

Libra CCI CEI 0-16 UPS

Power Plant Controller (PPC / CCI)



- Compliant with CEI 0-16 annexes O-T
- Functionality of active power limitation upon external DSO command of inverters (PF2)
- Plug & Play - Flexibility (open platform)
- Energy efficiency and White Certificates (TEE)
- Connectivity (Ethernet, LTE Modem, GPS, RS485)

The Libra CCI UPS is the Electrex solution for monitoring production plants in compliance with the **CEI 0-16 standard**, annexes O-T, following the Arera 540/2021/R/EEL resolution and the subsequent 385/2025/R/EEL, which mandates that photovoltaic and wind plants ≥ 100 kW, both new and existing and connected to the MV grid, must be equipped with a Central Power Plant Controller (CCI) with the functionality of "Active Power Limitation on external DSO command" for inverters (PF2).

The Libra CCI is a complete "Plug & Play" solution to collect plant information and securely transmit it to the distributor (DSO) for monitoring and management of electrical loads, measurement of renewable energy production, other energy vectors, and environmental parameters. The Libra CCI meets all functional specifications required by CEI 0-16, namely:

- Mandatory: related to data exchange (P, Q) between the producer and DSO and the PF2 functionality (for plants ≥ 100 kWp)
- Optional: related to voltage and power regulation at the delivery point
- Voluntary: related to participation in the Dispatching Services Market.

The Libra CCI energy analyzer has a measurement accuracy class ≤ 0.2 , as required in CEI 0-16:2025-04 Annex O (normative), Central Power Plant Controller (CCI), section O.13.2.1.

The Libra CCI energy analyzer has a measurement accuracy class ≤ 0.2 , as specified in the technical standard **CEI 0-16:2025-04, Annex O (normative)**, Plant Central Controller (CCI), section O.13.2.1. The Libra CCI can also be used as a starting point/master unit for more complex supervision systems, thanks to the ability to connect additional Electrex devices via RS485 subnetwork and/or Ethernet network. The Libra CCI is equipped with a real-time clock and memory for the synchronous recording of energy and environmental vectors. Through the **integrated Web Server**, it is possible to supervise the system by displaying instant measurements and graphical trends. The Libra CCI includes an internal **DC UPS (battery backup)** to ensure continuous power supply to the measurement system — a feature particularly recommended in cases involving automated operations and/or alarms. In addition, the Libra CCI is equipped with **five opto-isolated digital inputs (for status and/or counting) and three relay digital outputs (for status and/or pulse control**, with other versions available upon request). It also manages **Power Quality (PQ)**: detecting and recording various events in compliance with EN 50160 (voltage sags, swells, interruptions, harmonics) and EN 61000-4-30 Class S, with graphical event details, event tables and time-lines, measurement campaigns with selectable parameters, and programmable sampling frequency.

Versions of Libra CCI

The versions of Libra CCI are divided into:

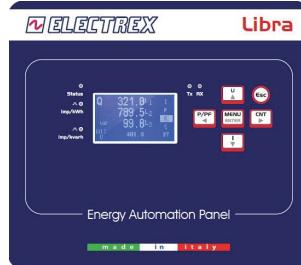
- **Libra CCI ECT UPS**: designed for non-invasive connection to **existing and suitable CTs already mounted into** the system (ECT Electrex Current Transformers are required in order to integrate the existing CTs).
- **Libra CCI UPS**: connects to standard CTs/5A or/1A..

Simplicity

The Libra CCI units are equipped with a high-contrast FSTN dot-matrix display with white LED backlighting, allowing the simultaneous reading of four measurements along with their identifying symbols, displayed in high-visibility characters.

The six-button keypad allows for simple and intuitive operation of the instrument, while the startup display page can be defined by the user.

On the front panel, there are two red calibration LEDs that flash at a frequency proportional to the imported active and reactive energy, a red LED below the Electrex logo indicating device operation, and two LEDs beneath the white band that signal RS485 communication activity.



Compliance: CEI 0-16, CEI EN 50470 and 62053-22

The Libra CCI complies with **CEI 0-16 annexes O-T**. All versions use analyzers meeting essential requirements of **CEI EN 50470-1 + 50470-3 and 62053-22**, as required for white certificate (TEE) applications.

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Measurement list table

Parameters	Type	Range
Voltage	U L-N	20,0V...400 kV
	U L-L	
	U L-N Min	
	U L-L Min	
	U L-N Max	
Current	I	10 mA ...10,0 kA Electrex Flex CTs ⁷ : 1A ... (5A - 500A)
	I Max	4A ... (20A - 2000A)
	I AVG ¹	8A ... (40A - 4000A)
	I MD ¹	
Power factor	PF	0,00ind..1,00..0,00cap
Frequency	F	45 ... 65 Hz
Phases sequence	132 CCW	
Harmonic distortion	U THD L-N	
	U THD L-L	0...199,9%
	I THD	
Active Power	P	
	P Max ³	± 0,00...1999 MW
	P AVG ²	
Reactive Power	P MD ²	
	Q Ind	± 0,00...1999 Mvar
	Q Cap	
	Q AVG Ind ²	
	Q AVG Cap ²	
Apparent Power	Q MD Ind ²	
	Q MD Cap ²	
	S	
Operating time ⁴	S AVG ²	± 0,00...1999 MVA
	S MD ²	
	h, h/100	0,01...99.999,99 hours
Active Energy	Ea Imp ⁵	0,1 kWh...100 GWh
	Ea Exp ⁵	
Reactive Energy	Er Ind Imp ⁵	0,1 kvarh...100 Gvarh
	Er Cap Imp ⁵	
	Er Ind Exp ⁵	
	Er Cap Exp ⁵	
Apparent Energy	Es Imp ⁵	0,1kVAh...100 GVAh
	Es Exp ⁵	
Pulse Counter	CNT ⁶	
Temperature	⁶	

Version H: Single Harmonics

Parameters ⁹	Management
Harmonics analysis	H voltage
	H current
	H Power & dir.

