english

NDS®

All the Energy you Need

iMANAGER

ADVANCED MULTI-BATTERY SYSTEM

BLACKBOX

DISPLAY TOUCH

www.ndsgroup.it ~ e-mail: commer@ndsgroup.it

CONTENTS

1. DESCRIPTION

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

Thanks to its touch screen, ***iManager*** shows all the information available on both the accumulators' state of charge and the modes of use, thus allowing to manually select the batteries to be activated or deactivated with a single touch, or for a more customized management.

iManager works on a continuous basis monitoring the voltages of the two batteries and automatically selects the batteries to be used, according to the charge and discharge currents.

Additionally, the system has a dedicated output for the engine battery. When it detects a charging source (network battery charger or solar panel) on the leisure batteries, and the latter are 100% charged, it sends a current of 4 A to keep the engine battery charged, thus avoiding bad surprises when restarting the engine.

iManager made of two units can be installed on every kind of battery and vehicle.

1.1 Main Functions:

- 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 of the accumulators' state of charge
- Displaying of the charge and discharge voltage and ampere
- Automatic (under 11V) or manual battery isolator, using the touch screen
- Displaying of info and advices on managing and maintaining the batteries
- Date and time
- Temperature control under charge/discharge, for higher safety

2. INSIDE THE BOX

Make sure the box includes the following components:

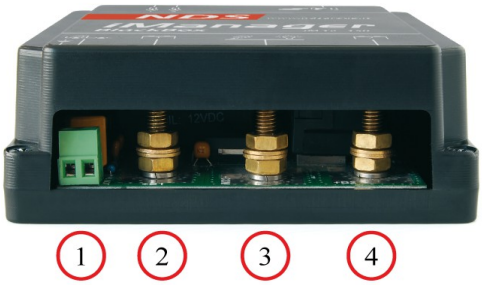
- 'BlackBox' control device
- '***iManager***' displaying device
- '***iManager***' communication cable
- No. 2 temperature probes
- Assembling screw kit

The items provided are designed for this device exclusively and are not compatible with other devices.

2.1 Device components

2.1.2 BLACKBOX ››BLACKBOX

Front view:



Back view:

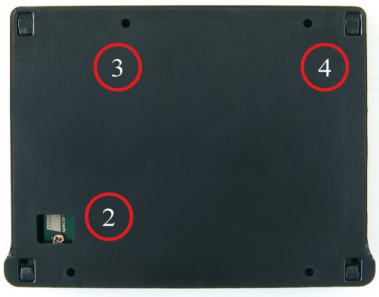
Number	Function
1	2-way connector for connecting the Ground and the positive pole of the Starter battery
2	M6 bolt connector for the Positive Pole of Leisure battery no. 1
3	M6 bolt connector for the system's Common Positive Pole
4	M6 bolt connector for the Positive Pole of Leisure battery no. 2
5	4-way connector for the Cable of connection with iManager
6	Double 2-way connector to connect the Temperature probes

3

2.1.3 Display ***iManager***

Front view:

Rear view:



Number	Function
1	Touch screen display
2	Hole for the passage of the Communication cable
3	4 Holes to fasten the cover to the wall
4	System for fastening the frame display to the cover

2.2 Accessories for installation

n.1 communication cable
n.2 temperature sensors
n.8 fixing screws

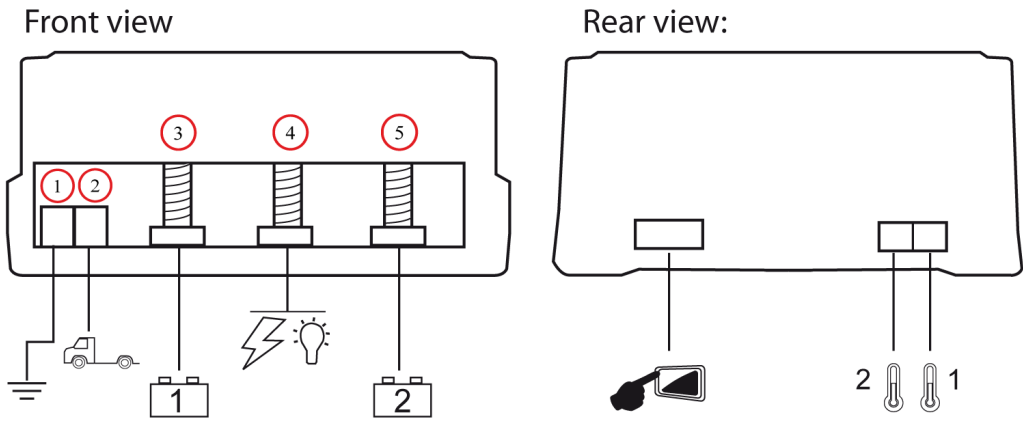
3. INSTALLATION AND ASSEMBLING INSTRUCTIONS

