Intelligence System Manual

Distributed for motorhomes

Model AS D2NA v. 1.0

ArSilicii Srl

Warnings

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Introduction

This manual contains information on the developed distributed intelligence system by the ArSilicii company and is structured as follows:

Instructions for use of the control unit and basic principles. This section contains everything the user needs to use this system profitably.

Detailed description of the system components and how they are interconnected, intended for the dealer or more expert user for repairs or particular installations.

Guide to solving the most frequent problems.

The structure of the system

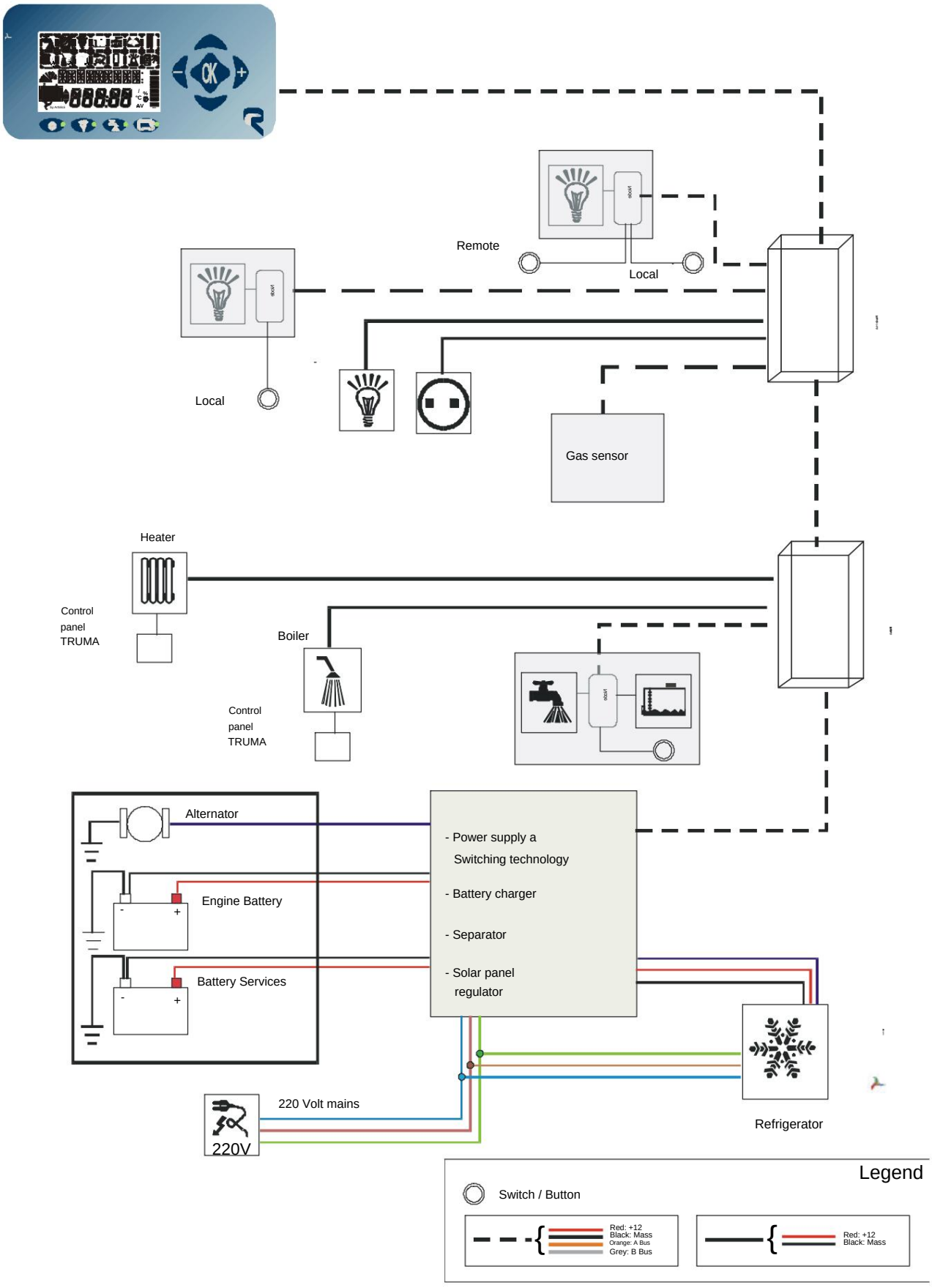
The distributed intelligence system covered by this manual is a modern and completely innovative electrical system.

A fundamental characteristic of the system is the transmission of data carried out on a special cable called "bus". Such data may relate to the functional parameters of the vehicle, such as battery voltage, or the level of a tank or functional data for the diagnosis of correct functioning.

The system allows you to customize the vehicle according to your needs. Through the installation of appropriate "kits", it is possible to easily and quickly add new optionals which are completely integrated into the system.

Since the structure of this type of system is different from the traditional one, we think that a brief description of the operating principles can give the end user the necessary knowledge to be able to fully exploit the potential offered.

The following figure shows the system wiring.



The main elements of the system are the following:

Cable

Control Panel
Distributors
power supply
Pump Node
Cherry

The connections between the devices are made using special **cables** which host four conductors of appropriate cross-section. In particular, the red conductor represents the +12V, the black one, the ground while the orange and gray pair, called bus, is dedicated to data. All the devices mentioned above (Control Panel, Distributors, Power Supply and Nodes), in fact, can communicate with each other through these two conductors.

The **control panel,** also called control unit, is the tool through which the user can know the operating status of the various parts of the motorhome, as well as give instructions
on or off commands.
The power supply is the manager of the energy sources, whether these are the batteries, the alternator motor the external 220 V mains, or the solar panels, if present. Energy, transformed and stabilized, it is carried through the dorsal[1] , to distributors.

The **distributors** are the organs through which information and energy are distributed, which, with a large cross-section line called backbone, comes from the power supply. The distributors, therefore, distribute the energy in extreme safety among the various loads subjected to them, in order to prevent risks in the event of a short circuit.
Non-destructive protections are used which, in the event of a short circuit, interrupt the energy supply. Once the cause of the short circuit has been eliminated, they start working again automatically without the need for intervention or replacement of parts such as fuses.
As mentioned, the distributors are also under the control of the control unit, via the bus.
In the system in question two distributors are mounted, one for the loads positioned on the floor, such as stove and boiler, the other, positioned at the top, for loads close to the ceiling such as ceiling lights.

The **node** is an electronic board whose main function is to manage the loads
power connected to it. In fact, through some software programs, the node allows you to supply or not supply electricity to the loads, to check the health of the system and, via the bus, to communicate with all the devices present in the motorhome. In the event of electrical malfunctions, the node allows the load to be isolated without any destructive intervention as happens with traditional fuses.

The node is also capable of detecting some quantities for which it was designed (temperature, water level in the tank, carbon monoxide, LPG, etc.). Through the bus, the Node communicates with the rest of the intelligent electrical system, making "crossed" forms of safety possible (e.g. if a gas leak is detected it is possible to close the solenoid valve on the cylinder)
In this specific case, the node fitted as standard is the **pump node,** which turns the water pump on and off, and controls the level of the fresh water and gray water tanks.
The **cherry** is nothing more than a small electronic device, inserted into the ceiling light near the entrance door. This device ensures that, when the general lights are turned back on, yes
turns on the lamp to which it is connected even if the switch that controls the lamp is in the off position.

[1] The four-wire line coming out of the power supply to which the distributors and the control unit are connected

DETAILS ON THE STRUCTURE OF THE AS D2NA SYSTEM

System description

This introductory document illustrates the structure of the AS D2NA system system. For details on the types of connectors and the section specifications of the conductors, refer to the subsequent chapters of this manual.

The AS D2NA system is essentially made up of 5 devices, an AL310X model power supply, two distributors, one for the distribution and protection of the floor utilities, model PH300S2-T and one for the distribution and protection of the sky utilities, model PH300S2- C; Furthermore, there is a CNLCD-99/00 model display and control panel and an NSA10 model actuator node.

Device connections Thanks to the

technology, which is the basis of the AS D2NA system, the devices that compose it can be placed in arbitrary positions, with no maintenance operations required, and having significantly reduced wiring compared to conventional systems.

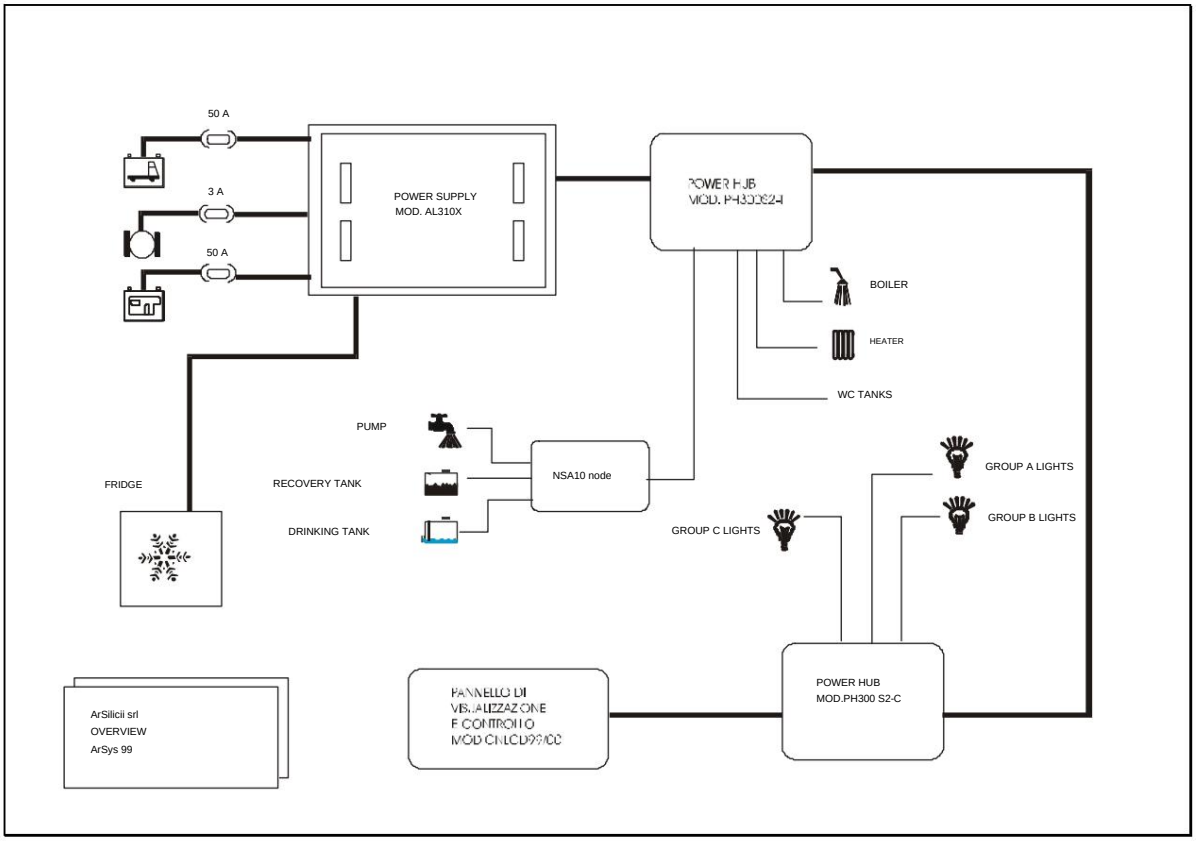


Figure 1 "System overview"

The wiring leading from the distributors is all of the "star" type, made up of point-to-point connections, i.e. without "T" or secondary branches.
The distributors, in particular, can be positioned in a central position with respect to the connected loads, in order to shorten the distances of the connections.
Figure 1 shows the overall view of the entire AS D2NA system.

