Features:
☑ Suitable for 6V and 12V sealed and open lead-acid batteries
☑ Fully automatic charge and maintenance cycle
☑ Status indicators for charge, float and end-of-charge
☑ Protected against polarity reversal
☑ Simply connect and forget

Specifications:
☑ Charge current: 0.3 or 1A selectable
☑ Power supply: 2x9V/25VA (our type 2090250MST)
☑ Dimensions (wxdxh): 97 x 140 x40mm / 3.8” x 5.5” x 1.6”
☑ Not suitable for non-rechargeable or NiCd/NiMH batteries

Options:
☑ Transformer prim. 230V - sec. 2x9V/25VA: 2090250MST
☑ Enclosure: TKAUS22G
☑ Power cord: NETSNOER
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1. Assembly (Skipping this can lead to troubles!)  
Ok, so we have your attention. These hints will help you to make this project successful.
Read them carefully.

1.1 Make sure you have the right tools:

- A good quality soldering iron (25-40W) with a small tip.
- Wipe it often on a wet sponge or cloth, to keep it clean; then apply solder to the tip, to give it a wet look. This is called ‘thinning’ and will protect the tip, and enables you to make good connections. When solder rolls off the tip, it needs cleaning.
- Thin raisin-core solder. Do not use any flux or grease.
- A diagonal cutter to trim excess wires. To avoid injury when cutting excess leads, hold the lead so they cannot fly towards the eyes.
- Needle nose pliers, for bending leads, or to hold components in place.
- Small blade and phillips screwdrivers. A basic range is fine.

* For some projects, a basic multi-meter is required, or might be handy

1.2 Assembly Hints:

- Make sure the skill level matches your experience, to avoid disappointments.
- Follow the instructions carefully. Read and understand the entire step before you perform each operation.
- Perform the assembly in the correct order as stated in this manual
- Position all parts on the PCB (Printed Circuit Board) as shown on the drawings.
- Values on the circuit diagram are subject to changes.
- Values in this assembly guide are correct*
- Use the check-boxes to mark your progress.
- Please read the included information on safety and customer service

* Typographical inaccuracies excluded. Always look for possible last minute manual updates, indicated as ‘NOTE’ on a separate leaflet.
1.3 Soldering Hints:

Mount the component against the PCB surface and carefully solder the leads. Make sure the solder joints are cone-shaped and shiny. Trim excess leads as close as possible to the solder joint.
AXIAL COMPONENTS ARE TAPEED IN THE CORRECT MOUNTING SEQUENCE!

REMOVE THEM FROM THE TAPE ONE AT A TIME!

1. JUMPER WIRES

- J1
- J2
- J3

2. 1/4W RESISTORS

- R1: 47K (4 - 7 - 0 - 2 - 1)

3. 1/2W RESISTORS

- R2: 27K (2 - 7 - 0 - 2 - 1)
- R3: 120K (1 - 2 - 0 - 3 - 1)
- R4: 180K (1 - 8 - 0 - 3 - 1)
- R5: 10K (1 - 0 - 3 - B)
- R6: 270K (2 - 7 - 0 - 3 - 1)
- R7: 10K (1 - 0 - 3 - B)
- R8: 1K5 (1 - 5 - 2 - B)
- R9: 1K (1 - 0 - 2 - B)
- R10: 10K (1 - 0 - 3 - B)
- R11: 4K7 (4 - 7 - 2 - B)
- R12: 1K (1 - 0 - 2 - B)
- R13: 10K (1 - 0 - 3 - B)
- R14: 10K (1 - 0 - 3 - B)
- R15: 33K (3 - 3 - 3 - B)
- R16: 10K (1 - 0 - 3 - B)
- R17: 1M (1 - 0 - 5 - B)
- R18: 680 (6 - 8 - 1 - B)
- R19: 15K (1 - 5 - 3 - B)
- R20: 10K (1 - 0 - 3 - B)
- R21: 10K (1 - 0 - 3 - B)
- R22: 220K (2 - 2 - 4 - B)
- R23: 2K2 (2 - 2 - 2 - B)
- R24: 2K2 (2 - 2 - 2 - B)
- R25: 12K (1 - 2 - 3 - B)
- R26: 1M (1 - 0 - 5 - B)
- R27: 1K (1 - 0 - 2 - B)
- R28: 2K2 (2 - 2 - 2 - B)

- R29: 1.5 (1 - 5 - B - B - 9)
- R30: 1.8 (1 - 8 - B - B - 9)
- R31: 2.2 (2 - 2 - B - B - 9)
4. DIODES (Watch the polarity!)

