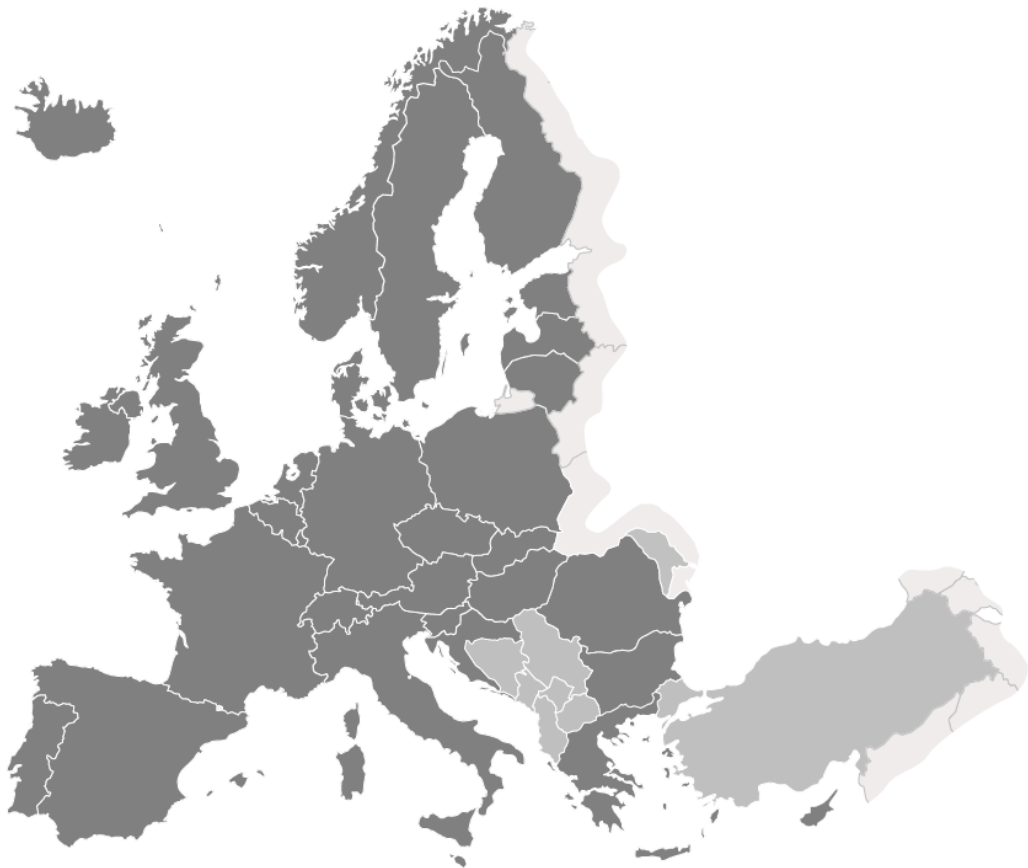


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WELMEC

European Cooperation in Legal Metrology

External Auxiliary Power Supply of Electrical Energy Meters



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European Cooperation in Legal Metrology

WELMEC is a cooperation between the legal metrology authorities of the Member States of the European Union and EFTA.

This document is one of a number of Guides published by WELMEC to provide guidance to manufacturers of measuring instruments and to Notified Bodies responsible for conformity assessment of their products.

The Guides are purely advisory and do not themselves impose any restrictions or additional technical requirements beyond those contained in relevant EU Directives.

Alternative approaches may be acceptable, but the guidance provided in this document represents the considered view of WELMEC as to the best practice to be followed.

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1. Foreword

Until recently, electricity meters deployed in Europe used the voltage circuit to draw the power required for their operation. As meters used the same source of energy as the load ensured the proper metering of the load in all conditions.

However, it has been recently recognised that for some applications, the usage of meters supplied solely by an external power supply provides significant benefits. This need is being addressed in the next revision of the standards IEC 62052-11 and could possibly figure in the coming revision of EN 50470. However, the use of external power supplies requires some precautions in order to fulfil all the essential requirements of MID.

2. Scope

The aim of this guide is to provide an introduction to the usage of auxiliary power in electricity meters and some of the relevant essential requirements of MID. The document also provides guidance for the Conformity Assessment of electricity meters operating with an external power supply.

3. Definitions, abbreviations

3.1 Definition of auxiliary supply

The definitions of the EN 50470 standards apply in addition to this guide.

Self powered meter: Meter supplied internally from **voltage** circuit

Dual powered meter: Meter supplied internally from **voltage circuit** or through an external power supply port

Externally powered meter: Meter supplied only by an external power supply port

See also annex A of the guide

3.2 Abbreviations:

MI	Measuring Instrument
MID	MID, directive 2014/32/EU
NB	Notified Body
TEC	Type- or Design examination certificate
EC	Evaluation Certificate as defined in WELMEC guide 8.8
PC	Parts Certificate as defined in WELMEC guide 8.8

4. Compliance to MID of externally powered meters

The exclusive use of an external power for the operation of an electricity meter removes one of the intrinsic safeguard against intentional or unintentional misuse of the meter. In effect the connection of the internal power supply to the mains power supply ensured the continuous metering of the load and the fulfilment of the following essential requirements of MID:

1. Section 7.1 of Annex I of MID - *Suitability*

"A measuring instrument shall have no feature likely to facilitate fraudulent use, whereas possibilities for unintentional misuse shall be minimal"

2. Section 7.2 of Annex I of MID - *Suitability*

"A measuring instrument shall be suitable for its intended use taking account of the practical working conditions and shall not require unreasonable demands of the user in order to obtain a correct measurement result"

