ELECTREX
the energy saving technology

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

LOW ENERGY CONSUMPTION

Lyra Family

The **Lyra devices**, in their elegant and functional container, are the ideal solution for applications of measurement, monitoring and management of energy and environmental carriers in the commercial and residential sector. The Lyra series can be used also for remote control, alarm management, building automation, and similar applications.

Lyra ECT Net H is an Energy Analyzer & Wi-Fi Web Data Manager (also battery powered) for the measurement of electrical parameters in Low Voltage and the logging of various other energy carriers . The device also measures individual harmonics up to the 51st order. It is compliant exclusively with Electrex ECT Current Transformers. It is equipped with connectors for connections to the Ethernet network, for the Electrex environmental sensors and in order to connect the Lyra ECT RS485 Two Energy Analyzer and / or the Lyra I-O and / or other RS485 Modbus RTU devices to the RS485 network.
Lyra ECT RS485 Two Energy Analyzer contains 2 x three/single-phase measuring instruments (that use exclusively the Electrex ECT Current Transformers and must be connected in an RS485 network to a device of the Net families).
Lyra I-O consists of digital and / or analog inputs and / or outputs and must be connected in an RS485 network to a device of the Net family.

Lyra ECT Net

The **Lyra ECT Net H** is 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. In order to reduce the energy consumption it is possible to configure the display's back-lighting.

Versatility of the Lyra ECT Net H (Wi-Fi)

The **Lyra ECT Net H** are suitable for LV, single phase systems (from 1 to 3 simultaneous measuring points), bi-phase, three phase 3- and 4-wires with various current full scales (e.g. up to 400A). 2 or 4 quadrant (import/export) measurement. Configuration from the keyboard (and/or via Energy Brain software. The **Lyra ECT Net H** is also available in the version (can be powered at 12Vdc) with a back-up battery to keep the microprocessor and any temperature, humidity and light sensors connected to it active in the event of power failures. **The Wi-Fi version** communicates with the existing Wi-Fi network and is equipped with an external directional antenna. The device can include a digital and/or analog inputs and/or outputs board or an environmental sensors connection board.

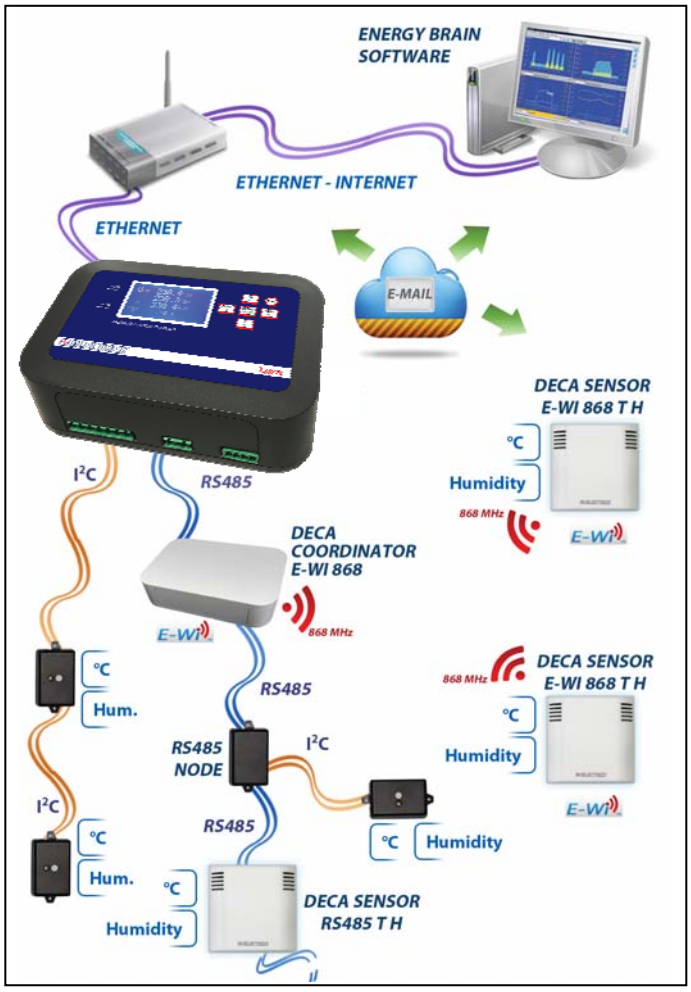
Ethernet communication and Rs485 sub-network

Lyra ECT Net 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”. It is equipped also with a serial RS485 port, protected against overvoltage, using Modbus-RTU, master type, allowing to connect other Electrex devices in a sub-network.

