

# ALLINA T1

All-in-one Test Solutions

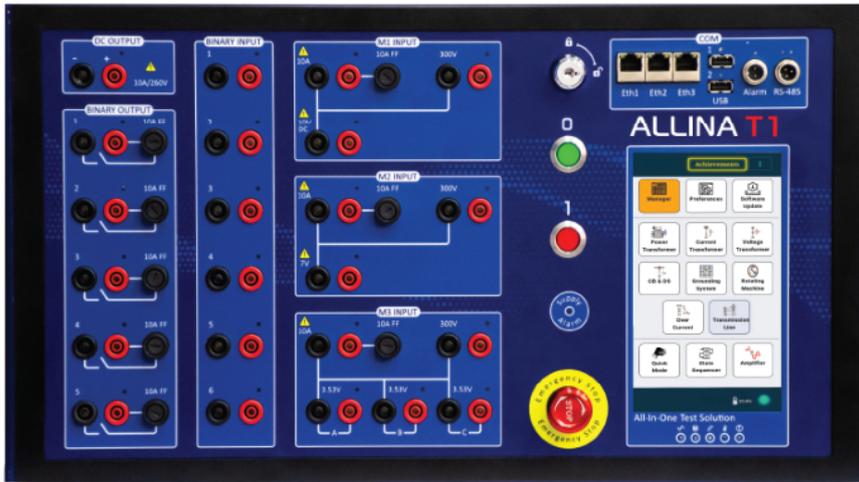


POWERTEST.IN



**ALLINA T1** is a controllable single-phase current and voltage source with the rated output power of 5 kVA. This is designed and produced by ESFA Group which is suitable for performing various kinds of commissioning, periodic, and diagnostic tests.

**ALLINA T1** can be employed in high voltage substations, distribution substations, power plants, industrial plants, high voltage equipment manufacturer, research centers, and universities. The output voltage can be controlled in the range of 0~2200 V-AC and 0~260 V-DC.



In addition, its output current can be controlled in the range of 0~1000 A-AC and 0~400 A-DC. Moreover, the frequency of AC voltage and current is controllable between 15 and 120 Hz.

Furthermore, ALLINA T1 can be synchronized with an external current or voltage source to generate either current or voltage with the same frequency, adjustable phase angle difference, and specified amplitude (up to 1000 A and 2200V).

Applications of such a feature consist of amplifying an electrical signal, performing three-phase tests using three separate ALLINA T1 devices, distance or directional relay function test by the primary injection method, and etc.

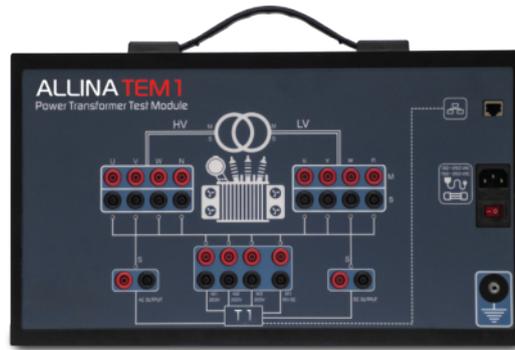


# Accessories Modules



**Circuit Breaker Test Module (Cb1)**

- Safe tests using dual ground method
- One wiring for all tests
- Fast mounting on main module to simplify tests



**Three-Phase Transformer Automatic Test Module (TEM1)**

- One wiring for all tests on three phases
- Wrong wiring detection
- Test duration reduction
- Easy and safe test performing



**Coupling Module (Cm1)**

- Line impedance measurement in presence of induced voltage
- Grounding system tests in presence of source of errors
- Measurement of ground grid safety voltages (step, touch, metal-to-metal voltages)

## Current Transformer Testing

- Capacitance and insulation dissipation factor (Tan Delta) measurement (up to 10 kV by TDM1 external module)
- Test and analysis of TPY- and TPZ-type CTs (magnetizing characteristic and ratio error)
- Excitation and hysteresis curves (up to 2.2 kV @ 50 Hz)
- Ratio and polarity (by injecting current into primary side up to 1000 A)
- Ratio and polarity (by applying voltage on secondary side up to 2.2 kV)
- Power frequency withstand voltage (up to 2.2 kV) for secondary side winding and circuit



ALLINA T1



ALLINA TDM1

- Secondary side DC winding resistance
- Secondary burden measurement
- Core demagnetizing

