

NEW PRODUCT

Full compliance with the IEC 61000-4-11 standard One unit solution for dip, swell, interruption and variation tests

VOLTAGE DIP AND UP SIMULATOR

VDS-2002

Voltage dips, also called sags, are brief reductions in AC mains voltage, typically between half a cycle to a few seconds. The best-known sources of voltage dips and interruptions are listed below:

- The starting of a large load such as a motor or resistive heater.
- Loose or defective wiring such as insufficiently tightened box screws on mains conductors leading to the increase of your system impedance, thus, making itself vulnerable to the effect of current increase.
- Faults or short circuits draw excessive currents until the protective devices such as a fuse or circuit breaker operates.
- Faults on distant circuit typically which can be automatically switched and removed by reclosers. This type of event is sometimes a series of voltage dips caused by continuous operation of reclosers.
- Loads that have continuously varying power levels cause voltage variations rather than an abrupt change.

Clearly from the above, voltage dips, interruptions, and variations are everywhere and unavoidable.

Voltage dips and short interruptions are not always abrupt because of the reaction time of rotating machines and protection elements- the rotating machines will operate as generators sending power into the network. Some equipment, typically containing a power-fail detection circuit, is more vulnerable to gradual variations than to abrupt change. In any case, these voltage changes can degrade the performance of electronic equipment in many different ways: digital circuit upset, data-loss or distortion and so on. Therefore, immunity testing for these types of events should be performed to ensure your product's safe and reliable operation.

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In fact, in the scheme of international compliance, the IEC 61000-4-11 compliance voltage dip test is a must for all products having a rated input current not exceeding 16A per phase.

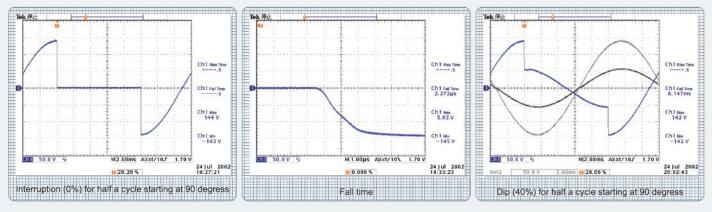
The NoiseKen VDS-2002 Voltage Dip and Up Simulator, uncompromising on and fully compliant with all the test generator requirements in the standard including fast rise and fall times, peak inrush current drive capability, overshoot/undershoot and others, fulfills accurate testing needs.

www.noiseken.com

VDS-2002

FEATURES

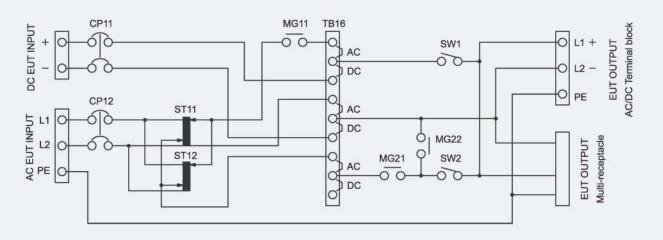
- Fully compliant with all the test generator requirements of IEC standard
- One unit solution for dip, swell, interruption, and variation tests up to 16A 290V single phase AC
- Interruption test up to 16A 125V DC*
- Two motor-driven transformers approach enables switching between any voltages*
- Preset IEC test levels 0%/40%/70% additional 120%
- Two modes for 0% (interruption) test: open & short*
- Optional Windows Application Software available to more extensively control the unit
- Accurate waveforms
- * Optional software required



CONTROL PANEL

		EUT OUTPUT: receptacles (Multi-type) +Terminal Blocks for AC/DC.
		TEST LEVEL: selects a test level among 0, 40, 70 and 120%.
1		DIP CYCLES: selects the duration of a dip among 0.5, 1, 5, 10, 25 and 50 cycles.
· Waterflam VDS-2002		DIP PHASE: selects the phase angle at which a dip starts among 0, 45, 90, 135, 180, 225, 270 and 315 degrees.
VOLTROE DIV AND AN BARLATON	9 99 9 99 9 99 •	INTERVAL CYCLES: selects the time interval between each dip among 1, 3, 5, 10, 30, 50, 100, 300, 500 cycles and 10s.
		REPEAT COUNT: selects the number of dips among 1, 3, 5, 10, 30, 50, 100 and infinite.
•		MEMORY NUMBER: used to save or call up the selected test setting among preset 5 settings
A WARNING A	А. МАЛИНИ А.	LINE: turns on and off power to the EUT
		SW1: for output verification, the unit outputs the normal voltage adjusted by the slide transformer 1.
	J	SW2: for output verification, the unit outputs the dip/swell voltages adjusted by the slider transformer 2.
		START: starts the test.
		STOP: stops the test.

