MANAGER

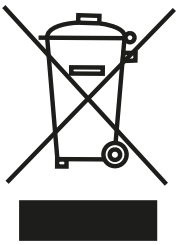
User Manual

ENGLISH

VALID FOR THE FOLLOWING MODELS

IM 12-150
IM 12-150W

INSTRUCTIONS FOR THE PROPER DISPOSAL



This electronic product is subject to the European Directive 2012/19 / EU. Comply with local waste disposal regulations, do not dispose of old products with normal household waste. The proper disposal of products that can no longer be used prevents potential negative consequences for the environment and for the population.

CE

INDEX

1. SAFETY INSTRUCTIONS

- Child Safety: Keep the device Out of Reach.
- Carefully check the integrity of the device and connectors.
- To avoid overheating and possible fires do not install the device in a sealed environment, Always choose a well ventilated area.
- Do not place the device on highly flammable surfaces or environments (eg: paper, cloth, etc.).
- Do not cover the cooling slits on the side and the fan on the top.
- Do not install the device near flooded batteries: they produce flammable, corrosive and explosive gas while working, and it can damage the product.
- protect the device from sunlight or direct sources of heat.
- To avoid malfunctions, DO NOT install and use the device in very humid environments, in contact with water splashes, various liquids, or exposed to rain.
- To avoid risk of electric shock and/or fire, the vehicle's fuel system must be in good condition.
- In case of damaged connecting cables or inadequate section, immediately replace them with suitable cables as specified by this manual or by a qualified electrician.
- In case of anomalies in the conformity of the product do not use it! it is strictly forbidden to open the device. Repairs may only be carried out by qualified technical personnel using original spare parts.
- Keep the instruction manual near the device for easy access to the essential safety, use and maintenance information.
- The information contained in this manual may be changed without notice. NDS Energy s.r.l. reserves the right to make changes and improvements to the product at any time without notice and without obligation to apply these changes to the devices previously distributed.
- The images of the products are purely indicative and may therefore not be fully representative of the

characteristics of the product, differing in color, size or accessories.

2. PACKAGE CONTENTS

Check the contents of the package:

1x “BlackBox” control unit
1x **MANAGER** Display
1x Power/data cable for **MANAGER** with cable, or power cable only for **MANAGER** Wireless
2x temperature sensors
Mounting screws

3. DESCRIPTION

MANAGER is the innovative management system of all batteries and power needs onboard.
It allows to manage up to three batteries, with different technologies and capacity, improving their performance and, thanks to the automatic battery isolating function, preserving their lives.

MANAGER'S touch screen display shows all the information available on both accumulator's: state of charge, Volt, Ampere, thus allowing to manually select the batteries to be activated or deactivated with a single touch, or for a more customized management.

MANAGER constantly checks voltages of the two batteries and automatically selects the batteries to be used, according to the charge and discharge currents.
The System also has a dedicated output for the engine battery charge. When the **MANAGER** detects a charging source (230V battery charger or solar panels), if the leisure batteries are 100% charged, **MANAGER** will charge the engine battery with 4A, avoiding bad

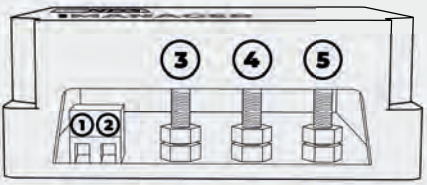
surprises when restarting the engine.

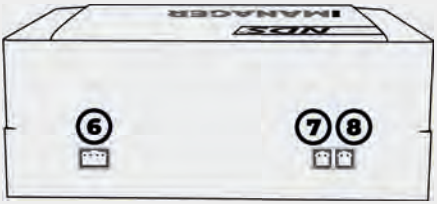
MANAGER, can be installed on any vehicle to manage Lead/Acid batteries (AGM, Gel, Wet). **MANAGER** does not manage Lithium batteries.

MAIN FEATURES

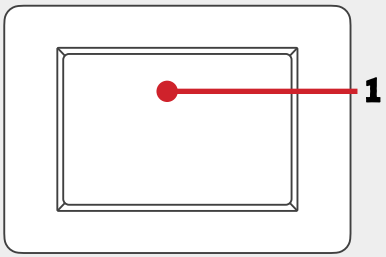
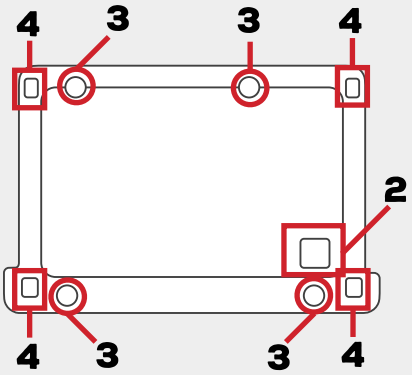
- Automatic or manual management of one or two leisure batteries, even of different technologies and amperage.
- Output dedicated to engine battery charging, when leisure batteries are at 100% (example: storage).
- Displaying the accumulators' state of charge (SoC).
- Displaying the charge and discharge voltage and ampere.
- Automatic (under 11V) or manual battery isolator, using the touch screen.
- Displaying of info and advices to better managing and maintain the batteries.
- Date and time.
- Temperature control during charging and discharging phase, for higher safety level.

