

TANDO 700

High-precision measuring and analysis system for
dissipation/power factor and capacitance



High-voltage insulation testing made safe, easy and reliable

Why dissipation/power factor and capacitance?

The condition of insulation is essential for secure and reliable operation of high-voltage (HV) electrical equipment. Measuring dissipation/power factor (Tan Delta) and capacitance helps you to determine overall insulation condition of:

- > Rotating machines (motors and generators)
- > High-voltage cables and cable accessories
- > Distribution, instrument and power transformers
- > Bushings
- > Capacitors
- > Circuit breakers

Early loss detection improves performance

Variations in the dissipation/power factor are often signs of mechanical displacements, the ingress of moisture, partial discharge, aging and degradation in insulation.

By detecting these conditions early, corrective action can be taken to improve the performance and reliability of electrical equipment.

Our TANDO 700 system provides you with a precise and extremely safe measuring solution that makes insulation tests easier and more reliable. It can be used for insulation material tests in research labs as well as production quality checks in factory HV test fields.

High-voltage area



Typical TANDO 700 system configuration

Complete testing and analysis with TANDO 700

TANDO 700 is a complete digital test and analysis system used to measure dissipation/power factor and capacitance in the insulation of high-voltage equipment.

Flexible testing solution

TANDO 700 measures both ungrounded and grounded test objects, since it can be operated on HV potential. The system is compatible with any type of reference capacitor for testing a variety of HV equipment

TANDO 700 can directly measure currents in a dynamic range from 5 μ A to 1 A. The input range can be extended up to 28 A by means of optional external shunts.

Compact, portable design

TANDO 700 includes two measuring units and a fiber optic converter, which is linked with a USB connection to any desktop PC, rack-mounted computer or laptop. This simple system design enables easy transport to various lab and field areas.

Highly precise, reliable data

The robust TANDO 700 provides you with extremely high measurement accuracy (typical $< 5 \times 10^{-6}$). It is suitable for use in environments with interference, such as in power plants, substations and unscreened test labs. The system continuously verifies signal quality through Fast Fourier Transformation (FFT) analysis.

Long, continuous measurement

TANDO 700 measurement channels are equipped with a powerful internal battery. The system's low power consumption allows for long measuring periods without having to recharge the internal battery. For even longer measurement sessions, an optional external battery can be added as an auxiliary power supply.

Safe, plug-and-play operation

The easy-to-use TANDO 700 software automatically recognizes connected hardware for easy plug-and-play operation. Fiber optic connections ensure complete galvanic isolation for superior safety in HV areas.

Additional measurements

TANDO 700 also measures power, voltage, current, impedance and frequency. All measurement data is displayed and analyzed in real time. The modular system can also be used with our MPD 600 for simultaneous measurement and analysis of partial discharges.

Safe area



MCU1
USB connection to PC

TANDO 700
PC software

TANDO 700

- > Very high measurement accuracy in environments with interference
- > Galvanic isolation for optimum safety
- > Large input measurement range for a wide variety of HV test objects
- > Compact design for easy transport to various testing areas
- > Plug-and-play operation for quick system setup

