

Programmable DC Power Supply

GPP-1000 Series

Programming Manual

GW INSTEK PART NO. 82PP-13230301



ISO-9001 CERTIFIED MANUFACTURER

GW INSTEK

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S SAFETY INSTRUCTIONS

This chapter contains important safety instructions that you must follow during operation and storage. Read the following before any operation to insure your safety and to keep the instrument in the best possible condition.

Safety Symbols

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



WARNING

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



CAUTION

Caution: Identifies conditions or practices that could result in damage to the GPP-1000 or to other properties.



DANGER High Voltage



Attention Refer to the Manual



Protective Conductor Terminal



Earth (ground) Terminal



Do not dispose electronic equipment as unsorted municipal waste. Please use a separate collection facility or contact the supplier from which this instrument was purchased.

Safety Guidelines

General Guidelines



CAUTION

- Do not place any heavy object on the device.
 - Avoid severe impacts or rough handling that leads to damaging the device.
 - Do not discharge static electricity to the device.
 - Do not block or obstruct the cooling fan vent opening.
 - Do not disassemble the device unless you are qualified as service personnel.
-

Power Supply



CAUTION

- AC Input voltage:
100 V / 120 V / 220 V / 240 VAC $\pm 10\%$, 50 / 60 Hz
 - Frequency: 47 Hz to 63 Hz
 - Before connecting the power plug to an AC line outlet, make sure the voltage selector switches of the bottom panel in the correct position.
-



WARNING

- The fuse specification is as following:
100 V / 120 V: T3.15 A / 250 V
220 V / 240 V: T1.6 A / 250 V
- Disconnect power cord and test leads before replacing fuse.
- To avoid electrical shock connect the protective grounding conductor of the AC power cord to an earth ground.

Cleaning the device	• Disconnect the power cord before cleaning. • Use a soft cloth dampened in a solution of mild detergent and water. Do not spray any liquid. • Do not use chemicals or cleaners containing harsh products such as benzene, toluene, xylene, and acetone.
---------------------	--

Operation Environment	• Location: Indoor, no direct sunlight, dust free, almost non-conductive pollution (note below) • Relative Humidity: < 80 % • Altitude: < 2000 m • Temperature: 0 °C to 40 °C
-----------------------	--

(Pollution Degree) EN 61010-1:2010 specifies the pollution degrees and their requirements as follows. The GPP-1000 series falls under degree 2.

Pollution refers to “addition of foreign matter, solid, liquid, or gaseous (ionized gases), that may produce a reduction of dielectric strength or surface resistivity”.

- Pollution degree 1: No pollution or only dry, non-conductive pollution occurs. The pollution has no influence.
 - Pollution degree 2: Normally only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected.
 - Pollution degree 3: Conductive pollution occurs, or dry, non-conductive pollution occurs which becomes conductive due to condensation which is expected. In such conditions, equipment is normally protected against exposure to direct sunlight, precipitation, and full wind pressure, but neither temperature nor humidity is controlled.
-

Storage environment	• Location: Indoor • Relative Humidity: < 70 % • Temperature: -10 °C to 70 °C
---------------------	--

GPP-1000 Series Overview

Series lineup

The GPP-1000 Series consists of 2 models: GPP-1323 and GPP-1205. Note that throughout the user manual, the term “GPP-1000” refers to all the models in the GPP-1000 Series lineup, unless stated otherwise.

Model	Output Voltage	Output Current	Output Power
GPP-1323	32 V	3 A	96 W
GPP-1205	20 V	5 A	100 W

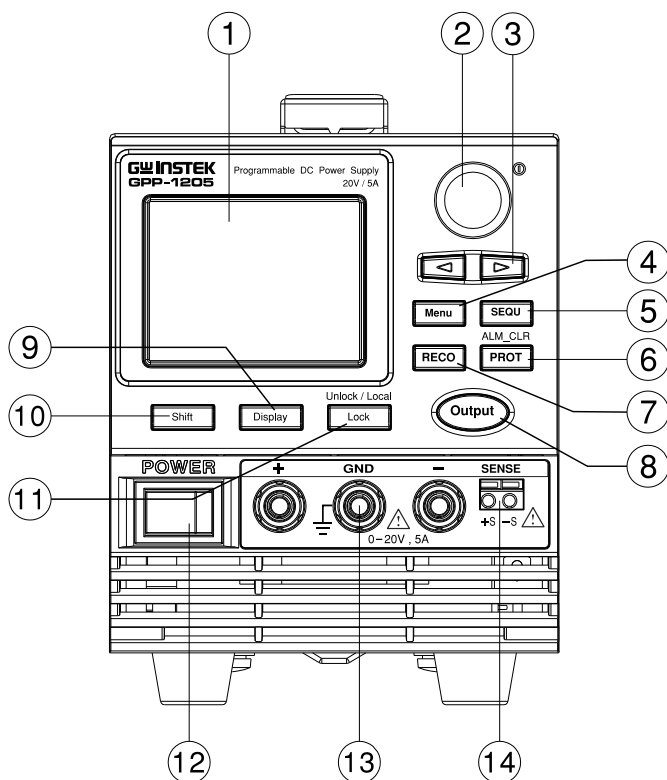
Main Features

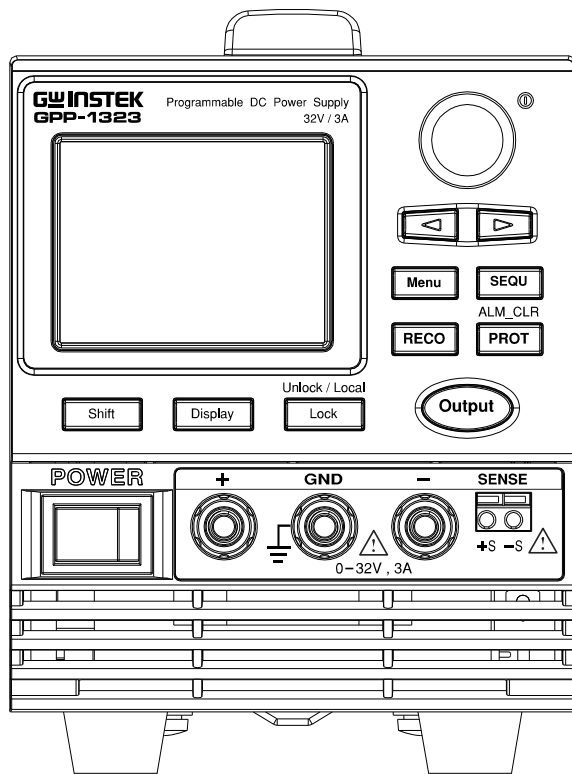
Features	• 2.4-inch TFT-LCD Panel. • Low noise: Temperature controlled cooling fan. • Remote sensing to compensate for voltage drop in load leads . • Output On/Off delay function. • CV, CC priority start function. (prevents overshoot with output ON) • Adjustable voltage and current slew rates. • Bleeder circuit ON/OFF setting. • OVP, OCP and OTP protection. • Supports test sequence. • With 3 measuring currents function.
Interface	• Built-in USB and LAN interface. • Optional GPIB interface. • External trigger control function.

Appearance

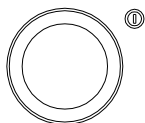
Front Panel Overview

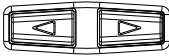
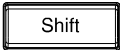
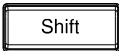
GPP-1205

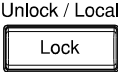
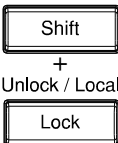
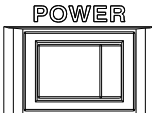
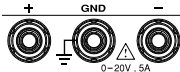
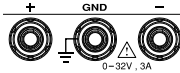
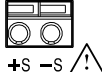




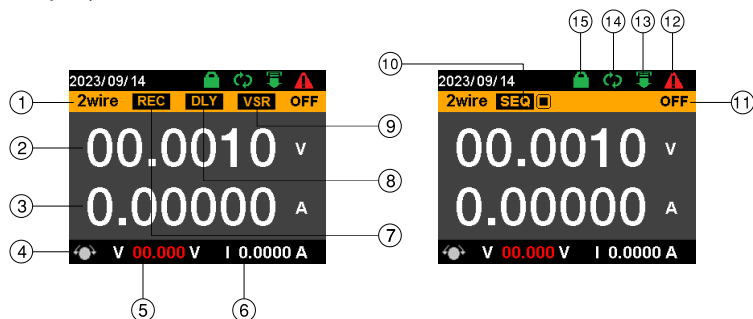
1. Display area
 2. Knob Key
- The display area shows set values, output values and parameter settings.
- Used to navigate menu, and to configure or confirm voltage/current/time values, among others. Also, the indicator on the upper-right corner shows current state and power mode.



- | | | | |
|-----|--------------------------|---|---|
| 3. | Left/Right
Arrow Keys |  | Used to select a parameter number in the Function settings. Also the left arrow key can be used as backspace. |
| 4. | Menu Button |  | Used to enter the Menu page. |
| 5. | SEQU Button |  | Used to run customized test sequence. |
| 6. | PROT Button | 
 | Used to set OVP, OCP protecting functions. |
| | ALM_CLR
Button | 
+
 | (+Shift) Used to release protection functions that have been activated. The tripped protection alarms include the following: OVP Alarm, OCP Alarm, OTP Alarm. |
| 7. | RECO Button |  | Used to run recorder function. |
| 8. | Output
Button |  | Used to turn the output on or off. |
| 9. | Display
Button |  | Used to switch among 3 different display modes. |
| 10. | Shift Button |  | Used to enable the functions that are written in blue characters above certain buttons. |

- | | | | |
|-----|---------------------|--|---|
| 11. | Lock Button |  | Used to lock all front panel buttons other than the Output Button. |
| | Unlock/Local Button |  | (+Shift) Used to unlock the front panel buttons or it switches to local mode. |
| 12. | Power Switch |  | Used to turn the power on/off. |
| 13. | Output terminal | 
 | <p>DC output terminal for GPP-1000 .
 GPP-1205 the max. output is 20 V/5 A/100 W
 DC output terminal for GPP-1000.
 GPP-1323 the max. output is 32 V/3 A/96 W</p> |
| 14. | Sensing Terminal |  | Terminal to connect the sensing cables, which compensate voltage drop occurred in load leads. |

