Real simulation of transient load !

GW Instek PEL-3032E DC Load

New Product Announcement

**This document allows GW Instek's partners
to quickly grasp the product's main features, FAB and ordering information.**

GWINSTEK

Simply Reliable

GW Instek launches new the PEL-3032E programmable single-channel electronic load, which inherited from the PEL-3000E series. With the current sink capability of 300W (2.5V~500V/15A), the PEL-3032E features an easy-to-read LCD panel, user-friendly interface and high-speed and accurate measurement capability suitable for electronic components, batteries, portable chargers and power products that require low to medium power consumption.

The PEL-3032E provides *Static, Dynamic* and *Sequence* functions to meet various complexities of current sink requirements; the *Count Time* function helps users obtain the duration of current sink and estimate the power capacity; the *Cut off Time* function is to terminate current sink based on users' requirements; the built-in *BATT Test Automation* function for battery discharge applications provides users with more flexible discharge stop settings as well as rise and fall slew rate; the *OCP and OPP test Automations* functions for DUT (ex. Power Supply) provide users with high resolution measurement values to verify whether the DUT's activation point meets regulations. Furthermore, the PEL-3032E provides users with *analog control terminal* to operate the PEL-3032E from external voltage, external resistance or switches. The Analog control terminal can also monitor the electronic load's status and display protective alarms.

The PEL-3032E offers *CC, CV, CR, CP modes,* which perform as outstanding as that of the high end of electronic loads. It's worth mentioning that the *CC+CV, CR+CV, CP+CV modes* of the PEL-3032E feature uninterrupted current sink capacity. In general, the current sink of an electronic load will be discontinuous once CC is switched to CV mode. Utilizing the *CC+CV* mode of the PEL-3032E enables a continuous current sink without any interruption when CC is switched to CV, thus, precise load simulation can be achieved. Generally, DC loads conduct high-speed current sink operation and the inductance effect on the cable connecting to the electronic load will lead to transient voltage drop on the electronic load's input terminals. Therefore, the *Soft Start* function of the PEL-3032E not only counters the output voltage fluctuation caused by the inductance effect, but also prevents the inrush current and surge voltage from happening on the DUT.

The PEL-3032E provides powerful functions that are suitable for the measurement applications of various products, including chargers, adapters, various kinds of power units, and portable chargers that require the load capacity of greater than 60mA and less than 300 watts. With a high performance to price ratio, the PEL-3032E series will definitely draw a lot of attention from the market.

Features

- 7 Operating Modes: CC, CV, CR, CP, CC+CV,
- CR+CV, CP+CV
- Fast/ Normal Sequence Function
- Soft Start
- Battery discharge test
- OCP、OPP test Automation
- Max. Slew Rate: 2.5A/us
- Dynamic mode

- Protection: OVP, OCP, OPP, OTP, RVP, UVP
- Remote Sense
- Integrate voltage, current and power measurement functions
- External Voltage or Resistance Control
- Rear Panel BNC、Trigger IN/OUT
- Analog External Control
- USB/GPIB(Optional)

Customers and Applications

Customers	Applications
Consumer electronics	➢ Product's output characteristics assessment for power supplies
Universities and graduate Schools	
Military industries	➢ Battery discharge tests
Automotive electronics	➢ Quality verification and susceptibility tests for electronic components such as power switch, relay, connector, and fuse, etc.
Solar power industries	
Production lines and verification units	➢ High voltage solar panel

Panel Introduction

Front Panel		Back Panel
1. Power Key	7. Input terminals	1. Analog control ports
2. Short	8. LCD Display	2. Trigger out port
3. Load On/Off	9. Function keys	3. Trigger in port
4. Scroll wheel		4. Power socket
5. USB host		5. GPIB (optional)
6. Sense+/-		6. USB device

Important Information of Product Ordering

Key Dates for Product Announcement

1. Distributor Announcement & Demo Unit order and Shipping (1st of Dec. 2016)
2. Global Market Announcement & Mass Quantity Order Fulfillment (3rd of Jan. 2017)

Service Policy

1. 1 year warranty. PEL-3032E programmable single-channel DC electronic load carries a standard warranty for 1 year.
2. Service Support the service instructions in Service Manual will help distributors repair damaged units promptly. Parts-swapping service support is provided by Good Will Instrument to facilitate repair jobs done at the distributor's site.