 www.omicron.at/tando700

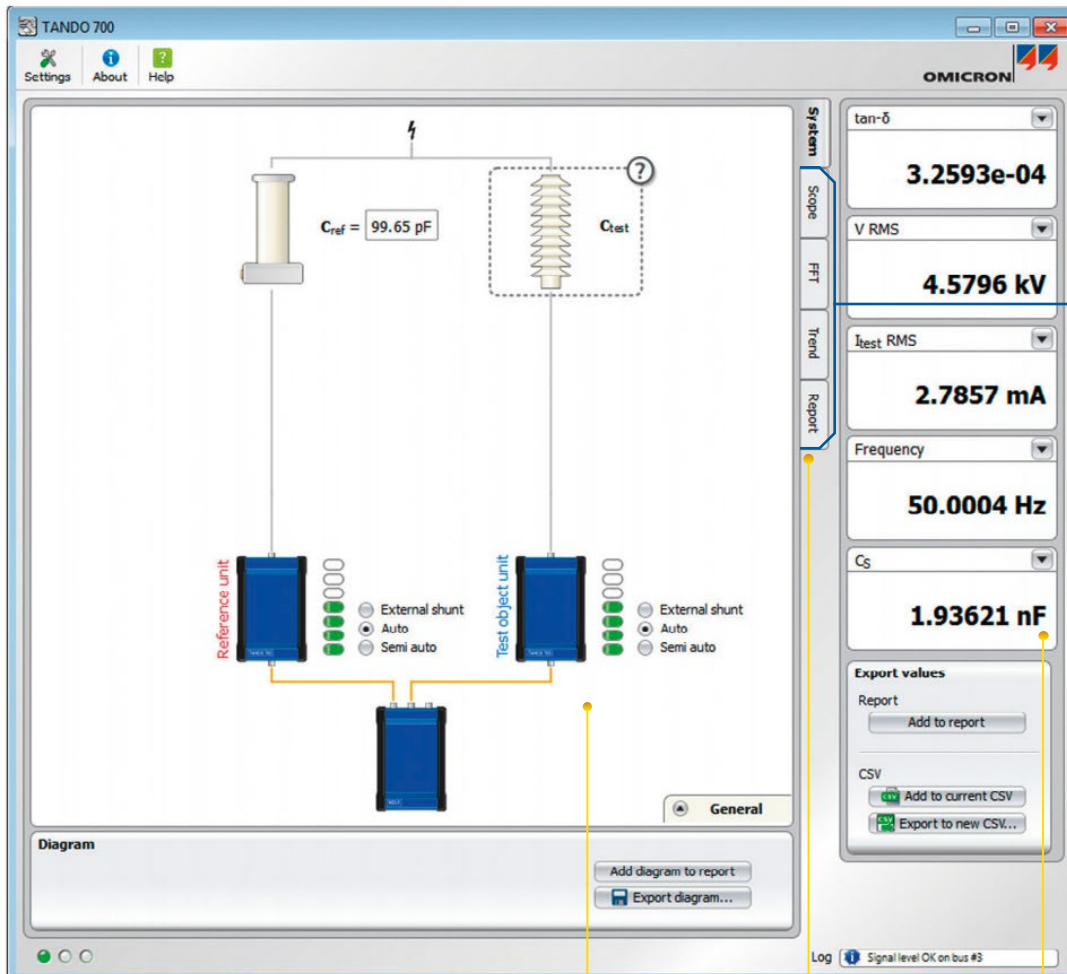
Customizable data display and reporting

All essential information at a glance

TANDO 700 includes easy-to-use software for system management as well as comprehensive data analysis, display and customized reporting. All essential information is available to you in real time.

The tab-based navigation lets you choose from a variety of display possibilities for viewing measurement values. You can also select which measurement parameters and trends are captured, saved and included in reports.

TANDO 700 software dashboard – System view

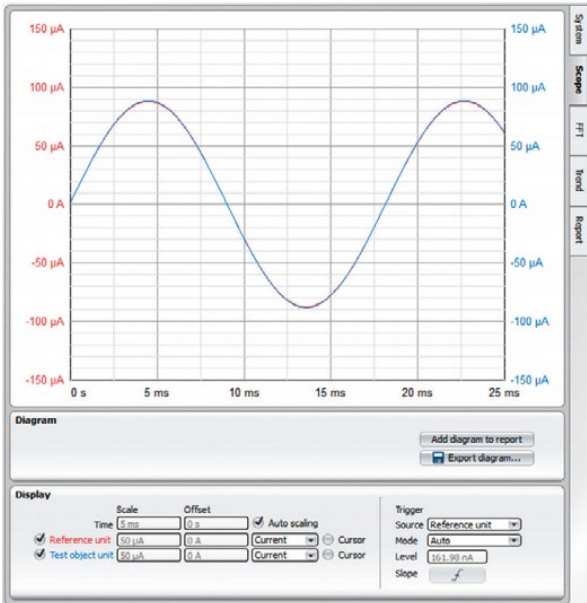


Schematic representation of test system verifies actual setup and connection status

Tab-based navigation lets you view measurement data and trends, and create custom reports

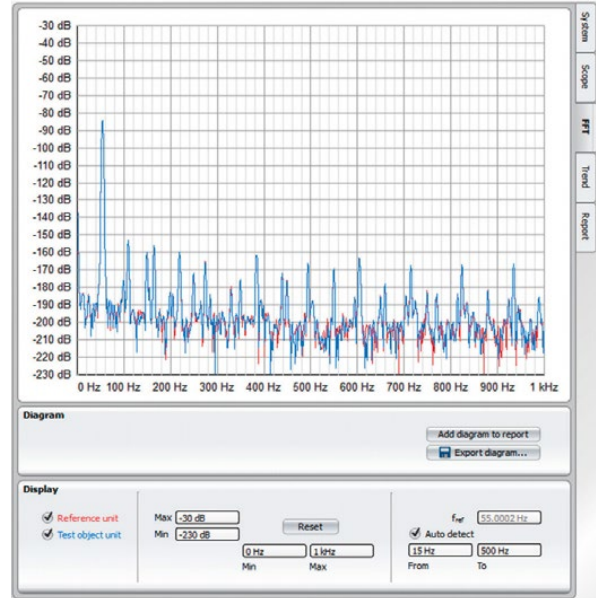
Real-time data display of up to five user-selectable measurement parameters for quick reference