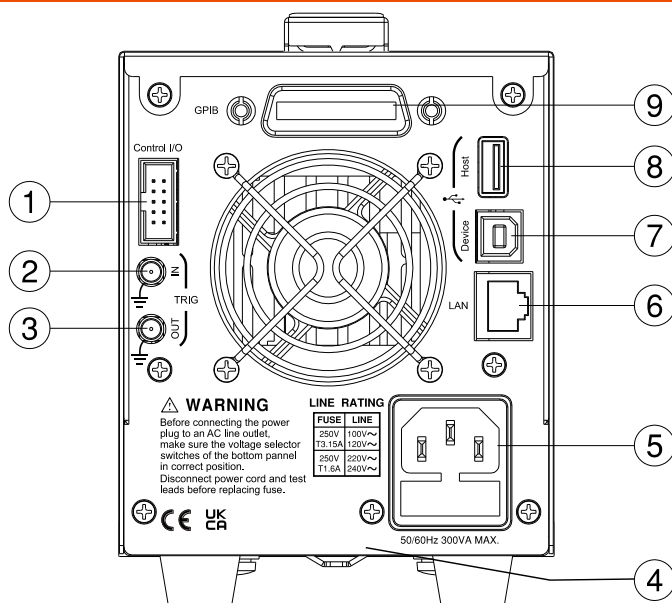
Display Area



- | | | |
|-----|------------------|---|
| 1. | 2Wire/4Wire | 2-wire or 4-wire indicator. |
| 2. | Voltage Meter | Displays the voltage. |
| 3. | Current Meter | Displays the current. |
| 4. | V/A Set Guidance | The scrolling symbol indicates to select between V and A set via scrolling knob key. |
| 5. | V Set | Manually sets voltage. |
| 6. | I(A) Set | Manually sets current. |
| 7. | REC Icon | When Recorder is enabled, the icon will be shown accordingly. Note that when SEQ appears, the icon will be faded out. |
| 8. | DLY Icon | When Output On/Off Delay (Dly) is enabled, the icon will be shown accordingly. Note that when SEQ appears, the icon will be faded out. |
| 9. | VSR/ISR Icon | When CV/CC Slew Rate Priority (CVLS/CCLS) is activated, the icon will be shown. Note that when SEQ appears, the icon will be faded out. |
| 10. | SEQ Icon | When Sequence function is turned On, the icon will be shown accordingly. |

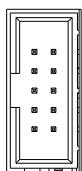
- | | |
|-------------------------------------|--|
| 11. CC/CV indicator | It shows when constant voltage or constant current mode is ongoing. However, when output is unregulated, which means neither in CV mode nor CC mode. If it is not under power output, it simply shows Off. |
| 12. Error Indicator | When error occurs from command of remote control, the icon will be shown. |
| 13. Remote Control Indicator | When remote control (USB/LAN/GPIB) is underway, the icon will be shown |
| 14. Communication Monitor Indicator | When communication monitor is enabled, the icon will be shown. |
| 15. Lock Indicator | When the lock mode is activated, the icon will be shown. |

Rear Panel Overview



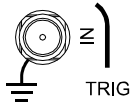
1. Control I/O

Control I/O



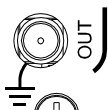
External Operation and Status Monitoring

2. Trigger-IN



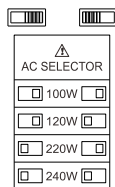
External Trigger Signal Input Terminal

3. Trigger-OUT



Trigger Signal Output Terminal

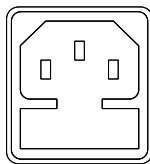
4. AC Select Switch



The AC selector is located at the bottom side of the unit.

Switch Voltage to 100 V, 120 V, 220 V or 240 V.

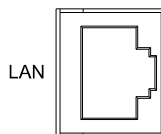
5. Power Cord / Fuse Socket



The power cord socket accepts the AC mains.

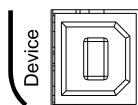
The fuse holder contains the AC mains fuse.

6. LAN



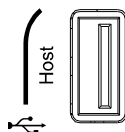
Ethernet port for controlling the GPP-1000 remotely

7. USB



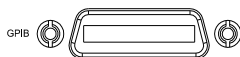
USB port for controlling the GPP-1000 remotely.

8. USB A Port



USB A port for data transfer, loading test scripts and firmware update.

9. GPIB



GPIB connector for units equipped with IEEE programming option. (Factory Installed Options)

Theory of Operation

The theory of operation chapter describes the basic principles of operation, protection modes and important considerations that must be taken into account before use.

Operating Description

Background The GPP-1000 power supplies are regulated DC power supplies with a stable voltage and current output. These operate within a switch automatically between constant voltage and constant current according to changes in the load.



Note

Suitable supply cord set for use with the equipment:

Mains plug: shall be national approval

Mains connector: C13 type

Cable:

1. Length of power supply cord: less than 3 m
2. Cross-section of conductors: at least 0.75 mm²
3. Cord type: shall meet the requirements of IEC 60227 or IEC 60245 (e.g.: H05VV-F, H05RN-F)



Caution

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

CC and CV Mode

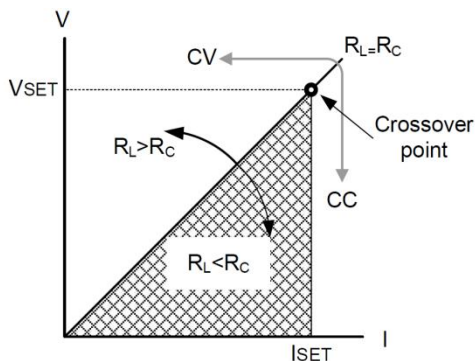
CC and CV mode	When the power supply is operating in constant current mode (CC) a constant current will be supplied to the load. When in constant current mode the voltage output can vary, whilst the current remains constant. When the load resistance increases to the point where the set current limit (ISET) can no longer be sustained the power supply switches to CV mode. The point where the power supply switches modes is the crossover point.
Description	

When the power supply is operating in CV mode, a constant voltage will be supplied to the load, whilst the current will vary as the load varies. At the point that the load resistance is too low to maintain a constant voltage, the power supply will switch to CC mode and maintain the set current limit.

The conditions that determine whether the power supply operates in CC or CV(VSET), the load resistance (R_L) and the critical resistance (R_C). The critical resistance is determined by $VSET/ISET$. The power supply will operate in CV mode when the load resistance is greater than the critical resistance. This means that the voltage output will be equal to the VSET voltage but the current will be less than ISET. If the load resistance is reduced to the point that the current output reaches the ISET level, the power supply switches to CC mode.

Conversely the power supply will operate in CC mode when the load resistance is less than the critical resistance. In CC mode the current output is equal to ISET and the voltage output is less than VSET.

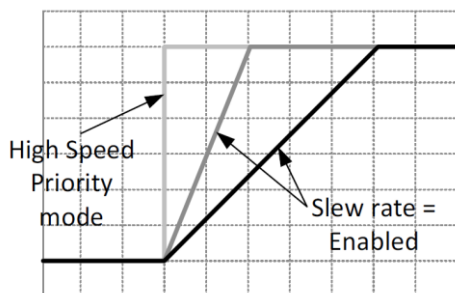
Diagram



Slew Rate

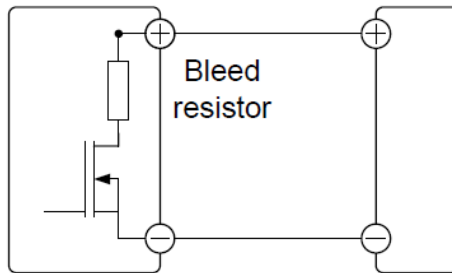
Theory

The GPP-1000 has selectable slew rates for CC and CV mode. This gives the GPP-1000 power supply the ability to limit the current/voltage draw of the power supply. Slew rate settings are divided into High Speed Priority and Slew Rate Priority. High speed priority mode will use the fastest slew rate for the instrument. Slew Rate Priority mode allows for user adjustable slew rates for CC or CV mode. The rising and falling slew rate can be set independently.



Bleeder Control

Background The GPP-1000 DC power supplies employ a bleed resistor in parallel with the output terminals.



Bleed resistors are designed to dissipate the power from the power supply filter capacitors when power is turned off and the load is disconnected. Without a bleed resistor, power may remain charged on the filter capacitors for some time and be potentially hazardous.

In addition, bleed resistors also allow for smoother voltage regulation of the power supply as the bleed resistor acts as a minimum voltage load.

The bleed resistance can be turned on or off using the configuration settings.



By default the bleed resistance is on. For battery charging applications, be sure to turn the bleed resistance off as the bleed resistor can discharge the connected battery when the unit is off.

Alarms

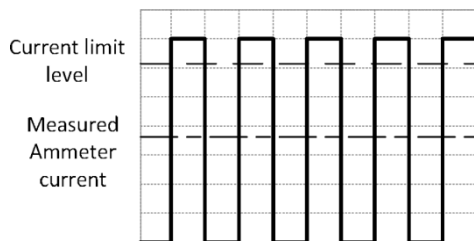
The GPP-1000 power supplies have a number of protection features. When one of the protection alarms are tripped, an alarm message will appear on the display. When an alarm has been tripped the output will be automatically turned off.

OVP	Over voltage protection (OVP) prevents a high voltage from damaging the load. This alarm can be set by the user.
OCP	Over current protection prevents high current from damaging the load. This alarm can be set by the user.
OTP	Over temperature protection is a hardware protection function.

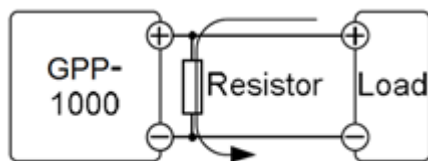
Considerations

The following situations should be taken into consideration when using the power supply.

Inrush current	When the power supply switch is first turned on, an inrush current is generated. Ensure there is enough power available for the power supply when first turned on, especially if a number of units are turned on at the same time.
Pulsed or Peaked loads	When the load has current peaks or is pulsed, it is possible for the maximum current to exceed the mean current value. The GPP-1000 power supply ammeter only indicates mean current values, which means for pulsed current loads, the actual current can exceed the indicated value. For pulsed loads, the current limit must be increased, or a power supply with a greater capacity must be chosen. As shown below, a pulsed load may exceed the current limit and the indicated current on the power supply ammeter.



Reverse Current: When the power supply is connected to a regenerative load such as a transformer or inverter, reverse current will feed back to the power supply. The GPP-1000 power supply cannot absorb reverse current. For loads that create reverse current, connect a resistor in parallel to the power supply to bypass the reverse current. This description only applies when the bleed resistance is off.



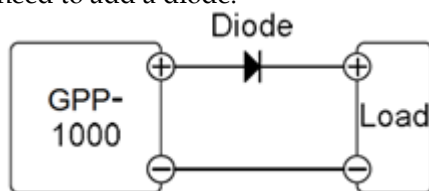
Reverse current



Note

The current output will decrease by the amount of current absorbed by the resistor. Ensure the resistor used can withstand the power capacity of the power supply/load.

Reverse Current: When the power supply is connected to a load such as a battery, reverse current may flow back to the power supply if the bleed resistance is on. To prevent damage to the power supply under this condition, use a reverse-current-protection diode in series between the power supply and load. If the bleed resistor is turned off or set to auto, there is no need to add a diode.




Caution

Ensure the reverse withstand voltage of the diode is able to withstand 2 times the rated output voltage of the power supply and the forward current capacity can withstand 3 to 10 times the rated output current of the power supply.

Ensure the diode is able to withstand the heat generated in the following scenarios.

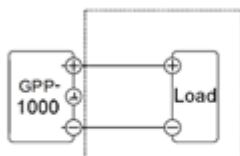
When the diode is used to limit reverse voltage, remote sensing cannot be used.

Grounding

The output terminals of the GPP-1000 power supplies are isolated with respect to the protective grounding terminal. The insulation capacity of the load, the load cables and other connected devices must be taken into consideration when connected to the protective ground or when floating.

Floating

As the output terminals are floating, the load and all load cables must have an insulation capacity that is greater than the isolation voltage of the power supply.



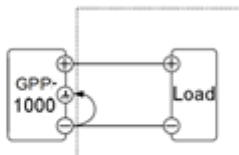
(—) Insulation capacity $\geq$ isolation voltage
of power supply


Warning

If the insulation capacity of the load and load cables are not greater than the isolation voltage of the power supply, electric shock may occur.

