





SINGLE-PHASE METER CIRWATT B 101-102





INSTRUCTION MANUAL (M98244801-03-12A)





E
ADVERTENCIAS / SÍMBOLOS

<p>PELIGRO</p> 	<p>Una conexión incorrecta del equipo puede producir la muerte, lesiones graves y riesgo de incendio. Lea y entienda el manual antes de conectar el equipo. Observe todas las instrucciones de instalación y operación durante el uso de este instrumento.</p> <p>La instalación, operación y mantenimiento de este instrumento debe ser efectuado por personal cualificado solamente. El Código Eléctrico Nacional define a una persona cualificada como "una que esté familiarizada con la construcción y operación del equipo y con los riesgos involucrados".</p>
<p>ATENCIÓN</p> 	<p>Consultar el manual de instrucciones antes de utilizar el equipo</p> <p>En el presente manual, si las instrucciones precedidas por este símbolo no se respetan o realizan correctamente, pueden ocasionar daños personales o dañar el equipo y /o las instalaciones.</p>



GB
WARNINGS / SYMBOLS

<p>DANGER</p> 	<p>Death, serious injury, or fire hazard could result from improper connection of this instrument. Read and understand this manual before connecting this instrument. Follow all installation and operating instructions while using this instrument.</p> <p>Installation, operation, and maintenance of this instrument must be performed by qualified personnel only. The National Electrical Code defines a qualified person as "one who has the skills and knowledge related to the construction and operation of the electrical equipment and installations, and who has received safety training on the hazards involved."</p>
<p>WARNING</p> 	<p>Consult the instruction manual before using the equipment.</p> <p>In this manual, if the instructions preceded by this symbol are not met or done correctly, can cause personal injury or equipment damage and / or facilities.</p>



F
WARNHINWEISE / SYMBOLE

<p>DANGER</p> 	<p>Un branchement incorrect de l'appareil peut entraîner la mort ou des lésions graves et peut provoquer un incendie. Avant de brancher votre appareil, lisez attentivement le manuel et assurez-vous de bien avoir compris toutes les explications données. Respectez toutes les instructions concernant le mode d'installation de l'appareil et son fonctionnement.</p> <p>L'installation, le fonctionnement et la maintenance de cet appareil doivent être réalisés uniquement par du personnel qualifié. Le code électrique national définit en tant que personne qualifiée toute personne connaissant le montage et le fonctionnement de l'appareil ainsi que les risques que ceux-ci comportent »</p>
<p>ATTENTION</p> 	<p>Consulter le manuel d'instructions avant d'utiliser l'appareil</p> <p>Si les instructions suivantes, précédées dans le manuel d'un symbole, ne sont pas respectées ou sont réalisées incorrectement, elles pourront provoquer des dommages personnels ou abîmer l'appareil et/ou les installations.</p>



D
WARNHINWEISE / SYMBOLE

<p>GEFAHR</p> 	<p>Durch einen nicht sachgemäßen Anschluss der Anlage können Tod, schwere Verletzungen und Brandrisiko hervorgerufen werden. Bevor Sie die Anlage anschließen, lesen Sie bitte das Handbuch durch und machen Sie sich dessen Inhalt klar. Beachten Sie bei Einsatz dieses Instrumentes sämtliche Installations- und Betriebshinweise.</p> <p>Installation, Betrieb und Wartung dieses Instrumentes müssen ausschließlich von entsprechend qualifiziertem Personal vorgenommen werden. Von dem nationalen Elektrocode wird eine qualifizierte Person als jemand definiert, "der mit der Konstruktion und dem Betrieb einer Anlage und der damit verbundenen Risiken vertraut ist".</p>
<p>ACHTUNG</p> 	<p>Vor Inbetriebnahme der Anlage ist das Handbuch zu lesen.</p> <p>Werden die in dem vorliegenden Handbuch mit diesem Symbol versehenen Hinweise nicht beachtet oder falsch verstanden, können Personenschäden und Schäden an der Anlage und/oder den Installationen verursacht werden.</p>

P
ADVERTÊNCIAS / SÍMBOLOS

<p>PERIGO</p> 	<p>Uma ligação incorrecta do equipamento pode provocar a morte, lesões graves e risco de incêndio. Leia e compreenda o manual antes de ligar o equipamento. Observe todas as instruções de instalação e operação durante o uso deste aparelho.</p> <p>A instalação, operação e manutenção deste aparelho devem ser levadas a cabo exclusivamente por pessoal qualificado. O Código Eléctrico Nacional define uma pessoa qualificada como "uma pessoa que se encontre familiarizada com a construção e operação do equipamento assim como com os riscos inerentes".</p>
<p>ATENÇÃO</p> 	<p>Consultar o manual de instruções antes de utilizar o equipamento</p> <p>No presente manual, se as instruções que precedem este símbolo não forem respeitadas ou realizadas de forma correcta, podem ocorrer ferimentos pessoais ou danos no equipamento e/ou nas instalações.</p>

I
AVVERTENZE / SIMBOLI

<p>PERICOLO</p> 	<p>Un collegamento errato del dispositivo può provocare morte, lesioni gravi nonché rischio di incendio. Prima di collegare il dispositivo leggere attentamente il manuale. Osservare tutte le istruzioni relative all'installazione e all'operatività durante l'uso di questo strumento.</p> <p>L'installazione, operatività e manutenzione di questo strumento devono essere realizzate solamente da personale qualificato. Il Codice Elettrico Nazionale definisce una persona qualificata come "colui che ha familiarità con la costruzione e operatività del dispositivo e con i rischi che ne possano derivare".</p>
<p>ATTENZIONE</p> 	<p>Consultare il manuale di istruzioni prima di utilizzare il dispositivo</p> <p>Qualora le istruzioni riportate nel presente manuale precedute da questo simbolo non vengano osservate o realizzate correttamente, possono provocare danni personali o danneggiare il dispositivo e/o gli impianti.</p>

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1.- GENERAL DESCRIPTION OF THE ENERGY METER

1.1.- Introduction

CIRWATT Type B is a single-phase static energy meter used to measure Class B active energy, in compliance with the European Directive 22/2004 EC (Class 1, in accordance with the IEC 62052-11 and IEC 62053-21 Standards). It also measures Class 2 reactive energy, in accordance with the IEC 62053-23:2003 Standard (optional).

