

ZERA



Product Range 2011

Portable Reference Meters & Test Systems
Current & Power Sources
Stationary Meter Test Systems
Automatic and Semi-automatic Testing
Instrument Transformer Test Systems
CT/PT Test Components
Constant Current Source
Precision Power Calibration Systems



Further information to the products and product-lines presented in this catalogue can be found in the appropriate leaflet.

Visit our website: www.zera.de.

Product-range-2011_GB_V100

Status: 4th January 2011

Subject to alteration.

© Copyright 2011 ZERA GmbH

ZERA GmbH

Hauptstraße 392

53639 Königswinter

Germany

Phone.: +49 (0) 2223 704-0

Fax: +49 (0) 2223 704-70

E-mail: info@zera.de

www.zera.de

Table of Contents

Portable Meter Testing Moving Test.....	5
Reference Meter and Primary Standard	6
COM3003.....	6
RMM3000	6
MT3000 Reference Meter	7
MT365	8
MT310	8
MT30	8
Test System	9
MT3000 Test System.....	9
MT3606	10
MT681	10
MT781.....	11
Current and Power Sources.....	12
MT3000 Power Source.....	12
MT500.....	12
MT400	12
Stationary Meter Test System MTS	13
Power Source Systems - MTS series	14
Components, Power Source System MTS	15
Frequency Generator	15
Reference Meters	15
Amplifiers.....	16
Components, Test Bench MTS	17
Scanning Heads	19
Transformers.....	20
MTS Additional Components.....	21
Scanning Head Suspension	23
Different Types of Test Benches	24
Automatic and Semi-automatic Test Systems for Meter Manufactures	27
ITTS – Stationary and Mobile Instrument Transformer Test Systems.....	29
Stationary Instrument Transformer Test System ITTS.....	30
Mobile Instrument Transformer Test Systems ITTS mobil.....	31
CT/PT Testing Components ITTS.....	33
Constant Current Sources	35
Precision Power Calibration System.....	36

Portable Meter Testing | Moving Test

Portable meter test systems of ZERA covers reference meters, primary standards, test systems as well as current and power sources. All measurements can be performed according to IEC standard. Reference meters with accuracy classes 0.2 to 0.02 are commonly used for testing of meter installations and for observing error limits of electricity meters on-site.

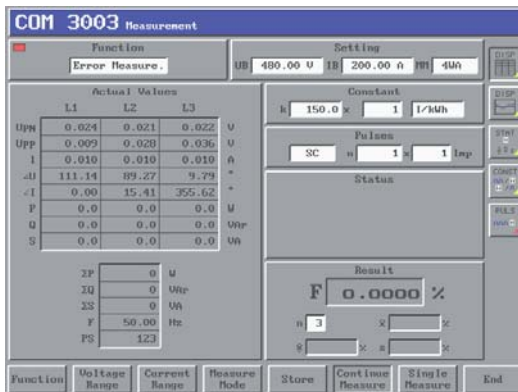
The primary standard with accuracy class 0.01 is used for very accurate testing of meters and reference meters.

Test systems are reference meters with integrated source. You can choose between systems with current source or current and voltage source. Test systems are especially useful if you need user-defined values for current and voltage while testing meter installation with only one device.





Primary standard with accuracy class 0.01



COM3003

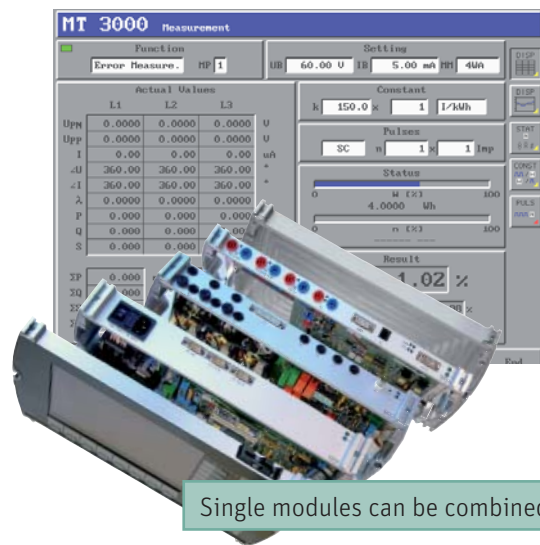
- Comparator
- Accuracy class 0.01
- AC/DC reference standard
- Primary standard, e. g. for meteorological institutes and calibration laboratories.
- Functions amongst others:
 - Actual values
 - Vectorial display
 - Curve display
 - Harmonic measurement
 - Error measurement
 - Reference measurement
- Static and electromechanical power meters respectively instruments with power proportional frequency output can be tested in the menu "Error measurement".
The user can select between scanning head input or frequency input.

