
SV-600Li,RV-680II,RV-780II

ARCON CONTROLLER

Operation Manual (REV.01.2021)

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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.

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Safety Precautions

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:



WARNING: Always wear goggles or safety glasses when working with or around the refrigeration system. Refrigerant or battery acid can cause permanent damage if it comes in contact with your eyes.



WARNING: Keep hands and loose clothing clear of fans and belts at all times when the unit is operating or when opening or closing compressor service valves.



WARNING: Exposed coil fins can cause painful lacerations. Service work on the evaporator or condenser coils is best left to a certified Thermo King technician.



CAUTION: Use extreme caution when drilling holes in the unit. Drilling into electrical wiring or refrigerant lines could cause a fire. Never drill into structural components.

Electrical Hazard



CAUTION: Be sure to turn off the high voltage power supply, and disconnect the electric cable before working on the unit. Units with electric standby present a potential electrical hazard

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.

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



DANGER: Fluorocarbon refrigerants may 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.



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Safety Precautions

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 arrival of emergency medical personnel.

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 arrival of emergency personnel.

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

Control System

I、 Control panel



1. Unit runs indicator
2. Defrost indicator
3. Set indicator
4. Alarm indicator
5. Standby indicator
6. Up key
7. Set key
8. ON/OFF key
9. Down key / Manual defrost key
10. Temp display zone

II、 Unit ON/OFF

1. Long press ON/OFF button  for 1s to turn ON/OFF the unit
 - a、 Initialization display
All illuminated → standard display
 - b、 Standard display
① is lit on, ⑩ zone display return air temperature of refrigeration compartment
2. Other description:
 - Only for VP ARCON Controller
 - When the heating function is enabled, P-1 must be set to 0 in Engineering parameters

III、 Setpoint Temperature

During Unit is operating, press set key  to modify temperature setpoint

Then press up  or down key  to change the set point

Control System

Increase the setpoint with up  key

Decrease the setpoint with down  key

Save the setpoint by press the set key  again

IV、Defrost

There are two ways to defrost. it is selectable through d-6 in user parameters

d-6 =0 hot-gas Hot gas defrosting

D-6 =1 off-cycle Unit off for defrost

Initiate defrost

During the unit runs, defrosting can be automatically initiated by defrosting timer, or manually started by long pressing the manual defrosting key 3s

Before initiation, the default defrost sensor temperature(CTS) is not higher than 0°C (this temperature value can be modified by d-7 parameter).

Defrost termination :

Defrost is terminated If any of the following four conditions are met

- 1) When defrosting, Long press the manual defrost key for 3s
- 2) Maximum defrosting time to (default: 30 minutes)
- 3) Long Press the ON/OFF button 1s during defrosting
- 4) The temperature of the defrost sensor is higher than 6°C (the temperature value can be modified by d-8parameter)

Notes:

The defrosting interval can be changed in user parameter d-9. Its unit is (d-9) *10 minute

The time limit for defrosting can be changed in user parameter d-10. Its unit is minute

Control System

V、Error Code

If there is any error,  symbol will illuminate

Alarm Code	Description	Remarks
E3	Return air temperature sensor failure	Check the sensor and the alarm will be cleared when the sensor returns to the effective range
E4	Discharge temperature sensor failure	Check the sensor and the alarm will be cleared when the sensor returns to the effective range
E5	Evaporator coil temperature sensor failure	Check the sensor and the alarm will be cleared when the sensor returns to the effective range
F1	EVAP Fan 1 Fuse Open	Check F1 Fuse and load circuit
F2	EVAP Fan 2 Fuse Open	Check F2 Fuse and load circuit
F3	EVAP Fan 3 Fuse Open	Check F3 Fuse and load circuit
F4	COND Fan 1 Fuse Open	Check F4 Fuse and load circuit
F5	COND Fan 2 Fuse Open	Check F5 Fuse and load circuit
F6	COND Fan 3 Fuse Open	Check F6 Fuse and load circuit
F7	CIS/HGS/CL/HEATER Fuse Open	Check F7 Fuse and load circuit
Hdt	Discharge temperature overheat alarm	The alarm will be automatically cleared when the discharge temperature returns to normal
dPH	High pressure switch alarm	Alarm lock, check system high pressure, IGN power off and restart
EPL	Low pressure switch alarm	Alarm lock, check system low pressure, IGN power off and restart
ICE	RS485 communication failure	Communication failure between HMI and ECU , alarm will be automatically cleared after communication is normal
EEp	Parameter reading failure	replace ECU board

Control System

Note: When a sensor is faulty, the unit can work normally in fault-tolerant mode (See maintenance manual for details). However, it is recommended to replace the corresponding sensor immediately

VI、 data storage

The ARCON control system unit has data storage function:

1.storage content:

- Temperature set point
- Return air temperature
- Evaporation temperature
- Exhaust temperature
- Compressor running time
- Alarm information

2. Storage capacity

The unit can store 1000 groups of data, which will be overwritten automatically after the storage exceeds 1000 groups.