Version PQ - Events U and I, measurement campaign

Parameters ^{9 11 12}	Management
Dips and Swells	
Overvoltage and overcurrent	Events logged in the internal memory with time-stamp
Sags and interruptions	

All instantaneous measurements are calculated over 10 cycles, for example 200ms at 50Hz.
 1) Average value over the integration time (1 .. 60 min. Programmable) and peak (MD).
 (2) Average value (moving average) in both Import and Export over the integration time (1 .. 60 min. Programmable) and peak (MD) is the maximum average value.
 (3) Maximum power values in both Import and Export.
 (4) Non-resettable life time and four operating times.
 (5) The energies in both Import and Export are displayed in 9 digits (one decimal). Internal meters are stored in 64-bit resolution which ensures a minimum definition of 0.1 Wh and a maximum count of 100 GWh
 (6) By adding the Electrex Sensor Bus Unit sensors.
 (7) With Electrex Flexible CTs, Class 1 overall accuracy, for currents as listed in the brackets.
 (8) Three partial counters for each marked measurement.
 (9) Calculation with FFT method of harmonics in amplitude and phase up to the 51st for the 3 phase voltages, the 3 phase currents, the 3 phase active powers with direction (accumulated for 10 periods).
 (10) Recording of events with date and time, duration of the event, maximum / minimum value. EN 50160 and EN 61000-4-30 programmable thresholds.
 (11) Graphic detail of the event: number of samples (programmable e.g. 1 second) taken before and after the event (sag, swells and interruptions).
 (12) Distribution table of events based on the threshold exceeded and the duration according to the dictates of the UNIPEDE standard and Time-line of events.

Active Power Limitation Function on External DSO Command (PF2)

The **PF2 functionality** ("Active Power Limitation on External DSO Command") is the **new operational requirement** introduced by Resolution 385/2025.

This feature, made **mandatory for all photovoltaic and wind plants above 100 kW connected to the medium-voltage grid**, allows the plant to reduce its active power upon direct command from the distribution system operator (DSO) or Terna (the Italian transmission system operator).

Phase sequence

The Libra CCI permits the identification of the correct phase sequence using the vector diagram (graph on web page).

Versatility

The **Libra CCI** can be inserted on any type of network: single-phase, two-phase, three-phase with 3 and 4 wires, symmetrical or asymmetrical, balanced or unbalanced, low and medium voltage, with 1, 2 or 3 CTs as well as for measurements on 2 and 4 quadrants (import / export). The voltage inputs and power supply are protected by a fuse.

A simple programming from the keyboard or **embedded web page (or from Energy Brain software)** allows you to set all the operating parameters such as type of network, LV / MV, CT ratio and any VTs (free value), integration time (1-60 min.) And alarms (thresholds, delay, hysteresis).

Ethernet communication, Modem and GPS integrated

The Libra CCI series is equipped with three 10/100 Base-TX (RJ45) Auto-MDIX Ethernet ports (one port dedicated to DSO and one to Enabled Operator), **integrated Modem** (2G/3G/4G/LTE Cat. 1) and **GPS/GLONASS Module** for time synchronization from satellites.

RS485 communication for slave devices

The **Libra CCI** is equipped with a "full compliant" Modbus RTU master RS485 serial port with configurable transmission speed up to 115.200bps, protected against overvoltage, allowing the connection of other slave Electrex devices in the subnet.

5 Digital Inputs

The **Libra CCI** are supplied with 5 opto-isolated digital inputs often used to count pulses or states (general and/or interface devices).

Properly programmed they can also function as remote status indicators (e.g. ON/OFF of machines and switches). Inputs are self-powered by a 12Vdc Libra CCI's output power.

3 Digital Outputs

The **Libra CCI** are equipped with 3 x 250Vac 3A digital relay outputs. The outputs are programmable as internal alarm outputs (see Alarms), or as output units controlled remotely via serial line and Modbus commands.

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Alarms

In case the Libra CCI outputs are programmed as alarms, each alarm can be associated with any of the available parameters and can be configured as both a minimum and a maximum alarm. Furthermore, all the alarm outputs can refer to the same parameter to have more alarm thresholds. It is possible to set an activation delay (1-99 sec.), an hysteresis (in% of the threshold value) and the polarity of the output contact (NO, NC). The status of the alarms is always available on the serial line (via Modbus "coils").

DC UPS

The Libra CCI panels can be equipped with a 12Vdc battery (DC UPS) which guarantees continuity for the power supply of the instrument even in the presence of interruptions. This is particularly useful in cases where automated operations and / or alarms are activated.

Libra ECT net per TA ECT

The **Libra CCI ECT UPS** use exclusively the Electrex ECT type CT:

- **ECT TA 100A 13MM Power Quality Current Transformer** Code PFAE000-01: external CT for AC loads up to 100A. Plastic shell. Internal size 13 mm.
- **ECT CTS 16-100A Split Core Power Quality Current Transformer** Code PFAE000-02: external CT for AC loads up to 100A. Plastic shell. Equipped with a snap-on closing, screwless mounting system. Internal size 16 mm. Protection on the secondary circuit.



Operating time counters

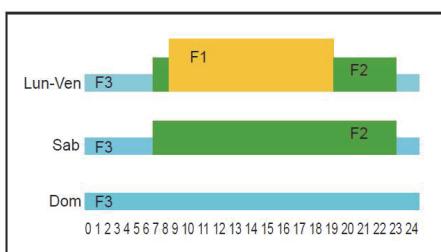
With appropriate programming, the Libra CCI in addition to energy consumption/production counters is able to log the operating time. The operating time counter can be triggered by the exceeding of a threshold, for example alarm on power measurements, or considering the status of a digital input.

Load curves and data of consumption / production

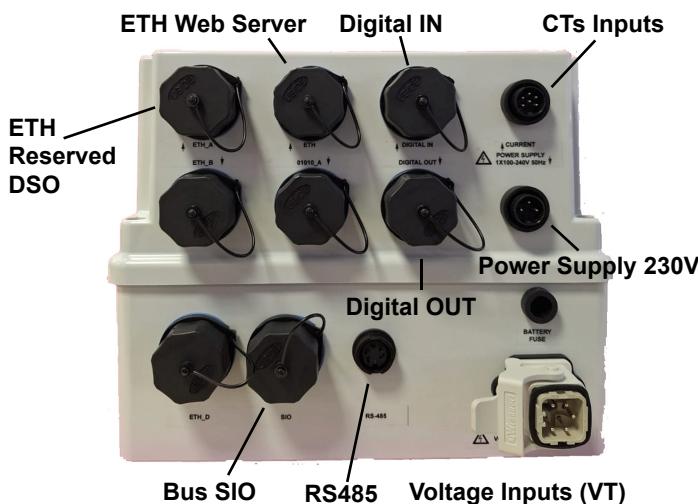
The Libra CCI continuously logs the data of consumption / production of energy and power by organizing them into separate daily files, containing the data necessary for the reconstruction of the load profile and the analysis of the trend of buying/selling of energy. The logged data can be downloaded via Ethernet port or Wi-Fi and managed using Energy Brain and/or Upgrade Charts option or via HTTP.

