Single Phase
kWh Energy Meter

USER MANUAL

Model Versions:-
E110 / 5235A,B,D

5235 USER MANUAL & TECHNICAL SPECIFICATION

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Purpose

This document details the functions for the following variants of the 5235 Single Phase Credit Meters:-

- Single Rate, kWh meter
- Single Rate, kWh meter with class A pulse output
- Multi-rate Externally switched meter

Meter Overview

The meter is a whole current static electricity meter capable of measuring kWh, an additional option to have a pulsed output is also available on the 'B' meter version. The meter is approved to IEC62052 – 11: 2003 & IEC62053 – 21:2003 classes 1.0 and 2.0 and has been given a 20 year certification life by OFGEM.

The meter is sealed for life by a liquid welding process and therefore does not carry an external wire seal.

All meter types feature an optical port used for reprogramming. The metrology LED is incorporated into this port and pulses at a rate of 1000 impulses per kWh.

All facia details are permanently laser etched directly onto the meter front. Options would normally include property details, serial numbering and various barcode options. Other details may be printed such as customer logo's and meter type codes etc.

Model versions

A character denotes meter version after the model number:

- A - Single rate only active only
- B - Single rate with pulsed output active only
- D - Externally switched two-rate active only

Reference Standards

The meter has been tested by Ofgem and has the following certification. IEC62052 – 11: 2003. IEC62053 – 21:2003. Alternating current static watt-hour meters for active energy. (Classes 1 & 2). Other standards are in the technical summary.

20 Year Certification Life

This meter has been given a certification life of 20 years by Ofgem the UK regulatory body. This has been achieved by proving the reliability of each of the components in the meter and by using mathematical models provided by Ofgem. This modelling has shown a reliability of better than 97% over twenty years. The Ofgem approval number for this meter is 986.

Measurement

The Meter is a 220-240Vac, 50Hz, 100A Single Phase Credit Meter. It contains a measuring element capable of measuring active energy (kWh). The meter measures and registers kWh up to class 1.0. accuracy. The metrology LED is incorporated into the optical port and pulses at a rate of 1,000 impulses per kWh for energy registration.

Anti-creep

Below starting current, the meter enters into an anti-creep mode. In this state the metrology LED is permanently lit and the registers do not increment. The LED remains lit until the meter current is increased in a forward direction beyond the starting current. The starting current is shown in the technical summary.

Meter Memory

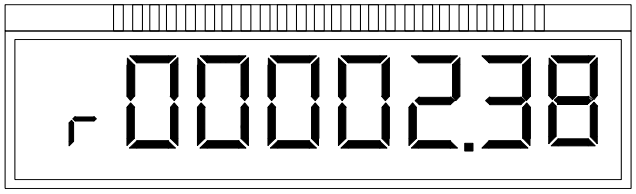
All the meters data is to be recorded in a Ferroelectric Random Access Memory (FRAM) under the control of the microprocessor. All the kWh registers are stored in the FRAM and will be updated periodically and on power-fail. The FRAM is able to be re-written throughout the life of the meter and will hold the information, if required for over twenty years.

Reverse / Export Energy registration

Three factory configurable reverse energy modes can be set as follows:

1. Export Energy Registration.

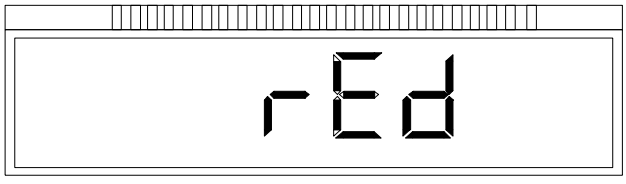
A reverse / export energy register stores the value of kWh recorded by the meter in a reverse direction. The register may be configured as part of the display cycle of the meter. Alternately the register is held in memory and can be read from the meter via the IEC 1107 port. The Reverse energy register can be displayed with 0, 1 or 2 decimal places. Export energy will be recorded in the same way as forward (Import) flowing energy using identical starting currents etc.



