NDS

POWERSERVICE

User Manual

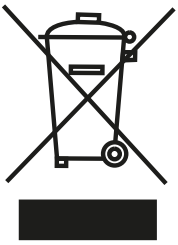
ENGLISH

VALID FOR THE FOLLOWING MODELS

PLUS 25
PLUS 30
PLUS 40
PLUS 12-24/20
PLUS 24-24/20

GOLD 25-M
GOLD 30-M
GOLD 40-M
GOLD 12-24-M
GOLD 24-24-M

INSTRUCTIONS FOR THE PROPER DISPOSAL



this electronic device is subject to the European Directive 2012/19/EU. according to the local waste disposal rules, 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 colour, size or accessories.

NOTE

It is indispensable, for a correct installation, to be equipped with suitable measuring instruments:

- Multimeter with DC voltage measurement (20V or autoscale) and continuity measurement.
- Amperometric clamp with direct current measurement (40A scale and higher).

2. MODELS

This manual is Valid for the following models

INPUT: 12V / OUTPUT: 12V
PRODUCT CODE
PLUS 25
PLUS 26
PLUS 27
GOLD 25-M
GOLD 30-M
GOLD 40-M

INPUT: 24V / OUTPUT: 24V
PRODUCT CODE
PLUS 24-24/20
GOLD 24-24-M

INPUT: 12V / OUTPUT: 24V
PRODUCT CODE
PLUS 12-24/20
GOLD 12-24-M

3. DESCRIPTION

POWERSERVICE is the special line of DC-DC/AC-DC chargers designed, patented and assembled by **NDS**, which ensure an efficient charge to the leisure batteries, guaranteeing 50% more charge than the alternator only. **POWERSERVICE** units safeguard battery life with specific charge curves for all types of batteries.

The **POWERSERVICE** charger line has been designed to guarantee reliability and maximum charging performance simply and automatically, responding to the needs of the most demanding travellers to get maximum energy in the shortest possible time.

POWERSERVICE allows you to correctly charge one or more leisure batteries (with capacities exceeding 75Ah) to maximum power, making the most of all available sources of energy on a motorhome or camper-van.

POWERSERVICE includes two advanced models tailored for modern recreational vehicles needs:

- **PLUS: CHARGER DC-DC** - charges from alternator and solar panel.
- **GOLD: CHARGER DC-DC | AC-DC** - charges from alternator, solar panel and external mains electricity supply.

MAIN FEATURES:

- Echarging at Up 40 Amps per Hour of Travel.
- High Efficiency, up to 92%.
- 5 Step Recharging
- Selectable Charging Curve: AGM, Gel, Flooded, Lithium ($LiFePO_4$)
- AUX Connection for Existing Systems.
- Split-Charge relay separates engine and leisure batteries.

- Compatible With Euro 6 Systems With Smart Alternator.
- Charge Management With Microprocessor.
- Fan Speed Regulated by Temperature and Operating Power, for a Silent and Efficient Device.
- Protection by Internal Fuses.
- Alternator Protection (in Case of Overload).
- Charging phase & power source indication by leds.
- Power Supply Function if Battery Is Not Present.
- Emergency Switch Reverts to Original Charging System in Case of Failure.
- Quiet, Compact and Easy To Install.

The innovative circuitry in the **POWERSERVICE** unit guarantees greater efficiency by reducing energy expenditure. output current is regulated both according to the needs of leisure batteries and to the quantity of input energy. while travelling the device gradually reduces the output current in the event that the alternator is in overload conditions (eg: at night with lights on, air conditioner on, engine idling and engine fan on, etc ...). The cooling fan is activated only if necessary and the rotation speed is electronically controlled according to the temperature inside the device keeping fan noise to minimum.

3.1 PROTECTIONS

POWERSERVICE units are equipped with several protection systems to ensure a high level of safety and security:

PROTECTION TYPE	REACTION TYPE
Battery over-voltage	Charge is interrupted
Alternator overload	Power Service automatically shuts off if the input voltage from the alternator and / or the engine battery falls below 12.8V
Over-temperature	Reduces the output current and turns off. automatic reactivation when the device temperature returns to an acceptable working level
Output short-circuit	Protection by fuses
Solar panel over-voltage	Charge is interrupted
Temperature too low	If the lithium curve is selected, then charge is interrupted

4. OPERATION

POWERSERVICE chargers provide the right charging curve to the most common leisure battery technologies by increasing the voltage coming from the alternator using a DC-DC converter. the charge curve related to the leisure battery technology in use (Wet Lead-acid, Gel, Agm, Lithium), must be selected using internal jumper switches. The 5 charging phases operate independently from the input energy source, and for each phase the voltage and current supplied are

continuously monitored, so as to quickly charge the battery as efficiently as possible.

CHARGING FROM THE ALTERNATOR

After the engine has started (and the alternator), the Ignition+ or D+ signal connected to the **POWERSERVICE** input will be active and the device will monitor the voltage of the engine battery to check its charge.
with a voltage higher than 13.3V (26.6V for 24-24 versions), the **POWERSERVICE** will start charging the leisure batteries.
During charging, the voltage of the starter battery will be constantly monitored to check any problems of supply or overload by the alternator, intervening promptly, if necessary, reducing the output current or stopping the charge completely.
the output current is limited if the **POWERSERVICE** detects an active signal D+ (or ignition+) and starter battery voltage below 13V.
the device switches off completely if it detects a voltage of 12.8V at the starter battery, or if the signal D+ or Ignition+ (ie engine shutdown) is no longer detected.

CAUTION
When selecting the intelligent alternator (Euro6) charging curve, the activation and deactivation thresholds of the device are as follows: activation >12V and deactivation <11.8V. in the latter case, the activation TIMES WILL ALSO BE DELAYED.
If you choose the ignition+ signal instead of the D+, don't leave the power on for more than 30 seconds.

POWER SUPPLY FROM SOLAR PANEL
If the following situations occur:

- Ignition+ or D + signal not active,
- Solar panel illuminated by sunlight with AN OPEN-CIRCUIT voltage higher than 16V,

The **POWERSERVICE** starts charging using the integrated solar regulator with PWM technology; charging phases are the same as those provided by the alternator and by an external mains supply.
the device stops charging using the solar controller when the panel voltage becomes lower than the leisure battery (there is not enough light to sustain a charging current).

POWER SUPPLY FROM 230V MAINS CONNECTION (GOLD SERIES ONLY)
If the ignition+ or D+ signal is not active, and the power supply is connected and active, the: **POWERSERVICE** GOLD gives priority to the mains power supply and stops using the solar panel.

The power source is selected by power priority, as below:

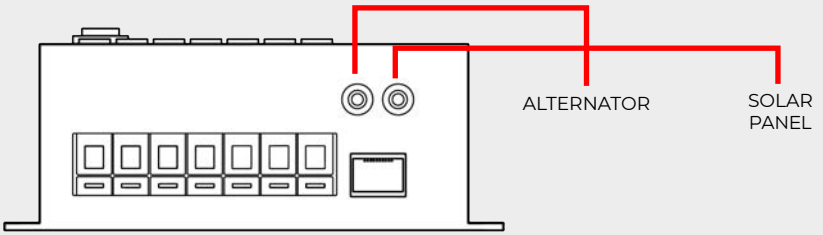
1. **Alternator.**
2. **Mains Power Supply (GOLD only).**
3. **Solar Panel.**

The charging source used will be displayed by the relevant LED.

