NDS

SUNCONTROL2

MPPT +25%
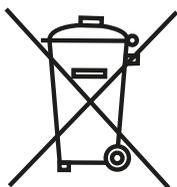

User manual   ENGLISH

VALID FOR THE FOLLOWING MODELS

SCE 320
SCE 360

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 colour, size or accessories

2. PACKAGE CONTENTS

Check the contents of the package:

- 1 x **SUNCONTROL2**
- 1 x Replacement fuse
- Wall mounting screws

3. DESCRIPTION

SUNCONTROL2, the automatic solar regulator with **MPPT** technology to push the efficiency of photovoltaic modules to the maximum: more energy, less space.
The **MPPT** algorithm always uses the "maximum power peak" delivered by the panel, with a significantly higher performance than the PWM technology (up to 25% more)

SUNCONTROL2 available in two models SCE 320 and SCE 360, manages (depending on the model), up to 350W input, with a maximum charge of 25A. The new microprocessor, equipped with **OPTICHARGE** firmware, performs up to 6 charging phases, including desulphation and maintenance phases, for optimal recharging of the on-board batteries.

SUNCONTROL2 is compatible with the following battery technologies: GEL, AGM, Wet and $LiFePO_4$ and both the leisure batteries and the starter battery can be recharged.

The **state of charge (SoC)** of both connected batteries is immediately visible on top of the device thanks to the two multicolored LEDs.

The system works with a 12V nominal voltage and it is possible to connect two photovoltaic panels, on separate inputs, with a maximum power of 180Wp (depending on the model).

The **Dip Switch selector**, located next to the power connections, allows you to select the output charge curve in a simple and fast way.

The **touch screen display DT002 (optional)** with new management software, allows you to view the charge information and set the various settings with the new communication protocol NDS.

MAIN FEATURES

- **MPPT** technology (+25% performances)
- Charging curve selection: GEL, AGM, Wet, and LiFePO$_4$
- New Firmware **OPTICHARGE**
- Up to **6 charging phases**
- Starting battery charge
- Desulphation curve
- **Independent inputs** for 2 solar panels
- **SoC Quick view** with status LEDs
- Touch screen Display (Optional)

4.OPERATIONS

SUNCONTROL2 charges up to two batteries: one service battery (B1) and one starter battery (B2), with priority charging to the service battery.

SUNCONTROL2 will start charging the batteries if the following conditions are satisfied:

1. The connected Solar Panels deliver a voltage 1V higher than the voltage of the batteries to be recharged.
2. Battery voltage higher then 8V.

The **Leisure Battery** will be charged with the selected curve.
The **Starting Battery** will be charged if the following conditions are satisfied:

- Leisure battery charged between 80% and 100%.
- Starting battery with voltage under 12,5V.

Every charging phase have a **maximum run time**, with the exception of the maintenance phase, which constantly monitors the state of charge and, if necessary, delivers an impulse current to keep the battery 100% charged.

NOTE

If the photovoltaic panels interrupt the power supply (during night, shadowed solar panel, etc. ...) the system goes into Stand-By mode: LEDs off and self-consumption to the minimum (<2mA).

5. STRUCTURE

FRONTAL CONNECTION

Fig.2
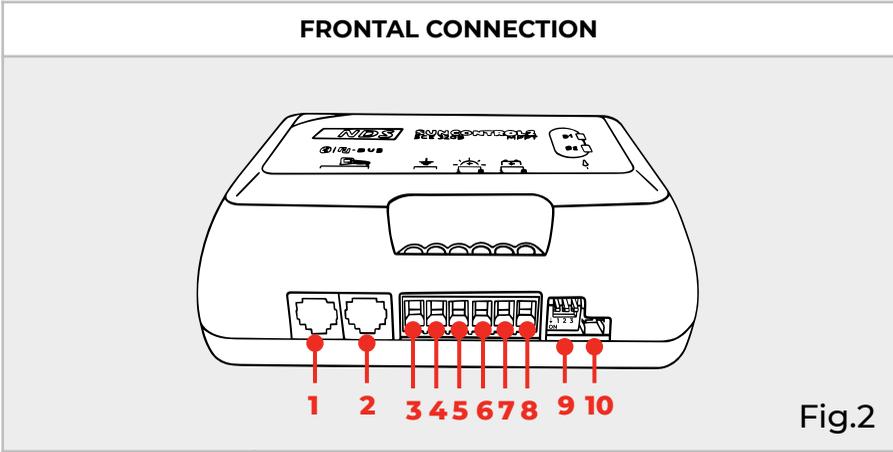
CONNECTION	FUNCTION
1	Display Bus DTB01 connection
2	N-BUS network connection
3	Solar panel negative connection
4	Battery negative connection
5	Solar panel positive connection 1
6	Solar panel positive connection 2
7	Leisure battery positive connection (B1)
8	Starter battery positive connection (B2)
9	Dip Switch - Charging curve selection
10	Temperature probe connection

6. N-BUS NETWORK AND CONTROLLERS

N-BUS devices can be networked for optimal operation of the entire NDS energy system. To start setting up your new energy system, simply connect two or more **N-BUS** devices with the optional data cable, available in various lengths (BC03M, BC06M or BC 10M). Furthermore, with N-BUS, you can use a single controller to monitor and control all NDS devices.

Manage the **SUNCONTROL2** and all **N-BUS** devices with a single touch screen full color display (**DTB01**), or with the mobile app for smartphones, if there is at least one NDS device with Bluetooth in the network. Bluetooth devices are e.g. **SUNCONTROL2** (models with Bluetooth) and **TEMPRA** Lithium Battery (all models). The mobile app can also be used to update all connected **N-BUS** devices if there is a Master device, such as **TEMPRA** Lithium Battery.