Total Reverse

2. Reverse Energy Detection

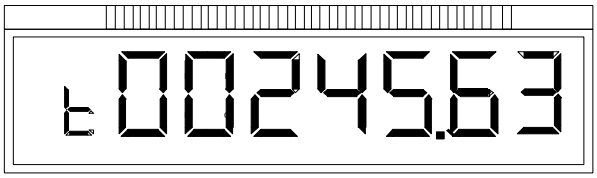
A configurable option within the meter will alternate a warning message on the display should a fraud attempt be made by running current backwards through the meter. The reverse energy warning message is triggered when the reverse power exceeds a programmable threshold level of between 1-10 Amps for a period of 10Wh. Once this level is reached the message below will be displayed which can only be reset via the IEC 1107 port. Whilst in this mode the LED will remain lit whilst there is reverse energy detected.



Reverse Energy Detection Message

Unidirectional Register

An optional requirement is to accumulate both import and export energy into the same register. Basically this will be the sum of adding both forward and reverse energy resisters. The register would be shown as the normal kWh display as below:



Total Display

Register Displays

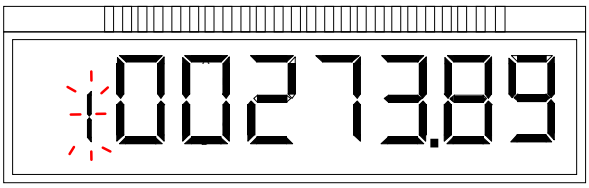
Single rate version -versions A & B

Single rate meters display the total kWh reading only. The display is configurable to show either whole numbers, 1 or 2 decimal places. The meter is also factory configurable to display either 5 or 6 digits with roll over to zero at 99999 or 999999.

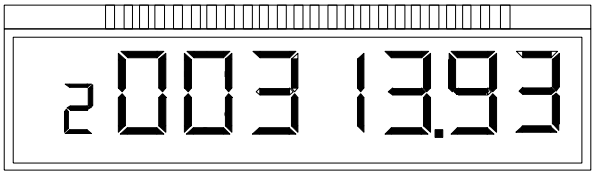
Two-rate meter (external time switch) - D version only

kWh are recorded at a particular rate and displayed using the rate enunciators on the left hand side of the display. The rate registers are displayed between 0 and a maximum of 2 decimal places unless configured to 3 decimal places of testing purposes via the optical port.

The rate register range is 00000.00 – 99999.99 kWh unless factory configured to six digits. The diagram shows a display sequence for a four-rate meter and total register below. In the two rate variant the meter may be configured to operate between 1 and 2 rates via the Optical port.



Rate 1 display. **Flashing enunciator indicates active rate**



Rate 2 Display

Pulsed Output (Option)

The type B meter has an optically isolated, voltage free open collector Pulse Output that is configurable to between 1 and 1000 pulses per kWh. To maximise operation with external monitoring devises, the pulse width can also be configured to between 20 and 260 mS in 20 mS steps. Configuration is made through the IEC 1107 port.

The output meets IEC62053-31: 1998 Class B, Maximum voltage 15Vdc.

Switching inputs (D model)

The configuration is factory set allowing the meter to operate as a single or two rate meter. Rate switching is achieved by switching neutral or live to the input terminal. See wiring diagram for the D model.

5235D-L Live switching model
5235D-N Neutral switching model

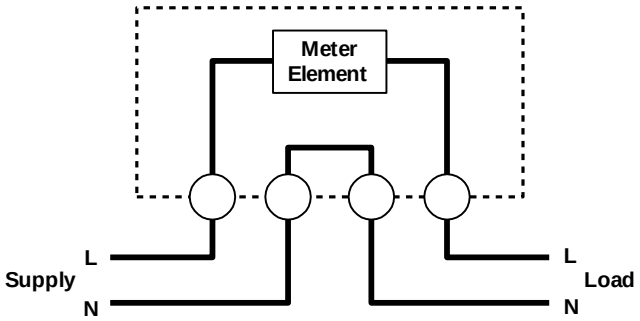
Construction

The Credit Meter case meets the requirements of BS5685 and is manufactured from following materials: -