Connection of batteries and alternator - power supply

The connection of the service battery to the power supply is carried out with a cable made up of two conductors of consistent section (+12 and GROUND) and through a fuse, of power adequate interrupting voltage (50 A), in series with the conductor connected to the positive pole of the battery. The connection to the power supply takes place with the appropriate connector. The negative pole of the battery is connected to the chassis of the vehicle near the battery itself.
The connection to the engine battery power supply and the engine running signal (D+) is made with a cable made up of three conductors (+12, GROUND, D+). On the conductor connected to the positive pole of the battery (+12) there must be a fuse with interrupting capacity adequate (50 A). The third conductor, the one relating to the engine running signal (D+), must have also an adequate protection fuse in series with the connector itself (2 A). The negative pole of the engine battery, if it is not, must be connected to the chassis of the vehicle.
The Schuko plug through which the power supply is connected to the 220V mains must be connected at the output to the differential switch that protects it and with the characteristic earthing.
The AL310X power supply, if connected to the external 220V mains, is a completely autonomous source of energy and is therefore able to supply power even if the batteries are not present or are damaged, or even if the fuses towards the batteries are blown. This feature provides further guarantees of robustness for the user.

Power supply - refrigerator connection

The point-to-point connection of the power supply, model AL310X, with the refrigerator must be made with a 3-wire cable of adequate section (+12, +12D+ and GROUND).

Power Supply Connection – Power Hub Earth

The point-to-point connection of the power supply, model AL310X, with the Terra Power Hub model PH300S2-T must be made with a 4-wire cable of adequate cross-section, two of which are power (+12 and GROUND) and two signal (BUS_A and BUS_B).

Power Hub Ground connection - Ground users

The connections, all point-to-point, of the Power Hub Terra, model PH300S2-T with the various floor utilities are made with a four-wire cable, two of which are power (+12 and MASS) and two are signal (BUS_A and BUS_B).
By carrying out wiring, entirely with four-connector cables (Smart Ready), it is possible insert, even at a later stage, *intelligent users* and exploit all the potential of the AS D2NA system

Connection of NSA10 Pump and Level Sensors Node

This type of connection is the one that exploits the potential of the AS D2NA system. In fact i loads or sensors are connected directly to the NSA10 node which can be located in proximity to them and exploit the potential of the control panel for viewing the states of connected objects and their actuations.

Power Hub Earth - Power Hub Sky connection

The point-to-point connection of the Power Hub Terra model PH300S2-T with the Power Hub Cielo model PH300S2-C must be made with a 4-wire cable of adequate cross-section, two of which are power (+12 and MASS) and two signal (BUS_A and BUS_B); the connection takes place with the appropriate connectors.

Cielo Power Hub - Cielo utilities connection

For the connections of the cielo utilities to the Cielo Power Hub model PH300S2-C (all point-to-point connections) the same considerations apply as for connecting the Power Hub Terra users to the ground users. At the time of installation of the system they are foreseen Power Hub Cielo connections with the Cielo four-wire users (Smart Ready) it is therefore possible to connect *intelligent users* at a later stage and fully exploit the potential of the AS D2NA system [2].

Cielo Power Hub connection – Display and control panel

The connection (point to point) of the Power Hub Cielo model PH300S2-C with the panel display and control model CNLCD-99/00 must also be performed with a 4-wire cable of which 2 are power (+12 and EARTH) and two are signal (BUS_A and BUS_B) registered with the specific connectors.

Maintenance tips:

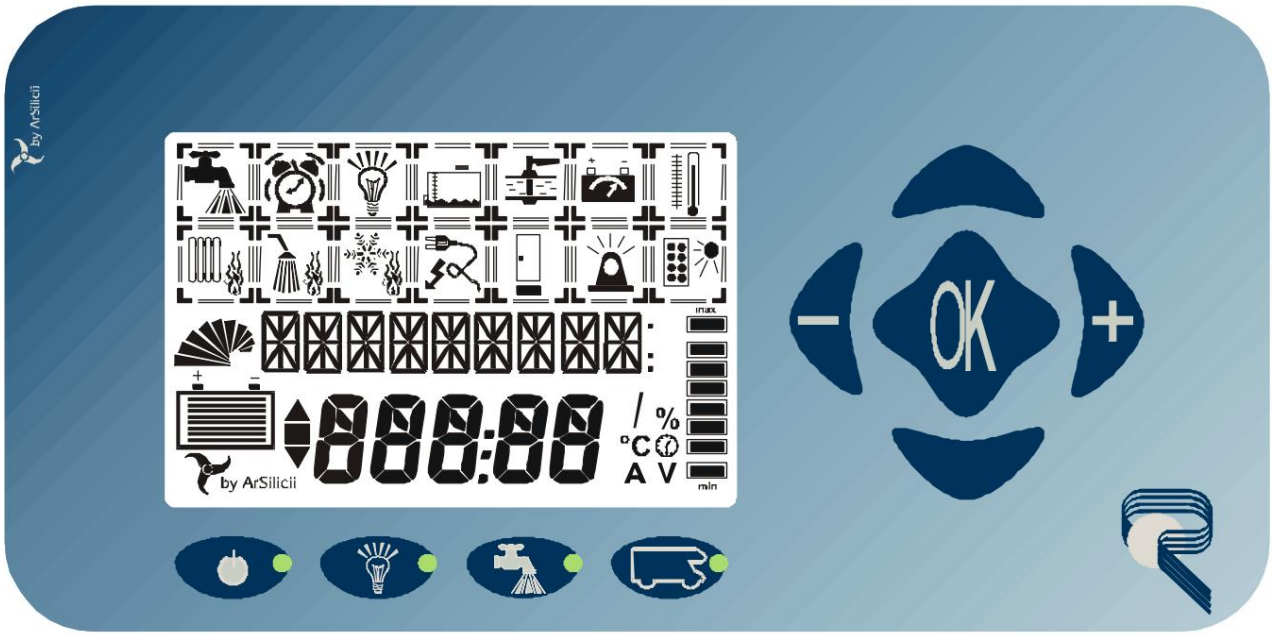
Do not work on the system without having disconnected the 220V mains, solar panels and batteries.
Periodically check the battery acid level.
During prolonged parking and storage of the vehicle, in the absence of external energy (220V mains or solar panels) it is advisable to disconnect the positive pole of both the engine battery and the service battery.

[2] Example: insert a monoxide sensor that functions not only as a stand-alone device but integrated directly with the AS D2NA and therefore automatically with the states that can also be viewed and set from the control panel without having to pass any wires between the sensor and the control unit.

STRUCTURE AND OPERATION OF THE CONTROL PANEL

The **Control Panel** has a liquid crystal display (LCD), which shows the main electrical quantities and the "health status" of the system. It differs from traditional ones because it is connected to the system only through a single cable, four
conductors.

The front panel, represented in the following illustration, consists of two keyboards; one, positioned to the right of the LCD viewer, called *navigation* and one, positioned under the
viewer, called *direct* or *fast.*



MAIN COMPONENTS OF THE CONTROL PANEL

The Keyboards

Navigation Keyboard

It is made up of 4 buttons around a central OK button located on the right of the display and is represented in the figure below.

Their functionality varies depending on the context in which we find ourselves and is described below:

They allow to:

scroll the icons horizontally

after selecting an icon, to choose between the menu alternatives (e.g. ON/OFF) or set new values (e.g. clock).

They allow to:

scroll vertically through the symbols on the display;
after selecting a symbol, scroll through the menu items associated with each icon

It allows to:

select a symbol to enter the menus associated with it;
execute the set command and, at the same time, return to the symbol navigation mode.

Fast Keyboard

It is made up of four buttons (depicted in the following figure) located just below the LCD display.

Each button has a small light (also called LED) which represents the status of the icon depicted on it. Let's see in detail what the functions connected with these keys are.

It allows you to remove or not remove the energy from all users, therefore, a real general. The light on indicates that I have voltage on the electrical system, vice versa all the users are not powered. If the LED flashes it means that there is a problem operation on a part of the system.

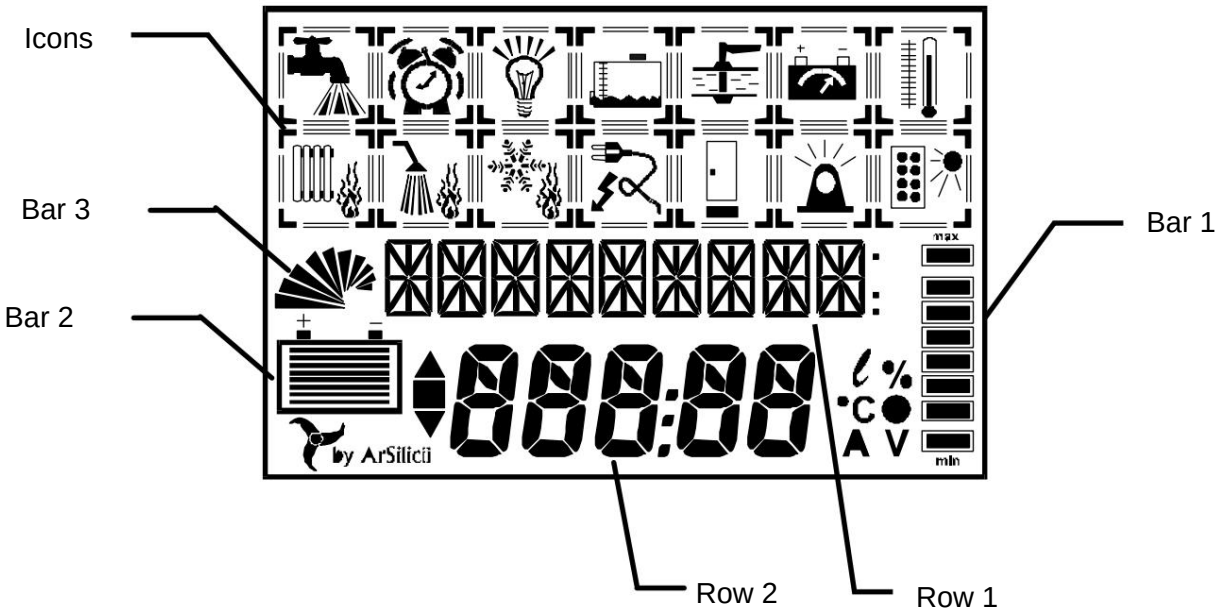
Indicates the general lights, allows you to supply or not supply voltage to all the lights present on the roof of the vehicle's living area. **Green light on** = SKY DISTRIBUTOR active, off = SKY DISTRIBUTOR deactivated, flashing = PROBLEMS.

It is the remote button for turning the pump on or off. Green light on = PUMP ON, off = PUMP OFF, flashing = PROBLEMS.

If the light is on it means that one of the following cases has occurred: service batteries flat, light tank in reserve, recovery tank full, by pressing the button you will then learn in detail which of the previous situations has occurred. This button is only active when you are not navigating, i.e. when the time is present on the display.

LCD viewer

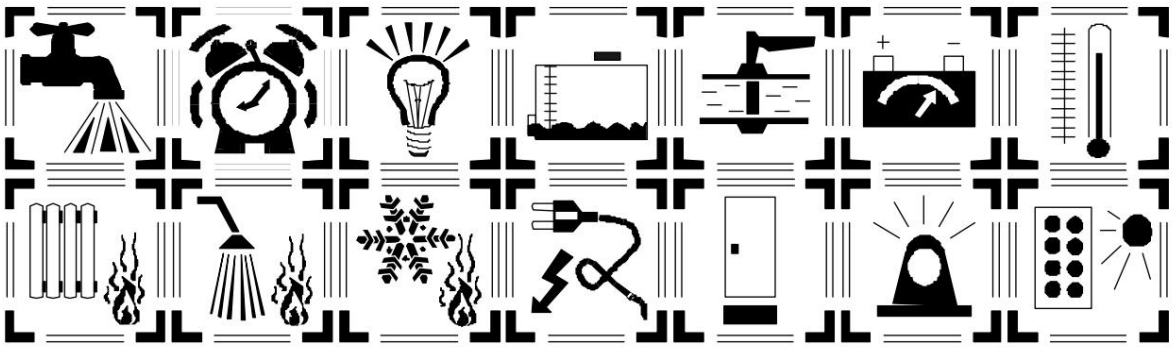
The structure of the LCD viewer is as shown in the figure:



In the upper part of the display, the symbols characterizing the main functional areas offered by the system are graphically represented; they are called icons.
Immediately below there are two lines of alphanumeric characters (Line 1 and Line 2) which, from time to time, describe the various items of the selected menus. On the sides of the LCD display, there are graphic bars that allow immediate and constant display of the fundamental quantities (e.g. service battery level, instantaneous current absorbed by the system, etc.).
Obviously not all the graphic symbols represented in the previous figure are visible at the same time.

