INTRODUCTION

This guide has been prepared for the operator of Carrier Transicold 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 to deliver the load in the best possible condition.

Please take the time to read the information contained in this booklet and refer to it whenever you have a question about the operation of your Carrier Transicold unit. This manual refers to the standard model. Some options may not appear in it, and in such cases you are requested to consult our Technical Services.

Your refrigeration unit has been engineered to provide long, trouble-free performance when it is properly operated and maintained. The checks outlined in this guide will help to minimize on the road problems. In addition, 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.

When having your unit serviced, be sure to specify genuine Carrier Transicold replacement parts for the highest quality and best reliability.

At Carrier Transicold, we are continually working to improve the products that we build for our customers. As a result, specifications may change without notice.

CONTENTS

1. DESCRIPTION & IDENTIFICATION

Keep the fold out sheet while reading the instructions.

1.1. Description

NEOS 100 unit is simple, tried and tested design; low-cost purchase and operation to equip little size delivery vehicles.
It is manufactured as a mono-bloc system, enabling it to adapt to any vehicle and any configuration.

a. Host unit
b. Roof skin
c. Cab control
d. Vehicle battery
e. Main road fuse (near the vehicle battery)
f. Standby module

1.2. Nameplate

Each unit is identified by a nameplate attached to the frame of the unit. The nameplate identifies the complete model number of the unit, the serial number and some other information.

If a problem occurs, please refer to the information on this plate, and make a note of the model and serial number before calling for assistance. This information will be needed when you contact a technician so that he may properly assist you.

The complete nameplate (1a) is fixed on the frame and the Serial Number is fixed on the pod (1b).

1.3. Noise level sticker

This sticker indicates the noise level in Lwa (sound power level).

2. RECOMMENDATIONS

2.1. Parking

Do not park your car in a slope above 10% in order to avoid bad water drain.

2.2. Washing

- When washing the vehicle, DO NOT point the high pressure water under the roof skin.
- DO NOT spray water on electric components.
- When washing inside the box, DO NOT spray the fan with detergent.

3. SAFETY

This manual contains safety and service instructions to follow in order to prevent any accident. Some of following stickers have been placed on the product for your SAFETY.

BEFORE USING THIS REFRIGERANT UNIT, read carefully all safety information explained in this manual and indicated on the product. Be sure that everybody who will use this refrigeration unit has been trained to use it in a safe way.

DURING THE USE OR MAINTENANCE OF THIS REFRIGERATION UNIT,

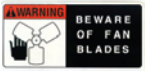
the notes on safety are to be considered.

	**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



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.

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.

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.

Always use Personal Protective Equipment when handling refrigerant: safety clothes, safety gloves and safety glasses.

Refrigerant handling must be done by qualified people.

Refrigerant Use & Handling

•Combustibility - Certain HFC & HCFC refrigerants can become combustible when mixed with high concentrations of air at elevated pressures. This not only includes R-22, but also many other HFC & HCFC refrigerants. For example, this is also true of R-134a.

•Therefore, these refrigerants should not be mixed with air under pressure for leak testing or other purposes.

•Inhalation Hazards - All refrigerants are hazardous if inhaled in concentrations exceeding the recommended safe limits. The symptoms include: headaches, nausea, sleepiness, lethargy, dizziness and loss of coordination. It can result in irregular heartbeat, unconsciousness and even death. The proper remedies should be taken to eliminate or reduce the exposures.

•Flame Enhancement - If you see a change in the color or size of the torch flame while welding or soldering in the presence of refrigerant vapors, stop work immediately and ventilate the area. This flame effect only occurs at dangerously high concentrations of refrigerant vapors. This could create the inhalation hazards noted above.

•Skin & Eye Protection - Contact with “liquid” refrigerants can result in immediate freezing of the tissues, and permanent damage or blindness can result. DO NOT handle liquid refrigerants without proper personal protective equipment. DO NOT cut into any refrigerant lines under pressure. DO NOT open valves or vent equipment where you may be sprayed with liquid refrigerant.

Cooling oil :

- avoid prolonged or repeated contact with the skin.

- wash carefully after handling.

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.

Always use adequate safety gloves when doing any maintenance on this refrigeration unit.

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.

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.

. Respect polarity when connecting a battery.

CAUTION

Under no circumstances should anyone attempt to repair the Logic or Display Boards. Should a problem develop with these components, contact your nearest Carrier Transicold dealer for replacement.

Under no circumstances should a technician electrically probe the processor at any point, other than the connector terminals where the harness attaches. Microprocessor components operate at different voltage levels and at extremely low current levels. Improper use of voltmeters, jumper wires, continuity testers, etc. could permanently damage the processor.

Most electronic components are susceptible to damage caused by electrical static discharge (ESD). In certain cases, the human body can have enough static electricity to cause resultant damage to the components by touch. This is especially true of the integrated circuits found on the truck/trailer microprocessor.