In order to install the device properly, Follow the instructions below

3.1 Installing the BlackBox device:

Prepare an area to house the BlackBox, as close as possible to the Leisure Batteries, but never inside the engine bay or in compartments that are not protected against weather agents.

Unscrew the two screws in the front, lift the cover and pull it out in order to access the connection points conveniently.



5

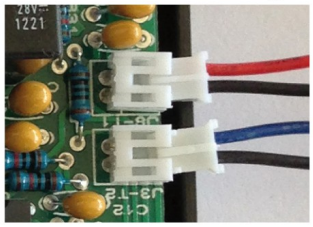
Follow these steps:

1. Make sure that the vehicle's engine and/or the battery chargers onboard are off
2. Prepare three cables (or two if you have only one leisure battery) with a diame ter equal to or higher than 10mm2, protecting each cable with a 120A fuse, the cables' length shall be suitable to make the following connections.
3. Connect a cable terminal for M6 screws on each cable.
4. Unscrew the three M6 nuts from the device's front screws and make the following connections with the cables prepared earlier:
   Screw no. 3 => Positive pole of Leisure battery no. 1
   Screw no.4 => Common positive pole of the vehicle's system
   Screw no. 5 => Positive pole of Leisure battery no. 2
   Tighten the three cable terminals to the screws firmly using the nuts supplied.
5. *Connect a cable with 1.5mm² to 2.5mm² of section, properly peeled, from connector no. 2 to the engine battery's positive pole. Then, fasten the screw over the connector properly.*
6. *Connect a cable with 1.5mm² to 2.5mm² of section, properly peeled, from connector no. 1 to the negative pole of one of the leisure batteries. Then, fasten the screw over the connector properly.*

Do not connect loads that consume more than 100A
The negative cable (Earth) connection shall be performed only at the end of the installation, as last step.

As soon as the earth cable has been connected to the BlackBox, the system immediately connects the leisure battery no. 1 and becomes active.

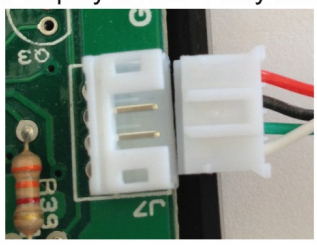
7. Delicately connect the temperature probes' connectors to their housings on the back of the device



DO NOT FORCE: connectors' direction must be mandatorily complied with

Place the temperature probes in central position on a major side of the batteries (long side). Use a drop of hotmelt glue or silicone, being careful to attach the sensor to the surface firmly.

8. Delicately connect the cable of connection with the display on the 4-way connector on the back of the device.



DO NOT FORCE, the connector's direction must be mandatorily complied with

9. Fix the base on the BlackBox to a wall or to the floor of the housing chosen for the installation; use the 4 self-tapping screws in the holes provided on the bottom of the base.
10. Close the BlackBox cover by introducing the two tabs on the back inside the proper housings on the base; fasten the 2 screws provided on the holes of the cover's front corners .

3.2 Installing the '*iManager*' displaying device:

1. Disassemble the ***iManager***'s display frame

a) make the display frame slide upwards with respect to the cover behind

b) lift the lower part of the display frame

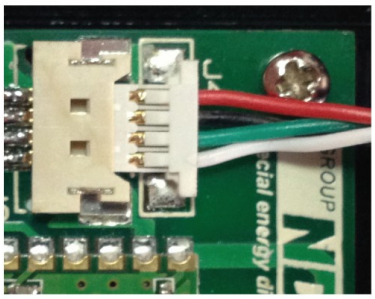
c) make the display frame slide downwards with respect to the cover and unhook it

2. Place the back cover on the wall chosen for installation. Mark the reference of the points where the holes for fastening screws (3mm of diameter) and the hole for the passage of the communication cable (minimum diameter of 7.2mm) have to be performed.

3. Perform the holes and tighten the cover behind the wall using the screws provided and being careful that they do not protrude the countersink once they have been fastened.

