

# X3M H BOX NET WEB

## Net Web Energy Data Manager portable

**X3M H BOX NET WEB** is a portable Net Web Energy Data Manager suitable for the temporary monitoring of the electrical energy. Perfect for specific energy analysis (quantity and quality) in the residential, tertiary and industrial sectors. You can connect it not only locally with other instruments in a RS485 network but also to an Ethernet/Internet network and to a GSM device (Yocto gate) making so easy even the data downloading from a remote instrument.

Based on the technology of X3M H DIN, conserves all the features and functions such as measurement of electrical parameters, storage of data intended to facilitate analysis of load curves and the recording of events such as maximum and minimum, interruptions and harmonics, plus the possibility of upgrading through internal firmware updates. The Yocto net adds to the peculiarities of X3M the ability to display by PC the standard and photovoltaic measures Web pages beyond the activation of new functionalities through PUK as the Alarms via Email. The instrument is wired for measurements on low-voltage electrical networks, in three-phase, with neutral or single phase, but you can rewire for other types of electrical networks.



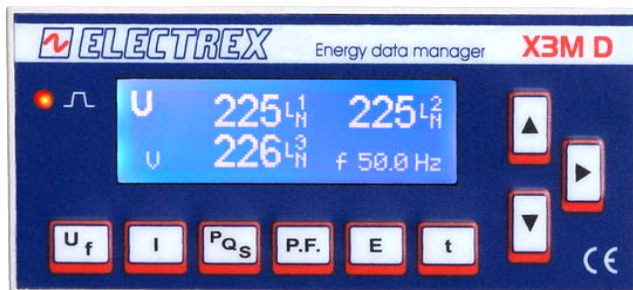
### General features

The measures, in True-RMS value, are obtained by continuously sampling the tensions waveforms and currents, ensuring high precision also when the loads change quickly (for example point welder) this makes it also more suitable for the function of supervising the energy quality. A digital measurement system with automatic scale changing on the current input and a compensation system of internal amplifier assures the maximum precision of the measure independently from the signal level and environmental condition.

Instrument architecture allow implementation for firmware modification by an anytime upload of new firmware with the purpose of expanding or substituting the old characteristics with new or different one.

### Semplicity

A large high-contrast, dot-matrix LCD display, with white backlight and adjustable contrast allows the simultaneous reading of 4 parameters and their symbols with high visibility digits.



9 keys, with clear indication of their function, make the instrument's use simple and intuitive. A Led indicator, pulsing with a frequency proportional to the active import power, is also provided on the front panel for field calibration verification by means of external optical devices.

### Versatility

The **X3M H BOX NET WEB** is suitable virtually for all type of electrical grid, 3- and 4-wire, symmetrical and asymmetrical, balanced or unbalanced, single-phase and bi-phase, Low Tension and High Tension, with 1, 2 or 3 CTs as well as for 2 and 4 quadrant (import/export) measurement.

Through a simple keyboard you can set all the operational parameters such as CT ratios and integration time (5-60 min).

### Measure

Parameters	Type	L1	L2	L3	Σ	Range
Tension	V L-N	•	•	•	•	20,0V...400 kV
	V L-L	•	•	•	•	
Current	I-Phase	•	•	•	•	10 mA...10,0 kA
	I-Neutral	•	•	•	•	
Power Factor	PF	•	•	•	•	0,00ind...1,00...0,00cap
Frequency	Hz				•	45 ... 65 Hz
Harmonic Distortion	THD-V	•	•	•	•	0...199,9%
	THD-I	•	•	•	•	
Timelife	h (1/100 h)				•	0,01...99.999,99 ore
Active power	P	•	•	•	•	± 0,00...1999 MW
	Pm (°)				•	
	Pmd (°)				•	
Reactive power	Q	•	•	•	•	± 0,00...1999 Mvar
	Qm-ind (°)				•	
	Qm-cap (°)				•	
	Qmd-ind (°)				•	
Apparent power	S	•	•	•	•	± 0,00...1999 MVA
	Sm (°)				•	
Active energy	KWh (°)				•	0,1 kWh...99.999,9 MWh
	Kvarh-ind (°)				•	
Reactive energy	Kvarh-cap (°)				•	0,1 kvarh...99.999,9 Mvarh
	KVAh (°)				•	
Apparent Energy	KVAh (°)				•	0,1kVAh...99.999,9 MVAh
	H Voltage	•	•	•	•	
	H Current	•	•	•	•	
Harmonic analysis	H Power &	•	•	•	•	Valore (H01), % (H02-H31)
						Valore (H01), % (H02-H31)