4. BLACK BOX STRUCTURE

FRONT VIEW	
 Fig.1	
CONNECTION	**FUNCTION**
1	Leisure Battery negative pole
2	Starting Battery positive pole
3	Leisure Battery 1 positive pole
4	Common Positive (appliances, inverter, chargers)
5	Leisure Battery 2 positive pole

BACK VIEW	
 Fig.2	
CONNECTION	**FUNCTION**
6	iManager (with cable version) display connection
7	Leisure Battery 2 Temperature sensor
8	Leisure Battery 1 Temperature sensor

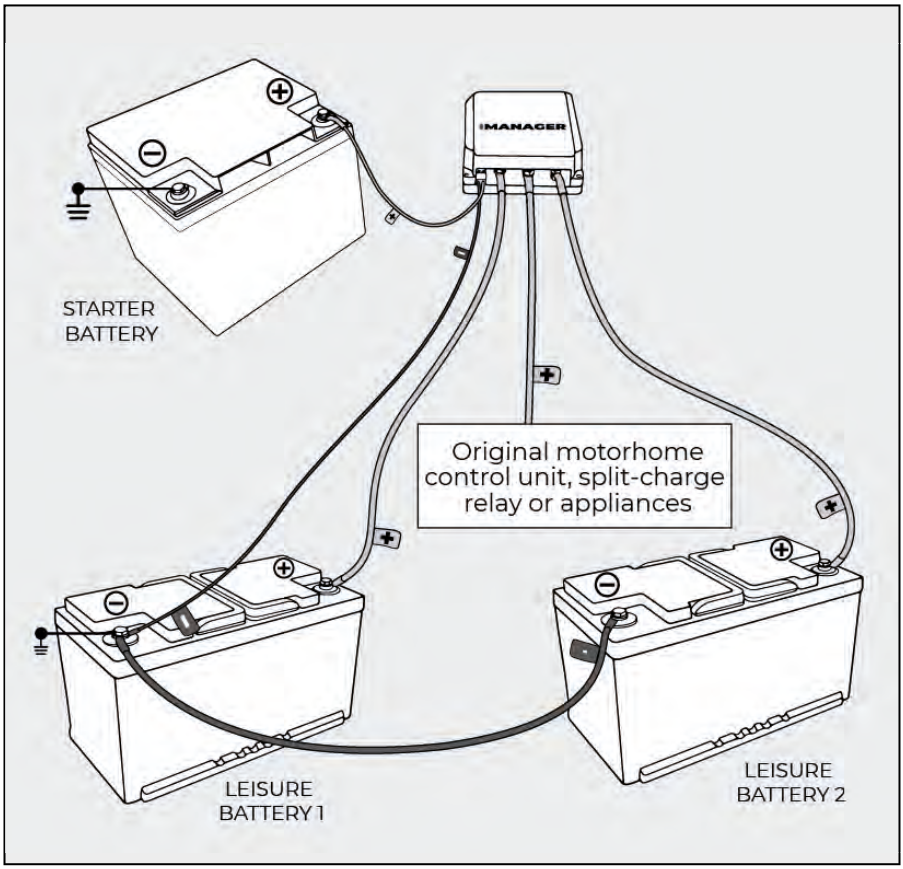
5. DISPLAY STRUCTURE

DISPLAY	MOUNTING FRAME
	

N°	FUNCTION
1	Touch screen Display
2	Communication cable hole
3	4 holes for wall fixing
4	Display cover plate to mounting frame fixing holes

6. INSTALLATION

Installing **MANAGER** is easy, but Pin.4 configurations may change depending on the electrical type. This universal diagram explains how to make the basic connections, the table below describes the connection options for Pin.4.



SETUP	DESCRIPTION
1	Original control unit
3	Split charge relais
2	Appliances: inverter, fridge, pump, heating

CONNECTION EXPLANATION

1. Make sure that the vehicle's engine and/or the battery chargers onboard are off.
2. Unscrew the two clamping screws located at the bottom, in the **MANAGER** frontal area(Fig.3).
3. Turn the plastic cover upwards until the interlocking flaps on the opposite side are released.

Fig.3

4. Place the **MANAGER** on the chosen support. Fix the device using the eyelets visible on the inside of the body with the screws provided or equivalent (Fig.4).

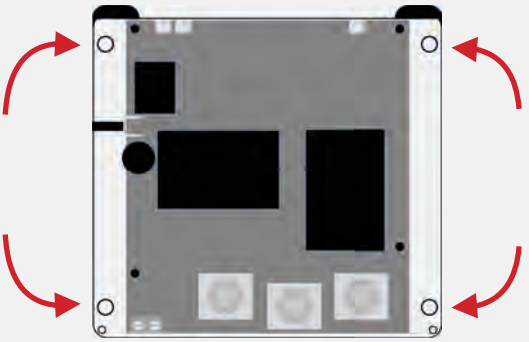


Fig.4

5. Unscrew and remove the 3 M6 nuts from the front connection screws and make the electrical connections as follows (Fig.5):

- Connection 3: Leisure Battery 1 positive.
- Connection 4: Common positive (appliances, Inverter, batter charger, solar regulator).
- Connection 5: Leisure Battery 2 positive.

6. Fasten the three cable lugs firmly to the connection screws by tightening the supplied nuts.

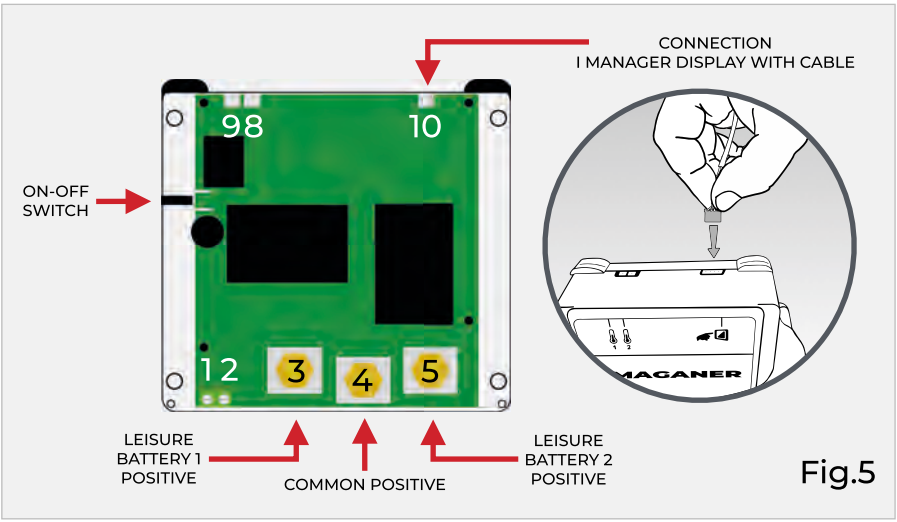


Fig.5

7. Connect one end of the cable (max. 2,5mm²) to the Pin.2 and the other end to the Starter battery positive pole. Fasten the screw.
8. Connect the display:
   - I **MANAGER with cable**, via the supplied cable on Blackbox Pin.10.
   - I **MANAGER Wireless** to any vehicle 12V available connection.

