Communication system for the management of electrical installations

INTEGRAL REMOTE MANAGEMENT SOLUTION

CIRWATT B series

MID
Approve

GSM / GPRS
status

Concentrator
status

PLC
CONCENTRATOR

**CIRCUTOR**
Technology for energy efficiency

PLC Communications (Power Line Communication)

Communications system used for the automatic meter reading through the Low Voltage distribution network.

The data from the energy meters is sent automatically to the concentrator, where it will be stored. This device is the main element of the PLC communication system, which sends the data periodically to the control center, via Ethernet, GSM or GPRS.

➤ **Quick and simple start-up**

➤ **No additional wiring required**

➤ **Plug & Play detection**
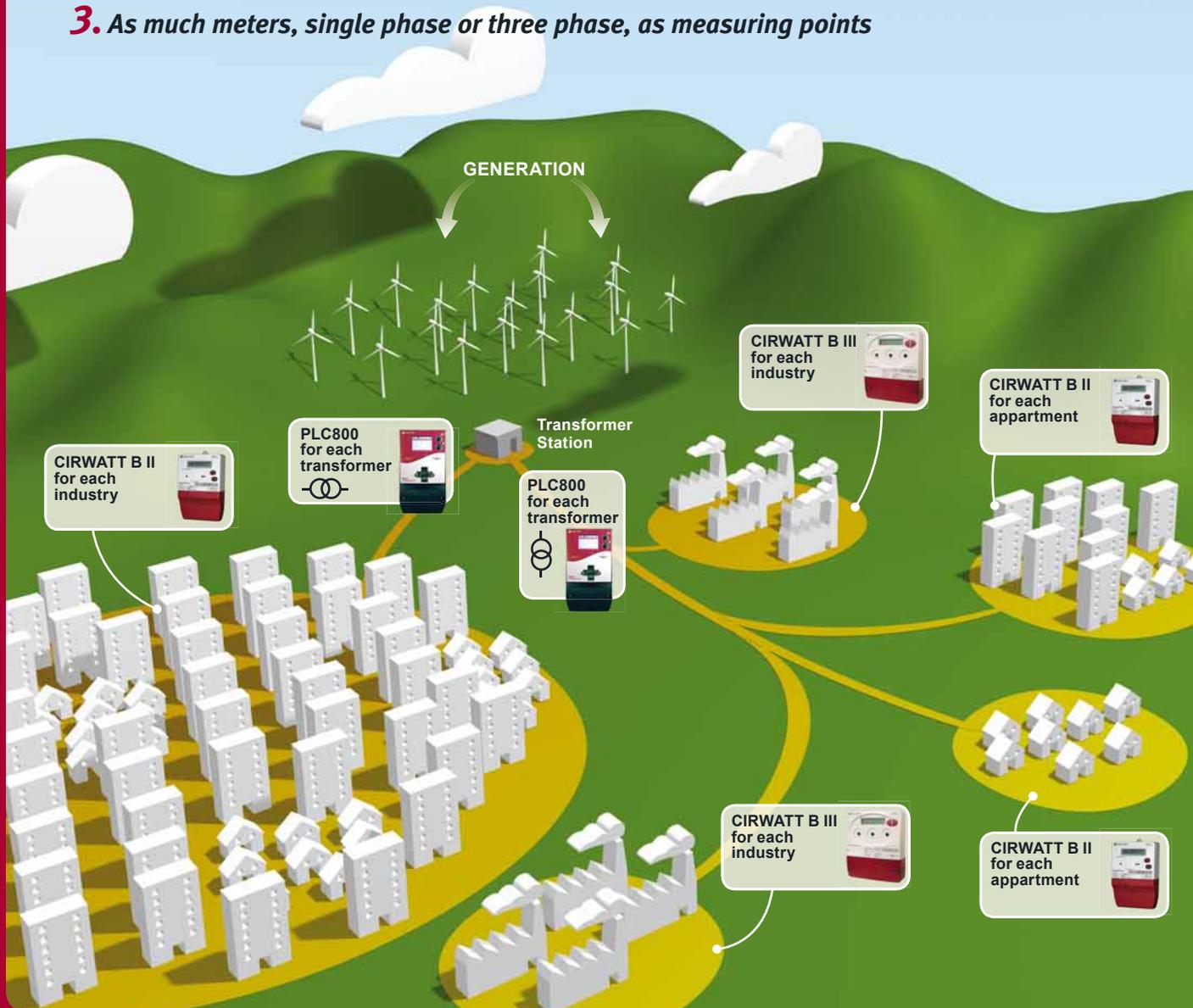
As simple as this:
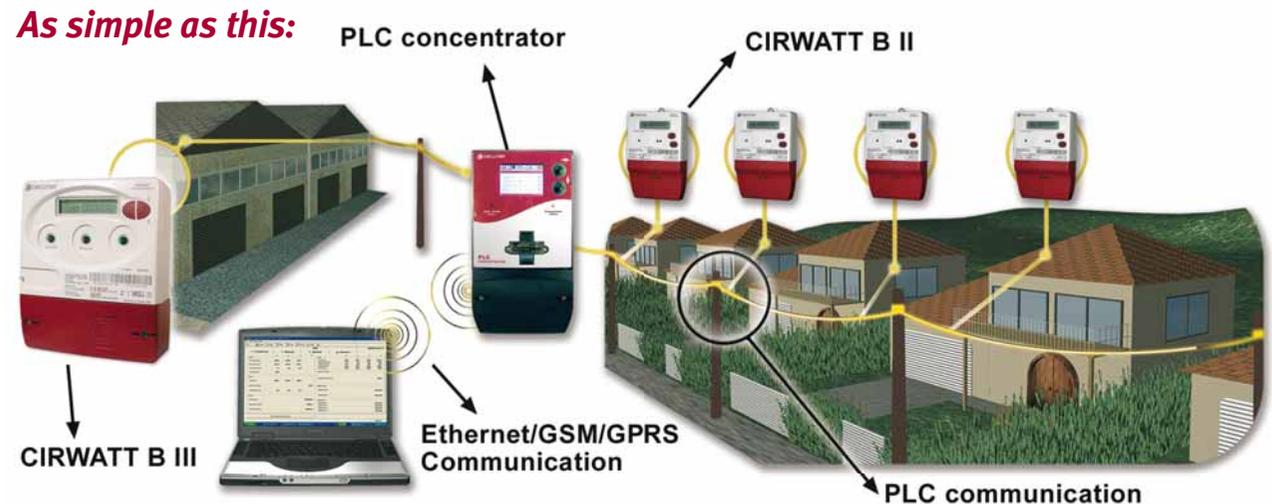
System features:

