

MID Directive

Energy Efficiency



Introduction



APPLI 1041

The measurement of electrical power has become a key part of improvement projects in energy performance, but measurements can be used for different purposes:

- monitoring consumption and analysing distribution,
- monitoring load levels, quality and monitoring the installation,
- billing and invoicing.

Applications requiring the installation of **meters** dedicated to **invoicing purposes in Europe must comply with the MID directive**.

The **MID** (Measuring Instrument Directive) is a **European directive** dating back to 26 February 2014 (MID 2014/32/EU). It applies to devices and systems with a measuring function, such as water, gas, electrical and heat meters and weighing instruments used in **commercial transactions**.

MID measuring instruments must be of high quality design and manufacture in terms of metrological technology and the security of measurement data.

The main objective of the MID is to ensure a high level of reliability and metrological assurance so that **any involved party can trust the measurement readings**.

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Directive and general rules

MID Directive

MID Directive 2014/32/EU of the European Parliament and of the Council of 26 February 2014 concerns measuring instruments.

The annexes of the directive detail the 10 categories of affected measuring instruments:

- MI-001: water meters,
- MI-002: gas meters and volume conversion devices,
- **MI-003: active electrical energy meters,**
- MI-004: thermal energy meters,
- MI-005: measuring systems for continuous and dynamic measurement of quantities of liquids other than water,
- MI-006: automatic weighing instruments,
- MI-007: taximeters,
- MI-008: material measures,
- MI-009: dimensional measuring instruments,
- MI-010: exhaust gas analysers.

General rules

The European MID Directive applies to instruments with a measuring function, detailed in ten annexes (MI-00x).

In particular, Annex MI-003 details the requirements for active electrical energy meters.

It is relevant to all European Union Member States and applies in **commercial transactions** to ensure fairness and consumer protection.

The conformity of measuring devices is assessed by a **notified body**.

For electricity meters, different conformity **assessment procedures** are possible:

B+D, B+ F or H1 :

- **Module B:** assessing the conformity of the meter's technical design,
- **Module D:** quality assurance of the production process,
- **Module F:** verifying the production of the meter,
- **Module H1:** full design quality and control assurance.

Socomec uses assessment procedure **B+D** for all its MID products.

This procedure is open to ISO 9001-certified companies. The same procedure is typically chosen by manufacturers of MID electricity meter.

In practice, for Module B, **the notified body** verifies the technical documentation, carries out the necessary tests and examinations and issues an EC type examination certificate (technical design meets the applicable requirements).

For Module D, it prepares a declaration of conformity to type based on quality assurance of the manufacturing process.

Requirements for active electrical energy meters

The MID Directive and electricity meters

The MID Directive **applies only to active electrical energy meters** used for commercial transactions with an end-customer if there is a direct relationship between the measured consumption and the invoice.

Meters must be intended for the following use:

- **residential,**
- **commercial,**
- **light industrial.**

The MID is not for:

- measurement transformers,
- reactive energy meters,
- reference meters (for calibration),
- portable meters,
- active energy meters used by heavy industry clients.

EN 50470 product standards

The EN 50470 set of product standards assumes conformity with the MID directive. They define mechanical, electromagnetic and precision requirements. If a meter is designed in accordance with this set of standards, it will meet the fundamental and specific requirements of the MID. The notified body will use these standards to verify the conformity of the meters.

Static active energy meters must meet the following two standards:

- **EN 50470-1***: Electricity metering equipment
Part 1: general requirements, tests and test conditions,
- **EN 50470-3**: Electricity metering equipment
Part 3: particular requirements - static meters for AC active energy.

Three accuracy classes are defined. Meters must meet at least one of these classes:

- accuracy class A: equivalent to class 2 of IEC 62053-21**,
- accuracy class B: equivalent to class 1 of IEC 62053-21**,
- accuracy class C: equivalent to class 0.5S of IEC 62053-22**.

Note:

* Standard EN 50470-1 soon to be replaced by EN IEC 62052-11: Electricity metering equipment - General requirements, tests and test conditions - Part 11: Metering equipment.

** Standard IEC 62053: Electricity metering equipment (AC) - General requirements:
- Part 21: Static meters for AC active energy (classes 0,5, 1 and 2)
- Part 22: Static meters for AC active energy (classes 0,2 S and 0,5 S).



Meters designed and tested under standards EN 50470-1 & EN 50470-3 comply with the fundamental and specific requirements of the MID Directive.

