

# General Manual

## **Trailer Charge (TC)**

# Trailer Charge

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## 1. Introduction.

We, members of the Hoorweg team, would like thank you for using the Trailer Charge battery charging system.



Before installation or commissioning, please read this manual carefully.

## 2. System description.

Trailer charge is specially designed to charge two sets of lead acid batteries (Gel,AGM,CaCa, (Semi-) Traction) on board of a trailer, independent of the alternator voltage of the truck, outside temperature and load.

During the design stage of Trailer Charge, reliability and safety were key issues. Input and outputs are protected against overload, short circuit and wrong polarity. The printed circuit boards are provided with a special coating against moisture. A lot of focus was given to the mechanical lay-out in order to protect Trailer Charge as much as possible against vibrations.

Trailer Charge can be programmed to charge a set of batteries with 25A. It is also possible to connect the two chargers in **parallel** to form one **50A** charger. In this case both circuits have to be programmed for the same type of batteries.

Each charger has three charging stages.

### 1. Bulk charge.

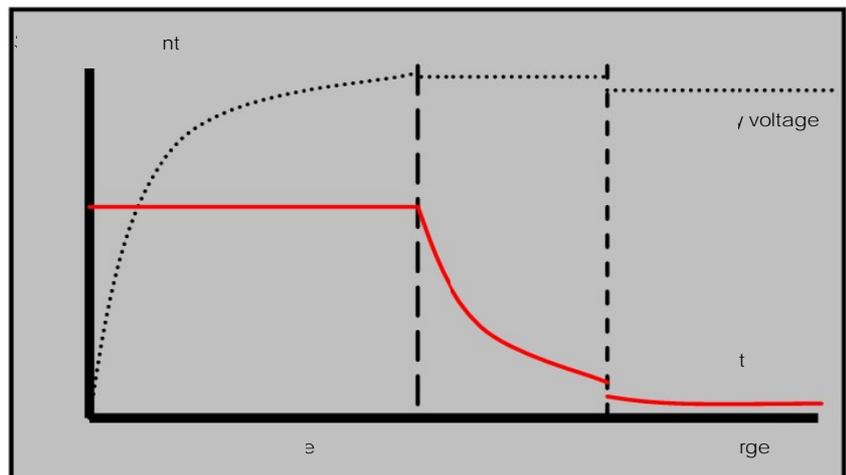
The current is limited to the set maximum value until a specific voltage is reached.

### 2. Absorption charge.

The voltage remains constant and the current drops slowly. As soon as the current reaches a certain value, the charger switches to the next stage.

### 3. Float charge.

The voltage is reduced to the maintenance value, the batteries are fully charged.



### 3. Technical data:

Input voltage	12 to 35 Volt DC
Output current	5, 10, 15 or 25 A Automatic
Output voltage	Standard 28.8; 29.4 and 30,5V
Temperature compensation	-20 to +40°C
Protection	Input polarity Output polarity Short circuit Overload
Dimension	L X W X H: 215 X 140 X 40 mm
Weight	1.5 Kg
Enclosure	IP 21

\* The maximum output current ( 25A) depends on the input voltage. If the input voltage is lower than the output voltage, the maximum current (25A) is reduced with the same percentage as the difference in voltages.



## 4. Safety instructions.

Read this manual carefully before fitting or commissioning the Trailer- Charge unit.



Follow the instructions as given in this manual.



Only work on the chargers with disconnected batteries and DC power supply from the truck



Trailer Charge has to be mounted in a dry location. Make sure that there is enough cooling air available to avoid the risk of **overheating**.



Only charge rechargeable batteries.

### Precautions for working with batteries.



Wash clothes and skin immediately with water and soap after it has been in contact with battery acid.



When acid has come in contact with the eyes, rinse with fresh water for at least 20 minutes and seek medical help.



During charging, explosive gases may develop. Do not smoke or use open fire in the vicinity of batteries that are being charged. Make sure there is proper ventilation.



Make sure that metal objects such as tools cannot fall on the battery poles. A battery short circuit can cause an explosion.



It is recommended to remove metal jewelry while working with batteries. A short circuit could cause serious burns.

## 5. Mounting and connecting

The location in the trailer is not particularly critical. In case of high moisture levels or the possibility of (occasional small quantities of) dripping water, it is recommended to mount the unit vertical, connectors facing downwards. In this way water droplets will not easily enter the unit.

Make sure that the Trailer-Charge unit is not exposed to large amounts of water and that there is enough cooling air available.

The cable size depends on the maximum charging current and distance between the charger and the batteries.

The size of the power supply cable (Connected to the truck alternator circuit) depend on the combined input currents of the two chargers in the unit. Also see paragraph 10. Too thin cables



Note:



Connect the supply voltage cable to the truck's electrical system that can supply the maximum current continuously and that switches off when the truck engine is not running or use a relais. If the two systems remain connected while the engine is not running, the Trailer Charge unit ***can fully drain*** the starter batteries in the truck.

Too small cables cause unnecessary power loss, longer charging cycles and possible overheating.

Battery cables are connected to the unit using M8 bolts with properly colour coded insulation.

A special multi-pole connector with pre wired cable is used to connect the Trailer-Charge unit to the remote display. For details see the manual for the remote display.

