Direct Drive Truck Units with Direct Smart Reefer
Operator's Manual
B-100, V-100, V-200, V-300, V-500, V-600, V-700, V-800

TK 51916-EN-18-OP (Rev. 9, 03/14)

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THERMO ASSISTANCE

Thermo Assistance is a multilingual communication tool designed to put you in direct contact with an authorised Service Dealer should you require one.

To use this system, you need the following information before you call:

- Contact Phone Number
- Type of TK Unit
- Thermostat Setting
- Present Load Temperature
- Probable Cause of Fault
- If the Unit is Under Warranty
- How You Will Pay for the Repair

Refer to the Thermo King Service Directory.

Give the Thermo Assistance Operator your name and a contact phone number and ask the operator to call you back. Thermo Assistance will then call you back, at which point you can give details of the service required and the repair will be organised.

Please note that Thermo Assistance cannot guarantee payments and that the service is designed for the exclusive use of refrigerated transporters using products manufactured by Thermo King Corporation.

DISCLAIMER

The manufacturer, Thermo King Corporation, assumes no responsibility for any act or action taken on the part of the owner or operator in the repair or operation of the products covered by this manual that are contrary to the manufacturer's printed instructions. No warranties express or implied, including warranties arising from cause of dealing or usage or trade, are made regarding the information, recommendations, and description contained herein. The manufacturer is not responsible and will not be held liable in contract or in tort (including negligence) for any special, indirect, or consequential damages, including injury or damage caused to vehicles, contents, or persons, by reason of the installation of any Thermo King product, its mechanical failure, or the failure of the owner/operator to heed caution and safety decals strategically located on the product.

INTRODUCTION

Thermo King Spain has developed a new digital Control Box with a programmable microprocessor that monitors the operation of the unit and displays this information rapidly and clearly on the screen.

These new In-cab Control Boxes have been designed for use in Thermo King vehicle engine-driven units equipped with the electronic control system.

A single control box can control both single-compartment units and bi-temperature two-compartment units alike.

There is nothing complicated about learning to use the In-cab Control Boxes manufactured by Thermo King Spain, but you will find that a few minutes spent studying the contents of this manual will be time well spent.

The In-cab Control Boxes can operate with both 12 and 24V units.

Temperatures can be displayed in either degrees Celsius or degrees Fahrenheit.

This driver's manual is published for information purposes only and the information being furnished herein should not be considered as all-inclusive or meant to cover all contingencies. If further information is required, consult your Thermo King Service Directory for the location and phone number of your local dealer.

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

1. They are equipped with the factory recommended tools to perform all service functions.
2. They have factory trained and certified technicians.

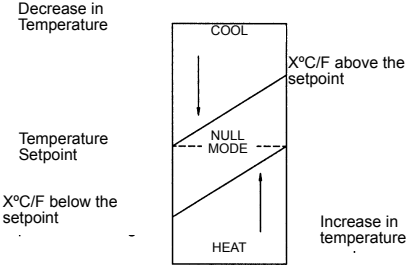
3. They are stocked with genuine Thermo King replacement parts.
4. The warranty on your new unit is valid when the repair and/or replacement of component parts is performed by an Authorised Thermo King dealer.

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

GENERAL OPERATION

In truck-driven units, temperature control is based on two values: The setting **(Setpoint)** of the electronic thermostat and the evaporator return temperature. The difference between these two temperatures will determine the mode of operation: cool, heat, or null.

- **Cool:** When the temperature in the load compartment is higher than the setpoint, the unit runs in cool mode to reduce the evaporator return temperature.
- **Heat:** When the temperature in the load compartment is lower than the setpoint, the unit changes to heat mode to raise the evaporator return temperature.
- **Null:** Once the Setpoint Temperature has been reached, and while the temperature remains between XºC/F above or below the setpoint, there is no demand for transfer of heat or cold, and the unit runs in null mode.
- **Defrost:** After a scheduled period of time in cool mode, between 1 and 8 hours, the unit runs in this fourth mode of operation to eliminate ice that has accumulated in the evaporator or condenser coil. Defrost can be initiated automatically or manually.



Factory setting for X is 3ºC (5ºF). During unit installation, this value can be adjusted by between 1 and 5ºC (2 and 9ºF) in increments of 1ºC/F.

Units with R-134a refrigerant: Temperatures can be controlled from -20ºC to +22ºC (-4ºF to +71ºF).

Units with R-404A refrigerant: Temperatures can be controlled from -32ºC to +22ºC (-26ºF to +71ºF).

CE

Address:
Sant Josep, 140-142 P.I. “El Pla”, Sant Feliu de Llobregat, Barcelona, Spain.

Year of manufacture: Reference Serial Plate.

Installation and commissioning are to be carried out by an authorised Thermo King Dealer in accordance with Thermo King procedures and drawings. Exceptions to this with the written authorisation of the manufacturer only.

SAFETY PRECAUTIONS

WARNING!

