DP-HA Series User's Manual

By DSC-Electronics Germany • Georgstraße 36 • 53111 Bonn

1. Connection

Our devices are pre-configured to the power grid chosen with order (if not specified otherwise, our devices are manufactured for the EU power grid 230V 50Hz / 400V 50Hz). Subsequent adjustment after delivery is not possible. Connecting the device to an unsuitable power source will void any warranty.

1 Phase / EU Power Grid	
Voltage (Recommended)	230V ± 10% AC
Voltage (Max.)	250V AC
Frequency	50Hz - 60Hz
Circuit breaker minimum requirements	The maximum current of the device shall be determined as follows: I = (maximum power of the device / 230) + 2
1 Phase / American Power Grid	
Voltage (Recommended)	115V ± 10% AC
Voltage (Max.)	130V AC
Frequency	50Hz - 60Hz
Circuit breaker minimum requirements	The maximum current of the device shall be determined as follows: I = (maximum power of the device / 115) + 4

3 Phase / EU Power Grid (TN-S Network)	
Voltage (Recommended)	380V - 410V
Voltage (Max.)	430V
Frequency	50Hz
Circuit breaker Minimum requirements	The maximum phase current of the device shall be determined as follows: I = ((maximum power of the device / 400) / 1,73) + 2

2. General

Please read through and understand this Operation Manual before operating the product. After reading always keep the manual nearby so that you may refer to it as needed. When moving the product to another location, be sure to bring the manual as well.

Calibration

Before shipment, the instrument has been calibrated carefully in our factory. The calibration procedures and standards are compliant to the national regulations and standards for electronic calibration. If you have requested a certificate with your order, this is enclosed with your device. With ordered off-site calibration (DaKKS) the calibration was not performed in-house, please refer to the laboratory calibration protocol for details.

Warranty

We guarantee that the instrument has undergone a strict quality test before shipment and has passed all prescribed functional tests. We provide our customers with a warranty period of three years from receipt of the device. During the warranty period, all repairs, as well as spare parts are always free of charge. The warranty is void in the case of defects which have been caused by user's fault, or in case of unauthorized opening.

2.1 Safety Instructions

This chapter contains important safety instructions that you must follow when operating the instrument and when keeping it in storage. Read the following before any operation to insure your safety and to keep the device in a proper condition.

Safety Symbols

The following safety symbols may appear in this manual or on the instrument:

	**WARNING**	Identifies conditions or practices that could result in injury or loss of life.
	**CAUTION**	Identifies conditions or practices that could result in damage to the instrument or to other properties.
	**DANGER**	High Voltage
	**ATTENTION**	Refer to the Manual
		Protective Earth (PE)
		Earth (Ground)

2.2 Safety Guidelines

Please follow the safety guidelines when using and putting the device into operation in order to prevent safety risks and to ensure the correct operation of the product.

- **Before connecting the device to the local power supply, make sure that the device is switched off.**
- **Check if the product is compatible with the local power supply before connecting it.**
- **Be careful on the correct earthing of the device (PE connection)**
- **Do not use the product in humid environments**
- **Do not touch the output terminals of the product with unprotected hands while it is switched on.**
- **Do not use the device in extremely dusty rooms**
- **Do not use the device outside the parameters specified in the data sheet**

2.3 Unpacking and Examination

Our products are delivered carefully packed in cardboard boxes or in wooden crates, depending on place of destination and the type of the device (dimensions, weight). We pay attention to the environmental compatibility of the upholstery and packaging materials used and ask you to dispose the filling material correctly if present.

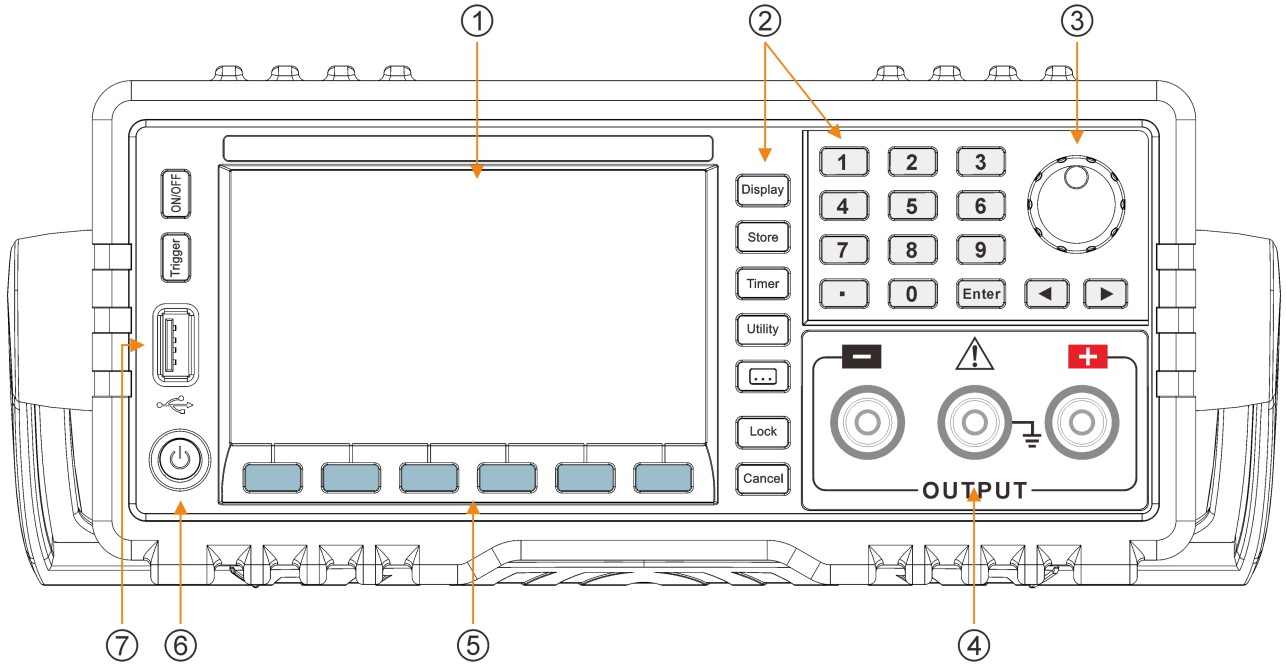
Please unpack the device and check the packaging as well as the product for transport damage. Should you notice any damage to the packaging or the device, we ask you to log it with photos and inform us immediately.

ATTENTION: If the device has been delivered in a wooden box, please do not dispose it as it can be used for eventual return transport for service procedures. Also the packaging material of smaller devices can be stored in order to be used if necessary for a return transport.

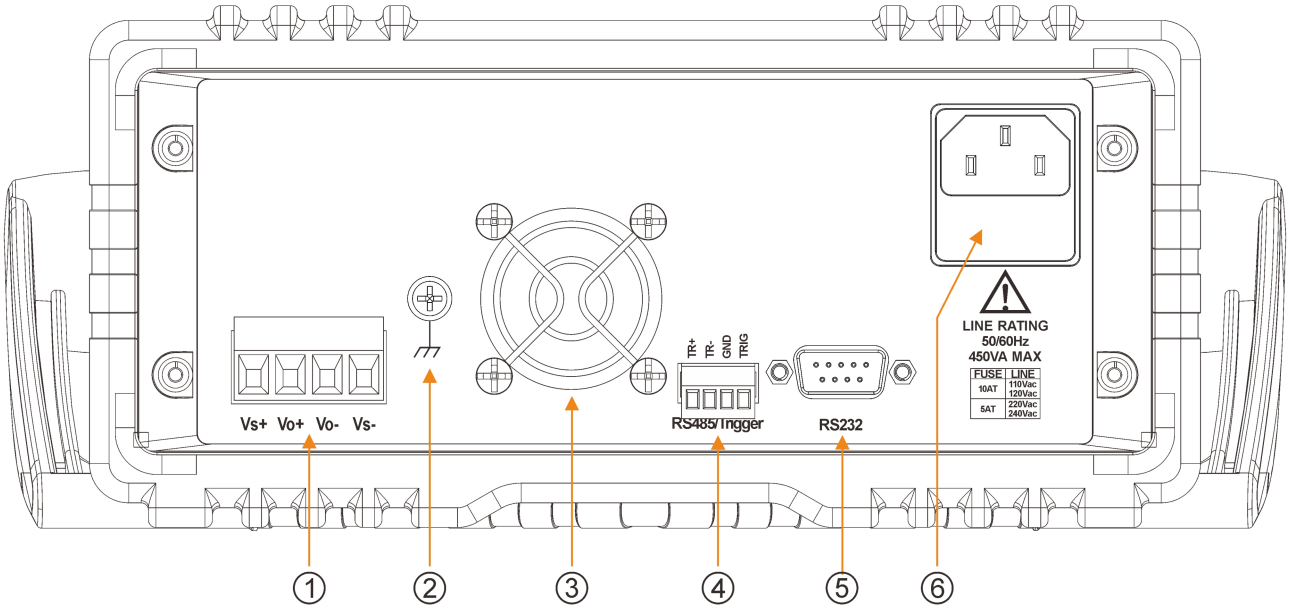
3. Product Description

The DSC-Electronics DP-HA Series are high accuracy programmable DC power supplies with single output. The power supply features an ARM Microprocessor control, RS232/RS485/USB SCPI and Modbus-RTU protocol compliant interface and many auto test and programming functions. Measuring results can be stored or recalled data via the USB host connection on the front panel. The 4.3-inch TFT LCD color display gives a complete overview over output parameters and Waveforms.

4. Front and Rear Panels



1. LCD display
2. Function keys
3. Parameter input
4. Output terminals
5. Soft-Keys
6. Power switch
7. USB Host port



1. Remote sensing terminals
2. Chassis ground terminal
3. Cooling fan
4. Trigger input and RS485
5. RS232 interface
6. Power cord / fuse socket

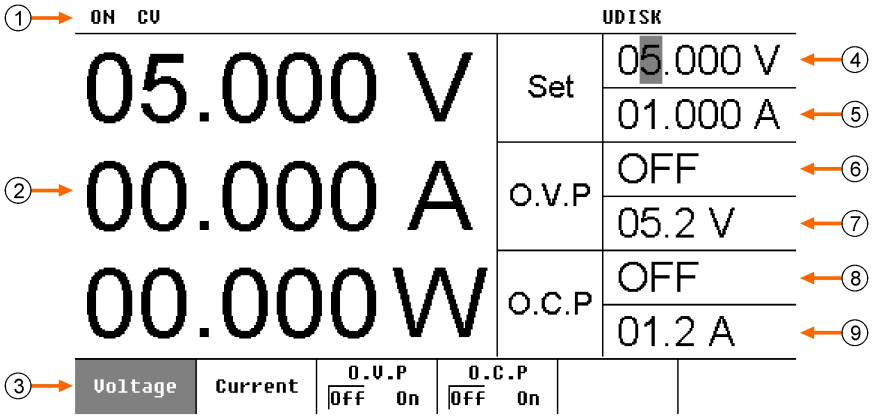
4.1 Key Description

There are 30 buttons on the front panel (not including the POWER button):

Key name	Main function
0	Input digit 0
1	Input digit 1
2	Input digit 2
3	Input digit 3
4	Input digit 4
5	Input digit 5
6	Input digit 6
7	Input digit 7
8	Input digit 8
9	Input digit 9
.	Input decimal point
< >	Move selection to the left/right
Rotary knob	Adjust selected value
Enter	Confirm input
Display	Switch display between parameter and waveform view
Store	Store and recall the settings and presets
Timer	Auto Test Mode
Utility	System configuration
...	Utilities
Lock	Panel lock
Cancel	Cancel
Menu keys	Current function is displayed on the display above
On/Off	Turn on/off output
Trigger	Trigger key
USB Host port	USB flash storage port

4.2 LCD display

This instrument provides two display modes: normal view and waveform view.



1	Status bar	ON/OFF	Output status
		CV/CC	Constant Voltage/Constant Current mode
		O.V.P/O.C.P	Over-voltage protection or over-current protection is enabled. Output will be turned off automatically
		O.T.P	Over-temperature protection is enabled. Output will be turned off automatically
		LOCK	The front panel is locked
		UDISK	A USB storage device is detected
		ERR	Remote operation error
		RMT	The instrument is in remote operation mode
		SENSE	Remote sense function is enabled
		A CTRL	Analog control function is enabled
		TIMER	Timed output enabled
		PULSE	Trigger input enabled
2	Real time output values		
3	Soft-Key function description		
4	Voltage setting value		
5	Current setting value		
6	O.V.P on/off state		
7	O.V.P setting value		
8	O.C.P on/off state		
9	O.C.P setting value		

5. First Use

5.1 Connect to Power

1) Check the input power
   Make sure that the AC power to be connected to the instrument fulfils the requirements.
2) Check the fuse
   When the instrument leaves factory, the specified fuse is installed. Make sure the correct type of fuse is installed before power up.
3) Connect the AC power
   Connect the instrument to AC power grid using the power cord provided with the product.

5.2 Automatic Power-On Check

Press the power switch at the front panel, the instrument starts and executes the self-test. If the instrument passes the self-test, the welcome message will be displayed. Otherwise, the corresponding self-test failure information will be displayed.

Note:
When powering on the instrument immediately after switching it off, make sure that the time interval between the two operations is longer than 5s.

5.3 Manual Function Check

The manual function check allows the user to check the basic functionality of the power supply, if the problem can not be found by the automatic power on check.

1) Enabling the output

Press the ON/OFF button to turn on/off the output (turn on the device before). The button's back-light will turn on once the instrument is powered on.

2) Output Votlage Control

a. While no load connected to the power supply, press the power switch to turn on the device and make sure that the current setting is higher than 0A.
b. Press the ON/OFF button, the channel will be in constant voltage mode after ON/OFF button light turns on.
c. Check whether the voltage can be adjusted from 0V to the maximum rated value.

3) Output Current Check

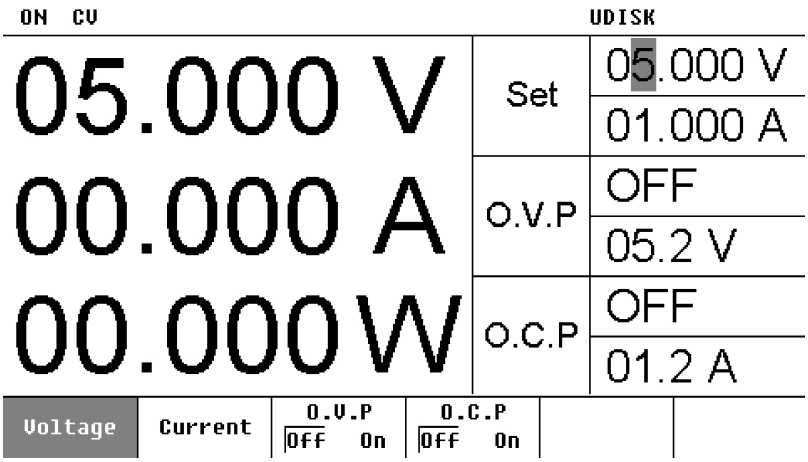
a. Turn on the device.
b. Shorten the output terminal (+) and (-) at the front panel using an insulated wire.
c. Set the voltage to the maximum rated value and press the ON/OFF button.
d. The channel will be working in constant current mode, check whether the current can be adjusted from 0A to the maximum rated value.

