ELECTREX
the energy saving technology

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

LOW ENERGY CONSUMPTION

Exa MID

MID Approved Energy Analyzer

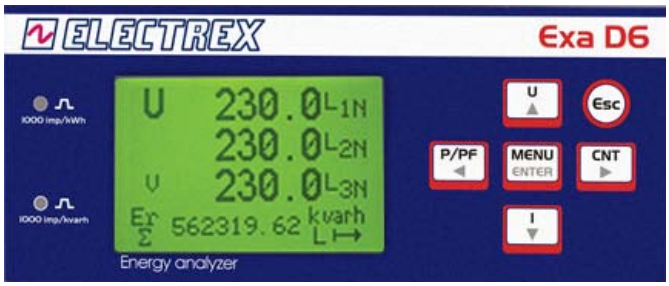
Exa MID is the new energy analyzer suitable for harsh environments and in accordance with MID Annex MI-003 certification for fiscal meters. Equipped with an Rs485 port, digital inputs and outputs and an extremely versatile and precise microprocessor. Designed to meet the most demanding applications of monitoring of electrical parameters and management of consumption of electrical energy in the industrial, civil and tertiary sectors.
The device provides the features of a MID approved counter but also of an energy analyzer.

True-RMS and measurement accuracy

The measures, in TrueRMS, obtained by continuously sampling the waveforms of voltages and currents, the automatic offset compensation of the internal amplifiers and of the angle error of the internal current transformers, ensure the maximum precision regardless the load variability in time (e.g. spot welding), the signal level and the environmental conditions of exercise. The resolution of 64 bits ensures also a high accuracy of the energy measurement even in the presence of small loads (e.g. equipment in stand-by).

Simple to use

Exa MID is equipped with an LCD graphic display (dot matrix) with LED backlighting and 2 levels of contrast. Simultaneous reading of 4 parameters and of their symbols with high visibility mode.



The 6-key Joystick keypad and the menu column on the display for configuring provide a simple and rational instrument use. In addition the initial page displayed when the instrument is turned on can be defined by the user.

On the front panel two red LEDs, for calibration checking, pulse with a frequency proportional to the active and reactive energy imported. Under the sine wave symbol next to the Electrex logo a red LED indicates the operation status, while 2 other LEDs (one red and one green) below the white band indicate the communication activities of the RS485 port.

Versatility

Exa MID is equipped with a sealable terminal block and with an Rs485 port. It is suitable for insertions in three-phase 3 and 4 wires, low voltage systems, with 2 or 3 CT and can measure on 2/4 quadrants (import/export). Insulated current inputs. With a Jumper (bridge) inserted the device can be configured from the keyboard and/or via Rs485 port (Modbus). From the keyboard can be set all the operative parameters as Rs4845 port, type or insertion, CT ratio, integration time (1-60 min) and depending on the version: digital inputs, digital outputs and alarms (threshold, delay and hysteresis). The configuration system is protected by password. Without the Jumper (to be removed before sealing) the MID parameters cannot be configured from both keyboard or Modbus protocol. Instead will still be possible to reset the operating time counter and the peaks of average power (P MD) and configure the inputs / outputs.