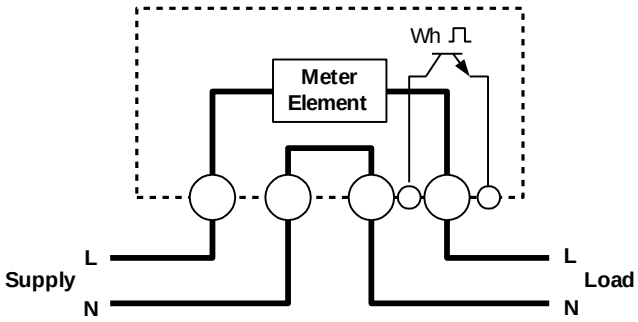
Meter Base:	Flame Retardant and UV stabilised Polycarbonate
Meter Top:	Flame Retardant and UV Stabilised Polycarbonate
Terminal Cover:	Flame Retardant and UV Stabilised Polycarbonate
Terminals:	Solid Brass extrusion, 8.3mm diameter with 2 screws.

Wiring

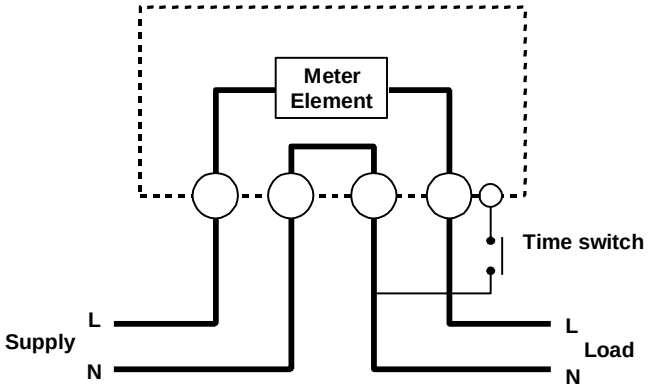
Terminal arrangement conforms to BS5685, Part1, 1979. Wiring diagrams can be put onto the terminal covers of the meters.



