

MPP- Windpower charge controller windMax500

Description:

This windpower charger in processor technique, contains all functions for smooth charging of lead batteries by windpower generators of 560W at 24V- and 280W at 12V-battery-systems.

Because of the powertracking it is possible to increase the charged electrical power from the wind generator into the battery up to 200%, compared with standart charging systems. This is achieved through controlled adaptation (1x per Second) of windgenerator and battery system.

The maximum generator dc-voltage can be for a 12V-system as well as for a 24V-system and 48V-System 200V. (Open circuit voltage)
The controller input is a 3phase current input. The voltage in the Maximum powerpoint of the windgenerator is transformed to the level of the battery system. (12V/24V/48V).

The topology of the buck converter feeds the maximum possible current from the power maximum into the battery. As soon as the battery is full and reaches its maximum voltage (14.1V/28.2V/56.4V) the charger drives the generator voltage towards open circuit voltage, preventing overcharging of the battery.

For protection of the windgenerator and charge controller it is possible to connect a load resistor to the terminal **Rload**.

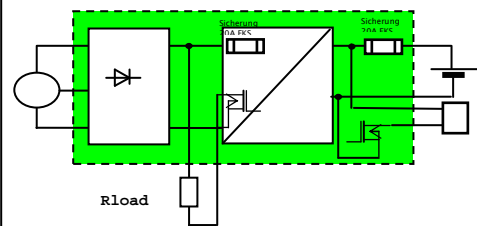
The load resistor is connected via a mosfet between +/- of the rectified generator voltage.

An optional temperature sensor at the battery system effects the maximum battery voltage at a rate of -4mV/°C/battery cell.

LED's indicate the battery state. Battery management allows optimal use of the battery capacity



Principal circuit diagram



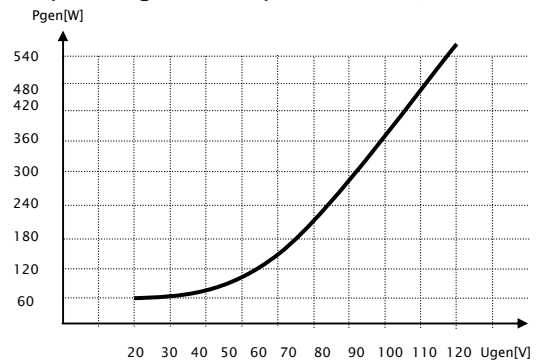
Highlights:

- * DC-Converter to optimize wind power income
- * MPP-Tracking of wind generator voltage
- * Selection of 3 battery voltages 12V/24V/48V
- * Load resistor terminal
- * Deep discharge protection
- * Temperature tracking of battery voltage
- * Battery management System

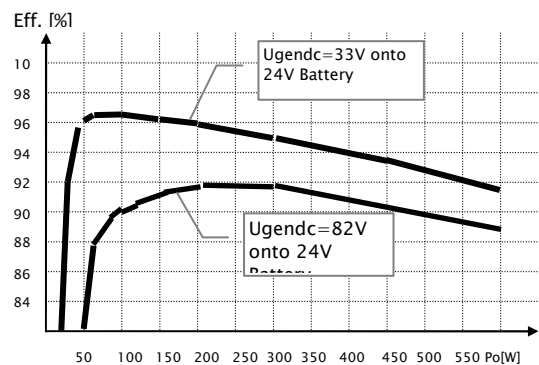
Technical data

	12V-Battery	24V-Battery	48V-Battery
Max. Generator voltage, U _{gendc}	200Vdc	200Vdc	200Vdc
Max. Generator current	8A	8A	8A
Max. Battery current	20A	20A	12.5A
Max. Generator power, P _{gen} @Eff.=90%	310W	620W	780W
Efficiency	93% @ 0.5P _{gen}	96% @ 0.5P _{gen}	96% @ 0.5P _{gen}
End of charge voltage	14.5V	29.0V	58.0V
Deep discharge protection			
Load disconnect	10.8V Battery voltage with 60 Sec. delay	21.6V Battery voltage with 60 Sec. delay	43.2V Battery voltage with 60 Sec. delay
Load reconnect	12.5V	25.0V	50.0V
Load resistor dis-/reconnect	150Vdc/80Vdc	150Vdc/80Vdc	150Vdc/80Vdc
Current consumption	3mA	3mA	3mA
Terminals	16qmm/10qmm, 16qmm/10qmm, 16qmm/10qmm, 1.5qmm, 1.5qmm, 4qmm/2.5qmm,		
3x wind generator			
2x battery output			
2x consumer outp.			
2x temp. sensor			
2x pot.free contacts			
2x Rload			
Temperature sensor	KTY10-5 or 1.91kOhm		
LEDs	right: yellow (max. battery voltage) left: green (battery current > 0.5A) middle: red (load disconnected)		
Housing	Diecast aluminium BxHxT 220x80x120mm		
protection	IP65		
weight	2200g		
Moisture	90%		
Operating temperature	-20°C to +50°C		