1.2.- Versions

The following table shows all the available options for the CIRWATT B 101-102 energy meters. It is a generic table, i.e., not all versions shown on the table might be currently available.

ENERGY METER TYPE	CIRWATT B 101	CIRWATT B 102		
2 asymmetrical connection wires	•	•	2	Connection mode
2 symmetrical connection wires	•	•	S	
Class (B) 1.0 Active / Does not measure reactive energy	•	•	10	Accuracy
Class (A) 2.0 Active / Does not measure reactive energy	•	•	20	
Class B Active/ Class 2.0 Reactive	•	•	12	
1x230 V	•	•	E	Measurement voltage
1x127 V	•	•	B	
Shunt 10(60) A	•	•	S4	Current measurement
Shunt 5(65) A	•	•	S7	
Shunt 5(60) A	•	•	S2	
50 Hz	•	•	A	Frequency
60 Hz	•	•	B	
Without communications	•	•	0	Communications
R1 / R2		RS-485	2	
Without inputs/outputs	•	•	0	Expansion
Optocoupler output	•	•	1	
3 A 250 V Relay Output	•	•	3	
Potential free input	•	•	A	
Residential model	•	•	B	Model
2 Quadrants	•	•	0	Number of quadrants
4 Quadrants	•	•	1	
Always positive	•	•	2	
No special features	•	•	0	Added features

For example: The **210ES7A20B10** code would be used for a *Standard Type B energy meter, Class B (Class 1) for active energy and Class 2 for reactive energy; with asymmetrical connection, at 50 Hz; with 1x230 power supply/measurement voltages and 5(65) A current measurement; with RS-485 communications and 4-quadrant measurement*

1.3.- Metrology

The main metrology features of the CIRWATT B 101-102 energy meter are as follows:

- Voltage measurement: 1x127 V or 1x230 V
- Current ranges:

<i>Values of the main magnitudes</i>	Active Class 1
I_{tr}	0.5 A
I_{st}	10 mA
I_{min}	250 mA
I_n / I_{ref}	5 A
I_{max}	65 A

1.4.- Measured Magnitudes

The energy meter can measure the following variables.

- Active energy (imported and exported) and reactive energy (Q1, Q2, Q3 and Q4).
- Active and reactive power.
- RMS voltage and current
- Power factor

1.5.- Nominal, maximum and minimum operating conditions

1.5.1.- Electrical parameters

- Reference voltage (U_{ref}): 1x127 V or 1x230 V (depending on the model)
- Operating voltages
 - minimum: 80% U_{ref}
 - maximum: 120% U_{ref}
- Reference frequency: 50 - 60 Hz
- Absorbed power per phase: <2 W; <10 VA for I_b , U_{ref} (w/o auxiliary performance features)

1.5.2.- Environmental parameters

- Minimum temperature: -40 °C (in compliance with metrological accuracy standards)
- Maximum temperature: +70 °C; 95% relative humidity.

1.6.- Build features

1.6.1.- Overview

The energy meter has an insulating enclosure, with protection class II and double insulation. No materials or substances not established in the 2002/96/EC and 2002/95/EC directives will be used on such enclosures. Materials used will be fireproof, halogen-free and with low emissions of opaque, toxic and corrosive fumes.

The unit's operation will not be affected by the presence of external magnetic fields. The unit has a forecast useful life of 15 years at an average operating temperature of 35 °C.

1.6.2.- Environmental features

The energy meter offers:

- Protection degrees provided by the Code IP53 enclosures, CEI 60529:2001 regulations.
- Protection against saline mist, EN 60068-2-11:2000 standard.
- Resistance to ultraviolet rays, EN 60068-2-5:2000 standard.

1.6.3.- Voltage connection

The voltage bridge internally separates the voltage and current circuits, so that they can not be externally tampered with.

1.6.4.- Seals

The cover and base of the energy meter are sealed, making it impossible to open them or insert objects without breaking the enclosure. In addition, the energy meter has a series of mechanical fixing elements that prevent the enclosure from being opened. It also has regulatory seals, both on the energy meter cover and on the sealable keypad and the terminal cover.

1.6.5.- Terminal cover

The energy meter has an opaque cover over the top of the terminal box, the screws and the connection conductors.

The dimensions of the terminal cover meet the requirements for single-phase energy meters, in compliance with the DIN 43857 standard. The bottom part is made for easy breakage and to partially let the wires out, protecting access to the terminals.

The energy meter has a sensor that detects the opening and closing of the terminal cover. This detection is always made, even if the energy meter has no power supply.

1.6.6.- Terminal box

1.6.6.1.- Screws

The screws are mixed type, allowing the use of PZ2 (Pozi drive no. 2) and flat-head screwdrivers. Fastening is achieved with a double screw, designed to prevent deformation after the various tightening and loosening operations that may occur throughout the energy meter's life.

1.6.6.2.- Terminals

All terminals are permanently numbered on the front panel, from left to right, indicating the role of the conductor according to the following key:

- 1 → Phase conductor input.
- 3 → Phase conductor output to user.
- 4 → Neutral conductor input.
- 6 → Neutral conductor output to user.

1.6.6.3.- Auxiliary terminals

These terminals are located above the main terminals. These terminals offer different configurations, depending on the energy meter model. The available options are described below:

S0 Impulse output (terminals 23-24): this output emits an impulse train that is proportional to the consumption measured by the energy meter. These impulses comply with the IEC 62053-31 Standard.

Relay output (terminals 23-24): this output is used to check the moment when the tariff is modified. This relay is closed to connect or disconnect charges, in accordance with the tariff.



Tariff modification input (Ripple Control) (terminals 23-24): this input is used to make a tariff change on 2-tariff energy meters.

RS-485 Communications port (terminals 21-22): this port allow to download data from the meter or to setup the meter. This port is also used to connect the energy meter to an RS-485 communications bus. It allows the connection of up to 32 energy meters. To this end, the same communications bus can be used to establish the communications with different units.

1.7.- Data display

Data is displayed on the LCD display that has been specially designed for this application. It will show all necessary information such as, for example: energy meters, electrical parameters, state indicators, etc.



