TEXIO
Test and Measurement Solutions

INSTRUCTION MANUAL

Multifunctional DC regulated power supply with electronic load function

PDW series

PDW32-6SG
PDW36-10SG
PDW72-5SG
PDW32-3DG
PDW30-6TG
PDW32-3TG
PDW36-5TG
PDW60-3TG
PDW32-3QG

B71-0528-01

CONTENTS

■ Firmware version description

The contents of this document are compatible with the PDW series firmware versions listed below or higher.

Type A: Ver1.26 PDW32-6SG, PDW32-3DG, PDW32-3TG, PDW32-3QG
Type B: Ver1.08 PDW30-6TG, PDW36-5TG, PDW60-3TG
Type C: Ver1.05 PDW36-10SG, PDW72-5SG

The latest version of the instruction manual is posted on our website (https://www.texio.co.jp/download/).
In order to be environmentally friendly and reduce waste, we are gradually discontinuing the use of paper or CD manuals that come with our products.
Even if there is a description in the instruction manual that the product is included, it may not be included.
Please copy the downloaded USB driver from our HP.

USING THE PRODUCT SAFELY

■ Preface

To use the product safely, read this instruction manual to the end. Before using this product, understand how to correctly use it.
If you read this manual but you do not understand how to use it, ask us or your local dealer. After you read this manual, save it so that you can read it anytime as required.

■ Notes on reading this instruction manual

The contents of this instruction manual include technical terms in part of their explanation. If you do not understand those terms, do not hesitate to ask us or your local dealer.

■ Pictorial indication and warning character indication

This instruction manual and product show the warning and caution items required to safely use the product. The following pictorial indication and warning character indication are provided.

＜Pictorial indication＞	
	Some part of this product or the instruction manual may show This pictorial indication. In this case, if the product is incorrectly used in that part, a serious danger may be brought about on the user's body or the product. To use the part with this pictorial indication, be sure to refer to this instruction manual.
<Warning character Indication>	
 **WARNING**	If you use the product, ignoring this indication, you may get killed or seriously injured. This indication shows that the warning item to avoid the danger is provided.
 **CAUTION**	If you incorrectly use the product, ignoring this indication, you may get slightly injured or the product may be damaged. This indication shows that the caution item to avoid the danger is provided.

USING THE PRODUCT SAFELY

WARNING

■ Do not remove the product's covers and panels

Never remove the product's covers and panels for any purpose.
Otherwise, the user's electric shock or a fire may be incurred.

■ Warning on using the product

The warning items given below are to avoid danger to the user's body and life and avoid the damage and deterioration of the product.
Use the product, observing the following warning and caution items.

■ Warning items on power supply

- Power supply voltage

  As the rated power supply voltage of the product, the range from 100 to 240 VAC can be used without being switched.

- Power cord

  Important: The attached power cord set can be used for this device only.

- Protection fuse

  If an input protection fuse is blown, the product does not operate. When the fuse is blown, the user can replace it. However, replace it correctly, observing the warning and caution items that are provided in the section of the instruction manual where the fuse replacement is explained. If the fuse is incorrectly replaced, a fire may occur.

- Changing the power supply

  IThe rated power supply voltage cannot be changed.
  Use the product only at the rated power supply voltage indicated on the product. Otherwise, a fire may occur. The product's rated power supply voltage is from 100 to 240 VAC. Use the product in this range.(For use at a voltage higher than 125 VAC, Please confirm the voltage ratings of the power cord.)

■ Warning item on grounding

The product has the GND terminal on the panel surface to protect the user from electric shock and protect the product.
Be sure to ground the product to safely use it.

USING THE PRODUCT SAFELY

WARNING

■ Warning item on installation environment

- Operating temperature

  Use the product within the operating temperature indicated in the rating column. If the product is used with the vents of the product blocked or in high ambient temperatures, a fire may occur.
- Operating humidity

  Use the product within the operating humidity indicated in the rating column. Watch out for condensation by a sharp humidity change such as transfer to a room with a different humidity. Also, do not operate the product with wet hands. Otherwise, an electric shock or fire may occur.
- Use in a gas

  Use in and around a place where an inflammable or explosive gas or steam is generated or stored may result in an explosion and fire. Do not operate the product in such an environment.

  Also, use in and around a place where a corrosive gas is generated or spreading causes a serious damage to the product. Do not use the product in such an environment.
- Do not let foreign matter in

  Do not insert metal and flammable materials into the product from its vent and spill water on it. Otherwise, an electric shock and fire may occur.

■ Warning item on abnormality while in use

If smoke or fire is generated from the product while in use, stop using the product, turn off the switch, and remove the power cord plug from the outlet. After confirming that no other devices catch fire, call the company or each sales office.

■ Front Panel

Please do not lift up the product, while touching the front grille.

■ Input/output terminal

Maximum input to the input terminals is specified to prevent the product from being damaged. Do not supply input, exceeding the specifications that are indicated in the "Rating" or "Caution on use" column in the instruction manual of the product. Otherwise, a product failure is caused.

Also, do not supply power to the output terminals from the outside. Otherwise, a product failure is caused.

USING THE PRODUCT SAFELY

CAUTION

■ **When the product is left unused for a long time**

Be sure to remove the power plug from the outlet.

(Calibration)

Although the performance and specifications of the product are checked under strict quality control during shipment from the factory, they may aging rate because of aging rate in its parts. It is recommended to periodically calibrate the product so that it is used with its performance and specifications stable. For consultation about the product calibration, call the dealer or the company or each sales office where you bought the product.

(Daily maintenance)

When you clean off the dirt of the product covers, panels, and knobs, avoid solvents such as thinner and benzene. Otherwise, paint may peel off or the resin surface may be affected.

To wipe off the covers, panels, and knobs, use a soft cloth with neutral detergent in it. During cleaning, be careful that water, detergents, and other foreign matters do not get into the product.

If a liquid or metal gets into the product, an electric shock and fire are caused. During cleaning, remove the power cord plug from the outlet.

Use the product correctly and safely, observing the above warning and caution items. Because the instruction manual indicates caution items even in individual items, observe those caution items to correctly use the product.

If you have questions or comments about the content of the instruction manual, ask us or E-Mail us.

1. General

The PDW series is a lightweight, multi-functional DC regulated power supply with an electronic load function.
The PDW series can be used in circuits that require multiple voltages and currents, and by using tracking mode, it can also be used in applications that require both positive and negative outputs.

PDW32-6SG/ PDW36-10SG/PDW72-5SG are 1-output models with remote sensing function.

Model name	Rated output power	Load rated input
PDW32-6SG	32V ,6A	32V ,6A ,100W
PDW36-10SG	36V ,10A	36V ,10A ,100W
PDW72-5SG	72V ,5A	72V ,5A ,100W

PDW32-3DG is a 2-output model.

Model name	CH1/CH2 Rated output power	CH1/CH2 Load rated input
PDW32-3DG	32V ,3A	32V ,3A ,50W

PDW30-6TG/PDW32-3TG/PDW36-5TG/PDW60-3TG are 3-output models. CH3 is a 1.8V/2.5V/3.3V/5V fixed voltage switching type CV operation only output.

Model name	CH1/CH2 Rated output power	CH1/CH2 Load rated input	CH3 Rated output power
PDW30-6TG	30V ,6A	30V ,6A ,50W	1.8/2.5/3.3/5V ,5A
PDW32-3TG	32V ,3A	32V ,3A ,50W	
PDW36-5TG	36V ,5A	36V ,5A ,50W	
PDW60-3TG	60V ,3A	60V ,3A ,50W	

PDW32-3QG is a 4-output model.

Model name	CH1/CH2 Rated output power	CH3 Rated output power	CH4 Rated output power	CH1/CH2 Load rated input
PDW32-3QG	32V ,3A	5V ,1A	15V ,1A	32V ,3A ,50W

1.1. Feature introduction

1.1.1. Independent, Tracking Series / Parallel

The PDW series has three output modes: independent output mode, serial tracking output mode, and parallel tracking output mode, which can be switched by key operation on the front panel.
In independent output mode, the output voltage and current are set individually for each channel. The withstand voltage between output terminal and chassis and between output terminal and output terminal is 500V.
In tracking output mode, CH1 and CH2 are automatically connected in series or parallel. No cable connection required.
Series tracking mode doubles the output voltage and parallel tracking mode doubles the output current.

1.1.2. Electronic load function

The PDW series has an electronic load function on two channels, CH1 and CH2 (only CH1 for PDW32-6SG/PDW36-10SG/PDW72-5SG). The electronic load function can be operated in three discharge modes: constant current (CC) mode, constant resistance (CR) mode, and constant voltage (CV) mode. Either operation mode can be selected by key operation on the front panel. The set current value, set resistance value, and set voltage value can be set for each operation mode.

1.1.3. Constant voltage (CV) operation/constant current (CC) operation

Each output operates in constant voltage (CV) and constant current (CC). The output voltage can be set even when the rated maximum current is being output. It operates as a constant voltage source for loads with high resistance and as a constant current source for loads with low resistance.
In independent output mode or constant voltage (CV) operation in tracking mode, the upper limit of the output current can be set by operating the front panel. The upper limit of the output voltage during constant current (CC) operation in independent output mode can also be set by operating the front panel.
When the output current increases and reaches the current setpoint, the unit automatically switches from constant voltage (CV) operation to constant current (CC) operation. Conversely, when the output voltage increases and reaches the voltage setting, the unit automatically switches from constant current (CC) operation to constant voltage (CV) operation.
Refer to page 9 for details on constant voltage and constant current operation.

1.1.4. Auto tracking mode

Output voltage and output current are displayed on CH1 and CH2 of the front panel display (multi-output PDW series). When operating in tracking mode, CH1 and CH2 are automatically connected.

1.1.5. Display change function

The PDW series has seven types of LCD display modes, which can be switched by setting. The type of display mode differs depending on the model.
Refer to page 23 for details.

1.1.6. Output waveform function

When using the PDW series as a power supply, you can use the sequence function to change the output voltage and current, and when using it as an electronic load, you can change the load. The frequency is limited to 1 Hz or less because the setting change is 1 second.
Refer to page 43 for details.

1.1.7. Front and rear output function

With the PDW series, the input/output terminals can be switched between the front panel terminals and the rear panel terminals using the panel menu or remote command. Some models do not have a rear panel.
Refer to page 21 for details.

1.1.8. Remote control

The PDW series can be controlled by USB, GP-IB, LAN, and RS-232C remote control.
Refer to page 104 for details.

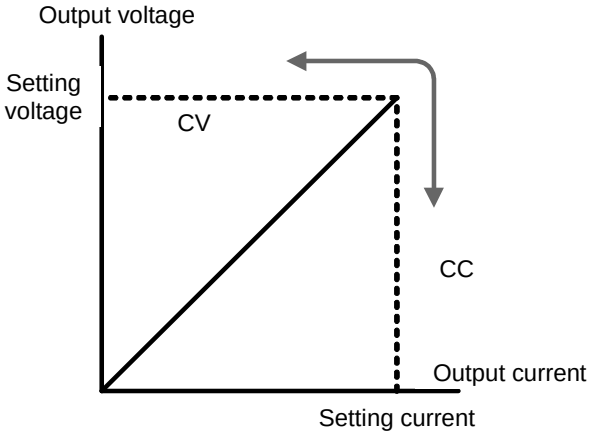
1.1.9. Control by external contact

The PDW series can be controlled by an external contact.
Refer to page 78 for details.

1.2. Key Features

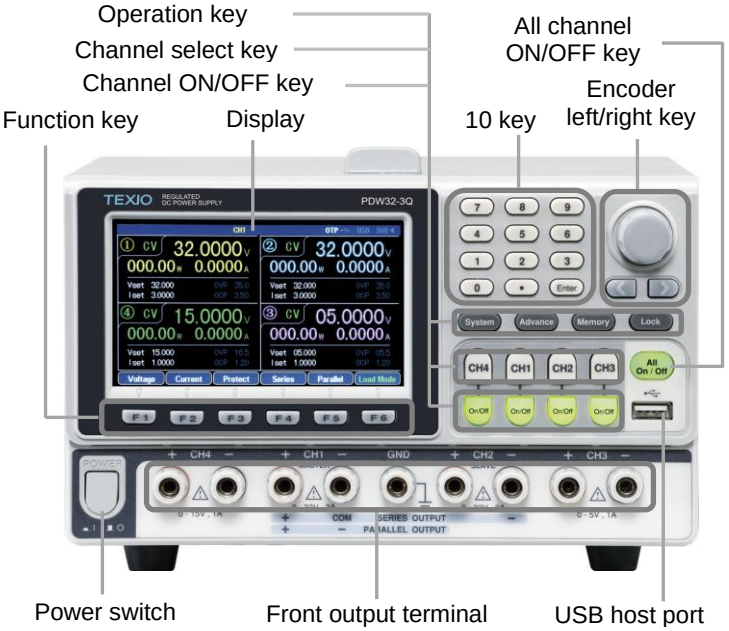
Features	▪ Multiple Outputs The number of channels varies depending on the model. ▪ Constant voltage and constant current operation. ▪ Small and lightweight Half-rack size with a height of 3U, it can be stored in a standard rack. ▪ Equipped with a 4.3-inch TFT display
Operation	▪ Digital control from panel ▪ Output (input) ON/OFF switching, controlled individually for each channel ▪ Voltage/current setting via front panel keys and encoders ▪ Save/read setting status (10 items) Power-on state setting (two states) Save/read sequence operation (10 programs) Save/read delay settings (10 settings) Save/read record function (10 data) ▪ CH1 and CH2 can operate as electronic loads ▪ Up to 7 display modes available Up to 4 types of numerical display modes and 2 types of waveform display modes Display mode types vary depending on the model ▪ Equipped with I/O ports for external control ▪ Generating buzzer sound at alarm ▪ Equipped with key lock function ▪ Front and rear output function There is no rear output depending on the model.
Protection function	▪ Equipped with Over Voltage Protection (OVP) and Over Current Protection (OCP) ▪ Equipped with overheat protection (OTP) ▪ Equipped with protection against reverse connection ▪ Equipped with overpower protection (OPP) when operating electronic load
Interface	▪ Equipped with RS-232C, USB, GP-IB, LAN

1.3. Constant voltage (CV) operation and constant current (CC) operation

Overview	The unit automatically switches between CV) and CC operation as the load changes.
CV mode	When the output current is smaller than the set current value, the unit operates in constant voltage (CV). The output current changes according to the size of the load, but the output continues at the set voltage value.
CC mode	When the output current increases and reaches the output current setting value, the unit switches to constant current (CC) operation and the LCD on the front panel also switches to display "CC". During constant current (CC) operation, the unit continues to output at the set output current value, and the output voltage changes according to the size of the load. When the output current drops below the output current setting, the unit will return to constant voltage (CV) operation.
Operating range diagram	

2. Panel description

2.1. Front panel



The above illustration is for PDW32-3QG.

2.1.1. Display

Display example: PDW32-3QG

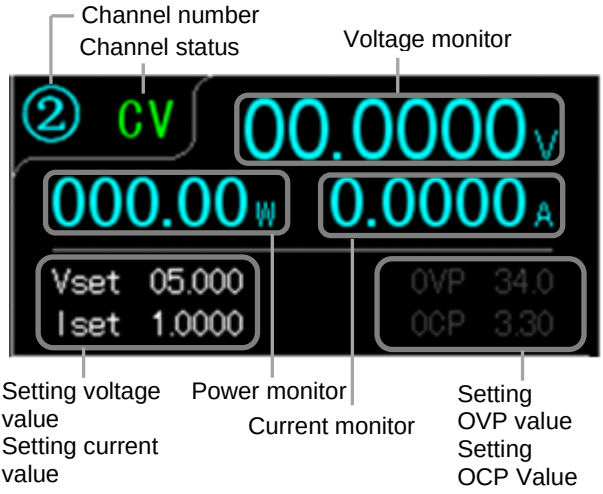
Channel display color

The display contents of each channel are displayed in the following colors for each channel.

CH1: Yellow CH2: Blue, CH3: Pink, CH4: Green

During tracking operation, CH1 becomes the master and CH2 turns yellow.

Displayed contents for each channel



Channel number

Channel numbers are also displayed in the above display colors for each channel.
However, when setting voltage, current, etc., the color changes, and the display color of each channel and orange blink.

In case of CH1: ① ⟷ ①

Channel status

Displays the operating status of the channel number。
When operating in power supply mode, CH1/CH2/CH3/CH4 display CV in green during constant voltage (CV) operation and CC in red during constant current (CC) operation.
When operating in electronic load mode, CC CR CV is displayed in orange for CH1/CH2.

Voltage monitor

Voltage monitor displays up to 6 digits. The unit is [V].

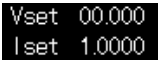
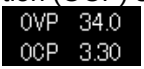
Display example: 00.0000 V

Display example for 3-output type CH3: 1.8 V

Current monitor

Current monitor displays up to 5 digits. The unit is [A].

Display example: 0.0000 A

Power monitor	The power monitor displays up to 5 digits. The unit is [W].
Setting voltage value Setting current value	Displays voltage and current settings. Display example:  Display example for 3-output type CH3:  3-output type CH3 does not display the setting current value.
Setting OVP value Setting OCP Value	Displays the overvoltage protection (OVP) and overcurrent protection (OCP) settings. Display example:  Display example for 3-output type CH3:  The OVP setting of the 3-output type CH3 is a fixed value of about 5.5V, and only ON/OFF switching of the operation is possible. In addition, OCP that operates at approximately 3.1A can be used only for the USB power supply port output.
Power supply operating status	The power supply operating status is shown at the top of the display.  The displayed contents are as follows.  : Display the channels that are in the setting state  : Display OTP status  : Display that USB memory is installed  : Display that communication by USB is disabled  : Display indicating that USB communication is valid  : Display to indicate external analog control Other displays: When operating in tracking mode, SER (in series)/PAR (in parallel) is displayed. When sequence operation/delay operation/monitor operation/recorder operation is enabled, SEQ/DLY/MON/REC is displayed respectively.

2.1.2. Function key

F1～F6 key

Various functions of the PDW series are assigned to the function keys (F1 to F6 keys). The assigned function is shown at the bottom of the display.

2.1.3. 10 key

Used to enter numeric parameters. Press the Enter key to confirm the numerical parameter.

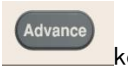
2.1.4. Encoder and left/right key

The encoder is used for parameter setting, and the left and right keys are used for parameter setting, menu item selection, and detailed voltage/current settings.

2.1.5. Operation key

key

Used to set the buzzer sound, LCD backlight, communication interface, etc.
Refer to page 101 for details.



key

It is used for setting the sequence operation, delay function, monitor function, record function, etc.

key

It is used for saving and reading set parameters.
Refer to page 92 for details.

key

Used to disable key operations on the front panel.
However, the channel ON/OFF key can be used even when key operation is disabled.
Pressing the F6 (Unlock) key while key operation is disabled will release the key operation disabled state.

2.1.6. Channel select key

key

To make various channel settings, press the channel selection keys (CH1 to CH4 keys) to be set.
1-output type models do not have a channel select key.
2-output models do not have CH3 and CH4 keys.
3-output models do not have CH4 keys.

2.1.7. Channel ON/OFF key


key

To turn the output ON/OFF for each channel, press the ON/OFF key for that channel.

When the output of a channel is turned ON, the ON/OFF key of that channel lights up.

OFF: 

ON: 

1-output type models do not have a channel ON/OFF key.
2-output models do not have CH3 and CH4 ON/OFF keys.
3-output models do not have CH4 ON/OFF keys.

2.1.8. All channel ON/OFF key

key

To turn on/off the output of all channels, press the ALL ON/OFF key.

The ALL ON/OFF key lights up when the output of all channels is turned ON.

OFF: 

ON: 

1-output type models are not "ALL ON/OFF",
It becomes the key of "ON/OFF".

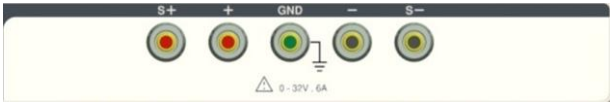
2.1.9. USB host port

USB memory can be installed.
Setting values, programs and data saved in the internal memory can be saved to and called from USB memory.
Refer to page 92 for details.

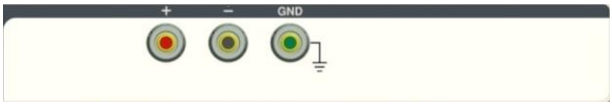
2.1.10. Front output terminal

The PDW series has different shapes depending on the output type.

1 output type
PDW32-6SG



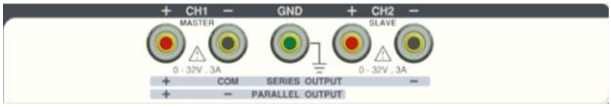
PDW36-10SG
PDW72-5SG



The + and - terminals are input/output terminals. It becomes an output terminal in power supply mode and an input terminal in electronic load mode.
The S+ and S- terminals are sensing terminals. Connect the sensing wires when using the remote sensing function.

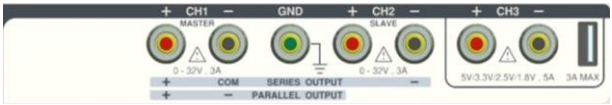
When not using the remote sensing function, connect the + terminal and the S+ terminal, and the - terminal and the S- terminal with a short bar.
When using the remote sensing function, remove the short bar connecting the + and S+ terminals and the - and S- terminals.
PDW36-10SG and PDW72-5SG do not have S+ and S- terminals.

2 output type



The CH1+ and CH1- terminals are the input/output terminals for CH1, and the CH2+ and CH2- terminals are the input/output terminals for CH2. It becomes an output terminal in power supply mode and an input terminal in electronic load mode.

3 output types



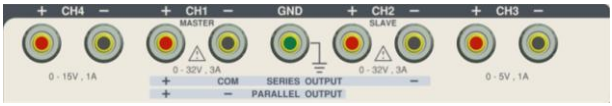
The CH1± and CH2± terminals are the same as the 2-output type.

The CH3+ and CH3- terminals are the output terminals of CH3. CH3 can also output power from the USB power supply port.

Note

The ± terminals of CH3 and the USB supply port are connected in parallel inside the PDW power supply. Please keep the total output current from the two terminals below 5A.

4 output types



The CH1± and CH2± terminals are the same as the 2-output type.

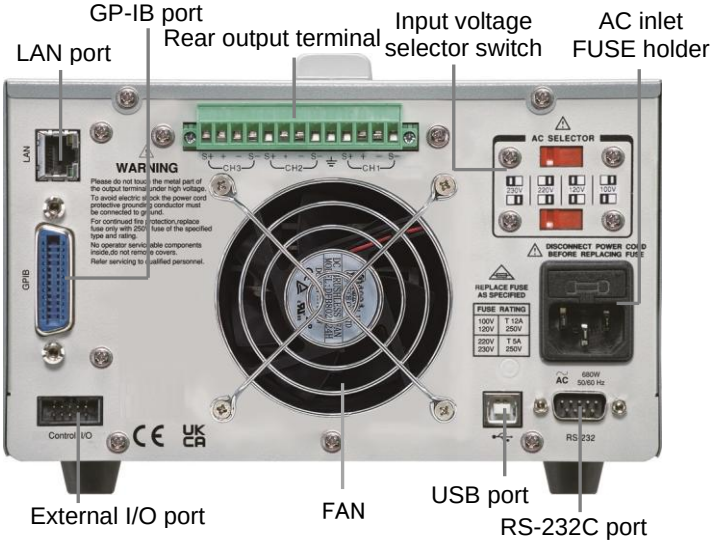
The CH3+ and CH3- terminals are CH3 output terminals, and the CH4+ and CH4- terminals are CH4 output terminals.

2.1.11. Power switch

Turns the power supply on/off.

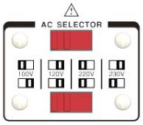
ON: ▬ OFF: ▙

2.2. Rear panel



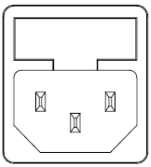
The above illustration is of a type with rear output terminals.

2.2.1. Input voltage selector switch



This is a switch for switching the AC input voltage.
The input voltage is 100V/120V/220V/230V±10% and the frequency is 50Hz or 60Hz.

2.2.2. AC inlet and FUSE holder



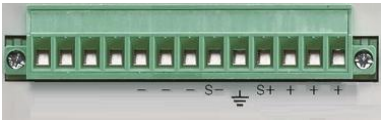
Input AC 100V/120V/220V/230V, frequency 50/60Hz.
The following slow-blow type fuses are used depending on the input voltage.
PDW32-6SG, PDW32-3DG, PDW32-3TG, PDW32-3QG:
100V/120V: T6.6A/250V, 220V/230V: T3.15A/250V
PDW36-10SG, PDW72-5SG, PDW30-6TG, PDW36-5TG, PDW60-3TG:
100V/120V: T12A/250V, 220V/230V: T6.3A/250V
Refer to page 201 for fuse replacement method.

2.2.3. Rear output terminal

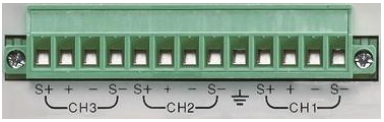
PDW32-6SG, PDW32-3DG, PDW32-3TG, and PDW32-3QG models do not have rear output terminals.

PDW36-10SG and PDW72-5SG are 1-output type, and PDW30-6TG, PDW36-5TG and PDW60-3TG are 3-output type.
Refer to pages 19, 30, 32, 35 for operation and connection modes.

1 output type



3 output types



The two types of illustrations on the left are when the connector for the rear output terminal is attached.

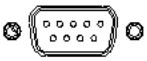
2.2.4. USB port

Connect the USB device used for remote control.
Refer to page 105 for details.

2.2.5. LAN port

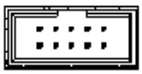
LAN port for remote control.
Refer to page 107 for LAN setup and operation details.

2.2.6. RS-232C port



RS-232C port for remote control. D-sub 9-pin male, using inch screws.
Refer to page 104 for details.

2.2.7. External I/O port



Input/output control signals can be used. MIL standard compliant 10-pin connector.
Refer to page 78 for details.

2.2.8. FAN

Do not block the opening by placing objects near the fan opening.

3. Setup

3.1. Checking the primary side of the power supply and turning the power switch ON

Checking the power supply voltage	Before turning on the power switch, make sure that the input AC voltage and the voltage of the input voltage selector switch match. Input can be switched to 100V/120V/220V/230V with the input voltage selector switch on the rear panel.
Checking FUSE	The FUSE on the primary side uses a slow-blow type. FUSE capacity is indicated on the left of the AC inlet.
Attaching the AC cable	Attach the supplied AC cable to the AC inlet. When the ground terminal of the included AC cable is connected to the ground on the outlet side, the housing of the PDW series is connected (grounded) to the ground.
⚠ **WARNING**	In order to avoid the risk of electric leakage, ground the housing of the PDW series when using it.
Power switch on/off	After checking the above items, turn on the power switch. Press the power switch to turn on the instrument and light up the display. When the power switch is pressed while the power is on, the instrument turns off.

3.2. Connecting the load line

3.2.1. Load cable connection to the front output terminals

Use the attached cables (GTL-104A, GTL-105A) for the load cables used for the front output terminals. It is recommended that each cable be used in a twisted state.

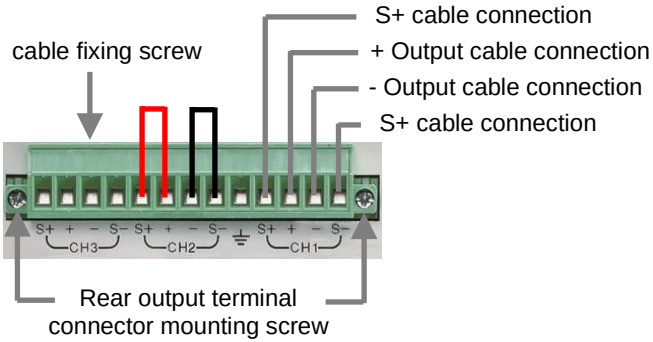
All models CH1 and CH2 terminals	GTL-104A (10A rated)
CH3 terminal for 3-output type	GTL-104A (10A rated)
CH3 and CH4 terminals for 4-output type	GTL-105A (3A rated)
1 output type S+ and S- terminals	GTL-105A (3A rated)

CH3 of 3 output type USB power port	There are no accessories or options for the cable that connects to this output. Connect a USB connector (A type) with a rated current of 4A or more.

3.2.2. Load line connection to rear output terminals

Rear output terminals are provided on PDW36-10SG, PDW72-5SG (2 models with 1 output), PDW30-6TG, PDW36-5TG, PDW60-3TG (3 models with 3 outputs).

Attaching the rear output terminal connector	Insert the rear output terminal connector into the rear output terminal part of the PSW power supply, and turn the left and right mounting screws of the rear output terminal connector to fix it.
cable fixing screw	A cable fixing screw is located on the top surface of each cable attachment point. Before attaching the cable, turn the screw counterclockwise to open the cable attachment opening. After installing the cable, turn the screw clockwise to fix the cable.
Attaching Output and Sensing Cables	When using the sensing function Connect each cable to the rear output terminal connector as shown for CH1 in the illustration below. When not using the sensing function Connect the ± output cable connection part and the S± cable connection part like the CH2 part in the illustration below. When connecting with wires, use wires thicker than AWG20. It is recommended that each cable be used in a twisted state.



3.2.3. Cable used for PDW power supply

Cable diameter used

There are no accessories or options for using a load cable other than the attached cable for the front output terminal, or for the cable to be connected to the rear output terminal connector.
Prepare each cable by referring to the table below.

cable diameter (AWG)	Maximum allowable current (A)
20	2.5
18	4
16	6
14	10
12	16

For the cable that connects the PDW series and the load, select a cable with sufficient current capacity, and use a cable with small voltage drop and impedance .Make sure that the voltage drop on the cable does not exceed 0.5V.

3.3. Select front and rear output terminals

PDW36-10SG, PDW72-5SG (2 models of 1-output type), PDW30-6TG, PDW36-5TG, PDW60-3TG (3 models of 3-output type) are equipped with front and rear output terminals. Select either the front or rear output terminal and use the PDW series. Other models cannot select the output terminal.

Step	Description
1	Press System key twice. 
2	Press the F1 (Front) key to select the front output terminals and press the F2 (Rear) key to select the rear output terminals. The selection state is displayed in the Output Panel.

3 Press F6 (Return) key to return to step 1.

Note The selection of front and rear output terminals applies to all channels. Selection by channel is not possible.

3.4. Output ON/OFF operation

Multi-output models can turn the output ON/OFF for each channel and can also turn all outputs ON/OFF simultaneously.
Also, under some conditions, all channels will be output OFF (forced OFF).

ON/OFF operation for each channel

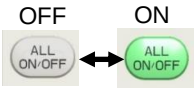
When the ON/OFF key is pressed, each channel to enable output ON/OFF operation for the corresponding channel.

The key lights up while the output is ON.

The 1-output model does not have an ON/OFF key for each channel.

All channel ON/OFF operation

When the ALL ON/OFF key is pressed, turn ON/OFF all channels.
The key lights while all outputs are ON.



ON/OFF key for 1-output model.

Conditions for forced OFF

When switching between power supply mode and electronic load mode

When switching between independent output mode/serial tracking mode/parallel tracking mode

When reading the settings saved in memory

When overvoltage protection (OVP)/overcurrent protection (OCP)/overpower protection (OPP)/overheat protection (OTP) is activated

When the sequence operation/delay operation/monitor operation/external I/O operation satisfies the set conditions

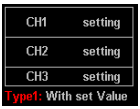
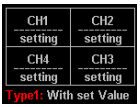
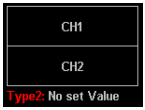
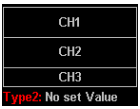
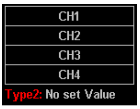
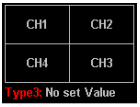
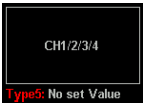
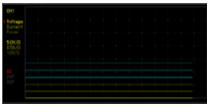
Note Before turning on the output, make various settings for the PDW series.

4. Basic operations

4.1. Display

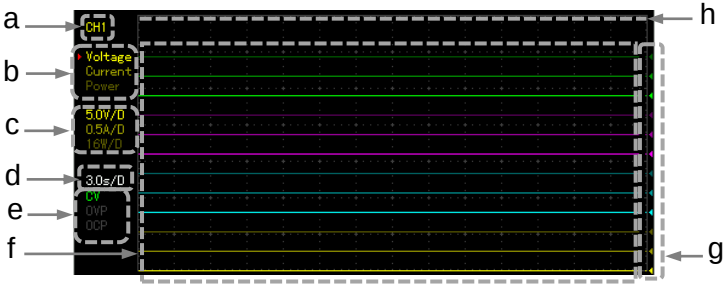
The PDW series can switch the display type (7 types) according to the purpose.
The displayed contents differ depending on the display type.

4.1.1. Display type

Display type	1 output model	2 output model	3 output model	4 output model
Type 1	×			
Type 2	×			
Type 3	×	×	×	
Type 4				
Type 5				
Type 6				
Type 7				

“X” does not have that display type.
Setting values are displayed only for Type1, Type4(Type1), Type7(Type4).
Normal Display: Type1, Type2, Type3, Type4(Type1), Type5(Type2)
Waveform display: Type6(Type3), Type7(Type4)
Types in parentheses are PDW36-10SG and PDW72-5SG.

4.1.2. Details of the Type6 display



The screen is of the 4-output model. Only CH1 is displayed for 1-output models, CH1 and CH2 are displayed for 2-output models, and CH1, CH2, and CH3 are displayed for 3-output models.

a Display the graph edit channel. The graph editing channel is selected with the channel selection key.
CH3 cannot select the graph editing channel.

b Displays graph display items (voltage/current/power).
Items that are displayed in CH color are displayed in the graph, and items that are displayed in gray are not displayed in the graph.
Select an item with the left/right key. Selected items are displayed with a "▸" mark on the left. After selecting an item, press the Enter key to switch display/hide.

c Displays the scale of the vertical axis in the graph display item of the selected channel. The scale is fixed and cannot be changed.

d Displays the horizontal axis (time axis) scale of the graph display. The scale is fixed and cannot be changed.

e Indicates the output operation status (CV/CC) of the selected channel and the ON (displayed in white)/OFF (displayed in gray) status of OVP and OCP.

f Graph display items are displayed in CH color.
The brightness of the CH color varies depending on the graph display item. The brightness of the color is the same as the display color of "b" above.

g Displays the zero level of graph display items with the CH color ◂ mark.
Zero level can be set using the encoder.

h Graph display upper limit. Please use so that the graph display items do not exceed the graph display upper limit.
When the graph display exceeds the display upper limit, values smaller than the zero level are graphed.

4.1.3. Change display type

Step	Description
1	When Advance key is pressed. Function key names change.
2	When F1 (Display) key is pressed. It becomes F1 (Normal) key and F2 (Waveform) key.
3	To display Type 1, Type 2, Type 3, Type 4, Type 5, press F1 (Normal) key. To display Type 6 and Type 7, press F2 (Waveform) key.
4	If any of F1(Type1/Type6), F2(Type2/Type7), F3(Type3), F4(Type4), F5(Type5) key is pressed, the display type will be changed. The Type number displayed on the function keys (F1 to F5 keys) differs depending on the model.

F1 key

4.2. Power supply function

Description	Each channel of the PDW series can be operated as a power supply. It is possible to display the set value and read value of voltage and current for each channel, and it is also possible to display the output status.	
Voltage	Vset	Sets the output voltage of the selected channel. Refer to page 27 for the setting method.
Current	Iset	Sets the output current of the selected channel. Refer to page 27 for the setting method.
Protect	OVP	Sets the OVP voltage of the selected channel. Refer to page 28 for the setting method.
	OCP	Sets the OCP current of the selected channel. Refer to page 29 for the setting method.

4.2.1. Voltage setting

For 3-output model other than CH3

Step	Item	Description	
1	Channel select	Press the channel selection key for voltage setting. 1-output models do not have channel selection keys.	
2	Voltage selects	When F1 (Voltage) key is pressed, the Vset value displayed on the display is displayed in red.	F1 key 
3	Voltage value setting 1	Using 10 keys: Enter a number using the 10 keys and press the ENTER key, F1(V) key or F2(mV) key.	Example 1.5→ ENTER 1.5→F1 1500→F2
	Voltage value setting 2	Using Encoder and Left/Right Keys: Press the left/right key to move the underline of the Vset value. Turn the encoder to increment or decrement the value of that digit.	

For CH3 of the 3-output model

Step	Item	Description	
1	Channel select	Press channels select key CH3.	
2	Voltage value setting	Press the function key of the voltage.	F1: 5.5V F2: 3.3V F3: 2.5V F4: 1.8V

4.2.2. Current setting

For 3-output model other than CH3

Step	Item	Description	
1	Channel select	Press the channel selection key for current setting. 1-output models do not have channel selection keys.	
2	Current selects	When F2(Current) key is pressed, the Iset value displayed on the display is displayed in red.	F2 key 

3	Current value setting 1	Using 10 keys: Enter a number using the 10 keys and press the ENTER key, F1(A) key or F2(mA) key.	Example 1.5→ ENTER 1.5→F1 1500→F2
	Current value setting 2	Using Encoder and Left/Right Keys: Press the left/right key to move the underline of the Iset value. Turn the encoder to increment or decrement the value of that digit.	