RMM3000

- Reference Multimeter
- Accuracy class 0.02
- Actual values
- Error measurement
- Energy comparison measurement via scanning head and frequency input

MT3000 Reference Meter

- Accuracy classes 0.02 and 0.05
- Coloured display
- Modular design
- System upgrade at any time
- Unique long-term and temperature stability of the measuring module
- Current measurement via AC-current clamps up to 300 A
- No additional error for reactive measurement
- 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
- Functions amongst others:
 - Harmonic measurement
 - Error measurement
 - Burden measurement
 - U/I transformer test
 - tm/te transmitter test
 - Long-time measurement
 - Selective power measurement
 - Data readout meter
 - Automatic operation (as option)



Single modules can be combined





Also available with accuracy class 0.05



Also available as single-phase device

MT365

- Accuracy class 0.05
- Coloured display
- Functions amongst others:
 - Vector and curve display
 - Harmonic measurement
 - Error measurement
 - Service function
 - Automatic operation (as option)
- Also available with accuracy class 0.1 as MT360

MT310

- Accuracy class 0.1
- Functions amongst others:
 - Actual values
 - Vector and curve display
 - Error measurement
 - Harmonic measurement
 - Burden measurement
 - I transformer testing (as option)
- Also available with accuracy class 0.05 as MT320

MT30

- Accuracy class 0.2
- Functions amongst others:
 - Actual values
 - Error measurement
 - Vector and curve display
 - Harmonic measurement
- Also available as single-phase device MT10

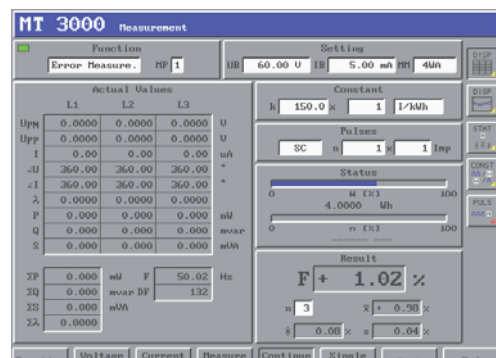
MT3000 Test System

- Accuracy classes 0.02 and 0.05
- Coloured display
- Reference meter with integrated current and voltage source
- Current generation from 4 mA up to 12 A (optional with booster up to 120 A, see below)
- Voltage generation from 40 V up to 300 V
- Modular design
- System upgrade at any time
- Unique long-term and temperature stability of the measuring module
- No additional error for reactive measurement
- Functions amongst others:
 - Harmonic measurement
 - Burden measurement
 - U/I transformer testing
 - tm/te transmitter test
 - Selective power measurement
 - Long-time measurement
 - Automatic operation

- With MT3000 current booster current generation up to 120 A



Similar to original product



MT3000 Current Booster



Single-phase with integrated source



Available with trolley

MT3606

- Accuracy class 0.1
- Coloured display
- Single-phase test system with integrated current and voltage source
- Testing of energy meters for accuracy classes 1 and 2 in 2-wire circuits
- Current generation from 10 mA up to 60 A
- Voltage generation from 40 V up to 300 V
- Functions amongst others:
 - Error measurement
 - Vectorial display
 - Free programmable load point settings for voltage and current generation
 - Automatic operation
 - Selective power measurement (as option)

MT681

- Accuracy class 0.1
- Coloured display
- Three-phase fully automatic test system with integrated current source
- Current generation from 10 mA up to 100 A
- Verification of the load conditions on metering installations
- Functions amongst others:
 - Vector display
 - Harmonic measurement
 - Error measurement
 - Automatic measurement
 - Selective power measurement (as option)
- Also available as single-phase device MT680.