DISPLAY	MOBILE APP
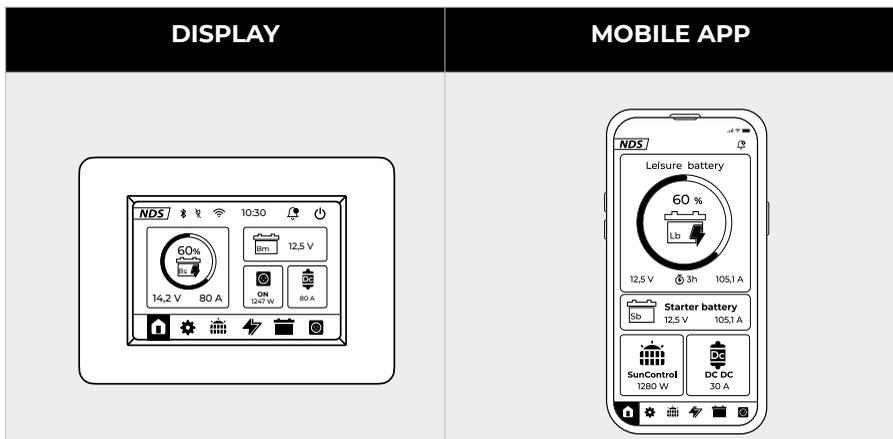
NOTE

A Bluetooth N-BUS device is required to use the Mobile App, such as **TEMPRA** Battery or **SUNCONTROL2** models **SCE 320B**, **SCE 360B**. The Mobile App does not work with the SCE 320, SCE 360 or the earlier SC320M and SC350M models.

7. INSTALLATION

Place the **SUNCONTROL2** on the chosen surface and secure the entire device using the fixing holes integrated in the shell with the supplied screws or equivalent (Fig.1).


Fig. 1
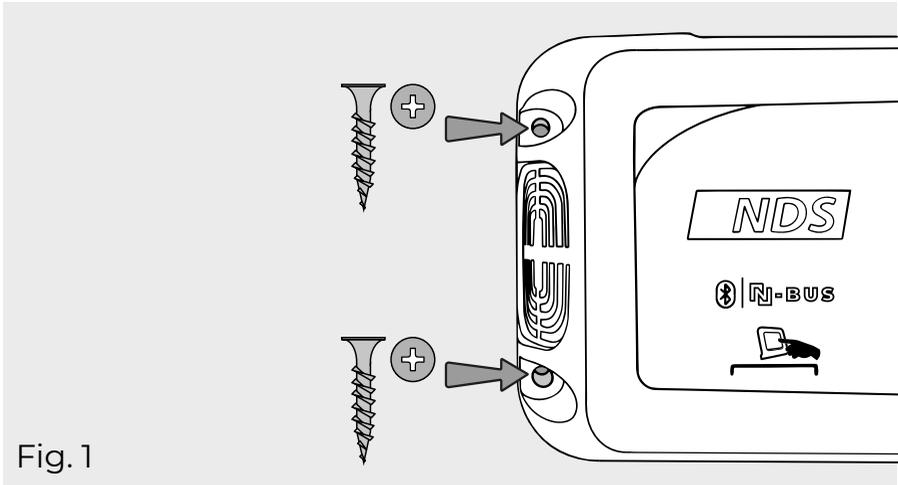
All electrical and setup connections are on the front, it is not necessary to disassemble the plastic shells, except for the protection fuse replacement.

On the front side, after the power connections, there's a **Dip Switch** for the **charging curve** selection, it's important to select the correct curve according to the type of battery supplied, for the selection of the correct curve please refer to the chapter "Charging curve selection".

CAUTION
- For electrical connections, use cables of appropriate cross-section: from 6 mm^2.
- In case of a **long stay**, it is advisable to disconnect the negative cable from the device to completely neutralize any residual consumption that may inadvertently discharge the leisure battery.