CH3 of the 3-output model does not have a current setting function.

4.2.3. OVP setting

For 3-output model other than CH3

Step	Item	Description	
1	Channel select	Press the channel selection key for OVP setting. 1-output models do not have channel selection keys.	
2	Select Protect	When F3 (Protect) key is pressed. Function key names change.	F3 key
3	Select OVP	When F1 (OVP) key is pressed, the OVP value displayed on the display is displayed in red.	F1 key 
4	OVP value setting 1	Using 10 keys: Enter a number using the 10 keys and press the ENTER key, F1(V) key or F2(mV) key.	Example 1.5→ ENTER 1.5→F1 1500→F2
	OVP value setting 2	Using Encoder and Left/Right Keys: Press the left/right key to move the underline of the OVP value. Turn the encoder to increment or decrement the value of that digit.	
5		Press F5 (Return) key. Function key names change.	
6	OVP function ON/OFF setting	Each time the F3 (OVP ON/OFF) key is pressed, the display color of the OVP value switches between white (ON) and gray (OFF).	F3 key

For CH3 of the 3-output model

Step	Item	Description
1	Channel select	Press channels select key CH3.
2	OVP function ON/OFF setting	Every time you press the F5 (OVP ON/OFF) key, the OVP display color changes between white (ON) and gray (OFF). The OVP setting is only ON/OFF of the function. When OVP operates, OVP is displayed in red and the output is turned OFF.

4.2.4. OCP setting

For 3-output model other than CH3

Step	Item	Description	
1	Channel select	Press the channel selection key for OCP setting. 1-output models do not have channel selection keys.	
2	Select Protect	When F3 (Protect) key is pressed. Function key names change.	F3 key
3	Select OCP	When F2 (OCP) key is pressed, the OCP value displayed on the display is displayed in red.	F2 key 
4	OCP value setting 1	Using 10 keys: Enter a number using the 10 keys and press the ENTER key, F1(A) key or F2(mA) key.	Example 1.5→ ENTER 1.5→F1 1500→F2
	OCP value setting 2	Using Encoder and Left/Right Keys: Press the left/right key to move the underline of the OCP value. Turn the encoder to increment or decrement the value of that digit.	
5		When F5 (Return) key is pressed. Function key names change.	
6	OCP function ON/OFF setting	Each time the F4 (OCP ON/OFF) key is pressed, the display color of the OCP value switches between white (ON) and gray (OFF).	F4 key

When OCP operates, OCP is displayed in red and the output is turned OFF.

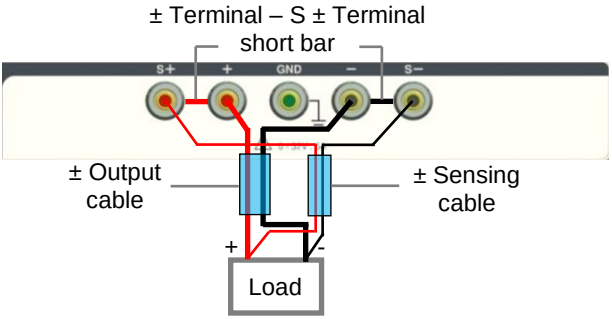
For CH3 of the 3-output model, the OCP setting is fixed to ON.

4.2.5. Usage in Independent Output Mode

Each channel of each PDW series model is independent of each other, and settings and output switching can be performed individually for each channel.

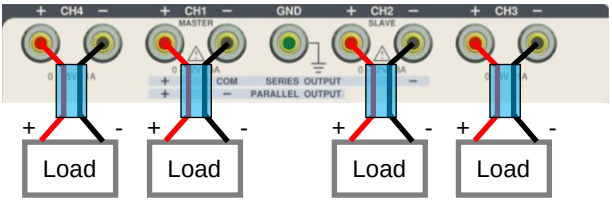
Load connection at the front output terminals

1 output model
Explained in
PDW32-6SG



It is recommended that each cable (light blue part) be used in a twisted state at the shortest length.
When using the sensing function, remove the ± terminal – S ± terminal short bars (2 pieces) and wire the ±sensing cable.
When not using the sensing function, attach the ± terminal – S ± terminal short bar (2 pieces) and do not use the ±sensing cable.

Multi-output
model
Explained in
PDW32-3QG



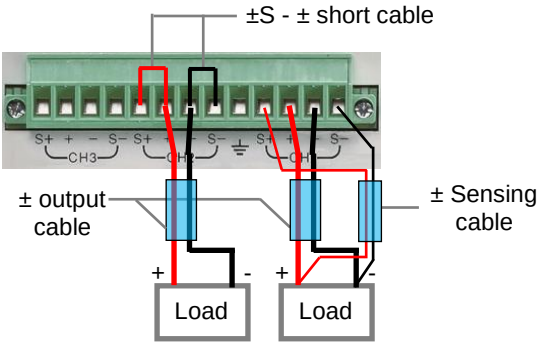
It is recommended that each cable (light blue part) be used in a twisted state at the shortest length.

Note

The arrangement and functions of the front output terminals vary depending on the model.

Load connection at the rear output terminals

The illustration on the right is for a 3-output type.



It is recommended that each cable (light blue part) be used in a twisted state at the shortest length.
When using the sensing function (see CH1 section), wire the ± sensing cables.
When not using the sensing function (see CH2 section), wire short cables (2 pieces) to the ± and S± terminals.

Note

The arrangement and functions of the rear output terminals vary depending on the model.

4.2.6. Usage in serial tracking mode

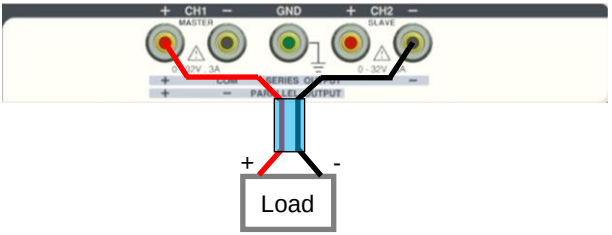
CH1 and CH2 of PDW series multi-output model can be used in series tracking mode.

Single output

CH1 works in CV and CC mode as a master unit. CH2 operates in CV mode as a slave unit. The output voltage of CH2 operates so that it becomes the same voltage as the CH1 voltage.

Load connection at the front output terminals

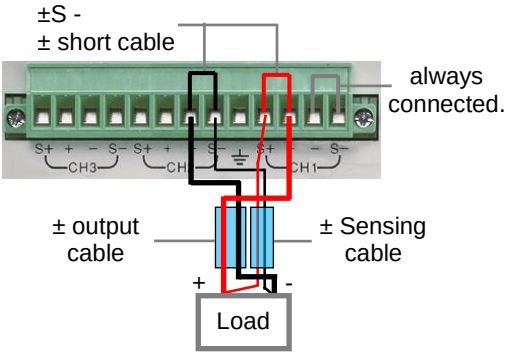
The illustration on the right is for a 2-output type.



It is recommended that each cable (light blue part) be used in a twisted state at the shortest length.

Load connection at the rear output terminals

The illustration on the right is for a 3-output type



It is recommended that each cable (light blue part) be used in a twisted state at the shortest length.

When using the sensing function, wire the ± sensing cables and do not use the short cables (two: red and black) for the ± and S± terminals.

When not using the sensing function, connect short cables (two: red and black) to the ± terminal and S± terminal, and do not use the ± sensing cable.

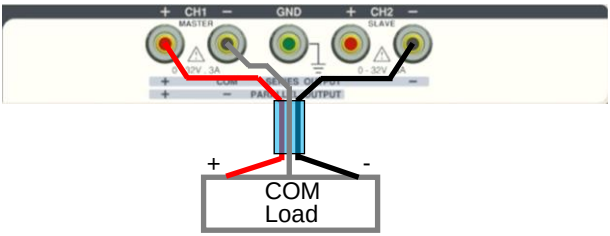
± Output

CH1 can be used as a positive output and CH2 as a negative output as a CV mode power supply.

Also, the ± output COM becomes the - output terminal of CH1.

Load connection at the front output terminals

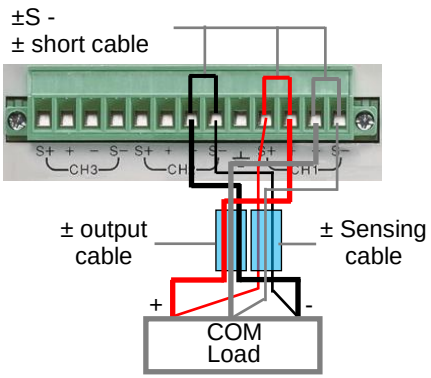
The illustration on the right is for a 2-output type.



It is recommended that each cable (light blue part) be used in a twisted state at the shortest length.

Load connection at the rear output terminals

The illustration on the right is for a 3-output type



It is recommended that each cable (light blue part) be used in a twisted state at the shortest length.

When using the sensing function, wire the ± sensing cables and do not use the short cables (two: red and black) for the ± and S± terminals.

When not using the sensing function, connect short cables (three: red, black, and gray) to the ± terminal and S± terminal, and do not use the ± sensing cable.

Setting method

Step	Item	Description
1	Mode setting	Press the F4 or F5 key with “Series” on the display to enter serial tracking mode. “SER” will appear in yellow at the top of the display.
2	CH1 setting	Press the CH1 key to set the CH1 voltage and current values.
3	CH2 setting	Press the CH2 key to set the CH2 current value. Set the current value of CH2 higher than that of CH1.
4	Output ON/OFF	Pressing the ON/OFF key of CH1 or CH2 switches the output ON/OFF CH1/CH2 in serial tracking mode. It is also possible to turn the output ON/OFF using the All ON/OFF key. Refer to page 27 for details on voltage and current settings.
	 Note	When CH1 goes into CC mode and the CH1 output voltage drops, the CH2 output voltage also drops.

4.2.7. Usage in Parallel Tracking Mode

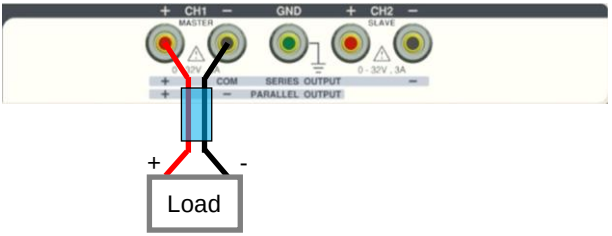
CH1 and CH2 of PDW series multiple output models can be used in parallel tracking mode.

The parallel tracking function internally connects CH1 (master) and CH2 (slave) in parallel to create a single output, which can output twice the rated current. By setting CH1, it is possible to set the total output current.

The CH1 output terminal can be used as a power supply in CV or CC mode.

Load connection at the front output terminals

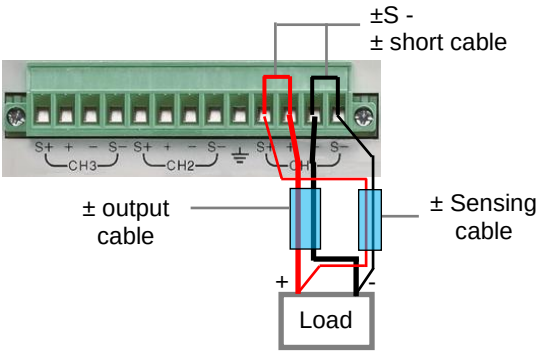
The illustration on the right is for a 2-output type.



It is recommended that each cable (light blue part) be used in a twisted state at the shortest length.

Load connection at the rear output terminals

The illustration on the right is for a 3-output type



It is recommended that each cable (light blue part) be used in a twisted state at the shortest length.

When using the sensing function, wire the ± sensing cables and do not use the short cables (two: red and black) for the ± and S± terminals.

When not using the sensing function, connect short cables (two: red and black) to the ± terminal and S± terminal, and do not use the ± sensing cable.

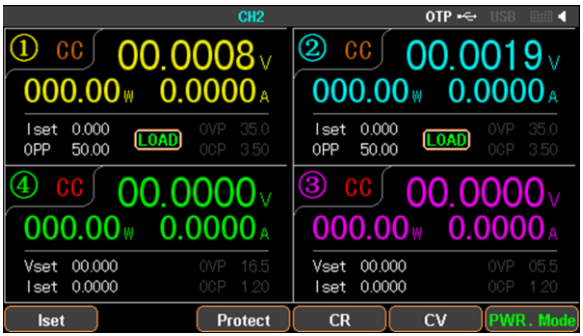
Setting method

Step	Item	Description
1	Mode setting	Press the F4 or F5 key with “Parallel” on the display to enter parallel tracking mode. “PAR” will appear in yellow at the top of the display.
2	CH1 setting	Press the CH1 key to set the CH1 voltage and current values.
3	Output ON/OFF	Pressing the ON/OFF key of CH1 or CH2 switches the output ON/OFF CH1/CH2 in serial tracking mode. It is also possible to turn the output ON/OFF using the All ON/OFF key. Refer to page 27 for details on voltage and current settings.

4.3. Electronic load function

Description

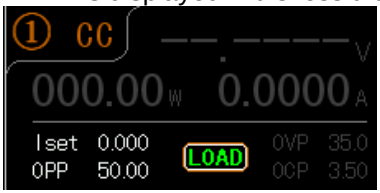
CH1 and CH2 of the PDW series multi-output model can be operated as electronic loads.
The electronic load function channel is indicated by an LOAD on the display.



When using the electronic load function, the series tracking function and parallel tracking function cannot be used.

Note

When the LOAD is OFF, the voltage value is displayed if the voltage applied to the terminal is 1V or more, and "--.---" is displayed if it is less than 1V.



The voltage value can be changed using communication commands.

Note

When switching modes, the terminal voltage of the target channel must be less than 1V. Switching is not possible when voltage is applied to the terminal or when potential remains.
The electronic load function cannot use the voltage remote sense function of the rear output terminals.

Voltage	Vset	Sets the CV mode voltage value for the selected channel. Refer to page 39 for the setting method.
Current	Iset	Sets the CC mode current value for the selected channel. Refer to page 38 for the setting method.
Resistance	Rset	Sets the CR mode resistance value for the selected channel. Refer to page 39 for the setting method.

Protect	OVP	Sets the OVP voltage of the selected channel.
	OCP	Sets the OCP current of the selected channel.

The Protect setting for the electronic load function is the same as for the power function. Refer to page 28,29 for the setting method.

4.3.1. Switch to electronic load function

Step	Item	Description	
1	Channel select	When the channel for the electronic load function is the power supply function, press the channel selection key (CH1 or CH2).	
2	Function switching	Press F6 (Load Mode) key. Function key names change.	
3	Mode selects	Select the discharge mode (CV, CC, CR) of the electronic load function. Press the function key (F1 to F3) for discharge mode.	F1: CV F2: CC F3: CR
		The display will show the green “LOAD” characters. The discharge mode (CV, CC, CR) is displayed on the right of the CH number.	
4	Change mode	The discharge mode that is not currently set is displayed on the function keys (F4, F5). Press F4 or F5 key to change discharge mode.	

To switch the electronic load function to the power function, press F6 (PWR. Mode) key.

4.3.2. CC mode setting

Step	Item	Description	
1	Channel select	Press the channel selection key (CH1 or CH2) whose discharge mode is set to CC.	
2		When F1 (Iset) key is pressed, the Iset value displayed on the display is displayed in red.	

3	Current value setting 1	Using 10 keys: Enter a number using the 10 keys and press the ENTER key, F1(A) key or F2(mA) key.	Example 1.5→ ENTER 1.5→F1 1500→F2
	Current value setting 2	Using Encoder and Left/Right Keys: Press the left/right key to move the underline of the Iset value. Turn the encoder to increment or decrement the value of that digit.	

4.3.3. CR mode setting

Step	Item	Description	
1	Channel select	Press the channel selection key (CH1 or CH2) whose discharge mode is set to CR.	
2		When F1 (Rset) key is pressed, the Rset value displayed on the display is displayed in red.	
3	Resistance setting 1	Enter a number using the 10 keys and press the ENTER key, F1(OHM) key.	Example 15→ENTER 15→F1
	Resistance setting 2	Using Encoder and Left/Right Keys: Press the left/right key to move the underline of the Rset value. Turn the encoder to increment or decrement the value of that digit.	

4.3.4. CV mode setting

Step	Item	Description	
1	Channel select	Press the channel selection key (CH1 or CH2) whose discharge mode is set to CV.	
2		When F1 (Vset) key is pressed, the Vset value displayed on the display is displayed in red.	

3	Voltage setting 1	Using 10 keys: Enter a number using the 10 keys and press the ENTER key, F1(V) key or F2(mV) key.	Example 5→ENTER 5→F1 5000→F2
	Voltage setting 2	Using Encoder and Left/Right Keys: Press the left/right key to move the underline of the Vset value. Turn the encoder to increment or decrement the value of that digit.	

4.4. Setting value memory function

Description

The PDW series can save parameters (each input/output setting value that can be set by pressing the CH key and operating the F1-F5 keys) in the internal memory (up to 10 types) and USB memory. Also, saved parameters can be recalled.

Parameters can be saved in internal memory and USB memory and called up. This section explains saving to and recalling from internal memory. Refer to page 92(File operations) for saving to and recalling from USB memory.

4.4.1. Saving and Recalling I/O Settings in Internal Memory

Setting parameters can be saved in the internal memory (up to 10 types) and each set value can be called.

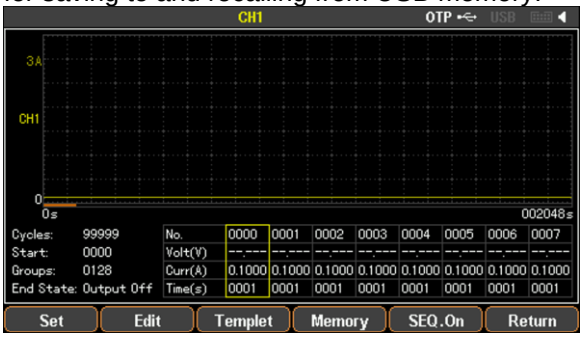
Step	Item	Description	
1	Channel select	Press the channel selection key of the channel to be set.	CH1-4 key
2	Setting input/output values	Press F1-F5 key to select the parameter to set and set the parameter.	F1-F5 key
3	Select Memory screen	Press the Memory key to bring the display to the parameter save/recall screen.	Memory key
4	Select save destination	After selecting “Men” on the left column of the LCD using the encoder and left/right keys, select the internal memory on the right column of the LCD (STATE01-STATE09). The selected internal memory is highlighted in black and white.	

5	Save	Press the F3 (Save) key to save the parameters set in step 2 of this operation to the selected internal memory (STATE01-STATE09).	F3: Save
6	Select recall destination	Select the internal memory (STATE01 to STATE09) from which you want to call parameters.	
7	Recall	Pressing the F4 (Recall) key recalls parameters from the selected internal memory (STATE01-STATE09).	F4: Recall
8	Return	Press F6 (Return) key to return to the previous operation.	
	 Note	F4 (Recall) key operation cannot be performed if the setting parameters are not saved in the internal memory (STATE01-STATE09).	

4.5. Sequence function

Description

The sequence function executes the STEP voltage and current values according to the STEP execution time with the set power supply or electronic load function.
The sequence function can set up to 2048 different STEPs (No.0000 to 2047) for CH1 and CH2.
Voltage value, current value, and STEP execution time can be set for each STEP.
The sequence function executes the set sequence output parameters. For the sequence output parameters, set the start STEP No. (Start), the number of execution STEPs (Groupe), and the number of sequence repetitions (Cycles).
Example: Start 0009, Groups 0040, Cycles 00001
Execute STEP No.0009 → No.0010 → No.0011 → ... → No.0048 → No.0049 once.
Sequence output parameters can be saved in the internal memory and USB memory as a sequence program and called up. This section explains saving to and recalling from internal memory. Refer to page 92 (File operations) for saving to and recalling from USB memory.



Note

The sequence function can be used for CH1, CH2 power supply and electronic load function. Only CV and CC modes are available for the electronic load function.

4.5.1. Setting the power supply or electronic load function

After setting the CH1 and CH2 functions (power supply or electronic load), set each parameter of the sequence function and create a sequence program.

Step	Item	Description
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.
2	Channel select	Press the channel selection key (CH1 or CH2 key) that uses the sequence function. 
3	Select of operating function	Select whether to use the sequence function with the power supply function or with the electronic load. When using the electronic load function, also select the discharge mode. Page 38
	Note	Use electronic load function CV mode: The voltage value can be set, but the current value cannot be set. CC mode: The current value can be set, but the voltage value cannot be set. CR mode: Sequence function cannot be used.

4.5.2. Sequence waveform editing method 1

To edit the sequence waveform, set the "STEP No." and then set the parameters (Voltage, Current, Time) for each step.

Step	Item	Description
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.
2	Sequence function setting	Press the keys in order of Advance→F2 (Sequence).
3	Edit select	Press F2 (Edit) key, F1-F4 keys will display each STEP parameter of the sequence.

4	Setting the STEP No.	Press the F1(No.) key, and the STEP No. value displayed on the display will be displayed in red. Settings use the numeric keypad, left/right keys and encoder. After setting the value, press F1 (Done) or Enter key. Press F4 (Page Up) key or F5 (Page Down) key to set the next 8 steps or the previous 8 steps.	 Setting range of STEP No.: 0000-2047
		Parameters for which “STEP No.” is set are displayed in yellow or blue squares.	
5	Setting the voltage value	Press F3(Voltage) key, the Volt(V) value displayed on the display will be displayed in red. Settings use the numeric keypad, left/right keys, and encoder. After setting the value, press F1(V), F2(mV) or Enter key.	 Setting range of Voltage: Rated voltage
	Setting the current value	When F4 (Current) key is pressed, the Curr (A) value displayed on the display is displayed in red. Settings use the numeric keypad, left/right keys, and encoder. After setting the value, press F1(A), F2(mA) or Enter key.	 Setting range of Current: Rated current
	Note	When using the sequence function with the electronic load function, either the voltage value or the current value can be set.	
	Setting step duration	Press the F2 (Time) key, the Time(s) value shown on the display will be displayed in red. Settings use the numeric keypad, left/right keys and encoder. After setting the value, press F1 (Second) or Enter key.	 Setting range for Time: 1s-300s
		Pressing F4 (Last) key or F5 (Next) key while setting parameters (Voltage, Current, Time) allows you to set parameter values for the previous or next step.	
6	Return	Press F6 (Return) key to return to the previous operation.	

4.5.3. Sequence waveform editing method 2

Sequence waveforms can also be edited using the template waveforms installed in the instrument.
There are 8 types of template waveforms: Sine, Pulse, Ramp, Stair Up, Stair Dn, Stair UpDn, Exp Rise, and EXP Fall.
This editing method and editing method 1 for sequence waveforms can be used together. Template waveforms created by this editing method can be continuously created as sequence waveforms.

Step	Item	Description	
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.	
2	Sequence function setting	Press the keys in order of Advance→F2 (Sequence).	
3	Edit select	Press F3 (Templet) key, F1-F5 keys will display sequence waveform editing parameters.	
4	Voltage/Current Edit Settings	When F1 (Object) key is pressed, the Object right character Voltage/Current displayed on the display is switched.	Object Voltage Edit Voltage Waveform Object Current Edit Current Waveform
	⚠Note	When using the sequence function with the electronic load function, only the voltage value or current value can be set, and the F1 (Object) key operation cannot be performed.	
5	Selecting a template waveform	Press the F2(Type) key to display a template waveform on the F1-F4 keys.	F1: Sine F2: Pulse F3: Ramp F4: Stair Up
		Pressing the F5 (More) key changes the template waveform displayed on the F1-F4 keys. Press F1-F4 key to select template waveform.	F1: Stair Dn F2: Stair UpDn F3: Exp Rise F4: Exp Fall

6		When you select a template waveform, the selected waveform and its setting parameters are displayed at the bottom of the LCD. Press F5 (Return) key to return to the previous screen.
7	Waveform height setting	Press F3 (Max Value/High Level) key and F4 (Mni Value/Low Level) key to set the high and low values of the waveform. Settings use the numeric keypad, left/right keys and encoder. After setting the value, press F1(V/A), F2(mV/mA) or Enter key.
8	Common parameter settings	After setting the waveform height, press F5 (Return) key to return to the previous screen. Press F5 (More) key to set other parameters.
	Start step setting	Press F1 (Start) key to set the STEP No. where the selected waveform starts. Start setting range: 0000-2037
	Waveform step number setting	Press the F2 (Point) key to set how many steps are used to change the selected waveform. Point setting range: 10-2047
	1 STEP execution time setting	Press F3 (Interval) key to set the time per step of the selected waveform. Interval setting range: 1s-300s

Parameter values (Start, Point, Interval) are set using the numeric keypad, left/right keys, and encoders. After setting, press F1 (Done) or Enter key. After setting the value, press F5 (Return) key to return to the previous screen.

9	Other parameter settings	The number of parameters to be set differs depending on the selected template waveform. Press F4 (More) key to set other parameters.
10	Apply Edit Waveform	Pressing the FX(Construct) key activates the parameters of the selected template waveform. If you do not press the Construct key, the template waveform parameters will not be valid.
11	Return	Press F6 (Return) key to return to the previous operation.

4.5.4. Sequence output parameter setting

Set the sequence start STEP No. (Start), execution sequence steps (Gropes), sequence repeat count (Cycles), and sequence end state (End State).

Step	Item	Description	
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.	
2	Sequence function setting	Press the keys in order of Advance→F2 (Sequence).	
3	STEP No. Parameter check	Check that the STEP No. parameters (Volt, Curr, Time) of the channel that uses the sequence function are set.	
4		Press F1(Set) key, F1-F5 keys will display sequence output parameters.	F1: Set
5	Sequence repeats count setting	When F1 (Cycles) key is pressed, the Cycle value displayed on the LCD is displayed in red, and the number of sequence repetitions can be set. Settings use the numeric keypad, left/right keys, and encoder. After setting the value, press F1 (Done) or Enter key. If F5 (Infinite) key is pressed, the number of sequence repetitions can be set infinitely.	 Cycles setting range: 00001 -99999, Infinite
	Sequence start STEP settings	When F2 (Start) key is pressed, the Start value displayed on the LCD is displayed in red, and the sequence start STEP No. can be set. Settings use the numeric keypad, left/right keys, and encoder. After setting the value, press F1 (Done) or Enter key.	 Start value setting range: 0000-2047

	Setting execution sequence steps	When F3 (Gropes) key is pressed, the Gropes value displayed on the LCD is displayed in red, and the execution sequence step can be set. Settings use the numeric keypad, left/right keys, and encoder. After setting the value, press F1 (Done) or Enter key.	 Gropes value setting range: 0001-2047
	Note	Set the Start and Gropes values so that they have the following relationship. Start value + Gropes value ≦ 2048	
	Setting the end of sequence state	Press the F4 (End State) key to set the operation at the end of the sequence. Output Off becomes Output (Load) Off. Last is the STEP state at the end of the sequence, with Output (Load) On.	End State: Output Off/Last
6	Return	Press F6 (Return) key to return to the previous operation.	

4.5.5. Executing the Sequence Function

The sequence function can run CH1 and CH2 separately or run CH1 and CH2 simultaneously.

Step	Item	Description
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.
2	Sequence function setting	Press the keys in order of Advance→F2 (Sequence).
3	STEP No. and sequence output parameters check	Check that the STEP No. parameters (Volt, Curr, Time) and sequence output parameters (Start, Gropes, Cycles, End State) of the channel that uses the sequence function are set.

4	Execute specified channel	Press the channel selection key (CH1 or CH2) to execute the sequence function, and then press F5 (SEQ. On) key to execute the sequence function of the selected channel. The ON/OFF key lights up during sequence execution.	 F5: SEQ. On
	⚠Note	When the CH On/Off key is pressed while it is out, the key lights up. The channel will be turned on as a power supply or electronic load without executing the sequence function.	
	Execute CH1 and CH2 simultaneously	Press ALL ON/OFF key, CH1 and CH2 will run the sequence function at the same time. In this case, the CH1 and CH2 ON/OFF keys and ALL ON/OFF keys light up.	
	⚠Note	When the sequence function is executed using the ALL ON/OFF key, other channels will also be Output On.	
5	Selected channel sequence re-execution	If F1 (Restart) key is pressed while the sequence function is running, the sequence function of the selected channel is restarted from Start STEP.	F1: Restart
	Simultaneous re-execution of CH1 and CH2 sequences	If the F2 (Sync) key is pressed while CH1 and CH2 are running the sequence function, the sequence function of CH1 and CH2 will be re-executed from Start STEP.	F2: Sync
		When press the F2 (Sync) key and CH1 and CH2 are re-executed from the Start Step, the word “Sync” will be displayed on the left side of the LCD. To restart CH1 and CH2 from the Start Step, press the F2 (Sync) key and delete the "Sync" character.	

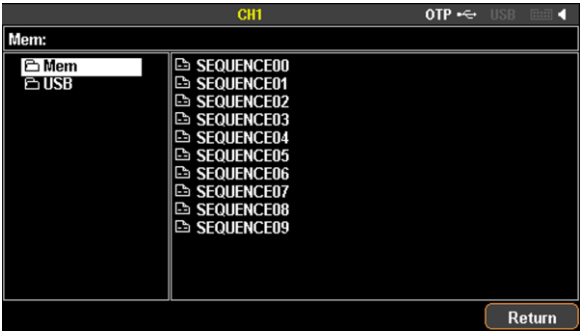
6	Sequence execution stop	Pressing the F4 (SEQ. Off) key or the On/Off key of the specified channel while the sequence function is running stops the sequence function of the selected channel.	F4: SEQ. Off 
		If the All On/Off key is pressed while CH1 and CH2 are running the sequence function, the sequence function of CH1 and CH2 will stop.	

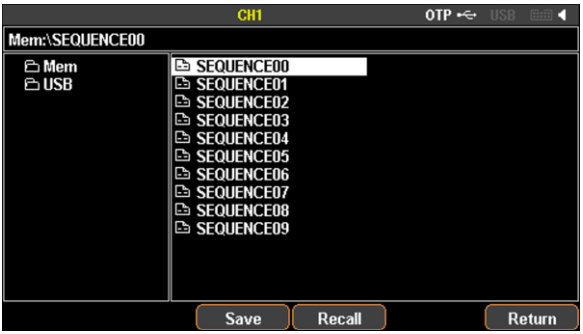
4.5.6. Saving and Recalling Programs in Internal Memory

The instrument can save and recall sequence programs in the internal memory.

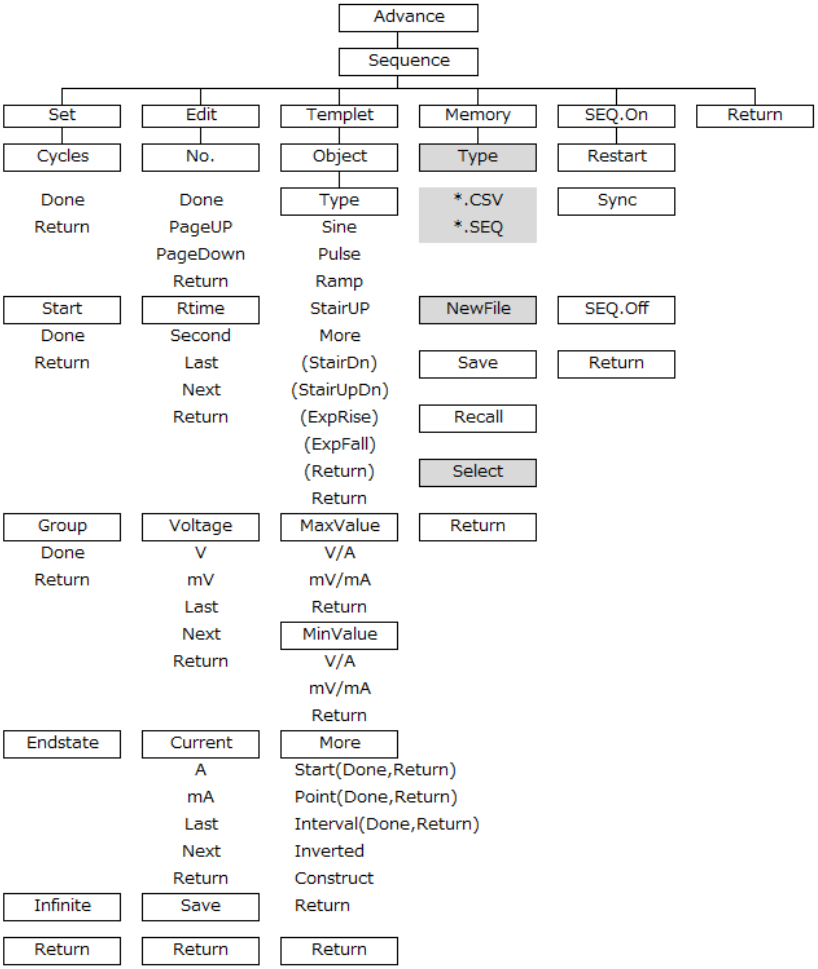
Up to 10 sequence programs (SEQUENCE00 to 09) can be stored in the internal memory, with CH1 and CH2 as one set. In addition, any program can be called as a set of CH1 and CH2 from the saved sequence program.

Step	Item	Description
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.
2	Sequence function setting	Press the keys in order of Advance→F2 (Sequence).
3		When F4 (Memory) key is pressed, the display and F1-F5 keys become sequence program saving and recalling display. The selected parameter is displayed in reversed black and white.



4	Select internal memory	Select "Mem" with the encoder, press the left/right key (right key) and select SECUENCE00-09 with the encoder. In the figure below, SECUENCE00 is selected.  	
5	Save	Pressing the F3 (SAVE) key saves the currently set sequence program to the SECUENCExx selected in step 3. The saved sequence program is the sequence program set in step 1 of this operation.	F3: SAVE
6	Recall	Press the F4 (Recall) key to recall the sequence program from SECUENCExx selected in step 4.	F4: Recall
7	Return	Press F6 (Return) key to return to the previous operation.	
	Note	If no sequence program is saved in the internal memory to be called, the call operation cannot be performed.	

4.5.7. Menu structure of the sequence function

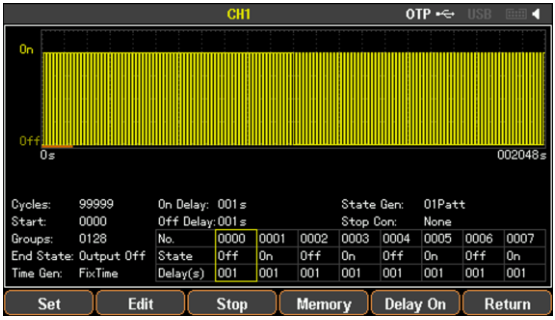


Note: In the Memory menu, Type/*.CSV/*.SEQ/New File/Select appear only when flash drive is plugged in.

4.6. Delay function

Description

The delay function executes Output (or Load) On/Off according to the STEP execution time in a constant state of voltage, current and resistance with the set power supply or electronic load function.
The delay function can set up to 2048 different steps (No.0000 to 2047) for CH1 and CH2.
Output or Load On/Off and STEP execution time can be set for each STEP of the delay function.
The Delay function executes the set Delay output parameters. The delay output parameter sets the start STEP No. (Start), the number of execution STEPs (Groupe), and the number of sequence repetitions (Cycles). Also, can set the stop condition (Stop Con).
Example: Start 0009, Groups 0040, Cycles 00001
Execute STEP No.0009 → No.0010 → No.0011 → ... → No.0048 → No.0049 once.
Delay output parameters can be saved in the internal memory and USB memory as a delay program and called up. This section explains saving to and recalling from internal memory. Refer to page 92 (File operations) for saving to and recalling from USB memory.



4.6.1. Setting the power supply or electronic load function

After setting the functions of CH1 and CH2 (power supply or electronic load), set each parameter of the delay function and create a delay program.

Step	Item	Description	
1	Channel select	Press the channel selection key (CH1 or CH2 key) that uses the delay function.	