MT781

- Accuracy class 0.1
- Coloured display
- Three-phase fully automatic test system with integrated current source
- Current generation from 10 mA up to 100 A
- Voltage generation from 40 V up to 500 V
- Verification of the load conditions on metering installations
- Functions amongst others:
 - Vector display
 - Harmonic measurement
 - Error measurement
 - Automatic measurement
 - Selective power measurement (as option)
- Also available with accuracy class 0.05 as MT786

With integrated current and voltage source



Available with trolley





MT3000 Power Source

- Three-phase power source
- Current generation from 4 mA up to 12 A
- Voltage generation from 40 V up to 300 V
- Coloured display
- Can be combined with MT3000 reference meter
- Energy dosage
- Programmable phase shift, frequency and balance and unbalance load



MT500

- Three-phase power source
- Current generation from 4 mA up to 12 A
- Voltage generation from 40 V up to 300 V
- Adjustable power factors
- Individual load point setting
- Functions amongst others:
 - Actual values
 - Vectorial display



MT400

- Three-phase current source
- Current generation from 4 mA up to 12 A
- Synchronization of the test currents on the existing test voltage phases of the meter under test
- Adjustable power factors
- Individual current load point setting
- Functions amongst others:
 - Actual values
 - Vectorial display

Stationary Meter Test System | MTS

Stationary meter test systems are suitable for economic testing of all types of meters as well as static meter of class 0.2. The wide range reference standard EPZ is used as working standard class 0.02 of the meter test system. If a higher accuracy is required the EPZ can be replaced by a comparator COM with accuracy class 0.01.

All measurements can be performed according to actual standards e.g. IEC. The modular system allows an individual and customized configuration for hard- and software.

A system upgrade is possible at any time.



Power Source Systems - MTS series



MTS340



MTS320



MTS301

Power Source Systems - MTS series

The product series MTS is based on digital switch mode amplifier modules and allows the combination of the different amplifiers with the function generator FG301 to a MTS-power source system.

ZERA provides three-phase sources MTS301, MTS310, MTS320 and MTS340 (for 1 up to 40 test positions) and single-phase sources MTS110 and MTS140. All source systems of the MTS3xx and MTS1xx series are also available with rolls.

For special applications like e.g. type testing of electricity meters in national metrology institutes or development laboratories of meter manufacturers, ZERA can also offer transformerless analog amplifier source MTS610 for the generation of AC- and DC-output settings over the whole range.

Frequency Generator

FG301

- Frequency generator FG301 as central unit of the synthetic waveform generation
- Generates the set points for the digital control of the power amplifier units
- Carries out the closed-loop control of the test settings and controls changeover operations during the test procedure.

Reference Meters

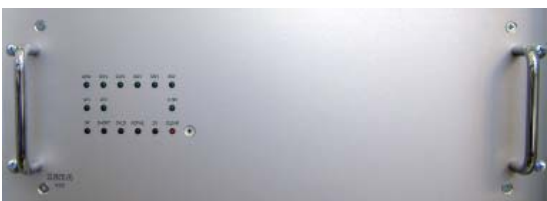
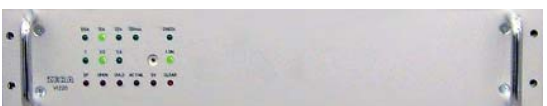
EPZ303

- Wide range substandard meters EPZ303 and EPZ103 as working standard of meter test systems
- Serves for power proportional pulse frequency
- Designed to measure actual values for test voltage, test current, test power and phase angle per phase
- Test values are indicated on an external monitor
- Accuracy class 0.02

COM3003

- Optional the reference standard EPZ303/EPZ103 can be replaced by a comparator COM3003/1003
- Accuracy of the complete system will be increased to 0.01 %.
- Accuracy class 0.01





Amplifiers

V200

- Test current amplifier V200 for AC output currents up to 120 A (optional: 160 A)
- Max. output power: 2000 VA

