ELECTREX
the energy saving technology

Engineered and manufactured in Italy
Made in Italy
Pensato, progettato e prodotto in Italia

LOW ENERGY CONSUMPTION

Kilo Rj45 & Net

- High Performance (accuracy class 0,5S)
- Flexibility (open platform)
- Reliability (high quality of components)
- Connectivity (RS485, ExpBus, Ethernet, Wi-Fi, NFC)
- For continuous monitoring (E.g. ISO 50001)
- Energy efficiency (E.g. 2012-27 EU-Directive and the Energy Efficiency Certificates)

(Power Quality) Energy Analyzer & (Wi-Fi) Data Manager

Power Quality Energy Analyzer & (Wi-Fi) Web Data Manager

The **Kilo RJ45 D6 H** is an Energy Analyzer & Data Manager microprocessor based (Dual Core Cortex-M4) outstanding flexibility and accuracy designed to meet the most demanding applications of monitoring of electrical parameters and electrical energy management in industrial, tertiary, commercial and residential sectors. The high accuracy class 0.5 S, for Active Energy, according to EN 62053-22 and measures of individual harmonics up to 51 ° order are obtained by continuously sampling the waveforms of voltages and currents with a very high resolution, thus ensuring the maximum accuracy even in the presence of rapidly varying loads in time (.eg. spot welding). The **Kilo RJ45 D6 H** is equipped with a slave Rs485 and an Ethernet (**Wi-Fi** option) port and, depending on the version, with an internal module for inputs/outputs or environmental sensors. The **Kilo RJ45 D6** is equipped with a 128 MB high capacity memory for implementing, through PUK codes, various features. Its architecture allows the firmware upload & update even remotely. The **Kilo D6 RJ45 H** D6 is equipped as well with an expansion bus, ExpBus, for the connection of digital and analog inputs/outputs, environmental sensors modules and supports NFC(Near Field Communication).

The **Kilo RJ45 D6 PQ** is a Power Quality Energy Analyzer & Data Manager which in addition to the functions of the del Kilo D6 includes the management of the quality of the energy through the Ethernet port (or Wi-Fi). It includes also functions related to the EN 50160 normative (peaks, dips, interruptions, harmonics) and EN 61000-4-30 for Class S with graphic detail of the event, table and timeline of the events, measurement campaigns with selectable parameters and programmable sampling frequency.

The **Kilo net D6 PQ** is a Power Quality Energy Analyzer & Web Data Manager, an open platform connected to the Ethernet / Internet via Rj45 (or Wi-Fi optional). it represents the starting point for the continuous monitoring of the energy efficiency through the measurement and management of the energy parameters (electricity, gas, water, etc.), environmental parameters (temperature, luminosity, CO2, etc.) and process parameters. Measures electrical parameters and quality of energy, is a Web and FTP Server, and communicates with/manages the other Electrex devices via the RS485 master port and the ExpBus port.

The **Wi-Fi** option permits to manage/display the data from any device having a browser (PC, Smartphone, tablet, etc.).

Simplicity

Equipped with a FSTN dot matrix display with high contrast, back-lighted, white LEDs allowing the simultaneous displaying of 4 measurements and of their identification symbol with high visibility characters.

The 6 keys keypad Joystick positioned and menu list type on the display for configuration provide a simple and rational use of the instrument, while the default page displayed when powering on is user definable.
On the front panel 2 calibration and control LEDs pulse with a frequency proportional to the imported Active and Reactive Energy for the on-field calibration with optical devices. The red LED pulsing under the symbol by the Electrex logo indicates the functioning state. 2 additional LEDs positioned under the white band report instead the activity on the RS485 port. While for the Rj45 port the 2 built-in LEDs will indicate the Ethernet activity. In order to reduce the energy consumption it is possible to configure the display's back-lighting, the state LED and the ones related to the RS485 port.

Versatility

The **Kilo D6** is suitable for virtually all type of electrical grid systems, single phase, bi-phase, three phase 3- and 4-wire, symmetrical and asymmetrical, balanced or unbalanced, LV/MV, with 1, 2 or 3 CTs as well as for 2 and 4 quadrant (import/export) measurement. A simple configuration from the keyboard (or via our Energy Brain software) allows to configure all the operating parameters like network type, CT and VT (if present) ratio, integration time (1-60m) and alarms (threshold, delay, hysteresis), digital outputs and configuration parameters related to optional modules connected.

Measures

Parameters	Type	L1	L2	L3	n	Σ	P	Range
Voltage	U_{L-N}	•	•	•		•		20,0V...400 kV
	U_{L-L}	•	•	•		•		
	$U_{L-N\ MAX}$	•	•	•				
	$U_{L-L\ MAX}$	•	•	•				
	$U_{L-N\ MIN}$	•	•	•				
	$U_{L-L\ MIN}$	•	•	•				
Current	I	•	•	•	•	•		10 mA…10,0 kA Electrex Flexible CT(7): 1A … (5A - 500A) 4A … (20A - 2000A) 16A … (80A - 8000A)
	I_{MAX}	•	•	•				
	$I_{AVG\ THERM}$ (1)	•	•	•				
	$I_{MD\ THERM}$ (1)	•	•	•				
Power Factor	PF	•	•	•		•		0,00ind..1,00..0,00cap
Frequency	F	•						45 … 65 Hz
Harmonic Distortion	$THD\text{-}U_{L-N}$	•	•	•		•		0…199,9%
	$THD\text{-}U_{L-L}$	•	•	•		•		
	THD-I	•	•	•		•		
Active Power	P	•	•	•		•		± 0,00…1999 MW
	P_{AVG} (2)					•		
	P_{MD} (2)					•		
	P_{MAX} (3)	•	•	•				
Reactive Power	Q_{IND}	•	•	•		•		± 0,00…1999 Mvar
	Q_{CAP}	•	•	•		•		
	$Q_{AVG\ IND}$ (2)					•		
	$Q_{AVG\ CAP}$ (2)					•		
	$Q_{MD\ IND}$ (2)					•		
	$Q_{MD\ CAP}$ (2)					•		
Apparent Power	S	•	•	•		•		± 0,00…1999 MVA
	S_{AVG} (2)					•		
	S_{MD} (2)					•		
Life Time	h, h/100					•	•	0,01…99.999,99 hours
Active Energy	$E_{a\ IMP}$ (5)	•	•	•		•	•	0,1 kWh…100 GWh
	$E_{a\ EXP}$ (5)	•	•	•		•	•	
Reactive Energy	$E_{r\ IND\ IMP}$ (5)	•	•	•		•	•	0,1 kvarh…100 Gvarh
	$E_{r\ CAP\ IMP}$ (5)	•	•	•		•	•	
	$E_{r\ IND\ EXP}$ (5)	•	•	•		•	•	
	$E_{r\ CAP\ EXP}$ (5)	•	•	•		•	•	
Apparent Energy	$E_{s\ IMP}$ (5)	•	•	•		•	•	0,1kVAh…100 GVAh
	$E_{s\ EXP}$ (5)	•	•	•		•	•	
Pulse Counter	CNT (6)					•	•	
Analog Measure	(6)					•	•	

For all the "instantaneous measures": mean over 10 cycles - example: 200ms at 50Hz.

(1) Mean value (rolling average) over the integration time (1.. 60 min. program.) and peak (MD).

(2) Average value (moving average) in both import and export over the integration time (1..60 min programmable) and peak (MD) that is the maximum average value.

(3) Maximum Power values for both import and export.

(4) Non resettable total lifetime counter. 3 partial lifetime counters.

(5) Import/Export energies displayed as 9 digits in floating-point readings; internal energy counters are logged with a 64 bit resolution which assures a minimum definition of 0,1 Wh and a max count of 100 GWh

(6) Only for versions with digital and analog inputs.

(7) With Flexible Electrex CT, accuracy Class 1 for both the devices, within the current ranges denoted above with brackets.

Kilo D6 : Single Harmonic

Parameters		L1	L2	L3	Σ	Management
Harmonics analysis (8)	H Voltage	•	•	•		Value (H01), % (H02-H51)
	H Current	•	•	•		Value (H01), % (H02-H51)
	H Power & dir.	•	•	•		Value (H01), % (H02-H51)

(8) FFT method calculation of the harmonics, amplitude and phase, up to the 51-st for the 3 voltages and currents per each phase, 3 active powers of each phase with direction (accumulated in 10 periods).