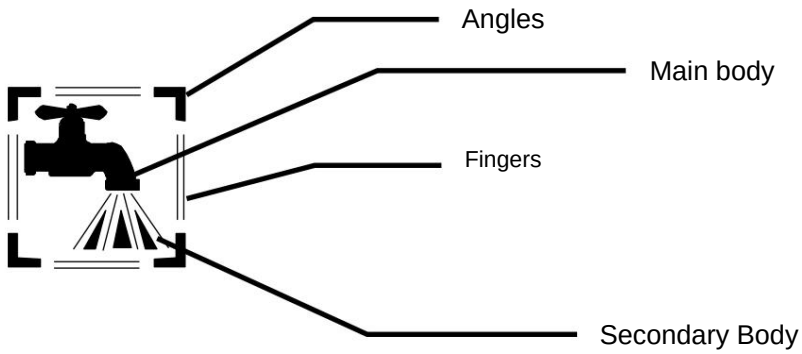
Icons

There are fourteen icons and they schematically represent all the functions of the control panel.



Each icon is made up of four parts (Main Body, Secondary Body, Corners and Bars), which are visible or not depending on the case.

The icon shown in the figure, located on the top left of the display, refers to the water pump.



The **Main Body,** (the tap), indicates the functionality, in this case the water pump.

The **Secondary Body** (water) summarizes whether the functionality is active or not. In this case, inside the icon you can see the water coming out of the tap only if the pump is on.

The **Corners** indicate which icon is currently selected using the *keyboard navigation.*

The **bars,** if they are lit, indicate an alarm or anomaly status relating to that group of functions (in this case, for example, it could be a short circuit on the pump).

Example: Turning the Water Pump On or Off:

By scrolling through the symbols on the display with the navigation keys , we position ourselves over the icon depicting the tap, by pressing the OK button (the symbol is selected) additional information appears in the form of alphanumeric characters. In this case the writing appears PUMP (line 1) and its ON/OFF status (line 2).

Using the *navigation* keys you scroll through the menu items: PUMP, PROTECTION, and PROBLEMS. Let's position ourselves on PUMP.

With the *navigation* keys (plus and minus) you select the state you want to set on the PUMP: **ON/OFF**

Pressing the OK button applies the selected menu item command chosen and, at the same time, you return to navigation mode.

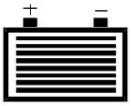
GRAPHIC BARS

There are three graphic bars that give an "at a glance" evaluation (since they are always visible in any operating mode we are in), of the main sizes of the camper. They can be examined in greater detail in the relevant items of the appropriate menus.

Bar **1** indicates the **clear water level**

The min. levels and max indicate respectively: fresh water tank *Empty* and fresh water tank *Full.* For more precise evaluations it is necessary to select the symbol relating to the tanks and consult the appropriate menu.

Bar **2** indicates the **state of charge remaining in the battery**



Also in this case it is possible to have more precise and extensive indications, by selecting the appropriate symbol and consulting all the menus contained therein.

Bar **3** indicates **the system's instantaneous absorption** from the service battery.

Its filling occurs counterclockwise , a greater number of segments indicates greater absorption. It should be noted that if a form of external energy is present, such as connection to the 220 V mains or solar panel, the bar in question always remains "off", since the consumption of the users is met by external energy sources.

LINE 1 AND LINE 2 (ALPHANUMERIC CHARACTERS)

The area dedicated to the representation of characters and numbers is divided into two lines. Theirs behavior varies depending on whether or not a symbol is selected.
If we are in navigation mode (no symbols selected), the top line appears completely off, while the lower one shows the time. Otherwise, the line the upper one shows the name of the menu item, while the lower one indicates its alternatives. Sometimes, if the selected symbol relates to a quantity (e.g. the battery or the tank), the upper line shows its name, the lower one its value and, next to the latter, the unit of measurement appears .

DESCRIPTION OF FUNCTIONS IN DETAIL

In this section we describe in detail the functions present on the control unit.
We remind you that some of them may not be present in the model you own, or refer to accessories that are not installed. For convenience, the functions are grouped according to the icons that contain them.

Functionality'

PUMP

Contains menu items relating to the use and diagnostics of the water pump.
The bars around the symbol are shown only in the event of a short circuit on the pump.
Flowing water indicates that the pump is on

PUMP: ON/OFF

Allows you to set the status, on or off, of the water pump. *Initially this menu item is positioned on OFF.*

PROTECTION ON/OFF

In addition to the electrical protection on the PUMP (which is always active thanks to the node), it is possible set an additional one. This, if activated, prevents the pump from turning on if there is not enough water in the tank. *Initially this menu item is positioned on OFF.*

PROBLEMS: NO/CC

Indicates the presence or absence of electrical problems on the pump (NO = no problem, CC = Short Circuit).

THE CLOCK

Contains the menu items relating to the clock. Allows you to set the current time using the left and right arrow keys.

LIGHTS

Contains the menu items relating to the motorhome ceiling power supply.

The bars around the icon are shown only in the event of an electrical malfunction relating to the upper part of the electrical system. The rays indicate that the ceiling lights located on the ceiling, or in any case all the loads connected to the output of the ceiling distributor, are live

LIGHTS: ON/OFF

Allows you to switch on or off power to all the loads connected to the vehicle's roof distributor. *Initially this menu item is positioned ON.*

PROBLEMS: NO/DC

Indicates the presence or absence of electrical problems in the sky (NO = no problem, CC = Short Circuit). A possible symbol next to the writing CC is used for auxiliary information regarding the location of the short circuit. In particular, the following symbolism is followed:

 short circuit on the left channel earth distributor

 short circuit on the right channel earth distributor

 short circuit on the left channel ceiling distributor

 short circuit on the right channel ceiling distributor

In case of multiple short circuit sources I have a combination of the symbols shown above. As mentioned previously, once the cause of the short circuit ceases, the signaling ceases and the system resumes functioning correctly without replacing the fuses.

LEVELS

Contains the menu items relating to the tanks.

The bars can indicate: the lack of clear water or the overflow of one of the recovery tanks.

CLEAR: *X* % This

menu item gives the level of the clear water tank expressed as a percentage of the total volume. (for a 4 level probe (0%-30%-60%-90%)

GRAY 1: NO/FULL

Indicates whether the gray 1 recovery tank is full or not.

GRAY 2: NO/FULL

Indicates whether the gray 2 recovery tank is full or not.

GAS-ELECTRIC VALVE

Functions that can only be activated by installing optional kits.

Contains the menu items relating to protections against gas leaks and the presence of carbon monoxide and signals the status of the gas solenoid valve.

GAS SENSOR: ON/OFF/GAS/--

Dashes (--) indicate that the sensor is not installed or is not functioning properly. The flashing ON message indicates that the sensor is warming up and therefore not able to detect an alarm situation. At the end of the heating phase, the word ON stops flashing.
The word GAS appears when an alarm situation has occurred, i.e. a gas leak.

ALR SOUND: ON/OFF/--

Dashes (--) indicate that the sensor is not installed or is not functioning properly. The ON command enables the acoustic warning device on the sensor to sound in the event of an alarm, while the OFF command disables it.

BATTERIES

Contains the menu items relating to the measurements of the voltages on the two batteries (engine and services), the current supplied and the quantity of charge stored.
The bars indicate that the service battery is starting to fail.

ENGINE BATTERY: *X* V

Indicates the voltage value, expressed in Volts, at the ends of the engine battery.

BATT SERV: *X* V

Indicates the voltage value, expressed in Volts, at the ends of the service battery.

CURRENT: *X* A

Displays the value of the instantaneous current supplied, **if the quantity is positive,** by the service battery. Conversely, a **negative value** expresses the value of the charging current (of the service battery or both).

AMPERS *H :*

Indicates the amount of charge, expressed in Ah, used or supplied to the battery since the last reset performed.

RESETAMPH

By pressing the OK button the ampere/hour (Ah) counter mentioned above is reset.

PROBLEMS: NO/LO

Indicates the presence or absence of problems on the service battery (NO = no problem, LO = beginning of irreversible damage on the service battery).

TEMPERATURES

Functions that can be activated using appropriate optional kits.

Contains menu items that indicate the momentary value of the internal temperature and that external.

IN TEMP: X °c / --

Indicates the temperature value expressed in degrees centigrade inside the passenger compartment. Dashes indicate that the sensor is not installed.

TEMP EXT : X °c / --

Indicates the temperature value expressed in degrees centigrade, outside the passenger compartment. Dashes indicate that the sensor is not installed.

HEATING

Contains the menu items for remote control and timing of the electronic stove.

Function not active in this model.

BOILER

Contains menu items for remote control and timing of the boiler.

Function not active in this model.

FRIDGE

Contains the menu items for controlling the fridge.

Function not active in this model.

220V MAINS

Contains the menu items relating to the presence of the external 220V network and the power supply.
The bars indicate an excessive internal temperature of the switching power supply.
The lightning bolt indicates the presence of connection to the 220V line.

ALIM EXT: ON/OFF

Indicates whether or not the vehicle is connected to the 220V mains line.

PARALLEL: ON/OFF

It allows you to decide, **if the vehicle is connected to the 220V line,** to put the engine battery in parallel with the service battery. *Initially this menu item is positioned on OFF.*

V MAX: *X* V

Indicates the value of the maximum voltage, expressed in Volts, imposed on the battery terminals of the services during the charging phase.

SUPPLY TEMP :

Provides the internal temperature of the power supply, expressed in degrees centigrade.
Values of this reading below 70 °C are acceptable. Beyond this threshold, there is an anomaly situation. The power supply, however, begins to decrease the power output to avoid
get damaged. As soon as the temperature returns to normal, the power supply starts working again normally without external intervention.

FAST: ON/OFF

Allows you to set the charging cycles to be carried out on the battery(s). *Initially this menu item is positioned on OFF.*

Note: *it is advisable to use fast ON only when the service battery begins to have sulfation problems, for partial regeneration, or in cases of extreme need for a charge in a short time, as the normal charging cycle (fast OFF) has been specially designed for a long battery life and is therefore to be preferred.*

MAINTENANCE ON/OFF

If a form of external energy is present, it allows you to set an alternative charging cycle compared to the fast ones.
Initially this menu item is positioned on OFF.

Please note: *this type of charge is to be used only in the case of prolonged parking of the vehicle, as it does not carry out a real charge but rather makes up for the self-discharge of the batteries and can only be activated if a form of external energy is present (mains 220V or solar panels). It has been designed so that the battery electrolyte is not consumed during periods of inactivity.*

LANGUAGES

Contains menu items that allow you to choose the language (ITALIAN, ENGLISH, FRENCH, GERMAN and SPANISH), in which all the information will be shown.

ALARMS

Contains the menu items linked to the alarms present in the motorhome.
The bars and rays indicate the presence of danger.

Functions that can be activated using appropriate optional kits.

SOLAR PANELS

Contains menu items relating to solar panels.
The sun (top right) indicates that the power delivered by the solar panels exceeds a certain threshold, which implies the presence of solar panels in operation.

P SOLAR: ON/OFF

Allows you to activate or deactivate the solar panels. *Initially this menu item is positioned on OFF.*
POWER : _

GENERAL ADVICE ON THE CORRECT USE AND MAINTENANCE OF THE SYSTEM:

During prolonged parking (over a month) of the vehicle, it is always
It is advisable to recharge the batteries to avoid them going flat
could seriously compromise the storage capacity of the batteries themselves.
If solar panels are present, these keep the batteries charged, which can then be kept in parallel with
the appropriate control unit command. If a 220V mains connection is available, the compensating maintenance charging system can be used
the self-discharge of the accumulators.
In systems with a power supply without a main switch, in the absence of external energy (220V mains or solar panels), it is advisable to disconnect the positive pole of both the engine battery and that of the service battery, so that the batteries reduce their consumption to their self-discharge.
Do not use chemicals, cleaning solvents or strong detergents to clean the control panel. To clean, use a soft, slightly damp cloth.