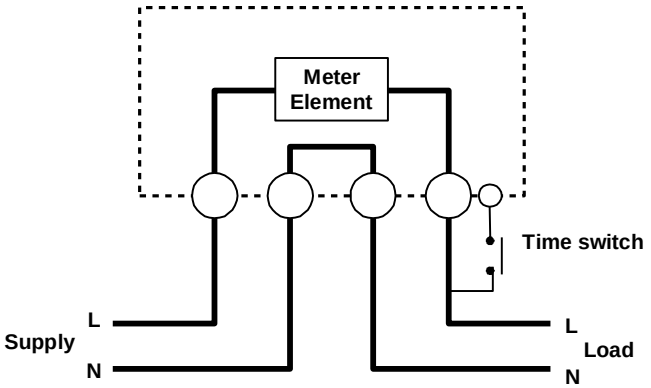
Meter type 5235 A



Meter type 5235 B



Meter type 5235 D - N



Meter type 5235 D - L

The technical specifications of the 5235

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- Technical Summary

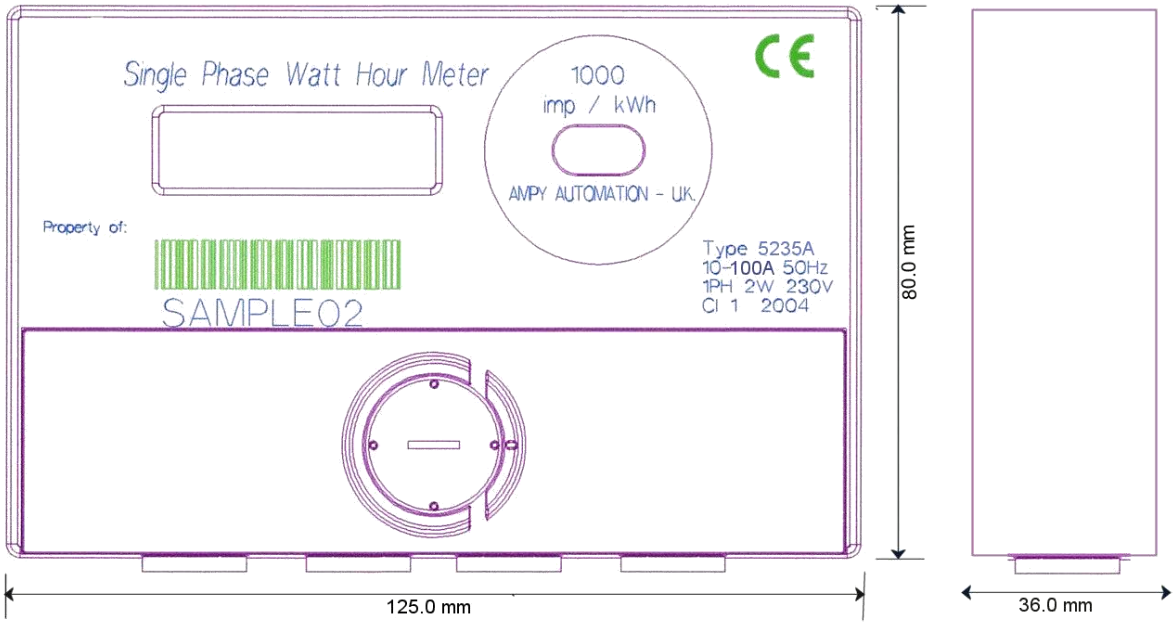
Technical Summary

System Voltage	Single element meters	240Vac Phase to Neutral 230Vac Phase to Neutral 220Vac Phase to Neutral 210Vac Phase to Neutral
	Supply variation	+15% to -20%
	Voltage withstand	415V continuous 10kV impulse @105J
Current (Base)	Direct connection Ib	5A, 10A, or 20A
Current (Max)	Imax	40A, 60A, 80A or 100A
Starting Current	(IEC)	0.4% of Ib
Max measuring range		20mA up to 100A
Measuring Accuracy	IEC 62053-21	Class 1 and 2
Burdens	Voltage Circuit @ 230Vac	0.9W 7.7VA
	Current Circuit @ Ib	0.1VA
Supply Frequency	Nominal	50Hz or 60Hz
	Frequency Variation	+/- 5%
Temperature Range	Limit operating ranges	-20°C to 55°C
	Storage range	-25°C to 70°C
Meter Constant		1000 imp/kWh
Pulse output		The output meets IEC62053-31: 1998 Class B, Maximum voltage 15Vdc
Display	Type – 7 character, 7segment LCD	Character size – 8×3.5 mm.
Quality	Manufactured to:	ISO 9001:1994
Ofgem approval number		986
Certificated life		20 years
Reference standards	1. IEC62052 – 11: 2003 & IEC62053 – 21:2003 Alternating current static watt-hour meters for active energy. (Classes 1 & 2) 2. BS5685: 1979: Part 1:Specification class 0.5, 1.0 and 2.0 Single phase and Polyphase, single rate and multi-rate watt-hour meters. 3. IEC62056 – 21: 2002.Data Exchange for Meter Reading, Tariff and Load Control. Direct Local Exchange.	

4. SI1566: 2003The Meters (Certification) Regulations 1990;

Construction		Flame Retardant and UV Stabilised Polycarbonate
Terminal arrangement		BS5685
Terminal size		8.3 mm diameter.
Weight		
	Standard Terminal Cover	304g
	Extended Terminal Cover	338g
Dimensions (mm)	Standard Terminal Cover	H 80 x W 125 x D 36
	Extended Terminal Cover	H 113 x W 126 x D 41

Dimensions



Appendix – A Definitions

BS: British Standard
IEC: International Electrotechnical Commission
SI: Statutory Instruments
kWh: Kilo Watt-hours
kVArh: Kilo Volt-Ampere hours reactive
LCD: Liquid Crystal Display
LED: Light Emitting Diode
HHU: Hand-Held Unit
mS: Milli-Second