3. Storage conditions

Automatic storage in unit running state

A or B or C or D or E

A 10 minutes automatic storage

B Alarm occurs automatic storage

C Automatic defrosting

D Exit defrosting

E Set point modification

4. View stored data

Data analysis and visual processing using upper computer, please contact the professional maintenance personnel of TK

VII、 User parameter Setting maintenance

Only authorized personnel can enter into User parameter Setting mode and change parameters. Improper parameter settings will reduce unit performance. If you need to look for or change the controller parameter of the unit, please contact the professional maintenance personnel of TK

Control System

VIII、Fuse Setup

SV-600Li unit (AMP)

VOLTAGE	F1	F2	F3	F4	F5	F6	F7	F8	F9
12V	25	25	25	25	25	25	20	3	25
24V	15	15	15	30	30	30	15	2	15

RV680II/780II unit (AMP)

VOLTAGE	F1	F2	F3	F4	F5	F6	F7	F8	F9
24V	10	10	10	30	30	30	15	2	10

Daily Inspection

Pre-trip Inspection (before starting Unit)

Pre-trip inspections are an important part of regularly scheduled preventive maintenance programs designed to minimize operating problems and breakdowns before they happen. You should perform the following suggested pre-trip inspection before every trip involving refrigerated cargo.

Note: Pre-trips are not intended to take the place of regular maintenance inspections.

Belts: The belts must be in good condition and adjusted to the proper tension.

Electrical: Check all electrical connections to make certain they are securely fastened. The wires and connections must be free of rust and break without moisture.

Structural: Visually inspect the unit for leaks, misses, or broken parts and other damage. Check if the bulkhead is tightly sealed. The bulkhead must be firmly mounted closely against the roof, compartment walls and floor so as to reduce heat transferring between compartments. Check the floor channel for block of returning air or damage and ensure that returning air not be obstructed.

Coils: The condenser and evaporator coils should be clean and free of debris.

Cargo Box: Inspect the interior and exterior of the box for damage, any damage to the walls or insulation must be repaired.

Defrost Drain: Check the defrost drain hoses and fittings to be sure they are open.

Compartment Door: Be sure doors and weather seals are in good condition, the doors latch securely and weather seals fit tightly.

Pre-load Inspection

This chapter describes pre-loading, post loading, and enroute inspection procedures. Thermo King refrigeration units are designed to maintain the required product load temperature during transit. Follow these recommended loading and enroute procedures to help prevent cargo spoilage.

Pre-Loading Inspection

1. Products must be pre-cooled before loading. Note any variances on the manifest.
2. Inspect door seals and vent doors for condition and tight seal with no air leakage.

Daily Inspection

3. Inspect the cargo compartment inside and outside for:
 - Damaged or loose skin and insulation
 - Damaged walls, air ducts, floor channels or “T” flooring
 - Clogged defrost drain tubes.
 - Blocked return air bulkhead.
4. Inspect bulkheads for a tight fit at ceiling, walls, and floor. Bulkheads must fit tightly to reduce heat transfer between compartments.
5. Pre-cool the cargo compartments: adjust the setpoints for both compartments: adjust the setpoints for both compartments and run the unit 30-60 minutes (longer if possible) before loading.
6. Supervise products loading to ensure sufficient air space is maintained around and through the load in both compartments. Airflow around the cargo must not be restricted.

Post-Load Inspection

Post-loading inspection ensures the cargo has been loaded properly. To perform a post-load inspection:

1. Inspect the evaporator outlets for blockage.
 2. Turn off the unit before opening the cargo box doors to maintain efficient operation.
- Note: You can run the unit with the cargo box doors open if the truck is backed into a refrigerated warehouse with tight door seals.
3. Perform a final check of the load temperature. If the load is above or below temperature, make a final notation on the manifest.