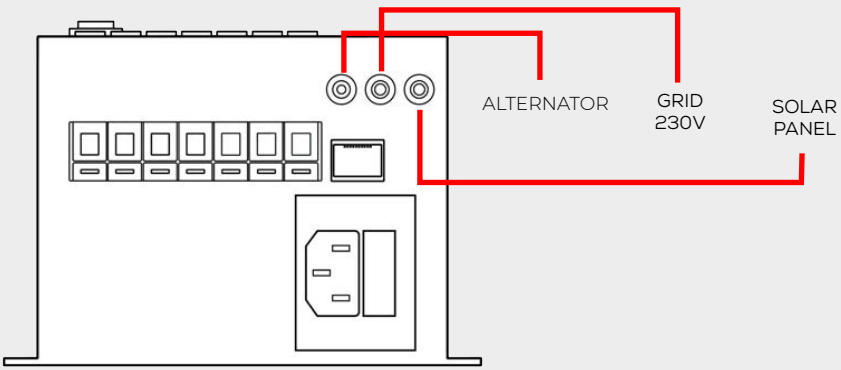
5. LED INDICATORS

POWERSERVICE è is equipped with LED indicators to signal the source of incoming charge and the charge phase that the device is using. the charging phase in progress is shown with a corresponding number of flashes on the relevant LEDs.

PLUS



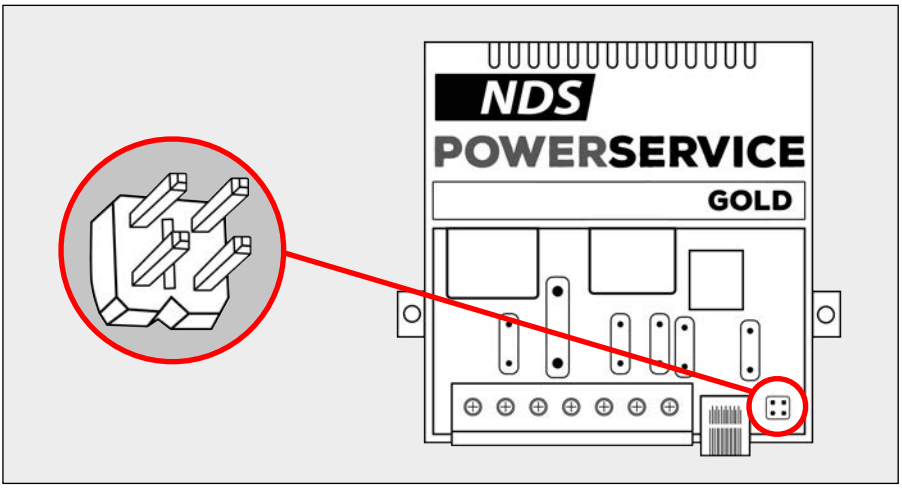
GOLD



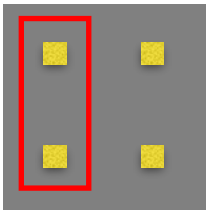
NOTE
All the led signals are at page 28.

6. CHARGING CURVES

POWERSERVICE units support battery charging for AGM, Gel and flooded lead-acid batteries. There is a special curve for Euro 6 systems with “smart” alternators and $LiFePO_4$ lithium batteries . The charge curves are selectable using two jumpers.



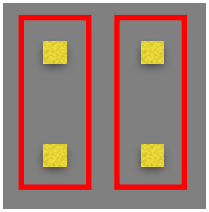
A Curve: AGM



YES NO

MODEL	12V	24V
Max voltage	14,8V	29,6V
Float voltage	13,8V	27,6V
Max desulfation voltage	15,8V	31,6V

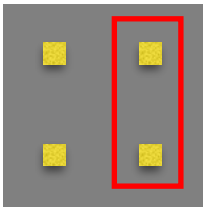
B Curve: GEL



YES YES

MODEL	12V	24V
Max voltage	14,3V	28,6V
Float voltage	13,6V	27,2V
Max desulfation voltage	15,8V	31,6V

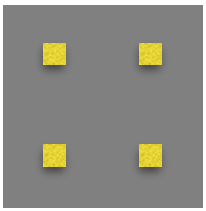
C CURVE: GENERIC CURVE (FLOODED, $LiFePO_4$)



NO YES

MODEL	12V	24V
Max voltage	14,5V	29V
Float voltage	13,5V	27V
Max desulfation voltage	NOT ALLOWED	

D CURVE: GENERIC CURVE FOR SMART ALTERNATOR, EURO 6 ($LiFePO_4$)

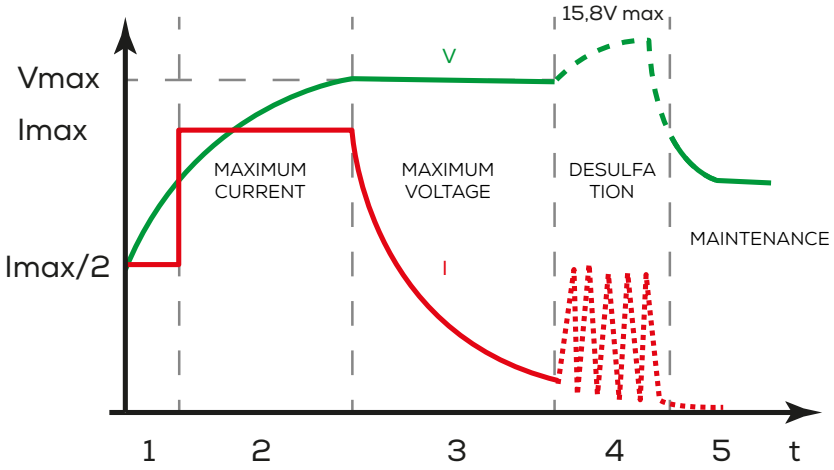


NO NO

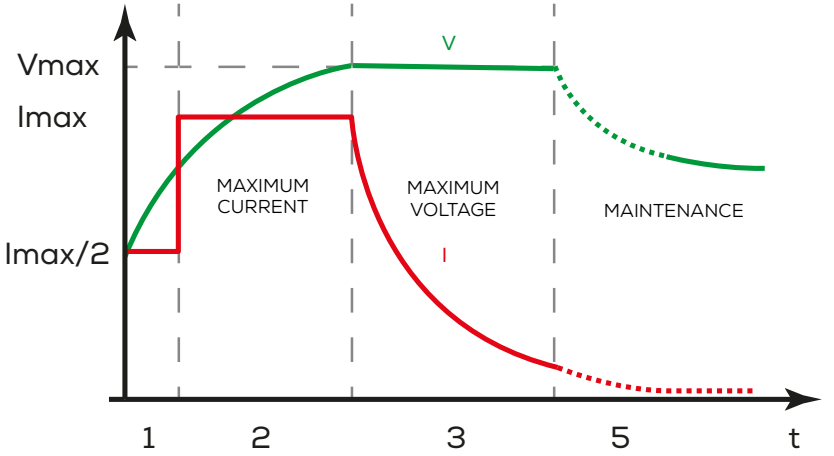
MODEL	12V	24V
Max voltage	14,6V	29,2v
Float voltage	13,7V	27,4V
Max desulfation voltage	NOT ALLOWED	

CAUTION
The **D curve** is specific for euro 6 engines with **smart alternators** and entails a delay of several seconds for the activation of the system, **wait until the end of the procedure.**

A, B CURVE (AGM, GEL)



C, D CURVE (FLOODED, LiFePO$_4$)



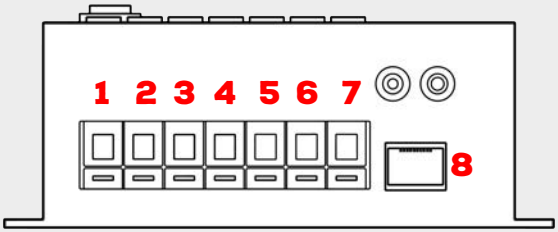
NOTE

During charging, the device's led indicators will emit flashes corresponding to the charging phase being used at the time. the various phases are indicated at the base of the above graphs.

