TECHNICAL INFORMATION - INSTALLATION, INSTRUCTIONS AND FUNCTIONAL TESTS

Technical characteristics and functions

- Dimensions / weight: Controller (plastic box): 70 x 125 x 40 mm. / ≈ 180 gr.
  - Cooling Plate, total weight ≈ 900 gr.
  - Radiator (anodized aluminum and stainless steel): 122 x 200 x 35 mm. +
  - Heat-sink (to built-in) with dimensions: 50 x 110 x 40 mm (tube holders excluded).
- Power supply: 10.5 – 14.5 Vdc.
- Consumption: ≤ 32 Watt (with standard mini-pump), low-operating in Normal mode;
- Absorption (Ampere @ 12,5 V):
  - Normal mode (low power): ≈ 2.6 A. or 1.7 A. when in Stand-by mode *);
  - Burst mode (high power): ≈ 9.5 A. for 5 minutes or less if reached the Stand-by mode *
  - Cycle mode (middle power 20 seconds Burst + 120 seconds Normal): average: 5 A. or less when in Stand-by mode *).
- ∆t maximum (if installed on typical ice-box): 27 C (81 F) between the sea-water and radiator temperature.
- Electric protections: auto-switch-off for power supply ≤ 10.5 V. **).
- Thermal Protections: auto-switch-off for high temperature on heat-sink ≥ 40 C ***);
- Stand-by mode:
  - for low temperature 0 ÷ 1 C (32 ÷ 34 F) to avoid the ice making on the radiator.
- Water mini-pump (standard): dimensions / weight: 55 x 45 x 55 mm / 200 gr.;
  - head = 2 m (not sucking);
  - noisiness = 17 dB, consumption 0.6 A;
  - ceramic bearing replaceable, life expectancy ≥ 50,000 hrs of operation.
- Water pump (special):
  - dimensions / weight: 55 x 54 x 66 mm / 400 gr.;
  - head = 4 m (not sucking);
  - noisiness = 24.5 dB, consumption 1.6 A;
  - ceramic bearing replaceable, life expectancy ≥ 50,000 hrs of operation.
- Water tube collectors: 10/13 mm.
- Electric cables (not supplied):
  - Main power supply (from magneto-thermal switch 15 A.): 2 x 2.5 mm (AWG-11);
  - Refrigerator Power supply: 2 x 2.5 mm (AWG-11) + 2 x 2.0 mm (AWG-12), 2 meter max;
  - Sensors and mini-pump: 3 x 1.0 mm + 2 x 1.0 mm (AWG-18), 2 meter max.

Note:
*) reached the temperature 0 C (32 F) on the radiator and up to the auto-restart (Stand-by mode for 20 seconds) the total absorption decreases under 0.6 Ampere. In this condition is operative only the mini-pump for the water circulation.

**) The device go in switch-off automatically when the battery voltage decreases under 10.5 Volt for over 5 seconds.

***) The device go in switch-off automatically when the temperature of the heat-sink reaches 40 C (104 F), e.g. due to the block of the water circulation.

KIT standard composition:
- Control Unit;
- Cooling Plate;
- Mini-Pump 12 Vdc, pipes adapter 10/13 mm, and brackets for fixing.
- Two Straight and two 90° nylon tube holders 10/13 mm.

Not supplied materials:
- Rubber pipes 10/13 mm;
- Stainless steel wrappers (6 – 16 mm);
- Electric cables / wires;
- Magneto-thermal switch (15 A);
- Tube holder (for drain sink)
- Water filter.
CONTROL UNIT DESCRIPTION

SETUP

First of all it is necessary to find (or to assemble) an hermetic and thermal insulated compartment...better if an ice-box, with volume not exceeding to 70 - 80 litres. Greater volumes would be not reach low temperatures in reasonable time!

KECO uses the thermal mass guaranteed from the sea water circulation. Insofar it is opportune that the ice-box (or the above compartment) is near 2/3 meters from the sea-cock and water discharger (e.g. drain sink).

The sea-cock could be obtained from an available sea-cock (e.g. for sea-water taking) by an “T” adapter, of course by a valve. The mini-pump isn't self-priming and therefore it must be installed under the water line (bilge floor). Beside, between the pump and sea-cock it is suggested to insert a good filter, better if transparent for the periodical inspections. For the water discharging can be used a drain sink or other pipeline to sea.

It is suggested to install the Cooling Plate on the side wall of the insulated compartment in vertical way to allow the possible condensing water discharge.