Product requirements set out by the MID and EN 50470

The requirements set out by the MID and EN 50470 for meters can be summarised as follows:

Unit

- Integrated or separate display.
- Metrological LED on front panel.
- Display of consumption (kWh or MWh).
- Tamper-proof unit and measuring terminal.
- IP 51 protection rating.
- Specific name-plate.

Settings and protection

- Protection of programming mode for installed meters.
- Tamper-proof metrology-related settings.
- Internal metrological firmware that cannot be modified without new certification. Proof of any intervention must be available within a reasonable timeframe.

Electrical characteristics

- Single-phase 2 wire meter, three-phase 3-wire meter, three-phase 4-wire meter.
- Accurate measurement of active energy (class A, B or C).
- Continuity of metering if 1 or 2 phases are lost.
- Maximum permissible errors.
- Tolerated effect of disruptions (unbalance, harmonics, continuous current, transients, etc.).

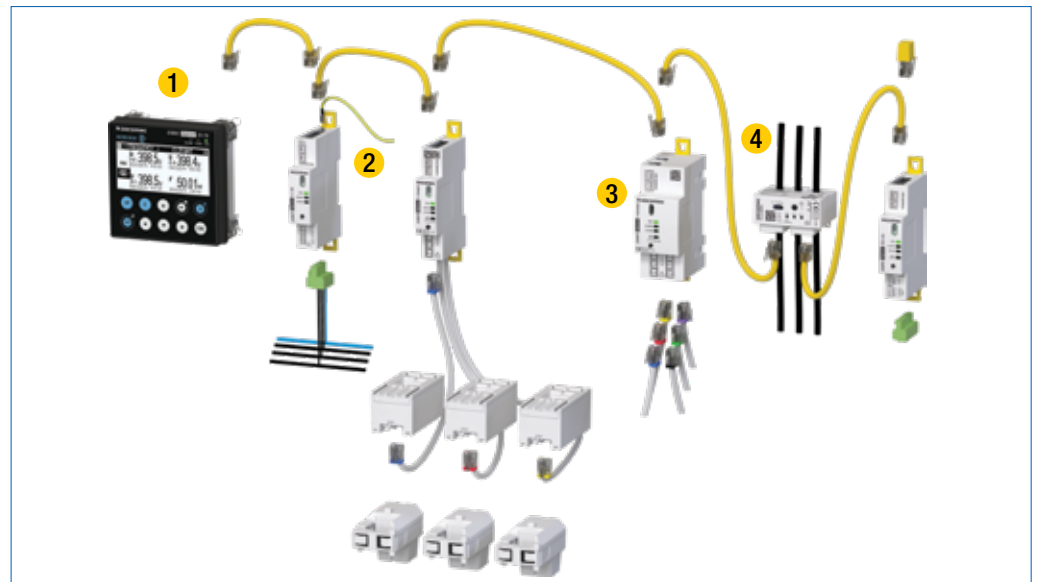
The ultimate solution for conformity and innovation: DIRIS Digiware MID

To ensure that energy measuring is safe, the MID imposes a certain number of constraints on meters that are necessary for applications involving a commercial transaction. Evolving technologies and standards have enabled DIRIS Digiware to broaden its range to serve the invoicing/sub-invoicing market with a MID-certified solution.

DIRIS Digiware offers a number of innovations, such as:

- dynamic load management → measuring multiple loads on a single meter,
- range of sensors associated with meters → accuracy class of the overall measurement chain,
- RJ12 / RJ45 connectivity → implementation time 4 times faster,
- U measurement only for several meters → reduced footprint,
- specific current sensors → automatic detection and safe opening when secondary is loaded.

Overview of MID DIRIS Digiware



*DIRIS Digiware offers
the first multi-circuit MID
system on the market*

1 Separate display		DIRIS Digiware D-50 (with Bluetooth) - Ref. 4829 0204
		DIRIS Digiware D-70 (avec Bluetooth) - Ref. 4829 0203
		DIRIS Digiware D-50 (sans Bluetooth) - Ref. 4829 0206
		DIRIS Digiware D-70 (sans Bluetooth) - Ref. 4829 0207
2 Voltage Transformer		DIRIS Digiware U-10 - Ref. 4829 0105
		DIRIS Digiware U-30 - Ref. 4829 0102
3 Class C MID meters with current transformer		DIRIS Digiware I-30MID - Ref. 4829 0133
		DIRIS Digiware I-35MID - Ref. 4829 0135
		DIRIS Digiware I-60MID - Ref. 4829 0134
		DIRIS Digiware I-61MID - Ref. 4829 0136
4 Direct connection class C MID meter		DIRIS Digiware S-130MID - Ref. 4829 0163
		DIRIS Digiware S-135MID - Ref. 4829 0164



DIRIS Digiware MID allows you to mutualise electrical consumption (active energy), monitor the quality of your electrical installation (Voltage, Current, Power, PF, THD, Harmonics) and set up alarms.