ELECTRICAL SCHEMATIC



OPERATING PRINCIPLE

As shown in the above schematic, the VDS employs two independent motor-driven slide transformers and two IGBT switches. Under complete control by the unit control circuitry, it generates voltages dips, interruptions and variations with much wider parameter settings than those originally required in the IEC 61000-4-11 standard.

Since the unit employs two slide transformers, it can generate two variable voltage levels, which are independently preset, corresponding to dip (or variation) and normal voltage (voltage in interval cycles). The two IGBT switches enable to fulfill the fast rise and fall time requirements called for in the relevant standard.

AC/DC selection terminals are provided to insert the two transformers for an AC test and to bypass them for the DC test. DC interruption test, therefore, can be done by utilizing the same IGBT switches.

To offer short and open mode selection in AC interruption test, two magnet relays, MG22 and MG21, work to realize low impedance and high impedance as seen from the load side.



VDS-2002

SPECIFICATIONS

				Specifications				Remarks		
Parameters Compliant standard				IEC 61000-4-1	1					
Number of lines			Single phase							
Test mode	Interruption			Synchronous	1	PC/local	Short circuit	-		
lest mode		'					Short circuit			
	AC/DC			Asynchronous		PC	Oner sizes'	4		
				Synchronous/A	syn	PC	Open circuit			
				chronous						
	Dip and swell			Synchronous						
				Asynchronous	Asynchronous PC					
	Variation			Asynchronous		PC/Local		+		
Variat		iriation								
						Only 2s-1s-2s standard defined test				
						available in local				
Input voltage range			AC90~264V, 5							
			DC0~125V							
Output voltage range				AC0V~120% o	AC290V max					
				NOLOOV Max						
0	sut V/A			4.224kVA	DC0V~input voltage					
Output VA					Continuous					
Output current	AC 100% of input voltage			16A rms				Continuous <5S		
capability		70% of input voltage 40% of input voltage		23A rms						
				40A rms						
	DC	10 · · · · · · · · · · · · · · · · · · ·		16A				Continuous		
Peak inrush current	AC100~12	0)/		>250A						
								at 100% output,		
drive capability	AC220~24			>500A				<10ms		
Load regulation	100% of in	put voltage		<5%						
	0~16A rms									
	70% of inp			<7%						
	0~23A rms									
		put voltage		<10%						
	0~40A rms	·								
Overshoot/undershoot				<5%				100 ohm loaded		
Rise time/fall time				1~5µS				100 ohm loaded		
Normal voltage setting	Setting by	nercent	PC	~120%				10V minimum		
Normal Voltage Setting	Setting by	percent								
			Local		100%					
	Setting by	voltage	PC	10V~290V				5V step		
	Accuracy			±5V				0V~16A output		
Dip/Swell level	Setting by	percent	PC	Short/Open se	ectable	for 0%	0~120%	· · · ·		
Diproweinieven	County by porcont			(interruption)	ootablo		0 .2070			
					00/		0/40/70/4000/			
			Local	Short circuit for			0/40/70/120%	4 steps		
				(interruption) s						
	Setting by	voltage	PC	Short/Open se	ectable	for 0V	0~290V (0~120%)	5V step		
	J	J		(interruption)						
	Acourcov			±5V						
	Accuracy									
Repetition of events	No. of ever				1~1000 or continuous					
		Local		1, 3, 5, 10, 30,	50, 100 or continuous			8 steps		
Interval cycle	Setting by	cycle	Synchronous	PC		0.5~5000.5 cycles		0.5 cycle step		
			Setting for short duration	Local		1,3,5,10,30,50,100,300,500 cycles, 10s		10 steps		
