

Metrological classification of the topic of
water meters – remote readout – smart meter gateways

In accordance with the European Measuring Instruments Directive 2014/32/EU (MID), Annex III (MI-001), a water meter is *an instrument designed to measure, memorise and display the volume at metering conditions of water passing through the measurement transducer*. This means that the meter reading is always saved for the first time in the meter itself, regardless of the type of meter. Correspondingly, each water meter that is to be placed on the market undergoes conformity assessment. By means of Section 8 (“Essential instrument-specific requirements”) of the Measures and Verification Ordinance (Measures and Verification Ordinance of 11 December 2014 [BGBl. (Federal Law Gazette) I, pp. 2010, 2011], last amended by Article 1 of the Ordinance of 26 October 2021 [BGBl. (Federal Law Gazette) I, p. 4742], the requirements of the European Measuring Instruments Directive are transposed into national law.

In Germany, remote readouts have long established themselves. Remote readable means that a facility for consumption metering can be readout even without providing access to individual premises. Remote reading is not subjected to the requirements of legal metrology since transferring the meter reading (repetition of the measured value) is considered as a readout aid (similar to the annual reading of the metering by means of a postcard, per post, telephone or email or, more conventionally, by a reading contractor on site). In each of these cases, the measurement result primarily indicated on the display of the water meter is considered as the basis for billing based on Measures and Verification Ordinance No. 9.5, Annex 2 and/or MID No. 10.5, Annex I. The further processing of values read out remotely does not fall under the scope of the Measures and Verification Act.

At present, remote reading is usually carried out in the walk-by or drive-by mode. Due to currently valid EU legislation, a water meter does, as a rule, not require any further supplementary device to be operative.

The functions, properties and requirements placed on water meters which are considered as additional functions that are relevant to the Measures and Verification Act are specified in national requirements for supplementary devices.

In the Measures and Verification Act (Measures and Verification Act of 25 July 2013 [BGBl. (Federal Law Gazette) I, pp. 2722, 2723], last amended by Section 1 of the Act of 9 June 2021 [BGBl. (Federal Law Gazette) I, p. 1663], the definition of “a device supplementary to a measuring instrument” is given in Section 3 (“Definitions specific to measuring instruments”):

24. A “device supplementary to a measuring instrument” (also called “supplementary device”) is a device which is connected to a measuring instrument but which is not needed for the functioning of this measuring instrument, and which is destined for one of the following purposes:

- a) to determine additional measurands,
- b) for storing or presenting measuring results for the first time, for the purpose of using measured values or data via the electronic control of the measuring instrument,
- c) for regulating payments,
- d) to determine the price to be paid for a purchased item or for a purchased service in the presence of the parties concerned (direct sales),

- e) to process measurement results in order to transmit them to supplementary devices within the meaning of Letters a to d, or*
- f) to connect it to a non-protective interface of the respective measuring instrument.*

If the water meter reading is radiotransmitted, none of the items listed is currently relevant to conventional consumption-based billing:

- a) To date, new quantities (e.g., peak loads) have not been determined for domestic applications.
- b) The measurement result is realized and stored for the first time in the water meter itself.
- c) There are no service control options (tariffs, economization, etc.) for water at domestic level in Germany.
- d) This is not a case of direct sales.
- e) The measured values are not further processed by supplementary devices.
- f) Water meters usually transmit their radiosignals unidirectionally and without interactions.

Since the mere repetition of data is not subject to mandatory verification, conformity assessment is not required for the radiotransmission function or the terminal to which the measured value is saved.

The amendment of the ordinance on the billing of heating costs (*HeizkostenV* – Federal Law Gazette 2021, part I, No. 80, issued in Bonn on 30 November 2021) specifies that devices for heat consumption metering (incl. hot water, but not cold water) installed a year after the ordinance came into force have to be connectable to a smart meter gateway (SMGW). Until this date, the following simplified requirement applies: Consumption meters that have been newly installed must provide a remote readout possibility, however, they do not have to be connectable to an SMGW. There is, however, no obligation to connect.

Interoperability of remote readable equipment for consumption metering is required. When ensuring this interoperability, attention must be paid to complying with the requirements placed on the protection of data, digital security and IT specifications.