- *Code line.* It shows the code that encodes the variable displayed on the data line.
- *Data line.* This area shows information about the electrical parameters, the energy meter, etc.
- *Units.* Unit of the magnitude being displayed.
- *Indicators.* The energy meter uses the second line on the display to show the indicators on all the screens. The format will be as follows:
 - **TX** , indicates the active period at each moment.
 -  indicates the presence of an alarm.
 -  , indicates that the LED will check the reactive measurement. Not available on energy meters that only measure active energy.

1.8.- Verification impulses

The unit has a combined verification LED used to verify reactive and active energy.

The weight of the LED depends on the energy meter's version, generally set to 1,000 imp/kWh(kvarh).


The LED is lit when the current is lower than during the energy meter's start-up. The LED will turn off and start emitting impulses proportional to the measured energy when the start-up current is exceeded (either due to the consumption of active or reactive power), following the rate shown on the features plate. This LED has a metallic ring used to fix and help position the verification head.

1.9.- Button

It is based on two keys (short and long keystroke). A short keystroke is one that lasts less than 2 seconds and a long keystroke lasts more than 2 seconds. The keystroke effect of each key depends on the energy meter's version. One of the keys is pre-sealed to prevent the energy meter from being tampered with by unauthorised staff.

1.10.- Features plate

The energy meter's front panel shows the features plate, which includes the indications that comply with the specifications of the IEC 62052-11 standard:

- Manufacturer's identification mark and place of manufacture
- Definition of the type and approval indications.
- Number of phases and number of circuit conductors to which the unit can be connected (for example, 2-wire single-phase)
- Energy meter's serial number (9 numerical characters). This number individually identifies each energy meter.
- Year of manufacture, year when the energy meter was manufactured.
- Reference voltage, depending on the voltage assigned by the grid or the secondary voltage of the measuring transformer to which the energy meter will be connected.
- Reference current and maximum current, for example 5(65) A for an energy meter with a base current of 5 A and maximum current of 65 A.
- Reference frequency in Hz.
- The energy meter's constant is based on the active energy impulse ratio, which defines the LED's flashing frequency. This ratio is 1,000 impulse/kWh.
- Energy meter class index
- The double square symbol is  used, since this is an energy meter with a protection class II insulating enclosure.
- Definition of the number and arrangement of the measuring elements.
- Bar code, in accordance with the EN 207010 Standard, for the identification of the energy meter.
- Model identification. Manufacturer code identifying the energy meter model. The configuration of the unit can be checked with this code: power supply, current measurement, measurement system, etc.
- Temperature range -25 ...+70 °C (-40 ...+70 °C metrology).

- Minimum current.
- Additional metrology marks.
- EC Mark.
- Firmware version

1.11.- Enclosure

The dimensions of the CIRWATT enclosure and its anchoring points comply with the specifications established in the DIN 43859 and DIN 43857 standards.

1.12.- Connections

Laser-marked on the energy meter's enclosure is a figure showing the electrical wiring diagram. In addition, a small installation manual is included to facilitate start-up operations, in case needed.

1.13.- Auxiliary contacts (depending on the version)

The energy meter can be optionally supplied with two auxiliary contacts.

1.13.1.- IMPULSE OUTPUT S0 (OPTIONAL).

The energy meter has an impulse output, with a 1000 imp/kWh rate that supports inputs of up to 24 V / 50 mA

1.13.2.- OUTPUT TARIFF RELAY(OPTIONAL)

The unit has a normally-open relay type output. It can govern loads of up to 230 V / 3 A when it has been activated (closed).

1.13.3.- TARIFF INPUT (OPTIONAL)

The unit has an input that is activated with voltages that range between 100 and 240 V. It can be used to show the change of tariff.

1.13.4.- RS-485 PORT

This communications port (*only available on model 102*) can be used to integrate the energy meter into a standard RS-485 network to link more devices to the same data bus.

The + and - terminals of the bus must be connected to each device connected to the same RS485 bus, in order to guarantee that communications are established correctly.

- 21 (A) → Terminal (+)
- 22 (B) → Terminal (-)

1.14.- Real time clock (*depending on the model*)

The energy meter has a real time clock that can keep the date and time with a drift of less than 0.5 seconds/day, as established in the EN 61038 standard.

The clock's accuracy is preserved when the unit is powered through the electrical network, or by its own battery.

1.15.- Battery

The energy meter has a battery that maintains the clock operating in real time. The battery can not be removed and is designed to supply energy for 5 years without another power supply to the energy meter. The battery has zero consumption when the energy meter is powered from the mains. The use of laser-sealed batteries guarantees a minimum self-discharge, so that the energy meter's battery can be guaranteed for a useful life of 20 years.

1.16.- Optical communications port

The unit has a serial optical communications port, in compliance with the EN 62056-21:2003 standard. The communications port is fully compatible with the optical heads approved by the major utilities companies.

On the surface of the cover there is a profile for the correct fastening and location of the optical heads.

1.17.- Parameterisation reset

There is a full reset mode that re-establishes the default factory parameters on the unit and sets the records to zero, except for the total values of the 6 energy magnitudes (EN50470-1 Standard, section 5.10). This function is executed locally and acts on an element inside the physical enclosure, generating an event.

All programmed parameters and stored data will be deleted. The following data will be maintained: date and time, battery status, manufacturer-set parameters and distributor-set parameters (passwords, 9600 baud serial communications port, 7E1 serial port configuration and automatic seasonal change).

1.18.- Tariffs (optional)

The energy meter can handle up to 3 tariffs. These tariffs can be configured for different seasons (usually winter/summer), tariff periods and types of day (working or holiday).

These configurations are set in the factory or by authorised staff.

1.18.1.- Seasons

A season is defined as each period of time in which a natural year can be divided and during which the associated billing conditions are not modified. A maximum of 2 seasons can be configured. Only 2 seasons are defined for the year and they are established by the dates of daylight saving time, with no need for any further parameterisation, since they are adjusted automatically every year. The automatic time change option can be disabled.

1.18.2.- Tariff periods

A tariff period is an hourly block in which a specific tariff is applied. There will be a minimum of one hourly block and a maximum of three hourly blocks. Each period is identified with a growing number, starting at 1 on the lower part of the screen (T8).

