

MPPT- Windpower charge controller windMax1000

Description:

This windpower charger in processor technique, contains all functions for smooth charging of lead batteries by windpower generators of 1200W at 24V- and 600W 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 battery, effects the maximum battery voltage at a rate of $-4mV/^{\circ}C$ /battery cell.

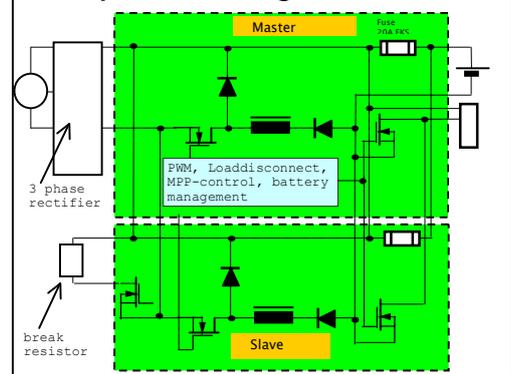
Optional the device can be equipped with a LCD Display for battery current, battery voltage, power and energy (kilowatt hour meter).

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 diagram

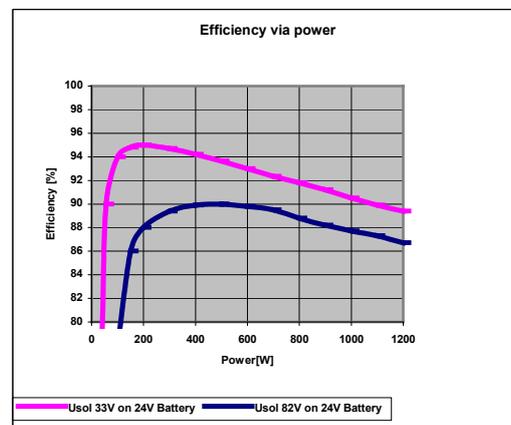
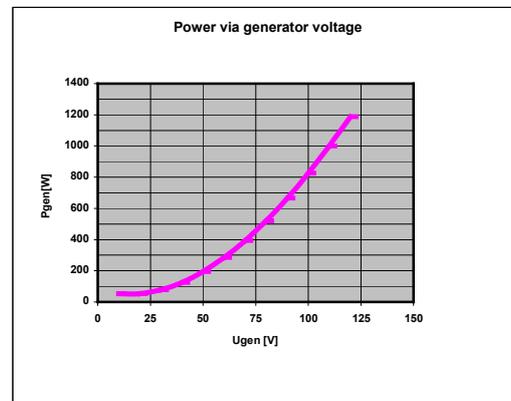


Highlights:

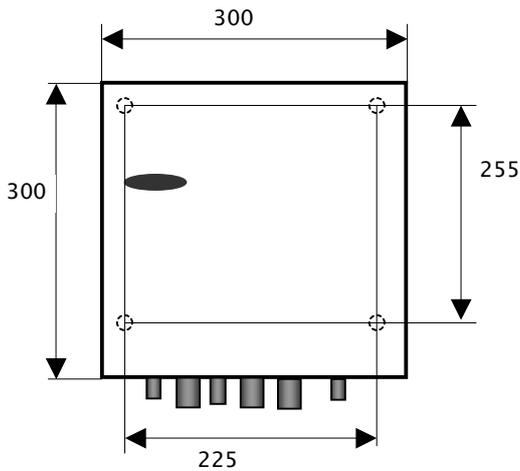
- * DC-Converter to optimize wind power income
- * MPPT-Tracking of wind generator voltage
- * Selection of 3 battery voltages 12V/24V/48V
- * Break resistor switching output
- * Deep discharge protection with shortcut protection
- * optional power curve programming, instead of mppt
- * optional dc boost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

Technical data:

	12V-Battery	24V-Battery	48V-Battery
Max. Generatorvoltage, U _{genc}	200Vdc	200Vdc	200Vdc
Max. Generator current	16A	16A	16A
Max. Battery current	40A	40A	25A
Max. Generator power, P _{gen} @Eff.=90%	644W	1234W	1543W
Efficiency	90% @ 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	25A	25A	25A
Break resistor dis-/reconnect	150Vdc/160Vdc	150Vdc/160Vdc	150Vdc/160Vdc
Current consumption	10mA	10mA	10mA
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		Steel wall mounted wxhxd 300x300x150mm	
protection		IP65	
weight		11 kg	
Moisture		90% (coating)	
Operating temperature		-20°C to +50°C	
Option Boost converter	29W	58W	116W
Max. charging current		2A	
Min. input voltage		7Vdc	



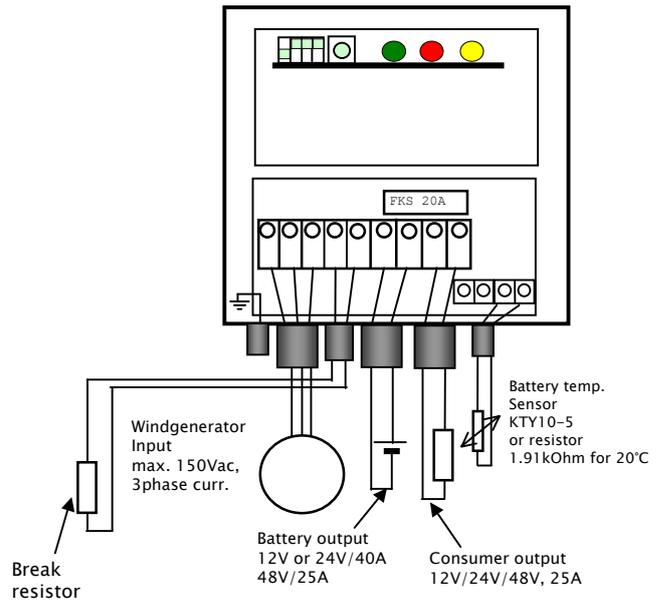
Housing dimensions (mm):



Height=150mm

○ Mounting holes in bottom of housing
 D=10mm

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.

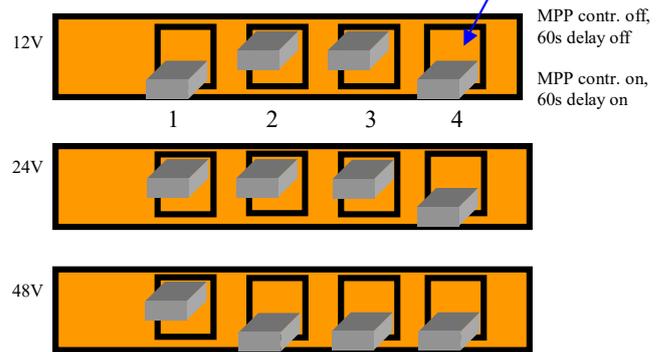
At a star connection the maximum generator dc-voltage is:
 $U_{gdc} = 1.35 \cdot U_{rs}$ or $1.35 \cdot U_{st}$ or $1.35 \cdot U_{rt}$
 $U_{rs} = 1.73 \cdot U_{string}$

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



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 (U_{gdc}) more than 160V 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: $P_{gen} = 1240W$

$R = 150 \times 150 / 1240 = 18.15 \Omega \Rightarrow 180 \Omega$
 $P = 150 \times 150 / 22 = 1250W$

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