Grounded
output
terminal

If the positive or negative terminal is connected to the protective ground terminal, the insulation capacity needed for the load and load cables is greatly reduced. The insulation capacity only needs to be greater than the maximum output voltage of the power supply with respect to ground.



(—) Insulation capacity $\geq$ voltage of power supply with respect to ground

RREMOTE INTERFACE

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Establishing a Remote Connection

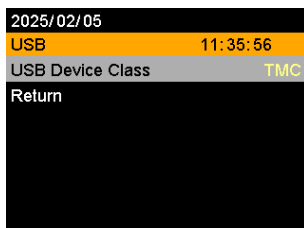
GPP-1000 has 3 remote communication interfaces which are USB, GPIB and LAN. These three communication modes can be used simultaneously.

Configure USB interface

Description	Communication via USB interface, using USB Device TMC mode.	
Interface	Connect the USB cable to the rear panel USB B (slave) port.	DEVICE 

Connection and operation

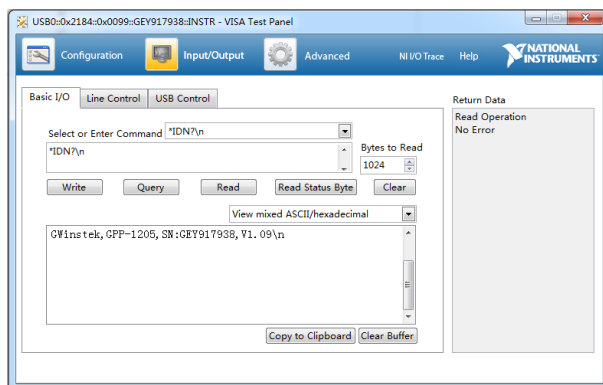
1. Use the USB cable to connect the **USB Device Interface** on the rear panel of the DC power supply to the USB interface of the PC.
2. Press the Menu key followed by **Interface** and **USB**. Press **USB Device Class**.



3. To use USB communication, you need to use the "NI Visa" software of NI (National Instruments Corporation);
4. After connecting to the host computer through the USB slave interface on the rear panel, open the "NI Visa" software, as shown in the figure above, select View -> Refresh in the menu bar of Measurement & Automation Explorer, when the connection is successful, click on the drop-down arrow of "Devices and Interfaces" in "My System" menu , the serial number of GPP-1000 and the USB Interface number will be displayed on the right side of the page.

Function Measurement

Click the "Open VISA Test Panel" key on the page to pop up the VISA Test Panel, click the Input/Output key in the VISA Test Panel, in the Select or Enter Command box, you can execute all statements including query, setting, measurement, reading and etc. When requiring to query, enter the corresponding query Command and then click the "Query" key to run the Command. Enter the corresponding Command when requiring to operate setting and measurement action and then click the "Write" key. Enter the corresponding Command when requiring to operate reading action and then click the "Read" key. Refer to Command List.



Enter the query Command “*IDN?” as shown above, and the instrument identification information such as manufacturer, model, serial number and software version will be returned. The message "Read Operation No Error" is displayed in the Return Data window.

- Exit remote control mode .Send System:Loacl Command from PC.
- .Press the Shift+Unlock/Local keys on the front panel.



NOTE: USB is a hot-swap device, which can be disconnected or connected at any time.

Configure GPIB interface

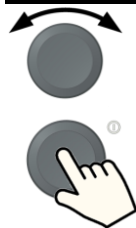
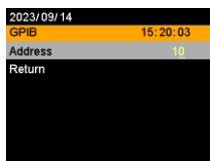
- Description The communication data format, compatibility settings and GPIB address must all be configured before using GPIB remote control.
- Interface Rear panel GPIB port.

Connection and operation

1. Connect the GPIB cable to the rear panel GPIB port.
2. Press the Menu key followed by Interface and GPIB. Press Address.



3. Use knob key to scroll and click to configure Address setting.



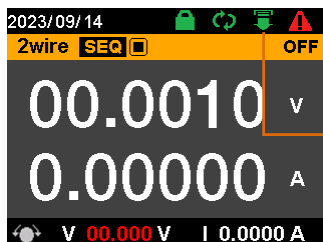
- Exit remote control mode .Send System:Local Command from PC
- .Press the Shift+Unlock/Local keys on the front panel.



WARNING: LAN is a hot-swap device, which can be disconnected or connected at any time.

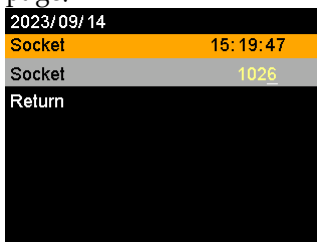
Configure LAN interface

Description	When using the LAN port, the relevant parameters are supposed to be set earlier.
Connection	Select LAN port in the Interface after connecting the LAN cable. The indicator will be shown when the first command connects successfully.



Remote
Control
indicator

Set port	The front panel keys are automatically locked when the connection is successful. A. Press the Menu key to enter the Menu page. B. Scroll the knob key to move to the Interface field followed by clicking the knob key to enter the Interface page. C. Scroll knob key to move to Socket field followed by click knob key to enter the Socket page.
----------	--



IP Mode	The IP address can be obtained by using either DHCP or Manual IP.
---------	---

Manual IP

- A. Press the Menu key to enter the Menu page.
- B. Scroll the knob key to move to the Interface field followed by clicking the knob key to enter the Interface page.
- C. Scroll the knob key to move to the LAN field followed by clicking the knob key to enter the LAN page. Turns DHCP off.
- D. F.Sets the default IP address. IP address 1 to 4 splits the IP address into four sections.
0 to 255, 0 to 255, 0 to 255, 0 to 255
- E. Sets the subnet mask. The subnet mask is split into four parts.
0 to 255, 0 to 255, 0 to 255, 0 to 255
- F. Sets the gateway address. The gateway address is split into 4 parts.
0 to 255, 0 to 255, 0 to 255, 0 to 255

2023/09/14	
LAN	15:19:27
MAC Address	00:80:E1:00:00:00
Hostname	GPP-100W
DHCP	Off
IP Address	192.168.000.123
Subnet Mask	255.255.255.000
Gateway IP	192.168.000.001
Return	

DHCP

- A. Press the Menu key to enter the Menu page.
- B. Scroll the knob key to move to the Interface field followed by clicking the knob key to enter the Interface page.
- C. Scroll the knob key to move to the LAN field followed by clicking the knob key to enter the LAN page. Turns DHCP on.

2025/02/07	
LAN	14:10:30
MAC Address	00:22:24:6A:B1:C4
DHCP	On
IP Address	192.168.000.007
Subnet Mask	255.255.255.000
Gateway IP	192.168.000.001
Return	

Exit remote
control mode

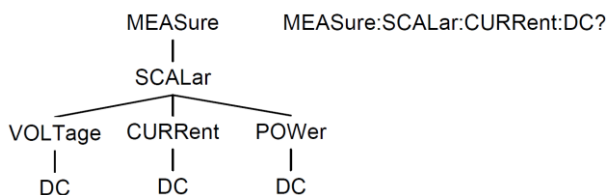
.Send System:Local Command from PC

 **WARNING:** LAN is a hot-swap device, which can be disconnected or connected at any time.

Command Syntax

Compatible standard	IEEE488.2	Partial compatibility
	SCPI, 1999	Partial compatibility
Command Structure	SCPI commands follow a tree-like structure, organized into nodes. Each level of the command tree is a node. Each keyword in a SCPI command represents each node in the command tree. Each keyword (node) of a SCPI command is separated by a colon (:).	

For example, the diagram below shows an SCPI sub-structure and a command example.



Command types

There are a number of different instrument commands and queries. A command sends instructions or data to the unit and a query receives data or status information from the unit.

Command types

Simple A single command with/without a parameter

Example *IDN?

Compound Two or more commands on the same command line. Compound commands are separated with either a semi-colon (;) or a semi-colon and a colon (::).

A semi-colon is used to join two related commands, with the caveat that the last command must begin at the last node of the first command.

A semi-colon and colon are used to combine two commands from different nodes.

Example `meas:volt:dc?;;meas:curr:dc?`

Query A query is a simple or compound command followed by a question mark (?). A parameter (data) is returned.

Example `meas:curr:dc?`

Command forms Commands and queries have two different forms, long and short. The command syntax is written with the short form of the command in capitals and the remainder (long form) in lower case.

The commands can be written in capitals or lower-case, just so long as the short or long forms are complete. An incomplete command will not be recognized.

Below are examples of correctly written commands:

Long form `SENSe:RECOOrder:STATe?`
`SENSE:RECORDER:STATE?`
`sense:recorder:state?`

	<NRf+>	NRf type with a	1, 1.5, 4.5e-1
	<Numeric>	suffix including MINimum, MAXimum or DEFault parameters.	MAX, MIN,
	<aard>	Arbitrary ASCII characters.	
Message terminators	LF CR	line feed code (new line) and carriage return.	
	LF	line feed code (new line)	
	EOI	IEEE-488 <i>EOI</i> (End-Or-Identify)	

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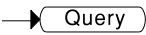
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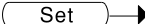
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*IDN?



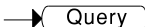
Description	Returns the power supply manufacturer, model name, serial number and firmware version number in the following format: Manufacturer, Model,SN:XXXXXXXX,Vm.mm
Query Syntax	*IDN?
Return parameter	<string>
Example	*IDN? Manufacturer, Model,SN:XXXXXXXX,Vm.mm Returns the identification of the power supply.

***RST**


Description Performs a device reset. Configures the unit to a known configuration (default settings). This known configuration is independent of the usage history. See page 86 for the default factory settings.

Note Note the *RST command will not delete instrument save states in memory.

Syntax ***RST**

***TST?**


Description Performs a system self-test and returns a pass or fail judgment. An error message will be generated if the self test fails.

Note The error message can be read with the SYST:ERR? query.

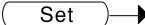
Query Syntax ***TST?**

Return parameter

0	Pass judgment
1	Fail judgment

Example ***TST?**
0

The power supply passed the self-test.

***OPC**


Description This command sets the Operation Complete Bit (bit 0) of the Standard Event Status Register after the power supply has completed all pending operations. For the GPP-1000, the *OPC command is used to indicate when a sequence has completed.

Note	Before the OPC bit is set, other commands may be executed.
------	--

Syntax	*OPC
--------	-------------

***OPC?**

→ Query

Description	Returns the OPC bit to the output buffer when all pending operations have completed. I.e. when the OPC bit is set.
-------------	--

Note	Commands cannot be executed until the *OPC? query has completed.
------	--

Query Syntax	*OPC?
--------------	--------------

Return parameter	1
------------------	---

Example	*OPC?
---------	--------------

1

Returns a "1" when all pending operations are complete.

***TRG**

Set →

Description	Generate a trigger event for power supply.
-------------	--

Note	Before the OPC bit is set, other commands may be executed.
------	--

Syntax	*TRG
--------	-------------

***CLS**

Set →

Description	The *CLS command clears all the event registers, the error queue and cancels an *OPC command.
-------------	---

Syntax	*CLS
--------	-------------

Set →

***ESE**

→ Query

Description	The Standard Event Status Enable command determines which events in the Standard Event Status Event register can set the Event Summary Bit (ESB) of the Status Byte register. Any bit positions set to 1 enable the corresponding event. Any enabled events set bit 5 (ESB) of the Status Byte register.	
Note	The *CLS command clears the event register, but not the enable register.	
Syntax	*ESE <enable value>	
Parameter	<enable value>	0 to 255
Example	*ESE 20 Sets a bit weight of 20 (bits 2 and 4).	
Query Syntax	*ESE?	
Return Parameter	<NR1>	Returns the bit sum of the Standard Event Status Enable register.
Example	*ESE? 4 Bit 2 is set.	