Kilo D6 Q: Events U and I, measurement campaign

Parameters (9) (10) (11)	L1	L2	L3	Σ	Management
Dips and peaks. .	•	•	•		Events logged in the internal memory with time-stamp
Overvoltage and overcurrent	•	•	•		
Sags and interruptions	•	•	•		

(9) Event logging with date and time, duration, max/min value. Programmable thresholds. EN 50160 and EN 61000-4-30.

(10) Event's graphic detail: nr. of samples (programmable e.g. 1 second) retrieved previously and after the event (dips, peaks and interruptions).

(11) Distribution table of the events based on the threshold exceeded and duration following UNIPEDE (http://www.eurelectric.org/) and Timeline of the events.

(12) Programmable measurement campaigns (choice of parameters and of the sampling time). See Memory Management section.

Harmonics up to the 51-st order

The **Kilo D6 H** displays also the single harmonics up to the 51-st order for the 3 voltages and currents per each phase, 3 active powers of each phase with the sign (+or -) that denotes the direction of the harmonic. FFT method calculation of the harmonics, for amplitude and phase.

Phase sequence

The **Kilo D6 H** permits the identification of the correct phase sequence.

Ethernet and/or serial via RS485 communication

The **Kilo D6 H** is equipped with a 10/100 Base-TX (RJ45) Auto-MDIX **Ethernet port** for the "http" communications (real-time measurements and memory logs) and "Modbus over IP" (real-time measurements). It is equipped also with a serial RS485 slave port, protected against overvoltage, using Modbus-RTU "*full compliant*" (instantaneous measurements). The data are read as numerical registers composed by mantissa and exponent in the IEEE format. The communication speed of the RS485 port is configurable, up to 38.400 bps, with a max. 125 registers requested (equivalent to 62 parameters) with no waiting time between two requests.

Versions of Kilo D6 H

- 1DI 2DO: 1 digital input and 2 digital outputs;
- 1DI 2DO Self-Powered: 1 self powered digital input and 2 digital outputs rated at 250V 100mA;
- 2AO 4-20mA: 2 analog self-powered 4-20mA outputs for loads up to 250 ohm, power supply needed for higher loads;
- 2DI 1RO Self-Powered: 2 self-powered digital inputs and 1 relay (24VDC);
- 2RO24VDC: 2 relay outputs (24VDC);
- 2RO230V: 2 relay outputs (230V);
- 4DI: 4 digital inputs;
- 4DO: 4 digital outputs;
- 2DI 2DO: 2 digital inputs and 2 digital outputs;
- 4AI: 4 analog inputs 0÷10V (4÷20mA);
- I2C: for environmental sensors (T, H, L, etc)

Digital Inputs

The versions **.. 1DI or 2DI or 4DI** are equipped with an optically insulated digital input with programmable filter for input glitches. The digital input is set to operate for external pulse count of, example, water meters, gas meters (insulation to meet the ATEX requirements), water meters, quantity count, etc. For the 1DI or the 2DI 1RO the max sampling frequency is 100Hz (5ms), while for the 2DI 2DO and the 4DO 500Hz (2ms). Other user selectable operative modes are ON/OFF state input (example for reading the ON/OFF state of machines and switches) and tariff change input (example for day-night tariff changeover). The digital input requires an external 10-30Vdc power supply.
The **1DI 2DO Self-Powered** and **2DI 1RO Self-Powered** versions instead are provided with self powered digital inputs.

Analog Inputs

The **Kilo D6 H 4AI** is equipped with 4 analog inputs rated at -10÷10V (compatible with 0÷10V, 0÷5V, -5÷5V, 4÷20mA at 200 ohm).

Digital outputs

The **Kilo D6 H .. 2DO or 4DO** are equipped with two optically insulated transistor outputs rated 27 Vdc 27 mA according to DIN 43864 standards. The outputs may be set for the transmission of pulses or alternatively configured as outputs of the internal alarms (see Alarms) or as remote output devices controlled via serial line and Modbus commands.
The **Kilo D6 H 1DI 2DO Self-Powered** instead is equipped with two opto-mos outputs rated at max 250V 100mA AC/DC.

Relay outputs

The **Kilo D6 H 2DI 1RO Self-Powered** and the **Kilo D6 H 2RO 24Vdc** are equipped with relay outputs with changeover contact rated at max 30V max 2A (resistive load).
The **Kilo D6 2RO 230V** are equipped with 2 relay outputs with changeover contact rated at max 250V max 2A (resistive load).

Alarms

The **Kilo D6 H .. 2DO** or **4DO** or **1RO** or **2RO** are equipped with outputs which can be related to the internal alarms. Each alarm can be linked to any one of the parameters available, for example, either as a minimum and/or as a maximum. All the alarm outputs can be linked to the same parameter in order to have more alarm thresholds. It is possible to set a delay on the activation / deactivation of each alarm (from 1s to 99 min), the hysteresis (% of the threshold value) and the polarity of the output contact (NA, NC, except for the **1RO** which is always NC). The alarms state information is always available on serial communication as Modbus "*coils*". Due to the numerous combinations available, only a part of them are programmable by keyboard while are entirely programmable via serial port with the Energy Brain software or via serial port using Modbus *Holding registers*.

Analog 4-20mA outputs

The **Kilo D6 H 2AO4-20mA** is equipped with 2 galvanic insulated analogue outputs 4-20 mA or 0-20 mA providing an extremely high accuracy and signal stability. The outputs are active for resistor loads up to 250 ohm, for higher loads an external power supply (12Vdc) will be needed (up to 750 ohm). The outputs ensure a response time of max. 200 ms. Each output can be associated to any of the parameters.

I2C Bus

The **Kilo D6 H I2C I2C** is equipped with an I2C Bus for connecting up to 4 sensors (up to 4 for the temperature or up to 1 for the temperature, 1 for the humidity, 1 for the luminosity and 1 for the air pressure). The max total distance of the I2C bus is 20 m.

Wi-Fi, Wi-Fi EDA and NFC (Near Field Communication)

The **Wi-Fi** and **Wi-Fi EDA** versions (with a connector for an external antenna) communicates using the Wi-Fi network without the need to be connected to an Ethernet cable while the presence of **NFC** opens the possibility for the creation of specific APPs for mobile devices on the energy management.

The Kilo F version for Electrex Flexible CTs

The **Kilo F D6 H** are equipped with current inputs exclusively for the Electrex Flexible split core current transformers FCTS (mV output and appropriate internal linearization in order to maximize measurement accuracy).
WARNING: Do not connect to these current inputs of CT with output in current (eg. ../1A or ../5A) because it may damage both the Kilo F D6 and the CT.
Selectable Full Scale, Class 1 accuracy (overall accuracy flexible CT + measuring instrument) between the full scale and a hundredth of the full scale. Minimum measurable current equal to one five-hundredth of the full scale.

FCTS 040-500 Flexible split CT, internal diameter 4 cm

FCTS 100-1000 Flexible split CT, internal diameter 10 cm

FCTS 200-2000 Flexible split CT, internal diameter 20 cm

FCTS 280-1000 Flexible split CT, internal diameter 28 cm

Load curves and data of consumption / production

The **Kilo D6 H** continuously logs the data of consumption / production 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 (downloadable via RJ45 port / Ethernet or Wi-Fi using Energy Brain or via Http).

Astronomical Clock Calendar

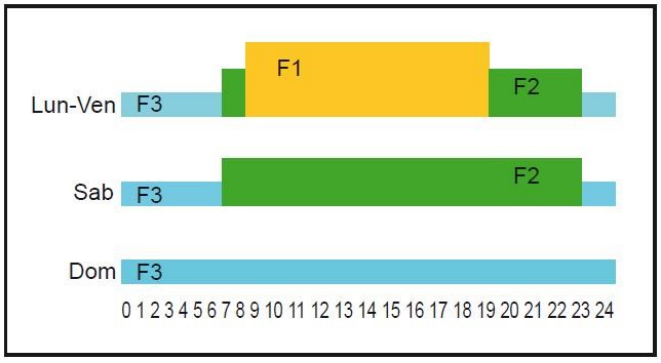
The **Kilo D6 H** is equipped with a clock / calendar with astronomical real time management of the Coordinated Universal Time (UTC). It manages also the rules for the automatic switching from Standard Time at summer time (Daylight Saving Time) and vice versa. Automatic synchronization via NTP.

