

# Programmable DC Electronic Load

PEL-2000B Series

## QUICK START GUIDE

CW INSTEK PART NO. 8zEL-2KBooMo1



## SAFETY INSTRUCTIONS

This section contains the basic safety symbols that may appear on the accompanying User Manual CD or on the instrument. For detailed safety instructions and precautions, please see the Safety Instructions chapter in the user manual CD.

### Safety Symbols

These safety symbols may appear in the user manual or on the instrument.

- Warning: Identifies conditions or practices that could result in injury or loss of life.
- Caution: Identifies conditions or practices that could result in damage to the instrument or to other properties.
- DANGER High Voltage
- Attention Refer to the Manual
- Protective Conductor Terminal
- Earth (ground) Terminal
- Do not dispose electronic equipment as unsorted municipal waste. Please use a separate collection facility or contact the supplier from which this instrument was purchased.

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- Supports frame link connections, with up to 4 slave units
- Color LCD display
- 120 different sets of programmable sequences
- Accurate load simulation using Sequences
- 4 panel setups
- USB flash drive support.

- Interface
- USB
  - RS-232C
  - LAN
  - GPIB (optional)

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Good Will Instrument Co., Ltd. No. 7-1, Jhongsing Rd., Tucheng Dist., New Taipei City 236, Taiwan.

## Power Cord for the United Kingdom

When using the instrument in the United Kingdom, make sure the power cord meets the following safety instructions.

NOTE: This lead/appliance must only be wired by competent persons.

WARNING: THIS APPLIANCE MUST BE EARTHED  
IMPORTANT: The wires in this lead are coloured in accordance with the following code:

Green/ Yellow: Earth  
Blue: Neutral  
Brown: Live (Phase)



As the colours of the wires in main leads may not correspond with the coloured marking identified in your plug/appliance, proceed as follows:

The wire which is coloured Green & Yellow must be connected to the Earth terminal marked with either the letter E, the earth symbol or coloured Green/Green & Yellow.

The wire which is coloured Blue must be connected to the terminal which is marked with the letter N or coloured Blue or Black. The wire which is coloured Brown must be connected to the terminal marked with the letter L or P or coloured Brown or Red.

If in doubt, consult the instructions provided with the equipment or contact the supplier.

This cable/appliance should be protected by a suitably rated and approved HBC mains fuse: refer to the rating information on the equipment and/or user instructions for details. As a guide, a cable of 0.75mm<sup>2</sup> should be protected by a 3A or 5A fuse. Larger conductors would normally require 13A types, depending on the connection method used.

Any exposed wiring from a cable, plug or connection that is engaged in a live socket is extremely hazardous. If a cable or plug is deemed hazardous, turn off the mains power and remove the cable, any fuses and fuse assemblies. All hazardous wiring must be immediately destroyed and replaced in accordance to the above standard.

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## Package Contents and Accessories

### Standard Accessories

Item	Description
Power Cable	Mains power cable (region dependent) (18AWGx3C, 125V/10A, 1.8m)
CD ROM	Contains PEL-2000B Series Electronic DC Load User Manual, Programming Manual and USB Driver
GTL-120	Load cables 2X red, 2X black (per load module)
GTL-121	Remote sense cables, 1X red, 1X black (per load module)
PEL-003	3 sets for PEL-2004B; 1set for PEL-2002B

### Optional Accessories

Item	Description
PEL-002	PEL-2000B Rack Mount kit (handle only)
PEL-003	Power Cover
GTL-246	USB
GTL-248	GPIB cable
GTL-249	Frame link

### Options

Item	Description
PEL-2020B	Load module
PEL-2030B	Load module
PEL-2040B	Load module
PEL-2041B	Load module
PEL-001	GPIB interface

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## GETTING STARTED

The Getting Started chapter introduces the instrument's main features, appearance, and set up procedure.

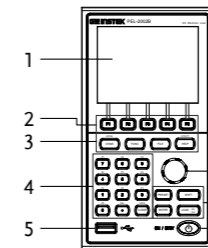
### Overview

The PEL-2002B and PEL-2004B are multichannel programmable DC electronic load mainframes. The PEL-2002B mainframe is able to hold 2 load modules, whilst the PEL-2004B is able to hold 4. The flexible module configuration allows the mainframes to either sink multiple loads independently or large loads when used in parallel.

The PEL-2000B series support four operation modes: constant current (CC), constant voltage (CV and CV+CC), constant resistance (CR) and constant power (CP). Constant current and constant resistance mode can operate in either static or dynamic mode.

