A leakage current tester has now been added to the TOS Series...

Conforms to international standard IEC 60990 ("Methods of measurement of touch current and protective conductor current").

The Leakage Current Tester TOS3200 is designed to test for leakage current (Touch Current and Protective Conductor Current) of general electrical apparatuses, excluding those used for medical purposes. With this tester, you can conduct tests conforming to various standards including IEC, UL, JIS and Electrical Appliance and Material Safety Law (Japan). You can set test conditions through simple operations on the panel because this tester holds in its memory the 51 types of test conditions for IT-related electrical equipment, electrical appliances, audio & visual equipment, lighting fixtures, power tools, and measuring and control instruments, accordingly with the standards of IEC/JIS and Electrical Appliance and Material Safety Law.

- Capable of measuring leakage current in three modes
- Seven built-in measurement circuit networks
- Up to 30 mA for RMS measurement
- Easy-to-understand operation
- Enables the continuous execution of tests
- Capable of saving test results
- 51 types of standard test conditions are preset
- Lets you manage the calibration time limit
- USB interface provided as standard
Capable of measuring leakage current in three modes

- **Touch current (TC) operating mode**
  Enables you to measure the touch current flowing between the enclosure (accessible portion) of the electrical equipment under test (EUT) and the power line (EUT) via a human phantom circuit. For human phantom circuits, seven measurement circuit networks (NTWKs) conforming to the applicable standards are provided as standard. The switching of the polarities of the power line to the EUT, as well as single-fault conditions, are automatically set with relays inside the tester.

- **Protective conductor current (PCC) operating mode**
  Enables you to measure the current flowing through the protective conductor (earth wire) by connecting the power plug (NEMA5-15 or an equivalent) of an item of 100 V electrical equipment to the socket on the front panel. A multi-outlet is available as an option (sold separately) to accommodate the different plugs used around the world.

- **Meter (METER) operating mode**
  In the same way as an ordinary multimeter, enables you to measure voltage and current using measurement terminals A and B on the front panel. For voltage measurement, it offers a “safety extra low voltage” (SELV) detection function; for current measurement, it offers a measurement function using measurement circuit networks (NTWKs). The TC=Touch Current  PCC=Protective Conductor Current

**Easy-to-understand operation**
Simple operation is possible thanks to the intuitively understandable test condition menu and the function keys/rotary knobs.

Enables the continuous execution of tests
Allows you to automatically conduct TC and PCC tests as a single sequence program by setting their test conditions as up to 100 tests; for auto tests, you can set up to 100 test programs, up to 500 steps in total.

**Up to 30 mA for RMS measurement**
Capable of measuring 30 μA to 30 mA for DC/RMS measurement and 50 μA to 90 mA for PEAK measurement, both in three ranges. Two range switching functions are provided, namely, a fixed range function (FIX) and auto range function (AUTO), which conform to the current to be measured. For RMS measurement, the “true root-mean-square value” is achieved. [Setting screen for touch current (TC) measurement]

Seven built-in measurement circuit networks
It offers built-in seven measurement circuit networks (NTWKs) for measuring the touch current of general electrical equipment.

- **Measurement circuit network (network A)**
- **Measurement circuit network (network B)**
- **Measurement circuit network (network C)**
- **Measurement circuit network (network D)**
- **Measurement circuit network (network E)**
- **Measurement circuit network (network F)**
- **Measurement circuit network (network G)**

**Capable of saving test results**
For independent tests, enables you to save not only test results but also the test date and time and the test conditions for up to 50 tests; for auto tests, you can save this data for up to 50 programs. You can also save the test results as external records using the USB and other interfaces.

**51 types of standard test conditions are preset**
The memory in the main unit is pre-written with 51 types of test conditions for general electrical equipment, which conform to IEC 60990 and the standards listed below. You can set the standard test conditions merely by calling them.

**Let’s manage the calibration time limit**
For independent tests, enables you to save not only test results but also the test date and time and the test conditions for up to 50 tests; for auto tests, you can save this data for up to 50 programs. You can also save the test results as external records using the USB and other interfaces.

**USB interface provided as standard**
In addition to the SIGNAL I/O, GPIB, and RS-232C interfaces, a USB interface is also provided as standard.

### Range of other functions
- "MAX function," which retains the largest current measured.
- "CONV function," which converts the measured current value into the corresponding value for the preset power voltage.
- "SELV function," which causes the DANGER lamp to turn ON if a preset safety extra low voltage (SELV) is exceeded in meter measurement mode.
- "CHECK function," which performs self-analysis of the measurement circuit networks.
**Leakage Current Tester TOS3200**

### Measurement items, measurement mode

- **Measurement item**: 3 types, namely, touch current (TC) measurement, protective conductor current (PCC) measurement, and METER measurement.
- **Measurement ref.**:
  - **TC**: Measure the voltage drop across the reference resistor, using a measurement circuit network (NTWK), and then calculate the current.
  - **PCC**: Measure the voltage drop across the reference resistor connected to the protective earth wire, and then calculate the current.
- **METER**: Measure the voltage and current using the measurement terminals.

