



www.mars-energo.com

Making energy visible

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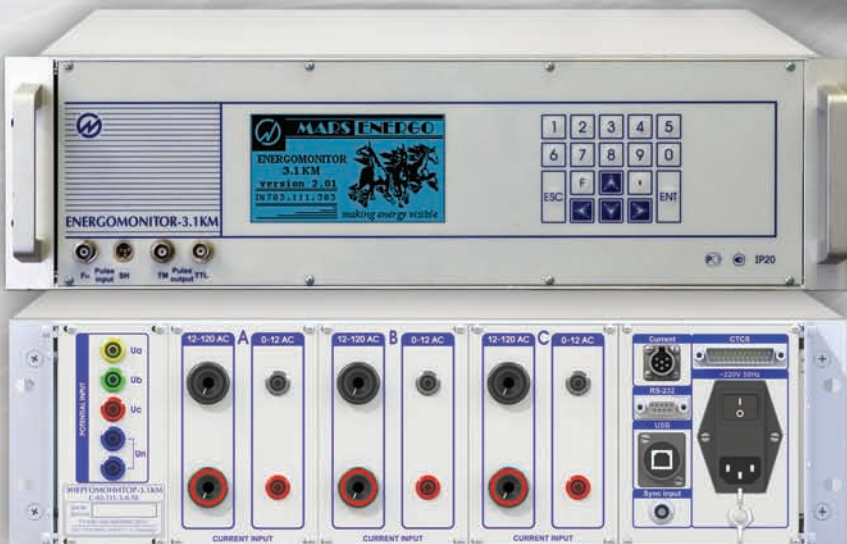
MULTIFUNCTIONAL REFERENCE METER

Energomonitor-3.1KM

accuracy class 0.02; 0.05

1. Energomonitor-3.1KM-P

Portable (part of
MTS ME 3.1KM-P)



2. Energomonitor-3.1KM-S

Stationary (part of
MTS ME 3.1KM-S)

Sphere of application

Accuracy testing and calibration of:

- AC and DC energy meters
- Wattmeters, varmeters, instrument converters for active and reactive power measurements, voltmeters, amperemeters, phase- and frequency meters (operating within the commercial range of frequencies), instrument converters of current and voltage (AC and DC)
- Power quality analyzers
- Current and voltage instrument (measuring) transformers.

Functionality and Options (portable version)

- 1. Reference meter: on-site accuracy testing and calibration of single-/three-phase energy meters of accuracy classes up to 0.05 (with EM 3.1KM-02) and up to 0.2 (with EM 3.1KM-05), PQ analyzers (class A), and other measuring instruments**

1



SH-I, SH-E (scanning heads for reading pulses from discs or leads)



CVFC (Current/Voltage-to-Frequency Converter)



Phantom Power Source Energoforma 3.3



Software EmCounter and EnForm

- 2. Comparator: on-site accuracy testing and calibration of instrument current transformers (accuracy class 0.2S; up to 5000 A)**

2



CTCS (Current Transformer Calibration Switch)



Reference Current Transformers PCTI-100 and PCTI-5000



Test Current Source IT5000



Software EmCalibrTrans

Burden Box (conventional type)

- 3. Comparator: on-site accuracy testing and calibration of instrument voltage transformers (accuracy class 0.2; up to 330 kV)**

3



Reference Unit (Capacitive HV Transducer CHVT)



Burden box

Source of test voltage (50; 100; 150 kV)




Control panel (Console)



Software EmCalibrTrans


- 4. Network Analyzer: electrical energy audit; network analysis including logging of instantaneous values (oscilloscope)**

4



1000 A
100 A
10 A

AC current clamps (accuracy class 0.2)