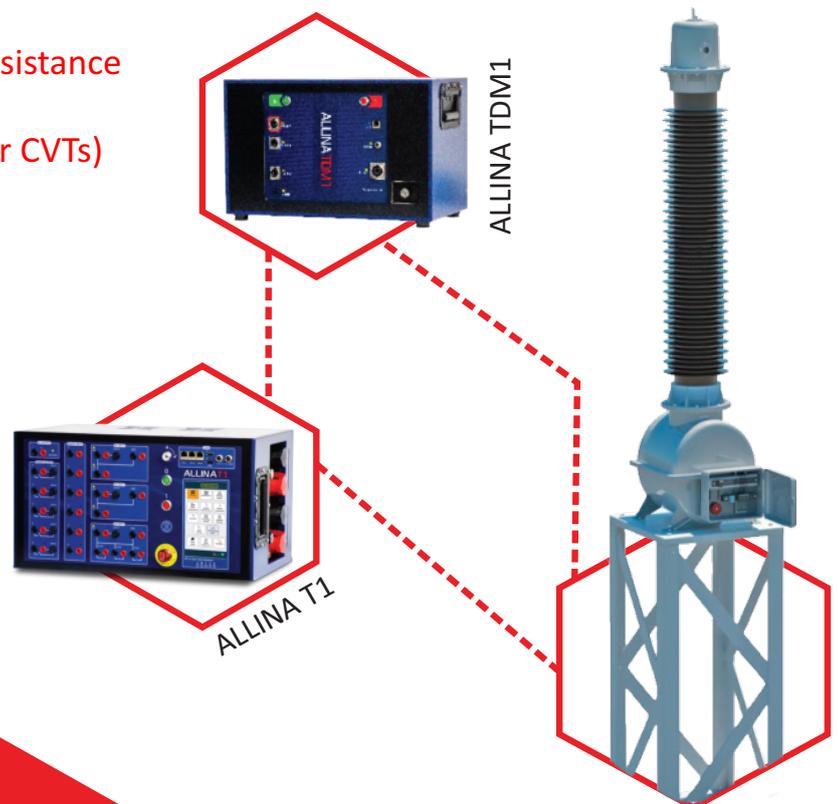
## Power Transformer Testing

- Switch box for automatic and quick performing tests on three-phase transformers (by “TEM1” external module)
- Capacitance and insulation dissipation factor (Tan Delta) measurement (up to 10 kV by “TDM1” external module)
- High voltage excitation current and loss measurement (up to 10 kV by TDM1 external module)
- Turn ratio test on both regular and phase shifting transformers (based on IEC61378-1 method)
- Winding resistance (by injecting DC current in the range of 0 to 10 A or 10 to 100 A, or applying DC voltage)

- Dynamic resistance test of on-load tap changers (up to 10 A DC)
- No-load current (excitation current) and loss (up to 2.2 kV)
- Short circuit and zero sequence impedance (up to 10 A)
- Magnetic core demagnetizing (up to 10 A DC)
- Magnetic balance (up to 2.2 kV)
- Vector group

## Voltage Transformer (CVT, PT)

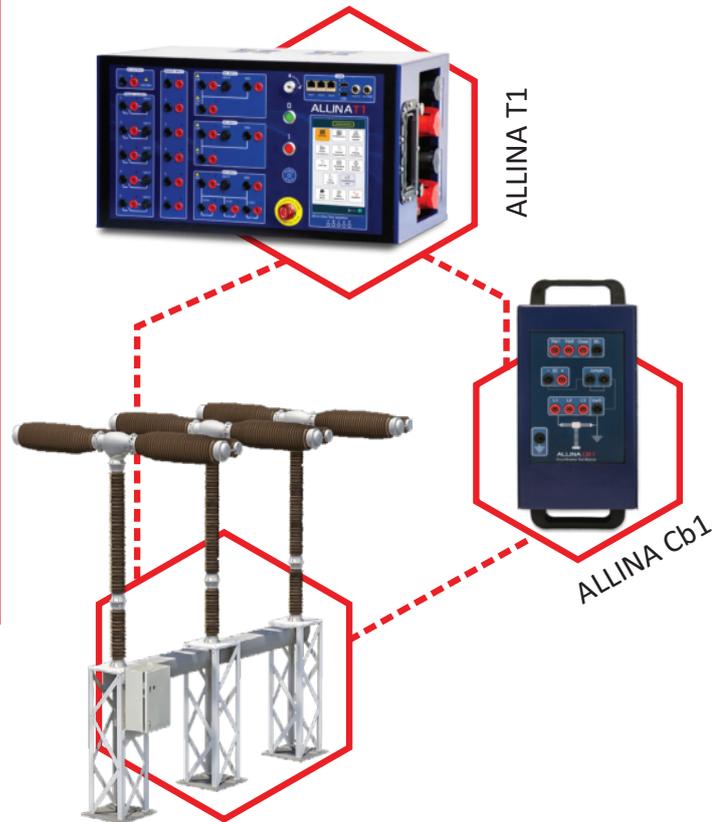
- Capacitance and insulation dissipation factor (Tan Delta) measurement (up to 12 kV by “TDM1” external module)
- Power frequency withstand voltage (up to 2.2 kV)
- Primary and secondary DC winding resistance
- Short circuit impedance (especially for CVTs)
- Ratio and polarity (up to 2.2 kV)
- Secondary burden