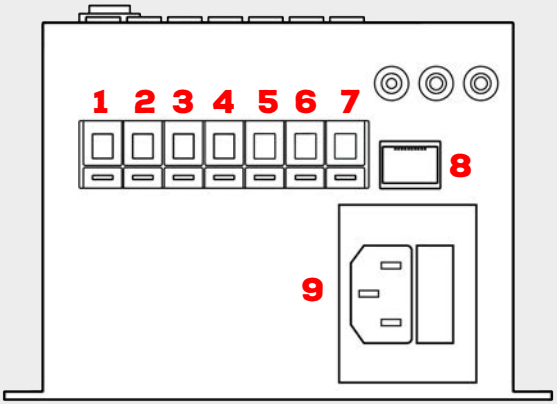
7. CONNECTIONS

The device has a seven (7) terminal block for power connections for cables up to 16mm$^{2.}$

PLUS



GOLD



1. - (negative) connection from the starter battery.
2. - (negative) connection of the leisure battery.
3. + (positive) connection from the starter battery.
4. D+ Signal from the alternator or ignition+ signal line.
5. AUX: connection of the existing control unit (sargent, schaudt, etc.).
6. Output of the charger (connects to the positive terminal of the leisure battery).
7. Solar panel direct connection 12V nominal (maximum voltage with open circuit lower than 28V).
8. Debug and update connection (NDS internal use).
9. IEC socket for the connection of the mains power supply (Only for GOLD series).

NOTE

The negative pins n°1 and 2 are internally connected to each

SPECIFIC AUX CONNECTION (PIN NO. 5) FOR THE FOLLOWING MODELS: PLUS 25, PLUS 30, PLUS 40, PLUS 24-24/20, GOLD 25-M, GOLD 30-M, GOLD 40-M, GOLD 24-24-M

POWERSERVICE has an auxiliary terminal: (terminal n°5) dedicated to the original control unit output (eg CBE, Sargen, Schaudt, nord elettronica) or to the split-charge relay. This Terminal is used to connect appliances such as the fridge, lights, pump, etc. All the cables that were originally connected to the leisure battery's positive terminal should be connected to this auxiliary input (5).

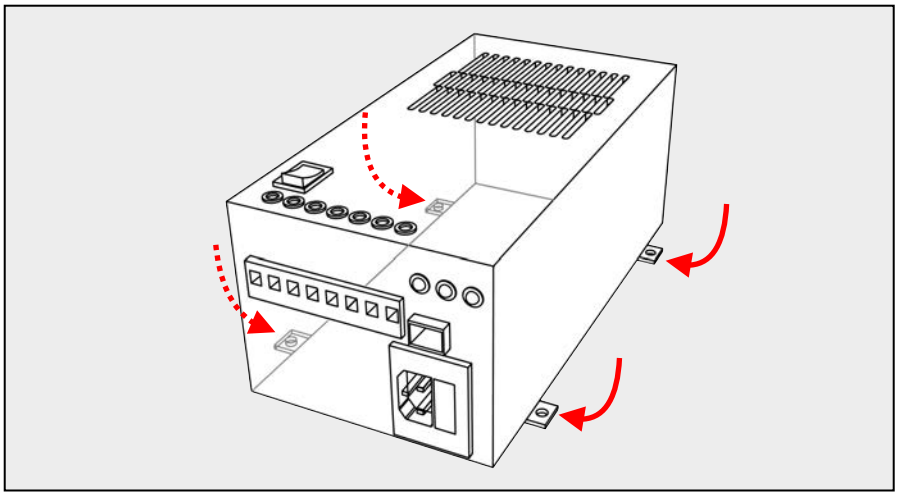
A relay with Normally Closed contact is active On **POWERSERVICE** Pin N°5 (AUX) and internally connected to Pin N°6 (Exit Pin). The Normally open contact is connected to input B+ (Pin N°3), so if the ignition+ signal line is not active (engine off) the appliance will be powered by the leisure battery. When the engine is running the internal relay will switch on the AUX and the loads will be powered directly by the alternator, input B+. The leisure battery will be free of loads, allowing the **POWERSERVICE** to further accelerate the charge while driving.

In case of vehicles without a control unit (self-build vehicles for example), and/or a vehicle with the electrical system being installed for the first time, the AUX input (Pin n°5) will have the same operation indicated above. It is always advisable to install an external "split-charge relay", since it guarantees the recharging of the leisure battery in case of malfunctions, taking power directly from the alternator.

NOTE
To take advantage of direct charging from the alternator, the **POWERSERVICE** switch must be moved to position 0. The normal position is 1.

8. INSTALLATION

POWERSERVICE can be installed easily and securely thanks to the external flanges (aluminum feet).



The ideal mounting position is smooth, well ventilated and not subject to overheating; avoid surfaces covered with fabric or carpet. Install the device as close as possible to the leisure batteries.

POWERSERVICE can work in any position; if installed on a vertical wall, it is recommended to keep the short side parallel to the floor, with connections downwards. Do not install the device close to sources of heat or in a place that is not adequately ventilated and that could reach very high temperatures (eg. engine compartment).

CAUTION
POWERSERVICE GOLD version integrates a 230VAC battery charger, therefore: pre-existing chargers, external chargers, integrated in the control unit chargers, must be uninstalled!

1. Set the power switch to 0.
2. Connect the negative pole of the starter battery to **POWERSERVICE** Pin N°1.
3. Connect the fuse holder to the positive pole of the starter battery.
4. Connect the other end of the fuse holder to Pin N°3 of the **POWERSERVICE**.
5. Insert a 70A fuse into the fuse holder.
6. Connect the negative terminal of the leisure battery to Pin No. 2 of the **POWERSERVICE**.
7. Disconnect all the cables on the positive pole of the leisure battery and connect them to pin N°5 of the **POWERSERVICE** (Not valid for models PLUS 12-24 and GOLD 12-24)
8. Connect the leisure battery positive pole to Pin N°6 of the **POWERSERVICE**
9. Connect the D+ or ignition + signal wire to the **POWERSERVICE** Pin n°4.
10. Only for GOLD models: connect the 230VAc mains supply to the input IEC connector. Link the connection after the general system safety switch (rcd switch).

To avoid interferences in audio / video systems:

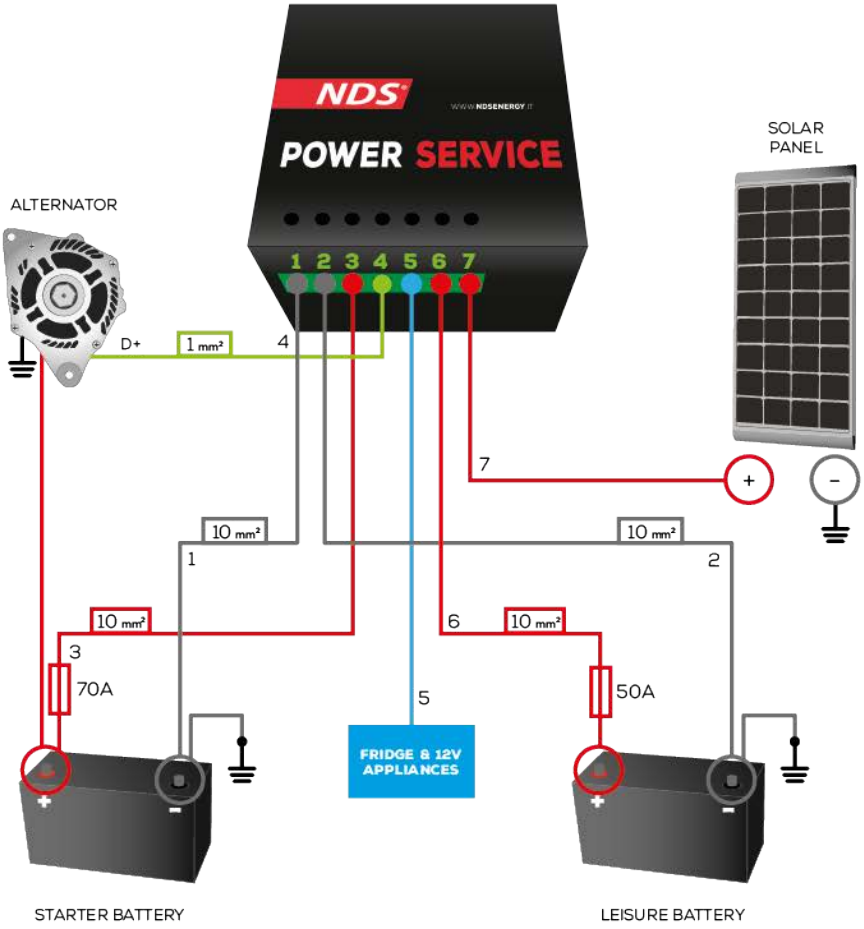
- Use high quality (and in good condition) cables for TV antennas and other transceivers.
- make sure that the **POWERSERVICE'S** power cables (input and output) are far from transceivers cables, sensitive devices power cables and **AC** current cables.
- Place sensitive equipment as far as possible from the **POWERSERVICE**.

