

Before starting up the unit, read this instruction manual carefully, store it and pass it on the next customer if the unit is resold.

WARNINGS

- Failure to follow instructions may cause damage and/or injury
- This unit may not be used for purposes other than those described in this manual.

GENERAL SAFETY

- The unit must only be installed by qualified personnel.
- If the unit shows visible signs of damage, do not operate it.
- The unit must only be repaired by specialised personnel (Indel Webasto Marine Service Centres). Repairs performed inadequately could cause damage and/or injury.
- Under no circumstances open the cooling circuit.
- Install the unit in a dry place, protected from any splashes of water and direct sunlight.
- Do not place the unit near naked flames or other heat sources (heating, direct sunlight, gas ovens etc.).
- Ensure that the cooling unit (compressor) is sufficiently ventilated.
- The unit must be stored and/or installed out of reach of children.
- Before operating the unit, ensure that the operating voltage and the battery voltage match.
- In order to connect to the main electricity supply, use protection systems and/or a circuit breaker (ΔI 0.03 A).
- If the connecting cable is damaged, it must be replaced with a cable that has the same technical specifications (cross-section and length).
- For general cleaning of the unit, never use detergents containing sandy substances, acids or solvents.
- Protect the unit from rain and moisture.
- Before connecting the quick charger, disconnect the main power supply to the unit.
- Never touch any exposed and/or damaged wires with bare hands.
- Disconnect the unit from the mains when not in use for long periods.
- The batteries may contain aggressive acidic and corrosive liquids. Ensure these do not come into contact with eyes/skin.

INSTALLATION AND USE

The Isotherm VE150 cooling unit is specifically designed to be installed inside a box that has been specially made for chilling and storing food, or can be used to chill a compartment that already exists but is not in use.

The unit is equipped with all the components necessary for its assembly, which is easy and does not require specific tools.

During the production stage, it is loaded with the appropriate refrigerant and delivered ready for use. To simplify installation, the system is divided into 2 sections: the condenser unit and the evaporator unit.

These sections are connected together via a hose equipped with quick couplings that can be easily connected and disconnected repeatedly without any loss of refrigerant.

When one of the two parts (condenser unit or evaporator unit) must be replaced or modified, the gas emptying/recharging procedure must be repeated.

The box housing the evaporator must be well insulated. Use a polyurethane foam or insulation panels with the following recommended cross-sections:

Box Volume (l)	Thickness of Insulation Material
L < 100	30 mm
100 < L ≤ 150	50 mm
150 < L ≤ 200	80 mm
200 < L ≤ 250	100 mm

The battery capacity must be at least 75 Ah to enable correct unit operation.

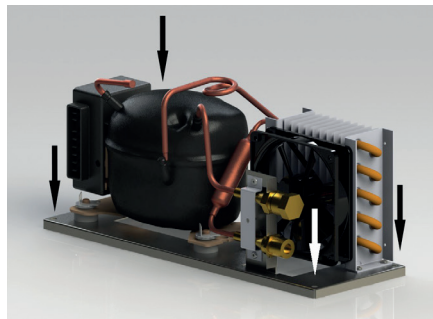
All electrical power supply devices must always be kept in good condition.

N.B. The cooling capacity of the unit is determined by the resistor connected between the terminal “T” on the control unit and one pole of the thermostat. For volumes greater than 150 litres or for boxes/ compartments made using material with low thermal insulation, the resistor must be present. For volumes less than 150 litres, the resistor should be omitted. See the wiring diagram.

INSTALLING THE CONDENSER UNIT

The condenser unit must be installed horizontally, and can operate constantly at a maximum gradient of 30°. It must be installed in a well-ventilated environment, protected from splashes of water. If the unit is installed in a confined space, ventilation should be improved by creating ventilation holes with a diameter of 8 cm, one located on the top and one on the bottom of the installation area. The unit must be secured through the four holes situated on the condenser unit support base. See the figure on the right.

Place the condenser unit near the location where you plan to install the evaporator unit, so as not to exceed the length of the connecting hose (about 2 m).