1.18.3.- Types of day

A type of day is defined as the set of tariff periods assigned to each of the 24 hours of a day. Each type of day is identified with a number, starting at 1 and increasing by one for subsequent types. There is only one type of day.

1.19.- Maximeter

A maximum value is the highest value obtained for the average demanded active power during a 15-minute period between two consecutive billing closures.

The 15-minute periods coincide with the quarter-hour load curve integration periods, i.e., they will start on minutes 0, 15, 30 and 45 and will end when the next period starts. The maximum values are expressed in absolute value in W.

1.20.- Billing closures

The energy meter stores the billing closures (or monthly summary) with the programmed date and time, the absolute total values of the energy magnitudes measured by the energy meter (A+, A-, R1, R2, R3, R4), including both total values by tariff periods, and those accumulated since the last closure until the current closure, to be displayed (from the energy meter's start-up in the case of the first closure). In addition, the maximum average quarter-hour active power calculation will be stored from the last closure (maximeter, corresponding to magnitude A+).

The units will be expressed in Wh for active energy and Varh for reactive energy.

Each closure will have an associated date and time. The energy meter must keep a log of the last 12 closures. The energy meter automatically performs the billing closure at 00:00 hours on a determined date, which will match the end of an hourly integration period.

1.21.- Events

All setup modification dates, battery replacements, time changes, billing closures, etc. will be stored.

The energy meter can store up to 128 events in its memory. The data is organised in the file with a rotating method. This means that, when the memory is full, the new data will overwrite the oldest data (FIFO type). This system guarantees that the energy meter constantly has updated information that corresponds to the latest data gathered.

The following events are registered:

- Start
- Power supply error
- Time change
- Software Update
- Parameter modification
- Intruder detection Start
- Intruder detection End
- Neutral current alarm

1.22.- Load profile

The energy meter can have an adjustable load curve (usually between 15 and 60 minutes), where the measured energies are recorded. The default recording period is 60 minutes.

The energy meter records and stores 6 energy records (in the case of active and reactive energy measurements) in the Wh or Varh absolute form for a total of 10,000 records.

- Imported Active Energy (non-vectorial, only magnitude) +A.
- Exported Active Energy (non-vectorial, only magnitude) –A (optional, depending on the version).
- Quadrant I Reactive Energy R (QI) (optional, depending on the version).
- Quadrant II Reactive Energy R (QII) (optional, depending on the version).
- Quadrant III Reactive Energy R (QIII) (optional, depending on the version).
- Quadrant IV Reactive Energy R (QIV) (optional, depending on the version).
- Date/time.

The default recording period of the load curve is 60 minutes. The load curve has no information gaps. Therefore, any periods with no measurements can be filled in with empty records.

1.23.- Daylight saving

The energy meter - counter automatically makes the daylight saving time change. If the unit is not receiving a power supply at that time, the change will be made when the unit is switched on after regaining a power supply.

The parameters that define this type of modification have two different formats. One is generic, so that it allows the automatic annual update and the other one will add the parameters included in the specific communications protocol message.

The formats are as follows:

- **Enabled:** this is a generic format, regardless of the year, with the pre-set month, day, time, pre-set delay or advance, as established in the current regulations (last Sunday of March and last Sunday of October)
- **Disabled:** This format specifies the year, month, day, time, delay or advance.

The time change parameters will be automatically updated at the start of the year, regardless of the format in which they have been programmed and in accordance with the generic format. In case a message is received from the communications protocol to update the daylight saving time, the format will be modified with the specifications established in this message.

1.24.- Synchronism

The unit must have an internal clock with a calendar to perform the billing closures, maximum value calculations, preparation of load curves and event dating and alarms.

Basic features:

- The Accuracy of the clock will have a maximum deviation of 0.5 s/day. The accuracy features of the internal clock are defined in EN 62054-21.
- The clock can be synchronised and the time can be set locally or remotely, but this must always be done with the communications protocol.
- The operating reserve will be over 2 years in the absence of voltage.

1.25.- Access and safety levels

1.25.1.- Communications

There are two communications modes:

- Data reading. The energy can be read from the energy meter without the use of a password in IEC-62056-21 Mode C.

- Unit parameter configuration. A password is used to read all the parameters and records. It is also needed to synchronise the date-time and to program the energy meter.

1.25.2.- Tampering detection

The unit will generate an event when the unit's terminal cover is removed. The alarm can only be deactivated by the communications protocol. The minimum time between two intruder detection events is 60 seconds.

1.25.1.- Magnetic field detector (optional)

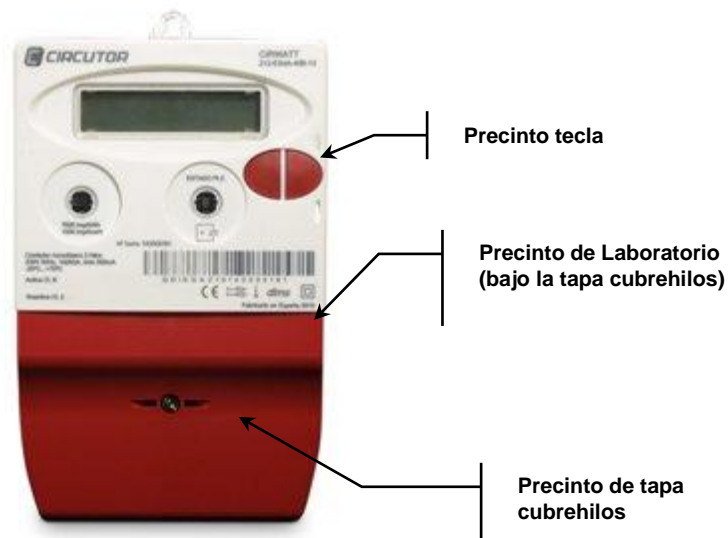
The unit will generate an event when the unit's terminal cover is removed and an alarm will be activated. The alarm can only be deactivated by the communications protocol. The minimum time between two intruder detection events is 60 seconds.

1.25.2.- Neutral current measurement (optional)

The energy meter can measure the neutral current to determine potential cases of fraud. This current is not calibrated, but an error of under 2% is guaranteed at the energy meter's nominal current.