5.4 Display Modes

This instrument provides two display modes: normal display mode and waveform display mode. Users can select the appropriate display mode as needed.

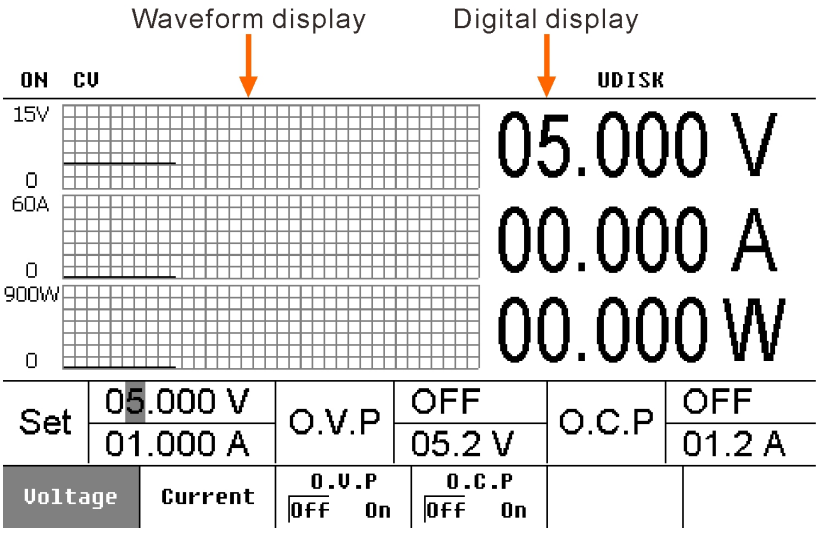
5.4.1 Normal display mode

After powered on the instrument enters normal display mode as shown in the figure below. If currently the waveform display mode is enabled, it can be switched to normal display mode by pressing the Display button. The normal display mode displays the settings of voltage, current and power as decimal values. The O.V.P and O.C.P settings also can be accessed directly.



5.4.2 Waveform display mode

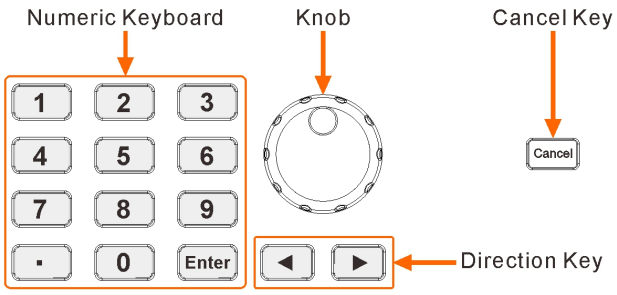
Press the Display button to enter the waveform display mode if you are in the normal display mode. To exit, press the button again. In this mode the settings of voltage, current and power are displayed as decimal values and as a waveform. The O.V.P and O.C.P settings can be accessed directly as-well.



6. Operation

6.1 Parameter Value Setting

The instrument has two methods of setting the parameters: **direct data input** and **tuning**. Parameters can be set by the numeric keyboard, cancel key, direction key and knob.



1) Direct data input: This method applies to the following parameters and uses the numeric keyboard, cancel key and direction key to set the values.

a. Voltage and Current settings
- Press the Voltage or Current soft-key on the front panel to select the corresponding menu.
- Use the numeral key to set the numerical value, and press the Enter button to confirm. The default Voltage/Current Unit is Volt (V) and Ampere (A).

Note:
During the input process, users can delete the value with the left direction key < or cancel the process by pressing the Cancel button.

b. O.V.P and O.C.P settings
Select the O.V.P or O.C.P menu, follow the steps described in the Voltage and Current setup guide above (a).

c. Timing setting
Select Timer Setup menu, follow the steps described in the Voltage and Current setup guide above (a).

2) Tuning: This method uses the knob and direction key to modify the parameter values on the fly.

a. This method can be applied to the same parameters as the "direct data input" method.
- Press the Voltage or Current soft-key at the front panel to select the corresponding menu.
- Rotate the knob to increase or decrease the cursor-highlighted digit directly, press the left/right direction key to move the cursor left or right.

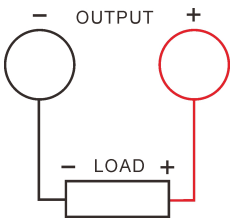
b. Store / Recall
- Press the Store button at the front panel to enter the memory interface.
- Rotate the knob to select the desired store / recall location.

6.2 Constant Voltage Output (CV)

This instrument provides two output modes including Constant Voltage Output (CV) and Constant Current Output (CC) and switches between these modes automatically as a response on load changes. The instrument will not rise the voltage or current beyond the setting value neither in CV, nor in CC mode. In CV mode, the output voltage equals to the Voltage value set and is not changing while the output current is adjusted according to the load resistance in the range 0,00 A to the Current limit value set.

For example: Set the voltage to 16V, the current limit to 3A and assume the load to have a resistance of 8Ω. Because (U=R x I) 8Ω × 3A = 24V > 16V and 16V / 8Ω = 2A < 3A the current flowing through the load will be less than the Current limit set, thus the device will remain in CV mode and the output parameters will be 16V, 2A.

Connection:



1) Connect the load to the output terminal of the device.

Please refer to the following table to select proper output wires.

Cross sect. mm2	5.26	3.30	2.08	1.31	0.83	0.52	0.33	0.21	0.13	0.09
AWG*	10	12	14	16	18	20	22	24	26	28
Maximum current (A)	40	25	20	13	10	7	5	3.5	2.5	1.7
Milliohm/meter	3.3	5.2	8.3	13.2	21.0	33.5	52.8	84.3	133.9	212.9

Note*: AWG American Wire Gauge

CAUTION
Wrong connection may lead to damage of the instrument or the equipment connected to it.

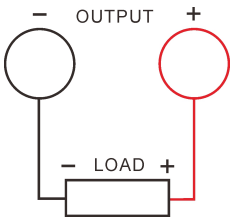
2) Turn on the power switch: Press the power switch to start the instrument.
3) Set the voltage: Press the Voltage softkey to set the voltage to 16V.
4) Set the current: Press the Current softkey to set the current to 3A.
5) Turn on the output: Press the ON/OFF button, the button light turns on, the instrument will operate in CV mode.

Note:
The power supply changes from CV to CC mode if the output current reaches the Current limit, due to changes in load resistance. In CC mode it will reduce the output Voltage to prevent the output Current from rising over the Current limit.

6.3 Constant Current Output (CC)

For example: Set the voltage to 16V, the current limit to 5A and assume the load to have a resistance of 2Ω. Because (U=R x I) 2Ω × 5A = 10V < 16V and 16V / 2Ω = 8A > 5A the current flowing through the load will be greater than the Current limit set if operating at the output Voltage set, thus the device will work in CC mode and adjust the output Voltage to keep the output current equal to the value set. The output parameters will be 10V, 5A.

Connection:



1) Connect the load to the output terminal of the device.

CAUTION
Wrong connection may lead to damage of the instrument or the equipment connected to it.

2) Turn on the power switch: Press the power switch to start the instrument.
3) Set the voltage: Press the Voltage softkey to set the voltage to 16V.
4) Set the current: Press the Current softkey to set the current to 5A.
5) Turn on the output: Press the ON/OFF button, the button light turns on, the instrument will operate in CC mode.

Note:
If during the operation in CC mode the output Voltage reaches the Voltage value set, the device switches to CV mode to prevent the output Voltage from rising over the limit set.

6.4 Constant Power Output (CP)

This instrument provides the ability to add a third variable to the automatic CV / CC switching, the output power. If a constant power value is set, the power supply will try to keep the power at the set level by adjusting the voltage/current within the limits set by the user. To activate this function and set the power value, please check the menu Utility→System→CP Output and set the required power value.

6.5 Over Voltage/Over Current Protection

This instrument provides Over Voltage Protection (O.V.P) and Over Current Protection (O.C.P) systems to protect the load from damage by wrong user input. Users can set the O.V.P and O.C.P parameters and enable/disable these limitations as needed. If the O.V.P / O.C.P is enabled, the instrument will turn off the output to protect the load when the output values exceed the O.V.P/ O.C.P values.

6.5.1 O.V.P

1) Setting the parameters
   - Select the O.V.P menu
   - Use the numeral keys to set the numerical value, and press the Enter button to confirm. Different operation modes may have different prameter ranges.
   - After the setting the parameter, check the values in O.V.P input box before closing.

2) To enable/disable O.V.P
   - Press the ON/OFF button to enable the output
   - Select the O.V.P menu
   - Toggle the O.V.P status between "ON" and "OFF" by repeatedly pressing O.V.P

Note:
While the output of the device is OFF the O.V.P status is always off. Still the O.V.P parameters are accessible and can be set. The O.V.P is OFF by default and the default value is 5.2V, please set the O.V.P value as required.

6.5.2 O.C.P

1) Setting the parameters
   - Select the O.C.P menu
   - Use the numeral key to input the numerical value, and press Enter button to confirm.
   - After the setting the parameter, check the values in O.C.P input box before closing.

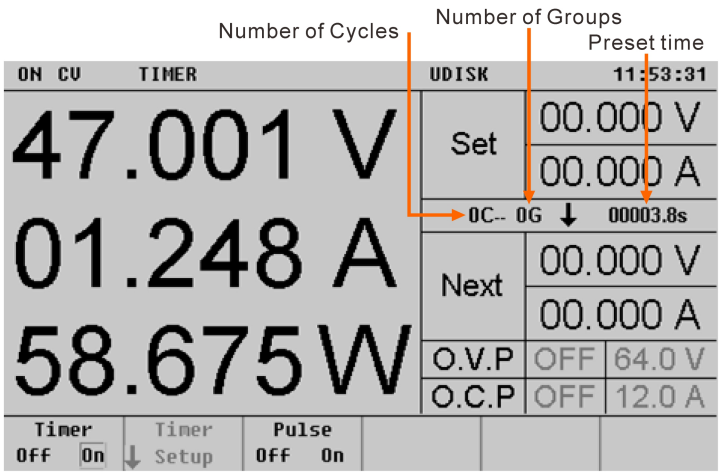
2) To enable/disable O.C.P
   - Press the ON/OFF button to enable the output
   - Select the O.C.P menu
   - Toggle the O.C.P status between "ON" and "OFF" by repeatedly pressing O.C.P

Note:
While the output of the device is OFF the O.C.P status is always off. Still the O.C.P parameters are accessible and can be set. The O.CP is OFF by default and the default value is 1.2A, please set the O.C.P value as required.

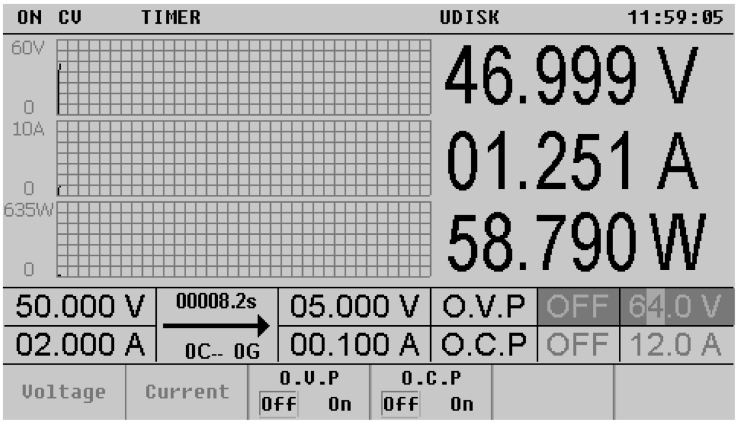
6.6 Auto Test Mode (Timed Output)

This instrument provides the ability to create Auto Test presets with up to 300 groups of Voltage, Current and Time settings which can be switched automatically by time or by an external trigger. The DP-HA can store 10 presets in the internal memory (each consisting of up to 100 Voltage, Current and Time groups) or a nearly unlimited amount of presets on an external memory drive. This function allows the user to design complex Voltage and Current waveforms or set up Voltage and Current changes in reaction on an external trigger. The Auto Test mode can run a predefined number of cycles (max. 99999) or endless.

Configuration:
1) Press the Timer button on the front panel and press Timer On/Off soft-key to select "On" and enable the Auto Test mode.
2) Turn on the output, the instrument starts the execution of the loaded/configured preset.
   As shown below in normal display mode, in the category "Set" you will see the present output voltage and current settings group while the category "Next" denotes the next output voltage and current settings group.



Below the view of the Auto Test mode in waveform display mode.

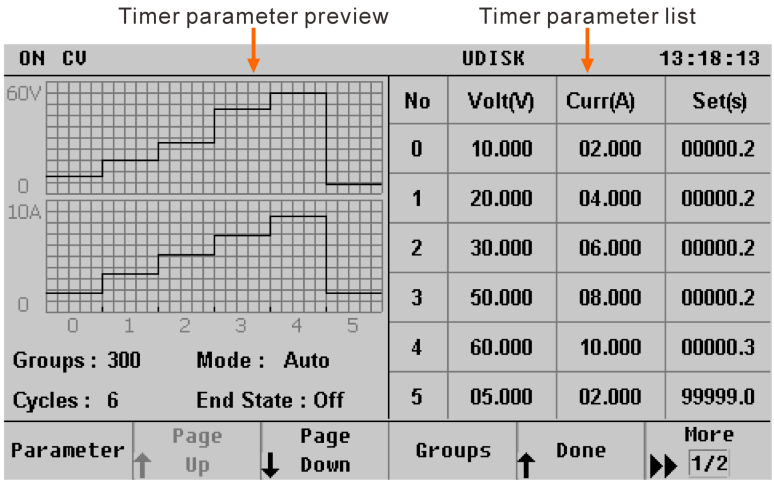


Note:

- Enabling the Auto Test timer will change the output value of the channel; Make sure that the change in the output value will not affect or damage the device connected to the power supply before enabling the Auto Test execution.
- The execution of the Auto Test preset starts only after both, the timer and the output are turned on.
- Output Values and parameters can not be edited while the Auto Test is being executed.

Editing and Creating Auto Test presets

Press Timer→Timer Setup to enter the Auto Test preset editing interface as shown in the figure below. The main page provides a list with Voltage and Current setting groups on the right and an output waveform preview graph on the left. The horizontal axis of the graph shows the parameter group number and the vertical axis denotes the output Voltage or Current setting of the group.