Orologio di sistema	
Ora UTC	Mer 17 Dic 2014 14:13:34
Ora locale	Mer 17 Dic 2014 15:13:34
Offset da UTC	+01:00
Offset ora legale	+00:00
Prossimo cambio d'ora	Dom 29 Mar 2015 02:00:00
Giorno di Pasqua	Dom 20 Apr 2014
Inizio giornata	07:48
Fine giornata	16:37
Mezzogiorno solare	12:13
Durata del giorno	8:49
Stato sincronizzazione NTP	Sincronizzazione effettuata
Prossima sincronizzazione NTP	Mer 17 Dic 2014 21:22:02

Tariffs TOU

The **Kilo D6 H** can manage complex tariffs, up to 8 tariffs with a max of 12 tariff changing per day.

The data provided include the energy consumption (Ea, Er, Es) and the max demand (peak) values (P_{MD}, Q_{MD}, S_{MD}) on all the 4 quadrants; total values and per each of the 8 tariffs therefore a total of 64 counters of energy and 64 power peak values. In case of only-import measurements and of a lower number of tariffs the device will update only the involved counters. All the measures related to each tariff can be available on the display and on the serial line. The management of the tariffs requires the upload of a customized calendar file generated with the software Energy Brain.



Example of a 3 Tariffs system

Firmware and Special versions on request

The **Kilo D6 H** can be provided also with other power supply or hardware versions and the firmware is upgradeable, remotely, at any time, in order to add and/or replace the existing characteristics with new and different functions.

Expansions via ExpBus

The **Kilo D6 H** is an evolutionary instrument capable to be adapted to the needs of the customer, even after it has been installed.
The system architecture is designed to allow the implementation on the field of hardware expansions thanks to the ExpBus, providing therefore to the customers the ability to modulate the investment and / or to respond to new needs.

UTP cable for the ExpBus (max 10m)	
VCC	Blue
Exp L	White & Blue
Exp H	Brown
GND	White & Brown

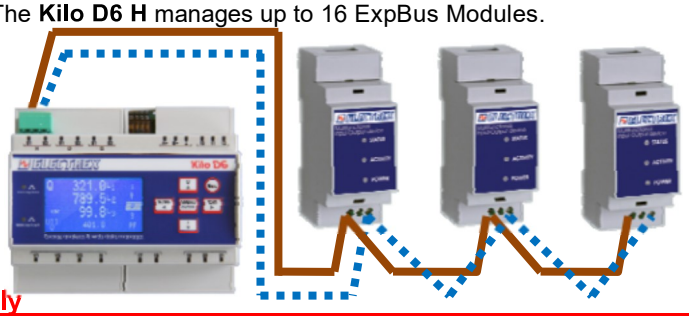
ExpBus

The **ExpBus,** configurable via the Ethernet port from Web pages:

- allows a multicast communication to 250kb/sec with collision management
- has a maximum length of 10 meters
- manages up to 16 nodes (modules) but technically it can manage up to 126

The connecting cable is a UTP where 4 wires are used:
2 for the power supply at 9 Vdc
2 for the bidirectional communication
The modules power the ExpBus
The cable must be connected in the in-out modality (multidrop) as for the RS485 Bus.
Each node must have an unique Modbus address

The **Kilo D6 H** manages up to 16 ExpBus Modules.



ExpBus Module suitable for the Kilo D6 e Kilo net D6 family

ExpBus Module D2

The *ExpBus Module D2* must be used with an external power supply of 24Vdc (e.g. Switching Power Supply D1 24VDC 400mA code PFTP100-Q2) and can contain up to 2 modules similar to the one shown here at the (of which, however, only one of the two types can be self powered, therefore only one for 1DI 2DO Self-Powered or 2AO4-20mA or 2DI 1RO Self Powered). Max. weight 45 gr..
When the ExpBus Module D2 is connected, the Kilo D6 recognizes it and allows you to configure it via Web page.

ExpBus Module D4

The ExpBus Module D4 have a built-in 230Vac power supply (24Vdc power supply version on request) and can contain up to 2 modules, also self-powered.
Max. weight 100 gr.

When the ExpBus Module D4 is connected, the Kilo D6 H recognizes it and allows you to configure it via Web page.

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UTP cable for the I2C Bus (max 20m)	
VCC	Orange
SCL	White Orange
SDA	Green
GND	White Green

How to order ExpBus Module

Description	Code

ExpBus Module D2 *versions (2 DIN rail modules):*
ExpBus Module D2 24VDC 4DI 4DO *PFAB20E-N5P*

Possible hardware combinations with 1 or 2 different modules (of which, however, only 1 can be a self-powered type, e.g. only one 1DI 2DO Self-Powered or 2AO4-20mA or 2DI 1RO Self Powered module). Requires external power supply 24Vdc:
Switching Power Supply D1 24VDC 400mA.....PFTP100-Q2
ExpBus Module D4 *versions (4 DIN rail modules):*
ExpBus Mod. D4 230V 2DI 2DO 2AO4-20mA *PFAB40E-Q26*
Possible hardware combinations with 1 or 2 different modules which can be also self-powered type.
Internal power supply 230Vac or other power supplies on request, see building code diagram below.

BUILDING CODE: ..... ***PFAB 4 0 E – N 2 P***

PFAB = External modules
Dimension in DIN modules: **4** = 4 modules
2 = 2 modules
Bus Type: ..... **E** = ExpBus

Internal modules:..... *Characters for code:*
No module.....***0***
Module 1DI 2DO ***1***
Module 2DI 1 RO Self Powered ***2***
Module 2RO24VDC ***5***
Module 2AO4-20mA ***6***
Module 2RO230V ***8***
Module 1DI 2DO Self Powered .....***E***
Module 4DI .....***N***
Module 4DO .....***P***
Module 2DI 2DO .....***Q***
Module 4AI .....***R***
Module I2C Bus.....***T***

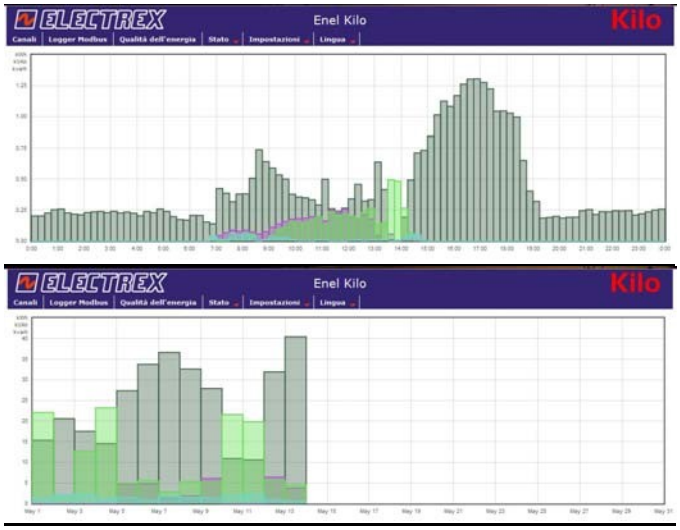
Power Supply:
24Vdc +/- 10% ***only for*** *Module D2*.....***5***
230Vac +/- 10% ***only for*** *Module D4*.....***2***
15÷36Vac/18÷60Vdc ***only for*** *Module D4*.....***8***
9÷24Vac/ 9÷36Vdc ***only for*** *Module D4*.....***7***

Memory management (via Ethernet port or Wi-Fi)

The **Kilo D6 H** family of devices manages the 128 MB flash memory in a flexible way for the storing of the different log services and event logs. Each log service can contain a maximum of 255 files and is characterized by a predetermined sampling frequency; The number of channels (e.g. instruments) that can be stored for each service depends on the activated PUKs and the amount of free memory. In the same memory are hosted also the web pages for the configuration and display of measures (standard and customized). It is possible to upgrade from the **Kilo D6 H** to **Kilo D6 PQ** purchasing the relative **Upgrade (PUK)** Code **PFSU940-81**. In the **Kilo D6 PQ** version the memory is also used for log of events and for the measurement campaigns The memory can be read from **Ethernet port or Wi-Fi** network using the Energy Brain software and / or the HTTP protocol.