### Measurement mode

- **DCRMS/PEAK**: (RMS being the true root-mean-square value)
  - **Network A**: Basic measurement element: 1.5 kΩ ± (2% of rdng + 10 μA) (confoming to IEC 60909)
  - **Network B**: Basic measurement element: 2.2 μF (conforming to IEC 60909)
  - **Network C**: Basic measurement element: 2.5 kΩ ± (4% of rdng + 10 μA) (confoming to IEC 60909)
  - **Network D**: Basic measurement element: 1 kΩ ± (2% of rdng + 10 μA) (conforming to the Electrical Appliance and Material Safety Law, etc.)
  - **Network E**: Basic measurement element: 1 kΩ ± (2% of rdng + 75 μA) (conforming to the Electrical Appliance and Material Safety Law, etc.)
  - **Network F**: Basic measurement element: 1.5 kΩ ± (2% of rdng + 10 μA) (UL, etc.)

### Network constant/fixed resistance

- **Resistance**: ±1%, capacitor ±0.1%, ±0.1% ±0.2% (UL, etc.)

### Current measurement section

- **Range 1**
  - **DC**: ±5% of rdng + 20 μA
  - **RMS**: ±5% of rdng + 20 μA
  - **PEAK**: ±5% of rdng + 20 μA

- **Range 2**
  - **DC**: ±10% of rdng + 20 μA
  - **RMS**: ±10% of rdng + 20 μA
  - **PEAK**: ±10% of rdng + 20 μA

- **Range 3**
  - **DC**: ±15% of rdng + 50 μA
  - **RMS**: ±15% of rdng + 50 μA
  - **PEAK**: ±15% of rdng + 50 μA

- **Input resistance, input capacitance**: 1 MΩ ± 1%, < 200 pF

### Common mode rejection ratio (CMRR)

- **1 kHz**: ±100 μV / μA, ±10 μV / mA
- **1 MHz**: ±400 μV / μA, ±40 μV / mA

### Leakage current tester

- **Input power**: Nominal input rating: 100Vac to 240Vac, 50/60Hz, power consumption: 70 VA max.
- **Safety**
  - CAT II: Conforms to the requirements of the directives and standard below.
  - EN61010-1 (Class I, Pollution degree 2)
  - Low Voltage Directive 2006/95/EC

### Leakage current tester TOS3200

- **Electromagnetic compatibility (EMC)**
  - Conforms to the requirements of the directive and standard below.
  - EN61326-1 (Class A, Pollution degree 2)

### Measurement range

- **Measurement range**: DC Leakage Current Measurement: 0 μA to 1000 A

### Protective operation

- **System**: Recorder, and system operation function
- **Safety**: Conforms to the requirements of the directives and standard below.

### Interface

- **RS-232C**: 9-pin D-sub connector (conforming to EIA-232-D/B; baud rate: 9600/4800 baud; 8-bit for communication with a PC, etc., use a “parity frame frame frame frame” cable)
- **GPIB**: Conforms to IEEE 488-1978
- **USB**: Conforms to USB specification 2.0
- **REMOTE**: 6-pin MUSHIN connector (for HPI-2210 optionally supplied only option)

### Environment

- **Temperature**: –20˚C to 70˚C, humidity: 90% rh or less (no condensation)
- **Input power**: Nominal input rating: 100Vac to 240Vac, 50/60Hz
- **Input power factor**: Nominal input rating: 100Vac to 240Vac, 50/60Hz
- **Maximum input current**: 100 Vac to 240Vac, 50/60Hz
- **Insulation resistance**: 500 Vdc (between AC line and chassis, between measurement terminals and chassis)
- **Withstand voltage**: 1390 Vac, 2 seconds/20 mA or less (between AC line and chassis, between measurement terminals and chassis)
- **Ground bond**: 25 A(±2%) or less

### Accessories

- 1 set of test leads (TL21-TOS; red and black, one each, with alligator clips)
- 1 flat probe (FPF1-TOS), 1 spare fuse (15A, for EUT power)
- 1 instruction manual, 1 circuit principle diagram sticker
- 2 power cords (for the tester and for the EUT AC line)

### External dimensions diagram

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Units: mm
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1. May not apply to custom-made or modified products.
2. Limited to products with CE marking on their panels.
3. The maximum range is indicated. The range differs depending on the measurement circuit network.
4. The maximum range is indicated. The range differs depending on the measurement circuit network.
5. Current converted value in Network A,B,C and PCC measurement, based on built-in voltmeter accuracy.
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