2	Select of operating function	Select whether to use the delay function with the power supply function or with the electronic load. When using the electronic load function, also select the discharge mode.	Page 38

4.6.2. STEP editing method of the delay function STEP

Step	Item	Description	
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.	
2	Delay function setting	Press the keys in order of Advance→F3(Delay).	
3	Edit select	Press F2 (Edit) key, F1-F4 keys will display each STEP parameter of the sequence.	
4	Setting the STEP No.	When F1(No.) key is pressed, and the STEP No. value displayed on the LCD will be displayed in red. Settings use the numeric keypad, left/right keys and encoder. After setting the value, press F1 (Done) or Enter key. Press F4 (Page Up) key or F5 (Page Down) key to set the next 8 steps or the previous 8 steps. Parameters for which “STEP No.” is set are displayed in yellow or blue squares. Press F1 (Done) and F6 (Return) keys to return to step 2.	 Setting range of STEP No.: 0000-2047
5	STEP On/Off setting	Press the F2 (State) key from the state of step 3, STEP Output (or Load) On/Off can be set. Pressing the F1(On) key sets the State to On and pressing the F2(Off) key sets the State to Off. Pressing the F3 (Inverted) key changes the State from Off→On or On→Off. Press F6 (Return) key to return to step 3.	State: F1: On F2: Off F3: Inverted

6	Setting step duration	Press the F3 (Time) key from the state of step 3, the Delay(s) value displayed on the LCD is displayed in red. Settings use the numeric keypad, left/right keys and encoder. After setting the value, press F1 (Second) or Enter key. Press F1 (Second) or F6 (Return) keys to return to step 3. Press F4(Last) key or F5(Next) key at during parameter (State, Time) value setting, parameter values can be set for the previous STEP or the next STEP.	Setting range of Delay(s): 1s-300s
7	On/Off automatic setting of STEP	When F4 (Pattern) key is pressed, On/Off of STEP from Start STEP to STEP set by Groups is automatically set. Press F1 (01 Patt) and F2 (10 Patt) keys to set the STEP On/Off pattern.	F1: 01 Patt F2: 10 Patt
	Example	For Start 0000, Groups 0004	
	Patt set 01 Patt 10 Patt	No. 0000 0001 0002 0003 State Off On Off On State On Off On Off	
		Press F6 (Return) key to return to step 3.	
8	Automatic setting of step duration	Press F5 (Time set) key to automatically set the step duration (Delay) from Start STEP to STEP set in Groups. There are three types of automatic setting of time, and they are selected by pressing the F1 (Model) key. The type of automatic setting is displayed to the right of the Time Gen display (Fix TIME/ Increase/ Decline). 1: Fix TIME On Delay and Off Delay 2: Increase Base Val and Increase Step 3: Decline Base Val and Decline Step	F1: Model Fix TIME / Increase / Decline

Fix TIME

This setting automatically sets the step duration for all STEPs with State set to On and step durations for all STEPs with Off. Each On or Off step duration is set the same.
When Fix TIME is selected, it becomes F2 (On Delay) key and F3 (Off Delay) key.

Press the F2 (On Delay) key to set the step duration of the On state STEP, and press the F3 (Off Delay) key to set the step duration of the Off state STEP.

F2: On Dlay
F3: Off Dlay

Settings use the numeric keypad, left/right keys and encoder. After setting the value, press F1 (Second) or Enter key.

Example

Start 0000, Groups 0004,
On Dlay 010s, Off Dlay 020s

No.	0000	0001	0002	0003
State	Off	On	Off	On
Delay(s)	020	010	020	010

Increase

This setting sets the step duration of the Start STEP to the base time (Base time) and sets the step duration of the next STEP to the previous step duration + Step(s).

When Fix TIME is selected, it becomes F2 (Base time) key and F3 (Step) key.

Press the F2 (Base time) key to set the base time and press the F3 (Step) key to set the increment time.

F2: Base time
F3: Step

Settings use the numeric keypad, left/right keys and encoder. After setting the value, press F1 (Second) or Enter key.

Example

Start 0000, Groups 0004,
Base time 010s, Step 005s

No.	0000	0001	0002	0003
State	Off	On	Off	On
Delay(s)	010	015	020	025

Decline	This setting sets the step duration of the Start STEP to the base time (Base time) and sets the step duration of the next STEP to the previous step duration - Step(s). When Fix TIME is selected, it becomes F2 (Base time) key and F3 (Step) key. Press the F2 (Base time) key to set the base time and press the F3 (Step) key to set the decline time. F2: Base time F3: Step Settings use the numeric keypad, left/right keys and encoder. After setting the value, press F1 (Second) or Enter key.
Example	Start 0000, Groups 0004, Base time 020s, Step 005s

No.	0000	0001	0002	0003
State	Off	On	Off	On
Delay(s)	020	015	010	005

Return	Press F6 (Return) key to return to the previous operation.
⚠Note	For step 7 (STEP On/Off automatic setting) and step 8 (step duration automatic setting), the delay start STEP No. (Start) and execution delay steps (Gropes) must be set in advance.

4.6.3. Delay Output Parameter Settings

Set the delay start STEP No. (Start), execution delay steps (Gropes), delay repetition count (Cycles), and delay end state (End State).

Step	Item	Description
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.
2	Delay function setting	Press the keys in order of Advance→F3(Delay).
3	STEP No. Parameter check	Check that the STEP No. parameters (State, Time) of the channel that uses the delay function are set.

4		When F1(Set) is pressed, F1-F5 keys will display delay output parameters.	F1: Set
5	Delay repeats count setting	When F1 (Cycles) key is pressed, the Cycle value displayed on LCD will be displayed in red and the number of delay repetitions can be set. Settings use the numeric keypad, left/right keys and encoder or Enter key. When F5 (Infinite) key is pressed, the number of sequence repetitions can be set infinitely.	 Setting range of Cycles: 00001-99999, Infinite
	Delay start STEP settings	When F2 (Start) key is pressed, the Start value displayed on the LCD is displayed in red, and the delay start STEP No. can be set. Settings use the numeric keypad, left/right keys and encoder. After setting the value, press F1 (Done) or Enter key.	 Setting range of Start: 0000-2047
	Execution delay step setting	When F3 (Gropes) key is pressed, the Gropes value displayed on the LCD is displayed in red, and the execution delay step can be set. Settings use the numeric keypad, left/right keys and encoder. After setting the value, press F1 (Done) or Enter key.	 Setting range of Gropes value: 0001-2047
	Note	Set the Start and Gropes values so that they have the following relationship. Start + Gropes values ≦ 2048	
	Delay end state setting	If F4 (End State) key is pressed, the operation at the end of delay can be set. Output Off becomes Output (Load) Off. Output On becomes Output (Load) On. Last is the state of the STEP at the end of the delay, which is Output (Load) On/Off.	End State: Output On Output Off Last

6	Return	Press F6 (Return) key to return to the previous operation.	

4.6.4. Delay stop condition parameter setting

Sets the delay stop condition (Stop Con).

Step	Item	Description	
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.	
2	Delay function setting	Press the keys in order of Advance→F3(Delay).	
3	STEP No. Parameter check	Check that the STEP No. parameters (State, Time) and delay output parameters (Start, Gropes, Cycles, End State) of the channel that uses the delay function are set.	
4		Press F3 (Stop) key, F1-F4 keys will display the delay stop condition.	F3: Stop
5	No stop condition setting	When F1 (None) key is pressed, the display to the right of ”Stop Con:” becomes ”None” and the delay stop condition is not set.	F1: None
6	Selection of stopping conditions	The stop condition of the delay function can be selected from voltage, current, and power. Press F2-F4 key to select stop condition.	F2: Voltage F3: Current F4: Power
7	Setting the stop condition value	When the stop condition is selected, the number to the right of "Step Con" displayed on the LCD is displayed in red. Use the numeric keypad, left/right keys and encoder to set values. After setting the value, press F4 (V/A/W), F5 (mV/mA/mW) or Enter key.	
8	Setting Comparison Operators	Press F1 (Defune) key to set the comparison operator (=, >, <) between "Step Con" and the red display value.	F1: Defune =, >, <
9	Return	Press F6 (Return) key to return to the previous operation.	

4.6.5. Executing the Delay Function

The delay function can run CH1 and CH2 separately or run CH1 and CH2 simultaneously.

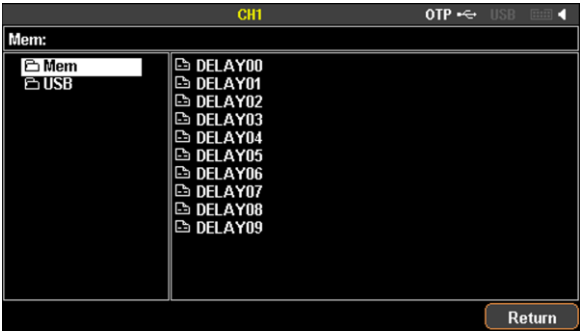
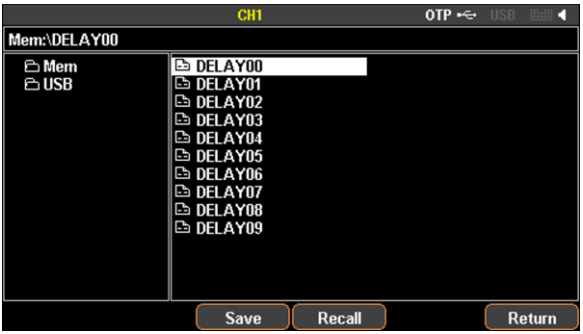
Step	Item	Description	
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.	
2	Delay function setting	Press the keys in order of Advance→F3(Delay).	
3	STEP No. Parameter check	Check that the STEP No. parameters (State, Time) and delay output parameters (Start, Gropes, Cycles, End State) of the channel that uses the delay function are set.	
4	Execute specified channel	Execute the delay function Press the channel selection key (CH1 or CH2) and press the F5 (Delay On) key to execute the delay function of the selected channel. At this time, when STEP is set to On, the ON/OFF key lights up, and when STEP is set to Off, the ON/OFF key goes out.	 F5: Delay On
	⚠Note	When using the ALL ON/OFF key to execute the delay function, other channels will also be Output On.	
5	Re-execute selected channel	When F1 (Restart) key is pressed while the delay function is running, the delay function of the selected channel is restarted from Start STEP.	F1: Restart
	CH1, CH2 simultaneous re-execution	When the F2 (Sync) key is pressed while CH1 and CH2 are executing the delay function, the delay function of CH1 and CH2 is re-executed from Start STEP.	F2: Sync

		When you press the F2 (Sync) key and CH1 and CH2 are re-executed from the Start Step, the word “Sync” will be displayed on the left side of the LCD. To restart CH1 and CH2 from the Start Step, press the F2 (Sync) key and delete the "Sync" character.	
6	Delay function stop	Pressing the F4 (SEQ. Off) key or the On/Off key of the specified channel while the delay function is running stops the delay function of the selected channel. When the All On/Off key is pressed while CH1 and CH2 are running the delay function, the delay function of CH1 and CH2 will stop.	F4: SEQ. Off  

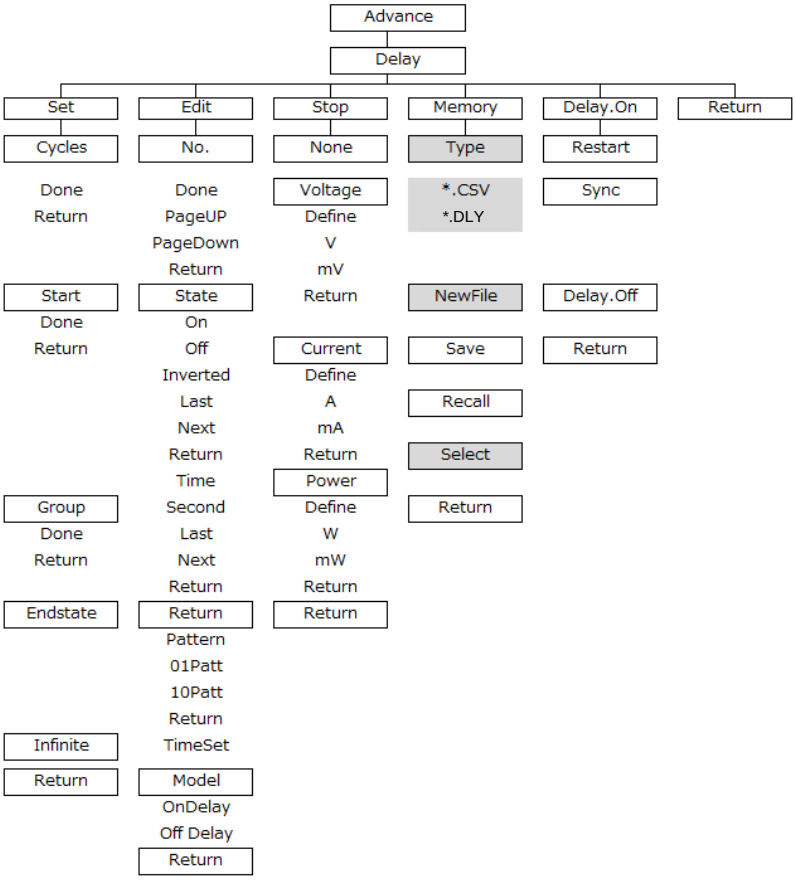
4.6.6. Saving and Recalling Programs in Internal Memory

The instrument can store and recall delay programs in internal memory. Up to 10 delay programs (DELAY00-09) can be stored in the internal memory, with CH1 and CH2 as one set. Moreover, CH1 and CH2 can be set as 1 set, and an arbitrary program can be called from the saved delay program.

Step	Item	Description
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.
2	Delay function setting	Press the keys in order of Advance→F3(Delay).

3		When F4 (Memory) key is pressed, the display and F1-F5 keys become delay program storage and recall display. The selected parameter is displayed in reversed black and white. 
4	Select internal memory	Select "Mem" with the encoder, press the left/right key (right key) and select DELAY00-09 with the encoder. In the figure below, DELAY00 is selected. 
5	Save	When the F3 (SAVE) key is pressed, the currently set delay program will be saved in DELAYxx selected in step 3. The delay program that is saved is the delay program set in step 1 of this operation.
6	Recall	When the F4 (Recall) key is pressed, recall the delay program from DELAYxx selected in step 3. If no delay program is stored in the internal memory to be recalled, the recall operation will not be possible.

4.6.7. Menu structure for the delay function



Note: In the Memory menu, Type/*.CSV/*.DLY/New File/Select appear only when flash drive is plugged in.

4.7. Monitor function

Description

The PDW series has a function to monitor the input/output status (voltage value, current value, power value) of each channel of the device. CH3 of the 3-output model does not have a monitoring function.

The monitor function can be used whether the channel is in the power supply function or the electronic load function.

When the monitor function is enabled (Mon. On) and the input/output status satisfies the arbitrarily set condition values (voltage, current, and power values), the instrument performs three types of operations.

The operation executes one or more of Output (Load) Off, Alarm display, and buzzer sound generation.

4.7.1. Channel setting to edit monitor function

Step	Item	Description
1	Channel select	Press the channel selection keys (CH1, CH2, CH3, CH4) to edit the monitor function.  Channel selection for editing monitor functions is possible even while editing monitor functions.
	Note	CH3 of the 3-output model does not have a monitor function.

4.7.2. Editing Condition Values

Three types of condition values, voltage, current, and power, can be arbitrarily set for each channel.

Step	Item	Description	
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.	
2	Monitor function setting	Press the keys in order of Advance→F4(Monitor).	
3	Select condition value	Select the condition value (voltage, current, power) you want to set. Press any of the F1-F3 keys.	F1: Voltage F2: Current F3: Power
4	Condition value setting	After selecting the condition value, press the F1 (Set) key, and the condition value being selected on the display will be displayed in red. Settings use the numeric keypad, left/right keys and encoder. After setting the value, press F1 (V/A/W), F2 (mV/mA/mW) or Enter key.	F1: Set
5	Return	Press F6 (Return) key to return to the previous operation.	

4.7.3. Selecting Usage Condition Values

The condition value used in the monitor function can be selected from 3 types of condition values. At least one type of conditional value to be used must be selected from three types of conditional values.

Step	Item	Description	
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.	
2	Monitor function setting	Press the keys in order of Advance→F4(Monitor).	
3	Select condition value	Select the condition value (voltage, current, power) you want to set. Press any of the F1-F3 keys.	F1: Voltage F2: Current F3: Power

4	Usage settings	Set whether to enable or disable conditional values. When F3 (Select) key is pressed, the color of the selected conditional value displayed on the LCD changes between gray and white.	F3: Select Gray: Disabled White: Enabled
5	Return	Press F6 (Return) key to return to the previous operation.	

4.7.4. Setting Comparison Operators

Input/output states and conditional values can be associated with comparison operators. When the input/output status is related to the condition value by the comparison operator, the instrument performs 3 types of operations that are set separately.

Step	Item	Description	
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.	
2	Monitor function setting	Press the keys in order of Advance→F4(Monitor).	
3	Select condition value	Select the condition value (voltage, current, power) you want to set. Press any of the F1-F3 keys.	F1: Voltage F2: Current F3: Power
4	Setting Comparison Operators	Press F4 (Defune) key to set the comparison operator (=,<,>) displayed before the condition value.	F4: Defune =, <, >
5	Return	Press F6 (Return) key to return to the previous operation.	

4.7.5. Setting Logical Operation

This device can set the logical operation (AND, OR) of the comparison result between the condition value and the input/output state.

Step	Item	Description
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.

2	Monitor function setting	Press the keys in order of Advance→F4(Monitor).	
3	Select condition value	Select the condition value (voltage, current, power) you want to set. Press any of the F1-F3 keys.	F1: Voltage F2: Current F3: Power
4	Voltage and Current Logical Operation Settings	Select Voltage (F1 key) in step 3 and press F4 (Logic) key to alternately display characters (& and ｜) between the voltage condition value and the current condition value. If set to "&", the voltage and current comparison result will be set to logical product (AND). If the current condition is invalid, it becomes the logical operation setting of Voltage and Power.	F4: Logic &: AND ｜: OR
5	Current and Power logical operation setting	Select Current (F2 key) in step 3 and press F4 (Logic) key to alternately display characters (& and ｜) between the voltage condition value and the current condition value. If set to "&", the Current and Power comparison result will be set to logical product (AND).	F4: Logic &: AND ｜: OR
	⚠Note	If Power is selected (F3 key) in step 3, logical operation settings cannot be made. In steps 4 and 5, if both logical operations are set to AND, the voltage, current and power comparison results will be set to logical product (AND). When “Voltage AND Current OR Power” is set, the operation will be “(Voltage AND Current) OR Power”. When “Voltage OR Current AND Power” is set, the operation will be “Voltage OR (Current AND Power)”.	
6	Return	Press F6 (Return) key to return to the previous operation.	

4.7.6. Action settings

When the monitor function is enabled and the input/output status satisfies the conditional value set arbitrarily, there are 3 types of action that can be selected.

One or more of Output (Load) Off, Alarm display, and buzzer sound can be selected for operation.

Step	Item	Description	
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.	
2	Monitor function setting	Press the keys in order of Advance→F4(Monitor).	
3		When F4 (Stop Type) key is pressed, F1-F3 keys display operation selection parameters.	F4: Stop Type
4	Output Off action setting	Enables or disables the Output (Load) Off action. When F1 (Output Off) key is pressed, the "Output Off" character on the right side of Stop Mode displayed on the LCD alternates between gray and white.	F1: Output Off Gray: Disabled White: Enabled
5	Alarm Display Setting	Enable or disable alarm display action. When F2 (Alarm) key is pressed, the "Alarm" character on the right of Stop Mode displayed on the LCD alternates between gray and white.	F2: Alarm Gray: Disabled White: Enabled
6	Beeper settings	Sets whether to enable or disable the buzzer sound generation action. When F3 (Beeper) key is pressed, the characters "Beeper" on the right of Stop Mode displayed on the LCD alternately appear in gray and white.	F2: Beeper Gray: Disabled White: Enabled
	⚠Note	If the beeper setting is OFF in the system settings, the beeper will not sound even if the Beeper setting is enabled. Output Off, Alarm and Beeper cannot all be disabled. Enable any one or more settings.	

7	Return	Press F6 (Return) key to return to the previous operation.	

4.7.7. Execution of monitor function

The PDW series can use the monitor function on each channel.

Step	Item	Description	
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.	
2	Monitor function setting	Press the keys in order of Advance→F4(Monitor).	
3	Monitor function On setting	Pressing the F5 (MON. ON) key sets the monitor function of the selected channel to On. “CHx” on the right side of the Monitor character displayed on the LCD is alternately displayed in gray and CH color.	F5: MON. ON Gray: Off CH Color: ON
4	Monitor function off setting	When the F5 (MON. Off) key is pressed while the monitor function is set to On, the monitor function will be set to Off.	F5: MON. Off
5	Return	Press F6 (Return) key to return to the previous operation.	

4.8. Recorder function

Description

The PDW series has a recorder function that stores the input/output status (voltage value, current value, power value) of each channel of the device. CH3 of the 3-output model does not have a recorder function.
The recorder function can be used whether the channel is the power supply function or the electronic load function.
Recorded data can be saved in the internal memory and USB memory while the recorder function is running.
For information on how to save the internal memory to a USB memory, refer to “File operations: page 92”.

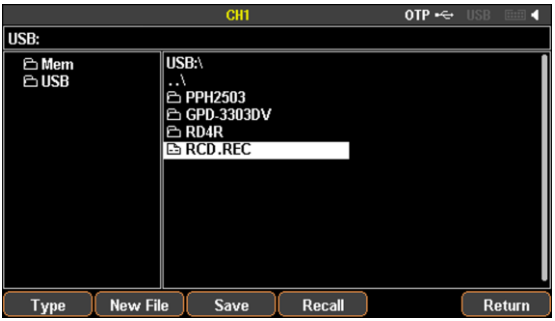
4.8.1. Parameter settings

Set the channel to use the recorder function (REC Channel), the period for recording input/output status (REC Period), the number of data to be recorded (REC Groups), and the save destination for recorded data (REC Path).

Step	Item	Description	
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.	
2	Recorder function setting	Press the keys in order of Advance→F5(Recorder).	
3	Enable/disable setting of channel functions	When F3 (Channel) key is pressed, CH1-CH4 are assigned to F1-F4 keys. Press any F1-F4 key to enable or disable the recorder function of the channel. At this time, the CHx character color on the right of REC Channel on the display changes.	F1-F4 Gray: Function disabled CH color: Function enabled
	Return	After enabling or disabling the recorder function of the channel, press F6 (Return) key to return to the operation of step 2.	
	⚠Note	Not all channels can be disabled. Set one of the channels to function valid.	
4	Recording interval setting	When F1 (Period) key is pressed, the period setting display on the right of REC Period on the LCD into red, allowing you to set the recording period. Settings use the numeric keypad, left/right keys and encoder. After setting the value, press F1(s) or Enter key.	F1: Period Setting range: 1s-300s
	Return	After setting the recording interval, press the F6 (Return) key to return to step 2.	

5	Recording data count setting	When F1 (Groups) key is pressed, the number of recording data displayed on the right of REC Groups on the LCD turns red, and the number of data can be set. Settings use the numeric keypad, left/right keys and encoder. After setting the value, press F1 (Done) or Enter key.	F1: Groups Setting range: 1-2048
		When saving recorded data to USB memory, the setting range is 1-204800.	
	Return	After setting the number of recorded data, press the F6 (Return) key to return to the operation of step 2.	
6	Select data storage destination	When F4 (Memory) key is pressed, set the save destination of recorded data. Internal memory or USB memory can be selected as the save destination. Select the save destination with the left/right keys or the encoder. The selected save destination is highlighted in black and white.	F4: Memory
		After selecting the save destination, press the F3 (Save) key to determine the data save destination of the recorded data.	F3: Save
	Storage destination internal memory	Mem: Select one of RECORD00-09. In the image below, RECORD00 is selected.	

Note	If the Recall operation is performed before this operation (selection of the data storage destination), pressing the F3 (Save) key will display “Save Succeed!”. In this case, press the F3 (Save) key again.
Storage destination USB memory	USB: Select a new file (*.CSV or *.REC, * is an arbitrary name) saved on the USB. Before selecting the file, select the file format by F1(Type)→F1(*.CSV) or F4(*.REC) key operation. If the file is in a folder, select that folder and press F5 (Select) key. For how to create a new file on the USB memory, refer “File operations: page 92”. In the figure below, RCD.REC is selected, but when editing or checking recorded data, we recommend selecting a “*.CSV” format file.



Note	If the selected file already contains recorded data, pressing the F3 (Save) key displays ``File size is not zero! Please reselect the File.''. A file in which recorded data is saved cannot be used as the data save destination.
Note	If the Recall operation is performed before this operation (selection of the data storage destination), pressing the F3 (Save) key will write the recalled recorded data to the selected new file. In this case, please create a new file again. When changing the save destination to USB memory after Recall→Save operation, be sure to change the save destination to internal memory (any of RECORD00-09). The recorded data in the internal memory of the save destination will be cleared (lost).

7	Return	After setting each parameter, press F6 (Return) key to return to the previous operation.

4.8.2. Executing Recorder Functions

Saves the recorded data (voltage, current, power) of each channel to the selected storage location under the conditions set in the parameters.

Step	Item	Description	
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.	
2	Recorder function setting	Press the keys in order of Advance→F5(Recorder).	
3	Check parameters	Check that the parameters (REC Channel, REC Period, REC Groups, REC Path) are set.	
4	Function execution	When F5 (REC. On) key is pressed, the recorder function is executed.	F5: REC. On
		While the recorder function is running, "REC" is displayed in the upper center of the LCD, and F5 key becomes "REC. Off".	
5	Function stops	If F5 (REC. Off) key is pressed while the recorder function is running, the recorder function will be stopped.	F5: REC. Off
	 Note	Recorded data will not be saved if the recorder function is stopped.	
6	End of function	When the recorder function is finished, the LCD will display “Save Success!”. Recorded data is saved in REC Path (internal memory or USB memory). F5 key becomes “REC. On”.	
7	Re-execution of function	To re-execute the recorder function, change the recording data save destination and press F5 (REC. On) key.	

Note

If the recording data save destination is set to the internal memory, re-executing the recorder function will overwrite the recording data in the selected internal memory.
If the recorded data save destination is a USB memory file, re-executing the recorder function will re-execute the recorder function, but the selected file will not overwrite the recorded data.

4.8.3. Save internal memory data to USB memory

The PDW series can save recorded data saved in the internal memory (RECORD00-09) to a file on the USB memory.
Two file formats (*.REC and *.CSV) can be selected for the file format of the recorded data to be saved. For file formats that can be created in USB memory, refer to “File formats that can be created in USB memory: page 92”.

Step	Item	Description
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.
2	Insert the USB memory	Insert the USB memory into the USB host port on the front panel.  The figure on the right is displayed on the upper right of the LCD. Save a new file in which recorded data is not saved in advance to the USB memory. For new files, please refer to” Page 94: Create New File in USB Memory”.
3		Press Advance key → F5 (Recorder) key → F4 (Memory) key in order.
4	Select of recorded data in internal memory	Select the internal memory (any of RECORD00-09) where recorded data is stored with the left/right key or encoder. The selected internal memory is highlighted in black and white.
5	Recalling recorded data	After selecting the internal memory (RECORD00-09), press the F4 (Recall) key to recall the selected recorded data. F4: Recall The display will show “Load OK!”.

6	Select file format	Select USB with left/right key or encoder and press F1(Type) key, F1 key will display "*.CSV" and F4 key will display "*.REC".	F1: Type
		Press F1(*.CSV) key or F4(*.REC) key to select the file format.	F1: *.CSV F4: *.REC
7	Select files in USB memory	Select the new file saved in the USB memory with the left/right key or encoder. The selected file is displayed in reversed black and white.	
8	Saving recorded data	Press the F3 (Save) key to save the recorded data called in step 5 in the USB memory file.	F3: Save
	 Note	The files on the USB memory that can save recorded data are only new files in which nothing is saved. Files cannot be overwritten.	
9	Return	After saving the recorded data to a file in the USB memory, press the F6 (Return) key to return to the previous operation.	
10	Re-operate	To save recorded data saved in another internal memory to a USB memory file, perform steps 3-8 of this operation.	
	 Note	After this operation (Recall → Save operation), when performing “Step 6: Selecting the data save destination” of the parameter setting (page 72), set the data save destination to the internal memory. If you set the data save destination to a USB memory file, only the REC Period and REC Groups information will be written to the file, making it a written file.	

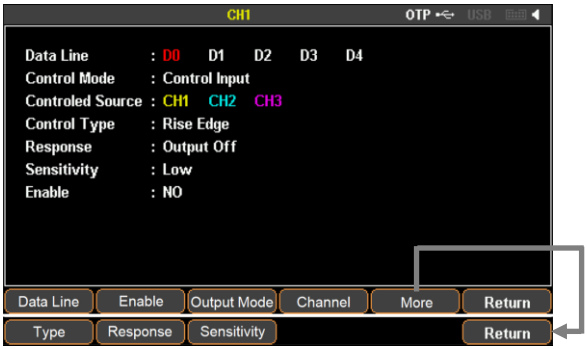
4.9. External I/O Control Functions

Description

The PDW series has 5 I/O ports (D0-D4) on the rear panel. Each I/O port can be used as an IN port or an OUT port.
By using the I/O port as the IN port and inputting a signal to the IN port, you can switch the Output (Load) On/Off of this unit and switch it to the power supply function and electronic load function.
When the I/O port is used as an OUT port, a signal is output from the OUT port when the I/O status of the instrument satisfies the arbitrarily set conditions. Condition values are Output (Load) On/Off status or voltage, current, and power values.

4.9.1. Parameter setting at IN port

When using an I/O port as an IN port, set “Control Mode:” to “Control Input”. Then set 4 parameters (Controlled Source, Control Type, Response, Sensitivity).

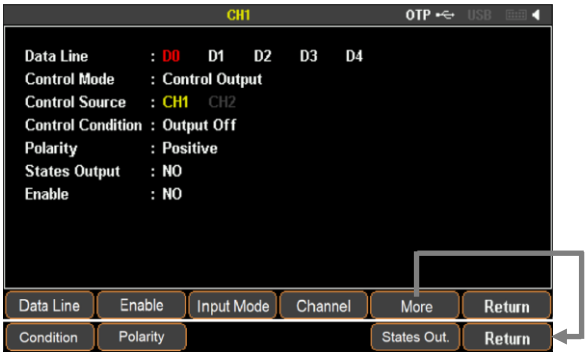


Step	Item	Description
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.
2	External I/O control selection	Press the keys in the order System key → F1 (Interface) key → F5 (Control I/O) key. F1-F5 keys display external I/O control function parameters.
3	IN port setting	Select the I/O port to use and set the selected I/O port to the IN port. For the selection and setting method, refer to page 81 (Setting I/O port as IN or OUT port).

	Note	When setting the IN port, set it to” Enable: NO”. If” Enable: YES”, parameter setting is not possible.	
4	Channel select	Pressing the F4 (Channel) key selects the channel that operates when the signal is input to the IN port selected in step 3, which is set by the parameter (Response). For channel selection, refer to page 82 (Channel parameter settings).	
5	Display of other parameters	Press the F5 (More) key to display IN port dedicated parameters.	F5 key More
6	Select signal type	Press the F1 (Type) key to select the signal type for detecting the IN port signal selected in step 3. For signal type selection, refer to page 84 (Setting the Type parameter).	
7	Select action	Press F2 (Response) key to select the operation of the channel selected in step 4 when the IN port selected in step 3 detects a signal. For channel action selection, refer to page 85 (Response parameter settings).	
8	Signal detection sensitivity select	Selects the sensitivity for signal detection by the IN port from three types. Each time you press the F3 (Sensitvity) key, the detection signal sensitivity switches between High/Low/Middle. The detected signal sensitivity is displayed to the right of "Sensitvity;" on the display.	F3 key Sensitivity High/Low /Middle
9	Return	After setting the parameters, press F6 (Return) key twice to return to step 2.	

4.9.2. Parameter setting at OUT port

When using an I/O port as an OUT port, set “Control Mode:” to “Control Output”. Then set 4 parameters (Control Source, Control Condition, Polarity, States Output).



Step	Item	Description	
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.	
2	External I/O control selection	Press the keys in the order System key → F1 (Interface) key → F5 (Control I/O) key. F1-F5 keys display external I/O control function parameters.	
3	OUT port setting	Select the I/O port to be used and set the selected I/O port as the OUT port. For selection and setting methods, refer to page 81 (Setting I/O port to IN or OUT port).	
	⚠ Note	When setting the OUT port, set it to” Enable: NO”. If” Enable: YES”, parameter setting is not possible.	
4	Channel select	Press F4(Channel) key to select the channel. The selected channel outputs a signal from the OUT port when the condition value set by the Condition parameter is met. For channel selection, refer to page 82 (Channel parameter settings).	
5	Display of other parameters	Press the F5 (More) key to display OUT port dedicated parameters.	F5 key More

6	Condition value setting	Press the F1 (Condition) key to set the condition value to be compared with the input/output status of the channel selected in step 4. For condition value settings, refer to page 86 (Condition parameter settings).	
7	OUT port output logic setting	Sets the logic of the signal output from the OUT port. Each time the F2 (Polarity) key is pressed, the output signal logic switches between Positive and Negative. The OUT port output logic is shown to the right of "Polarity;" on the display.	F2 key Polarity Positive /Negative
8	OUT port enable/disable setting	Sets whether to enable or disable the OUT port state. Each time you press the F5 (State Out.) key, the OUT port state will alternate between YES (enabled) and NO (disabled). The OUT port output status is displayed to the right of "States Output;" on the display.	F5 key State Out. YES/NO
9	Return	After setting the parameters, press F6 (Return) key twice to return to step 2.	

4.9.3. Setting I/O Ports as IN or OUT Ports

Select one of the five I/O ports (D0-D4) and set it as IN or OUT port.

Step	Item	Description	
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.	
2	External I/O control selection	Press the keys in the order System key → F1 (Interface) key → F5 (Control I/O) key. F1-F5 keys display external I/O control function parameters.	
3	Select I/O port	When F1 (Data Line) key is pressed, D0-D4 are assigned to F1-F5 keys.	F1 key Data Line

		Press any of F1(D0)-F5(D4) keys to select the I/O port to use. Once the I/O port is selected, automatically return to step 2.	F1-F5 key D0-D4
4	Enable setting	Pressing the F1 (Enable/Disable) key switches the ``Enable'' notation on the display between ``YES'' and "NO''. Set to" Enable: NO".	F1 key Enable /Disable
	 Note	If "Enable: YES", parameter setting is not possible.	
5	IN or OUT port setting	Pressing the F3 (Output/Input Mode) key switches the "Control Mode" notation on the display to "Control Output and Control Input".	F3 key Output /Input Mode
		If set to Control Output, the I/O port selected in step 3 will be set to the OUT port. If set to Control Input, the I/O port selected in step 3 will be set as the IN port.	
6	Other I/O port settings	For other I/O ports, perform steps 3-5 to set the ports.	

4.9.4. Channel parameter setting

The Channel parameter action differently depending on whether the I/O port is an IN port or an OUT port.

One or more channels can be selected for the IN port. The selected channel performs the action set by the Response parameter when a signal is detected at the IN port.

Step	Item	Description	
1	IN port setting	In step 5 of "4.9.3. Setting the I/O port to IN or OUT port", set "Control Mode: Control Input".	F3 key: Output /Input Mode
2	Channel select	When F4 (Channel) key is pressed, F1-F4 keys are assigned to CH1-CH4.	F4 key: Channel
3		Press F1(CH1)-F4(CH4) key to select the selected channel.	Fx: CHx

		The selected channel is shown next to "Controlled Source:" on the display. Selected channels are displayed in CH color and unselected channels are grayed out.	
4	Return	Press F6 (Return) key to return to step 1.	
	 Note	All channels can be selected, but all channels cannot be unselected. Please select one or more channels.	

Select any channel for the OUT port. The selected channel outputs a signal from the OUT port when the condition value set by the Condition parameter is met.

Step	Item	Description	
1	OUT port setting	In step 5 of “4.9.3. Setting the I/O port to IN or OUT port”, set “Control Mode: Control Input”.	F3 key: Output /Input Mode
2	Channel select	When F4 (Channel) key is pressed, F1-F4 keys are assigned to CH1-CH4.	F4 key: Channel
3		Press F1(CH1)-F4(CH4) key to select the selected channel.	Fx: CHx
		The selected channel is shown next to "Controlled Source:" on the display. Selected channels are displayed in CH color and unselected channels are grayed out. Once the channel is selected, automatically return to step 1.	
	 Note	Only one channel can be selected for the OUT port. Channel selection is not possible for CH3 of the 3-output model.	

4.9.5. Setting Type Parameter

The Type parameter is an IN port only parameter.
Select the type of signal detected at the IN port from five types.

Step	Item	Description	
1	IN port parameter setting	Set to the state of step 5 in “4.9.1. Parameter setting at IN port”. F1: Type key, F2: Response key, F3: Sensitvity	
2	Select signal type	Press F1(Type) key, then F1-F5 keys will display Type parameter.	F1: Type
	The five types of signals are as follows.		
	Rise Edge	Detects the signal at the rising edge of the input signal.	F1 key
	Fall Edge	Detects the falling edge of the input signal.	F2 key
	High Level	Signal detection at high level of input signal.	F3 key
	Low Level	Signal detection at low level of input signal.	F4 key
	States Input	Signal detection is performed when the input signal changes from H→L or L→H.	F5 key
	⚠Note	If the signal type is "States Input", the Response parameter can only be set to "Output".	
3		Press any F1-F5 key to select the signal type. The selected signal type is shown to the right of "Control Type;" in the display.	F1-F5
4	Return	After selecting the signal type, press the F6 (Return) key to return to step 1 of this operation.	

4.9.6. Setting Response parameters

The Response parameter is an IN port only parameter.
Sets the action to be performed by the selected channel when the IN port detects a signal.