LOGGED PARAMETERS CHARTS

The **Kilo D6** continuously logs the data on the consumption/production in daily files containing by default the 96 quarters of hour. The data logged can be displayed on the chart on a daily, weekly, monthly and yearly basis.



POWER QUALITY (Class S - EN 61000-4-30): Events Log

The **Kilo D6 PQ** detects and logs various events with a resolution of one cycle (with date / time * of each event, type of event, phase involved, duration, min / max value reached during the event and UNIPEDE classification) useful for monitoring the quality of energy (functions related also to the EN 50160 and EN 61000-4-30 standards for the S class). The parameters for defining abnormal events are programmable. Event types:

- **Voltage Dip**
- **Voltage Swell**
- **Over current and its direction**
- **Interruption**

Example:

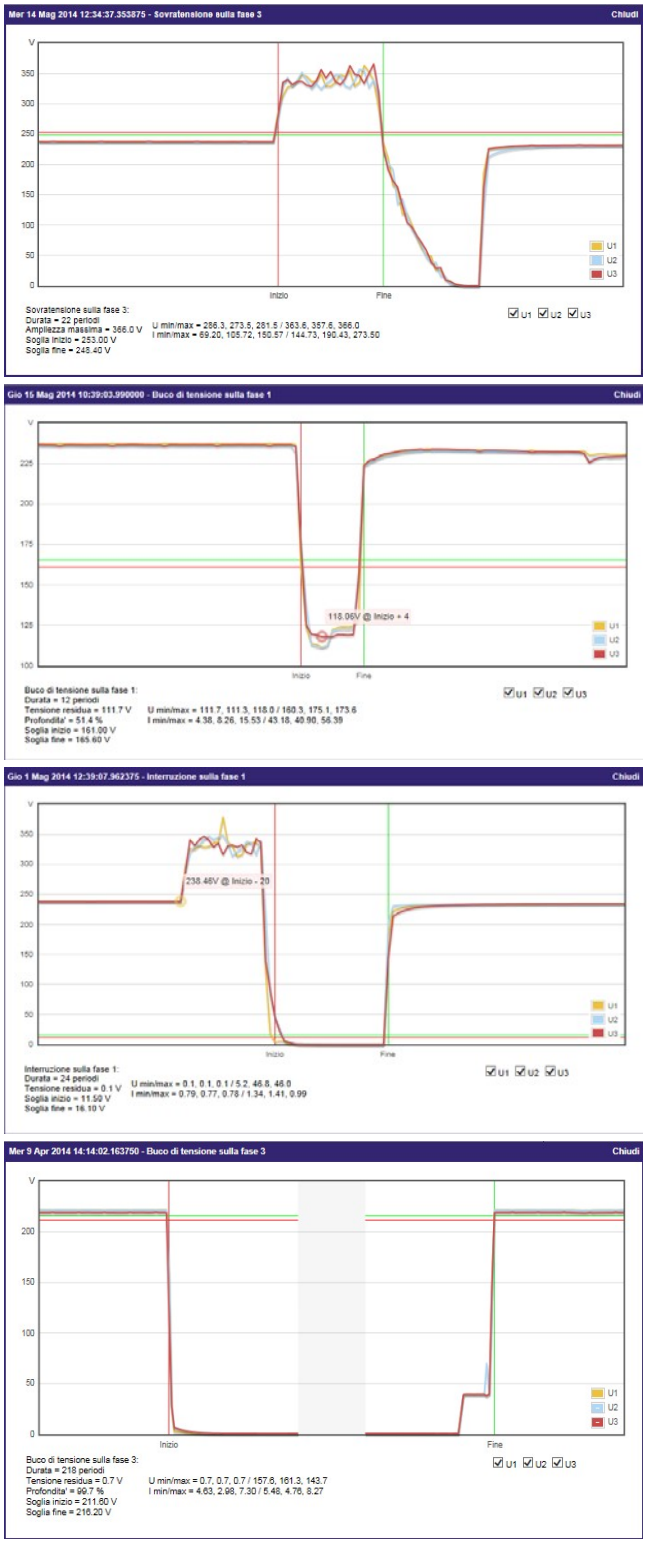
Data/ora	Evento	Fase	Durata [somma,us]	Durata [periodi]	Valore [V]	Classificazione UNIPEDE
2014-05-12 16:15:10.986375	Avvio logger	---	---	---	---	-
2014-05-14 12:34:37.353875	Sovratensione	1	0:00:00.440250	22	363.6	S1
2014-05-14 12:34:37.353875	Sovratensione	2	0:00:00.440250	22	357.6	S1
2014-05-14 12:34:37.353875	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

Elementi: 33

(*) Date/hour expressed in hours, minutes, seconds and milliseconds referring to the instruments' (local time). In the table are displayed also some functioning logs as the ones related with the start and configuration settings.

EVENT'S GRAPHIC DETAIL

The **Kilo D6 PQ** includes the functionality named "event's graphic detail" that allows to record and display the trends of the beginning and end of the event with a time frame (for both beginning and end) of a second (programmable).



EVENTS TIMELINE AND THE UNIPEDE TABLE

The **Kilo D6 PQ** can display a timeline of the succession of events

and maintains a diagram of distribution of events based on the % of the parameter considered in relation to its reference value and duration, according to the dictates of UNIPEDE (International Union of Producers and Distributors of Energy - http://www.eurelectric.org/).

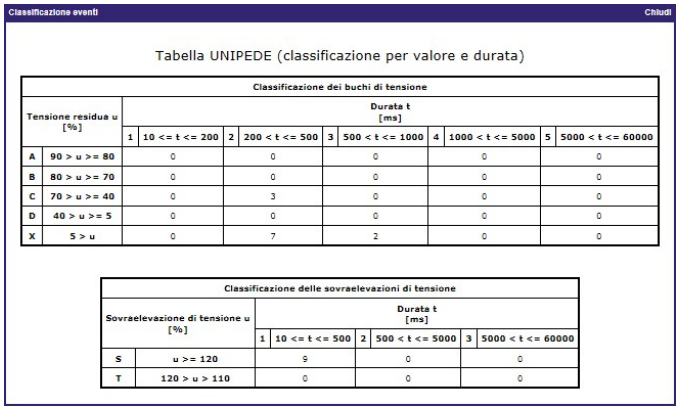


Tabella UNIPEDE (classificazione per valore e durata)

Classificazione dei buchi di tensione										
Tensione residua u [%]		Durata t [ms]								
		1	10 <= t <= 200	2	200 < t <= 500	3	500 < t <= 1000	4	1000 < t <= 5000	5	5000 < t <= 60000
A	90 > u >= 80	0		0		0		0		0	
B	80 > u >= 70	0		0		0		0		0	
C	70 > u >= 40	0		3		0		0		0	
D	40 > u >= 5	0		0		0		0		0	
X	5 > u	0		7		2		0		0	

Classificazione delle sovraelevazioni di tensione						
Sovraelevazione di tensione u [%]		Durata t [ms]				
		1	10 <= t <= 500	2	500 < t <= 5000	3	5000 < t <= 60000
S	u >= 120	9		0		0
T	120 > u > 110	0		0		0

Example: in the last column of the table here below , the S1 denotes a Voltage Swell with a duration between 10 and 500 mS (refer to the UNIPEDE table above),while the X2 denotes a Voltage Dip lower than 5% of the nominal voltage value with a duration between the 10 and 200 mS (refer to the UNIPEDE table above).

