

Operating Instructions

Battery-Charger and Trickle-Charger

UL30F

Version: 11/2018

DC 24V 8A / DC 24V 1A // AC 230V / 50-60 Hz
Part No.: UL30F.042 109-0037
NSN: 6130-12-399-1912 (with English front foil)



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General information

This manual by Nortec Electronics describes the battery charger / trickle charger UL30 in the UL30F version.

The microprocessor-controlled battery charger / trickle charger UL30F for charging and trickle charging of 24V Lead-Acid-Batteries was designed for the specific request of the French Army. Military practice recommends capacities from 20Ah to 400Ah for the UL30F. In case of higher capacities, the time of charging will be extended. Civil batteries can be different to this specification. The manufacturer information must be defined. The charger in IP65 aluminum housing is protected against shock and vibrations.

The charging will be connected with the 7-pole VG-connector type 16S. The length of the charging cable and the ambient temperature will be compensated by the software of the UL30F. Due to its automated trickle charging program, the battery can be unlimited connected to the battery charger without being damaged.

Attention

The working- and operating procedures must always be observed to prevent any risk to the operator and the device.

Note

The technical explanations are intended to provide a better and more convenient understanding. Please consider the drawn attention to specific operating requirements and procedures.

In the case of deviations or incompleteness, please inform:

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1. Technical Information UL30F

| | |
|----------------------------------|--|
| Type: | UL30F |
| Part-No.: | UL30F.042 109-0037 |
| NSN: | 6130-12-399-1912 (with English front foil) |
| Manufacturer: | NorTec Electronics GmbH & Co. KG An der Strusbek 32 B D-22926 Ahrensburg Tel.: +49/ (0) 4102 / 42002 Fax: +49/ (0) 4102 / 42840 E-Mail: info@nortec-electronics.de Web: www.nortec.de |
| Mains voltage: | 230V \pm 10% / 50-60 Hz |
| Input power: | < 500VA (max.) |
| Output voltage: | max. 35VDC \pm 1% (Device limited) |
| Output voltage pre-charging: | 28,8VDC \pm 1% (constant voltage) |
| Output current main-charging: | 8A \pm 5% (constant current) |
| Output voltage main-charging: | 28,8VDC \pm 1% (constant voltage) |
| Output current trickle-charging: | 1A \pm 5% (constant current) |
| Display: | 5 Led's |
| EMV: | According to VG95 373-GwK 3, EN55022, EN61000-3-2, EN61000-3-3, EN61000-4-2, -3, -4, -5, -6, and -11. |
| Protection class: | IP65 |

| | |
|-------------------------------|--|
| Operating temperature: | -25 to +40 °C (in case of higher temperature the output power will be reduced) |
| Storage temperature: | -40 to +85 °C |
| Humidity: | (5-95) % for $T_U=55^{\circ}\text{C}$ |
| Dimensions (L x H x l in mm): | 240 x 120 x 90 |
| Weight: | 2.3 kg without charging cable |
| Confirmations: | CE Conformity |
| Mains connection: | Protective contact plug with double protection contact system |
| Warranty: | 24 months |

2. General

We congratulate you for buying UL30F

The housing contains two chargers:

- Battery-charger
- Trickle-charger

Latest microprocessor technique is responsible for charging your battery according to UIUa-curve (recommended by the leading battery producers) which guarantees the maximum lifespan for the battery. Long-term experience in the German Army has shown that intermitting I-charge is superior to constant voltage trickle-charging. The vehicle parks of German Army show very convincing results even for vehicles which are not in use most of the time. A functioning deep discharged battery will be charged up to the highest possible capacity and kept at this level starting at a remaining voltage of about 6V. While charging it stays closed and connected to the vehicle. Batteries with failures will be recognized.

The status of the charging and the device will be indicated by the 5 LEDs of the device at any time.

3. Installation

A voltage of $230V \pm 10\%$ / 50-60 Hz is necessary for using this battery charger. Please check in advance whether this voltage is available and corresponds to the value on the type label of the charger. The design of the UL30F doesn't require a certain order of installation and handling. Especially the wrong polarity protection prevents installation damages.

We recommend the following procedure:

1. Connect the vehicle to AC mains. Short flashing of the indication LED shows that the charger finished its Selftest successfully and is ready for use. The device starts charging automatically.
2. Connect the charging cable correct to the battery. In case the voltage is below 6V please check battery voltage and connection.
3. Disconnect the charger from the power supply first. Then remove the charging cable from the vehicle

Note

Before the charger will be switched on, the battery connection cable has to be contacted. Charging cable and battery must be checked for contamination and mechanical and electrical condition before connection.

