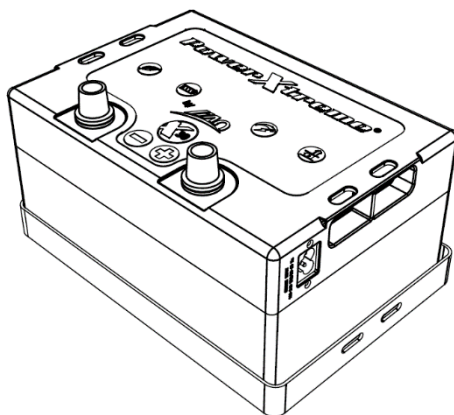




# PowerXtreme

## User manual

# POWERXTREME X20/X30 LiFePO4 Battery



Ultra light weight



High capacity



Extreme power



Long life

**EmergoPlus BV**

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# PowerXtreme

Dear customer,

Thank you for purchasing the high quality PowerXtreme battery from EmergoPlus! This product has been developed using the most modern technologies and quality systems. We assure you that we make every effort to ensure trouble-free operation so that you are happy with your purchase. Our ultimate goal is a satisfied customer. If you have any questions, please contact one of our dealers or our service department.

We hope you enjoy your PowerXtreme battery!

Cordial greetings,

EmergoPlus BV

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## 1. Product description

The PowerXtreme X20/X30 is a Lithium-iron phosphate (LiFePO<sub>4</sub>) battery. This is the safest of the most important lithium-ion battery types. Besides safety, the LiFePO<sub>4</sub> technology is characterized by:

- Minimal weight
- Small dimensions
- Low internal resistance
- High efficiency
- Excellent cycle performance
- Large permitted temperature range
- Almost constant Voltage throughout the entire discharge cycle
- It is possible to use 100% of the capacity before the battery is empty and switches itself off. On the PowerXtreme X20 this is 20Ah and on the PowerXtreme X30 is this 30Ah. This is in contrast to lead-acid batteries where usually 50 - 60% of the capacity can be used before the battery needs to be recharged.

Which makes the X20/X30 battery the right choice for a wide range of applications. Another big advantage compared to lead-acid batteries is that the LiFePO<sub>4</sub> battery does not need to be fully charged. A lead-acid battery will fail due to sulphating if it is not fully charged for a longer period of time. The PowerXtreme X20/X30 battery consists of 4 cells connected in series with a nominal voltage of 3.2V which together form 12.8V.

Essential part of the LiFePO<sub>4</sub> battery is its Battery Management System (BMS). The BMS monitors the cells that make up the battery for the following risks

- Too deep discharge - A LiFePO<sub>4</sub> cell will fail if the voltage is less than 2.5V. The BMS disconnects the battery before the cell voltage reaches this point.
- Overvoltage - If the cell voltage exceeds 3.65V during charging, the BMS will stop the higher voltage. The BMS stops the charging process before the cell voltage becomes too high.

- Too high temperature - The BMS will turn off the battery if the system temperature becomes too high.
- Too low temperature - The BMS prevents the battery from being charged at temperatures below -10°C.
- Short circuit - The BMS switches the battery off if the terminals are shorted.
- Our batteries have a cell balancing function built into the BMS. Because the cells are never 100% identical, this system ensures that the cells remain balanced and that no major differences in cell voltages can arise due to the discharge and charging.

The PowerXtreme X20 is equipped with Bluetooth technology that allows monitoring of the battery and switching it on and off via an App.

The PowerXtreme X30 does not have Bluetooth technology, but has a capacity indication by means of LEDs on the housing.

## 2. Safety instructions

### 2.1 Safety instructions statement

The safety instructions help you to avoid hazards when performing actions. The safety instructions are divided into the following categories:



#### **WARNING!**

Means that the act in question is dangerous and should be prepared before proceeding.



#### **CARFUL!**

Means that the operation can cause damage.



#### **PAY ATTENTION!**

Means advice for instruction to the user.

### 2.2 Safety instructions

- Carefully read this manual before using the battery pack.
- Keep the manual close to the battery and make it available to the user of the battery pack.
- Only technically qualified personnel may carry out work on the battery.
- The electrolyte is highly corrosive. Under normal circumstances, contact with the electrolyte is not possible. In case of damage to the battery, avoid direct contact with the electrolyte or powder. If you have come into

contact with the electrolyte, rinse it immediately with plenty of water. After this, consult a doctor.

