Programmable DC Electronic Load

PEL-2000A Series

QUICK START GUIDE

GW INSTEK PART NO. 82EL-2KA00M01

ISO-9001 CERTIFIED MANUFACTURER

GW INSTEK

The information in this manual was correct at the time of printing. However, Good Will continues to improve its products and therefore reserves the right to change the specifications, equipment, and maintenance procedures at any time without notice.

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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	Warning: Identifies conditions or practices that could result in injury or loss of life.
 Caution	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.

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 0.75mm² 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.

GETTING STARTED

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

Overview

The PEL-2002A and 2004A are multichannel programmable DC electronic load mainframes. The PEL-2002A mainframe is able to hold 2 load modules, whilst the PEL-2004A 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-2000A 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.

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-2020A (100Wx2)	2	100/100	2/20	1-80
PEL-2030A (30/(25/250W))	2	30/ (25/250)	5/4/40	1-80
PEL-2040A	1	(35/350)	7/70	1-80
PEL-2041A	1	(35/350)	1/10	2.5-500
*Left/Right channel, Low/High range **Low/High range				

Main Features

Feature Overview

- Flexible operation with removable load modules
- Multiple independent isolated channels
- High performance, up to 5 digit resolution
- High slew rate enabling a high response speed
- High capacity when frame linked
- Different load module types can be used in the same mainframe
- Dedicated parallel mode.
- Supports rack mount installation (PEL-2004A)

	• 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 • GPIB (optional)

Package Contents and Accessories

Standard Accessories

Item	Description
Power Cable	Mains power cable (region dependent)
CD ROM	Contains PEL-2000A 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)

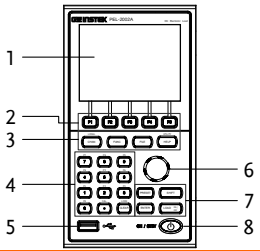
Optional Accessories

Item	Description
PEL-002	PEL-2000A Rack Mount kit (handle only)
GTL-232	RS-232C
GTL-246	USB
GTL-248	GPIB cable
GTL-249	Frame link

Options

Item	Description
PEL-2020A	Load module
PEL-2030A	Load module
PEL-2040A	Load module
PEL-2041A	Load module
PEL-001	GPIB interface (factory installed)

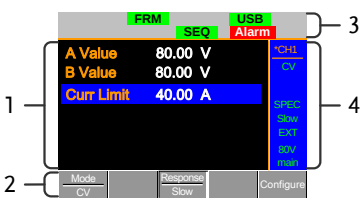
Front Panel - Mainframe



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

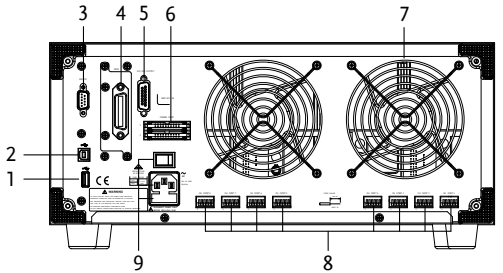


Description

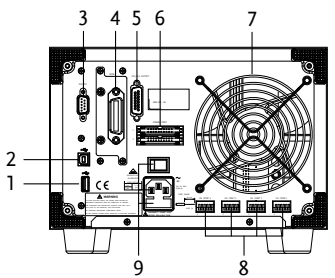
1. Main screen
2. Menu icons
3. Mainframe status panel
4. Current operation channel status panel

Rear Panel

PEL-2004A

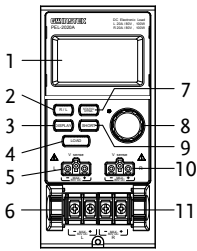


PEL-2002A



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

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

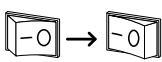
1. Channel display
2. Channel indicator
3. Channel units
4. Mode indicator

First Time Use Instructions

Use the following procedures when first using the PEL-2000A 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

1. Insert the AC power cord into the power socket.
2. Turn the power switch on from the rear panel. (O → —)



3. Hold the power button on the front panel to turn on the power.
   - The power button turns green from red (standby).

Warning — 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.

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

Recall Factory Default Settings

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

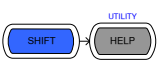
1. Press 

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

Updating the Firmware

The PEL-2000A 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.

View Firmware Version

1. Press 

.
2. The system information is listed in the display:
   - MainFrame Ver: Mainframe firmware 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

1. Press 

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

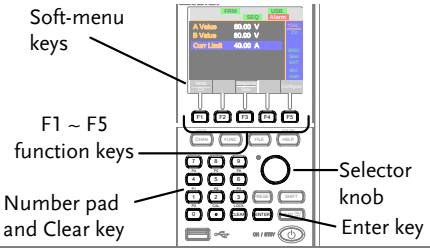
Do not turn the load generator off or remove the USB memory when the firmware is being read or upgraded.

