RIGOL

Programming Guide

DP800 Series Programmable Linear DC Power Supply

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Document Overview

This manual introduces how to program the power supply over remote interfaces in details.

Main Topics in this Manual:

Chapter 1 Programming Overview
This chapter introduces how to build the remote communication between the power supply and PC and how to control the power supply remotely. Besides, it also provides a brief introduction of the syntax, symbols, parameter types and abbreviation rules of the SCPI commands as well as the SCPI status system.

Chapter 2 Command System
This chapter introduces the syntax, function, parameters and using instruction of each DP800 command in A-Z order.

Chapter 3 Application Examples
This chapter provides the application examples of the main functions of the power supply. In the application example, a series of commands are combined to realize the corresponding basic function of the power supply.

Chapter 4 Programming Demos
This chapter introduces how to program and control DP800 using various development tools, such as Visual C++, Visual Basic and LabVIEW.

Chapter 5 Appendix
This chapter provides various information, such as the command list and factory setting list.

Tip
For the newest version of this manual, please download it from **RIGOL** official website (www.rigol.com).

Format Conventions in this Manual:

1 **Key**
The function key at the front panel is denoted by the format of "Key Name (Bold) + Text Box" in the manual. For example, **Utility** denotes the "Utility" key.

2 **Menu**
The menu item is denoted by the format of "Menu Word (Bold) + Character Shading" in the manual. For example, **SysInfo** denotes the "SysInfo" item under **Utility**.

3 **Operation Step**
The next step of the operation is denoted by an arrow "→" in the manual. For example, **Utility** → **System** denotes pressing **Utility** at the front panel and then pressing **System**.

Content Conventions in this Manual:

DP800 series programmable linear DC power supply includes the following models. Unless otherwise noted, in this manual, DP831A is taken as an example to illustrate the using method of each DP800 series command.

Model	Number of Channels	Output Voltage/Current
DP831A/DP831	3	8V/5A, 30V/2A, -30V/2A
DP832A/DP832	3	30V/3A, 30V/3A, 5V/3A
DP821A/DP821	2	60V/1A, 8V/10A
DP811A/DP811	1	20V/10A (Range 1), 40V/5A (Range 2)

Contents

Chapter 1 Programming Overview

This chapter introduces how to build the remote communication between the PC and instrument and control the power supply remotely. It also provides an overview of the syntax, symbols, parameter types and abbreviation rules of the SCPI commands and the SCPI status system.

Main topics of this chapter:

To Build Remote Communication

You can build the remote communication between DP800 and PC over USB, LAN, RS232 or GPIB (option, can be extended via the USB-GPIB interface converter) interface.

Note: The end mark of the command sent through RS232 interface is "\r\n".

Operation Steps:

1 Install the Ultra Sigma common PC software

You can acquire this software from the resource CD in the standard accessories or download it from **RIGOL** official website (www.rigol.com) and then install it according to the instructions.

2 Connect the instrument and PC and configure the interface parameters of the instrument

DP800 supports USB, LAN, RS232 and GPIB (extended via the USB HOST interface of the instrument) communication interfaces, as shown in the figure below.

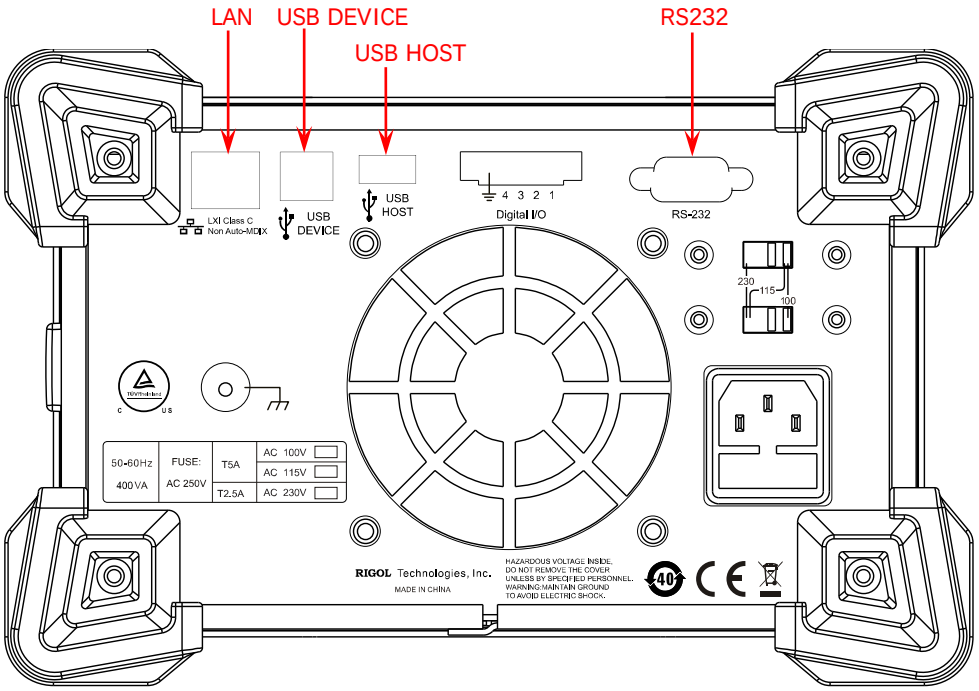


Figure 1-1 DP800 Communication Interfaces

Note: For DP831A/DP832A/DP821A/DP811A, the instrument is installed with the LAN and RS232 options when it leaves factory; users can build the remote communication between the instrument and PC via the LAN or RS232 interface directly. For DP831/DP832/DP821/DP811, the LAN interface communication and RS232 interface communication are optional functions; to use the functions, please order the corresponding option and install the option correctly (:LIC:SET).

(1) Use the USB interface: connect the USB DEVICE interface at the rear panel of DP800 and the USB HOST interface of the PC using USB cable.

(2) Use the LAN interface:

- Make sure that your PC is connected to the local network.
- Check whether your local network supports DHCP or auto IP mode. If not, you need to acquire the network interface parameters available, including the IP address, subnet mask, gateway and DNS.
- Connect DP800 to the local network using network cable.
- Press **Utility** → **I/O Config** → **LAN** to configure the IP address, subnet mask, gateway and DNS of the instrument.

(3) Use the RS232 interface:
- Connect the RS232 interface with the PC or data terminal equipment (DTE) using RS232 cable.
- Press **Utility** → **I/O Config** → **RS232** to set interface parameters (such as the baud rate and parity) that match the PC or terminal equipment.

(4) Use the GPIB interface:
- Use the USB-GPIB interface converter to extend a GPIB interface via the USB HOST interface at the rear panel of DP800.
- Connect the instrument with your PC using a GPIB cable.
- Press **Utility** → **I/O Config** → **GPIB** to set the GPIB address of the instrument.

3 Check whether the connection is successful

Run the Ultra Sigma, search for resource, right-click the resource name and select "SCPI Panel Control" in the pop-up menu. Enter the correct command in the pop-up SCPI control panel and click "Send Command" and then "Read Response" or click "Send & Read" directly to check whether the connection is successful.

Remote Control Methods

1 User-defined Programming

You can program and control the instrument using the SCPI (Standard Commands for Programmable Instruments) commands listed in chapter 2 **"Command System"** in various development environments (such as Visual C++, Visual Basic and LabVIEW). For details, refer to the introductions in chapter 4 **"Programming Demos"**.

2 Send SCPI Commands via the PC Software

It is recommended that you control the power supply remotely by sending SCPI commands via the PC software Ultra Sigma provided by **RIGOL**.

SCPI Command Overview

SCPI (Standard Commands for Programmable Instruments) is a standardized instrument programming language that is built upon the standard IEEE 488.1 and IEEE 488.2 and conforms to various standards (such as the floating point operation rules in IEEE754 standard, ISO646 7-bit coded character for information interchange (equivalent to ASCII programming)). This section introduces the syntax, symbols, parameters and abbreviation rules of the SCPI commands.

Syntax

SCPI commands present a hierarchical tree structure and contain multiple subsystems, each subsystem consists of a root keyword and one or more sub-keywords. The command string usually starts with ":"; the keywords are separated by ":" and are followed by the parameter settings available. The command keywords and the first parameter are separated by a space. "?" is added at the end of the command string to indicate query.

For example,
:SYSTem:COMMunicate:LAN:IPADdress <ip>
:SYSTem:COMMunicate:LAN:IPADdress?

SYSTem is the root keyword of the command. COMMunicate, LAN and IPADdress are the second-level, third-level and forth-level keywords respectively. The command string starts with ":" which is also used to separate the multiple-level keywords. <ip> represents the parameters available for setting. The command

keywords :SYSTem:COMMunicate:LAN:IPADdress and parameter <ip> are separated by a space. "?" represents query.

"," is generally used for separating multiple parameters contained in the same command, for example, :DELAY:PARAmeter <secnum>,{ON|OFF},<time>

Symbol Description

The following four symbols are not the content of SCPI commands and will not be sent with the commands. They are usually used to describe the parameters in the commands.

1 Braces { }
Usually, multiple optional parameters are enclosed in the braces and one of the parameters must be selected when sending the command. For example, :DISPlay:MODE {NORMal|WAVE|DIAL}.

2 Vertical Bar |
The vertical bar is used to separate multiple parameters and one of the parameters must be selected when sending the command. For example, :DISPlay:MODE {NORMal|WAVE|DIAL}.

3 Square Brackets [ ]
The content (command keyword) enclosed in the square brackets can be omitted. When the parameter is omitted, the instrument will set the parameter to its default. For example, for the :MEASure[:VOLTage][:DC]? command, sending any of the four commands below can achieve the same effect.
:MEASure?
:MEASure:DC?
:MEASure:VOLTage?
:MEASure:VOLTage:DC?

4 Triangle Brackets < >
The parameter enclosed in the triangle brackets must be replaced by an effective value. For example, send the :ANALyzer:CURRTime <value> command in :ANALyzer:CURRTime 5 form.

Parameter Type

The parameters of the commands introduced in this manual contains 5 types: bool, integer, real number, discrete and ASCII string.

1 Bool
The parameter could be "ON" (1) or "OFF" (0). For example, :RECorder[:STATe] {ON|OFF}.

2 Integer
Unless otherwise noted, the parameter can be any integer within the effective value range. Note that do not set the parameter to a decimal; otherwise, errors will occur. For example, in the :SYSTem:BRIGhtness <brightness> command, <brightness> can be any integer from 0 to 100.

3 Real Number
Unless otherwise noted, the parameter can be any real number within the effective value range. For example, for CH1 of DP831A, the ranges of <volt> and <curr> in the :APPLy CH1,<volt>,<curr> command are 0.000V to 8.400V and 0.0000A to 5.3000A respectively.

4 Discrete
The parameter could only be one of the specified values or characters. For example, in the :ANALyzer:OBJect {V|C|P} command, the parameter can be V, C or P.

5 ASCII String
The parameter should be the combinations of ASCII characters. For example, in the :MMEMory:STORe <file_name> command, <file_name> is the filename of the file to be saved and can include Chinese characters, English characters and numbers.

Besides, many commands contain the **MINimum** and **MAXimum** parameters which are used to set the parameter to its minimum or maximum value. For example, MINimum and MAXimum in the :SYSTem:BRIGhtness {<brightness>|MINimum|MAXimum} command are used to set the brightness to the minimum or maximum.

Command Abbreviation

All the commands are case-insensitive and you can use any of them. If abbreviation is used, all the capital letters in the command must be written completely. For example, the :ANALyzer:ANALyze command can be abbreviated to :ANAL:ANAL.

SCPI Status Registers

All the SCPI instruments execute the status register operations in the same way. The status system records the various instrument states into three register sets: status byte register, standard event register and questionable status register sets. The status byte register records the advanced summary information reported by other register sets. The SCPI status systems of the DP800 series multi-channel models (take DP831A as an example) and single-channel model (take DP811A as an example) are as shown in Figure 1-2 and Figure 1-3 respectively.

Event Register

The event register is read-only and is used to report some states of the power supply defined internally. All the bits in the event register are latched and once an event bit is set, the later state (state of the event represented by this bit) changes will all be ignored. The event register bits will be cleared automatically when you send command to query the event register (such as the *ESR? or :STATus:QUEStionable[:EVENt]? command) or send the *CLS command to clear the register, but the reset command (*RST) will not clear the bits in the event register. When querying the event register, the query returns a decimal value corresponding to the sum of the binary weights of all the bits in the register.

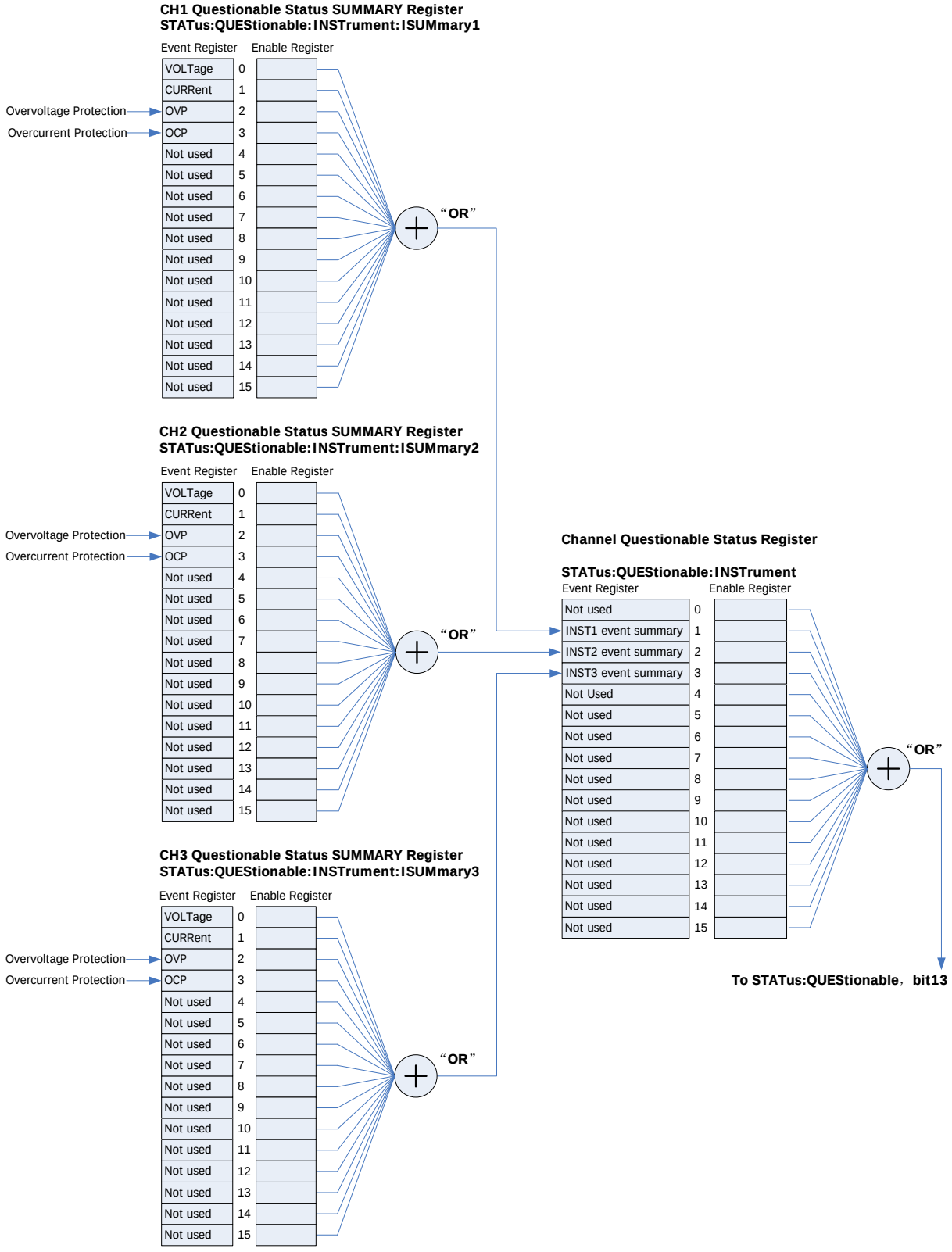
Enable Register

The enable register is both readable and writable. It is used to define which status information will be reported to the next-level. The bits in the enable register will not be cleared when you send command to query the enable register or send the *CLS command to clear the register state (but the *CLS command can clear the bits in the event register). To enable the bits in the enable register, you need to write into the register a decimal value corresponding to the sum of the binary weights of the bits to be enabled in the register.