	Setting by time	timo		Synchronous	PC	1~100s	ee,eee,eee eyelee, .ee	1s step		
		ume		Asynchronous						
						10ms~100s (50	,	0.1 ms step		
							Hz)			
						8.3ms~100s (60	1s~10h			
			Setting for long	Asynchronous	-3	8.3ms~100s (60 1s~10h		1s step		
			Setting for long duration	Asynchronous	- 3	· · · · · · · · · · · · · · · · · · ·		1s step		
	Setting by	cycle			PC	1s~10h				
Dip cycle	Setting by	cycle		Asynchronous Synchronous	PC	1s~10h 0.01~5000 cycle		0.01 cycle step		
Dip cycle		·	duration	Synchronous	Local	1s~10h 0.01~5000 cycle 0.5, 1, 5, 10, 25,		0.01 cycle step 6 steps		
Dip cycle	Setting by Setting by t	·	duration Setting for short	Synchronous Synchronous		1s~10h 0.01~5000 cycle 0.5, 1, 5, 10, 25, 0.1 ms~100s		0.01 cycle step 6 steps 0.1ms step		
Dip cycle		·	duration	Synchronous	Local	1s~10h 0.01~5000 cycle 0.5, 1, 5, 10, 25,		0.01 cycle step 6 steps		
Dip cycle		·	duration Setting for short duration	Synchronous Synchronous	Local	1s~10h 0.01~5000 cycle 0.5, 1, 5, 10, 25, 0.1 ms~100s		0.01 cycle step 6 steps 0.1ms step		
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Dip phase	Setting by	·	duration Setting for short duration Setting for long	Synchronous Synchronous Asynchronous	Local PC PC	1s~10h 0.01~5000 cycle 0.5, 1, 5, 10, 25, 0.1 ms~100s 0.1 ms~100s 1s~10h 0~359°	50 cycles	0.01 cycle step 6 steps 0.1ms step 0.1ms step 1s step 1° step		
Dip cycle Dip phase (Starting phase angle of	Setting by	time	duration Setting for short duration Setting for long	Synchronous Synchronous Asynchronous Asynchronous	Local PC	1s~10h 0.01~5000 cycle 0.5, 1, 5, 10, 25, 0.1 ms~100s 0.1 ms~100s 1s~10h 0~359°		0.01 cycle step 6 steps 0.1ms step 0.1ms step 1s step 1° step 8 steps		
Dip phase	Setting by	time phase angle	duration Setting for short duration Setting for long	Synchronous Synchronous Asynchronous Asynchronous	Local PC PC Local	1s~10h 0.01~5000 cycle 0.5, 1, 5, 10, 25, 0.1 ms~100s 0.1 ms~100s 1s~10h 0~359° 0, 45, 90, 135, 1	50 cycles 80, 225, 270, 315	0.01 cycle step 6 steps 0.1ms step 0.1ms step 1s step 1° step 8 steps (45 degrees step)		
Dip phase Starting phase angle of	Setting by	time phase angle	duration Setting for short duration Setting for long	Synchronous Synchronous Asynchronous Asynchronous	Local PC PC	1s~10h 0.01~5000 cycle 0.5, 1, 5, 10, 25, 0.1 ms~100s 0.1 ms~100s 1s~10h 0~359°	50 cycles 80, 225, 270, 315	0.01 cycle step 6 steps 0.1ms step 0.1ms step 1s step 1° step 8 steps		
Dip phase Starting phase angle of	Setting by	time phase angle	duration Setting for short duration Setting for long	Synchronous Synchronous Asynchronous Asynchronous	Local PC PC Local	1s~10h 0.01~5000 cycle 0.5, 1, 5, 10, 25, 0.1 ms~100s 0.1 ms~100s 1s~10h 0~359° 0, 45, 90, 135, 1	50 cycles 80, 225, 270, 315 DHz	0.01 cycle step 6 steps 0.1ms step 0.1ms step 1s step 1° step 8 steps (45 degrees step)		
Dip phase Starting phase angle of events)	Setting by Setting by	time phase angle time	duration Setting for short duration Setting for long duration	Synchronous Synchronous Asynchronous Asynchronous Synchronous	Local PC PC Local PC	1s~10h 0.01~5000 cycle 0.5, 1, 5, 10, 25, 0.1 ms~100s 0.1 ms~100s 1s~10h 0~359° 0, 45, 90, 135, 1 0~19.9 ms for 50 0~16.6 ms for 60	50 cycles 80, 225, 270, 315 DHz	0.01 cycle step 6 steps 0.1ms step 0.1ms step 1s step 1s step 8 steps (45 degrees step) 0.1ms step		