***ESR?**

—▶ Query

Description	Reads and clears the Standard Event Status Register. The bit weight of the standard event status register is returned.	
Note	The *CLS will also clear the standard event status register.	
Query Syntax	*ESR?	
Return Parameter	<NR1>	Returns the bit sum of the Standard Event Status (Event) register and clears the register.
Query Example	*ESR? 5	

Returns the bit weight of the standard event status register (bit 0 and 2).

***STB?** → Query

Description Reads the Status byte condition register.

Note Bit 6, the master summary bit, is not cleared.

Syntax ***STB?**

Set →
→ Query

***SRE**

Description The Service Request Enable Command determines which events in the Status Byte Register are allowed to set the MSS (Master summary bit). Any bit that is set to “1” can cause the MSS bit to be set.

Note The *CLS command clears the status byte event register, but not the enable register.

Syntax ***SRE <enable value>**

Parameter <enable value> 0 to 255

Example ***SRE 12**

Sets a bit weight of 12 (bits 2 and 3) for the service request enable register.

Query Syntax ***SRE?**

Return Parameter <NR1> Returns the bit sum of the Service Request Enable register.

Query Example ***SRE? 12**

Returns the bit weight of the status byte enable register.

***SAV** Set →

Description Saves the settings into memory slot M1 to M5.

Syntax ***SAV <NR1>**

parameter **<NR1>** 0 to 4 (as memory M1 to M5)

***RCL** Set →

Description Recalls the contents stored in memory slot M1 to M5.

Syntax ***RCL <NR1>**

parameter **<NR1>** 0 to 4 (as memory M1 to M5) 1 ~ 5 (as memory M1 to M5)

Measure Commands

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:MEASure:ALL

→ Query

Description	Takes a measurement and returns the average output current and voltage.
Syntax	:MEASure:ALL?
Example	:MEASure:ALL? 0.0000,0.00000,0.000 00 <voltage>, <current>, <power> Returns the voltage (V), current (A), power (W) respectively.

:MEASure:CURRent

→ Query

Description	Takes a measurement and returns the average output current.
Syntax	:MEASure:CURRent?
Example	:MEASure:CURRent? 0.0000 Returns the current in amps.

:MEASure:VOLTage

→ Query

Description	Takes a measurement and returns the average output voltage.
Syntax	:MEASure:VOLTage?
Example	:MEASure:VOLTage? 0.0000 Returns the voltage in volts.

:MEASure:POWer→ **Query**

Description Takes a measurement and returns the average output power.

Syntax **:MEASure:POWer?**

Example **:MEASure:POWer?**

0.0000

Returns the power measured in watts.

Set →**:MEASure:CURREnt:RANGe**→ **Query**

Description Sets or queries the current measurement range.

Syntax **:MEASure:CURREnt:RANGe {<NR1>|IH|IM|IL}**

Query Syntax **:MEASure:CURREnt:RANGe?**

Parameter **IH | 1** Current measurement IH range.

IM | 2 Current measurement IM range.

IL | 3 Current measurement IL range.

Return parameter **<NR1>** Returns the current measurement range.

Output Commands

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Set →**:OUTPut:DElay:ON**→ **Query**

Description Sets the Delay Time in seconds for turning the output on. The delay is set to 0.00 by default.

Syntax **:OUTPut:DElay:ON {<NR2>|MINimum|MAXimum}**

Query Syntax **:OUTPut:DElay:ON?**

Parameter	<NR2>	0.00 to 359999.99 seconds, where 0 = no delay.
Return parameter	"0.00"	Returns the delay on time in seconds until the output is turned on.

Set →

→ Query

:OUTPut:DElay:OFF

Description	Sets the Delay Time in seconds for turning the output off. The delay is set to 0.00 by default.	
Syntax	:OUTPut:DElay:OFF {<NR2> MINimum MAXimum}	
Query Syntax	:OUTPut:DElay:OFF?	
Parameter	<NR2>	0.00 to 359999.99 seconds, where 0 = no delay.
Return parameter	"0.00"	Returns the delay on time in seconds until the output is turned off.

Set →

→ Query

:OUTPut:MODE

Description	Sets the GPP-1000 output mode. This is the equivalent to the Output menu (V-I Slew Rate Select) settings.	
Syntax	:OUTPut:MODE {<NR1> CVHS CCHS CVLS CCLS}	
Query Syntax	:OUTPut:MODE?	
Parameter	CVHS 0 CCHS 1 CVLS 2 CCLS 3 <NR1>	CV high speed priority CC high speed priority CV slew rate priority CC slew rate priority Returns the output mode.
Return parameter		

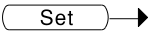
Set →

→ Query

:OUTPut[:STATe]

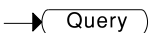
Description	Turns the output on or off.	
Syntax	:OUTPut[:STATe] { <bool> OFF ON }	
Query Syntax	:OUTPut[:STATe]?	
Parameter	OFF 0 ON 1	Turns the output off. Turns the output on.

Return parameter **<NR1>** Returns output status of the instrument.

:OUTPut:PROTection:CLEar 

Description Clears over-voltage, over-current and over-temperature (OVP, OCP, OTP) protection circuits.

Syntax **:OUTPut:PROTection:CLEar**

:OUTPut:PROTection:TRIPped 

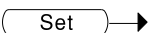
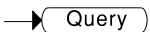
Description Queries the unit to see if a protection circuit has been tripped.

Syntax **:OUTPut:PROTection:TRIPped?**

Return **<boolean>** 0 = No protection error
1 = A protection error had occurred

Sense Commands

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:SENSe:RECOOrder:STATe.....	47
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:SENSe:AVERage:COUNT 


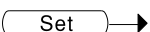
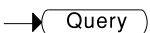
Description Sets or queries the level of smoothing for the average setting.

Syntax **:SENSe:AVERage:COUNT**
{<NR1>|LOW|MIDDLE|HIGH}

Query Syntax **:SENSe:AVERage:COUNT**

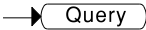
Parameter	OFF	0	Default setting
	LOW	1	Low setting
	MIDDLE	2	Middle setting
	HIGH	3	High setting

Return parameter **<NR1>** Returns the average setting.

:SENSe:RECOOrder:STATe 


Description	Enables or disables the recorder setting.	
Syntax	:SENSe:RECOOrder:STATe {<NR1>}	
Query Syntax	:SENSe:RECOOrder:STATe?	
Parameter	0	Disable recorder.
	1	Enable recorder. The data is stored in the USB storage when USB storage plug in.
	2	Enable recorder, The data is sent to the USB device interface when the remote control read data.
	3	Enable recorder, The data is sent to the LAN interface when the remote control read data.
Return parameter	<NR1>	Returns the recorder setting.

:SENSe:RECOOrder:PERiod



Description	Sets the sample period in seconds for recorder.	
Syntax	:SENSe:Recorder:PERiod {<NR2> MINimum MAXimum}	
Query Syntax	:SENSe:RECOOrder:PERiod?	
Parameter	<NR2>	1 to 999 seconds.
Return parameter	<NR2>	Returns the sample period setting.

Status Commands

For an overview of all the status registers, their associated register contents and the system diagram, please see the status overview on page 74.

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:STATus:OPERation:ENABle	49
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```