This unit is not intended for use by persons (including children) with a physical, sensory or mental impairment, or by persons without the proper experience or knowledge, unless they have been provided supervision or instruction regarding the use of the unit by a person responsible for their safety.
Children must be supervised to ensure they do not play with the unit.

Thermo King recommends that all services be performed by a Thermo King dealer. However, there are several general safety practices which you should be aware of:

1. When working with or around the refrigeration system, always wear goggles or safety glasses. Refrigerant or battery acid can cause permanent damage if they come in contact with your eyes.
2. Never run the unit with the compressor discharge valve closed.
3. Keep your hands and loose clothing clear of fans and belts at all times when the unit is running or when opening and closing the compressor service valves.
4. If you need to drill holes in your unit for any reason, use extreme caution. You could be weakening structural components. Drilling into electrical wiring or refrigerant lines could cause a fire.
5. It is recommended that any service work on evaporator or condenser coils be left for the certified Thermo King technician but, should you need to work around the coils, use extreme caution as exposed coil fins can cause painful lacerations.

REFRIGERANT

Although fluorocarbon refrigerants are classified as safe, observe caution when working with refrigerants or around areas where they are being used in the servicing of your unit.
Fluorocarbon refrigerants evaporate rapidly, freezing anything they contact if accidentally released into the atmosphere from the liquid state.
The Fluorocarbon refrigerants used in the air conditioning units may produce toxic gases which, in the presence of an open flame or electrical short, become severe respiratory irritants capable of causing death.

FIRST AID - REFRIGERANT

EYES: If liquid comes into contact with the eyes, flush with large amounts of water and get prompt medical attention.

SKIN: Flush affected area with large amounts of lukewarm water and keep cool. Cover burns with dry, sterile, bulky dressings to protect from infection or injury. Get medical attention.

INHALATION: Move victim to fresh air and restore breathing if necessary. Stay with victim until arrival of emergency medical personnel.

REFRIGERANT OIL

Always observe the following directions when working with refrigerant oil:

EYES: Do not allow refrigerant oil to contact your eyes.

SKIN: Do not allow prolonged or repeated contact with skin or clothing.

IRRITATION: To prevent irritation, wash thoroughly immediately after handling.

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 the irritation persists.

INHALATION: Move victim to fresh air and restore breathing if necessary. Stay with victim until arrival of emergency personnel.

INGESTION: Do not induce vomiting. Contact local poison control centre or physician immediately.

Fluorocarbon refrigerants tend to displace air and can cause oxygen depletion which could result in death by suffocation. Observe caution at all times when working with or around refrigerants, or air conditioning systems containing refrigerants, especially in enclosed or confined areas.

AUTO START

Thermo King truck powered refrigeration units may start up automatically at any time, whether under engine or electric standby operation.

Ensure that the unit is switched off before inspecting any component part.

ELECTRICAL HAZARD

Ensure that high voltage energy supply is switched off and disconnect the electric cable before working on the unit. Units with electrical power supply present a potential electrical hazard.

UNITS WITH ELECTRICAL STANDBY OPERATION

If the power cord is damaged, it must be replaced by the manufacturer, by the manufacturer's after-sales service team or by similarly qualified personnel, in order to prevent a hazardous situation arising.

Connect the unit to a power line protected by a differential and a circuit breaker with a minimum distance of 3 mm between the contacts. To do this, use the connecting plug supplied with the unit.

WARNING

Electric welding generates high ampere currents which can damage electrical and electronic components. To minimise damage, prior to any welding operation on the vehicle, the microprocessor controller and unit battery must be electrically disconnected from the vehicle. Turn off the microprocessor's On/Off switch. Remove the battery negative cable. Remove all connectors from the rear of the microprocessor controller. Close the control box. Connect the welder ground cable as close as possible to the area being welded. When welding is complete, remove the welder ground cable. Reconnect the cables to the rear of the microprocessor controller. Reconnect the battery negative cable. Turn on the microprocessor's On/Off switch. Reset all alarms and codes to their previous settings. Run a full Pre-trip Inspection. Detailed instructions can be found in Thermo King Service Procedure A26A.

ELECTRONIC CONTROL SYSTEM

Thermo King direct drive refrigeration units are composed of a condenser unit, an evaporator unit (two evaporators in bi-temperature units), a vehicle compressor (in models with electric standby there is a second compressor wich is driven by an electric motor) and a control panel (In-cab Control Box) witch operates the unit.

The Electronic Control System is composed of an Electronic Control Module (located inside the condenser unit) and the In-cab Control Box. This In-cab Control Box allows the truck driver to operate the Thermo King refrigeration unit.