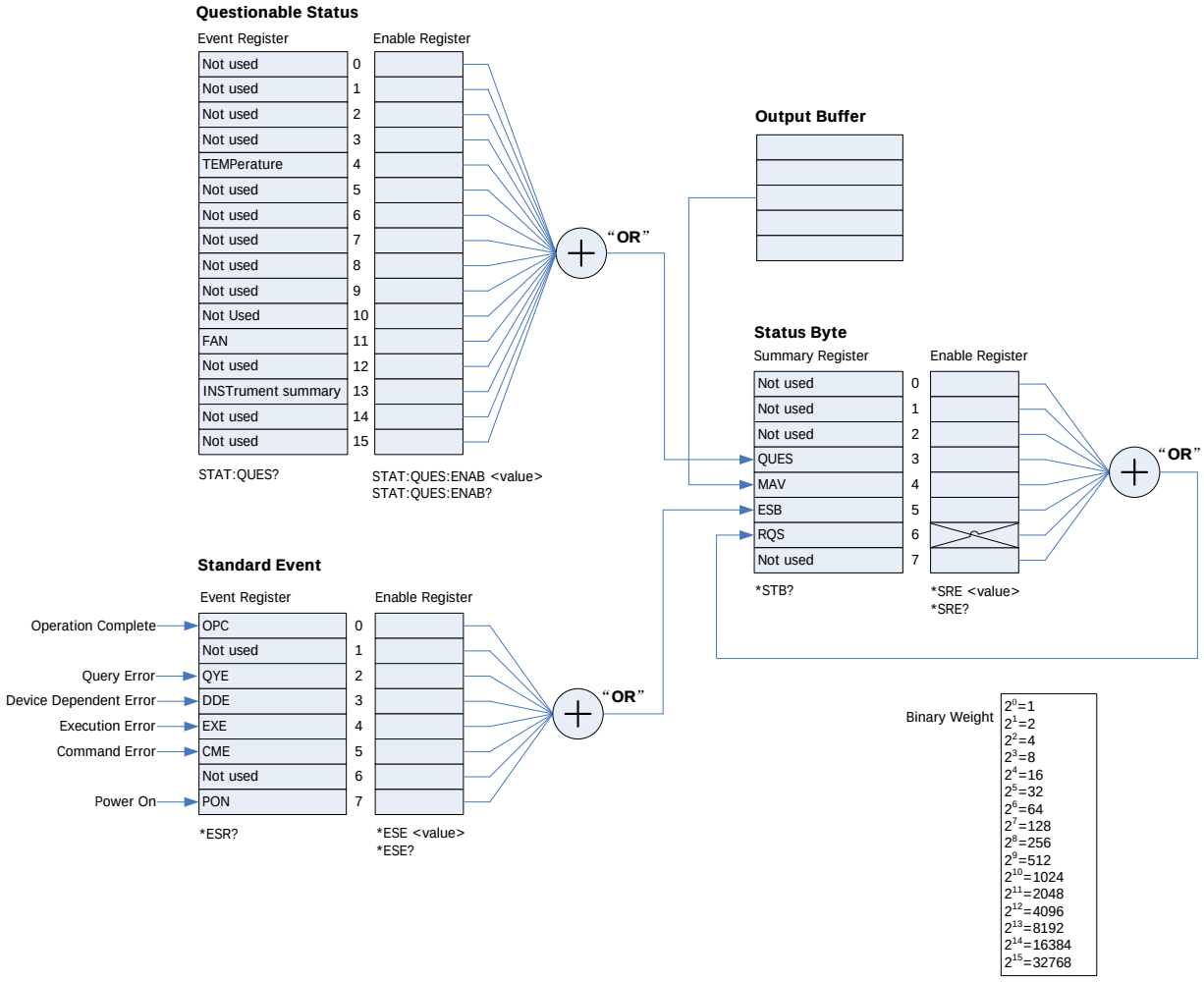
Multi-logic Output

This part is only applicable to multi-channel models. Take DP831A as an example. The 3-logic output of the power supply includes a channel questionable status register and three independent channel questionable status SUMMARY registers (corresponding to the logic outputs of the three channels respectively). The channel questionable status SUMMARY registers report the status of each channel to the channel questionable status register which then reports the channel status to the bit13 (ISUM bit) of the

questionable status register.



(a)



(b)

Figure 1-2 The SCPI Status System of DP800 Series Multi-channel Models (Take DP831A as an Example)

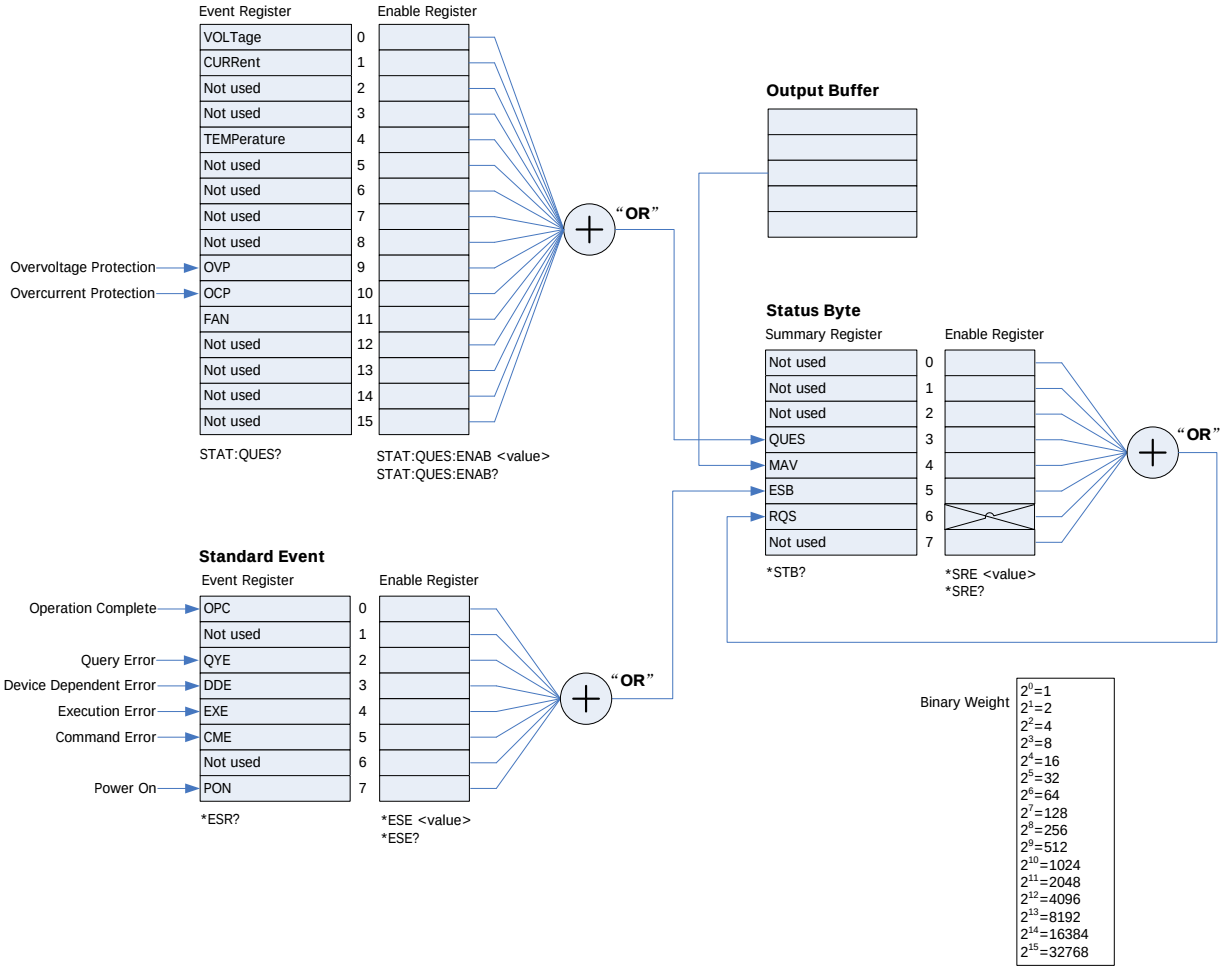


Figure 1-3 The SCPI Status System of DP800 Series Single-channel Model (Take DP811A as an Example)

Questionable Status Register

Questionable Status Register of Multi-channel Models

The SCPI status system of the multi-channel models is as shown in Figure 1-2. Wherein, the channel questionable status register indicates in which channel questionable event occurs. While for each specific logic output, the channel questionable status SUMMARY register is a pseudo-questionable status register.

The questionable status register provides information about the questionable status of the power supply. Bit4 (TEMPerature) reports the over-temperature state; bit11 (FAN) reports the fan failure state and bit13 (INSTrument summary) summaries the questionable output state of any of the three output channels. You can send the :STATus:QUEStionable[:EVENt]? command to read the register. To use bit13, you must first enable the register the information of which you want to summarize using bit13. Send the :STATus:QUEStionable:INSTrument:ENABle command to enable the channel questionable status register; then send the :STATus:QUEStionable:INSTrument:ISUMmary[<n>]:ENABle command to enable the corresponding channel questionable status SUMMARY register. The definitions of the bits in the questionable status register of the multi-channel models and the decimal values corresponding to their binary weights are as shown in Table 1-1.

Table 1-1 Definitions of the bits in the questionable status register of the multi-channel models and the decimal values corresponding to their binary weights

Bit		Decimal Value	Definition
0-3	Not used	0	Always be 0.
4	TEMPerature	16	Over-temperature.
5-10	Not used	0	Always be 0.
11	FAN	2048	Fan failure.
12	Not used	0	Always be 0.
13	INSTrument summary	8192	Summary information of the channel questionable status register and channel questionable status SUMMARY register set.
14-15	Not used	0	Always be 0.

Channel Questionable Status Register

The channel questionable status register provides the questionable status information of all the three channels. Bit1 (INST1 event summary), bit2 (INST2 event summary) and bit3 (INST3 event summary) report the information about the questionable states of CH1, CH2 and CH3 respectively. You can send the :STATus:QUEStionable:INSTrument[:EVENt]? command to read the register. To use the channel questionable status register, you must enable the channel questionable status SUMMARY register. You can send the :STATus:QUEStionable:INSTrument:ISUMmary[<n>]:ENABle command to enable the corresponding channel questionable status SUMMARY register. The definitions of the bits in the channel questionable status register and the decimal values corresponding to their binary weights are as shown in Table 1-2.

Table 1-2 Definitions of the bits in the channel questionable status register of the multi-channel model and the decimal values corresponding to their binary weights

Bit		Decimal Value	Definition
0	Not used	0	Always be 0.
1	INST1 event summary	2	Summary information of CH1 events.
2	INST2 event summary	4	Summary information of CH2 events.
3	INST3 event summary	8	Summary information of CH3 events.
4-15	Not used	0	Always be 0.

Channel Questionable Status SUMMARY Register

DP831A provides 3 channel questionable status SUMMARY registers corresponding to the three channels respectively. The channel questionable status SUMMARY register provides the channel voltage control, current control, overvoltage and overcurrent information. When the voltage becomes unregulated, bit0 (VOLTage) is set; when the current becomes unregulated, bit1 (CURRent) is set. You can send the :STATus:QUEStionable:INSTrument:ISUMmary[<n>][:EVENt]? command to read the channel questionable status SUMMARY register of the corresponding channel. The definitions of the bits in the channel questionable status SUMMARY register and the decimal values of their binary weights are as shown in Table 1-3.

Table 1-3 Definitions of the bits in the channel questionable status SUMMARY register of the multi-channel model and the decimal values corresponding to their binary weights

Bit		Decimal Value	Definition
0	VOLTage	1	The power supply is working in constant current mode and the voltage becomes unregulated.
1	CURRent	2	The power supply is working in constant voltage mode and the current becomes unregulated.
2	OVP	4	Overvoltage.
3	OCP	8	Overcurrent.
4-15	Not used	0	Always be 0.

You can send the :STATus:QUEStionable:INSTrument:ISUMmary[<n>]:COND? command to query the current working mode (CV or CC mode) of the corresponding channel. When bit0 is true, the corresponding channel is working in CC mode; when bit1 is true, the corresponding channel is working in CV mode; when bit0 and bit1 are both true, both the output voltage and current of the corresponding channel becomes unregulated; when bit0 and bit1 are both false, the power supply output is turned off.

Questionable Status Register of Single-channel Model

The SCPI status system of the single-channel model is as shown in Figure 1-3. Wherein, the questionable status register provides voltage control, current control, over-temperature, overvoltage, overcurrent and fan failure information. You can send the :STATus:QUEStionable[:EVENt]? command to read the register. The definitions of the bits in the questionable status register of the single-channel model and the decimal values corresponding to their binary weights are as shown in Table 1-4.

Table 1-4 Definitions of the bits in the questionable status register of the single-channel model and the decimal values corresponding to their binary weights

Bit		Decimal Value	Definition
0	VOLTage	1	The power supply is working in constant current mode and the voltage becomes unregulated.
1	CURRent	2	The power supply is working in constant voltage mode and the current becomes unregulated.
2-3	Not used	0	Always be 0.
4	TEMPerature	16	Over-temperature.
5-8	Not used	0	Always be 0.
9	OVP	512	Overvoltage.
10	OCP	1024	Overcurrent.
11	FAN	2048	Fan failure.
12-15	Not used	0	Always be 0.

Standard Event Register

The standard event register reports the following instrument events: power-on detection command syntax error, command execution error, self-test or calibration error, query error or operation complete. All these events or anyone of these events can be reported by the enable register to the bit5 (ESB, Event Summary Bit) of the status byte register. To set the enable register mask, you need to use the *ESE command to write a decimal value into the register. The definitions of the bits in the standard event register and the corresponding decimal values of their binary weights are as shown in Table 1-5.

Note: An error status (bit2, 3, 4 or 5 in the standard event register) records one or more errors in the power supply error queue and you can send the :SYSTem:ERRor? command to read the error queue.

Table 1-5 Definitions of the bits in the standard event register and the corresponding decimal values of their binary weights

Bit		Decimal Value	Definition
0	OPC	1	Operation complete. All the previous commands including the *OPC command are executed.
1	Not used	0	Always be 0.
2	QYE	4	Query error. The power supply tries to read the output buffer but it is empty; or the system receives a new command before the previous query command is read; or both the input and output buffers are full.
3	DDE	8	Device error. Self-test or calibration error occurs.
4	EXE	16	Execution error (include trigger ignore, initialization ignore, setting conflict, data overrange, data too long and invalid parameter value).
5	CME	32	Command error. Command syntax error occurs.
6	Not used	0	Always be 0.
7	PON	128	Power-on inspection. Turn off the power supply after the event register is read or cleared and then turn on the power supply.

Status Byte Register

The status byte register reports the status information of the other status registers. The bit4 (MAV, Message Available Bit) in the status byte register will report immediately when querying the data waiting to be queried in the output buffer of the power supply. The bits in the SUMMARY register of the status byte register are not latched. The corresponding bit in the SUMMARY register of the status byte register will be cleared when the event register is cleared. The bit4 (MAV, Message Available Bit) will be cleared when reading all the information including any pending queries in the output buffer. The definitions of the bits in the status byte register and the corresponding decimal values of their binary weights are as shown in Table 1-6.

Table 1-6 Definitions of the bits in the status byte register and the corresponding decimal values of their binary weights

Bit		Decimal Value	Definition
0-2	Not used	0	Always be 0.
3	QUES	8	One or more bits in the questionable status register are set (the bits in the enable register must be enabled)
4	MAV	16	The data in the output buffer of the power supply is available.
5	ESB	32	One or more bits in the standard event register are set (the bits in the enable register must be enabled)
6	RQS	64	The power supply is requesting for service.
7	Not used	0	Always be 0.

Chapter 2 Command System

This chapter introduces the syntax, function, parameter and using instruction of each DP800 command in A-Z order.

Main topics of this chapter:

Explanation: In this command system, setting commands relating to the time, voltage, current and power parameters can be sent with units. Unless otherwise noted, the units available and the default unit of each parameter are as shown in the table below.

Parameter Type	Units Available	Default Unit
Time	s[1]	s
Voltage	V, mV	V
Current	A, mA	A
Power	W, mW	W

Note[1]: For the :TRIGger:OUT:PERIod [D0|D1|D2|D3,]<value> command (setting the period of the square waveform of trigger output), <value> is a time parameter and the units available are s, ms and us. The default unit is s.

:ANALyzer Commands

The :ANALyzer commands are used to set the analyzer parameters, execute analysis and query the analysis results.

For DP831A/DP832A/DP821A/DP811A, the instrument is installed with the analyzer option when it leaves factory and users can directly use the analyzer function. For DP831/DP832/DP821/DP811, the analyzer is an optional function; to use this function, please order the corresponding option and install the option correctly (:LIC:SET).

Command List[1]:

:ANALyzer:ANALyze

Syntax :ANALyzer:ANALyze

Description When receiving this command, the instrument executes the analysis operation according to the current setting.

Explanation
- The analysis operation can only be executed when valid record file is opened (:ANALyzer:FILE?).
- You can send the :ANALyzer:RESult? command to view the analysis results.

Related Commands :ANALyzer:FILE?

:ANALyzer:RESult?

Note[1]: In the "Command List" in this manual, the parameters in the setting commands and the query commands are not included and you can view the complete introductions of the commands in the text according to the keywords.

:ANALyzer:CURRTime

Syntax :ANALyzer:CURRTime <value>

:ANALyzer:CURRTime?

Description Set the current time of the analyzer.