Choose the nylon tube holders types (straight or 90°) to screw to the Cooling Plate ...it depends from the available space for the rubber pipes passage.
INSTALLATION
Provide a rectangular hole 55 x 115 mm on the side wall of the insulated compartment. From the above hole the rubber pipes will go out toward the mini-pump and the drain sink, as the electric wires toward the Control Plate.

Hydraulic connections (Cooling Plate)
- Screw the two nylon tube holders (straight or 90° and turned of teflon tape) to the threaded holes of the Cooling Plate.
- Connect the rubber pipes to the nylon tube holders (the water In/Out are indifferent) fixing these by wrapper.
- Connect and assure by wrapper one rubber pipe to the drain sink (or before to a secondary Cooling Plate that will pour to the drain sink).

Hydraulic connections (Mini-Pump and drain sink)
- Screw the two metallic tube holders turned of teflon tape to the threaded holes of the pump.
- Fix the pump (e.g. by its cushioning brackets) on the bilge floor.
- Connect and assure by wrapper the rubber pipe deriving from the water filter to the input of the pump.
- Connect and assure by wrapper the rubber pipe deriving from the Cooling Unit to the Out of the pump.

Electric connections (Cooling Plate)
- Connect the seven electric conductors (it is suggested to not exceeding 2 meters) to the multipolar connector fixed on the water exchange, according to the following indications:
  - Two conductors 2.5 mm (AWG-11), to the +P1 and -P2 contacts then must be connected to the same contacts of the Control Plate.
  - Two conductors 2.0 mm (AWG-12) ...at least, to -P1 and +P2 contacts then must be connected to the same contacts of the Control Plate.
  - Three conductors 1.0 mm (AWG 18), to T_H, T_L and GND contacts then must be connected to the same contacts of the Control Plate.

Control Unit connections
- Open the plastic cover of the Control Unit to enter to the multipolar connector.
- Pass the conductors through the fairlead.
- Connect the conductors deriving from the Cooling Plate (refrigerator connector) according to the indications and diagram above described.
  - By two conductors 2.5 mm (AWG 11) ..at least, connect the - and + “POW” points to the magneto-thermal switch (12 Vdc) please attention to the polarity !!
  - By two conductors 1 mm (AWG 18) connect the - and + P points to the clamp of the mini-pump: Read = positive, black = negative. please attention to the polarity !!
FUNCTIONAL TEST
- Open the sea-cock valve and water discharge, enable the Main Power supply (12 Vdc) by switching-on the magneto-thermal switch and switch-on the Control Unit.
- If lighted of the yellow LED “On” and the green LED “Normal”, verify the immediate water circulation.
  Please check the possible water leaks and verify the cooling of the radiator.
- If all will work normally, switch-off the system and fix the Cooling Plate to the compartment side wall.
  If needed, to avoid the possible air passage, to seal with silicone.

USE AND SUGGESTIONS
- **Normal mode** (Yellow LED “On” and green LED “Normal” continually lighted)
  In this modality the system works in low-power consumption (about 32 Watt), the temperature of the radiator decrease slowly and, if possible *(*) up to 0°C (32 F). After this event is started an automatic On-Off modality around the 0°C that reduces the total power consumption.

- **Cycle mode** (Yellow LED “On” continually lighted, green LED “Normal” and yellow “Burst” LED in flashing)
  In this modality the system works in middle power consumption (about 60 Watt), the temperature of the radiator decrease faster and, if possible *(*) up to 0°C (32 F). After this event is started an automatic On-Off modality around the 0°C that reduces the total power consumption.
  This modality can be activated by short pressing of the “Burst” key. It allows to reduce the refrigeration time of the internal load (food and beverages) or compensate the temporary heating of the ice-box after the its opening for picking or loading.

- **Burst mode** (Yellow LED “On” continually lighted, yellow “Burst” LED 5 minutes continually lighted)
  In this modality the system works in maximum power consumption (about 110 Watt) for 5 minutes max, the temperature of the radiator decrease a lot faster and, if possible *(*) up to 0°C (32 F). After this event is started an automatic On-Off modality around the 0°C that reduces the total power consumption.
  This modality can be activated by long pressing of the “Burst” key. It allows to reduce the refrigeration time of the internal load (food and beverages) or compensate the temporary heating of the ice-box after the its opening for picking or loading.

Note *(*) it depends from various factors, e.g. sea water temperature, initial temperature of load, insulation and airtightness of the ice-box.
For the better fridge functionality it is suggested to load by cool water or drink the ice-box at 30% (at least). This will guarantee a good thermal mass!