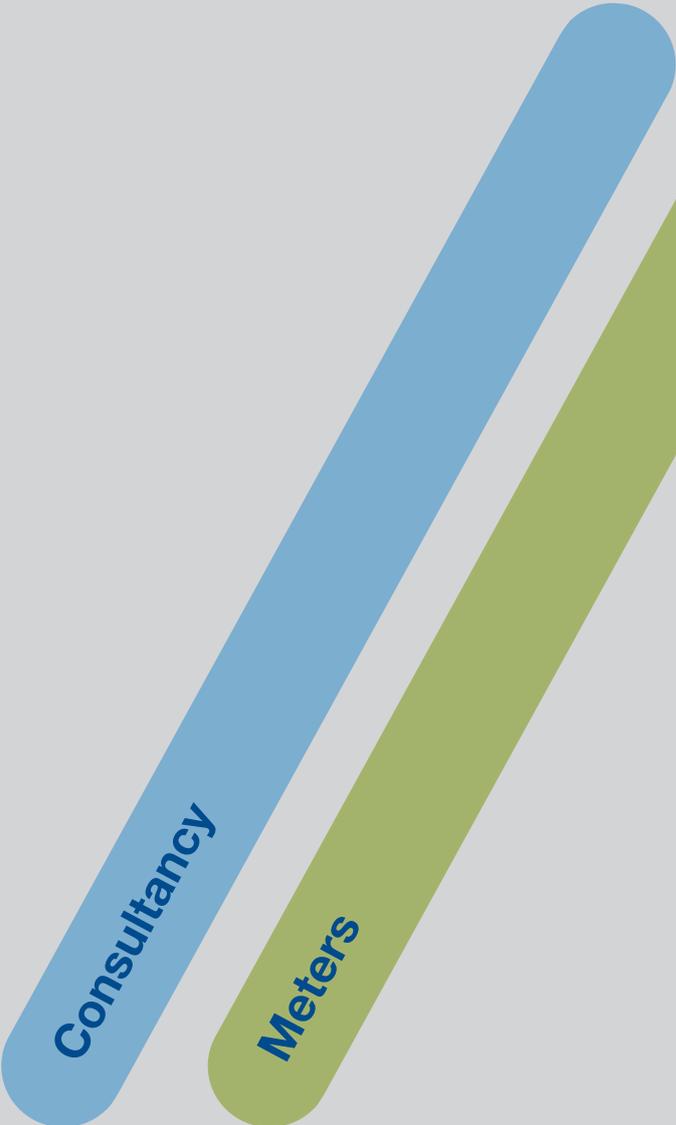

MID Guide



Consultancy



Meters

Our commitment to our clients is to deliver excellence through the expertise of our staff, by the innovation of our engineers, and with the integrity of the Company.

SHM has fully consulted in the preparation of this document with the appropriate legal authorities in the UK. Whilst we have fully checked this document and believe it to be fully accurate SHM cannot be held liable for any inaccuracies or errors.

Company overview

SHM's engineers are experts in electronic engineering, communications, metering, and software. They pioneered the shift from electromechanical to today's all-electronic meters and went on to develop advanced data loggers, which in conjunction with sophisticated multifunction meters, operate as outstations for complete energy monitoring, power quality, power management and remote tenant billing systems.

Experience and Expertise

We supply a full range of meters for all utilities including electricity, heat, water, gas, oil and diesel. The meters record energy consumption and instantaneous power information in plants, processes and buildings. The experience gained in our Power and Energy Monitoring Systems, provides us with the knowledge to integrate meters from the world's major manufacturers. Our data loggers and software, with our in-depth knowledge of manufacturers' hardware and software, ensure that we build in the right performance with every project we deliver.

Capability

We are an industry leader in energy and power monitoring with presence in every business sector throughout the world. We undertake all of our projects with determination and enthusiasm making sure we achieve a thorough understanding of the client's needs. We demonstrate our technical excellence and comprehensive expertise by delivering satisfaction to every client, large and small.

Executive Summary

Any meter used for billing of electricity, must be either MID approved or approved under UK National legislation. Meters already installed, that were approved under UK National legislation prior to October 2006 may remain installed indefinitely, as long as they are measuring accurately. Any new meter manufactured and approved after October 2006 must be approved under the MID regulations.

In the UK, the MID is applicable for loads up to 100kW. After October 2016 every new meter installed for billing must be MID approved. It is a criminal offence to use a non approved meter for billing. MID makes no distinction between primary main supply meters and secondary sub-billing meters. They are ALL billing meters.