## Circuit Breaker (CB)

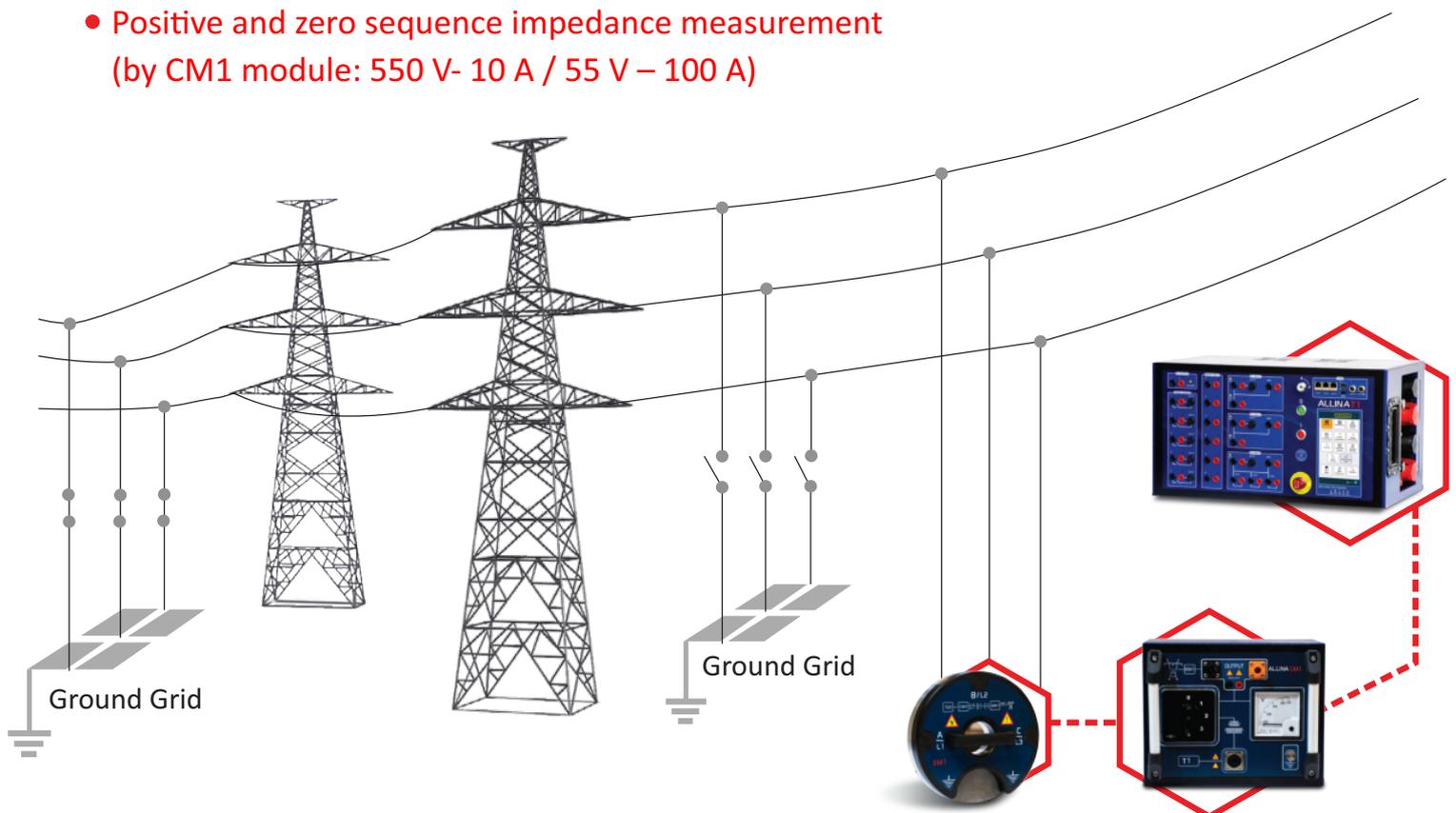
- Dual ground method (for time test under electromagnetic noises of in-service high voltage substations)
- Motor current and spring charge time monitoring (by using optional DC clamp-on ammeter)
- Trip/close coil minimum pickup voltage (up to 260 V DC/AC, 10 A)
- Time test (for various duty cycles such as C-O, O-C, C-O-C, O-C-O)
- Static contact resistance (by injecting DC current up to 400 A)
- Power frequency withstand voltage (up to 2.2 kV)