Avoid obstructing the passages necessary for cooling the power supply
switching.
Prevent the power supply from coming into contact with liquids or anything else that could infiltrate the container from the ventilation holes.
Avoid pressing the control panel buttons with screwdrivers, knives,
blades, etc.
Electrical system repairs should only be carried out by
qualified personnel.
If emergency intervention is necessary, it is advisable
disconnect both positive terminals of the batteries and any connection to the 220V mains or solar panels.

FEATURES OF POWER SUPPLY Mod. AL310X

Model AL310X

The AL310X model power supply is a device designed for energy management; it has the characteristic of being able to switch and regulate the various energy sources available, providing stable and safe powers on the outputs.
In a motorhome we typically have the following energy sources:

1. Engine battery(s);
2. Battery(s) services;
3. Alternator;
4. External Electricity Network;
5. Solar Panels;
6. Generator;
7. Alternative sources (Wind, etc..)

And the outputs are typically considered:

1. Services (entire living area at 12 V)
2. Fridge

Characteristics

Electrical

The electrical characteristics of the device are:

Supply voltage: 110-220 V, 50-60 Hz. Complies with regulations

Rated Power: 150 VA of the charger @ 13.5 V.

Services output: 13.5 Volt 30 Ampere.

Fridge output: 13.5 Volt 20 Ampere.

SMART type active protections.

the power supply, if connected to the external 110/220V network, supplies power even if the batteries are not connected

Optional: Main switch and indicator light

Encumbrances

Container: 220x195x82 Weight 1.5 Kg

Connections

- Cable (L. 150 cm) for connection to the external 110/220 V mains, with selector, 50 – 60 Hz with Schuko plug

- J1 ***molex caimano mlx 94213 - 2014*** (“S” connector used for connecting the service battery)
  - contact N.4 ? Negative
  - contact N.3 ? Not used
  - contact N.2 ? Positive (+12)
  - contact N.1 ? Not used

- J2 ***molex caimano mlx 94213 - 2014*** (“M” connector used for connecting the engine battery and engine running signal) - contact N.4 ? Negative - contact N.3 ? Not Used - contact N.2 ? Positive (+12) - contact N.1 ? D+ (Engine running signal)

- J3 ***molex caimano mlx 94213 - 2014*** (“B” connector used for power distribution towards the living cell) - contact N.4 ? Negative - contact N.3 ? Bus_B - contact N.2 ? Positive (+12) - contact N.1 ? Bus_A

- J4 ***molex caimano mlx 94213 - 2014*** (“F” connector used for connection to the refrigerator; **not to be used for assembling the *AES refrigerator)*** - contact N.4 ? Negative - contact N.3 ? Positive +12 (Power) - contact N.2 ? Positive (+12) (Low Power) - contact N.1 ? Aux

- J5 ***Amp Mate-N-Lock 2x1*** (“P” connector used for solar panel connection) - contact N.1 ? Negative - contact N.2 ? Positive

Compliance

Declaration of Conformity:	
The device complies with the requirements of the European Union Directives: 89/336 EEC Electromagnetic Compatibility, 73/23 and 93/68 EEC Safety of electrical products	
ArSilicii Srl Loc.Fosci, 25/F 53036 Poggibonsi (Siena)	
Product name:	**Fuseless Switching MotorHome Power Unit Mod.: AL 310**
Standards:	**EN60335-1**
Date	**01/10/1999**

Practical advice for use

Commissioning

To commission the power supply, it is recommended to carry out the following steps: - with the main switch in the "off" position, connect all the connectors - connect the plug for the external 220 V mains - place the switch in the "on" position and wait approximately 20 seconds for the calibration phase, after which the power supply will enter into service providing power on its outputs. During the calibration phase the light will remain lit, after this phase (20 sec), barring problems, the light must go off.

Decommissioned

- place the main switch in the “off” position; - disconnect the plug for the external 220 V mains - disconnect all the connectors

Disconnect batteries

With the main switch in the "off" position, the battery switch function is implemented.
NB. Even when the main switch is in the "off" position, the functions that parallel the service battery with the engine battery and the fridge power supply are always active.

Things not to do

- Do not connect or leave the solar panel connected in the absence of service batteries; - do not carry out maintenance with the external 220 V mains connected.

Solar Panel

- see any application note.

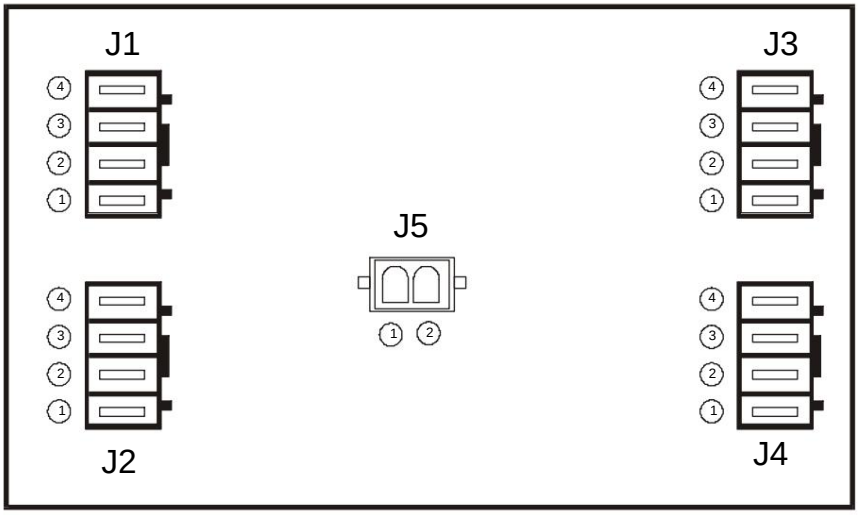


Figure 2 “Connector layout”

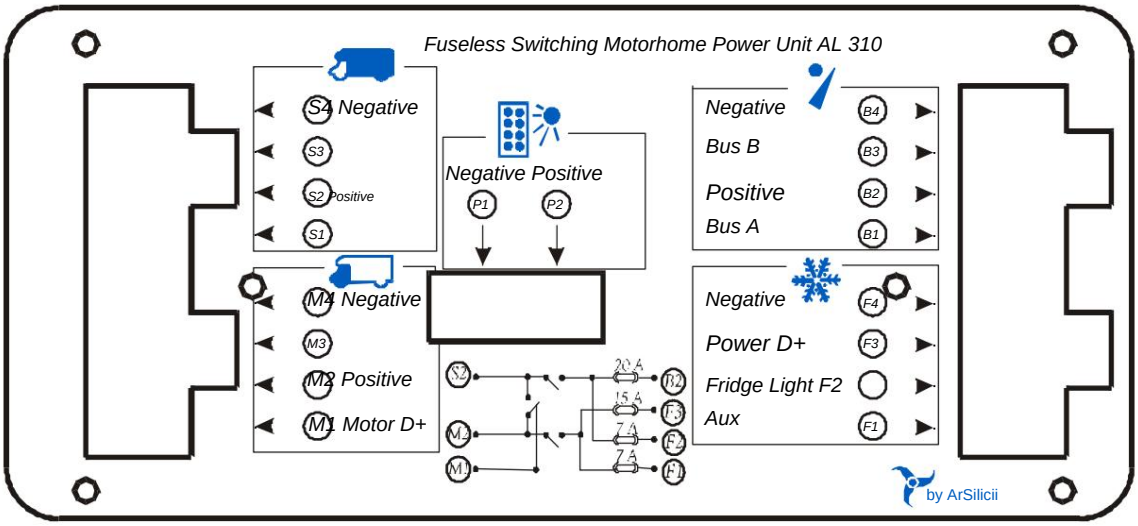


Figure 3 “Power supply contact arrangement”

FEATURES AND OPERATION OF THE POWER HUB

PH300S2

Model PH300S2

The power-hub, also called distributor, allows not only to distribute energy and information to the various devices connected to its outputs, but also to protect them from possible short circuits or anomalous overloads.

The distributor can be controlled to enable/disable the flow of energy to the outputs in two ways: locally, through a button (on/off) directly connected to the distributor (J4 in Figure 4), or remotely, through the control unit, with a specific command. The latter also displays the status of the distributor's electrical protections.

Entrances

The device essentially consists of three types of connectors. Connector J1, Figure 4, normally considered the input of the device, has homologous terminals, that is, in
common, with the J2 and J3 connectors therefore considered pure and simple pass-throughs.
The two-pole J4 connector is usually used to connect the output control button.

Get out

The device has a group of output connectors (from J5 to J12) logically made up of two subgroups that can be controlled independently3 , the first from J5 to J8 and the second from J9 to J12

Electrical Characteristics

The electrical characteristics of the device with reference to Figure 5 are:

Supply voltage 12 V

J1, J2 4-pole pass-through connector with 30 A capacity
J3 4-pole pass-through connector with 3 A capacity protected by a 5A self-resetting fuse

J5..J8 four protected outputs in pairs with 7A self-resetting fuses (F4 and F5); the group of four connectors is powered by a line with SMART protection worth 10 A (F2);

J9..J12 four protected outputs in pairs with 7A self-resetting fuses (F6 and F7); the group of four connectors is powered by a line with a SMART protection value of 10 A (F3).

J4 switch isolation control connector I1 and I2

Connectors

The connectors used on the device are of three types (see also Figure 5);

J1..J2 Molex *"caimano"* abbreviation **mlx94213-2014** with contacts arranged in the following manner (see also Figure 4)

1 - Bus A

[3] In the Power Hub 300 S2 model the two outputs are activated / deactivated in parallel.

2 - Positive +12 V

3 - Bus B

.J12 Molex *"mini-fit Jr"* abbreviation **MLX5569-04** with contacts arranged in the following manner (see also Figure 4)

1 - Bus B

2 - Mass

3 - Bus A

4 - Positive +12 V

J12 Molex *"mini-fit Jr"* abbreviation **MLX5569-02A2** with contacts arranged in the following manner (see also Figure 4)

1 – Pole A-Switch.

2 – Pole B-Switch.

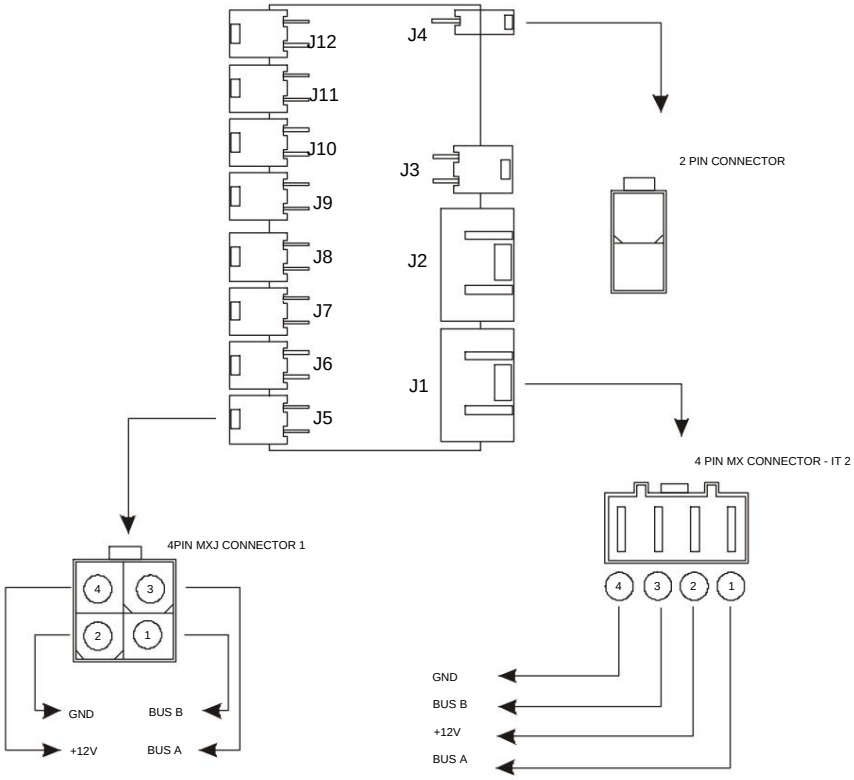


Figure 4 "Power Hub"