In-cab Control Box

DESCRIPTION OF THE ELECTRONIC CONTROL SYSTEM

The Electronic Control System has the following characteristics:

- Auto Start
- Soft Start
- Active Display
- Lit Keypad
- Total Hourmeter
- Vehicle Compressor Hourmeter
- Electric Standby Compressor Hourmeter
- Low Battery Voltage Alarm
- Buzzer
- Unit Control without In-cab Control Box
- Manual or Automatic Defrost
- Maintenance Warning
- Return Air Temperature Sensor
- Setpoint Temperature Reading
- Electric Power Warning
- Independent connection/disconnection of compartments in bi-temperature units.

Auto Start: Should the unit stop due to a failure in the power supply, whether during on-the-road or electric standby operation, it will start up again as soon as the power supply is re-established.

Soft Start: All operation modes remain inactive for a few seconds after an Auto Start.

Active Display: The In-cab Control Box display is always active and backlit except when the unit is disconnected (no power) or when the unit is connected but has been manually switched off from the In-cab Control Box (when there is no active alarm).

Lit Keypad: The In-cab Control Box keys are always lit except when the unit is disconnected (no power) or when the unit is connected but has been manually switched off from the In-cab Control Box (when there is no active alarm). The On/Off key is always lit except when the unit is disconnected (no power), and thus indicates the presence of power in the unit.

Total Hourmeter: Total number of hours the unit is in operation.

Vehicle Compressor Hourmeter: Number of hours the unit has been operating on-the-road.

Electric Standby Compressor Hourmeter: Number of hours the unit has been operating in electric standby.

Low Battery Voltage Alarm: Disconnects the unit when the battery voltage falls below 10.5V in 12VDC systems or below 21V in 24VDC systems.

Buzzer: It is energised when the vehicle battery and the electric power supply are connected at the same time. It is also energised if the doors are opened while the refrigeration unit is running.

Unit Control without In-cab Control Box: The unit can also be operated by the Electronic Control System without the In-cab Control Box, under conditions selected by the In-cab Control Box before it is disconnected.

Manual or Automatic defrost: It is possible to choose between manual or automatic defrost.

Maintenance Warning: On-screen warning of the need to carry out maintenance on the unit.

Return Air Temperature Sensor: On-screen reading of the temperature in the load compartment. In bi-temperature units, the temperature in both compartments can be read on the same screen.

Setpoint Temperature Reading: On-Screen Setpoint Temperature Reading. In bi-temperature units, the setpoint temperature of both compartments can be read on the same screen.

Electric Power Warning: On-screen warning that the unit is connected to an electric power supply.

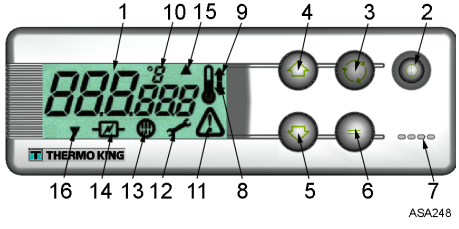
UNIT CONTROLS

WARNING!

Never operate the unit unless you completely understand the controls; otherwise serious injury may occur.

IN-CAB CONTROL BOX

Display, Keys and Symbols



1. Display. It is always active and backlit except when the unit is disconnected (no power) or when the unit is connected but has been manually switched off from the In-cab Control Box. It normally displays the return air temperature (of both load compartments in bi-temperature units).

2. ON/OFF Key. This key is used to start/stop the unit. It is always lit except when the unit is disconnected (no power), and thus acts as an indicator of the presence of power in the unit.

3. Select Key. Selects prompt screens and information screens.

4. Up Key. Is used to increase the setpoint temperature.

5. Down Key. Is used to reduce the setpoint temperature.

6. Enter Key. Is used to enter a new command such as manual defrost, etc.

7. Buzzer. It is energised when the vehicle battery and the electric power supply are connected simultaneously. It is also energised if the doors are opened while the refrigeration unit is running.

8. Cool Symbol (Thermometer with an arrow pointing downward). The unit is cooling.

9. Heat Symbol (Thermometer with an arrow pointing upward). The unit is heating.

10. ºC/ºF Symbol. Indicates whether the on-screen temperature reading is in degrees Celsius (ºC) or degrees Fahrenheit (ºF).

11. Alarm Symbol. Indicates that there is an alarm in the system.

12. Maintenance Symbol. Warns of the need to carry out maintenance to the unit.

13. Defrost Symbol. Indicates the evaporator or condenser unit is in Defrost Mode.

14. Electrical Symbol. Indicates that the unit is in Electric Standby.

15. Condenser Defrost Symbol. Indicates the condenser unit is in defrost mode (turns on at the same time as defrost symbol 13).

16. Combined compartment symbol. Indicates that the bi-temperature unit is working as a single temperature unit.

OPERATING INSTRUCTIONS

Ensure the following pre-trip inspections are performed before starting the unit.

WEEKLY PRE-TRIP INSPECTION

The following weekly pre-trip inspection should be carried out before loading the truck. The weekly inspection does not replace the regular maintenance inspections (refer to the section on the maintenance inspection schedule). However, it is an important part of the preventative maintenance programme designed to prevent operating problems before they occur.