Ordering Information

- PEL-3031E (150V / 60A/ 300W) programmable single-channel DC electronic load
- PEL-3032E (500V/ 15A/ 300W) programmable single-channel DC electronic load

Accessories

- Quick Start Guide
- User manual /Programming manual CD
- Power cord (Region dependent)
- Front terminal washers- Spring washer (M6) x2
- GTL-105A Remote sense cables, red x1, blackx1

Optional Accessories

- GTL-248   GPIB cable, 2.0m
- GTL-246   USB cable, Type A – Type B
- PEL-010   Dust Filter
- PEL-004   GPIB option

Detailed Product Information

Detailed descriptions for features

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

For the benefit of CC+CV, CR+CV, CP+CV modes, there will be no interruption during current sink operation when switching between two modes. For instance, while charging a battery using the CC+CV mode of PEL-3000E, there will be no interruption during current sink operation when the CC mode is switched to the CV mode.

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
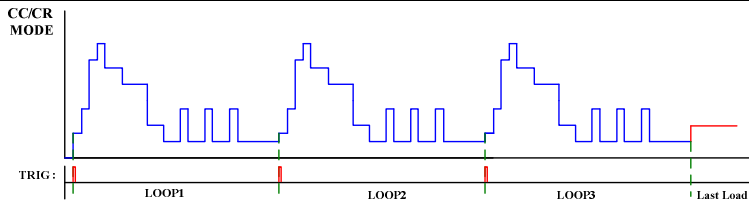
Fast Sequence Diagram
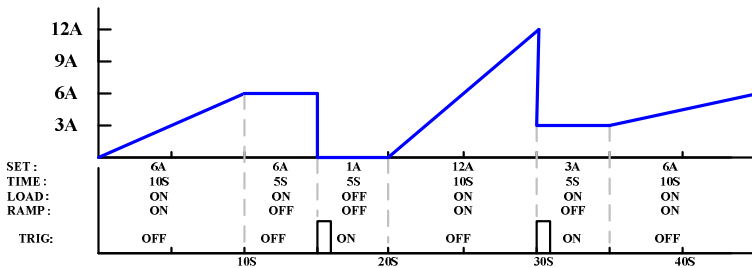
Normal Sequence Diagram

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.

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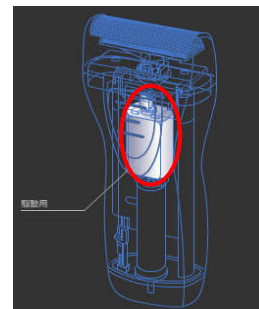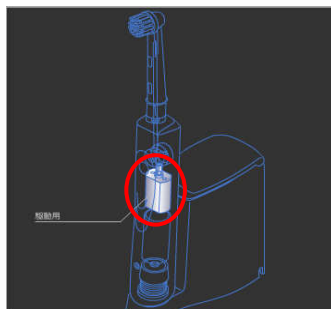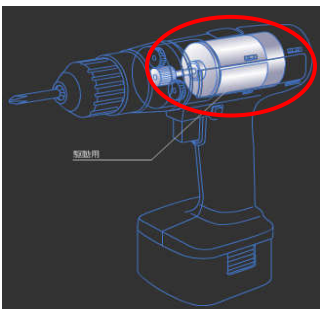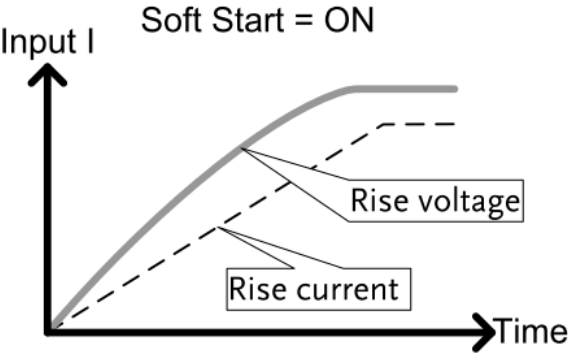
EX. **Power-driven tools simulation test**

Simulating load current

Fulfilling production test

Soft start

Soft Start = ON

Input I

Rise voltage

Rise current

Time

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.