:STATus:QUESTionable:ENABLE.....50
:STATus:PRESet.....50

```

:STATus:OPERation[:EVENT] → Query

Description Queries the Operation Status Event register and clears the contents of the register.

Syntax **:STATus:OPERation[:EVENT]?**

Return **<NR1>** Returns the bit sum of the Operation Status Event register.

:STATus:OPERation:CONDition → Query

Description Queries the Operation Status register. This query will not clear the register.

Syntax **:STATus:OPERation:CONDition?**

Return **<NR1>** Returns the bit sum of the Operation Condition register.

:STATus:OPERation:ENABLE Set → Query

Description Sets or queries the bit sum of the Operation Status Enable register.

Syntax **:STATus:OPERation:ENABLE <NR1>**

Query Syntax **:STATus:OPERation:ENABLE?**

Parameter **<NR1>** 0 to 32767

Return **<NR1>** 0 to 32767

parameter

:STATus:QUESTionable[:EVENT] → Query

Description Queries the bit sum of the Questionable Status Event register. This query will also clear the contents of the register.

Syntax **:STATus:QUESTionable[:EVENT]?**

Return **<NR1>** 0 to 32767

parameter

:STATus:QUESTionable:CONDition → Query

Description Queries the status (bit sum) of the Questionable Status register. This query will not clear the register.

Syntax **:STATus:QUESTionable:CONDition?**

Return parameter **<NR1>** 0 to 32767

:STATus:QUESTionable:ENABLE Set →
→ Query

Description Sets or queries the bit sum of the Questionable Status Enable register.

Syntax **:STATus:QUESTionable:ENABLE <NR1>**

Query Syntax **:STATus:QUESTionable:ENABLE?**

Parameter **<NR1>** 0 to 32767

Return parameter **<NR1>** 0 to 32767

:STATus:PRESet Set →

Description This command resets the ENABLE register and Questionable Status Registers. The registers will be reset to a default value.

Default Register/Filter Values	Setting
QUESTionable Status Enable	0x0000
Operation Status Enable	0x0000

Syntax **:STATus:PRESet**

Source Commands

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[SOURce]:CURRent:PROTection:TRIPped.....	52
[SOURce]:CURRent:SLEWrate:RISing.....	53

[[:SOURce]:CURRent:SLEWrate:FALLing	53
[[:SOURce]:MODE?	54
[[:SOURce]:VOLTage	54
[[:SOURce]:VOLTage:PROTection:STATe	54
[[:SOURce]:VOLTage:PROTection.....	55
[[:SOURce]:VOLTage:PROTection:TRIPped.....	55
[[:SOURce]:VOLTage:SLEWrate:RISing.....	56
[[:SOURce]:VOLTage:SLEWrate:FALLing.....	56
[[:SOURce]:VOLTage:SENSe	56

[[:SOURce]:CURRent

Set →
→ Query

Description	Sets or queries the current level in amps.	
Syntax	[[:SOURce]:CURRent {<NR2>(A) MINimum MAXimum}	
Query Syntax	[[:SOURce]:CURRent?	
Parameter	<NR2>	0 % to 105 % of the rated current output level.
	MIN	Minimum current level.
	MAX	Maximum current level.
Return parameter	<NR2>	0 % to 105 % of the rated current output level.
	MIN	Minimum current level.
	MAX	Maximum current level.
Example	SOUR:CURR? 1.00000 Returns the current level in amps.	

Set →
→ Query

[[:SOURce]:CURRent:PROTection:STATe

Description	Sets or queries the OCP function.	
Syntax	[[:SOURce]:CURRent:PROTection:STATe {<bool> OFF ON}	
Query Syntax	[[:SOURce]:CURRent:PROTection:STATe?	
Parameter	OFF 0	Turns OCP off
	ON 1	Turns OCP on
Return parameter	<bool>	Returns the setting in <bool> format.
Example	SOUR:CURR:PROT:STAT? Returns the status of the OCP function	

[:SOURce]:CURRent:PROTection:DElay		Set Query
Description	Sets the Delay Time for OCP in seconds. The delay is set to 0.20 by default.	
Syntax	[:SOURce]:CURRent:PROTection:DElay {<NR2> MINimum MAXimum}	
Query Syntax	[:SOURce]:CURRent:PROTection:DElay?	
Parameter	<NR2> MAX MIN	0.20 to 2.5 seconds The maximum allowed delay time The minimum allowed delay time
Return parameter	<NR2>	
Example	SOUR:CURR:PROT:DEL MAX Sets the current protection delay to the maximum.	

[:SOURce]:CURRent:PROTection		Set Query
Description	Sets or queries the OCP (over-current protection) level in amps.	
Syntax	[:SOURce]:CURRent:PROTection[:LEVel]{<NR2>(A) MINimum MAXimum}	
Query Syntax	[:SOURce]:CURRent:PROTection[:LEVel]?	
Parameter	<NR2> MAX MIN	Current protection level. Minimum: Irated x 0.05 Maximum: Irated x 1.1 Maximum current level. Minimum current level.
Return parameter	<NR2>	
Example	SOUR:CURR:PROT? 5.00 Returns the current level in amps.	

[:SOURce]:CURRent:PROTection:TRIPped		Query
Description	Returns the state of the current protection circuits.	
Query Syntax	[:SOURce]:CURRent:PROTection:TRIPped?	

Return **<bool>** Returns protection status.

parameter

Example **SOUR:CURR:PROT:TRIP?**

0

The protection circuit has not been tripped.

Set →

[[:SOURce]:CURRent:SLEWrate:RISing

→ Query

Description Sets or queries the falling current slew rate. This is only applicable for CC slew rate priority (CCLS) mode.

Syntax **[[:SOURce]:CURRent:SLEWrate:RISing
{<NR2>(A)|MINimum|MAXimum}**

Query Syntax **[[:SOURce]:CURRent:SLEWrate:RISing?**

Parameter **<NR2>** Per step is between 0.00001 A/msec and depend on the unit type: 0.01 A/msec.
MAX Maximum: Depend on the unit type: 0.01 A/msec.

MIN Minimum rising current slew rate is 0.00001 A/msec.

Return **<NR2>** Returns the step current in amps.

parameter

Example **SOUR:CURR:SLEW:RIS?**

0.00200

Sets the rising current slew rate to 0.00200 A/ms.

Set →

[[:SOURce]:CURRent:SLEWrate:FALLing

→ Query

Description Sets or queries the rising current slew rate. This is only applicable for CC slew rate priority (CCLS) mode.

Syntax **[[:SOURce]:CURRent:SLEWrate:FALLing
{<NR2>(A)|MINimum|MAXimum}**

Query Syntax **[[:SOURce]:CURRent:SLEWrate:FALLing?**

Parameter **<NR2>** Per step is between 0.00001 A/msec and depend on the unit type: 0.01 A/msec.
MAX Maximum: Depend on the unit type: 0.01 A/msec.

MIN Minimum rising current slew rate is 0.00001 A/msec.

Return **<NR2>** Returns the step current in amps.

parameter

Example

SOUR:CURR:SLEW:FALL MAX

Sets the falling current slew rate to the maximum.

[[:SOURce]:MODE?

→ **Query**

Description Returns the status of the output mode (CC, CV, Off) of the power supply.
The interface will return "CV" if the supply is in Constant Voltage Mode, "CC" if the supply is in Constant Current Mode or "OFF" if the supply output is off.

Query Syntax

[[:SOURce]:MODE?

Return

<string>

Returns the output state as a string, "CC", "CV", "OFF"

parameter

Example

:SOUR:MODE?

CC

The power supply is currently in CC mode.

Set →

[[:SOURce]:VOLTage

→ **Query**

Description Sets or queries the voltage level in volts.

Syntax

**[[:SOURce]:VOLTage
{<NR2>(V)|MINimum|MAXimum}**

Query Syntax

[[:SOURce]:VOLTage?

Parameter

<NR2>

0 % to 105 % of the rated output voltage in volts.

MAX

Maximum voltage level

MIN

Minimum voltage level

Return

<NR2>

Returns the voltage level in volts

parameter

Example

SOUR:VOLT 10

Sets the voltage level to 10 volts.

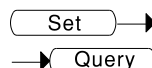
Set →

[[:SOURce]:VOLTage: PROTection:STATe

→ **Query**

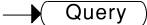
Description Sets or queries the OVP function.

Syntax	[:SOURce]:VOLTage:PROTection:STATe {<bool> OFF ON}	
Query Syntax	[:SOURce]:VOLTage:PROTection:STATe?	
Parameter	OFF 0	Turns OVP off
	ON 1	Turns OVP on
Return parameter	<bool>	Returns the setting in <bool> format.
Example	SOUR:VOLT:PROT:STAT? Returns the status of the OVP function	



[:SOURce]:VOLTage:PROTection

Description	Sets or queries the overvoltage protection level.	
Syntax	[:SOURce]:VOLTage:PROTection {<NR2>(V) MINimum MAXimum}	
Query Syntax	[:SOURce]:VOLTage:PROTection?	
Parameter	<NR2>	Minimum: Vrated x 0.05 Maximum: Vrated x 1.1
	MAX	Maximum OVP level
	MIN	Minimum OVP level
Return parameter	<NR2>	Minimum: Vrated x 0.05 Maximum: Vrated x 1.1
	MAX	Maximum OVP level
	MIN	Minimum OVP level
Example	SOUR:VOLT:PROT MAX Sets the OVP level to its maximum.	

[:SOURce]:VOLTage:PROTection:TRIPped 

Description	Sets or queries the overvoltage protection level.	
Query Syntax	[:SOURce]:VOLTage:PROTection:TRIPped?	
Return parameter	<bool>	
	0	Protection not tripped
	1	Protection tripped
Example	SOUR:VOLT:PROT:TRIP? 0 Indicates that the OVP protection has not been tripped.	

		Set → → Query
[[:SOURce]:VOLTage:SLEWrate:RISing		
Description	Sets or queries the rising voltage slew rate. This is only applicable for CV slew rate priority (CVLS) mode.	
Syntax	[[:SOURce]:VOLTage:SLEWrate:RISing {<NR2>(V) MINimum MAXimum}	
Query Syntax	[[:SOURce]:VOLTage:SLEWrate:RISing?	
Parameter	<NR2> MAX MIN	Per step is between 0.0001 V/msec and depend on the unit type: 0.04 V/msec. Maximum: Depend on the unit type: 0.04 V/msec. Minimum rising voltage slew rate is 0.0001 V/msec.
Return parameter	<NR2>	Returns the slew rate in V/msec.
Example	SOUR:VOLT:SLEW:RIS MAX Sets the rising voltage slew rate to its maximum.	

		Set → → Query
[[:SOURce]:VOLTage:SLEWrate:FALLing		
Description	Sets or queries the falling voltage slew rate. This is only applicable for CV slew rate priority (CVLS) mode.	
Syntax	[[:SOURce]:VOLTage:SLEWrate:FALLing {<NR2>(V) MINimum MAXimum}	
Query Syntax	[[:SOURce]:VOLTage:SLEWrate:FALLing?	
Parameter	<NR2> MAX MIN	Per step is between 0.0001 V/msec and depend on the unit type: 0.04 V/msec. Maximum: Depend on the unit type: 0.04 V/msec. Minimum rising voltage slew rate is 0.0001 V/msec.
Return parameter	<NR2>	Returns the slew rate in V/msec.
Example	SOUR:VOLT:SLEW:FALL MIN Sets the falling voltage slew rate to its minimum.	

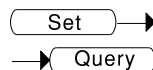
		Set → → Query
[[:SOURce]:VOLTage:SENSe		

Description	Sets or queries the remote sense.	
Syntax	[:SOURce]:VOLTage:SENSe {<NR2> INTernal EXTernal}	
