

PV feed-in optimization with hot water storage tanks: Meters measure unexpectedly but correctly

- **DKE working group addresses the phenomenon of electronic bidirectional meters allegedly counting incorrectly in combination with a certain renewable energy generation system**
- **Consumers had reported unexpected meter readings**
- **New DKE note on EN 50470-3 standard for electronic electricity meters aims to educate installers, utilities and metering manufacturers and shows that energy flows are correctly reflected**

(Frankfurt a. M., 10.07.2023) Many households with a photovoltaic system use the more cost-effective variant of a thermal storage tank instead of a battery storage system. As a rule, this is the hot water storage tank that is available anyway. For this purpose, an electric heating element is integrated into the installation, which heats the water flexibly and as steplessly as possible according to the PV surplus. The aim of the effort is to store or consume locally generated energy as directly as possible instead of feeding it in.

In such scenarios, however, consumers have observed that the electronic bidirectional meter relevant for billing apparently counts incorrectly. According to the meter reading, too much electricity was supposedly being fed in and drawn despite a surplus from the PV system and corresponding self-consumption. Those affected then reported the observations to their energy supplier or to the metering point operator. The anomalies were a case for the DKE working group on Measurement Stability under External Influence, which is now presenting its findings with the [reference to standard EN 50470-3](#) (in German).

Heating elements only very roughly controllable due to their design

The apparently incorrect measurement results are therefore not due to malfunctions of the EN 50470-3-compliant electricity meters, but correctly reflect the actual energy flows. The background to this is that heating elements, due to their design, are only very roughly

controllable in contrast to modern controllable consumption devices such as batteries of electric vehicles, heat pumps or battery storage. The chairman of the working group, Professor Dr. Michael Arzberger from DHBW Mannheim, explains: "Feed-in optimization is initially only poorly achieved with such heating elements, which is why special electronic ballasts have to be used. However, this results in unexpected physical effects that cause confusion when billing the bidirectional meter."

Correctly reflecting the amount of energy drawn and fed into the grid

In practice, this means that consumers can be sure that the bidirectional meters correctly reflect the amount of energy drawn and fed into the grid. The problem that has arisen results from the false expectation that the upgraded heating elements ensure that practically no more energy is fed in and that the excess energy is buffered in the hot water tank. However, this is physically not the case and is thus registered by the meter. The experts of the DKE working group also come to the conclusion that a remedy is not possible in a simple way. Technical solutions using appropriate devices do exist, but the costs would be disproportionately high. Professor Dr. Arzberger adds: "The result may be disappointing for some, but at least we can reassure affected consumers. They can still rely on the trustworthiness of their meter."

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