- Connect the mains plug, green LED "Mains okay" lights up
- Internal functioning test: all LED's lights up for about one second
- Afterwards the red LED „Pre-charging Main-charging“ lights up
- In case of a loaded Battery over 25.0V is connected, the charger starts Main-charging and skip over Pre-charging. If the battery reached the cutoff voltage of 28.8V and cutoff current of 1A the charger starts Monitoring/Trickle charging

4. Electrical Connection

Provide a contact socket (230V \pm 10% / 50-60 Hz) in the radius around the planned installation position of the UL30F

Note

The number of devices in regard to the protection values of the power supply lines must be limited:

Max. Input power UL30F: 500VA = 2.5A @ 200V AC net voltage (under voltage)

5. Construction

5.1 Housing

The UL30F battery charger is built into a dust and spray-water protected aluminum housing with protection class IP65. All power modules are connected to the rear wall in a heat-tight manner.

The mains cable is watertight and strain-relieved connected to the housing by a PG gland. The connection of the charging cable is also located on the underside of the device.

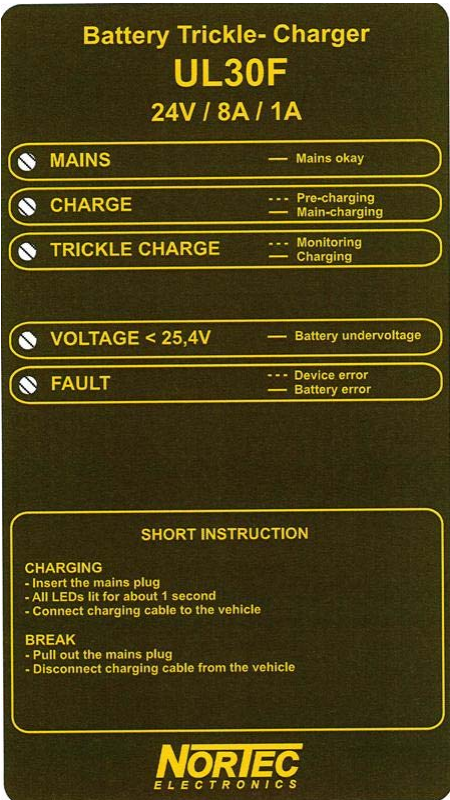
On the front panel of the housing are five indicator LEDs.

The front foil protects the display elements against moisture and is described with the short instruction.



Pic. 1: UL30F

5.2 Front Foil



Pic. 2: Front foil UL30F (English)

Legend

| | | |
|-----------------|-------|----------------------|
| MAINS | ___ | Mains okay |
| CHARGE | ----- | Pre-charging |
| | ___ | Main-charging |
| TRICKLE CHARGE | ----- | Monitoring |
| | ___ | Charging |
| VOLTAGE < 25.4V | ___ | Battery undervoltage |
| FAUT | ----- | Device error |
| | ___ | Battery error |

6. Charging

6.1 Preface

Proper battery charging is the first prerequisite for a long battery life. The UL30F treats any kind of lead-acid-batteries with a nominal voltage of 24V in the optimum way.

In order to avoid permanent damage on the battery caused by deep discharge, which can lead the battery being unusable, the battery has to be checked regularly. Please consider that only charged batteries should be stored. A deep discharge battery can destroy itself within a few days.

A functioning battery with open-circuit voltage greater than 24V can be easily charged with up to 8 Amps to its charging voltage of 28.8V. The charging voltage is preset by the device software.

After the open-circuit voltage has been reached, the charger can be left on the battery until the charging current falls to 1 Amp given by the software side and the battery is optimally charged.