4. Pass the communication cable through the hole especially made and insert it delicately inside the connector of the display board.

DO NOT FORCE, the connector's direction must be mandatorily complied with.



5. Fasten the display to cover on the back:

a) insert the plugs on the top of the display frame in the housings of the cover behind while keeping the lower part of the display frame with respect to the cover;

b) pull down the lower part of the display frame by attaching it to the cover

a) make the display frame slide downwards with respect to the cover.

4. GETTING STARTED

4.1 Using the touch screen

The iManager touch screen allows you to interact with the device by selecting the several functions easily.
For the proper use of the touch screen, follow the instructions below:

Do not exercise too much pressure with your fingers on the display surface and do not use sharp objects. By doing so, you may damage the device or cause it to malfunction.

Do not allow the display to come into contact with other electrical devices. Electrostatic discharges can cause it to malfunction.

Do not allow the display surface to come into contact with water. The touch screen may malfunction in humid conditions or when exposed to water or other liquids.

For best performance, tap the touch screen with your fingertip.
You can use plastic pens for a more accurate touch on the display, provided that they do not have sharp tips which can damage the surface.

4.2 Initial settings

Switching the device on
When the communication cable is connected, the display turns on and the initial screen appears, with the "***iManager***" writing which will keep displaying until the device has not received the first data from the BlackBox.

Initial settings
Once the data have been received, the display will show the connected batteries' data setup screen.

To ensure the system for proper functioning, set the values requested in all the screens.

Language setup:

The selection shall be made with a single touch on the relevant small box or the item indicating the language.

By clicking on the rightward arrow, you can move on to the settings, whereas by clicking on the leftward arrow, you can go back and change the input data.

From this screen you can set the following:

- manufacturing technology of batteries (agm, gel, lead-acid);

- capacity (Ah) for each} battery (except for the starter battery!);

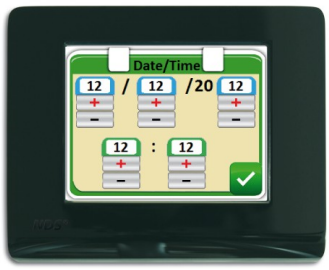
- The default capacity is 100Ah, but it can be changed by tapping the "+" (plus) or "-" (minus) icon on the display.

- You can select the technology of the relevant battery by tapping.

By clicking on the arrow, you move to battery no. 2's settings (if any!) to be carried out with the same methods or you access to the language setup.

If only one battery is connected to the system, battery no. 2's settings screen shall be skipped. Should the second battery be installed later, it will be possi ble to change the original settings (see p. 26).

Setting the date and time:



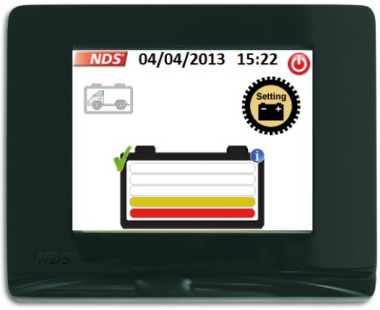
Input the current date and time by clicking the "+" (plus) or "–" (minus) icon under the relevant box.
By clicking on the arrow on the left, you can go back and change the input data.
By confirming, all the data inserted earlier are saved and you get to the ***iManager*** main screen.

5. OPERATION

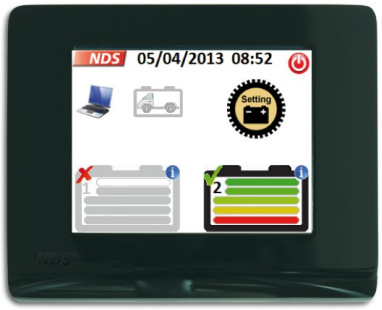
5.1 Main screen

The ***iManager*** main screen shows the information on the batteries' state of charge, the date and time.

Main screen with 1 Battery



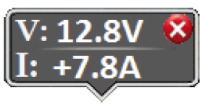
Main screen with 2 Batteries



5.2 Icons' meaning and functions

ICON	MEANING AND FUNCTIONS
NDS	NDS Group S.r.l. company logo, if pressed and held displays the company's complete data.
	Represents the Automatic operation mode
	Represents the Manual operation mode and, if clicked, allows to go back to the Automatic Mode.
	Engine battery not present.
	Disconnected engine battery, if clicked on displays the battery voltage.
	Charging engine battery, if clicked on displays the battery voltage.
	Power off icon, if clicked on turns off the display.