In accordance with the BSI TR-03109-1 Technical Directive titled “Requirements placed on the interoperability of the communication unit of a smart metering system, version 1.1” of 17 September 2021, Section 4.2, smart meter gateways, as supplementary devices, must implement diverse applications for billing, tariffing, accounting and network status data collection (which is abbreviated to “TAF” in German).

To date, two of these “TAFs” (TAF1 and TAF6) have been applicable to the established relevant methods used to determine the reading of water meters for consumption-based billing:

TAF1: This application describes tariffs that may be used as a basis for consumption-based billing where data minimization is an important criterion. Such data minimization is designed to prevent conclusions on consumption habits of the end-user from being drawn based on the measurement data sent by the smart meter gateway. Billing periods of one to several months are possible.

TAF6: This application allows measurement values to be retrieved in unforeseen situations. To allow retroactive readings at a defined due date, the SMGW must provide separate meter readings for each day in all of the measurands acquired by the SMGW within the scope of the billing-relevant tariffing. This is done automatically for each of the measurands acquired or generated by an evaluation profile within the SMGW. This application is therefore always active in the background. The data thus acquired may, however, only be retrieved in duly substantiated exceptional cases. This enables the meter to be read out on defined due dates, similar to a read out carried out on site by a service technician or when a new tenant moves out and a new one moves in.

For the water sector, no further TAFs are planned at present. Due to the amendment of the ordinance on the billing of heating costs (*HeizkostenV*), a monthly meter reading is required at most – in contrast to the sectors of gas and electricity. In the case of water meters, conventional billing merely requires the transmission of measured values. As early as in 2014, on the occasion of the General Assembly on Metrology and Verification, a consensus was reached on the fact that gateways implementing only TAFs 1 and 6 do not fall within the scope of the Measures and Verification Act (*MessEG*) or of the Measures and Verification Ordinance (*MessEV*), so that they do not require a type-examination certificate (*PTB-Mitteilungen*, 125th year, Vol. 3, October 2015).

Today, measuring the consumption of drinking water is not a process that falls within the scope of the Act on the operation of metering points (*Messstellenbetriebsgesetz*). In the sectors of water and thermal energy, consumers (metering point end-users) cannot select a competitive metering point operator. In the bill for thermal energy or water supply, the costs for the metering point operator are not indicated separately. Similarly, no difference is made between the costs originating in network use and those originating in energy/water supply. The end-user's only contractual partner is the vertically integrated thermal energy/water utility. Thus, tariffing similar to electricity or gas, where a measurement value with a (metrologically verified) time stamp is required for billing purposes, is not relevant when it comes to supplying drinking water to private households for conventional billing purposes.

Conclusions:

To be able to install a remote readable hot-water meter, the Ordinance on the billing of heating costs (*HeizkostenV*) requires a secure possibility of connecting an SMGW¹ as of 1 December 2022. The consumption-based billing of the costs still refers to the value measured by the water meter. If a consumption meter does not have the required data protocol already integrated, these protocols must be realized via an external communication adapter.

In the evaluation based on the Measures and Verification Act, three cases must be differentiated, assuming the use of conventional consumption-based billing:

1. Conventional remote reading without an SMGW;
2. Remote metering using an SMGW and a communication adapter; the SMGW processes the values measured by the water meter exclusively in accordance with TAF1 and TAF6;
3. Remote metering using an SMGW and a communication adapter; the SMGW processes the values measured by the water meter without any TAF-related limitations.

¹ The European Commission notified Germany's "special path" in October 2013 within the scope of the EU Directive on measuring systems.

To summarize, the situation concerning the treatment of these cases based on the Measures and Verification Act from PTB's vantage point is the following:

1. This case is the current status.
2. According to § 3, 24 e of the Measures and Verification Act (*MessEG*) a communication adapter is, as a matter of principle, a supplementary device that is subject to legislation on measures and verification. In this application case, however, it is questionable whether the (internal or external) communication adapter is used in accordance with the Measures and Verification Act. Here, the communication adapter is a modern form of conventional remote reading. It remains to be clarified whether or not an evaluation of communication adapters based on the Measures and Verification Act – which may be rather complex compared to the usage made – can still be dispensed with. As regards this topic, an evaluation by the relevant committees (such as AGME – the Working Group on Metrology and Verification) is necessary.
3. In this case, a full evaluation according to the Measures and Verification Act is necessary.

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