MARSENERGO
INSTRUMENTS FOR POWER INDUSTRY
www.mars-energo.com

Making energy visible

V.O. 13 Line, 6-8, office 41H
Saint-Petersburg, Russia, 199034
Tel./fax: +7 812 327-21-11, +7 812 331-87-36
E-mail: mars@mars-energo.com

THREE-PHASE PROGRAMMABLE PHANTOM POWER SOURCE

Energoforma 3.3-12

Output signal:
Current — up to 12 A
Voltage — up to 264 V
Harmonics — up to 50th
Interharmonics — up to 50.5th

SW «EnForm»

Sphere of Application

Together with reference standards Energomonitor 3.1KM or Energomonitor 3.3T1, Energoforma 3.3 makes up the test system meant for testing, calibration and adjustment of:

- Energy meters
- Power quality analyzers (IEC 61000-4-30–2008)
- Instrument (measuring) converters
- Instruments for various electrical measurements.

Functionality and Options

1. Calibration of single- and three-phase energy meters

Accuracy class of meters under test	0.5S	0.2S	0.05
Reference standards	*EM3.3T1*	*EM3.1KM-P-0.5*	*EM3.1KM-P-0.2*

Scanning Head

Software «EnForm»

2. Calibration of instrument converters

Current/ Voltage-to-Frequency Converter

3. Calibration of power quality analyzers

Energomonitor 3.1KM-P-0.5 (0.2)

Time Correction Module TCM-02C

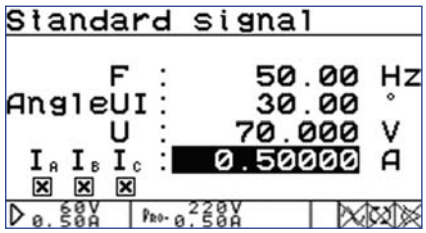
Operating Modes

1. Off-line mode (control from keypad)

1.1. Standard signals

Energoforma generates a three-phase balanced sinusoidal signal.
The angles between phase voltages are set to 120°.
Programmable parameters:

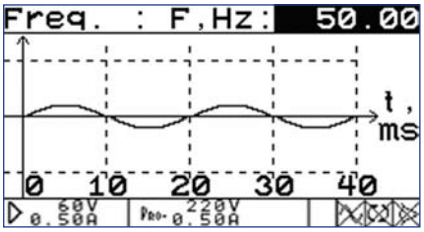
- Fundamental frequency (42.50 to 70.00 Hz in 0.01 Hz steps)
- Phase angles between current and voltage (for all phases) (from –179.99° to +180.00° in 0.01° steps)
- RMS voltage (from 1 mV to 264 V in 1 mV steps)
- RMS current (from 0.01 mA to 12 A in 0.01 mA steps).



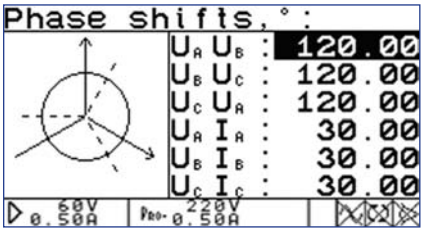
1.2. Special (user-defined) signals

The settings are made separately for each phase.
The ranges of settings are the same as in the standard signal mode.

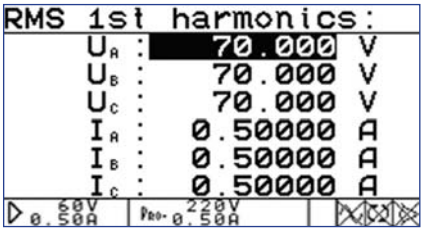
Frequency*



Phase angles



Voltage and current (RMS)



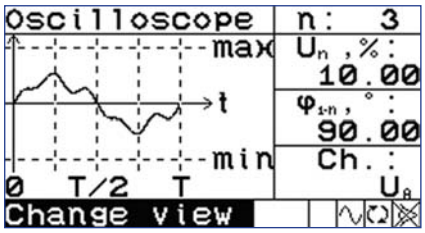
** Waveforms can be generated synchronously with mains frequency.*