- Use cables of the correct cross-section and keep the cable connections as short as possible. Use reliable cable clamps and tighten the bolts firmly.
- Never short-circuit the + and - poles. The internal BMS is protected against short circuits, but to prevent dangerous sparks this is strongly discouraged.
- Never connect the battery pack in series or in parallel with any other type of battery pack.
- Do not use the battery as a starter battery.
- Do not open the battery pack. The guarantee is void if the battery is opened.
- Do not place the battery pack in a high temperature environment or in direct sunlight or near a heat source >45°C.
- Never install the battery in rain or damp conditions with RV>80%.
- Avoid damage to the battery and/or charger housing.
- Do not store the battery in discharged condition (< 11.5V) for a longer period of time.
- If the battery is stored for a longer period of time without use, we recommend that you charge it once every six months. **Don't forget to disconnect the battery terminals or turn off the ground switch when you don't use the battery for a longer period of time.**
- Never charge the battery pack at temperatures below 0 °C.
- Always use the supplied charger. This charger is suitable for LiFePO4 cell chemistry with the corresponding charging voltage.
- Never use a damaged battery pack.
- Make sure that the battery and charger are never covered with clothing or other materials! This can lead to overheating!

**CAREFUL!**

Using a charger that is not suitable for LiFePO4 chemicals can damage the battery because it is not properly charged.

## 2.3 Transport alert

- The Li-ion battery must be transported in its original packaging.
- The X20/X30 batteries have been tested according to the UN handbook for tests and criteria, part III, paragraph 38.3 (ST/SG/AC.10/11/Rev.5). During transport, the battery falls under category UN3480 class 9, packing group II and must be transported in accordance with these regulations. This means that the battery must be packed in accordance with the packaging instruction P903 for transport over land or sea (ADR, RID & IMDG) and in the case of air transport (IATA) in accordance with the packaging instruction P965. The original packaging complies with these instructions.
- Make sure that the battery is properly secured during transport. The battery can become a projectile if a vehicle is involved in an accident.



### 3. Description and Operation

#### 3.1 LiFePO4 battery for caravan mover

The battery has more than enough capacity to carry out 2 normal displacement operations of a caravan. With heavy use (35 A continuous) you can use the mover for up to 60 (X20) or 75 (X30) minutes. With extreme use (100 A) you can use the mover for approx. 18 (X20) or 24 (X30) minutes. After each operation, it is recommended that you charge the battery for another operation.

The battery is suitable for briefly (approx. 10 sec) delivering very high currents to overcome a threshold or other obstacle. If you try to do this for a longer period of time, the battery will switch off automatically and you should wait until the battery resets itself.

#### 3.2 Charging

When the battery runs out, it must be recharged. Connect the charger to the battery and then plug it into the 230V socket. The charger now starts charging with a charging current of 2A.

During charging, the LED lights red.

At the end of the charging cycle the LED lights green.

The battery capacity can be read by pressing the thickener in the foil. One, two or three green LEDs will light up as a rough indication of the charge status. When the battery is empty, a small red LED lights up.



*Figure 1. SOC Indication on battery*

The charging time depends on the charging status at the start of the charging cycle. If the capacity is still 40%, 6Ah must be charged. The charging time is then around 3 hours x 2A + around 1 hour = around 4 hours. The charger can be continuously connected to 230V, even after the battery is fully charged. Never charge the battery pack at temperatures below 0°C. At -10°C, a protection device is activated which makes charging impossible. The battery can be discharged or used up to a temperature of -20°C.

**WARNING!**

Stop the charging process if the battery becomes too hot during charging (> 45°C – 50 °C).

The battery can also be charged by solar panels if they are connected to a charger that is suitable for charging LiFePO4 batteries. We have the XS20s MPPT Solar charger in our program. Because of the MPPT technique this charger gets the maximum efficiency from your Solar panels. You can also charge the battery while driving. For this you need to use a so-called charge booster, see paragraph 3.4.

