

## MT Product Series

Our portable devices are designed especially for testing of meter installations on-site. Its functionality meets all requirements for comprehensive meter testing. We distinguish between reference meters, sources and test systems.



MT-Serie\_PROS\_EXT\_GB\_V103

We offer a series of reference meters which meet a variety of requirements with accuracy classes from 0.2 up to 0.02. While testing meter installations on-site often a sufficient load is missing to achieve reliable results. You can generate currents up to 120 A and voltages up to 500 V with our sources. Our definition of test systems is a reference meter with an integrated source. Test systems are particularly usable for testing meter installations with defined current and voltage and only one single device will be used.

### Product Lines



MT310s2

#### Reference Meters

We offer a series of reference meters which meet a variety of requirements. Primarily they are used for testing of meter installations on-site with accuracy classes from 0.2 up to 0.02.



MT551

#### Sources

While testing of meter installations on-site often a sufficient load is missing to achieve reliable results. You can generate currents up to 120 A and voltages up to 500 V with our sources.



MT78x

#### Test Systems

Our definition of test systems is a reference meter with integrated source. Test systems are particularly usable for testing meter installations with defined current and voltage and only one single device should be used.

## Summary of functionality

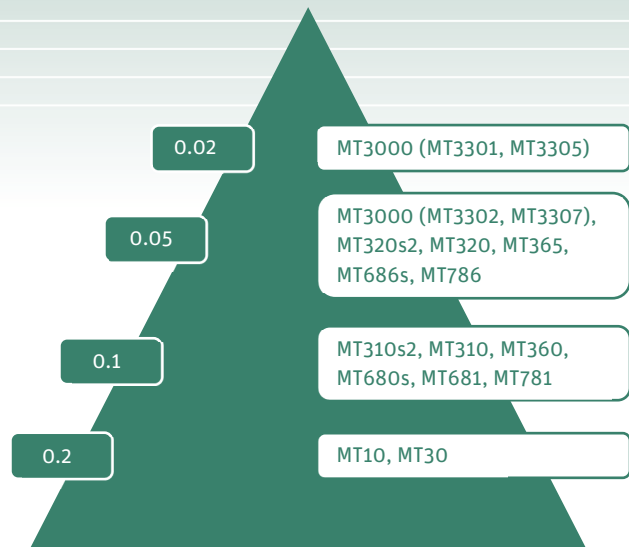
Function	Type	Reference Meter					Source			Test System	
	Device	MT10/30	MT3x0	MT3x0s2	MT36x	MT3000	MT400	MT500	MT551	MT68xs	MT78x
Actual values		X	X	X	X	X	X	X	X	X	X
4 <sup>th</sup> channel/effective values		-	-	X	-	-	-	-	-	-	-
Curve		X	X	X	X	X	0	0	X	X	X
Vector		X	X	X	X	X	X	X	X	X	X
Error		X	X	X	X	X	-	-	-	X	X
Harmonics		X	X	X	X	X	-	-	0	X	X
U transformer		-	-	-	X	X	-	-	-	-	X
I transformer		-	0	X	X	X	-	-	-	-	X
U burden		-	X	X	X	X	-	-	-	-	X
I burden		-	X	X	X	X	-	-	-	-	X
W register test		X	X	X	X	X	-	-	-	X	X
P register test		X	X	X	X	X	-	-	-	X	X
Selective measurement		0	0	X	X	X	-	-	-	0	X
Saving data		X	X	X	X	X	-	-	X	X	X
Control external source		-	X	X	X	X	-	-	-	-	-
Dosage		-	X	Z	X	X	-	-	-	X	X
Dosage time		-	-	-	-	X	-	-	-	-	-
Source curve form		-	-	-	-	-	-	-	0	0	0
Source harmonics		-	-	-	-	-	-	-	0	0	0
Automatic test procedure		-	-	Z	0	0	-	-	-	X	X
Additional channels (DC)		-	-	Z	-	0	-	-	-	-	-
tm/te transmitter test		-	-	-	-	X	-	-	-	-	-
Long-time measurement		-	-	X	X	X	-	-	-	-	-
Read out data of a meter		-	-	Z	-	X	-	-	-	-	-

Legend: X = Standard, 0 = optional, Z = in development, - = not available

Subjects to alteration.

