

# NEOS

## HIGH FREQUENCY

# Instructions Manual



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CAREFULLY READ THE FOLLOWING INSTRUCTIONS BEFORE CONNECTING THE DEVICE TO THE MAINS VOLTAGE AND/OR TO THE BATTERY.  
ALSO MAKE SURE THAT THE SIZE OF THE DEVICE IS ADEQUATE TO THE BATTERY CONNECTED TO IT.

The correct utilization of the device will increase its working life and maximize efficiency.  
In case of suggestions, advices or error noticed in this manual, your notifications will be very much appreciated to improve the quality of our service.

Thank you for your trust in choosing our product.

For further information, technical details, brochures or illustrative material please contact us or visit our website [www.tcechargers.com](http://www.tcechargers.com)

## **PROPER USE AND GENERAL SUGGESTIONS**

The product is built by following high qualitative standards to guarantee its reliability and safety.

Every inadequate use of the device can cause:



- Wounds or death to the user and/or to third party
- Damage to the device and/or to other materials or real or personal goods
- Damage to the environment near the device
- Inadequate and inefficient operations compared to the standard working state of the device

The personnel involved with the use of the device must:

- Have a qualification degree in the use of electrical / electronic devices
- Carefully read the manual to understand the proper and correct functioning of the device
- Respect the rules mentioned in this manual
- Use only the correct tools when doing standard maintenance or when repairing a fault on the device

In case of other signs or indication attached to the device for safety reasons, they must:

Be in a legible and comprehensible state for everyone



- Not to be damaged
- Not to be removed
- Not to be covered with other signs/stickers or painted with paint or color of any kind

The use of the device implies:

- A carefully reading of the manual and follow the instructions
- Perform periodical maintenance to maintain the device in an optimal state
- **ALWAYS** follow the instructions written on the battery from its producer



This device must be used **EXCLUSIVELY** to fulfill its purpose. Every other non-compliant use of the device will be reputed inadequate and will lead to the void of the warranty.

Every damage caused to the device, persons, real and personal property by an inadequate use of the device cannot be accused to the producer.

The device **MUST** be used only in networks with ground connection and with fuse or magnetic protection in the plug.

TCE Group Srl declares that the device has a protection degree **IP67**.

Before the utilization of the device, perform a quick visual inspection to make sure that there is no visual damage that could compromise the correct functioning of its operations.

In case of ascertain damages on the charger or on the safety devices that could compromise its functioning, they must be repaired immediately before starting the charging cycle.

Do not remove, cut off or modify in any way any of the many safety devices installed inside and/or outside the charger.

Before starting a normal charging cycle, also check the battery conditions:



- Make sure that there is no dirt or foreign objects on top of the battery
- Make sure the battery is in good condition
- Make sure that there are no short circuits or faulty cells
- Check the water level of the battery before any charge
- Check the condition of the connectors (make sure that the contacts inside the plug are in optimal condition)

**In case of suspected or ascertained damage to the battery or charger, do not start the charging cycle and contact a technician.**

## RISKS CAUSED BY THE NETWORK AND CHARGING CURRENT

The wrong utilization of the device can leave the operator open to many risks: for example, risks of electrocution or risks of electromagnetic fields that could cause cardiac problems to pacemaker users.

An electric shock can be fatal, to avoid electric shocks during the usage of the device:



- Do not touch any live wire inside the device or directly connected to it
- **NEVER** touch the battery poles connected to the device
- Do not short circuit the cables of the device or the charging plug

All the cables must be checked to make sure that there is no damage, they are insulated and well sized for the device.

Loose cable connection, burn marks, damage of different kind or wrong size must be IMMEDIATELY addressed.

## RISKS CAUSED BY ACID, GAS AND TOXIC VAPORS

The batteries charged by our device contain acid which can be dangerous for health and can cause serious problems to the eyes and/or the skin in case of direct contact.

In case of direct contact with the acid, use water to wash it away and seek medical advice.