Query Syntax	[:SOURce]:VOLTage:SENSe?	
Parameter	<NR2> INTernal 0 EXTernal 1 Sets remote sense 2 wire Sets remote sense 4 wire	
Return parameter	<NR2>	
Example	SOUR:VOLT: SENS EXT Sets remote sense 4 wire.	

System Commands

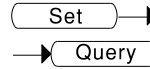
:SYSTem:CONFigure:BLEeder[:STATe]	58
:SYSTem:CONFigure:PON[:STATe]	58
:SYSTem:CONFigure:TRIGger:INPut:SOURce	59
:SYSTem:CONFigure:TRIGger:INPut:LEVel	59
:SYSTem:CONFigure:TRIGger:OUTPut:SOURce	59
:SYSTem:CONFigure:TRIGger:OUTPut:LEVel	60
:SYSTem:CONFigure:TRIGger:INPut:Voltage	60
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:SYSTem:COMMunicate:TCPIP:CONTRol	64
:SYSTem:ERRor	64
:SYSTem:KLOCK	64
:SYSTem:ERRor:ENABle	64
:SYSTem:VERsion	65
:SYSTem:KEYBoard:BEEPer	65

:SYSTem:CONFigure:BEEPer[:STATe]



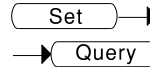
Description	Sets or queries the protect buzzer state on/off.
-------------	--

Syntax	:SYSTem:CONFigure:BEEPer[:STATe] {<bool> OFF ON}	
Query Syntax	:SYSTem:CONFigure:BEEPer[:STATe]?	
Parameter	OFF 0	Turns the buzzer off.
	ON 1	Turns the buzzer on.
Return parameter	<bool>	Returns the buzzer status.



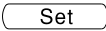
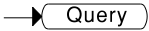
:SYSTem:CONFigure:BLEeder[:STATe]

Description	Sets or queries the status of the bleeder resistor.	
Syntax	:SYSTem:CONFigure:BLEeder[:STATe] {<NR1> OFF ON}	
Query Syntax	:SYSTem:CONFigure:BLEeder[:STATe]?	
Parameter	OFF 0	Turns the bleeder resistor off.
	ON 1	Turns the bleeder resistor on.
Return parameter	<NR1>	Returns bleeder resistor status.

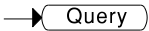


:SYSTem:CONFigure:PON[:STATe]

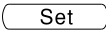
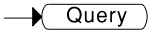
Description	Sets the output state at power-on. This is the equivalent to the PWR On Config menu (Power On Status) settings. These settings only apply after the unit has been reset.	
Syntax	:SYSTem:CONFigure:OUTPut:PON[:STATe] {<NR1> {DEFAult OFF} {SAVE ON}}	
Query Syntax	:SYSTem:CONFigure:OUTPut:PON[:STATe]?	
Parameter	DEF 0	The GPP-1000 turns on in the same state the unit was in prior to the factory default setting. The output is set to off (default).
	SAVE 1	The GPP-1000 turns on in the same state the unit was in prior to the previous shut down.
	0	The power on output setting is "DEF".
	1	The power on output setting is "SAVE".
Return parameter		

:SYSTem:CONFigure:TRIGger:INPut:SOUR  →
ce 

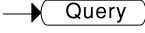
Description	Sets or queries what action will be performed on receiving a trigger. This is the equivalent to the TRIG Control menu (Trigin Action) settings.	
Syntax	:SYSTem:CONFigure:TRIGger:INPut:SOURce	
Query Syntax	{<NR1> NONE OUTPut SETTing MEMor y}	
Parameter	:SYSTem:CONFigure:TRIGger:INPut:SOURce?	
	NONE	No input trigger.
	0	
	OUTPut	Toggles the output on receiving a trigger.
	1	
	SETTing	Sets the voltage/current on receiving a trigger.
	2	
	MEMor y	Sets the voltage/current on receiving a trigger.
	3	
Return parameter	<NR1>	Returns the input source

:SYSTem:CONFigure:TRIGger:INPut:LEVel  →


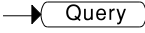
Description	Sets or queries the logic used to input trigger level. This is the equivalent to the TRIG Control menu (Trigin Level)settings.	
Syntax	:SYSTem:CONFigure:TRIGger:INPut:LEVel	
Query Syntax	{<NR1> LOW HIGH}	
Parameter	:SYSTem:CONFigure:TRIGger:INPut:LEVel?	
	LOW 0	Active low.
	HIGH	Active high.
	1	
Return parameter	<NR1>	Returns the trigger input level.

:SYSTem:CONFigure:TRIGger:OUTPut:SO  →
URce 

Description	Sets or queries the output trigger source. This is the equivalent to the TRIG Control menu (Trigout Source) settings.	
Syntax	:SYSTem:CONFigure:TRIGger:OUTPut:SOURce {<NR1> NONE OUTPut SETting MEMor y}	
Query Syntax	:SYSTem:CONFigure:TRIGger:OUTPut:SOURce?	
Parameter	NONE 0 OUTPut 1 SETting 2 MEMor y 3 <NR1>	No output trigger. Output trigger is generated by a change in the output. Output trigger is generated when a setting is changed. Output trigger is generated when a memory setting is loaded. Returns the output source.
Return parameter		

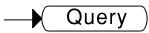
:SYSTem:CONFigure:TRIGger:OUTPut:LEV el  → → 

Description	Sets or queries the logic used to output trigger level. This is the equivalent to the TRIG Control menu (Trigin Level) settings.	
Syntax	:SYSTem:CONFigure:TRIGger:OUTPut:LEV el {<NR1> LOW HIGH}	
Query Syntax	:SYSTem:CONFigure:TRIGger:OUTPut:LEV el?	
Parameter	<NR1>	
Return parameter	LOW 0 High 1 <NR1>	Sets the output trigger to active low. Sets the output trigger to active high. Returns the trigger output level.

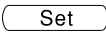
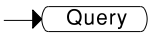
:SYSTem:CONFigure:TRIGger:INPut:VOLTage  → → 

Description	Sets or queries the voltage level in volts when a trigger in/software trigger has been generated.	
Syntax	:SYSTem:CONFigure:TRIGger:INPut:VOLTage {<NR2> (V) MINimum MAXimum}	

Query Syntax	:SYSTem: CONFigure:TRIGger:INPut:VOLTage?	
Parameter	<NR2>	0 % to 105 % of the rated voltage output in volts.
	MIN	Minimum current level.
	MAX	Maximum current level.
Return parameter	<NR2>	Returns the voltage level.

:SYSTem:CONFigure:TRIGger:INPut:CURR  
ent

Description	Sets or queries the current level in amps when a software trigger has been generated.	
Syntax	:SYSTem:CONFigure:TRIGger:INPut:CURRent{<NR2>(A) MINimum MAXimum}	
Query Syntax	:SYSTem: CONFigure:TRIGger:INPut:CURRent?	
Parameter	<NR2>	0 % to 105 % of the rated current output in amps.
	MIN	Minimum current level.
	MAX	Maximum current level.
Return parameter	<NR2>	Returns the current level.

:SYSTem:CONFigure:TRIGger:INPut:MEMo  
ry

Description	Sets or queries which memory is loaded when a trigger input is received and the trigger input is configured to load a memory setting. This is the equivalent to the TRIG Control menu (Trigin Memory) settings.	
Syntax	:SYSTem:CONFigure:TRIGger:INPut:MEMory <NR1>	
Query Syntax	:SYSTem:CONFigure:TRIGger:INPut:MEMory?	
Parameter	<NR1>	1 (M1) to 5 (M5).
	MIN	
	MAX	
Return parameter	<NR1>	Returns the memory setting.

		Set → → Query
:SYSTem:COMMUnicate:GPIB:ADDRess		
Description	Sets or queries the GPIB address. Note: the setting will only be valid after the power has been cycled.	
Syntax	:SYSTem:COMMUnicate:GPIB[:SELF]:ADDRess <NR1>	
Query Syntax	:SYSTem:COMMUnicate:GPIB[:SELF]:ADDRess?	
Parameter	<NR1>	1 to 30
Return parameter	<NR1>	1 to 30
Example	SYST:COMM:GPIB:ADDR 15 Sets the GPIB address to 15.	

		Set → → Query
:SYSTem:COMMUnicate:LAN:IPADdress		
Description	Sets or queries LAN IP address. Note: the setting will only be valid after the power has been cycled.	
Syntax	:SYSTem:COMMUnicate:LAN:IPADdress <string>	
Query Syntax	:SYSTem:COMMUnicate:LAN:IPADdress?	
Parameter	<string>	LAN IP address in string format ("address") Applicable ASCII characters: 20H to 7EH
Return parameter	<string>	LAN IP address in string format ("address") Applicable ASCII characters: 20H to 7EH
Example	SYST:COMM:LAN:IPAD 172.16.5.111 Sets the IP address to 172.16.5.111.	

		Set → → Query
:SYSTem:COMMUnicate:LAN:GATeway		
Description	Sets or queries the Gateway address. Note: the setting will only be valid after the power has been cycled.	
Syntax	:SYSTem:COMMUnicate:LAN:GATeway <string>	
Query Syntax	:SYSTem:COMMUnicate:LAN:GATeway?	
Parameter	<string>	Gateway address in string format ("address") Applicable ASCII characters: 20H to 7EH

Return parameter	<string>	Gateway address in string format ("address") Applicable ASCII characters: 20H to 7EH
Example	SYST:COMM:LAN:GAT 172.16.0.254 Sets the LAN gateway to 172.16.0.254.	

Set →

:SYSTem:COMMunicate:LAN:SMASk

→ Query

Description	Sets or queries the LAN subnet mask. Note: the setting will only be valid after the power has been cycled.	
Syntax	:SYSTem:COMMunicate:LAN:SMASk <string>	
Query Syntax	:SYSTem:COMMunicate:LAN:SMASk?	
Parameter	<string>	Subnet mask in string format ("mask") Applicable ASCII characters: 20H to 7EH
Return parameter	<string>	Subnet mask in string format ("mask") Applicable ASCII characters: 20H to 7EH
Example	SYST:COMM:LAN:SMASk 255.255.0.0 Sets the LAN mask to 255.255.0.0.	

:SYSTem:COMMunicate:LAN:MAC

→ Query

Description	Returns the unit MAC address as a string. The MAC address cannot be changed.	
Query Syntax	:SYSTem:COMMunicate:LAN:MAC?	
Return parameter	<string>	Returns the MAC address in the following format "FF-FF-FF-FF-FF-FF"
Example	SYST:COMM:LAN:MAC? 02-80-AD-20-31-B1 Returns the MAC address.	

Set →

:SYSTem:COMMunicate:LAN:DHCP

→ Query

Description	Turns DHCP on/off. Queries the DHCP status. Note: the setting will only be valid after the power has been cycled.	
Syntax	:SYSTem:COMMunicate:LAN:DHCP {<bool> OFF ON}	
Query Syntax	:SYSTem:COMMunicate:LAN:DHCP?	

Parameter	OFF 0 ON 1	DHCP off DHCP on
Return parameter	<bool>	Returns the DHCP status.

Set →

:SYSTem:COMMunicate:TCPIp:CONTrol

→ Query

Description	Queries the socket port number.	
Query Syntax	:SYSTem:COMMunicate:TCPIp:CONTrol?	
Return parameter	<NR1>	0000 to 9999
Example	SYST:COMM:TCP:CONT? 2268 Returns the socket port number	

:SYSTem:ERRor

→ Query

Description	Queries the error queue. The last error message is returned. A maximum of 32 errors are stored in the error queue.	
Query Syntax	:SYSTem:ERRor?	
Return parameter	<string>	Returns an error code followed by an error message as a single string.
Example	SYSTem:ERRor? -100, "Command error"	

Set →

:SYSTem:KLOCK

→ Query

Description	Enables or disables the front panel key lock.	