ICON	MEANING AND FUNCTIONS
	Settings Key, if quickly clicked on allows to access commands, if pressed and held allows to access the initial settings menu.
	Leisure battery deactivated with state of charge indication, if clicked on quickly within its area, the window displaying its voltage and current activates; if pressed and held, the Manual mode activates or the battery is selected in case the Manual mode is already on.
	Leisure battery connected to the loads in Automatic mode with state of charge indication, if clicked on quickly within its area, the window displaying its voltage and current activates; if pressed and held, the Manual mode activates.
	Leisure battery connected to the loads in Manual mode with state of charge indication, if clicked on quickly within its area, the window displaying its voltage and current activates; if pressed and held, the Manual mode activates.

ICON	MEANING AND FUNCTIONS
	Overheating Battery warning
	Icon confirming that the display has been pressed
	Represents the parallel connection of batteries
	Represents battery charging
	TBalloon showing data on battery voltage and charge and discharge current. By clicking inside its area, you close the view. The balloon closes automatically if no operations are performed for 2 minutes.
	Balloon displaying the engine battery voltage. By clicking inside its area, you close the view. The balloon closes automatically if no operations are performed for 2 minutes.
	Battery reactivation key. By clicking on it, the battery connection is restored to Automatic.

5.3 Displaying the state of charge (SoC)

Each leisure battery icon shown on the display has a 5-bar sequence representing tl state of charge in percentage of the relevant battery.

Icons with state of charge:

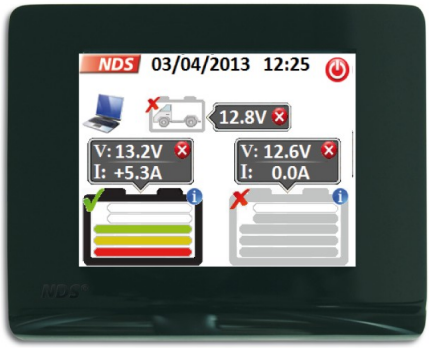
 SoC = 0%	 SoC = 60%
 SoC = 20%	 SoC = 80%
 SoC = 40%	 SoC = 100%

The state of charge of the battery in use is represented by coloured bar whereas the bars of the deactivated battery are grey. The meaning of the ba remains unchanged..

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 thanks to the device's self-learning algorithm, after the first use of the batteries the accurate indication will be available, both for charging and discharging.

5.4 Displaying data

By quickly clicking on the area of one of the leisure batteries' icon, you can display the voltage (V) and current (A) information regarding the relevant battery.
Whereas, by clicking on the engine battery (if connected) it is possible to display the voltage only.
The balloons may be closed by just clicking on their area.



6. MANAGING BATTERIES

6.1 Automatic Mode

This is the ***iManager***'s default operation mode after installation.
By automatically managing leisure batteries, the system can optimize the performance and preserve their efficiency over time thanks to the many safety functions.
This function is based on an algorithm designed to allow the batteries to be selected alternatively in order to keep them with a similar state of charge.

Automatic operation during Charging Phase:
Multiple factors affect iManager's choices when managing this phase:
- Batteries' voltage
- Charging current
- State of charge of the two batteries
- Temperature

If batteries have the same state of charge and the current supplied by the battery charger (or the alternator or the solar panel) allows it, the iManager will connect batteries in parallel until they reach an 80% state of charge. At this point, the charging will be completed separately for each battery.
If batteries have different states of charge (therefore no parallel connection is possible), the iManager will charge the most depleted battery first until it reaches a state of

charge such that to allow to proceed as the step above.
The engine battery will be recharged only if its voltage is lower than 12.5V and the leisure batteries are completely depleted (see the section of reference).

Automatic operation during Discharging Phase:
This phase is affected by the same parameters previously seen for the charging phase.
- Batteries' voltage
- Discharging current
- State of charge of the two batteries
- Temperature

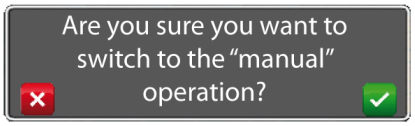
If the current taken is lower than 25A, the device selects the most charged battery which will be used until its voltage decreases by 0.3V compared with that of the battery which had remained deactivated until then.

Should the voltage of one of the batteries be lower than 11.2V, the system imposes its parallel connection, thus avoiding an excessive stress up to the minimum threshold of 10.5V, where all the connected loads are disconnected (automatic battery isolating function).