Astronomical Clock Calendar

Lyra ECT Net 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.

Example of a monitoring system including Lyra



In the example above the Lyra ECT Net H SI monitors the general consumption of the building and acts as a datalogger for some devices connected in the RS485 subnet and other devices connected to the internal SI board (I^2C bus). In the RS485 subnet there is the Deca Coordinator E-Wi which communicates, via Radio at 868MHz, with the two Deca Sensor E-Wi 868 TH which measure temperature and relative humidity in various rooms; there are also the RS485 Node connected to a Sensor Bus Unit TH and a Deca Sensor RS485 for other measures of environmental parameters. Connected directly to the SI board (I^2C bus) there are also other Sensor Bus Units TH.

Measures

Parameters	Type	L1	L2	L3	n	Σ	P (8)	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	•	•	•	•	•		40mA ...400A(7)
	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-U_{L-N}	•	•	•		•		0...199,9%
	THD-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)					•		
Operating time (4)	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)					•	•	

Absolute value (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 max. average value.

(3) Import / Export max. power values.

(4) Lifetime counter (cannot be reset) and 4 partial operating time 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 99.999.999,9999 kWh.

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

(7) According to the ECT current transformer used.

(8) Three partial counters for each measure marked and the 3 phases for Energy data.

Lyra ECT Net H : Single Harmonics

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

(1) 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).

The Net upgrade (PUK)

The **Lyra ECT Net H** can expand its functionality by enabling PUK codes:

Net upgrade WEB (PUK) - PFSU940-05

Enables the display of measures on web pages for the Lyra ECT Net H itself and each instrument connected to its RS485 port.

Net upgrade Log 8 (PUK) - PFSU940-01

With the activation of **PUK Log 8** it is possible to log the historical data series (profile) of the energy / environmental parameters acquired by the Lyra ECT Net H and another seven devices connected in its RS485 subnet. A Net upgrade Log 8 enables 1 storage service for 8 'logical' devices. The "service" is characterized by a unique logging interval (sampling frequency). It is possible to use more Log 8 for different services or to extend a single service for a maximum of 8 upgrade PUK Log 8.

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 sampling duration will depend on the sampling frequency set (minimum 5s or 10s) and the number of parameters selected. 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 Open WEB (PUK) - PFSU940-10

Adds to the Lyra ECT Net H the possibility to insert customized Web pages. The customized web pages can be created after attending a specific training session.

Net upgrade Charts (PUK) - PFSU940-30

Allows to display on a web page charts, of energy, temperature, humidity, luminosity, etc. obtained from the files stored in the Lyra ECT Net H exportable also as CSV.

Net upgrade EnergyAutomation(PUK) PFSU940-16

Adds the ability to manage Energy Automation tasks using the Ladder programming language for implementing ON/OFF switches, alarm and notifications and automations related to events and/or calendars (the Calendars option must be active) and/or the sending of e-mail/sms (E-Mail / SMS option must be active).

Net upgrade Calendars (PUK) PFSU940-20

Allows to create calendars to be used in combination with the Energy Automation option (if active).

Net upgr. eMail PFSU940-15 (& Sms PFSU940-17)

Adds the function of sending notification / alarm emails (and/or SMS by adding a specific modem/router). It can also be used in combination with the Energy Automation option (if active).

Net upgrade Sending Files – PFSU940-50

Adds the ability to send standard xml files (custom on request) through the function 'ftp report' or json strings through the 'http report' function. Additional costs for customizations. Requires activation of the Energy Automation PUK.

Net upgrade Net to Master Version (PUK)

With the activation of this PUK code the Lyra ECT Net H becomes a **Lyra ECT Net Master H** able to communicate with all the Electrex gateways in the Ethernet network and the related devices in the subnet.

Lyra ECT RS485 Two Energy Analyzer

The **Lyra ECT RS485 Two Energy Analyzer** contains two three/single-phase transducers/analyzers (using exclusively the Electrex ECT Current Transformers) and must be connected to a Net device in an RS485 network. It is available in different versions depending on the type of the internal boards (maximum two) of digital and/or analog inputs and/or outputs of which it can be equipped. Thus, in addition to the measurements of electrical and energy parameters, also pulses can be counted and/or statuses and/or environmental and process parameters can be detected.