BASIC CONNECTION

N-BUS CHAIN

STARTER BATTERY

LEISURE BATTERY

SOLAR PANELS
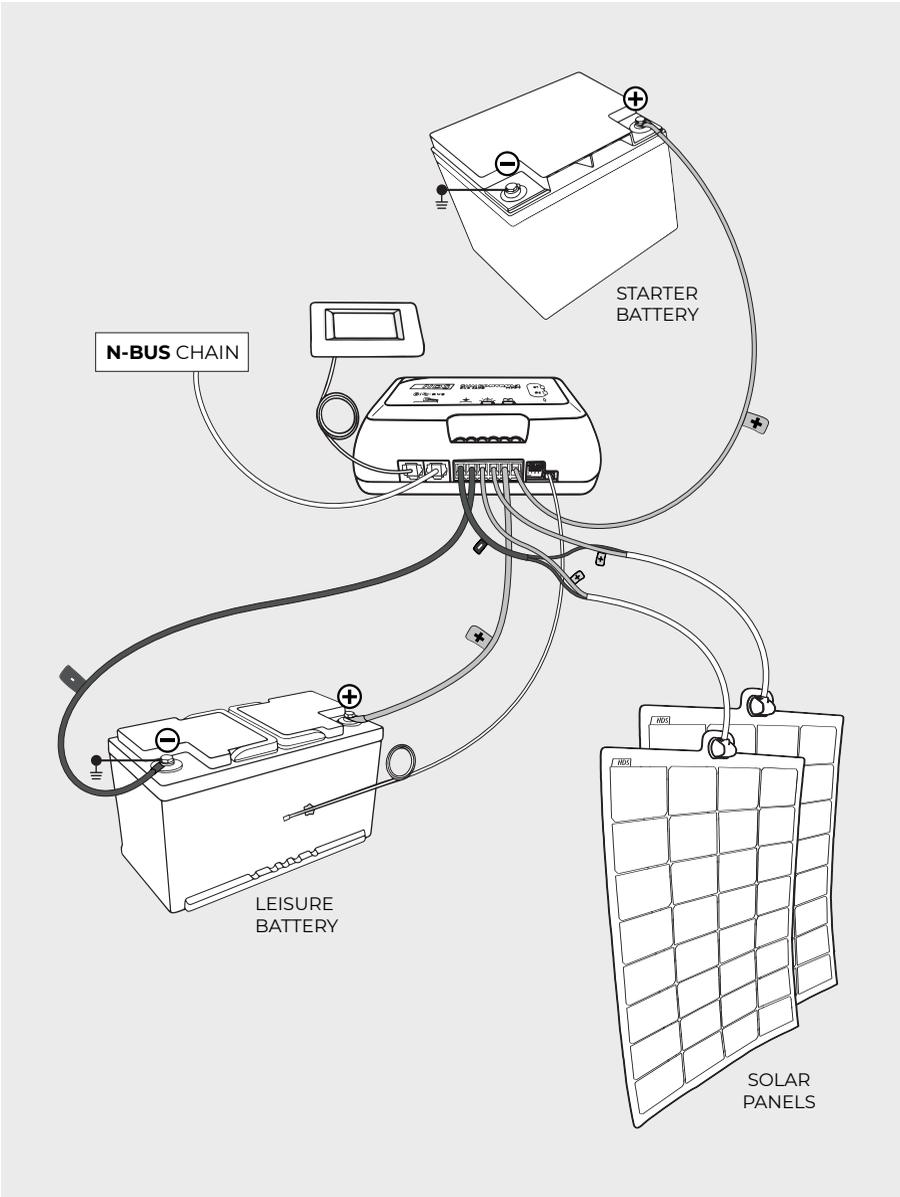
8. CHARGING CURVE SELECTION

The Dip Switches, located next to the power connections, allow you to select the proper charging curve for the installed services battery, use the table to set the correct curve for your battery. <u>The Dip Switches affect the B1 charging curve</u> (leisure battery), not B2 (starter battery). The B2 charging curve is preset to curve N°1 (GEL - Desulphation OFF).

CURVE NUMBER	DIP-SWITCH POSITION	CURVE TYPE	CHARGING PARAMETERS
1	1 = OFF 2 = OFF 3 = OFF	**GEL** Desulphation OFF	Vmax = 14,2V Vmaint = 13,5V
2	1 = ON 2 = OFF 3 = OFF	**Acido Libero** Desulphation OFF	Vmax = 14,4V Vmaint = 13,8V
3	1 = OFF 2 = ON 3 = OFF	**AGM** Desulphation OFF	Vmax = 14,7V Vmaint = 13,6V
4	1 = ON 2 = ON 3 = OFF	**AGM** Desulphation ON	Vmax= 14,7V Vmaint = 13,6V Vdes = 15,8V
5	1 = OFF 2 = OFF 3 = ON	**LiFePO₄ Litio** Maintenance ON	Vmax= 14,5V Vmaint = 13,8V
6	1 = ON 2 = OFF 3 = ON	**LiFePO₄ Litio** Maintenance OFF	Vmax= 14,5V
7	1 = OFF 2 = ON 3 = ON	**LiFePO₄ Litio** Maintenance ON	Vmax= 14,2V Vmaint = 13,6V
8	1 = ON 2 = ON 3 = ON	**LiFePO₄ Litio** Maintenance OFF	Vmax= 14,2V

CHARGING CURVE
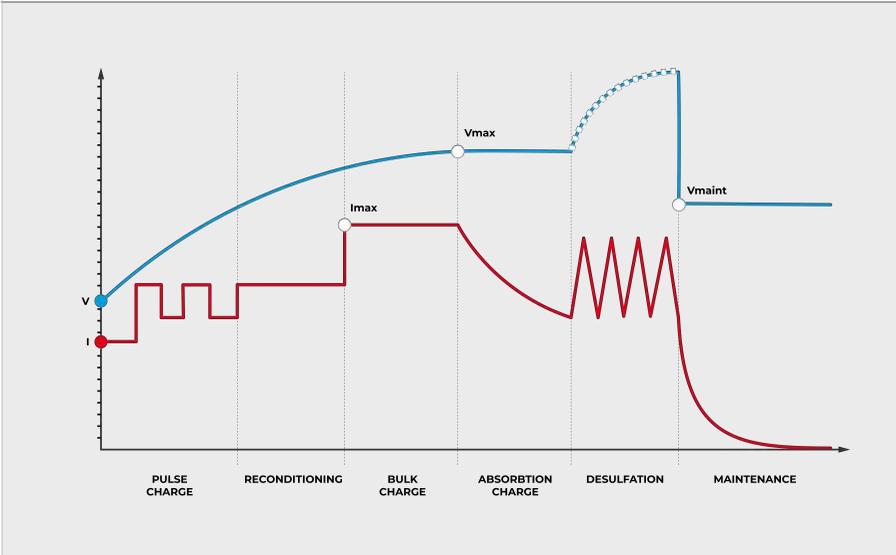
B1 - PHASE DISCUSSION	
PULSE CHARGE	With voltage between 8V and 10.5V, a current between 1A and 2A will be delivered, every 5 seconds. Timeout 4 hours.
RECONDITIONING	With voltage between 10.5V and 12.0V, an approximately 2A costant current will be delivered. Timeout 8 hours.
BULK CHARGE	With voltage between 12V and Vmax (Maximum voltage of the selected charging curve), will be delivered a constant current of: 20A model SCE 320 and 25A model SCE 360.

