

LIGHTNING SURGE SIMULATOR

■ GENERAL

Surges represent transients that might be induced in cables by lightning. By their nature, fairly high energy charges may easily damage or upset unprotected electronics circuits and components. Surges are not a new problem. Many companies have been testing their products at various stages of the products life: design tests, qualification tests, production tests and diagnostic tests. The advance of surge suppression devices and technique does not lessen the importance of surge testing, but rather increases it, as the requirement to reduce power consumption and to increase the operational speed of semiconductors has become more demanding. In addition, the issue of surge testing is attracting renewed interest since this form of immunity is now a must for almost all electronic products for access to the European Union market.

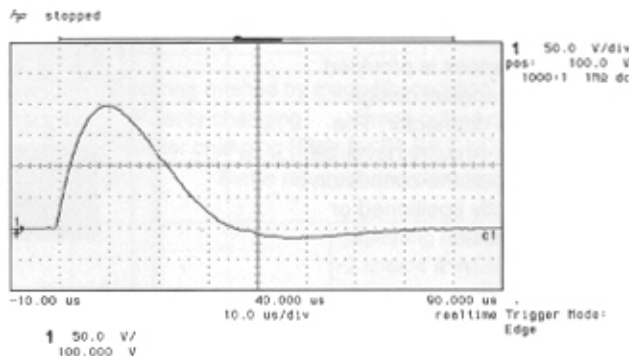
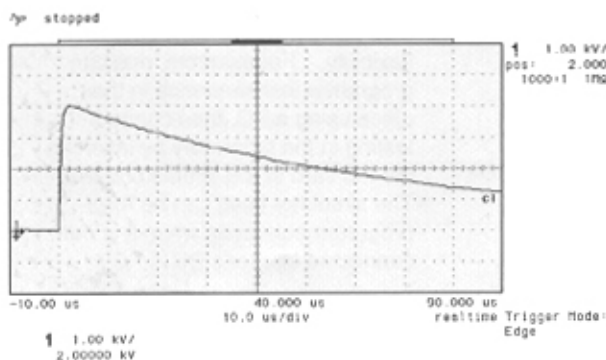
LSS-15AX series and LSS-6000 series simulators provide a combination waveform generator with a 2 ohm output impedance as called for by the IEC 61000-4-5, up to 15kV and 6kV, respectively. LSS-700 series simulators generating traditional two-separate pulses of 1.2/50us and 8/20us with output levels of 12kV(2.4kA), 20kV(4kA) and 30kV (6kA) are also available.



MODEL: LSS-15AX A-1

(Warning lamp in the photo is an optional accessory.)

■ OUTPUT WAVEFORMS EXAMPLE (LSS-15AX series)



Voltage surge waveform: 1.2/50 μ s
Voltage: 4kV V:1kV/Div. H:10 μ s/Div

Current surge waveform: 8/20 μ s
Current: 2000A V:500A/Div H:10 μ s/Div

Highly repeatable and exact waveform. A new methodology has achieved an improvement in actual output waveform. The times to half-value, to say, 50 microseconds, have very limited reduction when the pulses are coupled to the power line CDN, compared to the original waveform measured at the generator output itself.

LSS-15AX SERIES

The LSS-15AX series has been newly designed to completely satisfy and exceed the requirements in the IEC 61000-4-5 standard. The simulators consist of a combination wave generator applying a 1.2/50 open-circuit voltage wave in a high impedance test piece and delivering an 8/20 short-circuit current wave in a low impedance test piece, with CCITT telecom wave generator and associated coupling and decoupling circuits. (the contents depend on the model) With 15kV output capability, the simulators can also be use for evaluating the equipment under test in destructive mode testing.

■ FEATURES

- Fully programmable and easy to use simulator that meets and far exceeds the **IEC 61000-4-5 requirements**
- Data exchange with an external PC by a PCMCIA memory card
- Up to **15kV testing** for severe damage
- Advanced safety

PANEL EXPLANATION

Emergency stop button

This button, easily accessible and placed on the front panel, enables the operator to stop the generation of the pulses anytime he desires. In addition to the high voltage power, he can turn off the EUT.



Infra-red remote controller (option)

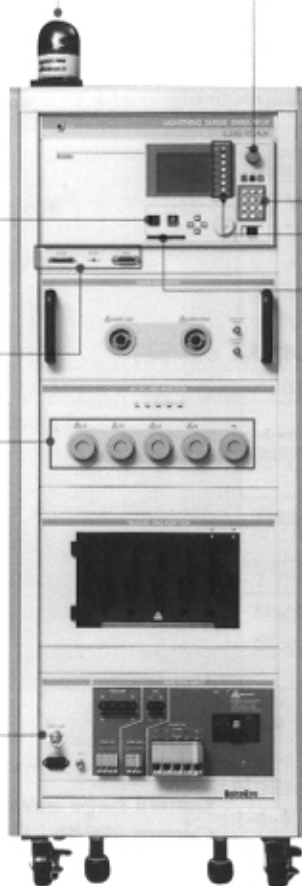
A remote controller with the same function as the control panel of the simulator can be provided

GP-IB or RS-232C can be equipped optionally.