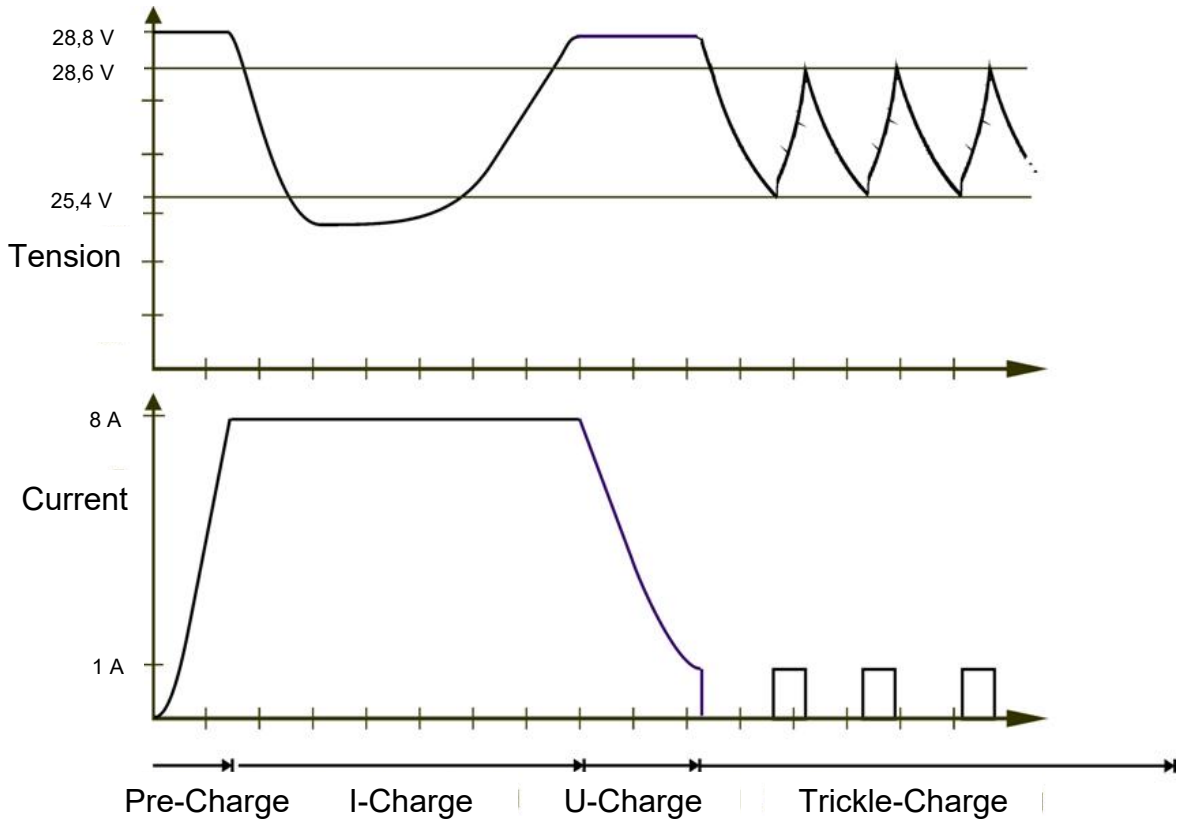
If the battery is deep discharged Irreversible chemical processes may occur in the battery. This may reduce the battery's current-carrying capacity significant.

In this case the pre-charge is used to try to reverse the chemical reaction.

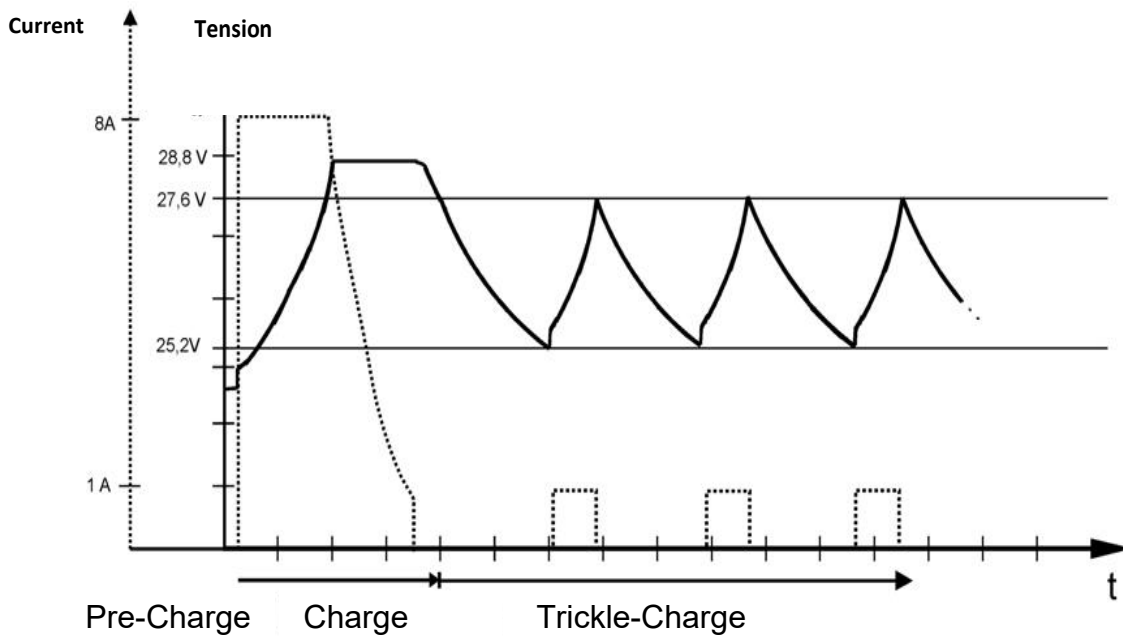
First the charging program checks if the pre-charge is required. In this case the battery must recover within a predetermined time. Is the pre-charge time exceeded 12h, the device displays fault.

