

MPPT- Windpower charge controller windMax500

Description:

This windpower charger in processor technique, contains all functions for smooth charging of lead batteries by windpower generators of 600W at 24V- and 300W at 12V-battery-systems.

Through powertracking more electrical energy is charged from the wind generator into the battery compared with standard charging systems, depending on the nominal voltage of the wind turbine. The higher the turbine voltage against the battery voltage, the higher the gain.

The maximum generator voltage can be 150Vac (Open circuit voltage). It is a 3phase 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 break resistor to the terminal **DUMPLoad**

The break resistor is switched on the gnd level via a mosfet at the output of the 3 phase rectifier.

MPPT is activated about every second.

Optional a power curve can be programmed ex works. The Voltage steps are 1V, between 0V and 192V.

Optional a temperature sensor placed near the batterysystem effects the maximum battery voltage at a rate of -4mV/°C/battery cell.

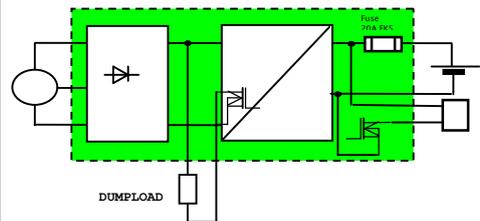
Optional the device can be equipped with a LCD Display for battery current, battery voltage, power and energy (kilowatt hour meter).

Optional a boost converter can be equipped, which feeds energy into the battery from minimum 7Vdc generator voltage. The battery system voltage may be 12V, 24V or 48V.

Optionally a RS232 can be added.



Principal circuit

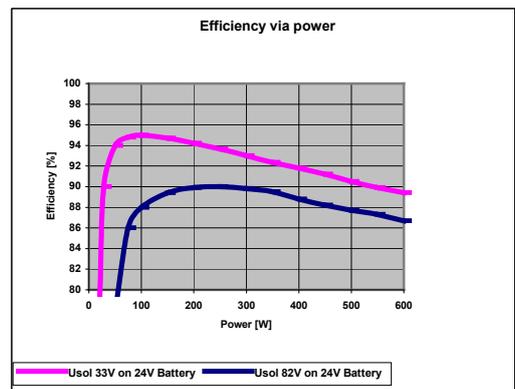
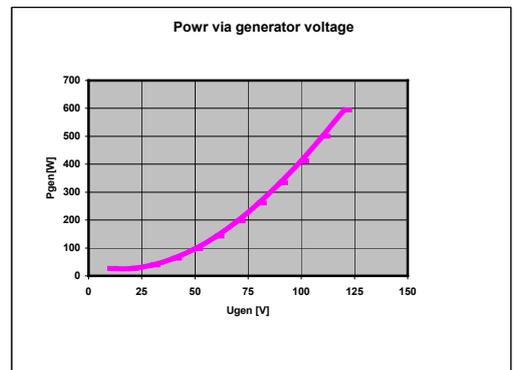


Highlights:

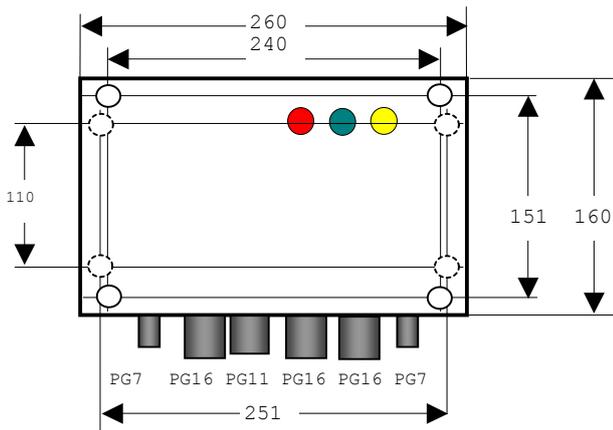
- * DC-Converter to optimize wind power income
- * MPPT-Tracking of wind generator voltage
- * Selection of 3 battery voltages 12V/24V/48V
- * Break resistor switching output
- * Deep discharge protection with shortcut protection
- * optional power curve programming, instead of mppt
- * optional dc boost converter for generator voltage.
- * optional LCD for current, voltage, power, energy