Innovative protection system

To ensure tamper-proof operation, a MID alarm system tracks and displays any tampering with the system linked to the measurement of electrical consumption. These alarms are time-stamped, making it possible to determine when the modification occurred.

! MID EVENT LOG S-135MID@5	
TYPE	CONFIG. MODIFICATION
SETTINGS	TYPE OF NETWORK
NEW VALUE	1P + N
PREVIOUS VALUE	3P + N
DATE/TIME	10.27.2021 18:04:38

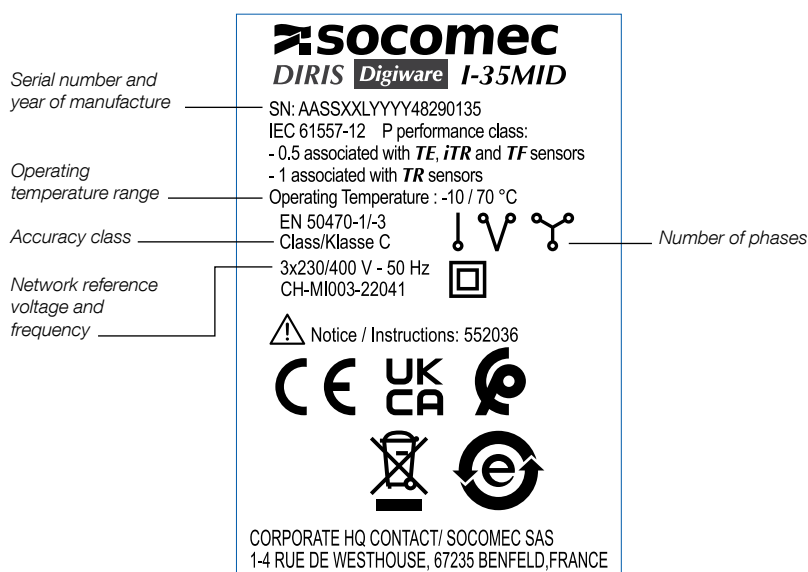
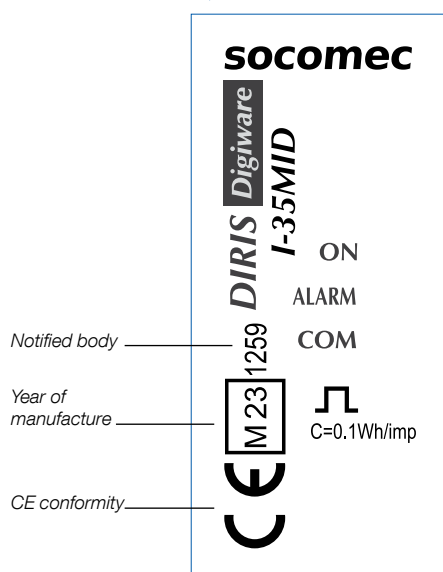
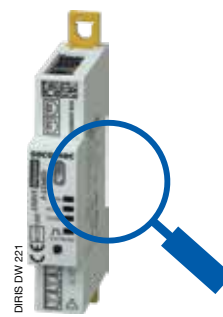
Example of an MID alarm on the DIRIS Digiware system in the event of a modification to the type of network

Guaranteed measuring accuracy

DIRIS Digiware, an integral system, guarantees a measurement accuracy of performance class 0.5 over the whole chain in accordance with IEC 61557-12, thanks to the use of its specific sensors.

Specific name-plate

An MID-compliant meter must have a specific name-plate indicating all the data leading to its certification.