NOTE

- The data connector placed on the right of the power connector is for technical use. it is strictly forbidden to connect any device in this socket, any tampering could irreparably damage the appliance.
- Use cables with a cross-section of at least 10mm^2 for: connections between engine battery and Power Service, and in the output towards the leisure battery. if the distance between the motor battery and the device exceeds 2 meters, it's recommended to increase the cable section, to reduce voltage drop and power losses.

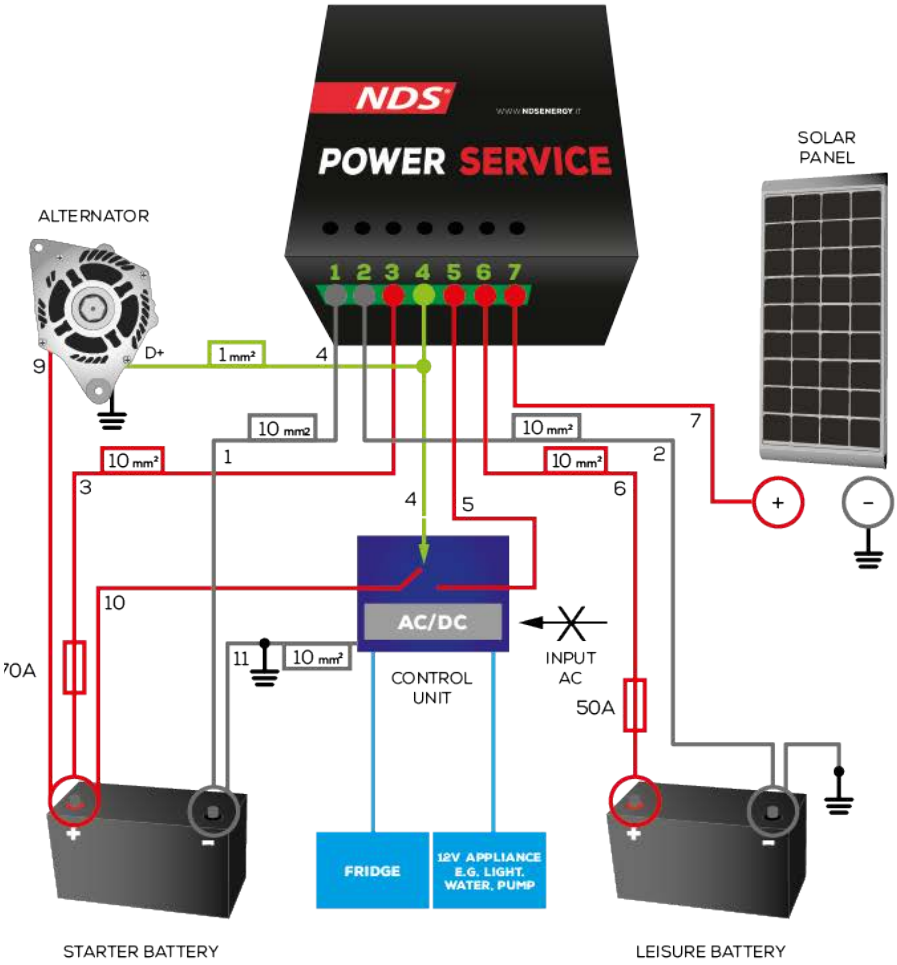
9. WIRING DIAGRAMS

INSTALLATION IN VEHICLE WITH NO CONTROL UNIT AND / OR SPLIT CHARGE RELAY



FOR CABLES LONGER THAN 2 METERS USE 16mm² CABLES
In this case, for ordinary vehicles to be transformed to RV or vehicles that need an auxiliary battery, the **POWERSERVICE** can be used to manage the charge and the distribution of energy.

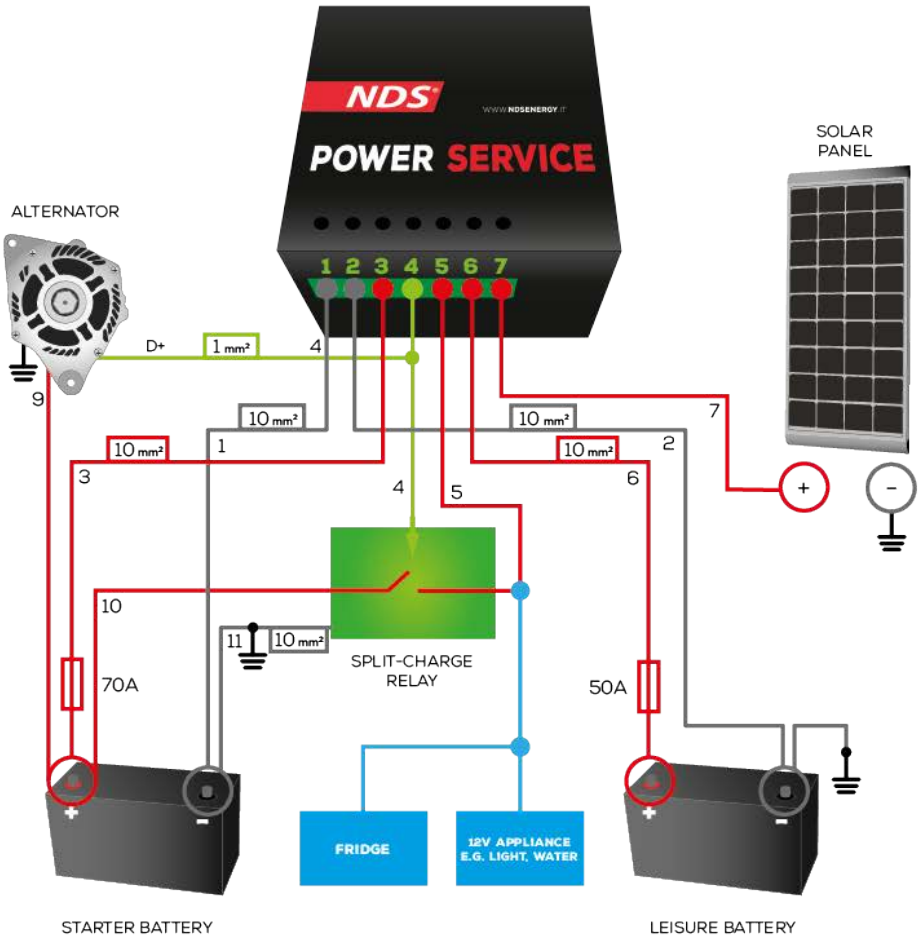
INSTALLATION IN VEHICLE WITH EXISTING USING CONTROL UNIT (CHARGING SYSTEM)



FOR CABLES LONGER THAN 2 METERS USE 16mm²

For the control unit we mean the unit of control and distribution of energy on the HABITATION PART of the vehicle (Eg.: CBE ds300, Schaudt EBL163, nord elettronica ne287, SARGENT, BCA, etc.).