ELECTRICAL CONNECTIONS

The electronic unit must be connected directly to the battery or the main switch, protected by safety systems: fuses, automatic switches or circuit breakers in the case of AC power. The fuse for the direct current electrical connection must be at least 15 A for 12 VDC and at least 7.5 A for 24 VDC.

It is very important to use cables with the right cross-section for the main power supply.

The minimum cross-section of the cables, in proportion to the distance between the unit and battery, is shown in the table:

Cable cross-section (mm ²)	Max length (m) 12 VDC	Max length (m) 24 VDC
2.5	0 – 2.5	0 – 5
4	2.5 – 4	5 – 8
6	4 – 6	8 – 12

To avoid loss of voltage and power, the cable must be as short as possible and not be interrupted.

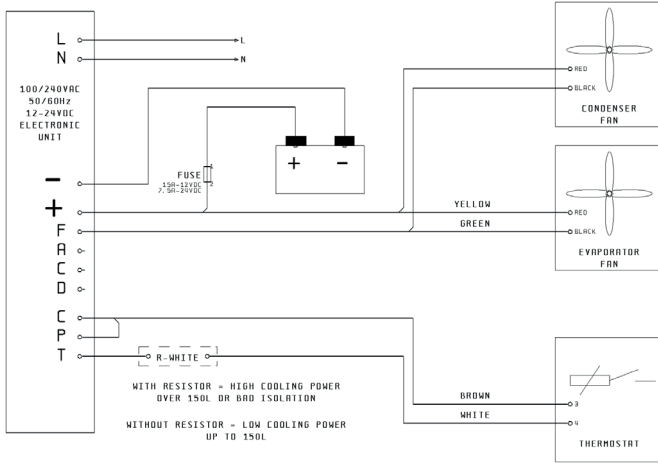
The electrical unit includes electronic protection against polarity reversal. To protect the battery, the unit shuts off automatically when the voltage is no longer sufficient.

12 VDC			24 VDC		
Cut-Out	Cut-In	Max	Cut-Out	Cut-In	Max
9.6 V	10.9 V	17 V	21.3 V	22.7 V	31.5 V

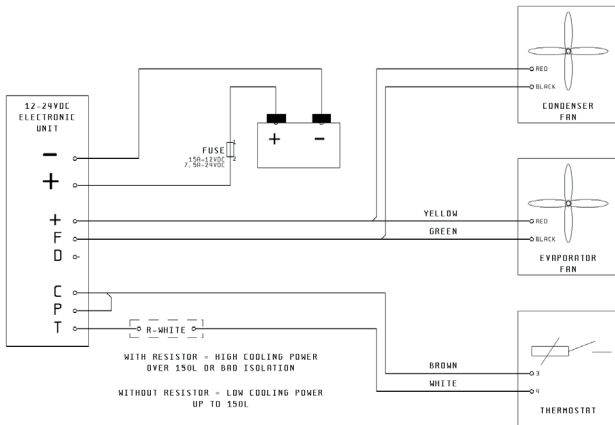
If the cooling unit is supplied with a connection to earth with an AC network (100-240 VAC), it is necessary to insert a protective circuit breaker between the electrical mains and the cooling unit (ΔI 0.03 A).

WIRING DIAGRAM

AC



DC



INSTALLING THE EVAPORATOR UNIT

The evaporator must be placed at the top inside the box/compartment in an upright position. See the figure on the right.

Drill a hole with a 30 mm diameter in the wall of the box/compartment so that the hose with the quick couplings can pass through.

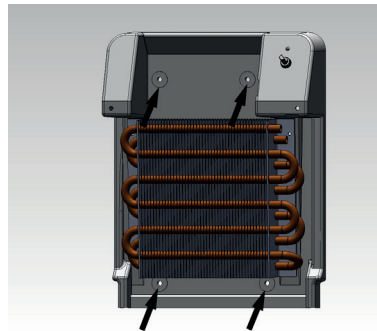
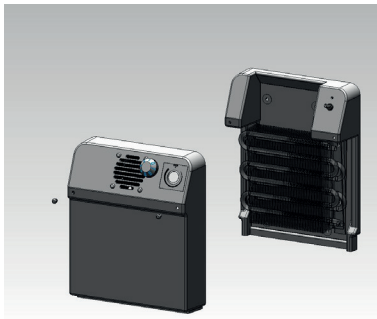
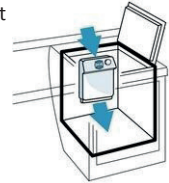
Before installing the evaporator unit, fully extend the hose, keeping the protective covers on the quick couplings until connection is made with the condenser part.

