

Energoforma 3.3-100

**THREE-PHASE
PROGRAMMABLE
PHANTOM POWER
SOURCE**



Output signal:

Current — up to 120 A

Voltage — up to 264 V

Harmonics — up to 50th

Interharmonics — up to 50.5th

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:

- Power quality analyzers (IEC 61000-4-30-2008)
- Instrument transducers
- Instruments for various electrical measurements (U , I , $\cos \varphi$, P , R , S , THD, F)
- Electrical energy meters of all types.

Functionality and Options

1. Calibration of single- and three-phase energy meters (up to $I_{\max} = 120$ A)



Energomonitor 3.3T1
(Reference instrument for testing energy meters of accuracy classes up to 0.5S)

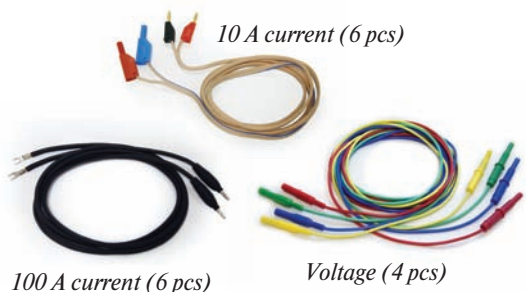


Energomonitor 3.1KM-P
(Reference instrument for testing energy meters of accuracy classes up to 0.2S and 0.05)



Scanning Head

Set of Cables



10 A current (6 pcs)

100 A current (6 pcs)

Voltage (4 pcs)



Energomonitor 3.1KM-P-0.5 (0.2)



Software EnForm



Current/Voltage-to-Frequency Converter Calmar-SL



Time Correction Module TCM-02C

2. Calibration of instrument converters

3. Calibration of power quality analyzers

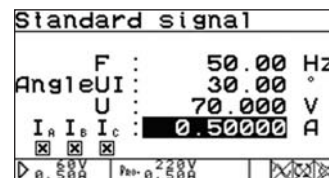
Operating Modes

Off-line mode (control from keypad)

Standard signals

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

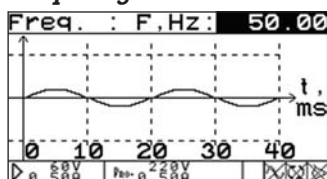
- Fundamental frequency (42.50 to 70.00 Hz in 0.01 Hz steps)
- Phase angles between current and voltage (for all phases) (from -179.99° to +180.00° in 0.01° steps)
- RMS voltage (from 1 mV to 264 V in 1 mV steps)
- RMS current (from 1 mA to 120 A in 0.1 mA steps).



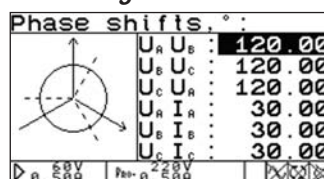
Special (user-defined) signals

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

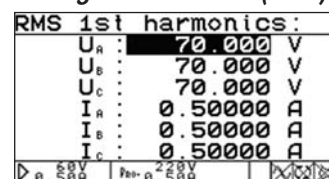
Frequency*



Phase angles



Voltage and current (RMS)



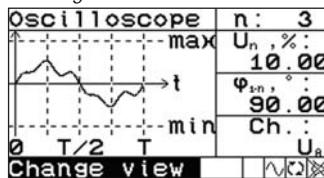
* Waveforms can be generated synchronously with mains frequency.

Wave shapes

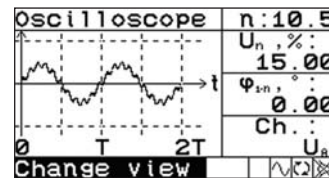
The screens representing wave shapes of signals being generated can be of 4 types:

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

Oscillogram

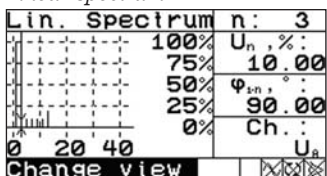


Interharmonics are off

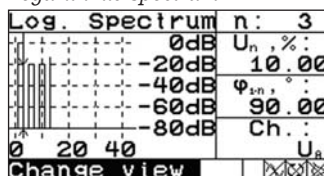


Interharmonics are on

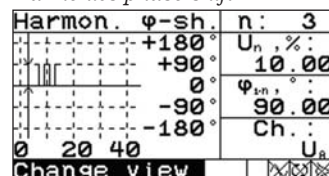
Linear spectrum



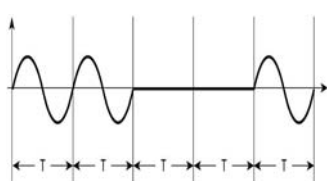
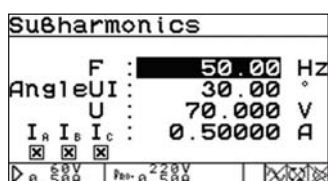
Logarithmic spectrum