## Accuracy classes of reference meters and test systems

Device	U <sub>max</sub>	I <sub>max</sub> **	Phases	Class
MT10	300 V	120 A	1	0.2
MT30	300 V	120 A	3	0.2
MT310	300 V	12 A	3	0.1
MT320	300 V	12 A	3	0.05
MT310s2	300 V	12 A	3	0.1
MT320s2	300 V	12 A	3	0.05
MT360	300 V	12 A	3	0.1
MT365	300 V	12 A	3	0.05
MT3301*	300 V	12 A	3	0.02
MT3305*	600 V	120 A	3	0.02
MT3302*	300 V	12 A	3	0.05
MT3307*	600 V	120 A	3	0.05
MT680s	500 V	120 A	1	0.1
MT686s	500 V	120 A	1	0.05
MT781	500 V	120 A	3	0.1
MT786	500 V	120 A	3	0.05



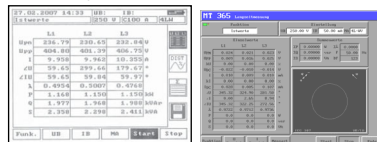
\* MT3000 series

\*\* Measurements with higher currents are possible via AC current clamps

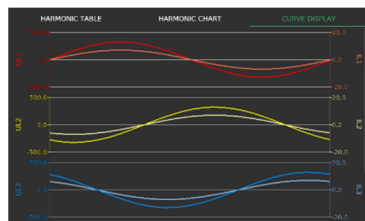
## Software features

ACTUAL VALUES	VECTOR DIAGRAM	POWER VALUES	RMS VALUES	
U <sub>PN</sub>	230.1390	230.0811	230.5231	V
U <sub>PP</sub>	399.8111	398.8444	398.7112	V
∠U	0.0000	119.997	240.057	°
kU	0.4276	0.4287	0.4637	%
I	4.9855	4.9941	4.9915	A
∠I	0.0127	119.996	239.997	°
kl	0.0976	0.1277	0.2160	%
∠UI	0.0157	-0.0014	-0.0097	°
λ	1.0000	1.0000	1.0000	
(4WA) P	1147.62	1149.05	1149.69	3446.36 W
(4WR) Q	0.2526	-0.0269	-1.1992	-0.9735 VAR
(4WAP) F	1147.67	1149.07	1149.65	3446.39 VA
F				49.9682 Hz

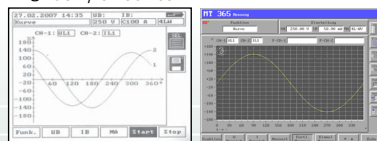
MT3x0s2 / s2 series



MT10/MT30/MT3x0 MT36x/MT3000



MT3x0s2 / s2 series



MT10/MT30/MT3x0 MT36x/MT3000

### Display of the currently measured values

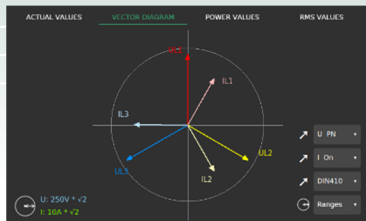
The 'Actual Values' displays the currently measured values as a table. The table view of the actual values provides a rapid overview for error analysis. The actual values measurement helps to assess the condition of the mains supply and the meter installation, for instance no voltage, no current, incorrect current polarity, symmetry and asymmetry, etc.

### Curve display

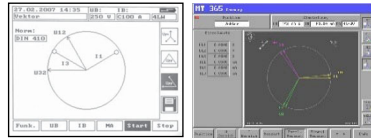
The 'Curve' display function displays the actual values of all the voltage and current channels as a waveform. One graph displays simultaneously the voltage and current values from one channel.

The graphs are scaled automatically based on the actual value amplitudes.

## Software features



MT3x0s2 / s2 series



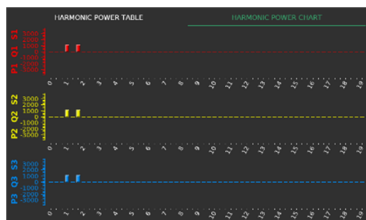
MT10/MT30/MT3x0 MT36x/MT3000

### Vector diagram

The 'Vector' diagram displays the actual values as vectors using various display options.