1) Parameter Group Editing

You can edit the parameters of each group manually by pressing the Parameter key and using the knob to select the group number (No) in the list. Push the knob to select the first parameter of the group, use the < and > arrows to move the cursor and turn the knob to change the value of the selection. Push the knob again to select the next parameter. You can set the output Voltage, Current and the Time interval this group shall remain active before switching to the next group.

Note:

Only 6 groups can be displayed on each page in the list, press Page Up or Page Down to view other groups.

2) Number of Groups executed in the preset
The number of executed groups during each cycle of the test run is shown under the graph on the left side of the screen. Press the Groups soft-key and use knob and the numeric keyboard to set the desired value. The range is from 1 to 100.

3) Execution Mode
Press the Mode soft-key to select "Auto" or "Step" execution modes.
- Auto: Automatic switching depending on the time intervals set in the parameter groups.
- Step: Switch from parameter group to the next group on trigger event.

4) Cycles
The number cycles the preset is executed can be changed by pressing the Cycles soft-key to set the number of cycles or pressing it twice to set it to "Infinite".

Note:
The final state of the power supply output (after executing all cycles) depends on the setting in "End State".

5) End state
The end state defines the state of the power supply output after it finishes the execution of all cycles. Press the End State soft-key to select "Off" or "Last".
- Off: The instrument turns off the output automatically after finishing the Auto Test.
- Last: The instrument remains at the output state of the last group after finishing the Auto Test.

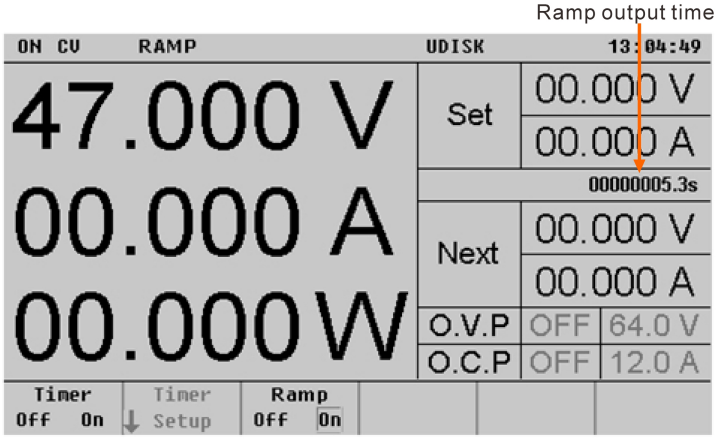
Note:
If the number of cycles is set to "Infinite" the End State value is not active.

6) Save / read
You can store the edited timer parameters in the internal memory and recall them when required.
- Save
  After editing the timer parameters, press Save to enter the store and recall interface. Please save the timer file according to the introduction in "Save/Recall".
- Read
  Press Recall to enter the store and recall interface. Please read the desired file according to the introduction in "Save/Read". Users can edit the timer file read.

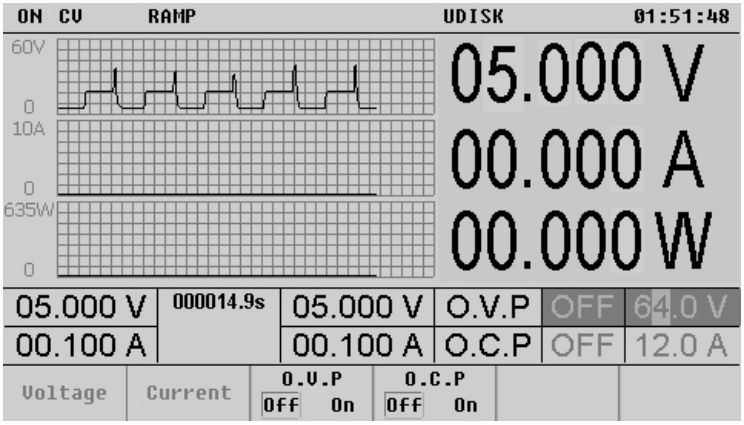
6.7 Ramp Auto Test Mode (Timed Output)

Besides the timed output mode with immediate transition of voltage and current values between preset groups, this instrument features the „Ramp" mode where the output values transition linearly between the preset groups within the set group timing value.

Configuration:
3) Press the Ramp button on the front panel and press Ramp On/Off soft-key to select "On" and enable the Ramp Auto Test Mode.
4) Turn on the output, the instrument starts the execution of the loaded/configured preset.
As shown below in normal display mode, in the category "Set" you will see the present output voltage and current settings group while the category "Next" denotes the next output voltage and current settings group.



Below the view of the Ramp Auto Test mode in waveform display mode.

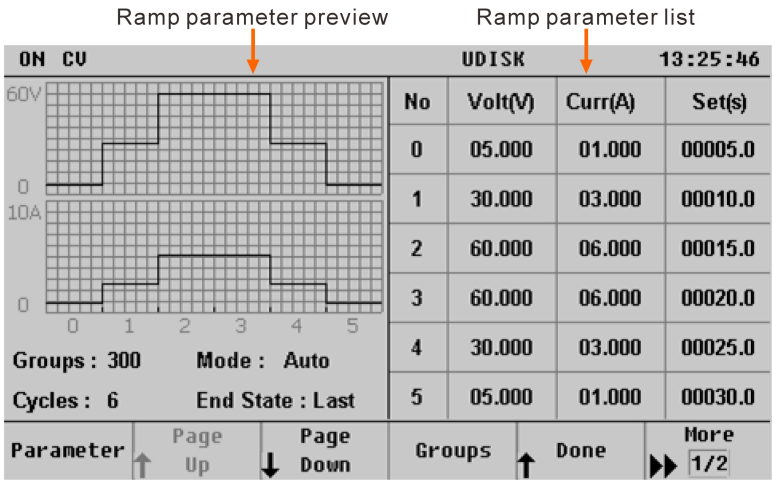


Note:

- Enabling the Auto Test timer will change the output value of the channel; Make sure that the change in the output value will not affect or damage the device connected to the power supply before enabling the Auto Test execution.
- The execution of the Auto Test preset starts only after both, the timer and the output are turned on.
- Output Values and parameters can not be edited while the Auto Test is being executed.

Editing and Creating Auto Test presets

Press Ramp→Ramp Off→Timer Setup to enter the Ramp Auto Test preset editing interface as shown in the figure below. The main page provides a list with Voltage and Current setting groups on the right and an output waveform preview graph on the left. The horizontal axis of the graph shows the parameter group number and the vertical axis denotes the output Voltage or Current setting of the group.



7) Parameter Group Editing

You can edit the parameters of each group manually by pressing the Parameter key and using the knob to select the group number (No) in the list. Push the knob to select the first parameter of the group, use the < and > arrows to move the cursor and turn the knob to change the value of the selection. Push the knob again to select the next parameter. You can set the output Voltage, Current and the Time interval this group shall remain active before switching to the next group.

Note:

Only 6 groups can be displayed on each page in the list, press Page Up or Page Down to view other groups.

8) Number of Groups executed in the preset
The number of executed groups during each cycle of the test run is shown under the graph on the left side of the screen. Press the Groups soft-key and use knob and the numeric keyboard to set the desired value. The range is from 1 to 100.

9) Execution Mode
Press the Mode soft-key to select "Auto" or "Step" execution modes.
- Auto: Automatic switching depending on the time intervals set in the parameter groups.
- Step: Switch from parameter group to the next group on trigger event.

10) Cycles
The number cycles the preset is executed can be changed by pressing the Cycles soft-key to set the number of cycles or pressing it twice to set it to "Infinite".

Note:
The final state of the power supply output (after executing all cycles) depends on the setting in "End State".

11) End state
The end state defines the state of the power supply output after it finishes the execution of all cycles. Press the End State soft-key to select "Off" or "Last".
- Off: The instrument turns off the output automatically after finishing the Auto Test.
- Last: The instrument remains at the output state of the last group after finishing the Auto Test.

Note:
If the number of cycles is set to "Infinite" the End State value is not active.

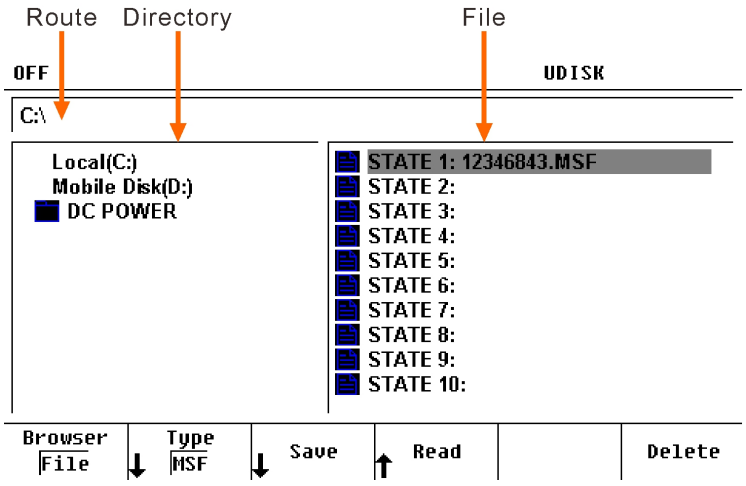
12) Save / read
You can store the edited timer parameters in the internal memory and recall them when required.
- Save
  After editing the timer parameters, press Save to enter the store and recall interface. Please save the timer file according to the introduction in "Save/Recall".
- Read
  Press Recall to enter the store and recall interface. Please read the desired file according to the introduction in "Save/Read". Users can edit the timer file read.

6.7 Save/Recall

This power supply supports two types of document storage: UDisk and local storage. It can store, recall and delete system settings such as Voltage, Current, O.V.P or O.C.P settings, etc. and/or Auto Test presets. The device has internal memory slots for the storage of 10 configuration save files (STATE1-10), 10 Auto Test presets (TIMER1-10) and 10 battery presets (BATTERY1-10).

Press the Store button to enter the "Save/Recall" interface as shown in the figure below, to exit press the button again. If a USB storage device is plugged "UDISK" is displayed in the status bar and indicates that a USB storage device is detected and configured. Meanwhile Mobile Disk (D:) and the folder "DC POWER" will be displayed in the directory list. The USB storage relevant operations including save, recall and delete only can be performed in the folder "DC POWER" which is created automatically on the first use of the drive.

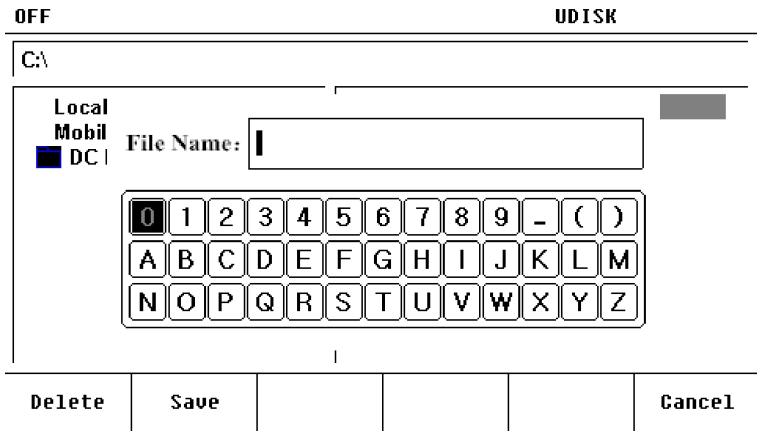
To select the parameters to store press the Type soft-key and select the appropriate file type:
To save the device configuration select MSF, for Battery preset configuration MBF, to store the current Auto Test preset configuration MTF.



Explanations of the save and recall menus

Browser	Selection of the directory or file list
Type	Select save file type
Save	Store the parameters in the selected storage location
Read	Read the parameters from the selected storage location
Delete	Delete the parameters in the selected storage location

Once you've highlighted the storage folder and selected the file type, press the Browserscreen key to go to the file list. Select a file or a storage slot from the file list if you want to overwrite existing files and press the Save button to open the keyboard. Turn the Rotary encoder to select the characters and letters.



Explanations of virtual keyboard operation

Delete	Delete the character in front of the cursor
Save	Save the file under the present file name
Cancel	Cancel saving and return to the previous window

The operation steps of each action:

1) Save

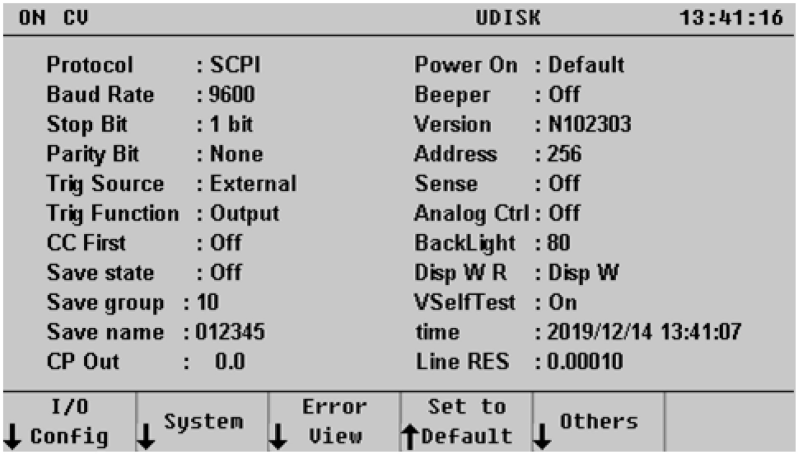
- Press Type to select the desired file type (STATE, BATTERY, TIMER, CSV).
- Press Browser to switch to the file list and use the knob to select the desired memory location.
- Press Save and set the file name by virtual keyboard, then press Save again to save the parameters.

2) Recall
- Press Type to select the desired file type (STATE, BATTERY, TIMER, CSV).
- Press Browser to switch to the file list and use the knob to select the desired memory location. If the file is invalid, the Read soft-key is hidden automatically.
- Press Read to finish.

3) Delete
- Press Type to select the desired file type (STATE, BATTERY, TIMER, CSV).
- Press Browser to switch to the file list and use the knob to select the desired memory location.
- Press Delete and press Ok to confirm the delete.

6.8 Utility

Press the Utility button to enter the system settings interface as shown below.



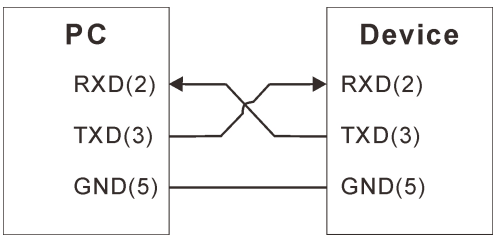
Explanation of the System settings

I/O Config	: Set I/O configuration and trigger options
System	: Set the system parameters
Error View	: View error messages
Set to Default	: Restore the instrument to factory settings
Others	: Other functions

6.8.1 I/O Setting

Set the RS232 Parameters

Connect the RS232 interface to the PC or data terminal equipment (DTE) using a RS232 cable and set the interface parameters (baud rate, parity bit, etc.) that match the PC or terminal equipment specifications.