1. Leaks. Check for refrigerant leaks and worn refrigerant lines.

2. Battery. Terminals should be properly tightened and show no signs of corrosion.

3. Belts. Check for cracks, wear, and proper belt tension.

4. Mounting bracket. Ensure that bolts are fully tightened.

5. Electrical system. Electrical connections should be securely fastened. Wires and terminals should show no signs of corrosion, cracks or dampness.

6. Structure. Visually check for physical damage.

7. Coils. The condenser and evaporator coils (evaporator coils in bi-temperature units) should be clean and free of debris.

8. Load Compartment. Inspect the interior and exterior of the truck for any damage. Any damage to the walls or insulation should be repaired.

9. Defrost Drains. Check the defrost drain hoses and fittings to ensure they are not blocked.

10. Doors. Ensure that doors and weather seals are in good condition and seal hermetically.

11. Sight glass. Check that the refrigerant charge sight glass on the running unit is totally full (the cargo compartment temperature must be approximately 0ºC).

STARTING THE UNIT

Engine Operation

1. Start the truck engine.
2. Press the On/Off switch located in the In-cab Control Box. The In-cab Control Box display will be activated.
3. Check the setpoint, and adjust if necessary.

Electric Standby Operation

1. Connect the external power supply to the electric power receptacle. Ensure that the power supply is of the correct voltage and phase for the unit.
2. Press the On/Off switch located in the In-cab Control Box. The In-cab Control Box display will be activated. The electric symbol will appear on the screen.
3. Check the setpoint, and adjust if necessary.

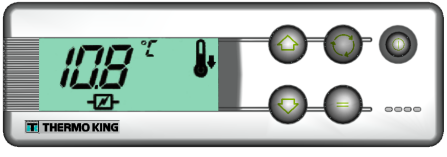
Note: ***Regular monitoring of the unit is recommended, the frequency of this monitoring will depend on the type of cargo.***

Note: ***The operating mode, whether engine-driven or electric standby, is selected automatically. When the unit is connected to an electric power source, engine-driven operation is automatically blocked. If the truck engine is started up while the power cable is still connected to the electrical power source, the unit will continue to operate in electric standby mode and the buzzer will be activated.***

STANDARD DISPLAY

This is the display that appears when the ON/OFF key is pressed and the unit started. It normally displays the return air temperature (of both load compartments in bi-temperature units) and the current operating mode with the appropriate symbol.
Should there be an alarm, the alarm symbol will also appear on screen.

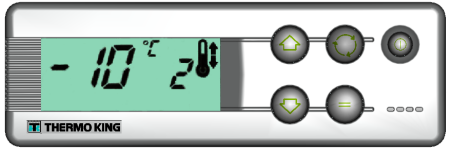
SINGLE-TEMPERATURE UNITS:



ASA249

The example in the drawing shows: 10.8ºC temperature, cool mode and standby operation.

BI-TEMPERATURE UNITS:



ASA275

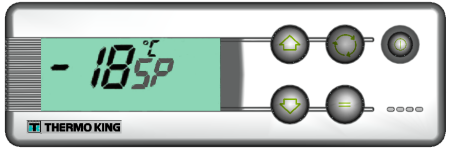
The example in the drawing shows: -10ºC temperature and cool mode in the main compartment, and 2ºC temperature and heat mode in the remote compartment. Unit running in on-the-road mode.

ENTERING THE SETPOINT TEMPERATURE

The Setpoint Temperature can be quickly and easily changed.

IN SINGLE-TEMPERATURE UNITS:

1. Press and release the SELECT key twice (three times in reverse cycle units), and the current Setpoint Temperature and the letters ***SP*** will appear on screen.



ASA250

2. Press the UP or DOWN arrow keys to select the desired Setpoint Temperature. Each time either of these buttons is pressed and released, the Setpoint Temperature will change 1 degree.

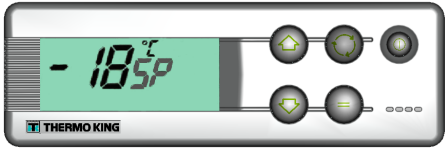
3. Press and release the ENTER key to set the setpoint or press and release the SELECT key to set the setpoint and return to the Standard Display.

CAUTION!

If the SELECT key or the ENTER key is not pressed within 20 seconds to select the new Setpoint Temperature, the unit will continue to run at the original Setpoint Temperature.

IN BI-TEMPERATURE UNITS:

1. **Main Load Compartment:** Press and release the SELECT key twice, and the current Setpoint Temperature in the main compartment and the letters ***SP*** will appear on screen.



ASA250

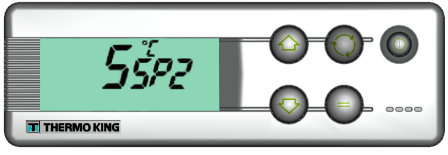
2. Press the UP or DOWN arrow keys to select the desired Setpoint Temperature. Each time either of these buttons is pressed and released, the Setpoint Temperature will change 1 degree.