Conventions

The following conventions are used throughout the user manual. Read the conventions below for a basic grasp of how to operate the PEL-2000A menu system on the main frame and using the front panel keys on both the mainframe and the module units. Please see 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 — Function/Item
CC — Parameter or State

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.

Main Frame Parameter Input

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

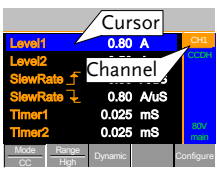
1. Press the *CHAN* key and turn the selector

knob to select a channel to edit.

2. Press the selector knob or the *ENTER* key to confirm the selection.

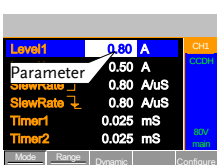
3. Use the scroll wheel to move the cursor to the desired parameter.

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



4. Press the *ENTER* key or to selector knob to select the parameter.

5. Then use the number pad* or selector knob** to edit the parameter value.



Clearing a Value

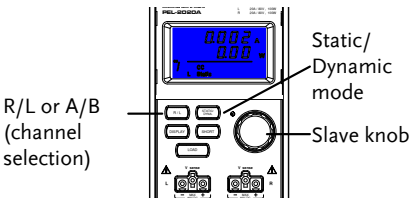
*When editing a parameter with the number pad, pressing the *CLEAR* key will restore the parameter to the previous value.

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.



1. Press the *R/L* or *A/B* key on the corresponding load module to select the desired channel or the desired A/B Value.

2. Press the *STATIC/DYNA.* key to switch from dynamic to static mode or vice versa.

3. Press the slave knob switch between coarse and fine editing mode.

4. 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.

SPECIFICATIONS

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

PEL-2020A

Model	PEL-2020A (100Wx2)	
RANGE	Low	High
CURRENT	0~2A	0~20A
VOLTAGE	1~80V	
MIN.OP. VOLTAGE	0.4V at 2A	0.8V at 20A
	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	1~80V	
CV+CC Set. Range	0~81.6V	
CP OP. Range	1~10W	1~100W
CP Setting Range	0~10.2W	0~102W

PEL-2030A

Model	PEL-2030A (30W/250W)		
RANGE	Low	Low	High
CURRENT	0~5A	0~4A	0~40A
VOLTAGE	1~80V		
MIN.OP. VOLTAGE	0.8V at 5A	0.4V at 4A	0.8V at 40A
	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

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	1~80V		
CV+CC Set. Range	0~81.6V		
CP OP. Range	1~30W	1~25W	1~250W
CP Setting Range	0~30.6W	0~25.5W	0~255W

PEL-2040A/PEL-2041A

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

EC Declaration of Conformity

We
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No.7-1, Jhongsing Rd., Tucheng Dist., New Taipei City 236, Taiwan
GOOD WILL INSTRUMENT (SUZHOU) CO., LTD.
No. 69, Lushan Road, Suzhou New District Jiangsu, China
declares that the below mentioned product
PEL-2002, PEL-2020A, PEL-2030, PEL-2030A, PEL-2040, PEL-2040A, PEL-2041A, PEL-2041A.
are herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Law of Member States relating to Electromagnetic Compatibility (2004/108/EC and 2014/30/EU) and Low Voltage Directive (2006/95/EC and 2014/35/EU).
For the evaluation regarding the Electromagnetic Compatibility and Low Voltage Directive, the following standards were applied:

◎ EMC

EN 61326-1 EN 61326-2-1	Electrical equipment for measurement, control and laboratory use — EMC requirements (2013)
Conducted Emission Radiated Emission EN55011: 2009+A1: 2010	Electrostatic Discharge EN 61000-4-2: 2009
Current Harmonics EN 61000-3-2: 2014	Radiated Immunity EN 61000-4-3: 2006 +A1:2008+A2:2010
Voltage Fluctuations EN 61000-3-3: 2013	Electrical Fast Transients EN 61000-4-4: 2012
----------	Surge Immunity EN 61000-4-5: 2006
----------	Conducted Susceptibility EN 61000-4-6: 2014
----------	Power Frequency Magnetic Field EN 61000-4-8: 2010
----------	Voltage Dip/ Interruption EN 61000-4-11: 2004

◎ Safety

Low Voltage Equipment Directive 2006/95/EC and 2014/35/EU
Safety Requirements: EN 61010-1: 2010; EN 61010-2-030: 2010