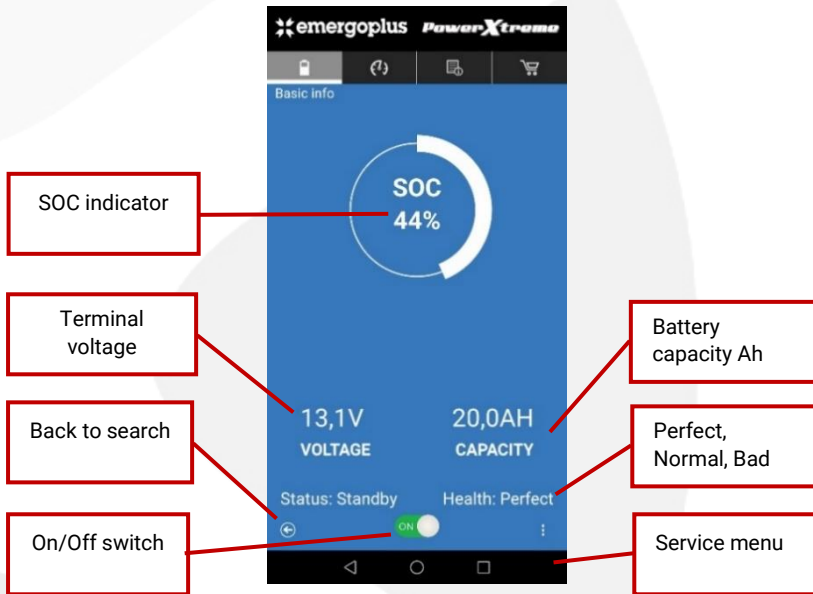
### 3.3 PowerXtreme App

Via the Apple store (suitable for iPhone 4S with IOS 6 or higher) or the Google Play store (suitable for Android 4.3 or higher) you can download the PowerXtreme App and use it to read the status and health of your battery. When you open the APP a dialog box appears where you can see all Bluetooth devices within the range (< 5.0 metres). You can recognise your battery by the serial number that starts with EP..... Select your battery, then connect via Bluetooth and you will see all the information about the battery. The following data is displayed in the APP:

**Basic Info tab:**

- State of Charge: SOC State of charge in %
- Voltage: Terminal voltage of the battery in V

- Capacity: Capacity/Content of the battery in Ah
- Status: Charging - Discharging – Standby
- Health: of the battery
- On/ Off On/ Off switch



SOC means "State of Charge" or the state of charge of the battery. The voltage and capacity of the battery are listed below. STATUS" shows whether the battery is charging or discharging or whether the battery is in standby mode.

Health shows the condition of the battery. This varies from Perfect, Good and Bad.

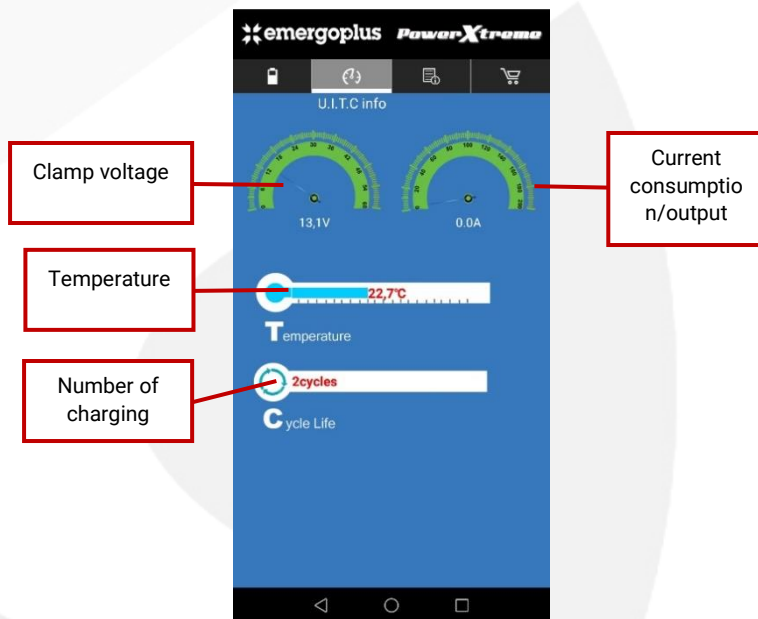
The three dots at the bottom right open a menu intended for service purposes.