TCE Group Srl advises to always wear personal protection equipment when carrying out maintenance operations to both the battery and chargers.

During the standard operations of the device, gases and vapors are released from the battery which can cause health problems. These gases and vapors are also highly explosive.



The correct use of the device requires the use of a well-ventilated environment to prevent the accumulation of such gases and avoid risks of explosions.

Charging rooms with less than 4% of Hydrogen in the air are reputed safe against explosions caused by gases.

Good ventilation provides a safe and reliable working environment for charging operations.



During the charge, TCE Group Srl advises to keep AT LEAST a 80cm distance between the charger and the battery and to keep well away from any object that could cause or could be the origin of sparks and/or flames.

To avoid problems or damage caused by gas, vapor or acid, TCE Group Srl suggests:

- Do not remove the charging plug during the charging cycle
- Do not inhale the gas or vapor released by the battery during the charge
- Make sure that the battery being charged is in a well-ventilated area
- Do not leave any foreign objects on top of the battery during the charge

## PROTECTING THIRD PARTIES

While the device is in function, it is advised to keep all non-authorized personnel away from the charger.

In case of any personnel whom have necessity to go near the device during the charging cycle, TCE Group Srl suggests:



- To warn them about the dangers caused by the device while in function (gas, dangers of electrocution and charging currents, electromagnetic fields, etc. etc.)
- Provide the necessary PPE (gloves, helmets, etc. etc.)
- Try to avoid direct contact between the device and non-authorized personnel

## SAFETY DEVICES

The charger is equipped with many different safety devices to guarantee a reliable and safe use.

The inbuilt safety features ensure good condition of the battery, the charger and of the near environment.

The control card offers safety on the charging cycle, it monitors the different charging phases making sure that the value recorded and read are always inside the range of optimal values for the connected battery.

The fuse installed inside the device offers protection against short circuit and reverse polarity.

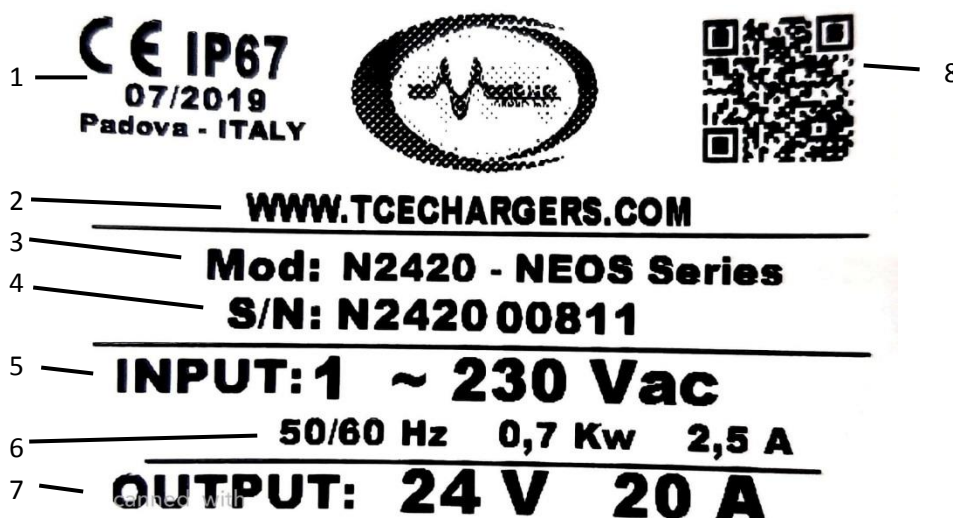
All TCE Group Srl devices have many safety timers to offer reliability during night charges or during the weekends when the battery is left attached to the charger for the equalization cycle.

## DEVICE SERIAL CODE LABEL

Attached on the side of every device produced by TCE Group Srl there is a label with a unique serial code number belonging to the device and some useful information.

The label is anti-tampering and has the purpose to give information regarding the period of time when the device was produced.

If the label is damaged or tampered with, the warranty will be considered void.