Environment :

Think about protection of environment during all the life of this refrigeration unit.

To prevent environmental damages NEVER release refrigerant in the atmosphere, NEVER throw coolant, oil, battery and chemicals in the nature. It must be recuperate and recycle according to current regulations.

When disposing this refrigerant unit do it in an environmentally sound way and in accordance with current regulations.

3.1. Warning stickers maintenance

a. Keep the warning pictograms clean and without any obstruction material.

b. Clean the pictograms with water and soap and wipe them with soft fabric.

c. Replace damaged or missing pictograms with new pictograms available in Carrier network.

d. If a component having a pictogram is replaced by a new one, be sure that the new component has the right pictogram.

e. Place a warning pictogram by applying it on a dry surface. Press to external sides to eliminate air bubbles.

4. 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.

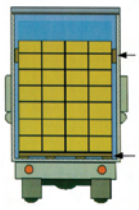
It is important to check the temperature of the product being loaded to ensure that it is at the correct temperature for transport. The refrigeration unit is designed to maintain the temperature of the product at the temperature at which it was loaded; it was not designed to cool a warm product.

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.

IMPORTANT
Never leave your unit more than a month without running.

5. 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.

More detailed information can be obtained from your Carrier Transicold dealer.

Product	Set point range
Bananas	15°C (60°F)
Fresh fruits and vegetables	+4°C to +6°C (+39°F to +43°F)
Fresh meats and seafood	+2°C (+36°F)
Dairy products	+2°C to +6°C (+36°F to +43°F)
Ice	-20°C (-4°F)
Frozen fruits and vegetables	-18°C (0°F)
Frozen meats and seafood	-20°C (-4°F)
Ice cream	-25°C (-13°F)

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.

6. DISPLAY BOARD

6.1. Cab control description

Keep the fold out sheet while reading the instructions.

This functional accessory simplifies all control operations. From your seat, you can out all the control operations : shut-down, automatic start-up, adjusting the set point, defrost, program to customize unit operation to your own requirements, manage error messages in event of malfunction.

You can display the box temperature and see whether the set point is being maintained by checking the green indicator. The indicator lights up red in the event of malfunction. When the battery voltage is too low, a fail-save safety system shuts down the unit. Unit restart is automatic and time-delayed if the voltage rises to the normal level.

1. Display – 3 digits	
2. °F LED	°F
3. °C LED	°C
4. Manual defrost key	
5. – key	–
6. Set key	SET
7. + key	+
8. OFF key	OFF
9. ON key	ON
10.Unit operation display **Green :** **Cooling mode**: green light ON **Null mode** (regulation) : green light OFF **Heating mode**: green light flashing **Red : malfunction (right half)**	!

7. OPERATION

7.1. Operation principle

7.1.1. Road mode

NEOS 100 is a all electrical unit, powered by the vehicle battery (alternator).

The unit automatically shuts down when the engine is switched off with the ignition key.

7.1.2. Standby mode

Neos 100 is powered by a standby module reducing the 220 VAC into 12 Vdc.

The power network connection is detected by the standby module which automatically starts up the unit in standby mode.

Double power supply buzzer: If the ignition key is switched ON while the unit is connected to the power network or if you connect the standby plug while unit is running, a buzzer alarm will sound indicating the double power supply.

As soon as one operating mode is inhibited, the unit automatically starts up in the other mode.

In all cases, the unit can be completely shut down manually by pressing the OFF key on the cab command.

7.1.3. Standby operation guideline

For safe, reliable operation in Standby mode, it is important to consider the following guideline:

a) **ALWAYS check** that the unit is OFF (Cab command) before connecting or disconnecting it from the power source.

b) The extension cable and fuse used for network connection must comply with the legislation currently applicable on the site of use (minimum H07 RNF CEI 245-4) and with the unit specifications as described in the table below:

Maximum amperage for operation equipment	
Operating voltage	
230 / 1 / 50 Hz	8 A
230 / 1 / 60 Hz	6,8 A

7.1.4. Temperature control

As soon as the set-point temperature has been reached, temperature control is obtained by shut-down and start-up of the electro-magnetic clutch.

The condenser and evaporator fans cut out during regulation. When transporting fragile loads such as fresh meat, vegetables and cheese, it is possible to program the microprocessor to obtain continuous ventilation by the evaporator during regulation.

7.1.5. Defrost

Defrost operation is fully automatic but can be manually controlled.

- Defrost cycles are fully controlled by the integrated microprocessor.

- During the defrost cycle, the evaporator fan shuts down. The condenser fan is controlled by the microprocessor.

- Defrost cycle termination is controlled by a defrost thermostat.

- During the defrost cycle, the cab command display indicates "d F".

7.1.6. Heating

Heating is provided by hot gas system.