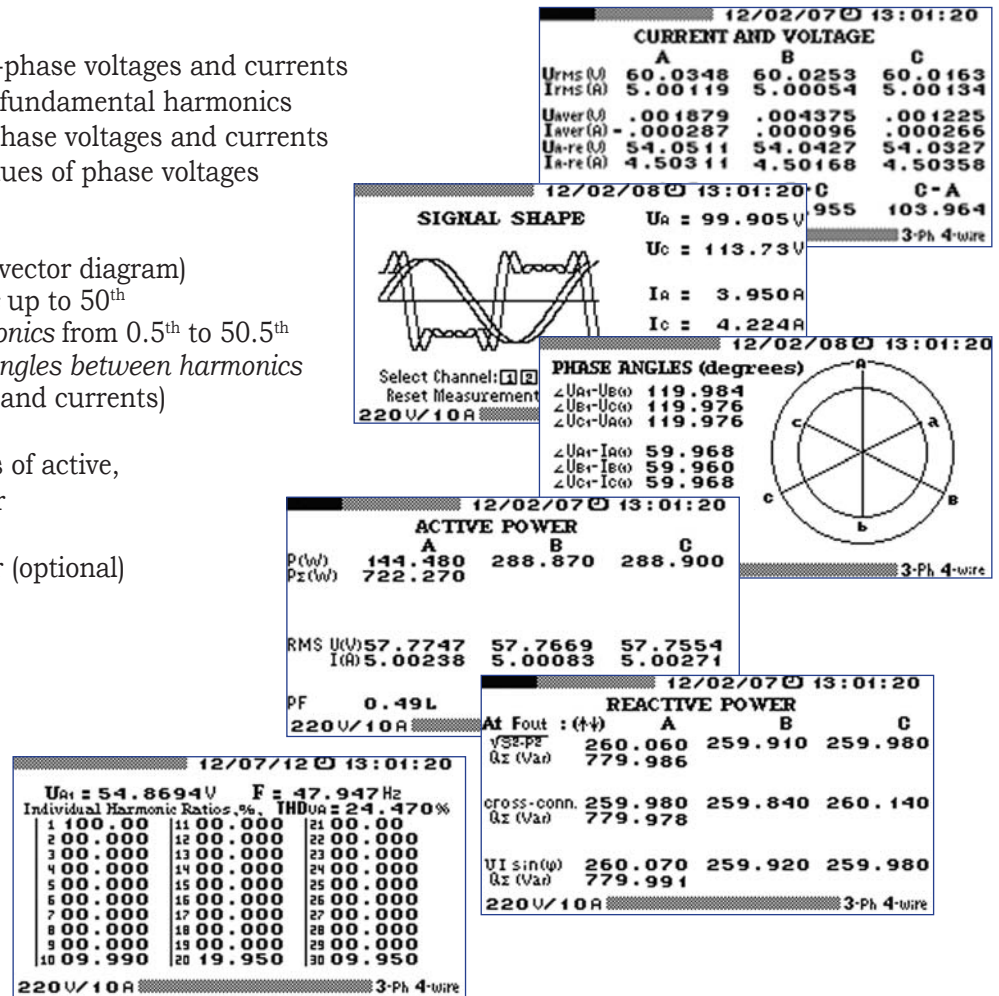


Rogowsky coils, (accuracy class 2.0)

ME FLEX 30/300/3000 A

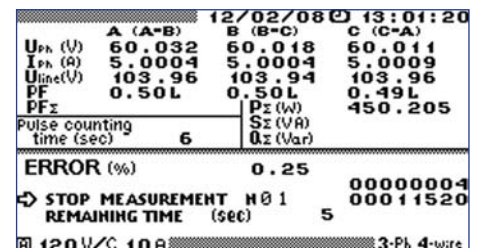
Measurements

- *Voltage and current:*
 - RMS of phase and phase-to-phase voltages and currents
 - RMS of voltage and current fundamental harmonics
 - Average-rectified values of phase voltages and currents
 - Average (DC component) values of phase voltages
- *Energy*
- *Frequency*
- *Phase angles* (current-voltage vector diagram)
- *Current and voltage harmonics* up to 50th
- *Current and voltage interharmonics* from 0.5th to 50.5th
- *Harmonic powers and phase angles between harmonics*
- *Signal shapes* (phase voltages and currents)
- *Power:*
 - Each phase and total values of active, reactive and apparent power
 - Power factor and tg φ
- DC voltage, current and power (optional)
- Power quality parameters
- Flicker, dips and swells.



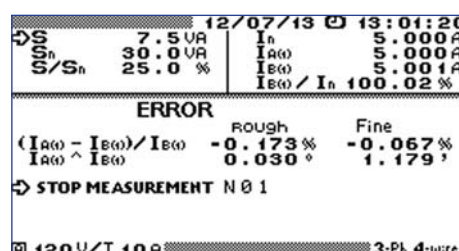
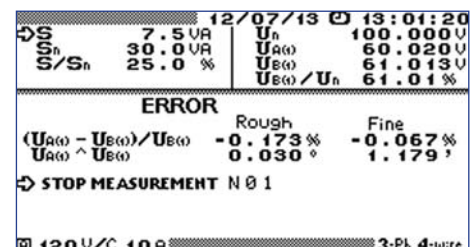
Testing of Energy Meters

The EM 3.1KM provides for performance and accuracy testing of energy meters of accuracy classes up to 0.05 (with EM 3.1KM-02) and up to 0.2 (with EM 3.1KM-05). Test results acquired from 200 meters (10 measurements per test) can be kept in the internal memory. With the EmCounter program, the results are loaded to a PC for viewing and management. Test reports are generated automatically.