Tariffs TOU

With appropriate programming, the Libra CCI is able to manage the energy tariffs TOU based on a calendar or the status of the digital inputs.



Example of Libra CCI polarized connectors



5-pole connector for voltage inputs - PCALV0-03



6-pole connector for current inputs - PCALV0-01



The Libra CCI is equipped with a 3-pole connector for the power supply, a 5-pole connector for the voltage inputs, a 6-pole connector for connecting the current transformers, RJ45 connectors for additional modules on the SIO Bus, three RJ45 connectors for connection to the Ethernet network, a connector for the possible RS485 network and two further RJ45 connectors for digital inputs and outputs.

Accessories

Included in the Libra CCI package:

- A 5-pole female connector for voltage meters with 2 meters of cable
- A 6-pole female connector for current transformers with 2 meters of multi-polar cable with 6 numbered conductors
- A 3-pole female connector for power with 2 meters of cable
- 4G antenna for integrated modem with 5m cable
- Magnetic GPS/GLONASS module antenna supplied with 5m of RG174 cable

Not included in the Libra CCI package:

- 5-pole male connector for RS485 network with 1 meter of RS485 cable
- Additional 6-pole female connectors for current transformers with 2 meters of multi-polar cable with 6 numbered conductors
- Box with short-circutitable terminal block for Current Transformers ..1A, ..5A and ECT

3-pole connector for power supply - PCALV0-02



Monitoring network example using Libra panels for the multi-site, commercial or public buildings

In the image here above are shown two examples of use of the Libra panels.

In the first one the monitoring solution includes two Libra panels placed in two shopping malls part of an international retail chain (but can be also two shops, offices or restaurants, etc.).

The Libra 1 retrieves and logs the consumptions of 5 electrical loads (mains, the PV system, the HVAC, internal and external lighting), the internal and external temperature and humidity.

The Libra 2 retrieves and logs the consumptions of 3 electrical loads (refrigerated counters, cold stores and the oven) and the alarm status of the refrigerated counters and cold stores.

In the second example in a bank branch has been installed a Libra net for the monitoring of the mains, internal temperature, humidity and external temperature. While for the lighting and the HVAC systems has been used a Libra Expansion. In both cases the Energy Manager uses the software Energy Brain in order to control and monitor the energy consumptions while the maintenance team is supported from the real-time measurements and alarm statuses displayed on the embedded Web interface. In a second stage of the project is has been scheduled the activation of the Energy Automation function in order to automate the switching (On/Off) of some loads in order to optimize the system's management and be more efficient.



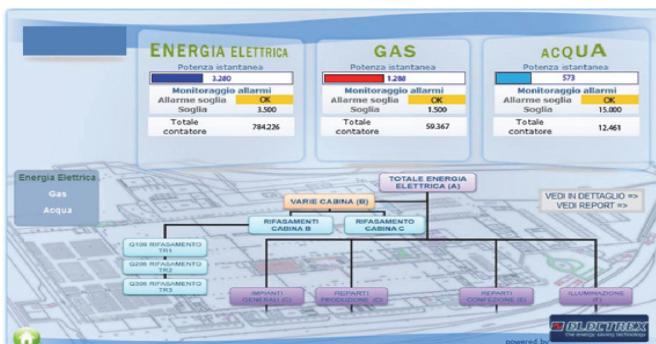
Standard Web pages example - PFSU940-05

Through the 'Net upgrade WEB' function it is possible to view the predefined web pages with instant measurements, average power values and energy total counters of both the Libra and each instrument / device connected to it in the RS485 subnet. The example below shows the page with instantaneous measurements and the page with the average values of the powers and energy meters relating to the general supply of a laboratory with offices.



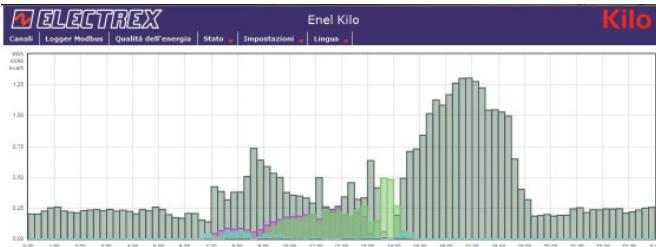
Custom Web page example – PFSU940-10

By enabling both the 'Net upgrade WEB' and 'Net upgrade Open WEB' functions, it is possible to insert customized web pages in the Libra net embedded web server. Below there is an example of real-time supervision of the electricity, gas and water used in a plant with the possibility of defining the thresholds beyond which the alarm is activated. It is then possible to connect to sub-pages detailing the consumption of departments and machinery and via a link to connect to historical data. The pages that reside on the Libra net web server are easily accessible from the browser of any PC, smart phone, etc., by typing the IP address and log in credentials.



Web chart example – PFSU940-30

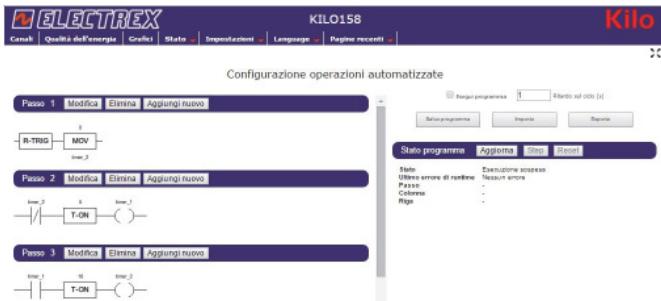
By enabling the 'Net upgrade Charts' function, it is possible to view the graphs obtained from the data stored in the Libra net, via the Web page. In the example, the graph shows the active energy purchased and produced by a PV system.



Energy Automation example – PFSU940-16

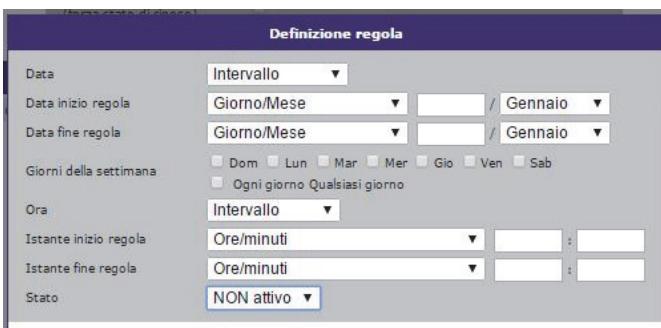
By enabling the 'Net upgrade Energy Automation' function, it is possible to automate even complex operations such as switching on / off, alarms / signals and operations conditioned by events.

