



www.mars-energo.com

Making energy visible

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Volt/mA CALIBRATOR **CALMAR-M**

Accuracy classes 0.02; 0.05

Calmar-M

Measurement and generation of:

- Direct voltage, V: 0÷0.2; 0÷5; 0÷10; -5÷5; -10÷10;
- Direct current, mA: 0÷20; 0÷5; 4÷20; -5÷5;
- Pulses with repetition frequency, Hz: 0÷6000/0÷9999.

Testing and calibration of:

Electric energy meters
and instrument-class
transducers.

Field of application

Portable design: CALMAR-MP

On-site testing of energy meter and process control systems



Data exchange with PC:

Ethernet
Bluetooth

Desktop design: CALMAR-ML

A stand-alone testing instrument or test system component for laboratory applications



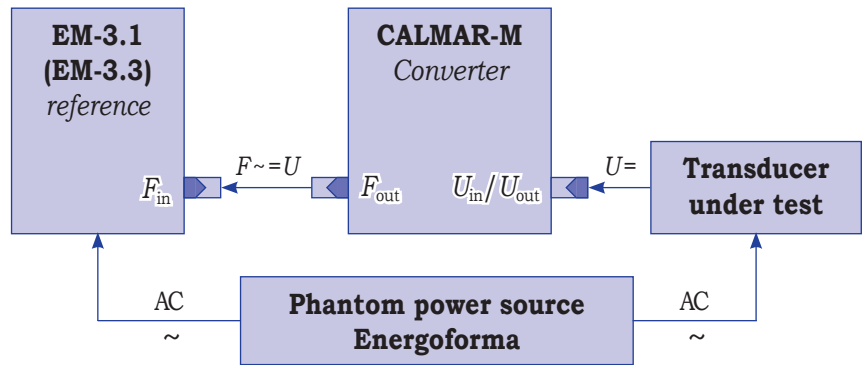
Energiforma 3.3

MTS ME 3.1KM

1 Converter

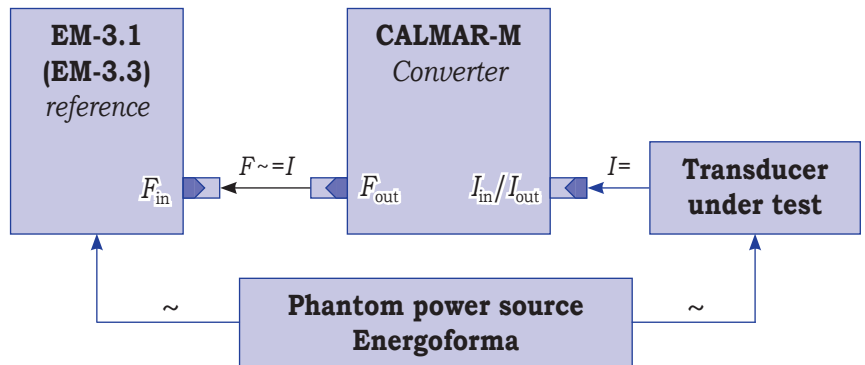
1.1 Measures DC voltage and converts it into a proportional frequency signal.

The function allows voltage, current, power and frequency transducers to be calibrated with standardized DC voltage signals (0...0.2 V, 0...5 V, 0...10 V, -5 ...5 V, and -10...10 V ranges) using conventional AC meter test systems.



1.2 Measures DC current and converts it into a proportional frequency signal.

The function allows voltage, current and power transducers to be calibrated with standardized DC current signals (0...20 mA, 4...20 mA, 0...5 mA, and -5...5 mA) using conventional AC meter test systems.