VI220

- Test current amplifier VI220 for AC output currents up to 120 A
- Max. output power: 400 VA

VUI301

- Combined single-phase current and voltage amplifier VUI301 for output voltages up to 320 V (only AC) and output currents up to 120 A (DC only up to 12 A).
- Max. output power voltage unit: 30 VA
- Max. output power current unit: 200 VA
- Used in MTS301 (single-position system)

V210

- Test voltage amplifier V210 for AC output voltages up to 480 V
- Max. output power: 1500 VA

VU220

- Single- or three-phase test voltage amplifier VU220 for AC and DC output voltages up to 320 V
- Max. output power: 400 VA

MTS-Components

SES330

- Measurement interface SES330 serves as a power supply for the DS3xx modules as well as for conversion of the RS232 interface in the PC to the system bus
- Control is accomplished by the FG301
- Only required if DS3xx modules are used

The following DS3xx error calculators are used per test position:

DS301

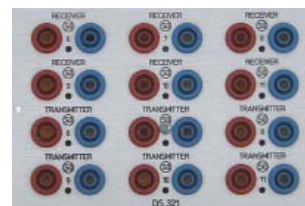
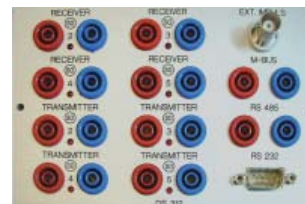
- Additional displaying of the measured error
- In-/output for testing of SO-pulse transmitter or receiver
- tm/te maximum demand time measuring
- testing of SO-pulse transmitter or receiver and bi-directional data transfer

DS312

- Can be used additionally to DS301, DS321
- In-/outputs for testing of SO-pulse transmitter or receiver
- Interface multiplexer for communication with the unit under test via RS232 (IR), RS485 or M-bus

DS321

- Can be used additionally to DS312
- In-/outputs for testing of SO-pulse transmitter or receiver





MTS Components

DS311

- Can be used additionally to DS301
- In-/outputs for testing of SO-pulse transmitter or receiver
- Additional interface for infrared scanning head TK117

DS421

- Multi-user error processor DS421 is designed as slide-in unit
- Used for testing up to 20 energy meters
- Can be combined with DSA400/DSA401
- Can not be combined with DS devices of the DS3xx series

DSA400

- LCD display unit DSA400 displays the error values during the test procedure
- Can be combined with DS421

DSA401

- LED display unit DSA401 displays the error values during the test procedure
- Can be combined with DS421

CCM1001

- Measuring and connecting adapter CCM1001 to inspect the test circuits for U-I-shorts before and during the test procedure
- Communication is performed via Win SAM

Scanning Heads

The following scanning heads are used per test position:

TK325

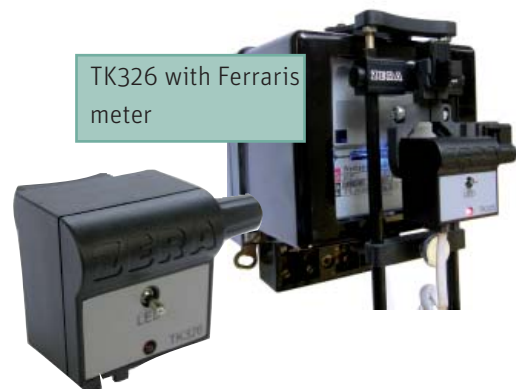
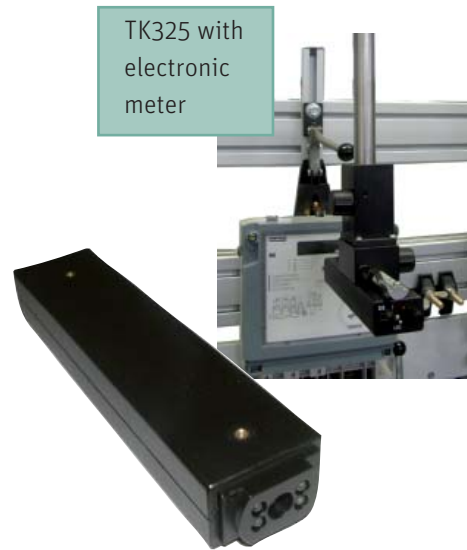
- Scanning head TK325 to scan rotor marks and LEDs of electronic meters
- The TK325 can detect the switching edge of a pulse and allows the automatic starting- and no load test on ZERA test systems
- Is used for advanced scanning head suspension.
- Can be combined with all DS devices