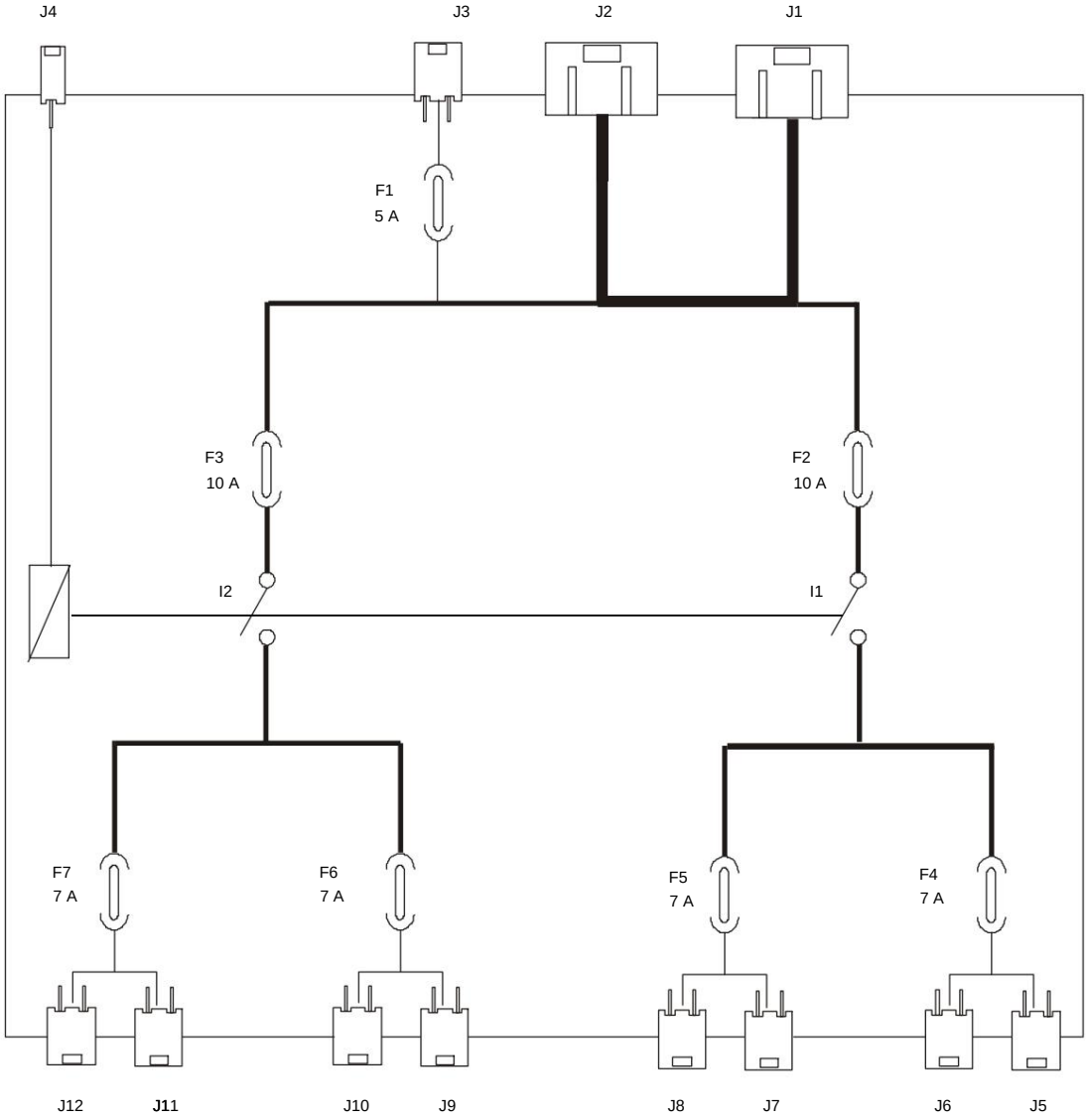


Figure 5 "Power Hub logic diagram"

NODE FEATURES Mod. NSA10

NSA Model 10

It is a system that allows you to deliver power to a load, such as the water pump, which is connected to the output, but also to protect it from possible short circuits or overloads
anomalous.

This node is designed for level detection with discrete probes (4 levels) and two overflow probes

The device can be controlled to enable/disable the flow of energy to the pump in two ways: locally, through a normal switch (on/off), as well as, remotely, through the control unit. The latter displays the status (on/off) of the device as well as the status of its protections and level probes.

Entrances

The device, as shown in Figure 6, essentially consists of three types of connectors. The
J1 connector, the device input; the six-pole J4 connector usually used to detect the levels of a tank with a discrete four-level sensor and the 4-pole J5 connector used instead to detect the overflow signal from two distinct tanks

Get out

The output consists of the J2 connector, as shown in Figure 6 (the J3 connector may not be mounted in some models) the J2 connector will have the power output and two contacts (Wire A and Wire B) to connect the power switch command

Electrical Characteristics

The electrical characteristics of the device are:

Supply voltage 12 V

J1 6-pole connector input, 5 A capacity

J2, J3 the two possible outputs controlled respectively by the relevant switch
connected to contacts CON_01 and CON_02 respectively protected with a SMART type fuse
with a capacity of 3 A

J4, J5 the two connectors for the level sensors.

Connectors

The connectors used on the device are of three types;):

J1 Molex *"mini-fit Jr"* abbreviation **MLX5569-04** with contacts arranged in the following manner

1 - Bus B

2 - Mass

3 - Bus A

4 - Positive +12 V

J2, J3 Molex *"mini-fit Jr"* abbreviation **MLX5569-04** with contacts arranged in the following manner

1 – Filo_01
2 - Mass

3 – Wire_02
4 - Positive +12 V

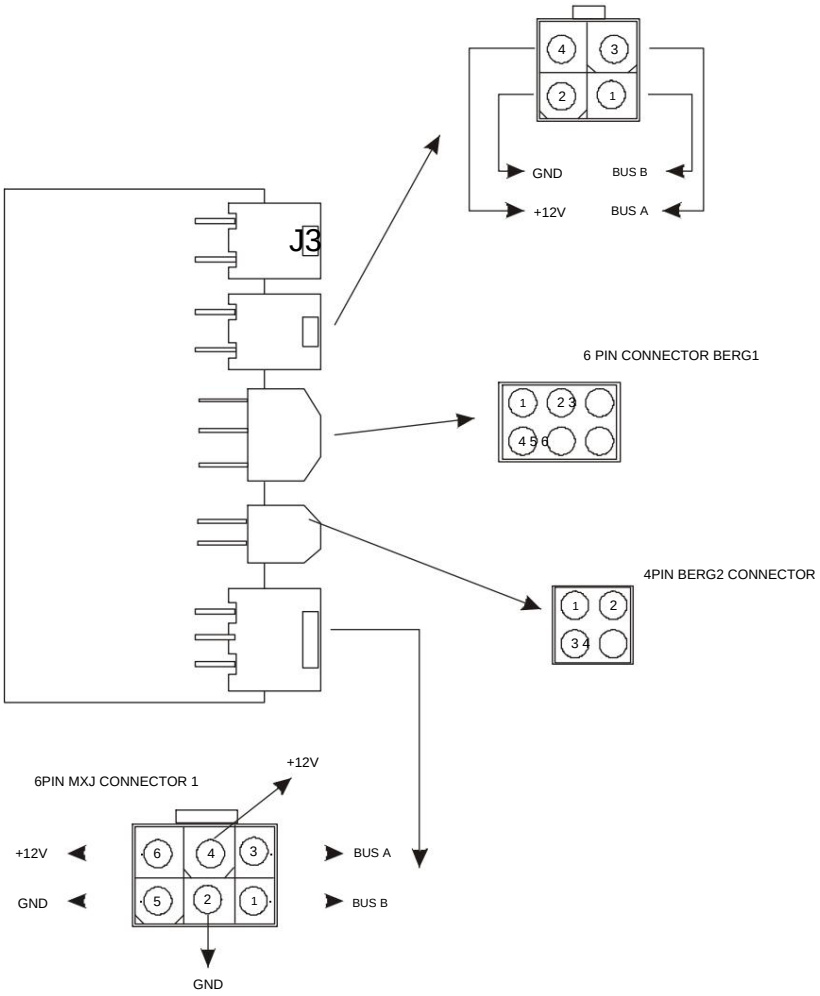


Figure 6 “Node Connector Arrangements”

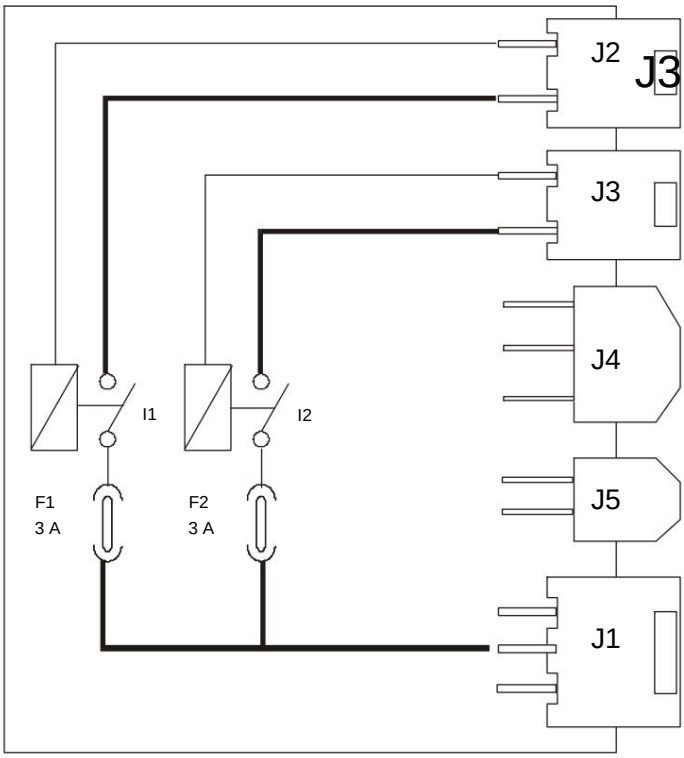


Figure 7"Equivalent logo diagram of the node"

WIRING SPECIFICATIONS OF THE AS D2NA SYSTEM (RIMOR SPA)

Introduction

These pages contain a detailed description of the wiring methods adopted by RIMOR SPA for the 1999/2000 production for the connection of the devices that make up the AS D2NA system according to the specifications. They are intended for qualified personnel to carry out repair work or for modifications and customizations of the system itself, as well as the assembly of new accessories.

Wiring of the Service Batteries – Power Supply connection

The wiring of the Service Battery connection with the power supply takes place as shown in Figure 8; the 50 A slow-acting blade fuse must be placed in series with the positive pole conductor of the battery in the vicinity of the battery; the section of the two conductors must be 6 mm2
at least4 ; for the 1999/2000 production RIMOR SPA.

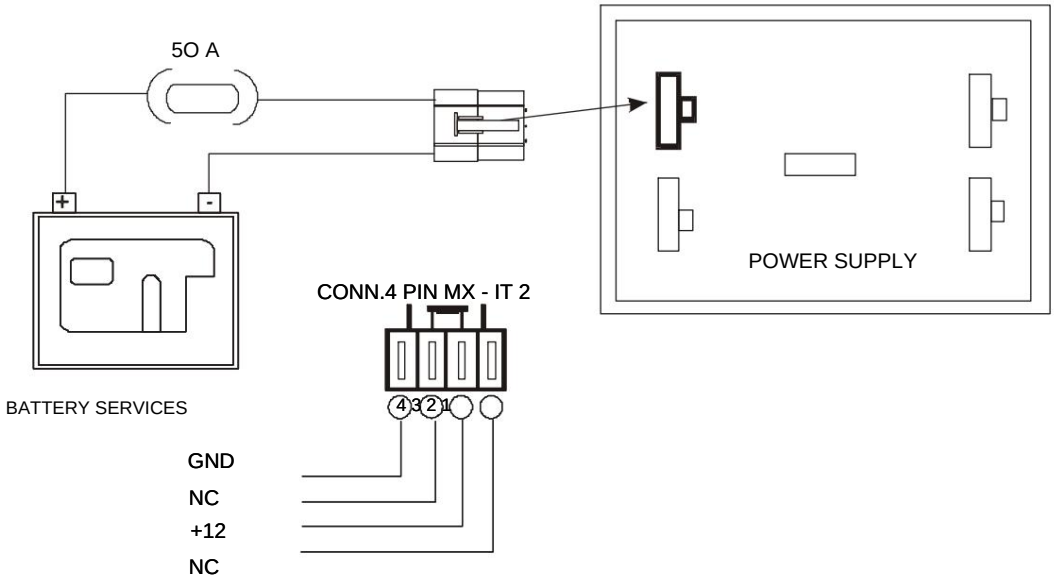


Figure 8 “Wiring Battery Services Power Supply”

The summary table details the type of extension header (connection
point-to-point) or with what type of connector it is terminated at its ends, the section and the color of the various conductors and the position of the contacts inside the connector itself.