1.25.3.- SEALS

CIRWATT B 101-102 energy meters can be protected with the following seals:



1.25.4.- Parameterization reset

There is a full reset mode that re-establishes the default factory parameters on the unit and sets the records to zero, except for the total values of the 6 energy magnitudes (EN50470-1 Standard, section 5.10). This function is executed locally and acts on an element inside the physical enclosure, generating an event.

All programmed parameters and stored data will be deleted. The following data will be maintained: date and time, battery status, manufacturer-set parameters and distributor-set parameters (passwords, 9600 baud serial communications port, 7E1 serial port configuration and automatic seasonal change).

1.26.- Technical features

Power Supply

Mode	Self-powered
Nominal voltage	127 V – 230 V
Tolerance	± 20%
Consumption	< 2 W 10 VA
Frequency	50 / 60 Hz, any of the two frequencies
Operating temperature	-25 ... + 70 °C (-40 ... +70 °C metrological part)

Voltage Measurement

Connection	Asymmetrical / Symmetrical (depending on the model)
Reference voltages	230 V and 127 V
Frequency	50 or 60 Hz

Current measurement

Currents (in)	5 A Direct
Maximum current	65 A
Start-up current	< 20 mA
Own consumption of the current circuit	< 0.2 VA / 10 A

Accuracy

Active Energy	Class A or B (EN 50470)
Reactive Energy	Class 2.0 (IEC 62053-23)

Calculation and processing

Microprocessor	RISC 16 bits
Converter	16 bits

Memory

Data	RAM type, stored by Lithium battery
Setup, events, load curve	Non-volatile FLASH memory

Battery:

Type	Lithium
Service life	> 15 years / 35 °C under the energy meter's normal operation

Clock:

Source	Self-compensated quartz crystal oscillator
Drift	< 0.5 seconds/day at 25 °C

Tariff output (optional)

Type	Relay
Operating	Selection of the activation tariff
Electrical features	Max. 250 V AC 3 A with a connection to a neutral potential when activated

Build features:

Enclosure	In accordance with the DIN 43859 standard
Dimensions	In accordance with the DIN 43857 standard
Protection degree	IP 53

Optical port

Hardware	EN62056-21
Speed	Max. 9600 bauds
Protocol	EN62056-21 Mode C

RS485 Port (optional)

Hardware	EN62056-21
Speed	9600 bauds
Protocol	EN62056-21 mode C

Intruder detector

Activation	Energy meter or connection handling
Delay	

Insulation

Alternating voltage	4 kV RMS 50 Hz during 1 minute
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Overimpulse

1.2/50 us 0R source impedance	6 kV at 60° and 240°, with positive and negative polarization
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1.27.- Applicable regulations and standards

CIRWATT Type B is based on the following regulations and standards:

- *EN 62052-11:2004* - Metering equipment for electrical energy (AC). General requirements, tests and test conditions. Part 11: Measurement equipment
- *EN 62053-21:2003* - Metering equipment for electrical energy (AC). Particular requirements. Part 21: Static active energy meters (classes 1 and 2).
- *EN 62053-22:2003* - Metering equipment for electrical energy (AC). Particular requirements. Part 21: Static active energy meters (classes 0.2 S and 0.5 S).
- *EN 62053-23:2003* - Metering equipment for electrical energy (AC). Particular requirements. Part 23: Static reactive energy meters (classes 2 and 3).
- *EN 62056-21:2003* - Metering equipment for electrical energy (AC). Data exchange for energy meter reading, tariff and load control. Part 21: Local data exchange.
- *UNE 20324:1993* - Protection degree provided by enclosures (IP Code). (IEC 529:1989).
- *EN 60068-2-11:2000* - Environmental testing. Part 2: Tests. Ka test: Salt mist. (IEC 60068-2-11 (1981-01)).
- *EN 60068-2-5:2000* - Environmental testing. Part 2: Tests. Sa test: Simulated solar radiation at the ground level.
- *UNE 207010:2003* - Bar code application for the coding of electrical energy meters.

- *IEC 62052-21 (2004-05)* - Electrical energy measuring equipment (AC). General requirements, tests and test conditions. Part 21: Tariff and load control equipment. (Replaces IEC 61038).
- *IEC 62054-21 (2004-05)* - Electricity metering (AC) - Tariff and load control - Part 21: Particular requirements for time switches. (Replaces IEC 61038).
- *DIN 43857 (1978-09)* - Watthour meters in moulded insulation case without instrument transformers, up to 60 A rated maximum current; principal dimensions for single-phase meters.

2.- ENERGY METER OPERATION

This section describes the behaviour of the unit from a functional point of view, i.e., we shall explain how to manage all the information provided by the unit and how to configure the different functions of the CIRWATT system

2.1.- Browsing and display modes

The read button is used to browse the different information screens. A short keystroke is required to browse within the same level. Alternatively, a long keystroke is required to access a lower level. The system will return to the standby mode 60 seconds after the button was last pressed.

2.1.1.- Standby Mode

The unit is in this mode by default when none of the buttons are pressed.

The purpose of the standby screens is to show information in a cyclical mode, with no need to perform an action on the energy meter. This type of browsing only takes place in the standby mode.

Scroll line shows alternating information every 6 seconds. The display screen shows the total current reading after a short keystroke on the read button.

You may manually browse through all the defined totals with short keystrokes. For units with a simple active energy tariff, the standby screen will only display a fixed display of the active energy total.

CIRWATT

2.1.2.- Read Mode

This mode is activated by a long keystroke of the read button. Browsing within one level is done cyclically.

This mode uses a screen tree structure, organizing the screens in three hierarchy levels to access the information.