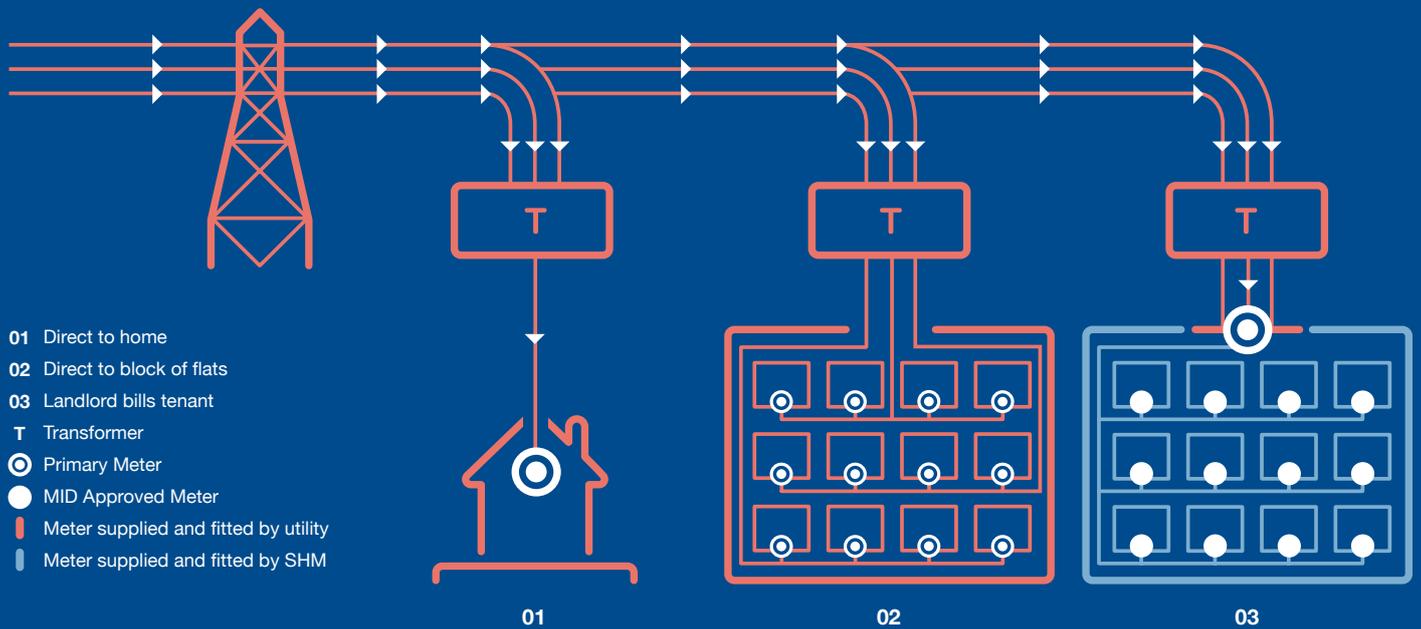
Meter installation in the UK

The diagrams below show how meters are installed in UK electricity distribution. The red areas indicate billing by a primary meter; the blue areas indicate billing by secondary meters.

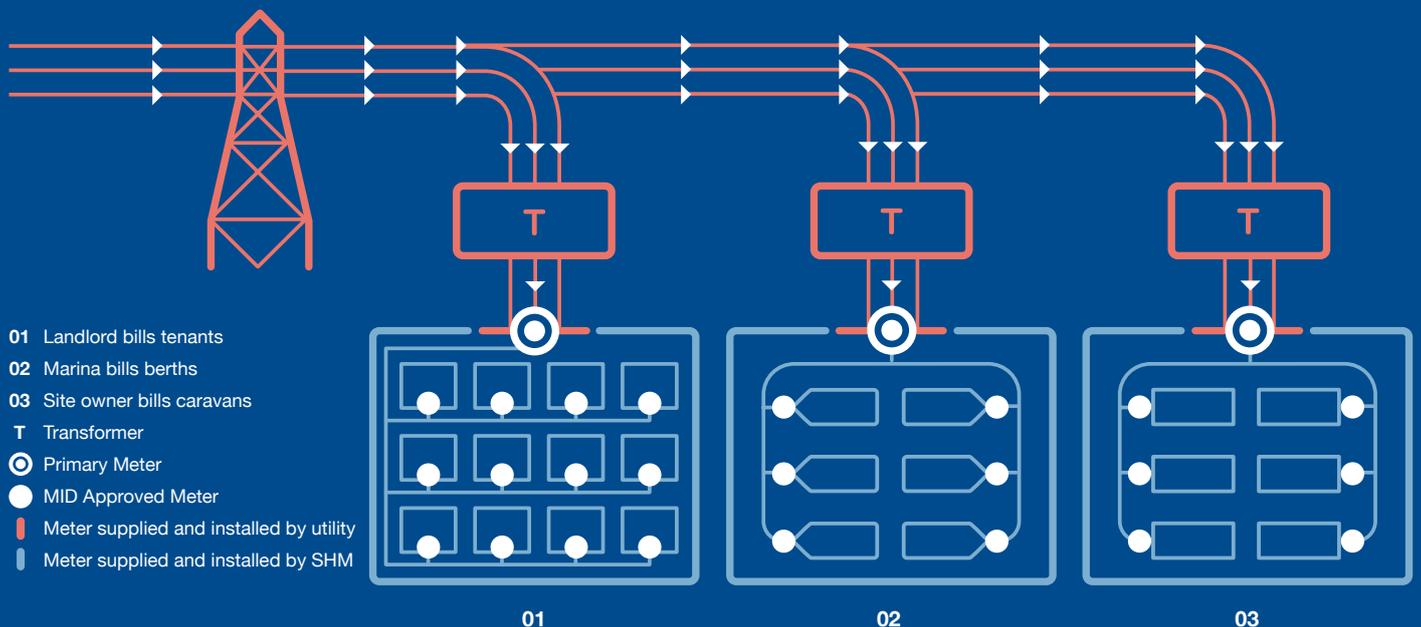
When a new electricity supply is provided a primary incoming meter is fitted and the building owner is billed by his electricity supplier according to the readings on this meter. Primary meters may be fitted at just the main supply to a building or site, or in some cases, may be fitted throughout a building or to many areas within a site.