   The I **MANAGER wireless** display could be connected the blackbox common positive (Pin.4). This way, using the I **MANAGER battery cut-off** function the display will be turned off too.
9. Connect one end of the cable (max. 2,5mm²) to the pin 1 and the other end to the nearest battery negative. Fasten the screw.

10. If the device has been switched on correctly **MANAGER** will run the display. If the power is on but the display is off push the ON-OFF switch.
11. Connect the two supplied temperature sensors connectors to Pin. 8 and 9 and the other side to be glued on the side of your leisure batteries.

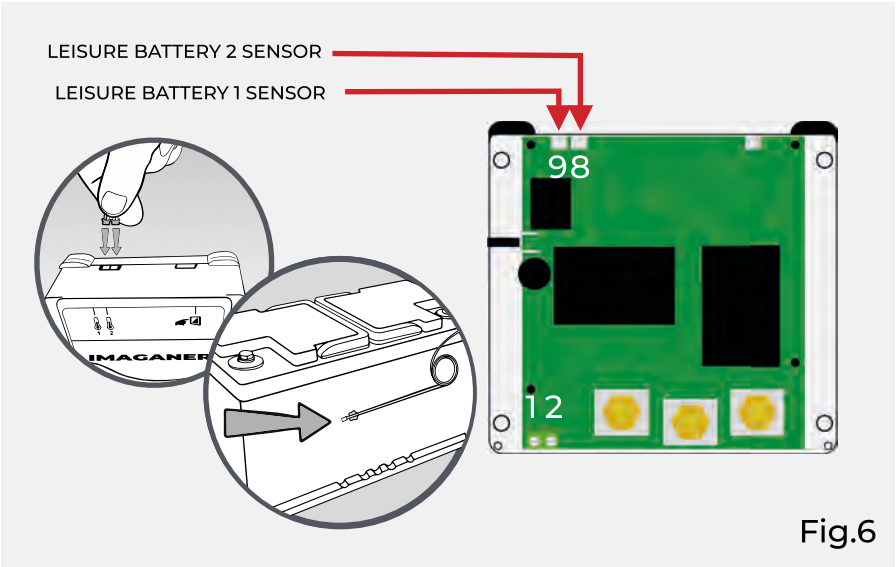


Fig.6

12. Replace the plastic shell in place and tighten the clamping screws to close the device.

CAUTION

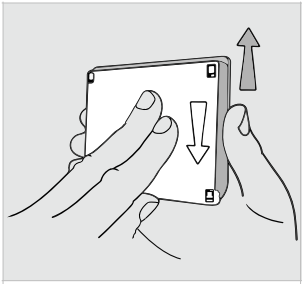
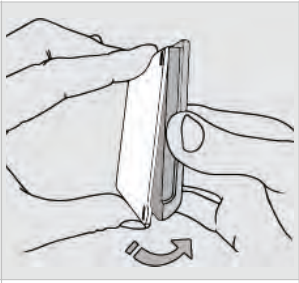
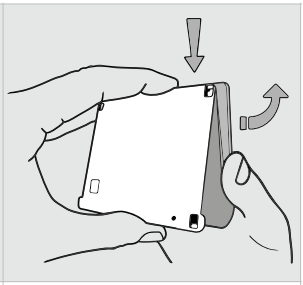
- The negative connection (Pin 1) must be connected at the end of the installation, as a last step!
- Do not use the Pin 1 for negative power connections.
- Connect only one cable (max 2,5mm^2) to the Pin 1 using the nearest negative connection.

NOTE

- For power connections we recommend to use cables minimum section of 25mm^2 or, in any case, of a suitable section for the currents involved and the length of the cable itself.
- In automotive installations the negative is connected to the vehicle chassis, so in most cases it is sufficient to use the nearest negative connection.

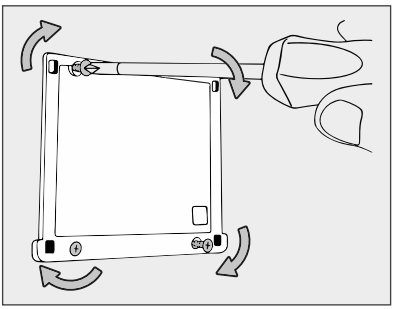
7. DISPLAY INSTALLATION

1. Remove the **MANAGER** mounting frame

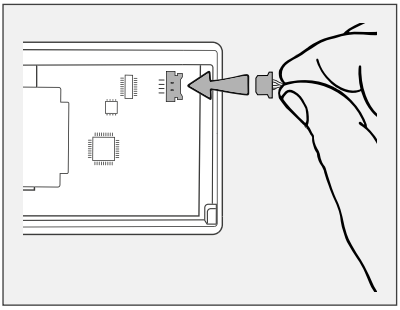
		
a. Slide the display cover plate upwards in relation to the rear mounting frame	b. Lift up the lower part of the display cover plate	c. Slide the display cover plate downwards, in relation to the mounting frame, and release it

2. Place the mounting frame on the wall chosen for installation and take marks for:
   - holes for the fixing screws (diameter 3mm);
   - hole for the communication cable pass through (minimum diameter 7.2mm).

