Energy Meters for Solar-Log™

Product Information

1   Background

An energy meter, also known as an electricity meter, is a device which is used to log supplied or consumed energy in kWh.

Typical electromechanical induction meter and digital utility meter

The common residential meters record the consumed amount of alternating current (A.C. or three-phase A.C. current), as well as the A.C. voltage at a particular moment. With these two values, the amount of active energy obtained from the grid is calculated in kilowatt hours (kWh).

In recent years, electronic meters that allow for remote readings have become more and more common. The possibility for remote readings has many advantages, such as allowing a direct connection to the Solar-Log™.

A direct connection can be established with an SO interface or RS485-bus. Meters with an SO output send out a defined number of impulses per kWh and can be connected to a Solar-Log™. Meters with a RS485 bus make it possible to retrieve exact meter readings and other values. When using the Solar-Log™ Utility Meter, several meters can be connected to a Solar-Log™.

In the field of photovoltaics, there are various applications for meters.

2   Ranges of Application

In the Solar-Log™ portfolio, you will find a suitable electronic meter for different applications. These meters have been tested and are suitable for use in combination with the Solar-Log™.

Here are some of the typical applications for meters:

- Measuring power consumption (Consumption Meter)
- Measuring power production (Solar Production Meter)
- Measuring total production
- Voltage measurements for managing reactive power Q(V)

3   Measuring Power Consumption (Consumption Meter)

This meter is used to measure power consumption. It can measure the power that comes from the grid or the power that comes from your own photovoltaic plant.
At a photovoltaic plant with self-consumption, the Solar-Log™ calculates energy performance based on current consumption and performance data from the inverter.

For the optimal utilization of self-produced power, Solar-Log™ offers several functions:

Energy Performance Time Line
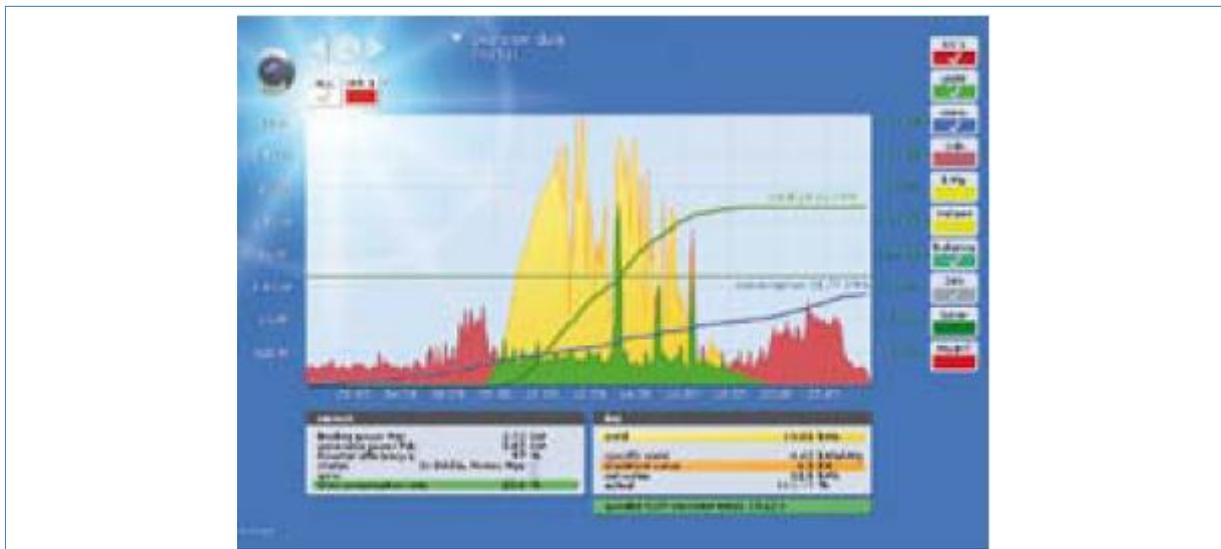
Energy performance over a 24 hour period: Red=Drawn from the Grid; Green=Self-Consumption; Yellow=Fed-in Energy

Display when there is a surplus of power

A "smiley" emoticon "☺" is shown in the display when power is being directed into the mains supply for remuneration

Consumption Control (only Solar-Log^{1000})

Remote controlled sockets

The Solar-Log^{1000} enables the optimal consumption of surplus power by remotely switching mains power sockets on and off.

3.1 Selecting a Meter

For use as consumption meters - for the optimal utilization of self-produced power – the more economical S0 meters are sufficient – so savings can be maximized further. One S0 meter can be connected to the Solar-Log™.
The meters with a RS485 connection are recommended for more precise measurements. The Solar-Log™ can use one meter as a consumption meter.
Both, the S0 and RS485 meters, are available for 1-phase or 3-phase measuring.

4 Measuring Power Production (Solar Production Meter)

If a customer uses an inverter that Solar-Log™ does not support, the inverter can also be monitored via a meter in "inverter mode." With this type of monitoring, the yield data from the meter are compared to other inverters or alternatively other meters. This allows yield deviations to be identified; however monitoring is limited, so status and error reports are not utilized.

4.1 Selecting a Meter

When monitoring several inverters, the total output of the inverter needs to be taken into account. Meters are available for 1-phase or 3-phase measuring.