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Dip phase Starting phase angle of events) /oltage variation test /demory Equipment input External interface	Setting by	time phase angle time	duration Setting for short duration Setting for long duration Changing time Changed time Interval	Synchronous Synchronous Asynchronous Synchronous Asynchronous Asynchronous	Local PC Local PC PC PC PC Local PC	1s~10h 0.01~5000 cycle 0.5, 1, 5, 10, 25, 0.1 ms~100s 0.1 ms~100s 1s~10h 0~359° 0, 45, 90, 135, 1 0~19.9 ms for 50 0~16.6 ms for 60 0.1s~10 s at least 0.1s req of input 0~10s 0~100s 0~120% 5 tests 10 steps	50 cycles 80, 225, 270, 315 0Hz 0Hz	0.01 cycle step 6 steps 0.1ms step 0.1ms step 1s step 1° step 8 steps (45 degrees step) 0.1ms step 0.1s step 0.1s step 0.1s step 1° step 0.1s step 0.1s step 0.1s step		
Dip phase (Starting phase angle of events) Voltage variation test Memory Equipment input External interface Dperating temperature	Setting by	time phase angle time	duration Setting for short duration Setting for long duration Changing time Changed time Interval	Synchronous Synchronous Asynchronous Synchronous Synchronous Asynchronous Asynchronous -240V±10%, 50/6	Local PC Local PC PC PC PC Local PC	1s~10h 0.01~5000 cycle 0.5, 1, 5, 10, 25, 0.1 ms~100s 0.1 ms~100s 1s~10h 0~359° 0, 45, 90, 135, 1 0~19.9 ms for 50 0~16.6 ms for 60 0.1s~10 s at least 0.1s req of input 0~10s 0~100s 0~120% 5 tests 10 steps	50 cycles 80, 225, 270, 315 0Hz 0Hz	0.01 cycle step 6 steps 0.1ms step 0.1ms step 1s step 1° step 8 steps (45 degrees step) 0.1ms step 0.1s step 0.1s step 0.1s step 1° step 0.1s step 0.1s step 0.1s step		
Dip phase (Starting phase angle of events) Voltage variation test Memory Equipment input External interface Operating temperature Operating humidity	Setting by	time phase angle time	duration Setting for short duration Setting for long duration Changing time Changed time Interval AC100~115V/200- optical RS-232 15~35°C 25~75%R.H. (No compared to the second sec	Synchronous Synchronous Asynchronous Synchronous Synchronous Asynchronous Asynchronous	Local PC Local PC PC PC Local PC Local PC	1s~10h 0.01~5000 cycle 0.5, 1, 5, 10, 25, 0.1 ms~100s 1s~10h 0~359° 0, 45, 90, 135, 1 0~19.9 ms for 5! 0~16.6 ms for 6! 0.1s~10 s at least 0.1s req of input 0~10s 0~100s 0~120% 5 tests 10 steps 20VA	50 cycles 80, 225, 270, 315 0Hz 0Hz	0.01 cycle step 6 steps 0.1ms step 0.1ms step 1s step 1° step 8 steps (45 degrees step) 0.1ms step 0.1s step 0.1s step 0.1s step 1° step 0.1s step 0.1s step 0.1s step		
Dip phase (Starting phase angle of events) Voltage variation test Memory Equipment input External interface Dperating temperature	Setting by	time phase angle time	duration Setting for short duration Setting for long duration Changing time Changed time Interval AC100~115V/200- optical RS-232 15~35°C	Synchronous Synchronous Asynchronous Synchronous Synchronous Asynchronous Asynchronous	Local PC Local PC PC PC Local PC Local PC	1s~10h 0.01~5000 cycle 0.5, 1, 5, 10, 25, 0.1 ms~100s 1s~10h 0~359° 0, 45, 90, 135, 1 0~19.9 ms for 5! 0~16.6 ms for 6! 0.1s~10 s at least 0.1s req of input 0~10s 0~100s 0~120% 5 tests 10 steps 20VA	50 cycles 80, 225, 270, 315 0Hz 0Hz	0.01 cycle step 6 steps 0.1ms step 0.1ms step 1s step 1° step 8 steps (45 degrees step) 0.1ms step 0.1s step 0.1s step 0.1s step 1° step 0.1s step 0.1s step 0.1s step		