Soft Start = OFF
Non-monotonic increase

Input I

Rise current

Rise voltage
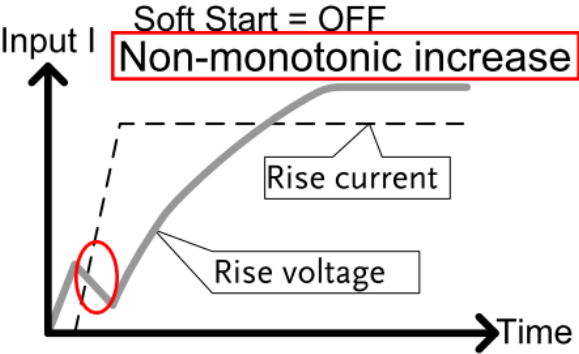
Time

BATT Test Automation
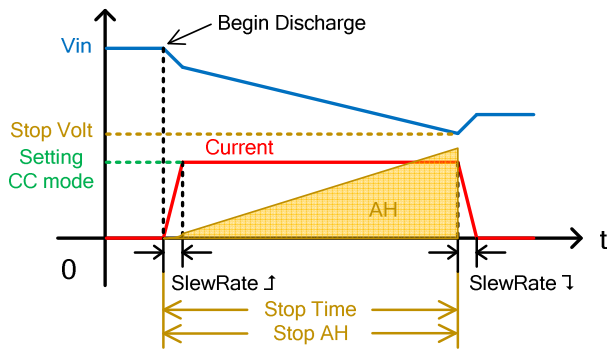
CC mode
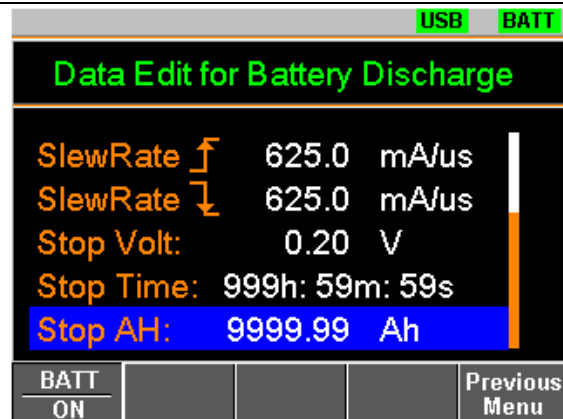
BATT Test Automation editing
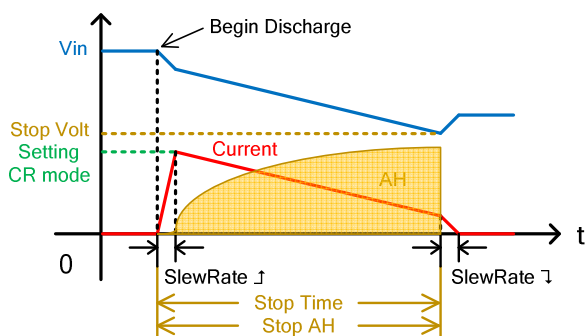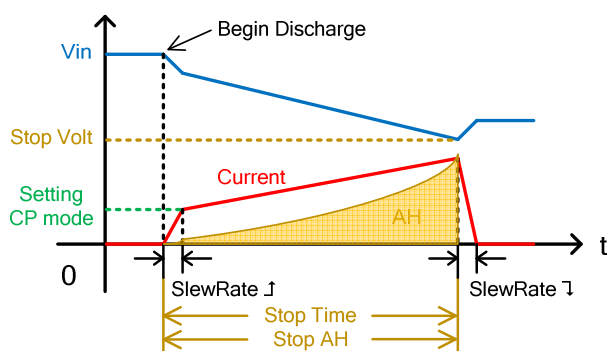
CR mode

The built-in BATT Test Automation of PEL-3000E provides battery discharge applications with more flexible discharge stop time setting as well as rise and fall Slew Rate for discharge current settings. Under CP, CC or CR mode, the conditions for stop discharge can be set respectively. For instance, set the input voltage for stop discharge current, the execution time for discharge current or total discharge current*time (AH) to satisfy the verification of battery capability.