Wave shapes

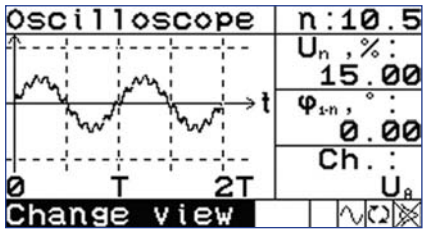
The screens representing the wave shapes of signals being generated can be of 4 types:

- Oscillogram
- Linear spectrum
- Logarithmic spectrum
- Spectrogram reflecting phase shifts of harmonics with respect to the fundamental.

Oscillogram

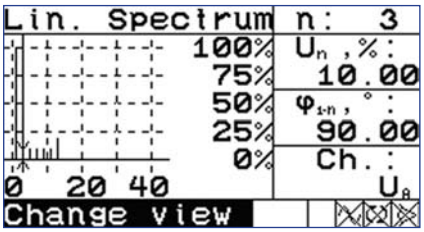


Interharmonics are off

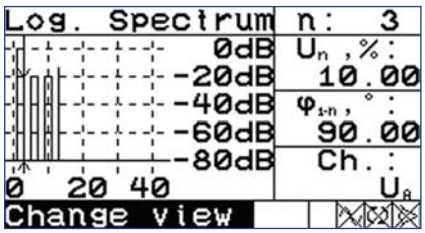


Interharmonics are on

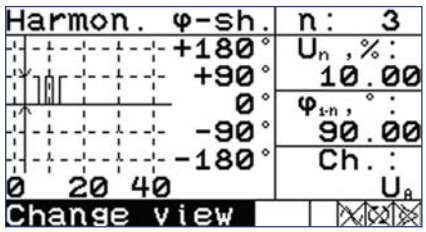
Linear spectrum



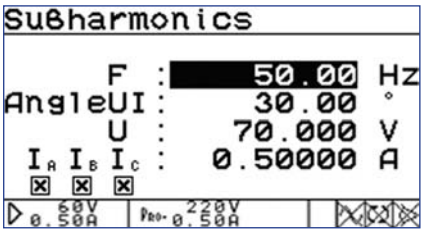
Logarithmic spectrum



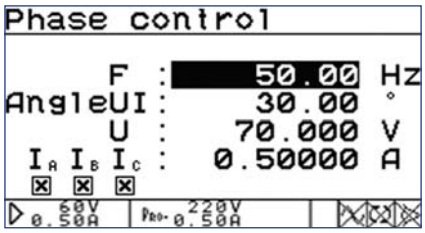
Harmonics phase shift



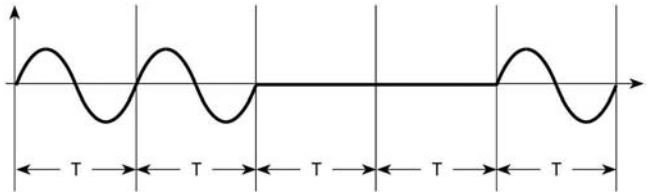
Subharmonics



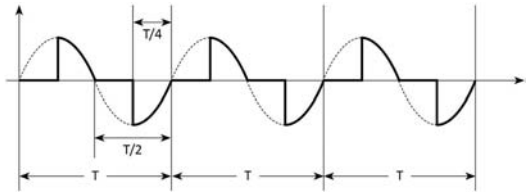
Phase control



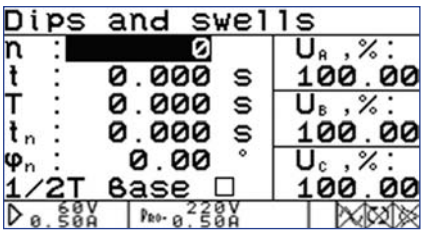
Signal shape (T is the period)