TK326

- Scanning head TK326 is able to scan rotor marks and LEDs of electronic meters
- The TK326 can detect the switching edge of a pulse and allows the automatic starting- and no load test on ZERA test systems
- Is used for simple scanning head suspension
- Can be combined with all DS devices

TK117

- Scanning head TK117 serves for data communication between the unit under test and the test system.
- Connection e. g. with error calculator DS301
- Can only be used with electronic meters
- Can only be used in combination with DS301 and DS311.





Transformers

ICT200

- Three-phase error-compensated isolated current transformer ICT200 to supply galvanic isolated test current to three-phase meters with closed link
- One ICT200 serves for one test position
- Max. current range 200 A

ICT123

- Three-phase error-compensated isolated current transformer ICT123 to supply galvanic isolated test current to meters with closed link.
- New compact design allows you to choose between stand-alone device or installation in a system
- Integrated self-protection
- Communication via WinSAM
- One ICT123 serves for one test position
- Max. current range 120 A

MSVT

- Multi secondary voltage transformer MSVT to supply galvanic isolated test voltage to single-phase meters
- The MSVT serves optionally for 10 or 20 test positions

MTS Additional Components

HK301

- Auxiliary circuit module HK301 for switching auxiliary circuits in meter testing units
- Can only be used in combination with power source MTS301

BT301

- Special modul BT301 breakertest with LED status lamps for inspecting the contact condition of the unit under test

K118

- Adapter K118 to convert AC potential linked contacts to the required DC voltage level for the SO-Input of the DS301 or DS311

Test Point Buttons

- Buttons to controll the automatic test procedure during adjustment of meters
- The sequence of measurements can be controlled by pressing the button (previous/next test point)

Automatic Rotor Mark Positioning AMV

- Built-in module AMV301 for automatic rotor mark positioning of Ferraris meters
- Advantageous before the starting or NO LOAD test
- This module is also available as pluggable unit
- Built-in and pluggable modules can only be used with DS301



Pluggable AMV module





Also available with
one position meter rack



MTS Additional Components

ET115

- Wireless handheld terminal ET115 for entering specific data of the meters under test, e.g. identity numbers, initial- and final register counts and for sending data via docking station to the user control PC

DR2791

- External field coil DR2791 to generate a magnetic field in combination with the voltage amplifier VU220-6
- Testing, if the magnetic field disturbs the measurement of the meter
- If required also available with one position meter rack/quick connecting device

ZZ8292

- Half-wave rectification ZZ8292 for separating the test current in positive and negative half-waves

Scanning Head Suspension

Scanning Head Suspension – Advanced System

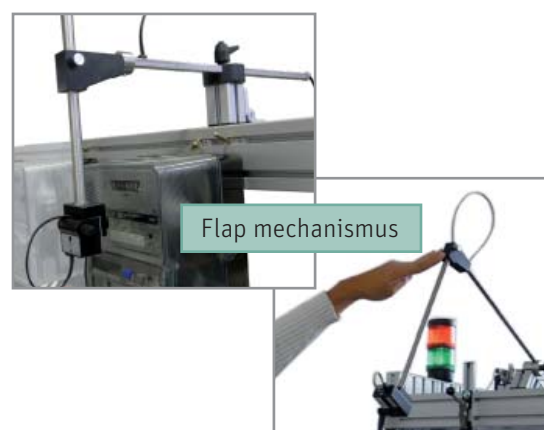
- Comfortable ball bearing suspension for scanning heads, adjustable in all positions
- Stoppers for safe guidance of the scanning head
- Quick height adjustment and fine adjustment for correctly positioning of the scanning head in front of the meter
- With single-position or multiple-position suspension
- Expansion possibilities of the measuring system are possible at any time
- Useable with scanning head TK325

Scanning Head Suspension with moveable meter rack

- Moveable in all positions, e. g. for performing a type testing
- Quick and safe positioning of the meter under test
- Available for single- or multiple-position test systems
- Useable with scanning head TK325.