Attention

Disconnect the charger from the power supply first. Then remove the charging cable from the vehicle.



Pic. 3: Current and Tension during charging a deep discharged 24V lead-acid-battery



Pic. 4: Current and Tension during charging a halfway discharged 24V lead-acid-battery

6.2 Battery types and charging characteristics

The battery charger and trickle charger UL30F can be used for 24V lead-acid batteries. Military practice recommends capacities from 20Ah to 400Ah for the UL30F. In case of higher capacities, the time of charging will be extended. Civil batteries can be different to this specification. The manufacturer information must be defined.

The integrated charging methods are optimized for 24V serially or parallel connected lead-battery sets according to VG96 924.

The battery charger and trickle charger UL30F is equipped with an IUa charging program (UIUa charge for deep-discharge batteries) with the following charging ranges:

- Charge divided into pre-charge (U), main charge (I) and main charge (U)
- Trickle charging

The long-term experience with the German armed forces shows that the I-trickle-charging method with upper and lower switching point (saw-tooth-charging-curve) in this device is clearly superior to the conventional U- or I-U charging method.

Note

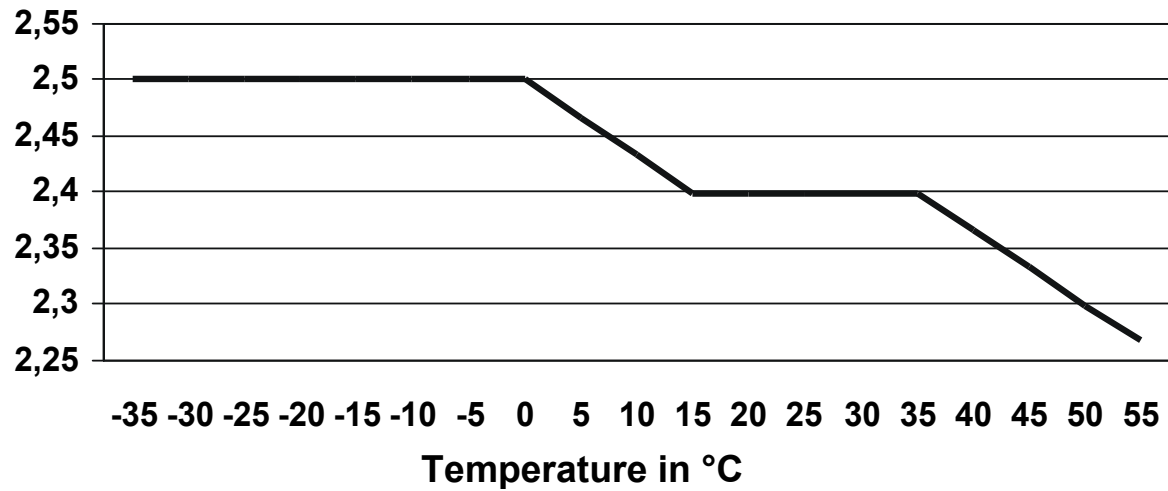
The charging functions cannot be chosen separately, because they are part of a closed function. The charging mode will be selected automatically after connection the battery:

- After switching on the supply voltage with the already connected battery.
- After a power failure and return of the supply voltage.
- When the lower switching point of 25.2V during trickle-charging e.g., by connecting a consumer, is exceeded for more than 10 seconds.

6.3 Temperature Compensation

The UL30F works with a temperature compensation of the charge voltage according to the specifications of the battery manufacturers. This results in optimal charging even under extreme climatic conditions and prevents battery damage.