- Trip/close coil current monitoring
- Pole discordance analysis



## Overhead Line and Cable

- Positive and zero sequence impedance calculation (by ESFAnalysis software based on tower outline and conductor specifications)
- Positive and zero sequence impedance measurement (by CM1 module: 550 V- 10 A / 55 V – 100 A)



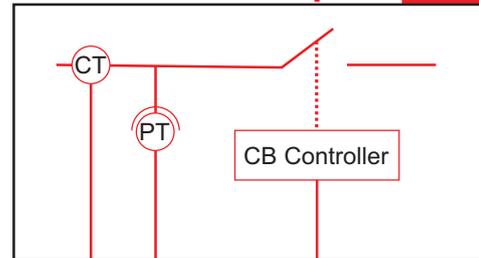
## Protection System

(Instrument Transformers, Relays, and Trip command circuit by injecting single-phase current and voltage)

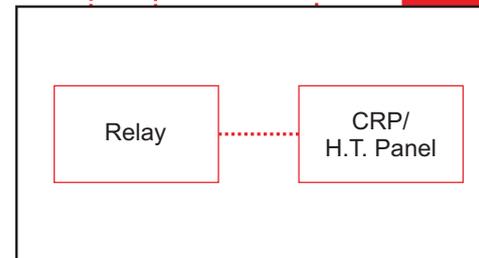
- High-impedance differential relay (including REF, busbar, motor, and generator)
- Low-impedance differential relay (including REF, busbar, motor, and generator)
- Distance relay (by “CM1” external module)
- Overcurrent and Earth Fault relays
- Directional overcurrent relay (DOC)
- Directional earth fault relay (DEF)



ALLINA T1



HV Switchgear



Control Room

## Low Voltage Breakers (MCB, MCCB, and ACB) and Fuse

- I-t characteristic (clearing time) for low-voltage, medium-voltage, and power fuses (by AC current injecting up to 1000 A)
- I-t characteristic for low-voltage circuit breakers (MCB, MCCB, and ACB)



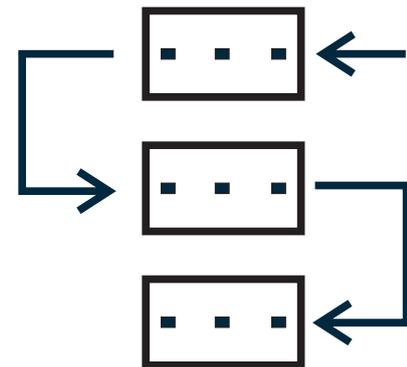
## Quick Mode

- Injecting current up to 1000 A AC (15 to 120 Hz) and up to 400 A DC.
- Applying voltage up to 2200 V AC (15 to 120 Hz) and up to 260 V DC.
- Adjusting limitations on test duration time, voltage, and current.
- Triggering mode (using wet/dry binary inputs and analog input).
- Selecting measurement channels  
M1 (300 V / 10 A / 10 V), M2 (300 V / 10 A / 10 V), and  
M3 (300 V / 10 A / 5 V-A / 5 V-B / 5 V-C).
- Calculating complex parameters including R / X / Z / L /  
C / P / Q / S based on measured signals.