Measures

Parameters	Type	L1	L2	L3	n	Σ	P	Range
Voltage	U_{L-N}	•	•	•		•		Exa MID U_{L-N} 230V ±15% U_{L-L} 400V ±15%
	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
	I_{MAX}	•	•	•				
	$I_{AVG\ THERM}$ (1)	•	•	•				
	$I_{MD\ THERM}$ (1)	•	•	•				
Power Factor	PF	•	•	•		•		0,00ind..1,00..0,00cap
Frequency	f	•						45 … 55 Hz
Harmonics 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)					•		
Life Time	h (1/100 h)					•	•	0,01…99.999,99 h
Active Energy on terminals (MID)	$E_{a\ IMP}$ (5)	•	•	•		•	•	0,1 kWh…100 GWh
	$E_{a\ EXP}$ (5)	•	•	•		•	•	
Active Energy - CT primary side	$E_{a\ IMP}$ (6)	•	•	•		•	•	0,1 kWh…100 GWh
	$E_{a\ EXP}$ (6)	•	•	•		•	•	
Reactive Energy	$E_{r\ IND\ IMP}$ (6)	•	•	•		•	•	0,1 kvarh…100 Gvarh
	$E_{r\ CAP\ IMP}$ (6)					•	•	
	$E_{r\ IND\ EXP}$ (6)					•	•	
	$E_{r\ CAP\ EXP}$ (6)					•	•	
Apparent Energy	$E_{s\ IMP}$ (6)					•	•	0,1kVAh…100 GVAh
	$E_{s\ EXP}$ (6)					•	•	
Analog Measure	CNT (7)					•	•	

All the instantaneous measures are calculated on 10 cycles, example: 200mS at 50Hz.

1) *Average value (rolling average) over the integration time (1.. 60 min. programmable) and peak (MD).*
2) *Import /Export mean value (rolling average) over the integration time (1.. 60 min. programmable) and peak (MD) that is, the maximum average value.*
3) *Max. power values for both Import and Export.*
4) *Life Time counter not resettable; 3 partial operation time counters.*
5) *Energy counters on the terminals side (MID), total and per each phase, for both import and export not resettable and the partial resettable counters are displayed as 9 digits (1 decimal). The internal 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) *The energy counters (considering the CT ratio) for both import and export are displayed as 9 digits (1 decimal) and the internal counters are logged as in point 5).*
7) *Only for versions with digital inputs.*

Serial Communication

Exa MID 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..

Exa MID versions

The **Exa MID** are available in 5 versions:

- *Basic*…….. without inputs or outputs
- *1DI 2DO*……. with 1 digital input and 2 digital outputs
- *2DI 2DO*…….. with 2 digital input and 2 digital outputs
- *4DI* …… with 4 digital inputs
- *4DO*……with 4 digital outputs

Exa MID

Exa MID, **Exa MID 1DI 2DO**, **Exa MID 2DI 2DO**, **Exa MID 4DI** and **Exa MID 4DO** are in accordance with MID Annex MI-003 certification for fiscal meters and are suitable for insertions in three-phase 3 and 4 wires, LV systems (L-N 230V ±15% and L-L 400V ±15%).

Digital Inputs and Tariffs

Exa MID 1DI 2DO or **2DI 2DO** or **4DI** are equipped with optically insulated digital inputs complete with programmable filter for input glitches. The digital input is set by default to operate for external pulse count of, example, water meters, gas meters (insulation to meet the ATEX requirements), quantity count, etc. 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) applying a 10-30Vdc voltage on a digital input (2 tariffs) or on two digital inputs (4 tariffs). The digital inputs require an external 10-30Vdc power supply.

Digital Outputs

Exa MID 1DI 2DO or **2DI 2DO** or **4DO** are equipped with two optically insulated transistor outputs rated 27 Vdc 27 mA per 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.

Alarms

Each output of the **Exa MID 1DI 2DO** or **2DI 2DO** or **4DO** can be associated to any of the parameters available, for example, either as a minimum alarm and / or as a maximum.

All alarm outputs can also refer to the same parameter For having more alarm thresholds. You can set the delay of activation of each alarm (1-99 sec.), the hysteresis (in% of the threshold value) and the polarity of the output contacts (NO, NC). The alarm status is always available on the serial line (via Modbus "coils"). Because of the many combinations available only part of the alarm is programmable from the keyboard while they are completely Web Page or through the Energy Brain software or by *"holding registers"* of the Modbus protocol.

Operating Time

The **Exa MID** display the total life time counter of the device and are equipped with three partial counters which can be activated by internal alarms for example for managing the operating time of a device when being used, when active but not being used and when it is inactive. The partial counters are also resettable.