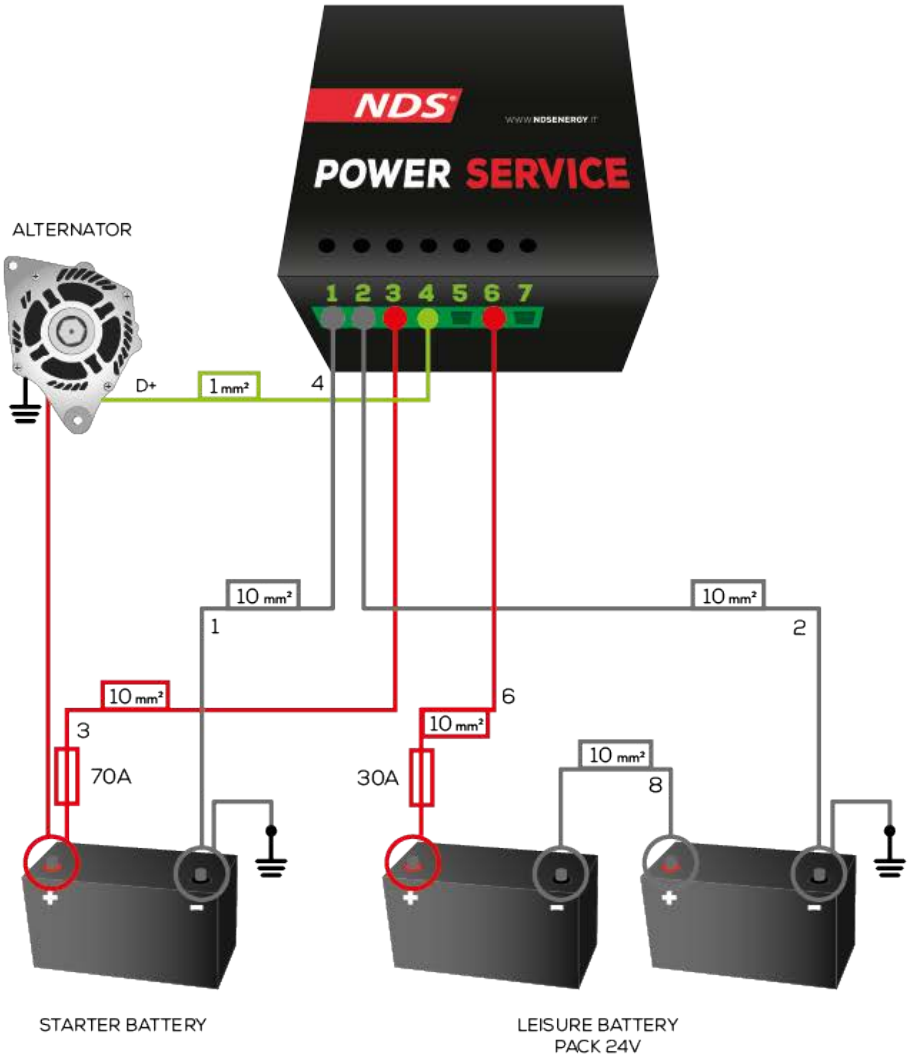
INSTALLATION WITH SPLIT CHARGE RELAY ONLY



FOR CABLES LONGER THAN 2 METERS USE 16mm² CABLES

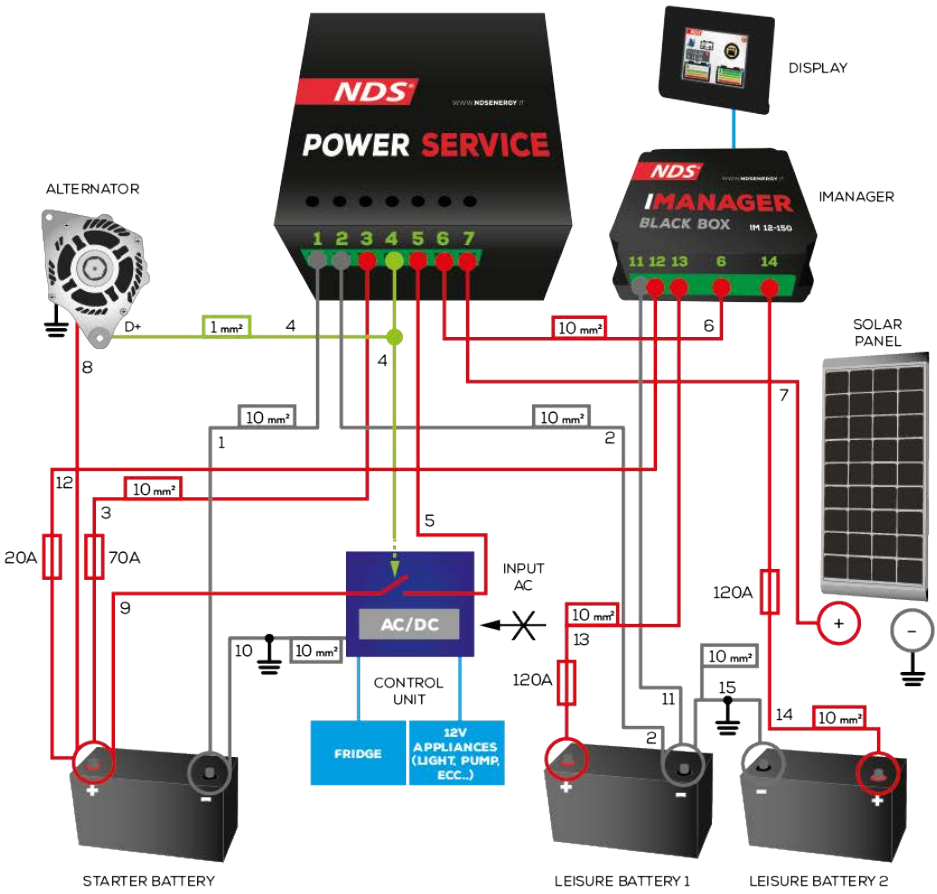
The parallel relay refers to the pre-existing relay which, when the vehicle engine is switched on, makes the connection between the leisure battery and the engine battery.)

PLUS AND GOLD 12-24-M INSTALLATION IN VEHICLE WITH 12V ALTERNATOR AND 24V SERVICE/LEISURE BATTERIES



FOR CABLES LONGER THAN 2 METERS USE 16mm² CABLES

INSTALLATION WITH I-MANAGER IN SYSTEMS WITH TWO LEISURE BATTERIES



FOR CABLES LONGER THAN 2 METERS USE 16mm² CABLES

The **POWERSERVICE** output must be connected to the common positive of the i-manager, in order to supply the two leisure batteries.

10.CHECKING THE SYSTEM'S OPERATION

After installation, it's necessary to check the correct operation of the device. before to start you must discharge the leisure battery first (about 25% less then the full charge) by switching on some of the appliances connected to the system: lights and TV for example. after that you can continue as follow.

ALTERNATOR CHARGING CHECK-UP

1. With the engine off, measure (with the multimeter) the leisure battery's voltage.
2. Set the device switch to 1.
3. start-up the engine.
4. When the LED relevant to alternator charging starts to blink, check that the leisure battery's voltage is greater than the previously measured value.
5. Wait for two flashes of the device LED, followed by a pause and check with a current CLAMP METER that the charge current is equal to the maximum current of the POWER SERVICE UNIT (this phase could last a few seconds if the leisure battery is completely charged).
6. With a multimeter measure the voltage on the starter battery poles, then measure the voltage between Terminal N°.1 and Terminal N°.3 of the **POWERSERVICE** UNIT and verify that the difference between the two is not higher than 0.7V. If it is, a cable with a larger cross section is needed to connect to Terminal N°.3. It may also be necessary to improve the ground connection (always take the measurement while the engine is running).