- D1: 1N4148
- D2: 1N4148
- D3: 1N4148
- D4: 1N5400 … 1N5408
- D5: 1N5400 … 1N5408
- D6: 1N5400 … 1N5408
- D7: 1N5400 … 1N5408
- D8: 1N5400 … 1N5408

5. IC SOCKET (Watch the position of the notch!)

- IC1: 14P

6. TRANSISTORS

- T1: BC547
- T2: BC547
- T3: BC547
- T4: BC547
- T5: BC547
- T6: BC557

7. VOLTAGE REFERENCE

- VR1: LM385Z2.5

8. TERMINAL BLOCKS

- SK1: 2P
- SK2: 2P
9. SWITCHES

- SW1: SINGLE POLE (ON-ON)
- SW2: SINGLE POLE (ON-ON)

10. ELECTROLYTIC CAPACITORS (Watch the polarity!)

- C1: 2µF
- C2: 4700µ/35V

11. POWER TRANSISTOR

- T7: MJ3001, MJ4035, BDX87, 2N6057, 2N6058, 2N6059, 2N6283, 2N6284 or EQ.

12. LEDS (Watch the polarity!)

- LD1: 3mm LED RED (2)
- LD2: 3mm LED RED (2)
- LD3: 3mm LED YELLOW (4)
- LD4: 3mm LED GREEN (5)

13. IC (Watch the position of the notch!)

- IC1: LM324, LM224
14. CONNECTION, TESTING AND USE

Connection: The unit can be connected as shown on drawing 15. Make sure your assembly complies with the local safety regulations. For improved safety, use a non-conductive enclosure.

Enclosure:
Drawing 17 provides a drill pattern for our optional enclosure (ref. TKAUS22G). The included adhesive front panel label can be used to mark the position of the holes to be drilled. Position the label on the front panel and fix it temporary with tape. Mark the center of the holes with a center punch. Remove the label and drill the holes. Pay attention to the correct diameter. Make sure all holes are free of burrs. Degrease the front panel before sticking the label onto it. The label edges will need to be trimmed with a sharp cutter. Drawing 16 provides an internal view of the finished unit. Whatever enclosure you use, make sure it is well ventilated, as the heatsink might run hot during charging.

Testing:
Perform all tests as shown below, before the first use of the unit. It allows you to check every function of your charger kit. Use the supplied 5W dummy load resistors and a reliable multi-meter.

Put SW2 in the 12V position. Measure the voltage across the output terminals. Output voltage should be 13.6V +/- 0.2V.
Put SW2 in the 6V position. Measure the voltage across the output terminals. Output voltage should be 6.8V +/- 0.2V

Put SW2 in the 12V position, put SW1 in the >4Ah position. Connect the supplied 33Ω/5W resistor to the output terminals. Measure the voltage across the resistor. It should read 14.7V +/- 0.2V

Put SW2 in the 6V position, put SW1 in the >4Ah position. Connect the supplied 33Ω/5W resistor to the output terminals. Measure the voltage across the resistor. It should read 7.3V +/- 0.2V

Put SW2 in the 12V position, put SW1 in the >4Ah position. Connect the supplied 8.2Ω resistor in series with the multi-meter. Switch the multi-meter to the ‘10A DC’ -position. It should read 1A +/- 0.1A.
Put SW2 in the 12V position, put SW1 in the <4Ah position. Connect the supplied 8.2Ω resistor in series with the multi-meter. Switch the multi-meter to the ‘10A DC’-position. It should read 0.3A +/- 0.03A.

If any of the measurements show a considerable difference with the reference values, please recheck the entire assembly, and pay special attention to resistor values.

Use:

Perform the necessary settings before you hook-up the battery to the unit:
Select the appropriate charge current and voltage according to the capacity of the battery.
Batteries < 4Ah: 0.3A charge current
Batteries > 4Ah: 1A charge current

You can easily estimate the charging time with the following formula:

Approx. charging time (hours) = (battery capacity (Ah) / charging current (A)) x 1.2

Pay attention to the polarity when you hook-up a battery to the charger.