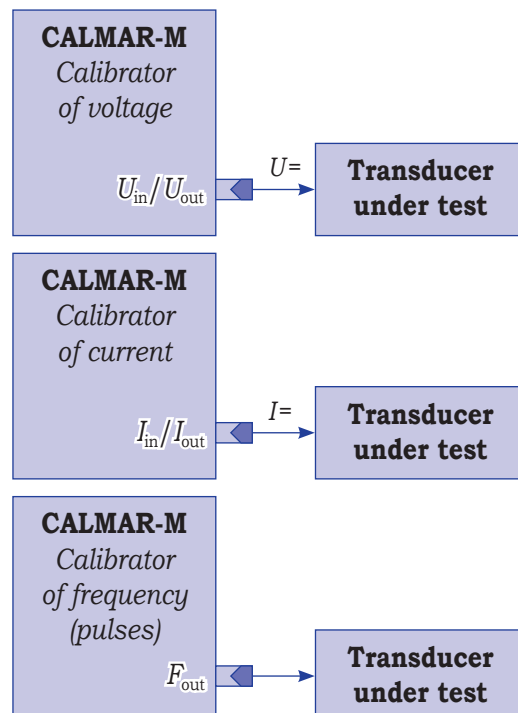
2 Calibrator

2.1 Generates DC voltage, DC current and frequency signals according to a user-specified model.

Ranges of output signals:

- DC voltage U_{out} : -10.5...+10.5 V;
- DC current I_{out} : -24...+24 mA;
- Pulse repetition frequency F_{out} : 0...9999 Hz.

The signals are used to test and calibrate instrument transducers, thermocouple converters and other electrical measurement devices with standard DC current and voltage outputs.



3 Comparator

3.1 Determines measurement errors of electric energy meters by the comparison method.

Frequencies on the reference meter and meter-under-test outputs are compared considering constants of the meters*.

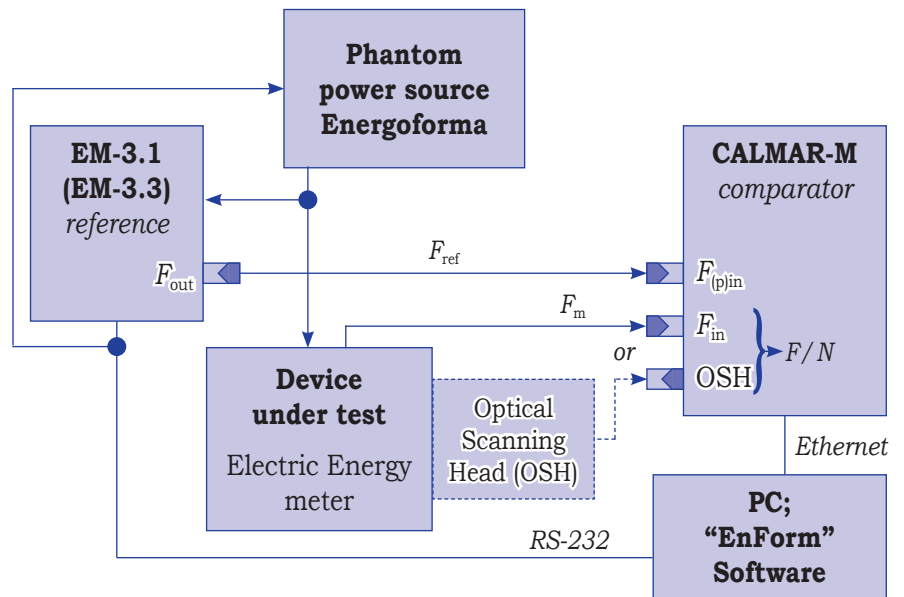
Pulse repetition range:

from 0.001 to 100 000 Hz;

Pulse amplitude range: 3 to 15 V;

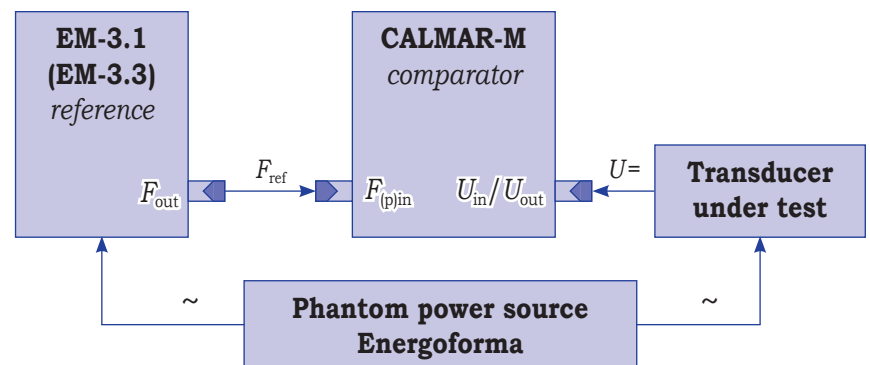
Ratio of frequencies: 0.000001 to 1.0.