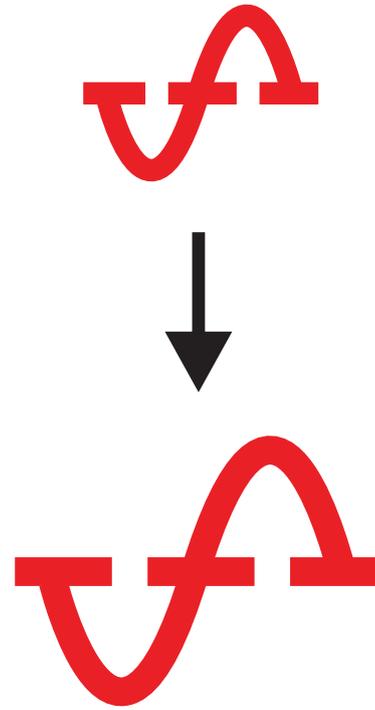
## State Sequencer Mode

- Employing up to 10 sequences with different amplitude and measuring time difference between states.
- Testing automatic reclosing circuit breaker performance.
- Injecting current up to 1000 A AC (15 to 120 Hz) and up to 400 A DC.
- Applying voltage up to 2200 v AC (15 to 120 Hz) and up to 260 V DC.
- Adjusting limitations on test duration time, voltage, and current.
- Setting triggering mode (using wet/dry binary inputs and analog input).
- Selecting measurement channels  
M1 (300 V / 10 A / 10 V), M2 (300 V / 10 A / 10 V), and M3 (300 V / 10 A / 5 V-A / 5 V-B / 5 V-C).
- Calculating complex parameters including R / X / Z / L / C / P / Q / S based on measured signals.



## Amplifier Mode

- Operation in AC voltage / current mode (15 Hz to 120 Hz variable frequency)  
Up to 2200 V AC / 1000 A AC
- Synchronization with AC voltage or current
- Injection of voltage / current signals with amplification factor and phase shift relative to the reference signal
- Synchronization of up to 3 ALLINA devices (with application of three-phase tests)



## Technical Data ALLINA T1

- Internal Measurement of Outputs

| Output         | Range  | Guaranteed accuracy |                  |                  | Typical accuracy |                  |                  |
|----------------|--------|---------------------|------------------|------------------|------------------|------------------|------------------|
|                |        | Amplitude           |                  | Phase            | Amplitude        |                  | Phase            |
|                |        | Reading error       | Full scale error | Full scale error | Reading error    | Full scale error | Full scale error |
| 1000 A AC      | —      | 0.20%               | 0.20%            | 0.2°             | 0.10%            | 0.10%            | 0.1°             |
| 400 A AC       | —      | 0.30%               | 0.10%            | —                | 0.10%            | 0.15%            | 0.1°             |
| 2260 V AC      | 2000 V | 0.10%               | 0.10%            | 0.2°             | 0.08%            | 0.05%            | 0.1°             |
|                | 1000 V | 0.10%               | 0.10%            | 0.2°             | 0.08%            | 0.05%            | 0.1°             |
|                | 500 V  | 0.10%               | 0.10%            | 0.2°             | 0.08%            | 0.05%            | 0.1°             |
|                | 10A    | 0.10%               | 0.10%            | 0.2°             | 0.08%            | 0.05%            | 0.1°             |
| 260 V DC       | 500 mA | 0.10%               | 0.10%            | 0.2°             | 0.08%            | 0.05%            | 0.1°             |
|                | 300 V  | 0.10%               | 0.15%            | —                | 0.05%            | 0.08%            | —                |
|                | 15 V   | 0.10%               | 0.15%            | —                | 0.05%            | 0.08%            | —                |
|                | 10 A   | 0.10%               | 0.15%            | —                | 0.05%            | 0.08%            | —                |
| Digital Output | 8 A DC | 0.20%               | 0.25%            | —                | 0.15%            | 0.20%            | —                |

