doubt as to the correct refrigeration requirements and/or loading procedures, call your company office for instructions.

Pre-Loading Inspection

1. Make sure the unit is turned off before opening the doors to minimize frost accumulation on the evaporator coil and heat gain in the trailer. (Unit may be running when loading the trailer from a warehouse with door seals.)
2. Spot check and record load temperature while loading. Especially note any off-temperature product.
3. Load the product so that there is adequate space for air circulation completely around the load. DO NOT block the evaporator inlets or outlets.
4. Products should be pre-cooled before loading. Thermo King transport refrigeration units are designed to maintain loads at the temperature at which they were loaded. Transport refrigeration units are not designed to pull hot loads down to temperature. Verify that the setpoint temperatures are correct for your cargo. Pre-cool the trailer as required.

CAUTION: Cargo must be pre-cooled to the proper temperature before loading. The unit is designed to maintain temperature, not to bring a product to temperature.

CAUTION: Push the controller access door firmly closed after each use. Unit damage can occur in transit if the door is not properly closed.
Loading and Enroute Inspections

1. Correct load height (trailers without chutes)
2. Tight doors and gaskets
3. Center bulkhead with tight air seals (multiple compartment trailers)
4. Good air circulation around load
5. Proper cargo temperature prior to loading
6. Interior/exterior walls and insulation in good condition
7. Clear defrost drains
8. Unit inspection
9. Good outside air circulation
10. Tight air seals between unit and trailer

Figure 135: Multi-Temperature Loading Considerations
Single Temperature Loading Procedures

Additional steps must be taken to insure load temperature requirements are implemented and maintained when a multi-temp unit is used to refrigerate a single-temperature load. Trailer loading procedure will be different depending on how temperature control has established for each trailer compartment Zone. See “Operating the Unit in Single Zone Mode” in the Operating Instructions chapter in this manual.

In the example in Figure 136, each Zone could be individually set to 35 F. The evaporator in each compartment will then control the temperature in that compartment to the same 35 F setpoint.

**NOTE:** Using the above method, it is recommended that the bulkheads that separate each compartment be in place to isolate the compartments.

Figure 137 shows two Zones that have the same setpoint. The bulkhead separating the compartments has been removed. The Host evaporator senses temperature and controls both evaporators to the temperature setpoint.
NOTE: Using Method 2, it is recommended that all bulkheads be removed to create one large compartment.

**Post-Loading Inspection**

1. Make sure all the doors are closed and locked.
2. Start the unit if it was shut off to load.
3. Make sure the setpoints are at the desired settings.
4. One-half hour after loading, manually initiate a Defrost cycle. If the evaporator coil sensor temperature is below 45 F (7 C), the unit will Defrost. The microprocessor will terminate Defrost automatically when the evaporator coil temperature reaches 58 F (14.5 C) or the unit has been in the Defrost mode for 30 or 45 minutes (depending on setting).

**Post Trip Checks**

1. Wash the unit.
2. Check for leaks.
3. Check for loose or missing hardware.
4. Check for physical damage to the unit.

---

**Inspection Troubleshooting**

1. If a temperature reading is not within desired temperature range, refer to the troubleshooting table on the following pages. Correct problem as required.
2. Repeat the Enroute Inspection every 30 minutes until the compartment temperature is within desired temperature range. Stop the unit if the compartment temperature is not within desired temperature range on two consecutive 30 minute inspections, especially if the compartment temperature appears to be moving away from the setpoint.
3. Immediately contact the nearest Thermo King Service Center or your company office.
4. Take all necessary steps to protect and maintain proper load temperature.

⚠️ **CAUTION:** Stop the unit if the compartment temperature remains more than the desired temperature range from the setpoint on two consecutive 30 minute inspections. Contact the nearest Thermo King Service Center or your company office immediately. Take all necessary steps to protect and maintain proper load temperature.
### Inspection Troubleshooting

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>A return air temperature reading is not within desired temperature range of the setpoint.</td>
<td>The unit has not had time to cool down to correct temperature.</td>
<td>Refer to the load log history. Look for above temperature load records, properly pre-cooled cargo compartment, length of time on road, etc. Correct as required. Continue monitoring return air temperature until reading is within desired temperature range of the setpoint.</td>
</tr>
<tr>
<td>The unit may have a low refrigerant charge.</td>
<td>Check the receiver tank sight glass for refrigerant level. If liquid is not showing in the receiver tank sight glass, the refrigerant charge may be low. A competent refrigeration technician is required to add refrigerant or repair the system. Contact the nearest Thermo King dealer, authorized Service Center, or call the Thermo King Cold Line for referral. Consult the Table of Contents for Cold Line information.</td>
<td></td>
</tr>
<tr>
<td>The unit is in defrost or has just completed a defrost cycle.</td>
<td>Monitor the return air temperature after the defrost cycle is completed to see if the temperature returns to the desired temperature range of the setpoint.</td>
<td></td>
</tr>
<tr>
<td>The evaporator is plugged with frost.</td>
<td>Initiate a manual defrost cycle. The defrost cycle will automatically terminate when complete. Continue monitoring return air temperature until reading is within desired temperature range of the setpoint.</td>
<td></td>
</tr>
</tbody>
</table>
## Loading and Enroute Inspections

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>A return air temperature reading is not within desired temperature range of the setpoint (continued)</td>
<td>Improper air circulation in the cargo compartment.</td>
<td>Inspect the unit and cargo compartment to determine if the evaporator fan(s) are working and properly circulating the air. Poor air circulation may be due to improper loading of the cargo, shifting of the load, or fan belt slippage. Correct as required. Continue monitoring return air temperature until problem is corrected.</td>
</tr>
<tr>
<td></td>
<td>The unit did not start automatically.</td>
<td>Determine the cause for not starting. Correct as required. Continue monitoring return air temperature until reading is within desired temperature range of the setpoint.</td>
</tr>
<tr>
<td></td>
<td>The unit is being used to cool/heat a single temperature load and does not have the capacity to cool the entire trailer.</td>
<td>A multi-temperature unit may not have the cooling or heating capacity to maintain a specific temperature range throughout an entire trailer. Refer to the “Single Temperature Loading Considerations” on page 111 for instructions.</td>
</tr>
</tbody>
</table>
Alarm Codes

Introduction

An alarm code is generated when the microprocessor senses an abnormal condition. Alarms direct an operator or service technician to the source of a problem.