CP mode

OCP test Automation
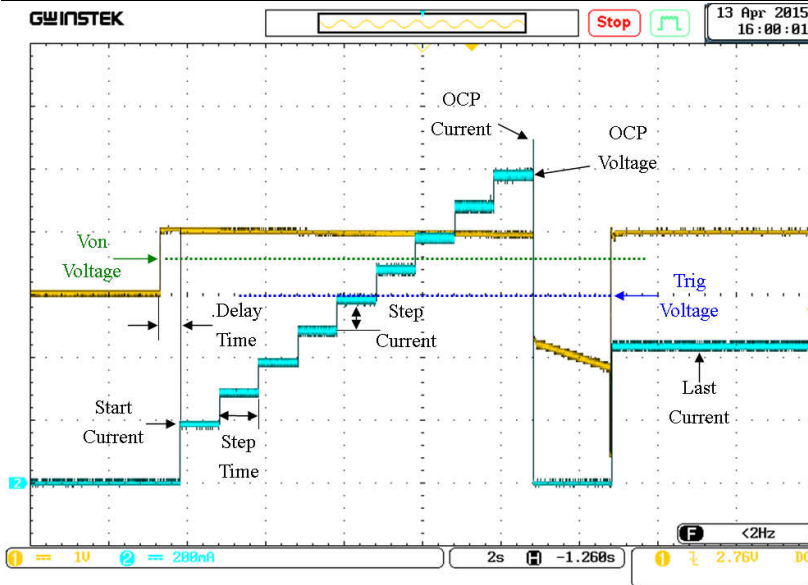
OCP test Automation for DUT(Power Supply)．Provide users with high resolution OCP measurement values to verify DUT's OCP activation point. Provide users with measurement results so as to help them determine whether DUT's actual OCP activation point meets the regulations. Test the value of OCP by setting load current increment from start current to stop current. OCP's activation point can be accurately measured.

OPP test Automation
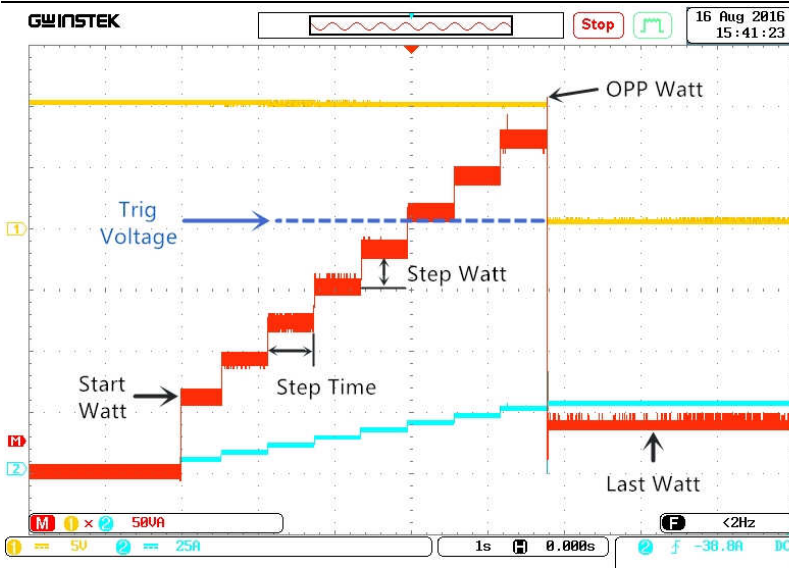
OPP test Automation for DUT(Power Supply)．Provide users with high resolution OPP measurement values to verify DUT's OPP activation point. Provide users with measurement results so as to help them determine whether DUT's actual OPP activation point meets the regulations. Test the value of OPP by setting power increment from start power to stop power. OPP's activation point can be accurately measured.

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.

Product Comparison

Features, Advantages and Benefits

Features	Advantages	Benefits
Sequence Function	Via sequence editing function, system or single unit users can edit current sink conditions of arbitrary waveforms from the memory function on the panel without connecting with a computer.	Rapid editing of any current sink conditions to save users' cost of system development.
Adjustable protective points	Adjust protective points according to test requirements.	Prevent damages on DUT
Adjustable Slew Rate, the maximum of 2.5A/us	Faster Slew Rate satisfies the tests of high-speed power products	Conduct fast transient response variation tests for products.
Soft Start	Alleviate input voltage drops caused from the moment current sink is activated. During the activation, current sink follows the set slew rate variation that will not affect the overall test speed.	Prevent inrush current and surge voltage from causing damages on DUT and increase test stability of the moment current sink is activated.
External voltage control	Directly control electronic load operation and monitor sinking current.	Applicable to analog voltage control conditions.
Input voltage monitoring GO/NO GO function	When input voltage exceeds the set range, NG warning signal will be shown on the display screen.	Self-definite test conditions and upper limit/ lower limit for measurement and analysis of DUT.