* Meter constant represents the relation between the amount of energy measured by the meter and the number of pulses on its pulse output.



3.2 Determines measurement errors of Electrical Power Transducers (EPT) with standard DC voltage outputs

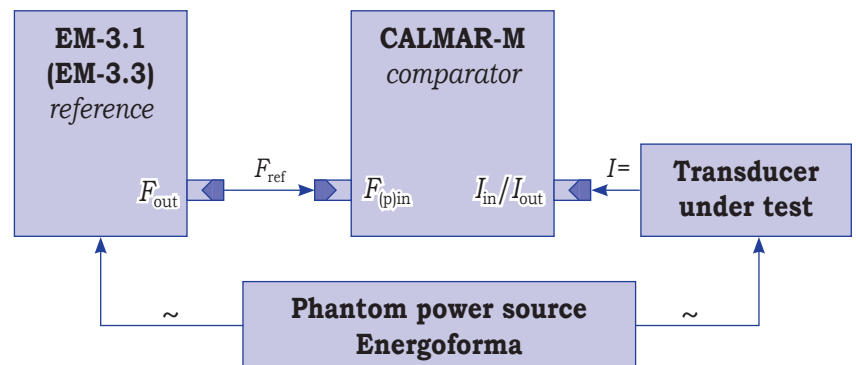
ranging from 0 to 0.2 V, 0 to 5 V, 0 to 10 V, -5 to 5 V, and -10 to 10 V**.



3.3 Determines measurement errors of Electrical Power Transducers (EPT) with standard DC current outputs

ranging from 0 to 20 mA, 4 to 20 mA, 0 to 5 mA, and -5 to 5 mA**.

** The measurement error is determined by converting an output current (or voltage) signal of the transducer under test into the frequency signal, which is then compared with the frequency signal taken from the reference meter (e.g., Energomonitor 3.1KM) considering their pulse/energy ratios.



Specifications

Measured or generated parameters	Ranges	Limits of intrinsic measurement error or error of output setting		Notes
		CALMAR-M-0.05	CALMAR-M-0.02	
<i>Measurement error: reducial ($\Delta X/X_n$, %)</i>				
Input DC voltage U_{in} , V	0 ... $\pm 1.5U_n$	± 0.05	± 0.02	$U_n = 0.2; 5; 10$
Input DC current I_{in} , mA	0 ... $\pm 1.5I_n$			$I_n = 5; 10; 20$
<i>Error of output setting: absolute (ΔX)</i>				
Output DC voltage U_{out} , V	0 ... ± 10.5	± 5.3 mV	± 2.3 mV	
Output DC current I_{out} , mA	0 ... ± 24	± 0.012	± 0.005	
Pulse repetition frequency on the pulse input F_{in} , Hz	0 ... 100 000	$\pm(0.1 + 3 \cdot 10^{-5} F_{in})$		Amplitude 3 to 15 V
Pulse repetition frequency (proportional to an analogue signal being converted) on the pulse output $F_{p.out}$, Hz	0 ... 6000	$\pm(1.0 + 3 \cdot 10^{-5} F_{p.out})$		$f_n = 4000$ Hz; amplitude 4 to 5.5 V
Pulse repetition frequency (related to generation of frequency signals) on the pulse output F_{out} , Hz	0 ... 9999 in 1.0 steps	$\pm 3 \cdot 10^{-5} F_{out}$		Amplitude 4 to 5.5 V

CALMAR-M – key component of the test system