Multiple alarms can be present at one time. All generated alarms will be stored in memory until cleared by the operator. Document all alarm occurrences and report them to the service technician.

See “Alarms Menu” in the Operation Instructions Chapter for information about viewing and clearing alarms.

NOTE: Some alarms (3, 4, 74, 203, and 204) cannot be cleared in the Alarms Menu, they must be cleared in the Maintenance Menu or the Guarded Access Menu. Contact your supervisor or a Thermo King dealer about clearing those alarms.

IMPORTANT: Always record any Alarm Codes that occur - in the order that they occur - as well as any other pertinent information. This information is extremely valuable to service personnel.

NOTE: In some cases alarms cannot be cleared, or cannot be cleared after they have occurred a specified number of times. If such is the case, these alarms must be cleared by service personnel. See “Clearing Alarm Codes” on page 118.

Alarm Types

The four types of alarms are described below.

Log Alarms: Log Alarms are indicated by the Log Alarms screen, which appears for approximately 30 seconds (just before the Standard Display appears) each time the unit is turned on. The Alarm Display must be used to view the existing alarms. This level of alarm serves as a notice to take corrective action before a problem becomes severe. Maintenance items such as a maintenance reminder hour meter reaching its time limit are log alarms.
Alarm Codes

Check Alarms: Check Alarms are indicated by the Alarm Display in which the large Alarm Icon will appear on the Standard Display as shown below in Figure 139. The Alarm Menu must be used to view the existing alarms. This level of alarm serves as a notice to take corrective action before a problem becomes severe. The unit will run with check alarms but some features and functions may be inhibited.

Prevent Alarms: Prevent Alarms are also indicated by the Alarm Display as shown in Figure 139. The Alarm Menu must be used to view the existing alarms. The unit may stop running and wait a timed interval or until conditions allow and then restart. If the unit is waiting to restart, Alarm Code 84 Restart Null will be present along with the Prevent Alarm. In other cases the unit may restart or run with reduced performance to determine if continued operation is possible. If the alarm does not reoccur with reduced performance the unit will then return to full performance. If the unit is operating with reduced performance Alarm Code 85 Forced Unit Operation will also be present.
**Shutdown Alarms:** Shutdown Alarms are indicated by the Alarm Display. Shutdown alarms also cause the display and backlight to flash on and off, and the display will switch from normal video to reverse video and back to normal video (light areas become dark and dark areas become light as shown in Figure 140). Shutdown alarms force the unit into shutdown. The unit will remain in shutdown and will not restart until the shutdown alarm is cleared. Exceptions are some engine and electric shutdown alarms become that log alarms when switched to the alternate operating mode (diesel to electric or electric to diesel).

If a shutdown alarm occurs that affects only Diesel Mode operation and the unit is switched to electric (either manually or automatically), the Diesel Mode shutdown alarm becomes an Electric Mode log alarm. This allows the unit to run in Electric Mode without clearing the shutdown alarm that is preventing Diesel Mode operation. If the unit is switched back to Diesel Mode, the alarm again becomes a Diesel Mode shutdown alarm and prevents unit operation. If the unit is configured for electric to diesel autoswitch, it automatically starts and runs in Diesel Mode if an electric shutdown occurs.

In the same manner, if a shutdown alarm occurs that affects only Electric Mode operation and the unit is switched to diesel (either manually or automatically), the Electric Mode shutdown alarm becomes a Diesel Mode log alarm to allow Diesel Mode operation. If the unit is switched back to Electric Mode, the alarm reverts to an Electric Mode shutdown alarm and prevents unit operation.

![Figure 140: Shutdown Alarm Display](image)

**Pretrip Alarm Codes**

If an alarm occurs during a Pretrip Test the alarm code will be displayed as Pretrip Alarm XX, where XX is the alarm code.
Clearing Alarm Codes

Most alarm codes can be cleared conventionally from the Alarm Menu using the CLEAR Key. See the Operating Instructions chapter for procedures.

The operator should contact a supervisor or a Thermo King dealer about clearing alarms using the Guarded Access Menu.

Refer to the table on the following pages for alarm corrective action.

*NOTE: Document all alarm faults and report them to the service technician.*

There are three levels of corrective action that can be taken when an alarm condition occurs.

**OK To Run:** An alarm condition exists but does not affect unit operation. Corrective action can occur at a later date.

**Check As Specified:** An alarm condition exists that could affect unit operation. Follow directions in the Corrective Action column on the following chart.

**Take Immediate Action:** An alarm condition exists that will damage the unit or load. Take immediate action to correct the problem.

*NOTE: The corrective actions listed in the Operating Instructions chapter and in the chart on the following pages are suggestions only. Always consult your company for final decisions.*

*NOTE: The chart on the following pages shows all possible alarm codes for all possible applications. Not all codes will be applicable to each individual unit.*
### Table of Alarm Codes

*NOTE: Not all alarm codes are available with all microprocessor controllers or all revisions of software.*

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Corrective Action</th>
<th>Ok To Run</th>
<th>Check</th>
<th>Shut Down</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>No Alarms Exist</td>
<td>None required</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Evaporator Coil Sensor</td>
<td>Manually monitor load temperature with independent thermometer. Report alarm at end of day.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Control Return Air Sensor</td>
<td>Manually monitor load temperature with independent thermometer. Report alarm at end of day.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Control Discharge Air Sensor</td>
<td>Manually monitor load temperature with independent thermometer. Report alarm at end of day.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Ambient Air Sensor</td>
<td>Report alarm at end of day.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Coolant Temp Sensor</td>
<td>Report alarm at end of day.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Engine RPM Sensor</td>
<td>Report alarm at end of day.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>High Evaporator Temperature</td>
<td>Manually monitor load temperature. Report alarm at end of the day.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>High Discharge Pressure</td>
<td>If unit is shut down repair immediately. Otherwise, report alarm at end of day.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
### Table of Alarm Codes

*NOTE: Not all alarm codes are available with all microprocessor controllers or all revisions of software.*