Press Utility→I/O Config→RS232 to open the RS232 parameter setting interface.

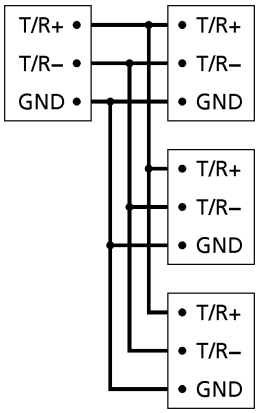
1) Baud rate
Press Baud Rate to configure the desired baud rate (2400, 9600, 14400, 19200, 38400, 56000, 57600 or 115200).

2) Stop bit
Press Stop Bits to configure the stop bits (1 or 2).

3) Parity
Press Parity to configure the parity mode (None, Even or Odd).

Set the RS485 Parameters

Connect the RS485 interface to the PC or data terminal equipment (DTE) using a suitable cable and set the interface parameters (baud rate, parity bit, etc.) that match the PC or terminal equipment specifications.



Press Utility→I/O Config→RS485 to open the RS485 parameter setting interface.

4) Baud rate
   Press Baud Rate to configure the desired baud rate (2400, 9600, 14400, 19200, 38400, 56000, 57600 or 115200).
5) Stop bit
   Press Stop Bits to configure the stop bits (1 or 2).
6) Parity
   Press Parity to configure the parity mode (None, Even or Odd).

6.8.2 Trigger Settings

Press Utility→I/O Config→Trigger to open the trigger settings interface.

1) Trigger source (Press Trigger Source to select)

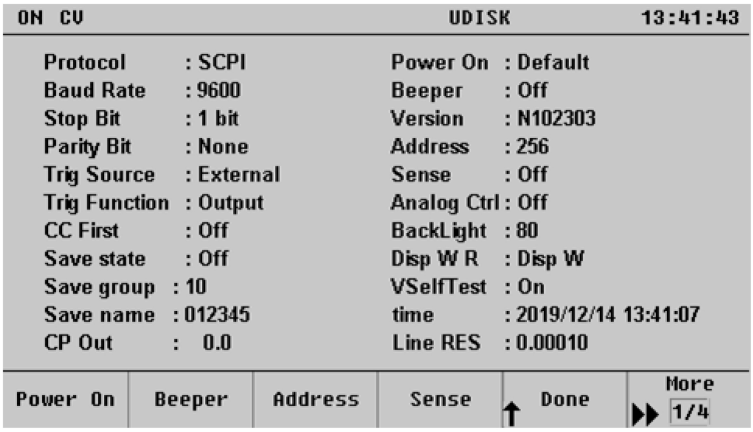
- EXT: Use the TRIG IN rear panel connector as source (push the Trigger button to trigger manually)
  Pulse: Use the TRIG IN rear panel connector as TTL signal source.
- Bus: Use RS232 or RS485 port as trigger command source.
- IMM: Listen for the command „TRIGger:IMMediate", all other sources are disabled.

2) Trigger function (Press Trigger function to select)

- Output: Enable / Desable Output
- Timer: Switch Auto Test value group to next
- Record: Trigger data record status

6.8.3 System Settings

Press Utility→System to access the system settings as shown below.



Power-on setting
Press Utility→System→Power On to select the instrument configuration ("Default" or "Last") the instrument uses at power-on.

- Last: Preserve the system configuration after power off.
- Default: Use the factory settings (except those parameters that are not affected by factory reset).

Beeper
Press Utility→System→Beeper to enable or disable the beeper. If the beeper is enabled, the instrument generates prompt sound if an error occurs during front panel operation or remote operation.

Address
Press Utility→System→Address and use the knob or numeric key to modify the ID of instrument.

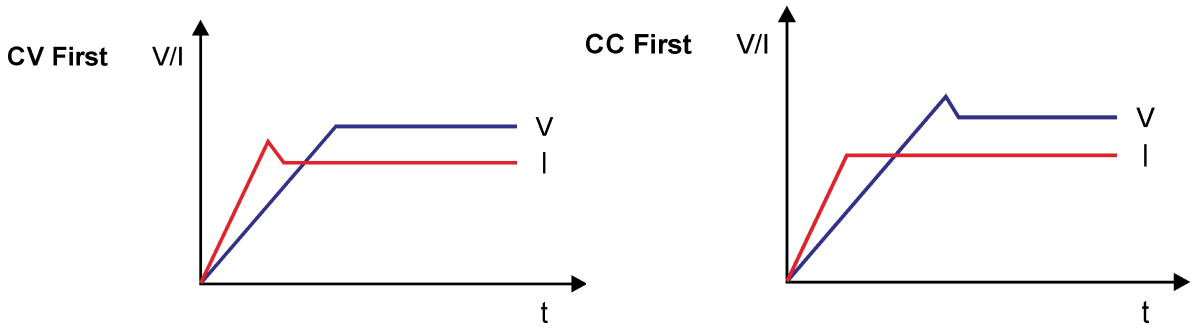
Sense
Press Utility→System→Sense to enable or disable the remote sensing function. For the details, refer to section 2.9 "Remote Sensing Function".

Backlight
Press Utility→System→BackLight and use the knob or numeric key to adjust the backlight.

Parameter display selection
Press Utility→System→Disp W R to select the third parameter to be displayed besides Voltage and Current.

Output Voltage auto tuning (VSelfTest)
Press Utility→System→VSelfTest to to enable or disable output voltage auto tuning. If output voltage auto tuning is enabled, the device will monitor the output voltage at output terminals and correct automatically to minimize the error between real output value and set value.

CV/CC Priority setup
Press Utility→System→CC First to set the priority of CC/CV regulation handling. By default, the power supply starts up in the CV mode as soon as the output is turned on and raises the output voltage to the set level, or until the set current limit is reached to change into CC mode (this can cause a slight current overshoot over the set current level). If this option is enabled, the power supply will start up in CC mode and adjust the voltage to reach the set current limit or to change to CV mode if the voltage limit was reached (this eliminates the current overshoot during startup).



Constant power output setup
Press Utility→System→CP Out to to enter the constant power output setup menu as described in point 6.4.

Line Resistance
Press Utility→System→CP Out to enter the fixed line resistance compensation setup. In case you are not able to use remote sensing leads to compensate the line losses automatically, you can enter the line resistance value in this setting so the power supply will compensate line losses based on this value.

6.8.4 Other settings

In the Utility→Others menu you can configure advanced system settings - please take care you know what you are doing as this might lead to unpredicted situations otherwise.

A Limit
Enables or disables the current limit settings „A MIN, A MAX, A Last"

A MIN
Adjusts the low range of the user current setting.

A MAX
Adjusts the high range of the user current settings.

A last
Enables or disables saving of the last user set current value after device power off/on.

V Limit
Enables or disables the voltage limit settings „V MIN, V MAX, V Last"

V MIN
Adjusts the low range of the user voltage setting.

V MAX
Adjusts the high range of the user voltage settings.

V last
Enables or disables saving of the last user set voltage value after device power off/on.

AVG
Adjusts the amount of measurement points the device takes into account while calculating the average output voltage. This setting affects the output voltage stability, as with a higher amount of measurement points the output behaves more stable, but reacts slower to changes. Each measurement is taken once every 10ms, meaning a setting of 1 disables the average calculation and the output voltage is controlled and adjusted in real time while a setting of 99 calculates the median over 990ms and adjusts the output voltage based on that calculation.

Out Timer
Enables or disables the „Timer Value" setting.

Timer Value
Allows setting a timer value in seconds, which starts immediately when the output is turned on and shuts down the output as soon as it reaches the set value.

Sense V
Adjusts the maximum voltage compensation value of the remote sensing input.

ADC AVG
Adjusts the amount of measurement points the device takes into account while calculating the average output current. This setting affects the output current stability, as with a higher amount of measurement points the output behaves more stable, but reacts slower to changes. Each measurement is taken once every 10ms, meaning a setting of 1 disables the average calculation and the output current is controlled and adjusted in real time while a setting of 99 calculates the median over 990ms and adjusts the output current based on that calculation.

Hotkey
Allows disabling or enabling of the device hotkeys.

6.8.4 Restore to Factory setting

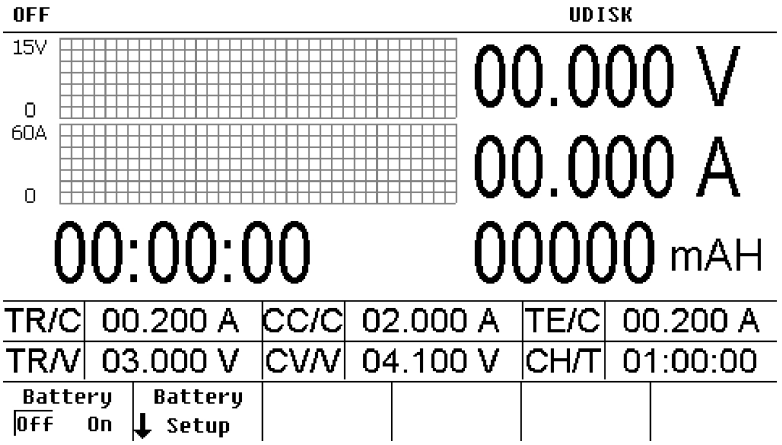
Press Utility→Set to Default to restore the instrument to factory settings.
Factory settings:

Parameters	
Voltage setting value	05.000V
Current setting value	01.000A
Voltage limit	05.2A
Current limit	01.2A
O.V.P On/Off	Off
O.C.P On/Off	Off
Output On/Off	Off
Timer	
Auto Test On/Off	Off
Groups	300
Auto Test parameter	Voltage, current, Time (different DP-HA models may have different values)
Running mode	Auto
Cycles	Infinite
End state	Off
I/O configuration	
RS232*	
Baud rate	9600
Stop bit	1bit
Parity bit	None
Trigger	
Trigger source	EXT
Trigger mode	Output
System settings	
Power-on setting*	Default
Beeper	On
Address	88
Sense	Off
Analog control	Off
Backlight	80
Parameter display	Disp W
VSelfTest	Off

Note*: These parameters are not affected by factory reset.

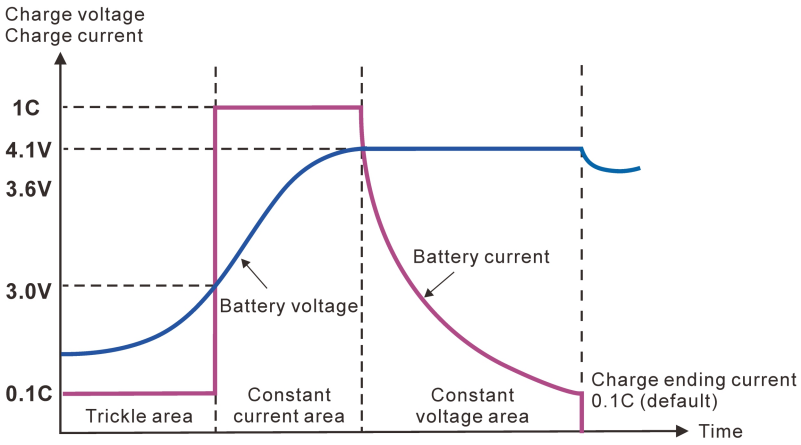
6.8 Utilities

The Utilities section contains additional functions (Apps). Currently this section contains only battery charge functions, but more apps are in development and will be available via firmware update later. Press [• • •] to enter the utilities section.



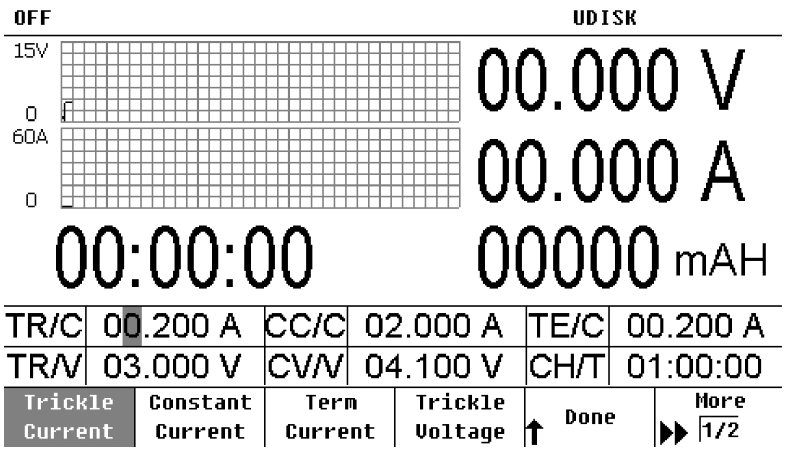
2.8.1 Battery Curved Charge Function

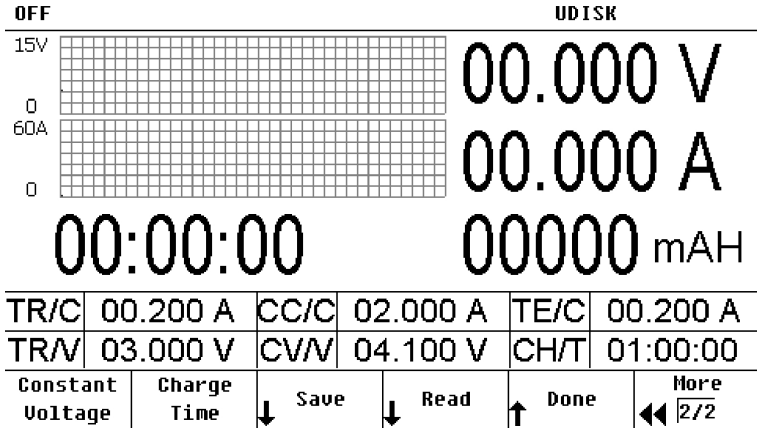
This instrument provides battery charge functionality as shown in the figure below.



Configuration:

1) Press [• • •] →Battery Setup to change the settings.





Explanations:

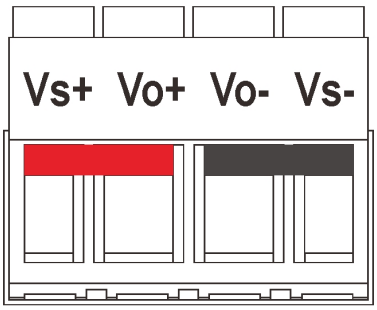
Parameters	**Menu**	**Display**
Trickle charge current	Trickle Current	TR/C
Standard charge current	Constant Charge	CC/C
Terminated current threshold	Term Current	TE/C
Trickle charge voltage threshold	Trickle Voltage	TR/V
Floating charge voltage	Constant Voltage	CV/V
Charge time	Charge Time	CH/T

2) Press Battery On/Off and select "On" to enable the battery charging functionality. Connect the battery to the instrument, the voltage of battery is displayed on the screen. Start charging by pressing the "ON/OFF" button.