Phase sequence

The **Exa MID** allows the identification of the correct phase sequence.

Technical Specifications

Functional characteristics and Inputs/Outputs

Measurement system:

- *True-RMS measurement up to the 31st harmonic*
- *2 and 4 quadrant measurement (programmable)*
- *12bit A/D converter (6-channel)*
- *Continuous sampling of voltage and current waveforms (64 sampling per period, with PLL)*
- *Automatic compensation of the offset and of the angle error of the internal current transformers*

RS485 serial port :

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

Digital Input (depending on type):

- *Galvanically insulated*
- *Programmable functionality: external pulse count, ON/OFF state detection*
- *Programmable 10/100 Hz filter for input glitches suppression.*
- *External powered needed: 10-30Vdc*
- *Absorbed current:..... from 2 to 10mA*

Digital outputs (depending on type):

- *Galvanically insulated*
- *NPN comply with DIN 43864 (27Vdc, 27mA)*

Front panel

Display:..... : graphic LCD with adjustable, 2 levels, contrast
……..…..100x64 dots
Visible area ……..…...43x25mm
Backlight: .....yellow/green Led
Display update interval: ……..……1s
Keyboard: …… ……6-key Joystick keypad
Led:. . 2 for impulses related to Active and Reactive Energy
..... 1 for checking functionality / status
..... 2 for the serial RS485 port activity

Digits displayed and Accuracy

Voltage: .....4 digits
Current:.....4 digits
Frequency:..... 4 digits
Power: .....4 digits
Energies: ..... 9 digits (1 decimal)
Active Energy on the terminals (MID): .....Class B EN50470
Reactive Energy: .....Class 2 EN62053-23
Active Energy - CT primary side: ..... EN 62053-21

Normative

General: ..... *CEI EN 50470-1*
Static Counters: ..... *CEI EN 50470-3*

Electrical characteristics Exa MID

Connection: ..... *LV 3-phase, 3 wires 2 CT or 4 wires 3 CT*
Voltage inputs:
Direct: ..... U_{L-N} *230V* ±15%
U_{L-L} *400V* ±15%
Frequency: ..... *45÷55 Hz*
Max voltage to ground: ..... *300 Vrms*

Current Inputs
(galvanic insulation via integrated CT):
With external CTs:
Primary: ..... *programmable (max. 10 kA)*
Secondary: ..... *5 A*
Max current: ..... *6 Arms*
Absorbed power from each input: ..... *< 0,7 VA*
Overload: 40 Arms per 1 sec.
Self-powered: ..... *F-N 230Vac +/- 15% 50Hz*
..... *F-F 400Vac +/- 15% 50Hz*
(remains powered even if missing 2 phases)
Self consumption: ..... *< 2,5VA*

Environmental conditions

Working temperature range Exa MID: ..... *-25/+55 °C*
Storage temperature range: ..... *-25/+70 °C*
Relative Humidity: ..... *95% non-condensing*

Mechanical characteristics

Terminals block: ..... *sealable*
Enclosure: ..... *Self-extinguishing plastic material class V0*
Protection degree ..... Front panel *IP40*
Terminals side *IP20*
Size: ..... *105 x 90 x 58 mm (6 modules DIN)*
Max cable size ..... *: 2,5 mm^2 (stranded cable) / 4 mm^2 (solid cable)*
Weight: ..... *290 g.*

How to order

Type	Code
Exa MID D6 RS485 85÷440V	PFAE6M1-0A
Exa MID D6 RS485 85÷440V 1DI 2DO	PFAE6M1-1A
Exa MID D6 RS485 85÷440V 2DI 2DO	PFAE6M1-QA
Exa MID D6 RS485 85÷440V 4DI	PFAE6M1-NA
Exa MID D6 RS485 85÷440V 4DO	PFAE6M1-PA

Distributor

ELECTREX the energy saving technology

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