Connection: Service Battery – Power Supply? Header Extend?			
..			No.2
Guy	**Section mm2 Color** 6 LIGHT		**Position**
+ 12V	BLUE		2
GND (GROUND)	6	BROWN 4	
..	..	..	3
..	..	..	1

[4] If the distances between the two objects are greater than the standard ones of a camper, it may be necessary to use cables with a larger section

Wiring for the Engine Battery – Power Supply connection

The wiring of the engine battery connection with the power supply takes place as shown in Figure 9; the 50 A slow-acting blade fuse must be placed in series with the positive pole wire of the battery near it;

The two rows must be 6 mm2 at least5 ;
In this connection, compared to the previous one, there is a third wire with a 1.5 mm2 section which is used to carry the engine running signal to the power supply. The arrangement of the three wires in the connector is that shown in Figure 9 and in the table following the figure

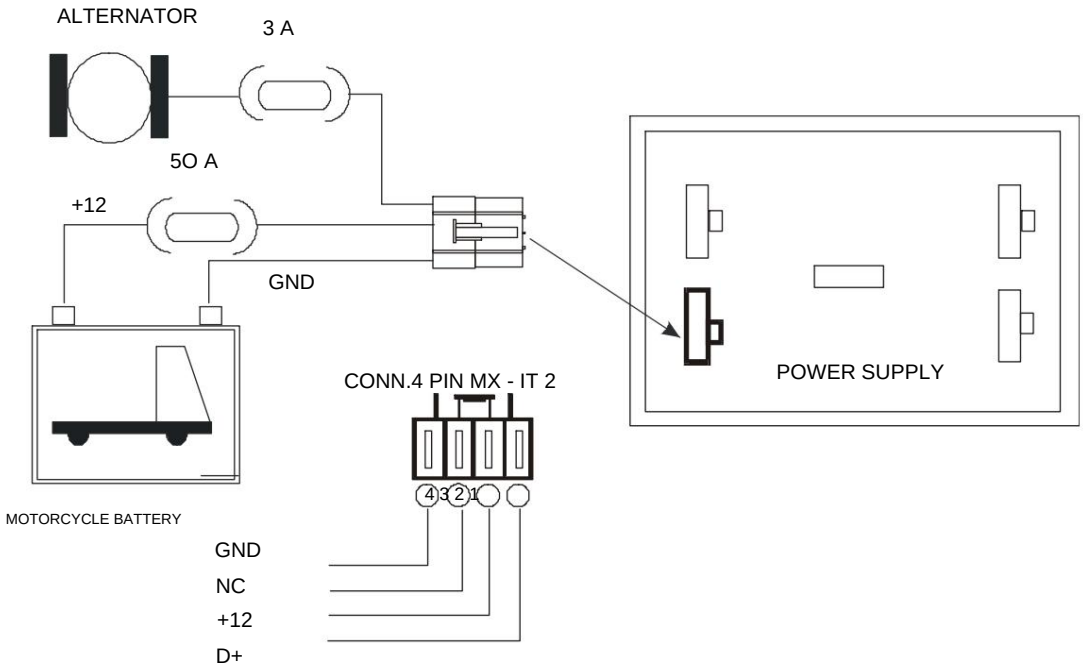


Figure 9 “Engine Battery and Alternator Wiring with Power Supply”

The summary table shows in detail, for the connection in question, the type of header of the extension (point - point connection) or what type of connector it is terminated with at its ends, the section and color of the various conductors and the position of the contacts inside the
connector itself (see section “Type of Connectors and their Description”)

Connection:	**Engine Battery – Power Supply?**		
..	**Header Extend?**		No.2
Guy	**Section mm2 Color** 6		**Position**
+ 12V	ORANGE		2
GND (GROUND)	6	BLACK	4
D+	1.5	RED	1
..	..	..	3

Wiring for the Power Supply – Standard Fridge connection

The connection of the fridge to the power supply is carried out with a three-wire cable all with a 6 mm2 section (+12, MASS, +12 D+) as shown in Figure 10. On this type of connection neither

[5] The same goes for the service battery

No external fuse needed as the model power supply is designed to protect this type of load with active SMART internal protection.

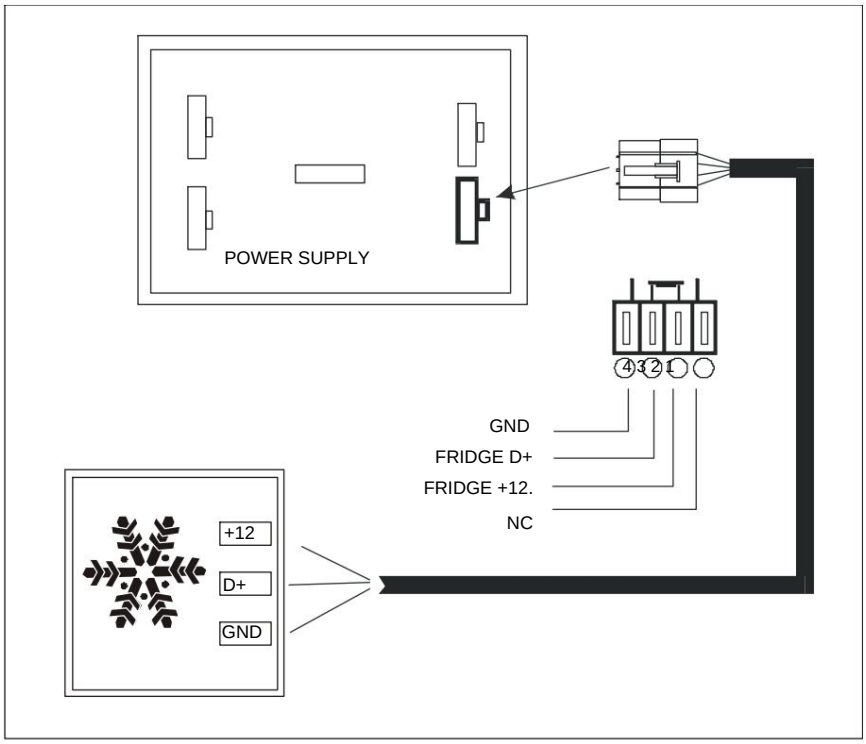


Figure 10 “Power Supply – Standard Fridge Connection”

Figure 11 shows a second type of refrigerator connection that must be done when the **AES** (fully automatic) model refrigerator of the
Electrolux ; this second connection method uses the two GND and FRIGO_D+ conductors of the cable connected to the power supply, while the positive conductor of the FRIGO (+12) is connected with a 10 mm2 section conductor and 30 A series fuse directly to the battery of services.

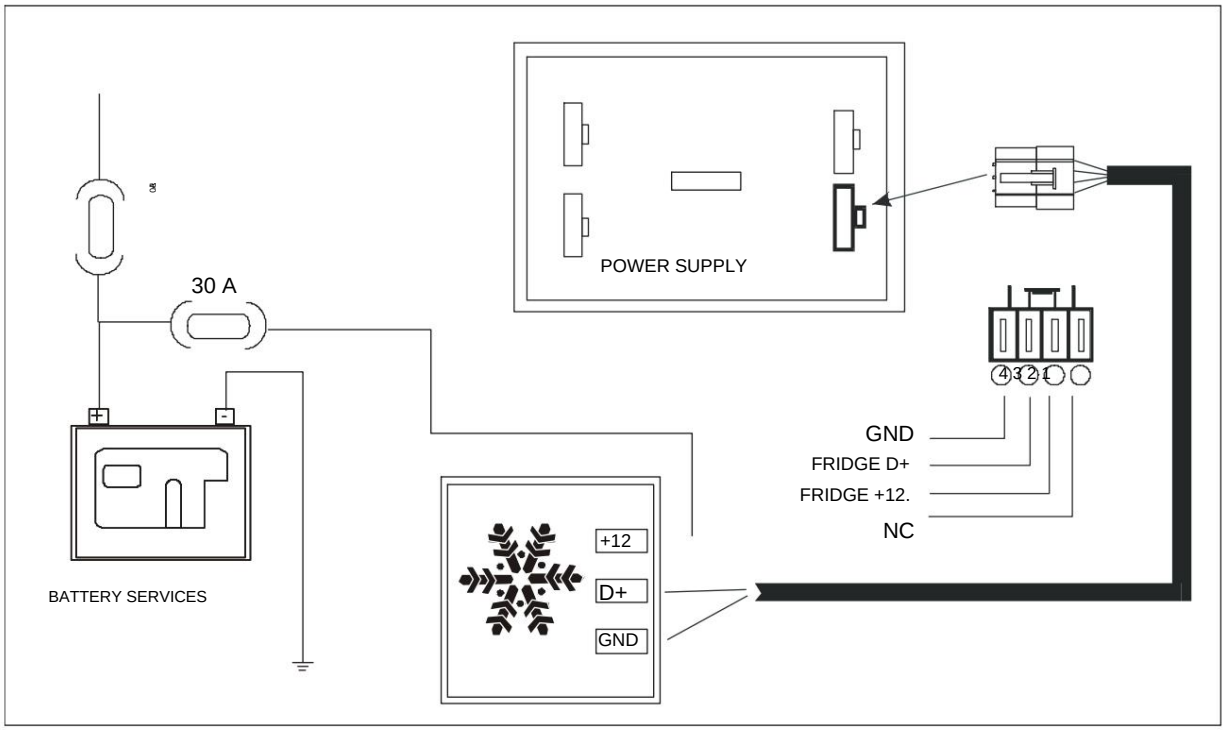


Figure 11 "Power Supply – AES Fridge Connection"

The summary table shows in detail, for the connection in question, the type of header of the extension (point - point connection) or what type of connector it is terminated with at its ends, the section and color of the various conductors and the position of the contacts inside the
connector itself (see section "Type of Connectors and their Description")

Connection:	**Power supply – AES type refrigerator**		
..	**? Header Extend?**		No.2
Guy	**Section mm2 Color** 6		**Position**
GND (GROUND)	BLACK 6	BLUE	4
+12_D+			3
+12	6	RED	2
..	..	..	1

Wiring for the Power Supply – Power Hub Earth connection

The connection of the power supply to the Power Hub Terra takes place via a point-to-point connection point (extension) as shown in Figure 12.

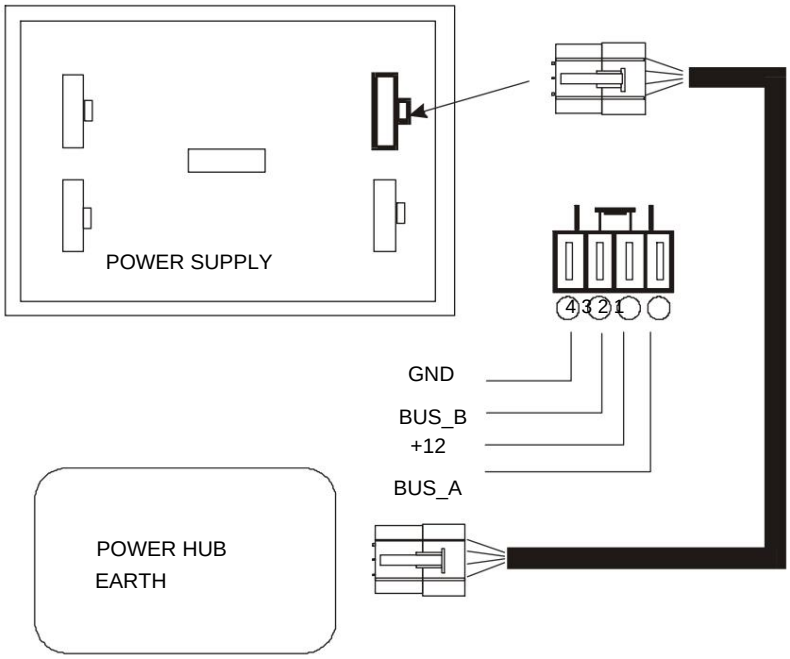


Figure 12 “Power Supply Connection - Power Hub Cielo”

The extension is headed at both ends with the same connector and with the cables arranged as in Figure 12. The sections of the conductors must be at least 6 mm2 , for the power conductors (+12 and GND), while the other two, the signal ones (BUS_A and BUS_B), need only be 0.75 mm2 .