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Corrective Action</th>
<th>Level Of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Unit Controlling on Alternate Sensor</td>
<td>Manually monitor load temperature with independent thermometer. Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>12</td>
<td>Sensor or Digital Input Shutdown</td>
<td>The indicated zone is no longer able to operate and has been shut down. Repair immediately.</td>
<td>X</td>
</tr>
<tr>
<td>13</td>
<td>Sensor Calibration Check</td>
<td>Manually monitor load temperature with independent thermometer. Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>17</td>
<td>Engine Failed to Crank</td>
<td>If unit is shut down repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>18</td>
<td>High Engine Coolant Temperature</td>
<td>If unit is shutdown repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>19</td>
<td>Low Engine Oil Pressure</td>
<td>If unit is shutdown repair immediately. Otherwise report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>20</td>
<td>Engine Failed to Start</td>
<td>If unit is shutdown repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
</tbody>
</table>
### Table of Alarm Codes

*NOTE: Not all alarm codes are available with all microprocessor controllers or all revisions of software.*

<table>
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<tr>
<th>Code</th>
<th>Description</th>
<th>Corrective Action</th>
<th>Level Of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Cooling Cycle Check</td>
<td>Manually monitor load temperature with independent thermometer. Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>22</td>
<td>Heating Cycle Check</td>
<td>Manually monitor load temperature with independent thermometer. Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>23</td>
<td>Cooling Cycle Fault</td>
<td>The indicated zone is no longer able to operate and has been shut down. Repair immediately.</td>
<td>X</td>
</tr>
<tr>
<td>24</td>
<td>Heating Cycle Fault</td>
<td>The indicated zone is no longer able to operate and has been shut down. Repair immediately.</td>
<td>X</td>
</tr>
<tr>
<td>25</td>
<td>Alternator Check</td>
<td>If unit is shutdown repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>26</td>
<td>Refrigeration Capacity</td>
<td>Manually monitor load temperature with independent thermometer. Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>28</td>
<td>Pretrip Abort</td>
<td>Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>29</td>
<td>Defrost Damper Circuit</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
</tbody>
</table>
## Table of Alarm Codes

*NOTE: Not all alarm codes are available with all microprocessor controllers or all revisions of software.*

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Corrective Action</th>
<th>Level Of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>Defrost Damper Stuck</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>x</td>
</tr>
<tr>
<td>31</td>
<td>Oil Pressure Switch</td>
<td>If unit is shutdown repair immediately. Otherwise, report alarm at end of day.</td>
<td>x</td>
</tr>
<tr>
<td>32</td>
<td>Refrigeration Capacity Low</td>
<td>The indicated zone is no longer able to operate and has been shut down. Repair immediately.</td>
<td>x</td>
</tr>
<tr>
<td>33</td>
<td>Check Engine RPM</td>
<td>Report alarm at end of day.</td>
<td>x</td>
</tr>
<tr>
<td>35</td>
<td>Run Relay Circuit</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>x</td>
</tr>
<tr>
<td>36</td>
<td>Electric Motor Failed to Run</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>x</td>
</tr>
<tr>
<td>37</td>
<td>Engine Coolant Level</td>
<td>Check coolant level, add as needed. Report alarm at end of day.</td>
<td>x</td>
</tr>
<tr>
<td>38</td>
<td>Electric Phase Reversed</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>x</td>
</tr>
</tbody>
</table>

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### Table of Alarm Codes

*NOTE: Not all alarm codes are available with all microprocessor controllers or all revisions of software.*

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Corrective Action</th>
<th>Level Of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>39</td>
<td>Water Valve Circuit</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>40</td>
<td>High Speed Circuit</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>41</td>
<td>Check Engine Coolant Temperature</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>42</td>
<td>Unit Forced to Low Speed</td>
<td>Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>43</td>
<td>Unit Forced to Low Speed Modulation</td>
<td>Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>44</td>
<td>Check Fuel System</td>
<td>Refill fuel tank.</td>
<td>X</td>
</tr>
<tr>
<td>45</td>
<td>Hot Gas Bypass or Hot Gas Bypass Circuit</td>
<td>If unit is shutdown repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>46</td>
<td>Check Air Flow</td>
<td>If unit is shut down repair immediately. Otherwise, report alarm at end of the day. Cargo may be restricting air flow, check load.</td>
<td>X</td>
</tr>
</tbody>
</table>
# Table of Alarm Codes

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<tbody>
<tr>
<td>48</td>
<td>Check Belts/Clutch</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>50</td>
<td>Reset Clock</td>
<td>Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>52</td>
<td>Heat Circuit</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>54</td>
<td>Test Mode Time-out</td>
<td>Service Test or Interface Board Test time out after 15 minutes. Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>56</td>
<td>Host Evap Fan Low Speed</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>57</td>
<td>Host Evap Fan High Speed</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>61</td>
<td>Low Battery Voltage</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>62</td>
<td>Ammeter Out of Calibration</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
</tbody>
</table>

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# Table of Alarm Codes

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<th>Description</th>
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<tbody>
<tr>
<td>63</td>
<td>Engine Stopped</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>64</td>
<td>Pretrip Reminder</td>
<td>Report alarm at end of day.</td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>Abnormal Temperature Differential</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day</td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>Low Engine Oil Level</td>
<td>Check engine oil level. If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>67</td>
<td>Liquid Line Solenoid Circuit</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>68</td>
<td>Internal Controller Fault</td>
<td>Report alarm at end of day.</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>Hourmeter Failure</td>
<td>Report alarm at end of day.</td>
<td></td>
</tr>
<tr>
<td>74</td>
<td>Controller Reset to Defaults</td>
<td>Report alarm at end of day.</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Internal Data Logger Overflow</td>
<td>Report alarm at end of day.</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>Compressor Temp Sensor</td>
<td>Report alarm at end of day.</td>
<td></td>
</tr>
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Table dimensions: 612.0x792.0