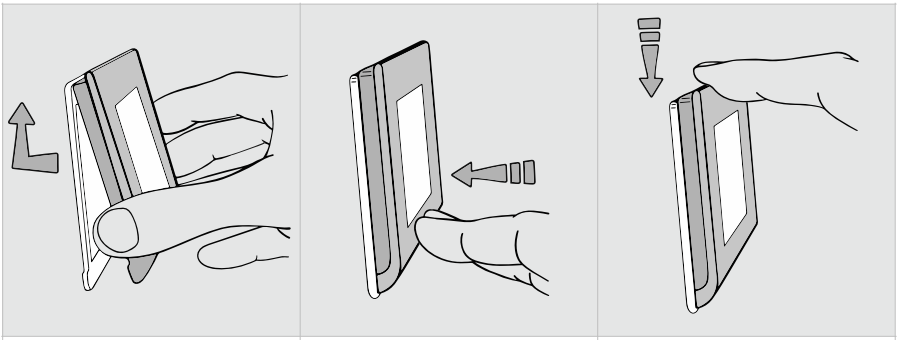
3. Drill the holes and screw mounting frame to the wall, using the screws provided, be sure that they do not protrude once screwed in.



4. Pass the communication cable (white connector) through the hole previously made and insert it gently onto the display board.



5. Fasten the display to the anchor bracket as required.



a. Insert the display cover plate fixing tabs into the appropriate housing of the mounting frame

b. Lower the bottom side of the display cover plate by making it stick to the mounting frame

c. Slide the display cover plate downwards in relation to the mounting frame

6. **MANAGER with cable:** connect the 4-pole data cable to the black box (Pin.10).
MANAGER wireless: connect the power cable to the common positive of the black box (Pin.4).

CAUTION

Using the battery direct connection to power up the **MANAGER** Wireless display, will keep always on the display, even with the battery disconnection function active.

NOTE

The **MANAGER** display is not compatible with other NDS

8. SETUP

For a touch screen display proper use please follow the instructions below:

- Touch the display with your fingertip or soft surfaces, avoid sharp or pointed objects.
- Do not apply excessive pressure to the display surface.
- Avoid contact with other electrical devices: electrostatic discharges may cause malfunctions.
- Avoid contact with water, moisture or other liquids: The touch screen may not function properly.

STEP 1

Connect the Power / Data cable to the Display, and wait until the start screen is finished.

POWER UP

STEP 2

The selection is made with a tap on the corresponding square or on the item indicating the language itself.

By clicking on the green arrow, you can continue with the battery data settings.

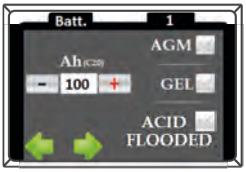
LANGUAGE SETUP

STEP 3

Set:

- The batteries technology types (AGM, Gel, Flooded).
- Capacity (Ah) for each battery by touching the "+" (plus) or "-" (minus) icon. The default capacity is 100Ah.

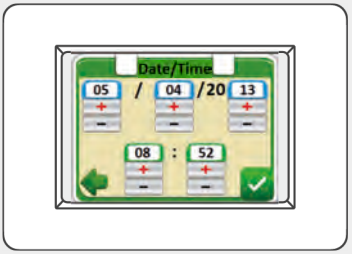
Click on the green arrow to switch to battery settings n°2 (if present!) to be performed in the same way.



BATTERY CAPACITY AND TECHNOLOGY

STEP 4

Enter the current date and time by clicking the "+" (plus) or "-" (minus) icon located below the reference box. Click on the green arrow on the left to fix the data already entered.
Confirming, with the button at the bottom right, the data are saved and you will get to the main iManager screen.



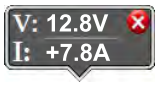
DATE AND TIME SETUP

HOME SCREEN

The Home Screen shows the connected batteries (two leisure batteries and one starter battery), the “setting” button, date and time, the “display light off” button.

9. ICONS EXPLANATION

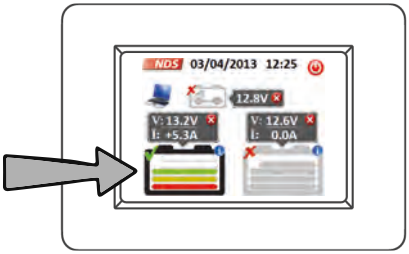
ICON	MEANING AND FUNCTIONS
	If long pressed it allows you to view the complete company data
	Automatic Mode is active
	Manual mode is active. If long pressed it allows you to automatic mode
	Starter battery not present
	Starter battery disconnected. If clicked displays the battery voltage
	Starting Battery in Charge. If clicked, the battery voltage is displayed.
	Display power off. If clicked it turns off the display.
	Settings button. A short click gives access to secondary commands, a long press returns you to the initial settings menu.
	Leisure battery disconnected with State of Charge (SoC) displayed on it. If shortly clicked, the information window appears with voltage and current related to the battery. If long pressed, it switchs to "Manual mode" or, in case of "Manual mode" already activated, it allows to select the battery to be used.

ICON	MEANING AND FUNCTIONS
	Leisure battery connected in "Automatic mode" with State of Charge (SoC) displayed on it. If shortly clicked, the display window appears with voltage and current related to the battery. If long pressed, "Manual mode" is activated.
	Leisure battery connected in "Manual mode" with State of Charge (SoC) displayed on it. If shortly clicked, the display window appears with voltage and current related to the battery.
	Over-temperature battery warning
	Display click feedback
	Battery connection in parallel is active
	Battery in charge
	Leisure battery data window: voltage and current in charge or in discharge. The windows closes automatically after 2 minutes if no operations are carried out, or by clicking on it.
	Starter battery data display window. Click on the window to close it. The window closes automatically after 2 minutes if no operations are done, or by clicking on it.
	Battery reactivation: turns back the batteries management in Automatic mode.

