PEL-3031E Programmable D.C. Electronic Load

GW Instek launches new PEL-3000E series programmable single-channel electronic load. In the series, PEL-3031E provides 300W (1V~150V/60A) current sink capability. Inherited from the PEL-3000 series, PEL-3031E has an easy-to-read LCD panel and user-friendly interface. This model features high speed and accurate measurement capability for electronic component, battery, portable charger and power products that require low to medium power consumption.

The PEL-3000E series is designed for current sink operation starting from 60mA and aims at measurement applications, including charger, adapter, various power supply equipment, and portable charger.

The PEL-3000E has seven operating modes. Among them, four basic operating modes are constant current, constant voltage, constant resistance, and constant power. Three other combined operating modes are constant current + constant voltage, constant resistance + constant voltage, constant power + constant voltage. Users can select operating modes based upon products' test requirements. For C.C. mode, electronic load will sink a constant current according to the set current value; for C.V. mode, electronic load will attempt to sink sufficient current to control the source voltage to the programmed value; for C.R. mode, electronic load will sink a current linearly proportional to input voltage according to the set resistance value; for C.P. mode, electronic load will initiate load power sinking operation (load voltage x load current) in accordance with the programmed power setting.

To meet the requirements of different test conditions, the Static function is to sink a constant current; the Dynamic function is to periodically switch between two sink conditions, and the Sequence function is to provide tests for more than two sink conditions. The sequence function can be divided into Normal Sequence and Fast Sequence. Normal Sequence are the most flexible means of generating complex sequences that can facilitate users to establish a set of changing current sink conditions based upon different sinking conditions (CC, CR, CV or CP mode) and time(adjustable range: 1ms to 999h 59min 59s). Fast sequence allows time resolution of 25us to be set for the smallest step. Setting parameters for multiple steps can simulate consecutive current changes of various real load conditions. For instance, while using an electronic load to test a power-driven tool's power supply we can first obtain waveforms by an oscilloscope and a current probe from the tool, and subsequently, use the obtained waveforms to edit simulated current waveforms, via electronic load's sequence function, to test the power-driven tool and to analyze its operational status. The Soft Start

function allows users to determine the rise time of current sink that is to decide the required time to reach electronic load's set current, resistance or power value. Setting a proper rise time for Soft Start is effective to counter output voltage fluctuation caused by DUT's (power supply) transient output current. It is worth noting, General DC loads do not have the soft start function. When conducting high speed current sink operation, the inductance effect on the cable connecting electronic load and DUT will lead to transient voltage drop on electronic load's input terminal, therefore, that will result in Voltage Non-monotonic increase. PEL-3000E's soft start function not only allows output voltage to be Monotonic increase, but also prevents inrush current and surge voltage from happening on DUT. For instance, tests using a power supply, LED and a DC load (activate the soft start function) can prevent inrush current and surge voltage from causing damages on LED.

The PEL-3000E is equipped with the count time function to obtain total time for electronic load's current sink that helps users estimate DUT's power capacity. The cut off time function is for users to control the total time of electronic load's current sink. Both flexible time control functions increase the test adaptability of electronic load. UVP can be applied on battery discharge tests. Electronic load will cease operation if battery's voltage is lower than the set UVP threshold to protect battery from over discharge. Other than that, PEL-3000E provides users with analog control terminal to control PEL-3000E from external voltage, external resistance and switch. Analog control terminal can also monitor electronic load's status and display protective alarms.

Operating Mode

The PEL-3000E series provides four fundamental operating modes and three add-on modes of CC, CR and CP separately combining with CV. Users can set different drawn current condition under different operating modes such as setting operating range for current sink level, Current Slew Rate, input voltage and current sink. The input voltage range has two levels --- high and low. The current sink operating range has two levels ---- high and low current levels which possess different resolutions to meet test requirements of different power product specifications.