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## Front Panel - Mainframe



### Description

- |                   |                  |
|-------------------|------------------|
| 1. LCD display    | 2. Function keys |
| 3. System keys    | 4. Number pad    |
| 5. USB input      | 6. Selector knob |
| 7. Operation keys | 8. Power         |

## Display Overview - Mainframe



### Description

- |                           |   |
|---------------------------|---|
| 1. Main screen            | 2. Menu icons                             |
| 3. Mainframe status panel | 4. Current operation channel status panel |

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## Load Module Line Up

The 4 different load module models each differ in the amount of current, voltage and power and the number of channels that the load module can accommodate. For detailed specifications, please see the user manual.

Load Module	Channels	Power (W)*	Current (A)**	Voltage (V)
PEL-2020B (100Wx2)	2	100/100	2/20	0-80
PEL-2030B (30/(25/250W))	2	30/(25/250)	5/4/40	0-80
PEL-2040B	1	(35/350)	7/70	0-80
PEL-2041B	1	(35/350)	1/10	0-500

\*Left/Right channel, Low/High range  
\*\*Low/High range

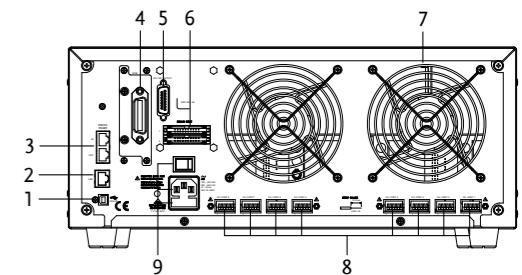
## Main Features

- |                  |   |
|------------------|---|
| Feature Overview | <ul style="list-style-type: none"> <li>• Flexible operation with removable load modules</li> <li>• Multiple independent isolated channels</li> <li>• High performance, up to 5 digit resolution</li> <li>• High slew rate enabling a high response speed</li> <li>• High capacity when frame linked</li> <li>• Different load module types can be used in the same mainframe</li> <li>• Dedicated parallel mode.</li> <li>• Supports rack mount installation (PEL-2004B)</li> </ul> |
|------------------|---|

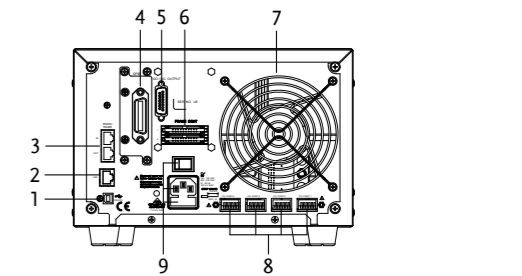
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## Rear Panel

### PEL-2004B



### PEL-2002B

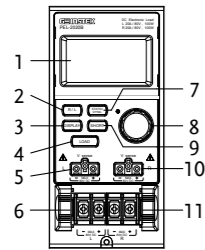


### Description

- |                                     |                         |
|-------------------------------------|-------------------------|
| 1. USB-B port                       | 2. LAN port             |
| 3. RS-232C/RS-485 port              | 4. GPIB port            |
| 5. Go/NoGo Output                   | 6. Frame Control 1,2    |
| 7. Fan                              | 8. Channel control, 1-8 |
| 9. Power switch, power socket, fuse |                         |

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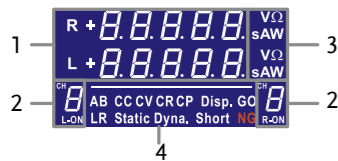
## Front Panel - Load Module



### Description

- |                       |                     |
|-----------------------|---------------------|
| 1. LED display        | 2. R/L or A/B key   |
| 3. Display key        | 4. Load key         |
| 5. V Sense L          | 6. Terminals (left) |
| 7. Static/Dynamic key | 8. Slave knob       |
| 9. Short key          | 10. V Sense R       |
| 11. Terminals (right) |                     |

## Display Overview - Load Module



### Description

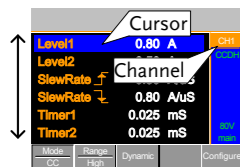
- |                    |                      |
|--------------------|----------------------|
| 1. Channel display | 2. Channel indicator |
| 3. Channel units   | 4. Mode indicator    |

## Main Frame Parameter Input

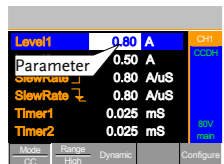
The scroll wheel, ENTER key and number pad can be used to edit parameter values.

- Press the **CHAN** key and turn the selector knob to select a channel to edit.
- Press the selector knob or the **ENTER** key to confirm the selection.
- Use the scroll wheel to move the cursor to the desired parameter.

- A scroll bar is shown when there are additional parameters off-screen.



- Press the **ENTER** key or to selector knob to select the parameter.
- Then use the number pad\* or selector knob\*\* to edit the parameter value.