Syntax	:SYSTem:KLOCK {<bool> OFF ON }	
Query Syntax	:SYSTem:KLOCK?	
parameter	OFF 0 ON 1	Panel lock: allow output off. Panel lock: allow output on/off.
Return parameter	0 1	Panel lock: allow output off. Panel lock: allow output on/off.

:SYSTem:ERRor:ENABLE

Set →

Description Clears the Error Queue and enables all error messages to be placed in the System Error Queue.

Syntax **:SYSTem:ERRor:ENABle**

:SYSTem:VERSion

→ Query

Description Returns the version of the GPP-1000 SCPI version.

Query Syntax **:SYSTem:VERSion?**

Return parameter **<string>** Returns the SCPI version as a string.

Example **SYST:VERS?**
1999.9

:SYSTem:KEYBoard:BEEPer

Set →

→ Query

Description Sets or queries the keyboard buzzer state on/off. This is the equivalent to the Buzzer menu (Keyboard)settings.

Syntax **:SYSTem:KEYBoard:BEEPer {<bool>|OFF|ON}**

Query Syntax **:SYSTem:KEYBoard:BEEPer?**

parameter **0 | OFF** Turns the keyboard buzzer off.
1 | ON Turns the keyboard buzzer on.

Return parameter **<bool>** Returns the keyboard buzzer status.

:SYSTem:LOCal

Set →

Description Disable remote control mode.

Syntax **:SYSTem:LOCal**

Example **SYST:LOC**
Sets the operating mode to local.

Apply Commands

:APPLy..... 66

Set

Query

:APPLy

Description

Syntax

Query Syntax

Parameter

Return parameter

Example

The apply command sets the voltage and current at the same time.

:APPLy

{<NRf>(V)|MINimum|MAXimum[,<NRf>(A)|MINimum|MAXimum]}

:APPLy?

<NRf>(V)

MINimum

MAXimum

<NRf>(A)

MINimum

MAXimum

Voltage setting.

Minimum voltage level

Maximum voltage level

Current setting.

Minimum voltage level

Maximum voltage level

<NRf>(V)

MINimum

MAXimum

<NRf>(A)

MINimum

MAXimum

Voltage setting.

Minimum voltage level

Maximum voltage level

Current setting.

Minimum voltage level

Maximum voltage level

APPL MIN, MIN

Sets the current and voltage to the minimum settings.

Sequence Commands

:SEQUence:ENABLE	67
:SEQUence:SAVE:INTernal	67
:SEQUence:LOAD:INTrenal	67
:SEQUence:SAVE:UDISK.....	68
:SEQUence:LOAD:UDISK	68
:SEQUence:RUN.....	68
:SEQUence:STATe	68

:SEQUence:ENABLE

Set →

Description	Enable or disable sequence function.
Syntax	:SEQUence:ENABLE{ON OFF}
Parameter	OFF Turns the sequence function off. ON Turns the sequence function on.
Example	SEQUence:ENABLE ON Turns the sequence function on.

:SEQUence:SAVE:INTernal

Set →

Description	Saves the sequence output file to the designated location of internal storage. {1 2 3 4 5} represent the storage locations of 5 files within the internal storage individually.
Syntax	:SEQUence:SAVE:INTernal{1 2 3 4 5 }
Parameter	<NR1> 1 to 5 (as memory 1 to 5)

:SEQUence:LOAD:INTrenal

Set →

Description	Recalls the sequence output file saved in the designated location from internal storage. {1 2 3 4 5} represent the storage locations of 5 files within the internal storage individually.
Syntax	:SEQUence:LOAD:INTernal{1 2 3 4 5 }

Parameter **<NR1>** 1 to 5 (as memory 1 to 5)

:SEQUence:SAVE:UDISK

Set →

Description Saves the sequence output file to the designated location of external storage. SEQU_<NR1>.CSV indicates the designated location of external storage with file format in either usb:\<name>.CSV. Storage location cannot be designated when sequence function is enabled.

Syntax **:SEQUence:SAVE:UDISK SEQU_<NR1>.CSV**

Parameter **<NR1>** 0 to 255

:SEQUence:LOAD:UDISK

Set →

Description Recalls the sequence output file saved in the designated location from external storage. SEQU_<NR1>.CSV indicates the designated location of external storage.

Syntax **:SEQUence:LOAD:UDISK SEQU_<NR1>.CSV**

Parameter **<NR1>** 0 to 255

:SEQUence:RUN

Set →

→ **Query**

Description Start output with the first sequence .

Syntax **:SEQUence:RUN{ON|OFF }**

Parameter **OFF** Stop the sequence function.
 ON Start the sequence function.

Set →

:SEQUence:STATe

→ **Query**

Description Queries the state of sequence output .

Query Syntax **:SEQUence:STATe?**

Return parameter	OFF	Sequence not enabled
	ON	The sequence is in a run state.
	Ready	The sequence is in a ready state.
	Pause	The sequence is paused during the execution of the sequence script. When a sequence is paused, transmit instruction SEQUence:RUN ON to continue running the sequence.
	TRIGIN	During the execution of the sequence script, the sequence is in a waiting trigger state. The Trigin status will be held until trig-in signal is received by GPP-1000 series unit.

Load Commands

:LOAD:CV	69
:LOAD:CC	69
:LOAD:MODE	70

:LOAD:CV

Set →

Description	Sets Channel as Load CV mode. Automatically switch to power mode after closing LOAD mode.	
Syntax	:LOAD:CV{ON OFF}	
Parameter	OFF 0	OFF
	ON 1	ON
Example	:LOAD:CV ON Sets Channel as Load CV mode.	

:LOAD:CC

Set →

Description	Sets Channel as Load CC mode.
Syntax	:LOAD:CC{ON OFF}

Parameter	OFF 0 ON 1	OFF ON
Example	:LOAD:CC ON Sets Channel as Load CC mode.	

:LOAD:MODE

→ Query

Description	Queries Channel work mode. 3 modes below: CV Load,CC Load,Source	
Syntax	:LOAD:MODE?	
Parameter	0 1 255	CV Load CC Load Source
Example	:LOAD:MODE? Queries Channel work mode.	

Status Register Overview

To program the GPP-1000 power supply effectively, the Status registers need to be understood. This chapter explains in detail how the Status registers are used and how to configure them.

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Introduction to the Status Registers

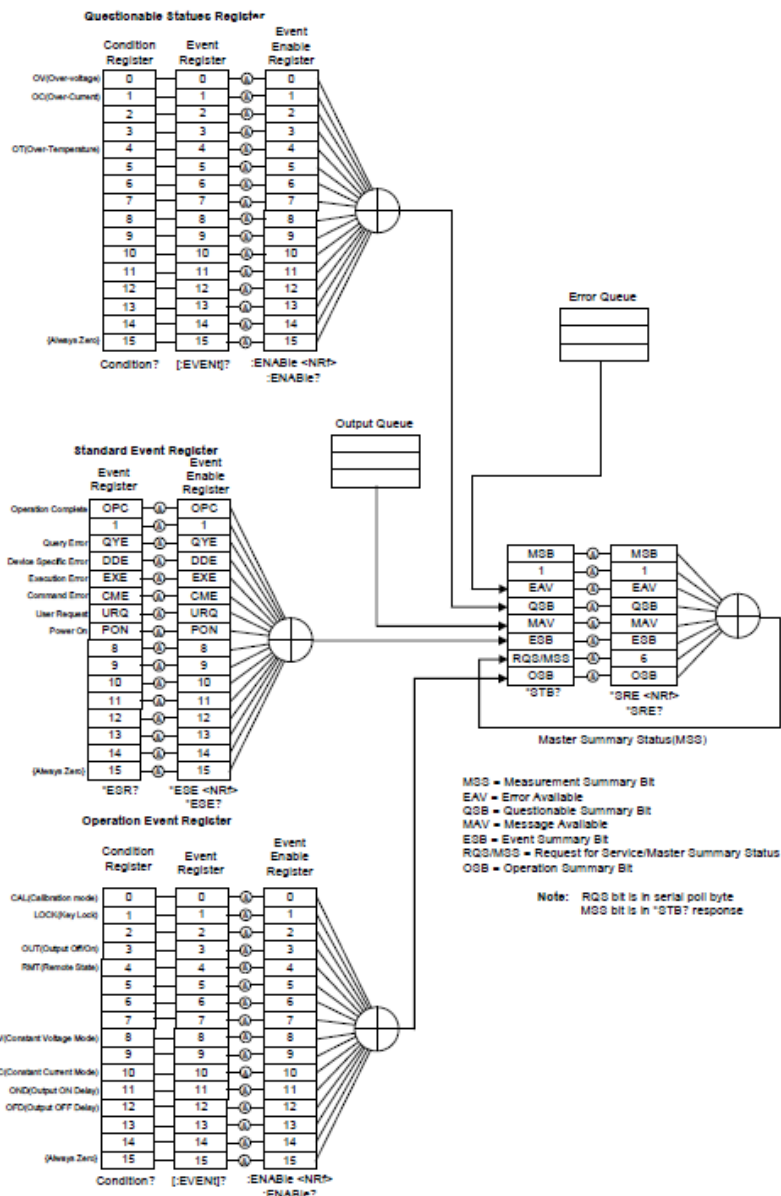
Overview

The status registers are used to determine the status of the power supply. The status registers maintain the status of the protection conditions, operation conditions and instrument errors. The GPP-1000 Series have a number of register groups:

- Questionable Status Register Group
- Standard Event Status Register Group
- Operation Status Register Group
- Status Byte Register
- Service Request Enable Register
- Service Request Generation
- Error Queue
- Output Buffer

The next page shows the structure of the Status registers.

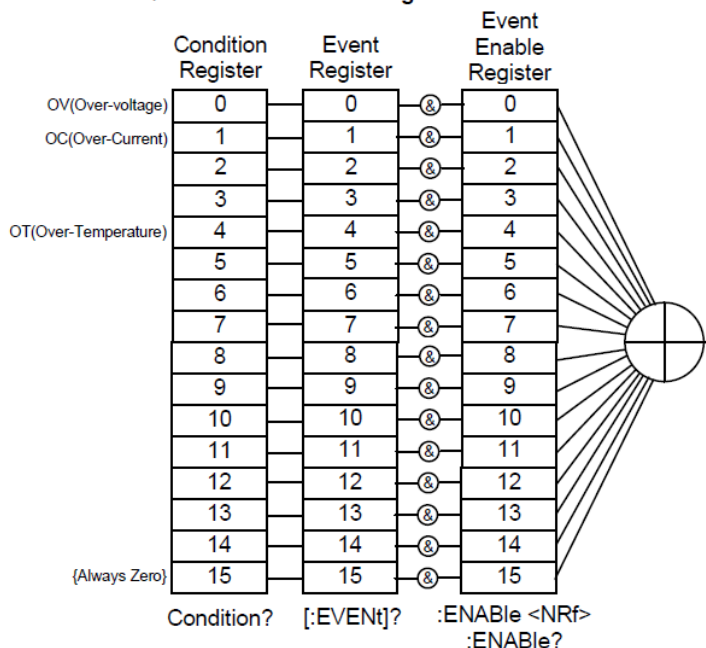
The Status Registers



Questionable Status Register Group

Overview The Questionable Status Register Group indicates if any protection modes or limits have been tripped.

Questionable Statuses Register

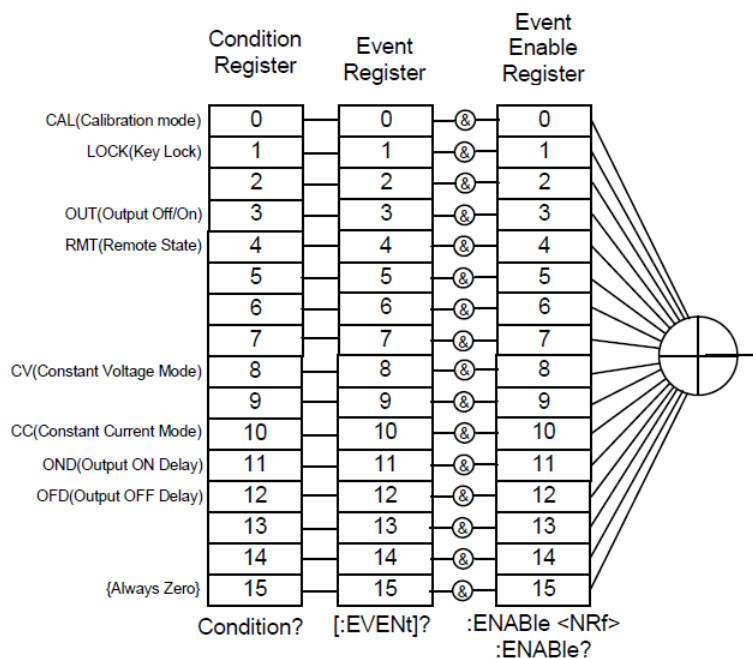


Bit Summary	Event	Bit	Bit Weight
	OV (Over-Voltage)	0	1
	Over voltage protection has been tripped		
	OC (Over-Current)	1	2
	Over current protection has been tripped		
	OTP(Over Temperature Protection)	4	16
	Over temperature protection has been tripped		
Condition Register	The Questionable Status Condition Register indicates the status of the power supply. If a bit is set in the Condition register, it indicates that the event is true. Reading the condition register does not change the state of the condition register.		
Event Register	The type of transition conditions will set the corresponding bits in the Event Register. If the Event Register is read, it will be cleared to 0.		
Enable Register	The Enable register determines which Events in the Event Register will be used to set the QUES bit in the Status Byte Register.		

Operation Status Register Group

Overview	The Operation Status Register Group indicates the operating status of the power supply.
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Operation Event Register

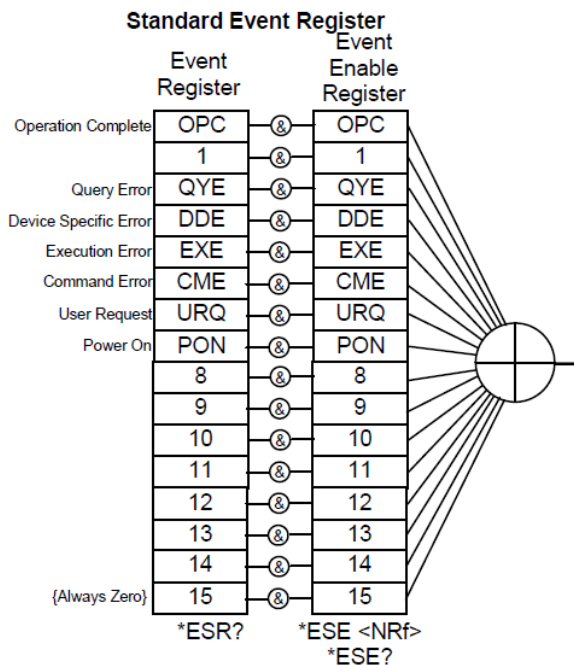


Bit Summary	Event	Bit	Bit Weight
	CAL (Calibration mode) Indicates if the GPP-1000 is in calibration mode.	0	1
	LOCK (Key Lock) Keyboard locked.	1	2
	OUT(Output off/on) Output off/on state.	3	8
	RMT(Remote state) Remote state	4	16
	CV (Constant voltage mode) Indicates if the GPP-1000 is in CV mode.	8	256
	CC (Constant current mode) Indicates if the GPP-1000 is in CC mode.	10	1024
	OND (Output ON Delay) Indicates if Output ON delay time is active	11	2048
	OFD (Output OFF Delay) Indicates if Output OFF delay time is active	12	4096
Condition Register	The Operation Status Condition Register indicates the operating status of the power supply. If a bit is set in the Condition register, it indicates that the event is true. Reading the condition register does not change the state of the condition register.		
Event Register	The Enable register determines which registered Events in the Event Register will be used to set the OPER bit in the Status Byte Register.		
Enable Register	The Enable register determines which Events in the Event Register will be used to set the QUES bit in the Status Byte Register.		

Standard Event Status Registers

Overview

The Standard Event Status Register Group indicates if any errors have occurred. The bits of the Event register are set by the error event queue.



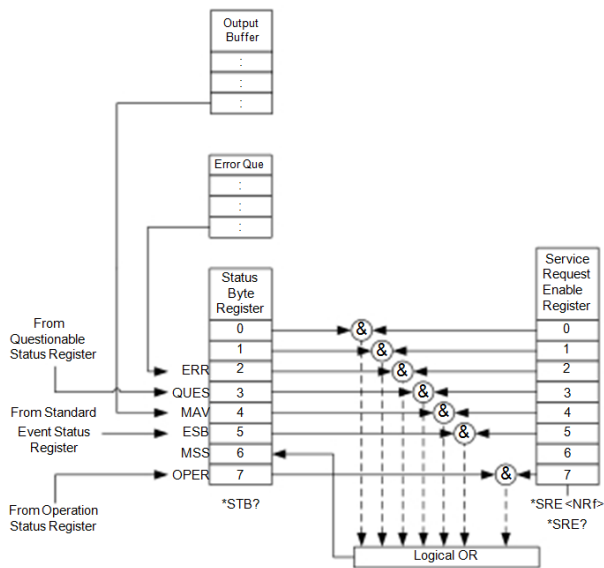
Bit Summary	Event	Bit	Bit Weight
	OPC (Operation complete) The OPC bit is set when all selected pending operations are complete. This bit is set in response to the *OPC command.	0	1
	QYE (Query Error) The Query Error bit is set in response to an error reading the Output Queue. This can be caused by trying to read the Output Queue when there is no data present.	2	4
	DDE (Device Dependent Error) Device specific error.	3	8
	EXE (Execution Error) The EXE bit indicates an execution error due to one of the following: illegal command parameter, parameter out of range, invalid parameter, the command didn't execute due to an overriding operation condition.	4	16
	CME (Command Error) The CME bit is set when a syntax error has occurred. The CME bit can also be set when a <GET> command is received within a program message.	5	32