Safety interlock

A safety interlock is provided through the special design high voltage connector. The high voltage circuitry never be activated when the connector is not correctly positioned or not firmly locked.

Warning lamp (option)



Easy operation

Very intuitive settings can be done by the assistance of the well configured user-interface consisting of a 5-inch LCD, ten-key, functions keys and others. Coupling modes are graphically shown, allowing the operator to select the desired mode and allows easy reference of settings during the run of a test

Memory card (option)

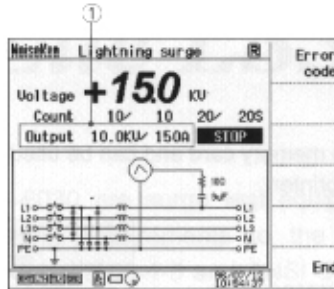
A PCMCIA memory card which is very common to notebook PCs is adopted. Tests in program mode can be controlled by this card, which gives the users ultimate flexibility. For example, one can program a test sequence in their office using a PC, then conduct testing in the laboratory by inserting the PC card to the simulator's slot. The simulator itself can be fully programmable even when it is not connected to user's PC

- <A> Control unit
- Surge generator
- <C> AC/DC lines injection unit
- <D> Telecom lines injection unit
- <E> Injection input panel

FUNCTION

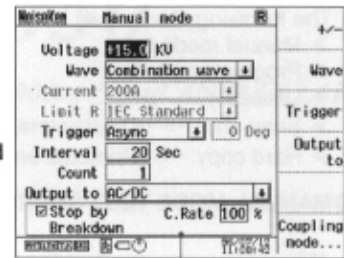
① Peak level monitor

The value of the actual peak amplitude is measured and shown for both voltage and current.



② Automatic stop by detecting breakdown

The simulator automatically stops generating the pulses if the peak current measured exceeds the threshold limit which can be freely set as the breakdown criteria.



SPECIFICATIONS

Item	Models	LSS-15AX A1 LSS-15AX A3	LSS-15AX B1 LSS-15AX B3	LSS-15AX C1 LSS-15AX C3
Surge generating unit	Output waveform	Combination wave (1.2/50 μs+8/20 μs)	①Combination wave (1.2/50 μs+8/20 μs) ②10/700 μs waveform	
	Output voltage/current	15kV/7500A	①15kV/7500A (Combination wave) ②15kV/375A (10/700 μs waveform, at output 40 Ω)	
	Surge switching element	By Ignitron		
	Output polarity	Positive or negative		
	Surge repetition cycle	20 sec. (at 15kV)	①20 sec. (Combination wave, at 15kV) ②30 sec. (10/700 μs waveform, at 15kV)	
	Output impedance	2 Ω	①2 Ω (Combination wave) ②40 Ω (10/700 μs, when limiter resistor is inserted)	
AC/DC line injecting unit	Injecting surge waveform	Combination wave		
	Injecting surge voltage/current	15kV/7500A maximum		
	Surge coupling	Between line and line: 18 μF	Between line and PE: 10 Ω+9 μF	
	Power capacity of injecting AC	Single phase, AC240V/30A (LSS-15AX A1 / B1/ C1) Single phase/3-phase, AC600V/50A (LSS-15AX A3/ B3/ C3)		
	Power capacity of injecting DC	DC60V/20A		
	Decoupling coil	1.5mH (each phase)		
	Decoupling capacitor	10 μF (Between line and line, between line and PE)		
Coupling phase angle control	0~360° (at 1° step)			
Communication line injecting unit	Injecting surge waveform			Combination wave 10/700 μs waveform
	Injecting surge voltage			15kV max.
	Matching resistance			40 Ω (Combination wave) 25 Ω (10/700 μs)
	Total line number			4 lines
	Decoupling coil			20mH (each phase)
	Power capacity of EUT			DC50V 100mA
Voltage/ current monitor output	Voltage/current monitor output ratio	1/2000 (voltage monitor), 1000A/V (current monitor)		
	Check circuit method	Waveform measuring method by magnetic coupling		
Auto control functions	Surge generating unit	•Surge waveform changing •Polarity changing •Surge output changing •10/700 μs waveform limiter resistor changing (Only for B1,B3,C1,C3)		
	AC/DC line injecting unit	•Surge injection phase changing •Surge return phase changing •Coupling element changing		
	Communication line injecting unit			•Matching resistance changing •2 lines/4 lines changing •Surge return route changing
Application function	Test mode	1)Manual test mode 2)Program test mode		
	Voltage/current monitor function	1)Peak level display function 2)Break down detecting function		
External interface	Communication function	RS-232C (Optional), GP-IB (Optional)		
Power supply		AC90~120/200~240V 450VA 50/60Hz		
Dimensions (W) x (H) x (D)mm		555 X 950 X 790 (A1) 555 X 1250 X 790 (A3)	555 X 1250 X 790	555 X 1500 X 790
	Weight	Approx. 170 kgs (A1) Approx. 260 kgs (A3)	Approx. 240kgs(B1) Approx. 280kgs(B3)	Approx. 260kgs (C1) Approx. 300kgs (C3)