10. CHARGING DATA AND SOC

Click on a leisure battery icon to display the voltage (V) and current (A) information of the corresponding battery.

Clicking the starter battery icon (if plugged in) only displays the voltage.



To close the displayed windows, click on the window itself.

If all the appliances, battery chargers, solar regulators, inverters, etc... are switched off and the **MANAGER** keep showing a current non-zero, a calibration is maybe required. Calibration instructions are on page 20.

State of Charge (SoC)

The Display shows the charge status for each service battery with a series of lines placed inside the battery itself.

The state of charge of the active batteries is displayed with 5 colored lines, and the state of charge of non-active batteries is displayed with 5 gray lines. In both cases the meaning remains unchanged.

State of Charge icons:

SoC	BATTERY CONNECTED	BATTERY DISCONNECTED
0%		
20%		
40%		
60%		
80%		
100%		

NOTE

- In order to have a reliable SoC indication, the parameters requested in the initial settings must be set properly.
- Right after the installation, the State of Charge displayed may not be correct, but after the first battery use (discharging/charging), the **I MANAGER** self-learning algorithm will fix it.

11. AUXILIARY FUNCTIONS

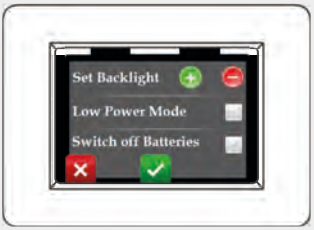
SETTING MENU

Click on the Setting icon to enter the Setup menu and you can configure:

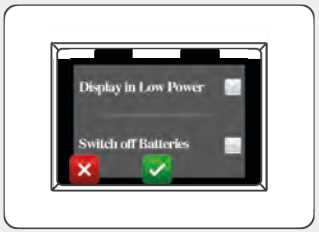
- **I Manager with cable display brightness adjustment**
  Adjust the display brightness with the plus and minus buttons on the right.
- **Economy mode**
  It allows to reduce display consumption.
- **Battery disconnector**
  Disconnects the leisure batteries from the system. Manual reactivation: the batteries can be reactivated manually with the green "active" button within 20 minutes. After 20 minutes of idle time, the Display switches off. Push the ON/OFF button on the black box side to wake the display up.

  Automatic restart: the batteries are automatically reactivated with the presence of a charging source (charger, solar panel, etc.).

Click on the green button to apply the settings. Clicking the red button with the X does not execute any function and returns you to the main screen.



SETTING MENU
I MANAGER WITH CABLE



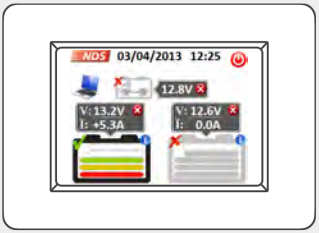
SETTING MENU I MANAGER
WIRELESS

DEVICE CALIBRATION

If the device displays a residual current, even with appliances and battery charges switched off, it is possible to manually calibrate the device.

Open one of the leisure batteries data display window (Page 17), click and hold on the window opened for more than 10 seconds:

- **I MANAGER with cable**
  An automatic calibration will be performed.
- **I MANAGER WIRELESS**
  A setting screen will be displayed. By clicking on the “Reset 1” button at the top left, an automatic calibration is performed; you can refine the voltage measurement of each battery clicking on the arrows with the + and - symbols directly comparing it with the measurement taken by the multimeter and calibrating it consequently.



I MANAGER WIRELESS CALIBRATION

NOTE

- Keeping the "Setting" button pressed for a long time you will go back to the starting programming mode.
- You can change the time by clicking on the timetable without resetting the device

12.OPERATION

AUTOMATIC MODE (DEFAULT)

The automatic management of the leisure batteries allows to optimize their performance to the maximum, preserving their efficiency over time thanks to multiple safety functions.
The **MANAGER,** with an algorithm developed by NDS experts, always maintains a similar state of charge between the two batteries, extending their lifes.

Automatic operation during the charging phase

Many factors influence the **MANAGER**'s choices to control this phase:

- Battery voltage
- Charging current
- State of Charge of the two batteries
- Temperature

If the batteries have the same state of charge and the current supplied by the charging source allows it (e.g. alternator, solar panel, battery charger, etc.), the **MANAGER** will connect the batteries in parallel up to a 80% SoC.
Charging will be completed separately on each battery.

If the batteries have a very different State of Charge (therefore parallel operation is not possible), **MANAGER** first charge the discharged battery until a similar state of charge is reached between the two. Charging will be completed separately on each battery.

NOTE

The starter battery will only be recharged if its voltage is less than 12.5V and the leisure batteries are fully charged.

Automatic operation during the discharging phase

This phase is conditioned by the same parameters seen previously for the charging phase:

- Battery voltage
- Charging current
- State of Charge of the two batteries
- Temperature

When discharging, the battery with the highest charge is always selected.

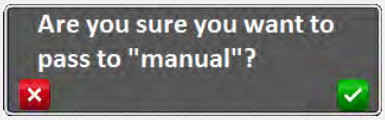
If the current taken is less than 25A the device selects the most charged battery that will be used until its voltage has dropped by 0.3V compared to that of the battery that is deactivated at that time.

If the voltage of one of the batteries is lower than 11.2V, the system sets it in parallel, avoiding excessive stress up to the minimum threshold of 10.5V, where all connected appliances are disconnected (automatic battery disconnection function).

When the discharge current is greater than 25A and the state of charge of the batteries is the same, the system parallelizes the two batteries until the current drawn falls below 20A.