Scope view



- Graph of real-time input signals from the measuring units
- > Visualizes quality of incoming input signals
- > Data export for reports in BMP, PNG or JPG formats

FFT view



- Fast Fourier Transformation (FFT) detects interference
- > FFT graph displays signal-to-noise ratio of input signals
- > Signal status is updated continuously

Trend view



- Visual historic summary of measurement values
- > Display of up to five user-selected values
- > Recordings made at user-specified time intervals

Report view

- Easy creation of customized reports
- > Add your logo and individualize input fields
- > Select measurement values, diagrams and graphs

Ordering information

TANDO 700 packages

Description	Order no.
TANDO 700 Standard Package Precision measurement solution for the following high-voltage (HV) assets: <ul style="list-style-type: none">> Rotating machines (motors and generators)> Bushings> Capacitors> Distribution, instrument and power transformers	VE004600
TANDO 700 Advanced Package High-precision measurement solution for all HV assets, particularly: <ul style="list-style-type: none">> Power cables / cable accessories> Research and development> Metrology institutes	VE004601

Package components

TANDO 700 standard and advanced packages both include the following components:

Hardware

- 1 x TANDO 700 reference unit
- 1 x TANDO 700 test object unit
- 2 x 24W standard battery charger
- 1 x MCU1 fiber optic controller with USB cable

Software

- 1 x TANDO 700 software and documentation CD
(Computer not included)

Cables and accessories

- 2 x Duplex fiber optic cables (20m or 50m)
- 1 x Connection cable kit, including:
 - 1 x Reference capacitor connection cable
 - 1 x Connection cable for devices with TNC plug
 - 2 x Coax adapter BNC female to 2x4 mm male 180°
 - 1 x Coax adapter TNC female to BNC male 180°
 - 2 x 4 mm banana connection cable, 0.5 mm, red
 - 2 x 4 mm banana connection cable, 0.5 mm, black
 - 2 x Banana clamp red
 - 2 x Banana clamp black

Documentation

- 1 x TANDO 700 calibration report
- 1 x TANDO 700 getting started guide

Optional accessories

Description	Order no.
External shunts (4 A, 15 A, 28 A) <ul style="list-style-type: none">1 x SHT1 Version A: 4 A with connection cable1 x SHT1 Version B: 15 A with connection cable1 x SHT1 Version C: 28 A with connection cable	VEHZ4140 VEHZ4141 VEHZ4142
External battery <ul style="list-style-type: none">RBP1 Includes a connection cableRBP1 package Includes a connection cable and standard 24W battery charger	VEHZ4146 VEHZ4147
Battery charger Standard 24W battery charger (spare or replacement)	VEHZ4143
Transport case Provides space for all package components and up to three shunts	VEHP0046
Software options <ul style="list-style-type: none">Report module Customizable report generation interfaceIntegration module Includes Microsoft COM® and LabVIEW library	VESM4103 VESM4108
TANDO 700 upgrade Upgrade from the TANDO 700 Standard Package to the Advanced Package	VEHO0005



Technical specifications

Standard System

Value	Accuracy ¹	Condition ²
Dissipation/ power factor	0.1 % rdg. + 1 x 10 ⁻⁴	5 μA ≤ I _{IN} ≤ 1 A
Capacitance	0.1 % rdg. + 0.1 pF	5 μA ≤ I _{IN} ≤ 1 A
Current	0.1 % rdg. + 0.1 nA	5 μA ≤ I _{IN} ≤ 1 A
Voltage	0.5 % rdg. + 1 V	10 pF ≤ C _{Ref} ≤ 10 nF

Advanced System

Value	Accuracy ¹	Guaranteed	Condition ²
	Typical		
Dissipation/ power factor	< 5 x 10 ⁻⁶	0.1 % rdg. + 2 x 10 ⁻⁵	5 μA ≤ I _{IN} ≤ 1 A
Capacitance	0.005 %	0.05 % rdg. + 0.05 pF	5 μA ≤ I _{IN} ≤ 1 A
Current	< 0.02 %	0.05 % rdg. + 0.05 nA	5 μA ≤ I _{IN} ≤ 1 A
Voltage	< 0.02 %	0.2 % rdg. + 1 V	10 pF ≤ C _{Ref} ≤ 10 nF

¹ The specified accuracies are valid for the frequency of the test voltage at 50/60 Hz, a temperature range of 23 °C ± 5 °C, SINAD of the power source < 12 dB and without errors depending on C_{REF}, input combination and parasitic capacitances.