(1) Mean value (rolling average) over the integration time (1.. 60 min. programmable)  
2) Energies displayed as 6 digit floating-point readings; internal energy metering performed with 0,1 Wh minimum resolution and 99.999.999,9999 kWh maximum energy count before rollover.

### Power quality (EN50160)

Parameter	L1	L2	L3	Σ	Handling
Leak, Peak, microinterruptions	•	•	•	•	Event Log saved With date and time
Over-U, Over-I,	•	•	•	•	
Under-U, Interruptions	•	•	•	•	
Min/Max Value	•	•	•	•	

### Other features

Communication ports: RJ45, RS485 and RS232  
Size: portable 280 x 270 x 100 mm  
Weight: portable 1450 gr, suitcase 4650 gr

## Data Storage Memories

The **X3M H BOX NET WEB** is equipped with a 2 MB flash disk memory for the storage of numerous data and events. The large memory capacity supports the storage of up to 255 days of load profiles (with 15 min. samples) or over 50.000 logs as well as other repartition according to the type of events. The memory is structured with the file system and the data is saved as distinct files, organized by type of services that can be read from serial port trough MODBUS commands ("read general file" and "write general file") or through Energy brain Software.

### Power Quality Events (EN 50160 standards)

The **X3M H BOX NET WEB** detects and stores, with individual date-time stamp, several events giving an accurate monitoring of the power supply quality according to the EN 50160 standards.

- **Voltage sags/dips**
- **Temporary over voltage/swell**
- **Temporary current peak and direction of flow**

*i.e. short duration events* (1 cycle resolution) with registration of date-time, event type, phase involved, duration in number of cycles and min/max parameter value attained during each event. Example:

Date	Time (*)	Event type	Duration (Cycles)	Min/Max Value
20 Dic. 06	16.35.30.67	Voltage Hole V1N	10	21,25
12 Feb. 06	16.35.15.21	Voltage Hole V2N	30	66,32
16 Feb. 06	16.35.32.20	Voltage Swell V3N	25	273,12
16 Feb. 06	16.39.58.87	Current Hole import I2	5	152,51
16 Feb. 06	16.41.30.91	Current Hole import I3	7	163,56
16 Feb. 06	16.41.45.07	Current Hole import I1	3	155,83

- **Under voltage/voltage interruption**
- **Over voltage**
- **Over current and direction of flow**

*i.e. medium and long duration events* with registration of event start-end date/time, event type, phase involved and parameter min/max value attained during each event. Example:

Data	Tempo (*)	Tipo Evento	Min/Max
19 Gen. 06	15.59.02.17	Under voltage start V3N	-
19 Gen. 06	15.59.17.31	Under voltage end V3N	20,48
20 Feb. 06	16.37.46.49	Under voltage start V2N	-
20 Feb. 06	16.41.45.88	Under voltage end V3N	60,34
01 Mar. 06	16.08.19.27	Over voltage start V2N	-
01 Mar. 06	16.08.19.99	Over voltage end V2N	264,35
01 Mar. 06	16.02.29.23	Import overcurrent Start I1	-
01 Mar. 06	16.08.19.72	Import overcurrent End I1	213,74

The event type is programmable for each parameter in terms of duration (trigger-on value and trigger-off value, number of cycles).

Instrument power supply interruptions are also logged in order to provide a complete picture of the activities.