Charging Voltage per cell



Pic. 5: Temperature compensation

7. Fault Indication and Rectification

7.1 Continuous Red Light «VOLTAGE < 25.4V»

The Red LED lights up when the battery voltage drops below 25.4V. The Red LED can light up in conjunction with the LED „Pre-charging“, „Main-charging“ or „Trickle Charging“.

Possible Causes

- a deep discharged battery
- a defect battery e.g., short circuit of a cell
- a connected electrical load which exceeds the charging current

Reasons and Measures

- Deep discharged battery?

- Measuring of the battery voltage with a multimeter
- In case of a battery voltage between 2V and 25.4V, continue the charging process by monitoring the battery voltage. The recharging a deep discharged battery pack of 100Ah may take up to 24 hours.

- Short circuit of a battery cell?

- Check the battery voltage of every single battery in the set.
- In case of a battery voltage below 0.5V, the complete battery set needs to be checked.

- Battery connection or charging cable broken?

- Visual check of the charging cable, its pins and the device connector.
- Replace the charging cable and continue charging.

- Short circuit of the charging cable?

- Electrical conductor check of the charging cable and its pins.
- Replace the charging cable and continue charging.

- Battery wrong connected to the device?

- Continue with correct connected battery charger and charging cable.
- Check of none switched off electrical loads to the battery.

7.2 Flashing Red Light «Device error»

Reasons and Measures

- Charging cable not connected?

- Check and connect

- Power supply unit fuse 2A defect?

- Replace defective fuse and repeat procedure.
- If the defect still exists the battery charger needs to be checked by repair department or manufacturer.

- Charging cable defect?

- Connect disconnected battery clamps to the battery
- Check and repair the charging cable
- Replace of the charging cable

- Switching power supply defect?

- Forward the device to the repair department or manufacturer.

7.3 Continuous Red Light «Battery error»

Possible Causes

- The battery connection is interrupted.
- The battery is still deep discharged and not able to be charged even after the permissible time of pre-charging.
- The allowed time of main-charging is exceeded and the charging current is not decreased to 1A.
- There is a device fault. The device needs to be checked by repair department or manufacturer.

Reasons and Measures

- Remove the battery pack from the vehicle
- Indicate the faulty battery
- If necessary, assembling of a new battery pack

Note

Only use batteries in a battery set with the date of manufacture is within 12 months apart.

Use only identical battery types. Never mix gel batteries with batteries containing liquid electrolyte.

Use only batteries with a capacity difference of max. 20%.

Attention

The weakest battery determines the life of the entire battery pack.

8. Accessories

8.1 Transportation frame

Up to two devices UL30F can be fixed on the transportation frame with two main sockets. The transportation frame has a connection cable of 10m length. Up to 8 devices may be connected to a single mains socket in a row which is fused with 16A.



Pic. 6: Transportation frame

8.2 Vehicle connection cable 032F

Vehicle connection cable for direct connection of battery chargers with 7-pole connector type 16S and vehicle with external start adapter (two-pole according to VG 96 917).



Pic. 7: Vehicle connection cable 032F

8.3 Battery connection cable 033E

The cable enables direct connection of battery chargers with 7-pole connector type 16S and the battery with 80A battery clamps.



Pic. 8: Battery connection cable 033E

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10. Spare Parts and Accessories

| Spare parts | Type | Part-No. |
|-------------------------------------|----------------------|--------------------|
| Battery charger and trickle charger | UL30F | UL30F.042 109-0037 |
| Manual | UL30F | 315 570 002 001 |
| Front foil | UL30F | 108 058 012 006 |
| LED-board | UL30i | 207 003 243 001 |
| Main-board | UL30 | 207 053 230 001 |
| Net cable (5m) | 3G1.0mm ² | 108 069 000 020 |
| Connector plug 7-pole CA3102E16S-1P | UL30 | 110 010 010 002 |
| Transistor | IRFP460 | 101 010 024 000 |
| Diode | STPS80150 | 101 030 200 000 |
| Magnet foot (pcs.) | UL30i | 108 205 906 436 |

| Accessories | Type | Part-No. |
|--|----------------------|-------------------|
| Transportation frame | UL30 | EL11.9440 000 269 |
| Net cable for transportation frame (10m) | 3G1.5mm ² | 209 040 003 150 |
| Vehicle connection cable 032F 10m | Kabel | 309 010 073 005 |
| Battery connection cable 033E 10m | Kabel | 309 010 072 006 |