# Technical Data ALLINA T1

## ● Current Output

| Output        | Amplitude | $t_{\max}$ | $I_{\max}$ | Power   | frequency     |
|---------------|-----------|------------|------------|---------|---------------|
| 1000 V AC     | 1000 A    | 30 s       | 5V         | 5000 VA | 15 ... 120 Hz |
|               | 500 A     | 10 min     | 5V         | 2000 VA | 15 ... 120 Hz |
|               | 200 A     | >2 h       | 5V         | 1000 VA | 15 ... 120 Hz |
| 400 A DC      | 400 A     | 2 min      | 5V         | 2000 VA | DC            |
|               | 200 A     | 10 min     | 5V         | 1000 VA | DC            |
|               | 100 A     | >2 h       | 5V         | 500 VA  | DC            |
| 10 A AC (rms) | 10 A      | 10 min     | 260 V      | 2600 VA | 15 ... 120 Hz |
|               | 3 A       | >2 h       | 260 V      | 780 VA  | 15 ... 120 Hz |
| 10 A DC       | 10 A      | 10 min     | 260 V      | 2600 VA | DC            |
|               | 3 A       | >2 h       | 260 V      | 780 VA  | DC            |

## ● Voltage Output

| Output    | Amplitude | $t_{\max}$ | $I_{\max}$ | Power   | frequency     |
|-----------|-----------|------------|------------|---------|---------------|
| 2000 V AC | 0...260V  | >2 h       | 3 A        | 780 VA  | 15 ... 120 Hz |
|           | 0...260V  | 10 min     | 10 A       | 2600 VA | 15 ... 120 Hz |
|           | 0...760V  | >2 h       | 1.5 A      | 1200 VA | 15 ... 120 Hz |
|           | 0...760V  | 10 min     | 5 A        | 3800 VA | 15 ... 120 Hz |
|           | 0...2260V | >2 h       | 0.5 A      | 1130 VA | 15 ... 120 Hz |
|           | 0...2260V | 1 min      | 1 A        | 2260 VA | 15 ... 120 Hz |
| 260 V DC  | 0...260 V | >2 h       | 3 A        | 780 VA  | DC            |
|           | 0...260 V | 10 min     | 10 A       | 2600 VA | DC            |

# Technical Data ALLINA T1

## ● Measuring Inputs

| Input             | Impedance      | Range     | Guaranteed accuracy |                  |                  | Typical accuracy |                  |                  |
|-------------------|----------------|-----------|---------------------|------------------|------------------|------------------|------------------|------------------|
|                   |                |           | Amplitude           |                  | Phase            | Amplitude        |                  | Phase            |
|                   |                |           | Reading error       | Full scale error | Full scale error | Reading error    | Full scale error | Full scale error |
| Mx-300V peak      | 500 K $\Omega$ | 300 V     | 0.10%               | 0.10%            | 0.2°             | 0.07%            | 0.05%            | 0.1°             |
|                   |                | 15 V      | 0.10%               | 0.10%            | 0.2°             | 0.07%            | 0.05%            | 0.1°             |
|                   |                | 750 mV    | 0.20%               | 0.10%            | 0.2°             | 0.07%            | 0.05%            | 0.1°             |
| Mx-10A peak AC/DC | <0.1 $\Omega$  | 10A AC    | 0.10%               | 0.10%            | 0.2°             | 0.07%            | 0.05%            | 0.1°             |
|                   |                | 500 mA AC | 0.10%               | 0.10%            | 0.2°             | 0.05%            | 0.08%            | 0.1°             |
|                   |                | 10A DC    | 0.05%               | 0.15%            | —                | 0.05%            | 0.08%            | —                |
|                   |                | 500 mA DC | 0.05%               | 0.15%            | —                | 0.05%            | 0.08%            | —                |
| M2-10V,peak       | 1 M $\Omega$   | 7 V       | 0.10%               | 0.10%            | 0.2°             | 0.08%            | 0.05%            | 0.1°             |
|                   |                | 350 mV    | 0.10%               | 0.10%            | 0.2°             | 0.08%            | 0.05%            | 0.1°             |
|                   |                | 20 mV     | 0.20%               | 0.20%            | 0.2°             | 0.10%            | 0.08%            | 0.1°             |
| M1-10V DC         | —              | 500 mV    | 0.05%               | 0.15%            | —                | 0.05%            | 0.08%            | —                |
|                   |                | 500 mV    | 0.05%               | 0.15%            | —                | 0.05%            | 0.08%            | —                |
|                   |                | 25 mV     | 0.10%               | 0.30%            | —                | 0.10%            | 0.10%            | —                |
| M3-5V,peak        | 1 M $\Omega$   | 3.5 V     | 0.10%               | 0.10%            | 0.2°             | 0.08%            | 0.08%            | 0.1°             |