The logic programming is in Ladder language. It is also possible to combine the programming with personalized calendars (if Net upgrade Calendars is implemented) and / or sending eMail and / or SMS (if the respective Net upgrades are implemented).



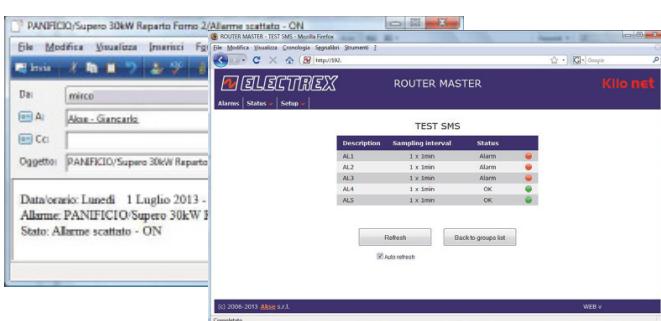
Net Upgrade Calendars – PFSU940-20

By enabling the 'Net upgrade Calendars' functionality in Libra net, it is possible to configure Calendars to be used, for example, for tariff bands and / or in conjunction with Energy Automation for scheduled switching on / off operations. The astronomical clock is synchronized via NTP (references from the Internet or from a PC in the internal network).



eMail alarms example – PFSU940-15

By enabling the 'Net upgrade eMail' function, it is possible to configure the Libra net to send notification / alarm e-mails both in relation to the exceeding of the threshold of a measured parameter and in relation to the situation of its entry. The example shows the alarm e-mail of a department in a bakery and a graphic display on the specific web page of the Libra net Web.



DATA MEMORY MANAGEMENT (VIA ETHERNET PORT AND WI-FI)

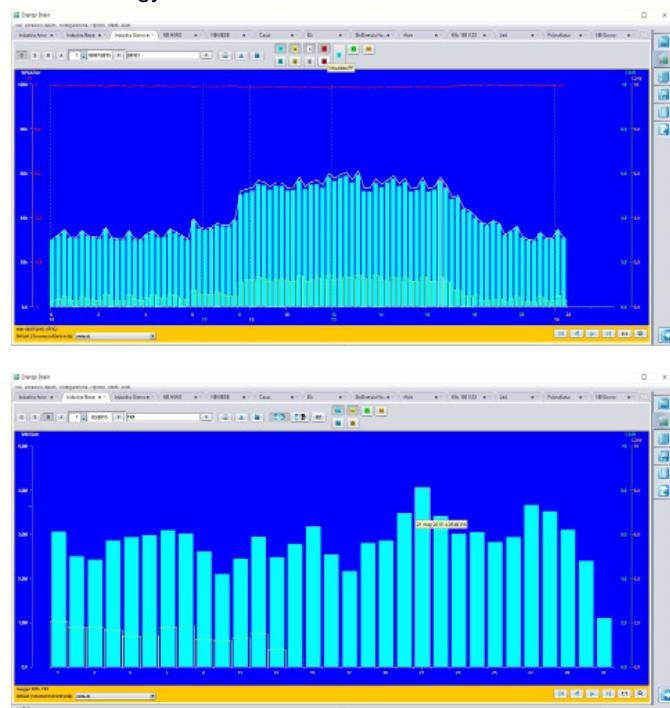
The Libra CCI manages a 128MB flash memory flexibly for recording various storage services and event logs. Each storage service can contain a maximum of 255 files and is characterized by a pre-established sampling frequency. Both standard and customized configuration and display web pages also reside in the memory. The same memory is also used for Power Quality events recording and measurement campaigns.

The memory can be read from the Ethernet or Wi-Fi port via the Energy Brain software and/or via the HTTP protocol.

Curves of stored parameters

The **Libra CCI** continuously store energy consumption / production data, organizing them in daily files consisting of 96 quarters of an hour by default.

The stored data can be viewed by day, week, month and year via the Energy Brain software::

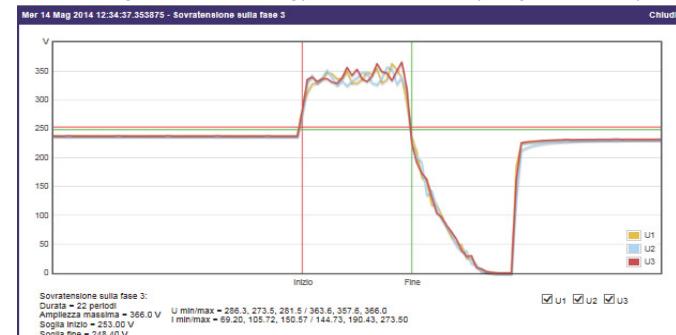


Graphic detail of the event (Web Server)

In the **Libra CCI** in addition to the list of events on the web page,

Data/ora	Evento	Fase	Durata [omis.us]	Durata [periodi]	Valore [V]	Classificazione UNIPEDE
2014-05-12 16:15:10.986375	Avvio logger	---	---	---	---	-
2014-05-14 12:34:37.353875	Sovratensione	1	0:00:00.440250	22	363.6	S1
2014-05-14 12:34:37.353875	Sovratensione	2	0:00:00.440250	22	357.6	S1
2014-05-14 12:34:37.353875	Sovratensione	3	0:00:00.440250	22	366.0	S1
2014-05-14 12:34:37.854250	Buco di tensione	1	0:00:00.360125	18	0.2	X2
2014-05-14 12:34:37.854250	Buco di tensione	2	0:00:00.380250	19	0.3	X2
2014-05-14 12:34:37.874250	Buco di tensione	3	0:00:00.360250	18	0.2	X2
2014-05-14 12:34:38.054375	Interruzione	3	0:00:00.160000	8	0.2	-
2014-05-14 12:34:38.074375	Interruzione	1	0:00:00.140000	7	0.2	-
2014-05-14 12:34:38.074375	Interruzione	2	0:00:00.140000	7	0.3	-
2014-05-15 10:39:03.990000	Buco di tensione	1	0:00:00.240125	12	111.7	C2
2014-05-15 10:39:04.010000	Buco di tensione	2	0:00:00.220125	11	111.3	C2

the “graphic detail of the event” function is activated, which allows you to record and view the trends of the beginning and end of the event on the web page with a window time (both for the starting and the ending) of one second (programmable).



