

LINE IMPEDANCE TESTING KIT



STS family accessory for line impedance test

- **Optional line impedance testing kit for STS 5000 and STS 4000**
- **The kit is made of:**
 - STLG- line and grid module**
 - STSG - safety grounding module**
- **The option allows performing the measurement of: soil resistivity, ground grid resistance, step and touch tests**
- **STSG protects the operator against possible high voltage spikes**

LINE IMPEDANCE TESTING KIT

The line impedance testing kit is made of:

- . STLG - line and grid module
- . STSG - safety grounding module

The line impedance test has the purpose of verifying the computed value of the Earth coefficient KL for the HV overhead lines. This is a critical parameter for the setting of a distance relay: a wrong value causes the false fault location.

STLG line and grid module



The option allows performing both the measurement of: soil resistivity, ground grid resistance, step and touch tests, and of: overhead lines zero sequence and mutual coupling coefficients. This option applies to STS 5000 and 4000 models.

Unless for soil resistivity, for these tests the device is connected to an out-of-service overhead line. Tests are performed with AC current; so, the total impedance is too high for the STS current or voltage generators. STLG is a high power transformer, which increases the output current. A high current switch allows selecting the desired current range. A voltage meter displays the generated voltage. The option takes its power from the EXT. BOOSTER connector of STS. Output current and voltage are metered and sent back to STS measuring inputs; a third output allows STS to know the selected range.

Device characteristics are the followings.

- . Input: from STS 5000, via the booster connector.
- . Output current ranges: 10, 20, 50, 100 A AC.
- . Output power: 1800 VA steady; 5200 VA peak for 10 s.
- . High current range selector switch.
- . Analogue output voltage meter. Meter range: 600 V AC.

STSG safety grounding module

During tests, STLG is connected to the overhead line to connect to the remote ground. The purpose of the STSG optional device is to protect the operator against possible high voltage spikes. STSG incorporates three voltage suppressors and one high current switch, to connect three lines in parallel. This option applies to STS 5000 and 4000 models, in conjunction with STLG. Option characteristics:

- . Nominal AC spark-over voltage: 1000 V rms
- . Impulse spark-over voltage: 2000 V peak
- . Short-circuit proof with 25 kAeff / 100 ms; 36 kAeff / 75 ms
- . Connection via three cylindrical ball studs 16, 20 or 25 mm diameter. The ball diameter must be specified at order.
- . Metal aluminum box with handle
- . Weight: 9.1 kg
- . Dimensions: 41 x 21 x 13.5 cm
- . Grounding cable, included: 95sq.mm, 2m.



THE TEST

LINE IMPEDANCE

- **LINE IMPEDANCE**

The line impedance test has the purpose of verifying the computed value of the Earth coefficient KL for the HV overhead lines. This is a critical parameter for the setting of a distance relay: a wrong value causes the false fault location. The test is performed injecting current into the lines, in many modes: line to line, three lines to ground, with or without current in parallel lines. With the STLG option, the current generation can be performed even in presence of induced voltages. The device measures the injected current and the corresponding voltage drop and phase shift. Input parameters are: maximum test voltage and test current. Other parameters are the line material and the test temperature. Tests are performed at frequencies ± 5 Hz with respect to the line frequency, in order to remove the noise. To the left, the display shows the measured and computed values of the impedances; to the right, the computed corrective factors.

| # | f (Hz) | V Meas (V) | I Meas (A) | R (Ω) | X (Ω) | Z (Ω) | ϕ ($^\circ$) |
|---|--------|------------|------------|----------------|----------------|----------------|---------------------|
| 1 | 45.0 | 796.651 | 10.000 | 5.850 | 79.450 | 79.665 | 85.8 |
| 2 | 55.0 | 796.651 | 10.000 | 5.850 | 79.450 | 79.665 | 85.8 |

| Measure | R (Ω) | X (Ω) | Z (Ω) | ϕ ($^\circ$) | Factor | Magnitude | Phase |
|---------|----------------|----------------|----------------|---------------------|--------|-----------|-------|
| ZA | 2.912 | 39.709 | 39.816 | 85.8 | KE | 0.823 | -10.6 |
| ZB | 2.938 | 39.741 | 39.849 | 85.8 | RE/RL | 2.850 | 0.0 |
| ZC | 2.983 | 40.038 | 40.149 | 85.7 | XE/XL | 0.798 | 90.0 |
| ZE | 8.392 | 31.774 | 32.863 | 75.2 | KD | 3.456 | -7.5 |
| Z1 | 2.944 | 39.829 | 39.938 | 85.8 | KLM | 0.703 | -13.0 |
| Z0 | 28.119 | 135.150 | 138.044 | 78.2 | RM/RL | 2.822 | 0.0 |
| ZM | 8.308 | 26.804 | 28.062 | 72.8 | XM/XL | 0.673 | 90.0 |
| Z0M | 24.924 | 80.413 | 84.186 | 72.8 | KLM | 2.108 | -13.0 |

ORDERING INFORMATION

| CODE | MODULE |
|-------|---|
| 84175 | Line impedance testing kit: . STLG Line & ground grid module (100 A booster) . Cables set for ST-LG . Heavy duty plastic transport case for ST-LG . STSG Safety grounding module . Heavy duty plastic transport case for ST-SG |
| 72175 | Stud 20 mm |
| 73175 | Stud 25 mm |
| 74175 | Stud 16 mm |



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