5 Measuring Total Production

In some cases, in particular in certain countries, it is requested that the Solar-Log™ logs the total production. For this purpose, a meter in Solar-Log™ is defined as a "total yield meter." This then logs the power production from several inverters.
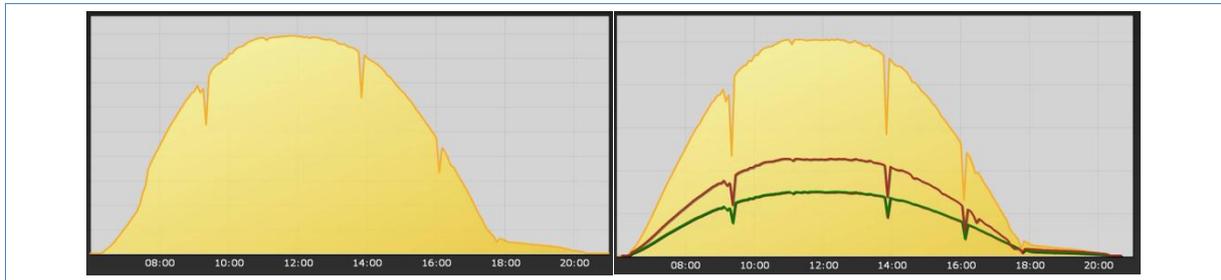

Comparing total production records with power meters (left) and total production from 2 inverters with Solar-Log™ (right)

5.1 Selecting a Meter

When monitoring several inverters, the total output of the inverter needs to be taken into account. The tendency is that "intense" power meters are more likely to be used. The calibrated RS485 meter and the Utility Meter are ideal for this application.

6 Voltage Measurements for managing reactive power Q(V)

The German Association of Energy and Water Industries (BDEW) guidelines "Generating Plants Connected to the Medium-Voltage Network" describe the options of feed-in management at the medium-voltage level in Germany. As a result, network operators with PV plants at the medium-voltage level (generally more than 100 kWp) can require the provision of reactive power as a function of the voltage at the medium-voltage level. The measurement is necessary to continuously adjust the reactive power from the inverter to the grid conditions. Solar-Log[1000]PM+ determines the required amount of reactive power or the cosφ depending on the measured voltage and a characteristic curve that has been furnished in the Solar-Log™ and adjusts the inverter accordingly.
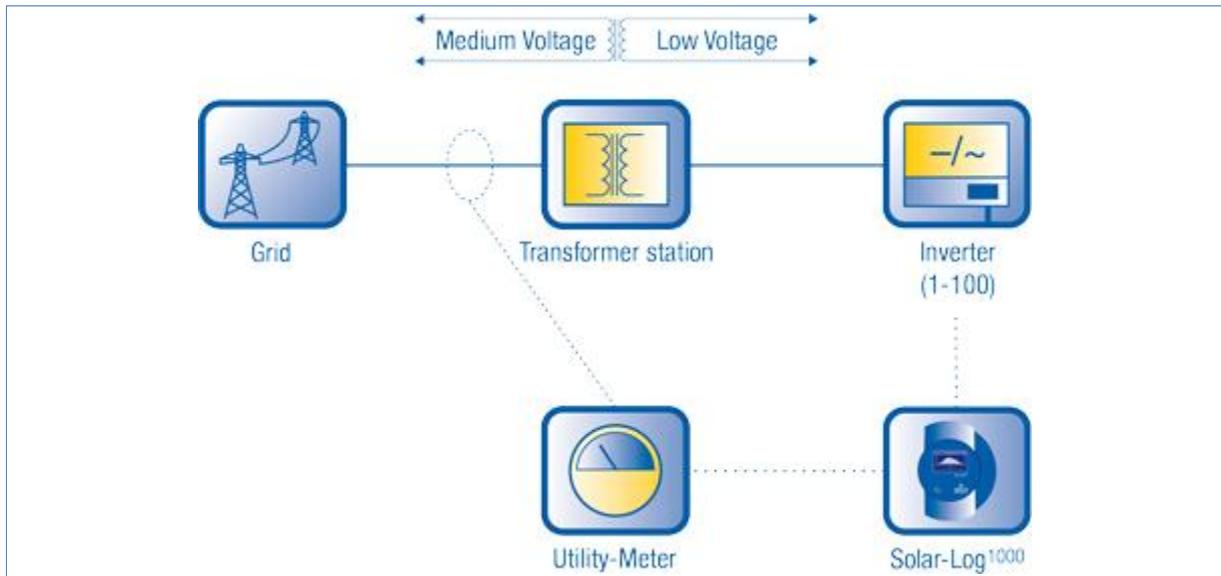
Setup of Q(V) Management

6.1 Selecting a Meter

The Utility Meter can also be used as a measuring device. With voltage transformers (100V), the prevailing voltage in the medium-voltage grid is measured and relayed to the Solar-Log[1000]PM+ via the RS485 bus.

7   Overview

The following overview shows the suitable meters for various application scenarios.

	Type	Power Consumption	Power Production	Total Production	Medium-Voltage Level Measurements
1-Phase	S0 uncalibrated 80A *Art. No. 255346*	++ Only for 1 phase use	+ For 1-phase inverter – only one meter can be connected	-	-
	S0&RS485 calibrated 100A *Art. No. 255420*	++ Only for 1-phase use	+ + For 1-phase inverter - only one meter can be connected	-	-
3-Phase	S0 uncalibrated 65A *Art. No. 255347*	++	+ For 3-phase inverter – only one meter can be connected	-	-
	S0&RS485 calibrated 100A *Art. No. 255421*	++	+ + For 3-phase inverter - only one meter can be connected	++ Suitable only for small plants	-
	Utility Meter RS485 calibrated *Art. No. 255385*	++ For large-scale con-sumption * *= current and voltage transformers are needed for power measurements at the medium-voltage level	++ For central inverters*	++ Suitable for large plants*	++

Legend:- not supported   + supported   ++ optimal

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