Testing of Current and Voltage Instrument Transformers

As a comparator, the EM 3.1KM provides for testing of potential transformers of an accuracy class up to 0.2 and 1 A and 5 A current transformers (accuracy class 0.2S, or less accurate). The internal memory can store test results from 200 CTs and/or PTs. Automatic report generation and log management are available with EmCalibrTrans software.



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Specifications

Measured parameters (34 parameters in total)	Measurement ranges	Intrinsic measurement error	
		Accuracy class 0.02	Accuracy class 0.05
RMS of AC voltage (from 0.1 to 6 V – optionally)	0.1 to 960 V ($U_{NOM} = 1, 2, 5, 10, 30, 60, 120, 240, 480, 800$ V)	±0.01 %	±0.02 %
RMS of AC current	5 mA to 120 A ($I_{NOM} = 0.05; 0.1; 0.25; 0.5; 1; 2.5; 5; 10; 25; 50; 100$ A)	±0.01 %	±0.02 %
	With AC current probes: 50 mA to 4500 A ($I_{NOM} = 10; 100; 1000; 300; 3000$ A)	±0.2 ... 2.0 % (depending on the type of probes)	
Phase angle between the 1st harmonics of phase voltages	0° to 360°	Absolute: ±0.01°	
Phase angle between the 1st voltage and 1st current harmonic in the same phase	0° to 360°	Absolute: ±0.01°	
Active power	$0.01U_{NOM}$ to $1.5U_{NOM}$ V ($PF_P = 1$)	Relative:	
	$0.1I_{NOM} \leq I < 1.5I_{NOM}$	±0.015 %	±0.05 %
Reactive power	$0.05I_{NOM}U_{NOM}$ to $1.5I_{NOM} \cdot 1.2U_{NOM}$ Var	Relative:	
	$PF_Q = 1$	±0.03 %	±0.05 %
	$PF_Q = 0.45L...0...-0.45C$	±0.05 %	±0.1 %
Power factor	-1.0 to +1.0	Absolute: ±0.001	
AC frequency	40 to 70 Hz	Absolute:	
		±0.001 Hz	±0.003 Hz
Negative and zero sequence voltage ratios	0 to 50 %	Absolute: ±0.05	
Total harmonic distortion and harmonics ($n = 2 \dots 50$) of voltage and current	0 to 49.9 %	Absolute: ±0.003 % (value < 1.0 %)	
		Relative: ±0.3 % (value ≥ 1.0 %)	
Interharmonics of voltage and current ($n = 0.5 \dots 50.5$)	0 to 49.9 %	Absolute: ±0.006 (value < 1.0 %)	
		Relative: ±0.6 % (value ≥ 1.0 %)	
Ratio error of instrument current transformer or potential (voltage) transformer (δ)	0.2 до 20 %	Absolute:	
		±0.002 %	±0.005 %
Angle error of instrument current transformer or potential (voltage) transformer (Δ)	0.1' to 180°	±0.1'	±0.2'
Flicker short-term severity	0.25 to 10 (relative units)	Relative: 5.0 % ($\Delta U/U \leq 20$ %)	
Measured parameters (optional)			
DC voltage	0.1 to 960 V	±0.01 %	±0.02 %
DC current	5 mA to 120 A	±0.01 %	±0.02 %
DC power	$0.01P_{NOM}$ to $2.55P_{NOM}$	Relative:	
		±0.03 %	±0.04 %

Pulse input and pulse output

Parameter	Input	Output
Level	5...15 V	5 V
Frequency (max.)	36 kHz	18 kHz
Pulse duration	>14 μs	10 ± 2 μs
Meter constant	1...999 999 999 imp/(kW · h)	$C = 144 \cdot 10^8 / (U_{NOM} \cdot U_{NOM})$ imp/(W · h)

Environmental

Operating temperature	10 to 30 °C
Relative humidity	80 % (20 °C)
Atmospheric pressure	84 to 106.7 kPa

Mechanical and general

Parameter	Value
Mains supply	100...264 V, (50 ± 5) Hz
Power consumption from mains	100 VA, or less
Dimensions (L × W × H)	Maximum
- Stationary	485 × 450 × 140 mm
- Portable	480 × 380 × 200 mm
Weight	Maximum
- Stationary	8 kg
- Portable	10 kg