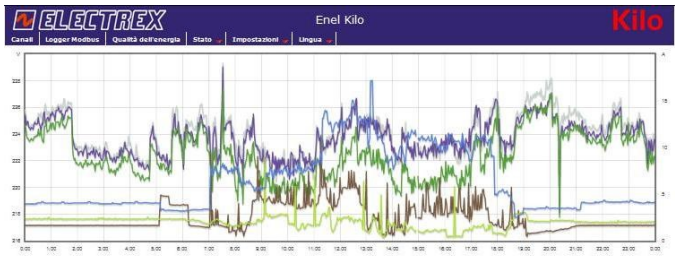
Data/ora	Evento	Fase	Durata [ciclo/ms]	Durata [periodi]	Valore [V]	Classificazione UNIPEDE
2014-05-12 16:15:10.986375	Avvio logger	---	---	---	---	-
2014-05-14 12:34:37.353875	Sovratensione	1	0:00:00.440250	22	363.6	S1
2014-05-14 12:34:37.353875	Sovratensione	2	0:00:00.440250	22	357.6	S1
2014-05-14 12:34:37.353875	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 12:34:37.074250	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 10:29:04.010000	Buco di tensione	2	0:00:00.220125	11	111.3	C2

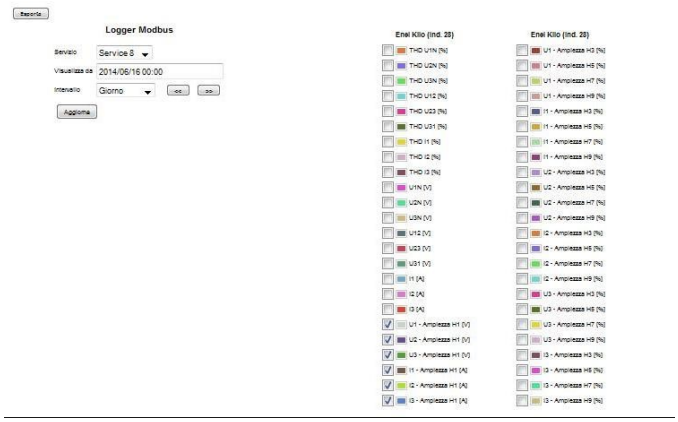
Elementi: 33

MEASUREMENT CAMPAIGN

In the **Kilo D6 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 2 min. for 60 days (FIFO) in daily files.

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





FUNCTIONAL LOG

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.

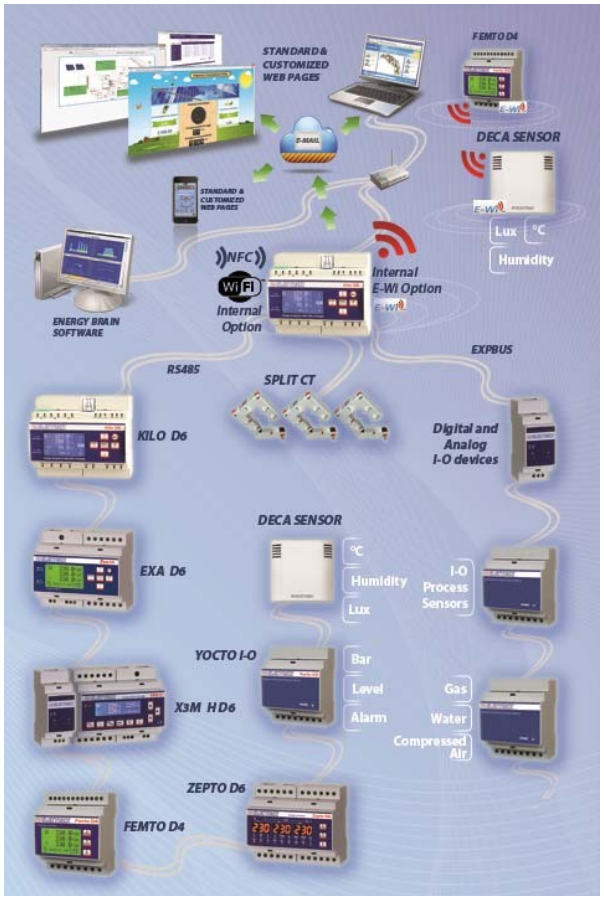
Kilo net

Power Quality Energy Analyzer & (Wi-Fi) Web Data Manager

Kilo net main features

The **Kilo net D6 PQ** in addition to the features of the Kilo D6 PQ already included, is also a: **WEB Server** used for the configuration, via WEB Browser, of the Kilo Net and of the other devices in the sub-network. The HTTP communication can be used for the instantaneous readings and for accessing the memory logs. It is also an FTP server for file transmissions; **Modbus-TCP Server** acting as a bridge between the Ethernet network (Modbus-TCP protocol for the instantaneous measures) and the RS485 port; **Arbiter** function between the Ethernet port (or Wi-Fi) and the expansion bus ExpBus (if other interfaces are used); Synchronization of the internal clock is made via NTP server; Static or dynamic IP address (DHCP protocol).

Il **Kilo net D6 PQ** can record the trend over time of the energy/environmental parameters retrieved by the Electrex devices *(called also channels)* connected in its RS485 port. The Kilo net has by default 2 active Log 8 storage services of which a service for storing energy/environmental parameters typically every quarter hour (with daily, weekly, monthly or yearly display options) and one for the measurement campaigns (see Open Log PUK). The number of devices that can be stored for each PUK Log 8 (8 stands for 8 Modbus addresses) for the energy/environment measures service depends also on the number of parameters that will be logged. Each service is characterized by the same time base (sampling rate).



Net Upgrade Kilo PQ to Kilo Net (PUK) PFSU940-82

Transforms the **Kilo RJ45 D6 PQ** in **Kilo net D6 PQ Web**.

Additional functions activated via PUK code

It is possible to implement the following functions on the Kilo net and the Kilo net log ordering a PUK code to be inserted in a Web page for the activation.

2 Active – Net upgrade Log 8 (PUK) PFSU940-01

Enables 1 logging service (e.g. log of 8 instruments/Modbus registers, power / energy just in import).
It is possible to activate up to 8 upgrade Log 8 (and then double those from Log 8 to Log 16 purchasing a PUK Log 16).

Net upgrade Log 16 (PUK) PFSU940-02

Doubbles the capacity of the storage services from Log 8 to Log 16. The Net upgrade Log 8 (PUK) code PFSU940-01 must have been installed previously.

Active - Net upgrade WEB (PUK) PFSU940-05

Enables the display of measures on web pages for each instrument connected to the RS485 port of the Kilo net.

Net upgrade WEB Open (PUK) PFSU940-10

Adds to the Kilo net / Kilo net Log the ability to upload and display custom Web pages.

Net upgrade Charts (PUK) PFSU940-30

Allows to display on a web page daily charts of electricity, temperature, humidity, luminosity, etc. obtained from the files stored in the Kilo net with the possibility to export to CSV files.

Net upgrade Mail Alarm (PUK) PFSU940-15

Adds to the Kilo net the ability to send alarm emails and / or ModBus commands (e.g. to close a contact or edit a ModBus register).