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<tbody>
<tr>
<td>82</td>
<td>High Compressor Temperature Shutdown</td>
<td>If unit is shutdown repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>83</td>
<td>Low Engine Coolant Temperature</td>
<td>If unit is shutdown repair immediately. Otherwise, report alarm at end of day.</td>
<td></td>
</tr>
<tr>
<td>84</td>
<td>Restart Null</td>
<td>Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>85</td>
<td>Forced Unit Operation</td>
<td>Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>86</td>
<td>Discharge Pressure Sensor</td>
<td>Report alarm at end of day.</td>
<td></td>
</tr>
<tr>
<td>87</td>
<td>Suction Pressure Sensor</td>
<td>Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>89</td>
<td>Check Electronic Throttling Valve Circuit</td>
<td>If unit is shutdown repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>90</td>
<td>Electric Overload</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>91</td>
<td>Electric Ready Input</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
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<tr>
<td>92</td>
<td>Sensor Grades Not Set</td>
<td>Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>93</td>
<td>Low Compressor Suction Pressure</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>96</td>
<td>Low Fuel Level</td>
<td>Check engine fuel level and add fuel. If unit is shutdown, repair immediately.</td>
<td>X</td>
</tr>
<tr>
<td>98</td>
<td>Fuel Level Sensor</td>
<td>Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>99</td>
<td>High Compressor Pressure Ratio</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>105</td>
<td>Receiver Tank Pressure Solenoid Circuit</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>106</td>
<td>Purge Valve Circuit</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>107</td>
<td>Condenser Inlet Solenoid Circuit</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
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<tr>
<td>108</td>
<td>Door Open Time-out</td>
<td>Close Doors. Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>110</td>
<td>Suction Line Solenoid Circuit</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>111</td>
<td>Unit Not Configured Correctly</td>
<td>Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>112</td>
<td>Remote Fans</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>113</td>
<td>Electric Heat Circuit</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>114</td>
<td>Multiple Alarms - Cannot Run</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>117</td>
<td>Auto switch from Diesel to Electric</td>
<td>Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>118</td>
<td>Auto switch from Electric to Diesel</td>
<td>Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>120</td>
<td>Alternator Exciter Circuit</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
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# Alarm Codes

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<tr>
<td>121</td>
<td>Liquid Injection Circuit</td>
<td>If unit is shutdown, repair immediately. Otherwise report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>122</td>
<td>Diesel/Electric Relay Circuit</td>
<td>If unit is shutdown, repair immediately. Otherwise, report at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>127</td>
<td>Setpoint Not Entered</td>
<td>Be sure the setpoint is set to the required temperature.</td>
<td>X</td>
</tr>
<tr>
<td>128</td>
<td>Engine Run Time Maintenance Reminder #1</td>
<td>Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>129</td>
<td>Engine Run Time Maintenance Reminder #2</td>
<td>Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>130</td>
<td>Electric Run Time Maintenance Reminder #1</td>
<td>Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>131</td>
<td>Electric Run Time Maintenance Reminder #2</td>
<td>Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>132</td>
<td>Total Unit Run Time Maintenance Reminder #1</td>
<td>Report alarm at end of day.</td>
<td>X</td>
</tr>
</tbody>
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## Alarm Codes

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<tr>
<td>133</td>
<td>Total Unit Run Time Maintenance Reminder #2</td>
<td>Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>134</td>
<td>Controller Power On Hours</td>
<td>Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>141</td>
<td>Autoswitch Diesel to Electric Disabled</td>
<td>Report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>143</td>
<td>Remote Zone Drain Hose Heater Output</td>
<td>If unit is shutdown, repair immediately. Otherwise, report at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>144</td>
<td>Lost Expansion Module CAN Communication</td>
<td>If unit is shut down repair immediately. Otherwise, report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>145</td>
<td>Loss of Controller “On” Feedback Signal</td>
<td>If unit is shut down repair immediately. Otherwise, report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>146</td>
<td>Software Version Mismatch</td>
<td>If unit is shut down repair immediately. Otherwise, report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>148</td>
<td>Autoswitch Electric to Diesel Disabled</td>
<td>Report alarm at end of the day.</td>
<td>X</td>
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<tr>
<td>150</td>
<td>Out of Range Low</td>
<td>Manually monitor load temperature. Report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>151</td>
<td>Out of Range High</td>
<td>Manually monitor load temperature. Report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>153</td>
<td>Expansion Module Flash Load Failure</td>
<td>If unit is shut down repair immediately. Otherwise, report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>157</td>
<td>OptiSet Plus Mismatch</td>
<td>Manually monitor load temperature. Report alarm at the end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>158</td>
<td>Primary Software Failed to Load</td>
<td>Report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>159</td>
<td>Check Battery Condition</td>
<td>If unit is shut down repair immediately. Otherwise, report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>160</td>
<td>Lost Radio Expansion Board (REB) CAN Communication</td>
<td>If unit is shut down repair immediately. Otherwise, report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>203</td>
<td>Display Return Air Sensor</td>
<td>Manually monitor load temperature with independent thermometer. Report alarm at end of day.</td>
<td>X</td>
</tr>
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<tr>
<td>204</td>
<td>Display Discharge Air Sensor</td>
<td>Manually monitor load temperature with independent thermometer. Report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>230</td>
<td>Future REB Alarm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>231</td>
<td>Future REB Alarm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>232</td>
<td>Future REB Alarm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>233</td>
<td>REB Transitioning From Conservative to Full Null</td>
<td>Report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>234</td>
<td>Relative Humidity Sensor</td>
<td>Report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>251</td>
<td>REB Miss-configured</td>
<td>Report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>252</td>
<td>Check Fresh Air Exchange Circuit</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>500</td>
<td>Host Evaporator Fan Low Speed</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
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<tr>
<td>501</td>
<td>Host Evaporator Fan High Speed</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>Ok To Run</td>
</tr>
<tr>
<td>502</td>
<td>Host Evaporator Fan RPM Sensor</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>Check</td>
</tr>
<tr>
<td>503</td>
<td>Host Condenser Fan 1 RPM Sensor</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>Shutdown</td>
</tr>
<tr>
<td>504</td>
<td>Host Condenser Fan 2 RPM Sensor</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td></td>
</tr>
<tr>
<td>505</td>
<td>Roadside Condenser Fan Motor Speed Circuit</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td></td>
</tr>
<tr>
<td>506</td>
<td>Curbside Condenser Fan Motor Speed Circuit</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td></td>
</tr>
<tr>
<td>507</td>
<td>Digital Scroll Output Circuit</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td></td>
</tr>
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<tr>
<td>508</td>
<td>Speed Request Communication Error</td>
<td>Report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>509</td>
<td>Engine Control Unit (ECU) Failed to Enable</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>510</td>
<td>Engine Control Unit (ECU) Run Signal Failed</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>511</td>
<td>Engine Wait to Start Time Delay Expired</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>512</td>
<td>High Compressor Suction Pressure</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>513</td>
<td>Low Compressor Suction Ratio</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>514</td>
<td>Minimum ETV Discharge Superheat Temperature</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
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<tr>
<td>515</td>
<td>Minimum ETV Discharge Superheat Temperature</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>☒</td>
</tr>
<tr>
<td>516</td>
<td>I/O Controller to Application Controller Communication Failure</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>☒</td>
</tr>
<tr>
<td>517</td>
<td>Check for Water in Fuel System</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>☒</td>
</tr>
<tr>
<td>518</td>
<td>Generator Ground Fault</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>☒</td>
</tr>
<tr>
<td>519</td>
<td>Check Battery Charger Input Power</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>☒</td>
</tr>
<tr>
<td>520</td>
<td>Check Battery Charger Output Power</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>☒</td>
</tr>
<tr>
<td>521</td>
<td>Battery Charger External/Environmental Fault</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>☒</td>
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<tr>
<td>522</td>
<td>Battery Temperature Sensor Alarm</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>523</td>
<td>Battery Temperature Sensor Alarm</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>524</td>
<td>Generator Operational Limit Vout to Frequency Ratio</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>525</td>
<td>Generator Frequency Range Fault</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>526</td>
<td>Generator Operational Limit Output Current</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>527</td>
<td>Reserved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>528</td>
<td>Controller Not Receiving Messages From Battery Charger</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>529</td>
<td>Check Fuel Pump Circuit</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
</tbody>
</table>