Starting from inside the box/compartment, pass the hose with the quick couplings through the hole drilled beforehand, until reaching the condenser unit, being careful not to bend or crush the hose. The hose cannot be shortened as it is full of refrigerant. The excess hose can be coiled with a minimum bend radius of 10 cm and must be secured to prevent vibration and noise being generated.

Lift the top lid of the casing, secure the evaporator unit through the appropriate holes and seal the opening created by the passage of the hose with sealant or foam.

Close the top cover with the 4 snap-in rivets provided.

Insert the supplied thermostat knob



MECHANICAL/ELECTRICAL CONNECTION

The quick couplings can be connected at this point as follows:

first connect the quick joint to the capillary hose and then the latter to the suction hose, turning the female coupling unit only, tightening the couplings until reaching the end of the threads then securing them tightly using suitable tools for 1/6 of a revolution or 60° maximum rotation.

Do not discard the protective covers on the quick joints if it is necessary to reposition the unit, as the couplings can be reopened without the refrigerant coming out and must be protected immediately using their protective caps.

Then connect the electrical connections as shown in the wiring diagram. See the wiring diagram.

START-UP

Test the operation of the unit by turning the thermostat knob in a clockwise direction. The compressor must start up within a few seconds. Check that the condenser cooling fan and the evaporator unit distribution fan work correctly. A few minutes after start-up, the evaporator unit will begin to cool down, producing cold air from the bottom.

The temperature can be adjusted using the control dial, with a scale with values ranging from 0 to 7, where 7 is the maximum cold production value and 0 is the stop/off value.

MAINTENANCE

The complete cooling unit can remain on the boat during the winter. To ensure it remains efficient, periodically remove any dust that accumulates on the condenser.




GENERAL NOTES

The cooling unit is built to cool boxes/compartments designed for storing food. Improper use or any other use is considered dangerous and the manufacturer disclaims any liability for damage or injury.

Packaging: The packaging and the unit must be disposed of in accordance with applicable environmental laws in the place of use. Ensure that the product is disposed of properly.

The foods inserted in the cooled box/compartment must be kept in containers suitable for use with food or in the original packaging.

Trouble Shooting

Problems	Reasons	Possible Issue / Check	Solution	Notes
Air cooled				
The Cooling Unit does not start - the Unit is new	The main supply voltage is too low	The unit is not connect or wrong polarity	Check the wire connection	
		Check the section of wires between battery and electronic unit	 101N0210.pdf	
		Check the voltage on the connection right before the Electronic Unit, the voltage must be between 10.5 V to 13.5 V for battery at 12 VDC and 21 to 27 for battery at 24 VDC	Recharge the battery - If the battery is older than 3 or 4 years it could be necessary to replace it!	
		The wires are oxidized	Replace the wires	
	Thermostat	The thermostat is not connected	Check the correct connection of the thermostat on the electronic unit and on the thermostat.	
		Thermostat is broken! Bridge C and T connections, on the electronic unit. The unit works.	Replace the thermostat	
	Faulty electronic Unit (rare case)	Bridge C and T connections, on the electronic unit. The unit does not start even if the voltage is correct.	Replace the electronic unit	
	Cooling Unit works for a short period of time	Not enough ventilation around the condenser	Remove the fridge from its place and turn it on, if it keeps cooling, improve the ventilation!	