Net upgrade Calendar (PUK) PFSU940-20

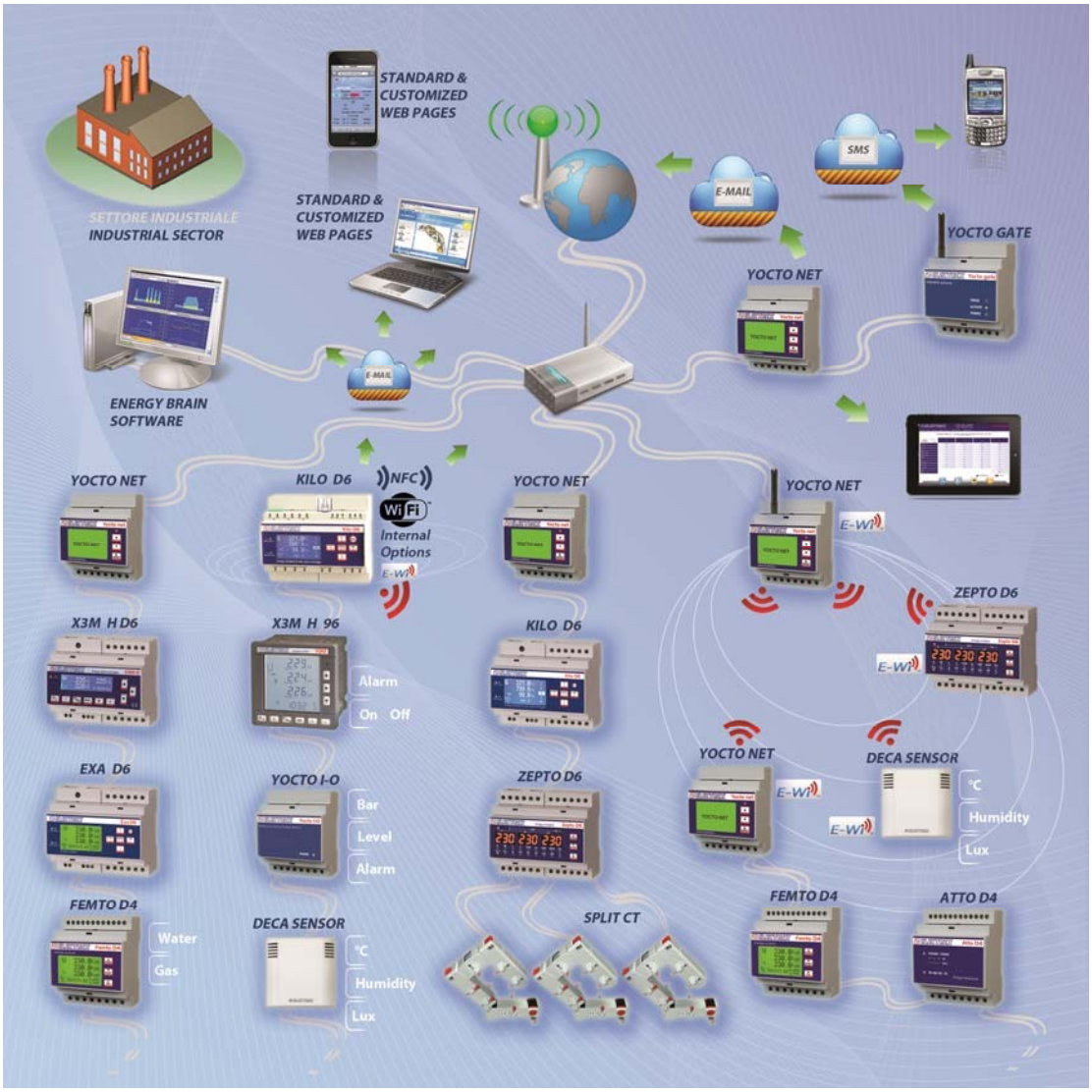
Adds to the Kilo net ability to manage Energy Automation functions such as on / off switches, alarms / alerts and automatisms conditioned to events and / or an annual calendar configurable in minutes / hours / days / months.

1 Active – Net upgrade Open Log(PUK) PFSU940-25

Allows to modify the sampling frequency and the choice of parameters to be logged for an existing Log 8 service for e.g. when performing a measurement campaigns. The Log 8 services to be modified must already be active and if, for example, it is needed to modify two Log 8 services, it is necessary to activate two PUK Open Log.

Net upgrade New Features – PFSU940-40

Upgrade to new versions of the firmware of the Kilo Net adding new features.



Production plant energy monitoring network example

In the diagram above represents a production plant powered by a main MV load and equipped with 3 MV/LV transformers (one of them replaced recently) which serve as many production lines, while the offices are powered by a LV system. The monitoring system consists of branch 1, 2 and 3 for monitoring the production lines while branch 4 controls the offices facility. The 4 branches are connect to the internal LAN Ethernet network via Yocto net (branches 1, 2, 3) and the Kilo net (branch 2 connected via Wi-Fi). The various instruments and sensors connected in the 4 branches monitor and control the main loads related.

- In branch 1 the X3M D6 H is placed after the Trafo 1 in order to monitor the quantity and quality of the energy consumed, while the Exa D6 MID is used to monitor the energy used in a galvanic process for tax deduction purposes; the Femto D4 instead covers the Test Lab facility where are monitored also the water and gas consumptions of the devices tested.
- In branch 2, the Kilo net in addition to the monitoring of the Trafo 2 load serves also as a gateway for: the l'X3M 96 H retrieving the data of an energy-consuming machine; for the Yocto I-O where are connected some process sensors; and for the Deca Sensor which monitors the environmental parameters for areas where even a single temp. degree makes a great difference in energy costs. (Note: in order to log the Deca Sensor, which has not a built in memory, the PUK 'Net upgrade Log 8' must be activated on the Kilo net and therefore activate a Log service). For the Kilo net there are different logging services (daily, weekly, monthly, yearly). In our example it is used a daily logging service which can store the energy counters, of up to 8 devices, for 60 days with a sampling time of 15 min.
- In branch 3, containing already Electrex devices connected to the Yocto net gateway, has been added a Kilo D6 monitoring Trafo 3 and replacing a Zepto D6 used for monitoring another machinery.
- In branch 4, controlling the offices, there are different devices communicating via E-Wi protocol with the Yocto net coordinator E-Wi which is connected to the company's LAN Ethernet network.

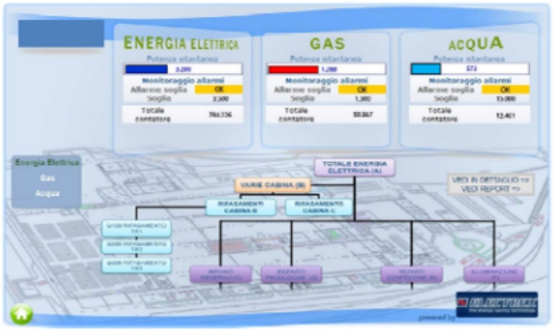
The network contains also an Yocto net master with e-mail alarms option for alerting the maintenance team in case of anomalies and customized Web pages for supervision that can be displayed from any PC, tablet or smart-phone of the facility managers.
The Energy Manager can use its PC both within (locally) and outside the production plant (remotely) in order to monitor and evaluate the efficacy of the energy efficiency actions using the data (downloaded periodically from the Electrex devices) and managed by the software Energy Brain.

Examples of standard web pages – PFSU940-05

Enabling the 'Net upgrade WEB' functionality it is possible to view the standard web pages displaying real-time measurements, the average values and the energy counters both of the internal instrument and of every instrument connected in the RS485 sub-network to the Kilo Net. In the example on the side are shown the web page with the instantaneous measurements and below the one with the average values of power and the energy counters of a Kilo Net D6 which measures the general supply of a R&D lab with offices.

Examples of custom web pages – PFSU940-10

Enabling the 'Net upgrade WEB' and the 'Net upgrade WEB open' functionalities it is possible to activate a memory part in the memory of the Kilo Net where can be uploaded custom web pages. Alongside are reported an example of real time monitoring of the electricity, gas and water of a production plant with the possibility of setting thresholds and alarms. The main page is linked to second level pages for more details on each load/monitoring point. The pages residing on the web server of the Kilo Net are easily accessible from any the browser of a PC, Smartphone, etc., typing just the IP address and password

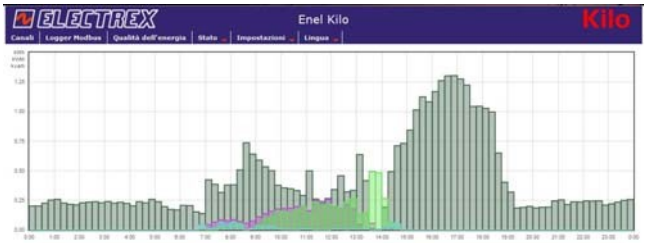


E-mail alarms examples – PFSU940-15

Enabling the 'Net upgrade email alarm' you can configure the Kilo Net to send emails and / or commands (On / Off, change ModBus registers, etc.) in the case where one or more instruments in the sub-network have exceeded the thresholds set.
The example shows the alarm e-mail of a department in a bakery and a graphical display in the specific web page of Kilo Net.

Calendar event example – PFSU940-20

Enabling the 'Net upgrade Calendar' option in the Kilo Net it is possible to manage Energy Automation tasks such as on / off switches, alarms / alerts and automatisms conditioned to events and / or an annual calendar configurable in minutes / hours / days / months which may be conditioned to the occurrence of various events detected by Electrex instruments in the sub-network. The astronomical clock is synchronized via NTP (references from the Internet or from a PC on the internal network) and the configuration of the time-zone enables you to identify the sunrise, the sunset and the Christian Easter Monday. You can manage up to 32 Events / Calendars different that you can match a Modbus command for ON-OFF.



Web charts examples – PFSU940-30

Enabling the 'Net upgrade Charts' option in the Kilo Net log it is possible to display on a web page, charts obtained from the files stored in the same Kilo Net log with the possibility to export to CSV files. In the examples, the first chart shows the load profile for each 15 min. of active energy produced and consumed from PV system. While in the second one is displayed the gas consumption and ambient temperature profiles..