136
## Table of Alarm Codes

*NOTE: Not all alarm codes are available with all microprocessor controllers or all revisions of software.*

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Corrective Action</th>
<th>Level Of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>530</td>
<td>Low Pressure Differential</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>531</td>
<td>Check Economizer Pressure Sensor</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>538</td>
<td>Engine J1939 CAN Datalink Degraded</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>539</td>
<td>Engine J1939 CAN Datalink Failed</td>
<td>If unit is shutdown, repair immediately. Otherwise, report alarm at end of day.</td>
<td>X</td>
</tr>
<tr>
<td>599</td>
<td>Engine Service Tool Connected</td>
<td>Maintenance information only. Report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>600</td>
<td>Check Crankshaft Speed Sensor</td>
<td>Report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>601</td>
<td>Check Camshaft Speed Sensor</td>
<td>Report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>602</td>
<td>Check Intake Throttle Position Sensor</td>
<td>If unit is shut down repair immediately. Otherwise, report alarm at end of the day.</td>
<td>X</td>
</tr>
</tbody>
</table>
### Table of Alarm Codes

*NOTE: Not all alarm codes are available with all microprocessor controllers or all revisions of software.*

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Corrective Action</th>
<th>Level Of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>603</td>
<td>Check Exhaust Pressure Sensor</td>
<td>If unit is shut down repair immediately. Otherwise, report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>604</td>
<td>Check Coolant Temperature Sensor</td>
<td>Report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>605</td>
<td>Check Fresh Air Temperature Sensor</td>
<td>Report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>606</td>
<td>Reserved</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>607</td>
<td>Check Fuel Temperature Sensor</td>
<td>Report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>608</td>
<td>Check Rail Pressure Sensor</td>
<td>If unit is shut down repair immediately. Otherwise, report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>609</td>
<td>Check Intake Pressure Sensor</td>
<td>If unit is shut down repair immediately. Otherwise, report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>610</td>
<td>Check Atmospheric Pressure Sensor</td>
<td>Report alarm at end of the day.</td>
<td>X</td>
</tr>
</tbody>
</table>
### Table of Alarm Codes

*NOTE: Not all alarm codes are available with all microprocessor controllers or all revisions of software.*

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Corrective Action</th>
<th>Level Of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>611</td>
<td>Check Glow Plug Circuit</td>
<td>Report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>612</td>
<td>Check Intake Throttle Circuit</td>
<td>If unit is shut down repair immediately. Otherwise, report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>613</td>
<td>Check Injector(s)</td>
<td>Report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>614</td>
<td>Check High Pressure Fuel Pump</td>
<td>If unit is shut down repair immediately. Otherwise, report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>615</td>
<td>Rail Pressure Fault</td>
<td>If unit is shut down repair immediately. Otherwise, report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>616</td>
<td>Engine Overspeed</td>
<td>If unit is shut down repair immediately. Otherwise, report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>617</td>
<td>Internal ECU Fault</td>
<td>If unit is shut down repair immediately. Otherwise, report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>618</td>
<td>Check EGR System</td>
<td>Report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>619</td>
<td>ECU Main Relay Fault</td>
<td>Report alarm at end of the day.</td>
<td>X</td>
</tr>
</tbody>
</table>
# Alarm Codes

## Table of Alarm Codes

*NOTE: Not all alarm codes are available with all microprocessor controllers or all revisions of software.*

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Corrective Action</th>
<th>Level Of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ok To Run</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Check</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Shut Down</td>
</tr>
<tr>
<td>620</td>
<td>Reserved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>621</td>
<td>Reserved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>622</td>
<td>Reserved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>623</td>
<td>TRU CAN Message Timeout</td>
<td>Report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>624</td>
<td>Check Intake Air Temperature Sensor</td>
<td>Report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>625</td>
<td>Check Intake Air Temperature Sensor</td>
<td>If unit is shut down repair immediately. Otherwise, report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>626</td>
<td>Check Exhaust Temperature Sensor</td>
<td>Report alarm at end of the day.</td>
<td>X</td>
</tr>
<tr>
<td>699</td>
<td>Unknown ECU Fault</td>
<td>If unit is shut down repair immediately. Otherwise, report alarm at end of the day.</td>
<td>X</td>
</tr>
</tbody>
</table>
Jump Starting

If the battery in a unit is discharged or run down, the unit may be jump started using jumper cables and another battery or vehicle. Consider the following precautions and be careful when jump starting a unit.

**IMPORTANT:** Make sure to use a 12-volt battery to jump start the unit. If you are using a vehicle, make sure it has a 12-volt battery with a negative ground system. Do not use a “hot shot” booster device or a 24-volt source.

Read and understand the following procedure completely before connecting any jumper cables. Use good jumper cables made with #2 gauge (or larger) cables.

1. Make sure the unit is turned off. If you are using a vehicle, make sure its ignition is also turned off.
2. Open the front doors on the unit. The battery is located to the right of the engine.
3. Check the discharged battery to make sure it is not damaged or frozen. Do not jump start a damaged or frozen battery. Check the vent caps to make sure they are tight.
4. Identify the positive (+) and negative (–) battery terminals.
5. Remove the red cover from the positive (+) battery terminal on the unit’s battery.