SHM usually supplies and fits meters in the blue sub-metered areas. Sub-meters are fitted where a primary meter supplies the main incoming electricity supply and the electricity is sub-billed as it is distributed at supply points within a building or to areas within a larger site. Examples of sub metering are billing of residential flats, marinas, multi-tenanted commercial buildings, metering for building regulation L2 compliance, commercially let areas such as car parks and restaurants, monitoring of landlord's plant, energy use in industrial processes and monitoring of manufacturing plant.

Metering residential property



Metering commercial property



What is MID?

The Measuring Instruments Directive (MID) was introduced by the European Commission to promote free trade of measuring instruments throughout Europe. The European Directive 2004/22/EC came into force throughout the EU on 30 October 2006.

The purpose of the directive is to create a single market in measuring instruments for the benefit of manufacturers and consumers across Europe. Approval to MID is required for meters used in any fiduciary (ie billing) application. National rules that deviate from MID are not allowed. With the MID European Type Approval Certificate an instrument may be freely sold and used in any European Union (EU) or European Economic Area (EEA) member state. Instruments must meet the general essential requirements of the directive plus one of ten instrument-specific annexes. For electricity meters this is MI-003 (active electrical energy meters).

Billing Applications

Prior to MID, meters were approved under UK National legislation and statutory responsibility for the Electricity Act 1989 was held by OFGEM. From 2009 responsibility for legal metrology and implementation of MID and its dependent UK regulations passed to the National Measurement Office (NMO) in Teddington. The Electricity Act remains in force but the MID requirements are implemented by a new Statutory Instrument (SI). The SI published in 2006 is the Measuring Instruments (Active Electrical Energy Meters) Regulations, SI2006/1679, and details the requirements for MID approval.

The word 'approval' now includes meters fulfilling the requirements of MID regulations by a Notified Body (ie a testing laboratory); this body need not be a UK organisation. The Electricity Act 1989 is still in force in the UK and directly legislates for those meters approved prior to October 2006. Meters that meet the requirements of SI2006/1679 are deemed to be 'approved' in accordance with the Electricity Act 1989 and for MID approved meters the 2006 Statutory Instrument applies. Approval now means approval as to both design and individual testing at manufacture according to the MID 2004/22/EC directive instrument specific annexes. For electrical energy meters this is Annex MI003.

Meters manufactured under pre-MID UK legislation may still be used, and even be continued to be installed. Under these regulations it is possible to install meters for commercial billing which are approved, but not individually certified for accuracy, so long as there is an agreement between supplier and consumer. From 2016 all new meters installed for billing purposes must be MID approved. Meter manufacturers are now ensuring that any current designs of meters which have only UK approval are being submitted for approval under MID, so as to increase the market for and the longevity of their products. MID approved meters may be sold and used throughout the whole EU, irrespective of their country of origin.

Certification

Certification under UK National legislation refers to individual testing of a meter manufactured with an Approved Pattern of Design. Exemption from certification only applies to meters approved under UK national legislation. MID does not recognise Certification as a separate process. Meters are either MID approved or they are not.