Measurement campaign example – PFSU940-25

Enabling the 'Net upgrade Open Log' option related to an existing Log 8 logging service of the Kilo net log it is possible to implement measurement campaigns for any parameter retrieved from Electrex devices connect to the Kilo net Log and with any sampling frequency. In the example it is shown the measures campaign for the 3 phase-currents and 3 phase-voltages logged every 2 minutes.

The Energy Brain software (to be installed on a PC, optional)

The Energy Brain software is uesd for the management of instrument networks, also very complex ones, both locally or remotely.
It is suitable for applications with Electrex instruments equipped with a communication port, and provides all the necessary functions for monitoring and accurate management of energy efficiency (consumption / production of electricity, gas, water, etc..), environmental parameters (temperature, humidity, luminosity, CO2, etc.) and process parameters.

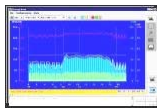
Main features

Configuration

- The available options allow for maximum flexibility in adapting the software to the network instruments (even to different types of networks connected simultaneously) and the operator needs.
  - Remote set-up of the devices (CT, alarms, etc.)
  - Network configuration (per each device, per each client, per groups, per locations) with individual setting of the local connection (direct RS485, E-Wi, Ethernet) or remote (Internet, Wi-Fi) and of the communication parameters (speed, etc.).
  - Configuration of scheduled downloading specific for each location and customer, on a daily, weekly or monthly basis through a programmable agenda.

Load chart and curves of consumption/production

- Charts of the daily, weekly, monthly, yearly power curves.
- Charts of the daily, weekly, monthly, yearly consumption curves.
- Charts of powers, power peaks and energy per each tariff.
- Up to 4 simultaneous charts.
- Zoom and selection of measures functions.
- Numerical and graphical data print.

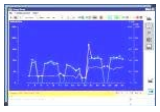


Parameters displaying

- Displays on-line all the measures provided by each of the instruments on the field

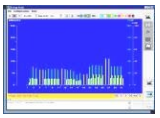
Data archive

- Automatic or manual download of the data of power, energy and other variables from the devices connected and automatic archiving in the internal database (Access®,PostgresSQL® or MySQL®).
- Export data to other DB via ODBC module or .txt or .xls format files.



Tariffs

- Management of the data per each tariff
- Configuration Editor for tariffs and calendars



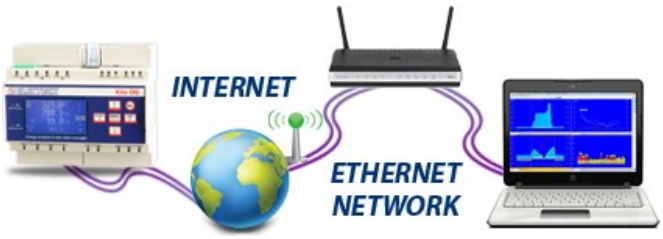
Virtual and Multiple Channels

- Creating virtual channels, so of "groups" of instruments (e.g. "summation" of various departments) and display those, on graphical form, in the same way of a physical channel
- Creation of multiple channels in order to view curves of more instruments in the same chart for a quick comparison.
- Inclusion of variables and mathematical formulas, even highly complex ones, particularly useful, for example, to perform simulations.

Other types of Energies / Measurements

- Creating charts of data obtained from Electrex Deca Sensors and / or third party transducers with pulse output (e.g. luminosity, temperature, gas, calories, etc.).

Connections between PC and Kilo
direct Ethernet Rj45 port, Wi-Fi, Ethernet network, Internet

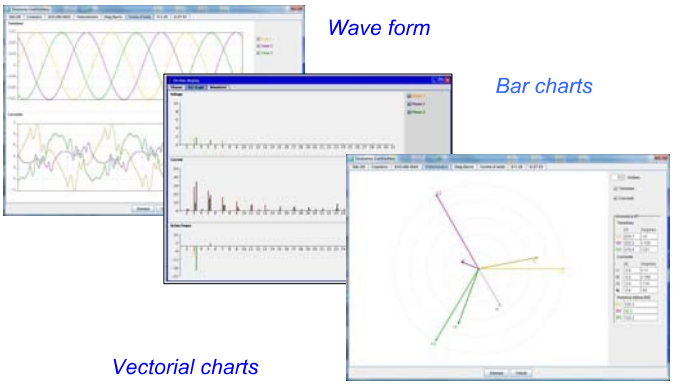


Specific functions for Kilo D6

- Downloads, logs and displays the events recorded in the internal memory of the Kilo D6 in compliance with EN 50160 and EN 61000-4-30.

Graphical display of the instantaneous measures

- Manages the charts for the **Kilo D6** devices.



Harmonics measurement campaign and other parameters

- It is possible to configure a measurement campaign, e.g. with a sampling frequency of 2 min. and date/time stamp for different parameters, for a period of 10 days.

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

Technical Specifications Kilo

Measurements

Voltage ..... U_{1-N}, U_{2-N}, U_{3-N}, U_{1-2}, U_{2-3}, U_{3-1}, $U_{LL\,\Sigma}$, $U_{LN\,\Sigma}$
Max (ABSOLUTE VALUE): .. U_{L1-N}, U_{L2-N}, U_{L3-N}, U_{L1-L2}, U_{L2-L3}, U_{L3-L1}
Min (ABSOLUTE VALUE): U_{L1-N}, U_{L2-N}, U_{L3-N}, U_{L1-L2}, U_{L2-L3}, U_{L3-L1}
Current ..... I_1, I_2, I_3, I_Σ, $I_{neutral}$
Max (ABSOLUTE VALUE):..... I_1, I_2, I_3
Therm: ..... I_1, I_2, I_3
Power Factor ..... PF_1, $PF2$, PF_3, PF_Σ
Frequency ..... f
Voltage THD ..... THD-U_1, THD-U_2, THD-U_3, THD-U_Σ
Current THD ..... THD-I_1, THD-I_2, THD-I_3, THD-I_Σ
Instantaneous Power... P_1,P_2,P_3,P_Σ - Q_1,Q_2,Q_3,Q_Σ - S_1,S_2,S_3,S_Σ
Average Power ..... PmΣ, QmΣ(ind), QmΣ(cap), SmΣ (imp/exp)
PmΣ, QmΣ(ind), QmΣ(cap), SmΣ (imp/exp)
Powers peak ..... PmdΣ, QmdΣ(ind), QmdΣ(cap), SmdΣ (imp/exp)
Active Energy (also per each phase) ..... Ea (import/export)
Reactive Energy (also per each ph.) Er(ind/cap)(import/export)
Apparent Energy (also per each phase) ..... Es (import/export)
Life Time TOTAL and 3 PARTIALS: ..... h, h/100
Pulse counting (per each digital input): ..... $C_{NT\,T}$, $C_{NT\,Part.}$
Analog measure(per each analog input): .....Instantaneous
Harmonics (FFT) ....H_{U1}, H_{U2}, H_{U3} (1-51° order)
H_{I1}, H_{I2}, H_{I3} (1-51° order)
Harmonics power and direction (1-51° order)
Load profile and consumption/production (via Ethernet port)
Tariff calendar (upload via Ethernet port)
Logged Events (Kilo Q - EN 50160 and EN 61000-4-30):
Voltage Dip (sags/dips)
Voltage swell and peaks
Current peaks and direction
Interruptions
Overvoltage/Undervoltage
Overcurrent and direction
Trigger function (programmable time)
Event classification
Functional logs - Harmonics measurement (Kilo PQ)

Electrical characteristics

Connection .....3-phase, 1-phase and 2-phase, LV,MV,HV
balanced, unbalanced, 3- and 4-wires
Voltage inputs .....from 20 to 500V phase-phase
(max. 1,7 crest factor)
With external VT (max. 400 kV primar.)
VT value: programmable
Overload ..... max, 900 Vrms peak per 1 sec.
Current Inputs..... 1, 2 or 3 CT external
max. 10kA primary .../1A and ../5A secondary
CT value: programmable
Overload .... max, 100 Arms peak per 1 sec..
Load on the CT ..... < 0,5 VA
For the Kilo F Net versions suitable with Electrex flexible CT:
max. 500/2000/8000A primary .../mV secondary
Power supply .....85÷265 Vac/100÷374 Vdc
or others on request e.g. 15÷40 Vac/18÷60 Vdc
or 9÷24 Vac/ 9÷36 Vdc
Power supply toward other modules, max:.....5 VA
Self consumption.....< 2 W
Frequency:..... 45-65 Hz

