Tettex INSTRUMENTS

TYPE 2285d

Transformer Test System

GENERAL

The 2285 is a modern computer controlled test system for Transformer **Resistance** and **Ratio** measurement with tap changer control. It also supports all measurements, supervisions, calculations and report functions for **Heat run** test.

The test point selector and the two power supplies enable measurements at various test configurations on transformers with up to 3 winding systems with 3 phases.

FEATURES

Fully automatic measurement of
- Winding resistance
- Turns ratio

with system controlled tap changing

Supports heat run test by
- Cold resistance measurement
- Temperature measurement and supervision during temperature rise
- Cooling curve measurement
- Extrapolation

Up to 18 resistance measurement channels
Up to 24 temperature measuring channels

Programmable test procedure for sequential measurement of resistance and ratio including tap changer control, fully automatic, without any human interaction.

TECHNICAL SPECIFICATION

General Specifications

Mains supply	3 x 400V
Reference conditions	
Ambient temperature	23 ± 5 °C
Relative humidity	45..75 %
Operating conditions	
Ambient temperature	0 ± 45 °C
Relative humidity	20..80 %

Further operating conditions according to IEC 359 recommendations, usage class I.
This system is designed in accordance to the safety requirements of VDE 0411/part 1a and IEC 348, Safety class I.

Resistance Measurement

Measuring range	1 μΩ...500 Ω
Resolution	0.1 μΩ
Limits of error	± 0.06% rdg ± 1 μΩ
	plus approx. 0.02% for test point selector

Conditions:
At reference conditions and test current table

Measuring range	Test current
10 μΩ ... 100 μΩ	≥ 25 A
100 μΩ ... 10 mΩ	≥ 15 A
10 mΩ ... 100 mΩ	≥ 10 A
100mΩ ... 1Ω	≥ 5 A
1Ω ... 10Ω	≥ 1 A
10Ω ... 100Ω	≥ 0.5 A

Measuring cycle time, selectable	5...99 s
Settling time, typically	10...40 sec
Test Voltage	max. 60 V
compliance voltage, twice	
Test Current	
Type 2285d/100/3	max. 100 A
Power Supplies	2 x 3 kW

Temperature Measurement

Number of Channels	12 (1 ..12)
Input type	PT100 (4 leads probe) or Thermistor (2 leads probe)
Probes available as	• Liquid probe (stick) • Surface probe (magnetic box)
Accuracy	± 0.3°C
Connection	LEMO
Cable length	30 m standard

Optional

Additional Channels	12 (13 ..24)
Input type	Thermocouple Type L (DIN-J)
Probes	Not in scope of supply
Connection	Type L (DIN-J)

Turns or Voltage Ratio Measurement

See specification of leaflet type 2795

No Load Current Measurement

See specification of leaflet type 2795

Measurement	only HIGH VOLTAGE SIDE Δ, Y, Z: U-V, V-W, W-U Yn, Zn: U-N, V-N, W-N

Measuring Cables

-4 Wire cables for Resistance measurement		50 A or 100 A
Ratio measurement (No Load measurement)		
-Number of cables		8 or 12
-Cable length		30 m, standard
-Connections	On system side :	High current connector
	Test object side :	Kelvin clamps (isolated for current and voltage)

Control of Tap Changer

UP	1 sec. contact closure switch capacity, 230 V, 1 A
DOWN	1 sec. contact closure switch capacity, 230 V, 1 A
READY	optional feedback for speed up contact closure or opening

The transformer test system is controlled by a personal computer.

Safety Circuits

For resistance, ratio and no load current measurement.

- Warning lamp
- Plug for the connection of
- external safety switch like foot switch. Equipped with short circuit plug as standard.
- Emergency switch, interrupts: Test current in resistance, Measurement mode, Test voltage in ratio and No load measurement mode

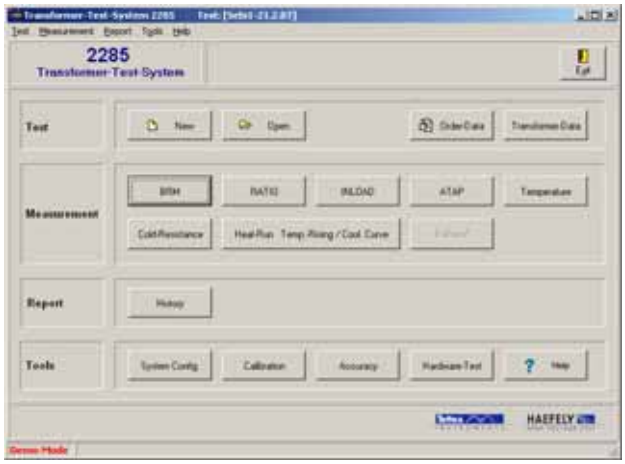
The emergency switch stays interrupted until it is released and measurement has started again.