Approval

MID meters can only have Approved status and Approval refers to design followed by individual testing at manufacture. Certification is not a recognised term under MID. Meters must have Approval according to Annex B + Annex D, Annex B + Annex F, or Annex H1. All MID approved meters MUST carry the full MID marking as shown and explained in figure 1, and it is having this full marking which denotes whether a meter is MID approved or not.

Meters covered by MID

If you are a residential, commercial, or industrial landlord or property manager, in any of the following situations you must employ an MID approved meter, or a UK National approved meter (which will have been approved prior to October 2006). However if the latter type of meter is already installed, so long as it is measuring accurately you may continue to use it indefinitely. Since any new billing-approved meter is almost certain to carry MID Approval, for new electricity supplies it is best to fit MID approved billing meters. From October 2016 only MID approved meters can be fitted. These are a few of the sub-billing applications commonly encountered:-

- | | |
|---------------------------------|--|
| / Multi-use commercial building | / Caravan parks |
| / Industrial Estates | / Data centre server supplies |
| / Sub-let shops or concessions | / Sports facilities |
| / Residential flats | / Any charging of electricity by meter reading |
| / Marinas | |

For these supplies any meter fitted after October 2016 MUST be MID approved. Any meter approved under UK National legislation CANNOT be installed for use after October 2016. From October 2016 the only legal option for newly metered supplies is to fit an MID meter.

The use of unapproved meters does not meet the requirements of the Electricity Act 1989. To bill electricity with a non approved meter is a breach of the 1989 Act and is classified as a criminal offence. On conviction the person committing the offence is liable to a fine not exceeding level 3 on the standard scale. This fine is currently set at £1000 per each offending meter, so for a multiple meter site the fine will be substantial.

Landlord Obligations

Landlords, estate managers and property developers should check that they have legally acceptable meters fitted throughout their premises. The use of unapproved meters for billing carries the risk of prosecution. A tenant is within his rights to refuse payment if his electricity bill is based on readings from a non-approved meter.

In SHM's experience we have found that around 90 per cent of meters presently fitted in commercial buildings are not approved for billing. SHM will be pleased to undertake a survey of all installed meters within a building or estate to determine whether or not the meters comply with current legislation.

Routes to approval

MID stipulates requirements in three areas;

- / **Climatic conditions**
temperature, humidity etc
- / **Mechanical influences**
- / **Electromagnetic environment**

Performance guidelines for electricity meters were initially drawn up by WELMEC a European Committee which established a harmonised approach to European legal metrology. These guidelines have been implemented in technical standards drawn up by CENELEC the European Committee for Electro-technical Standardisation, as standards EN50470-1, EN50470-2 and EN50470-3. These standards provide the reference metrological requirements for a meter to be tested to conform to MID.

MID has three alternative conformity assessment procedures that lead to verification of active electrical energy meters as defined in Annex MI-003. These are Annex B and D, Annex B and F, and Annex H1. These same procedures are also referred to in the corresponding UK legislation, 'Measuring Instruments (Active Electrical Energy Meters) Regulations 2006, SI2006/1679'.

Certification is not recognised as a separate process under MID. Meters are either MID approved, or they are not. An MID approved meter must be design approved and individually verified at manufacture.

Fig 2 gives a pictorial explanation of the three alternative assessment procedures.

/ **Conformity Assessment B+D**

The meter has been granted design approval by a notified body to Annex B. The manufacturer calibrates, seals, and self-certifies the meters; the process is approved to EN29002. Meters produced under these conditions carry the Annex B + Annex D approval. The final products are sample tested and the factory is audited by a notified body, and the 4-digit code for the notified body is applied as part of the MID marking (Fig 1).

/ **Conformity Assessment B+F**

The meter has been granted design approval by a notified body to Annex B. Each meter manufactured is submitted to a notified body for calibration, testing and sealing. The sealed meters may then be sold as fully MID approved meters. Meters produced by this process carry the Annex B + Annex F approval.

/ **Conformity Assessment H1**

This is a less common route to approval. Under the H1 procedure the manufacturer makes a declaration of conformity based on full quality assurance, whereby he undertakes to fully comply with the obligations laid down by this annex as to design, manufacture and final verification of each meter produced, so as to fully comply with the directive.

Meters are not permitted to be placed on the market or put into use unless they conform to one of these three conformity assessment procedures. Meter designs may have an EC Type Examination Certificate (Annex B) but still need to be verified to conform to Annex D or Annex F during the manufacturing process. This applies to all and every meter used for billing, whether for main supply (primary meters) or for internally distributed sub-supplies (secondary meters).

MID makes no distinction between meters used for primary billing and meters used for secondary billing. ALL fiduciary metering MUST use MID approved meters.