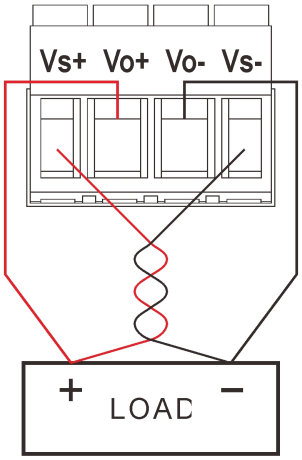
6.9 Remote Sensing Function

This power supply provides high output current, so the voltage drop over the primary connection wires cannot always be ignored. If remote sensing is enabled, the instrument can automatically check the Voltage at the load and compensate the voltage drop caused by the primary wiring resistance to ensure that the power supply output value set by the user is equal with the voltage acquired by the load.

By default, the power supply remote sensing connection is operating in „local" mode, thus does not take into account the losses in the connection cables. This is achieved by the installed bridges between Vs+ and Vo+, as well as Vo- and Vs-.



To enable the compensation of the connection lead losses, please remove the jumpers between Vs+ and Vo+, as well as Vo- and Vs-. Then connect the remote sensing cables and power leads according to the following schema.



Configuration:

1) Connect the output terminals of the power supply and the remote sensing input as shown in the figure above. Pay attention to the polarity when making connections.

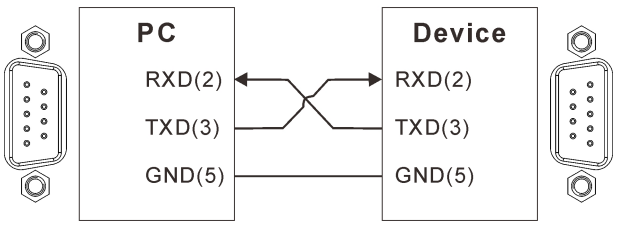
7. RS232 or RS485 / USB Connection

All functions of the DP-HA Series power supply can be controlled through the RS232/RS485 interface by using the SCPI or Modbus-RTU protocol.

7.1 Interface Settings

7.1.1 RS232 Interface

The RS232 interface is installed on the real panel of instrument.



7.1.1.1 COM Port Settings

Please use the following Settings on your Computer or digital controller to connect:

1) Baud rate: 9600
2) Parity bit: None
3) Data bit: 8
4) Stop bit: 1
5) Data flow control: None

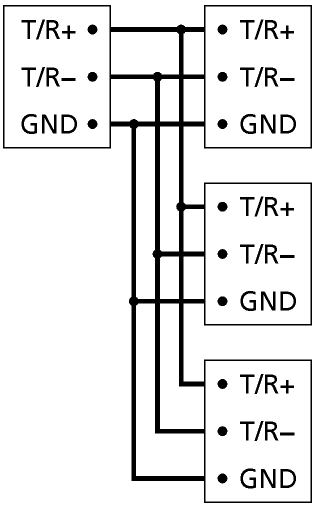
Note 1: If the connection can not be established for some reason, please check:

- Check the connection cable for defects and a proper connection
- Check if the connection cable is a crossover cable
- Check the communication settings on both sides
- Check whether the end character of the command is a line break (hexadecimal 0X0A)

Note 2: While a remote connection is established and the device is being controlled remotely, the front panel is locked down.

7.2.1 RS485 Interface

The RS485 interface is installed on the real panel of instrument.



Note: To avoid interferences, please use shielded cables and connect all GND's.

7.2.1.1 RS485 Port Settings

Please use the following Settings on your Computer or digital controller to connect:

6) Baud rate: 9600
7) Parity bit: None
8) Data bit: 8
9) Stop bit: 1
10) Data flow control: None

Note 1: If the connection can not be established for some reason, please check:
- Check the connection cable for defects and a proper connection
- Check if the connection cable is a crossover cable
- Check the communication settings on both sides
- Check whether the end character of the command is a line break (hexadecimal 0X0A)

Note 2: While a remote connection is established and the device is being controlled remotely, the front panel is locked down.

7.2 SCPI Commands

For detailed SCPI command list, please refer to the DP-HA Series SCPI Communication Protocol Sheet.

8. MAINTENANCE

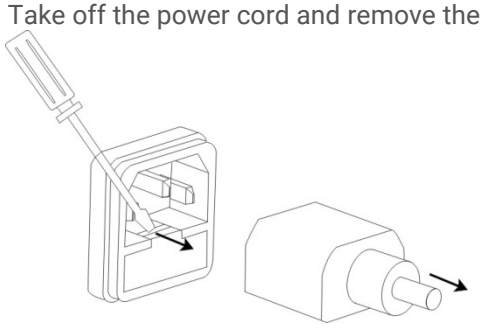
8.1 Inspection

- Inspect the instrument at regular intervals so that it maintains its initial performance for a long time.
- Check the input power cord for damage regularly.
- Check the terminal screws and binding posts for loosening.

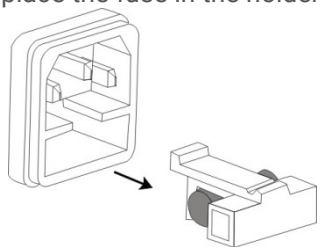
8.2 Fuse Replacement

Steps

(1) Take off the power cord and remove the fuse socket using a screw driver.



(2) Replace the fuse in the holder.



Fuse rating 230V Power Grid T15AL/250V

DP-HA Series Communication Protocol

DSC-Electronics Germany • Georgstraße 36 • 53111 Bonn

Content

Command System

Commands supported by this product are mainly categorized into the following types:

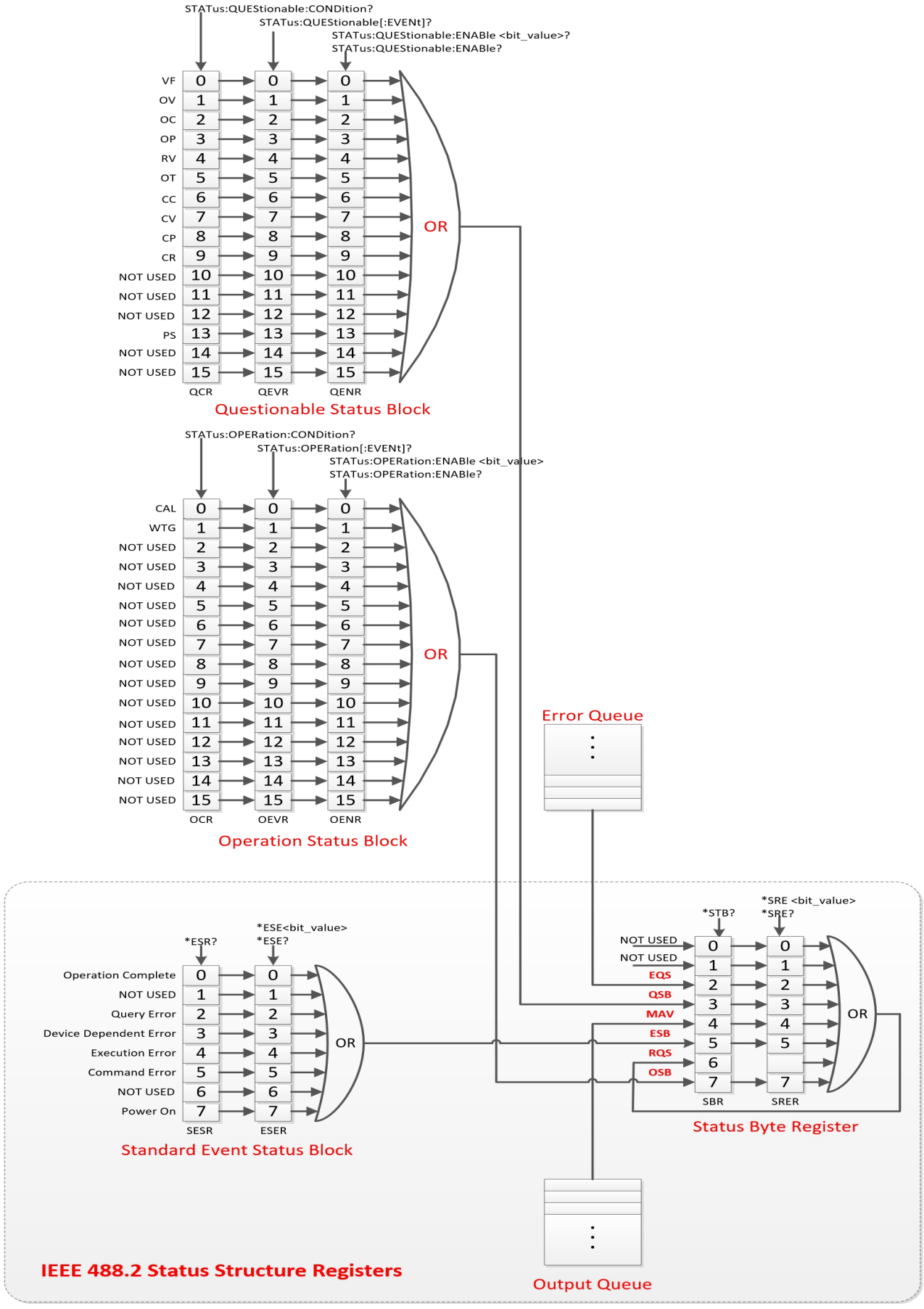
IEEE 488.2 Common Commands
APPLy Commands
CALibration Commands
HOTKey Commands
MEASure Commands
OUTPut Commands
SOURce Commands STATus Commands
SYSTem Commands

Parameter	Supported Unit	Omitted Unit
Voltage	V	V
Current	A	A
Cycle numbers	CYC	CYC
Time	s	s

IEEE 488.2 Common Commands
IEEE 488.2 standard defines a common command set for querying or executing basic operations. These commands usually start with a “*” and hold a keyword that is 3 characters long.

***CLS**
***ESE**
***ESR?**
***IDN?**
***OPC**
***PSC**
***RCL**
***RST**
***SAV *SRE**
***STB?**

The following chart shows the Status register Structure of the power supply:



***CLS**

Syntax:
*CLS

Function:
This command clears the event registers in all register groups. It also clears the Error queue.

Example:
*CLS

***ESE**

Syntax:
*ESE <value>
*ESE?

Function:
Set the bits in the Event Status Enable Register (ESER).
Query the bits in the Event Status Enable Register (ESER).

Parameters:

Name	Type	Range	Default
<value>	Integer	0 to 255	0

Remarks:
Bits of the Event Status Enable Register (ESER) are defined as per the following table. Bit 1 and Bit 6 are unused and are always defined as 0. The parameter <value> is a number from 0 (00000000, in decimal value as 0) to 255 (11111111, in decimal value as 255) of the binary bits of the ESER.

Bit	Weights	Name	Enable
7	128	PON	Power On
6	Not Used	--	Not Used
5	32	CME	Command Error
4	16	EXE	Execution Error
3	8	DOE	Device-Specific Error
2	4	QYE	Query Error
1	Not Used	--	Not Used
0	1	OPC	Operation Complete

Examples:
*ESE 128
Response: Enable bit 7 (decimal value 128) of the ESER.
*ESE?
Response: “128”

***ESR**

Syntax:
*ESR?

Function:
Return the contents of the Standard Event Status Register (SESR).

Remarks:
Bits of the Standard Event Status Register (SESR) are defined as per the following table. Bit 1 and Bit 6 are unused and are always defined as 0. The parameter <value> is a number from 0 (00000000, in decimal value as 0) to 255 (11111111, in decimal value as 255) of the binary bits of the SESR.

Bit	Weights	Name	Enable
7	128	PON	Power On
6	Not Used	--	Not Used
5	32	CME	Command Error
4	16	EXE	Execution Error
3	8	DOE	Device-Specific Error
2	4	QYE	Query Error
1	Not Used	--	Not Used
0	1	OPC	Operation Complete

Examples:
*ESR?
Response: “128” (Bit 7 is already set)

***IDN**

Syntax:
*IDN?

Function:
Query the instrument ID and return a string (unique identification code of the instrument).

Examples:
*IDN?
Response: 00000002030400

Remarks:
-

***OPC**

Syntax:
*OPC
*OPC?

Function:
The command (*OPC) sets the Operation Complete bit (bit 0) in the Standard Event Status Register (SESR) to 1 when all pending operations are finished. The query (*OPC?) returns if pending operation is finished or not.

Examples:
*OPC
*OPC?
Response: If pending operations are finished, returns “1” / If pending operations are not finished, returns “0”.

***PSC**

Syntax:
*PSC <value>
*PSC?

Function:
Set the Power-on-Status-Clean-Flag.
Query the Power-on-Status-Clean-Flag.

Parameters:

Parameter value	Power-on-Status-Clean-Flag
0	Registers will not be cleared during power-on.
1	Registers will be cleared during power-on.

Examples:
*PSC 0
*PSC?
Response: 0

***RCL**

Syntax:
*RCL {0|1|2...|99}

Function:
Recall the saved instrument status.

Examples:
*RCL 3
Recall the data saved in memory location 3.

***RST**

Syntax:
*RST

Function:
Restore the instrument default settings.

Examples:
*RST

***SAV**

Syntax:
*SAV {0|1|2...|99}

Function:
Save the current system status into the non-volatile memory with a specified location.

Examples:
*SAV3
Save the current system status into memory location 3.

***SRE**

Syntax:
*SRE <value>
*SRE?

Function:
Set the bits in the Service Request Enable Register (SRER).
Query the bits in the Service Request Enable Register (SRER).

Parameters:

Name	Type	Range	Default value
<value>	Integer	0 to 255	0

Remarks:
Bits of the SRER are defined as per the below table. Bit 0 and bit 1 are not used and are always regarded as 0, while bit 6 shall not be changed by the user. Parameter <value> is a number from 0 (00000000, in decimal value as 0) to 255 (11111111, in decimal value as 255) of the binary bits of the SRER.

Bit	Weights	Name	Enable
7	128	OPE	Standard Operation Summary
6	64	RQS	Request Service
5	32	ESB	Standard Event Summary
4	16	MAV	Message Available Summary
3	8	QUES	Questionable Data Summary
2	4	EQ	Error Queue
1	Not Used	--	Not Used
0	Not Used	--	Not Used

Examples:
*SRE 16
Enable bit 4 (decimal number 16) of the SRER.
*SRE?
Response: 16

***STB**

Syntax:
*STB?

Function:
The query returns the contents of the Status Byte Register (SBR).