The vector diagram helps to locate circuit faults:

- Incorrect connections
- Wrong terminal and incorrect rotating field
- Polarity



MT3x0s2 / s2 series



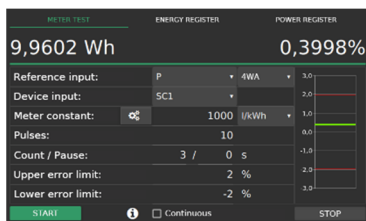
MT10/MT30/MT3x0 MT36x/MT3000

### Measurement of harmonics

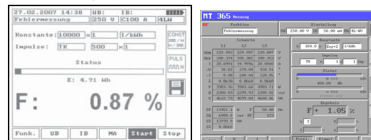
The 'Harmonics' function displays the actual values of the harmonics of all the channels referred to the fundamental harmonic. This enables to detect whether there are harmonic distortions in the current or voltage.

Due to the high sampling rate of the MT device harmonic distortions in voltage and current can be measured up to the 40<sup>th</sup> (according to the voltage quality standard DIN EN 50160).

The measured harmonic range can be displayed in table or graph with a various of scales.



MT3x0s2 / s2 series



MT10/MT30/MT3x0 MT36x/MT3000

### Determination of the measurement deviation

The Meter Test (also: 'Error values', 'Error measurement') detects the measurement deviation of a meter. This function compares the energy measured by the reference meter with the energy metered by the device under test. The energy detected by the device under test is transferred to the reference meter by a pulse sensor or by the user counting the pulses. When the measurement has finished, the measurement deviation of the device under test is displayed as a %.

*Especially with MT3x0s2: The error result will also be displayed in graphical view with the error limits.*

## Software features

	VOLTAGE BURDEN		CURRENT BURDEN		
	Burden L1	Burden L2	Burden L3		[ ]
UPN	230,565	230,535	230,883	V	
I	0,0001	4,9971	5,0018	A	
$\angle UI$	99,5459	0,0139	-0,0701	°	
Sb	0,0000	0,0217	0,0217	VA	
cos( $\beta$ )	-0,1658	1,0000	1,0000		
Sn	0,0000	2,1667	2,1656	%	
Nominal burden:				1 VA	
Nominal range:				1 V	
Wire cross section:				1 mm <sup>2</sup>	
Wire length:				1 m	

MT3x0s2 / s2 series



MT10/MT30/MT3x0 MT36x/MT3000

### Burden measurement

The burden measurement (also: 'voltage or current burden', 'burden values') can verify the operational burden on the secondary side of an instrument transformer in a meter installation on-site. This function allows to measure the operational burden of both, a voltage transformer and a current transformer. Considering the nominal voltage/current of the operational burden of the instrument transformer as well as the cable length and the cross-section, cos $\beta$  and operational burden in % will be displayed.

	Instrument		
X Prim	0,0001	A	
N Sec	0,0001	A	
X Sec	4,9963	A	
X Ratio	0,0000		
X- $\epsilon$	99,9985	%	
X- $\delta$	-21,5617	°	
X- $\phi$	-37,6323	crad	
X- $\theta$	-1293,70	arcmin	
N-Prim:	1,1 A	N-Sec:	1,2 A
X-Prim:	2 A	X-Sec:	2,1 A
Xc-Prim:	1,3 A	Xc-Sec:	1,4 A

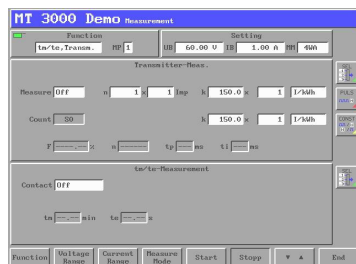
MT3x0s2



MT3x0

### Measurement deviation of instrument transformers

The function 'Current Transformer Values' (also: I-transformer measurement) determines the ratio of a current instrument transformer while in operation without having to disconnect the meter installation. In order to measure the high current on the primary side suitable current clamps are required. The result shows the ratio error and the phase shift of the transformer under test.

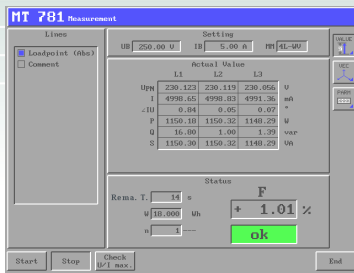


MT3000

### Detection of the pulse output

The function 'tm/te measurement' (also: tm/te transmitter) can detect additional pulse outputs or pulse inputs of meters (SO). The pulse outputs can either be compared with the energy measured by the reference meter or with the optical pulse output (LED) of the meter (meter under test). The tm/te measurement can be detected and displayed the measuring period (tm in min) as well as the reset time (te in s) of a maximum demand meter.

