

Mobile Instrument Transformer Test Systems

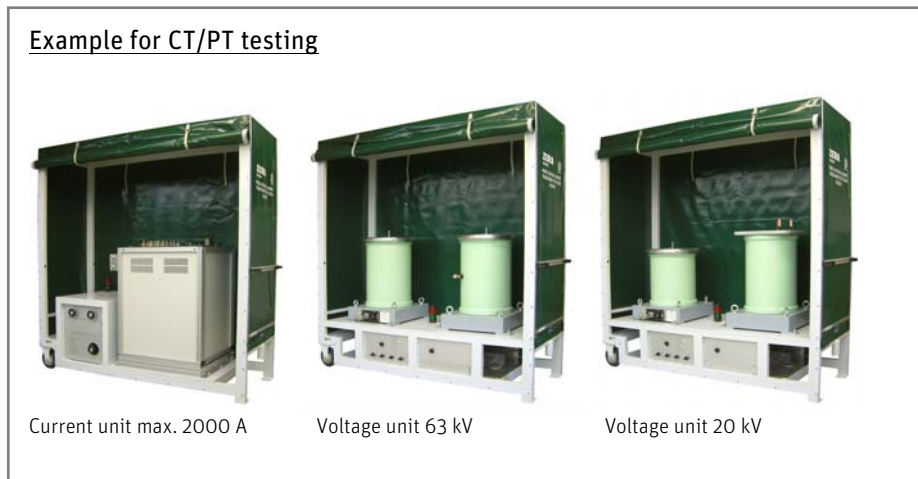


General

CT - current instrument transformer
PT - voltage instrument transformer

The test system is designed to perform on-site demagnetisation (CT), accuracy test (CT/PT) and polarity check (CT/PT) of current and voltage instrument transformers in middle, high and extra-high voltage grids according to standard IEC 60044-1 and IEC 60044-2.

All components can be customized.



Routine Tests

Demagnetisation (CT)

The following routine tests are possible:

- The demagnetisation will be performed generally for preparation of CTs for accuracy test. The current should be increased manually e.g. up to 5 % while the CTs are secondary open.

Polarity Check (CT/PT)

- This procedure checks the polarity between primary and secondary winding and guarantees the correct direction of energy flow. The polarity check takes place before the accuracy test.

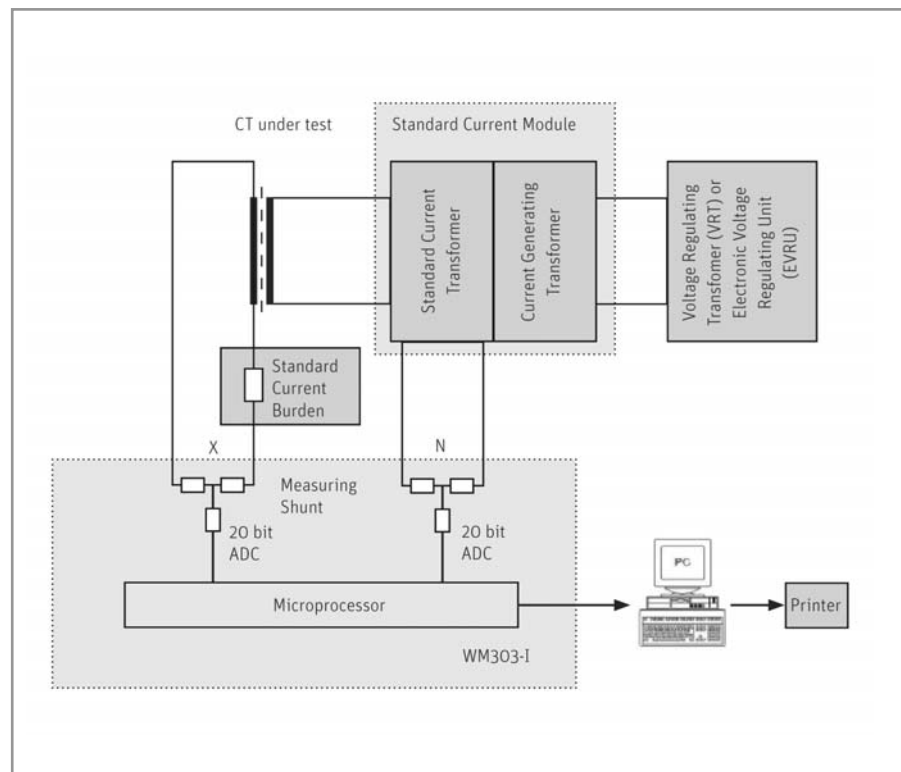
Accuracy Test (CT/PT)