Basic Scanning Head Suspension

- Functional scanning head suspension, adjustable in all positions via flap mechanism
- Expansion possibilities of this kind of system are limited
- Useable with scanning head TK326





Example: 10 position test bench



Moveable protective cover



Different Types of Test Benches

Multiple Position Test Bench

Test bench with:

- 10 test positions
 - 19" bottom section
 - Scanning head suspension – basic system
-
- Standard test benches with 5, 10, 20 or 40 test positions
 - Further designs available on request

Special Designs

Test bench with:

- 28 test position for single-phase meter testing of 14 meter simultaneously
 - Pneumatically operated protective cover with integrated scanning heads for safe placement of meters while performing a test procedure.
 - MSVT
-
- Further designs available on request

Single-position Test Bench

Test bench with:

- One test position
- DS3xx modules
- Scanning head suspension – advanced system

Different Types of Test Benches

Tunnel and Trolley System

- A stationary tunnel system is connected to the power source
- The respective trolley system is connected to the test bench via plug connection
- Interlock mechanism for fixing the trolley at the tunnel system
- The test bench is equipped with scanning head suspensions and emergency-stop-push-buttons

Trolley System

- Trolley system with 20 test positions
- Flexible placement of the meters under test by the use of a second trolley system which saves tooling-time
- Trolley system is equipped with a quick-connecting device for meters

Side Cabinet

- Side cabinet e. g. for measuring and connecting adapter CCM1001 and calibration panel



Semi-automatic Test System

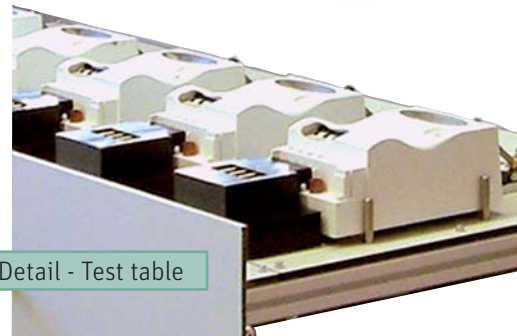
- Semi-automatic function test
- Manual load and unload of the units under test, automatic testing procedure.
- Drawers for two-way load
- No time-off for changing the units under test.
- While one lot of 6 meters is under test the other lot can be exchanged.

Test procedure

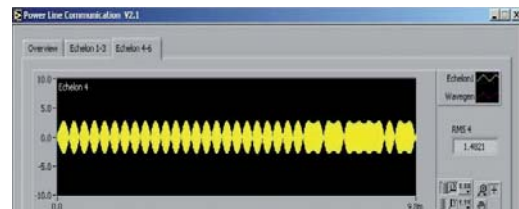
- Verification of power line communication (PLC)

Automatic Test System

- Automatic function test
- ZERA test systems can be integrated in customer production lines completely.
- Meters can be transported to the next test procedure via band conveyer.



Detail - Test table



ITTS – Stationary and Mobile Instrument Transformer Test Systems

Stationary and Mobile Instrument Transformer Test Systems from ZERA are developed for testing current transformers (CT) and voltage transformers (PT). Stationary test systems are available for manual or automatic operation.

Transformer testing serves for the accuracy test including polarity check and demagnetisation for current and voltage transformers in middle-voltage, high-voltage and extra-voltage grids according to IEC standard 60044-1, 60044-2, 60044-7, 60044-8 and 61850-9-2.