## Software features



MT36x/MT68xs/MT78x/MT3000

### Automatic measurement

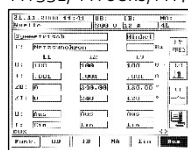
This function allows to edit and perform basic test sequences for testing electricity meters. All results are stored on the USB memory stick and further on can be evaluated with a suitable PC software.



MT551/ MT68xs/MT78x

### Load point setting

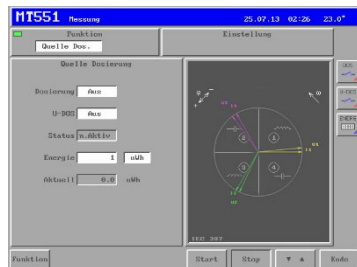
The function 'Source' (also: source value) allows to define and apply the required load points. The user can set the current and voltage values and the phase angle or power factor for each phase.



MT400/500

### Energy dosage

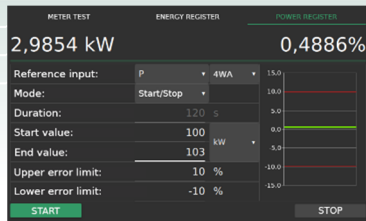
The 'Energy Dosage' (also: source dosage) is helpful for performing a register test of an electricity meter. Therefore, the corresponding MT device<sup>1</sup> defines the required energy which will be generated by the integrated current/voltage source<sup>2</sup> and sends it to the meter under test. The reference meter<sup>3</sup> serves as reference standard.



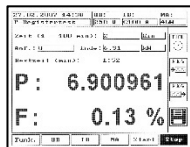
MT551/MT68xs/MT78x

- 1 MT551/MT68xs/MT78x
- 2 depending on the device type
- 3 integrated at all devices of type MT68xs/MT78x

## Software features



MT3x0s2



MT3x0



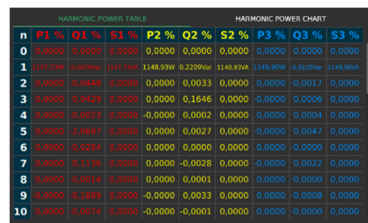
MT36x/MT68xs/  
MT78x/MT3000

### Register test

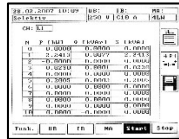
This function (also: W register/P register) allows to perform an accuracy test of the energy or power register of kW/h meters or maximum meters. Therefore, the energy consumption of a reference meter will be measured for a determined time period.

The comparison of the inserted values and the measured values of the reference meter shows the result in percentages of the measurement deviation.

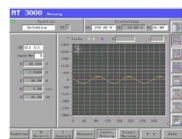
Energy register and maximum power of meters, which are connected to the mains, can be read-out by this function.



MT3x0s2 / s2 series



MT3x0



MT36x/MT68xs/  
MT78x/MT3000

### Selective measurement

This function (also: harmonic power) displays the active and reactive power components of each harmonic in each phase. The results clearly indicate the direction from which the harmonics originate in the mains resp. how large an effect the harmonics have on the mains.

*Especially with MT3x0s2: Display of the values relative to the fundamental (in %).*

ACTUAL VALUES	VECTOR DIAGRAM			POWER VALUES	PHASOR VALUES
	L1	L2	L3	AUX [ ]	
UPN	230,430	230,314	230,674	0,8470	V
∠U	0,0000	120,024	240,064	146,527	°
I	0,0001	4,9974	4,9970	0,0000	A
∠I	98,1594	120,019	239,998	0,0000	°

MT3x0s2 / s2 series

### Measurement with the 4<sup>th</sup> channel

The MT3x0s2 is equipped with an additional 4<sup>th</sup> voltage channel and an additional 4<sup>th</sup> connection for AC current clamps. These additional measuring channels can be used for optional function enhancement. Moreover, these additional measuring channels can be used to measure voltages on the protective earth and currents on the neutral conductor. This measurement can be useful e.g. for disturbances caused by harmonics.

The actual measurement values (also: effective values) of all four measurement inputs can be shown as a table.



## Software

With the test and control software WinSAM 7 portable devices of the MT devices can be controlled manually. This software also serves for compilation of individual test sequences and data logs as well as the data management.



## Accessories

All information for suitable accessories can be found in the product catalogue of each MT device on our website.

<https://www.zera.de/en/products/meter-testing/portable-reference-meters/>



## Tutorials

Helpful tips and information of handling the MT devices can be found on our website.

<https://www.zera.de/service/tutorials/>