16 Jan. 06	16.34.49.88	Power OFF
16 Jan. 06	16.35.03.50	Power ON
16 Jan. 06	16.35.04.10	Start readings

### MIN. and MAX. value logs

The **X3M H BOX NET WEB** records the absolute minimum and/or maximum instantaneous value (RMS over 1 sec) attained by the most significant parameters and logs the event in memory with date and time stamp.

- Voltage .....minimum and maximum value per phase
  - Current .....maximum value per phase
  - Active and Apparent power ..... maximum value per phase
  - Power factor ..... minimum value per phase
- (\*) all time stamps in hours, minutes, seconds and seconds/100.

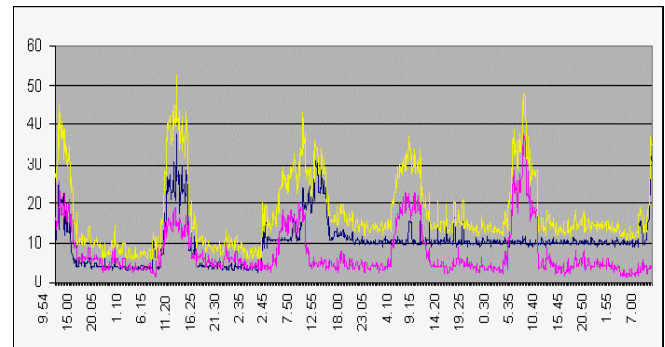
### Load profiles and consumption data

The **X3M H BOX NET WEB** systematically stores the consumption and demand data into *day files* containing all the necessary information for drawing accurate load profiles and also for comprehensive consumption analyses over long periods.

- Daily load profiles on the 4 quadrants with sampling according to the integration period. Up to 60 days' data default capacity with 15 min. samples.
- Max. Demand on the 4 quadrants and for each tariff, where programmed.
- Energy consumption on the 4 quadrants and for each tariff, where programmed.

### Harmonics surveys

A date/time stamped sample of 42 default readings is automatically saved in the instrument's built-in memory on a circular buffer (FIFO) covering a 10-day survey period with samples taken every 2 minutes and data organised in daily files.



- **Tension:** U, THD-U, H1-U, H3-U, H5-U, H7-U and H9-U per phase
- **Current:** I, THD-I, H1-I, H3-I, H5-I, H7-I and H9-I per phase

Memorized data can be downloaded through serial port in HTML, XLS or TXT.

### Functional logs

The memory is also used for several additional operations such as:

- Functional logs tracking all the operations that insert a settings change of the instrument since initial install.
- TOU calendar files for the handling of TOU tariffs and other memory configuration files.
- Specific files for special programming and/or for future implementation of new functions by means of up-loads.

*As a consequence of the large amount and complexity of the data collected in the memory, the configuration of the various memory services and the data downloads are exploited via serial port. The Energy Brain software represents an easy all-users tool. The use of the "read general file" and "write general file" Modbus commands is otherwise available.*

**Harmonics analysis**

The **X3M H BOX NET WEB** features the option of expanding its measurement capability by adding on new parameters to the existing ones. The FFT harmonics option adds all the parameters necessary for a comprehensive Harmonics analyses. It supports a 32 bit calculation which gives superior metering accuracy and enables to classify the **X3M H BOX NET WEB** as a genuine Energy & Harmonics analyser with a performance comparable with many sophisticated and expensive analysers. The FFT harmonics option supports all the readings that are needed for a superior analyses of the problems related to harmonics. Readings give both the harmonics power and the direction providing an invaluable tool for immediate examination of the harmonics flow inside a specific plant and for identifying potentially undesirable imported problems.

**Modbus communication**

A total of 384 readings related to harmonics are enabled as Modbus registers on serial port by the FFT harmonics option.

- Current and voltage harmonics per order and per phase
- Phase angle in degrees (range -180,0÷180,0°) per harmonic order, per phase, referred to U<sub>L1</sub> fundamental.
- These parameters may be used for external reconstruction of vectorial graphs such as those supported by the Energy Brain software (v. 5.4 or higher).