**U.I.T.C. info tab:**

- Voltage meter Terminal voltage of the battery in V
- Current meter Present current consumption in A

Temperature  
Cycle life

Temperature of the battery cells  
Number of charge/discharge cycles



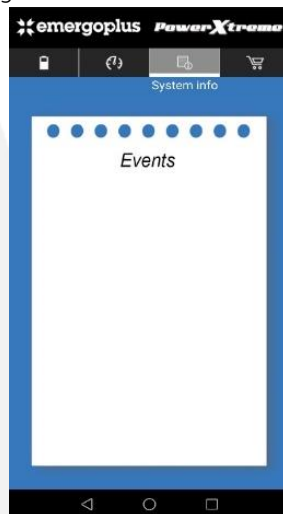
The UITC info shows 2 "meters", on the left the battery voltage and on the right the current. This can be the charging current or the current drawn from the battery. If the battery is connected to a charger but at the same time power is requested by users, the resulting current is displayed. Temperature of the cell pack. If the temperature is too low or too high, a safety device is activated.

Cycle life keeps track of how often the battery has been discharged by 80%. For example, from 90% SOC to 10% SOC is a cycle. Also, from 70% SOC to empty then charging to 100% and empty to 90% is a cycle.

## System Info tab


System info contains messages about events that occurred during the charging or discharge process. This refers to the following events:

- Short circuit
- Lift up short circuit
- High temperature at charging
- High temperature at discharge
- Low temperature at charging
- Low temperature at discharge
- Overcurrent when charging
- Too much current when discharged
- High Voltage
- Low Voltage
- Temperature/Voltage/Current back to normal
- Display remaining charge time



## The Buy Info tab

Please provide the contact details of EmergoPlus.



**PAY ATTENTION!**

It is possible that the app displays a value that is too low for the SOC (charge status) when the battery has not been used for a longer period of time. Once you have charged the battery, the SOC display will be correct again.

## 3.4 PowerXCharger XC3 (OPTIONAL)

To charge the battery while driving, the PowerXCharger XC3 is available as an option. This converts the charging voltage of the car alternator into the right charging voltage for the PowerXtreme battery. Due to the limited

charging current, there is no need to install thick wiring. The XC3 also acts as a battery guard. If the terminal voltage of the starter battery is too low, the XC3 switches the battery off so that the starter battery does not discharge further. Charging with a solar panel is also possible. However, a suitable charge regulator must be used for this.

### 3.5 Storage

If you want to store the battery for a longer period of time, disconnect the battery terminals. This will prevent the battery from being discharged by slumber consumption. Also disconnect the charging current connector from the battery. The battery has a very low self-discharge and can be stored for up to half a year without any problems. Charge the battery after half a year.

### 3.6 Installation

The following is important for the installation of the battery:

- In the box, you will find the following parts:
  - Battery with charger mounted inside
  - Battery terminals + and –
  - Mounting plate with Velcro and 4 self-tapping screws
  - Charging cord 230V
  - Instruction card



*Figure 2. Package contents X20/X30*

- After unpacking, check all parts for possible damage.
- Fully charge the battery before first use.



**WARNING!**

Never use the LiFePO<sub>4</sub> battery in locations with gas or dust explosion hazards or potentially flammable products.

- Mount the battery pack using the supplied mounting plate and Velcro fastener at the location of your choice in the camper.
- Make sure there is at least 10 cm clearance around the battery. Do not install the LiFePO<sub>4</sub> battery in an unventilated area, there is a risk of overheating!



**PAY ATTENTION!**

De meegeleverde accupolen hebben verschillende diameters, de dunste is voor de negatieve pool, de dikste voor de positieve pool.

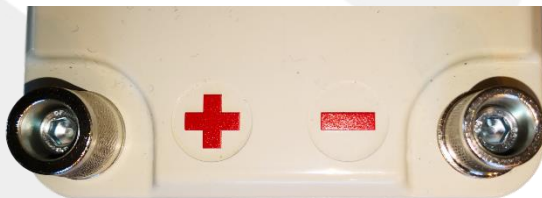


Figure 3. Difference diameter of + and - pole

- Switch off all loads and charging equipment before you start connecting.
- Use proper cabling of sufficient cross-section and correctly dimensioned terminals and battery terminals. Tighten all

connections securely. Recommended tightening torque for M6 is 9.9 - 14 Nm. Do not use too great a tightening torque, as this can lead to irreparable damage to the LiFePO<sub>4</sub> battery.

- If you use screws to connect consumers instead of the supplied battery terminals, make sure that these screws are not longer than 10mm.

**CAREFUL!**

If bolts that are too long are used, the connections will not get stuck! This leads to large contact resistances and can cause the battery or equipment to spark or switch off.