Comparison with major competitors

	GW PEL-303xE	Prodigit 33xx	B&K 85xx	B&K 86xx
Mode	CC & CV & CR & CP & CC+CV & CR+CV & CP+CV	CC & CV & CR & CP	CC & CV & CR & CP	CC & CV & CR & CP
Sequence mode	Normal Sequence(1000 Step) / Fast Sequence(1000 Step) / Program(256 Step)	NO	LIST Mode (1000 Steps)	LIST / Program 1~7 (2 ~84 steps, 20us ~3600S)
Program (Go/NoGo)	YES	YES	YES(Test files)	YES(Automatic Test Function)
OCP test Automation	YES	YES	NO	YES
OPP test Automation	YES	YES	NO	YES
BATT Test Automation	YES	NO	YES	YES
Soft Start	YES	NO	NO	NO
UVP	YES	NO	NO	NO
Elapsed time	YES	NO	NO	YES
Cut off time function	YES	NA	YES (Load on Timer)	YES (Configure Timed Input)
I Monitor	YES	YES	YES	YES
Trigger Input	YES	NO	YES	YES
Trigger Output	YES	NO	NO	NO
Preset	YES(0~9 / recall)	NO	NO	NO
Setup Memories	YES(100 sets)	YES(150 sets)	YES(25 sets)	YES(100 sets)

Specifications:

Series	PEL-3000E			
Model	PEL-3031E		PEL-3032E	
Power	300W		300W	
Range	Low	High	Low	High
Voltage	1~150V	1~150V	2.5~500V	2.5~500V
Current	0~6A	0~60A	0~1.5A	0~15A
Min. Operating Voltage(dc)	1V-6A	1V-60A	2.5V-1.5A	2.5V-15A
Static Mode				
Constant Current Mode				
Range	0~6A	0~60A	0~1.5A	0~15A
Setting Range	0~6.12A	0~61.2A	0~1.53A	0~15.3A
Resolution	0.2mA	2mA	0.05mA	0.5mA
Accuracy	(T ^{*1}) ± (0.1% of set +0.1% of F.S) +Vin/500 kΩ (Full scale of High range)	(T ^{*1}) ± (0.1% of set +0.2% of F.S) +Vin/500 kΩ (Full scale of High range)	(T ^{*1}) ± (0.1% of set +0.1% of F.S) +Vin/500 kΩ (Full scale of High range)	(T ^{*1}) ± (0.1% of set +0.2% of F.S) +Vin/500 kΩ (Full scale of High range)
Constant Resistance Mode				
Range	60S-0.002S(0.01666Ω~500Ω)(300W/15V); 6S-0.0002S(0.1666Ω - 5kΩ)(300W/150V)		6S-0.0002S(0.16666Ω~5KΩ)(300W/50V); 0.6S-0.00002S(1.6666Ω - 50kΩ)(300W/500V)	
Setting Range	60S-		6S-	

	0.002S(0.01666Ω~500Ω)(300W/15V);		0.0002S(0.16666Ω~5KΩ)(300W/50V);	
	6S-0.0002S(0.1666Ω - 5kΩ)(300W/150V)		0.6S-0.00002S(1.6666Ω - 50kΩ)(300W/500V)	
Resolution(30000 steps)	0.002S(15V) ; 0.0002S(150V)		0.0002S(50V) ; 0.00002S(500V)	
Accuracy	(T ^{*1}) ± (0.3% of set + 0.6S) + 0.002mS		(T ^{*1}) ± (0.3% of set + 0.06S) + 0.002mS	
Constant Voltage Mode				
Range	1~15V	1~150V	2.5~50V	2.5~500V
Setting Range	0~15.3V	0~153V	0~51V	0~510V
Resolution	0.5mV	5mV	1mV	10mV
Accuracy	(T ^{*1})± (0.1% of set + 0.1% of F.S)	(T ^{*1})± (0.1% of set + 0.1% of F.S)	(T ^{*1})± (0.1% of set + 0.1% of F.S)	(T ^{*1})± (0.1% of set + 0.1% of F.S)
	(Full scale of Low range)	(Full scale of High range)	(Full scale of Low range)	(Full scale of High range)
Constant Power Mode				
Range	0W-30W(6A)	0W-300W(60A)	0W-30W(1.5A)	0W-300W(15A)
Setting Range	0W-30.6W	0W-306W	0W-30.6W	0W-306W
Resolution	1mW	10mW	1mW	10mW
Accuracy	(T ^{*1})±(0.6 % of set + 1.4 % of f.s (Full scale of H range)) + Vin^2/500 kΩ		(T ^{*1})±(0.6 % of set + 1.4 % of f.s (Full scale of H range)) + Vin^2/500 kΩ	
Dynamic Mode				
General				
T1& T2	0.05mS - 30mS / Res : 1uS; 30mS - 30S / Res : 1mS		0.05mS - 30mS / Res : 1uS; 30mS - 30S / Res : 1mS	
Accuracy	1uS / 1mS ± 200ppm		1uS / 1mS ± 200ppm	

