



PWM-Solar Protects HRV-Solar

FAHReenergy HRV-Solar has a maximum input voltage of 13.5V. At higher input voltages it is damaged. This is why HRV-Solar needs protection against unstable power sources such as solar panels and car charging systems.

- 12V solar panels delivers to 22V at zero load.
- Solar 12V charging systems exceeds 14V.
- A car battery being charged (when the motor runs) may reach 14.6V.

PWM-Solar

PWM-Solar is a high efficiency Protection Regulator.

- It safely connects the FAHReenergy Fresh Air Heat Recovery ventilator, HRV-Solar, to a 12V solar panel or a 12V car/boat.
- It reduces DC power output to the HRV-Solar, in Quiet Mode, from 100% to 50% at near zero loss.
- It caps the solar panel and car voltage to a maximum of 13.4V.



Three Safety Actions

1: Over Voltage Protection (OVP)

A solar panel can deliver voltages above 14V if it is disconnected from the car battery.

The OVP acts at supply voltages above 14V by switching off the supply to the HRV-Solar.



2: Resettable Fuse (RF)

The RF cuts the supply at current loads above 0.75A. This prevents damage to the PWM-Solar should a short or overload occur.

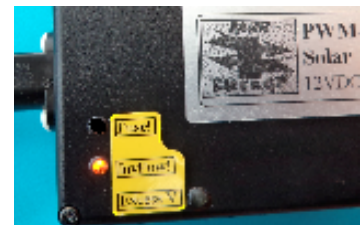
The RF thus prevents fire in the PWM-Solar and HRV-Solar.

Note: Electronic short circuit protection cannot perform this task as they are vulnerable to lightning etc and may thus fail to switch off.



3: Inverse Power Protection (IPP)

The IPP prevents the damage, inverse polarity would cause, by disconnecting the PWM-Solar and the HRV-Solar from the supply.





Specification for FAHReenergy PWM-Solar

FAHReenergy PWM-Solar is designed to deliver power to HRV-Solar from a 12V solar system, a 12V car system or a 12V boat system.

Note: For proper function a 12V solar panel must be connected to a 12V rechargeable battery (accumulator). The battery stores excessive energy and keeps a steady output.

An autonomous solar system also has a battery charge controller with overcharge and discharge protection.

Function (OVP)	Output capped to	Protection	Max voltage
Over Voltage Protection	13.4V	Cuts the output to the HRV	22V

Note: When the input voltage is reduced to 14V the output is below 13.4V and the OVP will be deactivated.

This protects from over voltage produced by solar systems and car/boat charging systems.

Function (Resettable fuse: RF)	Max current	Reset time	Fuse cycles	Reaction time
Over Load Protection (OLP)	0.75A	60sec.	Max 100	4sec.

Note: An active RF cuts the output to 2V. The fuse resets a little time after the overload has been removed. Max overload current is 3A.

At overload: Remove the overload immediately! The lifetime of the fuse is drastically reduced during overload.

Function (IPP)	Max inverse voltage	Protection
Inverse Power Protection	-22V	Cuts output to HRV

Dimensions: L * W * H = 72 * 49 * 28 millimeter

Quiet Mode

In Quiet Mode the HRV-Solar uses less than 4W.

Quiet Mode reduces HRV-Solar power consumption by 50% through Pulse Width Modulation (PWM) at better than 90% efficiency. The PWM pulses are 50% 12V and 50% 0V. This is necessary for the 12V ECM fans.

Power Source

Maximum short circuit current: 3A.

The output source must be limited to 3A.

A 12V, 30W solar panel delivers less than 3A. **OK.**

A car/boat charging system can deliver very high currents:
Never short circuit the PWM-Solar when connected to such a source.