## 6. Programming

The TC will have to be programmed for the types of batteries that are used. To properly charge a set of batteries two parameters are important, which are:

1. The maximum charging current.
2. The maximum charging voltage during the absorption stage.

### The maximum charging current.

The maximum charging current is set on 25 Amp and will go down automatically. This is suitable for most commonly used batteries of 180Ah to 230Ah.

(For most types of batteries the charging current should be around 10% of the battery capacity measured at 20 hours discharge. (C20 value))

The next table shows these settings and corresponding battery capacities.

The next table shows the current at which the charger will switch from absorption to float charge.

Current setting	Switching point absorption-float charge
5	2A
10	2,5A
15	3A
20	4A

Remark:

If a low amp setting of the charger (5 amp.) is selected to charge a very large battery set ( for instance 300Ah), the following may happen.

At the end of the absorption charge stage, the current may not drop below the minimum level to switch to float charge. This means that the charger will stay in the absorption stage too long. The voltage will be too high and serious water loss will be the case. Therefore it is important not to select the charging current too low in comparison with the battery capacity.

This effect is even more serious when traction batteries are to be charged. The absorption voltage is higher and therefore the current will be higher.

### The maximum charging voltage during the absorption stage.

Trailer charge has the following settings:

Setting	Absorption voltage
A	28,8 V
B	29,4 V
C	30,0V
D	30,7V (not for lead-acid batteries)

The next table shows what absorption voltage setting should be used for different types of lead-acid batteries.

Battery type	Setting
Maintenance free Gel battery	A
Maintenance free AGM battery	A
Maintenance free Ca-Ca battery	C
Starter battery (Flooded)	B
Semi-traction battery	B
Traction battery	C
Odyssey AGM	B

Your battery supplier can advise you which setting is the best for the type of batteries that are used.

If there is no information available the following might be of help.

Is the battery filled with a liquid and has the battery filling caps? **Setting B\***

Is the battery filled with a liquid but there are no filling caps? **Setting C**

No liquid and no filling caps? **Setting A**

\* This setting is correct for starter batteries and semi traction batteries. Full traction batteries are also filled with a liquid and have filling caps. One can usually recognise those batteries by their dimensions, single cell execution, different poles and special markings. Traction batteries require **Setting C**. If in doubt, select setting B.

## Programming.

The settings can only be changed by qualified staff members that are in the possession of a programming key. This extra safety feature makes it impossible for unauthorized people to change the settings which might cause battery damage or too short battery life.

Step by step procedure:

1. Connect the power input to a 15 to 35 Volt power supply or a set of batteries. The LED's for the current settings will light up.
2. If there is a remote display connected, remove the connector from the Trailer Charge.
3. Place the electronic key in the remote socket.  
The LED's that show the current settings will light with short off pulses.
4. Push the program button for the selected battery type and choose the battery type A,B, C or D.
5. When the button is released for 3 seconds the settings are fixed.
6. Both LED's now light with short off pulses.
7. Remove the programming key. The charging current is automated so these can light on 5, 10 15 or 20A.

## 8. Remote display.

The remote display unit consists of a small fully enclosed ( IP68) housing with two sets of LED's to indicate the state of charge of each set of batteries.

The state of charge is displayed as follows:

Red on.	Batteries are not charged.
Red flashing.	Bulk charge. The charger works.
Green flashing.	Absorption charge, the batteries are nearly full.
Green on.	Trickle charge, the batteries are full.

## 9. Ageing of batteries.

Older batteries may get effected by sulphation. This hard, high resistance layer causes the battery voltage to drop severely under load. During charge the voltage will increase quickly, causing the charger to switch to absorption charge too soon. Since the batteries are not yet properly charged the absorption charge stage will take much longer than it should.

When sulphation is very serious, the charger will go to the float stage very quickly, even if the batteries are not yet charged. ( Green LED on)  
Sulphation is a slow process that takes some time to develop. The first signs are a drop in voltage under load, even when the batteries are (supposed to be) fully charged.

Hard sulphate layers cannot be removed from the battery plates. The batteries will have to be replaced.

## 10. Too thin cables

Too thin cables between Trailer-Charge and the batteries will have a negative effect on the charging process. Too high circuit resistivity will make the charging voltage to rise too quickly during bulk charge. The charger will switch from bulk to absorption too soon, causing the absorption phase to become too long.

The next table gives an indication of cable size in relation to cable length and current setting of the charger.

Trailer Charge Current in A	Cross section of the cable in mm <sup>2</sup>								
	2,5	4	6	10	16	25	35	50	70
<b>Total length of the + en – cables together in meters</b>									
5	5,71	9,14	13,71	22,86	36,57	57,14	80,00	114,29	160,00
10	2,86	4,57	6,86	11,43	18,29	28,57	40,00	57,14	80,00
15	1,90	3,05	4,57	7,62	12,19	19,05	26,67	38,10	53,33
20	1,43	2,29	3,43	5,71	9,14	14,29	20,00	28,57	40,00

## 10. Maintenance.

Trailer Charge TC2020 does not require any maintenance. The enclosure can be cleaned using a clean dry piece of cloth. Never use water or a solvent to clean the enclosure, the cables or the connectors.

## 11. List of accessories.

	Description
1	Electronic key
2	Remote display

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