## Clearing a Value

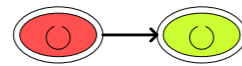
\*When editing a parameter with the number pad, pressing the **CLEAR** key will restore the parameter

## First Time Use Instructions

Use the following procedures when first using the PEL-2000B to power up the instrument, restore the factory default settings and check the firmware version. Lastly, the Conventions section will introduce you to the basic operating conventions used throughout the user manual.

### Power Up

- Insert the AC power cord into the power socket.
- Turn the power switch on from the rear panel. (O → —)
- Hold the power button on the front panel to turn on the power.
  - The power button turns green from red (standby).



Ensure that the power outlet has a ground socket. The power outlet will have a ground connection if it is a 3 socket type.

Upon turning on, the Mainframe will perform a self-test. The self-test checks the System, followed by any attached channels.

- If any of the System checks fail, please power down the load generator and reinstall the appropriate load module(s).

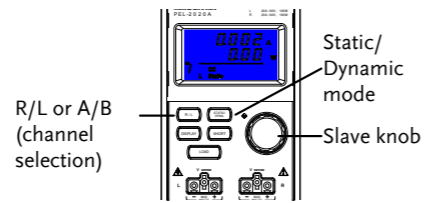
to the previous value.

### Coarse/Fine Adjustment

\*\*Press **SHIFT** to toggle between coarse and fine adjustment when editing the Value(Static mode) and Level(Dynamic mode) parameters.

### Load Module Parameter Input

The front panel keys on a load module can be used to edit the **CC/CV/CR/CP** setting value\* of a selected channel independently to the mainframe.



- Press the **R/L** or **A/B** key on the corresponding load module to select the desired channel or the desired **A/B** Value.
- Press the **STATIC/DYNA.** key to switch from dynamic to static mode or vice versa.
- Press the slave knob switch between coarse and fine editing mode.
- Rotate the slave knob to edit the value of the **CC/CV/CP/CR** Value parameter.

\* By default the slave knob mode is configured to "SetValue". However, when the slave knob is configured to "Measure" the slave knob must first be pressed to allow the value to be edited.



When the firmware version of the mainframe and the slave are not identical, a message "The firmware will be updated, please access to website [www.gwinstek.com](http://www.gwinstek.com) to confirm the firmware version." will appear on the mainframe.

### Recall Factory Default Settings

The factory defaults can be recalled at any time. For details on the factory defaults please see the user manual.

- Press **FILE**.
- Press **Media[F1]** repeatedly until the Media Default menu appears.
- Press **Recall [F4]** to recall the factory default settings.
- Wait a short time for the settings to be recalled.

### Updating the Firmware

The PEL-2000B firmware can be easily updated using a USB memory stick. For the latest firmware please see your local GW Instek distributor or download the latest firmware from [www.gwinstek.com](http://www.gwinstek.com).

### View Firmware Version

- Press **SHIFT** + **UTILITY**.
- The system information is listed in the display:
  - MainFrame Ver: Mainframe firmware

## SPECIFICATIONS

The following are the basic specifications for the PEL-2000B series. For detailed specifications, please see the user manual.

### PEL-2020B

Model	PEL-2020B (100Wx2)	
RANGE	Low	High
CURRENT	0~2A	0~20A
VOLTAGE	0~80V	
MIN.OP.	0.4V at 2A	0.8V at 20A
VOLTAGE	0.2V at 1A	0.4V at 10A
CC OP. Range	0~2A	0~20A
CC Setting Range	0~2.04A	0~20.4A
CR OP. Range	0.075Ω~300Ω(100W/16V) 3.75Ω~15kΩ(100W/80V)	
CR Setting Range	0.075Ω~300Ω(100W/16V) 3.75Ω~15kΩ(100W/80V)	
CV+CC OP. Range	1~16V	1~80V
CV+CC Set. Range	0~16.32V	0~81.6V
CP OP. Range	1~10W	1~100W
CP Setting Range	0~10.2W	0~102W

### PEL-2030B

Model	PEL-2030B (30W/250V)		
RANGE	High	Low	High
CURRENT	0~5A	0~4A	0~40A
VOLTAGE	0~80V		
MIN.OP.	0.8V at 5A	0.4V at 4A	0.8V at 40A
VOLTAGE	0.4V at 2.5A	0.2V at 2A	0.4V at 20A
CC OP. Range	0~5A	0~4A	0~40A
CC Setting Range	0~5.1A	0~4.08A	0~40.8A

version.

PEL-2XXX SN: Serial number of the mainframe.

- Slot(X)Ver: firmware version of the load module in the slot "X".

PEL-XXXX SN: Serial number of the load module in the corresponding slot.