- **Plug & Play system**: The connection of a new meter to the network does not require any additional setup. When the meter is connected to the network the concentrator auto detects it and stars the data download process, without user intervention.
- **Repeater system**: The system uses its own meters as repeaters. This guarantees the communications with the devices which are furthest from the power transformer.

- **Safety and robustness**: The reliability and robustness of readings is guaranteed with the frame control through the communications between meter and concentrator. The safety related to the data consumption access is guaranteed with the definition of users and passwords to limit the concentrator uses. All the data sent by the meters is also kept in their internal memory.
- **Bi-directional communications**: The remote management system can be used to read and program meters remotely, either directly from the concentrator or with the concentrator management software (PowerPLC).

- **Real time information**: The meter instantaneous values and communication status can be read directly from the concentrator or using PowerPLC. In addition, there are more parameters able to be read as: hourly discrimination, internal breaker control, current limit…

Elements that must be installed with PLC system

1. *A concentrator for each transformer (double concentrator option).*

2. *A three phase concentrator for each transformer or a three phase meter for each transformer output line. These can be used to manage losses and/or fraud.*

3. *As much meters, single phase or three phase, as measuring points*

GENERATION

CIRWATT B III
for each
industry

CIRWATT B II
for each
appartment

PLC800
for each
transformer

Transformer
Station

PLC800
for each
transformer

CIRWATT B II
for each
industry

CIRWATT B III
for each
industry

CIRWATT B II
for each
appartment

Management of losses / fraud

The **CIRWATT B** meter, located on the main (**2**), stores the energy consumed downstream which should be the same as the other meters installed on the grid (**3**), single phase or three phase, plus the technical looses.

The comparison between the consumption of the meter installed on the main (**2**) and the consumption summation of the other meters installed downstream (**3**), quickly indicates any installation losses or fraud attempt.

The simultaneous readings of all meters are carried out periodically to compare consumption values.