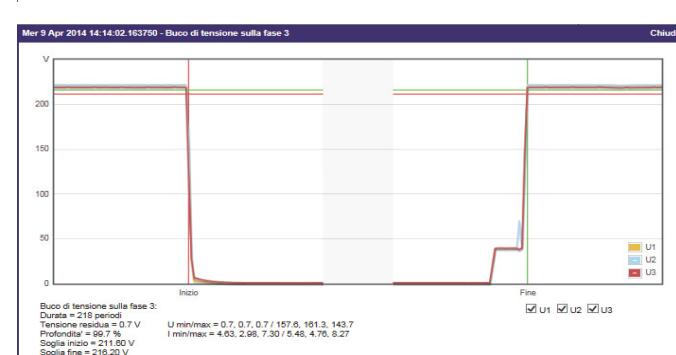
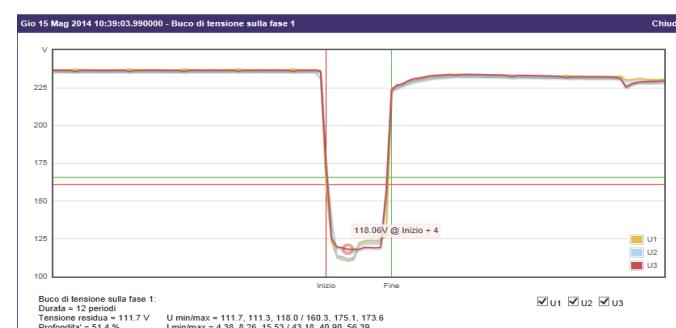
Harmonics measurement up to the 51st order

The Libra CCI displays individual harmonics up to the 51st order of the 3 phase voltages and the 3 phase currents. The calculation of the harmonics is carried out with the FFT method in amplitude and phase.

Power Quality (Class S - EN 61000-4-30): event log

The Libra CCI detects and stores various events with resolution of a cycle (indication of date / time of each event, type of event, phase concerned, duration, min / max value reached during the event) useful for monitoring the Power Quality (functions also related to EN 50160 and EN 61000-4-30 for class S). The parameters for defining the anomalous event are programmable. Types of events:

- Voltage sags (dip)
- Overvoltage (swell)
- Overcurrent and its direction
- Interruptions



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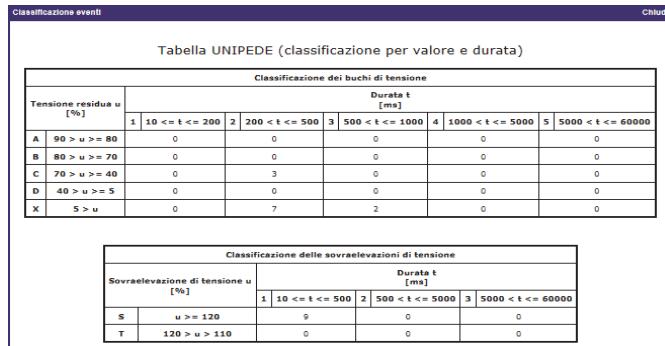
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Timeline of events and UNIPEDE table

The Libra net PQ also allows you to view a time line with the succession of events on the web page.



It also creates a distribution scheme of events based on the percentage of the parameter considered with respect to its reference value and duration according to the specifications of UNIPEDE (International Union of Producers and Distributors of Energy).



Example:

In the last column of the events table below, the S1 corresponds to an Overvoltage with a duration between 10 and 500 mS, while X2 corresponds to a voltage dip with voltage dropped below 5% of the rated voltage and duration between 10 and 200 mS (see Unipede Table above).

Data/ora	Evento	Fase	Durata [0:00:00,000:000]	Durata [periodi]	Valore [V]	Classificazione UNIPEDE
2014-05-12 16:15:10.986375	Avvio logger	---	---	---	---	-
2014-05-14 12:34:37.353875	Sovrattensione	1	0:00:00,440250	22	363.6	S1
2014-05-14 12:34:37.353875	Sovrattensione	2	0:00:00,440250	22	357.6	S1
2014-05-14 12:34:37.353875	Sovrattensione	3	0:00:00,440250	22	366.0	S1
2014-05-14 12:34:37.854250	Buco di tensione	1	0:00:00,360125	18	0.2	X2
2014-05-14 12:34:37.854250	Buco di tensione	2	0:00:00,380250	19	0.3	X2
2014-05-14 12:34:37.874250	Buco di tensione	3	0:00:00,360250	18	0.2	X2
2014-05-14 12:34:38.054375	Interruzione	3	0:00:00,160000	8	0.2	-
2014-05-14 12:34:38.074375	Interruzione	1	0:00:00,140000	7	0.2	-
2014-05-14 12:34:38.074375	Interruzione	2	0:00:00,140000	7	0.3	-
2014-05-15 10:39:03.890000	Buco di tensione	1	0:00:00,240125	12	111.7	C2
2014-05-15 10:39:04.010000	Buco di tensione	2	0:00:00,220125	11	111.3	C2

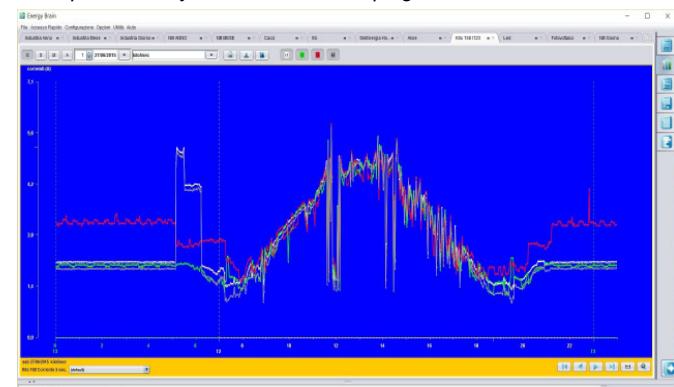
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Measurement campaign

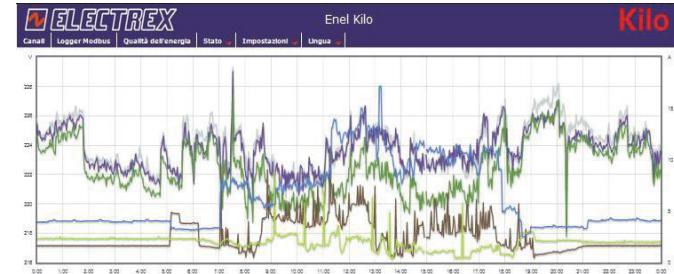
With the **Libra net PQ** it is possible to configure the measurement campaign in order to log, in the built-in memory, the various parameters with a programmable sampling rate, for example every 1 min., for 10 days (FIFO) in daily files. Data logged: U, I per each phase (per each parameter will be logged the nominal value and the % value of the fundamental; while the % value for the 3°, 5°, 7°, 9° harmonic and THD). The data can be displayed using Energy Brain software.

