

ZERA

MT3000 Series

Moving Test - MT3000

Three-Phase Reference Standard



Flexibility by Modular Design

The Modular Concept

The MT3000 is based on a modular design concept to provide greatest possible flexibility for a comprehensive testing of metering installations on-site and security of investment.

Additional to the standard configuration you can extend the Reference Meter by corresponding modules. E.g. choose the measuring module of accuracy class 0.02 instead of 0.05 or choose the module for direct measurement up to 120 A instead of 12 A.



The MT3000 system is distinguished by its user-friendly menu guided operation via the built in soft-keys and the coloured 10.4" TFT-display.

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 120 A
- Especially configured USB-stick for measurement results and customer data
- Windows based data management software MTVis for evaluation of the test results
- Current measurement up to 10000 A by using a required current sensor
- 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 40th 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 PTs and CTs by simultaneous measurement of both primary and secondary values in CT connected metering systems
- Testing of voltage, current and power transducers

Data Management

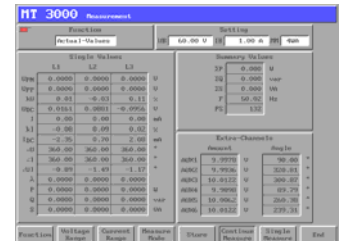
For later download on a PC the operator can store all measuring values on an especially configured USB-stick. The data management software MTVis provides the ability to transfer the data between PC and MT3000 on a bi-directional way.

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 ($\cos \varphi$)



Vector Display

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

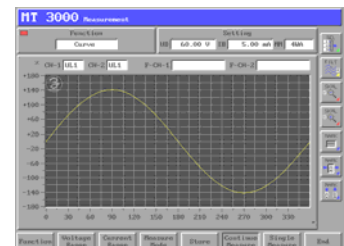
All measured values can be stored on USB-stick according to customer information data.



Waveform Display

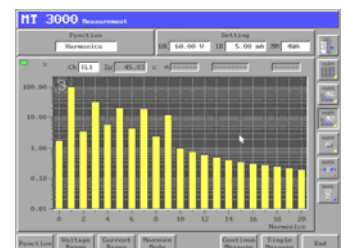
The waveform display for voltage and current serves for analysing of the signal quality. Two channels can be measured and displayed simultaneously. The measured waveform can be stored according to the customer information data on USB-stick.

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.



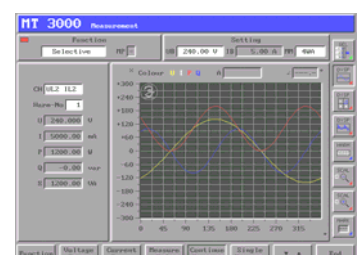
Harmonic Measurement

Harmonic spectrum measurement in voltage and current up to the 40th 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 USB-stick. 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.



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 SO-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 a USB-stick.



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 USB-stick.



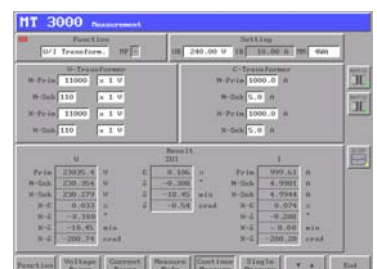
Ratio Measurement

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 AC current clamps, flexible clamps or other measuring sensors. The secondary measurement can be conducted directly or by using AC current clamps.

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 USB-stick.



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, AC-current clamps.



DAkKS Calibration Certificate

DAkKS-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.

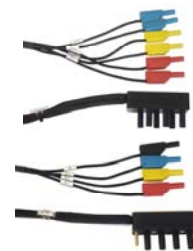


Photo Electric Scanning Head

The photo electric scanning head TK326 serves for detection of flashing LEDs 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.



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 transducer. 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 $< 0.1\%$. All primary and secondary values are simultaneously displayed on the screen.



Error Compensated AC-current clamps up to 120 A

The MT3422 is an error compensated AC-current clamp 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 MT3422.



High Current Clamps up to 1200 A

The MT3403 is an AC current clamp for current measurements up to 1200 A. It serves especially for clamping on thick cables with a diameter of up to 53 mm.



The AC current clamp MT3403 can be used as extension of the measuring range on the MT3000 system.