## Environmental Condition

- Operating temperature -10 °C ... + 55 °C/+14 °F ... + 131 °F
- Storage temperature -20 °C ... +70 °C / -4 °F ... +158 °F
- Humidity range 5 % ... 95 % relative humidity, no condensation
- EMC IEC 61326 -1, class A
- Environmental Reliability Vibration and shock (IDC-STD-810, 2-direction)

## Mechanical Data

| Module Name  | Application                                           | Weight | Dimensions         |
|--------------|-------------------------------------------------------|--------|--------------------|
| ALLINA T1    | Main Module                                           | 36 kg  | 520 * 285 * 330 mm |
| ALLINA TDM 1 | Capacitance and Disiipation factor Measurement Module | 34 kg  | 520 * 285 * 330 mm |
| ALLINA TEM1  | 3-Phase Power Transformer Test Module                 | 5 kg   | 446 * 247 * 116 mm |
| ALLINA Cm1   | Line Impedance Measurement Module                     | 23 kg  | 350 * 280 * 270 mm |
| ALLINA Cb1   | Circuit Breaker Test Module                           | 3 KG   | 370 * 165 * 120 mm |
| ALLINA Em1   | Earthing Module                                       | 6 KG   | 260 * 260 * 120 mm |

# Tan Delta Module (TDM1)

- Tan Delta measurement (with uncertainty less than 0.01%)
- Capacitance measurement ( 100pF – 50 uF)
- Power transformer ratio and no-load current (up to 12 kV)
- Power frequency withstand voltage (up to 12 kV)

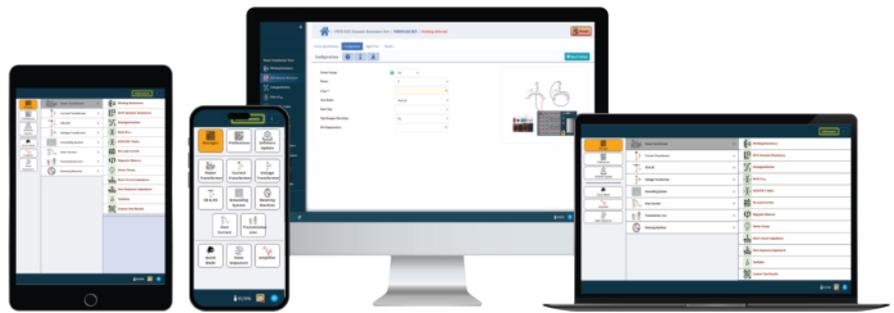


## Technical Data Tan Delta Module (TDM1)

| High Voltage Output         |                                 |                                 |         |         |                  |
|-----------------------------|---------------------------------|---------------------------------|---------|---------|------------------|
| Terminal                    | Voltage                         | Frequency                       | Current | S       | t <sub>max</sub> |
| High Voltage Output         | 0...12 kV                       | 15...120 Hz                     | 300 mA  | 3000 VA | 30 s             |
|                             |                                 |                                 | 100 mA  | 1000 VA | > 60 min         |
| Measurement                 |                                 |                                 |         |         |                  |
| Input                       | Range                           | Typical Accuracy                |         |         |                  |
| input A<br>Input B<br>Earth | 0...5 A AC                      | Error < 0.2% of reading + 100nA |         |         |                  |
| Capacitance                 |                                 |                                 |         |         |                  |
| Range                       | Typical Accuracy                |                                 |         |         |                  |
| 100 pF...3 uF               | Error < 0.2% of reading + 10 pF |                                 |         |         |                  |
| Dissipation Factor          |                                 |                                 |         |         |                  |
| Range                       | Typical Accuracy                | Conditions                      |         |         |                  |
| 0...10 %                    | Error < 0.2% of reading + 0.01% | V test > 500 V                  |         |         |                  |

## Software

- Web-based software eliminating need for installation and run on a computer, tablet and cellphone.
- Specific test rooms with corresponding wiring diagrams depending on the set parameters.
- User-friendly computer software supporting both Wi-Fi and Ethernet cable connections.
- Touch LCD for handling tests with the same performance as the connected computer.
- Aided software in all test steps automatically generating test results.
- Manageable database.



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ENERGY**

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