**WARNING:** A battery can be dangerous. A battery contains a flammable gas that can ignite or explode. A battery stores enough electricity to burn you if it discharges quickly. A battery contains battery acid that can burn you. Always wear goggles or safety glasses and personal protective equipment when working with a battery. If you get battery acid on you, immediately flush it with water and get medical attention.

**CAUTION:** Unhook the semi tractor from the trailer before using the tractor to jump start the unit on the trailer. The negative ground circuit is complete when the tractor is hooked to the trailer. This can cause dangerous sparks when the positive connection is made at the battery.
Jump Starting

6. Connect the red positive (+) jumper cable to the positive (+) battery terminal on the unit’s battery. Do not let the other end of the jumper cable touch anything that conducts electricity.

⚠️ **CAUTION:** Allowing the positive (+) jumper cable to short can produce dangerous sparks.

7. Connect the other end of the red positive (+) jumper cable to the positive (+) battery terminal on the good battery.

8. Connect the black negative (–) jumper cable to the negative (–) battery terminal on the good battery. Do not let the other end of the jumper cable touch anything that conducts electricity.

9. Connect the black negative (–) jumper cable to the lower starter mounting bolt on the unit’s engine.

10. If you are using a vehicle to jump start the unit, start the vehicle and let it run for a few minutes. This will help charge the discharged battery.

---

**Figure 141: Sequence for Connecting Jumper Cables**

| 1. Positive (+) Terminal on Unit Battery |
| 2. Positive (+) Terminal on Good Battery |
| 3. Negative (–) Terminal on Good Battery |
| 4. Starter Mounting Bolt on Unit Engine |
11. Turn the unit on and let it start automatically or start it manually. If the unit will not crank or start, contact a qualified technician.

**NOTE:** Some units with microprocessors will show an alarm code and will not try to start until the battery voltage is above 10 volts.

12. After the unit starts, remove the jumper cables in reverse order: black negative (–) from the unit starter mounting bolt, black negative (–) from the good battery, red positive (+) from the good battery, and red positive (+) from the unit battery (that was discharged).

---

**CAUTION:** Be careful around fans and belts. Keep your hands away from moving parts when an engine is running.

---

**Figure 142: Sequence for Disconnecting Jumper Cables**

1. Starter Mounting Bolt on Unit Engine
2. Negative (–) Terminal on Good Battery
3. Positive (+) Terminal on Good Battery
4. Positive (+) Terminal on Unit Battery
Warranty

Terms of the Thermo King Warranty are available on request from your Thermo King Dealer.

See the “EPA Emission Control System Warranty Statement” chapter in this manual for the non-road diesel engine in your unit.
## Specifications

### Engine

<table>
<thead>
<tr>
<th>Engine Type</th>
<th>Engine Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-600M</td>
<td>TK486V25L (Tier 4) diesel</td>
</tr>
<tr>
<td>S-610M and S-610DE</td>
<td>TK488CR (Tier 4) diesel</td>
</tr>
<tr>
<td>S-600M and S-600DE</td>
<td>TKDV6 (Tier 4) diesel</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Oil Capacity</th>
<th>Engine Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-600M, S-610M and S-610DE</td>
<td>12 quarts (11.4 liters) crankcase and oil filter*</td>
</tr>
<tr>
<td>S-600M and S-600DE</td>
<td>12.4 quarts (11.7 liters) crankcase and oil filter*</td>
</tr>
<tr>
<td>*Fill to full mark on dipstick</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Oil Type</th>
<th>Engine Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-600M, S-610M and S-610DE</td>
<td>API Classification CI-4 or better</td>
</tr>
<tr>
<td>S-600M and S-600DE</td>
<td>API Classification CJ-4 or better</td>
</tr>
</tbody>
</table>
### Specifications

#### Engine (Continued)

<table>
<thead>
<tr>
<th>Oil Viscosity: All Models</th>
<th>Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10W-30 Delo XLE Syntheblend for -13 to 100 F (-25 C to 38 C)</td>
</tr>
<tr>
<td></td>
<td>5W-40 Delo 400LE Full Synthetic for Cold Climates -22 to 122 F (-30 C to 50 C)</td>
</tr>
<tr>
<td>For Other Climates</td>
<td>14 F to 122 F (-10 C to 50 C): SAE 15W-40 (Synthetic)</td>
</tr>
<tr>
<td></td>
<td>5 to 104 F (-15 to 40 C): SAE 15W-40</td>
</tr>
<tr>
<td></td>
<td>-13 to 104 F (-25 to 40 C): SAE 10W-40</td>
</tr>
<tr>
<td></td>
<td>-13 to 100 F (-25 to 38 C): SAE 10W-30</td>
</tr>
<tr>
<td></td>
<td>-22 to 122 F (-30 to 50 C): SAE 5W-40 (Synthetic)</td>
</tr>
<tr>
<td></td>
<td>Below -22 F (-30 C): SAE 0W-30 (Synthetic)</td>
</tr>
</tbody>
</table>

| Fuel Type - All Models    | No. 2 diesel fuel under normal conditions                                   |
|                          | No. 1 diesel fuel is acceptable cold weather fuel                           |
### Engine (Continued)

| Engine Coolant Type - All Models | ELC (Extended Life Coolant), which is “RED”  
Use a 50/50 concentration of any of the following equivalents:  
Chevron Dex-Cool  
Texaco ELC  
Havoline Dex-Cool®  
Havoline XLC for Europe  
Shell Dexcool®  
Shell Rotella  
Saturn/General Motors Dex-Cool®  
Caterpillar ELC  
Detroit Diesel POWERCOOL® Plus |

**CAUTION:** Do not add “GREEN” or “BLUE-GREEN” conventional coolant to cooling systems using “RED” Extended Life Coolant, except in an emergency. If conventional coolant is added to Extended Life Coolant, the coolant must be changed after 2 years instead of 5 years.

| Coolant System Capacity - All Models | 7.5 quarts (7.1 liters) |
| Radiator Cap Pressure - All Models | 21 psig (145 kPa) |
| Engine Coolant Thermostat - All Models | 160 F (71 C) |
Specifications