*Figure 4. WRONG! Loose connection by using too long bolt*

- Connect the negative pole of the battery to the negative connection of the caravan mover unit.
- Connects the positive terminal of the battery to the positive terminal of the caravan mover unit.
- Use cables as prescribed in your caravan mover manual. It is recommended to use a minimum of 16 mm<sup>2</sup>. Use one red wire for the + and one black or blue wire for the -.





### **CAFEFUL!**

Observe the polarity of the battery and avoid short circuits! Equipment whose polarity is incorrectly connected can be irreparably damaged.

- Never connect the battery in parallel to any other type of battery, including the wiring from the car.
- Do not work on the LiFePO4 battery or the installation when it is still live. Only have changes to your electrical installation carried out by qualified electricians.



### **PAY ATTENTION!**

Install a fuse and a main switch to the power circuit according to local regulations. Place the fuse as close as possible to the + pole of the battery.

- After first use or test all connections for (over) heating. Repair or replace connections that have become too hot.
- Check the wiring and connections at least once a year. Immediately rectify defects such as loose connections and burnt cables.

▪ **System overview:**

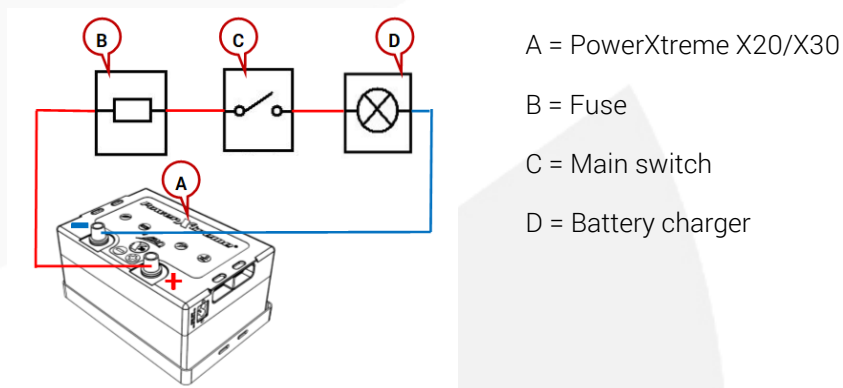


Figure 5. Wiring diagram



**WARNING!**

Never connect the battery in parallel to another battery, including the wiring from the car.

## 4. Decommissioning

Electric appliances should not be disposed of with normal household waste. According to the European Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), these devices must be collected separately in order to recycle them in an environmentally friendly manner possible.



## 5. Technical specifications

### 5.1 Denomination Battery

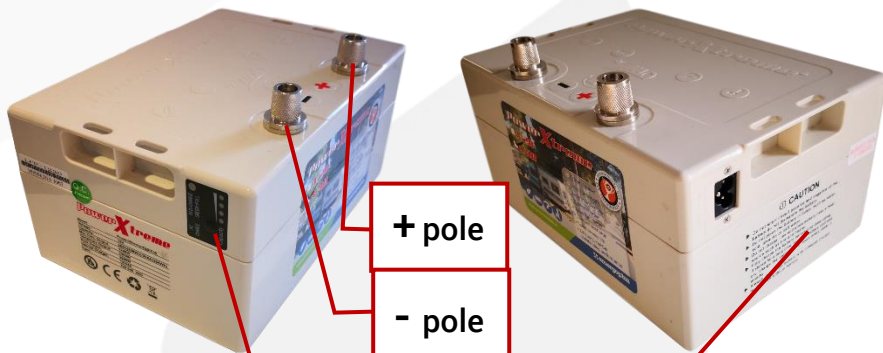
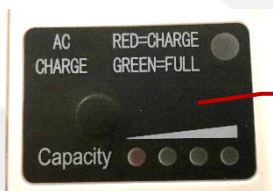


Figure 6. Battery X20 / X30

Figure 7. Battery X20 / X30



Charging cord connection

Indication battery capacity + LED indication charging process

Figure 8. SOC en charging indicator

### 5.2 Technical data

Model	X20	X30
Cell Chemistry	LiFePO4	
Cell Technology	Prismatic	
Voltage	12V	
Nominal voltage	12,8V	
Capacity	20Ah	30Ah