Any fraud is detected when there are differences in the consumption during a determinate time interval or when the tampering meter alarm is active.
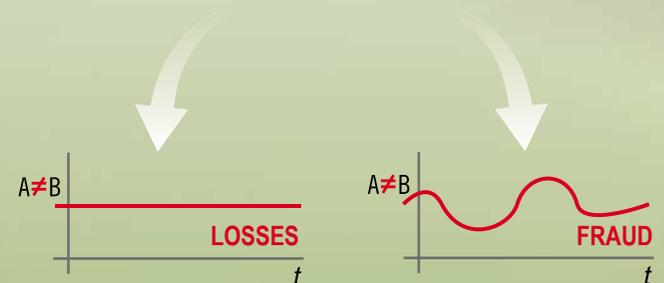
➤ *Quick losses detection*

➤ *Quick fraud detection*

The "magic" formula

Consumption comparison:

A = B1 + B2 + ...+ Bn => installation with NO losses

A ≠ B1 + B2 + ...+ Bn => installation WITH losses

A≠B

LOSSES
t

A≠B

FRAUD
t

Internal circuit breaker relay
(CIRWATT B)

The **CIRWATT type B** meter, has a programmable internal relay. It is located inside the enclosure with non accessible parts from the exterior. Additional wiring or elements not needed for its operation.

The reconnection of the circuit breaker can be done as follows:

- Directly on the meter, by the push buttons.
- Acting on the main circuit breaker of the installation.

In this case, the meter is able to detect the **MCB** opening (total absence of loads on the customer's side) to then rearm the internal circuit breaker.

Management system of the circuit breaker

- **Manual opening**: The remote management system allows the manual interruption of the electrical supply of the customer, acting on the meter's internal circuit breaker. This action can be executed from the concentrator or remotely from the management software (**PowerPLC**).
- **Automatic opening**: In case of the customer exceeds the contracted power, the meter will automatically open the circuit breaker, which will remain in this state until the loads that have caused the power excess are disconnected.

Total reconnection safety guarantees

In case there is an automatic opening caused by an excess power, the reconnection will be done by the customer. For this, the customer must open the installation main circuit breaker, in that moment the meter will detect that opening and will reconnect (close) its internal circuit breaker. The supply will be established as soon as the customer closes the main circuit breaker of the installation.

"Opening reclosing system"
CIRCUTOR patent No. 9300863

Management of information

- Consumption readings
- File download: load curve, events and closures.
- Meter parameters readings (kWh, kW, V, A, Hz, date and time).
- Setup reading
- Network status
- Circuit breaker powers programation

Communication via:

GSM, GPRS and Ethernet.

PLC 800 Concentrator

Description

PLC800 is a concentrator with PLC communications (Power Line Communications). Is the key product to interact with single and three-phase meters connected to the same LV network.

The best place to achieve the best communications is in the power transformer. From there it can obtain the best quality level of communications between the concentrator and meters.

Optionally, it is available a model of **PLC800** wich allows a dual connection (2 power transformers) instead of using 2 **PLC800**.

PLC800 has three types of connections to establish remote communications and to export the data to an FTP server: Ethernet, GSM and GPRS.

Applications

The concentrator has two main functions:

- *Data collection*: The concentrator collects the load curve, summary and event data each day; the information of the billing closures is stored monthly. All this information is stored in the internal memory of the PLC800, which can be exported to an FTP server.
- *Meter management*: **PowerPLC** can be used to control meters remotely, for example, to modificate contracted power or hourly discrimination. Likewise, it can display the status of communications and different electrical parameters in real time, such as, energy or power values.

PowerPLC Screens

Technical specifications

General	
Voltage reference	3x230/400 V or 3x127/220 (3/4 wires)
Operating voltage limit	440 V during 6 hours
Frequency reference	50 Hz
Operating temperature	+ 70 ºC
Relative humidity	95 %
IP protection	IP 51
Clock	Automatic daily synchronisation
Memory	SD type (1 GB) 1,000 meters 20 years without maintenance
Communications	1 Ethernet port 2 USB ports 1 GSM/GPRS Modem
Display	Colour LCD
Buttons	2 buttons to navigate through screens

PowerPLC

PowerPLC is a software that has been designed for the local or remote management of PLC concentrators. It allows the remote reading and setup of meters with the **PLC800** concentrator.

- *PLC800 remote setup*: Configuration of the Ethernet and GSM/GPRS connection, folder administration, export data and language selection.
- *Meters configuration*: Hourly discrimination, contracted power, billing closures, circuit breaker and closure reading. These actions can be programmed to be executed at a certain time.
- *Instantaneous reading*: Active energy, Reactive energy, Power Factor and current.

CIRWATT B
Single-phase

Description

CIRWATT B meter is a multifunctional digital single-phase meter. It measures Active energy, class B, and Reactive energy, class 2. The meter complies with the European Directive MID (EN 50470-1 and EN 50470-3), which allows the installation of CIRWATT B in any country of the European Union.

CIRWATT B includes an optical port and PLC (Power Line Communications) communications. It has a non-volatile FIFO memory, that can store load curves, events and billing closures. The information stored is kept in memory, even when the meter is switch-off. The display is able to be read without voltage connection. The internal circuit breaker allows the distributor to control the supply demand in a reliable and safety way.