Remarks:

Different bits of the SBR are defined as per the below table.
Bit 0 and bit 1 are not used and are always regarded as 0.

Bit	Weights	Name	Enable
7	128	OPE	Standard Operation Summary
6	64	RQS	Request Service
5	32	ESB	Standard Event Summary
4	16	MAV	Message Available Summary
3	8	QUES	Questionable Data Summary
2	4	EQ	Error Queue
1	Not Used	--	Not Used
0	Not Used	--	Not Used

Examples:
*STB?
Returns: 4 (bit 2 is set)

***TRG**

Syntax:
*TRG

Function:
Send trigger event once..

Examples:
*TRG

APPLy Commands

The APPLy Commands are used to quickly set or query voltage and current values of the power supply.

[:]APPLy

Syntax:
[:]APPLy {<voltage>|DEFault|MINimum|MAXimum}[,{<current>|DEFault|MINimum|MAXimum}]
[:]APPLy?

Function:
Set the output voltage and current value.
Query the output voltage and current value.

Examples:
:APPL 5,1
Set the output voltage at 5V and output current at 1A.
:APPL MAX,MAX
Set the output voltage and current at MAX value.

:APPL?
Return the present output voltage and current.

Related commands:
-

BATTery Commands
The BATTery Commands are used for settings of trickle charging threshold voltage, charging voltage, trickle charging current, charging current, terminated threshold current and turning on or off the battery charging functionality.

[:]BATTery:VOLTage:UNDErv
[:]BATTery:VOLTage:CHARge
[:]BATTery:CURRent:TRICkle
[:]BATTery:CURRent:CHARge
[:]BATTery:CURRent:TERMinated
[:]BATTery:STATe
BATTery:TRICkle:CURRent
BATTery:CHARge:CURRent
BATTery:TERMination:CURRent
BATTery:BROWn:VOLTage
BATTery:SATuration:VOLTage BATTery:CHARge:TIMe
BATTery[:STATe]

Function:

No.	Commands	Desceiption
1	scpi_batt_tric_curr_arg_parse	Set trickle charging current value. (BATTery:TRICkle:CURRent ...)
2	scpi_batt_tric_curr_ret_arg_parse	Query trickle charging current value. (BATTery:TRICkle:CURRent?)
3	scpi_batt_char_curr_arg_parse	Set charging current value. (BATTery:CHARge:CURRent ...)
4	scpi_batt_char_curr_ret_arg_parse	Query charging current value. (BATTery:CHARge:CURRent?)
5	scpi_batt_term_curr_arg_parse	Set termination current value. (BATTery:TERMination:CURRent ...)
6	scpi_batt_term_curr_ret_arg_parse	Query termination current value. (BATTery:TERMination:CURRent?)

7	Scampi_batt_brow_volt_arg_parse	Set brown voltage value (undervoltage value). (BATTery:BROWn:VOLTage ...)
8	scpi_batt_brow_volt_ret_arg_parse	Query brown voltage value (undervoltage value). (BATTery:BROWn:VOLTage?)
9	scpi_batt_sat_volt_arg_parse	Set saturation voltage value. (BATTery:SATuration:VOLTage ...)
10	scpi_batt_sat_volt_ret_arg_parse	Query saturation voltage value. (BATTery:SATuration:VOLTage?)
11	scpi_batt_char_time_arg_parse	Set charging time value. (BATTery:CHARge:TIMe ...)
12	scpi_batt_char_time_ret_arg_parse	Query charging time vaule. (BATTery:CHARge:TIMe?)
13	scpi_batt_stat_arg_parse	Set battery satus. (BATTery[:STATe] ...)
14	scpi_batt_stat_ret_arg_parse	Query battery status. (BATTery[:STATe]?)

[:]BATTery:VOLTage:UNDErv

Syntax:
[:]BATTery:VOLTage:UNDErvl <value>

Function:
Set the trickle charging threshold voltage.

Examples:
:BATTery:VOLTage:UNDErvl 3.0
Set the trickle charging threshold voltage to 3.0V.
:BATTery:VOLTage:UNDErvl?
Query the trickle charging threshold voltage.

Related commands:
[:]BATTery:VOLTage:CHARge
[:]BATTery:CURRent:TRICkle
[:]BATTery:CURRent:CHARge
[:]BATTery:CURRent:TERMinated
[:]BATTery:STATe

[:]BATTery:VOLTage:CHARge

Syntax:
[:]BATTery:VOLTage: CHARge <value>

Function:
Set the constant charge voltage.

Examples:
:BATTery:VOLTage: CHARge 4.2
Set the constant charge voltage to 4.2V.

:BATTery:VOLTage: CHARge?
Query the constant charge voltage.

Related commands:
[:]BATTery:VOLTage:UNDErv [:]BATTery:CURRent:TRICkle
[:]BATTery:CURRent:CHARge
[:]BATTery:CURRent:TERMinated
[:]BATTery:STATe

[:]BATTery:CURRent:TRICkle

Syntax:
[:]BATTery: CURRent:TRICkle <value>

Function:
Set the trickle charging current.

Examples:
:BATTery:CURRent:TRICkle 0.1
Set the trickle charging current to 0.1A.

:BATTery:CURRent:TRICkle?
Query the trickle charging current.

Related commands:
[:]BATTery:VOLTage:UNDErv
[:]BATTery:VOLTage:CHARge
[:]BATTery:CURRent:CHARge
[:]BATTery:CURRent:TERMinated
[:]BATTery:STATe

[:]BATTery:CURRent:CHARge

Syntax:
[:]BATTery: CURRent: CHARge <value>

Function:
Set the constant charge current.

Examples:
BATTery:CURRent:CHARge 1
Set the constant charge current to 1A.

:BATTery:CURRent:CHARge?
Query the constant charge current.

Related commands:
[:]BATTery:VOLTage:UNDErv
[:]BATTery:VOLTage:CHARge
[:]BATTery:CURRent:TRICkle
[:]BATTery:CURRent:TERMinated
[:]BATTery:STATe

[:]BATTery:CURRent:TERMinated

Syntax:
[:]BATTery: CURRent:TRICkle <value>

Function:
Set the termination threshold current.

Examples:
:BATTery:CURRent:TERMinated 0.05
Set the termination threshold current to 0.05A.

:BATTery:CURRent:TERMinated?
Query the termination threshold current.

Related commands:
[:]BATTery:VOLTage:UNDErv
[:]BATTery:VOLTage:CHARge
[:]BATTery:CURRent:TRICkle
[:]BATTery:CURRent:CHARge
[:]BATTery:STATe

[:]BATTery:STATe

Syntax:
[:]BATTery :STATe {ON | OFF} [:]BATTery :STATe?

Function:
Turn on or off battery charging functionality.
Query battery charging functionality status.

Examples:
:BATTery:STATe ON
Turn on battery charging functionality.

:BATTery:STATe?
The query returns battery charging functionality status.
Return: “ON” or “OFF”.

Related commands:
[:]BATTery:VOLTage:UNDErv
[:]BATTery:VOLTage:CHARge
[:]BATTery:CURRent:TRICkle
[:]BATTery:CURRent:CHARge
[:]BATTery:CURRent:TERMinated

HOTKey Commands

The HOTKey Commands are used for setting and querying the hotkey status of the power supply.

[:]HOTKey

Syntax:
[:]HOTKey {ON | OFF}
[:]HOTKey?

Function:
Turn on or off hotkeys.
Query hotkey status.

Examples:
:HOTK ON
Turn on the hotkey.

:HOTK?
The query returns hotkey functionality status.
Response: “ON” or “OFF”.

Related commands:
None

MEASure Commands

The MEASure Commands are used for querying the actual values of output voltage, current and power on the power supply's output terminals. The MEASure Commands include the following:

[:]MEASure[:SCALar]:CURRent[:DC]?
[:]MEASure[:SCALar]:POWer[:DC]?
[:]MEASure[:SCALar][:VOLTage][:DC]?

[:]MEASure[:SCALar]:CURRent[:DC]?

Syntax:
[:]MEASure[:SCALar]:CURRent[:DC]?

Function:
Query the value of the output current on output terminals.

Examples:
:MEAS:CURR?
Return the value of the output current on output terminals.

Related commands:
[:]MEASure[:SCALar]:POWer[:DC]?
[:]MEASure[:SCALar][:VOLTage][:DC]?

[:]MEASure[:SCALar]:POWer[:DC]?

Syntax:
[:]MEASure[:SCALar]:POWer[:DC]?

Function:
The query returns the value of the output power on output terminals.

Examples:
:MEAS:POW?
Return the value of the output power on output terminals.

Related commands:
[:]MEASure[:SCALar]:CURRent[:DC]?
[:]MEASure[:SCALar][:VOLTage][:DC]?

[:]MEASure[:SCALar][:VOLTage][:DC]?

Syntax:
[:]MEASure[:SCALar][:VOLTage][:DC]?

Function:
Query the value of the output voltage on output terminals.

Examples:
:MEAS?
Return the value of the output voltage on output terminals.

Related commands:
[:]MEASure[:SCALar]:CURRent[:DC]?
[:]MEASure[:SCALar]:POWer[:DC]?

OUTPut Commands

The OUTPut Commands are used to configure and query the output settings of the power supply.

[:]OUTPut

Syntax:
[:]OUTPut[:STATe] {ON | OFF} [:]OUTPut[:STATe]?

Function:
Turn on or off the output.
Query output status.

Examples:
:OUTP ON
Turn on the output.
:OUTP?
Response: “ON” or “OFF”.

Related commands:
None

SOURce Commands

The SOURce Commands are used to directly set the values of output voltage, output current, output voltage step, output current step, and protection threshold, set the status of OCP and OVP switch and to query related status.

The SOURce Commands include the following:

[:SOURce:]CURRent:PROTection:CLEar [:SOURce:]CURRent:PROTection:STATe
[:SOURce:]CURRent:PROTection:TRIPped?
[:SOURce:]CURRent:PROTection[:LEVel]
[:SOURce:]CURRent[:LEVel][:IMMediate]:STEP[:INCRement]
[:SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude]
[:SOURce:]VOLTage:PROTection:CLEar [:SOURce:]VOLTage:PROTection:STATe
[:SOURce:]VOLTage:PROTection:TRIPped?
[:SOURce:]VOLTage:PROTection[:LEVel]
[:SOURce:]VOLTage:RANGe
[:SOURce:]VOLTage[:LEVel][:IMMediate]:STEP[:INCRement]
[:SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude]

[:SOURce:]CURRent

The [:SOURce:]CURRent commands are used to set the values of output current, output current step, output current step, OCP threshold, set the status of OCP switch and to query related status.

The [:SOURce:]CURRent commands include the following:

[:SOURce:]CURRent:PROTection:CLEar [:SOURce:]CURRent:PROTection:STATe
[:SOURce:]CURRent:PROTection:TRIPped?
[:SOURce:]CURRent:PROTection[:LEVel]
[:SOURce:]CURRent[:LEVel][:IMMediate]:STEP[:INCRement]
[:SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude]

[:SOURce:]CURRent:PROTection:CLEar

Syntax:
[:SOURce:]CURRent:PROTection:CLEar

Function:
Clear the present OCP.

Examples:
:CURR:PROT:CLE
Clear the present OCP.

Related commands:
[:SOURce:]CURRent:PROTection:STATe
[:SOURce:]CURRent:PROTection:TRIPped?
[:SOURce:]CURRent:PROTection[:LEVel]
[:SOURce:]CURRent[:LEVel][:IMMediate]:STEP[:INCRement]
[:SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude]

[:SOURce:]CURRent:PROTection:STATe

Syntax:
[:SOURce:]CURRent:PROTection:STATe {OFF|ON} [:SOURce:]CURRent:PROTection:STATe?

Function:
Disable or enable the present OCP.
Query the present OCP status.

Examples:
:CURR:PROT:STAT OFF
Disable the present OCP.
:CURR:PROT:STAT?
Query the present OCP, return “ON” (enabled) or “OFF” (disabled).

Related commands:
[:SOURce:]CURRent:PROTection:CLEar
[:SOURce:]CURRent:PROTection:TRIPped?
[:SOURce:]CURRent:PROTection[:LEVel]
[:SOURce:]CURRent[:LEVel][:IMMediate]:STEP[:INCRement]
[:SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude]

[:SOURce:]CURRent:PROTection:TRIPped?

Syntax:
[:SOURce:]CURRent:PROTection:TRIPped?

Function:
Query if the current protection circuit is currently active.

Examples:
:CURR:PROT:TRIP?
Return “ON” (in operation) or “OFF” (not in operation).

Related commands:
[:SOURce:]CURRent:PROTection:CLEar
[:SOURce:]CURRent:PROTection:STATe
[:SOURce:]CURRent:PROTection[:LEVel]
[:SOURce:]CURRent[:LEVel][:IMMediate]:STEP[:INCRement]
[:SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude]

[:SOURce:]CURRent:PROTection[:LEVel]

Syntax:
[:SOURce:]CURRent:PROTection[:LEVel] {<current>|DEFault|MINimum|MAXimum}
[:SOURce:]CURRent:PROTection[:LEVel]? {DEFault|MINimum|MAXimum}

Function:
Set the OCP threshold.
Query the OCP threshold value.

Examples:
:CURR:PROT 6
Set the OCP threshold to 6A.
:CURR:PROT MAX
Set the OCP threshold to maximum value.
:CURR:PROT?
Return the OCP threshold.
:CURR:PROT? MAX
Return the OCP maximum value.

Related commands:
[:SOURce:]CURRent:PROTection:CLEar [:SOURce:]CURRent:PROTection:STATe
[:SOURce:]CURRent:PROTection:TRIPped?
[:SOURce:]CURRent[:LEVel][:IMMediate]:STEP[:INCRement]
[:SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude]

[:SOURce:]CURRent[:LEVel][:IMMediate]:STEP[:INCRement]

Syntax:
[:SOURce:]CURRent[:LEVel][:IMMediate]:STEP[:INCRement] {<numeric value>|DEFault|MINimum|MAXimum}
[:SOURce:]CURRent[:LEVel][:IMMediate]:STEP[:INCRement]? {DEFault|MINimum|MAXimum}

Function:
Set the current step increment.
Query the current step increment value.

Examples:
:CURR:STEP 1
Set the current step increment at 1A.
:CURR:STEP DEF
Set the current step increment at default value.
:CURR:STEP?
Return the present current step increment value.
:CURR:STEP? DEF
Return the default current step increment value.

Related commands:
[:SOURce:]CURRent:PROTection:CLEar [:SOURce:]CURRent:PROTection:STATe
[:SOURce:]CURRent:PROTection:TRIPped?
[:SOURce:]CURRent:PROTection[:LEVel]
[:SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude]

[:SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude]

Syntax:
[:SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude] {<current>|DEFault|MINimum|MAXimum}
[:SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude]? {DEFault|MINimum|MAXimum}

Function:
Set the output current.
Query the present output current value.