When the discharging current is higher than 25A and the batteries have the same state of charge, the system activates the parallel connection until the current taken decreases to under 20A.

6.2 Manual Mode

To access the Manual mode, just press and hold (press and hold for about 1.5 seconds) the icon of the battery you want to select; the system will show a screen confirming the switching to the manual mode.



In the Manual mode, the Computer icon ( *) is replaced by the little man icon (*  *) and the outline of the battery selected turns red.*

In order to change the battery to use, always press and hold (press and hold for about 1.5 seconds) the icon of the desired battery, and the following options will be available:
- Activation of the selected battery and deactivation of the one used previously, if they have different states of charge (SoC).
- Activation of both batteries (parallel mode) if their SoC are the same or differ by just a bar.

If you do not want no parallel connection, press the desired battery again to select it individually.

The parallel batteries setup is allowed only if their state of charge is the same or differ by just a bar (20%).

In this mode, the battery/batteries to be used is/are always selected by the user, but

the ***iManager*** keeps monitoring the operating temperature and the minimum voltage during the discharging phase (10.5V), thus always ensuring the highest condition of safety and, if necessary, restricting the user's choices.

You can go back to the automatic management at any time, by touching the little man icon.

6.3 Automatic Battery Isolating Function

The iManager, as already described, monitors the voltage and the temperature of both batteries to make sure that the conditions of use are always appropriate to avoid efficiency loss or irreversible damage.
The automatic battery isolating function disconnects all the loads in three different cases:
- When the voltage of one or both batteries drops to under the critical limit of 10.5V.
- When the voltage of one or both batteries remains under 11V for more than 15 minutes.
- When the temperature measured on one or both batteries exceeds the limit threshold of 60°C.

In case only one battery falls under one of these three cases and the automatic mode is on, the ***iManager*** will select the battery which is most suitable for use.

If the temperature exceeds the critical threshold of 60°C, it cannot be reused until it drops to under 55°C; such condition will be notified by an icon inside the battery.

Once the batteries have been disconnected from the loads, it is possible to reconnect them by activating a charging source or just clicking on the icon provided.

6.4 Charging the Engine battery

This function is crucial for storage periods. In fact, even after long stops it prevents from having the engine battery depleted, which would allow the engine to start.

The iManager allows to charge the engine battery automatically only when strictly necessary, when the following conditions occur:
Engine battery under 12.5V
The leisure battery/batteries has/have to be completely discharged
A charging source must be available: AC battery charger, solar panel or generator.

The maximum current delivered to the engine battery is 4A.
The charging stops when also the engine battery is completely charged and, anyway, as soon as the charging source is disconnected or the vehicle is started.

The charging function of the starter battery is only carried out automati cally by the iManager, it cannot be performed manually.

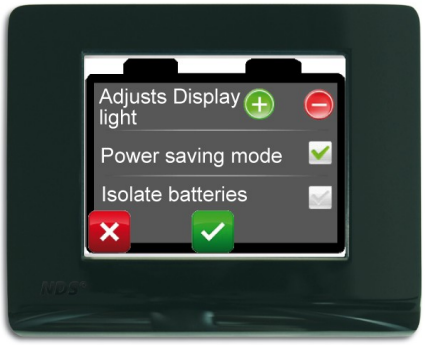
7. SETTINGS MENU (Setting key)

The icon below lets you access two different menus, based on the kind of touch:

Tap quickly
Press and hold

7.1 Setting key (tap quickly)

By tapping the Settings icon on the main screen, you access the additional settings:
- Display brightness adjustment
- Power saving mode setting
- Manual battery isolator function



7.1.1 Brightness adjustment:

By pressing and holding the "+" (more) o "-" (less) key, the display's backlight intensity can be changed to the condition desired by the user and which is the most suitable for the surrounding light conditions.

7.1.2 Power saving mode setting:

The power saving mode lets you reduce the display's brightness automatically after 3 minutes from the last touch on the touchscreen and, after 10 minutes with no touch, the display turns off completely.
To activate this function, you have to tick the box of the relevant item and click on the confirmation symbol.

By clicking on the cancel-command red key ("X"), no function is performed and you go back to the main screen.