Caution: *Pre-cool cargo to the correct temperature before loading. The unit is designed to maintain temperature, not cool an above-temperature load.*

4. Close or supervise the closing of the cargo box doors. Make sure they are securely locked.
5. Make sure the setpoint is at the temperature listed on the manifest.
6. If the unit was stopped, restart using the correct starting procedure. See the “Unit Operation”⁵⁵ chapter in this manual.
7. Repeat the after-start inspection. See the “Unit Operation” chapter in this manual.
8. Defrost the unit 30 minutes after loading by starting a manual defrost cycle.

Enroute Inspection

To help prevent damage to the cargo, complete the following enroute inspection every four

Daily Inspection

hours.

Inspection Procedure

1. Verify that the setpoints are correct.
2. Check the return air temperature readings. The temperature readings should be within the desired temperature range. If the readings are not within this range, see the "Inspection Troubleshooting" procedures below.
3. Initiate a manual defrost cycle after each enroute inspection.

Inspection Troubleshooting

1. If a return air temperature reading is not within the desired temperature range, refer to the troubleshooting table on the following pages. Correct the problem as needed.
2. Repeat the Enroute Inspection every 30 minutes until the compartment temperature is within the 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 the necessary steps to protect and maintain proper load temperature.



Caution: Stop the unit if the compartment temperature remains more than desired temperature range from the setpoint on two consecutive 30 minute inspections. Contact the nearest thermo King Service Center of your company office immediately. Take all necessary steps to protect and maintain proper load temperature

Maintenance Inspection Schedule

Weekly	Monthly	Semi-Annual	Annual	Inspect/Service These Items
				Electrical
		• • •	• • • • •	Check defrost initiation and termination. Check thermostat cycle sequence. Check operation of protection shutdown circuits. Check controller and sensors calibration in 0°C(320F) ice-water bath. Inspect wire harness for damaged wires or connections. Inspect/replace DC fan motor brushes.
				Refrigeration
		•	• •	Check refrigeration level. Replace dehydrator.
				Structural
	• •	• •	• •	Visually inspect unit and refrigerant hoses for fluid leaks. Visually inspect unit for damaged, loose or broken parts.
	• • •	• • • •	• • • •	Clean defrost drains. Inspect belts for condition and proper tension (belt tension tool P/N 204-427). Clean entire unit including evaporator coil and condenser coil. Check all unit mounting bolts, brackets, lines, hoses, etc.

Troubleshooting

Problem	Cause	Remedy
A return air temperature reading is not within desired temperature range of the setpoint.	The unit has not had time to cool down to correct menu	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.
	The unit may have a low refrigerant charge.	Check the receiver tank sight glass for refrigerant level. If liquid is not showing in the receiver tank sight glass, the refrigerant charge could 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.
	The unit is in defrost or has just completed a defrost cycle.	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.
	The evaporator is plugged with frost	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.
	Improper air circulation in the cargo compartment	Inspect the unit and cargo compartment to determine if the evaporator fans are working and properly circulating the air. Poor air circulation may be due to improper loading of the cargo, shifting of the load. Correct as required. Continue monitoring return air temperature until problem is corrected.
	The unit did not start automatically	Warning: the unit could start at any time when turned on. Turn the unit off before opening doors or inspecting any part of the unit. Determine the cause for not starting. Correct as required. Continue monitoring return air temperature until reading is within desired temperature range of the setpoint.

Serial Nameplate Location

Evaporator

The serial nameplate is located in side of evaporator frame (near expansion valve side)

Condenser

The serial nameplate is located in side of condenser frame (receiver tank side)

Warranty

Warranty

Should you require warranty service 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.

Thermo King Corporation Warranty Summary

Terms of the complete Thermo King Corporation Warranty are available on request. The complete unit is warranted to be free from defects in material and workmanship from the date in service for 12 months in accordance with the terms of such warranty. Please review the specific warranty that applies to your unit to determine whether additional warranty coverage is provided for specific components of your unit. The warranty shall only cover parts and labor.

Note: Thermo King shall have no liability in contract or in tort (including negligence or strict liability) or otherwise, for any injury or damage caused to vehicles, contents, product cargo or other property or for any special incidental, indirect or consequential damages whatsoever, including, but not limited to loss or interruption of business, lost profits and loss of use.

Note: Replacement of parts or repairs under warranty must be made by an authorized Thermo King dealer.

Recover Refrigerant

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.



THERMO KING

Providing equipment and services to manage controlled-temperature environments for food and other perishables, our Climate Control Technologies sector encompasses both transport and stationary refrigeration solutions. Our product brands include ThermoKing® a world leader in transport temperature control systems, and Hussmann®, a manufacturer of refrigeration and food merchandising equipment.

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