- 1) CE logo, IP67 protection logo, manufacture date, place of production
- 2) TCE Group SRL website
- 3) Model
- 4) Serial number
- 5) Input voltage
- 6) Absorption in Kw and Amp
- 7) Output voltage and current
- 8) QR code for TCE Group Srl website [www.tcechargers.com](http://www.tcechargers.com)

## **PREPARATION**

- Make sure that the power supply connector and charging connector are installed. If not, contact a technician to install the connectors properly dimensioned for the device and for the mains voltage network
- Make sure that the mains voltage plug where the device is connected is properly grounded and protected by adequate safety devices
- Make sure that the size of the device is adequate for the battery connected to it (check attached label)
- Make sure that the device is located in an adequate location for a proper use
- Avoid the placing of the device in areas with sparks and/or flames because the battery generates explosives gases during the charge
- Make sure that the battery cells are in good condition and verify the presence of short circuits
- Make sure that there are no objects on top of the battery cells before starting the charging cycle
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## **NETWORK and BATTERY CONNECTION**

- Before connecting the charger to the mains voltage, make sure that the voltage of the network is adequate for the device:
  - Input 220Vac  $\pm 15\%$  or 110Vac  $\pm 15\%$
  - 50 / 60 Hz
- **Connect the charger to the battery pack before connecting the charger to the AC outlet**
- Make sure that the AC plug is firmly connected to the AC outlet
- It is suggested to use the proper bi-polar connectors without the possibility of reverse polarity on the battery. Verify also the correct connection of the cables in the connector's contacts

## **ENVIRONMENT**

- Operating Temperature: from  $-30^{\circ}\text{C}$  to  $+65^{\circ}\text{C}$
- Storage Temperature: from  $-40^{\circ}\text{C}$  to  $+95^{\circ}\text{C}$
- Humidity: from 5% to 95%
- Altitude: up to 2000 mt
- Protection Grade: IP67

## **CHARGING PROCESS**

- Once the battery is connected to the charger, if the battery voltage is inside an allowed range, the charge will automatically begin
- The red light will start to glow to indicate the battery is connected and below 80%. Above 80% the yellow light will start to glow. Upon reaching 100% the green light will start to glow and it will be possible to de-attach the charger from the battery
- When the battery is fully charged, the charging process will be automatically interrupted
- In case of values outside the allowed range or in case the charge reaches the safety timer, the charge will automatically be interrupted
- In case of power failure during the charging phase, the charger will automatically resume the charge when the power failure is over

## **CHARGING CURVE**

The standard charging curve installed inside the chargers of the NEOS Series is divided in different stages.

In every stage, the charging current is subject to variations predetermined by the charging curve installed based on the typology of the battery (Lead Acid, AGM, GEL, Lithium, etc etc).

The charging curve stages are:

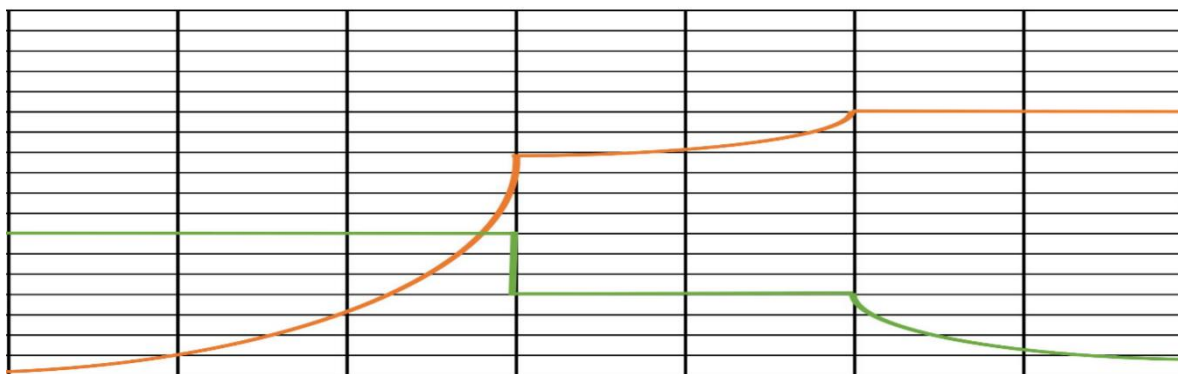
**S1** – The current rises slowly (soft start) upon reaching the maximum nominal current