Switch on the unit, to start the charging cycle. Batteries should be charged in a well ventilated area, because of the possible emission of gases. Do not cover the unit during charging, as it might result in overheating or even fire.
Operation:
When a discharged battery is connected to the unit, it starts charging it with
the maximum current (0.3A for batteries <4Ah, 1A for batteries >4Ah), until
the battery voltage reaches 14.7V (7.35V for a 6V battery). Once this volt-
age is established, the charger adjusts the charge current, in order to keep
this voltage steady. At the end of the charging cycle, when the charge cur-ent has dropped significantly, the output voltage is dropped to 13.6V (6.85V
for a 6V battery). This allows the battery to remain hooked-up to the
charger without any risk for an indefinite time. Should the battery discharge,
then the charge cycle will restart automatically.

Troubleshooting:
If you have successfully completed the above tests, there is not much that
can go wrong.
If the unit never leaves the ‘charge’ cycle, this could point to either a defec-
tive battery, a too low charge current setting, or a battery with a too large
capacity.

15. CONNECTION DIAGRAM

![Connection Diagram]
16. ASSEMBLING

- **AC**
- **RED**
- **BLACK**
- **SW1**
- **SW2**
- **R20**
- **R16**
- **J1**
- **M3 NUT**
- **20mm SPACER**
- **PCB BOTTOM**
- **30mm M3 BOLT**
- **M3 WASHER**
- **10mm M3 BOLT**
- **M3 NUT**
- **AC INLET TRANSFORMER 2x3V/25VA**
- **STRAIN RELIEF BUSHING**
- **ON/OFF SWITCH**
- **STATIONARY LOCK WASHER**
- **M3 NUT**
- **10mm M3 BOLT**
- **M3 WASHER**
- **BOTTOM**
- **SOLDER RED BLACK**
- **IC1 1**
- **D7**
- **D6**
- **D5**
- **D4**
- **C2**
- **D1**
- **D2**
- **D3**
- **T1**
- **T2**
- **T3**
- **R26**
- **R27**
- **R24**
- **R23**
- **R15**
- **R22**
- **SK1**
- **R3**
- **VR1**
- **T4**
- **R13**
- **R11**
- **R12**
- **R9**
- **R8**
- **b**
- **c**
- **R25**

**END OF CHARGE**

**CHARGE**

**STANDBY**

**POLARITY WRONG**

**ACCU VELLEMAN P8012'1 LEAD-ACID BATTERY CHARGER**

**VOLTAGE SELECT**

**CAPACITY BATTERY**

**J2**

**J3**

**T7**

**T6**

**R28**

**R21**

**SK2**

**- R14**

**R10**

**+ ACCU**

**VELLEMAN**

**VOLTAGE SELECT**

**CAPACITY BATTERY**

**J2**

**J3**

**T7**

**T6**

**R28**

**R21**

**SK2**

**- R14**

**R10**

**+ ACCU**

**VELLEMAN**

**VOLTAGE SELECT**

**CAPACITY BATTERY**

**J2**

**J3**

**T7**

**T6**

**R28**

**R21**

**SK2**

**- R14**

**R10**

**+ ACCU**

**VELLEMAN**

**VOLTAGE SELECT**

**CAPACITY BATTERY**

**J2**

**J3**

**T7**

**T6**

**R28**

**R21**

**SK2**

**- R14**

**R10**

**+ ACCU**
17. DRILL PATTERN ENCLOSURE ‘TKAUS22G’

All distances are expressed in mm
VELLEMAN P8012'1 LEAD ACID BATTERY CHARGER

SW1, SW2

6/12V

J1

1/4Ah

SW1

BATTERY CAPACITY SELECT

D5, D4

C1

T7

IC1

VR1

R1, R2, R3

R4, R5, R6

R7, R8

R9, R10

R11, R12

R13, R14

R15, R16

R17, R18

R19

R20

R21

R22

R23

R24

R25

R26, R27

R28

R29

R30

R31

6/12V

T1, T2

WRONG POLARITY

T3

LD1

CHARGE

T4

LD2

FLOAT CHARGE

T5

T6

J3

END OF CHARGE

D8

ACCU

+<4Ah

VELLEMAN P8012'1 LEAD ACID BATTERY CHARGER

18. PCB LAYOUT