The evaporator fan operates, the condenser fan is controlled by the microprocessor.

7.2. To start the unit

1. Start the vehicle engine or connect the standby plug.
2. Start the unit by pressing the ON key. Start-up is time-delayed for **30** seconds.
3. The digital display (1.) of the cab control displays the box temperature.
4. Check the temperature setpoint is correct by pressing the SET key. The setpoint temperature is highlighted on the digital display.
5. Enter a new setpoint if necessary (See *"To change setpoint temperature"* – paragraph 7.4 p.10)

In the event of difficulty on start-up, check:

In ROAD mode
- The main road fuse has not blown (e. - p4). If it is ok, contact your Carrier Service centre.
- The temperature selected by the cab control has not been affected.

In STANDBY mode
- The power network
- The temperature selected by the cab control has not been affected.

7.3. To stop the unit

- For a delivery stop: switch off by the vehicle ignition key.
- For a long stop (more than 2h) : press the OFF key.

7.4. To change setpoint temperature

Important
If, when settings are adjusted, no key is activated within 5 sec. the system reverts to displaying the box temperature. All changes made are recorded.

If the cab command is built into the vehicle control panel, the command unit must be located as far as possible from the heating ducts. Maximum temperature of exposure : 70°C**.**

1. Press the SET key to display setpoint temperature.
2. Press the − or + key to change the setpoint.
3. Press the SET key to return to box temperature display.

7.5. To change defrost parameters

Important
If, when settings are adjusted, no key is activated within 5 sec. the system reverts to displaying the box temperature. All changes made are recorded.

1. Press the OFF key to shut-down the unit.
2. Press **simultaneously** the ❄ AND ON keys during 5 seconds to display last selected defrost interval.
3. Press the − or + key to change the defrost interval:

00 : inhibit defrost function.
AUT (coefficient 1) : microprocessor-optimized automatic defrost according to type of cargo transported. (Variable intervals)
1 H, 2 H,... 6 H: Fixed defrost interval in hours.

4. Press the SET key to return to box temperature display.

7.6. To display other data (alarms, software version, box T°, hourmeter)

1. Press the SET key during **5** seconds to enable access to malfunction codes (see *"Fault alarm display"* – paragraph 7.7 p.11).
2. Press − or + key to display active or passive alarms.
3. Press the SET key to display software version.
4. Press the SET key to display hourmeter.
5. Press the SET key to return to box temperature display.

7.7. Fault alarm display

a. Access by the SET key

1. Press the SET key during **5** seconds to access to malfunction codes.
2. Press − or + key to display alarms.
3. To scroll through the alarm list, use the + key.

- ACTIVE malfunctions – AXX
An alarm is active when a problem occurs on the unit, the red LED is flashing speedily.

- PASSIVE malfunctions – PXX
An active alarm becomes passive when the problem disappears. The passive alarms stay in memory until the technician clears them. The red LED is flashing slowly.

MALFUNCTION CODE – Red LED flashes			
Code	**Description**	**Unit shutdown**	**Checking**
A00	No malfunction – Unit in operation		
A01/A02/A03	Low pressure switch open/ High pressure switch open/ DC electrical motor over heated (displayed alternatively)	**Yes**	Contact your Service Center
A04	Clutch compressor fault	**No**	
A06	Condenser fault		
A07	Evaporator fan fault		
A09	Defrost valve (HGV) fault		
A11	Main heat valve (MHV) fault		
A12	High temperature alarm		
A13	Low temperature alarm		
A14	Defrost alarm > 45 minutes		
A15	Setpoint adjusted out of the range -29°C / +30°C	**Yes**	

b. Direct display

Note
Direct display malfunction messages are displayed instead of temperature read-out as soon as the malfunction is detected, and remain displayed as long as malfunction persists.

The unit does not run until the malfunction has disappeared or been corrected.

Code	Description	Unit shutdown	Checking
E E	Evaporator temperature probe (open circuit)	Yes	Contact your Service Center
b A t	Battery low voltage alarm		
S E	Maintenance needed. This alarm will be displayed every 1000 hours alternatively with box T° and can be cancelled by Service Center only.	No	Contact your Service Center for maintenance.

8. 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 technician trained on Carrier products respecting all safety and quality standards of Carrier.

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 start-up during maintenance.