Tempo di funzionamento

The **Lyra ECT Net H** and **Lyra ECT RS485** can be configured in order to monitor and record not only the energy consumption/production but also the operating time of the load/device monitored considering as a trigger a threshold on the power or the status of a digital input.

Norme CEI EN 50470 e 62053-21/22

The **Lyra ECT Net H** e **Lyra ECT RS485** are compliant with EN 50470-1 + 50470-3 normative as well as with 62053-22 (Lyra ECT Net H) and 62053-21 (Lyra ECT RS485) as requested for obtaining the Energy Efficiency Certificates (White Certificates).

Phase sequence

Il **Lyra ECT Net H** permit the identification of the correct phase sequence from the display while for the **Lyra ECT RS485** this information is available via a Modbus register.

ECT series CT for Lyra ECT Net H & Lyra ECT RS485

The Lyra ECT Net e **Lyra ECT RS485** use exclusively Electrex ECT series current transformers (up to 200kW three-phase):

- **ECT TA 70/100A 13MM Power Quality Current Transformer** Code PFAE000-01: external CT for AC loads up to 100A. Plastic shell. Internal size 13 mm.

- **ECT CTS 16-70/100A 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.

- **ECT CTS 17-200A Split Core Power Quality Current Transformer** Code PFAE000-03: external CT for AC loads up to 200A. Plastic shell. Equipped with a snap-on closing, screwless mounting system. Internal size 17 mm. Protection on the secondary circuit.

- **ECT CTS 32-400A Split Core Power Quality Current Transformer** Codie PFAE000-04: external CT for AC loads up to 400A.

Lyra I-O

The **Lyra I-O** consists of digital and/or analog inputs and/or outputs and must be connected in RS485 network to any device of the Net families.
It is available in several versions that include some combinations of up to 8 boards among those shown below (maximum 4 of the same type considering that the 4AI, 4PT and 4NTC are of the same type):

- *4AI* .....4 analog inputs 0÷10V (4-20mA)
- *4PT100 or 4PT1000 or 4NTC* .....for the relative sensors
- *SI* ..... for environmental sensors (T, H, L, P, etc.)
- *4DI* ..... 4 digital inputs with dedicated commons
- *4DO* .....4 digital outputs with dedicated commons
- *2DI 2DO*. 2 digital inputs and 2 digital outputs, d. commons
- *2AO4-20mA*..... 2 outputs analog 4-20mA (external power supply for > 250 ohm resistances)

The version with 8 boards requires 4 Modbus addresses.

Analog Inputs and PT100 or PT1000 or NTC

The **.. 4AI** boards are equipped with 4 analog inputs rated at -10÷10V (compatible with 0÷10V, 0÷5V, -5÷5V, 4÷20mA at 200 ohm). While the **.. 4PT100** or **4PT1000** or **4NTC** versions have 4 independent inputs for the relative sensors..

Environmental Sensors Inputs

The **..SI version** is equipped with a Sensor Bus I^2C 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 Sensor Bus is 20 m.

Digital Inputs

The digital inputs of the Lyra series are 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. The max sampling frequency is 500Hz (2ms). Properly programmed they can also operate as remote status indicators (eg ON / OFF of machines, switches, etc.).

Digital outputs

The digital outputs are independent and 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.

Analog 4-20mA outputs

The .. **2AO4-20mA** board 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.

Features of Lyra ECT Net H ed RS485 Two En. Analyz.