Measurement Functions and Software

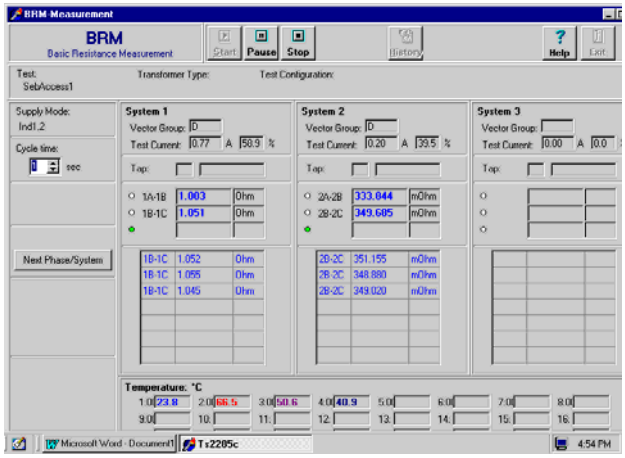
Basic resistance measurement BRM and Heat Run Test HRUN

Two or three windings can be measured simultaneously or alternatively according the users need. In the BRM the tap changer, up to 200 taps, is controlled by the 2285, but not in the HRUN. The switch over of the windings is performed in discharged state. On-load tap changer taps are changed during test current switched on.
Heat run test is done according to IEC and ANSI standards.

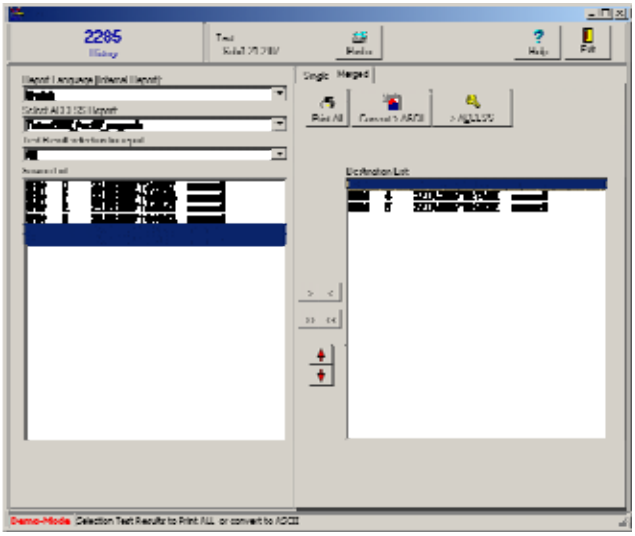
Mode Selection Screen



Basic Resistance Measurement BRM Interface



History Function with Language, and Test Result Selection for Preview and/or Printout of Test Report



Ratio

With this program the ratio can be measured including controlling of tap changer up to 200 taps. The characteristics of known vector groups can be determined before ratio measurement. Detailed information according used ratio meter.

ATAP

This program allows to set up a test procedure for fully automatic measurement of NO LOAD CURRENT, TURNS or VOLTAGE RATIO and RESISTANCE on transformers with up to 2 (optionally 3) three phase winding systems with tap changer.

The test procedure consists of a table of predefined test configurations for the above mentioned test modes. Note: a test mode can appear several times with different test configuration if necessary.

DATA saving

The measured data are saved together with the header and configuration data.
They can be printed out repeatedly after the test is finished. This data is also available as an ASCII file for further processing.

Test Point Selector Connections

System 1 (primary):	High voltage side 1 x 3 phases, max. 50 A 4 leads for Δ, Y, Z: or Yn, Zn
System 2 (secondary):	Low voltage side 1 x 3 phases, max. 100 A 4 leads for Δ, Y, Z: or Yn, Zn
System 3 (tertiary):	aux. winding 1 x 3 phases, max. 50 A 4 leads for Δ, Y, Z: or Yn, Zn

Measurements

The windings connected to the system 1 2 and 3 can be measured with individual measuring currents simultaneously or alternatively with 50 A for system 1 and 3
100 A for system 2
The switching over from phase to phase is done automatically and performed in the discharged state.

For Heat Run Test, simultaneous measurement of 2 winding systems, e.g., primary + secondary with 100 A is possible.

Resistance Channels:	18 (3 x 6)
for Δ, Y,	U-V, V-W, W-U
for Yn, Zn	U-N, V-N, W-N

Design

The measuring units of the transformer test system are placed in a 19“ cabinet. The computer, monitor, printer are located on the control desk.

Dimensions:	(W x H x D), mm
19“cabinet	600 x 1970 x 700
Control desk	1600 x 700 x 800

Weight, approx.	
Cabinet	
Type 2285d/100/3	200 kg
Control desk	40 kg

Cables	
Syst.1: 4 cables, 50 A	80 kg
Syst.2: 4 cables, 100 A	100 kg
Syst.3: 4 cables, 50 A	80 kg

Connection of the measuring cables at the DUT

Connection of the measuring cables to the system

ORDERING INFORMATION

Basic Systems
2285d/1/3, 100 A, 3 Winding system

Optional
- Additional 12 temperature measuring channels (→ total 24)
- Cable storage kart

Please contact us for further information as System details, Customer specific requirements, Scope of Supply.

RELATED PRODUCTS

The **TMS 580** Transformer Loss Measuring System allows highly accurate measurements of power losses in Transformers.
Measures load losses, no load losses, zero sequence measurement, supports Heat Run, Induced voltage test.

The **TTR 2795** verifies transformer turns ratio, excitation current and the phase angle between primary and secondary windings.

The **MIDAS 2880** mobile insulation analyzer, measures capacitance, Dissipation Factor (tan δ) and Power Factor (cos φ) of HV insulations. A powerful 15kV high-voltage supply is built-in.

The **FRA 5310** sweep frequency response analyzer, records the transformer winding frequency response "fingerprints".

The **2291** and **2292** high current resistance meters are special designed for high performance measurement of high inductance, low value resistances such as transformer windings, etc.

The **RVM 5462** recovery voltage meter, records the recovery voltages and analysis the insulation condition by tracing their polarization spectrum.

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