

# Line Impedance Testing Kit

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## Line Impedance Testing Kit

- 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

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.

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: 11, 22, 35, 55, 105 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

All necessary connection cables are included in the option. Current clamp provided: 400 A range.

### STSG Safety grounding module

During tests, STSG 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

### Transmission line parameter measurement

#### 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  $\pm 5$  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.

Resistances - Line Impedance Measurement									
STLG		f Test(kHz)		Check Induced Voltage					
Vc	300.0V	I	10.0A	f	45.0	Material	Cu	T meas	25.0°C
		k	1.00	T ref	25.0°C				
AB	BC	AC	ABC    on	ABC    off	ABC    gnd				
#	f (Hz)	V Meas (V)	I Meas (A)	R (Ω)	X (Ω)	Z (Ω)	φ (°)		
1	✓ 45.0	796.651	10.000	5.890	79.450	79.665	85.8		
2	✓ 55.0	796.651	10.000	5.890	79.450	79.665	85.8		
Measure	R (Ω)	X (Ω)	Z (Ω)	φ (°)	Factor	Magnitude	Phase		
ZA	2.912	39.709	39.816	85.8	KE	0.623	-10.6		
ZB	2.938	39.741	39.849	85.8	KE/RL	2.850	0.0		
ZC	2.963	40.038	40.149	85.7	XE/PL	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	KLH	0.703	-13.0		
Z0	26.119	135.150	138.044	76.2	RM/RL	2.822	0.0		
ZM	8.306	26.804	28.062	72.8	XM/OL	0.673	90.0		
Z0M	24.924	80.413	84.186	72.8	KLH	2.338	-13.0		

## Ordering Information

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