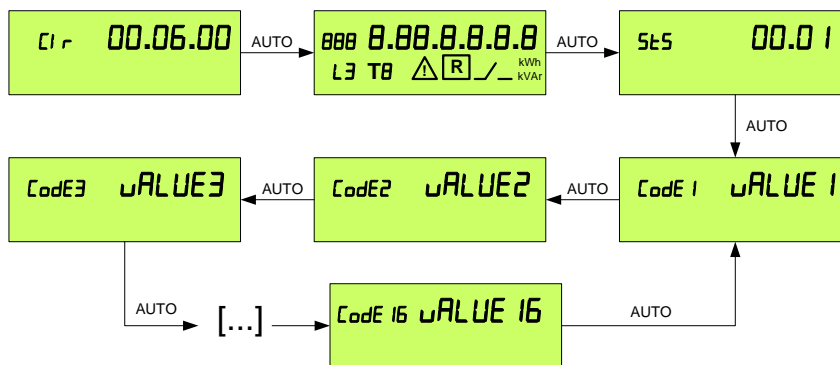
The different information can be accessed on the display in Read Mode by pressing the Read button with long and/or short keystrokes.

2.2.- Screen definition

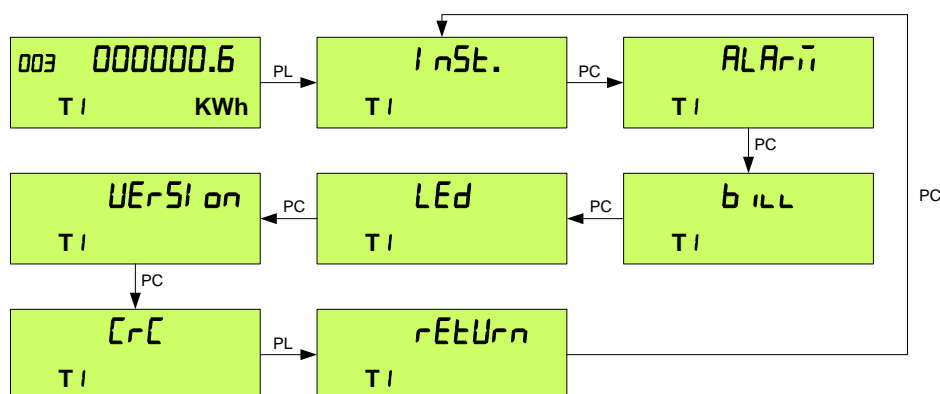
By short pulsations it will display the different defined screens. The screens that can be shown on the scrolling display can be configured by the user. The maximum allowed parameters are 16 variables.

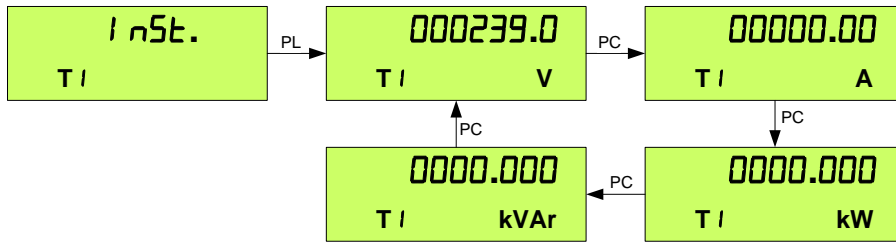
2.2.1.- Menu list

Staying on the cyclical display and making a long keystroke (more than 2 seconds) on the meter button it will show the meter menu list. On that screen different values can be shown like instant values, alarms, bill closure information, pulse LED selection, version and CRC.

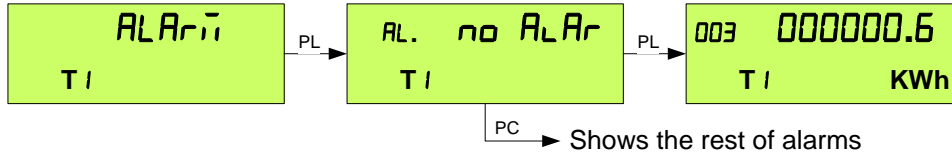


Note: Through manually short keystrokes the different screens will be shown.

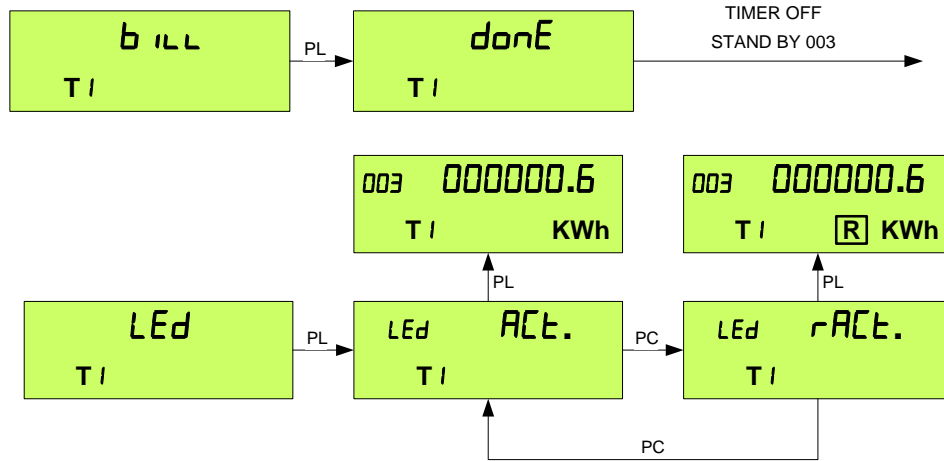




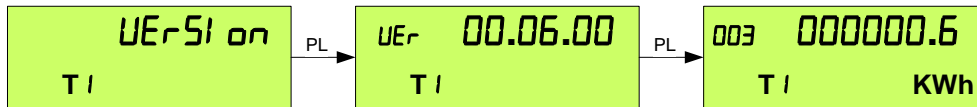
Note: Long keystroke will return to the stand by screen 003.



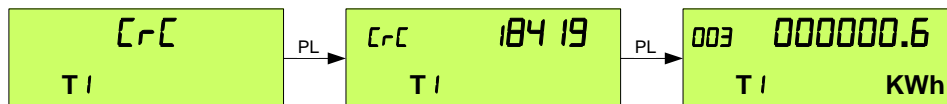
Note: It has a timer of 60 seconds



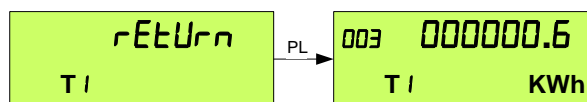
Note: It has a timer of 60 seconds



Note: It has a timer of 60 seconds



Note: It has a timer of 60 seconds



Note: It has a timer of 60 seconds

2.2.1.1.- Instant values screen (Inst).