Stationary, automatic current and voltage transformer test system

Mobile current transformer test system

Voltage regulating transformer VRT for generating the required voltage

Standard/High voltage transformer SVT/HVT

Standard current module SCM



VRT36

SVT100

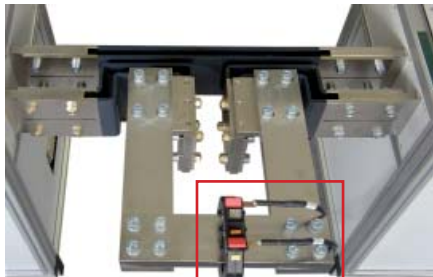
HVT130



GCT6000

SCT6000

Example of current transformer testing from 4000 A up to 6000 A.



Detail of the CT under test connected at the secondary side.

Stationary ITTS

- Measuring of voltage/current transformers (low-, middle- and high-voltage)
- Accuracy test, polarity check, interturn insulation test and demagnetisation.
- CT one-by-one testing

Example for low and middle voltage instrument transformer CT/VT testing*:

- Mains voltage: 3 x 230 V/400 V, (50) 60 Hz
- Output voltage: 0 ... 400 V
- Output power: max. 30 kVA

- Suitable for the following CTs:

- $I_N = 5 \dots 6000 \text{ A}$
- Max. $I_{\text{prim}} = 120 \% \text{ of } I_N$
- Secondary current: 5 A
- Max. burden of CT under test: 200 VA

- Suitable for the following VTs:

- $U_N = 120 \text{ V} \dots 100 \text{ kV}$
- Max. $U_{\text{prim}} = 120 \% \text{ of } U_N$
- Secondary voltages: 120 V, 115 V, 69 V
- Max. burden of VT under test: 200 VA

- Used components amongst others:

- Regulating transformer (variac)
- ESVB200/WM3000U
- ESCB200/WM3000I
- Generating current transformer GCT6000
- Standard current transformer SCT6000
- High voltage generating transformer HVT130
- Standard voltage transformer e. g. SVT100

* other customer requirements on request

ITTS mobil

- Testing of current and voltage transformers in middle-voltage, high-voltage and extra-high voltage grids
- Accuracy test, polarity check and demagnetisation
- Example voltage transformer:
 - $U_N = 110/\sqrt{3}$ kV
 - Max. $U_{Prim} = 120\%$ of U_N
 - Secondary voltages
100/ $\sqrt{3}$ V, 110/ $\sqrt{3}$ V, 100 V, 110 V
 - Max. burden of the voltage transformer under test 158,75 VA
- Example current transformer:
 - $I_N = 4000$ A
 - Max. $I_{Prim} = 120\%$ of I_N
 - Secondary currents: 5 A and 1 A
 - Max. burden of the current transformer under test 60 VA
- Used components amongst others:
 - Voltage Regulating Transformer VRT
 - SCM4000-120 (see page 34)
 - WM303-I (see page 34)
 - ESCB200 (see page 33)

VRT

- Voltage Regulating Transformer VRT for supply of the high voltage or high current transformer with variable voltage for testing of CTs/VTs



Assembly for high voltage measurement



Remote control for safe operation





Detail current transformer testing

Voltage regulating transformer VRTm2-40-40

ITTS mobil

- Testing of current transformers in middle-voltage, high-voltage and extra-high voltage grids
- Accuracy test, polarity check and demagnetisation
- Example current transformer:
 - $I_N = 5 \text{ A}$ up to 300 A
 - Max. $I_{\text{Prim}} = 120 \% \text{ of } I_N$
 - Secondary currents: 5 A and 1 A
 - Max. burden of the current transformer under test 30 VA
- Used components amongst others:
 - Voltage regulating transformer VRT
 - Standard current transformer SCT
 - Generating current transformer GCT
 - Measuring equipment ME

VRTm2-40-40

- Voltage regulating transformer VRT to transform a fixed input voltage (400 V) to a variable output voltage ($0 \dots 400 \text{ V}$)
- The VRT feeds the high current unit GCT as well as the transformer under test
- A control panel with all operating elements for the manual operation is placed on top of the VRT

MEm30

- The mobile measuring equipment MEm30 is equipped with
 - standard current burden SCB30
 - measuring bridge WM303-I
 - mobile PC