Max. continuous current	100A	
Momentary current (30 Sec)	150A	200A
Peak current (1 sec)	200A	300A
Max. charging current	40A	60A
Max. charging voltage	14,6V	
Max. discharge voltage	9V	
Operating temperature	-20 °C to +60	
Charge temperature	0 °C to 45	
Storage temperature	-10 °C to 45	
Weight	4,4Kg	5,6Kg
Poles	2 x M6 threaded hole + poles	
Communication	Bluetooth + indication on battery	Indication on battery
Lifespan (80% DOD)	>1500 cycles	
IP-class	IP 62	
Cell balancing	Yes	
Dimensions	250 x 175 x 120 mm	
Safety features	Over current, Under- and Over voltage, Short circuit, Temperature	
<b>Internal charger</b>		
Input Voltage	100 – 240 VAC	
Input Frequency	50 – 60 Hz	
Output Voltage	14,6 VDC	
Charge Current	4A	
Charging Characteristic	CC - CV	

## 6. Faults and repairs

### 6.1 Fault finding table

Problem	Cause	Solution
Charger LED-flashes red.	Charger defective.	Send charger to Emergoplus for repair.
Charger LED flashes red after charging for a while.	Possible charger defective or charging circuit failure.	Check charging current (4A) with APP. Reconnect the charger. If malfunction comes back send charger to Emergoplus for repair.
Battery capacity drops away, but voltage >12V.	SOC decreases faster than is actually the case.	Fully charge the battery. SOC is then again accurate.
No voltage at poles.	Short circuit or overload.	Disconnect the battery terminals. Let the charger charge for a while. Reconnect the battery terminals.
Battery does not work.	Battery is off.	Switch on the battery with App.

## **7. Warranty conditions**

EmergoPlus guarantees that the PowerXtreme X20/X30 battery is constructed in accordance with the legally applicable standards and regulations. During production and prior to delivery, all PowerXtreme X20/X30 batteries were extensively tested and checked. If you do not act in accordance with the instructions and the regulations of this manual, damage may occur and/or the unit will not comply with our specifications. This could imply that the warranty becomes void.

The warranty period is 2 years. If you register your battery with us (via website [www.emergoplus.com](http://www.emergoplus.com)) we extend the warranty period to 5 years.

## **8. Liability**

EmergoPlus cannot be held liable for:

- Damage resulting from the use of the PowerXtreme X20/X30;
- Possible errors in the supplied manual and their consequences;
- Use that is incompatible with the purpose of the product.

## 9. EG Declaration of Conformity

### EG DECLARATION OF CONFORMITY OF ELECTRICAL EQUIPMENT

Declaration according to Directive 2014/35 / EC, as amended

This language version of the statement is checked by the manufacturer (original statement).

We:

Name : EmergoPlus BV  
 Address : Informaticastraat 20, 4538 BT Terneuzen  
 Country : The Netherlands

declare for the product described below:

Generic name : LiFePO4 battery  
 Trade name : PowerXtreme X20/X30  
 Model : X20/X30  
 Function : 12V Battery for power supply in caravans and other applications.

that all relevant provisions of the Machinery Directive are met;

that the product also complies with the provisions of the following European directives:

2014-35/EU	DIRECTIVE 2014/35 / EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonization of the laws of the Member States concerning the making available on the market of electrical equipment for use within specified voltage limits.
2014/30/EU	DIRECTIVE 2014/30 / EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonization of the laws of the Member States concerning electromagnetic compatibility.
2011/65/EU	DIRECTIVE 2011/65 / EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

And the following harmonized standards:

EN 61000-6-1:2007	Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity for residential, commercial and light-industrial environments
EN 61000-6-2:2005	Electromagnetic Compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-3:2007+A1:2011	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standards for residential, commercial and light-industrial environments
EN 61000-3-2:2014	Electromagnetic compatibility (EMC) - Part 3-2: Limit values - Limit values for harmonic currents emissions (input current of the devices $\leq 16$ A per phase)
EN 61000-3-3:2013	Electromagnetic compatibility (EMC) - Part 3-3: Limits for voltage fluctuations, voltage fluctuations and flicker in public low-voltage networks for equipment with an input current $\leq 16$ A per phase and without conditional connection



EN60950- Information technology equipment - Safety - Part 1: General  
1:2005+A1:2009+A2:2013 requirements

and which the following natural or legal person established in the Community is authorized to compile the technical file:

Name : EmergoPlus BV  
Name and position : Dick van Wijck, CEO  
Address : Informaticastraat 20, 4538 BT Terneuzen  
Country : The Netherlands  
Done at Kapelle 3-9-2018



Dick van Wijck  
CEO, EmergoPlus BV