3. Press and release the ENTER key to set the setpoint or press and release the SELECT key to set the setpoint and to change to the **Remote Compartment** Setpoint Temperature Setting Screen.

CAUTION!

If the SELECT key or the ENTER key is not pressed within 20 seconds to select the new Setpoint Temperature, the unit will continue to run at the original Setpoint Temperature.

4. **Remote Load Compartment:** The present Setpoint Temperature in the remote compartment and the letters ***SP2*** will appear on screen.



ASA251

5. Press the UP or DOWN arrow keys to select the desired Setpoint Temperature. Each time either of these buttons is pressed and released, the Setpoint Temperature will change 1 degree.

6. Press and release the Enter key to set the set point value or press and release the SELECTION key to set the set point and move to the **CSE (Compartment Selection)** screen.

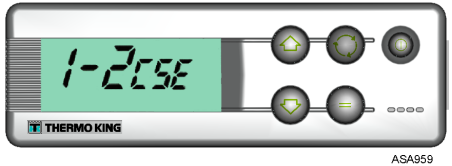
CAUTION!

If the SELECT key or the ENTER key is not pressed within 20 seconds to select the new Setpoint Temperature, the unit will continue to run at the original Setpoint Temperature.

COMPARTMENT SELECTION

7. Press the key UP or DOWN to change option between the four different options available:

- **1-2** This is the standard multi-temperature setting where both compartments (zones) are active.



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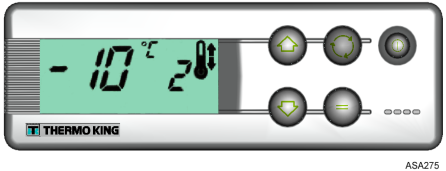
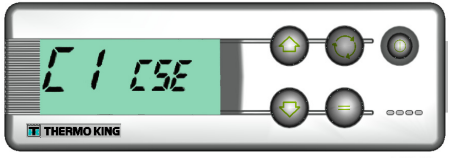
  – The screen shows the temperature in both compartments (zones).



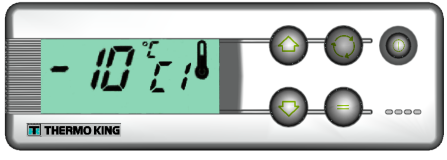
ASA275

- **C1:** Compartment 1 is active while Compartment 2 is disabled.



ASA960

  – Only the temperature for compartment 1 appears on the screen, while no reading is shown for compartment 2.



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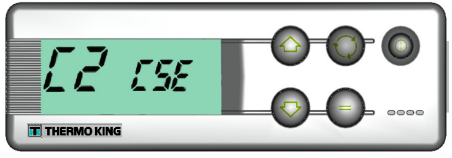
- **C2:** Compartment 2 is active while Compartment 1 is disabled.



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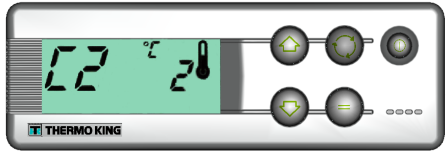
  – Only the temperature for compartment 2 appears on the screen, while no reading is shown for compartment 1.



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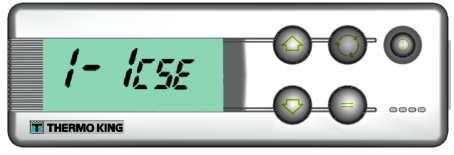
- **1-1:** Compartments 1 and 2 are combined to operate as a single-temperature unit; only the temperature for Compartment 1 is displayed.



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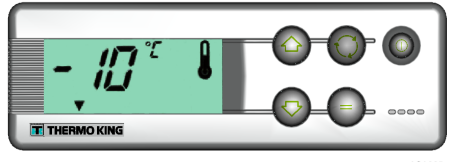
  – The screen is shown as that of a single-temperature unit but with the triangle symbol activated to indicate that it is actually a bi-temperature unit operating as a single-temperature unit.



ASA965

8. Press and release the ENTER key to select an option or press and release the SELECTION key to select an option and return to the standard screen.

CAUTION!

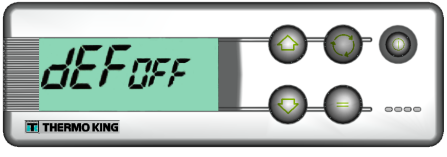
If the SELECT key or the ENTER key is not pressed within 20 seconds to select the new Setpoint Temperature, the unit will continue to run at the original Setpoint Temperature.

INITIATING THE EVAPORATOR MANUAL DEFROST CYCLE

CAUTION!

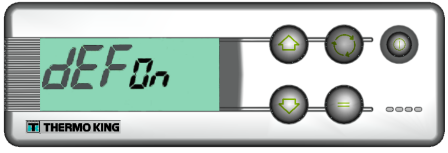
Before initiating a manual defrost, ensure that the unit is not already in a defrost cycle. When the unit is in a defrost cycle the defrost symbol appears on screen.