Query the current time of the analyzer.

Parameter

Name	Type	Range	Default
<value>	Integer	Start time to end time of the record file opened	Start time

Explanation You can only set the current time when valid record file is opened (:ANALyzer:FILE?).

Return Format The query returns an integer, for example, 12.

Example

```
:ANAL:CURRT 12      /*Set the current time of the analyzer to 12s*/
:ANAL:CURRT?        /*Query the current time of the analyzer and the query returns 12*/
```

Related Commands

:ANALyzer:FILE?

:ANALyzer:STARTTime

:ANALyzer:ENDTime

:ANALyzer:ENDTime

Syntax :ANALyzer:ENDTime {<value>|MINimum|MAXimum}

:ANALyzer:ENDTime? [MINimum|MAXimum]

Description Set the end time of the analyzer.

Query the end time of the analyzer.

Parameter

Name	Type	Range	Default
<value>	Integer	Refer to the "Explanation"	

Explanation

- You can only set the end time when valid record file is opened (refer to the :ANALyzer:FILE? command).
- When the groups of the record file opened is less than or equal to 2048, the range of the end time is from the start time to the maximum record time (groups times record period) of the record file opened and the default is the maximum record time of the record file opened.
- When the groups of the record file opened is greater than 2048, the range of the end time is from the start time to the product of the record period of the record file opened times 2048 and the default is the product of the record period of the record file opened times 2048.
- When receiving the :ANALyzer:ANALyze command, the analyzer will analyze the recorded data between the start time and end time.

Return Format The query returns an integer, for example, 125.

Example

```
:ANAL:ENDT 125      /*Set the end time of the analyzer to 125s*/
:ANAL:ENDT?         /*Query the current end time and the query returns 125*/
```

Related Commands :ANALyzer:ANALyze

:ANALyzer:FILE?

:ANALyzer:STARTTime

:ANALyzer:FILE?

Syntax :ANALyzer:FILE?

Description Query the record file currently opened.

Return Format When valid record file is currently opened, the query returns the directory of the file currently opened, for example, C:\REC 10:test.ROF; when no valid record file is currently opened, the query returns NULL.

:ANALyzer:MEMory

Syntax :ANALyzer:MEMory {1|2|3|4|5|6|7|8|9|10}

Description Open the specified record file in the internal memory (C disk).

Parameter

Name	Type	Range	Default
{1|2|3|4|5|6|7|8|9|10}	Discrete	1|2|3|4|5|6|7|8|9|10	None

Explanation

- This command is only available when valid record file is stored in the specified location.
- Parameters 1 to 10 represent the record files stored in the corresponding locations of the internal memory respectively.
- You can only set the start time, end time, current time and analysis object as well as execute the analysis operation when valid record file is currently opened (:ANALyzer:FILE?).

Example :ANAL:MEMory 10 /*Open the record file currently stored in record file storage location 10 in C disk*/

Related Commands :ANALyzer:FILE?
:ANALyzer:STARTTime
:ANALyzer:ENDTime
:ANALyzer:CURRTime
:ANALyzer:ANALyze

:ANALyzer:MMEMory

Syntax :ANALyzer:MMEMory <dest>

Description Open the record file in the specified directory in the external memory (D disk).

Parameter

Name	Type	Range	Default
<dest>	ASCII string	Valid directory under D disk	None

Explanation

- This command is only available when external memory is detected and valid record file is stored in the specified directory of the external memory.
- You can only set the start time, end time, current time and analysis object as well as execute the analysis operation when valid record file is currently opened (:ANALyzer:FILE?).

Example :ANAL:MMEMory D:\RECORD.ROF /*Open the RECORD.ROF file under D disk*/

Related Commands :ANALyzer:FILE?
:ANALyzer:STARTTime
:ANALyzer:ENDTime
:ANALyzer:CURRTime
:ANALyzer:ANALyze

:ANALyzer:OBJect

Syntax :ANALyzer:OBJect {V|C|P}

:ANALyzer:OBJect?

Description Set the analysis object of the analyzer to voltage, current or power.

Query the analysis object of the analyzer.

Parameter

Name	Type	Range	Default
{V|C|P}	Discrete	V|C|P	V

Explanation You can only set the analysis object when valid record file is opened (refer to the :ANALyzer:FILE? command).

Return Format The query returns V, C or P.

Example

```
:ANAL:OBJ V      /*Set the analysis object of the analyzer to voltage*/
:ANAL:OBJ?       /*Query the analysis object of the analyzer and the query
                   returns V*/
```

Related Command :ANALyzer:FILE?

:ANALyzer:RESult?

Syntax :ANALyzer:RESult?

Description Query the analysis results, including the number of groups, median, mode, average, variance, range, minimum, maximum and mean deviation.

Return Format The query returns the analysis results with the data separated by commas, for example,
Group:85,Median:41.9994V,Mode:0.0000V,Average:34.0924V,Variance:269.5170V,
Range:42.0002V,Min:0.0000V,Max:42.0002V,Mean:12.8347V.

Example

```
:ANAL:RES?       /*Query the analysis results and the query returns
                   Group:85,Median:41.9994V,Mode:0.0000V,Average:34.0924V,Va
                   riance:269.5170V,Range:42.0002V,Min:0.0000V,Max:42.0002V,M
                   ean:12.8347V*/
```

Related Command :ANALyzer:ANALyze

:ANALyzer:STARTTime

Syntax :ANALyzer:STARTTime {<value>|MINimum|MAXimum}

:ANALyzer:STARTTime? [MINimum|MAXimum]

Description Set the start time of the analyzer.

Query the start time of the analyzer.

Parameter

Name	Type	Range	Default
<value>	Integer	Record period of the record file opened to end time	Record period of the record file opened

Explanation

- You can only set the start time when valid record file is opened (refer to the :ANALyzer:FILE? command).
- Send the :ANALyzer:ANALyze command and the analyzer analyzes the recorded data between the start time and end time.

Return Format The query returns an integer, for example, 1.

Example

:ANAL:STARTT 1 /*Set the start time to 1s*/

:ANAL:STARTT? /*Query the current start time and the query returns 1*/

Related Commands

:ANALyzer:ANALyze

:ANALyzer:FILE?

:ANALyzer:ENDTime

:ANALyzer:VALue?

Syntax :ANALyzer:VALue? <time>

Description Query the voltage, current and power at the specified time in the record file opened.

Parameter

Name	Type	Range	Default
<time>	Integer	Start time of the record file opened to end time	None

Explanation This command is only valid when valid record file is opened (refer to the :ANALyzer:FILE? command).

Return Format The query returns the voltage, current and power separated by commas, for example, Volt:1.2817V,Curr:0.0485A,Power:0.0622W.

Example

:ANAL:VAL? 5 /*Query the voltage, current and power at 5s of the record file opened and the query returns Volt:1.2817V,Curr:0.0485A,Power:0.0622W*/

Related Commands

:ANALyzer:ENDTime

:ANALyzer:FILE?

:ANALyzer:STARTTime

:APPLy Command

The :APPLy command provides the most straightforward method to program the power supply over the remote interface. For the multi-channel models, you can select the specified channel and set the voltage and current in a single command; for the single-channel model, you can set the voltage and current in a single command. When the setting values are within the parameter ranges of the corresponding channel (multi-channel models) or range (single-channel model) of the specified model, the output voltage and current will change to the setting values immediately after executing this command. The voltage/current ranges and default values of each channel (multi-channel models) or range (single-channel model) of different models are as shown in the table below.

Table 2-1 Voltage/current ranges and default values of each channel (range) of different models of DP800 series

Channel (Range)		Voltage/Current Settable Range	Voltage/Current Default Value
DP831A	CH1 (8V/5A) CH2 (30V/2A) CH3 (-30V/2A)	0V to 8.4V/0A to 5.3A 0V to 32V/0A to 2.1A 0V to -32V/0A to 2.1A	0.000V/5.0000A 00.000V/2.0000A 00.000V/2.0000A
DP832A	CH1 (30V/3A) CH2 (30V/3A) CH3 (5V/3A)	0V to 32V/0A to 3.2A 0V to 32V/0A to 3.2A 0V to -5.3V/0A to 3.2A	00.000V/3.000A 00.000V/3.000A 0.000V/3.000A
DP821A	CH1 (60V/1A) CH2 (8V/10A)	0V to 63V/0A to 1.05A 0V to 8.4V/0A to 10.5A	00.000V/1.0000A 0.000V/10.000A
DP811A	Range1 (20V/10A) Range2 (40V/5A)	0V to 21V/0A to 10.5A 0V to 42V/0A to 5.3A	00.000V/05.0000A
DP831[1]	CH1 (8V/5A) CH2 (30V/2A) CH3 (-30V/2A)	0V to 8.4V/0A to 5.3A 0V to 32V/0A to 2.1A 0V to -32V/0A to 2.1A	0.000V/5.000A 00.00V/2.000A 00.00V/2.000A
DP832[1]	CH1 (30V/3A) CH2 (30V/3A) CH3 (5V/3A)	0V to 32V/0A to 3.2A 0V to 32V/0A to 3.2A 0V to -5.3V/0A to 3.2A	00.00V/3.000A 00.00V/3.000A 0.00V/3.000A
DP821[1]	CH1 (60V/1A) CH2 (8V/10A)	0V to 63V/0A to 1.05A 0V to 8.4V/0A to 10.5A	00.00V/1.000A 0.00V/10.00A
DP811[1]	Range1 (20V/10A) Range2 (40V/5A)	0V to 21V/0A to 10.5A 0V to 42V/0A to 5.3A	00.00V/05.00A

Note[1]: When DP831 (DP832, DP821 or DP811) is installed with the high resolution option, its voltage/current settable range and default value of each channel are the same with those of DP831A (DP832A, DP821A or DP811A).

:APPLy

Syntax :APPLy {CH1|CH2|CH3} [,<volt>|MINimum|MAXimum|DEF[,<curr>|MINimum|MAXimum|DEF]]

:APPLy [<volt>|MINimum|MAXimum|DEF[,<curr>|MINimum|MAXimum|DEF]]

:APPLy? [CH1|CH2|CH3[,CURRent|VOLTage]]

Description Select the specified channel as the current channel and set the voltage/current of this channel.

Set the voltage/current of the current channel.

Query the voltage/current of the specified channel.

Parameter

Name	Type	Range	Default
{CH1|CH2|CH3}[1]	Discrete	CH1|CH2|CH3	None
<volt>	Real	Refer to Table 2-1	
<curr>	Real	Refer to Table 2-1	
[CH1|CH2|CH3]	Discrete	CH1|CH2|CH3	None
[CURRent|VOLTage]	Discrete	CURRent|VOLTage	None

Explanation

- For the multi-channel models, this command is used to select the specified channel and set the voltage and current; for the single-channel model, this command is used to set the voltage and current of the channel. This command combines the channel select command (:INSTrument:NSELect, :INSTrument[:SELEct] or :INSTrument[:SELect], only applicable to the multi-channel models), voltage setting command ([:SOURce[<n>]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]) and current setting command ([:SOURce[<n>]]:CURRent[:LEVel][:IMMediate][:AMPLitude]) functions.
- In the query command, the parameter [CH1|CH2|CH3] is used to select the channel to be query. If it is ignored, the current channel will be query.
- <volt> and <curr> are used to set the voltage and current of the specified channel respectively. If only one parameter is specified, the value is the voltage setting value by default; if both of them are omitted, the command will select the desired channel. The voltage/current ranges of each channel (range) of different models are as shown in Table 2-1.
- You can use MINimum, MAXimum or DEF which denote setting the voltage or current of the specified channel (range) to the minimum, maximum or default instead of the specified voltage (<volt>) or current value (<curr>). The voltage/current ranges of each channel (range) of different models are as shown in Table 2-1.
- [CURRent|VOLTage] is used to select to query the voltage or current of the specified channel. If they are both omitted, the system will query both the voltage and current of the specified channel.
- In the query command, you can omit both of the parameters or only omit [CURRent|VOLTage]; but you cannot only omit [CH1|CH2|CH3].

Return Format The query returns a string.

- The query returns the voltage or current setting value of the specified channel when [CH1|CH2|CH3] and [CURRent|VOLTage] are specified, for example, 5.000.
- The query returns the channel (range) name, rated voltage/current value, voltage setting value and current setting value of the specified channel

(multi-channel models) or current range (single-channel model) when only [CH1|CH2|CH3] is specified, for example, CH1:8V/5A,5.000,1.0000.

- The query returns the voltage setting value and current setting value of the current channel (multi-channel models) or current range (single-channel model) when all the parameters are omitted, for example, 5.000,1.0000.

Example

```
:APPL CH1,5,1      /*Set the voltage and current of CH1 to 5V and 1A respectively*/
:APPL? CH1         /*Query the voltage and current setting values of CH1 and the
                     query returns CH1:8V/5A,5.000,1.0000*/
```

Related Commands

:INSTrument:NSELect

:INSTrument[:SELEct]

:INSTrument[:SELect]

[:SOURce[<n>]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]

[:SOURce[<n>]]:CURRent[:LEVel][:IMMediate][:AMPLitude]

Note[1]: In this command system, commands that can use channel names (such as CH1 and CH2) as parameters can also use channel ranges (such as P8V and P30V) as parameters unless otherwise noted. The corresponding relations of the channel name parameters and channel range parameters supported by DP800 series are as follows.
DP831A/DP831: CH1---P8V; CH2---P30V; CH3---N30V
DP832A/DP832: CH1---P30V; CH2---P30V2; CH3---P5V
DP821A/DP821: CH1---P60V; CH2---P8V

:DELAY Commands

The :DELAY commands are used to set the delayer parameters (such as the number of groups, number of cycles and end state) as well as enable or disable the delayer.

Command List:

:DELAY:CYCLEs

Syntax :DELAY:CYCLEs {N|I}[,<value>]

:DELAY:CYCLEs?

Description Set the number of cycles of the delayer.

Query the number of cycles of the delayer.

Parameter

Name	Type	Range	Default
{N|I}	Discrete	N|I	N
<value>	Integer	1 to 99999	1

Explanation

- The number of cycles refers to the number of times that the instrument performs delay output according to the preset state. Wherein, I represents infinite number of cycles; N represents finite number of cycles. The number of cycles is specified by <value> and when this parameter is omitted, the number of cycles is set to 1 by default.
- The total number of groups of the delay output = the number of groups × the number of cycles; wherein, the number of groups is set by the :DELAY:GROUPs command.
- The power supply will terminate the delayer function when the total number of groups of delays is finished or when the state that meets the "stop condition" (the :DELAY:STOP command) is detected. At this point, the state of the power supply depends on the setting of the :DELAY:ENDState command.

Return Format The query returns I or N,<value>, for example, N,100.

Example

```
:DELAY:CYCLE I          /*Set the number of cycles to "Infinite" */
:DELAY:CYCLE N          /*Set the number of cycles to 1*/
:DELAY:CYCLE N,100      /*Set the number of cycles to 100*/
:DELAY:CYCLE?           /*Query the current number of cycles and the query returns
                          N,100*/
```

Related Commands :DELAY:GROUPs

:DELAY:STOP

:DELAY:ENDState

:DELAY:ENDState

Syntax :DELAY:ENDState {ON|OFF|LAST}

:DELAY:ENDState?

Description Set the end state of the delayer.

Query the end state of the delayer.

Parameter

Name	Type	Range	Default
{ON|OFF|LAST}	Discrete	ON|OFF|LAST	OFF

Explanation

- The end state refers to the state of the instrument when the delayer stops. The power supply will terminate the delayer function when the total number of groups of delays is finished or when the state that meets the "stop condition" (the :DELAY:STOP command) is detected.
- ON: output on, the instrument turns on the output automatically; OFF: output off, the instrument turns off the output automatically; LAST: last state, the instrument stops at the output state of the last group.
- The total number of groups of the delay output = the number of groups × the number of cycles. Wherein, the number of groups is set by the :DELAY:GROUPs command and the number of cycles is set by the :DELAY:CYCLEs command.

Return Format The query returns ON, OFF or LAST.

Example

```
:DELAY:ENDS LAST      /*Set the end state of the delayer to Last*/
:DELAY:ENDS?          /*Query the current end state of the delayer and the query returns LAST*/
```

Related Commands

:DELAY:STOP

:DELAY:GROUPs

:DELAY:CYCLEs

:DELAY:GROUPs

Syntax :DELAY:GROUPs <value>

:DELAY:GROUPs?

Description Set the number of output groups of the delayer.

Query the number of output groups of the delayer.

Parameter

Name	Type	Range	Default
<value>	Integer	1 to 2048	1

Explanation

- The number of output groups refers to the number of times that the instrument turns on or off the output according to the preset state.
- The total number of groups of the delay output = the number of groups × the number of cycles. Wherein, the number of cycles is set by the :DELAY:CYCLEs command.
- The power supply will terminate the delayer function when the total number of groups of delays is finished or when the state that meets the "stop condition" (the :DELAY:STOP command) is detected. At this point, the state of the power supply depends on the setting of the :DELAY:ENDState command.