Step	Item	Description	
1	IN port parameter setting	Set to the state of step 5 in “4.9.1. Parameter setting at IN port”. F1: Type key, F2: Response key, F3: Sensitvity	
2	Select action	Press F2(Response) key, then F1-F4 keys will display Response parameter.	F2: Response
	The four types of actions are as follows.		
	Output	Press F1 (Output) to set the output (load) action for the selected channel. Also, by pressing F1 key, you can set 3 types of operation: Output Off→On→Toggle→Off….	F1 key Output Off Output On Output Toggle
	⚠Note	If the signal type is "States Input", only "Output On/Off" can be set as the Response parameter. In addition, "Output Toggle" and other modes cannot be set.	
	POW. Mode	Press F2 (POW. Mode) key to set the selected channel to power supply function.	F2 key Power Mode
	Load Mode	Press the F3 (Load Mode) key to set the selected channel to the electronic load function. Also, by pressing F5 key, you can set 3 modes of Load (CC→CR→CV→CC…) Mode.	F3 key Load CC Mode Load CR Mode Load CV Mode
	⚠Note	If a channel other than CH1 or CH2 is selected in the channel parameter setting, F2 (POW. Mode) key and F3 (Load Mode) key cannot be operated.	

	Track Mode	Press the F4 (Track Mode) key to set the selected channel to power supply function tracking mode operation. Also, by pressing F4 key, you can set 3 types of modes: Independent→Series→Parallel→Independent….	F4 key Independent Series Parallel
	⚠Note	F4 (Track Mode) key operation is not possible when channels other than the combination of CH1 and CH2 are selected in the channel parameter setting. Additionally, both CH1 and CH2 must be set to power supply function operation.	
3		Press any of the F1-F4 keys to select an action. The selected action to be performed is shown to the right of "Response;" in the display.	F1-F4
4	Return	After selecting Response, press the F6 (Return) key to return to step 1 of this operation.	

4.9.7. Setting Condition parameters

The Condition parameter is an OUT port only parameter.
This parameter sets a conditional value. When the input/output status of the selected channel satisfies the condition value, a signal is output from the OUT port.

Step	Item	Description	
1	IN port parameter setting	Set to the state of step 5 in "4.9.2. Parameter setting at OUT port". F1: Condition key, F2: Polarity key	
2	Select action	Press F1(Condition) key, then F1-F5 keys will display Condition parameters.	F1: Condition
	The five types of conditions (values) are as follows.		
	Output	When F1 (Output) key is pressed, F1 key becomes" Output Off" and F2 key becomes" Output On". Press F1 or F2 key to set the condition value (Output/Load On or Off state). Press F6 (Return) key to end the Output condition value setting.	F1 key F1: Output Off/ F2: Output On

	Voltage Current Power	When you press any of F2(Voltage), F3(Current), F4(Power) key, Function keys are assigned as follows. F1 Define key, F4: V/A/W key, F5: mV/mA/mW key Also, the" Control Condition:" right V, A or W value on the LCD will be displayed in red. Setting the V, A or W value uses the numeric keypad, left/right keys and encoders. After setting the value, press F4, F5 or Enter key. Press F1 (Defune) key to set the comparison operator (=→<→>→=→…) displayed on the left of the V, A or W value. Press F6 (Return) key to end the Voltage/Current/Power condition value setting.	F1: Defune =, <, >
	Auto	When F5 (Auto) key is pressed, the V, A or W value set by pressing F2-F4 keys becomes the condition value.	F5 condition value: V or A or W
3		Press any of the F1-F5 keys to select the condition value.	F1-F5
4	Return	After setting the condition value, press the F6 (Return) key to return to step 1 of this operation.	

4.9.8. Using external I/O ports

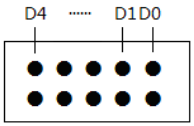
To use External I/O port, enable the external I/O port after completing various parameter settings. You can use the external I/O port by enabling the external I/O port.
Also, even if the external I/O port is enabled, it will be disabled (Enable: NO) when the power is turned on again. When using the external I/O port after turning on the power of the instrument, perform this operation to enable the I/O port (Enable: YES).

Step	Item	Description	
1	External I/O control select	Press the keys in the order System key → F1 (Interface) key → F5 (Control I/O) key. F1-F5 keys display external I/O control function parameters.	System F1: Interface F5: Control I/O
2	Select I/O port	Select the I/O port to use from "Data Line: D0-D4".	F1 key Data Line

3	Enable setting	Set to” Enable: YES”. When set to” Enable: YES”, the I/O port selected in step 2 is enabled.	F2 key Enable/ Disable
4	Return	Press the F6 (Return) key to return to step 1 of this operation.	
	 Note	The enable/disable setting of the external I/O port must be set for each Data Line.	

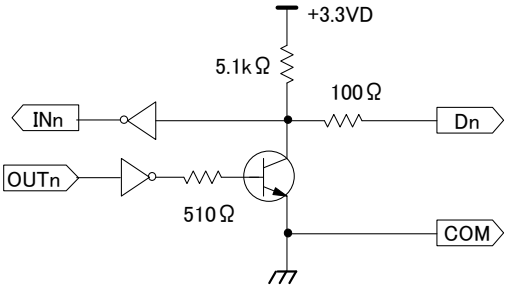
4.9.9. External I/O port specifications

The external I/O port is a 2.54 mm pitch 10-pin double-row rectangular connector conforming to the MIL-DTL-83503 standard.



The figure on the left shows the pin assignment when the I/O port is viewed from the back of the instrument.
As for the I/O ports, the top right pin is D0, the left pin is D1, …, and the top left pin is D4.
The bottom 5 pins are COM for D0-D4.

The figure on the right shows the circuit of each I/O port (D0-D4) and COM.



+3.3V is the internal voltage of the device, and COM is connected to the case of the device.

Electrical specifications

At IN port	LOW level DC input voltage: 0.3 V or less HIGH level DC input voltage: 2V to 3.3V
At OUT port	LOW level DC output voltage: 0.3 V or less HIGH level DC output voltage: 2V to 3.3V DC output current: 0.6mA or less

4.10. Initialization function

When the initialization function is executed, the instrument settings are set to the factory defaults.
This section describes how to initialize the instrument settings to the factory shipment state and the setting contents to be set to the factory shipment state.

4.10.1. Initialization operations

There are two ways to restore the instrument settings to factory defaults. The first method is to set the "Power On Parameter" to "Default". The second method is to operate the Preset key.

Step	Item	Description	
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.	
2	System menu	Pressing the System key causes the display to show the System menu. F2 key displays “Power On” and F5 key displays “Preset”.	System key
3	Initialization operation 1	When F2 (Power On) key is pressed, "Power On:" displayed on the LCD switches between "Default" and "Last".	F2: Power On Default/ Last
	Default	When the power of the instrument is turned on again, the settings of the instrument will be set to the factory defaults.	
	Last	When the power of the instrument is turned on again, the settings of the instrument are set to the state when the power was turned off.	
4	Initialization operation 2	Press the F5 (Preset) key to set the instrument to the factory default settings.	F4: Last
5	Return	Press the F6 (Return) key to return to step 1 of this operation.	
	 Note	Initialization by operating the Preset key is executed the moment the key is pressed. Be careful when operating the F5 (Preset) key.	

4.10.2. Factory Default Settings

Power supply and electronic load function

Item	Setting contents	Item	Setting contents
Voltage	0V 5V: CH3 of 3 output model 1.5V (Electronic load mode)	Current	0A 0A (Electronic load mode)
OVP	Maximum setting	OCP	Maximum setting
Display type	1 output model: Type4 multi-output model: Type1	Resistance	50Ω
Mode	Power supply function	Tracking settings	Independent output mode (multi-output model only)

System settings

Item	Setting contents	Item	Setting contents
Buzzer sound	ON	Output terminal	Front panel
Backlight brightness	High	Subnet mask	255.255.0.0
Power ON setting	Default	Hostname	GPP

5. File operations

5.1. File formats that can be created in USB memory

The PDW series can create the data saved in the internal memory by each function to the USB memory in the following file formats.
Setting parameter for set value memory function: *.SET
Sequence function sequence program: *.SEQ and *.CSV
Delay program for delay function: *DLY and *.CSV
Recording data of recorder function: *.REC and *.CSV
("*" means the file name.)
CSV files (*.CSV) can be edited with applications that can edit CSV files.

Setting parameters for the set value memory function

*.SET	The saved contents are the same as "STATE01-09" that can be saved in the internal memory.

Sequence program of sequence function

*.SEQ	All parameters of CH1 and CH2 sequence programs are saved. The saved contents are the same as "SECUENCExx" that can be saved in the internal memory.
*.CSV	The sequence program parameters of the currently selected channel shown in the upper center of the display are saved. The parameters that are saved are only Volt(V), Curr(A), Time(s) of STEP specified by Start and Groups. The parameters that are recalled are Volt(V), Curr(A), Time(s) of the STEP specified by Groups from STEP No. 0000 of the selected channel. It cannot be called by specifying the STEP No. Also, STEP parameters other than the called STEP will be the currently set ones (things before calling).
Example of a CSV file	Function:,Sequence, Groups:,3 Voltage,Current,Time, 10.000,2.0000,0001, 20.000,1.0000,0001, 10.000,1.0000,0001,

Delay program of the delay function

*.DLY	All parameters of CH1 and CH2 delay programs are saved. The saved contents are the same as "DELAYxx" that can be saved in the internal memory.
*.CSV	The delay program parameters for the currently selected channel shown in the top center of the display will be saved. The only parameters that are saved are the State and Delay(s) of the STEP specified by Start and Groups. The parameters to be called are State and Delay(s) of the STEP specified by Groups from STEP No. 0000 of the selected channel. It cannot be called by specifying the STEP No. Also, STEP parameters other than the called STEP will be the currently set ones (things before calling).
Example of a CSV file State: 0: Off、 1: On	Function:,Delay, Groups:,4, State,Time, 0,5, 1,4, 0,3, 1,2,

Data recorded by the recorder function

*.REC/ *.CSV	Measured data of CH1 or CH2 and CH1 and CH2 can be saved. Even if the file format is different, the data saved is the same.
Example of a CSV file	Function:,Recorder, Period:,10, Groups:,3, CH1, Voltage (V), Current (A), Power (W), 10.001,0.0021,0.02 10.001,0.0021,0.02 10.001,0.0021,0.02 CH2, Voltage (V), Current (A), Power (W), 10.001,0.0021,0.02 10.001,0.0021,0.02 10.001,0.0021,0.02

5.2. Create new file in USB memory

New files that can be created in the USB memory are created by changing the file format (extension) for each function. The new file to be created can be given an arbitrary name of up to 8 alphanumeric characters.
File names and folder names in the USB memory do not support long file names. Also, since this device does not have a clock function, the date and time are not added to the file.

Step	Item	Description
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.
2	Install USB memory	Insert the USB memory into the USB host port on the front panel. The right figure is displayed on the upper right of the delay. 
3	Select function	Select one of the 4 functions by following the steps below. Set value memory function: Press the Memory key. Sequence function: Press the keys in order of Advance→F2(Sequence)→F4(Memory). Delay function: Press the keys in order of Advance→F3(Delay)→F4(Memory). Recorder function: Press the keys in order of Advance→F5(Recorder)→F4(Memory).
4	Select USB	Select "USB" in the left column of the display using the encoder and left/right keys. When "USB" is selected, "Type" is displayed on the F1 key.
5	Select file format	Select the file format created in the USB memory by function. F1: Type Press F1(Type) key, F1-F4 keys will display the file format. Sequence function: F1(*.CSV), F2(*.SEQ) key Delay function: F1(*.CSV), F3(*.DLY) key Recorder function: F1(*.CSV), F4(*.REC) key

		Press any of the F1-F4 keys to select a new file format.	F1-F4
	Note	Since the file format for saving data in the set value memory function is “*.STA” only, the file format cannot be selected in this procedure.	
6	Select where to create files	Select a location to create the file. Selection uses the encoder and left and right keys. Select the new file creation location in the right column of the display. The selected file creation location is highlighted in black and white.	
		To select a folder in the USB memory, press the F5 (Select) key after selecting the folder.	F5: Select
7	Start creating new file	When F2 (New File) key is pressed after selecting the creation location, a keyboard is displayed on the LCD.	F2: New File
8	File name setting	Select a character with the encoder and press F1 (Enter Char) key to determine the character.	F1: Enter Char
		To delete a character, press F2 (Back Space) key.	F2: Back Space
		The file name can be up to 8 alphanumeric characters.	
		The file name can be changed using a computer, etc.	
9	Create new file	When F5 (Save) key is pressed, a new file will be created in the creation location.	F5: Save
10	Return	After setting each parameter, press F6 (Return) key to return to the previous operation.	

5.3. Save data to new file in USB memory

The setting parameters of the setting value memory function, the sequence program of the sequence function, and the delay program of the delay function can save the currently set parameters and program data to a new file in the USB memory. To save the setting parameters, sequence or delay program saved in the internal memory to a new file, recall that program (Recall operation).
When saving the recorded data of the recorder function to a new file, after recalling the recorded data saved in the internal memory, you can save it to a new file in the USB memory. For the operation method, refer to “4.8.3. Saving internal memory data to USB memory: page 76”.
Each data can be saved only in a new file created by operating the instrument. Also, files cannot be overwritten.

Step	Item	Description
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.
2	Check parameter settings for each function	Check that the parameters for each function (set value memory, sequence and delay) are set. When saving the internal memory data of each function to a USB memory file, call the data. Please refer to the following for data call. Set value memory data — Page 41 Sequence program parameters — Page 51 Delay program parameters — Page 62
3	Install USB memory	Insert the USB memory into the USB host port on the front panel. The right figure is displayed on the upper right of the delay. 
4	Select function	Select one of the 3 functions by following the steps below. Set value memory function: Press the Memory key. Sequence function: Press the keys in order of Advance→F2(Sequence)→F4(Memory). Delay function: Press the keys in order of Advance→F3(Delay)→F4(Memory).

5	Select USB	Select "USB" in the left column of the display using the encoder and left/right keys. When "USB" is selected, "Type" is displayed on the F1 key.	
6	Select file format	Select the file format created in the USB memory by function. Press F1(Type) key, F1-F4 keys will display the file format.	Select file format
		Sequence function: F1(*.CSV), F2(*.SEQ) key	
		Delay function: F1(*.CSV), F3(*.DLY) key	
		Press any of the F1-F3 keys to select a new file format.	F1-F3
	⚠Note	Since the file format for saving data in the set value memory function is “*.STA” only, the file format cannot be selected in this procedure.	
7	Select file save location	Select a file save location. Selection uses the encoder and left and right keys. Select a new file save location in the right column of the display. The selected file save location is highlighted in black and white.	
		To select a folder in the USB memory, press the F5 (Select) key after selecting the folder.	F5: Select
8	Select new file	Select a file on the USB, to save the internal memory data of each function. The selected file is displayed in reversed black and white.	
9	Save	After selecting a file on the USB, press F3 (Save) key to save the data.	F3: Save
10	Return	After setting each parameter, press F6 (Return) key to return to the previous operation.	

5.4. Recalling USB memory data

The data of each function saved in the USB memory (setting parameters of the set value memory function, sequence program of the sequence function, and delay program of the delay function) can be called. The parameters of each function (setting value memory function, sequence function, delay function) of this instrument are set by the called data. When the recorded data of the recorder function is called from the USB memory, the parameters of the recorder function of the instrument do not change. The recalled data can be saved in the internal memory of the recorder function (Save operation).

Step	Item	Description
1	Confirmation of Output OFF	Set Output (Load) OFF for all channels. Also, if the F6 key is displaying "Return", press the F6 key several times to turn off the "Return" display.
2	Install USB memory	Insert the USB memory into the USB host port on the front panel. The right figure is displayed on the upper right of the delay. 
3	Select function	Select one of the 4 functions by following the steps below. Set value memory function: Press the Memory key. Sequence function: Press the keys in order of Advance→F2(Sequence)→F4(Memory). Delay function: Press the keys in order of Advance→F3(Delay)→F4(Memory). Recorder function: Press the keys in order of Advance→F5(Recorder)→F4(Memory).
4	Select USB	Select "USB" in the left column of the display using the encoder and left/right keys. When "USB" is selected, "Type" is displayed on the F1 key.
5	Select file format	Select the file format created in the USB memory by function. F1: Type Press F1(Type) key, F1-F4 keys will display the file format. Sequence function: F1(*.CSV), F2(*.SEQ) key

		Delay function: F1(*.CSV), F3(*.DLY) key Recorder function: F1(*.CSV), F4(*.REC) key Press any of the F1-F4 keys to select a new file format.	F1-F4
	⚠Note	Since the file format for saving data in the set value memory function is “*.STA” only, the file format cannot be selected in this procedure.	
6	Select file save location	Select a file save location. Selection uses the encoder and left and right keys. Select a new file save location in the right column of the display. The selected file save location is highlighted in black and white.	
		To select a folder in the USB memory, press the F5 (Select) key after selecting the folder.	F5: Select
7	Select file	Select the file on the USB where the data of each function is saved. The selected file is displayed in reversed black and white.	
8	Recall	After selecting a file on the USB, press F5 (Select) key to recall the data.	F5: Select
9	Return	After setting each parameter, press F6 (Return) key to return to the previous operation.	

5.5. Screenshot function

This instrument can save the display screen to USB memory.
The LCD display screen that is saved as a screenshot is saved in the root directory of the USB memory in the "*.BMP" file format.
The "*" in the file "*,BMP" is the file name, which is automatically set when saving to the USB memory.
Pop-ups that appear on the display cannot be saved as LCD display screens.

Step	Item	Description	
1	Install USB memory	Insert the USB memory into the USB host port on the front panel. The right figure is displayed on the upper right of the delay.	
2	Screen setting	Operate the instrument and put the display screen into the state where you want to save it to the USB memory.	
3	Screen copy	Press System key→F3(Setting) key→F5(Hardcopy) key in order.	
4	Screen select	Operating the encoder changes the LCD screen. Display the LCD screen in step 2 on the LCD.	Encoder
5	Screen save	Press the Enter key to save the display screen selected in step 4 to the USB memory. After pressing the Enter key, if the display changes to the screen of step 3, saving is complete。	Enter key

6. Product system

6.1. System Information

Pressing the System key displays the system information screen below. After pressing the System key, press the F4 (Version) key.A pop-up screen displaying the system version will be displayed for about 5 seconds.
System version information contents
Model name: PDW-xxxx
Firmware version: Vx.xx, M, D, Y, Time
Serial number: xxxxxxxxx
Bootcamp version: Ver: x.xx
Hard version: Ver: x

6.2. System settings

Parameters related to the PDW series system can be set.

Parameters	Description
Interface	The selected remote interface is displayed. Press the F1 (Interface) key on the System menu and select the interface to be set. Refer to page 104 for details.
Power On	This is the setting for the operating state immediately after power-on. Press the F2 (Power On) key in the System menu and select "Last" to recall the settings when the power was turned off last time, or select "Default" to recall the factory settings. For details, refer to “Initialization function: page 90”.
Language	This is the setting for the language displayed on the display. After pressing the F3 (Setting) key in the System menu, press the F1 (Language) key, and select the English display by pressing the F1 (English) key or the Chinese display by pressing the F2 (Chinese) key.
Back Light	Adjust the brightness of the display backlight. After pressing the F3 (Setting) key in the System menu, press the F2 (Back Light) key and select from 3 levels: F1 (Low) key, F2 (Middle) key, F3 (High) key. .

Beep	This is the ON/OFF setting for the buzzer sound. After pressing the F3 (Setting) key in the System menu, press the F3 (Setting) key again to set. Each time F3 key is pressed, On/Off is switched.
Upgrade	Used for firmware upgrade. Refer to page 103 for details.
Hardcopy	Used for taking screen shots of the display. After pressing F3 (Setting) key in the System menu, select F5 (Hardcopy) key to proceed to screenshot operation. Refer to page 100 for details.
Preset	Restore factory settings. Pressing the F5 (Preset) key in the system menu restores the settings to their factory defaults. Refer to page 90 for details.
Front/Rear	Select front or rear output terminals. Double-click the System key and press F1(Front) key or F2(Rear) key to select front or rear input/output terminals. Refer to page 21 for details.

6.3. Usable USB memory for PDW series

Use USB memory for firmware upgrade, screenshot, file input/output.
This unit can be used with FAT32-formatted USB memory that supports USB 2.0 or higher, with a guaranteed capacity of up to 16 GB. However, Japanese cannot be used for folder names and file names.
It may not work with a converter such as a media reader or a USB hub. In addition, USB memory with functions such as encryption cannot be used.

6.4. Updating PDW Series Firmware

Copy the update file to the root folder of the USB memory and update the firmware of the PDW series.

Step	Item	Description
1	Install USB memory	Insert the USB memory with the firmware update file into the USB host port on the front panel. The figure on the right is displayed on the upper right of the LCD. 
2		Press the keys in order of System key → F3(Setting) key → F4(Upgrade) key.
3	Select file	Rotate the encoder to select the firmware update file.
4	Update execution	Press the F4 (Recall) key to start updating the firmware. F4: Recall When the firmware update is finished, a message will appear on the display.
5	Power off and on	Turn off the power of the instrument and turn it on again.
Note		The PDW series has the following three types of firmware. Firmware varies by model. Type A PDW32-6SG, PDW32-3DG, PDW32-3TG, PDW32-3QG Type B PDW30-6TG, PDW36-5TG, PDW60-3TG Type C PDW36-10SG, PDW72-5SG

7. Remote control

7.1. Interface settings

The PDW series can use four types of interfaces (RS-232C, USB, GP-IB, LAN) as standard.
The PDW series cannot use multiple interfaces at the same time. Therefore, set the interface to use before remote control.

7.1.1. Select Interface

Interface select operation	After pressing the System key, press the F1 (Interface) key, and select the interface to be used from F1 (RS-232) key, F2 (USB) key, F3 (GPIB) key, F4 (LAN) key. The selected interface will appear on the display as follows. Interface : USB : For USB selection
Selected interface display	The selected interface is grayed out to the right of the status bar. When communication by remote command is performed, this display changes to white display.

7.1.2. RS-232C

Description	The PDW series allows remote control via RS-232C. EIA-232D compliant, D-Sub9 pin: male
Connector	The rear panel has an RS-232C connector. 
Cable	Use a 3-wire connection crossover cable GTL-232. Use 3 wires, RxD, TxD and GND.
Connection	After connecting the RS-232C cable with the power off, select RS232 as the interface to use. At first, "RS232" is displayed in gray on the status bar, but it changes to white display when communication by remote command is performed.
⚠ Note	When communication by remote command is established, the key operation is automatically locked on the machine.
Parameter setting	After pressing the System key, press the F1 (Interface) key and press the F1 (RS-232) key again to select. Next, set the communication baud rate using the F1 to F5 keys.

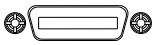
Settings for RS-232C	Settings for RS-232C are displayed on the LCD as shown below. RS232 Baud : 115200 8,N,1,N 8 : Data bit is set to 8bit N : No parity bit 1 : Set the stop bit to 1 bit N : No flow control
Operation check	Use a general-purpose terminal application to check the operation. The *IDN? query returns the manufacturer name, model name, serial number and software version. Example of response : TEXIO, PDW32-3QG, SN: xxxxxxxx, Vx.xx
Stop remote control	Send the command "LOCAL" from the control PC. Press and hold the F6 key (unlock) on the front panel.
Note	RS-232C does not support hot plugging. Therefore, connect with the power turned off.

7.1.3. USB

Description	The USB of the GPP series uses virtual COM for communication. Virtual COM requires communication baud rate setting. USB2.0 Type-B, Virtual COM (CH341)
Connector	There is a connector for USB communication on the rear panel. 
Install USB driver	If the PC does not recognize the PDW series as a COM port, install the USB driver on the PC. Download the USB driver from our HP and unzip it. Specify the driver by updating the driver in Device Manager. After connecting the USB cable, select USB as the interface to use with the machine. "USB" is displayed in gray in the status bar, but it changes to white display at the stage of communication by remote command. When the PC recognizes the instrument, it creates a virtual port for the COM port. Match the baud rate setting with the instrument.

Note	Key operations are automatically locked on this unit when a remote command is communicated.
Parameter setting	After pressing the System key, press the F1 (Interface) key and then the F2 (USB) key to select. Next, use the F1 to F5 keys to set the communication baud rate.
Settings for USB	Setting information related to USB is displayed on the LCD as shown below. USB Baud : 115200 Communication baud rate: 115200bps
Operation check	Use a general-purpose terminal application to check the operation. The *IDN? query returns the manufacturer name, model name, serial number and software version. Example of response : TEXIO, PDW32-3QG, SN: xxxxxxxx, Vx.xx
Stop remote control	Send the command "LOCAL" from the control PC. Press and hold the F6 key (unlock) on the front panel. Unplug the USB cable from the back panel.
Note	USB is hot plug. When not open COM port, it is safe to unplug the cable as long.

7.1.4. GP-IB

Description	Before starting GP-IB communication, it is necessary to set the GP-IB address. IEEE488.1 compliant
Connector	There is a GP-IB connector on the rear panel. 
Connection	After inserting the GP-IB cable, set the interface to be used to GPIB. Initially, the GPIB display is displayed in gray on the status bar, but it changes to white display when communication by remote command is performed.
Note	Key operations are automatically locked on this unit when a remote command is communicated.
Parameter setting	After pressing the System key, press the F1 (Interface) key and then the F3 (GPIB) key to select. Next, set the GP-IB address. Set the address displayed in red and press F1 (Enter) key to confirm.

Settings for GP-IB	The GP-IB address setting information is displayed on the LCD as shown below. GPIB Addr : 11 The GP-IB address is set to 11.
Operation check	Use the GP-IB communication application to check the operation. The *IDN? query returns the manufacturer name, model name, serial number and software version. Example of response : TEXIO, PDW32-3QG, SN: xxxxxxxxx, Vx.xx
Stop remote control	Send the remote command "LOCAL" from the control PC. Press and hold the F6 (unlock) key on the front panel.

7.1.5. LAN

Description	LAN communication allows remote control and monitoring through socket and HTTP connections. IEEE802.3 compliant, 100Base-TX, IPv4, DHCP/AutoIP/fixed IP, Auto-MDIX HTTP port: 80, socket port 1026
Connection	After inserting the LAN cable, set the interface to be used to LAN. LAN is displayed in gray in the status bar, but it changes to white display when communication by remote command is performed.
⚠Note	Key operations are automatically locked on this unit when a remote command is communicated.
Interface settings	After pressing the System key, press the F1 (Interface) key and then the F4 (LAN) key to set the interface to be used to LAN.
LAN parameter setting	Press F1(Config) key, F1-F4 keys will display LAN parameters. Set each parameter of IP Address, Net Mask, Gate Way.
Other display parameters	In addition to the parameters listed above, parameters are shown as unique values. Mac Address: Host Name: A unique value for the instrument. VISA Resource name shows IP Address and SOCKET port number (1026::SOCKET).
Edit Host Name	Press the F4 (Host Name) key and enter the host name manually. The input area becomes active, and the set characters

	are displayed in red. The first character displayed is 'A', and as you turn the rotary encoder clockwise, the characters change in the order A, B...Z, a, b...z. By pressing the F1 (Enter) key, the character being input is confirmed and the input of the next character is automatically started. Please note that numbers and symbols cannot be entered. Continue doing this until you finish entering the host name. After completing the setting, press F6 (Return) key to return to the LAN parameter setting screen.
IP mode parameter setting	Perform setting operations from the LAN parameter setting screen. The IP address is set by pressing F1 (DHCP) key, F2 (Auto IP) key or F3 (Manual) key.

Manual IP setting

Step	Item	Description	
1	Manual IP setting select	Press the keys in order of System→F1(Interface)→F4(LAN)→F1(Config)→F3(Manual). F1(IP addr) key, F2(Net Mask) key, F3(Gate Way) key will be displayed.	
2	IP address setting	Press the F1 (IP addr) key to set the "IP Address:" parameter (displayed in red).	F1: IP addr
	Setting range	1.0.0.0 to 223.255.255.255 (other than 127.nnn.nnn.nnn)	
3	Net Mask setting	Press the F2 (Net Mask) key to set the "Net Mask:" parameter (displayed in red).	F2: Net Mask
	Setting range	1.0.0.0～255.255.255.255	
4	Gate Way setting	Press the F3 (Gate Way) key to set the "Net Mask:" parameter (displayed in red).	F3: Gate Way
	Setting range	1.0.0.0～223.255.255.255 (other than 127.nnn.nnn.nnn)	
5	Decision	Set each parameter of IP Address, Net Mask, and Gate Way with the numeric keypad. After setting, press F1 (Done) key to set each parameter.	F1: Done

Pressing the F5 (Clear) key clears the parameters in the process of being set, allowing the settings to be made again.

DHCP setting

Step	Item	Description
1	Select DHCP setting	Press the keys in order of System→F1(Interface)→F4(LAN)→F1(Config)→F1(DHCP). The IP Address, Net Mask and Gate Way parameters are assigned by the DHCP server. After setting the parameters, return to the LAN parameter setting screen.
	Note	If there is no DHCP server in the network, the correct value will not be set.

Auto IP setting

1	Select Auto IP setting	Press the keys in order of System→F1(Interface)→F4(LAN)→F1(Config)→F2(Auto IP). Gate Way “255.255.0.0” and IP Address “169.254.x.x” are automatically set so that they do not conflict. Please set the same on the controller side.
	Note	The Auto IP setting is a simple mode when the unit and a controller such as a PC are connected one-to-one. The address is likely to change when you connect, so please check the address each time you use it. For multiple connections, please use fixed IP or DHCP.

Controller (PC) operation: HTTP access method

After entering the IP address in the web browser, a screen displaying the device information will be displayed.
The PDW series can be controlled via a web browser.

Stop remote control

Step	Description
1	Send the remote command "LOCAL" from the control PC.
2	Press and hold the F6 (unlock) key on the front panel.

3 Unplug the LAN cable from the rear panel.

LAN HTTP connections are hot-pluggable, unplugging cables is no problem.

7.2. Command syntax

The remote commands used by the PDW series conform to IEEE488.2 and SCPI-1999. Commands for compatibility with some other models are not compatible.

7.2.1. Command format

SCPI is an ASCII-based command language designed for instrumentation. SCPI commands are hierarchical and divided into different subsystems. Each subsystem is defined with different keywords. Each command consists of a root-level keyword and one or more hierarchical keywords separated by colons (:), followed by parameters. A space of one character is always required between keywords and parameters. Commands with a question mark (?) are all commands for inquiries (queries).

Example ：
:SYSTem:BEEPer:STATe {0|1|OFF|ON}
:SYSTem:BEEPer:STATe?

"SYSTem" is the root level keyword, and "BEEPer" and "STATe" are second and third level keywords, respectively. A colon ":" is always used to delimit keywords for each hierarchy. Items enclosed in braces "{ }" are parameters. The command "SYSTem:BEEPer:STATe" has parameters {0|1|OFF|ON} and the command and parameters are separated by a single space.
"SYSTem:BEEPer:STATe?" indicates that this command is a query.
Also, some commands require multiple parameters separated by commas “,”
(Example ： :STATus:QUEue:ENABle (-110:-222,-220)。

7.2.2. Symbols

SCPI commands have symbols that are used conventionally. These symbols are not commands, but are used to describe command parameters.

1. “{ }”
   “{ }” enclose parameters in the command string.
   Example ： {OFF|ON}

2. “ | ”
   “|” is used to separate one or more parameters.
   Only one of the delimited parameters is used in the actual command.
   When the parameter is {ON|OFF}, select ON or OFF.

3. “[ ]“
   Keywords and parameters enclosed in "[ ]" indicate that they can be omitted when executing a command.
   Example ： :OUTPut[:STATe] In {ON|OFF}, [:STATe] can be omitted.

4. “< >”
   Parameters enclosed in “< >” must be replaced with appropriate parameters.
   Example ： DISPlay:CONTrast <brightness>
   <brightness> should be replaced with a number.
   → DISPlay:CONTrast 1

7.2.3. Parameter types

There is not only one parameter type, different commands require parameters of different types.

1. Boolean
   The “OFF” or “ON” state is the parameter.
   Example ： DISPay:FOCUs {ON|OFF}

2. Integer type
   Parameters are consecutive integer values.
   Example ： DISPay:CONTrast <brightness>
   <brightness> is an integer such as 1 to 3.

3. Real type
   Parameters are consecutive real numbers. Real values can be applied within the set range and set accuracy range.
   Example ： CURRent {<current>|MINimum|MAXimum}
   This command sets the current value of the operating channel, but any value within the setting range can be applied to <current>.

4. Discrete type
   Parameters are discrete values. Only the listed numbers are allowed in the usage examples.
   Example ： *RCL {0|1|2|3| … |9}
   Only 0,1,2,3, … ,9 are allowed as parameters.

5. String type
   ASCII characters should be parameters.
   Example ： MODE <name>
   Parameter <name> must contain an ASCII string.

7.2.4. Shorthand Commands

SCPI commands are a mixture of uppercase and lowercase letters, and the uppercase part represents the abbreviated form of the command. Commands are not case sensitive. However, when using abbreviations, you should only use the uppercase part. Other omissions are not allowed.
Example ： :MEASure:CURRent? can be abbreviated as :MEAS:CURR?

7.2.5. Command terminators

When sending a remote command, you must send <LF> as a terminator following the command string. The IEEE-4888 EOI is also used as a newline character. <CR>+<LF> CR is ignored.
The command path always returns to the root level by sending a terminator.
Return values for queries are terminated with <LF>.