1. Press and release the SELECT key once, and the letters ***dEF*** will appear (flashing) on screen along with the present defrost condition ***OFF***.



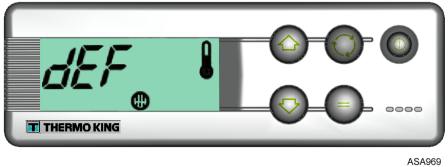
ASA270

2. To activate manual defrost, press the ENTER key and then the UP or DOWN key and the defrost condition will change to ***ON***.



ASA252

3. Press the SELECT key twice to return to the STANDARD DISPLAY (three times in bi-temperature units and in reverse cycle units), where the letters ***dEF*** and the DEFROST symbol will appear when the defrost cycle starts (***the load compartment temperature must be lower than 0ºC***).



ASA969

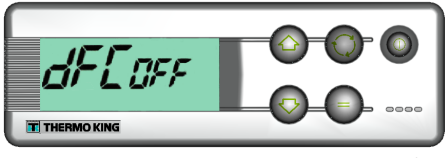
Note: *The letters* ***dEF will remain on screen for a while after returning to cool mode.***

INITIATING THE CONDENSER MANUAL DEFROST CYCLE (REVERSE CYCLE UNIT ONLY)

CAUTION!

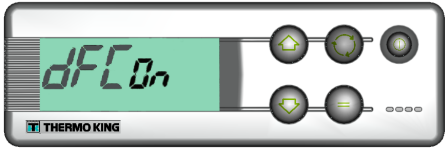
Before initiating a manual defrost, ensure that the unit is not already in a defrost cycle. When the unit is in a defrost cycle the defrost symbol appears on the screen.

1. Press and release the SELECT key twice, and the letters ***dFC*** will appear (flashing) on screen along with the present defrost condition ***OFF***.



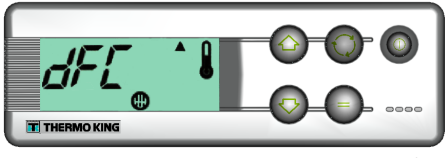
ASA692

2. To activate manual defrost, press the ENTER key and then the UP or DOWN key and the defrost condition will change to ***ON***.



ASA693

3. Press the SELECT key twice to return to the STANDARD DISPLAY, where the letters ***dFC*** and the DEFROST symbol will appear when the defrost cycle starts (***the outside ambient temperature must be lower than 0ºC***).



ASA970

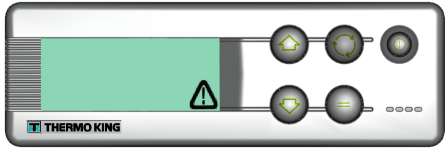
ALARMS

When the unit is not operating properly, the microprocessor records the alarm code, alerts the operator by displaying the ALARM symbol and, depending on the type of alarm, shuts the unit down.

There are three alarm categories:

Manual Start:

The alarm stops the unit, and only the ALARM symbol appears on screen.



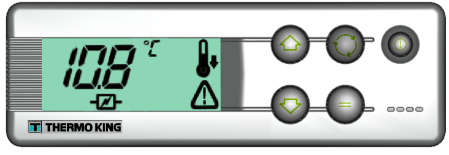
ASA253

Once the alarm condition has been rectified, the ON/OFF key must be pressed to start up again.

Press and release the SELECT key to display the current alarm code on screen. If there is more than one active alarm, all the alarm codes on the unit can be viewed in sequence by pressing and releasing the SELECT key.

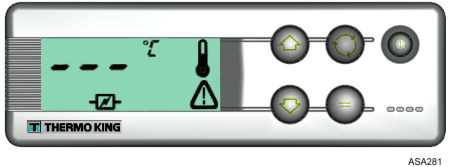
Auto Start:

The alarm stops the unit, the ALARM symbol appears on screen and the unit starts up automatically once the alarm condition has been rectified.



ASA272

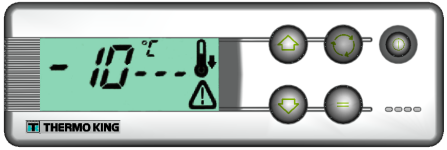
Should a **P1E** alarm occur- return air temperature read error alarm code - appear, --- will appear on screen together with the alarm symbol, instead of the return air temperature reading.



ASA281

If it is a **bi-temperature** unit, the --- will appear on the screen together with the alarm symbol, instead of the main compartment return air temperature reading.

In **bi-temperature** units, should a **P2E** - return air temperature read error in the remote compartment alarm code - appear, --- will also appear on screen together with the alarm symbol, instead of the remote compartment return air temperature reading.



ASA282

Press and release the SELECT key to display the current alarm code on screen. If there is more than one active alarm, all the alarm codes on the unit can be viewed in sequence by pressing and releasing the SELECT key.