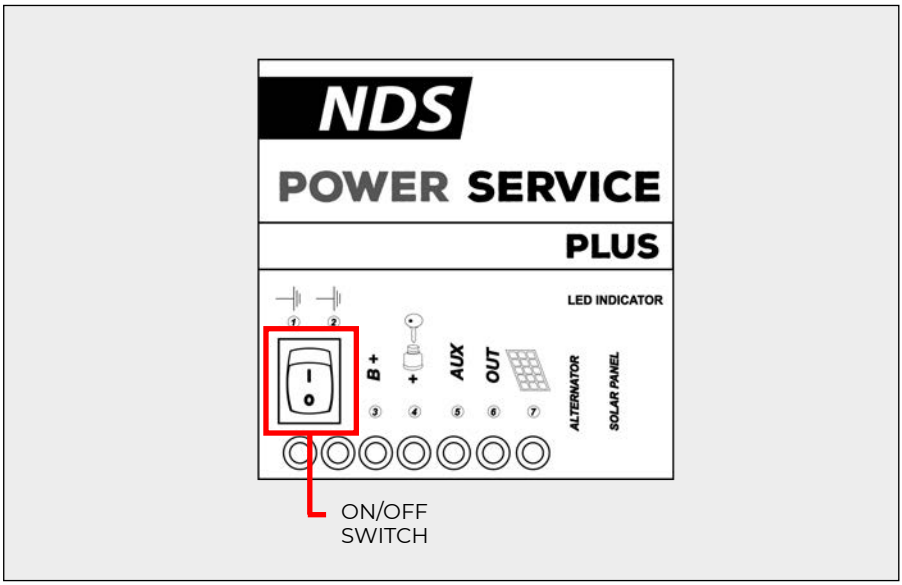
SOLAR PANEL CHARGING CHECK (CAN ONLY BE DONE WHEN VEHICLE IS OUTSIDE AND DURING DAYLIGHT HOURS!)

1. Turn off the vehicle engine.
2. If the solar panel is correctly installed and oriented to the sun, after a few seconds the LED RELEVANT to the solar PANEL INPUT will flash.
3. Measure with the current CLAMP METER that there is a charge CURRENT GOING to the leisure battery.
4.

EXTERNAL MAINS POWER SUPPLY CHARGING CHECK (GOLD SERIES ONLY)

1. Keep the engine off and connect the power supply.
2. the led, related to the power supply, starts to flash
3. Check with the current CLAMP METER that there is a charge current GOING TO the leisure battery.

ON-OFF (0-1) SWITCH



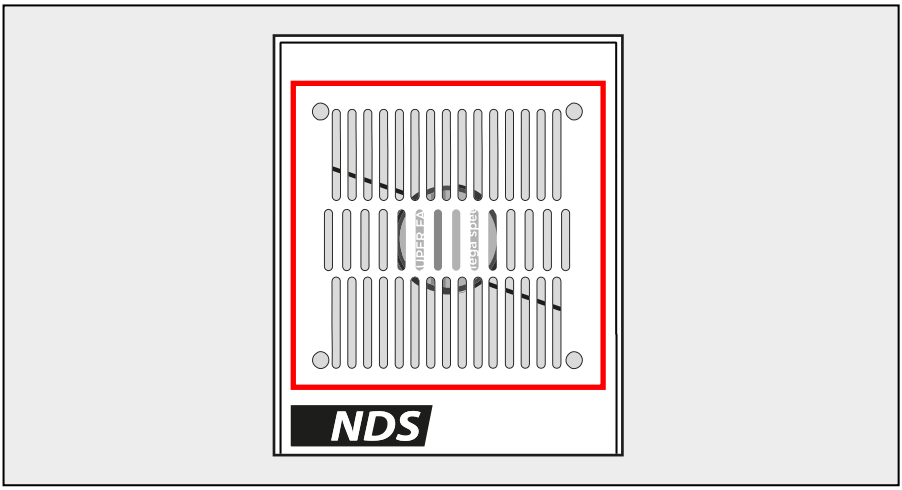
The switch on the device must always be left in the ON position (1), for normal operation.

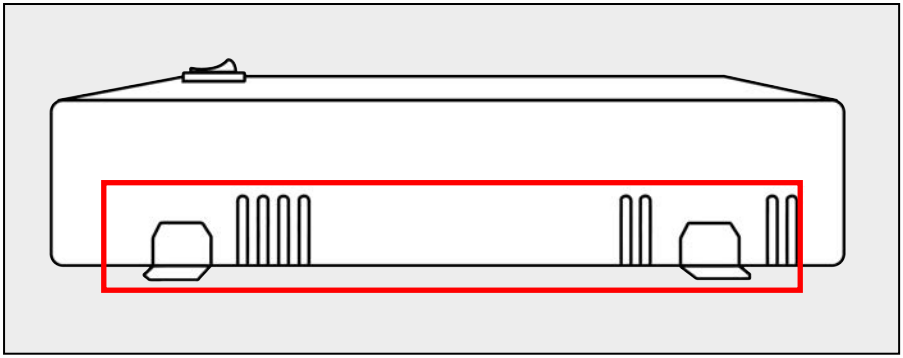
If the switch is set to OFF (0), the **POWERSERVICE** is disabled only from the "Alternator" charge source, then it continues to operate from the solar panel and / or 230V mains (for the GOLD model), but it will not work while the engine is running. The switch should be set to OFF (0) only if the device malfunctions, disconnecting it when the engine is switched on, and allowing the battery to be charged using the alternator directly, using the original system.

11. MAINTENANCE

The **POWERSERVICE** requires minimal maintenance to continue operating properly. we periodically recommend:

- Clean externally to prevent accumulation of dust and dirt.
- Check that the input connections and the battery poles are tight and SECURE.
- Make sure that the ventilation slots are not obstructed by dirt or any material.