ABSORPTION CHARGE	With battery voltage equal to Vmax (Maximum voltage of the selected charging curve), will be delivered a costant voltage equal to the selected curve Vmax. The delivered current will decrease as the battery state of charge increases till about 3A. Timeout 6 hours.
DESULPHATION	An approximately 2A constant current will be delivered, allowing the battery voltage to rise independently to the maximum value of 15.8V. This phase ends to the achievement of 15.8V. Timeout 2 hours.
MAINTENANCE	This phase keep a constant voltage related to the selected charging curve (Vmaint). This phase has a 4 hours timeout for the LiFePO$_4$ charging curve with maintenance ON (curve N°7), while for the other curves there's no time limit. If during the maintenance phase the voltage should fall below 13.15V for LiFePO$_4$ curve and 12.65V Wet curve and 12.8V and for the other curves, charge will be restarted from the first phase. Timeout 4 hours.

B2 - PHASE DISCUSSION	
PULSE CHARGE	With voltage between 8V and 10.5V, a variable current between 1A and 2A, every 5 seconds. Timeout 4 hours.
RECONDITIONING	With voltage between 10.5V and 12.0V, an approximately 2A costant current will be delivered. Timeout 8 hours.
BULK CHARGE	With battery voltage between 12V and 14,4V, will be delivered a 5A constant current.
ABSORPTION CHARGE	With battery voltage 14,4V will be delivered a 14,4V constant voltage. The delivered current will decrease as the battery state of charge increases till about 3A. Timeout 6 hours.
MAINTENANCE	This phase keep a constant voltage of 13,5V. Timeout 8 hours.

9. LED INDICATORS

The two LEDs on the upper part of the device, marked B1 and B2, allow you to quickly understand the charge status of the connected battery.
Each LED can emit different colors referred to a precise state of charge of the battery, the table below explains the relationship between the LED color and the battery state of charge.

SIGNAL	MEANING
Red LED	Charging
Orange LED	Reconditioning
Green LED	Fully charged / Maintenance

CAUTION

A fast flashing of both LEDs (with the solar panel active) shows an error due to the internal fuse breaking, or services battery voltage below 6V.

10.FUSE REPLACEMENT

If the protective fuse on the **SUNCONTROL2** electronic board is damaged, it can be replaced with the original replacement fuse (supplied) or with a common 25A (for SCE320) or 30A (for SCE360) automotive fuse.

FUSE:
• 25A (SCE320)
• 30A (SCE360)
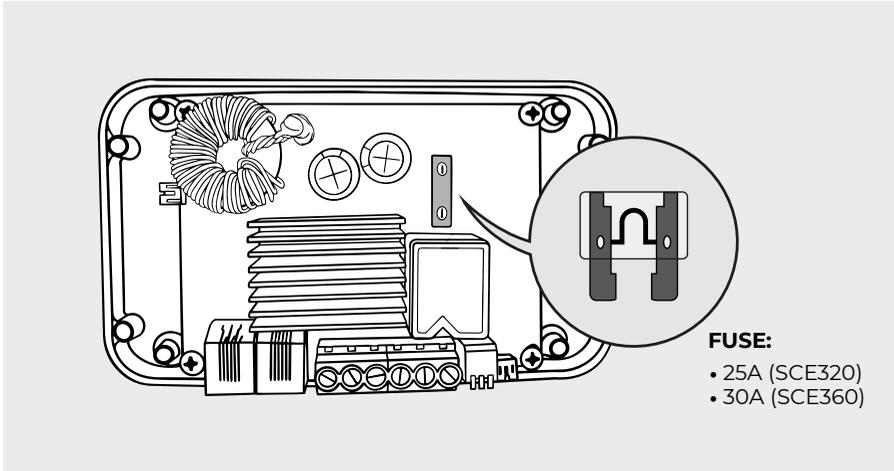
Follow these steps to reach the fuse:

1. Remove **SUNCONTROL2** from its housing.
2. Rotate the device to reveal the screws on the bottom of the device.
3. Unscrew the 4 screws.
4. Remove the front shell of **SUNCONTROL2** to access the fuse.
5. Replace the fuse.