- Carry out the accuracy test with free selectable test points e. g. 120 – 100 – 20 – 5 – 1 % I_N (CT) or 80 – 100 – 120 % U_N (PT) with the corresponding burdens. A load point table can be prepared and entered according to own standards.
- The test compares the ratio error of the CT or PT under test with the standard transformer of the test equipment. The result of ratio error and phase displacement will be indicated.
- The comparison takes place in a self-calibrating comparator (measuring bridge).
- The PC shows the following measurement results:
 - Rated current (% I_N) / rated voltage (% U_N)
 - Ratio error (%)
 - Phase displace error (min)
 - Frequency (Hz)

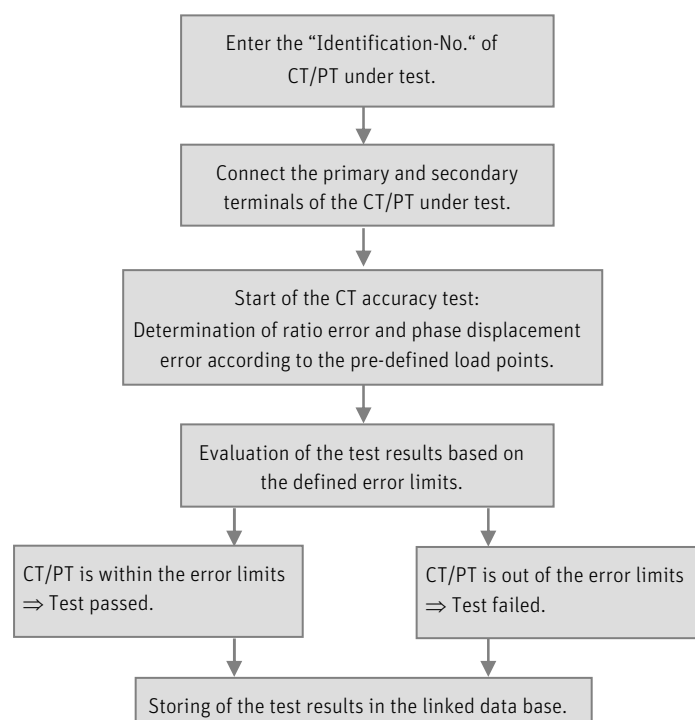
Accuracy Test (CT/PT)

- The PC stores the measurement results. The results are compared with the error values corresponding to the accuracy class. Finally a test protocol represents the results.
- CTs or PTs, which errors are outside the allowable limits are marked as FAIL.

Accuracy Test of CT



Process of CT/PT Testing



1. Example: Components for CT and PT Testing

Example for CT/PT Testing Components

Example *voltage instrument transformer*:

- Primary nominal voltage * $U_N = 110/\sqrt{3}$ kV
- Max. primary voltage 120 % of U_N^*
- Secondary nominal voltages * = $100/\sqrt{3}$ V, $110/\sqrt{3}$ V, 100 V, 110 V
- Max burden of the PT under test = 158,75 VA *

Example *current instrument transformer*:

- Primary nominal current * $I_N = 4000$ A
- Max. primary current 120 % of I_N^*
- Secondary nominal current = 5 A and 1 A *
- Max. burden of the CT under test = 60 VA *



On-site testing

General Operating Conditions

Input supply voltage: 3x 230 V (400 V) Neutral is earthed.*
 Frequency: 50 Hz / 60 Hz

* Additional customized solution on request.

Summary of Components

A mobile ITTS for CT/PT testing can contain the following components:

- Voltage regulating transformer VRT
- Standard current module SCM
- Measuring unit WM303-U/WM303-I
- High voltage transformer HVT
- Standard voltage transformer SVT
- Standard current/voltage burden



Remote Control for operating from a safe distance

Voltage Regulating Transformer VRT

The voltage regulating transformer VRT feeds a variable voltage to the high voltage or high current generating transformer for generating a primary test values.