² Without a connected shunt and running the software in Auto Mode.

For detailed range dispersion and pre-conditions for accuracy values, please contact OMICRON Support.

System Data

Frequency Range 5 Hz ... 400 Hz

Direct and internal shunt input ranges

1.2 mA	Impedance	17 Ω
	Current	0.5 μA ... 1.2 mA
200 mA	Impedance	50 Ω
	Current	1 mA ... 200 mA
1 A	Impedance	5.4 Ω
	Current	10 mA ... 1 A

Connection to MCU1

Fiber optic	Wave length	1300 nm
	Mode	Multimode 50 / 125 μm
	Fiber length	Up to 2 km

Computer Requirements

Characteristic	Required
Processor	Intel Pentium 4 (≥ 2.5 GHz), Pentium M (≥ 1.5 GHz), Core, Core 2 processor or AMD Athlon 64 or Turion 64 processor
Memory	1GB RAM, USB 2.0 Hi-speed compatible
Operating system	Microsoft Windows XP (32 Bit), Windows 7, Windows 8

Calibration certificates

Certificate	TANDO 700 System
PTB calibration mark 20269 - 20273 PTB 14	Standard
PTB calibration mark 20269 - 20273 PTB 14	Advanced

Power Data

Parameter	Value
Supply voltage (Power input)	9 V ... 24 V DC, 24 W
Power consumption	< 100 mW active < 1 mW standby < 15 W charging
Internal battery pack	Rechargeable lithium battery 3.7 V / 11.6 Ah
Internal battery charge period	Minimum 21 days

Mechanical Data

Characteristic	Rating
Dimensions (W x D x H)	115 x 175 x 55 mm (4.53 x 6.88 x 2.16 in.)
System package weight	< 5 kg / 11.36 lbs (without accessories)
Connections	Front: 2 x Standard connectors for fiber optic network 1 x 4 pin DC input socket, LEMO FFA Rear: 2 x 4 mm banana red/black plug 1 x 4 pin shunt socket, LEMO FGG

Environmental Conditions

Characteristic	Rating
Operating temperature	-10 °C ... +50 °C -14 °F ... +122 °F
Storage temperature	-20 °C ... +60 °C -4 °F ... +140 °F
Charging temperature	0 °C ... +40 °C 32 °F ... +104 °F
Humidity	-5 % ... 85 % (non-condensing)

SHT1 External Shunts

Parameter	Value		
Maximum current	4 A	15 A	28 A
Minimum current	100 mA	1 A	3 A
Nominal resistance	500 mΩ	50 mΩ	15 mΩ
Typical temperature coefficient	2 ppm	2 ppm	2 ppm
Initial resistance accuracy	±0.04 %		
Absolute phase deviation	tan δ < 2 x 10 ⁻⁵		
Weight	0.68 kg / 1.49 lbs		

CE Conformity

(EMC) Directive 2004/108/EC, (LVD) low-voltage directive 2006/95/EC

EMC	EN 61326-1/2013	Emission: Class A Immunity: Table 2
Safety	UN 38.3 IEC 62133:2012 (ed.2) UL 2054 (ed.2, incl. rev. 2011) TÜV certificate no. B 14 11 17955 065	
Protection	IEC 60068- /2-6 / 2-27 / 2-78 IEC 60529 § 12.2 / § 13.2	Vibration, Shock, Damp Heat IP4X

OMICRON is an international company serving the electrical power industry with innovative testing and diagnostic solutions. The application of OMICRON products allows users to assess the condition of the primary and secondary equipment on their systems with complete confidence. Services offered in the area of consulting, commissioning, testing, diagnosis and training make the product range complete.

Customers in more than 140 countries rely on the company's ability to supply leading-edge technology of excellent quality. Service centers on all continents provide a broad base of knowledge and extraordinary customer support. All of this together with our strong network of sales partners is what has made our company a market leader in the electrical power industry.

For more information, additional literature, and detailed contact information of our worldwide offices please visit our website.