Fig 1. MID Approval Mark



- 01 EU Consumer Safety Directive compliance
- 02 MID 'M' metrology mark, plus 2-digit year of manufacture
- 03 Approving Notified Body reference number

Fig 2. Approvals Procedures

| Product group | Conformity assessment | |
|---|---|--|
| | Design | Production |
| Electricity meter Water meter Gas meter Heat meter Taximeter Exhaust gas analysers | Type examination by NB (B) | Quality of production process "EN 29002" (D) |
| | | Verification by NB (F) |
| | Total quality control + design examination by NB (H1) | |

Approval for electricity meters: B+D or B+F or H1. NB = Notified Body, these are normally standards laboratories. Examples: NMI Holland, SP Sweden, PTB Germany, LNE France, SGS UK, IMQ Italy.

Frequently asked questions

Q. Can MID meters be used for supplies over 100kW?

A. In the UK MID meters are only able to be used as Primary meters for sites not exceeding 100kW. Above 100kW, meters must be approved under UK national legislation because Code of Practice 5 (COP5) meters must be used for settlement in the half-hourly market. As Secondary meters (sub-meters) installed after the Primary supply meter, MID meters can be used for any internal supply above or below 100kW.

Q. Can I use a panel-mount meter for billing

A. Yes. 96x96mm and 72mmx72mm MID approved panel mount meters are now readily available. As long as the meter is an approved billing meter, it is immaterial whether it is wall mounting or surface panel mounting. There are very few 96x96mm panel mount meters approved under UK national regulations and these are highly specialist and expensive. Any panel meter used henceforward for billing or sub-billing should sensibly be specified to be an MID Approved meter.

Q. Can a DIN-Rail meter be used for billing

A. Yes. There are several panel-mount meters which have MID approval. There are no DIN rail meters which were approved for metering under the old pre-2006 regulations. So any DIN rail meter used for billing must be an MID approved meter.

Q. Can I use meters with just Annex B for billing?

A. No Annex B is a design acceptance and the meter therefore has not completed the full MID approval process. A meter cannot be used for billing until it has completed the full conformity process and carries the B+D or B+F Approval and is clearly identified by the use of the full MID Approval mark. Refer to Fig 1.

Q. Why do manufacturers sell meters that are only Annex B?

A. A manufacturer may design and produce a meter to the specification standard and requirements of MID, but may decide not to complete the full approval process. This meter cannot be used for billing. Mid Annex B is a procedure that ensures meter accuracy and quality. It allows the manufacturer, should he so chose, to complete the full MID Approval process at a later stage.

Q. What about the billing system, does it need to be MID approved?

A. No, only the meter itself is subject to MID. The data collection system whether it is manual reading, remote reading via data loggers, BMS, EMS software or any other means is not covered. If there is a dispute over the accuracy of a meter, it is important to emphasise that the meter register remains the prima facie evidence for consumption and a data logger or other item of equipment or software has no influence whatsoever over a dispute decision.

Q. Are current transformers covered by MID?

A. No, only the meter itself is covered by MID. Good practice requires that Current Transformers should have accuracy consistent with the meter and the load to which they are connected. The 1989 Electricity act states only that the CT and the meter are to be installed in an approved manner. MID makes reference to instrument transformers (CT's), but does not cover any aspect of their performance or accuracy.

Q. I am billing people only for a small amount of electricity on a caravan site, can I use low cost non-approved meters?

A. No. All meters used for billing at ANY level of consumption must be approved.

Q. Are there MID meters with current and voltage indication?

A. Yes. SHM supplies MID approved kWh meters that have full multi-function capability including Harmonic Distortion if required.

Q. Do I need to replace meters approved under UK National legislation?

A. No. Meters approved under UK National legislation can be used up to the end of their certification life. The initial certification period may be 10, 15 or 20 years, but may be extended for as long as the meter continues to meet the stipulated accuracy requirements. Any replacement meter installed after October 2016 must be MID approved. If meters approved under UK national legislation are installed prior to October 2016, they can remain 'on the wall' indefinitely, as long as they are accurate.

Q. I am specifying meters under Part L of the Building Regulations to be used only for energy management purposes, do I need MID Approved meters?

A. It is not necessary to install MID approved meters for purely monitoring purposes, but if it is likely that in future they may be used for billing it is wise to specify MID approved meters throughout.

MID Approved Meters

ABB MID meters communicate via M-Bus, LonWorks, Pulse, GSM/GPRS, EIB/KNX, Ethernet. Communication is via the meter directly or via infrared modules. Modbus communication will be available.



ABB meters have type approval according to Annex B and final verification according to Annex D. ABB uses NMI, for metrological testing, certification and calibration. ABB has MID approval for all meters produced. Every ABB meter is individually tested to ensure that it conforms to MID requirements.