Examples: :CURR 1
Set the output current to 1A.
:CURR MAX
Set the output current to maximum value.
:CURR?
Return the present output current value.
:CURR? MAX
Return the maximum value of the present output current.

Related commands:
[:SOURce:]CURRent:PROTection:CLEar [:SOURce:]CURRent:PROTection:STATe
[:SOURce:]CURRent:PROTection:TRIPped?
[:SOURce:]CURRent:PROTection[:LEVel]
[:SOURce:]CURRent[:LEVel][:IMMediate]:STEP[:INCRement]

[:SOURce:]VOLTage

The [:SOURce:]VOLTage commands are used to set the values of output voltage, output voltage step, output voltage step, OVP threshold, set the status of OVP switch and to query related status.

The [:SOURce:]VOLTage commands include the following:

[:SOURce:]VOLTage:PROTection:CLEar [:SOURce:]VOLTage:PROTection:STATe
[:SOURce:]VOLTage:PROTection:TRIPped?
[:SOURce:]VOLTage:PROTection[:LEVel]
[:SOURce:]VOLTage:RANGe
[:SOURce:]VOLTage[:LEVel][:IMMediate]:STEP[:INCRement]
[:SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude]

[:SOURce:]VOLTage:PROTection:CLEar

Syntax:
[:SOURce:]VOLTage:PROTection:CLEar

Function:
Clear the OVP mode.

Examples:
:VOLT:PROT:CLE
Clear the OVP mode.

Related commands:
[:SOURce:]VOLTage:PROTection:STATe
[:SOURce:]VOLTage:PROTection:TRIPped?
[:SOURce:]VOLTage:PROTection[:LEVel]
[:SOURce:]VOLTage:RANGe
[:SOURce:]VOLTage[:LEVel][:IMMediate]:STEP[:INCRement]
[:SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude]

[:SOURce:]VOLTage:PROTection:STATe

Syntax:
[:SOURce:]VOLTage:PROTection:STATe {OFF|ON} [:SOURce:]VOLTage:PROTection:STATe?

Function:
Enable or disable the present OVP, query if the OVP is enabled or disabled.

Examples:
:VOLT:PROT:STAT OFF
Disable the OVP.
:VOLT:PROT:STAT?
Query the status of the OVP setting.

Related commands:
[:SOURce:]VOLTage:PROTection:STATe
[:SOURce:]VOLTage:PROTection:TRIPped?
[:SOURce:]VOLTage:PROTection[:LEVel]
[:SOURce:]VOLTage:RANGe
[:SOURce:]VOLTage[:LEVel][:IMMediate]:STEP[:INCRement]
[:SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude]

[:SOURce:]VOLTage:PROTection:TRIPped?

Syntax:
[:SOURce:]VOLTage:PROTection:TRIPped?

Function:
Query if the OVP is currently in operation.

Examples:
:VOLT:PROT:TRIP?
Returns “ON” (in operation) or “OFF” (not in operation).

Related commands:
[:SOURce:]VOLTage:PROTection:CLEar
[:SOURce:]VOLTage:PROTection:STATe
[:SOURce:]VOLTage:PROTection[:LEVel]
[:SOURce:]VOLTage:RANGe
[:SOURce:]VOLTage[:LEVel][:IMMediate]:STEP[:INCRement]
[:SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude]

[:SOURce:]VOLTage:PROTection[:LEVel]

Syntax:
[:SOURce:]VOLTage:PROTection[:LEVel] {<voltage>|DEFault|MINimum|MAXimum}
[:SOURce:]VOLTage:PROTection[:LEVel]? {DEFault|MINimum|MAXimum}

Function:
Set the OVP threshold.
Query the present OVP threshold value.

Examples:
:VOLT:PROT 31
Set the OVP threshold to 31V.
:VOLT:PROT MAX
Set the OVP threshold to maximum value.
:VOLT:PROT?
Return the present OVP threshold.
:VOLT:PROT? MAX
Return the OVP maximum threshold.

Related commands:
[:SOURce:]VOLTage:PROTection:CLEar
[:SOURce:]VOLTage:PROTection:STATe
[:SOURce:]VOLTage:PROTection:TRIPped?
[:SOURce:]VOLTage:RANGe
[:SOURce:]VOLTage[:LEVel][:IMMediate]:STEP[:INCRement]
[:SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude]

[:SOURce:]VOLTage:RANGe

Syntax:
[:SOURce:]VOLTage:RANGe {LOW | HIGH} [:SOURce:]VOLTage:RANGe?

Function:
Set the output voltage range.
Query the present output voltage range.

Remarks:
This command is used to choose an output voltage range (only applies to dual-range models).
“HIGH”, high voltage range is selected.
“LOW”, low voltage range is selected.

Examples:
:VOLT:RANG LOW
Set the output voltage range to low range.

Related commands:
[:SOURce:]VOLTage:PROTection:CLEar
[:SOURce:]VOLTage:PROTection:STATe
[:SOURce:]VOLTage:PROTection:TRIPped?
[:SOURce:]VOLTage:PROTection[:LEVel]
[:SOURce:]VOLTage[:LEVel][:IMMediate]:STEP[:INCRement]
[:SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude]

[:SOURce:]VOLTage[:LEVel][:IMMediate]:STEP[:INCRement]

Syntax:
[:SOURce:]VOLTage[:LEVel][:IMMediate]:STEP[:INCRement] {<numeric value>|DEFault}
[:SOURce:]VOLTage[:LEVel][:IMMediate]:STEP[:INCRement]? {DEFault}

Function:
Set the output voltage step increment.
Query the output voltage step increment value.

Examples:
:VOLT:STEP 1
Set the output voltage increment to 1V.
:VOLT:STEP DEF
Set the output voltage step increment to default value.
:VOLT:STEP?
Return the present output voltage step increment.
:VOLT:STEP? DEF
Return the default output voltage increment value.

Related commands:
[:SOURce:]VOLTage:PROTection:CLEar
[:SOURce:]VOLTage:PROTection:STATe
[:SOURce:]VOLTage:PROTection:TRIPped?
[:SOURce:]VOLTage:PROTection[:LEVel]
[:SOURce:]VOLTage:RANGe
[:SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude]

[:SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude]

Syntax:
[:SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude] {<voltage>|DEFault|MINimum|MAXimum}
[:SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude]? {DEFault|MINimum|MAXimum}

Function:
Set the output voltage.
Query the present output voltage value.

Examples:
:VOLT 5
Set the output voltage to 5V.
:VOLT MAX
Set the output voltage to maximum value.
:VOLT?
Return the present output voltage value.
:VOLT? MAX
Return the present maximum output voltage value.

Related commands:
[:SOURce:]VOLTage:PROTection:CLEar
[:SOURce:]VOLTage:PROTection:STATe
[:SOURce:]VOLTage:PROTection:TRIPped?
[:SOURce:]VOLTage:PROTection[:LEVel]
[:SOURce:]VOLTage:RANGe
[:SOURce:]VOLTage[:LEVel][:IMMediate]:STEP[:INCRement]

STATus Commands

The STATus Commands are used to set and query the contents of the Questionable Status Register group and Operation Status Register group.

The STATus Commands include the following:
[:]STATus:OPERation:CONDition?
[:]STATus:OPERation:ENABle
[:]STATus:OPERation[:EVENt]?
[:]STATus:PRESet
[:]STATus:QUEStionable:CONDition?
[:]STATus:QUEStionable:ENABle
[:]STATus:QUEStionable[:EVENt]?

[:]STATus:OPERation:CONDition?

Syntax:
[:]STATus:OPERation:CONDition?

Function:
Query the contents of the Operation Condition Register (OCR).

Examples:
:STAT:OPER:COND?
Return the status of the Operation Condition Register (OCR).

Related commands:
[:]STATus:OPERation:ENABle
[:]STATus:OPERation[:EVENt]?
[:]STATus:PRESet
[:]STATus:QUEStionable:CONDition?
[:]STATus:QUEStionable:ENABle
[:]STATus:QUEStionable[:EVENt]?

[:]STATus:OPERation:ENABle

Syntax:
[:]STATus:OPERation:ENABle <enable_value> [:]STATus:OPERation:ENABle?

Function:
Set the contents of the Operation Enable Register (OENR), query the Operation Enable Register (OENR).

Examples:
:STAT:OPER:ENAB?
Return the status of the Operation Enable Register (OENR).

Related commands:
[:]STATus:OPERation:CONDition?
[:]STATus:OPERation[:EVENt]?
[:]STATus:PRESet
[:]STATus:QUEStionable:CONDition?
[:]STATus:QUEStionable:ENABle
[:]STATus:QUEStionable[:EVENt]?

[:]STATus:OPERation[:EVENt]?

Syntax:
[:]STATus:OPERation[:EVENt]?

Function:
Query the status of the Operation Event Register (OEVR).

Examples:
:STAT:OPER?
Return the status of the Operation Event Register (OEVR).

Related commands:
[:]STATus:OPERation:CONDition?
[:]STATus:OPERation:ENABle
[:]STATus:PRESet
[:]STATus:QUEStionable:CONDition?
[:]STATus:QUEStionable:ENABle
[:]STATus:QUEStionable[:EVENt]?

[:]STATus:PRESet

Syntax:
[:]STATus:PRESet

Function:
Clear the Operation Enable Register (OENR) and the Questionable Enable Register (QENR).

Examples:
:STAT:PRES

Related commands:
[:]STATus:OPERation:CONDition?
[:]STATus:OPERation:ENABle
[:]STATus:OPERation[:EVENt]?
[:]STATus:QUEStionable:CONDition?
[:]STATus:QUEStionable:ENABle
[:]STATus:QUEStionable[:EVENt]?

[:]STATus:QUEStionable:CONDition?

Syntax:
[:]STATus:QUEStionable:CONDition?

Function:
Query the status of the Questionable Condition Register (QCR).

Examples:
:STAT:QUES:COND?
Return the status of the Questionable Condition Register (QCR).

Related commands:
[:]STATus:OPERation:CONDition?
[:]STATus:OPERation:ENABle
[:]STATus:OPERation[:EVENt]?
[:]STATus:PRESet
[:]STATus:QUEStionable:ENABle
[:]STATus:QUEStionable[:EVENt]?

[:]STATus:QUEStionable:ENABle

Syntax:
[:]STATus:QUEStionable:ENABle <enable value> [:]STATus:QUEStionable:ENABle?

Function:
Set the status of the Questionable Enable Register (QENR), query the Questionable Enable Register (QENR).

Examples:
:STAT:QUES:ENAB?
Return the status of the Questionable Enable Register (QENR).

Related commands:
[:]STATus:OPERation:CONDition?
[:]STATus:OPERation:ENABle
[:]STATus:OPERation[:EVENt]?
[:]STATus:PRESet
[:]STATus:QUEStionable:CONDition?
[:]STATus:QUEStionable[:EVENt]?

[:]STATus:QUEStionable[:EVENt]?

Syntax:
[:]STATus:QUEStionable[:EVENt]?

Function:
Query the status of the Questionable Event Register (QEVR).

Examples:
:STAT:QUES?
Return the status of the Questionable Event Register (QEVR).

Related commands:
[:]STATus:OPERation:CONDition?
[:]STATus:OPERation:ENABle
[:]STATus:OPERation[:EVENt]?
[:]STATus:PRESet
[:]STATus:QUEStionable:CONDition?
[:]STATus:QUEStionable:ENABle

SYSTem Commands

The SYSTem Commands are used for controlling beeper, interface setup, error query, remote control and functions related to timing output.

The SYSTem Commands include:
[:]SYSTem:AUTO:CYCLe
[:]SYSTem:AUTO:DELay
[:]SYSTem:AUTO:STARt
[:]SYSTem:AUTO[:STATe]
[:]SYSTem:AUTO:STOP
[:]SYSTem:BEEPer:STATe
[:]SYSTem:BEEPer[:IMMediate]
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor:COUNt?
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:LOCal
[:]SYSTem:MEMory?
[:]SYSTem:REMote
[:]SYSTem:RWLock
[:]SYSTem:VERSion?

[:]SYSTem:AUTO:CYCLe

Syntax:
[:]SYSTem:AUTO:CYCLe {0|1|...|99999} [:]SYSTem:AUTO:CYCLe?

Function:
In preset mode, this command is used to set the number of times of execution.
The value 0 means infinite cycling.

Examples:
:SYST:AUTO:CYCL 1
1 sets auto cycle to repeat the setting 1 time and stop.
:SYST:AUTO:CYCL?
Return an integer number within 0 to 99999.

Related commands:
[:]SYSTem:AUTO:DELay
[:]SYSTem:AUTO:STARt
[:]SYSTem:AUTO[:STATe]
[:]SYSTem:AUTO:STOP
[:]SYSTem:BEEPer:STATe
[:]SYSTem:BEEPer[:IMMediate]
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor:COUNt?
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:LOCal
[:]SYSTem:MEMory?
[:]SYSTem:REMote
[:]SYSTem:RWLock
[:]SYSTem:VERSion?

[:]SYSTem:AUTO:DELay

Syntax:
[:]SYSTem:AUTO:DELay {1|...|99999} [:]SYSTem:AUTO:DELay?

Function:
In preset mode, set the execution time for each preset. (The time unit is “s”, minimum resolution is 1s).

Examples:
:SYST:AUTO:DEL 1
The next preset will be set after 1 second.

:SYST:AUTO:DEL?
Return an integer number within 1 to 99999.

Related commands:
[:]SYSTem:AUTO:CYCLe
[:]SYSTem:AUTO:STARt
[:]SYSTem:AUTO[:STATe]
[:]SYSTem:AUTO:STOP
[:]SYSTem:BEEPer:STATe
[:]SYSTem:BEEPer[:IMMediate]
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor:COUNt?
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:LOCal
[:]SYSTem:MEMory?
[:]SYSTem:REMote
[:]SYSTem:RWLock
[:]SYSTem:VERSion?

[:]SYSTem:AUTO:STARt

Syntax:
[:]SYSTem:AUTO:STARt {0|1|...|99} [:]SYSTem:AUTO:STARt?

Function:
In preset mode, set the start memory section for auto execution.

Examples:
:SYST:AUTO:STAR 0
Set the start memory section 1 as the start point for auto execution.
:SYST:AUTO:STAR?
Return an integer number within 0 to 99.

Related commands:
[:]SYSTem:AUTO:CYCLe
[:]SYSTem:AUTO:DELay
[:]SYSTem:AUTO[:STATe]
[:]SYSTem:AUTO:STOP
[:]SYSTem:BEEPer:STATe
[:]SYSTem:BEEPer[:IMMediate]
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor:COUNt?
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:LOCal
[:]SYSTem:MEMory?
[:]SYSTem:REMote
[:]SYSTem:RWLock
[:]SYSTem:VERSion?