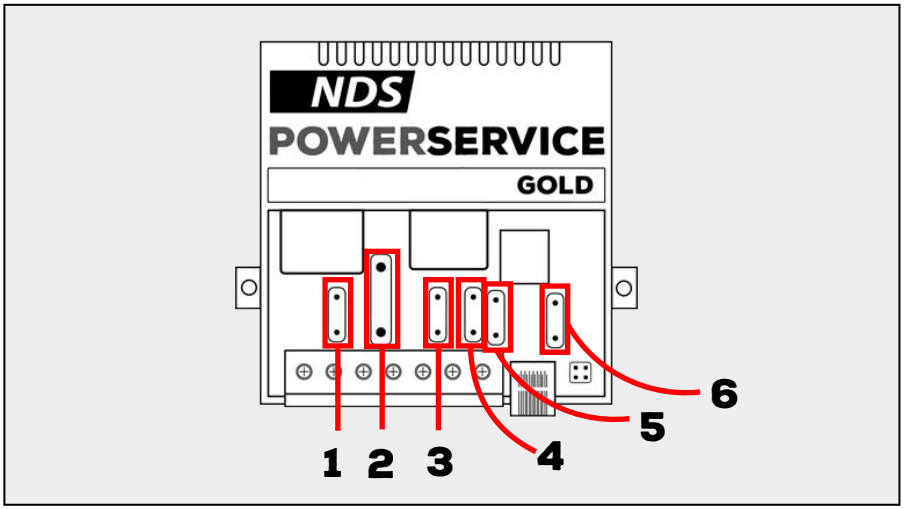


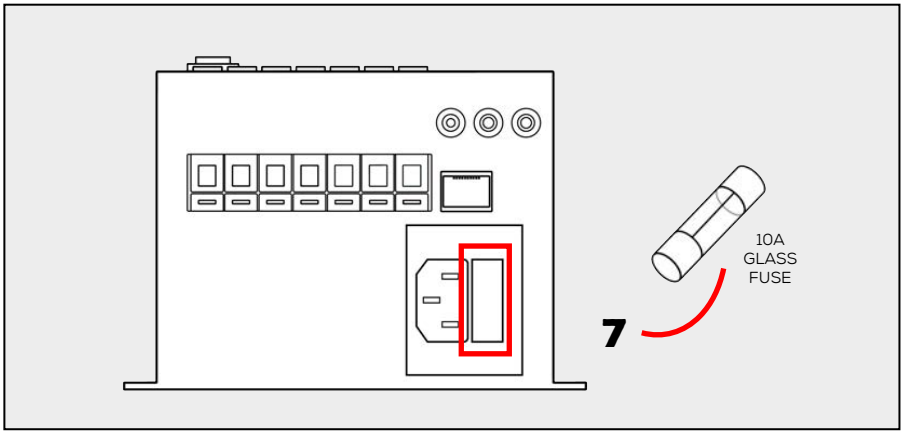


12. FUSE REPLACEMENT

POWERSERVICE units are electronically protected, but feature fuse protections for each of the input and output terminals.

To access the DC part fuse, you must unscrew 4 side screws (2 on each side) and lift the front cover, taking care not to damage the wires connected to the leds and to the switch:





N°	PROTECTION	FUSE TYPE
1	Main power supply (IEC socket) only GOLD series	40A blade fuse
2	Starter battery power line (pin n°3)	70A blade fuse
3	Aux line (pin n°5) non for PLUS 12-24 and GOLD 12-24 models	40A blade fuse
4	Out line (pin n°6)	25A blade fuse
5	Out line (pin n°6)	25A blade fuse
6	Solar panel line (pin n°7) non for 24V output models	25A blade fuse
7	Main power supply (IEC socket) only GOLD series	10A glass fuse Type 5x20

NOTE

- All the connection pins you can find in the upper table are explained at page 14 chapter 7: connections.
- Fuses 4 and 5 are connected in parallel and they are connected both to pin n°6.
- By replacing the fuses, the **POWERSERVICE** will perform an automatic restart.
- In case of further additional faults, contact the NDS energy service center promptly.

13. TROUBLESHOOTING

PROBLEM	POTENTIAL CAUSES
All the LEDs flash 5 times accompanied by the sound of the buzzer. pause. Again flash and sound	• Fuse failure related to the cable connected to the output • Solar panel voltage too high. • Electronic board overheating.
SOLUTION	
1. Check the integrity of the 2 x 25A fuses at the "out" pin. 2. Check for any faulty contacts. 3. Check that the solar panel voltage (pin 7) is less than 28V. 4. Wait for the system to cool down. 5. Restart the device at full speed (with battery not fully charged)	

PROBLEM	POTENTIAL CAUSES
Alternator and solar panel leds are on continuously	External temperature detected under -2°C
SOLUTION	
It’s a security system in case of charging curve 3 or 4 were selected. The led turns of when temperature rises above 0°c.	

PROBLEM	POSSIBILI CAUSE
The alternator led flash 6 times	• Detected voltage drop on the alternator • Alternator insufficient power • Power component overheating • Power loss on the cables

SOLUTION

1. Cables must have 10mm^2 (min) section.
2. Check the connections on terminals 1,2,3 and 6.
3. Connect the cable attached to terminal 1 directly to the negative pole of the engine battery (or services),
4. Cable attached to terminal 2 directly to the negative pole of the leisure battery (or motor),
5. The cable relative to terminal 3 to the positive pole of the engine battery, or positive pole of the alternator
6. The cable relative to terminal 6 to the positive pole of the leisure battery.

In case of overheating of the power components of the electronic board, the system automatically reduces the current supplied for charging, until the alarm returns.

PROBLEM	POTENTIAL CAUSES
Some unexpected Electronic device malfunction	Leisure battery high voltage (higher then 15V)

SOLUTION

We suggest to avoid the desulphation phase selecting the C o D charging curve.

14. TECHNICAL FEATURES

PRODUCT CODE		PLUS 25	PLUS 30	PLUS 40
Nominal Input Voltage	Alternator	12V		
	Solar Panel	12V		
Input Voltage Range	Alternator	11V-15V		
	Solar Panel	12V-28V		
Maximum Input Voltage	Alternator	28A	34A	45A
	Solar Panel	15A		
Input Sources Recommended Power	Alternator	≥70A	≥90A	≥110A
	Solar Panel	≤250W		
Nominal Output Voltage		12V		
Output Voltage Range		11V-16V		
Battery Output Numbers		1		
Max Charging Current	Alternator	25A	30A	40A
	Solar Panel	15A		
Galvanic Insulation		No		
Maximum Efficiency		93%	92%	92%
Cooling		Cooling fan		
Charging Curves*		5 Phases		
Charging Curve Selector*		Yes – Jumper		
Battery Technology		AGM, GEL, Flooded, $LiFePO_4$		
Recommended Battery Capacity		≥75Ah	≥90Ah	≥120Ah

PRODUCT CODE		PLUS 25	PLUS 30	PLUS 40
Battery Voltage Detection		Yes		
D+ Signal Alternator / Ignition+		Yes / Active high		
Euro6 System Compatibility And Smart Alternator		Yes		
Activation Threshold	Alternator	Vm≥13,3V and D+ on		
	Smart Alternator	Vm≥12,4V and D+ on		
	Solar Panel	Vp≥16V and D+ off		
Deactivation Threshold	Alternator	Vm≤12,8V or D+ off		
	Smart Alternator	Vm≤11,8V or D+ off		
	Solar Panel	Vp < vbs or D+ on		
Connections		7-Pole screw terminal block		
Status Indicator		Yes – 2 LED e Buzzer		
Protection Degree		IP20		
Protections		Short-circuit, Reversed polarity, Overheating		
Working Temperature		-20°C / +50°C		
Size		225mm x 135mm x 51mm		
Weight		950g		

NOTE

For more details refer to the chapter "Charging curves".

PRODUCT CODE		PLUS 12-24/20	PLUS 24-24/20
Nominal Input Voltage	Alternator	12V	24v
	Solar Panel	-	-
Input Voltage Range	Alternator	11V-15V	22V-30V
	Solar Panel	-	-
Maximum Input Voltage	Alternator	45A	30A
	Solar Panel	-	-
Input Sources Recommended Power	Alternator	≥110A	
	Solar Panel	-	-
Nominal Output Voltage		12V	24v
Output Voltage Range		22V-32V	
Battery Output Numbers		1	
max charging current	Alternator	20A	
	Solar Panel	-	-
Galvanic Insulation		No	
Maximum Efficiency		83%	90%
Cooling		Cooling fan	
Charging Curves*		5 phases	
Charging Curve Selector*		Yes – Jumper	
Battery Technology		AGM, GEL, Flooded, $LiFePO_4$	
Recommended Battery Capacity		≥60Ah	

PRODUCT CODE		PLUS 12-24/20	PLUS 24-24/20
Battery Voltage Detection		Yes	
D+ Signal Alternator / Ignition+		Yes / Active high	
Euro6 System Compatibility and Smart Alternator		Yes	
Activation Threshold	Alternator	Vm≥13,3V and D+ on	Vm≥26,6V and D+ on
	Smart Alternator	Vm≥12,4V and D+ on	Vm≥24,8V and D+ on
	Solar Panel	-	-
Deactivation Threshold	Alternator	Vm≤12,8V or D+ off	Vm≤25,6V or D+ off
	Smart Alternator	Vm≤11,8V or D+ off	Vm≤23,6V or D+ off
	Solar Panel	-	-
Connections		7-Pole screw terminal block	
Status Indicator		Yes – 2 LED and Buzzer	
Protection Degree		IP20	
Protections		Short-circuit, Reversed polarity, Overheating	
Working Temperature		-20°C / +50°C	
Size		225mm x 135mm x 51mm	
Weight		950g	

NOTE

For more details refer to the chapter "Charging curves".