Example of a daily measurement campaign of the 3 currents:



With the **Libra net PQ** it is possible to display on the web interface the measurement campaigns.

Example of a daily measurement campaign of the 3 voltages every 15 seconds:



Functional Logs

The instrument's memory is used also for other operative functions such as:

- Functional log for the recording of all the operations that alter the functioning of the instrument since the first use.
- Tariff Calendar file for the management of the tariffs and other files for memory configuration.

Considering the quantity and the complexity of the data contained in the memory, the memory management and the configuration of the services can be made exclusively via Ethernet port or Wi-Fi using FTP and HTTP commands, more simply by using Web pages and/or the software Energy Brain.

The Energy Brain 6.x and PRO 6.x software (additional option)



Energy Brain is the software created for the creation of instrument networks, even very complex ones, both locally and remotely. It is suitable for application with all Electrex instruments equipped with a communication port and provides all the necessary functions for the monitoring and accurate management of **energy efficiency** (consumption / production of electricity, gas, water, etc.), of the **environmental** (temperatures, humidity, brightness, CO₂, etc.) and **process parameters**.

MAIN FEATURES

Configuration

The available options allow maximum flexibility in adapting the software to the network of instruments (even to different types of networks connected simultaneously) and to the needs of the operator.

- Remote instrument configuration (CT, TV, alarms, etc.)
- Network configuration (per instrument, per customer, in groups, per location) with autonomous setting of the type of local connection (direct RS485, Ethernet, E-Wi) or remote (Internet, Wi-Fi) and of the communication parameters (speed, etc.).
- Configuration of the data download frequency divided by location, by customer, on a daily, weekly or monthly basis via programmable agenda.

Display of graphs and consumption / production curves

- Graphs of daily, weekly, monthly, yearly power curves.
- Graphs of daily, weekly, monthly, yearly consumption curves.
- Electrex environmental sensor graphics and / or commercial transducers with pulse / analog output (light, temperature, gas, calories, etc.).
- Graphs of powers, power peaks and energies divided by tariffs.
- Up to 4 simultaneous graphs
- Export and printing of graphs and numerical data.

Parameter display

- Online display of all the measurements provided by each of the instruments in the field.

Data storage

- Automatic or manual download of power, energy and other variables data from connected instruments and automatic archiving in PostgreSQL® database.
- Data export to other DBs via ODBC module or txt or xls format.

Tariffs

- Data management by tariffs
- Tariffs and calendar configuration editor

Virtual and Multiple Channels

- Creation of virtual channels that is “groups” of instruments (example “summation” of various departments) and their display, in graphic form, in the same way as a physical channel
- Creation of multiple channels to be able to view overlapped graphs of multiple instruments for quick comparison.
- Insertion of variables and mathematical formulas, even very complex ones, particularly useful, for example, for simulations.

ENERGY BRAIN CLOUD

Energy Brain Cloud is the software that allows to display and manage via a web browser, on a variety of devices such as PCs, tablets, Smart phones, data, measures and real-time and historical charts acquired by Electrex instruments.

Taking advantage of the technology of cloud computing, users can manage the data collected through a standard Internet browser without installing any software on their computer or mobile device.

Energy Brain Cloud can be used in three modalities:

1. Energy Brain Cloud is installed and managed directly by the end user of the Electrex monitoring networks
2. A third party (Energy Consultants, Energy Saving Company, associations, etc.). Installs and manages Energy Brain Cloud and makes available to its customers/members the access to their data as a service
3. Electrex offers to the end users of the monitoring solutions access to their data through Energy Brain Cloud as a service.



Energy Brain PRO 6.x software

For a description of all the additional functions introduced by the PRO 6.x version, refer to the product sheet of the Energy Brain software.

The Energy Brain software is available in various versions according to the functions and the number of channels required. For more details on the software: www.electrex.it/en

TECHNICAL SPECIFICATIONS LIBRA CCI

Electrical characteristics		
Connection	three-phase, LV, MV, HT balanced, unbalanced, 3 and 4 wires	
Voltage inputs	Direct insertion	from 20 to 500V phase-phase (max. 1.7 crest factor)
	With external VT	(max. 400 kV primar.) VT value: programmable
	Sovraccarico	max, 900 Vrms peak per 1 sec.
Current Inputs	External CTs ECT	max. 400A primary secondary mA output
	TA apribili flessibili FCTS	max. 4000A primary secondary mV output
	Traditional external CTs	max. 10kA primary .../1A and ../5A secondary CT value: programmable
	Load on the CT	< 0,5 VA
	Overload	max. 100 Arms peak per 1 sec
Power supply	230 Vac (other types on request)	
Frequency	45-65 Hz	

Functional characteristics	
Measurements	True-RMS up to the 51st harmonic
Quadrants	2 or 4 quadrants (programmable)
Sampling	continuous at 8kHz of the voltage and current waveforms
Compensation	Automatic of the amplifiers' offsets
Scale Change	Automatic on the current inputs (highest resolution)
Insulation	Galvanic on all the inputs and outputs
	1 dedicated port for DSO
Ethernet Connections	1 dedicated port for Enabled Operator
	Modem 2G/3G/4G/LTE Cat.1 integrated
	SMA Male connector
Time Synchronization	Module GPS/GLONASS integrated
	SMA Male connector
Memory	Slot MicroSD up to 120Gb
Services	http(s), ftp(s), ssh, snmp v2, v3 trap
	ntpd, ptptp client o server (IEEE-1588)
	redundancy cover system
	Firewall
	Access with RBAC
	Tasks ladder IEC 61131-3
	Server Web for management and control