### Firmware update

- Press **FILE**.
- Press **Media [F1]** repeatedly until the Media USB menu appears.
- Press the **File Utility [F5]** soft-key.
- Select the \*.P2K upgrade file using the scroll wheel and press **Select[F1]** twice. Once to select the file and once to confirm.
- Wait for the update to finish. A message will be displayed upon completion.
- Reset the power from the front panel to reset the load generator.



Do not turn the load generator off or remove the USB memory when the firmware is being read or upgraded.

### Conventions

The following conventions are used throughout the user manual. Read the conventions below for a basic grasp of how to operate the PEL-2000B menu system on the main frame and using the front panel keys on both the mainframe and the module units. Please see

CR OP. Range	0.3Ω~1.2kΩ (30W/16V) 15Ω~60kΩ (30W/80V)	0.0375Ω~150Ω (250W/16V) 1.875Ω~7.5kΩ (250W/80V)
CR Setting Range	0.3Ω~1.2kΩ (30W/16V) 15Ω~60kΩ (30W/80V)	0.0375Ω~150Ω (250W/16V) 1.875Ω~7.5kΩ (250W/80V)
CV+CC OP. Range	1~16V	1~80V
CV+CC Set. Range	0~16.32V	0~81.6V
CP OP. Range	1~30W	1~25W
CP Setting Range	0~30.6W	0~25.5W

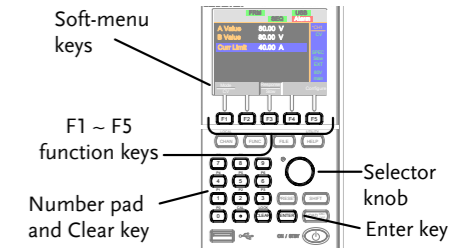
### PEL-2040B/PEL-2041B

Model	PEL-2040B		PEL-2041B	
RANGE	Low	High	Low	High
CURRENT	0~7A	0~70A	0~1A	0~10A
VOLTAGE	0~80V		0~500V	
MIN.OP.	0.4V at 7A	0.8V at 70A	1V at 1A	2V at 10A
VOLTAGE (Typ.)	0.2V at 3.5A	0.4V at 35A	0.5V at 0.5A	1V at 5A
CC OP. Range	0~7A	0~70A	0~1A	0~10A
CC Setting Range	0~7.14A	0~71.4A	0~1.02A	0~10.2A
CR OP. Range	0.025Ω~100Ω (350W/16V) 1.25Ω~5kΩ (350W/80V)		1.25Ω~5kΩ (350W/125V) 50Ω~200kΩ (350W/500V)	
CR Setting Range	0.025Ω~100Ω (350W/16V) 1.25Ω~5kΩ (350W/80V)		1.25Ω~5kΩ (350W/125V) 50Ω~200kΩ (350W/500V)	
CV+CC OP. Range	1~16V	1~80V	2.5~125V	2.5~500V
CV+CC Set. Range	0~16.32V	0~81.6V	0~127.5V	0~510V
CP OP. Range	1~35W	1~350W	1~35W	1~350W
CP Setting Range	0~35.7W	0~357W	0~35.7W	0~357W

the user manual for proper details.

### Soft-menu keys (Mainframe)

The **[F1]** to **[F5]** function keys at the bottom of the display correspond directly to the soft-menu keys on top.



### Select Sub Menu

Dynamic

Pressing this type of soft-menu key will enter a submenu.

### Toggle Parameter or State

Mode  
CC

This type of soft-menu icon has the function/item on the top of the label and the selected setting or mode on the bottom of the label.

Repeatedly press the associated function key (**[F1]**-**[F5]**) to cycle through each setting.

For some parameters, a popup window will also appear. Selection of the setting is the same. Repeatedly pressing the relevant function key (**[F1]**-**[F5]**) will cycle through each setting.

## EC Declaration of Conformity

We  
**GOOD WILL INSTRUMENT CO., LTD.**  
declare that the CE marking mentioned product satisfies all the technical relations application to the product within the scope of council:  
Directive: EMC; LVD; WEEE; RoHS  
The product is in conformity with the following standards or other normative documents:

© EMC	
EN 61326-1	Electrical equipment for measurement, control and laboratory use — EMC requirements
Conducted & Radiated Emission EN 55011 / EN 55032	Electrical Fast Transients EN 61000-4-4
Current Harmonics EN 61000-3-2 / EN 61000-3-12	Surge Immunity EN 61000-4-5
Voltage Fluctuations EN 61000-3-3 / EN 61000-3-11	Conducted Susceptibility EN 61000-4-6
Electrostatic Discharge EN 61000-4-2	Power Frequency Magnetic Field EN 61000-4-8
Radiated Immunity EN 61000-4-3	Voltage Dip / Interruption EN 61000-4-11 / EN 61000-4-34
© Safety	
EN 61010-1 :	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements

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