8.1. Maintenance schedule

Hours displayed	Running hours	Initial service	Service A	Service B
10	100	■		
100	1000		■	
200	2000		■	■
300	3000		■	
400	4000		■	■
500	5000		■	
600	6000		■	■
700	7000		■	

8.2. Service description

Initial service	•Check the tightness of bolts and screws and that the unit is correctly fastened on to the box. •Check the fixation of the roof top skin •Check the gasket pod for air leak
Service A	•Clean up battery & battery clamps. •Check compressor belt tension. •Replace compressor belt every 3000 hours. •Check for refrigerant leaks •Check all electrical connection •Check the cooling mode •Check the defrost operation •Check the operation of the cab control. •Check and replace the pod gasket if necessary •Clean up the condenser coil •Clean up the pod (inside) •Check the insulation gasket at the condenser opening •Check the insulation gasket at the condenser fan motor opening
Service B	•Replace electrical motor brushes.
Every TWO years	•Replace filter drier. •Clean up the expansion orifice filter. •Replace compressor oil - only use Ester oil (POE) approved by Carrier Transicold. •Replace refrigerant. •Replace orifice expansion valve

Refrigerant: type R134a

Compressor oil type: The compressors are supplied with CARRIER POLYOLESTER (POE) oil. The presence of a sticker indicates that oil-change has been correctly carried out in our Carrier Transicold plant.

Oils of PAG type are strictly incompatible with the operation of our unit: never use an oil other than that approved by Carrier.

Oil analysis: on request, we can analyze your compressor oil.
To do this, we send a small drum with a label on which you should indicate: the type of compressor, the lapse time or mileage since the last oil change, the type of Carrier equipment, the date of initial operation.

9. A.T.P. EUROPE REGULATION EXTRACT

(Date : March 1974)

Approval of vehicles intended for the carriage of perishable goods.

Before putting a refrigerated vehicle into service, it is necessary to have it approved by the Regional Health Department.

Characteristics of vehicles used for carrying perishable goods; refrigeration unit.

The refrigeration unit is an insulated unit with a cooling system which makes it possible, with a mean outside temperature of +30°C, to lower the temperature inside the empty body and to maintain this low temperature in the following way:

class A : Refrigeration unit furnished with a cooling system whereby a temperature between +12°C and 0°C inclusive can be chosen.
class B : Refrigeration unit furnished with a cooling system whereby a temperature between +12°C and –10°C inclusive can be chosen.
class C : Refrigeration unit furnished with a cooling system whereby a temperature between +12°C and –20°C inclusive can be chosen.

The cooling capacity of a unit is determined by a test carried out in one of the approved testing stations and ratified by an official report.

Note: The "K" factor of bodies intended to be classified as C must be equal to or lower than 0.4 W/m2 °C.

Signs, identification marks and plates to be attached to refrigeration units

Refrigeration Plate

This reference must be followed by identification marks according to the following list:

Standard refrigeration unit Class A	FNA
Reinforced refrigeration unit Class A	FRA
Reinforced refrigeration unit Class B	FRB
Reinforced refrigeration unit Class C	FRC

In addition to the above identification marks, the date (month and year) of expiry of the approval certificate must be indicated.

Example:
FRC 6-2006
(6 = month (June) 2006 = year)

Very important

Regularly check the expiry date of the approval certificate. During transport, the approval certificate or provisional certificate should be shown on request of qualified agents. To have an insulated unit approved as a refrigeration unit, an application to modify the approval certificate should be sent to the regional health office.

10. 24H ASSISTANCE

At Carrier Transicold we're working hard to give you complete service when and where you need it. That implies a worldwide network of dealers and available an emergency service. These service centres are manned by factory-trained service personnel and backed by extensive parts inventories that will assure you of prompt repair.

Should you encounter a unit problem with your refrigeration unit during transit, follow your company's emergency procedure or contact the nearest Carrier Transicold service centre. Consult the directory to locate the service centre nearest you. This directory may be obtained from your Carrier Transicold dealer.

If you are unable to reach a service center, call Carrier Transicold's 24Hour Assistance:

In Europe, please use the following free phone numbers from :

A	AUSTRIA	0800 291039
B	BELGIUM	0800 99310
CH	SWITZERLAND	0800 838839
D	GERMANY	0800 1808180
DK	DENMARK	808 81832
E	SPAIN	99 993213
F	FRANCE	0800 913148
FIN	FINLAND	0800 113221
GB	GREAT BRITAIN	0800 9179067
GR	GREECE	00800 3222523
H	HUNGARY	06800 13526
I	ITALY	800 791033
IRL	IRELAND	1800 553286
L	LUXEMBURG	800 3581
RUS	RUSSIA	810 800 200 31032
N	NORWAY	800 11435
NL	THE NETHERLANDS	0800 0224894
P	PORTUGAL	8008 32283
PL	POLAND	00800 3211238
S	SWEDEN	020 790470

From other countries / Direct : +32 9 255 67 89
In Canada or United States, call 1 – 800 – 448 1661

When calling, please have the following information ready for fastest service:

- Your name, the name of your company, and your location
- A telephone number where you can be called back
- Refrigeration unit model and serial number
- Box temperature, setpoint and product
- Brief description for the problem you are having and what you have already done to correct the problem.

We will do everything we can to get your problem taken care of and get you back on the road.

24 HOUR
Carrier TRANSICOLD
ASSISTANCE