

# ZERA

MT3000 Series

## Three- phase Reference Standard



## Moving Test MT 3000

Keep ahead with

**Modular Design**

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## MT3000 Series

### The modular concept

The MT3000 is based on a real modular design concept to provide the greatest possible flexibility for a comprehensive testing of metering installations in the field.

The stable casing made of aluminium frames looks appealing and support the functionality of the system. A coloured 10,4" TFT display visualize the high quality of the system.

The MT3000 system is distinguish oneself by its excellent menu guided operation via the built in soft-keys and the coloured 10.4" TFT-display.

Because of the real modular design concept the MT3000 system comprises of various interchangeable modules to configure the system individually according to customer requirements. A system upgrade by adding various modules with new functionality can be easily done at any time without opening the calibration seal. The protection of designs has been registered under approval No. 20111830.0



### Features

- A consistently modular design allows a system upgrade at any time.
- Excellent user-guidance.
- Many configuration possibilities by adding various modules.
- Unique long-term and temperature stability of the measuring module.
- Measurement is also possible via error compensated Clip-on CT modules up to 120A.
- Extendable Compact-Flash-Memory for measurement results and customer data.
- Windows based data management software MTVis for evaluation of the test results.
- Current measurement up to 10.000A by using a required current sensor.
- Voltage measurement up to 40.000V by using a high voltage stick.
- No additional error for reactive measurement.

### Functions

The MT3000 reference standard supports the following functions:

- Energy meter testing of the accuracy classes 0.2s, 0.2, 0.5, 1 and 2 for 2-wire, 3-wire and 4-wire circuits.
- Power and energy measurement of active, reactive and apparent energy.
- 4 quadrant measurement.
- Frequency-, phase angle- and power factor measurement.
- Harmonic waveform analysis for voltage and current up to the 40<sup>th</sup> THD
- Harmonic analysis through selective power measurement.
- Waveform sampling and displaying.
- Vector diagram display.
- Rotary field display.
- Operating burden measurement on instrument transformers for CT and PT.
- Ratio test on PT`s and CT`s by simultaneous measurement of both primary and secondary values in CT connected metering systems.
- Testing of voltage, current and power transducers.

### Data management

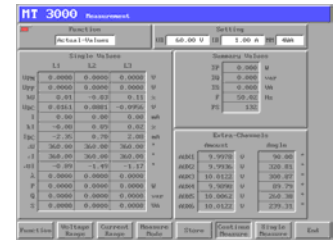
For later download on a PC the operator can store all measuring values on a Compact-Flash-Memory-Card. The data management software MTVis provides the ability to transfer the data between PC and MT3000 on a bi-directional way.

For data representation, the operator can print all results in a test report.

### Actual values Measurement

All instantaneous values are displayed simultaneously.

- RMS values for AC and DC components of all voltages and currents phases.
- All phase angles between voltage and current.
- Active, reactive and apparent power.
- Frequency and phase rotation.
- Power factor.



### Vector Display

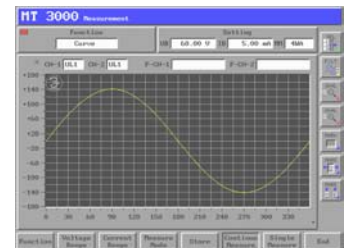
The coloured vector diagram display for voltage and current makes it very easy to detect wiring faults in voltage and current circuits.

All measured values can be stored on the Compact-Flash-Memory according to customer information data.



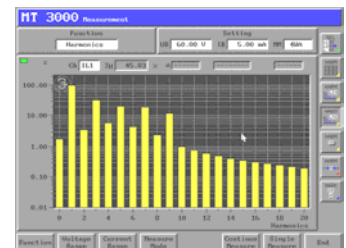
### Wave form Display

The wave form display for voltage and current serves for analysing of the signal quality. Two channels can be measured and displayed simultaneously. The measured waveform can be stored according to the customer information data on the memory card. This function provides also the ability to scan the measured signal by using two cursors and to display the scanned values referring to the cursor position on the screen.



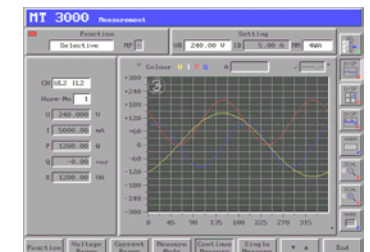
### Harmonic Measurement

Harmonic spectrum measurement in voltage and current up to the 40<sup>th</sup> THD conforming to EN 50160. The harmonic spectrum can be displayed in a chart or in a diagram. All measured harmonic values can be stored according to the customer information data on the Compact-Flash-Memory. The system has also the ability to scan the measured harmonic by using a cursor and to display the scanned values referring to the cursor position on the screen.



### Selective Power Measurement

The selective power measurement serves for analysing of specific harmonics measured in the voltage and current circuit. The system can display the voltage, current and power values of the selected measuring channel as numeric values, wave forms and vector diagram. All wave forms can be scanned by using a cursor and the numeric value of the specific cursor position is displayed on the screen.