Return Format The query returns an integer from 1 to 2048.

Example

```
:DELAY:GROUP 125      /*Set the number of groups to 125*/
:DELAY:GROUP?         /*Query the current number of groups and the query
                        returns 125*/
```

Related Commands :DELAY:CYCLEs

:DELAY:STOP

:DELAY:ENDState

:DELAY:PARAmeter

Syntax :DELAY:PARAmeter <secnum>,{ON|OFF},<time>

:DELAY:PARAmeter? <firnum>[,<timercount>]

Description Set the delayer parameters of the specified group.

Query the delayer parameters of the specified groups.

Parameter

Name	Type	Range	Default
<secnum>	Integer	0 to 2047	None
{ON|OFF}	Bool	ON|OFF	OFF (even group); ON (odd group)
<time>	Integer	1s to 99999s	1s
<firnum>	Integer	0 to 2047	None
<timercount>	Integer	1 to 2048	1

Explanation

- <secnum> is the group number of the delayer parameters to be set; {ON|OFF} is the output state; <time> is the delay time.
- <firnum> is the group number of the first group of delayer parameters to be queried; <timercount> is the total number of groups of delayer parameters to be queried. When <timercount> is omitted, the command queries a single group of delayer parameters by default.

Return Format The query returns a string starting with **#**. For example, **#90000000152,OFF,3;3,ON,1;**; wherein, **#9000000015** is the data block header; **2,OFF,3;3,ON,1;** are the actual delayer parameters.

- The data block header is used to describe the data stream length information and starts with #. For example, the number "9" in **#9000000015** denotes that the 9-bit data (000000015) following it is used to denote the data stream length (15 bytes).
- The format of each group of delayer parameters is "number,output state,delay time"; multiple groups of parameters are separated by";". For example, **2,OFF,3;3,ON,1;** denotes there are two groups of delayer parameters; the number of the first group of delayer parameters is 2, the output state is OFF and the delay time is 3s; the number of the second group of delayer parameters is 3, the output state is ON and the delay time is 1s.

Example

:DELAY:PARA 1,ON,2 /*Set the delayer parameters of the first group. Set the state of the first group to ON and the delay time to 2s*/

:DELAY:PARA? 3,2 /*Query two groups of delayer parameters starting from the third group. The query returns #90000000153,ON,1;4,OFF,1;*/

:DELAY[:STATe]

Syntax :DELAY[:STATe] {ON|OFF}

:DELAY[:STATe]?

Description Enable or disable the delay output function of the current channel.

Query the state of the delay output function of the current channel.

Parameter

Name	Type	Range	Default
{ON|OFF}	Bool	ON|OFF	OFF

Explanation

- Enabling the delayer will change the output state of the channel. Make sure that the devices connected to the power supply will not be affected by the change of the output status before enabling the delayer.
- The delayer parameters cannot be modified when the delayer is enabled.
- For the multi-channel models, you can send the :INSTrument:NSELect, :INSTrument[:SELEct] or :INSTrument[:SELect] command to switch the current channel, set the delayer parameters of the current channel and enable or disable the delayer.
- The timer (:TIMEr[:STATe]) and delayer cannot be enabled at the same time.

Return Format The query returns ON or OFF.

Example

```
:DELAY ON       /*Enable the delay output*/
:DELAY?         /*Query the status of the delay output and the query returns ON*/
```

Related Commands

:INSTrument:NSELect

:INSTrument[:SELEct]

:INSTrument[:SELect]

:TIMEr[:STATe]

:DELAY:STATe:GEN

Syntax :DELAY:STATe:GEN {01P|10P}

:DELAY:STATe:GEN?

Description Select the pattern used when generating state automatically.

Query the pattern used when generating state automatically.

Parameter

Name	Type	Range	Default
{01P|10P}	Discrete	01P|10P	01P

Explanation

- 01P: 0 1 pattern. The state is set to "Off" and "On" alternately.
- 10P: 1 0 pattern. The state is set to "On" and "Off" alternately.

Return Format The query returns 01P or 10P.

Example

```
:DELAY:STAT:GEN 10P   /*Select 1 0 pattern*/
:DELAY:STAT:GEN?      /*Query the pattern used when generating state
                        automatically and the query returns 10P*/
```

:DELAY:STOP

Syntax :DELAY:STOP {NONE|<V|>V|<C|>C|<P|>P}[,<value>|MINimum|MAXimum]

:DELAY:STOP? [MINimum|MAXimum]

Description Set the stop condition of the delayer.

Query the stop condition of the delayer.

Parameter

Name	Type	Range	Default
{NONE|<V|>V|<C|>C|<P|>P}	Discrete	NONE|<V|>V|<C|>C|<P|>P	NONE
<value>	Real	0 to the maximum voltage/current/power of the current channel	0V/0A/0W

Explanation

- The power supply monitors the output voltage, current and power during delay output. Use this command to set a stop condition and the delay output stops when state that fulfills this condition is detected.
- "NONE", "<V", ">V" "<C", ">C", "<P" and ">P" can set the stop condition to "None", "<Volt", ">Volt", "<Curr", ">Curr", "<Power" or ">Power" respectively.
- <value> is used to set the voltage, current or power of the stop condition and when it is omitted, this command is used to select the stop condition.

Return Format The query returns NONE or "stop condition,value", for example, >V,8.000.

Example

```
:DELAY:STOP >V,8      /*Set the stop condition of the delayer to ">8V"*/
:DELAY:STOP?          /*Query the current stop condition of the delayer and the
                        query returns >V,8.000*/
```

:DELAY:TIME:GEN

Syntax :DELAY:TIME:GEN {FIX|INC|DEC}[,<value0>[,<value1>]]

:DELAY:TIME:GEN?

Description Set the method used to generate time automatically and the corresponding parameters.

Query the method used to generate time automatically as well as the corresponding parameters.

Parameter

Name	Type	Range	Default
{FIX|INC|DEC}	Discrete	FIX|INC|DEC	FIX
<value0>	Integer	Refer to the "Explanation"	1s
<value1>	Integer	Refer to the "Explanation"	1s

Explanation

- When FIX (fixed time) is selected, you can set the on delay (<value0>, namely the duration when the state is "On") and off delay (<value1>, namely the duration when the state is "Off"). Both the ranges of <value0>and <value1> are from 1s to 99999s. When only one of the parameters is specified, the on delay time will be set by default.
- When INC (monotonic increase) or DEC (monotonic decline) is selected, the duration is generated following the monotonic increase or monotonic decline rule, namely the time is generated by increasing or declining at the step from the time base value. You can set the time base value (<value0>) and step (<value1>). The two fulfills the relation: time base value + number of output groups*step value≤99999s. The actual range of <value0> is from 1s to (99999s- number of output groups*step value); the actual range of <value1> is from 1s to int{(99999s-time base value)/number of output groups}.When only one of the parameters is specified, the time base value will be set by default.
- When <value0> and <value1> are both omitted, this command is used to select the method used to generate time automatically.

Return Format The query returns a string in "the method used to generate time automatically,<value0>,<value1>" form, for example, INC,2,5.

Example

:DELAY:TIME:GEN INC,2,5 /*Set the method used to generate time automatically to monotonic increase, the time base value to 2s and the step to 5s*/

:DELAY:TIME:GEN? /*Query the method used to generate time automatically and the parameters; the query returns INC,2,5*/

Related Command :DELAY:GROUPs

:DISPlay Commands

The :DISPlay commands are used to set the display mode, turn on or off the screen display, display and clear the string on the screen.

Command List:

:DISPlay:MODE

Syntax :DISPlay:MODE {NORMal|WAVE|DIAL|CLAS}

:DISPlay:MODE?

Description Set the display mode.

Query the current display mode.

Parameter

Name	Type	Range	Default
{NORMal|WAVE|DIAL|CLAS}	Discrete	NORMal|WAVE|DIAL|CLAS	NORMal

Explanation

- DP831A/DP832A provides four display modes: number, waveform, dial and classic.

  DP831/DP832/DP821A/DP821/DP811A/DP811 provides three display modes: number, waveform and dial.
- NORMal: number mode. The parameters (such as the voltage and current) of all the channels are displayed in number format.
- WAVE: waveform mode. The parameters (such as the voltage and current) of the channel currently selected are displayed in both waveform and number formats.
- DIAL: dial mode. The parameters (such as the voltage and current) of the channel currently selected are displayed in both dial and number formats.
- CLAS: classic mode. The parameters (such as the voltage and current) of all the channels are displayed in number (classic) format.

Return Format The query returns NORMAL, WAVE, DIAL or CLASSIC.

Example

```
:DISP:MODE WAVE      /*Select the waveform display mode*/
:DISP:MODE?          /*Query the current display mode and the query returns
                       WAVE*/
```

:DISPlay[:WINDow][:STATe]

Syntax :DISPlay[:WINDow][:STATe] {OFF|ON}

:DISPlay[:WINDow][:STATe]?

Description Turn off or on the screen display.

Query the current screen display state.

Parameter

Name	Type	Range	Default
{OFF|ON}	Bool	OFF|ON	ON

Explanation

- OFF: turn off the screen display; ON: turn on the screen display.
- Turning off the screen display is only valid in remote mode. When the instrument returns to the local mode, the screen display is turned on automatically. Pressing **Back** can return the instrument from remote mode to local mode.

Return Format The query returns OFF or ON.

Example

```
:DISP OFF      /*Turn off the screen display*/
:DISP?         /*Query the current screen display state and the query returns
                 OFF*/
```

:DISPlay[:WINDow]:TEXT:CLEar

Syntax :DISPlay[:WINDow]:TEXT:CLEar

Description Clear the characters displayed on the screen.

Example

```
:DISP:TEXT:CLE      /*Clear the characters displayed on the screen*/
```

Related Command :DISPlay[:WINDow]:TEXT[:DATA]

:DISPlay[:WINDow]:TEXT[:DATA]

Syntax

:DISPlay[:WINDow]:TEXT[:DATA]
<quoted string>[,<coordinate X value>[,<coordinate Y value>]]

:DISPlay[:WINDow]:TEXT[:DATA]?

Description

Display the specified string from the specified coordinate on the screen.

Query the string currently displayed on the screen.

Parameter

Name	Type	Range	Default
<quoted string>	ASCII string	Refer to the "Explanation"	None
<coordinate X value>	ASCII string	Refer to the "Explanation"	
<coordinate Y value>	ASCII string	Refer to the "Explanation"	

Explanation

- <quoted string> is a string enclosed in double quotation marks, for example, "RIGOL" (note that the content displayed on the instrument screen does not contain the double quotation marks in the string). The string cannot exceeds 45 characters (comma, semicolon and period are treated as an independent character). If the string contains more than 45 characters, the command is invalid. The specified string will be truncated if it can not be displayed within a line (only the previous section will be displayed normally, and the rest section that needs to be displayed in a new line will not be displayed).
- <coordinate X value> and <coordinate Y value> denotes the X axis (horizontal axis) and Y axis (vertical axis) coordinate values respectively (the coordinate values set are the coordinate values of the upper-left corner of the string on the screen). When only one parameter is specified, the horizontal axis value (<coordinate X value>) is set by default; when the two parameters are both omitted, the string is displayed at the default coordinate (5,110).
- The ranges of <coordinate X value> and <coordinate Y value> are 0 to 320 and 0 to 240 respectively and the default coordinate is (5,110). If the specified X axis coordinate value is less than 2, the X axis coordinate value will be treated as 2; if it is greater than 315, it will be treated as 315. If the specified Y axis coordinate value is greater than 230, the Y axis coordinate value will be treated as 230.

Return Format

The query returns a string enclosed in double-quotation marks. The content enclosed in the double quotation marks are the content actually displayed on the screen (the double quotation marks are not part of the content currently displayed on the screen), for example, "RIGOL".

Example

```
:DISP:TEXT "RIGOL",25,35      /*Display the string RIGOL from (25,35)*/
:DISP:TEXT?                   /*Query the string currently display on the screen
                                and the query returns "RIGOL"*/
```

Related Command

:DISPlay[:WINDow]:TEXT:CLEar

IEEE488.2 Common Commands

Command List:

*CLS

Syntax *CLS

Description Clear all the event registers.

Explanation

- You can also send command (:STATus:QUEStionable[:EVENt]? or *ESR?) to query the event register to clear the corresponding event register.
- The reset command (*RST) or device clear command cannot clear the event registers.

Related Commands :STATus:QUEStionable[:EVENt]?

*ESR?

*ESE

Syntax *ESE <enable value>

*ESE?

Description Enable the bits in the enable register of the standard event register.

Query the bits currently enabled in the enable register of the standard event register.

Parameter

Name	Type	Range	Default
<enable value>	Character	Refer to the "Explanation"	None

Explanation

- <enable value> is a decimal value corresponding to the sum of the binary weights of the bits to be enabled in the enable register of the standard event register. For the definitions of the bits in the standard event register and their corresponding decimal values, refer to Table 1-5.
  For example, to enable bit2 (query error) and bit4 (execution error) in the enable register of the standard event register, set <enable value> to 20 (according to $2^2+2^4=20$).
- After the bits in the enable register of the standard event register are enabled, the system reports the state of the corresponding bit to the status byte register.
- When <enable value> is set to 0, executing this command will clear the enable register of the standard event register.
- You can also send the *PSC (*PSC 1) command to clear the enable register of the standard event register at the next power-on.

Return Format The query returns a decimal value corresponding to the sum of the binary weights of the bits to be enabled in the enable register of the standard event register, for example, 20.

Example

```
*ESE 20     /*Enable bit2 (query error) and bit4 (execution error) in the enable register of the standard event register*/
*ESE?       /*Query the bits currently enabled in the enable register of the standard event register and the query returns 20*/
```

Related Command *PSC

*ESR?

Syntax *ESR?

Description Query the event register of the standard event register.

Explanation

- This command returns a decimal value (corresponding to the sum of the binary weights of all the bits in the register) and clears the status of this register. For the definitions of the bits in the standard event register and their corresponding decimal values, refer to Table 1-5.
  For example, if query error and execution error currently occur in the instrument, the bit2 (query error bit) and bit4 (execution error bit) in the event register of the standard event register are set and this command returns 20 (according to $2^2+2^4=20$).
- The bits in the event register of the standard event register are latched and reading the register will clear it. You can also use the *CLS command to clear this register.

Return Format The query returns a decimal value corresponding to the sum of the binary weights of all the bits in the register, for example, 20.

Example *ESR? /*Query the event register of the standard event register and the query returns 20*/

Related Command *CLS

*IDN?

Syntax *IDN?

Description Query the ID string of the instrument.

Return Format The query returns the ID string of the instrument which consists of 4 parts (the manufacturer name, the instrument model, the instrument serial number and the digital board version number in sequence) separated by commas ",".

*OPC

Syntax *OPC

*OPC?

Description After executing this command, the bit0 (OPC, "operation complete" bit) in the event register of the standard event register is set.

Query whether the *OPC command is executed. The query returns "1" to the output buffer when the command is executed.

Explanation

- Operation complete refers to that all the previous commands including the *OPC command are executed.
- Sending the *OPC? command and viewing the result can ensure synchronization.
- When setting the instrument configuration via programming (by executing the command string), using this command as the last command can determine when the command queue is executed (when the command queue is executed the, bit0 (OPC, "operation complete" bit) in the event register of the standard event register will be set).
- Send the *OPC command after sending command to load the information in the output buffer (query data) of the power supply and you can determine when the information is available via the "OPC" bit.

Return Format The query returns 1 when the current operation is completed.

Example

```
*OPC      /*Set the bit0 (OPC, "operation complete" bit) in the event register of the standard event register after completing the current operation*/
*OPC?     /*Query whether the current operation is completed and the query returns 1*/
```

*OPT?

Syntax *OPT?

Description Query the installation status of the options.

Explanation

- The options include high resolution, analyzer, monitor, LAN, RS232 and trigger.
- For DP831A/DP832A/DP821A/DP811A, the instrument is installed with the six options mentioned above when it leaves factory. For DP831/DP832/DP821/DP811, to use the optional functions, please order the corresponding options and install the options correctly (:LIC:SET).

Return Format The query returns the installation status of the options and different options are separated by commas ",". The query returns the option name if the option is installed; otherwise, the query returns 0.
High resolution option: DP8-ACCURACY Analyzer option: DP8-ANALYZER
Monitor option: DP8-MONITOR LAN option: DP8-LAN
RS232 option: DP8-RS232 Trigger option: DP8-TRIGGER
For example, the query returns DP8-ACCURACY,DP8-ANALYZER,DP8-MONITOR, DP8-LAN,DP8-RS232,DP8-TRIGGER, indicating that the six options mentioned above are all installed.

Example

```
*OPT?     /*Query the installation status of the options and the query returns 0,DP8-ANALYZER,DP8-MONITOR,DP8-LAN,DP8-RS232,DP8-TRIGGER*/
```

*PSC

Syntax *PSC {0|1}

*PSC?

Description Enable or disable the function to clear the enable registers of the status byte and standard event registers at power-on.