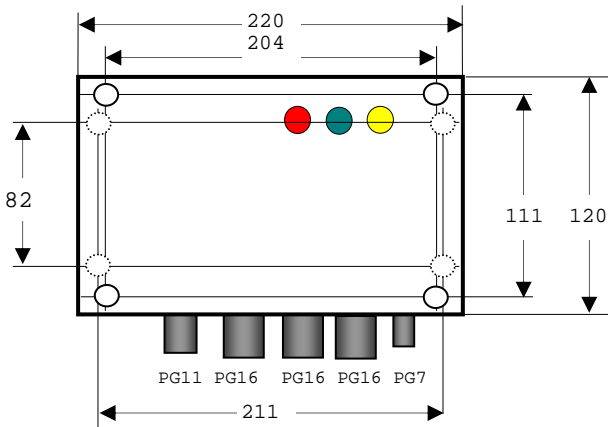
expected generator power (battery side)



Efficiency vs power



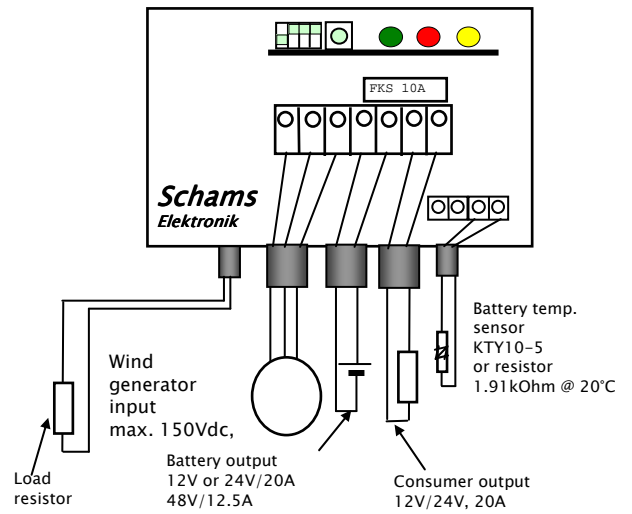
Housing dimensions (mm):



Height 80mm

- Mounting hole in cover, M6
- ⊙ Mounting hole in bottom of housing D=7mm

connection diagram



Basic calculations:

The maximum admissible input voltage of the charge controller is determined by the rectified AC-Voltage of the three phase generator. Depending on star or delta connection, the dc-voltage is different.

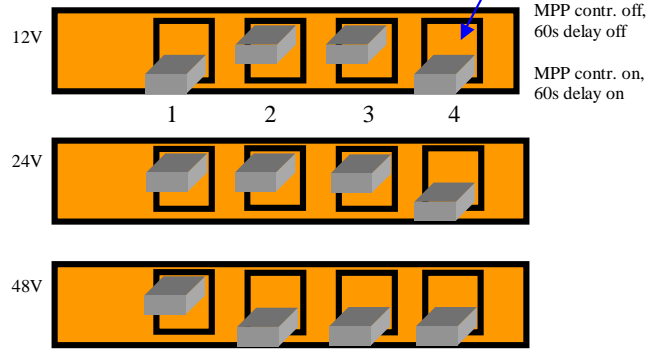
At a star connection the maximum generator dc-voltage is:
 $U_{gendc} = 1.35 \cdot U_{rs}$ or $1.35 \cdot U_{st}$ or $1.35 \cdot U_{rt}$
 $U_{rs} = 1.73 \cdot U_{string}$

At a delta connection the maximum generator dc-voltage is:
 $U_{gendc} = 1.35 \cdot U_{rs}$



Dil switches and reset on controll board

MPP and deep discharge protection



By pressing the reset switch and having switched off the MPP control you can adjust manually to the MPP of the wind generator.

Connection of load resistor

The load resistor must be connected to the terminal Rload.

It's purpose is to remove electrical energy from the windgenerator when the battery is full and if the windpower is too large.

As soon as a generator dc- voltage (U_{gendc}) more than 150Vdc is at the charge controller, the load resistor is switched on.

Recommended dimensioning:

Resistor value: $R_{load} = 150V \times 150V / P_{gen}$
 Resistor power: $P_{load} = 150V \times 150V / R_{load}$

Example: $P_{gen} = 620W$

$R_{load} = 150 \times 150 / 620 = 36.3 \Omega \Rightarrow 33 \Omega$
 $P_{load} = 150 \times 150 / 33 = 682W$

Wind-generator 3phase rectifier MPP-tracking buck regulator Battery consumer