The summary table shows in detail, for the connection in question, the type of header of the extension (point-to-point connection) or with what type of connector it is terminated at its ends, the section and color of the various conductors and the position of the contacts inside the
connector itself (see section “Type of Connectors and their Description”)

Connection:	**Power supply – Power Hub Cielo**		
N.2	**? Header Extend?**		No.2
Guy	**Section mm2 Color** 6 RED		**Position**
+ 12V			2
GND (GROUND)	6	BLACK	4
BUS_A	0.75	ORANGE	1
BUS_B	0.75	GREY	3

Wiring of the Power Hub Earth connection - Earth users

In general, all the floor utilities are connected to the Terra Power Hub. It is possible to connect up to eight loads; the connection with a generic load (boiler, toilet cassette stove, etc.) is carried out with a point-to-point connection (extension).

The extensions are terminated at both ends with the same connector and with the conductors arranged as in Figure 13; the wire sections must be clearly sized
adequate for the power of the load and their length; for general users present on the vehicle, power conductor sections of at least 1.25 mm2 (+12 and GND) can be used while the other two (BUS_A and BUS_B) 0.75 mm2 is sufficient .

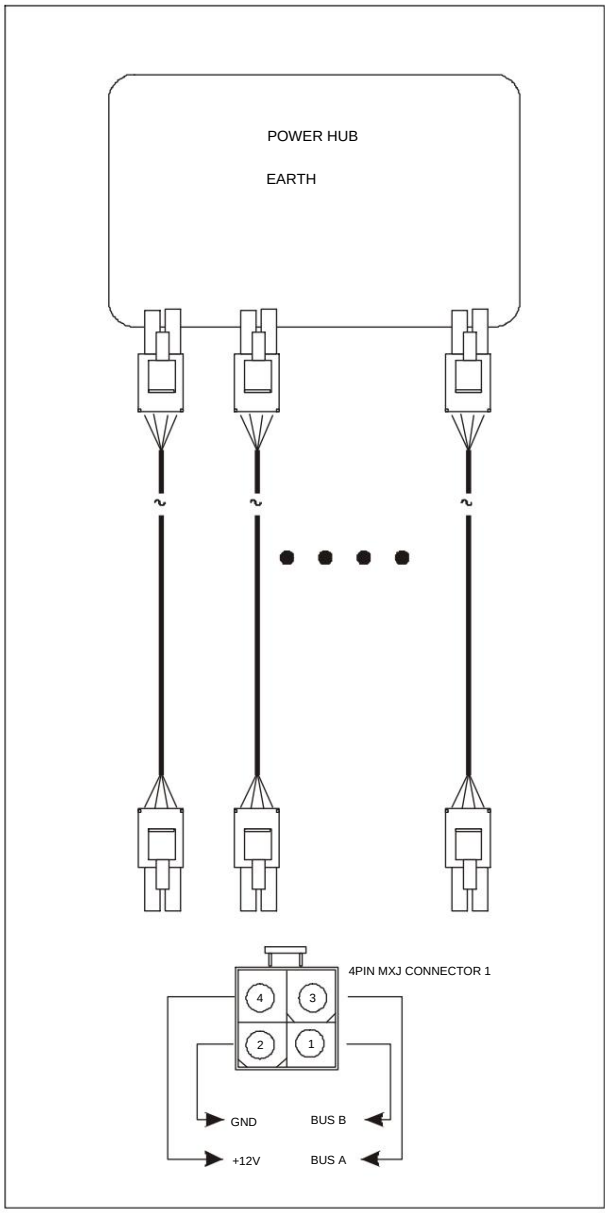


Figure 13 “Power Hub Ground connection - Floor utilities”

The summary table shows in detail, for the connection in question, the type of header of the extension (point - point connection) or what type of connector it is terminated with at its ends, the section and color of the various conductors and the position of the contacts inside the
connector itself (see section “Type of Connectors and their Description”)

Connection:	**Power Hub Terra – Terra utilities**		
N.4	**? Header Extend?**		No.4
Guy	**Section mm2 Color** 1.5		**Position**
+ 12V	RED 1.5 BLACK 0.75		4
GND (GROUND)	0.75		2
BUS_A		ORANGE	3
BUS_B		GREY	1

Wiring for the NSA10 Pump and Level Sensor Node connection

The wiring and insertion of the NSA10 Node on one side with the Terra Power Hub and on the other with the devices it must control (pump, fresh water levels, recovery tank No.1 and recovery tank No.2) is the one shown in Figure 14.
This type of connection, thanks to the technology developed by Arsilicii, allows us to exploit the potential of the system; in fact all the devices are connected locally to the node and in turn connected to the system with the usual four wires, the input ones of the same.

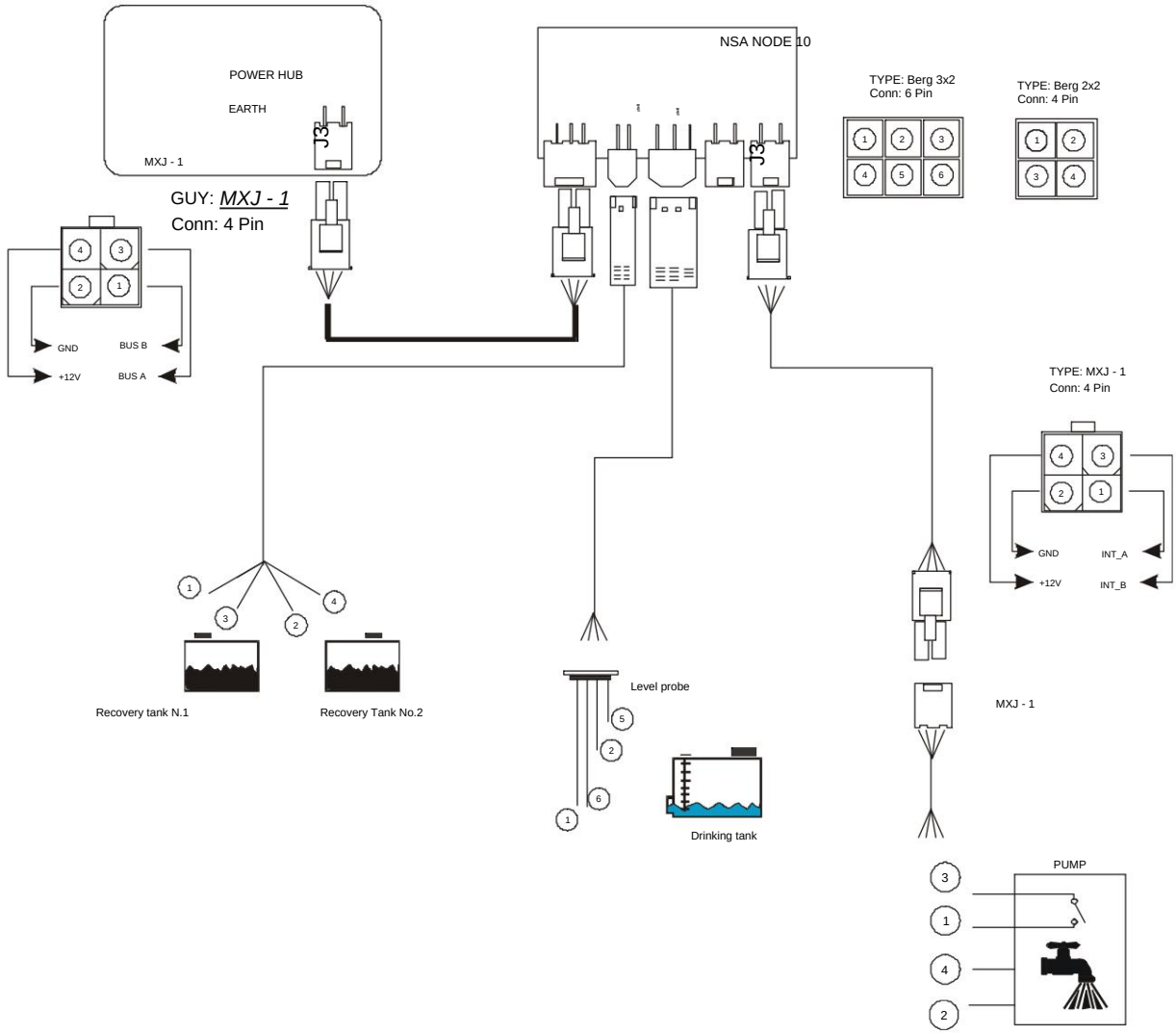


Figure 14 "Power Hub Earth wiring - NSA10 node - Utilities"

The summary table shows in detail, for the connection in question, the type of header of the extension (point - point connection) or what type of connector it is terminated with at its ends, the section and color of the various conductors and the position of the contacts inside the connector itself (see section “Type of Connectors and their Description”)

Connection:	**Power Hub Terra – NSA10 Node**		
N.4	**? Header Extend?**		No.4
Guy	**Section mm2 Color** 1.5		**Position**
+ 12V	RED 1.5 BLACK 0.75		4
GND (GROUND)			2
BUS_A		ORANGE	3

BUS_B	0.75	GREY	1

Wiring of the Power Hub Terra – Power Hub Sky connection

The connection of the Power Hub Terra with the Power Hub Cielo occurs through a point-to-point connection (extension) as shown in Figure 15. The extension is headed at both ends with the same connector and with the cables arranged as shown in Figure 15

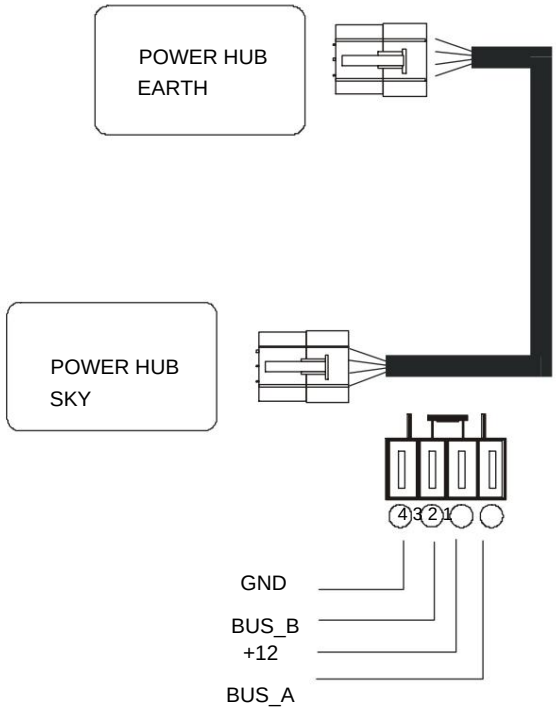


Figure 15 “Power Hub Ground -* Power Hub Sky wiring”

The summary table shows in detail, for the connection in question, the type of header of the extension (point - point connection) or what type of connector it is terminated with at its ends, the section and color of the various conductors and the position of the contacts inside the
connector itself (see section “Type of Connectors and their Description”)

Connection:	**Power Hub Earth – Power Hub Sky**		
N.2	**? Header Extend?**		No.2
Guy	**Section mm2 Color** 6 RED		**Position**
+ 12V			2
GND (GROUND)	6	BLACK	4
BUS_A	0.75	ORANGE	1
BUS_B	0.75	GREY	3

Wiring of the Cielo Power Hub - Cielo users connection

In general, all the utilities represented in the sky are connected from the Cielo Power Hub
mainly from neon or incandescent lights or from fans. It is possible to connect up to eight loads; the connection between the generic load (generally group of lamps) is
performed with a point-to-point connection (extension) as shown in Figure 16; the extension headed at both ends with the same connector and with the cables arranged as in Figure 16