11. TECHNICAL FEATURES

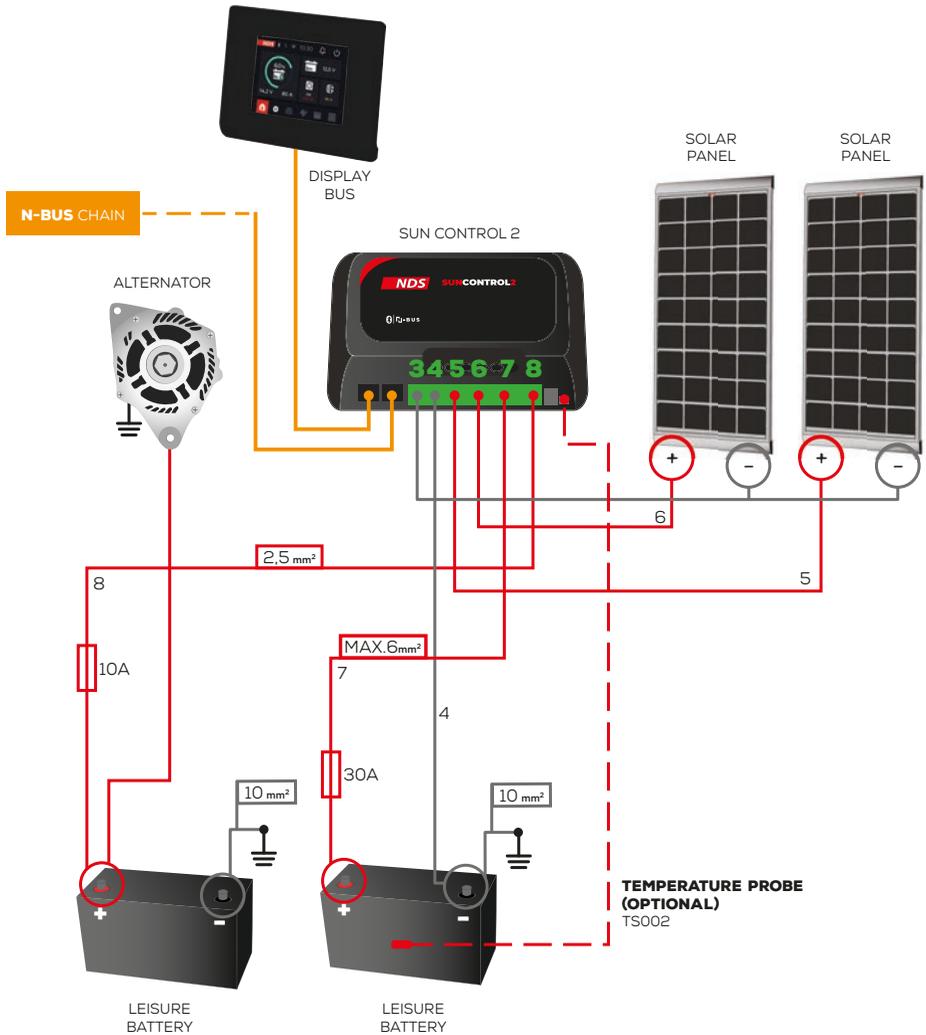| DESCRIPTION	SCE320	SCE360
INPUTS		
Maximum input Voltage solar panels (open circuit voltage)	29,5V	29,5V
Solar Panel input Connections	2	2
Solar Panel input Maximum Power Suppoerted	50W - 160W	50W - 200W
OUTPUT B1		
Battery nominal voltage	12V	12V
Charging current maximum output	20A	25A
Minumum battery capacity required Lead-acid	60Ah	80Ah
Minumum battery capacity required LiFePO$_4$	40Ah	50Ah
Mimumum battery voltage required	8V	8V
Charging curve selector/Curves number	Yes/8	Yes/8
Temperature regulated fan speed	No	Yes
Temperature regulated charging (by temperature sensor for B1 battery - optional)	Yes/-30mV/°C	Yes/-30mV/°C

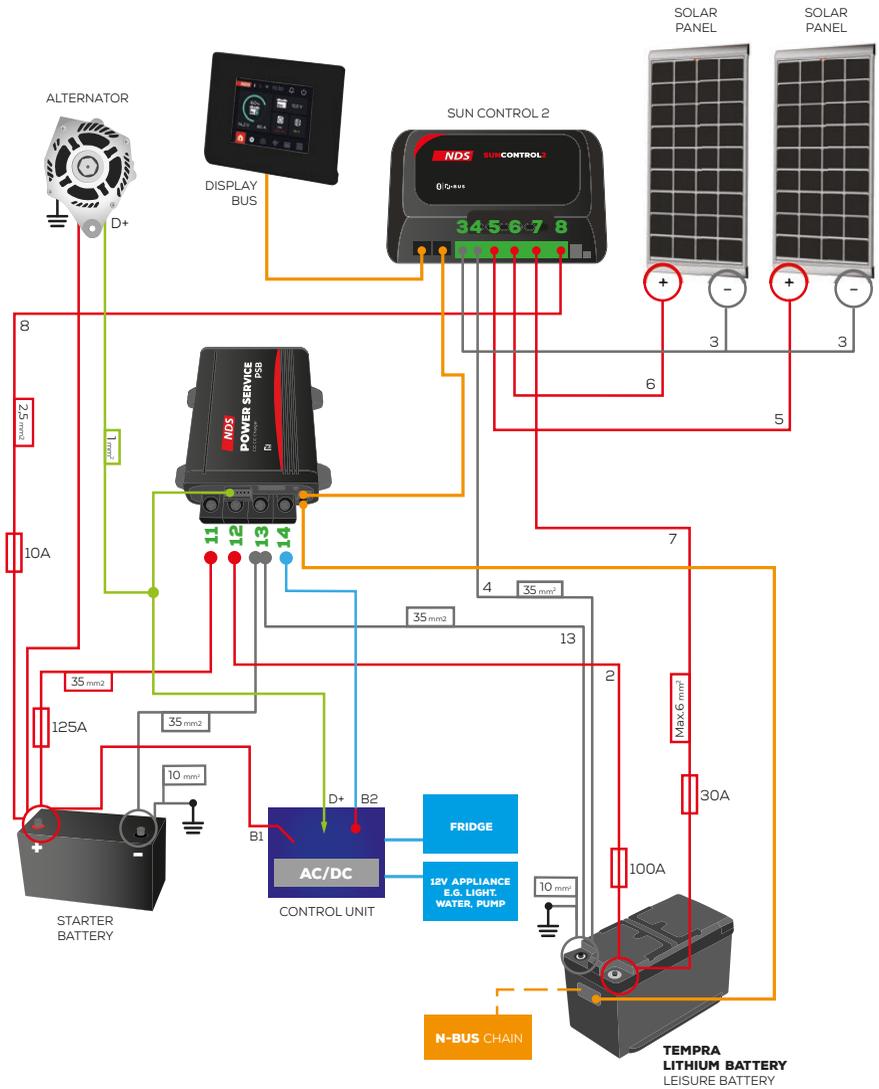| OUTPUT B2		
Battery nominal voltage	12V	12V
Charging current maximum output	5A	5A
Minumum battery capacity required Lead-acid/LiFePO$_4$	15Ah/10Ah	15Ah/10Ah
Minimum/maximum voltage starting charge	8V - 12,5V	8V - 12,5V
Maximum charging voltage	14,4V	14,4V
Temperature regulated fan speed	No	Yes
Maximum charging timeout	8h	8h
GENERAL		
Charging algorithm **OPTICHARGE**	Yes	Yes
Stand-by self-consumption	<2mA	<2mA
Display connection	Yes	Yes
Internal protection fuse	25A	30A
Reverse polarity protection	Yes	Yes
Night-time discharge protection	Yes	Yes
Overload protection	Yes	Yes
Overheating protection (output power reduction)	Yes	Yes
Size (mm)	123 x 108 x 50	123 x 108 x 50
Weight (cables excluded)	400g	420g
Working temperature	-20°C/+50°C	-20°C/+50°C
Ambient humidity	<90% no condensation	<90% no condensation
Maximum altitude	3000m maximum nominal output up to 2000m)	3000m (maximum nominal output up to 2000m)