7.3. Command List

7.3.1. Measurement Commands

Command name	Overview	Page
:MEASure[1|2|3|4] :<CURRent|VOLTage |POWEr>?	Queries the measurement value of a specific channel current, voltage, or power.	130
:MEASure[1|2|3|4]:ALL?	Queries the current, voltage, and power measurement values for a specific channel.	130
:MEASure :<CURRent|VOLTage |POWEr>:ALL?	Queries the measurement value of all channel current, voltage, or power.	130
VOUT<1|2|3|4>?	Queries the output voltage	130
IOUT<1|2|3|4>?	Queries the output current	131

7.3.2. Display Function Commands

Command name	Overview	Page
:DISPlay:ENABle <b>	LCD display ON/OFF switching	131
:DISPlay:ENABle?	Queries the LCD display status	131
:DISPlay:BRIGhtness <Low|Middle|High>	LCD backlight brightness setting	131
:DISPlay:BRIGhtness?	Query the brightness of the LCD backlight	131
:DISPlay :TYPE {1|2|3|4|5|6|7}	LCD display type setting	132
:DISPlay:TYPE?	Queries the LCD display type.	132

7.3.3. Output Commands

Command name	Overview	Page
:OUTPut[1|2|3|4] [:STATe] <b>	Output ON/OFF switching	132
:OUTPut[1|2|3|4][:STATe]?	Queries output ON/OFF status	132
:ALLOUTON	Output ON for all channels	132
:ALLOUTOFF	Output OFF for all channels	133
OUT<Boolean>	Output ON/OFF for all channels	133

ROUTe :TERMinals {FRONt|REAR}	Select output terminal	133
ROUTe:TERMinals?	Queries the selected output terminal.	133
:OUTPut[1|2|3|4] :OVP:STATe <b>	OVP operation enable/disable switching	133
:OUTPut[1|2|3|4] :OVP:STATe?	Queries OVP operation enable/disable	133
:OUTPut[1|2|3|4] :OVP:TRIGer?	Queries if the OVP protection is triggered.	134
:OUTPut[1|2|3|4] :OVP <NR2>	OVP operation level setting	134
:OUTPut[1|2|3|4]:OVP?	Queries the OVP operation level.	134
:OUTPut[1|2|3|4] :OCP:STATe <b>	OCP operation enable/disable switching	134
:OUTPut[1|2|3|4] :OCP:STATe?	Queries OCP operation enable/disable	135
:OUTPut[1|2|3|4] :OCP:TRIGer?	Queries if the OCP protection is triggered.	135
:OUTPut[1|2|3|4] :OCP <NR2>	OCP operation level setting	135
:OUTPut[1|2|3|4]:OCP?	Queries the OCP operation level.	135

7.3.4. Power supply/electronic load control commands

Command name	Overview	Page
:SOURce[1|2|3|4] :CURRent <NR2>	Output current value setting	135
ISET<1|2|3|4>:<NR2>	Output current value setting	136
:SOURce[1|2|3|4] :CURRent?	Queries the output current setting value.	136
ISET<1|2|3|4>?	Queries the output current setting value.	136
:SOURce[1|2|3|4] :CURRent[:LIMit]:STATe?	Query status for current limit	136
:SOURce[1|2|3|4] :VOLTage <NR2>	Output voltage value setting	137

VSET<1|2|3|4>:<NR2>	Output voltage value setting	137
:SOURce[1|2|3|4] :VOLTage?	Queries the output voltage setting value.	137
VSET<1|2|3|4>?	Queries the output voltage setting value.	137
:SOURce[1|2] :RESistor <NR2>	Electronic load function CR mode resistance setting	138
:SOURce[1|2]:RESistor?	Queries the electronic load function CR mode resistance setting value.	138
:SOURce:CURRent:ALL?	Queries the current setting value for all channels.	138
:SOURce:VOLTage:ALL?	Queries the voltage setting value for all channels.	138
TRACK<0|1|2>	Independent, series tracking, and parallel tracking mode settings	138
:OUTPut:SERies {ON|OFF} [,FAST]	Series tracking mode setting	139
:OUTPut:PARallel {ON|OFF}[,FAST]	Parallel tracking mode setting	139
:LOAD[1|2]:CV {ON|OFF}[,FAST]	Electronic load function CV mode set	139
:LOAD[1|2]:CC {ON|OFF}[,FAST]	Electronic load function CC mode set	140
:LOAD[1|2]:CR {ON|OFF}[,FAST]	Electronic load function CR mode set	140
:MODE[1|2]?	Query operation mode	140
:LOAD[1|2] :RESistor <NR2>	Electronic load mode CR operating resistance setting	141
:LOAD[1|2]:RESistor?	Queries the electronic load mode CR operating resistance value.	141
:LOAD:DISPlay {Low|Middle|High}	Electronic load mode display minimum voltage setting	141
:LOAD:DISPlay?	Queries the electronic load mode display minimum voltage value.	141

7.3.5. Delay function commands

Command name	Overview	Page
:DELAy[1|2] :CYCLEs {N|I}[,<NR1>]	Setting the delay function repeat count	142
:DELAy[1|2]:CYCLEs?	Querying the delay function repeat count	142
:DELAy[1|2] :ENDState {ON|OFF|LAST}	Setting the operating state at the end of delay function operation	142
:DELAy[1|2]:ENDState?	Queries the operation status setting when delay function operation ends	142
:DELAy[1|2] :GROUPs <NR1>	Setting the number of steps for executing the delay function	143
:DELAy[1|2]:GROUPs?	Queries the number of steps for executing the delay function.	143
:DELAy[1|2]:PARAmeter <No>,{ON|OFF},<time>	Setting the delay function specified step operation parameter	143
:DELAy[1|2]:PARAmeter? <No>[,<count>]	Queries the settings for the delay function specification step.	144
:DELAy[1|2]:RESTart	Restart from the beginning of the delay function	144
:DELAy[1|2]:STARt <NR1>	Delay function starting step setting	145
:DELAy[1|2]:STARt?	Queries the delay function start Step number.	145
:DELAy[1|2] [:STATe] {ON|OFF}	Delay function ON/OFF setting	145
:DELAy[1|2][:STATe]?	Queries the delay function operation status.	145
:DELAy[1|2]:STATe :GENErate {01P|10P}	Set the delay function output state setting to 01P or 10P	145
:DELAy[1|2]:STATe :GENErate?	Queries the delay function output state setting (01P or 10P)	146

:DELAy[1|2]:STOP {NONE|<V|>V|=V|<C|>C|=C|<P|>P|=P}[,<NR2>]	Setting the delay function output stop condition	146
:DELAy[1|2]:STOP?	Queries the delay function operation stop condition.	146
:DELAy:SYNChronize {ON|OFF}	Simultaneous restart of CH1 and CH2 delay function	147
:DELAy[1|2]:TIME :GENErate {FIX|INC|DEC}[,<value0>[,<value1>]]	Automatic setting of the duration of each step of the delay function	147
:DELAy[1|2]:TIME :GENErate?	Queries the parameter set by ":DELAy[1|2]:TIME:GENErate"	148
:DELAy:MEMory :SAVE {0|1|2|3|4|5|6|7|8|9}	Save the delay function settings to the specified number in the internal memory	148
:DELAy:MEMory :LOAD {0|1|2|3|4|5|6|7|8|9}	Recalls the delay function settings from the specified number in the internal memory	149
:DELAy[1|2]:USB :SAVE <dest>	Save the delay function settings to the specified file in the USB memory	149
:DELAy[1|2]:USB :LOAD <dest>	Recall the delay function settings from the specified file in the USB memory	149

7.3.6. Monitor function commands

Command name	Overview	Page
:MONItor[1|2|3|4] :CURRent:CONDition {<C|>C|=C|NONE}, {AND|OR|NONE}	Setting monitoring conditions for output current	150
:MONItor[1|2|3|4] :CURRent:CONDition?	Queries the monitoring conditions for the output current.	150
:MONItor[1|2|3|4] :CURRent[:VALue] {<NR2>|MINimum|MAXimum}	Setting the current value that is the condition for monitoring the output current	151

:MONItor[1|2|3|4] :CURRent[:VALue]?	Queries the current value that is the monitoring condition for the output current.	151
:MONItor[1|2|3|4] :POWER:CONDition {<P|>P|=P|NONE}	Setting monitoring conditions for output power	151
:MONItor[1|2|3|4] :POWER:CONDition?	Queries the monitoring condition for output power.	152
:MONItor[1|2|3|4] :POWER[:VALue] {<NR1>|MINimum| MAXimum}	Setting the power value that is the monitoring condition for the output power	152
:MONItor[1|2|3|4] :POWER[:VALue]?	Queries the power value that is the monitoring condition for the output power.	152
:MONItor[1|2|3|4] [:STATe] {ON|OFF}	Output monitoring function enable/disable switching	152
:MONItor[1|2|3|4][:STATe]?	Queries whether the output monitoring function is enabled/disabled.	153
:MONItor[1|2|3|4] :STOPway {OUTOFF |ALARM |BEEPER}, {ON|OFF}	Setting the action to occur when the monitoring condition is met	153
:MONItor[1|2|3|4]: STOPway?	Queries the action that occurs when the monitoring condition is met.	153
:MONItor[1|2|3|4] :VOLTage:CONDition {<V|>V|=V|NONE}, {AND|OR|NONE}	Setting monitoring conditions for output voltage	154
:MONItor[1|2|3|4] :VOLTage:CONDition?	Queries the monitoring condition for the output voltage.	154
:MONItor[1|2|3|4] :VOLTage[:VALue] {<NR2>|MINimum| MAXimum}	Setting the voltage value that is the monitoring condition for the output voltage	155

:MONItor[1|2|3|4] :VOLTage[:VALue]?	Queries the voltage value that is the monitoring condition for the output voltage.	155

7.3.7. External I/O Function Commands

Command name	Overview	Page
:TRIGger:IN[:ENABle] {D0|D1|D2|D3|D4}, {ON|OFF}	Trigger input function enable/disable setting	155
:TRIGger:IN[:ENABle]? {D0|D1|D2|D3|D4}	Queries enable/disable of trigger input function	155
:TRIGger:IN:RESPonse {D0|D1|D2|D3|D4}, {ON|OFF|TOGGLE| POWER|CV|CC|CR|IND| SER|PAR}	Setting the trigger input response	156
:TRIGger:IN:RESPonse? {D0|D1|D2|D3|D4}	Queries the response at trigger input.	157
:TRIGger:IN:SENSitivity {D0|D1|D2|D3|D4}, {LOW|MID|HIGH}	Setting the trigger input sensitivity	157
:TRIGger:IN:SENSitivity? {D0|D1|D2|D3|D4}	Queries the trigger input sensitivity.	157
:TRIGger:IN:SOURce {D0|D1|D2|D3|D4}, {CH1|CH2|CH3|CH4}, {ON|OFF}	Setting the trigger input operation channel	158
:TRIGger:IN:SOURce? {D0|D1|D2|D3|D4}	Queries the trigger input operation channel.	158
:TRIGger:IN :TYPE {D0|D1|D2|D3|D4}, {RISE|FALL|HIGH|LOW| STATE }	Setting the trigger input type	158
:TRIGger:IN:TYPE? {D0|D1|D2|D3|D4}	Queries the input trigger type.	159

:TRIGger:OUT :CONDition {D0|D1|D2|D3|D4}, {OUTOFF|OUTON| >V|<V|=V|>C|<C|=C |>P|<P|=P|AUTO},<NR2>	Setting trigger output conditions	159
:TRIGger:OUT:CONDition? {D0|D1|D2|D3|D4}	Queries the trigger output condition.	160
:TRIGger:OUT[:ENABle] {D0|D1|D2|D3|D4}, {ON|OFF}	Trigger output function enable/disable setting	160
:TRIGger:OUT[:ENABle]? {D0|D1|D2|D3|D4}	Queries enable/disable of trigger output function	160
:TRIGger:OUT:POLArity {D0|D1|D2|D3|D4}, POSItive|NEGAtive}	Setting the trigger output signal polarity	160
:TRIGger:OUT:POLArity? {D0|D1|D2|D3|D4}	Queries the trigger output signal polarity.	161
:TRIGger:OUT:SOURce {D0|D1|D2|D3|D4}, {CH1|CH2|CH3|CH4}	Trigger output function and channel association setting	161
:TRIGger:OUT:SOURce? {D0|D1|D2|D3|D4}	Queries the relationship between the trigger output function and the channel.	161
:TRIGger:OUT :STATe {D0|D1|D2|D3|D4}, {ON|OFF}	Setting the trigger output state	162
:TRIGger:OUT:STATe? {D0|D1|D2|D3|D4}	Queries the trigger output state.	162

7.3.8. Recorder Function Commands

Command name	Overview	Page
:RECOrder:PATH?	Querying the storage location of recorded data	162
:RECOrder :MEMory {0|1|2|3|4|5|6|7|8|9}	Specify the internal memory save destination for recorded data	163
:RECOrder:USB <dest>	Save recorded data to external USB memory	163

:RECOrder:PERIod <NR1>	Recorder function recording interval setting	164
:RECOrder:PERIod?	Queries the recorder function recording cycle.	164
:RECOrder [:STATe] {ON|OFF}	Recorder operation ON/OFF setting	164
:RECOrder[:STATe]?	Queries recorder operation ON/OFF	164
:RECOrder :GROUPs <NR1>	Set the number of data to record with the recorder function	165
:RECOrder:GROUPs?	Queries the number of data recorded by the recorder function.	165
:RECOrder[1|2|3|4] :ENABle {ON|OFF}	Setting the recorder function ON/OFF	165
:RECOrder[1|2|3|4]:ENABle?	Queries the recorder function ON/OFF.	166

7.3.9. Sequence function command

Command name	Overview	Page
:SEQUence[1|2] :CYCLEs {N|I}[,<value>]	Setting the number of sequence function repetitions	166
:SEQUence[1|2]:CYCLEs?	Queries the number of sequence function repetitions.	166
:SEQUence[1|2] :ENDState {OFF|LAST}	Setting of operation status at the end of sequence function	166
:SEQUence[1|2] :ENDState?	Queries the operation state setting at the end of sequence function.	167
:SEQUence[1|2] :GROUPs <value>	Setting the number of steps for sequence function execution	167
:SEQUence[1|2]:GROUPs?	Queries the number of steps for sequence function execution.	167
:SEQUence[1|2] :PARAmeter <No>,<volt>, <curr>,<time>	Setting sequence function parameters	167

:SEQUence[1|2] :PARAmeter? <No>,<count>	Queries sequence function parameters.	168
:SEQUence[1|2]:RESTart	Restart from the beginning of the sequence function	169
:SEQUence[1|2] :STARt <NR1>	Set the step number to be executed first in the sequence function	169
:SEQUence[1|2]:STARt?	Queries the Step number to be executed first in the sequence function.	169
:SEQUence[1|2] [:STATe] {ON|OFF}	Sequence function ON/OFF switching	169
:SEQUence[1|2][:STATe]?	Queries sequence function ON/OFF	170
:SEQUence :SYNChronize {ON|OFF}	Synchronize sequence function of CH1 and CH2 and restart	170
:SEQUence[1|2]:TEMPlet :CONSTruct	Finalize sequence waveform function parameters	170
:SEQUence[1|2]:TEMPlet :FALLRate <NR1>	Setting the fall parameter of the sequence waveform function ExpFall	171
:SEQUence[1|2]:TEMPlet :FALLRate?	Queries the fall parameter of the sequence waveform function ExpFall.	171
:SEQUence[1|2]:TEMPlet :INTErval <NR1>	Setting the time per step with the sequence waveform function	171
:SEQUence[1|2]:TEMPlet :INTErval?	Queries the time per step in the sequence waveform function	171
:SEQUence[1|2]:TEMPlet :INVErt {ON|OFF}	Waveform inversion ON/OFF setting with the sequence waveform function	172
:SEQUence[1|2]:TEMPlet :INVErt?	Queries waveform inversion ON/OFF in the sequence waveform function.	172

:SEQUence[1|2]:TEMPlet :MAXValue {<NR2>| MINimum|MAXimum}	Setting of maximum voltage/current values with sequence waveform function	172
:SEQUence[1|2]:TEMPlet :MAXValue?	Queries the maximum voltage/current value in the sequence waveform function	173
:SEQUence[1|2]:TEMPlet :MINValue {<NR2>| MINimum|MAXimum}	Setting of minimum voltage/current values with sequence waveform function	173
:SEQUence[1|2]:TEMPlet :MINValue?	Queries the minimum voltage/current value in the sequence waveform function.	173
:SEQUence[1|2]:TEMPlet :OBJect {V|C}	Selection of voltage/current editing with sequence waveform function	174
:SEQUence[1|2]:TEMPlet :OBJect?	Query voltage/current edit in the sequence waveform function	174
:SEQUence[1|2]:TEMPlet :POINTs <NR1>	Setting the number of steps to change with the sequence waveform function	174
:SEQUence[1|2]:TEMPlet :POINTs?	Queries the number of steps to change in the sequence waveform function.	175
:SEQUence[1|2]:TEMPlet :RISERate <NR1>	Setting how to rise with the sequence waveform function ExpRise	175
:SEQUence[1|2]:TEMPlet :RISERate?	Queries how to rise with the sequence waveform function ExpRise.	175
:SEQUence[1|2]:TEMPlet :SELect {SINE|PULSE| RAMP|UP|DN|UPDN| RISE|FALL}	Selecting a waveform to use with the sequence waveform function	175
:SEQUence[1|2]:TEMPlet :SELect?	Queries the waveform selected by the sequence waveform function.	176
:SEQUence[1|2]:TEMPlet :SYMMetry <NR1>	Setting the symmetry with the sequence waveform function RAMP	176

:SEQUence[1|2]:TEMPlet :SYMMetry?	Queries the symmetry of the sequence waveform function RAMP	176
:SEQUence[1|2]:TEMPlet :WIDTh <NR1>	Setting the pulse width with the sequence waveform function Pulse	176
:SEQUence[1|2]:TEMPlet :WIDTh?	Queries the pulse width using the sequence waveform function Pulse.	177
:SEQUence[1|2]:TEMPlet :STARt <NR1>	Setting the sequence waveform function start Step number	177
:SEQUence[1|2]:TEMPlet :STARt?	Queries the sequence waveform function start Step number.	177
:SEQUence:MEMory :SAVE {0|1|2|3|4|5|6|7|8|9}	Save sequence function settings in internal memory	177
:SEQUence:MEMory :LOAD {0|1|2|3|4|5|6|7|8|9}	Recall sequence function settings from internal memory	178
:SEQUence[1|2]:USB :SAVE <dest>	Save the sequence function settings to the USB memory with the specified name	178
:SEQUence[1|2]:USB :LOAD <dest>	Recall sequence function settings from USB memory	178

7.3.10. Status commands

Command name	Overview	Page
STATus?	Query operation status	179
:STATus:PRESet	Clear each Event Enable register	180
:STATus:OPERation [:EVENt]?	Queries the Operation Event register	180
:STATus:OPERation :CONDition?	Queries the Operation Condition Status register	180
:STATus:OPERation :ENABle <NR1>	Operation Enable Status register setting	180
:STATus:OPERation :ENABle?	Queries the Operation Status Enable register	180

:STATus:MEASurement :ENABle <NR1>	Measurement Status Enable register setting	180
:STATus:MEASurement [:EVENt]?	Queries the Measurement Event Status register	181
:STATus:MEASurement :ENABle?	Queries the Measurement Status Enable register	181
:STATus:MEASurement :CONDition?	Queries the Measurement Condition Status register	181
:STATus:QUEStionable [:EVENt]?	Queries the Questionable Event Status register	181
:STATus:QUEStionable :CONDition?	Queries the Questionable Condition Status register	181
:STATus:QUEStionable :ENABle <NR1>	Questionable Enable Status register setting	181
:STATus:QUEStionable :ENABle?	Queries the Questionable Enable Status register	182
:STATus:QUEue[:NEXT]?	Reading messages stored in the error queue	182
:STATus:QUEue :ENABle <list>	Settings for items to be output to the error queue	182
:STATus:QUEue:ENABle?	Query what to output to the error queue	182
:STATus:QUEue :DISable <list>	Settings that do not output to the error queue	183
:STATus:QUEue:DISable?	Queries for items not to be output to the error queue	183
:STATus:QUEue:CLEar	Delete error messages stored in error queue	183

7.3.11. System commands

Command name	Overview	Page
:SYSTem:VERSion?	Querying the firmware version	183
:SYSTem:ERRor?	read the last error	184
ERR?	Check error status and reply last error message	184
:SYSTem:CLEar	Clear error queue	184
:SYSTem :POSetup <RST|Last>	Selection of the state to be set immediately after power-on	184

:SYSTem:POSetup?	Queries the status that is set immediately after power-on.	185
:SYSTem:COMMunicate :LAN:DHCP[:STATe] <b>	DHCP enable/disable setting	185
:SYSTem:COMMunicate :LAN:DHCP[:STATe]?	Query DHCP enable/disable	185
:SYSTem:COMMunicate :LAN:IPADdress <IP address>	IP address setting	185
:SYSTem:COMMunicate :LAN:IPADdress?	Query for IP address	186
:SYSTem:COMMunicate :LAN:SMASk <Mask>	Subnet mask setting	186
:SYSTem:COMMunicate :LAN:SMASk?	Query subnet mask	186
:SYSTem:COMMunicate :LAN:GATEway <IP address>	Gateway address setting	186
:SYSTem:COMMunicate :LAN:GATEway?	Queries the gateway address	186
:SYSTem:COMMunicate :LAN:MANualip [:STATe] <b>	IP address manual setting enable/disable setting	187
:SYSTem:COMMunicate: LAN:MANualip[:STATe]?	Queries whether the IP address manual setting is enabled/disabled.	187
:SYSTem:COMMunicate :LAN:APPLy	Apply all LAN-related settings set by other commands	187
:SYSTem:REMote	Set instrument to remote state	187
REMOTE	Set instrument to remote state	187
:SYSTem:BEEPer :STATe <b>	Buzzer sound ON/OFF setting	188
BEEP<Boolean>	Buzzer sound ON/OFF setting	188
:SYSTem:BEEPer:STATe?	Queries the buzzer sound ON/OFF.	188
:SYSTem:LOCal	Set the instrument from remote status to local status	188

LOCAL	Set the instrument from remote status to local status	188
:SYSTem:INTerface [USB|RS232|GPIB|LAN]	Choosing which interface to use	188
:SYSTem:BAUDrate :USB {9600|19200|38400| 57600|115200}	Selection of baud rate in USB communication	189
:SYSTem:BAUDrate:USB?	Queries the baud rate in USB communication	189
:SYSTem:BAUDrate :RS232 {9600|19200| 38400|57600|115200}	Selection of baud rate in RS-232C communication	189
:SYSTem:BAUDrate :RS232?	Queries the baud rate in RS-232C communication	189
BAUD<NR1>	Selection of RS232 or USB communication baud rate	189
:SYSTem:LANGuage [CHINese|ENGlish]	Display language English (ENGlish) / Chinese (CHINese) selection	189
:SYSTem:LANGuage?	Queries the display language	190
HELP?	Reply with simple command list	190

7.3.12. IEEE488.2 common command

Command name	Overview	Page
*IDN?	Query device information	190
*RST	Instrument reset, factory default settings	190
*SAV <NR1>	Save current settings to the selected storage location	191
*RCL <NR1>	Recall configuration state stored in memory	191
*SRE <NR1>	Service Request Enable register setting	191
*SRE?	Queries the setting contents of the Status Byte Enable register.	191

*STB?	Queries the Status Byte register	191
*ESE <NR1>	Setting the Standard Event Enable Register	192
*ESE?	Queries the setting contents of the Standard Event Enable register.	192
*ESR?	Queries the Standard Event register	192
*CLS	Status Byte register summary, all Event registers, clear each buffer	192
*OPC	Set the OPC bit in the Standard Event register after all pending operations are completed	193
*OPC?	When all pending operations have completed, return 1 to the output queue	193

7.4. Command Details

When selecting a specific channel, [1] represents CH1. Similarly, [2] represents CH2, [3] represents CH3, and [4] represents CH4.
As a special case, [1] representing CH1 can be omitted. [2], [3], and [4] must be entered when specifying CH2, CH3, and CH4.

7.4.1. Measurement Commands

Command	:MEASure[1|2|3|4]: <CURRent|VOLTage|POWEr>?
Function	Queries the current, voltage, or power measurement value for a specific channel.
Parameter	CURRent: Returns the current measurement. VOLTage: Returns the voltage measurement. POWEr: Returns the power measurement.
Example	:MEASure2: CURRent? Returns the CH2 current measurement.
 Note	The measured values of current and power for the 3-output model CH3 are 0A and 0W.

Command	:MEASure[1|2|3|4]:ALL?
Function	Queries the current, voltage, and power of a specific channel all at once.
Example	:MEASure1:ALL? Queries all measured values of CH1. 0.5005,0.0009,0.00 CH1 measurements are voltage: 0.5005V, current: 0.0009A, power: 0.00W.

Command	:MEASure:<CURRent|VOLTage|POWEr>:ALL?
Function	Queries the specified item for all channels.
Parameter	CURRent: Returns the current measurement. VOLTage: Returns the voltage measurement. POWEr: Returns the power measurement.
Example	:MEASure:VOLTage:ALL? Queries the voltage measurement values of all channels. 0.5004,1.0014 The voltage measurements are CH1: 0.5004V, CH2: 1.0014V.

Command	VOUT<1|2|3|4>?

Function	Queries the output voltage of the specified channel.
Example	VOUT1? Query the output voltage of CH1. 00.501V The voltage measurement value is 0.501V.

Command	IOUT<1|2|3|4>?
Function	Queries the output current of the specified channel.
Example	IOUT1? Query the output current of CH1. 0.0009A The measured current value is 0.0009A.
⚠Note	The measured current value for 3-output model CH3 is 0A.

7.4.2. Display Function Commands

Command	:DISPlay:ENABle <b>
Function	Switches the LCD display ON/OFF.
Parameter	b 0/OFF：Turns off the LCD display. 1/ON：Turns on the LCD display.
Example	:DISPlay:ENABle ON Turns on the LCD display.

Command	:DISPlay:ENABle?
Function	Queries the LCD display status.
Example	:DISPlay:ENABle? Queries the display status of the LCD. ON The LCD display status is ON.

Command	:DISPlay:BRIGhtness <Low|Middle|High>
Function	Set the brightness of the LCD backlight in 3 steps: Low / Middle / High.
Parameter	Brightens in the order of Low→Middle→High.
Example	:DISPlay:BRIGhtness Low Set the backlight brightness to "Low".

Command	:DISPlay:BRIGhtness?

Function	Queries the LCD backlight brightness setting.
Example	:DISPlay:BRIGhtness? Queries the brightness of the LCD backlight. High The brightness of the LCD backlight is High.

Command	:DISPlay:TYPE {1|2|3|4|5|6|7}
Function	Sets the display type. Refer to page 23 for details.
Parameter	1: TYPE 1, 2: TYPE 2, …6: TYPE 6, 7: TYPE 7
Example	:DISPlay:TYPE 4 Set the display type to Type 4.

Command	:DISPlay:TYPE?
Function	Queries the LCD display type.
Example	:DISPlay:TYPE? Queries the LCD display type. 1 The display type is Type 1.

7.4.3. Output Commands

Command	:OUTPut[1|2|3|4][:STATe] <b>
Function	Switch output ON/OFF of the specified channel.
Parameter	<b> 0/OFF: Turn off the output. 1/ON: Turn on the output.
Example	:OUTPut1:STATe ON Turn CH1 output ON.

Command	:OUTPut[1|2|3|4][:STATe]?
Function	Queries the output ON/OFF status of the specified channel.
Example	:OUTPut1:STATe? Query CH1 output ON/OFF. ON CH1 output is ON.

Command	:ALLOUTON
Function	Turns on all channels.

Command	:ALLOUTOFF
Function	Turns off all channels.

Command	OUT<Boolean>
Function	Turns on/off the output of all channels.
Parameter	<Boolean> 0= OFF, 1=ON
Example	OUT0 Turns off the output of all channels.

Command	ROUTe:TERMinals {FRONt|REAR}
Function	Select the output terminal.
Parameter	FRONt: Select the front output terminal. REAR: Select the rear output terminal.
Example	ROUTe:TERMinals REAR Select the rear output terminal.

Command	ROUTe:TERMinals?
Function	Returns the currently selected output terminal.
Query	FRONT: Selecting front output terminal REAR: Selecting rear output terminal
Example	ROUTe:TERMinals? Queries the selected output terminal. FRONT The front side is selected as the output terminal.

Command	:OUTPut[1|2|3|4]:OVP:STATe <b>
Function	Select whether to enable or disable OVP operation for the specified channel.
Parameter	<b> 0/OFF：Disable OVP operation. 1/ON：Enable OVP operation.
Example	:OUTPut2:OVP:STATe ON Enables CH2 OVP operation.

Command	:OUTPut[1|2|3|4]:OVP:STATe?
Function	Queries whether OVP operation is enabled or disabled for the specified channel.

Example	:OUTPut2:OVP:STATe? Queries whether CH2 OVP operation is enabled/disabled. OFF CH2 OVP operation is disabled.

Command	:OUTPut[1|2|3|4]:OVP:TRIGer?
Function	Queries the presence or absence of OVP operation for the specified channel.
Query	0: No OVP, 1: OVP occurrence
Example	:OUTPut2:OVP:TRIGer? Query the presence or absence of OVP operation for CH2. 1 OVP operation was occurring on CH2.

Command	:OUTPut[1|2|3|4]:OVP <NR2>
Function	Sets the OVP operation level of the specified channel.
Parameter	<NR2> OVP value
Example	:OUTPut2:OVP 10.5 Set the CH2 OVP operating level to 10.5V.
⚠Note	The OVP value of 3-output model CH3 is fixed at 5.5V. This cannot be set.

Command	:OUTPut[1|2|3|4]:OVP?
Function	Queries the OVP operation level of the specified channel.
Example	:OUTPut2:OVP? Query the OVP operation level of CH2. 10.0 CH2 OVP operating level is 10.0V.

Command	:OUTPut[1|2|3|4]:OCP:STATe <b>
Function	Select whether to enable or disable OCP operation of the specified channel.
Parameter	<b> 0/OFF：Disable OCP operation. 1/ON：Enable OCP operation.
Example	:OUTPut2:OCP:STATe ON Enable OCP operation for CH2.

Command	:OUTPut[1|2|3|4]:OCP:STATe?
Function	Queries whether OCP operation is enabled/disabled for the specified channel.
Example	:OUTPut2:OCP:STATe? Queries the enable/disable of CH2 OCP operation. ON OCP operation of CH2 is enabled.

Command	:OUTPut[1|2|3|4]:OCP:TRIGer?
Function	Queries the presence or absence of OCP operation for the specified channel.
Query	0: No OCP, 1: OCP occurrence
Example	:OUTPut2:OCP:TRIGer? Query the presence or absence of OCP operation on CH2. 1 OCP operation was occurring on CH2.

Command	:OUTPut[1|2|3|4]:OCP <NR2>
Function	Sets the OCP operating level of the specified channel.
Parameter	<NR2> OCP value
Example	:OUTPut2:OCP 1.5 Set the CH2 OCP operating level to 1.5A.
⚠Note	The OCP value of CH3 for 3-output models is fixed at 3.1A. Cannot be set. In addition, the function is only on the USB power supply terminal side.

Command	:OUTPut[1|2|3|4]:OCP?
Function	Queries the OCP operation level of the specified channel.
Example	:OUTPut2:OCP? Query the OCP operation level of CH2. 3.00 CH2 OCP operation level is 3.00A.

7.4.4. Power supply/electronic load control commands

Command	:SOURce[1|2|3|4]:CURRent <NR2>
Function	Set the current value of the specified channel.
Parameter	<NR2> Current value

Example	:SOURce2:CURRent 1.0005 Set the CH2 current to 1.0005A.
Note	Current cannot be set for CH3 of the 3-output model.

Command	ISET<1|2|3|4>:<NR2>
Function	Set the current value of the specified channel.
Parameter	1=CH1, 2=CH2, 3=CH3, 4=CH4 <NR2> Current value
Example	ISET1:2.2345 Set the CH1 output current to 2.2345A.
Note	Current cannot be set for CH3 of the 3-output model.

Command	:SOURce[1|2|3|4]:CURRent?
Function	Queries the current setting value of the specified channel.
Example	:SOURce2:CURRent? Query the CH2 output current setting value. 1.5000 The output current setting value of CH2 is 1.500A.

Command	ISET<1|2|3|4>?
Function	Queries the current setting value of the specified channel.
Parameter	1=CH1, 2=CH2, 3=CH3, 4=CH4
Example	ISET1? Query the CH1 output current setting value. 1.5000 The output current setting value of CH1 is 1.500A.
Note	CH3 of the 3-output model cannot query the current setting.

Command	:SOURce[1|2|3|4]:CURRent[:LIMit]:STATe?
Function	Queries whether the current of the specified channel has reached the set current value. When the current of a specified channel reaches the set current value, that channel is operating in CC mode.
Query	0: The current setting has been not reached. 1: The current setting has been reached.

Example	:SOURce2:CURRent:STATe? Query whether CH2 is in the current limit value state. 1 CH2 is operating at current limit value.
Note	Parameter 0 is returned when the output is OFF and in the electronic load function.

Command	:SOURce[1|2|3|4]:VOLTage <NR2>
Function	Set the voltage value of the specified channel.
Parameter	<NR2> Voltage value
Example	:SOURce2:VOLTage 5.321 Set the CH2 output voltage to 5.321V.
Note	The CH3 voltage setting for the 3-output model is only the specified value.

Command	VSET<1|2|3|4>:<NR2>
Function	Set the voltage value of the specified channel.
Parameter	1=CH1, 2=CH2, 3=CH3, 4=CH4 <NR2> Voltage value
Example	VSET1:20.345 Set the CH1 output voltage to 20.345V.

Command	:SOURce[1|2|3|4]:VOLTage?
Function	Queries the voltage setting value of the specified channel.
Example	:SOURce2:VOLTage? Query the CH2 voltage setting value. 8.000 The output voltage setting value of CH2 is 8.000V.

Command	VSET<1|2|3|4>?
Function	Queries the voltage setting value of the specified channel.
Parameter	1=CH1, 2=CH2, 3=CH3, 4=CH4
Example	VSET2? Query the CH2 voltage setting value. 08.000 The output voltage setting value of CH2 is 8.000V.

Command	:SOURce[1|2]:RESistor <NR2>
Function	Set the resistance value of the specified channel in electronic load function CR mode.
Parameter	<NR2> Resistance value
Example	:SOURce2: RESistor 1000 Set the resistance value of CH2 to 1000Ω.

Command	:SOURce[1|2]:RESistor?
Function	Queries the resistance setting value of the specified channel in electronic load function CR mode.
Example	:SOURce2: RESistor? Query the CH2 CR mode resistance setting value. 1000 CH2 CR mode resistance setting value is 1000Ω.

Command	:SOURce:CURRent:ALL?
Function	Queries the current settings of all channels.
Example	:SOURce:CURRent:ALL? Queries the current settings of all channels. 1.5000,1.0000 The current setting value is CH1: 1.5000A, CH2: 1.0000A.

Command	:SOURce:VOLTage:ALL?
Function	Queries the voltage settings of all channels.
Example	:SOURce:VOLTage:ALL? Queries the voltage setting values of all channels. 8.000,1.200 The voltage setting values are CH1: 8.000V, CH2: 1.200V.

Command	TRACK<0|1|2>
Function	Sets the operating mode of the power function.
Parameter	0: Independent output mode 1: Series tracking mode 2: Parallel tracking mode
Example	TRACK0 Set to independent output mode.

⚠Note	This command does not work on the 1-output model and the electronic load function.

Command	:OUTPut:SERies {ON|OFF}[,FAST]
Function	Set CH1 and CH2 to series tracking mode. The FAST option enables forced mode switching even if a voltage of 1V or more is applied to the terminal. Please note that the terminal voltage may damage the internal circuitry of the unit.
Example	:OUTPut:SERies ON Set CH1 and CH2 to series tracking mode.
⚠Note	This command does not work on the 1-output model and the electronic load function.

Command	:OUTPut:PARallel {ON|OFF}[,FAST]
Function	Set CH1 and CH2 to parallel tracking mode. The FAST option enables forced mode switching even if a voltage of 1V or more is applied to the terminal. Please note that the terminal voltage may damage the internal circuitry of the unit.
Example	:OUTPut:PARallel ON Set CH1 and CH2 to parallel tracking mode.
⚠Note	This command does not work on the 1-output model and the electronic load function.

Command	:LOAD[1|2]:CV {ON|OFF}[,FAST]
Function	Set the parameter "ON" to set the specified channel to electronic load function CV mode. When the command is executed with the parameter "OFF", the electronic load function returns to the power supply function. The FAST option enables forced mode switching even if a voltage of 1V or more is applied to the terminal. Please note that the terminal voltage may damage the internal circuitry of the unit.
Example	:LOAD2:CV ON Set CH2 to electronic load function CV mode. :LOAD2:CV OFF Set CH2 to power supply function.

Command	:LOAD[1|2]:CC {ON|OFF}[,FAST]
Function	Set the parameter "ON" to set the specified channel to electronic load function CC mode. When the command is executed with the parameter "OFF", the electronic load function returns to the power supply function. The FAST option enables forced mode switching even if a voltage of 1V or more is applied to the terminal. Please note that the terminal voltage may damage the internal circuitry of the unit.
Example	:LOAD2:CC ON Set CH2 to electronic load function CC mode. :LOAD2:CC OFF Set CH2 to power supply function.

Command	:LOAD[1|2]:CR {ON|OFF}
Function	Set the parameter "ON" to set the specified channel to electronic load function CR mode. When the command is executed with the parameter "OFF", the electronic load function returns to the power supply function.
Example	:LOAD2:CR ON Set CH2 to electronic load function CR mode. :LOAD2:CR OFF Set CH2 to power supply function.

Command	:MODE[1|2]?
Function	Queries the operation mode of the specified channel.
Query	Power: Power supply function PDW72-5SG/PDW36-10SG Only) SER： Power supply function Series Tracking Mode PAR： Power supply function Parallel Tracking Mode IND： Power supply function independent output mode CV： Electronic load function CV mode CC： Electronic load function CC mode CR： Electronic load function CR mode
Example	:MODE1? Query the operation mode of CH1. IND The operating mode of CH1 is power function independent output mode.

Command	:LOAD[1|2]:RESistor <NR2>
Function	Set the resistance value of the specified channel in electronic load function CR mode.
Parameter	<NR2> Resistance value
Example	:LOAD2:RESistor 100 Set the CH2 electronic load function CR mode resistance value to 100Ω.

Command	:LOAD[1|2]:RESistor?
Function	Queries the set resistance value of the specified channel in electronic load function CR mode.
Example	:LOAD2:RESistor? Queries the CH2 CR mode setting resistance value. 2 The CH2 CR mode setting resistance value is 2Ω.

Command	:LOAD:DISPlay {Low|Middle|High}
Function	Sets the minimum voltage value that can be displayed in the electronic load function. The default value is High. Below this value, the voltage display will show "--.----".
Parameter	Low: 0.5V, Middle: 0.75V, High:1V
Example	:LOAD:DISPlay Low Set the minimum display voltage of the electronic load function to 0.5V.

Command	:LOAD:DISPlay?
Function	Queries the minimum display voltage setting of the electronic load function.
Example	:LOAD:DISPlay? Queries the minimum display voltage setting of the electronic load function. Middle The minimum display voltage setting for the electronic load function is 0.75V.

7.4.5. Delay function commands

Command	:DELAy[1|2]:CYCLEs {N|I}[,<NR1>]
Function	Sets the number of repetitions of the delay function of the specified channel.
Parameter	I: Infinite loop setting, N: Set to repeat count <NR1> Repeat count: 1～99999
Example	:DELAy2:CYCLEs N,100 Set the number of repetitions of the delay function of CH2 to 100 times.

Command	:DELAy[1|2]:CYCLEs?
Function	Queries the repeat count of the delay function of the specified channel.
Parameter	I: infinite loop N,<NR1>: Number of repetitions
Example	:DELAy2:CYCLEs? Queries the number of repetitions of the CH2 delay function. N,10 The CH2 delay function can be repeated 10 times.

Command	:DELAy[1|2]:ENDState {ON|OFF|LAST}
Function	Set the operation state at the end of the delay function of the specified channel.
Parameter	ON: Set the output to ON. OFF: Set the output to OFF. LAST: It will be the output state of the last step.
Example	:DELAy2:ENDState OFF Sets the operating state at the end of the CH2 delay function to output OFF.

Command	:DELAy[1|2]:ENDState?
Function	Queries the operation state setting at the end of the delay operation of the specified channel.

Example	:DELAy2: ENDState? Queries the operating state setting when the CH2 delay function ends. LAST The operating state when the CH2 delay function ends is LAST.