**Filters**

<table>
<thead>
<tr>
<th>Filter Type</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine Oil Filter - EMI 3000 Hour</td>
<td>P/N 11-9959</td>
</tr>
<tr>
<td>Fuel Filter - EMI 3000 Hour</td>
<td>P/N 11-9957</td>
</tr>
<tr>
<td>Air Filter - EMI 3000 Hour</td>
<td>P/N 119955</td>
</tr>
</tbody>
</table>

**Refrigeration System**

Contact your Thermo King dealer for refrigeration system service or maintenance.
### Electrical Control System

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Voltage</td>
<td>12.5 Vdc</td>
</tr>
<tr>
<td>High Voltage</td>
<td>230 Vac from AC generator at engine low speed</td>
</tr>
<tr>
<td></td>
<td>345 Vac from AC generator at engine high speed</td>
</tr>
<tr>
<td></td>
<td><strong>DANGER:</strong> All inspection or service procedures of the high voltage systems should only be done by your authorized Thermo King dealer.</td>
</tr>
</tbody>
</table>

**Battery**

- One, Group C31, 12 volt battery. The battery must be suitable for deep cycling, heavy duty and rated with a minimum of 95 amp/hr.
- Thermo King ReliaMax 925N (925 CCA) wet cell battery is recommended for both warm and cold climates.
- Thermo King EON (1150 CCA) AGM battery is recommended for extreme climates and for Rail Ready (RR), Domestic Refrigerated Container (DRC), and Trailer on Flat Car (TOFC) applications.

**NOTE:** If the unit is not going to be used for an extended period of time, turn the Microprocessor On/Off Power Switch to the OFF position to maximize battery life.

**Fuses**

See “A number of fuses are used to protect various circuits and components.” on page 25.

**Battery Charging**

- 12 volt, 37 amp, brush type, Thermo King Alternator
Specifications

Electrical Standby (SmartPower Units Only)

NOTE: A transformer is used to convert 460 Vac to 230 Vac in units configured to use electric standby input voltage of 460 Vac.

Electric Motor and Overload Relay

<table>
<thead>
<tr>
<th>Voltage/Phase/Frequency</th>
<th>Horsepower</th>
<th>Kilowatts</th>
<th>rpm</th>
<th>Full Load (amps)</th>
<th>Overload Relay Setting (amps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>230/3/60</td>
<td>12.0</td>
<td>9.0</td>
<td>1760</td>
<td>31.2</td>
<td>34</td>
</tr>
<tr>
<td>460/3/60</td>
<td>12.0</td>
<td>9.0</td>
<td>1760</td>
<td>15.6</td>
<td>20</td>
</tr>
<tr>
<td>460/3/60</td>
<td>19.0</td>
<td>14.2</td>
<td>3500</td>
<td>21.7</td>
<td>32</td>
</tr>
</tbody>
</table>
## Standby Power Cord Requirements

<table>
<thead>
<tr>
<th>Supply Circuit Breaker:</th>
<th>12 HP Motor 230/3/60</th>
<th>70 amps</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12 HP Motor 460/3/60</td>
<td>40 amps</td>
</tr>
<tr>
<td></td>
<td>19 HP Motor 460/3/60</td>
<td>60 amps</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Extension Cord Size:</th>
<th>12 HP Motor 230/3/60</th>
<th>8 AWG Power Cable, 25 to 50-foot length</th>
</tr>
</thead>
<tbody>
<tr>
<td>(All 4 conductor, 2000 Vac, Type W Power Cable)</td>
<td>12 HP Motor 230/3/60</td>
<td>6 AWG Power Cable, 75-foot length</td>
</tr>
<tr>
<td></td>
<td>12 HP Motor 460/3/60</td>
<td>10 AWG Power Cable, up to 75-foot length</td>
</tr>
<tr>
<td></td>
<td>19 HP Motor 460/3/60</td>
<td>8 AWG Power Cable, up to 75-foot length</td>
</tr>
</tbody>
</table>
NOTE: Pretrip inspections can be performed by the operator.  
1,500, 3,000 and 4,500 hours/annual inspections should be performed by an authorized Thermo King dealer.

<table>
<thead>
<tr>
<th>Pretrip</th>
<th>Every 1,500 Hours</th>
<th>Every 3,000 Hours*</th>
<th>Annual/4,500 Hours</th>
<th>Inspect/Service These Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microprocessor</td>
<td>Run Pretrip Test</td>
<td>Engine</td>
<td>Check fuel supply.</td>
<td>Check engine oil level.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Inspect belts for condition and proper tension.</td>
</tr>
</tbody>
</table>

*3,000 hours or two years, whichever occurs first.

** Based on EPA 40 CFR Part 89.
### Host Unit (Continued)

<table>
<thead>
<tr>
<th>Pretrip</th>
<th>Every 1,500 Hours</th>
<th>Every 3,000 Hours*</th>
<th>Annual/4,500 Hours</th>
<th>Inspect/Service These Items</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Check engine oil pressure hot, on high speed (should display “OK”).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Listen for unusual noises, vibrations, etc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Check engine coolant level and antifreeze protection (-30 F [-40 C]).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Drain water from fuel tank and clean vent.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Inspect/clean electric fuel pump filter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Check and adjust engine speeds (high and low speed).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Check condition of drive coupling bushings per Service Bulletin T&amp;T 171.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Check engine mounts for wear.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Replace EMI 3000 air cleaner element at 3,000 hours or two years (whichever occurs first).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Replace EMI 3000 fuel filter/water separator.</td>
</tr>
</tbody>
</table>

*3,000 hours or two years, whichever occurs first.
** Based on EPA 40 CFR Part 89.
# Maintenance Inspection Schedule

## Host Unit (Continued)

<table>
<thead>
<tr>
<th>Pretrip</th>
<th>Every 1,500 Hours</th>
<th>Every 3,000 Hours*</th>
<th>Annual/4,500 Hours</th>
<th>Inspect/Service These Items</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Change engine oil and oil filter (hot).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>C-600M, S-610DE and S-610M</strong> - Requires oil with API Rating CI-4 or better.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>S-600M and S-600DE</strong> - Requires oil with API Rating CJ-4 or better.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>NOTE: For high biodiesel use (B20) the engine oil and filter should be changed every 1,500 hours.</strong></td>
</tr>
<tr>
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<td></td>
<td><strong>S-600M and S-600DE</strong> - Replace Timing Belt, Water Pump, Belt Tensioner, and Idler Pulley with Timing Belt Kit every 6,000 hours, When replacing the Timing Belt, inspect the High Pressure Fuel Pump and replace as necessary.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>S-610DE and S-610M</strong> - Inspect/clean EGR system (valve, piping, and cooler).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>C-600M</strong> - Test fuel injection nozzles at least every 3,000 hours. ** **</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td><strong>C-600M</strong> - Replace fuel return lines between fuel injection nozzles every 10,000 hours.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Adjust engine valve clearance.</td>
</tr>
<tr>
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<td></td>
<td>Change ELC (red) engine coolant every 5 years or 12,000 hours.</td>
</tr>
</tbody>
</table>