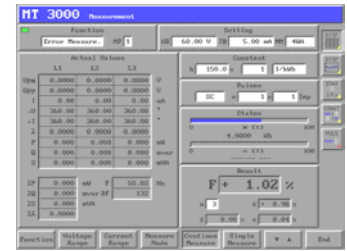
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### Accuracy Test

By entering of all relevant parameter like meter constant and the number of pulses the system can perform the error measurement on electricity meters. The system is able to determine the percentage error including all statistical values to store it according to the customer information data.

In order to inform the operator about the status of the measurement a graph bar will indicate continuously the measured energy as well as the detected metrology pulses from the unit under test.



### Pulse output Test

With this function the pulse output of an energy meter can be tested for both contact and S0-interfaces. To be sure that the pulse output and also the metrology of a meter is operating properly the MT3000 can compare both with each other and display the percentage deviation. The result can be stored according to the customer information data on the Compact-Flash-Memory.



### Operating burden Measurement

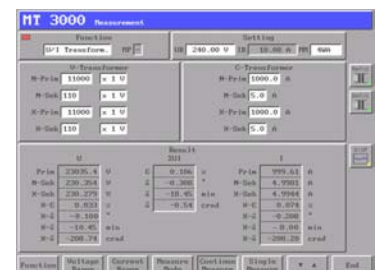
For verification of the load on an instrument transformer in a metering installation the MT3000 system is equipped with a feature to measure the operating burden on voltage and current transformers. Beside the determined conductance and resistance of a transformer the unit will display all instantaneous values of the measuring circuit in one screen. The results can be stored according to the customer information data on the Compact-Flash-Memory.



### Ratio Measurement

The MT3000 carries out the ratio test on transformers by simultaneously measurement of primary and secondary values.

The primary measurement can be performed with error compensated clip-on CT's, flexible clamps or other measuring sensors. The secondary measurement can be conducted directly or by using clip-on CT's. Ratio, errors and phase angles between primary and secondary side of a transformer are tested. The results can be stored according to the customer information data on the Compact-Flash-Memory.



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### Accessories

#### Transport case

Rigid and stable trolley transport case with wheels and an inlay made of foamed plastic.

For a secure transport of the MT3000 unit including accessories such as cable set, photo electric scanning head, clip-on CT's.



#### DKD Calibration Certificate

DKD-calibration certificate of the MT3000 system is traceable to international standards.



#### Quick connection cable set

The quick connection cable set serves for an easy connection of the voltage and current measuring circuit. The quick connecting cable set has been especially designed to minimize the risk of wiring faults and to speed up the preparations for the measurement in the field.



#### Photo electric scanning head

The photo electric scanning head TK323 serves for detection of flashing LED's on a static meter or rotor disc of electromechanical meters. The holding facility is especially designed for mounting on various meter housings with different shapes in the field.



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### Infrared data head

With the magnetic infrared data head TK117 it is possible either to detect metrology pulses from a flashing LED or to read the internal data of a static meter.



### Tripod

For a comfortable operation while measuring in the field the MT3000 measuring system can be mounted on a tripod.



### Windows control software

By using the windows based control software SSM3000 the MT3000 system can be controlled by an external PC. For later evaluation or report printing the measuring results will be stored in the internal data base.



### Testing of transducers

With the additional module MT3303 it is possible to test various types of measuring transductor. The MT3303 is equipped with six free programmable DC-measurement inputs. Each of them can measure up to +/- 10 Volts and currents up to +/- 20 mA with an accuracy of <math><0,1\%</math>. All primary and secondary values are simultaneously displayed on the screen.



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### Error compensated Clip-on CT's up to 120A

The MT3402 is an error compensated Clip-on CT adapter for current measurements up to 120 A and can be used as extension of the measuring range for the MT3000 system. It can be re-calibrated independently from the MT3000 unit because all calibration data are stored internally in a chip. A calibration report traceable to international standards belongs to the MT3402.



### High current Clip-on CT's up to 1.000A

The MT3403 is a Clip-on CT adapter for current measurements up to 1000 A. It serves especially for clamping on thick cables with a diameter of up to 53mm. The Clip-on CT adapter MT3403 can be used as extension of the measuring range on the MT3000 system.



### Flexible current clamp up to 10.000A

The MT3404 is a flexible measuring adapter for current measurements up to 10.000 A on cables, bars and cores. The flexible current sensor MT3404 can be used as extension of the measuring range on the MT3000 system.



### High Voltage stick up to 40.000V

The MT3405 is a measuring adapter for primary voltage measurements on power transmission lines up to 40KV. The high-voltage measuring sensor MT3405 can be used as extension of the measuring range on the MT3000 system.



### High Current stick up to 2.000A

The MT3406 is a measuring adapter for primary current measurements on power transmission lines up to 2000 A. The high-current measuring sensor MT3406 can be used as extension of the measuring range on the MT3000 system.