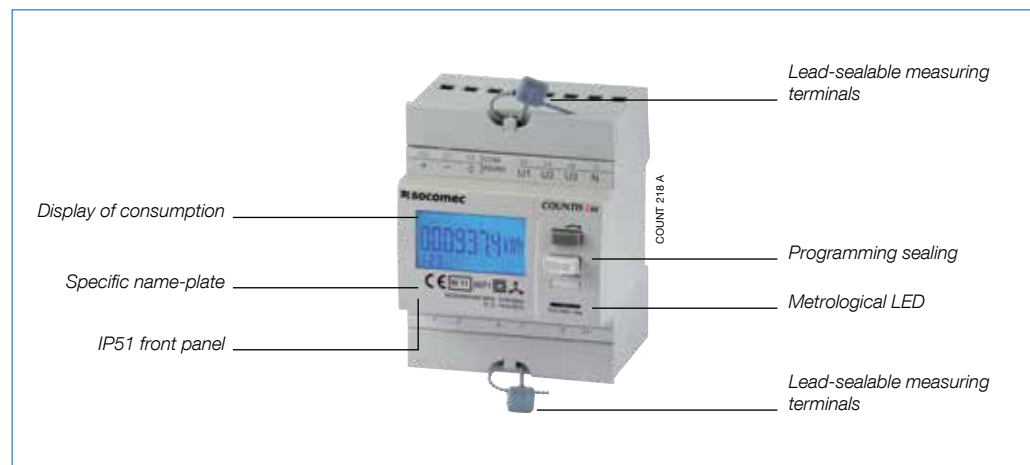


Other Socomec MID meters

Socomec offers a range of MID meters (COUNTIS) meters that mainly measure the type of energy consumption described below:

Type of network Input current	Single-phase Direct 32 A	Single-phase Direct 40 A	Single-phase Direct 63 A	Single-phase Direct 80 A	Three-phase Direct 80 A	Three-phase Direct 100 A	Three-phase CT 5 A 3000 A
							
COUNTIS E meters	E02	E04/E06	E12	E14/E16/ E18	E22/E24/ E26/E28	E32/E34/ E36	E42/E44/ E46
Accuracy class active energy	B	B	B	B	B	B	C
Output	Pulse	Pulse Modbus M-Bus	Pulse	Pulse Modbus M-Bus Ethernet	Pulse Modbus M-Bus Ethernet	Pulse/ Modbus M-Bus	Pulse Modbus M-Bus

COUNTIS MID products.



With the DIRIS A14, Socomec also offers a MID-certified measuring unit or PMD under standard IEC 61557-12 which can also measure the electrical parameters of the installation (U, I, P, PF...) and THD.



PMD MID DIRIS A14

- Three-phase TC 5 A - 2500 A.
- Active energy accuracy class C.
- Modbus output.
- IEC/EN 61557-12 conformity.

MID fields of application

Fields covered by the MID

In Europe, the MID establishes:

- **key requirements**, applicable from the design to market launch or commissioning of the new devices,
- **specific requirements for each device category**,
- a conformity assessment based on **standards**,
- an assessment procedure on the **conformity by notified bodies**,
- designation criteria from notified bodies,
- principles **of device identification**.

Implementation by member states

Directives are subject to national transpositions. As such, a state may add national requirements depending on the use, such as below for accuracy.

When a member state imposes measuring for residential use, measurement is carried out using a class A meter.

For specific purposes, some member states require a class B meter.

When a member state imposes measuring for commercial and/or light industry use, measurement is carried out using a class B meter.

Some member states require a class C meter for some specific purposes.

Similarly, some points remain the responsibility of each state, such as:

- legal control (calibration),
- periodic inspection of devices in service (recalibration, life of calibration, maximum transaction errors).

For example **in France** the transposition and implementing rules are described in the Decree of 1 August 2013 relating to active electrical energy meters.

About accuracy

The MID directive only refers to the measurement of active energy expressed in kWh or MWh.
→ **Accuracy is only guaranteed for active energy.**

Measurement accuracy of electrical parameters (U, I, P, PF...) is not guaranteed within the MID framework.

To guarantee the accuracy of these parameters, the meter or PMD must refer to another standard, such as IEC 61557-12 for power metering and monitoring devices (PMD).

CT under the MID:

For meters with external sensors, the MID does not take into account the overall measurement chain Meter + CT.

The MID does not apply to external current measuring transformers (CTs).

However, these do have a significant influence on the overall measurement chain and must be taken into account when assessing the accuracy of the measurement.



The MID only ensures the accuracy of active energy (Ea) and not other electrical parameters (U, I, P, PF, etc.).



PMD



Current sensor



Voltage transformer

Measurement chain.



The MID does not apply to external current measuring transformers (CTs).

To obtain the overall accuracy of the measurement chain, the accuracy of each element has to be considered: PMD, current sensor, voltage transformer and wires.

To minimise the impact of sensor accuracy on overall accuracy, IEC 61557-12 gives recommendations for the accuracy of the sensor to be used depending on that of the PMD.

Performance class of the PMD without external sensors	Recommended sensor class to be associated with the PMD	Overall typical accuracy
0.1	0.1 or higher	0.2
0.2	0.2 or higher	0.5
0.5	0.5 or higher	1
1	1 or higher	2
2	2 or higher	5
5	5 or higher	10

Table - Recommended accuracy class of the sensor depending on the performance class of the PMD.