*3,000 hours or two years, whichever occurs first.  
** Based on EPA 40 CFR Part 89.
### Host Unit (Continued)

<table>
<thead>
<tr>
<th>Pretrip</th>
<th>Every 1,500 Hours</th>
<th>Every 3,000 Hours*</th>
<th>Annual/4,500 Hours</th>
<th>Inspect/Service These Items</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Electrical</td>
</tr>
<tr>
<td></td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>Inspect battery terminals and electrolyte level.</td>
</tr>
<tr>
<td></td>
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<td>•</td>
<td>•</td>
<td>Inspect wire harness for damaged wires or connections.</td>
</tr>
<tr>
<td></td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>Inspect AC generator and alternator wire connections for tightness.</td>
</tr>
<tr>
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<td>•</td>
<td>•</td>
<td>•</td>
<td>Inspect electric motors.</td>
</tr>
<tr>
<td></td>
<td>•</td>
<td></td>
<td>•</td>
<td>Inspect and if required re-torque all electrical connections on the contactors in the Fan Control Box to 15 in-lb (1.7 N·m).</td>
</tr>
<tr>
<td></td>
<td>•</td>
<td></td>
<td>•</td>
<td>Inspect and if required re-torque all electrical connections on the contactors in the High Voltage Box in SmartPower units. Torque the connections on the Compressor Motor Contactor, Phase Contactors, and Overload Relay to 22 in-lb (2.5 Nm). Torque the connections on all other contactors to 15 in-lb (1.7 N·m).</td>
</tr>
</tbody>
</table>

*3,000 hours or two years, whichever occurs first.
** Based on EPA 40 CFR Part 89.
### Host Unit (Continued)

<table>
<thead>
<tr>
<th>Pretrip</th>
<th>Every 1,500 Hours</th>
<th>Every 3,000 Hours*</th>
<th>Annual/4,500 Hours</th>
<th>Inspect/Service These Items</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Refrigeration</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>Check refrigerant level.</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>Check for proper suction pressure.</td>
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<tr>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>Check compressor oil level and condition.</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
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<td>•</td>
<td>Check compressor efficiency and pump down refrigeration system.</td>
</tr>
<tr>
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<td>•</td>
<td>Empty oil collection container mounted on compressor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>•</td>
<td>Replace dehydrator and check discharge and suction pressure every two (2) years.</td>
</tr>
</tbody>
</table>

*3,000 hours or two years, whichever occurs first.
** Based on EPA 40 CFR Part 89.
### Host Unit (Continued)

<table>
<thead>
<tr>
<th>Pretrip</th>
<th>Every 1,500 Hours</th>
<th>Every 3,000 Hours*</th>
<th>Annual/4,500 Hours</th>
<th>Inspect/Service These Items</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Structural</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>Visually inspect unit for fluid leaks.</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>Visually inspect unit for damaged, loose or broken parts (includes air ducts and bulkheads).</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>Inspect idlers for bearing wear (noise).</td>
</tr>
<tr>
<td>•</td>
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<td>•</td>
<td>Clean entire unit including condenser and evaporator coils and defrost drains.</td>
</tr>
<tr>
<td>•</td>
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<td>•</td>
<td>•</td>
<td>Check all unit and fuel tank mounting bolts, brackets, lines, hoses, etc.</td>
</tr>
</tbody>
</table>

*3,000 hours or two years, whichever occurs first.  
** Based on EPA 40 CFR Part 89.
Remote Evaporator(s)

<table>
<thead>
<tr>
<th>Pretrip</th>
<th>Every 1,500 Hours</th>
<th>Every 3,000 Hours*</th>
<th>Annual/4,500 Hours</th>
<th>Inspect/Service These Items</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Electrical</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Inspect wire harness for damaged wires or connections.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Inspect/replace DC fan motors.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Structural</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Visually inspect unit for fluid leaks.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Visually inspect unit for damaged, loose, or broken parts.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Clean entire unit including evaporator coils and defrost drains.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Check all unit mounting bolts, brackets, lines, hoses, etc.</td>
</tr>
</tbody>
</table>
Serial Number Locations

Located on Rear Evaporator Housing

Located on Frame in Engine Compartment (near battery)

Serial Number Plate and Locations
Emergency Cold Line

If you can’t get your rig rolling, and you have tried the Thermo King North American Service Directory (available from any Thermo King dealer) to reach a dealer without success, then call the Toll Free Emergency Cold Line Number (888) 887-2202.

The answering service at the factory will assist you in reaching a dealer to get the help you need. The Cold Line is answered 24 hours a day by personnel who will do their best to get you quick service at an authorized Thermo King Dealer.
Recover Refrigerant

At Thermo King, we recognize the need to preserve the environment and limit the potential harm to the ozone layer that can result from allowing refrigerant to escape into the atmosphere.

We strictly adhere to a policy that promotes the recovery and limits the loss of refrigerant into the atmosphere.

In addition, service personnel must be aware of Federal regulations concerning the use of refrigerants and the certification of technicians. For additional information on regulations and technician certification programs, contact your local THERMO KING dealer.

CALIFORNIA Proposition 65 Warning

Diesel exhaust is a chemical known to the State of California to cause cancer.
Ingersoll Rand’s Climate Solutions sector delivers energy-efficient HVACR solutions for customers globally. Its world-class brands include Thermo King, the leader in transport temperature control and Tierco, a provider of energy-efficient heating, ventilating and air conditioning systems, building and contracting services, parts support and advanced controls for commercial buildings and homes.

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Precedent™
Multi Temperature Units
C-600M, S-600M, S-600DE, and S-610DE
TK 56171-2-OP (Rev. 2, 05/16)