

NEG 4

The basis of this device are experiences, basing on the development of grid connected inverters since 1987.

In those days they call it “Ghostriders in the network”. One couldn’t talk about a “1000-roof-program” (German creation) or even market introducing strategies. Meanwhile there is a serious market competition of network connected photovoltaic-equipments and its components.

What counts is the price performance ratio of the price per kW peak of an installed or even only carriage paid equipment. The quality and with it the long term price performance ratio according to the output of pv-energy is often not enough considered. With the network NEG4 as the heart of the system this aspect is put in the centre.

The cost covering incentivis is the future, because of the long term profit and not because of cheaply bought and supported peak-power. It’s included components which in the long term guaranty high results at low running costs.

Technical description

The basic principle isn’t new but successful. Implied are a classical network feeder with a step-down converter followed by an inverter bridge and a 50-Hz transformer. Power-Mosfet-Transistors serve as power switches. The transformer has got the disadvantage of a high weight, but allows an otherwise not realizable safety standard. This happens by:

- voltaic isolation from the network
- additional earth connected shield-winding between primary and secondary winding
- low input voltage at the solar generator side (low voltage safety range)
- protective insulation at the entrance side of the equipment not necessary
- direct current supply into the grid excluded
- simply realizable earth-leakage fault monitoring

Another advantage is the limitation of power bounded high-frequency interference by grid separation and the additional shield-winding. This reduces the effort and with it the losses of the line filter. The transformer is an especially loss poor toroidal core type. Here the losses of the iron core are additionally reduced by a special circuit in the underload-range. At an input-power lower 700 W the number of windings of the main side is increased. There is another advantage in addition to the decrease of iron losses by ca. 5 W. The MPP-tracking range of

the input voltage is extended down by 15 V, therefore a feeding is possible even at very low insolation.

No engineering compromises at the transmission maintenance

The integrated ENS (islanding protection system) with an own patented process for measuring the impedance of the grid allows an one-phase connection.

Permanently monitored are impedance, voltage and frequency of the grid and at every inadmissible overrange the prescribed switching off and disconnection is released. Because of the high security standard (according to VDE 0126, a new german prestandard) repeated tests of the islanding protection circuits are not longer necessary. That means low costs for the

user. At night the transmission maintenance system is switched off which is a clear advantage opposite the external ENS equipment. The patented circuit for impedance measuring ensures a safe function of the ENS at low power consumption.

Power range

The device is designed for rated power of 4 kW. The maximum power amounts to ca. 5 kW, at permanent overload the power is limited to ca. 4 kW. Under general European conditions a pv-generator reaches a long term maximum power not much more than 80% of the given peakpower.

The NEG 4 is therefore suitable for equipments up to 5 kW rated power. Because of the extremely high efficiency factor in the underload range and the very low power consumption it is technically seen also a good choice for smaller equipments. A high specifically output can be expected in every case. This is also an advantage for equipments, which are planned to be extended in the future. To avoid a disconnection because of grid overvoltage, as a result of the current fed in, the device steps down the output power before at weak grids the upper limit of the still tolerable voltage is reached. The effect is a stabilization of the grid voltage at an upper tolerable level.

Pv-connection

There is a terminal box for the AC and DC wires, whose lid can be taken off separately. The terminals are installed on a mounting bar and can be replaced easily.

The NEG4 is available in two version types, concerning the installation:

1. Terminals and switches for two dc-main power transmission lines

The pv-generator can be divided up on two string distributors. Instead of 2 electric transmission lines four are lead to the inverter, the cross sections are then a little bit smaller and easier to handle. By mutual disconnection of the solar generator-halves and comparing the power on the LCD display an easy checking of the solar generator is possible. The failure of one string would be indicated by different power.

2. integrated strand distributor for 12 PV strings

Up to 12 pv-strings can be directly connected with 4 mm² wire. The 24 fused terminals can be switched off separately. Each string can be p on and controlled in its power individually. Overvoltage rotection devices are integrated in the device. The terminal box is accessible after taking off the lid. To make the installation more comfortable the wires are not connected by cable glands, but are only fastened on special moss-rubber strips.

Installation

The installation of the device is not “easy” – it weighs at least ca. 40 kg – but simple. The base is fastened to the wall with two-four screws and the inverter can be plugged there.

Service

A once installed device is normally not completely changed, but only the central unit circuit boards with the complete electronic. The box, the transformer, the heat sink and the terminal box remain untouched. In emergency there is a service package which includes an exact instruction, tools and complete modules. This enables every pv-electrician to bring a device into service.

Warranty

10 years, also for damages caused by lightning surge. At direct lightning stroke into the house the building insurance has to be called on.

Technical characteristics

Input DC:

Solar generator power	< 5 kW
max. no-load voltage	110 V
MPP - tracking - range (lower 700 W 40 - 95V)	54 - 95 V
max. input current	90 A
feeding from	ca. 10 W

AC-output (grid):

Output voltage	230 V + 10 - 15 %
Rated power	4 kW
max. power	4,65 kW
max. output current	ca. 20 A
cos Phi	1
distortion factor	< 3 %
voltage limitation (shut down)	250 V
by power limitation	248V by moving the operating point
by switching off	(according to VDE 0126)

main fuse	20 A automatic circuit breaker
disconnecting device	ENS-T (according to. VDE 0126)
no prescribed repeated tests	

Box:

measurements (w x h x d)	267x585x171 mm
weight	ca. 40 kg
max. ambient temperature	- 15 - + 50 ° C
recommended temperature	0 - + 40 ° C

measurement technique: (LCD and RS 485 data interface)

DC – current, voltage

AC – current, voltage, power, impedance

AC – feeding energy: continuing and daily values