Query the state of the function to clear the enable registers of the status byte and standard event registers at power-on.

Parameter

Name	Type	Range	Default
{0|1}	Discrete	0|1	0

Explanation

- *PSC 1 denotes clearing the enable registers of the status byte and standard event registers at power-on; *PSC 0 denotes that the enable registers of the status byte and standard event registers will not be affected at power-on.
- You can also send the *SRE command (*SRE 0) or *ESE command (*ESE 0) to clear the enable registers of the status byte and standard event registers respectively.

Return Format The query returns 0 or 1.

Example

*PSC 1 /*Enable the function to clear the enable registers of the status byte and standard event registers at power-on*/

*PSC? /*Query the setting of the power-on status clear and the query returns 1*/

Related Commands *SRE

*ESE

*RCL

Syntax *RCL {1|2|3|4|5|6|7|8|9|10}

Description Recall the instrument state stored in the internal memory.

Parameter

Name	Type	Range	Default
{1|2|3|4|5|6|7|8|9|10}	Discrete	1|2|3|4|5|6|7|8|9|10	None

Explanation

- The power supply provides 10 storage locations (numbered 1 to 10) for instrument states. This command recalls the instrument state stored in the specified location. Selecting number 1 to 10 can recall the instrument states stored in the corresponding locations respectively.
- This command is only available when a state file has been stored in the specified storage location in the internal memory.
- You can also send the :MEMory[:STATe]:LOAD or :RECAll:LOCal command to recall the instrument state stored in the internal memory.

Related Commands :MEMory[:STATe]:LOAD

:RECAll:LOCal

*RST

Syntax *RST

Description Restore the power supply to factory state (refer to "**Appendix B: Factory Setting**") and clear the error queue.

Related Commands :PRESet:KEY

:PRESet[:APPLy]

*SAV

Syntax *SAV {1|2|3|4|5|6|7|8|9|10}

Description Save the current instrument state to the specified storage location in the internal memory using the default filename.

Parameter

Name	Type	Range	Default
{1|2|3|4|5|6|7|8|9|10}	Discrete	1|2|3|4|5|6|7|8|9|10	None

Explanation

- The power supply provides 10 storage locations (numbered 1 to 10) for instrument states. The default name is RIGOLn.RSF; n corresponds to the number of the storage location.
- If a state file has already been stored in the specified storage location, this command will directly store the current instrument state to the specified location (directly overwrite the original file). If the state file stored in the specified storage location is locked (refer to the :MEMory[:STATe]:LOCK command), this command is invalid (will not overwrite the original file).
- You can also send the :MEMory[:STATe]:STORe or :STORe:LOCal command to store the current status of the power supply to the specified location in the internal memory.

Example *SAV 5 /*Save the current instrument state to storage location 5 of state files in the internal memory of the power supply with the filename RIGOL5.RSF*/

Related Commands :STORe:LOCal

:MEMory[:STATe]:STORe

:MEMory[:STATe]:LOCK

*SRE

Syntax *SRE <enable value>

*SRE?

Description Enable the bits in the enable register of the status byte register.

Query the bits currently enabled in the enable register of the status byte register.

Parameter

Name	Type	Range	Default
<enable value>	Discrete	Refer to the "Explanation"	None

Explanation

- <enable value> is a decimal value corresponding to the sum of the binary weights of the bits to be enabled in the status byte enable register. For the definitions of the bits in the status byte register and their corresponding decimal values, please refer to Table 1-6.
  For example, to enable the bit3 (QUES) and bit4 (MAV) in the status byte enable register, set <enable value> to 24 (according to $2^3+2^4=24$).
- After the bits are enabled, the system sends service request via the bit6 (service request bit) in the status byte register.
- When <enable value> is set to 0, executing this command will clear the enable register of the status byte register. You can also send the *PSC command (*PSC 1) to clear the enable register of the status byte register at the next power-on.

Return Format The query returns a decimal value corresponding to the sum of the binary weights of the bits enabled in the status byte enable register, for example, 24.

Example

```
*SRE 24      /* Enable the bit3 (QUES) and bit4 (MAV) in the enable register of the
                status byte register and enable the service request*/
*SRE?        /* Query the bits currently enabled in the enable register of the status
                byte register and the query returns 24*/
```

Related Command *PSC

*STB?

Syntax *STB?

Description Query the SUMMARY register of the status byte register.

Explanation The query returns a decimal value (corresponding to the sum of the binary weights of all the bits in the register) but do not clear the register. For the definitions of the bits in the status byte register and their corresponding decimal values, please refer to Table 1-6.
For example, if questionable state currently occurs in the instrument and the service request is send, the bit3 (QUES) and bit6 (RQS) in the SUMMARY register of the status byte register are set and the query returns 72 (according to $2^3+2^6=72$).

Return Format The query returns a decimal value corresponding to the sum of the binary weights of all the bits in the SUMMARY register of the status byte register, for example, 72.

Example

```
*STB?        /* Query the SUMMARY register of the status byte register and the query
                returns 72*/
```

*TRG

Syntax *TRG

Description Generate a trigger operation.

Explanation

- This command is only available when "Bus (software) trigger" (:TRIGger[:SEQuence]:SOURce or :TRIGger:IN:CHTYpe) is selected.
- When "Bus (software) trigger" is selected, sending this command will trigger the power supply and generate a trigger operation after the specified delay time (when trigger delay is set (:TRIGger[:SEQuence]:DELay)).

Example

```
:TRIG:SOUR BUS      /*Select "Bus (software) trigger"*/
:TRIG:DEL 3         /*Set the trigger delay time to 3s*/
:INIT               /*Initialize the trigger system*/
*TRG                /*Generate a trigger operation after the specified trigger
                    delay time (here it is set to 3s)*/
```

Related Commands

:TRIGger[:SEQuence]:SOURce

:TRIGger:IN:CHTYpe

:TRIGger[:SEQuence]:DELay

*TST?

Syntax *TST?

Description Query the self-test results of the instrument.

Explanation

- The power supply executes self-test at start-up. This command queries the self-test results (including TopBoard, BottomBoard and fan).
- You can also send the :SYSTem:SELF:TEST:BOARD? or :SYSTem:SELF:TEST:FAN? command to query the self-test result of the TopBoard, BottomBoard or fan.

Return Format The query returns the self-test results of TopBoard, BottomBoard and fan respectively, for example, TopBoard:PASS,BottomBoard:PASS,Fan:PASS.

Related Commands

:SYSTem:SELF:TEST:BOARD?

:SYSTem:SELF:TEST:FAN?

*WAI

Syntax *WAI

Description Set the instrument to executing any other command after all the pending operations are completed.

Explanation When "BUS" (Bus trigger, namely software trigger) is selected, sending this command can ensure synchronization. After executing this command, the instrument will only execute any other command after all the pending operations are completed.

Example

```
*WAI    /*Set the instrument to executing any other command after all the
        pending operations are completed*/
```

:INITiate Command

The :INITiate command is used to initialize the trigger system of the instrument.

:INITiate

Syntax :INITiate[:IMMediate]

Description Initialize the trigger system.

Explanation

- When the trigger type (:TRIGger[:SEQuence]:SOURce or :TRIGger:IN:CHTYpe) is set to "IMM" (immediate trigger), the instrument will execute a complete trigger operation after executing this command.
- When the trigger type (:TRIGger[:SEQuence]:SOURce or :TRIGger:IN:CHTYpe) is set to "BUS" (Bus trigger, namely software trigger), executing this command will initialize the trigger system. Then, send the *TRG command to trigger the power supply and the power supply will starts the trigger operation after the specified delay time (when the delay time is set (:TRIGger[:SEQuence]:DELay)).
- You can also send the :TRIGger:IN:IMMEdiate command to initialize the trigger system.

Related Commands

:TRIGger[:SEQuence]:SOURce

:TRIGger:IN:CHTYpe

*TRG

:TRIGger[:SEQuence]:DELay

:TRIGger:IN:IMMEdiate

:INSTrument Commands

Command List:

:INSTrument:COUPle[:TRIGger]

Syntax :INSTrument:COUPle[:TRIGger] {ALL|NONE|<list>}

:INSTrument:COUPle[:TRIGger]?

Description Select the trigger coupling channels.

Query the current trigger coupling channels.

Parameter

Name	Type	Range	Default
<list>	Discrete	Refer to the "Explanation"	None

Explanation

- This command is only applicable to multi-channel models.
- <list> should contain at least two channels separated by comma, for example, CH1,CH2; CH1,CH3; CH2,CH3 or CH1,CH2,CH3.
- You can set the trigger voltage of each channel using the [:SOURce[<n>]]:VOLTage[:LEVel]:TRIGgered[:AMPLitude] or :TRIGger:IN:VOLTage command and set the current of each channel using the [:SOURce[<n>]]:CURRent[:LEVel]:TRIGgered[:AMPLitude] or :TRIGger:IN:CURRent command respectively; the current channel and the current coupling channels (the current coupling channels can contain or not contain the current channel) will execute the trigger operation at the same time (the channel voltage/current setting values change to the trigger voltage/current values immediately) when the trigger condition is met and the outputs of the corresponding channels are turned on (:OUTPut[:STATe]).

Return Format The query returns the names of the current coupling channels and the rated voltage/current values; different channels are separated by commas, for example, CH1:8V/5A,CH2:30V/2A. If the coupling channels contain all the channels, the query returns ALL.

Example

```
:INST:COUP CH1,CH2      /*Set the trigger coupling channels to CH1 and CH2*/
:INST:COUP?             /*Query the current trigger coupling channels and the
                          query returns CH1:8V/5A,CH2:30V/2A*/
```

Related Commands

[:SOURce[<n>]]:CURRent[:LEVel]:TRIGgered[:AMPLitude]

:TRIGger:IN:VOLTage

[:SOURce[<n>]]:VOLTage[:LEVel]:TRIGgered[:AMPLitude]

:TRIGger:IN:CURRent

:OUTPut[:STATe]

:INSTrument:NSELect

Syntax :INSTrument:NSELect {1|2|3}

:INSTrument:NSELect?

Description Select the current channel.

Query the channel currently selected.

Parameter

Name	Type	Range	Default
{1|2|3}	Discrete	1|2|3	1

Explanation

- This command is only applicable to multi-channel models.
- The parameters 1, 2 and 3 represent CH1, CH2 and CH3 respectively.
- The function of this command is the same with the functions of the :INSTrument[:SELEct] and :INSTrument[:SELect] commands.

Return Format The query returns 1, 2 or 3.

Example :INST:NSEL 3 /*Select CH3 as the current channel*/

:INST:NSEL? /*Query the channel currently selected and the query returns 3*/

Related Commands :INSTrument[:SELEct]

:INSTrument[:SELect]

:INSTrument[:SELEct]
:INSTrument[:SELect]

Syntax :INSTrument[:SELEct] {CH1|CH2|CH3}

:INSTrument[:SELect] {CH1|CH2|CH3}

:INSTrument[:SELEct]?

:INSTrument[:SELect]?

Description Select the current channel.

Query the channel currently selected.

Parameter

Name	Type	Range	Default
{CH1|CH2|CH3}	Discrete	CH1|CH2|CH3	CH1

Explanation

- These two commands are only applicable to multi-channel models.
- The functions of these two commands are the same with the function of the :INSTrument:NSELect command.

Return Format The query returns CH1:8V/5A, CH2:30V/2A or CH3:-30V/2A.

Example :INST CH3 /*Select CH3 as the current channel*/

:INST? /*Query the channel currently selected and the query returns CH3:-30V/2A */

Related Command :INSTrument:NSELect

:LIC Command

The :LIC command is used to install the options and is applicable to DP831/DP832/DP821/DP811. For DP831A/DP832A/DP821A/DP811A, the instrument is installed with the high resolution, analyzer, monitor, LAN, RS232 and trigger options when it leaves factory and users do not need to install them.

:LIC:SET

Syntax :LIC:SET <license>

Description Install the options.

Parameter

Name	Type	Range	Default
<license>	ASCII string	Refer to the "Explanation"	None

Explanation

- To install an option, the option license is required. <license> is the option license (for each instrument, the license is unique); the option license is a 28-byte string and can only include uppercase English letters and numbers.
- To acquire the option license, you need to order the desired option to get the key and then generate the option license using the key following the steps below.
  - Log in the **RIGOL** official website (www.rigol.com). Click **Customer Center** → **License Generate** to enter the license generation interface.
  - Input the correct key, serial number (press **Utility** → **Sys Info** to acquire the serial number of the instrument) and indentifying code in the license generation interface and click **Generate** to acquire the option license (the hyphens are not included).

Example :LIC:SET UVF2L3N3XXKYTB73PPRSA4XDMSRT

Related Command *OPT?

:MEASure Commands

Command List:

:MEASure:ALL[:DC]?

Syntax :MEASure:ALL[:DC]? [CH1|CH2|CH3]

Description Query the voltage, current and power measured on the output terminal of the specified channel.

Parameter

Name	Type	Range	Default
[CH1|CH2|CH3]	Discrete	CH1|CH2|CH3	None

Explanation

- If [CH1|CH2|CH3] is omitted, the command queries the voltage, current and power measured on the output terminal of the channel currently selected.
- You can also send the :MEASure:CURRent[:DC]?, :MEASure:POWEr[:DC]? and :MEASure[:VOLTage][:DC]? commands to query the current, power and voltage measured on the output terminal of the specified channel respectively.

Return Format The query returns the voltage, current and power (separated by commas) measured on the output terminal of the specified channel, for example, 2.0000,0.0500,0.100.

Example

```
:MEAS:ALL? CH1    /*Query the voltage, current and power measured on the
                    output terminal of CH1 and the query returns
                    2.0000,0.0500,0.100*/
```

Related Commands

:MEASure:CURRent[:DC]?
:MEASure:POWEr[:DC]?
:MEASure[:VOLTage][:DC]?

:MEASure:CURRent[:DC]?

Syntax :MEASure:CURRent[:DC]? [CH1|CH2|CH3]

Description Query the current measured on the output terminal of the specified channel.

Parameter

Name	Type	Range	Default
[CH1|CH2|CH3]	Discrete	CH1|CH2|CH3	None

Explanation

- If [CH1|CH2|CH3] is omitted, the command queries the current measured on the output terminal of the channel currently selected.
- You can also send the :MEASure[:VOLTage][:DC]? and :MEASure:POWEr[:DC]? commands to query the voltage and power measured on the output terminal of the specified channel respectively, or send the :MEASure:ALL[:DC]? command to query the voltage, current and power measured on the output terminal of the specified channel at the same time.

Return Format The query returns the current measured on the output terminal of the specified channel, for example, 0.0500.

Example :MEAS:CURR? CH1 /*Query the current measured on the output terminal of CH1 and the query returns 0.0500*/

Related Commands

:MEASure[:VOLTage][:DC]?

:MEASure:POWEr[:DC]?

:MEASure:ALL[:DC]?

:MEASure:POWEr[:DC]?

Syntax :MEASure:POWEr[:DC]? [CH1|CH2|CH3]

Description Query the power measured on the output terminal of the specified channel.

Parameter

Name	Type	Range	Default
[CH1|CH2|CH3]	Discrete	CH1|CH2|CH3	None

Explanation

- If [CH1|CH2|CH3] is omitted, the command queries the power measured on the output terminal of the channel currently selected.
- You can also send the :MEASure:CURRent[:DC]? and :MEASure[:VOLTage][:DC]? commands to query the current and voltage measured on the output terminal of the specified channel respectively, or send the :MEASure:ALL[:DC]? command to query the voltage, current and power measured on the output terminal of the specified channel at the same time.

Return Format The query returns the power measured on the output terminal of the specified channel, for example, 0.100.

Example :MEAS:POWE? CH1 /*Query the power measured on the output terminal of CH1 and the query returns 0.100*/

Related Commands

:MEASure:ALL[:DC]?

:MEASure:CURRent[:DC]?

:MEASure[:VOLTage][:DC]?

:MEASure[:VOLTage][:DC]?

Syntax :MEASure[:VOLTage][:DC]? [CH1|CH2|CH3]

Description Query the voltage measured on the output terminal of the specified channel.

Parameter

Name	Type	Range	Default
[CH1|CH2|CH3]	Discrete	CH1|CH2|CH3	None

Explanation

- If [CH1|CH2|CH3] is omitted, the command queries the voltage measured on the output terminal of the channel currently selected.
- You can also send the :MEASure:CURRent[:DC]? and :MEASure:POWEr[:DC]? commands to query the current and power measured on the output terminal of the specified channel respectively, or send the :MEASure:ALL[:DC]? command to query the voltage, current and power measured on the output terminal of the specified channel at the same time.

Return Format The query returns the voltage measured on the output terminal of the specified channel, for example, 2.0000.

Example

```
:MEAS? CH1      /*Query the voltage measured on the output terminal of CH1 and
                  the query returns 2.0000*/
```

Related Commands

:MEASure:ALL[:DC]?

:MEASure:CURRent[:DC]?

:MEASure:POWEr[:DC]?

