ELECTREX
the energy saving technology

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

Zepto

Multimeter
Power & Energy Meter
Analyzer

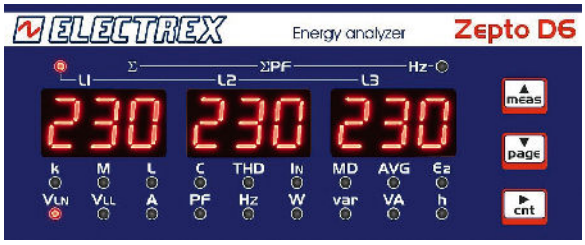
Zepto is a microprocessor based Multimeter, Power & Energy Meter and Analyzer with outstanding flexibility and accuracy designed to meet the most demanding applications of electrical parameters analyses and energy supply monitoring in the industrial and residential environment. The instrument combines the functions of multimeter, power&energy meter and analyzer

True-RMS

All the readings are "true-RMS" and they are obtained with a continuous sampling of the voltage and current waveforms in order to ensure the maximum metering accuracy of rapidly varying loads (e.g. spot welding). A sophisticated digital measurement method with a compensation system of the internal amplifiers' offsets ensures the maximum metering accuracy and stability irrespective of the signal level and the environmental working conditions.

Simple to use

The high brightness red led displays provide a superior reading visibility, up to 7 m. away, also in presence of intense light. Three displays of 3 digits each with floating point allow the simultaneous reading of 3 parameters (or a 9 digit reading of the energy counters).



3 keys on the instrument front panel, make the instrument use simple and rational.

Versatile in application

Zepto is suitable for virtually all type of electrical grid, 3- and 4-wire, symmetrical and asymmetrical, balanced or unbalanced, single- and bi-phase, Low Tension and High Tension, with 1, 2 or 3 CTs as well as for 2 quadrant measurement.
A simple keyboard programming allows the setting of all the operational parameters such as grid type, LT/HT, CT and VT ratios (free setting) integration time (1-60 min), digital output and alarms (thresholds, delays, hysteresis), digital input, RS485 serial communication.
The instrument set-up is password protected against undesired modifications.

Zepto types

All **Zepto** meters are available in 2 versions:
§ *Without* digital inputs and outputs.
§ *With* 1 digital input and 2 digital outputs.

Digital input

Zepto 1DI 2DO is equipped, as standard feature, with an optically insulated digital input complete 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), quantity count, etc. The input may be alternatively configured to operate as ON/OFF input (example for reading the ON/OFF state of machines and switches). The digital input requires an external 10-30Vdc power supply.

Readings

Parameter	*Type*	L1	L2	L3	n	Σ	P	*Range*
Voltage	U_{L-N}	h	h	h		h		*20,0V...400 kV*
	U_{L-L}	h	h	h		h		
Current	I	h	h	h	h	h		*10 mA…10,0 kA*
	$I_{AVG\ THERM}$ (1)	h	h	h				
	$I_{MD\ THERM}$ (1)	h	h	h				
Power Factor	PF	h	h	h		h		*0,00ind..1,00..0,00cap*
Frequency	f	h						*45 … 65 Hz*
Harmonic distortion	$THD\text{-}U_{L-N}$	h	h	h		h		*0…199,9%*
	$THD\text{-}U_{L-L}$	h	h	h		h		
	THD-I	h	h	h		h		
Active Power	P	h	h	h		h		*± 0,00…1999 MW*
	P_m (1)					h		
	P_{MD} (1)					h		
Reactive Power	Q_{IND}	h	h	h		h		*± 0,00…1999 Mvar*
	Q_{CAP}	h	h	h		h		
	$Q_{m\ IND}$ (1)					h		
	$Q_{m\ CAP}$ (1)					h		
	$Q_{MD\ IND}$ (1)					h		
	$Q_{MD\ CAP}$ (1)					h		
Apparent Power	S	h	h	h		h		*± 0,00…1999 MVA*
	S_m (1)					h		
	S_{MD} (1)					h		
Life Time	h, (1/1000 h)					h	h	*0,01…99.999,99*
Active Energy	E_a (2)					h	h	*0,1 kWh…99.999,9 MWh*
Reactive Energy	$E_{r\ IND}$ (2)					h	h	*0,1 kvarh…99.999,9 Mvarh*
	$E_{r\ CAP}$ (2)					h	h	
Apparent Energy	E_s (2)					h	h	*0,1kVAh…99.999,9 MVAh*