On this screen the instant values are showed. Those are voltage, current, active power, reactive power (Cirwatt B 102). With a long keystroke will go back to stand by screen.

2.2.1.2.- Alarm screen

On this screen the current alarms are showed, if there are. With a long keystroke will go back to stand by screen.

2.2.1.3.- Bill screen (bill)

By entering on that screen a bill closure will be forced. After 6 seconds it will go back to stand by screen.

2.2.1.4.- LED screen (led)

On that screen the user can select if the LED pulse is related to active or reactive energy. With a long keystroke will go back to stand by screen.

2.2.1.5.- Version screen

This screen shows the meter firmware version. With a long keystroke will go back to stand by screen.

2.2.1.6.- CRC screen

This screen shows the firmware version CRC of the meter. With a long keystroke will go back to stand by screen.

2.2.2.- Scrolling display variables

The user can configure up to 16 variables to be show on the scrolling display. The list of variables are:

Code	Description	Obis Code	Data line code
1	Current date	0.9.1	000000
2	Current hour	0.9.2	000000
3	Total imported active energy	1.8.0	000000
4	Imported active energy in tariff 1	1.8.1	000000
5	Imported active energy in tariff 2	1.8.2	000000
6	Imported active energy in tariff 3	1.8.3	000000
8	Total exported active energy	2.8.0	000000
9	Exported active energy in tariff 1	2.8.1	000000
10	Exported active energy in tariff 2	2.8.2	000000
11	Exported active energy in tariff 3	2.8.3	000000
13	Total reactive energy Q1	5.8.0	000000
14	Reactive energy Q1 in tariff 1	5.8.1	000000
15	Reactive energy Q1 in tariff 2	5.8.2	000000
16	Reactive energy Q1 in tariff 3	5.8.3	000000
18	Total reactive energy Q2	6.8.0	000000
19	Reactive energy Q2 in tariff 1	6.8.1	000000
20	Reactive energy Q2 in tariff 2	6.8.2	000000
21	Reactive energy Q2 in tariff 3	6.8.3	000000
23	Total reactive energy Q3	7.8.0	000000
24	Reactive energy Q3 in tariff 1	7.8.1	000000
25	Reactive energy Q3 in tariff 2	7.8.2	000000
26	Reactive energy Q3 in tariff 3	7.8.3	000000
28	Total reactive energy Q4	8.8.0	000000
29	Reactive energy Q4 in tariff 1	8.8.1	000000
30	Reactive energy Q4 in tariff 2	8.8.2	000000
31	Reactive energy Q4 in tariff 3	8.8.3	000000
33	Total maximum demand	1.6.0	000000
34	Maximum demand in tariff 1	1.6.1	000000
35	Maximum demand in tariff 2	1.6.2	000000
36	Maximum demand in tariff 3	1.6.3	000000
38	Total imported active energy in the last bill closure	1.8.0	6000000
39	Total imported active energy in tariff 1 in the last bill closure	1.8.1	6000000
40	Total imported active energy in tariff 2 in the last bill closure	1.8.2	6000000
41	Total imported active energy in tariff 3 in the last bill closure	1.8.3	6000000
43	Total exported active energy in the last bill closure	2.8.0	6000000

44	Total exported active energy in tariff 1 in the last bill closure	2.8.1	6000000
45	Total exported active energy in tariff 2 in the last bill closure	2.8.2	6000000
46	Total exported active energy in tariff 3 in the last bill closure	2.8.3	6000000
48	Total reactive energy Q1 in the last bill closure	5.8.0	6000000
49	Reactive energy Q1 in tariff 1 in the last bill closure	5.8.1	6000000
50	Reactive energy Q1 in tariff 2 in the last bill closure	5.8.2	6000000
51	Reactive energy Q1 in tariff 3 in the last bill closure	5.8.3	6000000
53	Total reactive energy Q2 in the last bill closure	6.8.0	6000000
54	Reactive energy Q2 in tariff 1 in the last bill closure	6.8.1	6000000
55	Reactive energy Q2 in tariff 2 in the last bill closure	6.8.2	6000000
56	Reactive energy Q2 in tariff 3 in the last bill closure	6.8.3	6000000
58	Total reactive energy Q3 in the last bill closure	7.8.0	6000000
59	Reactive energy Q3 in tariff 1 in the last bill closure	7.8.1	6000000
60	Reactive energy Q3 in tariff 2 in the last bill closure	7.8.2	6000000
61	Reactive energy Q3 in tariff 3 in the last bill closure	7.8.3	6000000
63	Total reactive energy Q4 in the last bill closure	8.8.0	6000000
64	Reactive energy Q4 in tariff 1 in the last bill closure	8.8.1	6000000
65	Reactive energy Q4 in tariff 2 in the last bill closure	8.8.2	6000000
66	Reactive energy Q4 in tariff 3 in the last bill closure	8.8.3	6000000
68	Total maximum demand in the last bill closure	1.6.0	6000000
69	Maximum demand in tariff 1 in the last bill closure	1.6.1	6000000
70	Maximum demand in tariff 2 in the last bill closure	1.6.2	6000000
71	Maximum demand in tariff 3 in the last bill closure	1.6.3	6000000

2.2.3.- Default screen

The meter goes with a factory default screen showing the screen number 3.

3.- COMMUNICATIONS

CIRWATT B102 energy meter has an RS-485 communications port which is used to connect various energy meters to the same bus.