Command	:DELAy[1|2]:GROUPs <NR1>
Function	Sets the number of execution steps of the delay function of the specified channel.
Parameter	<NR1> Number of steps: 1 - 2048
Example	:DELAy2:GROUPs 100 Set the number of execution steps of the CH2 delay function to 100.

Command	:DELAy[1|2]:GROUPs?
Function	Queries the number of execution steps of the delay function of the specified channel.
Example	:DELAy2:GROUPs? Queries the number of execution steps of the CH2 delay function. 10 The number of execution steps for the CH2 delay function is 10.

Command	:DELAy[1|2]:PARAmeter <No>,{ON|OFF},<time>	
Function	Sets the operation parameters for the specified Step of the delay function of the specified channel.	
Parameter	<No>	Specifies the Step number to be set. Setting range: 0～2047
	{ON|OFF}	Sets the output ON/OFF of the specified Step.
	<time>	Sets the duration of the specified Step. Setting range: 1s～300s
Example	:DELAy2:PARAmeter 1,ON,10 For CH2, set Step 1 of the delay function to output ON and duration of 10 seconds.	

Command	:DELAy[1|2]:PARAmeter? <No>[,<count>]	
Function	Queries the settings of the specified Step of the delay function of the specified channel.	
Parameter	<No>	0～2047 Set the Step number to inquire about the settings.
	[<count>]	1～2048 Set how many Steps to inquire about, starting from the Step number specified in <No> above.
Query content	The query will be block data starting with "#" as shown below. #90000000241,OFF,2;2,ON,2;3,OFF,2; "#9" in blue means that the number of characters in the query content is 9 digits. The 9-digit "000000024" means that the step setting specified for the delay function in black letters is 24 characters. The number of characters includes "," and ";", and includes delimiters that are not even displayed as one character. The black text is the setting details of the specified step of the delay function. The settings for each step are separated by ";". The settings for each step are "Step No., OUTPUT ON/OFF, Step duration time", separated by ",". “1,OFF,2” means that Step No. 1 is OUTPUT OFF and the duration is 2 seconds.	
Example	:DELAy2:PARAmeter? 1,3 Queries the parameters of Step No. 1 to Step No. 3 for CH2. #90000000241,OFF,2;2,ON,2;3,OFF,2; The settings for the CH2 delay function were returned. Step No.1: OUTPUT OFF, duration 2 seconds Step No.2: OUTPUT ON, duration 2 seconds Step No.3: OUTPUT OFF, duration 2 seconds	

Command	:DELAy[1|2]:RESTart
Function	Restarts the delay function of the specified channel from the beginning.
Example	:DELAy2:RESTart Restarts the CH2 delay function from the beginning.

Command	:DELAy[1|2]:STARt <NR1>
Function	Sets the start Step number of the delay function of the specified channel.
Parameter	<NR1> 1～2047
Example	:DELAy2:STARt 10 Sets the start Step number of the delay function.

Command	:DELAy[1|2]:STARt?
Function	Queries the delay function start Step number of the specified channel.
Example	:DELAy2:STARt? Query the delay function start step number of CH2. 1 The delay function start step number is 1.

Command	:DELAy[1|2][:STATe] {ON|OFF}
Function	Sets the delay function ON/OFF of the specified channel.
Parameter	ON Starts delay function. OFF Turns the delay function OFF while the delay action is ON.
Example	:DELAy2 ON Start delay operation for CH2.

Command	:DELAy[1|2][:STATe]?
Function	Queries the operating state of the delay function of the specified channel.
Example	:DELAy2:STATe? Query the delay function operation status of CH2. ON The CH2 delay function is ON.

Command	:DELAy[1|2]:STATe:GENErate {01P|10P}
Function	Automatically sets the output status setting of the delay function of the specified channel to repeat ON/OFF for each step. Steps within the range specified by “Start” and “Groups” are automatically set.
Parameter	01P Set to repeat “OFF, ON, OFF, ON, …”. 10P Set to repeat “ON, OFF, ON, OFF, …”.

Example	:DELAy2:STATe:GENE 01P For the CH2 delay function, set the output settings for each Step using the 01P specifications.

Command	:DELAy[1|2]:STATe:GENErate?
Function	Queries whether the delay function output status setting for the specified channel is set to 01P or 10P.
Example	:DELAy2:STATe:GENE? Query the output status setting status of CH2. 01P The output status setting status of CH2 is 01P.

Command	:DELAy[1|2]:STOP {NONE|<V|>V|=V|<C|>C|=C|<P|>P|=P}[,<NR2>]
Function	Sets the delay function stop condition of the specified channel.
Parameter	NONE It operates as set without any stop conditions due to voltage, current, or power. Set the stop condition to one of the following. <V: When it becomes smaller than the set voltage value >V: When it becomes larger than the set voltage value =V: When equal to the set voltage value <C: When it becomes smaller than the set current value >C: When it becomes larger than the set current value =C: When equal to the set current value <P: When it becomes smaller than the set power value >P: When it becomes larger than the set power value =P: When equal to the set power value <NR2> Set the voltage, current, and power values that serve as the stop conditions. The setting range is 0 to the maximum value of the channel to be set.
Example	:DELAy2:STOP >V,8 For CH2, set the condition for stopping the delay function to "when it becomes greater than 8V".

Command	:DELAy[1|2]:STOP?
Function	Queries the delay operation stop conditions for the specified channel.

Example	:DELAy2:STOP? Queries the CH2 delay function stop conditions. <V,10.000 The delay function stop condition is when the output voltage is 10V or less.	

Command	:DELAy:SYNChronize {ON|OFF}	
Function	When both CH1 and CH2 channels are ON with delay function, it restarts from the beginning with both channels synchronized.	
Parameter	ON	Synchronous delay function started Display “Sync” text on LCD
	OFF	Sync delay function ended
Example	:DELAy:SYNChronize ON Synchronize the delay operations of CH1 and CH2 and restart them.	

Command	:DELAy[1|2]:TIME :GENErate {FIX|INC|DEC}[,<value0>[,<value1>]]	
Function	For setting the delay function of the specified channel, the duration of each step is automatically set according to the input conditions. All Steps within the range specified by the Start and Groups settings are automatically set. At the same time this command is executed, the output ON/OFF state of each step is automatically set (changed) according to the set State Gen setting (01P or 10P). For details on the settings made using this command, see step 8 of "STEP editing method of the delay function STEP" on page 55.	
Parameter	FIX, <value0>, <value1>	The FIX setting sets constant ON and OFF times for the specified range. <value0> is the duration for Step with output ON setting, and <value1> is the duration for Step with output OFF setting. The setting range of <value0> and <value1> is 1 to 300 seconds.

	INC, <value0>, <value1>	With the INC setting, the duration of the first Step in the specified range is set to <value0>, and the duration of each Step thereafter is set by adding the value of <value1>. First Step: <value0> Second Step: <value0> + <value1> Third Step: <value0> + 2×<value1>
	DEC, <value0>, <value1>	With the DEC setting, the duration of the first Step in the specified range is set to <value0>, and the duration of each Step thereafter is set by subtracting the value of <value1>. First Step: <value0> Second Step: <value0> - <value1> Third Step: <value0> - 2×<value1>
Example	:DELAy2:TIME:GENE INC,3,5 For CH2, set the duration of each step of the delay operation to 3 seconds for the first step in the specified range, and then add 5 seconds for each subsequent step.	

Command	:DELAy[1|2]:TIME:GENErate?
Function	Queries the contents set by the ":DELAy[1|2]:TIME:GENErate" command of the specified channel.
Example	:DELAy2:TIME:GENE? Query the contents set by the ":DELAy2:TIME:GENErate" command on CH2. FIX,1,2 The settings for CH2 are "FIX,1,2".

Command	:DELAy:MEMory:SAVE {0|1|2|3|4|5|6|7|8|9}
Function	Saves the delay function settings of the all channel to the specified number in internal memory.
Parameter	{0|1|2|3|4|5|6|7|8|9} Internal memory number
Example	:DELAy2:MEMory:SAVE 1 Saves the CH2 delay function setting to internal memory 1 (DELAY01).
⚠Note	Save the delay function settings for all channels to the same internal memory number.

Command	:DELAy:MEMory:LOAD {0|1|2|3|4|5|6|7|8|9}
Function	Recalls the delay function settings for the all channel from the specified number in internal memory.
Parameter	{0|1|2|3|4|5|6|7|8|9} Internal memory number
Example	:DELAy2:MEMory:SAVE 1 Recalls CH2 delay function settings from internal memory 1 (DELAY01).

Command	:DELAy[1|2]:USB:SAVE <dest>
Function	Saves the delay function settings of the specified channel to the specified file in the USB memory.
Parameter	<dest> USB:\name.Extension name: Up to 8 alphanumeric characters Extension: CSV or DLY
	If the file to be saved is in “CSV” format, specify the channel. The file saves the settings for the specified channel. If the file to be saved is in “DLY” format, there is no need to specify the channel. The file saves settings for all channels.
Example	:DELAy2:USB:SAVE USB:\R001.CSV Save the CH2 delay operation settings to “R001.CSV” on the USB memory. If the “R001.CSV” file does not exist on the external USB memory, a “R001.CSV” file will be created.
⚠Note	This command cannot operate on files located in a folder on a USB memory. Note that settings cannot be saved during delay operation.

Command	:DELAy[1|2]:USB:LOAD <dest>
Function	Recalls the delay action settings from the specified file in the USB memory.
Parameter	<dest> USB:\name.Extension name: Up to 8 alphanumeric characters Extension: CSV or DLY

	If the file to recall the settings is in “CSV” format, specify the channel. The settings recalled from the file become the settings for the specified channel. If the file to call the settings is in "DLY" format, there is no need to specify the channel. The settings recalled from the file become the settings for all channels.
Example	:DELAy2:USB:LOAD USB:\R001.CSV Recall "R001.CSV" in the USB memory as the delay function setting for CH2.
⚠Note	This command cannot operate on files located in a folder on a USB memory.

7.4.6. Monitor function commands

Command	:MONItor[1|2|3|4]:CURRent :CONDition {<C|>C|=C|NONE},{AND|OR|NONE}
Function	Set the monitoring conditions for the output current monitoring function of the specified channel.
Parameter	Select the monitoring condition from the following. <C: Less than the set current. >C: Greater than the set current. =C: equal to the set current. NONE: Disable the current condition. Select additional monitoring conditions from the following. AND, OR, NONE The NONE setting does not change the logical operation.
Example	:MONItor2:CURRent:CONDition <C,AND Set the monitoring conditions for the CH2 output current monitoring function to "less than the set current" and "determine by ANDing the output power monitoring condition".

Command	:MONItor[1|2|3|4]:CURRent:CONDition?
Function	Queries the monitoring conditions for the output current monitoring function of the specified channel.

Example	:MONItor2:CURRent:CONDition? Queries the monitoring conditions of the CH2 output current monitoring function. <C,AND The monitoring conditions for the output current monitoring function are ``the output current value is smaller than the set current value'' and ``the output current monitoring function and the output power monitoring function are in an AND relationship.''

Command	:MONItor[1|2|3|4] :CURRent[:VALue] {<NR2>|MINimum|MAXimum}	
Function	Set the current value that is the monitoring condition for the output current monitoring function of the specified channel.	
Parameter	<NR2>	0A to maximum value of setting channel.
	MINimum	The minimum value of the channel.
	MAXimum	The maximum value of the channel.
Example	:MONItor2:CURRent 2 Set the monitoring condition to 2A for the CH2 output current monitoring function.	

Command	:MONItor[1|2|3|4]:CURRent[:VALue]?
Function	Queries the monitoring condition value for the output current monitoring function of the specified channel.
Example	:MONItor2:CURRent? Queries the monitoring condition value of the CH2 output current monitoring function. 1.5000 The monitoring condition value for the CH2 output current monitoring function is 1.5A.

Command	:MONItor[1|2|3|4]:POWER:CONDition {<P|>P|=P|NONE}
Function	Set the monitoring conditions for the output power monitoring function of the specified channel.
Parameter	Select the monitoring condition from the following. <P: Less than the set power. >P: Greater than the set power. =P: Equal to set power. NONE: Disable power conditions.

Example	:MONItor2:POWER:CONDition <P Set the monitoring condition for the CH2 output power monitoring function to "less than the set power".

Command	:MONItor[1|2|3|4]:POWER:CONDition?
Function	Queries the monitoring conditions for the output power monitoring function of the specified channel.
Example	:MONItor2:POWER:COND? Queries the monitoring conditions of the CH2 output power monitoring function. >P The monitoring condition for the output power monitoring function is "the output power value is greater than the set power value".

Command	:MONItor[1|2|3|4] :POWER[:VALue] {<NR2>|MINimum|MAXimum}	
Function	Set the monitoring condition value for the output power monitoring function of the specified channel.	
Parameter	<NR2>	0W to maximum value of setting channel.
	MINimum	The minimum value of the channel.
	MAXimum	The maximum value of the channel.
Example	:MONItor2:POWER 20 Set the monitoring condition value to 20W for the CH2 output power monitoring function.	

Command	:MONItor[1|2|3|4]:POWER[:VALue]?
Function	Queries the power value that is the monitoring condition for the output power monitoring function of the specified channel.
Example	:MONItor2:POWER? Queries the monitoring condition value of the CH2 output power monitoring function. 55.00 The monitoring condition value for the CH2 output power monitoring function is 55W.

Command	:MONItor[1|2|3|4][:STATe] {ON|OFF}
Function	Enables/disables the output monitoring function of the specified channel.

Parameter	ON: Function enabled, OFF: Function disabled
Example	:MONItor2 ON Enable the CH2 output monitoring function.

Command	:MONItor[1|2|3|4][:STATe]?
Function	Queries whether the output monitoring function of the specified channel is enabled/disabled.
Example	:MONItor2? Queries the enable/disable of the CH2 output monitoring function. ON CH2 output monitoring function is enabled.

Command	:MONItor[1|2|3|4] :STOPway {OUTOFF|ALARM |BEEPER},{ON|OFF}	
Function	For the output monitoring function of the specified channel, set the operation to occur when the monitoring conditions are met. When setting multiple operations, setting commands for each operation of OUTOFF, ALARM, and BEEPER.	
Parameter	OUTOFF	When set to ON, the output will turn OFF when the monitoring conditions are met.
	ALARM	When set to ON, a warning message is displayed on the LCD when the monitoring conditions are met.
	BEEPER	When set to ON, a buzzer sounds when the monitoring conditions are met.
Example	:MONItor2:STOPway ALARM,ON A warning message is displayed on the LCD when the monitoring conditions for the CH2 output monitoring function are met.	

Command	:MONItor[1|2|3|4]:STOPway?
Function	Queries the operation that occurs when the monitoring conditions are met for the output monitoring function of the specified channel.

Example	:MONItor2:STOPway? Queries the operation of the CH2 output monitoring function. OutputOff:ON, Alarm:OFF, Beep:OFF The operation of the CH2 output monitoring function is “OUTOFF”.

Command	:MONItor[1|2|3|4]:VOLTage :CONDition {<V|>V|=V|NONE},{AND|OR|NONE}
Function	Set the monitoring conditions for the output voltage monitoring function of the specified channel.
Parameter	Select the monitoring condition from the following. <V: Less than the set voltage. >V: Greater than the set voltage. =V: equal to the set voltage. NONE: Disable voltage conditions. Select additional monitoring conditions from the following. AND, OR, NONE The NONE setting does not change the logical operation.
Example	:MONItor2:VOLTage:CONDition <V,AND Set the monitoring conditions for the CH2 output voltage monitoring function to "less than the set voltage" and "determine by ANDing the output current monitoring condition".

Command	:MONItor[1|2|3|4]:VOLTage:CONDition?
Function	Queries the monitoring conditions for the output voltage monitoring function of the specified channel.
Example	:MONItor2:VOLTage:CONDition? Queries the monitoring conditions of the CH2 output voltage monitoring function. <V,OR The monitoring conditions for the output voltage monitoring function are ``the output voltage is lower than the set voltage'' and ``the output voltage monitoring function and the output current or power monitoring function are in an OR relationship.''

Command	:MONItor[1|2|3|4] :VOLTage[:VALue] {<NR2>|MINimum|MAXimum}	
Function	Set the voltage value that is the monitoring condition for the output voltage monitoring function of the specified channel.	
Parameter	<NR2>	0V to maximum value of setting channel.
	MINimum	The minimum value of the channel.
	MAXimum	The maximum value of the channel.
Example	:MONItor2:VOLTage 5 Set the monitoring condition value to 5V for the CH2 output voltage monitoring function.	

Command	:MONItor[1|2|3|4]:VOLTage[:VALue]?
Function	Queries the monitoring condition value for the output voltage monitoring function of the specified channel.
Example	:MONItor2:VOLTage? Query the monitoring condition value of the CH2 output voltage monitoring function. 10.100 The monitoring condition value for the CH2 output power monitoring function is 10.1V.

7.4.7. External I/O Function Commands

Command	:TRIGger:IN[:ENABle] {D0|D1|D2|D3|D4},{ON|OFF}
Function	Sets enable/disable of the trigger input function for the specified data line.
Example	:TRIGger:IN D0,ON Enable the trigger input function for data line D0.

Command	:TRIGger:IN[:ENABle]? {D0|D1|D2|D3|D4}
Function	Queries whether the trigger input function is enabled or disabled for the specified data line.
Example	:TRIGger:IN? D0 Queries whether the trigger input function is enabled/disabled for data line D0. ON The trigger input function of data line D0 is valid.

Command	:TRIGger:IN:RESPonse {D0|D1|D2|D3|D4}, {ON|OFF|TOGGLE|POWER|CV|CC|CR|IND|SER|PAR}	
Function	Sets the response when a trigger is input to the specified data line.	
Parameter	ON	Output ON setting When a trigger signal is input to the specified data line, the output of the selected channel is turned ON.
	OFF	Output OFF setting When a trigger signal is input to the specified data line, the output of the selected channel is turned off.
	TOGGLE	Output ON/OFF state is inverted When a trigger signal is input to the specified data line, the output state of the selected channel is reversed (if the output is ON, the output changes to OFF; if the output is OFF, the output changes to ON).
	POWER	Switch to power supply mode When a trigger signal is input to the designated data line, the controlled channel switches to power supply mode.
	CV	Switch to electronic load mode CV mode When a trigger signal is input to the specified data line, the controlling channel switches to CV operation in electronic load mode.
	CC	Switch to electronic load mode CC mode When a trigger signal is input to the specified data line, the controlling channel switches to CC operation in electronic load mode.
	CR	Switch to electronic load mode CR mode When a trigger signal is input to the specified data line, the controlled channel switches to CR operation in electronic load mode.
	IND	Switching to independent operation mode When a trigger signal is input to the specified data line, CH1 and CH2 switch to independent operation in power supply mode.

	SER	Switching to series tracking mode When a trigger signal is input to the designated data line, CH1 and CH2 switch to series tracking operation.
	PER	Switch to parallel tracking mode When a trigger signal is input to the specified data line, CH1 and CH2 switch to parallel tracking operation.
⚠Note	When setting IND/SER/PAR parameters, both CH1 and CH2 of "Controlled Source:" must be selected and both CHs must be set to power mode.	
Example	:TRIGger:IN:RESPonse D0,ON When a trigger signal is input to data line D0, the selected channel is set to output ON.	

Command	:TRIGger:IN:RESPonse? {D0|D1|D2|D3|D4}
Function	Queries the operation of the specified data line when a trigger is input.
Example	:TRIGger:IN:RESPonse? D0 Queries the operation when a trigger is input for data line D0. POWER The selected channel operates in power mode by trigger input to D0.

Command	:TRIGger:IN :SENSitivity {D0|D1|D2|D3|D4},{LOW|MID|HIGH}
Function	Sets the trigger input sensitivity for the specified data line. When the input operation is not set, the command will not be accepted.
Parameter	LOW By lowering the trigger input sensitivity, MID malfunctions in noisy environments can be HIGH suppressed.
Example	:TRIGger:IN:SENSitivity D0,LOW Set the trigger input sensitivity of data line D0 to LOW.

Command	:TRIGger:IN:SENSitivity? {D0|D1|D2|D3|D4}
Function	Queries the trigger input sensitivity for the specified data line.

Example	:TRIGger:IN:SENSitivity? D0 Queries the trigger input sensitivity for data line D0. MID The trigger input sensitivity setting is MID.

Command	:TRIGger:IN:SOURce {D0|D1|D2|D3|D4}, {CH1|CH2|CH3|CH4},{ON|OFF}
Function	Sets the channel to be operated by the trigger input for the specified data line. Multiple channels can be run on the same data line. The operation is specified with ":TRIGger:IN:RESPonse".
Parameter	CH1, CH2, CH3, CH4 All channels can be controlled.
Example	:TRIGger:IN:SOURce D0,CH1,ON Set CH1 to operate when a trigger is input to data line D0.

Command	:TRIGger:IN:SOURce? {D0|D1|D2|D3|D4}
Function	Queries the channel that operates when a trigger signal is input to the specified data line.
Example	:TRIGger:IN:SOURce? D0 Queries the channel to operate when a trigger is input to data line D0. CH1,CH2 When a trigger is input to data line D0, the operating channels are CH1 and CH2.

Command	:TRIGger:IN:TYPE {D0|D1|D2|D3|D4}, {RISE|FALL|HIGH|LOW|STATE}	
Function	Sets the type of trigger input for the specified data line.	
Parameter	RISE	Rising edge
	FALL	Falling edge
	HIGH	High level signal
	LOW	LOW level signal
	STATE	Both rising and falling edges
Example	:TRIGger:IN:TYPE D0,RISE For data line D0, set the input trigger RISE (rising edge).	
 Note	When "STATE" is set with this command, Response is set to "Output Off".	

Command	:TRIGger:IN:TYPE? {D0|D1|D2|D3|D4}
Function	Queries the input trigger type for the specified data line.
Example	:TRIGger:IN:TYPE? D0 Queries the input trigger type for data line D0. RISE The input trigger type for data line D0 is RISE.

Command	:TRIGger:OUT :CONDition {D0|D1|D2|D3|D4}, {OUTOFF|OUTON|>V|<V|=V|>C|<C|=C| >P|<P|=P|AUTO},<NR2>
Function	Sets the trigger output condition for the specified data line.
Parameter	Input trigger: The specified channel triggers output under the following conditions. OUTOFF: When output is turned off OUTON: When output is turned on Voltage trigger: The specified channel triggers output under the following conditions. >V: Output voltage is greater than the reference value. <V: Output voltage is less than the reference value. =V: The output voltage is equal to the reference value. Current trigger: The specified channel triggers output under the following conditions. >C: Output current is greater than the reference value. <C: Output current is less than the reference value. =C: Output current and reference value are equal. Power trigger: The specified channel triggers output under the following conditions. >P: Output power is greater than the reference value. <P: Output power is less than the reference value. =P: Output power equals reference value. AUTO: automatic trigger When any of the preset voltage, current or power trigger conditions are met, a trigger will be output.

	<NR2> When setting a voltage trigger, current trigger, or power trigger, you must enter the voltage, current, and power values that will be used as the criteria for trigger operation. When selecting OUTOFF, OUTON, or AUTO, omit the trigger operation judgment reference value.
Example	:TRIGger:OUT:CONDition D0,>V,10 Set the trigger output condition of data line D0 to "when the output voltage exceeds 10V".

Command	:TRIGger:OUT:CONDition? {D0|D1|D2|D3|D4}
Function	Queries the trigger output condition for the specified data line.
Example	:TRIGger:OUT:CONDition? D0 Query the trigger output condition of data line D0. >P,50.00 The trigger output condition is that the output power is greater than 50W.

Command	:TRIGger:OUT[:ENABle] {D0|D1|D2|D3|D4},{ON|OFF}
Function	Set enable/disable of the trigger output function for the specified data line. When the trigger output function is enabled, when the specified channel meets the trigger conditions, a level signal will be output from the specified data line according to the settings.
Example	:TRIGger:OUT D0,ON Enable the trigger output function for data line D0.

Command	:TRIGger:OUT[:ENABle]? {D0|D1|D2|D3|D4}
Function	Queries whether the trigger output function is enabled or disabled for the specified data line.
Example	:TRIGger:OUT? D0 Queries whether the trigger output function is enabled or disabled for data line D0. OFF Trigger output function is disabled.

Command	:TRIGger:OUT :POLArity {D0|D1|D2|D3|D4},POSItive|NEGAtive}

Function	Sets the polarity of the trigger output signal for the specified data line.	
Parameter	POSITIVE	Positive output: When the trigger output condition is met, the trigger output signal is output.
	NEGATIVE	Negative output: When the trigger output condition is met, the trigger output signal (reverse state signal) is output.
Example	:TRIGger:OUT:POLArity D0,POSItive For data line D0, set the polarity of the trigger output signal to positive (POSitive).	

Command	:TRIGger:OUT:POLArity? {D0|D1|D2|D3|D4}
Function	Queries the polarity of the trigger output signal for the specified data line.
Example	:TRIGger:OUT:POLArity? D0 Queries the trigger output signal polarity for data line D0. NEGATIVE Trigger output signal polarity is negative polarity output.

Command	:TRIGger:OUT :SOURce {D0|D1|D2|D3|D4},{CH1|CH2|CH3|CH4}
Function	Set which channel to associate with the trigger output function of the specified data line.
Parameter	CH1, CH2, CH3, CH4 Any one of all channels can be set. CH3 of the 3-output model cannot be set.
Example	:TRIGger:OUT:SOURce D0,CH1 Associate the trigger output function of data line D0 with CH1.

Command	:TRIGger:OUT:SOURce? {D0|D1|D2|D3|D4}
Function	Queries which channel the trigger output function is associated with for the specified data line.

Example	:TRIGger:OUT:SOURce? D0 Query which channel the trigger output function is associated with for data line D0. CH2 The channel associated with the trigger output function is CH2.

Command	:TRIGger:OUT:STATe {D0|D1|D2|D3|D4},{ON|OFF}
Function	Sets enable/disable of the OUT port status output of the trigger output function for the specified data line.
Parameter	ON: Enables OUT port status output. OFF: Disables OUT port status output.
Example	:TRIGger:OUT:STATe D0,ON Enable the trigger output function OUT port status output of data line D0.

Command	:TRIGger:OUT:STATe? {D0|D1|D2|D3|D4}
Function	Queries whether the OUT port status output of the trigger output function is enabled/disabled for the specified data line.
Example	:TRIGger:OUT:STATe? D0 Queries the trigger output function OUT port status output status of data line D0. OFF OUT port status output state is invalid.

7.4.8. Recorder Function Commands

Command	:RECOrder:PATH?
Function	Queries the save destination for recorded data using the recorder function. For CH3 of the 3-output model, it is not possible to inquire about the storage location of recorded data.

Example	:RECOrder:PATH? Queries the recorder function recording data storage destination. MEM:RECODER00 The recorded data is saved to internal memory number 0. USB:\REC00.REC The recorded data is saved to the “REC00.REC” file on the internal USB memory. USB:\\ABC\REC00.REC The recording data is saved in the "REC00.REC" file in the ABC folder of the internal USB memory.

Command	:RECOrder:MEMory {0|1|2|3|4|5|6|7|8|9}
Function	Select the internal memory number of the set to save the recorded data of the recorder function.
Parameter	{0|1|2|3|4|5|6|7|8|9} Internal memory number
Example	:RECOrder:MEMory 5 Set the recorder function recording data storage location to internal memory 5.

Command	:RECOrder:USB <dest>
Function	Select the file on the external USB memory to save the recorded data of the recorder function. It is also possible to create a file to save recorded data on an external USB memory.
Parameter	<dest> USB:\name.Extension name: Up to 8 alphanumeric characters Extension: CSV or REC
Example	:RECOrder:USB USB:\R001.CSV Select the "R001.CSV" file on the external USB memory as the file to save the recorded data of the recorder function. If the “R001.CSV” file does not exist on the external USB memory, a “R001.CSV” file will be created.
⚠Note	File operations cannot be performed using this command within the folders of the USB memory.

Command	:RECOrder:PERIod <NR1>
Function	Set the recording cycle by the recorder function. When the recorder function is turned on, the record function recording data of all channels will be recorded at recording cycle intervals.
Parameter	<NR1> 1 to 300, Unit: second.
Example	:RECOrder:PERIod 5 Set the recording cycle by the recorder function to 5 seconds.

Command	:RECOrder:PERIod?
Function	Queries the recording cycle of the recorder function.
Example	:RECOrder:PERIod? Query the recording cycle of the recorder function. 10 The recording cycle is 10 seconds.

Command	:RECOrder[:STATe] {ON|OFF}
Function	Set the start/stop of the recorder function. When the recorder function ends, the recorded data of the record function is recorded to the save destination.
Parameter	ON: Starts recorder function OFF: Stops recorder function
Example	:RECOrder ON Starts the recorder function.
⚠Note	When the recorder function is ON, you cannot specify the recording time and save destination.If the recorder function is stopped before the recorder function is finished, the recorded data will not be recorded to the save destination.If the recorded data is saved to a file on a USB memory, the recorded data can only be saved to a new file. Files cannot be overwritten.

Command	:RECOrder[:STATe]?
Function	Queries the operating status of the recorder function.
Example	:RECOrder? Queries the operating status of the recorder function. ON Recorder function is working.

Command	:RECOrder:GROUPs <value>
Function	Set the number of data to be recorded for the recorder function. The recorder function of this unit operates to record the data for the set number of data at each set cycle.
Parameter	<NR1> Save to internal memory: 1 to 2048 Save to USB memory: 1 to 204800
Example	:RECOrder:GROUPs 100 Set the number of data to be recorded to 100.

Command	:RECOrder:GROUPs?
Function	Queries the number of data to be recorded for the recorder function.
Example	:RECOrder:GROUPs? Query the number of data to be recorded using the record function. 1000 The number of data recorded using the record function is 1000.

Command	:RECOrder[1|2|3|4]:ENABle {ON|OFF}
Function	Set enable/disable of the recorder function of the specified channel. Data will be recorded only on channels where the recorder function is enabled when the recorder operation is ON.
Parameter	ON: Recorder function enabled OFF: Recorder function disabled
Example	:RECOrder2:ENABle ON Enables recording of CH2 data when record operation is ON.

Command	:RECOrder[1|2|3|4]:ENABle?
Function	Queries whether the recorder function of the specified channel is enabled/disabled.
Example	:RECOrder2:ENABle? Queries the enable/disable of the CH2 recorder function. OFF CH2 recorder function is disabled.

7.4.9. Sequence function command

Command	:SEQUence[1|2]:CYCLEs {N|I}[,<NR1>]	
Function	Sets the number of repetitions of the sequence function for the specified channel.	
Parameter	{N|I}	I: Infinite times, N: Finite times
	<NR1>	Repeat count: 1 - 99999
Example	:SEQUence2:CYCLEs N,20 Set the repeat count of CH2 sequence function to 20 times.	

Command	:SEQUence[1|2]:CYCLEs?
Function	Queries the repeat count of the sequence function of the specified channel.
Example	:SEQUence2:CYCLEs? Query the number of repetitions of the CH2 sequence function. I The number of repetitions is infinite. N,100 The number of repetitions is 100.

Command	:SEQUence[1|2]:ENDState {OFF|LAST}	
Function	Sets the operation state at the end of the sequence function of the specified channel.	
Parameter	OFF	When the sequence function ends, the output is automatically turned OFF.
	LAST	When the sequence function ends, the operation state of the final step is maintained.
Example	:SEQUence2:ENDState LAST Set the operation status at the end of CH2 sequence function to “LAST”.	

Command	:SEQUence[1|2]:ENDState?
Function	Queries the operation state setting at the end of the sequence function of the specified channel.
Example	:SEQUence2:ENDState? Queries the operating state setting at the end of the CH2 sequence function. LAST The operating state setting at the end of the sequence function is LAST.

Command	:SEQUence[1|2]:GROUPs <NR1>	
Function	Set the number of steps to be executed in the sequence function of the specified channel. When a sequence function is performed, the number of steps set by this command is executed from the step set by Start.	
Parameter	<NR1>	1 to (2048 - the value set in Start). The setting range is 1 to 1948 when 100 is set for Start.
Example	:SEQUence2:GROUPs 25 For CH2, set the number of steps to be executed by the sequence function to 25.	

Command	:SEQUence[1|2]:GROUPs?
Function	Queries the number of steps for executing the sequence function on the specified channel.
Example	:SEQUence2:GROUPs? Query the number of steps to execute the sequence function of CH2. 100 The number of sequence function execution steps is 100.

Command	:SEQUence[1|2]:PARAmeter <No>,<volt>,<curr>,<time>	
Function	Set the parameter for the specified step of the sequence function on the specified channel.	
Parameter	<No>	Specify the Step number to set the parameter.

	<volt>	Sets the output voltage for the specified step. The unit is [V] and the setting range is the same as the output setting range of the specified channel.
	<curr>	Sets the output current for the specified step. The unit is [A] and the setting range is the same as the output setting range of the specified channel.
	<time>	Sets the duration of the specified Step. The unit is [seconds] and can be set within the range of 1 to 300 seconds.
Example	:SEQUence2:PARAmeter 1,8,1,10 For CH2, set Step 1 of the sequence function to 8V/1A/10 seconds.	

Command	:SEQUence[1|2]:PARAmeter? <No>,<count>	
Function	Queries the sequence function parameters for multiple steps specified by the specified channel.	
Parameter	<No>	0-2047 Set the Step number to inquire about the settings.
	<count>	1-2048 Set how many Steps to inquire about, starting from the Step number specified in <No> above.
Query content	The query will be block data starting with "#" as shown below. #90000000360,10.000,1.0000,3;1,0.100,1.0000,1; "#9" in blue means that the number of characters in the reply content is 9 digits. The 9-digit "000000036" means that the setting content of the Step specified by the sequence function in black characters is 36 characters. The number of characters includes "," and ";", and includes delimiters that are not even displayed as one character.The black text is the setting details of the specified step of the sequence function. The settings for each step are separated by ";". The setting contents of each step are "Step No., set voltage value, set current value Step duration", separated by ",". For “0,10.000,1.0000,3”, Step No.0 is set to 10V1A and the duration is 3 seconds.	

Example	:SEQUence2:PARAmeter? 0,2 Queries the sequence function setting parameters for CH2, Step number 0 to two Steps (Step 0 and Step 1). #90000000360,10.000,1.0000,3;1,0.100,1.0000,1; Step number 0 has a duration of 3 seconds with a 10V1A setting. Step number 1 has a duration of 1 second with a setting of 0.1V1A.

Command	:SEQUence[1|2]:RESTart
Function	Restarts the sequence function of the specified channel from the beginning.
Example	:SEQUence2:RESTart For CH2, restart the sequence function from the beginning.

Command	:SEQUence[1|2]:STARt <NR1>
Function	Set the step number to be executed first when executing the sequence function on the specified channel.
Parameter	<NR1> 0 to 2047
Example	:SEQUence2:STARt 10 For CH2, set the sequence function to start from Step 10.

Command	:SEQUence[1|2]:STARt?
Function	Queries the Step number to be executed first when executing a sequence function on the specified channel.
Example	:SEQUence2:STARt? Queries the Step number to be executed first using the CH2 sequence function. 0 The first step number executed by the sequence function is 0.

Command	:SEQUence[1|2][:STATe] {ON|OFF}
Function	Set the start and stop of the sequence function for the specified channel.
Parameter	ON: Sequence function starts operating OFF: Sequence function operation stopped
Example	:SEQUence2:STATe ON Starts the sequence function for CH2.

⚠Note	The output state changes when the sequence function is turned on, so before turning on the sequence function, make sure that it does not affect the connected load. Sequence output operates only when the sequence function parameters are set and the sequence function is set to ON. While the sequence function is in operation, settings related to the sequence function cannot be changed. Also, in models with multiple channels, the sequence function will be turned ON/OFF only for the specified channel. Please note that the sequence function and delay function cannot be used at the same time.

Command	:SEQUence[1|2][:STATe]?
Function	Queries the operating status of the sequence function of the specified channel.
Example	:SEQUence2:STATe? Query the sequence function operating status for CH2. ON CH2 sequence function is operating.

Command	:SEQUence:SYNChronize {ON|OFF}	
Function	While the sequence function of both CH1 and CH2 channels is active, synchronize and restart the two channels.	
Parameter	ON	Synchronous sequence function starts Display “Sync” text on LCD
	OFF	Synchronous sequence operation ends
Example	:SEQUence:SYNChronize ON Synchronize both channels CH1 and CH2 and restart the sequence function operation.	

Command	:SEQUence[1|2]:TEMPlet:CONSTruct
Function	When this command is executed, the sequence waveform being edited with the sequence waveform function is actually set as parameters for each step of the specified channel according to the edited contents.
Example	:SEQUence2:TEMPlet:CONSTruct The template selected by the sequence waveform function is set to the CH2 sequence output parameter.

Command	:SEQUence[1|2]:TEMPlet:FALLRate <NR1>
Function	Sets the fall parameter for the sequence waveform function ExpFall of the specified channel.
Parameter	<NR1> 0 to 10
Example	:SEQUence2:TEMPlet:FALLR 5 For CH2, set the fall parameter on ExpFall to 5.