The parameter settings and main functionality tests of CC, CR, CV, CP, and +CV are as follows:

Operating mode	Parameter setting	Functionality tests
CC	Current	Voltage load regulation for power supply
CR	Resistance	Power supply activation and current limit
CV	Voltage	Power supply current limit and battery simulation to test battery charger
CP	Power	Overall rating power output for power supply
+CV	Voltage	Restrain load from sinking total current of power supply under test to protect DUT

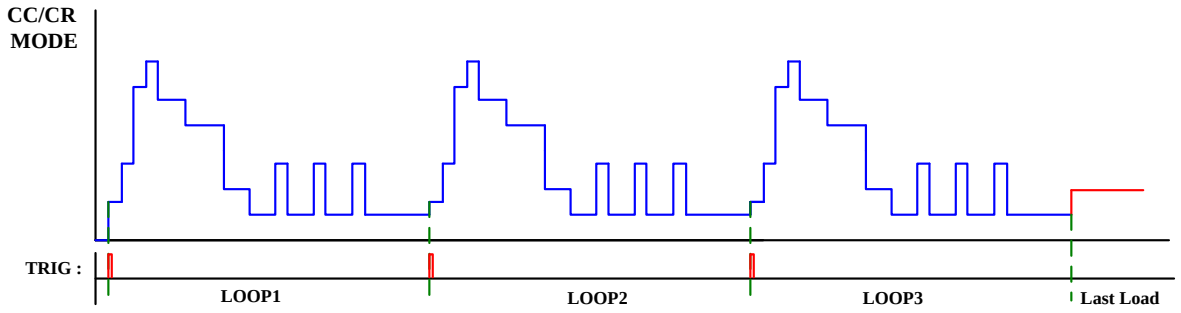
Static/Dynamic/Sequence mode

The PEL-3000E series, according to different test conditions, step or continuous changes, test speeds, and selectable modes, has three operating functions: Static, Dynamic and Sequence. Detailed descriptions of these functions are as follows:

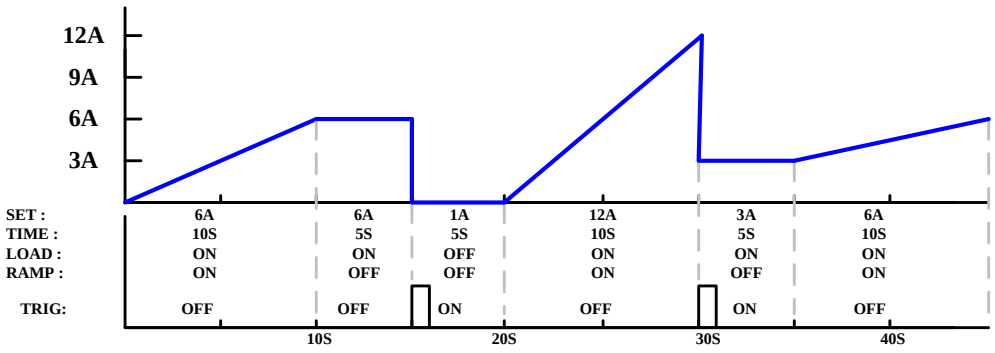
Operation / Function	Static	Dynamic	Sequence	
			Fast	Normal
Operating condition selection	Single fixed condition	Switch between two conditions	Selection from more than two conditions	Selection from more than two conditions
Operating modes	All modes	Two conditions using same mode Support CC or CR	Each condition must use same mode Support CC or CR mode	Each condition is able to be used in different mode All modes
Adjustable condition setting	• Value A/ Value B • Slew Rate	• Level 1/Level 2 • Timer 1/Timer 2 • Slew Rate 1/ Slew Rate 2	• Level • Timer • Slew Rate • Others…	• Level • Timer • Slew Rate • Others…
Sequence step combination	N/A	N/A	• 1 Sequence • 1,000 steps • 25us/step	• 10 Sequence • 1,000 steps • 1ms/step
Other functions	N/A	Trigger Out function	Trigger Out function	• Trigger Out function • Ramp function

Fast Sequence & Normal Sequence

Set a complete sequence editing function to obtain following waveforms. Users can save development cost and time without using a PC to control electronic load and writing programs.