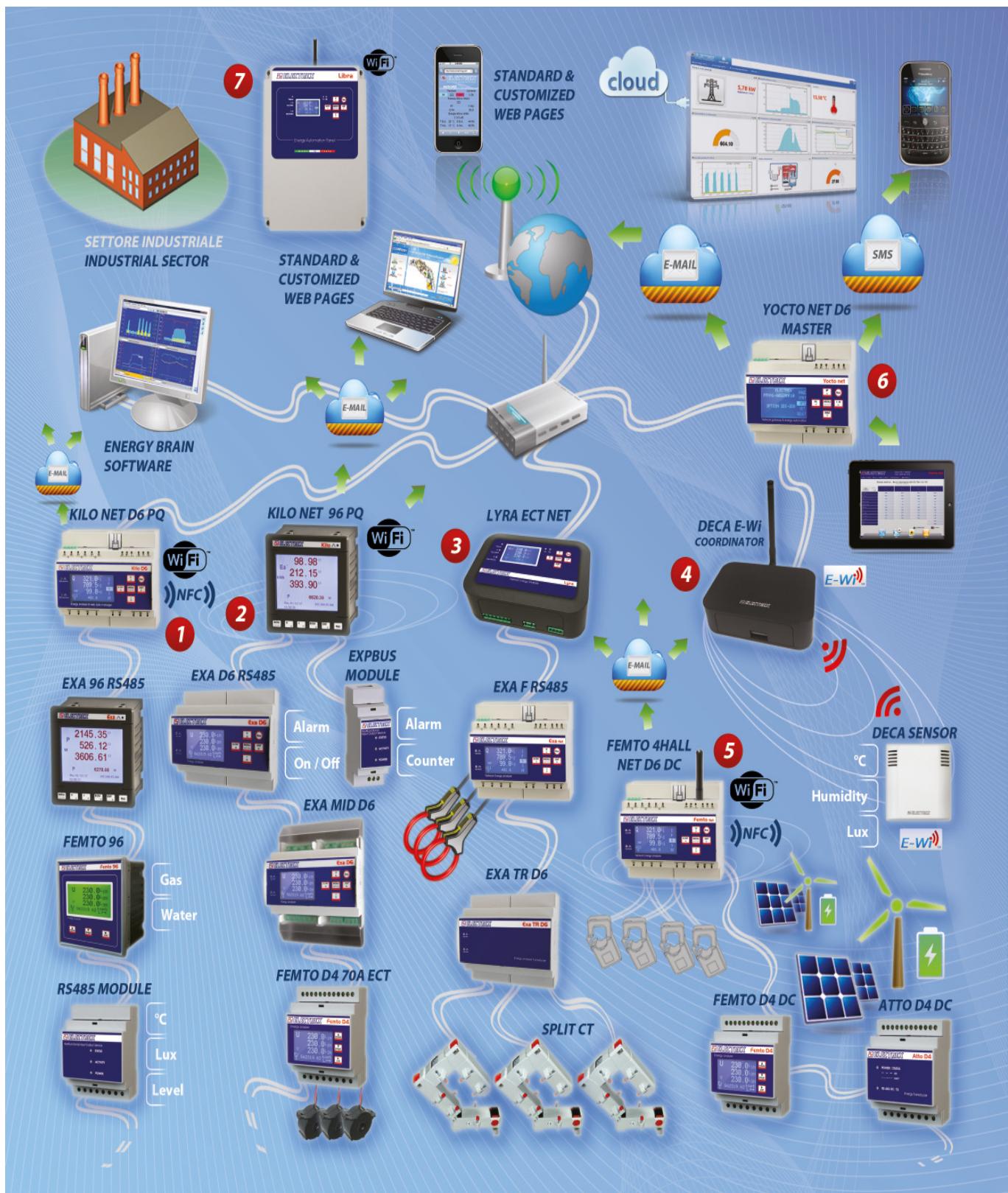
Mechanical characteristics		
Operating temperature	-20/+60 °C	
Humidity	95% R.H. non condensing	
Enclosure	Self-extinguishing plastic material class V0	
Protection degree	IP40	
Weight – Libra net	around 5,1 kg net, 5,7kg package	
Size (WxLxH)	236x316x190 mm	236x316x130 mm

Front Panel		
Display	LCD, FSTN dot-matrix 128 x 64 points	
Visible area	22x44 mm (HxL)	
Backlight	White Led	
Keyboard	6 keys keypad Joystick positioned	
Calibration LED	2 red for the Ea and Er	
Functioning / State LED	1 red under the symbol 	
Communication RS485 LED	1 green and 1 red under the white band	

Protocols		
Serial ports (RS232 or RS485)	IEC 61158-15 ModBus-RTU	
	IEC 60870-5-101	
	IEC 60870-5-103	
Ethernet ports	IEC 60870-5-104	
	IEC-61850 Server/Client/Goose	
	IEC 61158-15 ModBus-TCP/IP	
	DNP 3	
	S7-Comm	
	OPC-UA Client	
	C37.118 Client	
Secure protocols	IEC 62056-21 (DLMS)	
	IEC 62351 (crypto/cyber security)	
	Part 3 for IEC-60870-5-104 and DNP3	
	Part 4 for IEC 61850	
	Part 5 for IEC-60870-5-104 and DNP3	
	Part 6 per IEC 61850	
	Part 7 for SNMP	
	Part 8,9	

Normatives		
Accuracy	Active Energy	Class 0,5S CEI EN 62053-22 Class C EN 50470-3
	Reactive Energy	Class 1 CEI EN 62053-24
Safety	IEC EN 61010 class 2	
E.M.C.	IEC EN 61326-1A	
Cyber Security	Compliant with IEC 62443-4-2	
	Trusted Platform Module 2.0	
	FIPS 140-2 Level 3 (OS) e Level 4 (HW)	
	RBAC	
	TRNG	