Command	:SEQUence[1|2]:TEMPlet:FALLRate?
Function	Queries the falling parameter of the sequence waveform function ExpFall of the specified channel.
Example	:SEQUence2:TEMPlet:FALLRate? Queries the falling parameter by ExpFall for CH2. 5 ExpFall's falling parameter is 5.

Command	:SEQUence[1|2]:TEMPlet:INTErval <NR1>
Function	Sets the time per step applied when setting with the sequence waveform function of the specified channel.
Parameter	<NR1> 1 to 300: Unit s This value is set as the duration of each step when generating waveforms with the sequence waveform function.
Example	:SEQUence2:TEMPlet:INTErval 15 When setting each step using the sequence waveform function on CH2, set the duration of each step to 15 seconds. However, this setting is not reflected in the Pulse setting.

Command	:SEQUence[1|2]:TEMPlet:INTErval?
Function	Queries the setting value of the duration applied to each step when setting with the sequence waveform function of the specified channel.
Example	:SEQUence2:TEMPlet:INTErval? When setting each step using the sequence waveform function on CH2, query the duration setting value applied to each step. 2 The duration applied to each step is 2 seconds.

Command	:SEQUence[1|2]:TEMPlet:INVErt {ON|OFF}
Function	Sets whether to invert the waveform edited in the sequence waveform function of the specified channel. When inverting the selected waveform, first invert the selected waveform, and then set the time. Supported waveforms are Sine, Pulse, and Ramp only.
Example	:SEQUence2:TEMPlet:INVErt ON Inverts the waveform selected by the CH2 sequence waveform function.

Command	:SEQUence[1|2]:TEMPlet:INVErt?
Function	Queries the output inversion setting for the waveform selected by the sequence waveform function of the specified channel.
Example	:SEQUence2:TEMPlet:INVErt? Queries the inversion setting of the selected waveform for the CH2 sequence waveform function. OFF The selected waveform of the sequence waveform function is set to inversion OFF.

Command	:SEQUence[1|2]:TEMPlet :MAXValue {<NR2>|MINimum|MAXimum}	
Function	Sets the maximum voltage/current value for the waveform selected by the sequence waveform function of the specified channel.	
Parameter	<NR2>	0 to maximum value of setting channel.
	MINimum	The minimum value of the channel.
	MAXimum	The maximum value of the channel.
	When editing the output voltage, the maximum voltage value is set, and when editing the output current, the maximum current value is set. If Pulse is selected as the waveform, set the value of the high level of the pulse.	
Example	:SEQUence2:TEMPlet:MAXValue 5 When setting output voltage: Set the maximum voltage to 5V for the waveform selected by the CH2 sequence waveform function.	

Command	:SEQUence[1|2]:TEMPlet:MAXValue?
Function	Queries the maximum voltage/current setting for the waveform selected by the sequence waveform function of the specified channel.
Example	:SEQUence2:TEMPlet:MAXValue? Queries the maximum voltage/current value for the waveform selected with the CH2 sequence waveform function. 33.000 The maximum voltage setting is 33V. : In case of voltage edit selection

Command	:SEQUence[1|2]:TEMPlet :MINValue {<NR2>|MINimum|MAXimum}	
Function	Set the minimum voltage/current value for the waveform selected by the sequence waveform function of the specified channel.	
Parameter	<NR2>	0 to maximum value of setting channel.
	MINimum	The minimum value of the channel.
	MAXimum	The maximum value of the channel.
Parameter	When editing the output voltage, the minimum voltage value is set, and if editing the output current, the minimum current value is set. If Pulse is selected as the waveform, set the value of the Low level of the pulse.	
Example	:SEQUence2:TEMPlet:MINValue 0.5 When setting output voltage: Set the minimum voltage to 0.5V for the waveform selected by the CH2 sequence waveform function.	

Command	:SEQUence[1|2]:TEMPlet:MINValue?
Function	Queries the minimum voltage/current setting for the waveform selected by the sequence waveform function of the specified channel.

Example	:SEQUence2:TEMPlet:MINValue? Queries the minimum voltage/current value for the waveform selected by the CH2 sequence waveform function. 10.000 The minimum voltage setting is 10V. : In case of voltage edit selection

Command	:SEQUence[1|2]:TEMPlet:OBJect {V|C}
Function	Select whether to edit the voltage or current for the waveform selected by the sequence waveform function of the specified channel.
Parameter	V: Voltage edit selection C: Current edit selection
Example	:SEQUence2:TEMPlet:OBJect V Sets voltage editing for the waveform selected by the CH2 sequence waveform function.

Command	:SEQUence[1|2]:TEMPlet:OBJect?
Function	Queries whether you are editing the voltage or current of the waveform selected in sequence waveform mode of the specified channel.
Example	:SEQUence2:TEMPlet:OBJect? Queries the editing items for the waveform selected with the CH2 sequence waveform function. V The selected waveform with the sequence waveform function is voltage editing selection.

Command	:SEQUence[1|2]:TEMPlet:POINTs <NR1>
Function	Sets how many steps are used to change the waveform selected by the sequence waveform function of the specified channel. However, it cannot be used for Pulse settings.
Parameter	<NR1> 10 to 2048
Example	:SEQUence2:TEMPlet:POINTs 10 Set the waveform selected by the CH2 sequence waveform function to change in 10 steps.

Command	:SEQUence[1|2]:TEMPlet:POINTs?
Function	Queries how many steps are used to change the waveform selected by the sequence waveform function of the specified channel.
Example	:SEQUence2:TEMPlet: POINTs? Queries how many steps are used to change the waveform selected by the CH2 sequence waveform function. 200 With the sequence waveform function, the selected waveform changes in 200 steps.

Command	:SEQUence[1|2]:TEMPlet:RISERate <NR1>
Function	Set the rise parameter to the sequence waveform function ExpRise of the specified channel.
Parameter	<NR1> 0 to 10
Example	:SEQUence2:TEMPlet:RISERate 10 Set the rise parameter to 10 for the sequence waveform function ExpRise selected in CH2.

Command	:SEQUence[1|2]:TEMPlet:RISERate?
Function	Queries the rise parameter set by the sequence waveform function ExpRise of the specified channel.
Example	:SEQUence2:TEMPlet:RISERate? Queries the rising parameters of CH2 ExpRise. 5 ExpRise's rise parameter is 5.

Command	:SEQUence[1|2]:TEMPlet :SELect {SINE|PULSE|RAMP|UP|DN|UPDN|RISE|FALL}	
Function	Select the waveform to use for the sequence waveform function of the specified channel.	
Parameter	SINE	Sine wave
	PULSE	Pulse wave
	RAMP	Saw wave
	UP	Monotonically increasing waveform
	DN	Monotonically decreasing waveform

	UPDN	Monotonically increasing → Monotonically decreasing waveform
	RISE	Rise waveform
	FALL	Falling wave
Example	:SEQUence2:TEMPlet:SELect SINE For CH2, set the waveform used in the sequence waveform function to sine wave.	

Command	:SEQUence[1|2]:TEMPlet:SELect?
Function	Queries the waveform selected by the sequence waveform function of the specified channel.
Example	:SEQUence2:TEMPlet:SELect? Queries the selected waveform of the CH2 sequence waveform function. SINE The waveform selected by the sequence waveform function is a sine wave.

Command	:SEQUence[1|2]:TEMPlet:SYMMetry <NR1>
Function	Set the symmetry ratio for RAMP of the sequence waveform function of the specified channel.
Parameter	<NR1> 0-100, unit: %
Example	:SEQUence2:TEMPlet:SYMMetry 50 For CH2, set the symmetry ratio of the RAMP output by the sequence waveform function to 50%.

Command	:SEQUence[1|2]:TEMPlet:SYMMetry?
Function	Queries the set symmetry for the RAMP output of the sequence waveform function of the specified channel.
Example	:SEQUence2:TEMPlet:SYMMetry? Queries the symmetry ratio setting value set in the RAMP output of the sequence waveform function for CH2. 60 RAMP output symmetry ratio is 60%.

Command	:SEQUence[1|2]:TEMPlet:WIDTh <NR1>
Function	Sets the pulse width for Pulse of the sequence waveform function of the specified channel.

Parameter	<NR1>	Unit seconds 1 to (“Points” setting of sequence waveform function - 1)
Example	:SEQUence2:TEMPlet:WIDTh 5 Set the pulse width of Pulse by the sequence waveform function of CH2 to 5 seconds.	

Command	:SEQUence[1|2]:TEMPlet:WIDTh?
Function	Queries the pulse width that is set for Pulse of the sequence waveform function of the specified channel.
Example	:SEQUence2:TEMPlet:WIDTh? Queries the pulse width of the pulse output of the CH2 sequence waveform function. 20 The pulse output pulse width of the sequence waveform function is 20 seconds.

Command	:SEQUence[1|2]:TEMPlet:STARt <NR1>	
Function	Set the waveform start step number to be edited for the sequence waveform function of the specified channel.	
Parameter	<NR1>	0 to 2037
Example	:SEQUence2:TEMPlet:STARt 100 Set the waveform start step number during editing of the CH2 sequence waveform function to 100.	

Command	:SEQUence[1|2]:TEMPlet:STARt?
Function	Queries the waveform start step number being edited for the sequence waveform function of the specified channel.
Example	:SEQUence2:TEMPlet:STARt? Queries the starting step number of the waveform being edited for the sequence waveform function of CH2. 50 The waveform start step number being edited is 50.

Command	:SEQUence:MEMory:SAVE {0|1|2|3|4|5|6|7|8|9}
Function	Saves sequence function settings for all channels to internal memory.

Parameter	{0|1|2|3|4|5|6|7|8|9} "SEQUENCE00~09" in internal memory
Example	:SEQUence:MEMory:SAVE 1 Saves the sequence function settings for all channels to internal memory SEQUENCE01.

Command	:SEQUence:MEMory:LOAD {0|1|2|3|4|5|6|7|8|9}
Function	Recalls the sequence function settings for the all channel from internal memory.
Parameter	{0|1|2|3|4|5|6|7|8|9} "SEQUENCE00~09" in internal memory
Example	:SEQUence:MEMory:LOAD 1 Recalls the sequence function settings for all channels from internal memory SEQUENCE01.

Command	:SEQUence[1|2]:USB:SAVE <dest>
Function	Saves the sequence function settings of the specified channel to the specified file on the USB memory.
Parameter	<dest> USB:\name.Extension name: Up to 8 alphanumeric characters Extension: CSV or SEQ
	If the file to be saved is in "CSV" format, specify the channel. The file saves the settings for the specified channel. If the file to be saved is in "SEQ" format, there is no need to specify the channel. The file saves settings for all channels.
Example	:SEQUence1:USB:SAVE USB:/R001.CSV Save the CH1 sequence function settings to "R001.CSV" in the USB memory. If the "R001.CSV" file does not exist on the external USB memory, a "R001.CSV" file will be created.
⚠ Note	This command cannot operate on files located in a folder on a USB memory. Note that settings cannot be saved during sequence function.

Command	:SEQUence[1|2]:USB:LOAD <dest>
Function	Recalls the sequence function settings for the specified channel from the USB memory.

Parameter	<dest>	USB:\name.Extension name: Up to 8 alphanumeric characters Extension: CSV or SEQ
	If the file to recall the settings is in “CSV” format, specify the channel. The settings recalled from the file become the settings for the specified channel. If the file to call the settings is in "SEQ" format, there is no need to specify the channel. The settings recalled from the file become the settings for all channels.	
Example	:SEQUence1:USB:LOAD USB:/R001.CSV Recall the CH1 sequence function settings from “R001.CSV” in the USB memory.	
⚠Note	This command cannot operate on files located in a folder on a USB memory.	

7.4.10. Status commands

Command	STATUS?		
Function	Query the operational status. Returns an 8-bit value in decimal according to the table below.		
Return value	Bit	Item	Description
	0	CH1	0: CC, 1: CV
	1	CH2	0: CC、1: CV
	2,3	Tracking	01: Independent, 10: Parallel, 10：Series
	4	Beep	0: OFF, 1: ON
	5	Output	Main output 0: OFF, 1 ON
	6,7	Baud	00: 115200bps, RS-232C/USB 01: 57600bps, RS-232C/USB 10: 9600bps, RS-232C/USB
	Except for the bauds above, bytes 6 and 7 are 11 in other states (19200bps, 38400bps, LAN, GPIB).		
Example	STATUS? Query the operational status. Return value: 01010111 CH1: CC, CH2: CV, ch1/ch2 independent output, buzzer: off, Main: ON, IF: GPIB/LAN		

Command	:STATus:PRESet
Function	Clear the Operation Event Enable register, Measurement Event Enable register, and Questionable Event Enable register. This will return these Event Enable registers to their default settings.
Example	:STATus:PRESet Clear the Event Enable register.

Command	:STATus:OPERation[:EVENt]?
Function	Query the Operation Event register.
Example	:STATus:OPERation? Returns the Operation Event register.

Command	:STATus:OPERation:CONDition?
Function	Queries the Operation Condition Status register.
Example	:STATus:OPERation:CONDition? Returns the Operation Condition Status register.

Command	:STATus:OPERation:ENABle <NR1>	
Function	Sets the Operation Enable Status register.	
Parameter	<NR1>	8: CL (Current enable bit) 16: CLT (Current limit tripped enable bit) 64: PSS (Power supply shutdown enable bit)
Example	:STATus:OPERation:ENABle 64 Set the Operation Enable Status register to PSS.	

Command	:STATus:OPERation:ENABle?
Function	Queries the Operation Status Enable register.
Example	:STATus:OPERation:ENABle? Returns the Operation Status Enable register.

Command	:STATus:MEASurement:ENABle <NR1>	
Function	Set the Measurement Status Enable register.	
Parameter	<NR1>	8: ROF (reading overflow enable bit) 16: PTT (pulse trigger timeout enable bit) 32: RAV (Reading available enable bit) 512: Buffer full enable bit.

	This register is a 16-bit configuration. When register setting is a number between 256 and 511, that number is set. When register setting is a number between 512 and 65535, bit 8 Cal is set.
Example	:STATus:MEASurement:ENABle 8 Set the Measurement Status Enable register to ROF.

Command	:STATus:MEASurement[:EVENt]?
Function	Query the Measurement Event Status register.
Example	:STATus:MEASurement? Returns the Measurement Event Status register.

Command	:STATus:MEASurement:ENABle?
Function	Query the Measurement Status Enable register.
Example	:STATus:MEASurement:ENABle? Returns the Measurement Status Enable register.

Command	:STATus:MEASurement:CONDition?
Function	Query the Measurement Condition Status register.
Example	:STATus:MEASurement:CONDition? Returns the Measurement Condition Status register.

Command	:STATus:QUEStionable[:EVENt]?
Function	Queries the Questionable Event Status register.
Example	:STATus:QUEStionable? Returns the Questionable Event Status register.

Command	:STATus:QUEStionable:CONDition?
Function	Queries the Questionable Condition Status register.
Example	:STATus:QUEStionable:CONDition? Returns the Questionable Condition Status register.

Command	:STATus:QUEStionable:ENABle <NR1>
Function	Sets the Questionable Enable Status register.
Parameter	<NR1> 256: CAL (Calibration summary enable bit)

	This register is 16bit configuration. When register setting is a number between 256 and 511, that number is set. When register setting is a number between 512 and 65535, bit 8 Cal is set.
Example	:STATus:QUEStionable:ENABle 512 Enable bit 8 (CAL) of the Questionable Enable Status register.

Command	:STATus:QUEStionable:ENABle?
Function	Query the Questionable Enable Status register.
Example	:STATus:QUEStionable:ENABle? Returns the Questionable Enable Status register.

Command	:STATus:QUEue[:NEXT]?
Function	Read messages stored in the error queue.
Example	:STATus:QUEue? Returns an error message in the error queue.

Command	:STATus:QUEue:ENABle <list>
Function	Set what to output to the error queue for specific error messages and status messages.
Parameter	<list> (-440:+900) Output all error messages. (-110): Output only errors with error code -110. (-110:-222) Output only errors between error codes -110 to -222. (-110:-222, -220) Outputs errors between error code -110 to -220 and errors with error code -220.
Example	:STATus:QUEue:ENABle (-110:-222) Only errors with error codes between -110 and -222 will be output to the output queue.

Command	:STATus:QUEue:ENABle?
Function	Queries the error messages that are set to be output to the output queue.

Example	:STATus:QUEue:ENABle? Returns the error messages that are set to be output to the output queue.

Command	:STATus:QUEue:DISable <list>
Function	Set specific error messages and status messages that are not output to the error queue.
Parameter	<list> (-440:+900) Do not output any errors. (-110) Only error code -110 will not be output. (-110:-222) Only the errors between error code -110 to -222 will not be output. (-110:-222, -220) Prevents output of errors between error code -110 and -220 and error code -220.
Example	:STATus:QUEue:DISable (-110:-222) Do not output errors between error codes -110 to -222 to the error queue.

Command	:STATus:QUEue:DISable?
Function	Queries errors that are set not to be output to the error queue.
Example	:STATus:QUEue:DISable? Returns errors that are set not to be output to the error queue.

Command	:STATus:QUEue:CLEar
Function	Deletes all error messages stored in the error queue.
Example	:STATus:QUEue:CLEar Deletes all error messages stored in the error queue.

7.4.11. System commands

Command	:SYSTem:VERSion?
Function	Queries the firmware version.
Example	:SYSTem:VERSion? Returns the version.

Command	:SYSTem:ERRor?
Function	Acknowledge the error message stored in the error queue and remove it from the queue.
Example	:SYSTem:ERRor? Remove error responses and errors from the queue.

Command	ERR?
Function	Checks the error status and returns the last error message.
Reply error message	Description
a	Command is too long The command length must be 15 characters or less.
b	Invalid characters An invalid character has been entered. Example: VOUT#
c	Parameter error The command has no parameters. Example: VSET: (requires a number)
d	Out-of-bounds data The input value is out of specification. Example: VSET:33 (must be ≤32V)
e	Prohibited commands The command you entered is not allowed. Example: Trying to set the CH2 output while in tracking mode.
f	Undefined header The command you entered is either unterminated or has incorrect syntax.

Command	:SYSTem:CLEar
Function	Clear the error queue.
Example	:SYSTem:CLEar Clear the error queue.

Command	:SYSTem:POSetup <RST|Last>
Function	Select the state to be set immediately after power-on.

Parameter	RST: The set will start with the default settings of the machine. Last: The set will start with the settings from when the power was last turned off.
Example	:SYSTem:POSetup RST The state set immediately after the power is turned on is the default setting of the unit.

Command	:SYSTem:POSetup?
Function	Queries the state to be set immediately after power-on.
Example	:SYSTem:POSetup? Returns the status that is set immediately after power-on.

Command	:SYSTem:COMMunicate:LAN:DHCP[:STATe] <b>
Function	Set whether to enable or disable DHCP.
Parameter	<b> 0/OFF: Disable DHCP 1/ON: Enable DHCP
⚠Note	To enable DHCP setting by this command, you need to execute ":SYSTem:COMMunicate:LAN:APPLy" command.
Example	:SYSTem:COMMunicate:LAN:DHCP ON Enable DHCP.

Command	:SYSTem:COMMunicate:LAN:DHCP[:STATe]?
Function	Queries whether DHCP is enabled/disabled.
Example	:SYSTem:COMMunicate:LAN:DHCP? Returns whether DHCP is enabled or disabled.

Command	:SYSTem:COMMunicate:LAN:IPADdress <IP address>
Function	Set the IP address.
Parameter	<IP address> Set in the range of 1.0.0.0 to 223.255.255.255. However, 127.nnn.nnn.nnn is excluded.
⚠Note	This command is valid only when manually setting the IP address. Also, to enable the IP address set by this command, the :SYSTem:COMMunicate:LAN:APPLy command must be executed.

Example	:SYSTem:COMMunicate:LAN :IPADdress 172.131.161.152 Set the IP address to 172.131.161.152.

Command	:SYSTem:COMMunicate:LAN:IPADdress?
Function	Queries the IP address.
Example	:SYSTem:COMMunicate:LAN:IPADdress? Returns the IP address.

Command	:SYSTem:COMMunicate:LAN:SMASk <Mask>
Function	Set the subnet mask.
Parameter	<Mask> Set in the range from 1.0.0.0 to 255.255.255.255.
⚠Note	To enable the subnet mask set by this command, it is necessary to execute the ":SYSTem:COMMunicate:LAN:APPLy" command.
Example	:SYSTem:COMM:LAN:SMAS 255.255.255.0 Set the subnet mask to 255.255.255.0.

Command	:SYSTem:COMMunicate:LAN:SMASk?
Function	Queries the subnet mask.
Example	:SYSTem:COMMunicate:LAN:SMASk? Returns the subnet mask.

Command	:SYSTem:COMMunicate:LAN:GATEway <IP address>
Function	Set the gateway address.
Parameter	<IP address> Set in the range from 1.0.0.0 to 223.255.255.255. However, 127.nnn.nnn.nnn is excluded.
⚠Note	To enable the gateway address set by this command, it is necessary to execute the ":SYSTem:COMMunicate:LAN:APPLy" command.
Example	:SYSTem:COMMunicate:LAN:GATEway 172.16.3.1 Set the gateway address to 172.16.3.1.

Command	:SYSTem:COMMunicate:LAN:GATEway?
Function	Queries the gateway address.

Example	:SYSTem:COMMunicate:LAN:GATEway? Returns the gateway address.

Command	:SYSTem:COMMunicate:LAN:MANualip[:STATe] <b>
Function	Set whether to enable or disable the manual setting of the IP address.
Parameter	<b> 0/OFF: Disable manual IP address configuration. 1/ON: Enable manual IP address configuration.
⚠Note	To enable the setting value with this command, it is necessary to execute the "SYSTem:COMMunicate:LAN:APPLy" command.
Example	:SYSTem:COMMunicate:LAN:MANualip ON Enable manual IP address configuration.

Command	:SYSTem:COMMunicate:LAN:MANualip[:STATe]?
Function	Queries whether manual IP address configuration is enabled or disabled.
Example	:SYSTem:COMMunicate:LAN:MANualip? Returns whether manual IP address configuration is enabled or disabled.

Command	:SYSTem:COMMunicate:LAN:APPLy
Function	When this command is executed, LAN-related settings set by other commands are applied. Note that if you are communicating via LAN, you will be disconnected.
Example	:SYSTem:COMMunicate:LAN:APPLy Actually apply all LAN related settings set by other commands.

Command	:SYSTem:REMote
Function	Set the instrument to remote mode.
Example	REMOTE Set the instrument to remote mode.

Command	REMOTE
Function	Set the instrument to remote mode.
Example	REMOTE Set the instrument to remote mode.

Command	:SYSTem:BEEPer:STATe <b>
Function	Sets ON/OFF the buzzer sound.
Parameter	<b> 0/OFF: Turn off the buzzer sound. 1/ON: Turn on the buzzer sound.
Example	:SYSTem:BEEPer:STATe OFF Turn off the buzzer sound.

Command	BEEP<Boolean>
Function	Sets ON/OFF the buzzer sound.
Parameter	<Boolean> 0: Turn off the buzzer sound. 1: Turn on the buzzer sound.
Example	BEEP1 Turn on the buzzer sound.

Command	:SYSTem:BEEPer:STATe?
Function	Queries the setting status of the buzzer sound.
Example	:SYSTem:BEEPer:STATe? Returns the setting status of the buzzer sound.

Command	:SYSTem:LOCal
Function	Cancels the remote control state and changes to the local state.
Example	:SYSTem:LOCal Cancels the remote control state and changes to the local state.

Command	LOCAL
Function	Cancels the remote control state and changes to the local state.
Example	LOCAL Cancels the remote control state and changes to the local state.

Command	:SYSTem:INTerface {USB|RS232|GPIB|LAN}
Function	Select the interface to use.
Example	:SYSTem:INTerface USB Set the interface to use USB.

Command	:SYSTem:BAUDrate :USB {9600|19200|38400|57600|115200}
Function	Select the baud rate for USB communication.
Example	:SYSTem:BAUDrate:USB 115200 Set the baud rate for USB communication to 115200bps.

Command	:SYSTem:BAUDrate:USB?
Function	Queries the baud rate for USB communication.
Example	:SYSTem:BAUDrate:USB? Returns the baud rate for USB communication.

Command	:SYSTem:BAUDrate :RS232 {9600|19200|38400|57600|115200}
Function	Select the baud rate for RS-232C communication.
Example	:SYSTem:BAUDrate:RS232 9600 Set the baud rate for RS-232C communication to 9600bps.

Command	:SYSTem:BAUDrate:RS232?
Function	Queries the baud rate for RS-232C communication.
Example	:SYSTem:BAUDrate:RS232? Returns the baud rate for RS-232C communication.

Command	BAUD<NR1>
Function	Select the baud rate from 9600bps/57600bps/115200bps. This command is for compatibility and the selection items are limited.
Parameter	<NR1> 0: 115200bps, 1: 57600bps, 2: 9600bps
 Note	This command can be executed only when communicating via RS-232C or USB. There are no query commands.
Example	BAUD0 Set the communication baud rate to 115200bps.

Command	:SYSTem:LANGuage {CHINese|ENGlish}
Function	Switches the display language between English (ENGlish) and Chinese (CHINese).

Example	:SYSTem:LANGuage ENGlish Set the display language to English.

Command	:SYSTem:LANGuage?
Function	Queries the display language.
Example	:SYSTem:LANGuage? Returns the display language.

Command	HELP?
Function	The following simple command list is returned.

- ISET<x>:<NR2>
- VSET<x>:<NR2>
- ISET<x>?
- VSET<x>?
- IOUT<x>?
- VOUT<x>?
- TRACK<NR1>
- BAUD< NR1 >
- RCL<NR1>
- SAV<NR1>
- BEEP<Boolean>
- OUT<Boolean>
- LOCAL
- REMOTE
- *IDN?
- ERR?
- STATUS?

7.4.12. IEEE488.2 common command

Command	*IDN?	
Function	Queries device information.	
Parameter	<string>	It consists of four items: manufacturer, model name, serial number, and version, and each item is separated by a comma.
Example	*IDN? The machine information is returned. Example of response TEXIO,PDW32-3Q,XXXXXXXXX,V1.00 TEXIO: Manufacturer PDW32-3Q: Model name XXXXXXXXX: Serial number V1.00: Firmware version	

Command	*RST
Function	Reset the device to factory settings.

Example	*RST Reset the device to factory settings.

Command	*SAV <NR1>
Function	Saves the current settings to the internal memory with the specified number.
Parameter	<NR1> 0 - 9: STATE00 - STATE09
Example	*SAV 3 Saves the current setting state to STATE03 in the internal memory.

Command	*RCL <NR1>
Function	Recall the setting state saved in the internal memory.
Parameter	<NR1> 0 - 9: STATE00 - STATE09
Example	*RCL 2 Recalls the setting state saved in STATE02 of the internal memory.

Command	*SRE <NR1>
Function	Controls the Service Request Enable register. It sets which of the events in the Status Byte register to enable by sending the sum of the weights of the bits.
Parameter	<NR1> 0 to 255 as a decimal number
Example	*SRE 7 Set the Service Request Enable register to decimal 7 (→ 0000 0111).

Command	*SRE?
Function	Queries the setting of the Status Byte Enable register. The return value is a decimal number that is the sum of the weights of each bit that is set in the Status Byte Enable register. The return value ranges from 0 to 255.
Example	*SRE? Queries the setting of the Service Request Enable register.

Command	*STB?

Function	Query the Status Byte register. Same as serial poll operation, but master summary bit (MSS, bit6) is not cleared by *STB command. The return value range is 0-255.
Example	*STB? Query the Status Byte register. When the Status Byte register is set to '0101 0001', the return value is '81'.

Command	*ESE <NR1>
Function	Sets the Standard Event Enable register.
Parameter	<NR1> 0 to 255 as a decimal number
Example	*ESE 65 Set the Standard Event Enable register to 65 (=0100 0001).

Command	*ESE?
Function	Queries the setting of the Standard Event Enable register. The return value is a decimal number that is the sum of the weights of each bit set in the Standard Event Enable register, and the return value range is 0-255.
Example	*ESE? Queries the setting of the Standard Event Enable register. When the register is set to '0100 0001', the return value will be 65.

Command	*ESR?
Function	Queries the Standard Event register. The return value is a decimal number in the range 0 to 255 that is the sum of the weights of the bits that are set.
Example	*ESR? Queries the Standard Event register. When the register is set to '0100 0001', the return value will be 65.

Command	*CLS

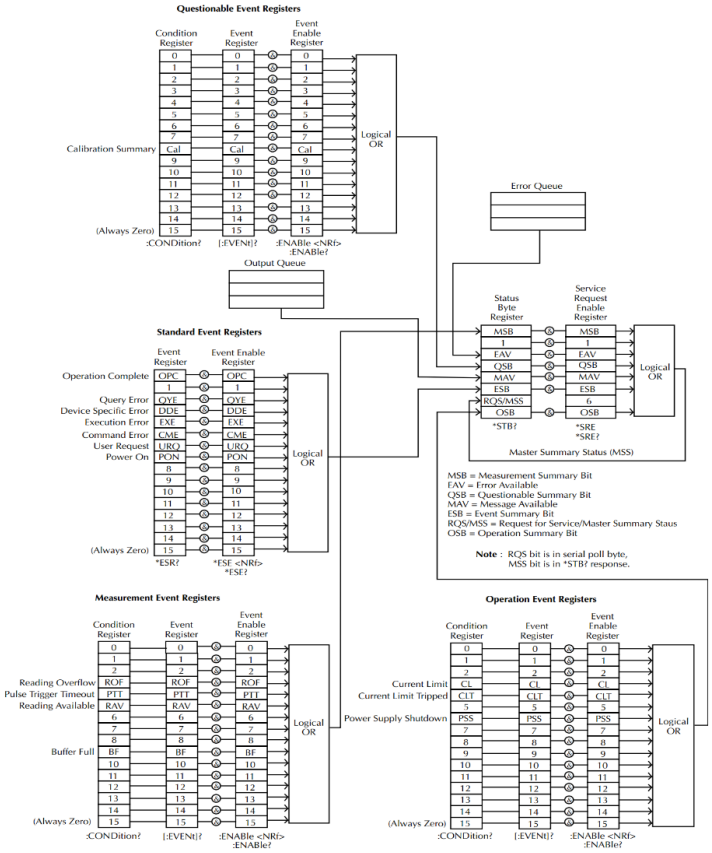
Function	Clears the Status Byte register summary, all Event registers, and each buffer.
Example	*CLS Clears the Standard Event register, Operation Event register, Measurement Event register, Questionable Event register, and each buffer.

Command	*OPC
Function	Sets the OPC bit in the Standard Event register when all pending operations are complete.
Example	*OPC

Command	*OPC?
Function	Returns 1 to the output queue if all pending operations have completed.
Example	*OPC? After the last command is executed, will return a “1” to the output queue.

7.5. SCPI Status Registers

The SCPI instrument configuration is controlled by the status registers. The Status system records various instrument conditions into three main register groups: The status byte register, the standard event register group and the questionable data register group. The status byte register records a high-level summary of the other register groups. The following diagram is the SCPI Status System diagram.



※URQ indicates that the "Lock" key on the panel has been used.
(Entering lock from unlock or Entering unlock from lock).

7.5.1. Event Registers

The operation, measurement and questionable status register groups all have event registers. The event registers are read only registers that reflect the status of the unit. Individual bits in the event registers are latched (set) when a corresponding event occurs and will remain latched even if the corresponding event changes, as long as the event bit is still set. The register query (*ESR) or the command (*CLS) will automatically clear any set bits in the event registers. The reset command (*RST) will not clear the bits in the event register. Queries for the event registers will return a binary-weighted decimal value that represents the state of all the bits in an event register.

7.5.2. Enable Registers

The enable registers define which bits in the corresponding event register can be latched (set). The enable register can be read and written to. Any queries for the enable register will not clear the value in the register. The *CLS command will not clear the enable register, but will clear the events in the event register. To allow the individual bits in the event registers to be set, the corresponding bits in the enable registers must be set, where each bit is represented by a binary number.

7.5.3. Status Byte Register

The status byte register reports the status of the other status registers. The message available bit (bit 4), will indicate when there is a message in the output buffer. Clearing an event register will clear the corresponding bit in the status byte condition register. Reading all the data in the output buffer will clear the message available bit. To set the enable register mask for the status byte register and to generate an SRQ (service request) you must use the *SRE command to write the appropriate decimal value to the register.

Status Byte レジスタのビット定義

Bit number	Decimal value	Definition
0 Not used	1	Not used, returns “0”
1 Not used	2	Not used, returns “0”
2 Error Queue	4	Indicates that one or more errors are stored in the error queue.
3 Questionable Summary bit	8	One or more bits are set in the questionable data register (for enabled events).
4 Message Available bit	16	Indicates that a message is available in the output queue.

5 Standard Event Summary bit.	32	Indicates that one or more bits are set in the standard event register. (For enabled events).
6 Master Summary bit	64	Indicates that a summary bit is set in the status byte register. (for enabled summary bits)
7 Unused	128	Not used, returns “0”

The status byte condition register is cleared when one of the following occurs:

●*CLS command is used to clear the status byte register.

●When reading the Event register from another register group.

In this case, only the corresponding bit in the condition register is cleared.

The Status Byte Enable register is cleared by the following operations.

●When the *SRE 0 command is executed.

Use the *STB? query to read the status byte register.

The *STB? query will return the contents of the status byte register if the bit 6 (MSS) has been cleared.

Using the *OPC? query to place a signal in the output buffer.

In general, it is best to use the Operation Complete Bit (bit 0) in the standard event register to check to see if an operation/command has completed. After executing the *OPC command, the OPC bit will be set to 1. If a command or query is placed in the output buffer immediately before the *OPC command is sent, the Operation Complete Bit can be used to determine when the information can be used. However, if too many commands/queries are executed prior to the execution of the *OPC command, the output buffer could become saturated and the unit will stop taking readings.

However if too many commands/queries are executed prior to the execution of the *OPC command, the output buffer could become saturated and the unit will stop taking readings.

7.5.4. Standard Event Register

The Standard Event Register reports the following types or events: Power on has been detected, command syntax errors, command execution errors, self-test and execution errors, query errors or if the *OPC command is executed. Any one or more of these events will set the standard event summary bit in the status byte register. To set a mask for the enable register, a binary-weighted decimal number must be written using the *ESE command.

Bit Definition for the Standard Event Register

Bit number	Decimal value	Definition
0 Operation Complete Bit	1	The *OPC command will set this bit when all overlapping operations have completed (including the *OPC command itself).
1 Not used	2	Not used, returns 0.
2 Query Error	4	This bit is set when reading from the queue when it is empty, or when the input and output buffers are full.
3 Device Error	8	This bit is set in the event of a self-test, calibration, or other device-specific error.
4 Execution Error	16	This bit is set if there is an execution error.
5 Command Error	32	This bit is set in case of a syntax error in the command.
6 Not used	64	Not used, return 0.
7 Power On	128	This bit is set if the power has been reset since the last time the event register was read.

The following will clear the standard event register:

- When The *CLS command is executed.
- When the *ESR command is executed to query the Event register.

The following operations clear the Standard Event Enable register.

- When The *ESE command is executed.

7.6. Errors

7.6.1. Error Message

- Errors are stored in a first in-first out (FIFO) order. The first error message that is returned is the first error message that was stored. When an error is read it is also cleared from the queue.
- When there are more than 10 errors produced the last error in the queue is replaced with “Que overflow”. Unless the error queue is cleared, no more errors can be written to the error queue. If there are no errors in the error queue, the instrument will return “No error”.
- To clear the error queue, you can use the “:SYSTem:CLEar” command or cycle the power. When you read a message from the error queue that message will be cleared from the error queue. Using the *RST command to reset the instrument does not clear the error queue.
- Remote control instructions can be used to clear the error queue. See the instructions listed in the previous chapter for details.