Flexible AC Current Probe up to 10000 A

The MT3404 is a flexible AC current probe for current measurements up to 2000 A (MT3411) or up to 10000 A (MT3404) on cables, bars and cores.



The flexible AC current probe can be used as extension of the measuring range on the MT3000 system.

Options

- **MT3303:** Three-phase transformer ratio testing prim./sec.
- **MT3305/3307:** Three-phase 120 A measurement, class 0.02 / 0.05 (direct)
- **MT3422/3417:** Error compensated AC current clamps up to 120 A / 300 A
- **MT3403/3413:** AC current clamp up to 1.200 A / 1.800 A
- **MT3411/3404:** Flexible AC current probe up to 2.000 A / 10.000 A
- **MT3412:** Adapter for MT3411/MT3404 for connection with MT3000
- **MT3450:** Temperature sensor
- **TK117:** Infrared scanning head for meter reading according to IEC62056-21
- **TK118-05:** Photo electric scanning head (pulse detection)
- **TK326:** Photo electric scanning head (pulse/disc detection)

All data refer to MT3000 Reference Meter with integrated module MT3305/MT3307.

Technical Data

	MT3000 – 120 A Reference Meter	MT3305 Class 0.02	MT3307 Class 0.05
General			
Power supply	85 ... 265 V, 47 ... 63 Hz		
Power consumption	~ 50 VA		
Temperature range, operation	-10° ... + 50° C		
Temperature range, storage	-15° ... + 65° C		
Relative humidity (not condensing)	max. 95 %		
Dimensions (DxWxH)	448 x 321 x 188 mm		
Weight	~ 10 kg		
Safety			
IP class according to DIN EN 60529	IP30		
Declaration of conformity	CE conform		
Protection class according to DIN EN 61140	I		
Overvoltage category voltage measurement	CAT IV 600 V		
Reference meter			
Measuring modes	2WA / 2WR / 2WAP 3WA / 3WR / 3WRCA / 3WRCB / 3WAP 4WA / 4WAb / 4WR / 4WRb / 4WRC / 4WAP / 4WAPb		
Fundamental frequency	40 ... 70 Hz		
Bandwidth	40 ... 3000 Hz		
Sampling	16 bit 504 samples/period		
Accuracy class for measuring of power / energy	0.02	0.05	
Angle measurement accuracy 3) 4) 11)	< 0.01°		
Frequency measurement deviation	± 0.01 Hz		
Voltage Measurement			
Voltage measurement	40 mV... 600 V ≈		
Voltage range(s)	2 V, 15 V, 60 V, 125 V, 250 V, 500 V		
Voltage measurement accuracy 5)	< 0.01 % @ 10V .. 500 V < 0.1 % @ 10 V .. 500 V (DC)	< 0.02 % @ 10V .. 500 V (AC) < 0.1 % @ 10 V .. 500 V (DC)	
Voltage measurement temperature drift 3)	< 4 x 10 E-6 / K		
Voltage measurement stability 1) 3) 11)	< 25 x 10 E-6		
Voltage measurement long term stability 2) 3) 11)	< 40 x 10 E-6 / Year		
Current measurement			
Current measurement	1 mA ... 120 A ~		
Current range(s)	25 mA, 50 mA, 100 mA, 250 mA, 500 mA 1 A, 2.5 A, 5 A, 10 A, 25 A, 50A, 100 A		
Current measurement accuracy 5)	< 0.01 % @ 20 mA ... 120 A < 0.02 % @ 10 mA ... < 20 mA < 0.04 % @ 5 mA ... < 10 mA	< 0.02 % @ 20 mA ... 120 A < 0.04 % @ 10 mA ... < 20 mA < 0.1 % @ 5 mA ... < 10 mA	
Current measurement temperature drift	< 4 x 10 E-6 / K @ 20 mA ... 120 A		
Current measurement stability 1) 4) 11)	< 25 x 10 E-6		
Current measurement long term stability 2) 4) 11)	< 40 x 10 E-6 / Year		
Power Measurement			
Power/energy measurement accuracy 3) 4) 5) 6) 11)	< 0.02 %		
Power/energy measurement temperature drift 3) 4) 11)	< 8 x 10 E-6 / K		
Power/energy measurement stability 1) 3) 4) 11)	< 50 x 10 E-6		
Power/energy measurement long term stability 2) 3) 4)	< 80 x 10 E-6 / Year		