Application

CIRWATT B is a static single-phase meter that measures and stores active and reactive energy for billing purposes. It is used to measure energy in the residential sector with a contracted power that does not exceed to 15 kW. The internal PLC communications module reads the parameters stored by the meter through the **PLC800**. It also can display the device status and modify some parameters.

One of the main features of this meter is its internal circuit breaker, which can be configured up to 15 kW, depending on the customer's power. In case the customer exceeds the contracted power values, the internal relay will be opened disconnecting the supply. Then, it will not be closed automatically, the customer have to disconnect all necessary loads. The power of the circuit breaker can be programmed from the **PLC800** or remotely from the management software (**PowerPLC**). These parameters can also be programmed locally on the meter (optical port) with **SoftWatt** programming software.

Technical specifications

Power supply / Measurement	
Nominal voltage	230 V
Consumption	< 2W; 10 V.A
Operating temperature	-25ºC to 70ºC
Nominal current	10 (60) A
Accuracy	
Active Energy	Class B (50470)
Reactive Energy	Class 2.0 (IEC 62053-21)
Memory	
Clock	RAM type, stored by Lithium battery
Setup, events, load curve	Non-volatile memory of the FLASH type
Capacity:	Events: 200 records / Load curve: 2200 / Billing closures: 12
PLC	
Type	DCSK (For other options, please ask)
Hardware	CENELEC A or CENELEC B
Circuit breaker	
Type	Bistable relay
Maximum switching current	100A
Billing output	
Type	Relay
Build features	
Degree of protection	IP 51
Tampering detector	
Activation	Meter manipulation or connection
Delay	Activation is delayed 72 hours to help in the product installation

Three-phase CIRWATT B

Description

CIRWATT B three-phase meter is suitable to measure and record Active energy, class B and Reactive energy, Class 2, for Low Voltage and Medium Voltage applications. It has a non-volatile FIFO memory, which can store various information: load curves, events and billing closures. The display shows the readings of all parameters recorded. There are three **CIRWATT B** three-phase meter models: direct measurement, direct measurement with internal circuit-breaker and indirect measurement.

CIRCUTOR, S.A. has designed the following communications modules, valid for any base model: RS232/PLC, RS232/RS232, RS232/RS485, RS232/Ethernet; in accordance with the current market needs and the constant evolution of new technologies.

The meter is available in 2 or 4 quadrants. The 4-quadrant meter has been specially designed for applications where there is an energy generation.

Application

The **CIRWATT B** three-phase meter is suitable for Low Voltage and Medium Voltage applications.

Small and medium industries, shops and small-scale cogeneration plants. 4-quadrant meter for photovoltaic plants, with different communications options.

Technical specifications

Power supply	
Nominal voltage	3 x 230 / 400 V
Consumption	< 2W; 10 V.A
Operating temperature	-25ºC to 70ºC
Nominal current reference I_{ref}	10 (100) A
Accuracy	
Active Energy	Class B (50470)
Reactive Energy	Class 2.0 (IEC 62053-21)
Memory	
Data	RAM type, stored by Lithium battery
Setup, events, load curve	Non-volatile memory of the FLASH type
Capacity:	Events: 200 records / Load curve: 4000 / Billing closures: 12 x contract
PLC (optional)	
Type	DCSK (For other options, please ask)
Hardware	CENELEC A or CENELEC B
Circuit breaker (depends on the model)	
Type	Bistable relay
Maximum switching current	100A
Mechanical features:	
Protection degree	IP 51
Tampering detector	
Activation	Manipulation of the connections
Delay	Activation is delayed 72 hours to help in the product installation

* Three-Phase **CIRWATT B** Direct connection

CIRCUTOR's meters contribute to the electrical energy efficiency improvement

CIRCUTOR, leading company in the **electrical energy efficiency** field considers that energy meters are a vital and necessary element for energy supervision.

For this reason, **CIRCUTOR** has developed this family range**,** using the last technology and features:

➢ **Contracted power detection**

➢ **Tariff discrimination detection**

➢ **Energy hourly consumption analysis**

➢ **Demand peaks detection**

➢ **Reactive energy consumption**

Advantages of PLC communication system

➢ **Remote reading**

➢ **Energy management**

➢ **Loss management**

➢ **Fraud control**

➢ **Easy and intuitive information management system**

➢ **Current limited, with remote opening and closing options (CIRWATT B)**

➢ **Total reconnection safety guarantees (CIRWATT B)**

MID Approval

www.circutor.com