The VRT consists additionally of the following components:

- Measuring unit WM303U or WM303I
- Standard current burden
- Standard voltage burden



VRT20-22-24

Standard Current Module SCM

The standard current module SCM consists of:

- A test current generating transformer (generation)
- A standard current transformer (measurement)

This compact design was developed by ZERA to offer a very excellent component in terms of technology and budget.



SCM2000-120

Standard Burden SCB/SVB

The standard burden SCB/SVB is used for measuring CT/PT according to IEC60044-1/-2*. The selection of the burden steps is done manually.

* Additional standard ANSI on request.

Measuring Unit WM303-I/U

The WM303I/U is a high precision comparator unit which compares the current/voltage signals received from the CT/PT under test and the standard CT/PT. The resulting errors will be transferred as ratio and phase angle via interface.

High Voltage Transformer HVT

The high voltage transformer HVT generates the test voltage for the accuracy test of the voltage instrument transformers.

Standard Voltage Transformer SVT

The standard voltage transformer SVT is suitable to test the voltage transformer of single and double pole transformers.

PC System

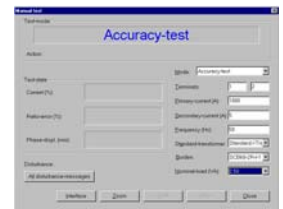
The configuration is corresponding to the test system. A notebook is in scope of delivery if required.

Software CheckCon

The CheckCon software allows the operator to enter, edit and store details of the CT/PT under test and evaluate them statistically with several criteria. Moreover test reports can be created.



HVT50



CheckCon - Automatic Accuracy test

description	test sequence	transformer type	primary current	secondary current	nominal burden
ASK 123.3+	Class 1.1 range	ASK 123.3+	2000,00	5,00	15,00
NBS wandler	Class 1.1 range	ASK 123.3	2000,00	5,00	15,00

Trolleys

The mobile instrument transformer test system consists of several trolleys with the following components:

- Standard Current module (Current generation unit and standard CT)
- Voltage generation unit HVT and standard voltage transformer SVT
- Measuring unit VRT
- Measuring equipment / accessories (e.g. connecting cables, Notebook)



Safety Aspect

The safety aspects meet the requirements.

The equipment will be labelled with the safety instructions for a safe operation and handling of the test system.

Installation Commissioning Training

ZERA assumes installation and commissioning on site and provides training for the operators of the CT/PT test equipment.

2. Example: Components only for CT Testing

Example for CT Testing Components

Example *current instrument transformer*:

- Primary nominal current * $I_N = 5 \text{ A} \dots 300 \text{ A}$
- Max. current 120 % of I_N^*
- Secondary nominal current = 5 A and 1 A *
- Max. burden of the CT under test = 30 VA*

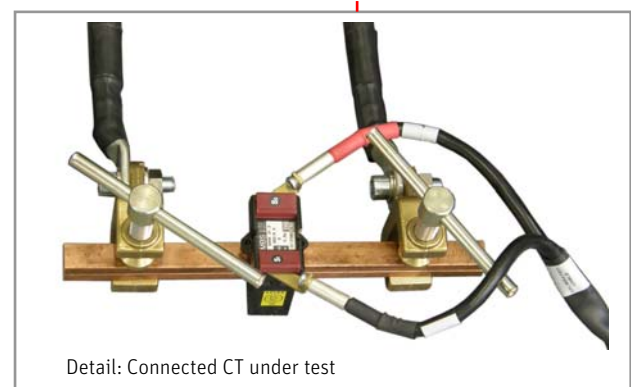
General Operating Conditions

Input supply voltage: 3x 230 V (400 V) Neutral is earthed*.