MANUAL MODE

To enter Manual mode click and hold (approx. 1.5 seconds) on the battery icon you wish to select. The system will show you a window to confirm the switch to the manual mode.



Click on the green confirmation button. In manual mode the Computer icon is replaced by the icon of the little man with spanner.

When the operation is completed the outline of the selected battery will be red.

To change the battery to be used make a long touch (press for about 1.5 seconds) on the battery icon you want to use, then you can choose to:

- **Activate the selected battery or deactivate the other previously active** - If the State of Charge between the two batteries (SoC) is different.
- **Leisure batteries parallel mode** - If the two batteries SoC is the same or differs by only one notch (20%).

NOTE

If parallel connection is not desired, press the battery of choice again to select it individually.

In this mode the user can select the battery(s) to be used, but the **MANAGER** continues to monitor the operating temperature and the minimum voltage during discharge (10.5V) and, if necessary, limiting the user's choices to always guarantee maximum safety conditions.
You can go back to automatic mode at any time by touching the little ma icon.

AUTOMATIC BATTERY DISCONNECTION FUNCTION

The **MANAGER**, checks the voltage and temperature of both batteries to ensure that the conditions of use are always correct in order to avoid efficiency drops or irreversible damage.
The automatic battery disconnection function disconnects all utilities in three different cases:

- The Voltage of one or both batteries below the critical limit of 10.5V.
- The Voltage of one or both batteries below 11V for more than 15 minutes.
- The Temperature measured on one or both batteries exceeds 60°C.

NOTE

If only one battery falls into one of these three cases and you are in automatic mode, **MANAGER** will select the most suitable battery for operation.

Once the batteries have been disconnected from the appliances, they can be reconnected by activating a charging source or simply by clicking on the relevant icon within 20 minutes.

CAUTION

If the battery temperature exceeds the critical threshold of 60°C, the system will not be operational until a temperature below 55°C is reached. This condition will be displayed by an icon

STARTER BATTERY CHARGING

This function is essential for storage periods: after long stops it avoids being with a low starter battery, which will not allow starting.

MANAGER allows the starter battery to be recharged automatically only when it is really needed, when the following conditions are satisfied:

- Starter battery below 12.5V.
- The leisure battery(s) must be fully charged.
- There must be a charging source: AC mains charger, photovoltaic panel or generator.

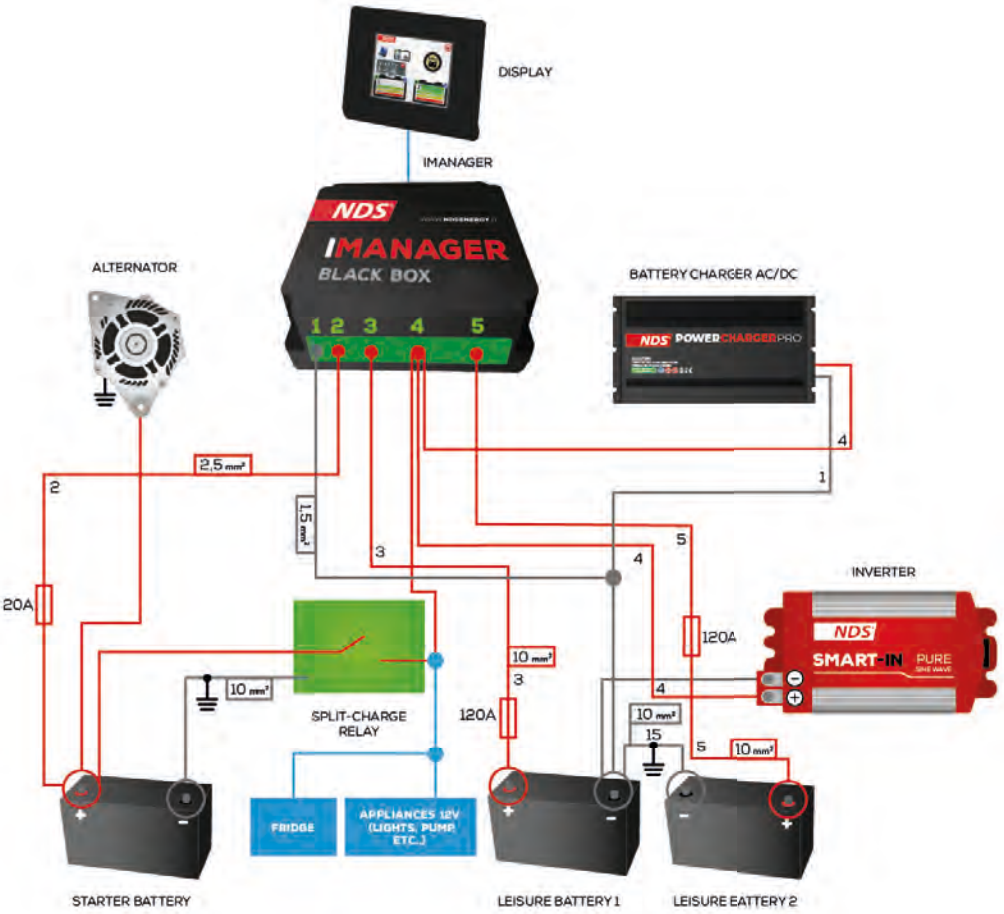
The maximum current supplied to the starter battery is 4A. Charging is interrupted if the starter battery is also fully charged and, in any case, as soon as the charging source is switched off or the vehicle is started.

NOTE

The starter battery charging function is only performed automatically by **MANAGER**, it is not possible to perform it manually.