### Further options

- 3- phase transformer ratio testing prim/sec (Module MT3303 required)
- 1- phase current measurement direct up to 120A cl. 0.02 (Module MT3304 required)
- 3- phase current measurement direct up to 120A cl. 0.02 (Module MT3305 required)
- Error compensated clip- on CT for 12A measurement (Module MT3401 required)
- Error compensated clip- on CT for 120A measurement (Module MT3402 required)
- Clip- on CT for 1000A measurement (Module MT3403 required)
- Flexible current sensor for 10000A measurement (Module MT3404 required)
- High voltage stick for 40000V primary measurement (Module MT3404 required)
- High current stick for 2000A primary measurement (Module MT3405 required)
- VCS 320 power source control (Module MT3605 required)
- Meter reading according to IEC 1107 (Module TK117 required)
- Photo electric scanning head (Module TK323 required)

### Technical data

MT3000 Reference Standard	MT3301 Class 0.02	MT3302 Class 0.05
Power supply	85 ... 132VAC / 170 ... 265 VAC, 47... 63Hz	85 ... 132VAC / 170 ... 265 VAC, 47... 63Hz
Power consumption	Approx. 50 VA	Approx. 50 VA
Voltage measurement	40mV / ... 300V	40mV / ... 300V
Voltage ranges	2 – 15 – 60 – 125 - 250	2 – 15 – 60 – 125 - 250
Current measurement (direct)	4mA ... 12A	4mA ... 12A
Current ranges	25 – 50 – 100 – 250 - 500 mA 1 - 2,5 – 5 – 10 A	25 – 50 – 100 – 250 - 500 mA 1 - 2,5 – 5 – 10 A
Fundamental frequency	15 ... 70Hz	15 ... 70Hz
Bandwidth	DC ... 1000 Hz	DC ... 1000 Hz
Measuring modes	4 wire active 4 wire reactive true 4 wire reactive cc 4 wire apparent 3 wire active 3 wire reactive true 3 wire reactive cc A 3 wire reactive cc B	4 wire active 4 wire reactive true 4 wire reactive cc 4 wire apparent 3 wire active 3 wire reactive true 3 wire reactive cc A 3 wire reactive cc B
Accuracy class rating according to PTB for measuring of power and energy. <sup>1 2 4</sup> <i>Independent of the measuring mode.</i>	0.02	0.05
Voltage measurement error <sup>1 2 4</sup>	< 0,01% for AC measurement < 0,01% for DC measurement	< 0,02% for AC measurement < 0,02% for DC measurement
Voltage long term drift	< 40 ppm/Year	< 80 ppm/Year
Voltage temperature drift	< 4 ppm/K	< 8 ppm/K
Voltage measurement stability <sup>2 3 4 6</sup>	< 25 ppm	< 50 ppm
Current measurement error <sup>4</sup>	< 0.01% (20mA...12A) for AC measurement < 0.1% (4mA...20mA) for AC measurement < 1% (20mA...12A) for DC measurement	< 0.02% (20mA...12A) for AC measurement < 0.2% (4mA...20mA) for AC measurement < 2% (20mA...12A) for DC measurement
Current temperature drift	< 2 ppm/K	< 4 ppm/K
Current long term drift	< 40 ppm/Year	< 80 ppm/Year
Current measurement stability <sup>2 3 4 6</sup>	< 35 ppm	< 70 ppm
Power/energy measurement error <sup>2 3 4 8</sup>	<200ppm	<500ppm
Power/energy temperature drift	< 5 ppm/K	< 10 ppm/K
Power/energy long term drift <sup>8</sup>	< 80 ppm/Year	< 160 ppm/Year
Power/energy measurement stability <sup>2 3 4 6 8</sup>	< 60 ppm	< 120 ppm
Phase angle measurement error <sup>2 3 4</sup>	< 0.01°	< 0.02°
Frequency measurement error	+/- 0,01Hz	+/- 0,01Hz
Harmonic measurement error <sup>5</sup>	< 0,1%	< 0,2%
Temperature range	0° ... 45° C	0° ... 45° C
Rel. Humidity, not condensing	max. 95%	max. 95%
Max. dimensions (HxWxD)	448 x 321 x 168mm	448 x 321 x 168mm
Weight	Approx. 9 Kg	Approx. 9 Kg

<sup>1</sup> Related to the reading value with optimal range setting.

<sup>2</sup> In the range of 10V ... 300V and 20mA ... 12A

<sup>3</sup> Independent of the measuring mode

<sup>4</sup> With basic frequency in the range of 40 ... 70Hz

<sup>5</sup> For harmonic measurement from the 1<sup>st</sup> to the 20<sup>th</sup>

<sup>6</sup> Integration time >60s

<sup>7</sup> For voltage <100mV and frequency in the range of 48 ... 58Hz

<sup>8</sup> Refer to the apparent power

**Subject to alteration !**