1: Stability over 1hour (every minute one measurement with $t_i = 10$ s)
 2: Stability over 1year (every month one measurement over one hour) 10 s)
 3: From 10 V ... 500 V
 4: From 20 mA ... 120 A
 5: Related to the read value at optimum range selection
 6: Related of apparent power
 11: From 45 Hz ... 65 Hz

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Technical Data

	MT3000 Reference Meter	MT3301 Class 0.02	MT3302 Class 0.05
General			
Power supply	85 ... 265 V, 47 ... 63 Hz		
Power consumption	~ 50 VA		
Temperature range, operation	-10° ... + 50° C		
Temperature range, storage	-15° ... + 65° C		
Relative humidity (not condensing)	max. 95 %		
Dimensions (DxWxH)	448 x 321 x 168 mm		
Weight	~ 9 kg		
Safety			
IP class according to DIN EN 60529	IP30		
Declaration of conformity	CE conform		
Protection class according to DIN EN 61140	I		
Reference meter			
Measuring modes	2WA / 2WR / 2WAP 3WA / 3WR / 3WRCA / 3WRCA / 3WRCA / 3WRCA / 3WRCA / 3WRCA 4WA / 4WAb / 4WR / 4WRb / 4WRC / 4WAP / 4WAPb		
Fundamental frequency	15... 70 Hz		
Bandwidth	DC ... 3000 Hz		
Sampling	16 bit 504 samples/period		
Accuracy class for measuring of power / energy	0.02		0.05
Angle measurement accuracy 3) 4) 11)	< 0.01°		
Frequency measurement deviation	± 0.01 Hz		
Voltage Measurement			
Voltage measurement	40 mV... 300 V ≈		
Voltage range(s)	2 V, 15 V, 60 V, 125 V, 250 V		
Voltage measurement accuracy 5)	< 0.01 % @ 30V .. 300 V (AC) < 0.1 % @ 30 V .. 300 V (DC)		< 0.02 % @ 30V .. 300 V (AC) < 0.1 % @ 30 V .. 300 V (DC)
Voltage measurement temperature drift 3)	< 3 x 10 E-6 / K		
Voltage measurement stability 1) 3) 11)	< 25 x 10 E-6		
Voltage measurement long term stability 2) 3) 11)	< 40 x 10 E-6 / Year		
Current measurement			
Current measurement	4 mA ... 12 A ≈		
Current range(s)	25 mA, 50 mA, 100 mA, 250 mA, 500 mA 1 A, 2.5 A, 5 A, 10 A		
Current measurement accuracy 5)	< 0.01 % @ 20 mA ... 12 A (AC) < 0.1 % @ 4 mA ... < 20 mA (AC) < 1 % @ 20 mA ... 12 A (DC)		< 0.02 % @ 20 mA ... 12 A (AC) < 0.2 % @ 4 mA ... < 20 mA (AC) < 1 % @ 20 mA ... 12 A (DC)
Current measurement temperature drift	< 2 x 10 E-6 / K @ 20 mA ... 12 A (AC) < 0.025 % / K @ 20 mA ... 12 A (DC)		
Current measurement stability 1) 4) 11)	< 35 x 10 E-6		
Current measurement long term stability 2) 4) 11)	< 40 x 10 E-6 / Year		
Power Measurement			
Power/energy measurement accuracy 3) 4) 5) 6) 11)	< 0.02 %		
Power/energy measurement temperature drift 3) 4) 11)	< 5 x 10 E-6 / K		
Power/energy measurement stability 1) 3) 4) 11)	< 60 x 10 E-6		
Power/energy measurement long term stability 2) 3) 4) 11)	< 80 x 10 E-6 / Year		
			04.09.2018
1: Stability over 1 hour (every minute one measurement with $t_i = 10$ s)			
2: Stability over 1 year (every month one measurement over one hour) 10 s			
3: From 30 V ... 300 V			
4: From 20 mA ... 12 A			
5: Related to the read value at optimum range selection			
6: Related of apparent power			
1t: From 45 Hz ... 65 Hz			
Subjects to alteration.			