(1) Mean value (rolling average) over the integration time (1.. 60 min. programmable).
(2) *Energies displayed as 9 digits in floating-point readings; internal energy metering performed with 0,1 Wh minimum resolution and 99.999.999,9999 kWh maximum energy count before rollover.*

Digital outputs

Zepto 1DI 2DO is equipped, as standard feature, with two optically insulated transistor outputs rated 27 Vdc 27 mA per DIN 43864 standards. The two outputs are factory set to the transmission of pulses proportional to the Active energy and the Reactive energy (pulse weight and length are user programmable). The outputs may be alternatively configured as outputs of the internal alarms (see Alarms) or as remote output devices controlled via serial line and Modbus commands.

Alarms

Zepto 1DI 2DO is complete with 2 programmable alarms offering the maximum configuration flexibility for adapting to the most diverse requirements. Each alarm can be selected to link to any one of the parameters available, for example, either as a minimum and/or as a maximum. Linking of both alarms to the same parameter is also possible for operating as dual threshold alarm. The alarms configuration includes the option of precise setting of a delay time (1-99 sec), an hysteresis cycle (in % of threshold value) and the polarity of the output contacts (NO, NC). The alarms state information is always available on serial communication as Modbus "*coils*". Due to the numerous combinations available the alarms are programmable only via serial port with the Energy Brain software or by means of Modbus *Holding registers*.

Power Supply

Zepto is equipped with 230-240Vac power supply (transformer type). On request 115/120 Vac or 400 Vac transformer power supply.

Serial communication

Zepto is equipped, as standard feature on all types, with an optoinsulated and over-voltage protected RS485 serial communication port. The protocol is a *full compliant* Modbus-RTU suitable for communication with PLCs and with SCADA programs. The instrument data are read as numerical registers composed by mantissa and exponent in the IEEE format.
A transmission speed of up to 38.400 bps, with maximum 125 registers (equivalent to 62 parameters) per query with no waiting time between queries, ensure an unrivalled communication speed and dialogue efficiency.

Technical specification

Readings

Voltage: ..... U_{L1-N}, U_{L2-N}, U_{L3-N}, U_{L1-L2}, U_{L2-L3}, U_{L3-L1}, $U_{LL\Sigma}$
Current: ..... I_1, I_2, I_3, I_Σ, I_N
Therm.: ..... I_1, I_2, I_3
Power Factor: ..... PF_1, PF_2, PF_3, PF_Σ
Frequency: ..... f
Voltage THD: ..... U_{L1-N}, U_{L2-N}, U_{L3-N}, $U_{LN\Sigma}$ U_{L1-L2}, U_{L2-L3}, U_{L3-L1}, $U_{LL\Sigma}$
Current THD: ..... I_1, I_2, I_3, I_Σ
Active Power: ..... P_1, P_2, P_3, P_Σ
Average (AVG): ..... P_Σ
Max. Demand (MD): ..... P_Σ
Reactive Power: ..... Q_{1IND}, Q_{2IND}, Q_{3IND}, $Q_{\Sigma IND}$ ..... Q_{1CAP}, Q_{2CAP}, Q_{3CAP}, $Q_{\Sigma CAP}$
Average (AVG): ..... $Q_{IND\Sigma}$, $Q_{CAP\Sigma}$
Max. Demand (MD): ..... $Q_{IND\Sigma}$, $Q_{CAP\Sigma}$
Apparent Power: ..... S_1, S_2, S_3, S_Σ
Average (AVG): ..... S_Σ
Max. Demand (MD): ..... S_Σ
Active Energy: ..... $E_{a\Sigma T}$, $E_{a\Sigma Part.}$
Reactive Energy $_{INDUCTIVE}$: ..... $E_{r\Sigma T}$, $E_{r\Sigma Part.}$
$_{CAPACITIVE}$: ..... $E_{r\Sigma T}$, $E_{r\Sigma Part.}$
Apparent Energy : ..... $E_{s\Sigma T}$, $E_{s\Sigma Part.}$
Life Time $_{TOTAL}$ *:* .....Hours, 1/100 h