**Technical characteristics**

Harmonics range ..... Odd and Even harmonics up to 31<sup>st</sup> order  
Parameters ... H<sub>U</sub>, H<sub>I</sub>, H<sub>P</sub> & sign (direction) per order, per phase  
Parameters up date interval..... approx. 1 s  
Readings indication:

H01 .. floating pnt. values with automatic unit/K/M exponent  
H02-31... values in % of fund. (3½ digit, range 0,0÷100,0%)  
H direction ..... (+) or (-) sign on power

Modbus readings:

Voltage, current , phase angle per harmonic order, per phase  
Accuracy:

H<sub>U</sub> & H<sub>I</sub> ..±(0,1%rdg.+1LSD) for H01 to max. ±2,0% for H31  
H<sub>P</sub> .....±(0,2%rdg.+2LSD) for H01 to max. ±2,0% for H31  
Phase angles ....±0,1deg. for H01 to max ±3,0deg. for H31

Sampling frequency ..... 64 x f (mains frequency)  
FFT size ..... 64 points  
FFT calculation accuracy ..... 32 bits  
Window ..... rectangular  
Minimum reading..... 1%

**Harmonics readings**

**• Voltages Harmonics**

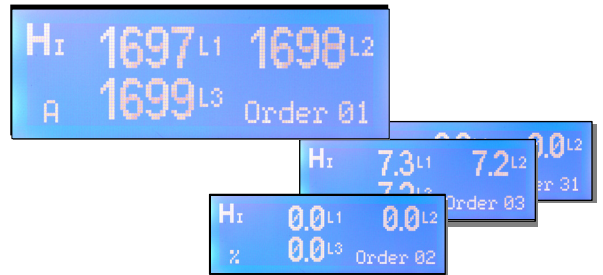
- H01: value in Vrms per phase
- H02...31: value in % of the fundamental per phase



**U<sub>r</sub>** key to show H01 values  
**▲ ▼** keys to scroll H02...H31 values.

**• Currents Harmonics**

- H01: value in Arms per phase
- H02...31: value in % of the fundamental per phase



**I** key to show H01 values  
**▲ ▼** keys to scroll H02...H31 values.

**• Harmonics Powers/Direction**

- H01: value in W per phase
- H02...31: value in % of the fundamental per phase
- + or – sign indicating the harmonics origin downstream (load) or upstream (source) the measurement point.



**P<sub>as</sub>** key to show H01 values  
**▲ ▼** keys to scroll H02...H31 values

**Yocto net - main functions**

Modbus/TCP server (max. 4 simultaneous connections) with bridge functions between RS485 line (Modbus-RTU) and Ethernet line (Modbus/TCP).

WEB Server for configuration of Yocto net through WEB Browser.

FTP Server for firmware update.

Arbiter function between Ethernet and RS232 serial port (Modbus-RTU protocol with possibility of supporting a PC, PLC or Yocto gate connection) toward RS485 port (Modbus-RTU protocol).

Static or dynamic IP address (DHCP protocol).

**Activation of new functionality by PUK code**

It is possible to activate new functions on Yocto net (see Yocto net data sheet) ordering a PUK code to be entered by a Web page. For example: Yocto net upgrade mail alarm (PUK) adds the possibility to send an e-mail with various user programmable alarm (and SMS alarms if connected to a Yocto gate). Standard and photovoltaic measures Web pages are already activated.

**Energy Brain**

The Energy Brain is the software package designed for the realization of all types of local and/or wide area networks of instruments.

It is suitable for all the Electrex instruments equipped with communication port supplying the functions needed for an accurate monitoring and targeting of industrial energy consumption.

**Main functions**

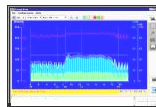
**Configuration**

The available options give maximum flexibility, adapting the software to the type of network (several types of simultaneously connected networks too) and to the operator needs.