Signal shape (T is the period)

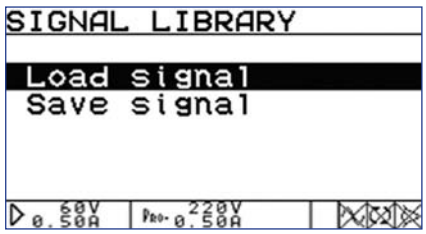


Dips and swells



Flicker

Library*



** 8 libraries with the capacity of 5 test signals per each.*

2. PC-controlled mode

As part of MTS ME 3.1KM (or -3.3T1)-P test systems, Energoforma is controlled from a PC via EnForm or EnForm/MTS programs.

Software «EnForm»

EM3.3T1

EM3.1KM-P

Mars-Energo
V.O. 13 Line, 6-8, office 41H
Saint-Petersburg, Russia, 199034
Tel./fax: +7 812 327-21-11, +7 812 331-87-36
www.mars-energo.com
E-mail: mars@mars-energo.com

Specifications

Parameter	Characteristics		
	Output setting range	In increments of	Max deviation from the set value
Frequency of the fundamental harmonic (f_1), Hz	45.0...70	0.01	Absolute: ±0.01
Phase angle between • Fundamental harmonics of phase voltages in different phases, degrees • Fundamental harmonics of current and voltage in the same phase, degrees	–179.99 ... +180	0.01	Absolute: ±2°
RMS of the fundamental harmonic of voltage (U_1), V (at the rated load)	20...264	0.01	Relative: 1 %
Output power of the Voltage source, VA (at a load of 4.8 kOhm)	10	—	—
RMS of the fundamental harmonic of current (I_1), A	0.01...12	0.0001	Relative: 1 %
	0.001...0.05		Relative: 2 %
Output power of the Current source, VA (at a current of 10 A, R_{NOM} = 0.05 Ohm)	5	—	—
Total harmonic distortion of voltage and current, %	—	—	Relative: 1 %, or less
Harmonic composition of the current and voltage signals:			
Harmonics (number: 49)	2...50	0.01	—
Interharmonics (number: 51)	0.5; 1.5; ...; 49.5; 50.5		
RMS value of the current or voltage harmonic, % of U_1 or I_1			
For harmonics from the 2nd to 19th	0...100	0.01	—
For harmonics from the 20th to 50th	0...50		
For interharmonics (from the 0.5th to 50.5th)	0...15		
Phase angle between: • The 1st and nth voltage harmonic in the same phase, degrees • The 1st and nth current harmonic (interharmonic) in the same phase, degrees	–179.99 ... +180	0.01	—
Number of voltage dips or swells	0 to 100 000	1	
Duration of a voltage dip or swell (t), s (f_1 = (50 ± 1) Hz)	0 to 600	0.001	Absolute: ±0.002
Event repetition period (interval between adjacent dips or swells) (T; $T \geq t$), s (f_1 = (50 ± 1) Hz)	0 to 600	0.001	Absolute: ±0.002
RMS value of voltage during a dip (U_{min}), % of U_1 (f_1 = (50 ± 1) Hz)	0 to 9.99	0.01	—
	10 to 29.99		Relative: ±[1.0+0.5(U_{NOM}/U–1)] %
	30 to 100		Relative: ±1 %
RMS value of voltage during a swell (U_{max}), % of U_1 (f_1 = (50 ± 1) Hz)	100 to 200	0.01	Relative: ±0.5 %

General

Parameter	Value
Mains supply	220 ± 22 V, 50 ± 0.1 Hz
Power consumption	250 VA, or less
Dimensions (L × W × H)	Maximum 500 × 450 × 200 mm
Weight	12 kg, or less

Environmental

Ambient temperature	10 to 35 °C
Relative humidity	80 % (25 °C)
Atmospheric pressure	70 to 106.7 kPa

Edition 13.09.2016