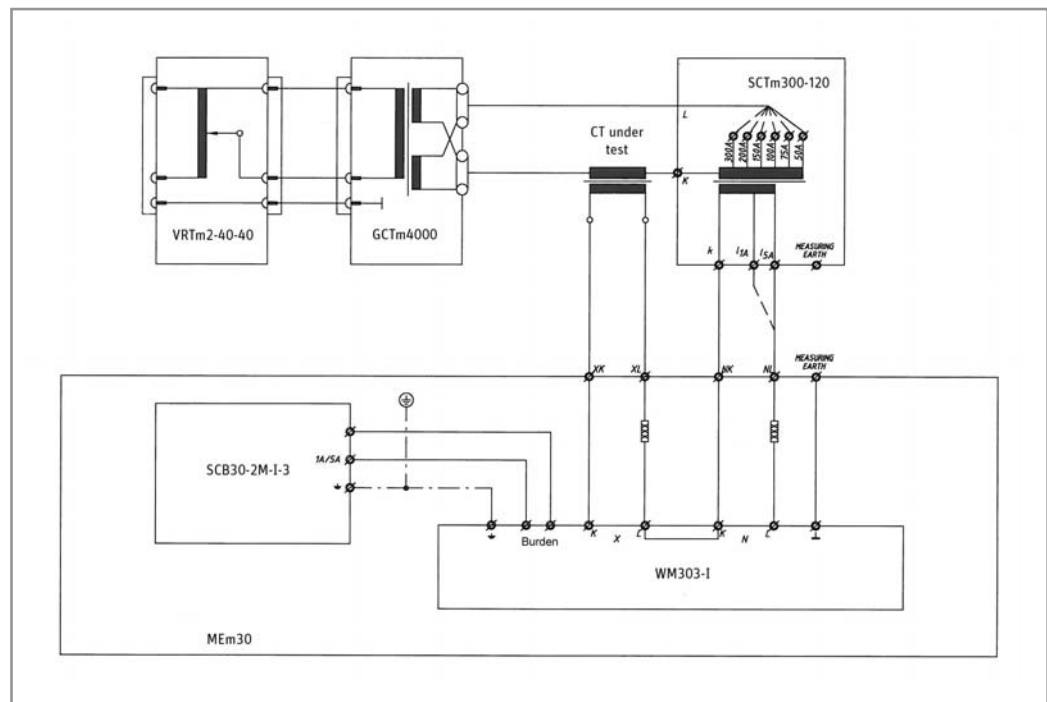
Frequency: 50 Hz / 60 Hz

* Additional customized solution on request.

All components can be customized.



Principle Diagram



Summary of Components

A mobile ITTS for CT testing can contain the following components:

- Voltage regulating transformer VRT
- Generating current transformer GCT
- Standard current transformer SCT
- ME including measuring unit and standard burden

Voltage Regulating Transformer VRT

The voltage regulating transformer VRT is used to transform a fixed input voltage (400 V) to a variable output voltage (0 ... 400 V). A control panel with all operating elements for the manual operation is placed on top of the unit.



VRTm2-40-40

Generating Current Transformer GCT

The generating current transformer GCT receives a variable voltage from the voltage regulating transformer VRT and generates the high current. This current feeds the CT under test and the standard current transformer on the primary side.



GCTm4000

Standard Current Transformer SCT

The standard current transformer SCT is used as reference unit and designed for:

- Primary current 50 ... 300 A*
- Secondary current 1 A and 5 A*
- Frequency 50 Hz*

* Additional customized solution on request.



SCTm300-120

Measuring Unit ME

The measuring unit ME is supplied by 230 V from the VRT and can be switched on/off separately. For testing CTs according to IEC 60044-1 the device under test needs to be loaded by standard burden and the secondary signal is the input for the comparator. For better handling on-site this unit is equipped with a pull-out table for laptop and PC-mouse.

The measuring unit contains of the following components:

- a standard current burden SCB30-2M-I
- a current measuring unit WM303-I



Mem30

Standard Current Burden SCB

The standard current burden SCB30-2M-I is required for putting the burden at the secondary side of the CT under test according to IEC 60044-1.



SCB30-2M-I

Measuring Unit WM303-I

The WM303I is a high precision comparator unit which compares the current signals received from the CT under test and the standard CT. The resulting errors will be transferred as ratio and phase angle via interface.



WM303-I

PC System

If required the mobile CT test system can be delivered with Laptop and customized software configuration.