The table shows that choosing a sensor with an accuracy level that is identical to that of the PMD leads to an overall accuracy level that is twice as low.

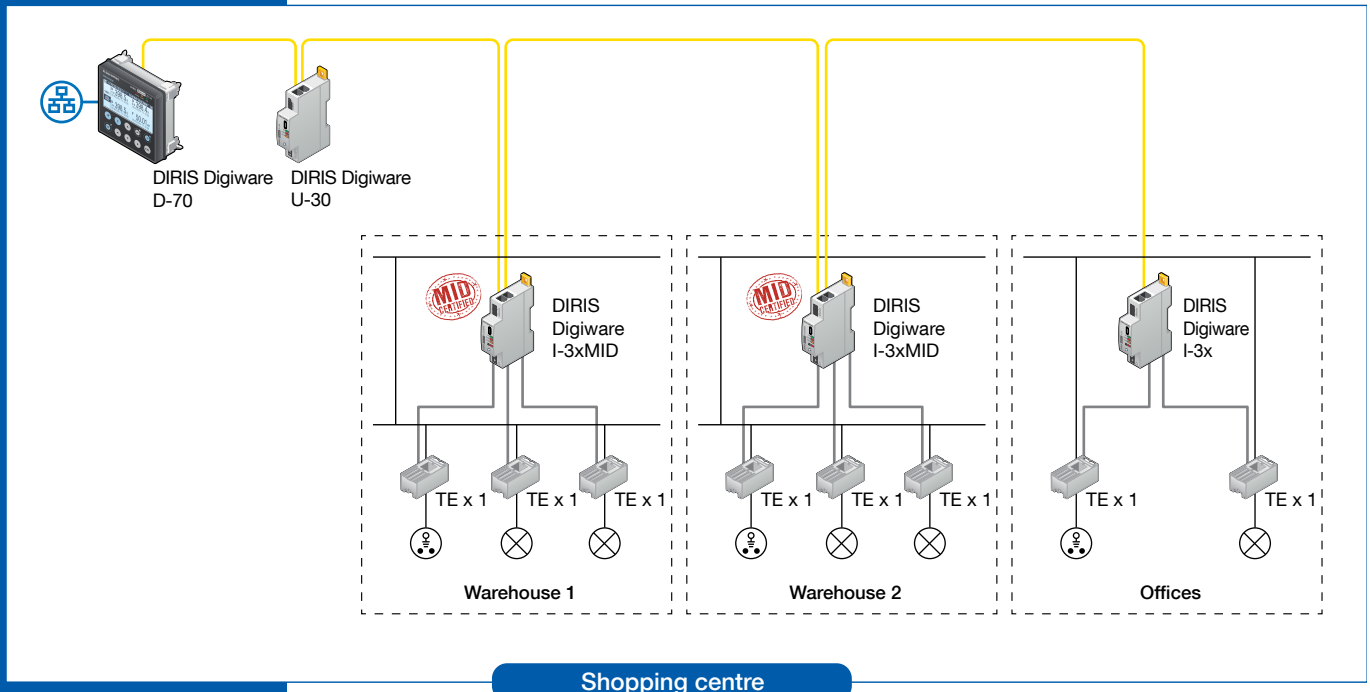
PMDs that use dedicated sensors are considered directly embedded PMDs and can have an overall performance class that includes the sensors.

Note: for more details, refer to the Technical note, "IEC 61557-12" which gives useful information for assessing the impact of the accuracy of sensors and the benefits of offering an overall performance class.

Measurement flexibility: integration of a mixed solution

If certain measuring points within an installation require MID certification, it is not necessary for the entire installation to be MID-certified.

For example, in a shopping centre, stores must be equipped with MID meters to facilitate sub-billing, while this requirement is not necessary for offices and technical facilities:



Electrical installation of a shopping centre equipped with the DIRIS Digiware system.

In summary

The **MID** (Measuring Instrument Directive) applies to devices and systems with a measuring function, such as water, gas, electrical and heat meters and weighing instruments used for **commercial transactions**.

The MID provides a high level of metrological protection so anyone can trust the measurement results. This requirement translates into a specific design and implementation of the electricity meters.

With DIRIS Digiware, Socomec is the first manufacturer to offer an MID multi-circuit metering system. Among other things, this system can consolidate all MID-certified metering points on a single screen, and offers the intrinsic advantages of DIRIS Digiware (compactness, easy installation, implementation and measurement accuracy).

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400 experts
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