	PON (Power On)	7	128
	Indicates the power is turned on.		
Event Register	Any bits set in the event register indicate that an error has occurred. Reading the Event register will reset the register to 0.		
Enable Register	The Enable register determines which Events in the Event Register will be used to set the ESB bit in the Status Byte Register.		

Status Byte Register & Service Request Enable Register

Overview

The Status Byte register consolidates the status events of all the status registers. The Status Byte register can be read with the *STB? query and can be cleared with the *CLS command.



Bit Summary	Event	Bit	Bit Weight
	ERR (Error Event/Queue)	2	4
	If data is present in the Error queue, the ERR bit will be set.		
	QUES (Questionable Status Register)	3	8
	The summary bit for the Questionable Status Register group.		
	MAV (Message Available)	4	16
	This is set when there is data in the Output Queue waiting to be read.		
	(ESB) Event Summary Bit.	5	32
	The ESB is the summary bit for the Standard Event Status Register group.		
	MSS Bit	6	64
	The MSS Bit is the summary of the Status Byte Register and Service Request register (bits 1 to 5, 7). This will be set to 1.		
Status Byte Register	Any bits set in the Status byte register acts as a summary register for all the three other status registers and indicates if there is a service request, an error in the Error Queue or data in the Output Queue. Reading the Status Byte register will reset the register to 0.		
Service Request Enable Register	The Service Request Enable Register controls which bits in the Status Byte Register are able to generate service requests.		

Error List

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Command Error Codes

Overview An <error/event number> in the range [-199 , -100] indicates that an IEEE 488.2 syntax error has been detected by the instrument's parser. The occurrence of any error in this class shall cause the command error bit (bit 5) in the event status register (IEEE 488.2, section 11.5.1) to be set. One of the following events has occurred:

An IEEE 488.2 syntax error has been detected by the parser. That is, a controller-to-device message was received which is in violation of the IEEE 488.2 standard. Possible violations include a data element which violates the device listening formats or whose type is unacceptable to the device.

An unrecognized header was received.

Unrecognized headers include incorrect device-specific headers and incorrect or unimplemented IEEE 488.2 common commands.

Events that generate command errors shall not generate execution errors, device-specific errors, or query errors; see the other error definitions in this chapter.

-101 Invalid character

An invalid character was used in the command string. Example: #, \$, %.

SOURCE:VOLT 12#

-102 Syntax error

Invalid syntax was used in the command string.
Example: An unexpected character may have been encountered, like an unexpected space.

SOURCE:VOLT 1

-103 Invalid separator

An invalid separator was used in the command string. Example: a space, comma or colon was incorrectly used.

SOURCE:VOLT 12

-108 Parameter not allowed

The command received more parameters than were expected. Example: An extra (not needed) parameter was added to a command

OUTPUT OPEN

-109 Missing parameter

The command received less parameters than expected. Example: A required parameter was omitted.

SOURCE:VOLT

-113 Undefined header

An undefined header was encountered. The header is syntactically correct. Example: the header contains a character mistake.

SOURCE:VOLT A

-131 Invalid suffix

An invalid suffix was used. Example: An unknown or incorrect suffix may have been used with a parameter.

SOURCE:VOLT +A

-148 Character data not allowed

A legal character data element was encountered where prohibited by the device. Example: Using a suffix when not allowed.

SOURCE:VOLT 1ma

-158 String data not allowed

An unexpected character string was used where none were expected. Example: A character string is used instead of a valid parameter.

SOURCE:VOLT "1.1v"

Execution Errors

Overview

An <error/event number> in the range [-299 , -200] indicates that an error has been detected by the instrument's execution control block. The occurrence of any error in this class shall cause the execution error bit (bit 4) in the event status register (IEEE 488.2, section 11.5.1) to be set. One of the following events has occurred:

A <PROGRAM DATA> element following a header was evaluated by the device as outside of its legal input range or is otherwise inconsistent with the device's capabilities.

A valid program message could not be properly executed due to some device condition.

Execution errors shall be reported by the device after rounding and expression evaluation operations have taken place. Rounding a numeric data element, for example, shall not be reported as an execution error. Events that generate execution errors shall not generate Command Errors, device-specific errors, or Query Errors; see the other error definitions in this section.

--223 Data out of range

Indicates that a command was received but the data in the output buffer from a previous command was lost.

Device Specific Errors

Overview

An <error/event number> in the range [-399 , -300] or [1 , 32767] indicates that the instrument has detected an error which is not a command error, a query error, or an execution error; some device operations did not properly complete, possibly due to an abnormal hardware or firmware condition. These codes are also used for self-test response errors. The occurrence of any error in this class should cause the device-specific error bit (bit 3) in the event status register (IEEE 488.2, section 11.5.1) to be set. The meaning of positive error codes is device-dependent and may be enumerated or bit mapped; the <error message>string for positive error codes is not defined by SCPI and available to the device designer.

Note that the string is not optional; if the designer does not wish to implement a string for a particular error, the null string should be sent (for example, 42,""). The occurrence of any error in this class should cause the device-specific error bit (bit 3) in the event status register (IEEE 488.2, section 11.5.1) to be set. Events that generate device-specific errors shall not generate command errors, execution errors, or query errors; see the other error definitions in this section.

-350 Query INTERRUPTED

Indicates that a command was received but the data in the output buffer from a previous command was lost.

Query Errors

Overview An <error/event number> in the range [-499 , -400] indicates that the output queue control of the instrument has detected a problem with the message exchange protocol described in IEEE 488.2, chapter 6. The occurrence of any error in this class shall cause the query error bit (bit 2) in the event status register (IEEE 488.2, section 11.5.1) to be set. These errors correspond to message exchange protocol errors described in IEEE 488.2, section 6.5. One of the following is true:

- An attempt is being made to read data from the output queue when no output is either present or pending;
- Data in the output queue has been lost.

Events that generate query errors shall not generate command errors, execution errors, or device-specific errors; see the other error definitions in this section.

-410 Query INTERRUPTED

Indicates that a command was received but the data in the output buffer from a previous command was lost.

GPP-1000 Factory Default Settings

The following default settings are the factory configuration settings for the power supply.

For details on how to return to factory default settings, see page62.

Initial	Default Setting
Output	Off
LOCK	Disabled
Voltage Set	0.000 V
Current Set	0.0000 A

Output	Default Setting
Output On Dly(Delay)	00(hour):00(minute):00.00(sec)
Output Off Dly(Delay)	00(hour):00(minute):00.00(sec)
Remote Sense	2 Wire
V/I Slew Rate	CVHS = CV high speed priority
R_V(Rising Voltage) Slew Rate	0.04 V/ms
F_V(Falling Voltage) Slew Rate	0.04 V/ms
R_C(Rising Current) Slew Rate	0.01 A/ms
F_C(Falling Current) Slew Rate	0.01 A/ms
Measurement	Default Setting
Measure Average	Off
Current Range	IH
Mode Control	Default Setting
Mode	Source
PWR(Power) On Config	Default Setting
Power On Status	Default
Utility -Buzzer	Default Setting
Protect	On
Keyboard	Off
Utility -Bleeder	Default Setting
Bleeder	On
Utility -Keyboard	Default Setting
Lock Mode	Output On/Off
Protect	Default Setting
Voltage Limit	On
OVP Level	1.1 x Vr _{ate}
Current Limit	On

OCP Level	$1.1 \times I_{rate}$
OCP Delay	0.20 s

EC Declaration of Conformity

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declare that the CE marking mentioned product

satisfies all the technical relations application to the product within the scope of council:

Directive: EMC; LVD; WEEE; RoHS

The product is in conformity with the following standards or other normative documents:

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Conducted & Radiated Emission EN 55011 / EN 55032	Electrical Fast Transients EN 61000-4-4
Current Harmonics EN 61000-3-2 / EN 61000-3-12	Surge Immunity EN 61000-4-5
Voltage Fluctuations EN 61000-3-3 / EN 61000-3-11	Conducted Susceptibility EN 61000-4-6
Electrostatic Discharge EN 61000-4-2	Power Frequency Magnetic Field EN 61000-4-8
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