■ DISPLAY EXAMPLE

The following menus can be selected in the menu display.

- > Manual mode test
- > Program mode test
- > Utilities
- > Snap shotDisplay image (Bit map form) can be saved in a memory card and can be used for making reports, etc.
- > Hard copyPrintouts are available with a parallel-interface printer.

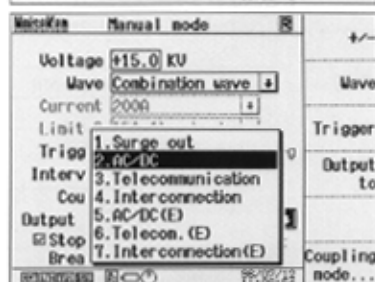
● MANUAL MODE TEST SETTING DISPLAY (1)

When Manual mode test is selected in the menu display, the corresponding test setting display will be shown. The output voltage, waveform and other test parameters can be set. Unnecessary items are indicated lightly and the simulator does not accept change in setting.



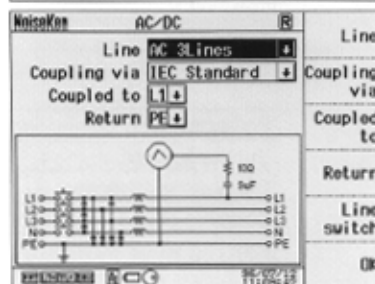
● MANUAL MODE TEST SETTING DISPLAY (2)

When ↓ (arrow) mark is indicated on the right side of the items, the pop up menu (selection menu) will appear by pressing the Enter key. The display example shows a pop up menu of "Output to".



● AC/DC INJECTION SETTING DISPLAY

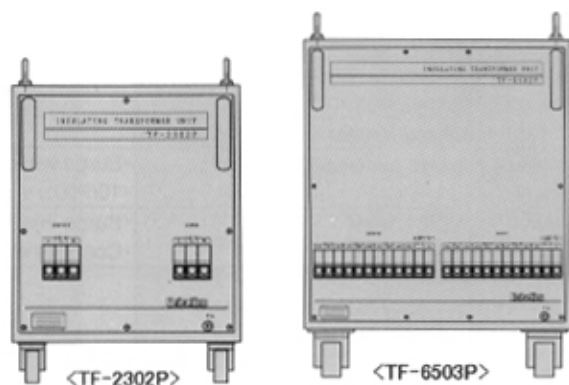
When AC/DC injection or Telecom injection is selected as "Output to" port, the line injection setting screen will appear by pressing the coupling mode key. The example shows the AC/DC injection setting screen on which coupled and return lines can be set. On the telecom injection setting screen, the number of lines (2 or 4 lines), limit resistance (IEC standard, 25Ω or 40Ω) and return line (1, 2, 3, 4, or PE) can be set.



■ OPTIONS

● Insulation transformer unit

Items	TF-2302P	TF-6503P
Input voltage	Single phase 240VAC max. (50/60Hz)	Single or 3-phase 600VAC max. (50/60 Hz)
Output current	30A max.	50A max.
Dielectric strength	Primary side : Core AC4kV (1 minute) Secondary side: Core AC4kV (1 minute) Primary side: Secondary side AC4kV (1 minute)	
Insulation resister	100MΩ or over at DC500V	
Dimensions (mm)	350 x 475 x 400 (W) (H) (D)	500 x 640 x 700 (W) (H) (D)
Weight	Approx. 60 kg	Approx. 350 kg



- Infra-red remote controller: Model:08-00006B
- Warning lamp: Model:11-00008A
- Memory card: Model:08-00003A

- GP-IB interface: Model: LSSAXGPIB SET
- RS-232C interface: Model: LSSAXRS232C SET
- PC control software (English) : Model:14-00020A