13.WIRING DIAGRAMS SAMPLES

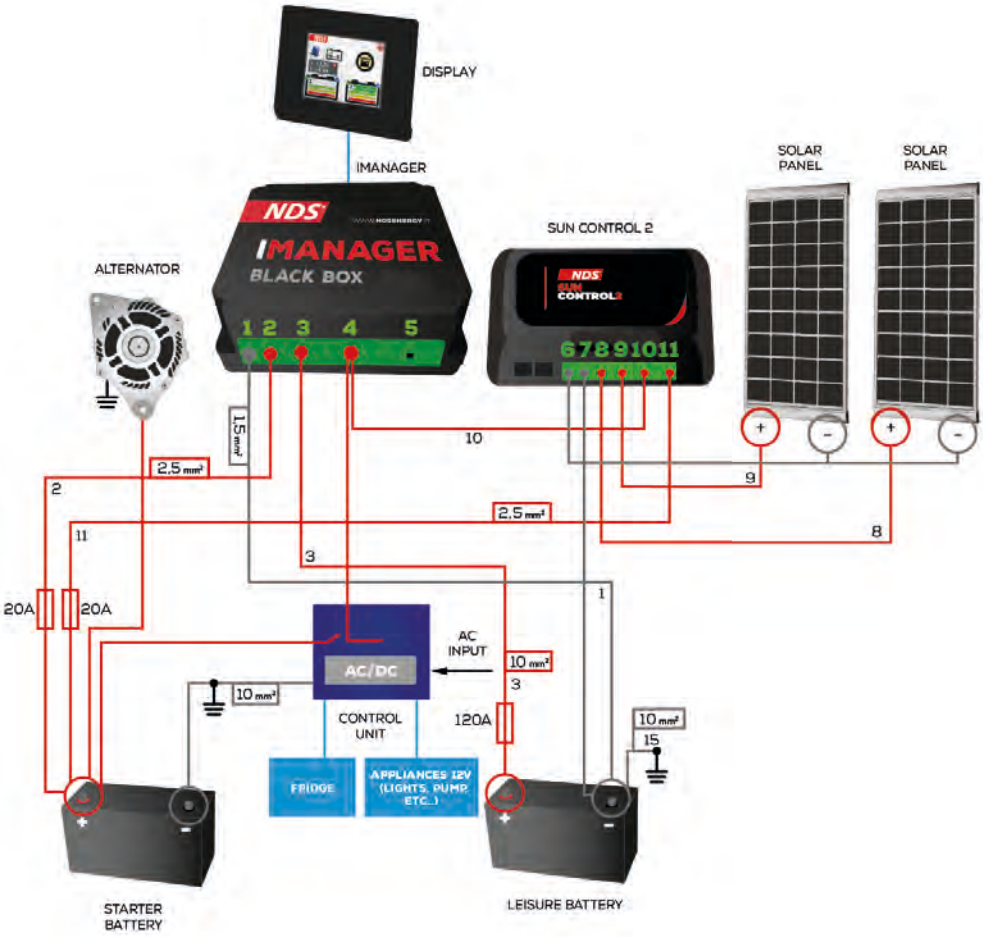
MANAGER INSTALLATION WITH BATTERY CHARGER, INVERTER, ON SYSTEM WITH PARALLEL RELAYS



NOTE

Parallel Relay is the pre-existing relay which, when the vehicle's engine is running, makes the parallel between Leisure Battery and Starter Battery (e.g.: Relays normally used on converted and camper van).

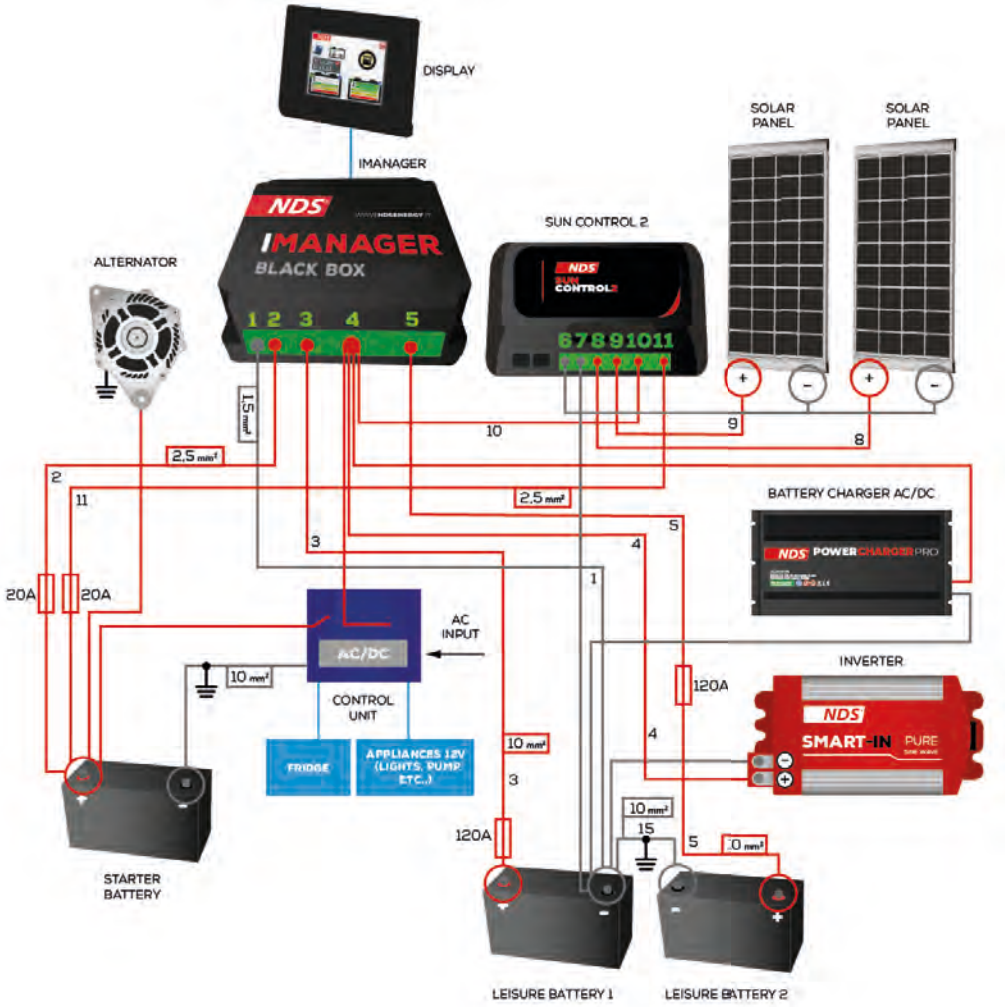
MANAGER INSTALLATION WITH SINGLE LEISURE BATTERY, SOLAR REGULATOR, SOLAR PANELS ON AN EXISTING CONTROL UNIT AND CHARGER PLANT