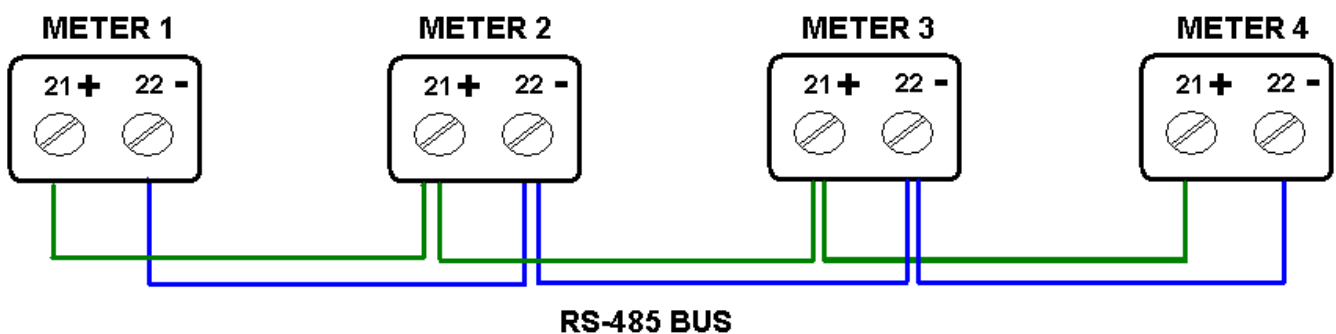
3.1.- Optical communications port

CIRWATT B101-102 single-phase energy meters have an optical serial communications port, in compliance with the EN 62056-21:2003 standard. The communications port is fully compatible with the certified optical heads approved by the major utilities companies, in compliance with the EN 62056-21 Standard.

On the surface of the cover there is a magnetic profile for the correct fastening and location of optical heads.

3.2.- RS-485 Communications (only in model B102)

This type of communications method is used to create a communications bus for up to 32 devices, with a maximum installation distance of 1,200 metres.



3.3.- MODBUS Memory map (only in model B102)

The CIRWATT B102 energy meter has a series of instructions in the MODBUS protocol that can integrate these energy meters within a network with a MASTER peripheral device that will query data in this protocol.

NOTE: The standard meter goes with the protocol IEC 62056-21 into the RS-485 communication bus. By request, Circutor can provide the meter with Modbus communications.

The following MODBUS variables are available:

Address (Hex.)	Address (Dec.)	Variable type	Description
0x0008	8	INT16	Peripheral address
0x0300	768	INT32	Serial number
0x0708	1800	INT32	Imported active energy Wh without decimals
0x0710	1808	INT32	Exported active energy Wh without decimals
0x0718	1816	INT32	Reactive energy Q1 en VARh without decimals
0x0720	1824	INT32	Reactive energy Q2 en VARh without decimals
0x0728	1832	INT32	Reactive energy Q3 en VARh without decimals
0x0730	1840	INT32	Reactive energy Q4 en VARh without decimals
0x0732	1842	INT32	Voltage L1 with one decimal
0x0738	1848	INT32	Current L1 with one decimal
0x0746	1862	INT32	Active power L1 in W
0x074E	1870	INT32	Reactive power L1 in VAR (Cirwatt B 102)
0x0756	1878	INT32	Apparent power L1 in VA (Cirwatt B 102)

4.-PARAMETERIZATION AND READ SOFTWARE


All energy meters have an optical communications channel. The optical interface complies with the electrical and mechanical specifications established in the IEC62056-21 Standard. The correct registration address and password must be entered to establish communications.

This software can be used to configure all the available options of an energy meter while downloading its information.

5.-INSTALLATION AND START-UP

5.1.- Equipment installation

The energy meter has been designed in accordance with the DIN 43857 standard, with its defined dimensions and fixing points.

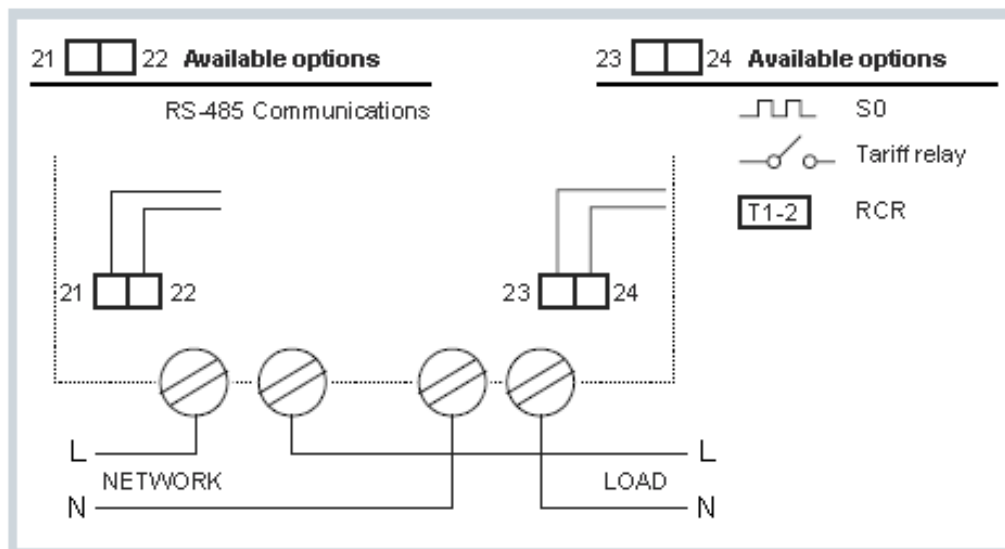


Take into account that when the device is connected, the terminals may be hazardous to the touch, and opening the covers or removing elements may provide access to parts that are dangerous to the touch. Do not use the device until it is fully installed.

Attention: All connections must remain inside the terminal cover.

5.2.- Energy meter connection diagrams

CIRWATT B101-102 single-phase energy meters have the same type of electrical connection, whether they have additional performance features, such as the impulse output, relay output, tariff modification input or RS-485 port on the upper connection terminals. The electrical connections are shown on the following figure.



6.-MAINTENANCE

No special maintenance is required.

7.-DISCLAIMER

CIRCUTOR, SA reserves the right to make changes, without previous notice, to the devices or specifications of the analyzers shown in this manual.

The term of the CIRCUTOR guarantee is two years from the date of purchase and is limited to a refund of the purchase price, repair free of charge or a replacement of defective equipment that is returned to the CIRCUTOR post-sales service within the term of the guarantee.

CIRCUTOR, SA makes the latest versions of its device specifications and the most up-to-date manuals available to its clients on its web sites www.circutor.es and www.circutor.com

8.-TECHNICAL SERVICE

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For any questions regarding equipment operation or failure, Please contact CIRCUTOR's **Technical Assistance Service** (S.A.T.)

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