MANUAL BOOK

CONTENTS

INTRODUCTION

This manual is intended for the operator of Sinoclima transport refrigeration units. It contains basic instructions for the daily operation of the refrigeration unit as well as safety information, troubleshooting tips and other information that will help you deliver the load in the best possible condition.

Please take the time to read the information in this booklet and refer to it whenever you have a question about the operation of your unit. This manual covers the standard model. Some options may not be included, in which case you should contact our technical department.

Your refrigeration unit is designed to provide long, trouble-free service when properly operated and maintained. The checks outlined in this manual will help minimize problems in the field. In addition, a comprehensive maintenance program will help ensure that the unit continues to operate reliably. Such a maintenance program will also help control operating costs, extend the life of the unit, and improve performance.

When performing maintenance, please use Sinoclima parts to ensure optimal performance and reliability.

Everyone at Sinoclima is dedicated to continually improving product performance to meet the ever-changing needs of our customers.

Sinoclima, a leader in transport temperature control systems, specializes in the design, manufacture, and service of transport refrigeration units for trucks, vans, and various types of vehicles. Each Sinoclima product is supported by an international dealer network, which allows us to ensure consistency in pre-sales and after-sales consulting and technical support. We are confident that our products will meet your needs, whether your business is vehicle aftermarket, retail, or distribution.

1,DESCRIPTION

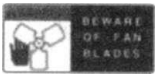
1.1. Description

It is manufactured as a split system, enabling it to adapt to any vehicle and any configuration.

a. Evaporator
b. Condenser
c. Cab command
d. Main road fuse
e. Compressor
f. Install kits

2,SAFETY

This manual contains safety and service instructions that should be followed to prevent accidents. Some of the following labels have been placed on the unit for your safety. before operating this refrigerant unit, carefully review all safety information explained in this manual and on the equipment. Be sure that all persons who will be operating this refrigeration unit have been trained in its safe use.
When operating or maintaining this refrigeration unit, be sure to follow the safety warnings.

	**Personal protective equipment:** Always use adequate Personal Protective Equipment before doing anything on this refrigerant unit, as explained in this manual. Hearing protection is recommended when unit is running.
	**Working at height :** Take all necessary safety precautions when accessing this refrigeration unit : use safe ladders, working platforms with appropriate guards.
	**Automatic start :** This refrigeration unit is equipped with Auto-Start/Stop, a valuable fuel saving feature. Before servicing refrigeration unit, make sure the main power switch is on the OFF position. Ensure the unit will not restart. Lock-out / Tag-out can be performed by disconnecting and enclosing: - the negative battery cable in diesel mode - the electrical plug in electrical mode
	**Electricity :** When this refrigeration unit is running in electrical operation, some devices are powered up especially in the electrical control box. Always use adequate tools and Personal Protective Equipment when working on electrical devices: safety gloves and safety glasses
Before servicing refrigeration unit, make sure the main power switch is on the OFF position. Ensure this refrigeration unit is disconnected from the local electrical network. Lock-out / Tag-out can be performed as described above. Before working in the electrical control box, it is required to control the absence of tension. Ensure that all condensers are discharged before service to avoid electric shock. WHEN IT IS NECESSARY TO WORK IN THE ELECTRICAL CONTROL BOX UNDER TENSION, PEOPLE MUST BE QUALIFIED FOR WORKS UNDER LOW OR HIGH VOLTAGE.	
	**Cooling oil :** - avoid prolonged or repeated contact with the skin. - wash carefully after Handling.
	**Belts and fans :** This refrigeration unit is equipped with Auto start/stop, it may start at any time and without warning.
When the unit is running beware of belts and fans that are moving. Before servicing refrigeration unit, make sure the main power switch is on the OFF position.Ensure the unit will not restart. Lock-out / Tag-out can be performed as described above. When there is protective structure (fan grid or guard for example) make sure they are in place. Never removed them when the refrigeration unit is running. Always keep your hands, body parts, clothes, hairs and tools far from moving parts.	