Front panel

Display..... LCD, FSTN dot-matrix 128 x 64 points
Visible area.....22 x 44 mm
Backlight .....White Led
Keyboard ..... 6 keys keypad Joystick positioned
On the front panel:
Calibration LED ..... 2 red for the Ea and Er
Functioning / State LED..... 1 red under the symbol
Communication RS485 LED1 green and 1 red under the white band

Functional characteristics

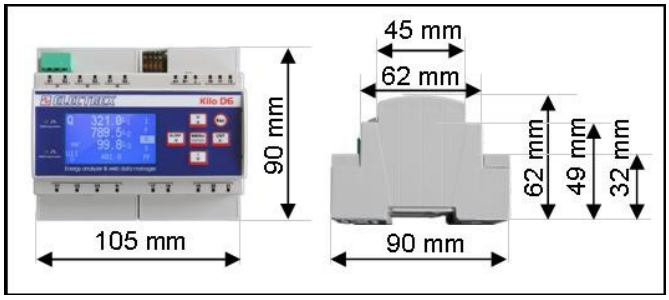
Measurement.....True-RMS up to the 51st harmonic
Quadrants..... 2 or 4 quadrants (programmable)
Accuracy: ..... Class 0.5S for Active Energy - EN 62053-22
Class 1 for Reactive Energy - EN 62053-23
Sampling: Continuous sampling of voltage and current waveforms
Compensation ..... Automatic of the amplifiers' offsets
Scale Change: ..... Automatic on the current inputs
(highest resolution)
Insulation .....Galvanic on all the inputs and outputs
Standards: - Safety: .....IEC EN 61010 class 2
- E.M.C.: ..... IEC EN 61326-1A
Accuracy: .. ..EC EN 61036

Mechanical characteristics

Working temperature .....-20/+60 °C
Humidity..... 95% R.H. non condensing
Enclosure.....Self-extinguishing plastic material class V0
Protection degree ..... Front panel IP40
IP20 (Terminals side)
Size..... 6 DIN modules
Mounting.....DIN rail
Terminals:..... screw connector cables max. section up to 4 mm^2
Weight .....about 260 gr. net

Hardware characteristics

Nr. 1 Master Serial port RS-485 galvanically insulated for connection of Electrex devices in the subnetwork
Nr.1 Ethernet Port 10/100 BASE-TX (RJ45) Auto-MDIX .
Nr.1 Wi-Fi Ethernet Port
Nr.1 NFC - Near Field Communication Port
Nr. 1 ExpBus Port for the management of ExpBus modules
Microprocessor: Cortex-M4 Dual Core
Astronomical Clock / Calendar with battery backup.
128MB Flash memory (non volatile) available for the measurements management, for the Web pages and/or data logging and/or other functionalities as e-mail alarms.
Disk access via Ethernet port through HTTP protocol.



How to order Kilo RJ45 D6 and Kilo Net D6

Description	Code
Kilo RJ45 D6 H 85÷265V 1DI 2DO	PFNK6-1H719-0M0
*The **Kilo RJ45 H or Kilo F RJ45 H** can evolve in **Kilo RJ45 PQ or Kilo F RJ45 PQ** by activating the following Upgrade (PUK):*	
Upgrade H to PQ Version	PFSU940-81
Kilo RJ45 D6 PQ 85÷265V 1DI 2DO	PFNK6-1Q719-0MM
*The **Kilo RJ45 PQ or Kilo F RJ45 PQ** can evolve in **Kilo Net PQ Web or Kilo F Net PQ Web** by activating the following Net upgrade (PUK):*	
Net Upgrade Kilo RJ45 PQ to Net PQ Web version	PFSU940-82
Kilo net D6 PQ Web 85÷265V 1DI 2DO	PFNK6-1Q519-121
*The **Kilo Net PQ Web** or **Kilo F Net PQ Web** can evolve in **Kilo Net Master PQ Web** or **Kilo F Net Master PQ Web** by activating the following Net upgrade (PUK):*	
Net Upgrade Net to Master version	PFSU940-86
Kilo net D6 PQ Web Charts 85÷265V 1DI 2DO	PFNK6-1Q519-A21
Kilo net D6 PQ Full 85÷265V 1DI 2DO	PFNK6-1Q519-F21
Kilo net Wi-Fi EDA D6 PQ Web 85÷265V 1DI 2DO	PFNK6-1QA19-121
Kilo net D6 PQ Web 18÷60VDC 1DI 2DO	PFNK6-1Q518-121
Kilo net D6 PQ Web 85÷265V 4DO	PFNK6-1Q5P9-121
Kilo F RJ45 D6 H 85÷265V 1DI 2DO	PFNK6-FH719-0M0
Kilo F RJ45 D6 PQ 85÷265V 1DI 2DO	PFNK6-FQ719-0MM
Kilo F net D6 PQ Web 85÷265V 1DI 2DO	PFNK6-FQ519-121
Kilo F net D6 PQ Web Charts 85÷265V 1DI 2DO	PFNK6-FQ519-A21
Kilo F net D6 PQ Full 85÷265V 1DI 2DO	PFNK6-FQ519-F21
*The **Kilo Net** and **Kilo F Net** can implement additional features in subsequent times after the purchase by activating the following Net upgrade (PUK):*	
Net Upgrade Log 8 (PUK)	PFSU940-01
Net Upgrade Log 16 (PUK)	PFSU940-02
Net Upgrade Open Web (PUK)	PFSU940-10
Net Upgrade Charts (PUK)	PFSU940-30
Net Upgrade Open Log (PUK)	PFSU940-25
Net Upgrade Mail Alarm (PUK)	PFSU940-15
Net Upgrade Calendar (PUK)	PFSU940-20
Net Upgrade New Features (PUK)	PFSU940-40
Upgrade H to PQ Version (Puk)	PFSU940-81
Upgrade RJ45 PQ to Net PQ Web version (Puk)	PFSU940-82
Net Upgrade Net to Master Version (Puk)	PFSU940-86

Other versions of Kilo RJ45 D6 and Kilo Net D6

CODICE **P F N K 6 -** _ _ _ _ _ _ _ _

Description	Code
BUILDING CODE	**PFN K 6 - 1 Q 5 1 9 - 1 2 1**
Family Kilo = **K**	
Dimension 6 modules DIN = **6**	
Current Input ../5A & ../1° = **1**	
Flexible Split Core CT = **F**	
Displaying the single harmonics = **H**	
Power Quality = **Q**	
Communication	
RJ45	**7**
Net	**5**
Wi-Fi	**W**
Wi-Fi EDA	**A**
Internal module	
Module 1DI 2DO	***1***
Module 2DI 1 RO Self Powered	***2***
Module 2RO24VDC	***5***
Module 2AO4-20mA	***6***
Module 2RO230V	***8***
Module 1DI 2DO Self Powered	***E***
Module E-Wi	***L***
Module 4DI	***N***
Module 4DO	***P***
Module 2DI 2DO	***Q***
Module 4AI	***R***
Module I2C	***T***
Power Supply:	
85÷265Vac/100÷374Vdc	***9***
15÷40Vac/18÷60Vdc	***8***
9÷24Vac/9÷36Vdc	***7***
Not Master version	**-**
Master	**M**
Additional Functionality:	
No additional functionality	***0***
Functionality Web	***1***
Functionality Web Charts	***A***
Functionality Web Mail Alarm	***7***
Functionality Web Calendar	***8***
Functionality Full (Web, Charts, Alarm, Calendar)	***F***
Functionality Open Web	***2***
Functionality Open Web Charts	***C***
Functionality Open Web Mail alarm Calendar	***B***
Functionality Full Open Web	***D***
Log for the internal energy analyzer	**M**
Net: N. of active Log 8 services	**1 a 8**
Log services Doubled to Log 16	**9**
Open Log for the internal energy analyzer	**M**
Net: N. of active Open Log services	**1 a 8**

Subject to modification without prior notice
Data sheet Kilo RJ45 D6 e Kilo Net D6 2015 02 17-ENG

Distributor

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