IEC 61000-4-11 Standard/Voltage Dips, Short Interruptions and Variations

Test levels

Test Level %U _T	Voltage dip and short interruptions %U _T	Duration (in perriod)	Test Level %U _T	Time for decreasing voltage	Time at reduced voltage	Time for increasing voltage
0	100	0.5 1	40%U _T	2s±20%	1s±20%	2s±20%
40	60	5 10 25	0%U _T	2s±20%	1s±20%	2s±20%
70	30	50 x		х	х	x

The voltages in this standard use the rated voltage for the equipment (U_T) as a basis for voltage test level specifications. If the equipment has a specified input voltage range, then testing should be performed at the lower and upper limits of the voltage range specified. However, in practice it is only necessary to perform the tests at the lowest specified input voltage, since all the tests concern a reduction or interruption of supply voltages. "X" is an open duration. One or more of the above test levels and durations may be chosen.

IEC61000-4-11 is a basic EMC standard defining test generator, methods and others and does not specify particular test levels and durations, but it is the Generic Immunity standards, as well as the Product family standards, that specify the test revel and pass/fail performance criteria applied to a particular class of equipment.

For an open set of duration, the IEC standard says other values may be taken in a justified case and shall be specified in product specifications. For possible future requirements, VDS-2002 has provisions of a variable slew rate from 1s to 10s (0~100% output)

Characteristics of the test generator

Peak inrush current drive capability (not required for voltage variation tests)

500A for 220V-240V mains 250A for 100V-120V mains

The test generator has to simulate the very low output impedance characteristics of the real world mains. In other words, the generator must be able to provide inrush currents of a similar level to the actual power mains.

Most electronic products such as those using switching power supplies exhibit high start up currents needed to charge capacitive input circuitry in their input section. *Conventional AC amplifiers cannot meet this requirement, and worse yet, they perform as external soft-start circuits for the EUT.* For verifications, the generator shall be switched from 0% to 100% of full output, when driving a load consisting of an uncharged capacitor whose value is 1700μ F in series with a suitable rectifier. A bleeder resistor in a range of 100 ohm to 10k ohm shall be connected in parallel with the capacitor. Several time constants must be allowed between tests. The standard specifies the current monitor's characteristics used to measure peak inrush current capability.

Overshoot/Undershoot (loaded with 100 ohms) : <5%

Voltage rise/fall time (for abrupt change, generator loaded with 100 ohms): 1 to 5µs. Conventional AC amplifiers cannot meet this requirement

Phase shifting: 0 to 360°

Execution of test

3 dips/interruptions/variations with interval of 10s minimum

Abrupt change in supply voltage shall occur at zero crossing of the voltage. Additional angles (45, 90, 135, 180, 225, 270, 315°) are specified for use by product committees or individual product specifications.

The IEC standard requires the monitoring of EUT line voltage within a accuracy of 2%.*ALM-21 is suitable for this purpose with its logging capability. This power Line Monitor also can monitor the VDS output voltages.*

ALM-21 accuracy: \pm (0.5% rdg+0.8V)

OPTIONAL ACCESSORIES

Control Software Model 14-00029A

- Wider parameter settings than locally allowed
- Setting to IEC 61000-4-11 are preprogrammed
- Intuitive setting for all test parameters
- GUI (graphical user interface)
- Sequential operation up to 10 steps
- Test report generation

RS232C Optlink set Model 07-00017A

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AC Line Monitor Model ALM-21

The IEC 61000-4-11 requires monitoring of the main voltage for testing (voltage to AC EUT INPUT) within an accuracy of 2%. A compact, portable AC Line Monitor ALM-21, originally intended for site surveys, is suitable for this purpose with its data logging capability. It also can monitor the output from the VDS-2002.

• Designs and specifications are subject to change without notice.