12. WIRING DIAGRAMS SAMPLES

Simple connection, with solar panels, bus display (optional).

N-BUS CHAIN

DISPLAY BUS

SOLAR PANEL

SOLAR PANEL

SUN CONTROL 2

ALTERNATOR

NDS SUNCONTROL2

3 4 5 6 7 8

+ − + −

6

2,5 mm²

8

5

MAX.6mm²

7

4

10A

30A

10 mm²

10 mm²

LEISURE BATTERY

LEISURE BATTERY

TEMPERATURE PROBE (OPTIONAL)
TS002

Connection with solar panels, bus display (optional), original control unit.

ALTERNATOR

DISPLAY BUS

SUN CONTROL 2

SOLAR PANEL

SOLAR PANEL

D+

8

2,5 mm2

1 mm2

10A

POWER SERVICE PSB

N-BUS CHAIN

11 12 13 14

35 mm2

125A

35 mm2

10 mm²

STARTER BATTERY

D+ B2

B1

AC/DC

CONTROL UNIT

FRIDGE

12V APPLIANCE E.G. LIGHT. WATER, PUMP

3 4 5 6 7 8

+ − + −

3

3

6

5

TEMPERATURE PROBE (OPTIONAL) TS002

4

7

35 mm²

35 mm2

35 mm2

13

100A

Max 6 mm²

30A

10 mm²

LEISURE BATTERY
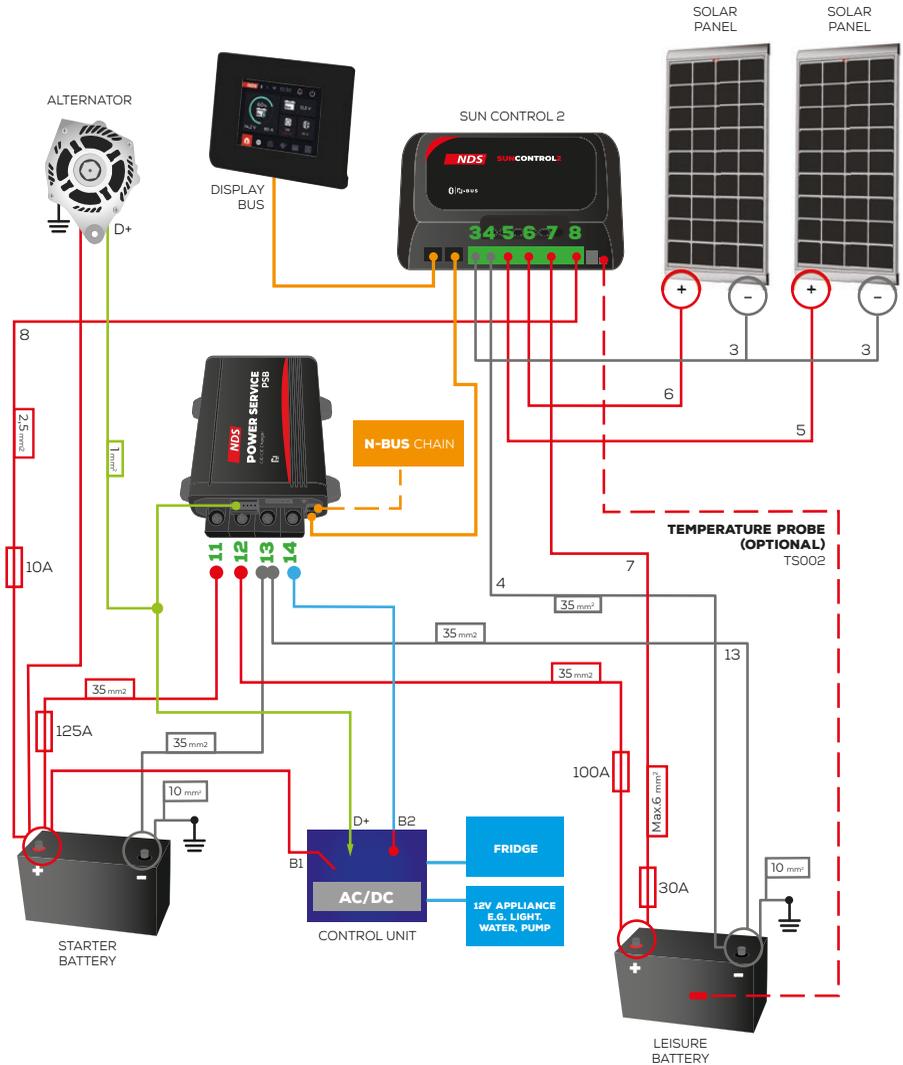
Connection with solar panels, display bus (optional), original control unit and TEMPRA lithium battery.