[:]SYSTem:AUTO:[STATe]

Syntax:
[:]SYSTem:AUTO:[STATe] {ON | OFF}
[:]SYSTem:AUTO:[STATe]?

Function:
Turn on or off the preset output functionality, query the preset output functionality status.

Examples:
:SYST:AUTO ON
Turn on the preset output functionality.

:SYST:AUTO?
Return the preset output functionality status: “ON” or “OFF”.

Related commands:
[:]SYSTem:AUTO:CYCLe
[:]SYSTem:AUTO:DELay
[:]SYSTem:AUTO:STARt
[:]SYSTem:AUTO:STOP
[:]SYSTem:BEEPer:STATe
[:]SYSTem:BEEPer[:IMMediate]
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor:COUNt?
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:LOCal
[:]SYSTem:MEMory?
[:]SYSTem:REMote
[:]SYSTem:RWLock
[:]SYSTem:VERSion?

[:]SYSTem:AUTO:STOP

Syntax:
[:]SYSTem:AUTO:STOP {0|1|...|99}
[:]SYSTem:AUTO:STOP?

Function:
In preset mode, set the stop preset section for the auto execution or query the stop preset section.

Examples:
:SYST:AUTO:STOP 10
Set the stop memory section to preset 10. The auto execution stops with the execution of preset 10.

:SYST:AUTO:STOP?
Return an integer number within 0 to 99.

Related commands:
[:]SYSTem:AUTO:CYCLe
[:]SYSTem:AUTO:DELay
[:]SYSTem:AUTO:STARt
[:]SYSTem:AUTO[:STATe]
[:]SYSTem:BEEPer:STATe
[:]SYSTem:BEEPer[:IMMediate]
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor:COUNt?
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:LOCal
[:]SYSTem:MEMory?
[:]SYSTem:REMote [:]SYSTem:RWLock
[:]SYSTem:VERSion?

[:]SYSTem:BEEPer:STATe

Syntax:
[:]SYSTem:BEEPer:STATe {ON | OFF}
[:]SYSTem:BEEPer:STATe?

Function:
Set the present beeper state, query the present beeper state.

Examples:
:SYST:BEEP:STAT ON
Turn on the beeper.
:SYST:BEEP:STAT?
Return “ON” (beeper is on) or “OFF (beeper is off)”.

Related commands:
[:]SYSTem:AUTO:CYCLe
[:]SYSTem:AUTO:DELay
[:]SYSTem:AUTO:STARt
[:]SYSTem:AUTO[:STATe]
[:]SYSTem:AUTO:STOP
[:]SYSTem:BEEPer[:IMMediate]
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor:COUNt?
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:LOCal
[:]SYSTem:MEMory?
[:]SYSTem:REMote
[:]SYSTem:RWLock
[:]SYSTem:VERSion?

[:]SYSTem:BEEPer[:IMMediate]

Syntax:
[:]SYSTem:BEEPer[:IMMediate]

Function:
Activate a single beep immediately.

Examples:
:SYST:BEEP
The beeper beeps for a single time.

Related commands:
[:]SYSTem:AUTO:CYCLe
[:]SYSTem:AUTO:DELay
[:]SYSTem:AUTO:STARt
[:]SYSTem:AUTO[:STATe]
[:]SYSTem:AUTO:STOP
[:]SYSTem:BEEPer:STATe
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor:COUNt?
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:LOCal
[:]SYSTem:MEMory?
[:]SYSTem:REMote [:]SYSTem:RWLock
[:]SYSTem:VERSion?

[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD

Syntax:
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD

Function:
Set baud rate of the power supply's interface.

Remarks:
A baud rate code is corresponding to a baud rate as shown in below table:

Code	0	1	2	3	4	5	6	7	8	9
Baud rate	1200	2400	4800	9600	14400	19200	28800	38400	57600	115200

Examples:
:SYST:COMM:SER:BAUD 3
Set baud rate to 9600.

Related commands:
[:]SYSTem:AUTO:CYCLe
[:]SYSTem:AUTO:DELay
[:]SYSTem:AUTO:STARt
[:]SYSTem:AUTO[:STATe]
[:]SYSTem:AUTO:STOP
[:]SYSTem:BEEPer:STATe
[:]SYSTem:BEEPer[:IMMediate]
[:]SYSTem:ERRor:COUNt?
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:LOCal
[:]SYSTem:MEMory?
[:]SYSTem:REMote
[:]SYSTem:RWLock
[:]SYSTem:VERSion?

[:]SYSTem:ERRor:COUNt?

Syntax:
[:]SYSTem:ERRor:COUNt?

Function:
Query the number of error records to be read from the power supply.

Remarks:
The maximum number of recorded error records is 20 sets.

Examples:
:SYST:ERR:COUN?
A response of 3 means that there are 3 error records to read from the power supply.

Related commands:
[:]SYSTem:AUTO:CYCLe
[:]SYSTem:AUTO:DELay
[:]SYSTem:AUTO:STARt
[:]SYSTem:AUTO[:STATe]
[:]SYSTem:AUTO:STOP
[:]SYSTem:BEEPer:STATe
[:]SYSTem:BEEPer[:IMMediate]
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:LOCal
[:]SYSTem:MEMory?
[:]SYSTem:REMote
[:]SYSTem:RWLock
[:]SYSTem:VERSion?

[:]SYSTem:ERRor[:NEXT]?

Syntax:
[:]SYSTem:ERRor[:NEXT]?

Function:
Read the next error message from the power supply.

Remarks:

Error message	Decription
0,"No error"	There is no error message.
-100,"Command error"	Parameter is not allowed to follow the command.
-109,"Missing parameter"	There is missing parameter to follow the command.
-112,"Program mnemonic too long"	The mnemonic characters are too long.
-123,"Exponent too large"	The parameter value is too high.
-200,"Execution error"	There is execution error.
-220,"Parameter error"	The parameter value is wrong.
-221,"Settings conflict"	There is conflict in the setting commands.
-222,"Data out of range"	The data is out of permitted range.

-224,"Illegal parameter value"	The parameter value is illegal.
-350,"Queue overflow"	The error queue is over flow (more than 20 sets).
-702,"Cal secured"	The operation is illegal, because a password is required to start calibration.
-703,"Invalid secure code"	The calibration password is wrong.
-704,"Secured code too long"	The calibration password is too long.

Examples:
:SYST:ERR?
A response with the value “0” means a missing error message or no error.

Related command:
[:]SYSTem:AUTO:CYCLe
[:]SYSTem:AUTO:DELay
[:]SYSTem:AUTO:STARt
[:]SYSTem:AUTO[:STATe]
[:]SYSTem:AUTO:STOP
[:]SYSTem:BEEPer:STATe
[:]SYSTem:BEEPer[:IMMediate]
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor:COUNt?
[:]SYSTem:LOCal
[:]SYSTem:MEMory?
[:]SYSTem:REMote
[:]SYSTem:RWLock
[:]SYSTem:VERSion?

[:]SYSTem:LOCal

Syntax:
[:]SYSTem:LOCal

Function:
Set the power supply to the local operation mode.

Examples:
:SYST:LOC
Set the power supply to the local operation mode.
All control knobs on the front panel are enabled in local mode.

Related commands:
[:]SYSTem:AUTO:CYCLe
[:]SYSTem:AUTO:DELay
[:]SYSTem:AUTO:STARt
[:]SYSTem:AUTO[:STATe]
[:]SYSTem:AUTO:STOP
[:]SYSTem:BEEPer:STATe
[:]SYSTem:BEEPer[:IMMediate]
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor:COUNt?
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:MEMory?
[:]SYSTem:REMote
[:]SYSTem:RWLock
[:]SYSTem:VERSion?

[:]SYSTem:MEMory?

Syntax:
[:]SYSTem:MEMory?

Function:
Query the memory section that is currently recalled.

Examples:
:SYST:MEM?
Return an integer number between 0 to 99.

Related commands:
[:]SYSTem:AUTO:CYCLe
[:]SYSTem:AUTO:DELay
[:]SYSTem:AUTO:STARt
[:]SYSTem:AUTO[:STATe]
[:]SYSTem:AUTO:STOP
[:]SYSTem:BEEPer:STATe
[:]SYSTem:BEEPer[:IMMediate]
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor:COUNt?
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:LOCal
[:]SYSTem:REMote
[:]SYSTem:RWLock
[:]SYSTem:VERSion?

[:]SYSTem:REMote

Syntax:
[:]SYSTem:REMote

Function:
Set the power supply to remote control mode. In remote control mode, all knobs on the front panel are disabled, except “Local” and “Output” keys. During remote control, press “Local” key to return the power supply to local mode.

Examples:
:SYST:REM
Set the power supply to remote control mode.

Related commands:
[:]SYSTem:AUTO:CYCLe
[:]SYSTem:AUTO:DELay
[:]SYSTem:AUTO:STARt
[:]SYSTem:AUTO[:STATe]
[:]SYSTem:AUTO:STOP
[:]SYSTem:BEEPer:STATe
[:]SYSTem:BEEPer[:IMMediate]
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor:COUNt?
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:LOCal
[:]SYSTem:MEMory?
[:]SYSTem:RWLock
[:]SYSTem:VERSion?

[:]SYSTem:RWLock

Syntax:
[:]SYSTem:RWLock

Function:
Set the power supply to remote control mode. In remote control mode, all knobs on the front panel are disabled, except “Output” key.

Examples:
:SYST:RWL
Set the power supply to remote control mode.

Related commands:
[:]SYSTem:AUTO:CYCLe
[:]SYSTem:AUTO:DELay
[:]SYSTem:AUTO:STARt
[:]SYSTem:AUTO[:STATe]
[:]SYSTem:AUTO:STOP
[:]SYSTem:BEEPer:STATe
[:]SYSTem:BEEPer[:IMMediate]
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor:COUNt?
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:LOCal
[:]SYSTem:MEMory?
[:]SYSTem:REMote
[:]SYSTem:VERSion?

[:]SYSTem:VERSion?

Syntax:
[:]SYSTem:VERSion?

Function:
Query the SCPI version of the power supply.

Examples:
:SYST:VERS?
Return 1999.0

Related commands:
[:]SYSTem:AUTO:CYCLe
[:]SYSTem:AUTO:DELay
[:]SYSTem:AUTO:STARt
[:]SYSTem:AUTO[:STATe] [:]SYSTem:AUTO:STOP
[:]SYSTem:BEEPer:STATe
[:]SYSTem:BEEPer[:IMMediate] [:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD [:]SYSTem:ERRor:COUNt?
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:LOCal
[:]SYSTem:MEMory?
[:]SYSTem:REMote
[:]SYSTem:RWLock

TRIGger Commands

The TRIGger Commands are used to set the trigger function, trigger source and trigger mode.

Related commands:
[:]TRIGger:FUNCtion
[:]TRIGger[:IMMediate]
[:]TRIGger:SOURce

[:]TRIGger:FUNCtion

Syntax:
[:]TRIGger:FUNCtion {OUTPUT|TIME}
[:]TRIGger:FUNCtion?

Function:
Set and query trigger function.

Examples:
:TRIG:FUNC OUTPUT
Set trigger function as: output ON/OFF.
:TRIG:FUNC?
Query trigger function.

Related commands:
[:]TRIGger[:IMMediate]
[:]TRIGger:SOURce

[:]TRIGger[:IMMediate]

Syntax:
[:]TRIGger[:IMMediate]

Function:
Activate trigger once.

Examples:
:TRIG
Activate trigger once.

Related commands:
[:]TRIGger:FUNCtion
[:]TRIGger:SOURce

[:]TRIGger:SOURce

Syntax:
[:]TRIGger:SOURce{HOLD|EXTernal|BUS|PULSe}
[:]TRIGger:SOURce?

Function:
Set trigger mode.
EXTernal: trigger by external key.
PULSe: trigger by TTL signal from rear panel.
HOLD: trigger by the command “TRIGger:IMMediate”. Other trigger modes are off.
BUS: trigger by communication interface.
Query trigger mode.

Examples:
:TRIG:SOUR EXTernal
Set trigger mode to external trigger.

:TRIG:SOUR?
Return trigger mode.

Related commands:
[:]TRIGger:FUNCtion
[:]TRIGger[:IMMediate]

Command Quick Reference A-Z

*CLS
*ESE
*ESR?
*IDN?
*OPC
*PSC
*RCL
*RST
*SAV
*SRE
*STB?

A
[:]APPLy

C
[:]CALibration:COUNt?
[:]CALibration:CURRent[:DATA]
[:]CALibration:CURRent:LEVel
[:]CALibration:SECure:CODE
[:]CALibration:SECure:STATe
[:]CALibration:VOLTage[:DATA]
[:]CALibration:VOLTage:LEVel

H
[:]HOTKey

M
[:]MEASure[:SCALar]:CURRent[:DC]?
[:]MEASure[:SCALar]:POWer[:DC]?
[:]MEASure[:SCALar][:VOLTage][:DC]?

O
[:]OUTPut[:STATe]

S
[:SOURce:]CURRent:PROTection:CLEar [:SOURce:]CURRent:PROTection:STATe
[:SOURce:]CURRent:PROTection:TRIPped?
[:SOURce:]CURRent:PROTection[:LEVel]
[:SOURce:]CURRent[:LEVel][:IMMediate]:STEP[:INCRement]
[:SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude] [:SOURce:]VOLTage:PROTection:CLEar
[:SOURce:]VOLTage:PROTection:STATe
[:SOURce:]VOLTage:PROTection:TRIPped?
[:SOURce:]VOLTage:PROTection[:LEVel]
[:SOURce:]VOLTage:RANGe
[:SOURce:]VOLTage[:LEVel][:IMMediate]:STEP[:INCRement]
[:SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude]
[:]STATus:OPERation:CONDition?

[:]STATus:OPERation:ENABle
[:]STATus:OPERation[:EVENt]?
[:]STATus:PRESet
[:]STATus:QUEStionable:CONDition?
[:]STATus:QUEStionable:ENABle
[:]STATus:QUEStionable[:EVENt]?

[:]SYSTem:AUTO:CYCLe
[:]SYSTem:AUTO:DELay
[:]SYSTem:AUTO:STARt
[:]SYSTem:AUTO[:STATe]
[:]SYSTem:AUTO:STOP
[:]SYSTem:BEEPer:STATe
[:]SYSTem:BEEPer[:IMMediate]
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor:COUNt?
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:LOCal
[:]SYSTem:MEMory?
[:]SYSTem:REMote
[:]SYSTem:RWLock
[:]SYSTem:VERSion?

T
[:]TRIGger:FUNCtion
[:]TRIGger[:IMMediate]
[:]TRIGger:SOURce