To ensure that the calibration and verification of ABB electricity meters meets MID, ABB has its own in-house accredited calibration laboratory that operates under the auspices of SWEDAC, the Swedish Board of Accreditation and Conformity Assessment. Each meter is stamped with the code SE1818, showing that it has been calibrated and approved in ABB's own laboratory.

Manufacture with control by an accredited laboratory and Annex D approval requires that both NMI and SWEDAC perform regular audits to ensure that ABB manufacturing and test conform to requirements.

Direct Connection

| | | | |
|---|--|---|--|
|  | ODIN Single 65A Direct Connection, Single Phase, Pulse, Comms via infra-red |  | ODIN 80A Direct Connection, Three Phase, Pulse, Comms via infra-red |
|  | DELTA Plus Multifunction, 80A Direct Connection, Three Phase, Internal clock, Tariff options, Comms via infra-red Pulse, LON, Mbus |  | DELTA MAX Multifunction, 80A Direct Connection, Three Phase Internal clock, Tariff options, Pulse, LON, Mbus, Datalogging, Comms via infra-red, Max demand and more advanced functions |
|  | DELTA Single 80A Direct Connection, Single Phase, Pulse, Comms via infra-red | | |

Current Transformer Connection

| | | | |
|---|--|--|--|
|  | DELTA Plus Multifunction, 6(1,2,5)A CT Connection, Single Phase, Internal clock, Tariff options, Pulse, Comms via infra-red |  | DELTA Plus Multifunction, 6(1,2,5)A CT Connection, Three Phase, Internal clock, Tariff options, Pulse, Comms via infra-red |
|  | ODIN 6(1,2,5)A CT Connection, Three Phase, Pulse, Comms via infra-red | | |
|  | DELTA MAX Multifunction, 6(1,2,5)A CT Connection, Three Phase, Internal clock, Tariff options, Pulse, LON, Mbus, Datalogging, Comms via infra-red, Max demand and other advanced functions | | |



Socomec has type approval to Annex B and verification is to Annex D. Socomec uses LNE, for metrological testing, certification and calibration. All Socomec meters shown here are individually tested to ensure that they are fully approved to MID.

To ensure the calibration and verification of Socomec electricity meters meet MID requirements, Socomec has its own accredited calibration laboratory that operates under the auspices of LNE, the notified body. The meters carry the mark showing that they have been calibrated and approved in the Socomec laboratory according to requirements evaluated and proved by LNE.

Manufacture with an accredited laboratory and Annex D approval requires that LNE performs regular audits to ensure that Socomec manufacturing conforms to requirements.

Direct Connection

| | | | |
|---|---|--|--|
|  | E12 63A Direct Connection, Single Phase, Pulse |  | E32 100A Direct Connection, Single Phase, Pulse |
|---|---|--|--|

Current Transformer Connection

| | | | |
|---|--|---|---|
|  | E42 CT (6000A) 5A CT Connection, Three Phase, Pulse |  | E44 CT (6000A) 5A CT Connection, Three Phase, Modbus, JBUS |
|---|--|---|---|

MID Approved Meters

Carlo Gavazzi's MID meters are available with both RS485 Modbus communication as well as pulse output. The meters are multifunction and feature settable alarms as well as channels for gas and water metering.



Carlo Gavazzi's MID energy meters have an Annex B design approval from the PTB laboratories in Germany. Final certification according to Annex D is by IMQ laboratories in Milan. The production is assessed and approved by IMQ at the Carlo Gavazzi Belluno manufacturing plant. Each MID Approved meter is stamped with the MID mark. For Carlo Gavazzi this is 'CE M11' followed by '0051' the IMQ Certified Body reference number. This mark proves that the meter has an approved design to Annex B and is individually calibrated and verified in-house to Annex D. The meter is fully approved to MID as a billing meter.

Direct Connection

| | | | |
|---|--|--|---|
|  | EM10 32A Direct Connection, Single Phase, Pulse |  | EM11 32A Direct Connection, Single Phase, Multifunction, Pulse |
|  | EM23 64A Direct Connection, Three Phase, Multifunction, Pulse |  | EM24 64A Direct Connection, Three Phase, Advanced Multifunction, Dual Pulse, Modbus |

Current Transformer Connection

| | | | |
|---|---|--|--|
|  | EM21 DIN Rail Mounting, CT (6000A) 5A CT Connection, Three Phase, Multifunction, Pulse, Modbus |  | EM21 72 x72mm Panel Mounting, CT (6000A) 5A CT Connection, Three Phase, Multifunction, Pulse, Modbus |
|  | EM24 CT (6000A)1/5 (10A) CT Connection, Three Phase, Advanced Multifunction, Dual Pulse, Modbus |  | EM26 CT (6000A) 1/5 (10A) CT Connection, Three Phase, Advanced Multifunction inc THD, Pulse, Modbus |



The new range of Lovato modular MID DME series Energy Meters are equipped with mechanical or LCD display. The range extends from single phase meters, single DIN module (18mm) width, direct connect 40Amp, up to three phase meters in four module width (72mm) with both direct connect 63Amp and 5Amp CT versions available.

