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*Making energy visible*

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**MULTI-PURPOSE TEST SYSTEM FOR CALIBRATION  
OF SMART METERS CONNECTED TO ELECTRONIC TRANSFORMERS  
WITH LOW-POWER ANALOGUE OUTPUTS**

# **MTS-ME 3.1KM-E**

**ACCURACY CLASSES: 0.02; 0.05**



Error  
calculator  
**Calmar-S**

**SW Enform-MTS-E**



Software:

- controls the waveform generator Energoforma 3.1KM-E and the reference meter Energomonitor 3.1KM-E
- receives the results of measurement error calculation from the Calmar-S
- creates test reports and maintains the database of meters

Waveform generator  
**Energoforma 3.1KM-E**

External voltage amplifier **VA-6.1**

Reference meter  
**Energomonitor 3.1KM-E**

**Device (smart meter) under test**



## Sphere of application

Testing and calibration of the smart energy meters of accuracy classes 0.2S (or less accurate) specified by IEC 60044-X standards

*Basic customers:* manufacturers of smart meters, accredited metrological labs, and certification bodies.

## Accuracy specifications (as regards testing of IEC 60044 devices)\*

| Measured values   | Measurement ranges                  | Measurement error               | Notes                                    |
|---|-------------------------------------|---------------------------------|--|
| RMS of AC voltage ( $U_U$ )   | 1 mV ... 12 V                       | Relative, %, or less            | $U_{U_{nom}}$ : 10 mV; 100 mV; 1 V; 10 V |
|   |                                     | $\pm 0,02$                      | $U_{U_{nom}} > 2 V$                      |
|   |                                     | $\pm 0,03$                      | $U_{U_{nom}} \leq 2 V$                   |
| RMS of AC current ( $I$ )   | 0,1 mV ... 12 V                     | Relative, %, or less            | $U_{I_{nom}}$ : 1, 10, 100 mV; 1, 10 V   |
|   |                                     | $\pm 0,02$                      | $U_{I_{nom}} > 2 V$                      |
|   |                                     | $\pm 0,03$                      | $U_{I_{nom}} \leq 2 V$                   |
| Active electrical power ( $P$ )   | 0,01 $P_{nom}$<br>to 1,44 $P_{nom}$ | Relative, %, or less            | $0,9 <  \cos \varphi  < 1,0$             |
|   |                                     | $\pm 0,02$                      | $U_{nom} > 2 V$                          |
|   |                                     | $\pm 0,03$                      | $U_{nom} < 2 V$                          |
| Power factor ( $PF=P/S$ )   | 0,1 to 1,0                          | Absolute<br>$\pm 0,001$         |  |
| AC frequency ( $f_1$ )  | 40 to 70                            | Absolute, Hz<br>$\pm 0,001$     |  |
| Phase angle between the fundamental harmonics of the input voltage and input current in the same phase ( $\varphi_1$ ), degrees | 0 to 360                            | Absolute, degrees<br>$\pm 0,01$ |  |

\* Other accuracy specifications – as applied to MTS-ME 3.1KM.

Generator Energoforma 3.1KM-E power output: at least 1 VA per a channel.

## Calibrating the smart meter (principle diagram)