<table>
<tr><td>  </td><td>Refrigerant :
The refrigerant contained in this refrigeration unit can cause frostbite, severe burns or blindness in case of projection and direct contact with the skin or eyes.
In contact with flame or heat, refrigerant generates toxic gas: keep any flame, any lighted object or any source of sparks away from the refrigerant unit.</td></tr>
<tr><td colspan="2">Always use Personal Protective Equipment when handling refrigerant: safety clothes, safety gloves and safety glasses.
Refrigerant handling must be done by qualified people.</td></tr>
<tr><td rowspan="2">  </td><td>Burning with hot and cold :
When this refrigeration unit is running or even after, different components can be very cold or hot (exhaust pipe, tubes, coils, receiver, accumulator or engine for example)Beware when operating closed from cold or hot components.</td></tr>
<tr><td>Cuttings :
Beware when handling or operating closed from parts that could be sharp (coils, evaporators, clamps for example). Always use adequate safety gloves when doing any maintenance on this refrigeration unit.</td></tr>
<tr><td>  </td><td>Always use adequate safety gloves when doing any maintenance on this refrigeration unit.</td></tr>
<tr><td> 
  </td><td>Battery:
This refrigeration unit may be equipped with a lead-acid type battery. When charging the battery normally vents small amounts of flammable and explosive hydrogen gas. Projections of acids on the skin or eyes can cause severe burns.
Keep any flame, any lighted object or any source of sparks away from the battery elements.Always use Personal Protective Equipment when handling and charging battery: safety clothes, safety gloves and safety glasses.</td></tr>
</table>

3,PRODUCT LOADING

Proper air circulation in the insulated box, air that can move around and through the load, is a critical element in maintaining product quality during transport. If air cannot circulate completely around the load: hot spots or top-freeze can occur.The use of pallets is highly recommended. Pallets, when loaded so air can flow freely through the pallets to return to the evaporator, help protect the product from heat passing through the floor of the truck. When using pallets, it is important to refrain from stacking extra boxes on the floor at the rear of the truck, because this will cut off the airflow.

Product stacking is another important factor in protecting the product. Products that generate heat, fruits and vegetables for example, should be stacked so the air can flow through the product to remove the heat; this is called "air stacking" the product. Products that do not create heat, meats and frozen products, should be stacked tightly in the centre of the box. All products should be kept away from the sidewalls of the body, allowing air to flow between the body and the load; this prevents heat filtering through the walls from affecting the product.

It is important to check the temperature of the product being loaded to ensure that it is at the correct temperature for transport. The refrigeration unit is designed to maintain the temperature of the product at the temperature at which it was loaded; it was not designed to cool a warm product.

SOME ADVICE

BEFORE LOADING

• Pre-cool the inside of the insulated body by lowering the temperature for about 15 minutes.

• Evacuate the humidity existing inside the box by carrying out a manual defrost. This can only take place when enabled by the defrost thermostat (box temperature lower than 3°C during pull down and 8°C during heating).

• Evaporator fans are protected by safety grills. In the event of heavy duty use of the unit, ice can accumulate on the grills. It is therefore recommended to clean them regularly by means of a small brush. The operation MUST be done when the unit has been SHUT DOWN.

WHEN LOADING

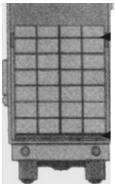
• To be carried out with the unit stopped.

• It is recommended to open doors as little as possible to avoid the intake of hot air and humidity.

• Select the temperature by means of the thermostat, according to the transported goods.

• Check the internal temperature of the goods being loaded (using a probe thermometer).

• Take care not to obstruct the air intakes on the evaporator section and the ventilation ducts.



• Leave a free space of about :
- 6 to 8 cm between load and front wall,
- 20 cm between the top of the load and the roof,
- between the floor and the load (gratings, pallets).

• Do not forget to close the doors.

• Before closing the doors, check your load once more and see that nobody is shut inside the box.

NOTE :For stationary utilization, we recommend to place the body in the shade.

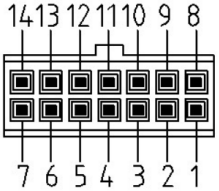
4,RECOMMENDED TRANSPORT TEMPERATURES

Below are some general recommendations on product transport temperatures and operating modes for the unit. These are included for reference only and should not be considered pre-emptive of the set-point required by the shipper or receiver.

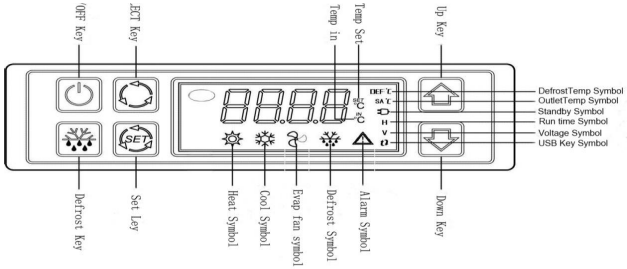
Product	Set point range		Running Mode
Banana	15˚C	60 F	Continuous
Fruit and vegetables	4˚C to 6˚C	39F to 43F	Continuous
Fresh meat or sea food	2˚C	36F	Auto.start, Auto.off or continuous
Dairy	2˚C to 6˚C	36F to 43F	Auto.start, Auto.off or continuous
Ice	-20˚C	-4F	Auto.start, Auto.off
Frozen fruit or vegetables	-18˚C	0F	Auto.start, Auto.off
Frozen meat or sea food	-20˚C	-4F	Auto.start, Auto.off
Ice cream	-25˚C	-13F	Auto.start, Auto.off

It is essential to shut down the compartment during the periods when the doors are open, in order to maintain the temperature of the cargo in the other compartments and keep the unit operating correctly.