The range includes a single phase version in two-module width (36mm) for direct connection in circuits up to 63Amp.

Lovato energy meters comply with class B (class 1) as per the European MID Directive for measuring devices 2004/22/CE (MID). MID-Approved Lovato meters conform to Annex B and Annex D and are individually verified by the in house Lovato test laboratory accredited by IMQ.

Direct Connection

| | | | |
|---|---|---|--|
|  | DME M100 T1 Mechanical register, 32A Direct Connection, Single Phase, Pulse |  | DME D100 32A Direct Connection, Single Phase, Pulse |
|  | DME D110 32A Direct Connection, Single Phase, Multifunction, Pulse |  | DME D120 63A Direct Connection, Single Phase, Multifunction, Pulse |
|  | DME D300 63A Direct Connection, Three Phase, Multifunction, Dual Pulse | | |

Current Transformer Connection

| | |
|---|---|
|  | DME 310 CT (6000A) 5A CT Connection, Three Phase, Pulse, Infra-red port for expandable comms including USB, Modbus, RS232, RS485, Ethernet, Pulse or Relays |
|---|---|

**OFGEM & MID Approved Meters
Code of Practice 5 (COP5)**



Elster has a complete range of electronic meters, for residential, commercial and industrial applications. Multiple communication options and configuration software means that these meters can be easily incorporated into automated meter reading systems.

Commercial/Industrial Three Phase

The A1700 is a popular high-end meter used in the UK for half-hourly settlement metering. The meter also provides a complete solution for complex time of use metering for commercial and industrial consumers. The following versions of the meter are available:



A1700
Direct Connected, CT or CT-VT operated, Multi-utility external gas and water inputs, Class 0.5s and Class 0.2s, CT-VT transformer loss compensation.

RS232 or RS485 provides networking and remote communications, either directly from a PC or via a modem or via a PSTN, GSM, GPRS or Ethernet module.

The Meter can be programmed and read locally or remotely. Local communications is via an optical port, using a PC or Hand Held Unit with a FLAG reading head (IEC 62056-21, IEC 61107).

Residential - Single Phase

The A100C meter provides a cost effective solution for single rate or import-export domestic supplies. The meter is housed in an extremely compact case. The A120C variant provides dual tariff metering.



A100C
The A100C has the option of optical FLAG (IEC 62056-21) communication. This allows the meter registers and security data to be read electronically by a laptop or hand-held unit, eliminating the possibility of meter reading errors.



Three Phase

The MT375 meter provides a complete solution for complex time of use metering for commercial and industrial consumers.



MT375

Fully Integrated GSM/GPRS modem AMR, demand and alarm call-backs. Simple, fast and easy installation, Multi-utility inputs for water, heat or gas. Optional contactor for remote disconnection or limitation.

The MT171 Three Phase electronic meters are designed for measuring energy via direct connection or CT operation.



MT171

Fast and easy installation, indication of incorrect connection, Compact size, Single Phase or Three Phase connection, Universal current terminals for all cable sizes, Indication of operational status.

Single Phase

The ME162 electronic kWh-meter is used for measurement of dual energy flow in Single Phase supplies.



ME162

Internal clock, Import-Export, LCD display during power outage, LCD backlight, Optical port for hand-held meter reading.

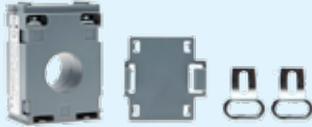
Electricity Meter Accessories

Below are some SHM products that are used in conjunction with the MID approved electricity meters featured in this guide. We have many more products and services available. We recommend, design and install complete metering systems, suitable for all sizes of buildings ranging from a small block of flats up to a large estate. We also just supply meters.

All the products featured in this guide are available direct from SHM and can also be purchased online from our web shop www.shmmetershop.co.uk.

If you have any questions refer to our main website www.shmcomms.co.uk. Alternatively call us on 01962 865142 or email sales@shmcomms.co.uk.

Current Transformers



Moulded Case

These CT's are used when the supply can be disconnected and the conductor fed through the CT. They are available from 40-8000 Amp.



3 in 1 Block

These space-saving CT's are mostly used by switchgear manufacturers and mounted on a busbar. They are designed to match the frame sizes of MCB or MCCB and are available from 100-600 Amp.