**S2** – The maximum nominal current is kept until the predetermined voltage of the battery type (for example 2,4V/Cell for lead acid batteries) is reached

**S3** – Upon reaching the predetermined soil, the current drops to 2/3 of the maximum nominal current until reaching the second predetermined voltage (for example 2,55 V/Cell for lead acid batteries)

**S4** – Upon reaching the second threshold, the current drops to 1/3 of the maximum nominal current until the final charging current is reached (for example 2,68 V/Cell for lead acid batteries)

**S5**– The charger keeps the voltage constant and variates the current until the charge is completed



— Battery Voltage  
— Charging Current

### Final charging voltages

<u>Battery Type</u>	<u>Final charging voltage</u>
Lead Acid "heavy duty"	2,68 V/Cell
Lead Acid "light duty"	2,4 V/Cell
GEL	2,35 V/Cell
AGM1	2,38 V/Cell
AGM2	2,45 V/Cell

### LED COLORS

<u>LED Color</u>	<u>Description</u>	<b>Battery Charging Status</b>
Green/Red alternate flash	Battery not connected	
Red flash	Battery from 0% to 80%	
Yellow Flash	Battery from 80% to 100%	
Green flash	Battery at 100%	

Red/Green/Red	Over voltage / Over current	<b>Anomalies and faults</b>
Red/Green/Red/Green	Environment temperature too high or too low	
Green/Red	Charger overheating	
Red/Green	Output under voltage	
Red/Green/Red/Green/Red	Input AC anomaly	

### TROUBLESHOOTING

<b>LED Color</b>	<b>Description</b>	<b>Solutions</b>
Green/Red alternate flash	Battery not connected	Check if the connection between battery and charger is loose, if there is reverse polarity or if the battery voltage too low
Red/Green/Red	Over voltage / Over current	If this error occurs often, return to factory for repair/inspection
Red/Green/Red/Green	Environment temperature too high or too low	Check the environment temperature and make sure the ventilation is good. Also check the temperature sensor location.
Green/Red	Charger overheating	Check if the environment temperature is too high and if ventilation is good
Red/Green	Output under voltage	Return to factory for repair/inspection
Red/Green/Red/Green/Red	Input AC anomaly	Check the input voltage to match the charger specifics and plug connection

## WARRANTY

This device is built by following high qualitative standards to assure its high quality. Every single construction phase is overviewed by specialized personnel.

**The warranty is granted ONLY AND IF TCE Group Srl agrees that the damage claimed is caused by faulty parts installed during the construction or assembly of the device.**

In the event of a warranty claim, the customer will have to dispatch the unit in question to TCE Group Srl, if it is then deemed that the fault/damage was caused by faulty parts installed during the constructions or assembly, TCE Group Srl will provide a replacement of the faulty part/component to restore the optimal state of the device.

The duration of the warranty is **12 months** from the moment when the unit leaves TCE Group Srl warehouse (except if there are others agreement between TCE Group Srl and the customer/distributor).

The warranty IS NOT GRANTED if:

- The unit has been tampered with or **OPENED**
- The unit has been damaged by misuse and/or bad installation
- The unit has been damaged by a use that is not what it was built for
- The unit has been damaged by third party or environment causes
- The unit has been damaged by the surrounding environment
- The unit has been damaged during transportation

This warranty does not cover in any case the replacement of the device or any compensation for costs, injuries, direct or indirect damages caused by unit fault (production stop included).

For any legal claims, the court of Padova (Italy) will be responsible and will handle the matter.

To request assistance or in case of problems, contact the nearest authorized dealer or directly contact TCE Group Srl.

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