NOTE

Control unit is the energy controller and distributor on the vehicle's living part (example: CBE DS300, SCHAUDT EBL163, Nord Elettronica NE287, SARGENT, etc...).

MANAGER, INSTALLATION WITH SOLAR REGULATOR, SOLAR PANELS, INVERTER ON AN EXISTING CONTROL UNIT AND BATTERY CHARGER PLANT



NOTE

Control unit is the energy controller and distributor on the vehicle's living part (example: CBE DS300, SCHAUDT EBL163, Nord Elettronica NE287, SARGENT, etc...).

14. TECHNICAL FEATURES

I MANAGER	
Nominal voltage	12V (9V - 18V)
Relays maximum current	100A
Batteries automatic disconnection threshold	10,5V
Batteries temperature disconnection threshold	60°C
Operation mode	Automatic and Manual
Maximum current on the Starter battery	4A
Starter battery's charging threshold	<12,5V
Self-consumption	5mA
Working temperature	-15°C up to +65°C

BLACK BOX	
Black Box size	124x120x47mm
Black Box weight	35g
Average consumption	8mA Active Batteries / 4mA Batteries disconnected
Working temperature	-15°C up to +65°C
DISPLAY	
Display size	79x100x12mm
Display weight	8g
Display technology	TFT 2,83“ - 262k color touch screen
Operation mode	Normal and Low consuption
Maximum brightness consumption	76mA
Display Off consumption	18mA
Battery disconnected and Display off consumption	10mA
Connection Type	7meter cable with low profile connector or Wireless
Working temperature	-10°C up to +70°C

15. F.A.Q.

- **What is the maximum inverter power I can connect to I MANAGER?**

  The limit is not the inverter rated power, the limit is the appliance connected to the inverter.
  The maximum appliance constant power consumption must be 1500W.
  Here are some examples:
  Can I run a 700W air-conditioner from a 3000W inverter?
  Yes, but pay attention to the air-conditioner peak power.
  Can I connect a 1800W inverter to an appliance with a constant power consumption of 2000W?
  No.
- **How do I connect my inverter to the I MANAGER?**
  The Inverter, like all charging and discharging sources, must be connected to I MANAGER's Pin.4 (common positive) up to a maximum of 1500W constant.
  Appliances above 1500W continuous must be connected to the Leisure battery, this reduces the efficiency of I Manager.
- **Is I MANAGER compatible with other NDS devices (e.g. Power Service)?**

  Yes I MANAGER is compatible with all NDS devices such as Power Service.
- **Is it possible to connect a wired display on I MANAGER wireless and vice versa?**

  No, there is no compatibility between the two displays.
- **Is the I MANAGER a Battery charger? Is it an inverter? Is it a solar regulator?**

  None of these options are valid: IMANAGER is a multi-battery charge manager.

DECLARATION OF EU CONFORMITY

Company: **NDS Energy s.r.l.**

Address: via Giovanni Pascoli
65010 - Cappelle sul Tavo (PE)
Italy

Declares under its own responsibility that the product:

Nome commerciale: **I MANAGER**

Modelli: **iM12-150, iM12-150W**

To which this declaration refers, is in compliance with the provisions of the Directive of the Council of the European Union concerning the electromagnetic compatibility (EMC) **Directive 2004/108/EU**, demonstrated to the observance of the following norms:

- ✓ **EN 55022:2010**
- ✓ **EN 55024:2010**
- ✓ **EN 61000-3-2:2006+A1:2009+A2:2009**
- ✓ **EN 61000-3-3:2008**

The model iM12-150W complies to the **Directive 2014/53/EU (RED)** for devices with wireless communications, demonstrated by compliance with the standard:

- ✓ **EN 300220**

Compliance for the restriction of the use of hazardous substances is demonstrated in compliance with **Directive 2011/65/EU (RoHS 2)**, according to the law:

- ✓ **EN 50581:2012**

Cappelle sul Tavo, 09/05/2014

STAMP AND SIGNATURE

NDS®

WARRANTY COUPON

MODEL_____

SERIAL NUMBER_____

PURCHASE DATE_____

STAMP AND SIGNATURE OF THE SELLER

NDS ENERGY S.R.L.
VIA G. PASCOLI, 169
65010 CAPPELLE SUL TAVO (PE)
ITALY

EMAIL: CUSTOMER@NDSENERGY.IT
TEL: +39 085 4470396
FAX: +39 085 9112263

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ALL THE ENERGY YOU NEED

TUTTA L'ENERGIA CHE TI SERVE

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NDS ENERGY S.R.L.
VIA PASCOLI, 169
65010 CAPPELLE SUL TAVO (PE) ITALY
TEL.:+39 085 4470396
WEB: WWW.NDSENERGY.IT
EMAIL: CUSTOMER@NDSENERGY.IT
LIKE US: FACEBOOK.COM/NDSENERGYSRL