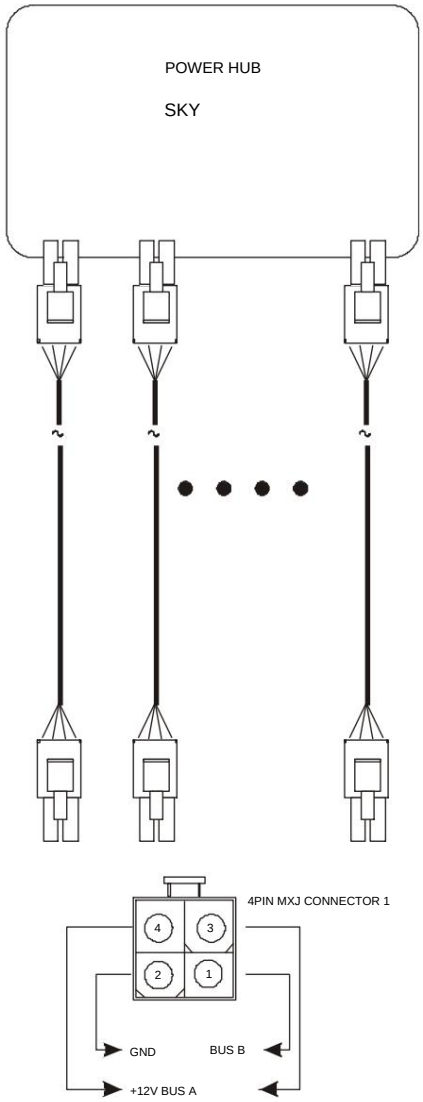


Figure 16 "Cielo Power Hub - Cielo users connection"

The sections of the cables of the individual extensions must be of a size suitable for the power of the loads and their length; for the general utilities present on the vehicle and for the way in which the system is implemented, the section of the power wires must be at least 1.25 mm2 (+12 and GND) while the section of the signal wires (BUS_A and BUS_B) is sufficient to be 0.75 mm2 .

The summary table shows in detail, for the connection in question, the type of header of the extension (point-to-point connection) or with what type of connector it is terminated at its ends, the section and color of the various conductors and the position of the contacts inside the connector itself (see section “Type of Connectors and their Description”)

Connection:	**Power Hub Cielo – Cielo utilities**		
N.4	**? Header Extend?**		No.4
Guy	**Section mm2 Color** 1.5		**Position**
+ 12V	RED 1.5 0.75 0.75		4
GND (GROUND)		BLACK	2
BUS_A		ORANGE	3
BUS_B		GREY	1

Wiring of the Power Hub Cielo connection - Display and control panel

Also the point-to-point connection of the Cielo Power Hub with the panel visualization and control is carried out with a four-wire cable, two of which are power (+12 and GROUND) and two are signal (BUS_A and BUS_B) connected with the appropriate connectors as shown in Figure 17.

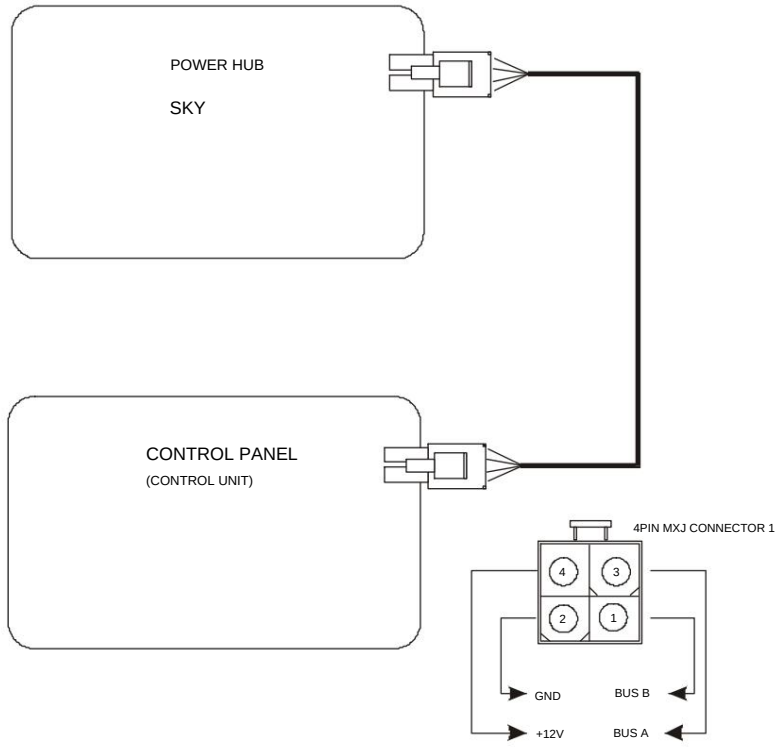


Figure 17 "Power Hub Cielo - Control Unit connection"

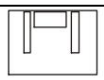
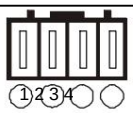
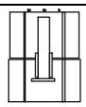
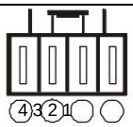
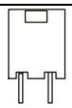
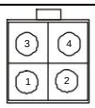
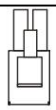
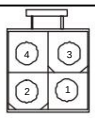
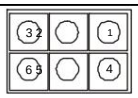
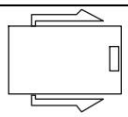
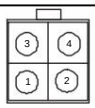
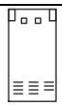
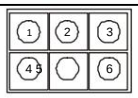
The summary table shows in detail, for the connection in question, the type of header of the extension (point-to-point connection) or with what type of connector it is terminated at its ends, the section and color of the various conductors and the position of the contacts inside the connector itself (see section “Type of Connectors and their Description”)

Connection:	**Power Hub Cielo – Control unit**		
N.4	**? Header Extend?**		No.4
Guy	**Section mm2 Color** 1.5		**Position**
+ 12V	RED 1.5 BLACK 0.75		4
GND (GROUND)	0.75		2
BUS_A		ORANGE	3
BUS_B		GREY	1

NB. For this type of connection, the use of cables with sections of 1.5 mm2 is recommended for the power part (+12 and GROUND), while cables with a section of 0.75 mm2 are sufficient for the signal wires (BUS_A and BUS_B).

Type of Connectors and their Description

NB. The view of the contact arrangement is that of the back of the connector, where the contacts are inserted.

	Connector symbol	Contact layout (Rear view)	Description	
No.1			Name: Molex Caimano MX - IT – 3	
			Contacts	Male
			Contact Port:	Male Door
No.2			Name: Molex Caimano MX - IT – 2	
			Contacts	Female
			Contact Port:	Female Door
No.3			Designation: Molex MXJ – 1 5559A	
			Contacts	Male
			Contact Port:	Male Door
No.4			Name: Molex MX - IT – 4 5557	
			Contacts	Female
			Contact Port:	Porta Femmian
No.5			Designation: Berg 3 x2 from PCB	
			Contacts	Male
			Contact Port:	Male door
No.6			Name: Molex MiniFit Volante MXJ 5	
			Contacts	Male
			Contact Port:	Male Door
No.7			Name: Berg 3 x2 Volante	
			Contacts	Female
			Contact Port:	Female Door
No.8			Designation: Berg 2 x2 from PCB	
			Contacts	Male
			Contact Port:	Male door
No.9			Name: Berg 2 x2 Volante	
			Contacts	Female
			Contact Port:	Female Door

SOLUTION OF THE MOST COMMON PROBLEMS

IF IT HAPPENS THAT…..	CHECK THAT……..AND….DO
The Services Battery does not recharge while the vehicle is moving.	Check engine battery fuse (50 A blade in the small black box on the positive terminal of the battery) check that the power supply connectors are inserted in the right positions (colors of the connectors males equal to the colors of the female connectors). check the status of the 3 A fuse coming out of the mechanical alternator; check that the “engine on6 ” signal (output of the mechanical alternator, the one called commonly D+) is taken correctly and arrives at the input of the power supply. check that the voltage is correct with the engine running engine and service batteries are the same value (around 13.5 V); this verification can be performed in two ways: by reading the service and engine battery voltage directly on the control unit (LCD model), or by measuring their voltage directly on their poles contact qualified personnel
There is no voltage on “the whole” cell housing (including the control unit).	Check the main switch that of the power supply is in the *on* position and the LED indicator is off Check the state of the 50 A blade fuse not near the positive pole of the service battery; check that the service battery is charged; check whether with the engine running or with 220 V inserted, voltage arrives in the living cell; so far as if the service battery could be discharged or damaged contact qualified personnel
The entrance lamp turns off only when the ignition is commanded of other lights	Replace the “cherry” circuit.
The fridge does not work with the motor switched on	Check the correct position of the connector coming out of the power supply; check signal fuse (3A engine compartment). engine running (D+); check that the fridge output of the power supply is not short-circuited or any wires are broken;

[6] The "engine on" signal that reaches the power supply is usually taken from the alternator output of the vehicle's mechanics; in some mechanics there may be more than one wire coming out of the alternator, it is therefore recommended to pay attention that the signal is taken from the right one. In other mechanics, however, the same signal is taken from the starting key.

IF IT HAPPENS THAT…..	CHECK THAT……..AND….DO
	check that the “engine on” signal (alternator engine)” is picked up correctly and arrives at the input of the power supply. check the connections to the fridge and respectively to the power supply by following the instructions in the power supply description section and the manual of the refrigerator contact qualified personnel
The fridge runs on 12V with the engine off	Check that the connections to the fridge and the power supply respectively are correct (Be careful not to swap the +12 file with the D+ file especially in AES models); check that the “engine on” signal is on picked up correctly and arrive at the entrance of the power supply following the instructions given in the section and the refrigerator manual; replace the power supply and check for the problem persists contact qualified personnel
The water pump is not controlled by the control unit	Make sure the switch on the power supply (general) is activated and that the indicator light LED is off. Check that it has not been listed in the pump menu the protection of the same is activated which in case of lack of water in the tank prevents its power on; Check that, due to a water leak, the control node (NSA 10 sewage) is not wet, then try to dry it; Check the correct position of the cables at the node sewage (as per manual); Check whether the other floor utilities (boiler cassettes, stove) work properly or if the floor distributor, usually nearby of the power supply, it works correctly. Check that the pump power supply is not short-circuited (from the control unit) Check that the pump can be controlled from the local switch (it is not mounted on all models) Check that the anomaly persists even after *“reset”* the system Check, from the advanced menu, the presence of the sewage v.1.10 node; If necessary, use the power connector direct *“bypass”* of the pump contact qualified personnel

IF IT HAPPENS THAT…..	CHECK THAT……..AND….DO
The water level is not reported correctly.	Check that the probe has been connected to the NSAv.1.0 node according to specifications; check the level probe does not have dirty electrodes7 Check, from the advanced menu, the presence of the sewage node v.1.10; contact qualified personnel. Check that the power supply plug is inserted
The lightning bolt is not displayed when the external 220 V mains is connected	into its socket. Check that the differential switch is "armed"; check if this is the only anomaly, i.e. for example if the pump from the control unit turns on; Contact qualified personnel to check that the riser line is not short-circuited and that the power supply supplies output power
The lights in the sky don't come on	check that the overhead distributor is turned on by pressing the control button mounted at the entrance to the vehicle; check the presence of the overhead distributor from the advanced menu contact qualified personnel to check
The floor utilities are not powered	that the riser line is not short-circuited and that the power supply supplies output power; for this purpose, the indicator LED on the power supply is checked to ensure that it is not on constantly check whether the floor distributor, usually in the vicinity of the power supply, can be controlled via the local control button. contact qualified personnel and make sure you have disconnected the solar panels, if
The signaling of the current on the control unit even though **all** the cell loads are deactivated indicates a quantity other than zero Amperes	fitted; check directly on the service battery if it is supplying current (for this you need to insert an ammeter in series with the wire connected to the positive of the service battery if necessary.) Perform the current reset from the menu advanced. contact qualified personnel

System reset or rearm procedure : - place the power supply switch in the *off position* - make sure that the power supply connectors are all inserted correctly;

[7] For this purpose it is recommended to keep the electrodes of the four-level probe clean.

- wait a few seconds;
- return the switch to the *on position;*
- the signaling LED must remain lit for approximately 16 seconds and then turn off. During the phase that lasts 16 sec. there is no output power and the power supply performs the calibration steps