ALTERNATOR

DISPLAY BUS

SUN CONTROL 2

SOLAR PANEL

SOLAR PANEL

NDS SUNCONTROL2

3 4 5 6 7 8

+ − + −

3   3

6

5

D+

ALTERNATOR

8

2,5 mm2

10A

1 mm2

NDS POWER SERVICE PSB

11 12 13 14

7

4   35 mm²

35 mm2

13

35 mm2

125A

35 mm2

2

Max.6 mm²

10 mm²

D+ B2

B1

FRIDGE

AC/DC

CONTROL UNIT

12V APPLIANCE
E.G. LIGHT.
WATER. PUMP

30A

100A

10 mm²

STARTER BATTERY

N-BUS CHAIN

TEMPRA
LITHIUM BATTERY
LEISURE BATTERY

13. F.A.Q.

- **About solar panels, what's the maximum voltage supported by SUNCONTROL2?**

  Maximum supported voltage is 29,5V.

- **Is it possible to connect one 200W solar panel only, on a single SUNCONTROL2 connection?**

  It's possible to connect just one bigger solar panel (200W), for example on **SUNCONTROL2** Pin N°5, but you must connect Pin N°5 and Pin N°6.
  For the connection bridge, please use, at least, a 6 mm² cross-size cable.

- **Is it normal to have a battery voltage (with solar regulator working) over 15V?**

  It's normal when the device is in desulphation mode. It is possible to turn OFF the desulphation selecting the proper charging curve: look at the chapter "Charging curve selection".

DECLARATION OF EU CONFORMITY - SUN CONTROL 2

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

Address: via Giovanni Pascoli, 96/98
65010 - Cappelle sul Tavo (PE)
Italy

Declares under its own responsibility that the product:

Commercial Name: **SUN CONTROL2**

Models: **SCE320, SCE360,
SC320M, SC350M
SCE320B, SCE360B**

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:

✔ **EN55014-1:2017+A11:2020**
✔ **EN55014-2:2015**
✔ **EN IEC 61000-3-2:2019**
✔ **EN61000-3-3:2013+A1:2019**
✔ **EN IEC 61000-6-1:2019**
✔ **EN IEC 61000-6-2:2019**
✔ **EN IEC 61000-6-3:2021**

It also complies with Directive 2014/53/EU (RED) for wireless communications equipment, demonstrated by compliance with the standard:

✔ **EN 300220**

For models with BLE connectivity: SCE320B and SCE360B, the radio equipment directive (RED) 2014/53/UE applies to compliance with the following regulations:

✔ **EN62368-1:2020+A11:2020**
✔ **ETSI EN 301489-1 V2.2.3 (2019-11)**
✔ **ETSI EN 301489-17 V3.2.4 (2020-09)**
✔ **EN 300328 v2.2.2 (2019-07)**
✔ **EN50663:2017**

compliance for radiated emissions and electromagnetic immunity on vehicles is demonstrated in compliance with the directive:

✔ **ECE R10**

compliance with the restriction on the use of hazardous substances is demonstrated by compliance with directive 2011/65/EU (ROHS2).

$$C \hspace{-0.2em} \epsilon$$

Cappelle sul Tavo, 14/06/2022

Administrator and legal representative

NDS ENERGY s.r.l.