7.6.2. Command Errors

- -440 Query unterminated after indefinite
- -430 Response
- -420 Query deadlocked
- -410 Query unterminated
- -363 Query interrupted
- -350 Input buffer overrun
- -330 Queue overflow
- -314 Self-test failed
- -315 Save/recall memory lost
- -260 Configuration memory lost
- -241 Expression error
- -230 Hardware missing
- -225 Data corrupt or stale
- -224 Out of memory
- -223 Illegal parameter value
- -222 Too much data
- -221 Parameter data out of range
- -220 Settings conflict
- -200 Parameter error
- -178 Execution error
- -171 Expression data not allowed

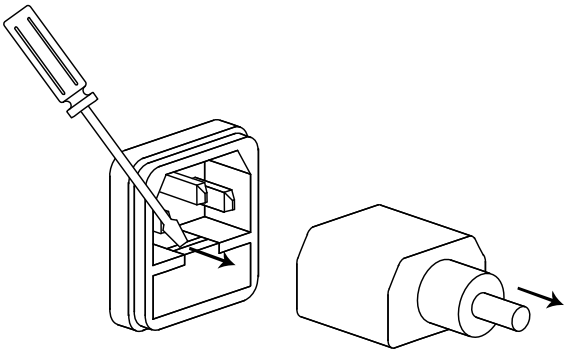
- -170 Invalid expression
- -161 Expression error
- -160 Invalid block data
- -158 Block data error
- -154 String data not allowed
- -151 String too long
- -150 Invalid string data String data error
- -148 Character data not allowed
- -144 Character data too long
- -141 Invalid character data
- -140 Character data error
- -124 Too many digits
- -123 Exponent too large
- -121 Invalid character in number
- -120 Numeric data error
- -114 Header suffix out of range
- -113 Undefined header
- -112 Program mnemonic too long
- -111 Header separator error
- -110 Command header error
- -109 Missing parameter
- -108 Parameter not allowed
- -105 GET not allowed
- -104 Data type error
- -103 Invalid separator
- -102 Syntax error
- -101 Invalid character
- -100 Command error
- +000 No error
- +101 Operation complete
- +301 Reading overflow
- +302 Pulse trigger detection timeout
- +306 Reading available
- +310 Buffer full
- +320 Current limit event
- +321 Current limit tripped event
- +409 OTP Error

- +410 OVP Error
- +438 Date of calibration not set
- +440 Gain-aperture correction error
- +500 Calibration data invalid
- +510 Reading buffer data lost
- +511 GPIB address lost
- +512 Power-on state lost
- +514 DC Calibration data lost
- +515 Calibration dates lost
- +522 GPIB communication data lost
- +610 Questionable calibration
- +900 Internal system error

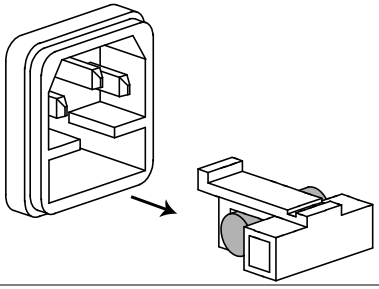
8. Appendix

8.1. Replacing the Fuse

Step Remove the power cord and then take out the box using a small screwdriver.



The fuse is stored in the housing.



Model name	PDW32-6SG, PDW32-3DG, PDW32-3TG, PDW32-3QG
Fuse rating	T6.30A/250V（100V/120V）/ T3.15A/250V（220V/230V）
Model name	PDW36-10SG, PDW72-5SG PDW30-6TG, PDW36-5TG, PDW60-3TG
Fuse rating	T12A/250V(100V/120V) / T6.3A/250V(220V/230V)

8.2. Specifications

Specifications apply under the following conditions:
The PDW series has been turned on within +20°C to +30°C for at least 30 minutes.

8.2.1. PDW32-6SG

Power supply function

Output rating	CH1 rated	0 - 32.000V, 0 - 6.0000A
Voltage characteristic	Line regulation	≤ 0.01% + 3mV
	Load regulation	≤ 0.02% + 5mV
	Ripple & noise	≤0.5mVrms, (5Hz-1MHz)
	Transient recovery time	≤100us, (50% load regulation, 0.5A minimum load)
	Temperature coefficient	≤ 300ppm/°C
Current characteristic	Line regulation	≤ 0.2% + 3mA
	Load regulation	≤ 0.2% + 3mA
	Ripple & noise	≤4mArms
Resolution	Voltage	Settings: 1mV, Readback: 0.1mV
	Current	Settings: 0.2mA, Readback: 0.2mA
Accuracy	Voltmeter	Setting digits: 5 digits Readback digits: 6 digits
	Ammeter	Setting digits: 5 digits Readback digits: 5 digits
	Voltage setting	± (0.03% of reading + 10mV)
	Current setting	± (0.3% of reading + 10mA)
	Voltage display	± (0.03% of reading + 10mV)
	Current display	± (0.3% of reading + 10mA)

Electronic load function

Load mode	CV mode, CC mode, CR mode	
Display	Voltage	1 - 33.00V
	Current	0 – 6.200A
	Power	0 – 100.00W
CV mode	Setting range	1.500V - 33.00V
	Setting display accuracy	≤0.1% + 30mV
	Resolution	10mV

CC mode	Setting range	0 - 6.200A
	Setting display accuracy	≤±0.3% + 10mA
	Resolution	1mA
CR mode	Setting range	1Ω - 1kΩ
	Setting display accuracy	≤±(3% + 1Ω) (Voltage ≥0.1V and current ≥0.1A)
	Resolution	1Ω
Other specifications		
Protection function	Overheat, overvoltage, overcurrent, overpower (under load), reverse connection (under load) When entering the protection state, the output /LOAD is turned off.	
OVP function	Power supply function	OFF, ON (0.5V - 35.0V)
	Electronic load function	OFF, ON (1.5V - 35.0V)
	Setting accuracy	±100mV
	Resolution	100mV
OCP function		OFF, ON (0.05A - 7.00A)
	Setting accuracy	±20mA
	Resolution	10mA
OPP function	Electronic load function	100W or more
Overheat protection	When internal temperature is abnormal	
Dimension	213 (W) x 145 (H) x 311.2 (D) mm	
Weight	Approximately 7.5kg	
Input voltage	AC100V/120V/220V/230V±10%, 50Hz/60Hz、Switching type	
Power consumption	360W	

8.2.2. PDW36-10SG

Power supply function		
Output rating	CH1 rated	0 - 36.000V、0 - 10.0000A
Voltage characteristic	Line regulation	≤ 0.01% + 3mV
	Load regulation	≤ 0.01% + 5mV
	Ripple & noise	≤2mVrms, (5Hz-1MHz)

	Transient recovery time	≤100us, (50% load regulation, 0.5A minimum load)
	Temperature coefficient	≤ 300ppm/°C
Current characteristic	Line regulation	≤ 0.01% + 3mA
	Load regulation	≤ 0.01% + 3mA
	Ripple & noise	≤2mArms
Resolution	Voltage	Settings: 1mV, Readback: 0.1mV
	Current	Settings: 0.2mA, Readback: 0.2mA
Accuracy	Voltmeter	Setting digits: 5 digits Readback digits: 6 digits
	Ammeter	Setting digits: 5 digits Readback digits: 5 digits
	Voltage setting	± (0.03% of reading + 10mV)
	Current setting	± (0.3% of reading + 10mA)
	Voltage display	± (0.03% of reading + 10mV)
	Current display	± (0.3% of reading + 10mA)
Electronic load function		
Load mode	CV mode, CC mode, CR mode	
Display	Voltage	1-36.50V
	Current	0-10.200A
	Power	0 – 100.00W
CV mode	Setting range	1.500V-36.50V
	Setting display accuracy	≤0.1% + 30mV
	Resolution	10mV
CC mode	Setting range	0 - 10.200A
	Setting display accuracy	≤ ± (0.3% + 10mA)
	Resolution	1mA
CR mode	Setting range	1Ω - 1kΩ
	Setting display accuracy	≤±(3% + 1Ω) (Voltage ≥0.1V and current ≥0.1A)
	Resolution	1Ω
Other specifications		
Protection	Overheat, overvoltage, overcurrent, overpower (under	

function	load), reverse connection (under load) When entering the protection state, the output /LOAD is turned off.	
OVP function	Power supply function	OFF, ON (0.5V - 38.0V)
	Electronic load function	OFF, ON (1.5V - 38.0V)
	Setting accuracy	±100mV
	Resolution	100mV
OCP function		OFF, ON (0.05A - 10.50A)
	Setting accuracy	±20mA
	Resolution	10mA
OPP function	Electronic load function	100W or more
Overheat protection	When internal temperature is abnormal	
Dimension	213 (W) x 145 (H) x 362 (D) mm	
Weight	Approximately 10kg	
Input voltage	AC100V/120V/220V/230V±10%, 50Hz/60Hz、Switching type	
Power consumption	900VA、680W	

8.2.3. PDW72-5SG

Power supply function

Output rating	CH1 rated	0 - 72.000V, 0 - 5.0000A
Voltage characteristic	Line regulation	≤ 0.01% + 3mV
	Load regulation	≤ 0.01% + 5mV
	Ripple & noise	≤2mVrms, (5Hz-1MHz)
	Transient recovery time	≤100us, (50% load regulation, 0.5A minimum load)
	Temperature coefficient	≤ 300ppm/°C
Current characteristic	Line regulation	≤ 0.01% + 3mA
	Load regulation	≤ 0.01% + 3mA
	Ripple & noise	≤2mArms
Resolution	Voltage	Settings: 2mV, Readback: 0.1mV
	Current	Settings: 0.1mA, Readback: 0.1mA

Accuracy	Voltmeter	Setting digits: 5 digits Readback digits: 6 digits
	Ammeter	Setting digits: 5 digits Readback digits: 5 digits
	Voltage setting	± (0.03% of reading + 10mV)
	Current setting	± (0.3% of reading + 10mA)
	Voltage display	± (0.03% of reading + 10mV)
	Current display	± (0.3% of reading + 10mA)
Electronic load function		
Load mode	CV mode, CC mode, CR mode	
Display	Voltage	1 – 72.50V
	Current	0 – 5.200A
	Power	0 – 100.00W
CV mode	Setting range	1.500V – 72.50V
	Setting display accuracy	≤0.1% + 30mV
	Resolution	10mV
CC mode	Setting range	0 - 5.200A
	Setting display accuracy	≤ ± (0.3% + 10mA)
	Resolution	1mA
CR mode	Setting range	1Ω - 1kΩ
	Setting display accuracy	≤±(3% + 1Ω) (Voltage ≥0.1V and current ≥0.1A)
	Resolution	1Ω
Other specifications		
Protection function	Overheat, overvoltage, overcurrent, overpower (under load), reverse connection (under load) When entering the protection state, the output /LOAD is turned off.	
OVP function	Power supply function	OFF, ON (0.5V - 75.0V)
	Electronic load function	OFF, ON (1.5V - 75.0V)
	Setting accuracy	±100mV
	Resolution	100mV
OCP function		OFF, ON (0.05A – 5.50A)
	Setting accuracy	±20mA

	Resolution	10mA
OPP function	Electronic load function	100W or more
Overheat protection	When internal temperature is abnormal	
Dimension	213 (W) x 145 (H) x 362 (D) mm	
Weight	約 10kg	
Input voltage	AC100V/120V/220V/230V±10%, 50Hz/60Hz、Switching type	
Power consumption	900VA、680W	

8.2.4. PDW32-3DG

Power supply function		
Output rating	CH1/CH2 independent output mode 0 - 32.000V, 0 - 3.0000A	
	CH1/CH2 parallel tracking mode 0 - 32.000V, 0 - 6.0000A	
	CH1/CH2 serial tracking mode 0 - 64.000V, 0 - 3.0000A	
CH1/CH2 independent output mode		
Voltage characteristic	Line regulation	≤ 0.01% + 3mV
	Load regulation	≤ 0.01% + 3mV
	Ripple & noise	≤0.35mVrms, (5Hz-1MHz)
	Transient recovery time	≤50us, (50% load regulation, 0.5A minimum load)
	Temperature coefficient	≤ 300ppm/°C
Current characteristic	Line regulation	≤ 0.2% + 3mA
	Load regulation	≤ 0.2% + 3mA
	Ripple & noise	≤2mArms
CH1/CH2 tracking mode		
	Tracking error	≤ 0.1% +10mV of Master: No load When there is a load, add load variation ≤100mV
Parallel	Line regulation	≤ 0.01% + 3mV
	Load regulation	≤ 0.02% + 5mV

Serial	Line regulation	≤ 0.01% + 5mV
	Load regulation	≤ 100mV
	Ripple & noise	≤1mVrms, (5Hz-1MHz)
Resolution	Voltage	Settings: 1mV, Readback: 0.1mV
	Current	Settings: 0.1mA, Readback: 0.1mA
Accuracy	Voltmeter	Setting digits: 5 digits Readback digits: 6 digits
	Ammeter	Setting digits: 5 digits Readback digits: 5 digits
	Voltage setting	± (0.03% of reading + 10mV)
	Current setting	± (0.3% of reading + 10mA)
	Voltage display	± (0.03% of reading + 10mV)
	Current display	± (0.3% of reading + 10mA)
Electronic load function (CH1, CH2)		
Load mode	CV mode, CC mode, CR mode	
Display	Voltage	1 - 33.00V
	Current	0 – 3.200A
	Power	0 – 50.00W
CV mode	Setting range	1.500V - 33.00V
	Setting display accuracy	≤0.1% + 30mV
	Resolution	10mV
CC mode	Setting range	0 - 3.200A
	Setting display accuracy	≤±0.3% + 10mA
	Resolution	1mA
CR mode	Setting range	1Ω - 1kΩ
	Setting display accuracy	≤±(3% + 1Ω) (Voltage ≥0.1V and current ≥0.1A)
	Resolution	1Ω
Other specifications		
Protection function	Overheat, overvoltage, overcurrent, overpower (under load), reverse connection (under load) When entering the protection state, the output /LOAD is turned off.	
OVP function	Power supply function	OFF, ON (0.5V - 35.0V)

	Electronic load function	OFF, ON (1.5V - 35.0V)
	Setting accuracy	±100mV
	Resolution	100mV
OCP function		OFF, ON (0.05A – 3.50A)
	Setting accuracy	±20mA
	Resolution	10mA
OPP function	Electronic load function	50W or more
Overheat protection	When internal temperature is abnormal	
Dimension	213 (W) x 145 (H) x 311.2 (D) mm	
Weight	Approximately 7.5kg	
Input voltage	AC100V/120V/220V/230V±10%, 50Hz/60Hz、Switching type	
Power consumption	360W	

8.2.5. PDW30-6TG

Power supply function		
Output rating	CH1/CH2 independent output mode 0 - 30.000V, 0 - 6.0000A	
	CH1/CH2 parallel tracking mode 0 - 30.000V, 0 - 12.0000A	
	CH1/CH2 serial tracking mode 0 - 60.000V, 0 - 6.0000A	
CH1/CH2 independent output mode		
Voltage characteristic	Line regulation	≤ 0.01% + 3mV
	Load regulation	≤ 0.01% + 5mV
	Ripple & noise	≤1mVrms, (5Hz-1MHz)
	Transient recovery time	≤100us, (50% load regulation, 0.5A minimum load)
	Temperature coefficient	≤ 300ppm/°C
Current characteristic	Line regulation	≤ 0.01% + 3mA
	Load regulation	≤ 0.01% + 3mA
	Ripple & noise	≤2mArms

CH1/CH2 tracking mode		
	Tracking error	≤ 0.1% +10mV of Master: No load When there is a load, add load variation ≤200mV
Parallel	Line regulation	≤ 0.01% + 3mV
	Load regulation	≤ 0.02% + 5mV
Serial	Line regulation	≤ 0.01% + 5mV
	Load regulation	≤ 200mV
	Ripple & noise	≤2mVrms, (5Hz-1MHz)
Resolution	Voltage	Settings: 1mV, Readback: 0.1mV
	Current	Settings: 0.2mA, Readback: 0.1mA
Accuracy	Voltmeter	Setting digits: 5 digits Readback digits: 6 digits
	Ammeter	Setting digits: 5 digits Readback digits: 5 digits
	Voltage setting	± (0.03% of reading + 10mV)
	Current setting	± (0.3% of reading + 10mA)
	Voltage display	± (0.03% of reading + 10mV)
	Current display	± (0.3% of reading + 10mA)
CH3 bind post output		
	Output voltage	1.8V/2.5V/3.3V/5.0V, ±5%, no readback
	Output current	5A, no readback
	Line regulation	≤ 3mV
	Load regulation	≤ 5mV
	Ripple & noise	≤2mVrms, (5Hz-1MHz)
	Transient recovery time	≤ 100μs (50% load regulation, 0.5A minimum load)
CH3 USB power supply port		
	Out put	1.8V/2.5V/3.3V/5.0V、±0.35V, 3A
⚠Note	The total output current of the two CH3 should be 5A or less.	
Electronic load function (CH1, CH2)		
Load mode	CV mode, CC mode, CR mode	
Display	Voltage	1 - 32.00V
	Current	0 – 6.200A

	Power	0 – 50.00W
CV mode	Setting range	1.500V - 32.00V
	Setting display accuracy	≤0.1% + 30mV
	Resolution	10mV
CC mode	Setting range	0 - 6.200A
	Setting display accuracy	≤±0.3% + 10mA
	Resolution	1mA
CR mode	Setting range	1Ω - 1kΩ
	Setting display accuracy	≤±(3% + 1Ω) (Voltage ≥0.1V and current ≥0.1A)
	Resolution	1Ω
Other specifications		
Protection function	Overheat, overvoltage, overcurrent, overpower (under load), reverse connection (under load) When entering the protection state, the output /LOAD is turned off.	
OVP function	Power supply function	CH1, 2: OFF, ON (0.5V - 35.0V) CH3: Fixed at 5.5V
	Electronic load function	OFF, ON (1.5V - 35.0V)
	Setting accuracy	±100mV
	Resolution	100mV
OCP function		CH1, 2: OFF, ON (0.05A – 6.50A) CH3: 3.1A fixed (USB power supply port)
	Setting accuracy	±20mA
	Resolution	10mA
OPP function	Electronic load function	50W or more
Overheat protection	When internal temperature is abnormal	
Dimension	213 (W) x 145 (H) x 362 (D) mm	
Weight	Approximately 10kg	
Input voltage	AC100V/120V/220V/230V±10%, 50Hz/60Hz、Switching type	

Power consumption	900VA, 680W

8.2.6. PDW32-3TG

Power supply function		
Output rating	CH1/CH2 independent output mode 0 - 32.000V, 0 - 3.0000A	
	CH1/CH2 parallel tracking mode 0 - 32.000V, 0 - 6.0000A	
	CH1/CH2 serial tracking mode 0 - 64.000V, 0 - 3.0000A	
CH1/CH2 independent output mode		
Voltage characteristic	Line regulation	≤ 0.01% + 3mV
	Load regulation	≤ 0.01% + 3mV
	Ripple & noise	≤0.35mVrms, (5Hz-1MHz)
	Transient recovery time	≤50us, (50% load regulation, 0.5A minimum load)
	Temperature coefficient	≤ 300ppm/°C
Current characteristic	Line regulation	≤ 0.2% + 3mA
	Load regulation	≤ 0.2% + 3mA
	Ripple & noise	≤2mArms
CH1/CH2 tracking mode		
	Tracking error	≤ 0.1% +10mV of Master: No load When there is a load, add load variation ≤100mV
Parallel	Line regulation	≤ 0.01% + 3mV
	Load regulation	≤ 0.02% + 5mV
Serial	Line regulation	≤ 0.01% + 5mV
	Load regulation	≤ 100mV
	Ripple & noise	≤1mVrms, (5Hz-1MHz)
Resolution	Voltage	Settings: 1mV, Readback: 0.1mV
	Current	Settings: 0.1mA, Readback: 0.1mA
Accuracy	Voltmeter	Setting digits: 5 digits Readback digits: 6 digits

	Ammeter	Setting digits: 5 digits Readback digits: 5 digits
	Voltage setting	± (0.03% of reading + 10mV)
	Current setting	± (0.3% of reading + 10mA)
	Voltage display	± (0.03% of reading + 10mV)
	Current display	± (0.3% of reading + 10mA)
CH3 bind post output		
	Output voltage	1.8V/2.5V/3.3V/5.0V, ±5%, no readback
	Output current	5A, no readback
	Line regulation	≤ 3mV
	Load regulation	≤ 5mV
	Ripple & noise	≤2mVrms, (5Hz-1MHz)
	Transient recovery time	≤ 100μs (50% load regulation, 0.5A minimum load)
CH3 USB power supply port		
	Out put	1.8V/2.5V/3.3V/5.0V、±0.35V, 3A
⚠Note	The total output current of the two CH3 should be 5A or less.	
Electronic load function (CH1, CH2)		
Load mode	CV mode, CC mode, CR mode	
Display	Voltage	1 - 33.00V
	Current	0 – 3.200A
	Power	0 – 50.00W
CV mode	Setting range	1.500V - 33.00V
	Setting display accuracy	≤0.1% + 30mV
	Resolution	10mV
CC mode	Setting range	0 - 3.200A
	Setting display accuracy	≤±0.3% + 10mA
	Resolution	1mA
CR mode	Setting range	1Ω - 1kΩ
	Setting display accuracy	≤±(3% + 1Ω) (Voltage ≥0.1V and current ≥0.1A)
	Resolution	1Ω

Other specifications		
Protection function	Overheat, overvoltage, overcurrent, overpower (under load), reverse connection (under load) When entering the protection state, the output /LOAD is turned off.	
OVP function	Power supply function	CH1, 2: OFF, ON (0.5V - 35.0V) CH3: Fixed at 5.5V
	Electronic load function	OFF, ON (1.5V - 35.0V)
	Setting accuracy	±100mV
	Resolution	100mV
OCP function		CH1, 2: OFF, ON (0.05A – 3.50A) CH3: 3.1A fixed (USB power supply port)
	Setting accuracy	±20mA
	Resolution	10mA
OPP function	Electronic load function	50W or more
Overheat protection	When internal temperature is abnormal	
Dimension	213 (W) x 145 (H) x 311.2 (D) mm	
Weight	約 7.5kg	
Input voltage	AC100V/120V/220V/230V±10%, 50Hz/60Hz、Switching type	
Power consumption	420W	

8.2.7. PDW36-5TG

Power supply function	
Output rating	CH1/CH2 independent output mode 0 - 36.000V, 0 - 5.0000A
	CH1/CH2 parallel tracking mode 0 - 36.000V, 0 - 10.0000A
	CH1/CH2 serial tracking mode 0 - 72.000V, 0 - 5.0000A
CH1/CH2 independent output mode	
Voltage	Line regulation ≤ 0.01% + 3mV

characteristic	Load regulation	≤ 0.01% + 5mV
	Ripple & noise	≤1mVrms, (5Hz-1MHz)
	Transient recovery time	≤100us, (50% load regulation, 0.5A minimum load)
	Temperature coefficient	≤ 300ppm/°C
Current characteristic	Line regulation	≤ 0.01% + 3mA
	Load regulation	≤ 0.01% + 3mA
	Ripple & noise	≤2mArms
CH1/CH2 tracking mode		
	Tracking error	≤ 0.1% +10mV of Master: No load When there is a load, add load variation ≤200mV
Parallel	Line regulation	≤ 0.01% + 5mV
	Load regulation	≤ 0.01% + 5mV
Serial	Line regulation	≤ 0.01% + 5mV
	Load regulation	≤ 200mV
	Ripple & noise	≤2mVrms, (5Hz-1MHz)
Resolution	Voltage	Settings: 1mV, Readback: 0.1mV
	Current	Settings: 0.2mA, Readback: 0.1mA
Accuracy	Voltmeter	Setting digits: 5 digits Readback digits: 6 digits
	Ammeter	Setting digits: 5 digits Readback digits: 5 digits
	Voltage setting	± (0.03% of reading + 10mV)
	Current setting	± (0.3% of reading + 10mA)
	Voltage display	± (0.03% of reading + 10mV)
	Current display	± (0.3% of reading + 10mA)
CH3 bind post output		
	Output voltage	1.8V/2.5V/3.3V/5.0V, ±5%, no readback
	Output current	5A, no readback
	Line regulation	≤ 3mV
	Load regulation	≤ 5mV
	Ripple & noise	≤2mVrms, (5Hz-1MHz)
	Transient recovery time	≤ 100μs (50% load regulation, 0.5A minimum load)

CH3 USB power supply port		
	Out put	1.8V/2.5V/3.3V/5.0V、±0.35V, 3A
⚠Note	The total output current of the two CH3 should be 5A or less.	
Electronic load function (CH1, CH2)		
Load mode	CV mode, CC mode, CR mode	
Display	Voltage	1 – 36.50V
	Current	0 – 5.200A
	Power	0 – 50.00W
CV mode	Setting range	1.500V – 36.50V
	Setting display accuracy	≤0.1% + 30mV
	Resolution	10mV
CC mode	Setting range	0 - 5.200A
	Setting display accuracy	≤±0.3% + 10mA
	Resolution	1mA
CR mode	Setting range	1Ω - 1kΩ
	Setting display accuracy	≤±(3% + 1Ω) (Voltage ≥0.1V and current ≥0.1A)
	Resolution	1Ω
Other specifications		
Protection function	Overheat, overvoltage, overcurrent, overpower (under load), reverse connection (under load) When entering the protection state, the output /LOAD is turned off.	
OVP function	Power supply function	CH1, 2: OFF, ON (0.5V - 38.0V) CH3: Fixed at 5.5V
	Electronic load function	OFF, ON (1.5V - 38.0V)
	Setting accuracy	±100mV
	Resolution	100mV
OCP function		CH1, 2: OFF, ON (0.05A – 5.50A) CH3: 3.1A fixed (USB power supply port)
	Setting accuracy	±20mA

	Resolution	10mA
OPP function	Electronic load function	50W or more
Overheat protection	When internal temperature is abnormal	
Dimension	213 (W) x 145 (H) x 362 (D) mm	
Weight	Approximately 10kg	
Input voltage	AC100V/120V/220V/230V±10%, 50Hz/60Hz、Switching type	
Power consumption	900VA, 680W	

8.2.8. PDW60-3TG

Power supply function		
Output rating	CH1/CH2 independent output mode 0 - 60.000V, 0 - 3.0000A	
	CH1/CH2 parallel tracking mode 0 - 60.000V, 0 - 6.0000A	
	CH1/CH2 serial tracking mode 0 - 120.000V, 0 - 3.0000A	
CH1/CH2 independent output mode		
Voltage characteristic	Line regulation	≤ 0.01% + 3mV
	Load regulation	≤ 0.01% + 5mV
	Ripple & noise	≤1mVrms, (5Hz-1MHz)
	Transient recovery time	≤100us, (50% load regulation, 0.5A minimum load)
	Temperature coefficient	≤ 300ppm/°C
Current characteristic	Line regulation	≤ 0.01% + 3mA
	Load regulation	≤ 0.01% + 3mA
	Ripple & noise	≤2mArms
CH1/CH2 tracking mode		
	Tracking error	≤ 0.2% +20mV of Master: No load When there is a load, add load variation ≤200mV
Parallel	Line regulation	≤ 0.01% + 3mV
	Load regulation	≤ 0.01% + 5mV

Serial	Line regulation	≤ 0.01% + 5mV
	Load regulation	≤ 200mV
	Ripple & noise	≤2mVrms, (5Hz-1MHz)
Resolution	Voltage	Settings: 2mV, Readback: 0.1mV
	Current	Settings: 0.1mA, Readback: 0.1mA
Accuracy	Voltmeter	Setting digits: 5 digits Readback digits: 6 digits
	Ammeter	Setting digits: 5 digits Readback digits: 5 digits
	Voltage setting	± (0.03% of reading + 10mV)
	Current setting	± (0.3% of reading + 10mA)
	Voltage display	± (0.03% of reading + 10mV)
	Current display	± (0.3% of reading + 10mA)
CH3 bind post output		
	Output voltage	1.8V/2.5V/3.3V/5.0V, ±5%, no readback
	Output current	5A, no readback
	Line regulation	≤ 3mV
	Load regulation	≤ 5mV
	Ripple & noise	≤2mVrms, (5Hz-1MHz)
	Transient recovery time	≤ 100μs (50% load regulation, 0.5A minimum load)
CH3 USB power supply port		
	Out put	1.8V/2.5V/3.3V/5.0V、±0.35V, 3A
⚠Note	The total output current of the two CH3 should be 5A or less.	
Electronic load function (CH1, CH2)		
Load mode	CV mode, CC mode, CR mode	
Display	Voltage	1 - 62.00V
	Current	0 – 3.200A
	Power	0 – 50.00W
CV mode	Setting range	1.500V - 62.00V
	Setting display accuracy	≤0.1% + 30mV
	Resolution	10mV
CC mode	Setting range	0 - 3.200A
	Setting display accuracy	≤±0.3% + 10mA

	Resolution	1mA
CR mode	Setting range	1Ω - 1kΩ
	Setting display accuracy	≤±(3% + 1Ω) (Voltage ≥0.1V and current ≥0.1A)
	Resolution	1Ω
Other specifications		
Protection function	Overheat, overvoltage, overcurrent, overpower (under load), reverse connection (under load) When entering the protection state, the output /LOAD is turned off.	
OVP function	Power supply function	CH1, 2: OFF, ON (0.5V - 65.0V) CH3: Fixed at 5.5V
	Electronic load function	OFF, ON (1.5V - 35.0V)
	Setting accuracy	±100mV
	Resolution	100mV
OCP function		CH1, 2: OFF, ON (0.05A – 3.50A) CH3: 3.1A fixed (USB power supply port)
	Setting accuracy	±20mA
	Resolution	10mA
OPP function	Electronic load function	50W or more
Overheat protection	When internal temperature is abnormal	
Dimension	213 (W) x 145 (H) x 362 (D) mm	
Weight	Approximately 10kg	
Input voltage	AC100V/120V/220V/230V±10%, 50Hz/60Hz、Switching type	
Power consumption	900VA, 680W	

8.2.9. PDW32-3QG

Power supply function

Output rating	CH1/CH2 independent output mode 0 - 32.000V, 0 - 3.0000A	
	CH1/CH2 parallel tracking mode 0 - 32.000V, 0 - 6.0000A	
	CH1/CH2 serial tracking mode 0 - 64.000V, 0 - 3.0000A	
	CH3 0 - 5.000V, 0 - 1.0000A	
	CH4 0 - 15.000V, 0 - 1.0000A	
CH1/CH2 independent output mode, CH3, CH4		
Voltage characteristic	Line regulation	≤ 0.01% + 3mV
	Load regulation	≤ 0.01% + 3mV
	Ripple & noise	CH1, 2: ≤0.35mVrms, (5Hz-1MHz) CH3, 4: ≤1mVrms, (5Hz-1MHz)
	Transient recovery time	≤50us, (50% load regulation, 0.5A minimum load)
	Temperature coefficient	≤ 300ppm/°C
Current characteristic	Line regulation	≤ 0.2% + 3mA
	Load regulation	≤ 0.2% + 3mA
	Ripple & noise	≤2mArms
CH1/CH2 tracking mode		
	Tracking error	≤ 0.1% +10mV of Master: No load When there is a load, add load variation ≤100mV
Parallel	Line regulation	≤ 0.01% + 3mV
	Load regulation	≤ 0.02% + 5mV
Serial	Line regulation	≤ 0.01% + 5mV
	Load regulation	≤ 100mV
	Ripple & noise	≤1mVrms, (5Hz-1MHz)
Resolution	Voltage	Settings: 1mV, Readback: 0.1mV
	Current	Settings: 0.1mA, Readback: 0.1mA
Accuracy	Voltmeter	Setting digits: 5 digits Readback digits: 6 digits

	Ammeter	Setting digits: 5 digits Readback digits: 5 digits
	Voltage setting	± (0.03% of reading + 10mV)
	Current setting	± (0.3% of reading + 10mA)
	Voltage display	± (0.03% of reading + 10mV)
	Current display	± (0.3% of reading + 10mA)
Electronic load function (CH1, CH2)		
Load mode	CV mode, CC mode, CR mode	
Display	Voltage	1 - 33.00V
	Current	0 – 3.200A
	Power	0 – 50.00W
CV mode	Setting range	1.500V - 33.00V
	Setting display accuracy	≤0.1% + 30mV
	Resolution	10mV
CC mode	Setting range	0 - 3.200A
	Setting display accuracy	≤±0.3% + 10mA
	Resolution	1mA
CR mode	Setting range	1Ω - 1kΩ
	Setting display accuracy	≤±(3% + 1Ω) (Voltage ≥0.1V and current ≥0.1A)
	Resolution	1Ω
Other specifications		
Protection function	Overheat, overvoltage, overcurrent, overpower (under load), reverse connection (under load) When entering the protection state, the output /LOAD is turned off.	
OVP function	Power supply function	CH1, 2: OFF, ON (0.5V - 35.0V) CH3: OFF, ON (0.5V - 5.5V) CH4: OFF, ON (0.5V - 16.5V)
	Electronic load function	OFF, ON (1.5V - 35.0V)
	Setting accuracy	±100mV
	Resolution	100mV

OCP function		CH1, 2: OFF, ON (0.05A – 3.50A) CH3, 4: OFF, ON (0.05A – 1.20A)
	Setting accuracy	±20mA
	Resolution	10mA
OPP function	Electronic load function	50W or more
Overheat protection	When internal temperature is abnormal	
Dimension	213 (W) x 145 (H) x 311.2 (D) mm	
Weight	Approximately 7.5kg	
Input voltage	AC100V/120V/220V/230V±10%, 50Hz/60Hz、Switching type	
Power consumption	420W	

8.2.10. Common specifications

General function	
Sequence function	Maximum 2048 steps, variable voltage/current
Delay function	Maximum 2048 steps, variable output/LOAD
Monitor function	Set condition range and judge
Recorder function	Saves monitor values in memory at regular intervals
External I/O control function	Operation state switching by output and input according to internal state setting
Memory function	Save settings to internal memory or USB memory
Interface	
RS-232C	EIA-232D compliant, D-Sub 9 pin: female
USB host	USB2.0 Type-A, USB memory only, FAT32, 16GByte or less, long file name not allowed
USB device	USB2.0 Type-B, Virtual COM (CH341)
GP-IB	IEEE488.1 compliant
LAN	IEEE802.3 compliant, 100Base-TX, IPv4, DHCP/Auto IP/fixed IP, Auto-MDIX HTTP port: 80, Socket port 1026
Communication command	IEEE488.2 compliant, SCPI1999 compliant (Some compatible commands are not applicable)
buzzer	Sound can be muted during monitor function judgment and key operation
External I/O	3.3V TTL level (no protection circuit) Bidirectional 5 ports with function switching MIL standard compliant 10-pin 2.54mm pitch double row
EMC	EMC Directive 2004/108/EC for Class A test
LVD	LVD Directive 2006/95/EC
Insulation resistance	Between chassis and output terminal: 20MΩ or more (DC 500V) Between chassis and AC input terminal: 30MΩ or more (DC 500V)
Usage environment	Altitude: 2000m or less, Measurement category: II, Pollution degree: 2 Temperature: 0 to 40°C, Relative Humidity: 80% or less
Storage environment	Temperature: -10°C to 70°C, Humidity: 70% or less

8.3. Accessories

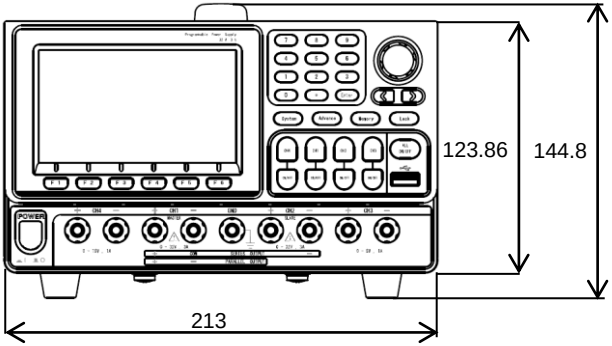
Power Cable

Test lead

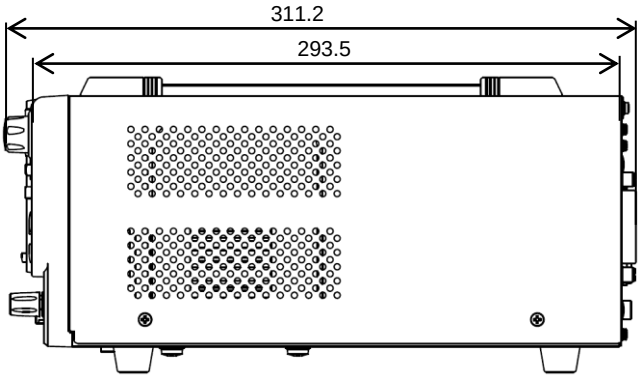
GTL-104A x 1, GTL-105A x 1	PDW32-6SG
GTL-104A x 1	PDW36-10SG, PDW72-5SG
GTL-104A x 2	PDW32-3D
GTL-104A x 3	PDW30-6TG, PDW32-3TG, PDW36-5TG, PDW60-3TG
GTL-104A x 2, GTL-105A x 2	PDW32-3QG
Rear output terminal connector x 1	PDW36-10SG, PDW72-5SG
Short bar x 1	PDW30-6TG, PDW36-5TG, PDW60-3TG

8.4. PDW dimensions

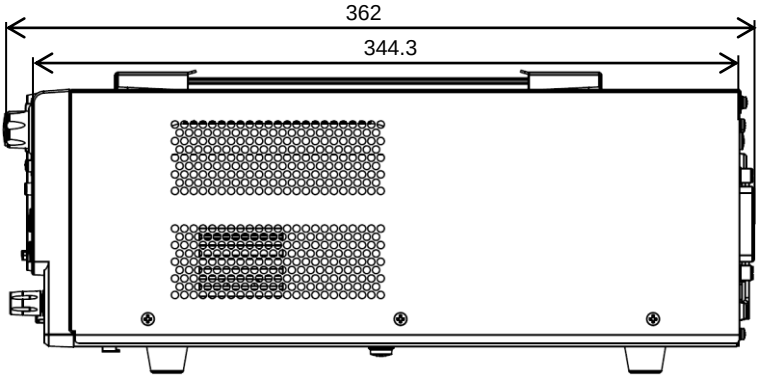
Front dimension All models common



Side dimension PDW32-6SG, PDW32-3DG,
PDW32-3TG, PDW32-3QG



Side dimension PDW36-10SG, PDW72-5SG,
PDW30-6TG, PDW36-5TG, PDW60-3TG



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