Buzzers

They are energised when the vehicle battery and the electrical supply are connected simultaneously (the unit continues running in standby mode). They are also energised if the doors open, if this option is selected.

ALARM CODE DESCRIPTIONS

	Manual Start
OL	**Electric Motor Overload.** Unit protection system during electric standby operation. *If the problem persists when the unit is restarted, contact your Service Dealer.*
bAt	**Low Battery Voltage.** Unit and battery protection system.
	Auto Start
HP	**High Pressure Alarm.** Indicates that the refrigeration system will shut down in the event of excessively high pressure in the refrigerant circuit. *If the problem persists when the unit is restarted, contact your Service Dealer.*
LP	**Low Pressure Alarm.** Indicates that the refrigeration system will shut down in the event of excessively low pressure in the refrigerant circuit. *If the problem persists when the unit is restarted, contact your Service Dealer.*

PSE	**High Pressure Sensor Failure.** The high pressure sensor has become faulty or disconnected. *Contact your Service Dealer.*
tEP, tP4	**Thermal protection alarm.** *If the problem persists when the unit is restarted, contact your Service Dealer*
dr1, dr2	**Doors Open.** *This option must be activated.*
tCO	**Control Module Overheating.** *If the problem persists when the unit is restarted, contact your Service Dealer.*
SOF	**Software failure.** *Contact your Service Dealer.*
P1E	**Main or Single Cargo Box Return Air Temperature Reading Error (open circuit or short-circuit).** *Contact your Service Dealer.*
P2E	**Remote Cargo Box Return Air Temperature Reading Error (open circuit or short-circuit).** *Contact your Service Dealer.*
C	**Communications Failure.** *Contact your Service Dealer.*

CLEARING ALARM CODES

The alarm condition in the unit must first be corrected. After clearing the alarm condition, press and release the SELECT key to remove existing ALARM codes. The standard display will appear once the ALARM codes have been cleared.

VIEWING INFORMATION SCREENS

MAIN MENU

From the **Standard Display** use the SELECT key to display:

1. Alarms (if any active)
2. Evaporator Manual Defrost
3. Condenser Manual Defrost (reverse cycle units only)
4. Temperature Setpoint

HOURMETER MENU

From the **Standard Display** press the SELECT key for 3 seconds to open the **Hourmeter Menu**, then use the SELECT key to display:

1. **HC:** Hours remaining to maintenance notice.
2. **tH:** The total amount of time the unit has been switched on protecting the load.
3. **CC:** Engine-driven compressor operating hours.
4. **EC:** Electric standby compressor operating hours.
5. Return to Main Menu.

Note: ***Units with firmware version 380.03 and earlier: The unit of measurement is tens of hours (e.g. 150 = 1500 hours)***
Units with firmware version 380.06 and later: The unit of measurement is hours

POST-START INSPECTION

Thermostat. Adjust the thermostat setting to above and below the compartment temperature to check thermostat operation (see Operating Modes).

Pre-cooling. With the thermostat set at the desired temperature, run the unit for half-an-hour to one hour (or longer if possible) before loading the truck. Pre-cooling eliminates residual heat and acts as a good test of the refrigeration system.

Defrost. When the unit has finished pre-cooling the truck interior - the evaporator temperature should have dropped below 2ºC (35.6ºF) - initiate a defrost cycle with the manual defrost switch. The defrost cycle should stop automatically.

LOADING PROCEDURE

1. To minimise frost accumulation in the evaporator coil and a heat increase inside the load compartment, ensure that the unit is OFF before opening the doors. (The unit may continue to run when the truck is being loaded in a warehouse with the doors closed.)
2. Carefully check and record the load temperature when loading the truck. Note whether any products are out of temperature range.
3. Load the product in such a way that there is sufficient space for the air to circulate throughout the load. DO NOT block the evaporator inlet or outlet.
4. Product should be pre-cooled before loading. Thermo King units are designed to maintain the load at the temperature at which it is loaded. Transport refrigeration units are not designed to reduce the load temperature.

PROCEDURE AFTER LOADING

1. Ensure that all doors are closed and locked.
2. Adjust the thermostat to the desired temperature setpoint.
3. Start the unit.
4. Half an hour after loading the truck, defrost the unit for a moment by pressing the Manual Defrost switch. If the coil temperature drops to below 2ºC (35.6ºF), the unit will defrost. The defrost cycle should stop automatically.

WEEKLY PRE-TRIP CHECKS

1. Visually inspect belt.
2. Listen for unusual noises, vibrations, etc.
3. Visually inspect unit for fluid leaks (coolant, oil, refrigerant).
4. Visually inspect unit for damaged, loose or broken parts (including air ducts and bulkheads, if so equipped).
5. In the event of excess of dirt or obstruction clean the unit, including condenser and evaporator coils.

WEEKLY POST-TRIP CHECKS

1. Clean the outside cover of the unit. Use a damp cloth and neutral detergents. Do not use harsh cleaning products or solvents.