:MEMory Commands

The :MEMory commands are used to save the file to the specified location in the internal memory and delete, read, lock or unlock the file stored in the specified storage location in the internal memory. DP800 allows the following four kinds of files to be saved in the internal memory.

1. State File (RSF): store the current system state, including the voltage, current, OVP, OCP and track function status of each channel as well as the system parameters.
2. Record File (ROF): store the output state, voltage, current and power of each channel when the recorder is enabled (for the channel of which the output is disabled, the corresponding recorded data will be 0).
3. Timer File (RTF): store the timer parameters edited (the voltage, current and time of each group of parameters).
4. Delay File (RDF): store the delayer parameters edited (the state and time of each group of parameters).

Command List:

:MEMory[:STATe]:DELete

Syntax :MEMory[:STATe]:DELete {RSF|ROF|RTF|RDF},{1|2|3|4|5|6|7|8|9|10}

Description Delete the file stored in the specified location in the internal memory, including state file (RSF), record file (ROF), timer file (RTF) and delay file (RDF).

Parameter

Name	Type	Range	Default
{RSF|ROF|RTF|RDF}	Discrete	RSF|ROF|RTF|RDF	None
{1|2|3|4|5|6|7|8|9|10}	Discrete	1|2|3|4|5|6|7|8|9|10	None

Explanation

- The internal memory of DP800 series power supply can store at most 10 state files, 10 record files, 10 timer files and 10 delay files respectively.
- This command is only available when a file has been stored in the specified storage location and the file is not locked (:MEMory[:STATe]:LOCK).
- {1|2|3|4|5|6|7|8|9|10} represent the files stored in the corresponding locations in the internal memory respectively.

Example

```
:MEM:DEL RSF,5      /*Delete the file currently stored in storage location 5 of state
                      files in the internal memory*/
```

Related Command :MEMory[:STATe]:LOCK

:MEMory[:STATe]:LOAD

Syntax :MEMory[:STATe]:LOAD {RSF|RTF|RDF},{1|2|3|4|5|6|7|8|9|10}

Description Read the specified file stored in the internal memory, including state file (RSF), timer file (RTF) and delay file (RDF).

Parameter

Name	Type	Range	Default
{RSF|RTF|RDF}	Discrete	RSF|RTF|RDF	None
{1|2|3|4|5|6|7|8|9|10}	Discrete	1|2|3|4|5|6|7|8|9|10	None

Explanation

- This command is only available when a file has been stored in the specified storage location in the internal memory.
- You can also use the *RCL or :RECAll:LOCal command to read the specified file stored in the internal memory.
- {1|2|3|4|5|6|7|8|9|10} represent the files stored in the corresponding locations in the internal memory respectively.

Example

```
:MEM:LOAD RSF,5    /*Read the file currently stored in storage location 5 of state
                     files in the internal memory */
```

Related Commands *RCL

:RECAll:LOCal

:MEMory[:STATe]:LOCK

Syntax :MEMory[:STATe]:LOCK {RSF|ROF|RTF|RDF},{1|2|3|4|5|6|7|8|9|10},{ON|OFF}

:MEMory[:STATe]:LOCK? {RSF|ROF|RTF|RDF},{1|2|3|4|5|6|7|8|9|10}

Description Lock or unlock the file in the specified storage location in the internal memory, including state file (RSF), record file (ROF), timer file (RTF) and delay file (RDF).

Query whether the file in the specified storage location in the internal memory is locked.

Parameter

Name	Type	Range	Default
{RSF|ROF|RTF|RDF}	Discrete	RSF|ROF|RTF|RDF	None
{1|2|3|4|5|6|7|8|9|10}	Discrete	1|2|3|4|5|6|7|8|9|10	None
{ON|OFF}	Bool	ON|OFF	OFF

Explanation

- This command is only available when a file has been stored in the specified storage location in the internal memory.
- The locked file cannot be saved and deleted, but can be read.
- The query returns NO if no file has been stored in the specified storage location in the internal memory.
- {1|2|3|4|5|6|7|8|9|10} represent the files stored in the corresponding locations in the internal memory respectively.

Return Format The query returns YES or NO.

Example

```
:MEM:LOCK RSF,5,ON      /*Lock the file currently stored in storage location 5 of
                          state files in the internal memory */
:MEM:LOCK? RSF,5        /*Query the locking state of the file currently stored in
                          storage location 5 of state files in the internal memory
                          and the query returns YES*/
```

:MEMory[:STATe]:STORe

Syntax :MEMory[:STATe]:STORe {RSF|RTF|RDF},{1|2|3|4|5|6|7|8|9|10}

Description Save the specified type of file to the specified storage location in the internal memory in the default filename, including state file (RSF), timer file (RTF) and delay file (RDF).

Parameter

Name	Type	Range	Default
{RSF|RTF|RDF}	Discrete	RSF|RTF|RDF	None
{1|2|3|4|5|6|7|8|9|10}	Discrete	1|2|3|4|5|6|7|8|9|10	None

Explanation

- If a file has been stored in the specified storage location, this command will save the specified type of file to the specified storage location in the internal memory (overwrite the original file directly). If the file stored in the specified storage location is locked (refer to the :MEMory[:STATe]:LOCK command), this command is invalid (will not overwrite the original file).
- {1|2|3|4|5|6|7|8|9|10} represent the corresponding storage locations in the internal memory respectively.
- The storage directory of the record file is specified by the :RECorder:MEMory command and the record file is stored automatically to the specified directory when the recorder is turned off.
- You can also send the *SAV or :STORe:LOCal command to store the current instrument state to the specified location in the internal memory.

Example

```
:MEM:STOR RSF,5    /*Store the current instrument state to the status file storage location 5 in the internal memory; the filename is RIGOL5.RSF*/
```

Related Commands *SAV

:STORe:LOCal

:RECorder:MEMory

:MEMory[:STATe]:LOCK

:MEMory[:STATe]:VALid?

Syntax :MEMory[:STATe]:VALid? {RSF|ROF|RTF|RDF},{1|2|3|4|5|6|7|8|9|10}

Description Query whether a valid file has been stored in the specified storage location in the internal memory, including state file (RSF), record file (ROF), timer file (RTF) and delay file (RDF).

Parameter

Name	Type	Range	Default
{RSF|ROF|RTF|RDF}	Discrete	RSF|ROF|RTF|RDF	None
{1|2|3|4|5|6|7|8|9|10}	Discrete	1|2|3|4|5|6|7|8|9|10	None

Explanation

- The read, delete and lock operations are only valid when a valid file has been stored in the specified storage location in the internal memory.
- {1|2|3|4|5|6|7|8|9|10} represent the files stored in the corresponding locations in the internal memory respectively.

Return Format The query returns YES or NO.

Example

```
:MEM:VAL? RSF,5    /*Query whether a valid file has been stored in storage location 5 of state files in the internal memory and the query returns YES*/
```

:MMEMory Commands

The :MMEMory commands are used to store the file to the specified external storage directory, read or delete the specified file in the external memory as well as query the disk information of the external memory. DP800 supports to save state file (RSF), timer file (RTF) and delay file (RDF) into the specified external storage directory.

Command List:

:MMEMory:CATalog?

Syntax :MMEMory:CATalog?

Description Query all the files and folders stored in the external storage directory (D disk).

Explanation This command is only valid when external memory (D disk) is detected and the current directory is the external memory or a folder in the external memory.

Return Format The query returns the names of all the files and folders (separated by commas) stored in the external memory, for example, RIGOL0.BMP,cc.RSF,RIGOL. Wherein, RIGOL0.BMP represents bitmap file, cc.RSF represents state file and RIGOL represents the folder.

:MMEMory:CDIRectory

Syntax :MMEMory:CDIRectory <directory_name>

:MMEMory:CDIRectory?

Description Set the current operation directory.

Query the current operation directory.

Parameter

Name	Type	Range	Default
<directory_name>	ASCII string	Refer to the "Explanation"	NULL

Explanation

- This command is only applicable to external memory and is only valid when external memory (D disk) is detected.
- <directory_name> must be valid directory (it can be the external memory (D:\) and the folder (such as D:\RIGOL) in the external memory) in the external memory (D disk). If the directory set does not exist, "Invalid directory" will be displayed.
- After setting the external storage directory to the current operation directory, send the :MMEMory:DELete, :MMEMory:LOAD or :MMEMory:STORe command to delete or read the file under the current directory or to save the file to the current directory. Sending the :MMEMory:MDIRectory command will create a folder under the current directory.

Return Format The query returns the current operation directory, for example, D:\RIGOL.

Example

```
:MMEM:CDIR D:\RIGOL    /*Set the current operation directory to D:\RIGOL*/
:MMEM:CDIR?            /*Query the current operation directory and the query
                         returns D:\RIGOL*/
```

Related Commands

:MMEMory:DELete

:MMEMory:LOAD

:MMEMory:STORe

:MMEMory:MDIRectory

:MMEMory:DELete

Syntax :MMEMory:DELete <file_name>

Description Delete the specified file or empty folder under the current operation directory.

Parameter

Name	Type	Range	Default
<file_name>	ASCII string	Filenames of the files stored in the current operation directory	None

Explanation

- This command is only applicable to external memory and is only valid when the current directory is the external memory or a folder in the external memory. Executing this command can delete the state file (RSF), record file (ROF), timer file (RTF), delay file (RDF) and empty folder under the current operation directory.
- This command is only available when the current operation directory contains the specified file or empty folder. <file_name> is the filename (the filename uses the file type as the suffix, for example, STA.RSF) of the file to be deleted or the name of the empty folder to be deleted.
- If the file or empty folder to be deleted is not under the current operation directory, please use the :MMEMory:CDIRectory command to modify the current operation directory.

Example :MMEM:DEL STA.RSF /*Delete the STA.RSF file under the current operation directory*/

Related Command :MMEMory:CDIRectory

:MMEMory:DISK?

Syntax :MMEMory:DISK?

Description Query the drive letter of the external memory available of the power supply.

Return Format The query returns the drive letter available, for example, D:\.

Example :MMEM:DISK? /*Query the drive letter of the external memory available and the query returns D:*/

:MMEMory:LOAD

Syntax :MMEMory:LOAD <file_name>

Description Read the specified file under the current operation directory.

Parameter

Name	Type	Range	Default
<file_name>	ASCII string	Filenames of the files stored in the current operation directory	None

Explanation

- This command is only applicable to external memory and is only valid when the current directory is the external memory or a folder in the external memory. Executing this command can read the state file (RSF), timer file (RTF) and delay file (RDF) under the current operation directory.
- This command is only available when the specified file has been stored in the current operation directory. <file_name> is the filename (the filename uses the file type as the suffix, for example, STA.RSF) of the file to be read.
- If the file to be read is not under the current operation directory, please use the :MMEMory:CDIRectory command to modify the current operation directory.
- You can also send the :RECAll:EXTErnal command to recall the instrument state file stored in the root directory of the external memory of the instrument.

Example

```
:MMEM:LOAD STA.RSF    /*Read the STA.RSF file under the current operation
                        directory*/
```

Related Commands :MMEMory:CDIRectory

:RECAll:EXTErnal

:MMEMory:MDIRectory

Syntax :MMEMory:MDIRectory <dir_name>

Description Create a new folder under the current operation directory.

Parameter

Name	Type	Range	Default
<dir_name>	ASCII string	Refer to the "Explanation"	None

Explanation

- This command is only applicable to external memory and is only valid when the current directory is the external memory.
- <dir_name> is the name of the folder to be created. It can contain up to 9 characters, including Chinese characters, English characters or numbers (one Chinese character is counted as two characters).
- If the current directory contains a folder with the same name, the system will display the prompt message showing that the operation fails.

Example

```
:MMEM:MDIR NEW    /*Create a folder with the name NEW under the current
                    operation directory*/
```

:MMEMory:STORe

Syntax :MMEMory:STORe <file_name>

Description Save the file with the specified filename under the current operation directory.

Parameter

Name	Type	Range	Default
<file_name>	ASCII string	Refer to the "Explanation"	None

Explanation

- This command is only applicable to external memory and is only valid when the current directory is the external memory or a folder in the external memory.
- With this command, you can save the state file (RSF), timer file (RTF) and delay file (RDF) under the current operation directory. <file_name> is the name of the file to be created, including the name of the file (for example, "STA" in STA.RSF) and file type (for example, "RSF" in STA.RSF). The filename can contain up to 17 characters, including Chinese characters, English characters or numbers (a Chinese character is counted as two characters).
- If a file with the same filename has been stored in the current operation directory, this command is invalid (will not overwrite the original file directly).
- You can also send the :STORe:EXTErnal command to store the current instrument state to the external memory.

Example

```
:MMEM:STOR STB.RSF    /*Save the current instrument state under the current
                        operation directory with the name STB.RSF*/
```

Related Command :STORe:EXTErnal

:MONItor Commands

The :MONItor commands are used to set the monitor condition and stop mode of the monitor as well as enable or disable the monitor (the current channel). For multi-channel models, the instrument can monitor the output states of multiple channels at the same time. You can send the :INSTrument:NSELect, :INSTrument[:SELEct] or :INSTrument[:SELect] command to switch the current channel and set the monitor conditions.

For DP831A/DP832A/DP821A/DP811A, the instrument is installed with the monitor option when it leaves factory and users can directly use the monitor function. For DP831/DP832/DP821/DP811, the monitor is an optional function; to use this function, please order the corresponding option and install the option correctly (:LIC:SET).

Command List:

- :MONItor:CURRent:CONDition
- :MONItor:CURRent[:VALue]
- :MONItor:POWER:CONDition
- :MONItor:POWER[:VALue]
- :MONItor[:STATe]
- :MONItor:STOPway
- :MONItor:VOLTage:CONDition
- :MONItor:VOLTage[:VALue]

:MONItor:CURRent:CONDition

Syntax :MONItor:CURRent:CONDition {<C|>C|NONE},{AND|OR|NONE}

:MONItor:CURRent:CONDition?

Description Set the current monitor condition of the monitor (the current channel).

Query the current monitor condition of the monitor (the current channel).

Parameter

Name	Type	Range	Default
{<C|>C|NONE}	Discrete	<C|>C|NONE	NONE
{AND|OR|NONE}	Discrete	AND|OR|NONE	NONE

Explanation

- You can set the current monitor condition to "<C" (<current), ">C" (>current) or "NONE". "NONE" means do not monitor the current.
- The actual monitor condition is the logic combination of the voltage, current and power. The logic relations include "AND", "OR" and "NONE"; wherein, "NONE" indicates that no logic relation is set.
- You can send the :MONItor:CURRent[:VALue] command to set the current monitor value.

Return Format The query returns the current monitor condition and logic relation separated by comma, for example, <C,AND.

Example

```
:MONI:CURR:COND <C,AND      /*Set the current monitor condition (the current channel) to "<C,AND"*/
:MONI:CURR:COND?            /*Query the current monitor condition (the current channel) and the query returns <C,AND*/
```

Related Commands

:MONItor:CURRent[:VALue]

:MONItor:POWER:CONDition

:MONItor:POWER[:VALue]

:MONItor:VOLTage:CONDition

:MONItor:VOLTage[:VALue]

:MONItor:CURRent[:VALue]

Syntax :MONItor:CURRent[:VALue] {<value>|MINimum|MAXimum}

:MONItor:CURRent[:VALue]? [MINimum|MAXimum]

Description Set the current value of the monitor condition (the current channel).

Query the current value of the monitor condition (the current channel).

Parameter

Name	Type	Range	Default
<value>	Real	Refer to the "Explanation"	

Explanation For multi-channel models, the range of <value> is from 0 to the maximum current of the current channel and the default is 0.5*rated current of the current channel; for single-channel model, the range of <value> is from 0 to the maximum current of the current range and the default is 0.5*rated current of range 1.

Return Format The query returns the current of the monitor condition (the current channel), for example, 4.0000.

Example

:MONI:CURR 4 /*Set the current value of the monitor condition (the current channel) to 4A*/

:MONI:CURR? /*Query the current value of the monitor condition (the current channel) and the query returns 4.0000*/

Related Command :MONItor:CURRent:CONDition

:MONItor:POWER:CONDition

Syntax :MONItor:POWER:CONDition {<P|>P|NONE}

:MONItor:POWER:CONDition?

Description Set the power monitor condition of the monitor (the current channel).

Query the power monitor condition of the monitor (the current channel).

Parameter

Name	Type	Range	Default
{<P|>P|NONE}	Discrete	<P|>P|NONE	NONE

Explanation

- You can set the power monitor condition to "<P" (<power), ">P" (>power) or "NONE". "NONE" indicates that the instrument will not monitor the power.
- The actual monitor condition is the logic combination of the voltage, current and power.
- You can send the :MONItor:POWER[:VALue] command to set the power monitor value.

Return Format The query returns the power monitor condition, for example, <P.