5,DISPLAY BOARD



1	Low voltage input (grounded during normal operation)	8	Power supply positive(DC12V/24V)
2	Power supply negative terminal	9	High voltage input (grounded during normal operation)
3	Temperature sensor negative terminal	10	Cold storage temperature sensor
4	Air outlet temperature sensor	11	Defrost temperature sensor
5	Empty	12	Evaporator fan control
6	Defrost solenoid valve control	13	Compressor control
7	Empty	14	Condenser fan control



6,OPERATION

6.1,POWER ON/OFF

ON: With the vehicle running the is lit. Pressing the key will start the refrigeration processes.

OFF: Press for 1 second and the shutdown process will commence.

6.2,DEFROSTI

Defrosting is set to automatically defrost 2 hours. Should an ice build up be noticed then the manual defrost button can be initiated.

1,Press key and the manual defrost will be initiated

2,Press key again, and the sequence will be aborted.

If the manual key is pressed and the defrost parameters have not been met, then 3 short beeps will be heard. The manual defrost sequence will not commence. The controller will revert to the automatic system.

6.3,SELECT KEY

The use of this key will toggle the display from the box temperature to: Supply air temperature, Unit voltage and total unit operating hours.The display will revert to load box temperature after 5 seconds.

6.4,SET KEY

SET key :display Set point temperature and sensor temperature will be displayed.

1,Press the SET key to display set point temperature

2,Press the or key to change the set point.

3,Press the SET key and parameter setting condition.

4, Press the SET key and return box temperature display.

6.5,INDICATOR LIGHT

The functions of the indicator lights are showed as follows:

Indicator	Status	Explanation
	Yellow	cooling conditions are ready; the compressor is going to start the refrigeration.
	Blue	Cooling status;the compressor refrigeration is started.
	Light on	Defrosting on-going.
	Blink	Defrosting finished; dripping status
	Light on	The evaporator blower starts working
	Light on	Heating mode
	Light on	The electrical heating is start-up
	Light on	Warning

CHECK NORMAL TEMPERATURE VALUE

1 press the **Up** key and release it.
2 corresponding light on and indicates the normal unit temperature.
3 pres the key again or exit auto. after 15s' waiting, it returns to display the normal temperature.

CHECK AND MODIFY THE SET OF THE VALUE

1 press the **SET** key and release it immediately, it displays the set value;
2 the **SET** indicator light begins to blink;
3 press the **Up** or **Down** key to modify the set value, which need to be finished within ten minutes;

4 press the **SET** key or wait for ten minutes to save the newly set value.

START UP THE MANUALLY DEFROSTING

1 press the **DEF** key to start the defrosting.

Modify the parameter values

1 Enter into the parameter set condition

2 press or to choose the parameter needed.

3 press the **SET** key, display the parameter value(The and blinks)

4 press the or to modify the value

5 press **SET** key to save the new parameter value, and enter into next parameter setting process.

Exit: press the **SET**+ or wait for 15s to exit auto.

Note: The new modified parameter value is saved even if the waiting time has expired and the procedure is exited.

Temperature switch

1 Press the key, display the defrosting temperature

2 Long press the key for more than 3s, display separately the system voltage and the total running time of the unit; if there is not any operation within 3s, it will display the the temperature inside the container automatically.