PRODUCT CODE		GOLD 25-M	GOLD 30-M	GOLD 40-M
Nominal Input Voltage	Alternator	12V		
	Solar Panel	12V		
	Grid	230VAC / 50Hz		
Input Voltage Range	Alternator	11V-15V		
	Solar Panel	12V-28V		
	Grid	90VAC-264VAC 47/63Hz		
Maximum Input Voltage	Alternator	28A	34A	45A
	Solar Panel	15A		
	Grid	3,5A		
Input Sources Recommended Power	Alternator	≥70A	≥90A	≥110A
	Solar Panel	≤250W		
	Grid	≥450W		
Nominal Output Voltage		12V		
Output Voltage Range		11V-16V		
Battery Output Numbers		1		
Max Charging Current	Alternator	25A	30A	40A
	Solar Panel	15A		
	Grid	20A		
Galvanic Insulation		Not from DC – Yes from AC		
Maximum Efficiency		93%	92%	92%
Cooling		Cooling fan		

PRODUCT CODE		GOLD 25-M	GOLD 30-M	GOLD 40-M
Charging Curves*		5 Phases		
Charging Curves*		Yes – Jumper		
Charging Curves*		AGM, GEL, Flooded, $LiFePO_4$		
Recommended Battery Capacity		≥75Ah	≥90Ah	≥120Ah
Battery Voltage Detection		Yes		
D+ Signal Alternator / Ignition+		Yes / Active high		
Euro6 System Compatibility and Smart Alternator		Yes		
Activation Threshold	Alternator	Vm≥13,3V and D+ on		
	Smart Alternator	Vm≥12,4V and D+ on		
	Solar Panel	Vp≥16V and D+ off		
	Grid	Presenza rete and D+ off		
Deactivation Threshold	Alternator	Vm≤12,8V or D+ off		
	Smart Alternator	Vm≤11,8V or D+ off		
	Solar Panel	Vp < vbs or D+ on		
	Grid	Grid unavailable or D+ on		
Connections		7-Pole screw terminal block		
Status Indicator		Yes – 2 LED and Buzzer		
Protection Degree		IP20		
Protections		Short-circuit, Reversed polarity, Overheating		
Working Temperature		-20°C / +50°C		
Size		230mm x 135mm x 94mm		
Weight		1400g		

PRODUCT CODE		GOLD 12-24/20	GOLD 24-24/20
Nominal Input Voltage	Alternator	12V	24v
	Solar Panel	-	-
	Grid	230VAC / 50Hz	
Input Voltage Range	Alternator	11V-15V	22V-30V
	Solar Panel	-	-
	Grid	90VAC-264VAC 47/63Hz	
Maximum Input Voltage	Alternator	45A	30A
	Solar Panel	-	-
	Grid	3,5A	
Input Sources Recommended Power	Alternator	≥110A	≥55A
	Solar Panel	-	-
	Grid	≥450W	≥450W
Nominal Output Voltage		24V	
Output Voltage Range		22V-32V	
Battery Output Numbers		1	
Max Charging Current	Alternator	20A	
	Solar Panel	-	-
	Grid	10A	
Galvanic Insulation		No	
Maximum Efficiency		83%	90%
Cooling		Cooling fan	
Charging Curves*		5 phases	
Charging Curve Selector*		Yes – Jumper	
Battery Technology		AGM, GEL, Flooded, $LiFePO_4$.	
Recommended Battery Capacity		≥60Ah	

PRODUCT CODE		GOLD 12-24/20	GOLD 24-24/20
Battery Voltage Detection		Yes	
D+ Signal Alternator / Ignition+		Yes / Active high	
Euro6 System Compatibility and Smart Alternator		Yes	
Activation Threshold	Alternator	Vm≥13,3V and D+ on	Vm≥26,6V and D+ on
	Smart Alternator	Vm≥12,4V and D+ on	Vm≥24,8V and D+ on
	Solar Panel	-	-
	Grid	Grid available and D+ off	
Deactivation Threshold	Alternator	Vm≤12,8V or D+ off	Vm≤25,6V or D+ off
	Smart Alternator	Vm≤11,8V or D+ off	Vm≤23,6V or D+ off
	Solar Panel	-	-
	Grid	Grid unavailable e D+ on	
Connections		7-Pole screw terminal block	
Status Indicator		Yes – 2 LED and Buzzer	
Protection Degree		IP20	
Protections		Short-circuit, Reversed polarity, Overheating	
Working Temperature		-20°C / +50°C	
Size		230mm x 135mm x 94mm	
Weight		1400g	

15. F.A.Q.

1. **What is the maximum voltage supported for solar panels?**
   Units support a maximum voltage of 28V.

2. **How much current does the POWERSERVICE unit consume?**
   13,0mA.

3. **It is possible to recharge the starting battery with the POWERSERVICE?**
   Currently it is not possible to recharge the engine battery, only the leisure batteries. The engine battery is not charged by the **POWERSERVICE**, even if the device is connected to the mains power supply electricity mains power supply or to the solar panel. Please ask your installer or supplier for advice.

4. **Sometimes the voltage at the leisure battery rises above 15.8/16V, is this normal?**
   This is normal during the desulfation phase.

5. **How long is the desulfation phase?**
   Desulphation has a variable duration, depending on the length of the general charge. It can last up to 2 hours.

6. **It is possible to connect a remote control to the POWERSERVICE?**
   No, it is not possible to use a remote control to control or display the functioning of the **POWERSERVICE.** We recommend using THE NDS i-manager device to get all the information on the battery charge status.

7. **Can a solar panel be connected to the POWERSERVICE or is another device needed?**
   No intermediate device is required, the **POWERSERVICE** incorporates a PWM charge controller, so you only need to connect the panel to terminal 7

DECLARATION OF EU CONFORMITY - PWS PLUS

Company:	NDS ENERGY S.R.L.
Address	Via giovanni pascoli 65010 - cappelle sul tavo (PE) Italy

Declares under its own responsibility that the product:

Commercial Name:	**POWER SERVICE**
Models:	**PLUS 25, PLUS 30, PLUS 40, PLUS 12-24/20, PLUS 24-24/20**

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 2014/30 / EC**, demonstrated to the observance of the following norms:

✔**EN55022:2010**
✔**EN55024:2010+A1:2015**
✔**EN61000-3-2:2014**
✔**EN61000-3-3:2013**

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**

CE

CAPPELLE SUL TAVO, 30/03/2016

STAMP AND SIGNATURE

NDS ENERGY s.r.l.

DECLARATION OF EU CONFORMITY - PWS GOLD

Company:	NDS ENERGY S.R.L.
Address:	Via giovanni pascoli 65010 - cappelle sul tavo (PE) Italy

Declares under its own responsibility that the product:

Commercial Name:	**POWER SERVICE**
Models:	**PLUS 25, PLUS 30, PLUS 40, PLUS 12-24/20, PLUS 24-24/20**

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 2014/30/EC**, demonstrated to the observance of the following norms:

- ✓**EN55022:2010**
- ✓**EN55024:2010+A1:2015**
- ✓**EN61000-3-2:2014**
- ✓**EN61000-3-3:2013**

Related to the electrical security (BT), **Directive 2014/35/EU**, the conformity demonstrated to the observance of the following norms:

- ✓**EN60335-1:2012+A11:2014**

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**

CE

CAPPELLE SUL TAVO, 30/03/2016

STAMP AND SIGNATURE

NDS ENERGY s.r.l.

WARRANTY COUPON

MODELS_____

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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