Example

:MONI:POWER:COND <P /*Set the power monitor condition (the current channel) to "<P"*/

:MONI:POWER:COND? /*Query the current power monitor condition and the query returns <P*/

Related Commands

:MONItor:POWER[:VALue]

:MONItor:CURRent:CONDition

:MONItor:CURRent[:VALue]

:MONItor:VOLTage:CONDition

:MONItor:VOLTage[:VALue]

:MONItor:POWER[:VALue]

Syntax :MONItor:POWER[:VALue] {<value>|MINimum|MAXimum}

:MONItor:POWER[:VALue]? [MINimum|MAXimum]

Description Set the power value of the monitor condition (the current channel).

Query the power value of the monitor condition (the current channel).

Parameter

Name	Type	Range	Default
<value>	Real	Refer to the "Explanation"	

Explanation For multi-channel models, the range of <value> is from 0 to the maximum power of the current channel and the default is 0.25*rated power of the current channel; for single-channel model, the range of <value> is from 0 to the maximum power of the current range and the default is 0.25*rated power of range 1.

Return Format The query returns the power of the current monitor condition (the current channel), for example, 20.000.

Example

```
:MONI:POWER 20      /*Set the power of the monitor condition (the current
                      channel) to 20W*/
:MONI:POWER?        /*Query the power of the current monitor condition (the
                      current channel) and the query returns 20.000*/
```

Related Command :MONItor:POWER:CONDition

:MONItor[:STATe]

Syntax :MONItor[:STATe] {ON|OFF}

:MONItor[:STATe]?

Description Enable or disable the monitor (the current channel).

Query the state of the monitor (the current channel).

Parameter

Name	Type	Range	Default
{ON|OFF}	Bool	ON|OFF	OFF

Explanation The monitor can monitor the current output state of the instrument. When the monitor is enabled and the channel output state meets the monitor condition set, the instrument will turn off the output, display the corresponding prompt message or sound the beeper according to the stop mode selected (set by the :MONItor:STOPway command; you can select one or more stop modes).

Return Format The query returns ON or OFF.

Example

```
:MONI ON        /*Enable the monitor (the current channel)*/
:MONI?          /*Query the state of the monitor (the current channel) and the query
                  returns ON*/
```

Related Command :MONItor:STOPway

:MONItor:STOPway

Syntax :MONItor:STOPway {OUTOFF|WARN|BEEPER|NONE},{ON|OFF}

:MONItor:STOPway?

Description Set the stop mode of the monitor (the current channel).

Query the stop mode of the monitor (the current channel).

Parameter

Name	Type	Range	Default
{OUTOFF|WARN|BEEPER}	Discrete	OUTOFF|WARN|BEEPER	None
{ON|OFF}	Bool	ON|OFF	ON

Explanation The monitor can monitor the current output state of the instrument. When the monitor is enabled (:MONItor[:STATe]) and the channel output state meets the monitor condition set, the instrument will turn off the output, display the corresponding prompt message or sound the beeper according to the stop mode selected (you can select one or more stop modes).

Return Format The query returns the on/off status of the three stop modes separated by commas, for example, OutputOff:ON,Warn:ON,Beep:ON.

Example

```
:MONI:STOP OUTOFF,ON      /*Enable the "OutpOff" stop mode*/
:MONI:STOP WARN,ON        /*Enable the "Warning" stop mode*/
:MONI:STOP BEEPER,OFF     /*Disable the "Beeper" stop mode*/
:MONI:STOP?               /*Query the current stop modes of the monitor and
                            the query returns
                            OutputOff:ON,Warn:ON,Beep:OFF*/
```

Related Command :MONItor[:STATe]

:MONItor:VOLTage:CONDition

Syntax :MONItor:VOLTage:CONDition {<V|>V|NONE},{AND|OR|NONE}

:MONItor:VOLTage:CONDition?

Description Set the voltage monitor condition of the monitor (the current channel).

Query the voltage monitor condition of the monitor (the current channel).

Parameter

Name	Type	Range	Default
{<V|>V|NONE}	Discrete	<V|>V|NONE	NONE
{AND|OR|NONE}	Discrete	AND|OR|NONE	NONE

Explanation

- You can set the voltage monitor condition to "<V" (<voltage), ">V" (>voltage) or "NONE". "NONE" means do not monitor the voltage.
- The actual monitor condition is the logic combination of the voltage, current and power.
- You can send the :MONItor:VOLTage[:VALue] command to set the voltage monitor value.

Return Format The query returns the voltage monitor condition and logic relation separated by comma, for example, <V,AND.

Example

```
:MONI:VOLT:COND <V,AND      /*Set the voltage monitor condition (the current channel) to "<V,AND"*/
:MONI:VOLT:COND?            /*Query the current voltage monitor condition (the current channel) and the query returns <V,AND*/
```

Related Commands

:MONItor:CURRent:CONDition

:MONItor:CURRent[:VALue]

:MONItor:POWER:CONDition

:MONItor:POWER[:VALue]

:MONItor:VOLTage[:VALue]

:MONItor:VOLTage[:VALue]

Syntax :MONItor:VOLTage[:VALue] {<value>|MINimum|MAXimum}

:MONItor:VOLTage[:VALue]? [MINimum|MAXimum]

Description Set the voltage value of the monitor condition (the current channel).

Query the voltage value of the monitor condition (the current channel).

Parameter

Name	Type	Range	Default
<value>	Real	Refer to the "Explanation"	

Explanation For multi-channel models, the range of <value> is from 0 to the maximum voltage of the current channel and the default is 0.5*rated voltage of the current channel; for single-channel model, the range of <value> is from 0 to the maximum voltage of the current range and the default is 0.5*rated voltage of range 1.

Return Format The query returns the voltage of the current monitor condition (the current channel), for example, 5.000.

Example

```
:MONI:VOLT 5        /*Set the voltage of the monitor condition (the current channel) to 5V*/
:MONI:VOLT?         /*Query the voltage of the current monitor condition (the current channel) and the query returns 5.000*/
```

Related Command :MONItor:VOLTage:CONDition

:OUTPut Commands

The :OUTPut commands are used to enable or disable the channel output, overvoltage/overcurrent protection functions, track function and Sense function, query the output mode of the channel as well as set and query the related information of overvoltage/overcurrent protection. For single-channel model, you can also select and query the current range of the channel. The range and default value of overvoltage/overcurrent protection corresponding to each channel (multi-channel models) or range (single-channel model) of different models are as shown in the table below.

Table 2-2 Range and default value of overvoltage/overcurrent protection of each channel (range) of different models of DP800 series

Channel (Range)		OVP/OCP Settable Range	OVP/OCP Default Value
DP831A	CH1 (8V/5A) CH2 (30V/2A) CH3 (-30V/2A)	1mV to 8.8V/0.1mA to 5.5A 1mV to 33V/0.1mA to 2.2A -1mV to -33V/0.1mA to 2.2A	8.800V/5.5000A 33.000V/2.2000A -33.000V/2.2000A
DP832A	CH1 (30V/3A) CH2 (30V/3A) CH3 (5V/3A)	1mV to 33V/1mA to 3.3A 1mV to 33V/1mA to 3.3A 1mV to 5.5V/1mA to 3.3A	33.000V/3.300A 33.000V/3.300A 5.500V/3.300A
DP821A	CH1 (60V/1A) CH2 (8V/10A)	1mV to 66V/0.1mA to 1.1A 1mV to 8.8V/1mA to 11A	66.000V/1.1000A 8.800V/11.000A
DP811A	Range1 (20V/10A) Range2 (40V/5A)	1mV to 22V/0.1mA to 11A 1mV to 44V/0.1mA to 5.5A	22.000V/11.0000A
DP831[1]	CH1 (8V/5A) CH2 (30V/2A) CH3 (-30V/2A)	10mV to 8.8V/1mA to 5.5A 10mV to 33V/1mA to 2.2A -10mV to -33V/1mA to 2.2A	8.800V/5.500A 33.00V/2.200A -33.00V/2.200A
DP832[1]	CH1 (30V/3A) CH2 (30V/3A) CH3 (5V/3A)	10mV to 33V/1mA to 3.3A 10mV to 33V/1mA to 3.3A 10mV to 5.5V/1mA to 3.3A	33.00V/3.300A 33.00V/3.300A 5.50V/3.300A
DP821[1]	CH1 (60V/1A) CH2 (8V/10A)	10mV to 66V/10mA to 1.1A 10mV to 8.8V/10mA to 11A	66.00V/1.100A 8.80V/11.00A
DP811[1]	Range1 (20V/10A) Range2 (40V/5A)	10mV to 22V/10mA to 11A 10mV to 44V/10mA to 5.5A	22.00V/11.00A

Note[1]: When DP831 (DP832, DP821 or DP811) is installed with the high resolution option, its overvoltage/overcurrent protection settable range and default value of each channel are the same with those of DP831A (DP832A, DP821A or DP811A).

Command List:

- :OUTPut:CVCC?
- :OUTPut:MODE?
- :OUTPut:OCP:ALAR?
- :OUTPut:OCP:QUES?
- :OUTPut:OCP:CLEAR
- :OUTPut:OCP[:STATe]
- :OUTPut:OCP:VALue

:OUTPut:CVCC?
:OUTPut:MODE?

Syntax :OUTPut:CVCC? [CH1|CH2|CH3]

:OUTPut:MODE? [CH1|CH2|CH3]

Description Query the current output mode of the specified channel.

Parameter

Name	Type	Range	Default
[CH1|CH2|CH3]	Discrete	CH1|CH2|CH3	None

Explanation

- DP800 series power supply provides three output modes, including CV (Constant Voltage), CC (Constant Current) and UR (Unregulated). In CV mode, the output voltage equals the voltage setting value and the output current is determined by the load; in CC mode, the output current equals the current setting value and the output voltage is determined by the load; UR is the critical mode between CV and CC modes.
- When [CH1|CH2|CH3] is omitted, the system queries the output mode of the current channel.

Return Format The query returns CV, CC or UR.

Example :OUTP:CVCC? CH1

:OUTP:MODE? CH1 /*Query the output mode of CH1 and the query returns CV*/

:OUTPut:OCP:ALAR?
:OUTPut:OCP:QUES?

Syntax :OUTPut:OCP:ALAR? [CH1|CH2|CH3]

:OUTPut:OCP:QUES? [CH1|CH2|CH3]

Description Query whether OCP occurred on the specified channel.

Parameter

Name	Type	Range	Default
[CH1|CH2|CH3]	Discrete	CH1|CH2|CH3	None

Explanation

- Overcurrent protection (OCP) refers to that the output turns off automatically when the actual output current of the channel exceeds the overcurrent protection value.
- When [CH1|CH2|CH3] is omitted, the system queries whether OCP occurred on the current channel.
- You can send the :OUTPut:OCP:CLEAR command to clear the OCP occurred on the specified channel.

Return Format The query returns YES or NO.

Example :OUTP:OCP:ALAR? CH1

:OUTP:OCP:QUES? CH1 /*Query whether OCP occurred on CH1 and the query returns YES*/

Related Command :OUTPut:OCP:CLEAR

:OUTPut:OCP:CLEAR

Syntax :OUTPut:OCP:CLEAR [CH1|CH2|CH3]

Description Clear the label of the overcurrent protection occurred on the specified channel.

Parameter

Name	Type	Range	Default
[CH1|CH2|CH3]	Discrete	CH1|CH2|CH3	None

Explanation

- Before executing the command, make sure that the reason that causes the OCP on the specified channel is cleared (you can decrease the output current to be below the OCP value or increase the OCP value to be greater than the output current).
- When [CH1|CH2|CH3] is omitted, the system clears the label of the OCP occurred on the current channel.
- You can also send the [:SOURce[<n>]]:CURRent:PROTection:CLEar command to clear the circuit and label of the OCP occured on the specified channel and turn on the corresponding channel output.
- You can send the :OUTPut:OCP:ALAR? or :OUTPut:OCP:QUES? command to query whether OCP occurred on the specified channel.

Example

```
:OUTP:OCP:QUES? CH1    /*Query whether overcurrent protection currently
                         occurred on CH1 and the query returns YES*/
```

(Operation: decrease the output current to be below the OCP value or increase the OCP value to be greater than the output current)

```
:OUTP:OCP:CLEAR CH1    /*Clear the label of the overcurrent protection occurred
                         on CH1*/
:OUTP:OCP:QUES? CH1    /*Query whether overcurrent protection occurred on
                         CH1 and the query returns NO*/
```

Related Commands

:OUTPut:OCP:ALAR?

:OUTPut:OCP:QUES?

[:SOURce[<n>]]:CURRent:PROTection:CLEar

:OUTPut:OCP[:STATe]

Syntax :OUTPut:OCP[:STATe] [CH1|CH2|CH3,]{ON|OFF}

:OUTPut:OCP[:STATe]? [CH1|CH2|CH3]

Description Enable or disable the overcurrent protection (OCP) function of the specified channel.

Query the status of the overcurrent protection (OCP) function of the specified channel.

Parameter

Name	Type	Range	Default
[CH1|CH2|CH3]	Discrete	CH1|CH2|CH3	None
{ON|OFF}	Bool	ON|OFF	OFF

Explanation

- When the overcurrent protection function is enabled, the output will turn off automatically when the output current exceeds the overcurrent protection value currently set (:OUTPut:OCP:VALue). You can send the :OUTPut:OCP:ALAR? or :OUTPut:OCP:QUES? command to query whether overcurrent protection occurred on the specified channel currently.
- When [CH1|CH2|CH3] is omitted, the system executes the corresponding operation on the current channel.

Return Format The query returns ON or OFF.

Example

```
:OUTP:OCP CH1,ON    /*Enable the overcurrent protection function of CH1*/
:OUTP:OCP? CH1      /*Query the status of the overcurrent protection function of
                      CH1 and the query returns ON*/
```

Related Commands

:OUTPut:OCP:ALAR?

:OUTPut:OCP:QUES?

:OUTPut:OCP:VALue

:OUTPut:OCP:VALue

Syntax :OUTPut:OCP:VALue [CH1|CH2|CH3,]{<value>|MINimum|MAXimum}

:OUTPut:OCP:VALue? {CH1|CH2|CH3}[,MINimum|MAXimum]

:OUTPut:OCP:VALue? [MINimum|MAXimum]

Description Set the overcurrent protection value of the specified channel.

Query the overcurrent protection value of the specified channel.

Query the overcurrent protection value of the current channel.

Parameter

Name	Type	Range	Default
[CH1|CH2|CH3]	Discrete	CH1|CH2|CH3	None
<value>	Real	Refer to Table 2-2	
{CH1|CH2|CH3}	Discrete	CH1|CH2|CH3	None

Explanation

- When the overcurrent protection function is enabled, the output will turn off automatically when the output current exceeds the overcurrent protection value currently set. You can send the :OUTPut:OCP:ALAR? or :OUTPut:OCP:QUES? command to query whether overcurrent protection occurred on the specified channel currently.
- When [CH1|CH2|CH3] is omitted, the system performs the corresponding operation on the current channel.
- You can also send the [:SOURce[<n>]]:CURRent:PROTection[:LEVel] command to set the OCP value of the specified channel.

Return Format The query returns the overcurrent protection value, for example, 5.0000.

Example

```
:OUTP:OCP:VAL CH1,5          /*Set the OCP value of CH1 to 5A*/
:OUTP:OCP:VAL? CH1           /*Query the OCP value of CH1 and the query returns
                               5.0000*/
```

Related Commands :OUTPut:OCP:ALAR?

:OUTPut:OCP:QUES?

[:SOURce[<n>]]:CURRent:PROTection[:LEVel]

:OUTPut:OVP:ALAR?
:OUTPut:OVP:QUES?

Syntax :OUTPut:OVP:ALAR? [CH1|CH2|CH3]

:OUTPut:OVP:QUES? [CH1|CH2|CH3]

Description Query whether OVP occurred on the specified channel.

Parameter

Name	Type	Range	Default
[CH1|CH2|CH3]	Discrete	CH1|CH2|CH3	None

Explanation

- Overvoltage protection (OVP) refers to that the output turns off automatically when the actual output voltage of the channel exceeds the OVP value.
- When [CH1|CH2|CH3] is omitted, the system queries whether OVP occurred on the current channel.
- You can send the :OUTPut:OVP:CLEAR command to clear the OVP occurred on the specified channel.

Return Format The query returns YES or NO.

Example

```
:OUTP:OVP:ALAR? CH1
:OUTP:OVP:QUES? CH1     /*Query whether OVP occurred on CH1 and the query returns YES*/
```

Related Command :OUTPut:OVP:CLEAR

:OUTPut:OVP:CLEAR

Syntax :OUTPut:OVP:CLEAR [CH1|CH2|CH3]

Description Clear the label of the overvoltage protection occurred on the specified channel.

Parameter

Name	Type	Range	Default
[CH1|CH2|CH3]	Discrete	CH1|CH2|CH3	None

Explanation

- Before executing the command, make sure that the reason that causes the OVP on the specified channel is cleared (you can decrease the output voltage to be below the OVP value or increase the OVP value to be greater than the output voltage).
- When [CH1|CH2|CH3] is omitted, the system clears the label of the OVP occurred on the current channel.
- You can also send the [:SOURce[<n>]]:VOLTage:PROTection:CLEar command to clear the circuit and label of the OVP occurred on the specified channel and turn on the corresponding channel output.
- You can send the :OUTPut:OVP:ALAR? or :OUTPut:OVP:QUES? command to query whether OVP occurred on the specified channel.