CT/VT Testing Components

Conventional Burden | SCB/SVB

- Standard current/voltage burden for measuring current/voltage instrument transformers according to IEC 60044-1/2
- Standard Current Burden SCB with adjustable steps up to 60 VA (IEC) or 200 VA (ANSI)
- Standard Voltage Burden SVB with adjustable steps up to 318,75 VA (IEC) or 400 VA (ANSI)

Electronical Burden | ESCB/ESVB

- Electronical compensated current or voltage burden ESCB/ESVB for manual and automatic test of current/voltage instrument transformers.
- User-friendly menu guidance
- 10,4" TFT-mono chrome display
- ESVB/ESCB with adjustable steps up to 200 VA (IEC and ANSI)

Standard Current Module | SCM

- Standard current module SCM consisting of generating current transformer GCT and standard current transformer SCT
- Cost-effective and space-saving combination of GCT and SCT
- Less wiring due to fixed wiring inside
- Time-saving due to one-off connection of GCT and SCT
- Example SCM3000-120*:
 - Max. current 3840 A
 - Max. output power 16 kVA

* other customer requirements on request



Manual standard voltage burden





Generating Current Transformer | GCT

- The GCT for generating the test current for accuracy testing of current transformers
- Example GCT6000*:
 - Max. output power 36 kVA
 - Max. test current 6000 A

Standard Current Transformer | SCT

- The values of the CT under test will be compared with the values of the standard current transformer SCT.
- Example SCT6000*:
 - I_{Nsec} 5 A
 - Load range 1 ... 120 %
 - Max. current 7200 A

High Voltage Transformer | HVT

- High voltage transformer HVT for generating the test voltage for accuracy testing of voltage transformers.

Standard Voltage Transformer | SVT

- Standard voltage transformer SVT for testing voltage transformer with single and double-pole connections.

Measuring Bridge | WM

- The current/voltage measuring bridges WM3000I/U are high-precision comparator units for comparing secondary signal from transformer under test (or digital information of non-conventional transformers) with a reference signal supplied by a standard device.
- Display of measuring values and control of the test procedure via touch screen.

* other customer requirements on request

Constant Current Sources

- MCCB testing
- Thermal and magnetic tripping test
- Line circuit breaker, motor circuit breaker
- Example for a constant current source:
 - Single-phase
 - Max. output power 11 kVA
 - Max. test current 200 VA
 - Current steps/output voltages:
200 A/55 V, 100 A/55 V, 50 A/55 V,
25 A/ 55 V, 5 A/55 V, 2,5 A/55 V

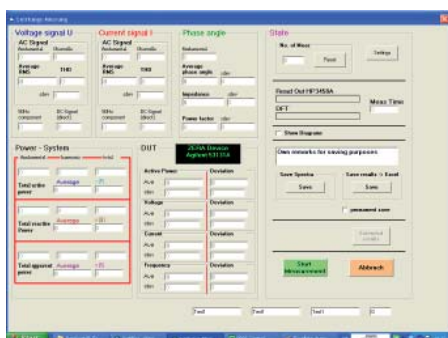
Constant Current Sources

- Constant current sources are typically used in testing and adjusting equipment
- The source provides a defined test current for the equipment
- The concrete value is specified by the needs of the unit under test and is the basis for the whole project planning

Control unit SES

- The communication between electrical source and equipment runs via the control unit SES
- In addition to the RS232 interface optically isolated in- and outputs for an SPC are provided
- The concrete test parameters are entered at the PC or at the SPS.





PPCS – Precision Power Calibration System

- high precision, traceable calibration of measuring devices (e.g. comparator)
- Lowest measuring uncertainty from $< 10 \times 10^{-6}$ (at 40 up to 60 Hz, relative to the nominal value of the apparent power)
- Output voltage from 60 V up to 480 V
- Output current from 0,1 A up to 100 A
- Used for highly accurate current, voltage and power calibration
- High measuring stability due to ZERA components that have been proven for many years
- High repeat accuracy of the measuring values
- Wide range of Harmonic generation and accurate measurement

PPCS Software

- Windows based software (precision power sampling system) to control the system
- Software controls the device under calibration and calculates error values and measurement uncertainty
- Result will be stored in the PC