CAUTION!

Do not use pressurised water.

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

PREVENTATIVE MAINTENANCE SCHEDULE

A closely followed maintenance program will also help to keep your Thermo King unit in top operating condition. The following general schedule is provided to assist in monitoring that maintenance. Maintenance actions should be performed where applicable depending on the model.

UNIT MODELS VP Range			
First Week Inspection Recommended			
AFTER FIRST WEEK of operation:			
• Check belt tension			
• Tighten unit and mount bracket mounting bolts			
• Check for chafing of wiring harnesses and all hoses			
• Check refrigerant hoses, tubes and fittings for leaks.			
Recommended Every 500 hrs Or 6 months	**A Every 1,500 hrs Or 12 months**	**B Every 3,000 hrs Or 24 months**	**Inspect/repair the following items**
Miscellaneous			**These procedures may be carried out as an addition to the standard service procedures**
	☑	☑	* Check calibration of return and discharge sensors as per customers HACCP or annually. Also stand alone loggers if installed. Testing not included as part of service time.
☑	☑	☑	Check operation of all accessories.
☑	☑	☑	Check service records and ensure all service and warranty modifications have been completed. (Updates not included).

UNIT MODELS VP Range			
The service technician is responsible for assessing the condition of all parts & components found, during any service operation, to be in a condition suitable for further operation up to the next scheduled service. If parts are not considered to be in a suitable condition, they should be replaced.			
Recommended Every 500 hrs Or 6 months	**A Every 1,500 hrs Or 12 months**	**B Every 3,000 hrs Or 24 months**	**Inspect/repair the following items**
			Electrical
☑	☑	☑	Download Datalogger - Check alarm for codes and system operation and function & take corrective action as required (where applicable)
☑	☑	☑	Check defrost initiation and termination. Check evaporator fans function during defrost (fans should be stopped during defrost)
☑	☑	☑	Check thermostat switch sequence.
	☑	☑	Check the safety devices in the closing circuits.
	☑	☑	Check thermostat and temperature sensor calibration.
	☑	☑	Check for loose wires or plug connections.
☑	☑	☑	Check wiring and harnesses for chafing
☑	☑	☑	Check operation of condenser and evaporator fans
	☑	☑	Inspect DC motor brushes. Replace them before 2,000 HRS. (If the next service inspection is going to exceed the 2000hrs change them at this inspection)
☑	☑	☑	Check operation of all Thermo King external accesory equipment.
☑	☑	☑	Check operation of all non Thermo King external accesory equipment.
			Structure
☑	☑	☑	Visually inspect the unit for damaged, loose or broken parts.
	☑	☑	Clean defrost drains.
	☑	☑	Clean the evaporator and condenser coils and the heat sink of the bridge rectifier.
	☑	☑	Check all mounting bolts, brackets, lines, hoses, etc.

UNIT MODELS VP Range			
Recommended Every 500 hrs Or 6 months	**A Every 1,500 hrs Or 12 months**	**B Every 3,000 hrs Or 24 months**	**Inspect/repair the following items**
			Refrigeration
☑	☑	☑	Visually inspect refrigerant hoses, tubes and fittings for leaks.
☑	☑	☑	Visually inspect refrigerant hoses, tubes and fittings for rubbing.
☑	☑	☑	Check routing of refrigerant hoses in road compressor.
☑	☑	☑	Check refrigerant charge.
	☑	☑	Check preassure regulator valves
		☑	Replace dehydrator.
	☑	☑	Inspect oil separator.
		☑	Check the compressor's suction inlet filter when replacing drier. (Or if system is opened for other reason)
☑	☑	☑	Check operation of compressor clutches
	☑	☑	Check and ensure temperature change during heating and cooling cycles. (heating where applicable)
	☑	☑	Check validity of F Gas certificate as per local regulations. (Certification is not included as part of the Preventative Maintenance).
			Drive Kit Adapter (Refer to manufacturer maintenance recomendations)
	☑	☑	Visually inspect the compressor mount kit and associated components.
	☑	☑	Check that all adapter bolts are properly tightened.
	☑	☑	Check that there are no abnormal vibrations.
		☑	Replace the belt according to manufacturer recommendations.
☑	☑		Inspect the belts for condition and tension according to manufacturer recommendations.

WARRANTY

Should you require warranty service or repair during the warranty period, simply present your copy of the Warranty Certificate at any of the dealer locations shown in the Thermo King Service Directory. They will be happy to help you in accordance with the summary below.

WARRANTY SUMMARY

Full terms of the Thermo King Limited Warranty are available from your Thermo King dealer.

Note: Parts replacements or repairs under warranty must be performed by an authorised Thermo King dealer.

Note: Warranty term and times are subject to change. The specific warranty which applies to your unit can be checked by your Thermo King dealer.

RECOVER REFRIGERANT

At Thermo King we recognise 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.