Electrex Monitoring Solutions



Production plant energy monitoring solution example

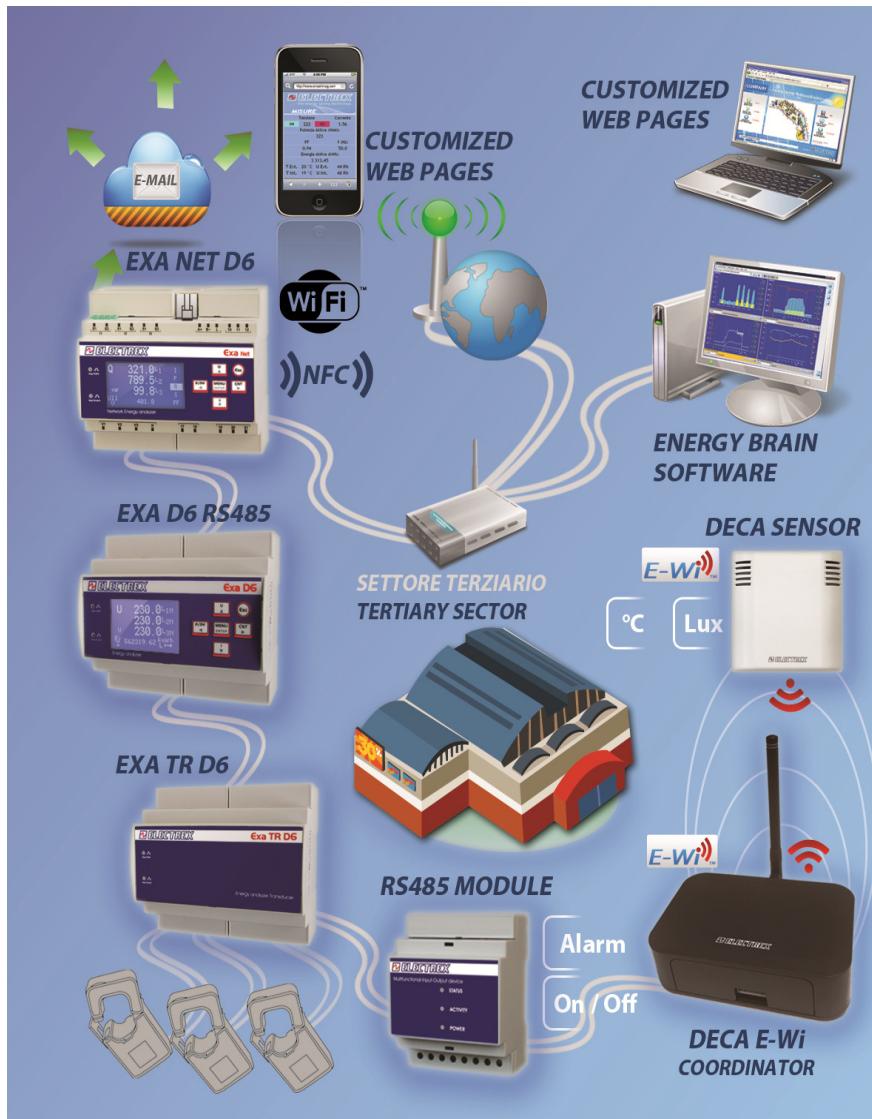
The diagram above represents a part of a monitoring solution in a production plant powered by a main MV load and equipped with 2 MV/LV transformers (one of them replaced recently) that serves 2 production lines, while the offices are powered by a LV system. The monitoring system consists of branches 1 and 2 to monitor the transformers and a part of the production lines, while branches 3, 4, 6 and 7 take care of the building with the offices, the testing department, a Photovoltaic on the roof and R & D building. These branches are connected to the company Ethernet network via the Kilo net D6 PQ (branch 1), the Lyra ECT net (branch 3) and the Yocto net D6 Master (branch 6) and via Wi-Fi the Kilo net Wi-Fi EDA 96 PQ (branch 2) and the Femto 4Hall net Wi-Fi EDA D6 DC (branch 5). The various instruments and sensors inserted in each branch are responsible for monitoring the relevant main users.

- **In branch 1** the Kilo net D6 PQ (gateway and datalogger) monitors the quantity and power quality under the transformer 1 and the Exa 96 RS485 in sub-grid RS485 to the Kilo net controls a machining center, while the Femto 96 is equipped with digital inputs in addition to taking care of lighting consumption and also of gas and water consumption. The RS485 Module detects some parameters from existing analogue probes.
- **In branch 2** the Kilo net Wi-Fi EDA 96 PQ (gateway datalogger) monitors the quantity and power quality under the transformer 2; one of the several Exa D6 RS485 in sub-network RS485 under the Kilo 96 detects a compressor while the Exa MID D6 is used to de-tax the energy of a galvanic processing. The ExpBus module connected to the Kilo net 96 deals with alarms and counting. There is also a Femto D4 ECT for monitoring an area with LED lighting. In Kilo net 96 the Energy Automation was activated to automate and make more efficient the switching on and off of three compressors by piloting the digital outputs of the same number of Exa D6 RS485.
- **In branch 3** that starts from the technical room there is a Lyra ECT net (gateway datalogger) that takes care of the general lighting of the offices having in RS485 sub-network an Exa F D6 Rs485 TA opening flexible (easier to insert) for the testing desk of large engines and an Exa TR D6 for testing of smaller engines.
- **In data-point 4** there is a Deca Coordinator E-Wi 868 that acts as an E-Wi 868MHz radio gateway for a Deca Sensor E-Wi 868 that detects the environmental parameters of a laboratory. The Deca Coordinator is connected in RS485 to the Yocto net Master which acts as the datalogger of the branch.
- **Branch 5** deals with continuous side monitoring (Femto 4Hall net DC, Femto D4 DC and Atto D4 DC) of a 50kWp photovoltaic system placed on the roof of the building.

In the Ethernet network, the Yocto Net D6 Web Master, **branch 6**, has enabled customized web pages (including those of the HVAC) to display the supervision pages on the PCs, tablets and smart-phones of the managers and maintainers as well as sending alarms via eMail to warn in case of anomalies.

To monitor the Research & Development building across the street, a Libra (quick to install) panel was used connected to a router with data SIM, **data-point 7**.

The Energy Manager uses his notebook both when it is in the plant (locally) and when it is out (remotely), to connect to the company Lan network and evaluate the effectiveness of energy efficiency interventions through data that the software Energy Brain PRO periodically downloads from Electrex devices. Recently, in order to continuously improve in terms of energy efficiency (ISO 50001), the Energy Manager has also involved in the Energy Management System the department managers, making available their consumption data that can be viewed from a PC, tablet and smart-phone at any time via the Energy Brain Cloud which is also active in the **Control Room**. The management is implementing different levels of interconnection (hardware and software) with a view to **Industry 4.0**.



Monitoring network example using Libra panels for the multi-site, commercial or public buildings

In the image here above are shown two examples of use of the Libra panels.

In the first one the monitoring solution includes two Libra panels placed in two shopping malls part of an international retail chain (but can be also two shops, offices or restaurants, etc.).

The Libra 1 retrieves and logs the consumptions of 5 electrical loads (mains, the PV system, the HVAC, internal and external lighting), the internal and external temperature and humidity.

The Libra 2 retrieves and logs the consumptions of 3 electrical loads (refrigerated counters, cold stores and the oven) and the alarm status of the refrigerated counters and cold stores.

In the second example in a bank branch has been installed a Libra net for the monitoring of the mains, internal temperature, humidity and external temperature. While for the lighting and the HVAC systems has been used a Libra Expansion.

In both cases the Energy Manager uses the software Energy Brain in order to control and monitor the energy consumptions while the maintenance team is supported from the real-time measurements and alarm statuses displayed on the embedded Web interface. In a second stage of the project is has been scheduled the activation of the Energy Automation function in order to automate the switching (On/Off) of some loads in order to optimize the system's management and be more efficient.

Subject to modification without prior notice.
 Datasheet Libra CCI
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