Problems	Reasons	Possible Issue / Check	Solution	Notes
<p>The Cooling Unit works for few seconds - the Unit is new</p>	<p>It works <0.5 sec.</p>	<p>Too much gas</p>	<p>Remove some gas from the unit. In this situation experience is very important, gas pressure may vary depending on temperature. Under normal circumstances internal pressure is up to 3.5 bar with temperature between 20-25°C</p>	<p>More detailed info can be requested if needed.</p>
		<p>The unit is blocked between compressor and condenser</p>	<p>Warning, dangerous situation, issue can be solved by a skilled technician. There is no actual danger for people or system.</p>	
	<p>It works up to 2 sec.</p>	<p>See “The Cooling Unit works for few seconds - the Unit is new” section</p>		
	<p>It works from 3 up to 5 sec.</p>	<p>Faulty Fan - disconnect wire of fan and check if the unit works</p>	<p>Replace the fan.</p>	
<p>The Cooling Unit works but it is not cooling - The Unit is new</p>	<p>Too low or no gas in the system</p>	<p>Check if quick couplings are well tightened.</p>	<p>Tight quick couplings as much as possible by hand, then use tools to tight them up to one quarter of a turn</p>	

Problems	Reasons	Possible Issue / Check	Solution	Notes
The Unit is new		Gas Leakage 1. The electrical consumption is less than normal 2. The pressure on charge valve is lower than 0 bar (0 psi) when the system works 3. The pressure on charge valve is less of 1.5 bar (21 psi) when the system is off	Where it is possible close the leak with welding or remove the part where is the hole.	Put the system on pressure with nitrogen gas max 5 bars (70 psi), search the leakage with liquid leak detector or electronic nose for R134a
	Presence of humidity inside the capillary in the evaporator.	1. The electrical consumption is 20% less than normal. 2. The pressure on charge valve is lower than 0 bar (0 psi) when the system works 3. The pressure on charge valve is less of 1.5 bar (21 psi) when the system is off	Switch off the system, wait about 5 minutes, then heat up the capillary, than turn on the system, check again from the beginning. If pressure keeps going under 0 bar, heat up the capillary while the system is on. If pressure keeps going under 0 bar, it is necessary to bring the unit back to the laboratory.	More detailed info can be requested if needed.
	Presence of Humidity inside the cabinet	Humidity gets inside the cabinet by passing through the gasket or pipes hole through the cabinet. / Ice presence all over evaporator	Look where the ice is thicker, usually humidity gets in on that side. Put back in place the gasket, by modelling it by hand, if it is not possible by using moderate heat source Replace the gasket where it is possible or the door.	
	Too much gas	Low performance - a bit higher consumption and presence of ice on pipe between evaporator and compressor.	Remove gas a bit at a time, check how pressure works inside the system.	

Problems	Reasons	Possible Issue / Check	Solution	Notes
The Cooling Unit does not start - the Unit worked	The main supply voltage is too low	Electrical connection	Check the wire connection	
		Check the voltage		
		The wires are oxidized		
	Thermostat	Thermostat is broken!		
	Faulty electronic Unit			
	Everything is well installed, gas inside the system, no cool at all (rare case)	Power consumption greatly increased, constant pressure in the system	Replace the compressor	
The Cooling Unit works for few seconds - the Unit worked				
The Cooling Unit works but it is not cooling - The Unit is new				
The Cooling Unit keeps working	The cabinet is too big	Check the cabinet dimension and compare it to the maximum cooling capacity of the unit. Is the correct unit installed in the cabinet?	You have wrong cooling unit!!!	
	Thermostat not installed on the evaporator or installed in the wrong position	Check if the probe is installed on the evaporator or if it is in a different socket	Place the probe in the appropriate socket	
	Humidity inside the cabinet	Humidity gets inside the cabinet by passing through gasket or pipes hole through the cabinet. Ice presence all over evaporator	Find where humidity gets inside from.	

SAFETY

Do not use the unit if there is visible damage, be it mechanical or electrical.

Never open the cooling circuit, except for the quick coupling joints if they are self-sealing and designed for this purpose.

Check that compressor ventilation is not blocked. If there is a battery charger, it must be connected to the battery and never directly to the cooling unit.

TECHNICAL DATA

DC power supply:	12/24 VDC
DC absorption:	6/3 A
AC power supply:	100/240 VAC
AC absorption:	0,7 A
Average power consumption:	500 Wh/24h
Compressor:	BD35F
Refrigerant:	R134a
Refrigerant capacity:	Up to 250 litres
DC fuses:	15 A - 12 VDC / 7.5A - 24 VDC
Circuit breaker:	6A VAC (ΔI 0.03 A)