7.1.3 Manual battery isolator:

Through this command you manually isolate the batteries from the loads. This command shall only be performed after clicking on the confirmation key.
Once the batteries have been disconnected from the loads, to reconnect them you can activate any battery charger (alternator, AC battery charged, solar panel or generator) or just click on the icon provided.

If a charging source is active, the battery isolating function cannot be executed.

By clicking on the cancel-command red key ("X"), no function is performed and you go back to the main screen.

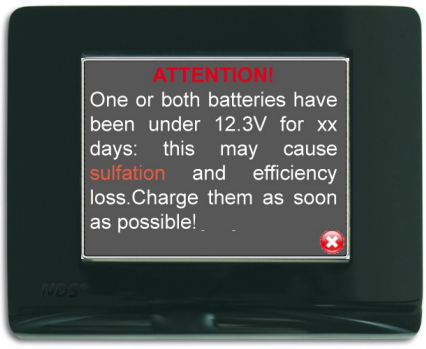
7.2 Settings key (press and hold)

By pressing and holding the Settings key, you access the initial settings menu, meaning the several screens appearing on the first installation, which therefore can always be referred to and changed (see section 4.2).

8 AUXILIARY FUNCTIONS

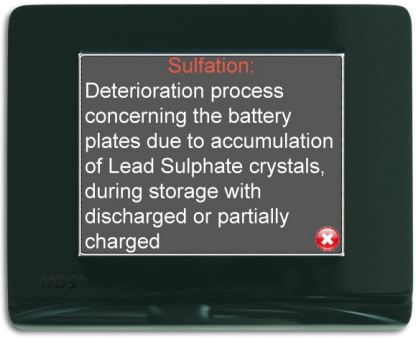
8.1 Warnings

If one or both batteries are left unused with a voltage lower than 12.3V (therefore discharged) or under discharge for more for more than 15 consecutive days, the iManager will show the following warning screen on the display:



If the device is set on the "power saving" mode, this warning will be displayed upon reactivation (by just tapping the display, or by reactivating a charging source, etc.).

To quit the warning screen, you have to click on the screen close icon on the lower right corner.
By touching anywhere else on the display, you access the screen which explains briefly the meaning of sulfation:
By touching anywhere on the display, you exit this screen and go back to the main one.



Remember to never leave the batteries discharged (or partially charged) for a long time. For excellent and lasting performance, always keep them fully charged.

8.2 Turning off the display

You can switch the display off at any time by simply tapping the red icon with the power-off symbol on the upper right corner of the screen. When the display is off, to reactivate it just touch it.

8.3 NDS useful numbers:

Should you need to contact the NDS Group S.r.l. technical department, by pressing and holding the company logo on the upper left corner of the display, all the company's data are shown, including phone number and e-mail address for quick use. To exit that screen, just tap the display.

9. TECHNICAL FEATURES

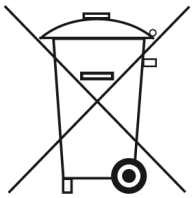
BLACKBOX	
Working voltage	12V (9V - 18V)
Relays maximum current	100A + 100A
Batteries' automatic disconnection threshold	Voltage: 10,5V Temperature: 60° C
Operation mode	Automatic and Manual
Maximum current on the Starter battery	4A
Starter battery's charging threshold	12V - 12,8V
BlackBox average consumption	8mA @ Active batteries 4mA @ Disconnected batteries
Working temperature	-15° C - +65° C
REMOTE DISPLAY	
Type of Display	TFT 2,83" 262k Colours with Touch Screen
Operation mode	Normal and Low consumption
Average Consumption	60mA @ maximum brightness 8mA @ Display OFF 2mA @ disconnected batteries and display OFF
Type of Connection	3m cable with low profile connector
Operating temperature	-10°C - +70°C

10. WARRANTY

The manufacturer shall guarantee the proper functioning of the ***iManager*** and undertake to make free replacement of partswhich should be deteriorated due to defects in construction within 24 months from the date of purchase, as evidenced by the validation slip (to be filled in each part and returned to the manufacturer).
The defects resulting from improper installation, use,tampering or negligence shall not be covered by warranty. Furthermore, we assume no liability for any direct or indirect damages.The ***iManager*** returned, even if under warranty, will have to be shipped “Freight paid” and shall be returnedand on a “Freight collect” basis.
The certificate of warranty shall be valid only if accompanied by a official receipt or delivery document.
Any dispute will be under the competent jurisdiction of the court of Pescara (Italy)

Model..... Serial no. .....

Date of purchase .....