3. Section 5.3 of Annex V of MID - *Suitability*

"In the event of loss of electricity in the circuit, the amounts of electrical energy measured shall remain available for reading during a period of a least 4 months"

4. Section 5.4 of Annex V of MID - *Running with no load*

"When the voltage is applied with no current flowing in the current circuit (current circuit shall be open circuit), the meter shall not register energy at any voltage between $0.8 U_n$ and $1.1 U_n$ "

5. Guidance for ensuring MID compliance

In general case:

1. It shall not be possible to connect or disconnect the external power supply without breaking an installation seal. (Article 7.1 and 7.2 of Annex I of MID)
2. The meter shall be able to log as event a power supply outage occurring at the external power supply port irrelevantly if the measured circuit stays powered or not (Article 7.1 of MID). Power supply outage should be understood as having a duration sufficient to de energise the meter. The log should include both the time of the occurrence of the power supply outage as well the time of its termination. Details about the event log is provided in P7 of the Welmec Guide 7.2
3. In the event of loss of electricity supply, the amounts of electrical energy measured shall remain available for reading during a period of at least 4 months (Article 5.3 of Annex V of MID)
4. The technical documentation of the meter shall specify that the Auxiliary power supply, shall not be connected to the load side of the meter (Article 5.4 of Annex V of MID)

5. The technical documentation of the meter shall describe in detail the wiring and installation conditions including the requirements and instructions for correct operation with the auxiliary power supply according to the MID requirements (Article 9.3 of Annex I of MID)
6. The electricity meter shall be equipped with an alarm that provides a visible warning on the display when an outage on the external power supply port occurs (Article 7.1 of Annex I of MID). This warning must be only visible on when the meter is powered. The resetting of the warning should be protected by a seal or a password.

6. Considerations

For conformity assessment of electricity meters the following shall be taken into account:

1. When a meter is supplied solely by an external power supply, the electricity meter shall be evaluated with the specific external power supply connected to the meter voltage circuit.
2. The external power port must be tested with all electromagnetic influences quantities required by MID (Articles 1.3.3 and 1.3.4 in Annex I of MID)
3. The voltage port must be tested with all electromagnetic influences quantities required by MID even if an external power port is fitted (Articles 1.3.3 and 1.3.4 in Annex I of MID)

Annex A – Description of different solutions for powering energy meters

Powering of electricity meters

The harmonised standards EN 50470, derived from IEC 62052-11, is commonly used for MID type approval of electricity meters. It defines the voltage circuit of a meter as:

“Internal connection of the meter, part of the measuring element and in the case of static meters, part of the power supply, supplied by the voltage of the circuit to which the meter is connected”

Figure 1 illustrates this practice. This configuration is referred to as "self powered meter". In this configuration, the mains power supply provides energy to both the load and the measuring system within the meter. This ensures the reliable metering of the energy consumed by the load

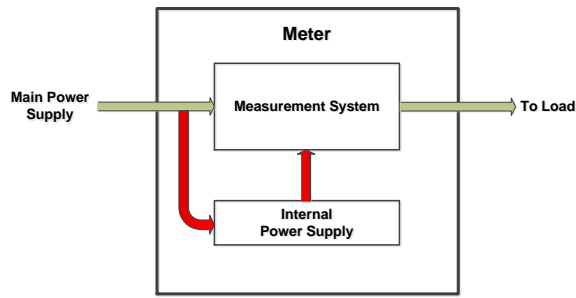


Figure 1 Self powered Meter (Supplied internally from measured circuit)

The standards EN 50470 and IEC 62052-11 make provision for the addition of an external power supply port. The addition of an auxiliary power supply port enables the operation of the meter in the absence of the main power. The use of a secondary power supply has been used for many years, particularly in communicating meters. It secures reliable metering of the energy consumed and also ensures the full functionality of the meter in the absence of the main power. Figure 3 illustrates this configuration.

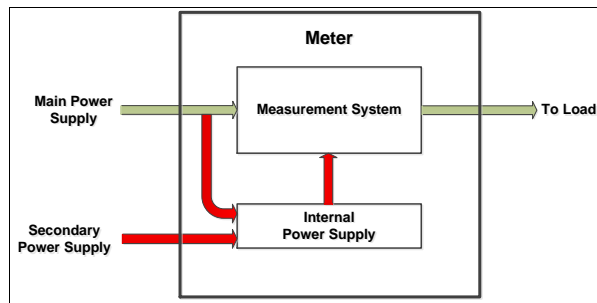


Figure 2 Dual powered meter (Supplied internally or through an external power supply port)

The exclusive use of an external power port to energise a meter presents several design and operational advantages required in applications where space is at premium or when an external power supply exists. However, this configuration could facilitate fraudulent use of the meter unless some precautions are taken. Figure 3 illustrate this configuration.

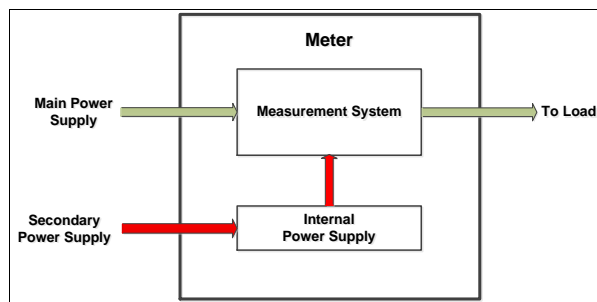


Figure 3 Externally powered meter (Supplied only by an external power supply port)