Thermostat Functions

Press the Set key for 3 seconds to enter into advance menu function; combine with the Up and Down key to set the following functions:

Code	Item	Range	Default value
F01	Defrost interval time	30~600Minute;OFF(No Defrost)	120Minute
F02	Defrosting time	1~60Minute	20Minute
F03	Dripping time after defrosting	1~10Minute	3Minute
F04	Cooling return different temperature	1℃~10℃	2℃
F05	Defrosting termination temperature	-10℃~50℃	8℃
F06	Heating return different temperature	1~20℃；OFF(only cooling)	OFF(only cooling
F07	Maximum box temperature setting	10℃~40℃	30℃
F08	Minimum box temperature setting	-40℃~5℃	-25℃
F09	Cold room temperature error compensation	-10℃~10℃	0℃
F10	Evaporator blower operating mode	**Auto**: stop running when reach setting temperature; **Cont**: Continuously running; **ALOn**: Always operating	Auto
F11	Voltage selection	Auto 12U:12V 24U:24V	Auto

F12	Percentage of voltage correction measurements	-2.0~2.0P %	0.0
F13	Minimum shutdown time of the compressor	30~900Seconds	60Seconds
F14	Defrost sensor broken alarm option	yES:Alarm no:No Alarm	yES:Alarm
F15	Display screen light degree	L-1~9	8
F16	Whether to turn on condensing fan during defrost	dCon:Open Condenser fan；dCoF：Close condenser fan	dCoF
F17	Auto defrost temperature difference	5.0~24.5℃；OFF	OFF
F18	Delay to start evaporator fans	1~240S	5S
F19	Delay to stop evaporator fans	1~240S	10S
F20	Evaporator fans delay after dripping	0~14Minute	1Minute

ALARM CODE – Red LED flashes

Code	Description	Checking
OPE1	Box temperature sensor open circuit	Check wiring and replace probe
SHR1	Box temperature sensor short circuit	Check probe and probe wiring
OPE2	Defrost temperature probe open circuit	Check wiring and replace probe
SHR2	Defrost temperature probe short circuit	Check wiring and replace probe
LPER	Low Pressure alarm	Clean coils. Check condenser fan operation
HPER	High Pressure alarm	Check for ice build up. Check gas level
HUER	High voltage alarm (Above DC32V/16V)	Check main fuse. Check alternator output
LUER	Low voltage alarm (Below DC19V/10V)	Check alternator output

7,MAINTENANCE

A comprehensive maintenance program will help to insure that the unit continues to operate reliably. Such a maintenance program will also help to control operating costs, increase the unit's working life, and improve performance.

NOTE

All maintenance services must be done by a trained technician respecting all safety and quality standards of refrigeration unit. Before any operation requiring an intervention on the unit, check that:

- the unit (cab command) is OFF

- It is impossible for the unit to automatically startup during maintenance.

MAINTENANCE SCHEDULE

kms	miles	Initial service	service A	service B
5,000	3,000	■		
30,000	18,000		■	
60,000	36,000		■	■
90,000	54,000		■	
120,000	72,000		■	■
150,000	90,000		■	
180,000	108,000		■	■
210,000	126,000		■	

MAINTENANCE INSTRUCTION

Initial service	-Check the bolts and screws for tightness and that the unit is properly secured to the box. to the box. -Check for pressure leaks. - Check that the high and low RPMs of the road compressor are correct. -Check compressor belt tension.

service A	-Clean battery and battery terminals -Check compressor belt tension -Replace compressor belt every 3000 hours -Check for refrigerant leaks -Check all electrical connections -Check cooling operation -Check defrost operation -Check cab control operation -Clean the condenser coil
service B	-Replace the idler pulley bearing if required.
Every year	•Replace filter drier. •Clean up the expansion valve orifice filter.
Every two year	-Change compressor oil - use only polyolester (POE) oil. -Replace refrigerant. -Replace orifice expansion valve

8,QUICK TROUBLE SHOOTING GUIDE

Failure Mode	Possible Causes	Correction Method
Compressor not working	①Power switch and fuse failed	Replace with new fuse and connect the circuits.
	②Clutch not activate (too low voltage; no current in coils, wire coils burn out)	Check the clutch circuit, temperature sensor and pressure switch; Replace failed components.
	③Clutch activated (compressor get stuck; belt broken or skidding; clutch skidding)	Replace compressor; Adjust belt tension or replace belt; Check the clutch clearance.
Compressor working but without cooling; Low pressure at input and output.	①Refrigerant leaked completely	Repair the leakage and re-fill refrigerant
	②Compressor valve parts damaged	Repair or replace Compressor valve parts
	③Expansion valve gets stuck, system refrigerant can not recycle.	Repair or replace the expansion valve.
	④Drier filter is jammed	Repair or replace the drier.

	⑤Evaporator fan not work （Circuit impassibility）	Check connection and the fan blade
Cooling air inadequate, low pot meter reading is high. High pot and low pot meter readings are all low	① Fan voltage is low ② Evaporator surface gets stuck ③ Fan variable resistance failure, unable to set to high speed	① Check connection, remove bad contacts ② Clean the evaporator ③ Repair and replace resistance

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