Technical data

	12V-Battery	24V-Battery	48V-Battery
Max. Generatorvoltage, U _{gencd}	200Vdc	200Vdc	200Vdc
Max. Generator current	8A	8A	8A
Max. Battery current	20A	20A	12.5A
Max. Generator power, P _{gen} @Eff.=90%	322W	617W	771W
Efficiency	92% @ 0.5P _{gen}	94% @ 0.5P _{gen}	94% @ 0.5P _{gen}
End of charge voltage	14.5V	29.0V	58.0V
Deep discharge protection			
Load disconnect (short cut protected)	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
Max. consumer current	12.5A	12.5A	12.5A
Break resistor dis-/reconnect	160Vdc/150Vdc	160Vdc/150Vdc	160Vdc/150Vdc
Current consumption	7mA	7mA	7mA
Terminals			
3x wind generator		16qmm/10qmm,	
2x battery output		16qmm/10qmm,	
2x consumer outp.		16qmm/10qmm,	
2x temp. sensor		1qmm,	
2x pot.free contacts		1qmm,	
2x DUMPLoad		4qmm/2.5qmm,	
1x Earth		M6	
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		
Option Boost converter	14.5W	29W	58W
Max. charging current	1A	1A	1A
Min. input voltage	7Vdc		



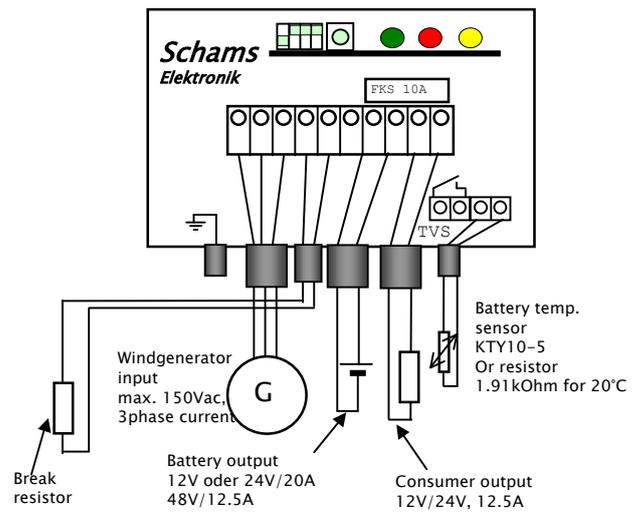
Housing dimensions (mm):



Height 80mm

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

connection diagram

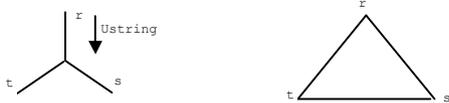


Basic calculations:

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.

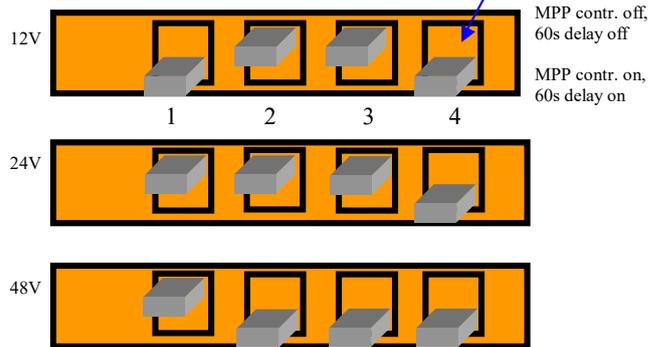
At a star connection the maximum generator dc-voltage is:
 $U_{gendc} = 1.35 \cdot U_{rs}$ or $1.35 \cdot U_{st}$ or $1.35 \cdot U_{rt}$
 $U_{rs} = 1.73 \cdot U_{string}$

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 break resistor

The break resistor must be connected to the terminal **DUMLOAD**.

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 (**Ugendc**) more than 160Vdc is at the charge controller, the break resistor is switched on.

Recommended dimensioning:

Resistor value: $R = 150V \times 150V / P_{gen}$
 Resistor power: $P = 150V \times 150V / R$

Example: $P_{gen} = 620W$

$R = 150 \times 150 / 620 = 36.3 \Omega \Rightarrow 33 \Omega$
 $P = 150 \times 150 / 33 = 682W$

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