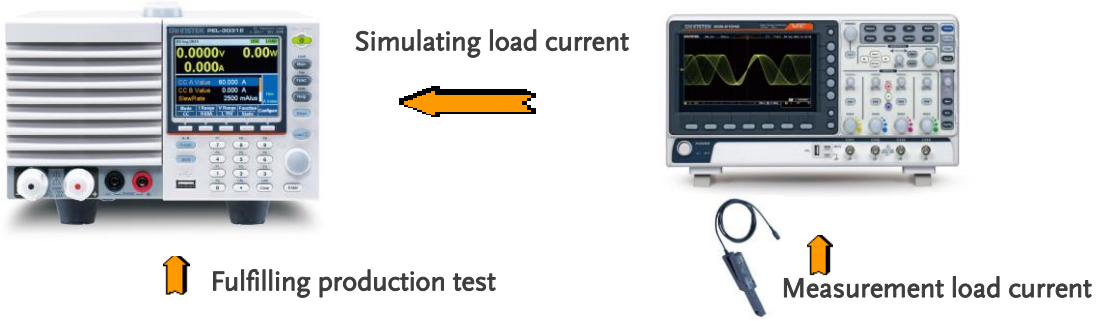


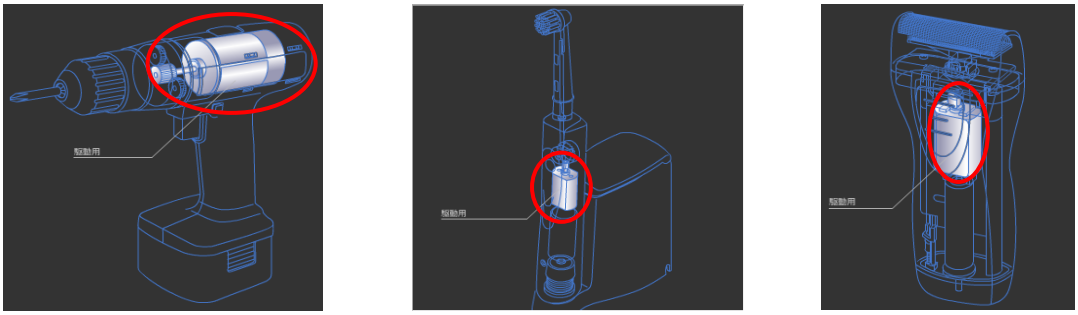
Fast Sequence Diagram



Normal Sequence Diagram

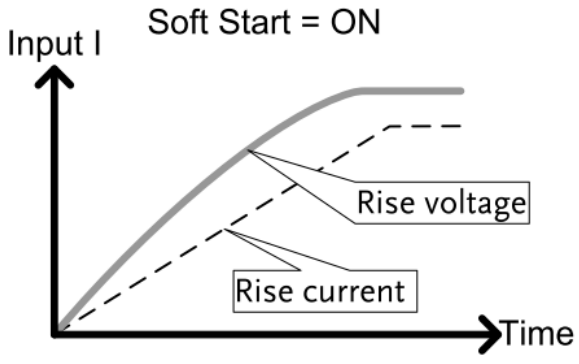
EX. **Power-driven tools simulation test**

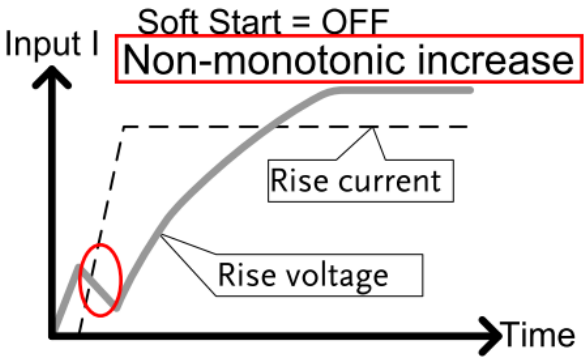




Soft start

The Soft Start function of PEL-3000E allows users to determine the rise time of current sink that is to decide how much time is required to reach electronic load's set current, resistance or power value. PEL-3000E's soft start function prevents inrush current and surge voltage from happening on DUT. For instance, test applications using a power supply, LED and a DC load (activate the soft start function) can prevent inrush current and surge voltage from causing damages on LED.





Protection Modes

The PEL-3000E series provides many protective functions including over current protection (OCP), over voltage protection (OVP), over power protection (OPP), over temperature protection (OTP) and under voltage protection (UVP). Except for OTP, all thresholds of protective functions are adjustable. When protective function is activated, electronic load will send out warning signal and terminate operation. Other than

protective functions, Limit function can also be utilized to maintain electronic load in operation at a preset value. The related settings and selections are as follows:

Protection Functions	OCP	OVP	OPP	OTP	UVP
Adjustable thresholds	V	V	V	N/A	V
Load Off	V	V	V	Fixed	V
Limit Function	V	N/A	V	N/A	N/A

Analog Channel Control

The PEL-3000E series provides the external analog channel control function, which allows users to connect J1 connectors on the rear panel to input voltage or to connect resistance to control electronic load operation. Users can integrate this function into test system and utilize signals generated from the test system to control PEL-3000E.