Seller stamp and signature

10.1 Validation Slip

iManager

Model ..... Serial number .....Purchase Date .....

Surname ....Name .....

Street..... ..... No. .....Poste Code.....

City ....Phone.no. .....

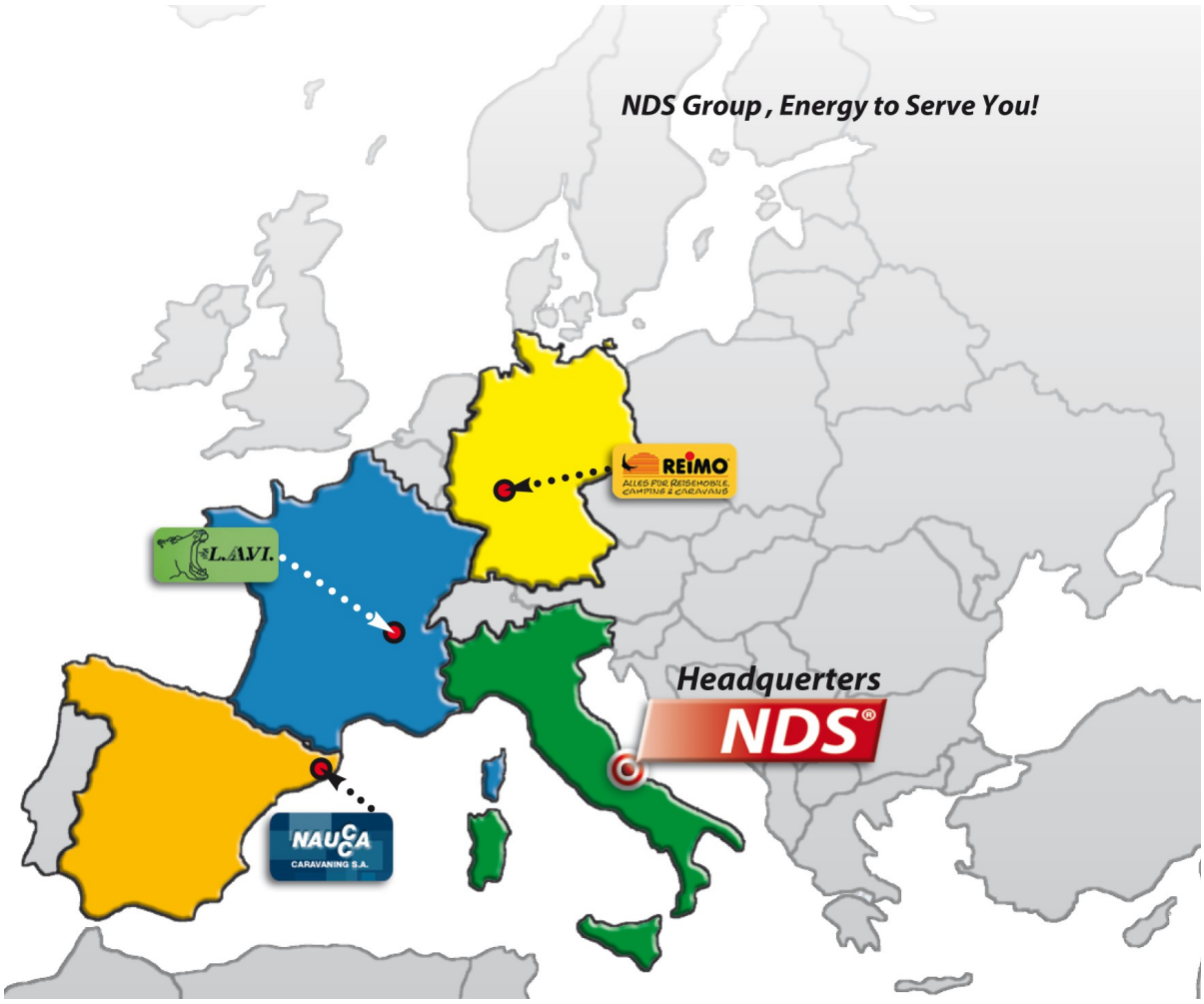
I authorize the use of my personal data under the provisions of law “D.L. 30th June 2003 No.196”

stamp and signature of the seller

Customer's signature

To be returned in a sealed envelope to:

NDS Group s.r.l. - Via Magellano, 67 - 65126 Pescara (Italia)



REV.1-2013

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