Harmonics phase shift

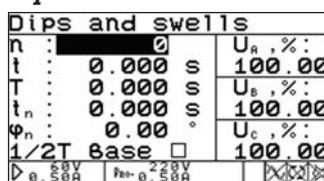


Subharmonics

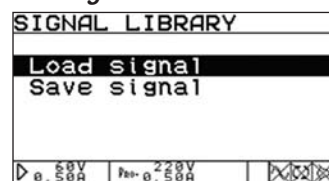


Signal shape (T is the period)

Dips and swells

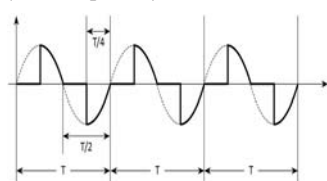
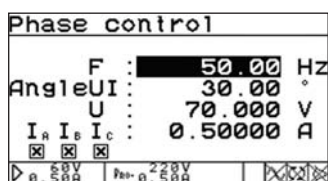


Library*

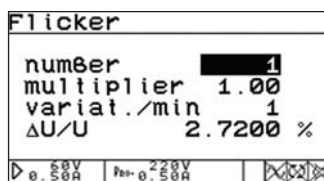


*8 libraries with the capacity of 5 test signals per each.

Phase control



Flicker



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.

ESME

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Specifications

Parameter	Characteristics		
	Output setting range	In increments of	Max deviation from the set value
RMS of the fundamental harmonic of voltage (U_1)	6 ... 264 V	0.01 V	Relative: 1 %*
	0 ... 5.9 V	1 mV	—
RMS of the fundamental harmonic of current (I_1)	0.001 ... 0.1 A	0.1 mA	Relative: 2 %
	0.1 ... 100** A	1 mA	Relative: 1 %*
Frequency of the fundamental harmonic (f_1)	45.0 ... 70 Hz	0.01 Hz	Absolute: ± 0.01
Phase angle between: • Fundamental harmonics of phase voltages in different phases • Fundamental harmonics of current and voltage in the same phase	$-179.99^\circ \dots +180^\circ$	0.01°	Absolute: $\pm 2^\circ$
Output power of the Voltage source (at a load of 4.8 kOhm)	10 V·A	—	—
Output power (per phase)			
at a current of up to 10 A, $R_{load} = 0.05 \text{ Ohm}$	5 V·A	—	—
at a current of up to 120 A, $R_{load} = 0.012 \text{ Ohm}$	150 V·A	—	—
Harmonic composition of the current and voltage signals:			
Harmonics	2 ... 50	—	—
Interharmonics	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 2 nd to 19 th	0 ... 100	0.01	—
For harmonics from the 20 th to 50 th	0 ... 50		
For interharmonics (from the 0.5 th to 50.5 th)	0 ... 15		
Phase angle between: • The 1 st and n th voltage harmonic in the same phase • The 1 st and n th current harmonic (interharmonic) in the same phase	$-179.99^\circ \dots +180^\circ$	0.01°	—
Number of voltage dips or swells	0 to 100 000	1	
Duration of a voltage dip or swell (t) ($f_1 = (50 \pm 1) \text{ Hz}$)	0 to 600 s	1 ms	Absolute: ± 0.002
Event repetition period (interval between adjacent dips or swells) (T , $T \geq t$) ($f_1 = (50 \pm 1) \text{ Hz}$)	0 to 600 s	1 ms	Absolute: ± 0.002
RMS value of voltage during a dip (U_{min}), % of U_1 ($f_1 = (50 \pm 1) \text{ Hz}$)	0 to 9.99	0.01	—
	10 to 29.99		Relative: $\pm 1.5 \%$
	30 to 100		Relative: $\pm 1 \%$
RMS value of voltage during a swell (U_{max}), % of U_1 ($f_1 = (50 \pm 1) \text{ Hz}$)	100 to 200	0.01	Relative: $\pm 0.5 \%$

* Total harmonic distortion of current and voltage: 1 %, or less.

** 120 A can be sustained for 3 min, as a maximum.

General

Parameter	Value
Mains supply	220 \pm 22 V, 50 \pm 0,1 Hz
Power consumption	1000 VA, or less
Dimensions (L \times W \times H)	Maximum 564 \times 423 \times 250 mm
Weight	20 kg, or less

Environmental

Ambient temperature	10 to 35 $^\circ\text{C}$
Relative humidity	80 % (25 $^\circ\text{C}$)
Atmospheric pressure	70 to 106.7 kPa