Connection 3-phase, 1-phase (1, 2 or 3points) and 2-phase, LV balanced, unbalanced, 3- and 4-wires
Voltage inputs .....from 20 to 500V phase-phase (max. 1,7 crest factor)
Overload ..... max, 900 Vrms peak per 1 sec.
Current Inputs.....external CT ECT (non included)
Primary: ..full scales 16A, 32A and 100A or 200A or 400A
Secondary (ratio 1.000/1):.....mA output
Power supply .....85÷265 Vac/100÷374 Vdc
or others on request e.g. 15÷36 Vac/18÷60 Vdc
.....e.g. 9÷24 Vac/9÷36 Vdc
Power supply toward other modules, max …… ..... 5 VA
Self consumption ……< 2 W
Frequency …… 45-65 Hz
Lyra Net terminals: with 5 screw terminals, three of which are galvanically isolated for the RS485 port and two for the 12Vdc power supply
Galvanic insulation:
- Aux. power supply: 4kV
- RS-485 port: 1,5kV
- Digital inputs and outputs: 1,5kV
- Analog outputs 4-20mA: 1,5kV

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
Calibration LED ..... 2 red for the Ea and Er

Functional characteristics

Measurement Lyra ECT Net H ..True-RMS up to the 51st harmonic
Lyra ECT RS485 .. True-RMS up to the 31a harmonic
Quadrants..... 2 or 4 quadrants (programmable)
Accuracy: .....
Active Energy for Lyra ECT Net H: .....
Cl. 0,5S for CEI EN 62053-22 (including the ECT type CT)
..... Class C according to EN 50470-3 (EN 50470-1)
Reactive Energy: Class 1 according to CEI EN 62053-24
Active Energy for Lyra ECT RS485: .....
..... Cl. 1 for CEI EN 62053-21 (including the ECT type CT)
.....Class B according to EN 50470-3 (EN 50470-1)
Reactive Energy: Class 2 according to CEI EN 62053-23
Sampling: ..... at 8kHz 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

Conditions of use and mechanical characteristics

Maximum cable section .....1 mm^2
Working temperature. .....-10/+50 °C
Relative Humidity.....95% senza condensa
Protection degree ..... IP40 front panel, IP20 terminals side
Simple assembly: ..... fixing with screws, free installation
ABS Container self-extinguishing UL 94 V0
Size (l x h x w): ..... 150 x 45 x 100 mm

Other reference standards

Safety..... IEC EN 61010-1
E.M.C. ..... EN 301489-1 and -3
RF spectrum efficiency .....EN 300 220-2 v.2.3.1

Main product codes for ordering

Type	Code
Lyra ECT Net H Web Log 8 85÷265V	PFALT-EH5090-110
Lyra ECT Net H Web Log 8 85÷265V SI .	PFALT-EH5T90-110
Lyra ECT Net H Web Log 8 85÷265V 2DI 2DO 4COMMON ...	PFALT-EH5D90-110
Lyra ECT Net H Web Log 8 85÷265V 4AI	PFALT-EH5R90-110
Lyra ECT RS485 230-240V TWO ENERGY ANALYZER	PFALTE1-020
Lyra ECT RS485 230-240V 2DI 2DO 2DI 2DO 8COMMON TWO ENERGY ANALYZER	PFALTE1-D2D
Lyra I-O RS485 230-240V 4DI 4DO 4DI 4DO 4DI 4DO 4DI 4DO 32COMMON	PFALT01-B2CBCBCBC
Current transformers for Lyra ECT:	
ECT TA 100A 13MM Current Transformer	PFAE000-01
ECT CTS 16-100A Split Core C. T. Mini S.....	PFAE000-02
ECT CTS 17-200A Split Core C. T. Mini Series..	PFAE000-03
ECT CTS 32-400A Split Core C. T. Mini Series..	PFAE000-04
Additional features for Lyra ECT Net:	
Net Upgrade Log 8 (PUK).....	PFSU940-01
Net Upgrade Open Web (PUK).....	PFSU940-10
Net Upgrade Charts (PUK)	PFSU940-30
Net Upgrade Open Log (PUK)	PFSU940-25
Net Upgrade Energy Automation (PUK).....	PFSU940-16
Net Upgrade eMail (PUK)	PFSU940-15
Net Upgrade Sms (PUK)	PFSU940-17
Net Upgrade Calendars (PUK)	PFSU940-20
Net Upgr. Bundle En. Autom., Calendars, eMail (PUK) ...	PFSU940-22
Net Up. Bundle En. Autom., Calend., eMail, Sms (PUK) .	PFSU940-23
Net Upgrade Sending Files (PUK).....	PFSU940-50
Net Upgrade New Features (PUK)	PFSU940-40

NOTE: Lyra ECT Net H, Lyra RS485 and Lyra I-O are available in other versions on request.

Subject to modification without prior notice *Data sheet Lyra Family 2018 09 14-ENG*

Distributor

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