14.WARRANTY

NDS
WARRANTY COUPON

FIRST NAME _____

SURNAME _____

POSTCODE _____

E-MAIL _____

MODEL _____

SERIAL NUMBER _____

PURCHASE DATE _____

STAMP AND SIGNATURE OF THE SELLER

I CONSENT TO THE ACTIVITY DESCRIBED IN POINT 3.C OF THE INFORMATION NOTICE ON WWW.NDSENERGY.IT/PRIVACY-POLICY/

NDS ENERGY S.R.L.
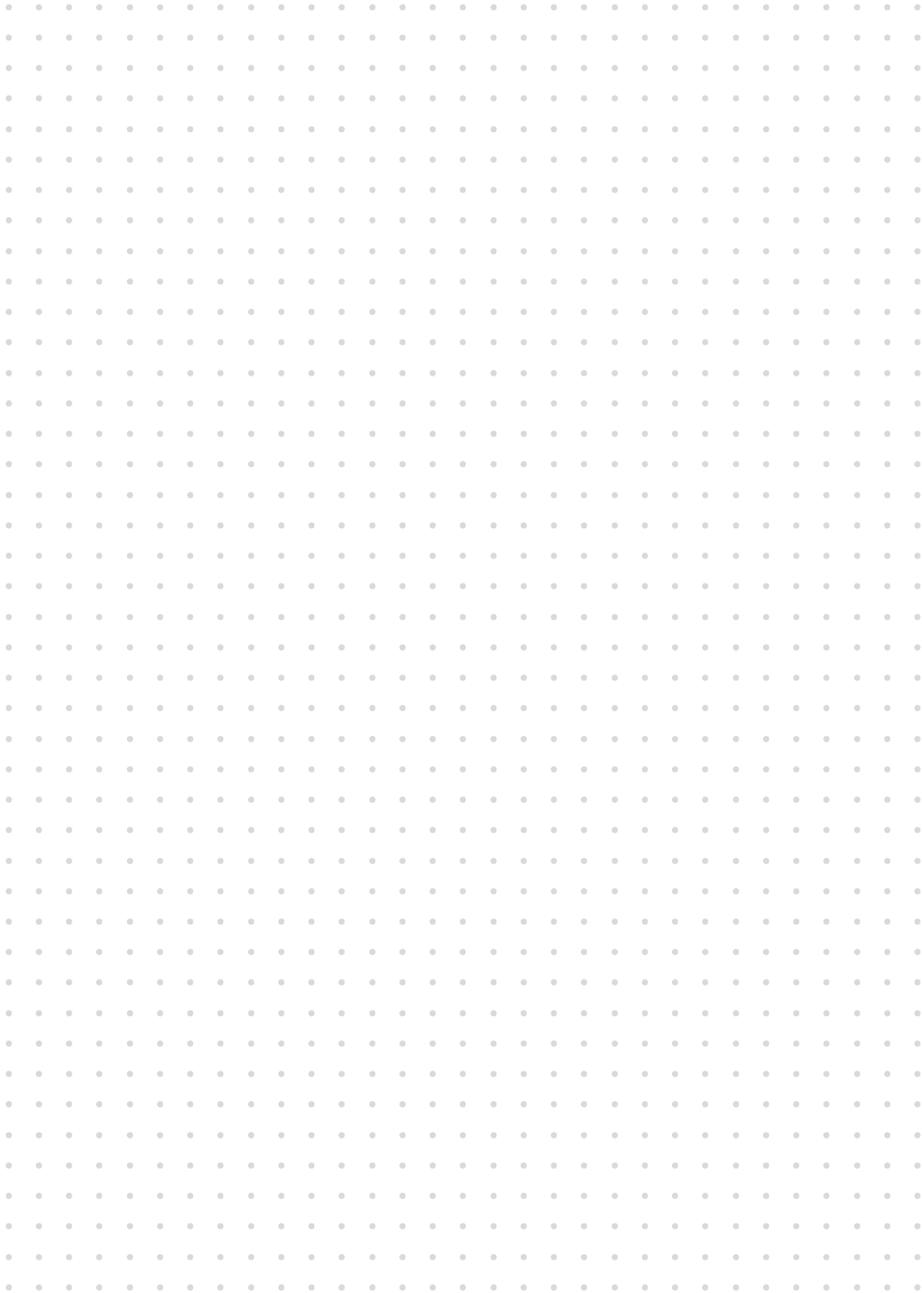VIA G. PASCOLI, 96/98
65010 CAPPELLE SUL TAVO (PE)
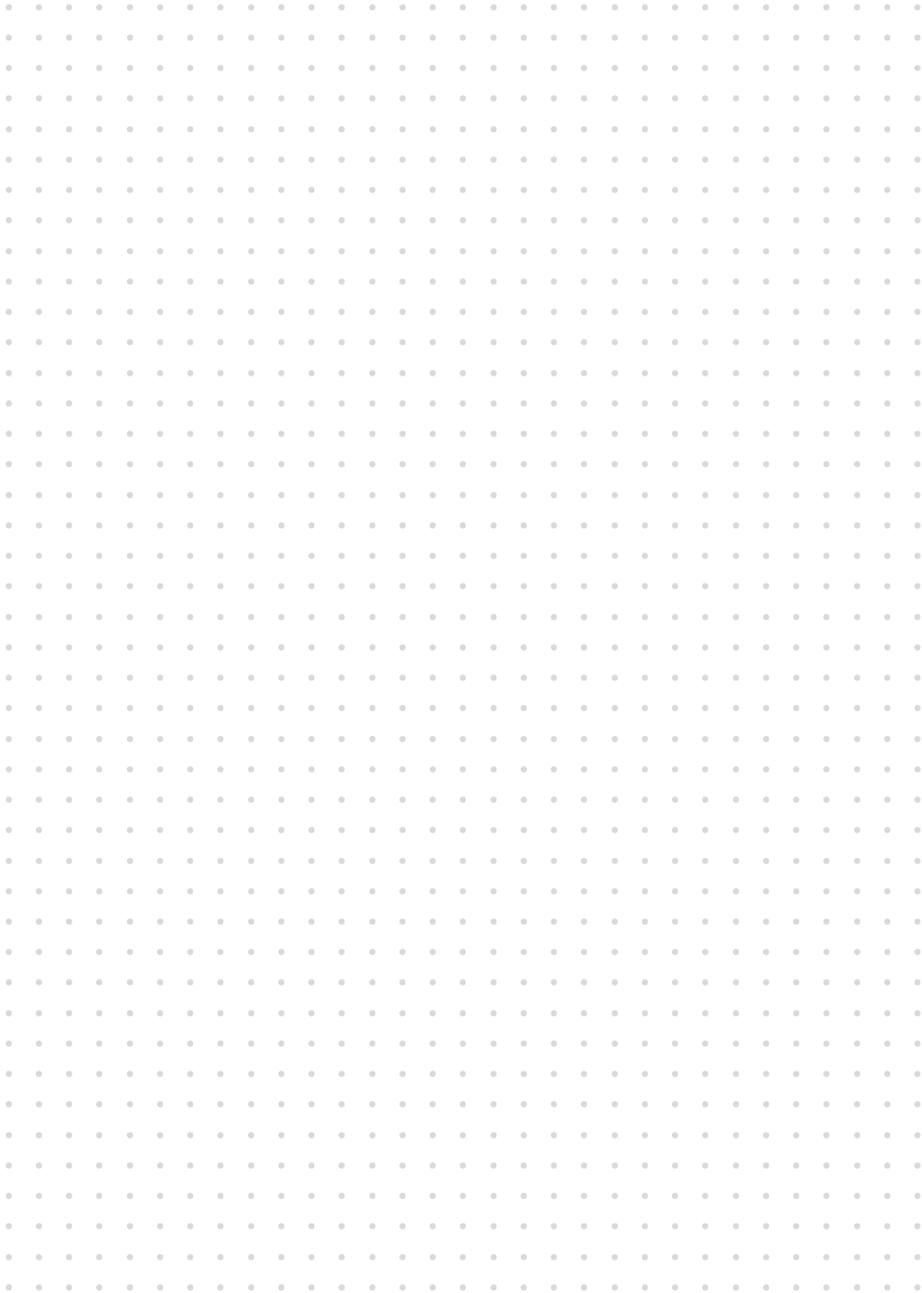ITALY

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

NOTES

NOTES

0078_MANS_SUN2_SCE_GB00