Standard Split Core

These CT's are used for retrofit where meters are to be installed and the power cannot be disconnected. These are available from 100-8000 Amp.



SHM specialises in providing this unique product range of compact retrofit CT's suitable for use in restricted spaces.

MiniClip Split Core

These SHM MiniClip CT's are used for retrofit where limited space will not allow use of standard split core. They are ideally suited to distribution board metering and are available from 60-200 Amp.

Meter Management Units



A

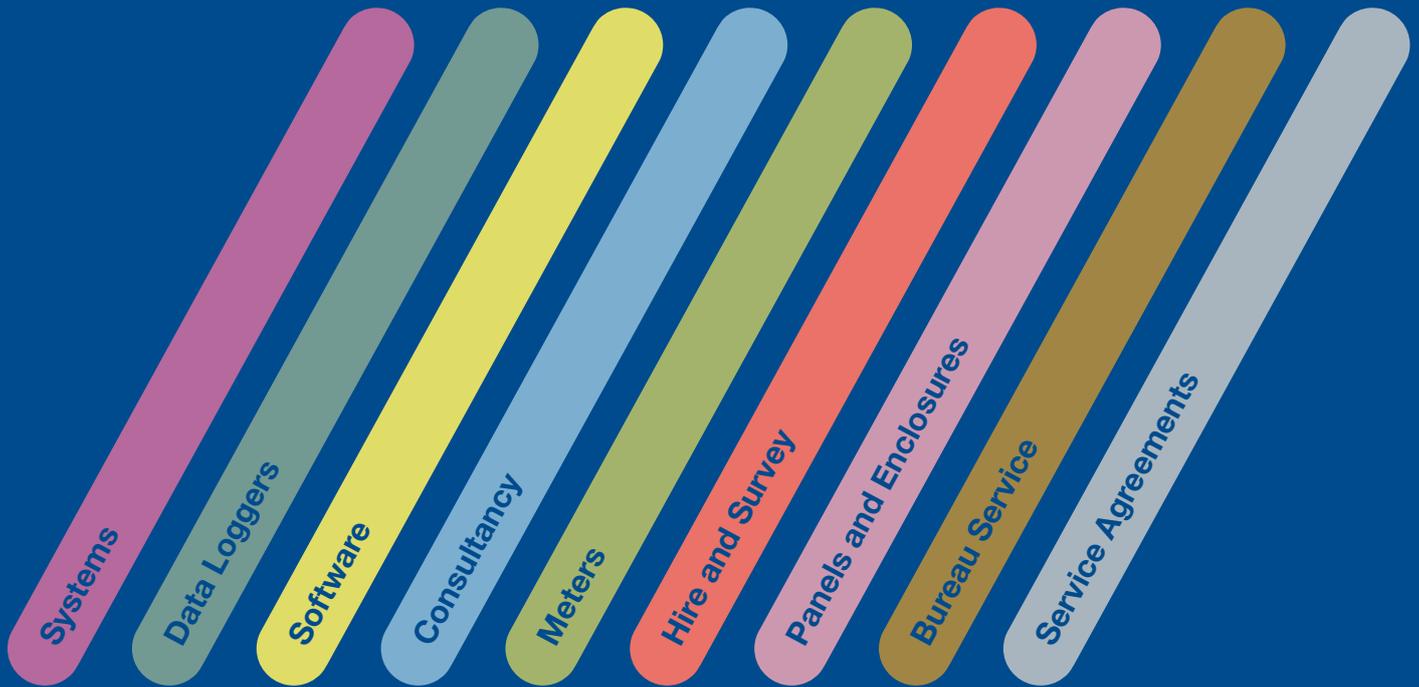


B

A Our DIN rail MID meters can be flush mounted using one of our range of panel kits.

B We supply special enclosures for our meters. Our wide range of Meter Management Units can contain any of the MID certified DIN rail meters that we highlight on previous pages. They are pre wired with voltage and CT disconnect terminals. Installers just need to connect CT leads and voltage reference supplies. They are easily mountable next to or attached to existing panels and are an ideal solution for updating non-approved tenant meters to MID approved billing meters.

The Full SHM Service



SHM Expertise

Engineering innovation
Knowledge leaders
Software and firmware development
Wide product portfolio
Billing systems
Power Monitoring
Installation and commissioning

SHM Milestones

1993 SHM Logger Protocol
1994 UL8 Data Logger released
1996 DL4 Data Logger
2000 UL24 Data Logger
2006 ML32 Modbus Logger
2008 Valley House HQ
2009 500-channel Superlogger
2010 SHM Metershop
2010 SHM MiniClip CT

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