- Field instruments set up (CT, PT, alarms, etc.)
- Network configuration (instrument, customer, groups, locations, etc) with individual setting of the communication mean local (by RS232/RS485, Ethernet) or remote (by Modem, GSM, Internet) and communication parameters (speed, etc.)
- Scheduling of the data collection and download agenda (distinct for location and customer) with daily, weekly or monthly intervals

**Load and energy profiles/graphs**

- Demand profiles (day, month and year)
- Energy profiles (day, month and year)
- Time-of-use Demand and Energy profiles
- MD profiles (per month, year and per tariff)
- Up to 4 graphs displayed simultaneously
- Zoom and parameter selection tools
- Graphical and numerical print-out



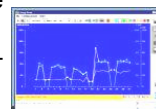
**On line readings display**

- On line display of the readings supplied by the field instruments.



**Data collection and storage**

- Automatic or manual download of power and energy data from the field instrument with automatic saving into the internal data base (Access® PostgresSQL® or MySQL®).
- Data export to other DBs by means of built-in ODBC or in txt format.



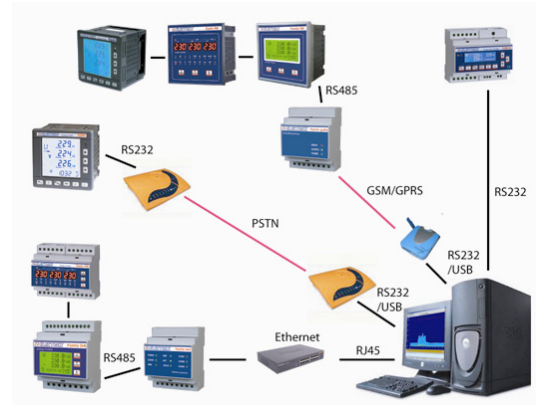
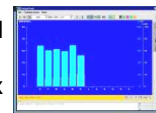
**Time-of-use tariffs**

- Handling of time of use tariffs
- Built in editor for TOU tariff & Calendar set up.



**Virtual channels**

- Creation of virtual channels (e.g. "summation" of departments, channel "combinations", etc.). Data display and treatment likewise a physical channel.
- Merging of variables and complex mathematical formulas particularly useful, example, for carrying out simulations



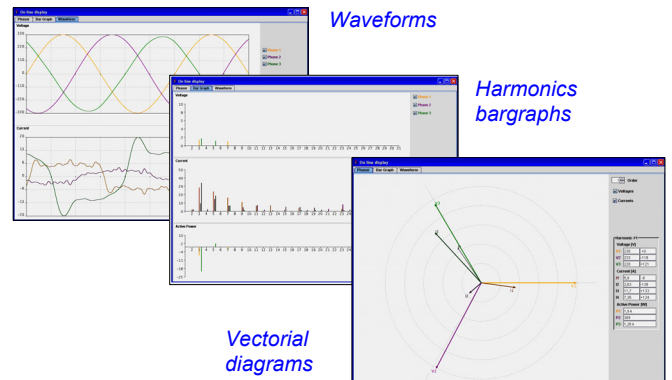
**Functions for X3M instruments**

- Download, storage to PC and display of the events and logs collected by the X3M instruments (all types).
- Set up of events and discrimination in terms of duration (trigger-on value and trigger-off value, number of cycles).

Description	Value
Voltage Dip/Sag & Undervoltage Threshold [V]	30
Voltage Dip/Sag & Undervoltage Restore Threshold [V]	40
Voltage Dip/Sag Max Duration [Cycles]	70
Voltage Dip/Sag & Overvoltage Threshold [V]	260
Voltage Swell & Overvoltage Restore Threshold [V]	250
Voltage Swell Max Duration [Cycles]	70
Current Peak & Overcurrent Threshold [A/100]	2500
Current Peak & Overcurrent Restore Threshold [A/100]	2000
Current Peak Max Duration [Cycles]	70

**On-line graphs**

- Graphs supported for instruments type **X3M D6** equipped with FFT harmonics option or for **X3M D6 H**. Available only with on-line connected Instrument(s).



Several Energy Brain software versions are available to meet user requirements and number of channels required. Information available separately.

**Order Code**

Type	Code
X3M H BOX NET WEB 85 – 265V .....	PKAR011-00

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Your distributor