Slew Rate (Accuracy 10%)	0.001~0.25A/uS	0.01~2.5A/uS	0.25mA~62.5mA/uS	2.5mA~625mA/uS
Slew Rate Resolution	0.001A/uS	0.01A/uS	0.25mA/uS	2.5mA/uS
Slew Rate Accuracy of Setting	±(10% + 15us)		±(10% + 15us)	
	* Time to reach from 10% to 90% when the current is varied from 2% to 100% (20% to 100% in L range) of the rated current.			
Constant Current Mode				
Current	0~6A	0~60A	0~1.5A	0~15A
Setting range	0~6.12A	0~61.2A	0~1.53A	0~15.3A
Current Resolution	0.2mA	2mA	0.05mA	0.5mA
Current Accuracy	±0.8% F.S.		±0.8% F.S.	
Constant Resistance Mode				
Range	60S-0.002S(0.01666Ω~500Ω)(300W/15V);		6S-0.0002S(0.16666Ω~5KΩ)(300W/50V);	
	6S-0.0002S(0.1666Ω - 5kΩ)(300W/150V)		0.6S-0.00002S(1.6666Ω - 50kΩ)(300W/500V)	
Setting Range	60S-0.002S(0.01666Ω~500Ω)(300W/15V);		6S-0.0002S(0.16666Ω~5KΩ)(300W/50V);	
	6S-0.0002S(0.1666Ω - 5kΩ)(300W/150V)		0.6S-0.00002S(1.6666Ω - 50kΩ)(300W/500V)	
Resistance Resolution	30000 steps		30000 steps	
Resistance Accuracy	(T [*1])±(1% of set + 0.6S) + 0.002mS		(T [*1])±(1% of set + 0.06S) + 0.002mS	
Measurement				
Voltage Readback				

Range	0~15V	0~150V	0~50V	0~500V
Resolution	0.5mV	5mV	2mV	20mV
Accuracy	(T ^{*1})± (0.1% of rdg + 0.1% of F.S) (Full scale of Low range)	(T ^{*1})± (0.1% of rdg + 0.1% of F.S) (Full scale of High range)	(T ^{*1})± (0.1% of rdg + 0.1% of F.S) (Full scale of Low range)	(T ^{*1})± (0.1% of rdg + 0.1% of F.S) (Full scale of High range)
Current Readback				
Range	0~6A	0~60A	0~1.5A	0~15A
Resolution	0.2mA	2mA	0.05mA	0.5mA
Accuracy	(T ^{*1})± (0.1% of rdg + 0.1% of F.S) (Full scale of High range)	(T ^{*1})± (0.1% of rdg + 0.2% of F.S) (Full scale of High range)	(T ^{*1})± (0.1% of rdg + 0.1% of F.S) (Full scale of High range)	(T ^{*1})± (0.1% of rdg + 0.2% of F.S) (Full scale of High range)
General				
Function				
Trigger In/Out terminal (BNC)	YES		YES	
Current momitor output	YES		YES	
Analog External Control	YES		YES	
Soft Start	YES		YES	
SEQUENCE (Normal/Fast)	YES		YES	
BATT Test Automation	YES		YES	
OCP autotest function	YES		YES	
OPP autotest function	YES		YES	

PRESET DATA	10 Sets		10 Sets	
PROTECTION	OCP, OPP, UVP, OVP, OTP, RVP		OCP, OPP, UVP, OVP, OTP, RVP	
Other				
POWER SOURCE	100‑120VAC/ 200‑240VAC, 47‑63Hz		100‑120VAC/ 200‑240VAC, 47‑63Hz	
Interface	USB, GPIB(Option), Analog external control		USB, GPIB(Option), Analog external control	
Dimensions & Weight	213.8(W) x 124.0(H) x 400.5(D)mm, Approx. 7.5Kg		213.8(W) x 124.0(H) x 400.5(D)mm, Approx. 7.5Kg	

(The specifications apply when the PEL-3000E is powered on for at least 30 minutes to warm-up to a temperature of 20 ℃ to 30 ℃, unless specified otherwise.)

Should you have any questions on the PEL-3032E Series announcement, please don't hesitate to contact us.

Sincerely yours,

Overseas Sales Department

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