Functional characteristics

Measurement system:
- *True-RMS measurement up to the 31st harmonic*
- *2 quadrant measurement*
- *12bit A/D converter (6-channel)*
- *Continuous sampling of voltage and current waveforms (64 sampling per period, with PLL)*
- *Automatic compensation of the offset*

RS485 serial port :
- *Galvanically insulated*
- *2.400 to 38.400 bps programmable speed*
- *Built-in over-voltage protection*
- *Modbus-RTU protocol, full compliant*

Digital Output:
- *Galvanically insulated*
- *DIN 43864 (27Vdc, 27mA)*
- *Programmable functionality: pulse output, remote control.*

Digital Input:
- *Galvanically insulated*
- *Programmable functionality: external pulse count, ON/OFF state detection*
- *Programmable 10/100 Hz filter for input glitches suppression.*

Front panel

Display: *red led display*
Display update interval: *1s*
Keyboard: ..... *3 keys*

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Electrical characteristics

Connection: .....single-, bi-phase & 3-phase, LT and HT grids, balanced, unbalanced, 3- and 4-wire
Voltage inputs:
- Direct:.....up to 300 Vrms phase-neutral or 519 Vrms phase-phase (300Vrms if bi-phase)
- Via external VTs:
  - Primary:.....programmable (max. 400 kV)
  - Secondary:..... programmable (max. 300 V)
- Frequency: ..... 45÷65 Hz
- Max voltage to ground:..... 300 Vrms
- Input burden: ..... < 0,3 VA
- Input impedance ..... > 2 MΩ
- Overload:..... 900 Vrms phase-phase per 1 sec

Current Inputs:
- with external CT:
  - Primary:.....programmable (max. 10 kA)
  - Secondary:.....1 or 5 A
- Max current:..... 1,2 or 6 Arms
- Input burden: ..... < 0,7 VA
- Overload: ..... 40 Arms, 1 sec.

Digital Inputs (depending on type):
- Power supply (external):.....10 to 30 Vdc
- Absorbed current: ..... 2 to 10mA
- Max counting frequency: ..... 10 or 100Hz (programmable)

Digital Outputs (depending on type):
- Type (per DIN 43864):..... open collector (NPN)
- Max voltage:..... 27 Vdc
- Max current:..... 27mA

Power supply (separate from voltage inputs):
- standard type:.....230/240Vac +/- 10% 50/60Hz
- Self consumption: ..... < 3VA

Galvanic insulation:
- Power supply (separate):.....4 kV
- RS485 serial port: ..... 1,5 kV
- Digital Input & Outputs: ..... 1,5 kV

Accuracy

Voltage: .....0,5% of reading +/- 1 digit from 40 to 300V, min. reading: 10V
Current:..... 0,5% of reading +/- 1 digit from 0,02 to 1,2A or from1,2 to 6A, min. reading: 10mA
Frequency:..... 0,02Hz from 45 to 65 Hz
Power: ..... 1% of reading +/- 1 digit
Active Energy:.....Class 1 complying with IEC EN 62053-21
Reactive Energy:.....Class 2 complying with IEC EN 62053-21

Standards

Safety: ..... IEC EN 61010-1 CAT III-300V, class 2
E.M.C.:.....IEC EN 61326-1A
Accuracy:..... IEC EN 62053-21
Digital Outpus:.....DIN 43864

Environmental conditions

Working temperature range: .....-10/+50 °C
Storage temperature range:.....-15/+60 °C
Relative Humidity ..... RH< 95% non-condensing

Mechanical characteristics

Enclosure ..... Self-extinguishing plastic material class V0
Protection degree ..... Front panel .....IP40)
Terminals side.....IP20
Size: Zepro D6 .... 105 x 90 x 58 mm (6 DIN modules)
Mount .....DIN rail
Zepto 96.....96 x 96 x 72 mm
Mount .....panel
Panel cut-out..... 92 x 92 mm
Terminals ..... screw connector
Max cable size: ..... 2,5 mm^2 (stranded cable) / 4 mm^2 (solid cable)

How to order

Type	Code
Zepto D6 RS485 230-240V	PFA8611-02
Zepto D6 RS485 230-240V 1DI 2DO	PFA8611-12
Zepto 96 RS485 230-240V	PFA8C11-02
Zepto 96 RS485 230-240V 1DI 2DO	PFA8C11-12

Your distributor

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