Example

:OUTP:OVP:QUES? CH1 /*Query whether overvoltage protection currently occurred on CH1 and the query returns YES*/

(Operation: decrease the output voltage to be below the OVP value or increase the OVP value to be greater than the output voltage)

:OUTP:OVP:CLEAR CH1 /*Clear the label of the overvoltage protection occurred on CH1*/

:OUTP:OVP:QUES? CH1 /*Query whether OVP occurred on CH1 and the query returns NO*/

Related Commands

:OUTPut:OVP:ALAR?

:OUTPut:OVP:QUES?

[:SOURce[<n>]]:VOLTage:PROTection:CLEar

:OUTPut:OVP[:STATe]

Syntax :OUTPut:OVP[:STATe] [CH1|CH2|CH3,]{ON|OFF}

:OUTPut:OVP[:STATe]? [CH1|CH2|CH3]

Description Enable or disable the overvoltage protection (OVP) function of the specified channel.

Query the status of the overvoltage protection (OVP) function of the specified channel.

Parameter

Name	Type	Range	Default
[CH1|CH2|CH3]	Discrete	CH1|CH2|CH3	None
{ON|OFF}	Bool	ON|OFF	OFF

Explanation

- When the overvoltage protection function is enabled, the output will turn off automatically when the output voltage exceeds the overvoltage protection value currently set (:OUTPut:OVP:VALue). You can send the :OUTPut:OVP:ALAR? or :OUTPut:OVP:QUES? command to query whether overvoltage protection occurred on the specified channel currently.
- When [CH1|CH2|CH3] is omitted, the system performs the corresponding operation on the current channel.

Return Format The query returns ON or OFF.

Example

```
:OUTP:OVP CH1,ON      /*Enable the overvoltage protection function of CH1*/
:OUTP:OVP? CH1        /*Query the status of the overvoltage protection function
                        of CH1 and the query returns ON*/
```

Related Commands :OUTPut:OVP:ALAR?

:OUTPut:OVP:QUES?

:OUTPut:OVP:VALue

:OUTPut:OVP:VALue

Syntax :OUTPut:OVP:VALue [CH1|CH2|CH3,]{<value>|MINimum|MAXimum}

:OUTPut:OVP:VALue? {CH1|CH2|CH3}[,MINimum|MAXimum]

:OUTPut:OVP:VALue? [MINimum|MAXimum]

Description Set the overvoltage protection (OVP) value of the specified channel.

Query the overvoltage protection (OVP) value of the specified channel.

Query the overvoltage protection (OVP) value of the current channel.

Parameter

Name	Type	Range	Default
[CH1|CH2|CH3]	Discrete	CH1|CH2|CH3	None
<value>	Real	Refer to Table 2-2	
{CH1|CH2|CH3}	Discrete	CH1|CH2|CH3	None

Explanation

- When the overvoltage protection function is enabled, the output will turn off automatically when the output voltage exceeds the overvoltage protection value currently set. You can send the :OUTPut:OVP:ALAR? or :OUTPut:OVP:QUES? command to query whether overvoltage protection occurred on the specified channel currently.
- When [CH1|CH2|CH3] is omitted, the system sets or queries the OVP value of the current channel.
- You can also send the [:SOURce[<n>]]:VOLTage:PROTection[:LEVel] command to set the OVP value of the specified channel.

Return Format The query returns the overvoltage protection value, for example, 8.800.

Example

```
:OUTP:OVP:VAL CH1,8.8    /*Set the overvoltage protection value of CH1 to 8.8V*/
:OUTP:OVP:VAL? CH1       /*Query the overvoltage protection value of CH1 and
                           the query returns 8.800*/
```

Related Commands

:OUTPut:OVP:ALAR?

:OUTPut:OVP:QUES?

:OUTPut:OVP[:STATe]

[:SOURce[<n>]]:VOLTage:PROTection[:LEVel]

:OUTPut:RANGe

Syntax :OUTPut:RANGe {P20V|P40V|LOW|HIGH}

:OUTPut:RANGe?

Description Select the current range of the channel.

Query the range currently selected of the channel.

Parameter

Name	Type	Range	Default
{P20V|P40V|LOW|HIGH}	Discrete	P20V|P40V|LOW|HIGH	P20V

Explanation

- This command is only applicable to single-channel model (DP811A/DP811).
- P20V or LOW represents Range1: 20V/10A and P40V or HIGH represents Range2: 40V/5A.
- You can also send the [:SOURce[<n>]]:VOLTage:RANGe command to select the current range.

Return Format The query returns the rated voltage and current values of the range selected, for example, 20V/10A。

Example

```
:OUTP:RANG P20V      /*Select Range1: 20V/10A as the current range*/
:OUTP:RANG?          /*Query the range currently selected and the query returns 20V/10A*/
:OUTP:RANG HIGH      /*Select Range2: 40V/5A as the current range*/
:OUTP:RANG?          /*Query the range currently selected and the query returns 40V/5A*/
```

Related Command [:SOURce[<n>]]:VOLTage:RANGe

:OUTPut:SENSe

Syntax :OUTPut:SENSe [CH1|CH2|CH3,]{ON|OFF}

:OUTPut:SENSe? [CH1|CH2|CH3]

Description Enable or disable the Sense function of the channel.

Query the status of the Sense function of the channel.

Parameter

Name	Type	Range	Default
[CH1|CH2|CH3]	Discrete	CH1|CH2|CH3	None
{ON|OFF}	Bool	ON|OFF	OFF

Explanation

- In large current output, to ensure that the load can acquire accurate voltage drop, CH2 of DP821A/DP821 and DP811A/DP811 provide Sense (remote sense) working mode. In this mode, the voltage at the load terminal instead of the output voltage of the power supply is measured to compensate the voltage drop caused by the load lead automatically.
- This command is only applicable to the channels (DP821A/DP821 (CH2) and DP811A/DP811) that support the Sense function. For channels that do not support the Sense function, the query returns NONE.
- DP821A/DP821/DP811A/DP811 provides output terminal on the front panel for the Sense working mode. Besides, the output interface on the rear panel of DP811A/DP811 can also be used for the Sense working mode. But, only one output mode can be selected at one time and the output terminal on the front panel can provide higher precision than the output interface on the rear panel.

Return Format The query returns ON or OFF. For channels that do not support the Sense function, the query returns NONE.

Example :OUTP:SENS CH1,ON /*Enable the Sense function of the DP811A channel*/

:OUTP:SENS? CH1 /*Query the status of the Sense function of the DP811A channel and the query returns ON*/

:OUTPut[:STATe]

Syntax :OUTPut[:STATe] [CH1|CH2|CH3,]{ON|OFF}

:OUTPut[:STATe]? [CH1|CH2|CH3]

Description Enable or disable the output of the specified channel.

Query the output status of the specified channel.

Parameter

Name	Type	Range	Default
[CH1|CH2|CH3]	Discrete	CH1|CH2|CH3	None
{ON|OFF}	Bool	ON|OFF	OFF

Explanation

- Make sure that the current setting will not affect the device connected to the power supply before enabling the channel output.
- When [CH1|CH2|CH3] is omitted, the system performs the corresponding operation on the current channel.

Return Format The query returns ON or OFF.

Example :OUTP CH1,ON /*Enable the output of CH1*/

:OUTP? CH1 /*Query the current output status of CH1 and the query returns ON*/

:OUTPut:TIMEr

Syntax :OUTPut:TIMEr {P8V|P30V|N30V},<secnum>,<volt>,<curr>,<time>

:OUTPut:TIMEr? {P8V|P30V|N30V}

Description Set the specified group of timer parameters of the specified channel.

Query the first 5 groups of timer parameters (the group numbers are 0 to 4) of the specified channel.

Parameter

Name	Type	Range	Default
{P8V|P30V|N30V}	Discrete	P8V|P30V|N30V	None
<secnum>	Integer	0 to 2047	None
<volt>	Real	Voltage range of the current channel	CH1/CH2: 1V CH3: -1V
<curr>	Real	Current range of the current channel	1A
<time>	Real	1s to 99999s	1s

Explanation

- <secnum> is the group number of the specified group of timer parameters. <volt>, <curr> and <time> are the voltage, current and time of this group of timer parameters respectively and the units are V, A and s respectively.
- You can also send the :TIMEr:PARAmeter command to set or query the timer parameters.

Return Format The query returns a string. The format of each group of timer parameters is "number,voltage,current,time". Multiple groups of parameters are separated by ";".

Example

```
:OUTP:TIME P8V,1,5,1,10    /*Set the timer parameters of group 1 of CH1 to 5V, 1A and 10s*/
:OUTP:TIME? P8V            /*Query the first 5 groups of timer parameters of CH1. The query returns 0,1.000,1.0000,1;1,5.000,1.0000,10;2,1.000,1.0000,1;3,1.000,1.0000,1;4,1.000,1.0000,1*/
```

Related Command :TIMEr:PARAmeter

:OUTPut:TIMEr:STATe

Syntax :OUTPut:TIMEr:STATe {P8V|P30V|N30V},{ON|OFF}

:OUTPut:TIMEr:STATe? {P8V|P30V|N30V}

Description Turn on or off the timer output function of the specified channel.

Query the state of the timer output function of the specified channel.

Parameter

Name	Type	Range	Default
{P8V|P30V|N30V}	Discrete	P8V|P30V|N30V	None
{ON|OFF}	Bool	ON|OFF	OFF

Explanation

- Turning on the timer will change the output state of the channel; therefore, make sure that the output state change will not affect the devices connected to the power supply before turning on the timer.
- The timer output is valid when both the timer and the channel output are turned on.
- You cannot modify the timer parameters when the timer is turned on.
- For multi-channel models, you can send the :INSTrument[:SELEct], :INSTrument[:SELect] or :INSTrument:NSELect command to switch the current channel as well as set the timer parameters of the channel selected and turn on or off the timer.
- The timer and delayer (:DELAY[:STATe]) canot be turned on at the same time.
- You can also send the :TIMEr[:STATe] command to turn on or off the timer output function.

Return Format The query returns ON or OFF.

Example

```
:OUTP:TIME:STAT P8V,ON      /*Turn on the timer output function of CH1*/
:OUTP:TIME:STAT? P8V        /*Query the state of the timer output function of CH1
                              and the query returns ON*/
```

Related Commands

:INSTrument[:SELEct]

:INSTrument[:SELect]

:INSTrument:NSELect

:DELAY[:STATe]

:TIMEr[:STATe]

:OUTPut:TRACk

Syntax :OUTPut:TRACk [CH1|CH2|CH3,]{ON|OFF}

:OUTPut:TRACk? [CH1|CH2|CH3]

Description Enable or disable the track function of the specified channel.

Query the status of the track function of the specified channel.

Parameter

Name	Type	Range	Default
[CH1|CH2|CH3]	Discrete	CH1|CH2|CH3	None
{ON|OFF}	Bool	ON|OFF	OFF

Explanation

- This command is only applicable to channels supporting the track function: CH2 and CH3 of DP831A/DP831 as well as CH1 and CH2 of DP832A/DP832.
- For two channels supporting the track function, when only the track function of one of the two channels is enabled, the voltage setting value of the other channel will change accordingly when the voltage setting value of this channel is changed; when the track functions of both of the two channels are enabled, the voltage setting value of the other channel will change accordingly when the voltage setting value of any of the two channels is changed.
- By default, the track function is disabled and it is usually used to provide symmetric voltage for the calculation amplifier or other circuits.
- The track function only tracks the voltage setting value and the actual output voltage will not be affected.

Return Format The query returns ON or OFF. For channels that do not support the track function, the query returns NONE.

Example

```
:OUTP:TRAC CH2,ON        /*Enable the track function of CH2 of DP831A*/
:OUTP:TRAC? CH2          /*Query the status of the track function of CH2 of
                          DP831A and the query returns ON*/
```

:PRESet Commands

The :PRESet commands are used to set channel voltage/current values and OVP/OCP values as well as enable or disable the OVP/OCP functions, over-temperature function and track function (the track function is only applicable to channels that support the track function: CH2 and CH3 of DP831A/DP831, CH1 and CH2 of DP832A/DP832) of the user-defined setting. The default voltage/current values of each channel in the user-defined setting of different models of DP800 series are as shown in the table below.

Table 2-3 Default voltage/current value of each channel in the user-defined setting of different models of DP800 series

Channel	USER1	USER2	USER3	USER4
DP831A				
CH1 (8V/5A) CH2 (30V/2A) CH3 (-30V/2A)	1.500V/0.5000A 03.300V/1.0000A -05.000V/1.0000A	3.300V/1.0000A 04.200V/1.0000A -04.200V/1.0000A	3.300V/1.0000A 05.000V/1.5000A -08.000V/1.5000A	5.000V/1.0000A 12.000V/2.0000A -12.000V/2.0000A
DP832A				
CH1 (30V/3A) CH2 (30V/3A) CH3 (5V/3A)	03.300V/1.000A 03.300V/1.000A 1.500V/1.000A	04.200V/1.000A 04.200V/1.000A 4.200V/1.000A	05.000V/2.000A 08.000V/2.000A 3.300V/1.000A	12.000V/3.000A 24.000V/3.000A 5.000V/2.000A
DP821A				
CH1 (60V/1A) CH2 (8V/10A)	03.300V/1.0000A 3.300V/01.000A	04.200V/1.0000A 4.200V/01.000A	08.000V/1.0000A 5.000V/02.000A	24.000V/1.0000A 8.000V/03.000A
DP811A				
CH1 (20V/10A)	03.300V/01.0000A	04.200V/01.0000A	05.000V/02.0000A	12.000V/03.0000A
DP831[1]				
CH1 (8V/5A) CH2 (30V/2A) CH3 (-30V/2A)	1.500V/0.500A 03.30V/1.000A -05.00V/1.000A	3.300V/1.000A 04.20V/1.000A -04.20V/1.000A	3.300V/1.000A 05.00V/1.500A -08.00V/1.500A	5.000V/1.000A 12.00V/2.000A -12.00V/2.000A
DP832[1]				
CH1 (30V/3A) CH2 (30V/3A) CH3 (5V/3A)	03.30V/1.000A 03.30V/1.000A 1.50V/1.000A	04.20V/1.000A 04.20V/1.000A 4.20V/1.000A	05.00V/2.000A 08.00V/2.000A 3.30V/1.000A	12.00V/3.000A 24.00V/3.000A 5.00V/2.000A
DP821[1]				
CH1 (60V/1A) CH2 (8V/10A)	03.30V/1.000A 3.30V/01.00A	04.20V/1.000A 4.20V/01.00A	08.00V/1.000A 5.00V/02.00A	24.00V/1.000A 8.00V/03.00A
DP811[1]				
CH1 (20V/10A)	03.30V/01.00A	04.20V/01.00A	05.00V/02.00A	12.00V/03.00A

Note[1]: When DP831 (DP832, DP821 or DP811) is installed with the high resolution option, its default voltage/current value of each channel of each user-defined setting are the same with those of DP831A (DP832A, DP821A or DP811A).

Command List:

- :PRESet[:APPLy]
- :PRESet:KEY
- :PRESet:USER[<n>]:SET:CURRent
- :PRESet:USER[<n>]:SET:DEFault
- :PRESet:USER[<n>]:SET:OCP
- :PRESet:USER[<n>]:SET:OTP
- :PRESet:USER[<n>]:SET:OVP
- :PRESet:USER[<n>]:SET:SURE
- :PRESet:USER[<n>]:SET:TRACk
- :PRESet:USER[<n>]:SET:VOLTage

Note: When [<n>] is omitted, the operation is performed on the user-defined setting currently selected by default.

:PRESet[:APPLy]

Syntax :PRESet[:APPLy]

Description Restore the instrument to the default setting or recall the specified user-defined setting.

Explanation Sending this command is equivalent to pressing **Preset** at the front panel, namely recalling the default setting or the specified user-defined setting (depend on the :PRESet:KEY command).

Related Command :PRESet:KEY

:PRESet:KEY

Syntax :PRESet:KEY {DEFAULT|USER1|USER2|USER3|USER4}

:PRESet:KEY?

Description Define the setting recalled by **Preset** at the front panel.

Query the setting recalled by **Preset** at the front panel.

Parameter

Name	Type	Range	Default
{DEFAULT|USER1|USER2|USER3|USER4}	Discrete	DEFAULT|USER1|USER2|USER3|USER4	DEFAULT

Explanation

- DP800 supports to restore the instrument to the default setting (DEFAULT) or recall the user-defined setting (USER1, USER2, USER3 and USER4).
- After sending this command to define the setting recalled by **Preset** at the front panel, sending the :PRESet[:APPLy] command or pressing **Preset** at the front panel can restore the instrument to the default setting or recall the specified user-defined setting.
- When user-defined setting is selected, you can use the :PRESet:USER:SET series commands to set the parameters of the user-defined setting currently selected.

Return Format The query returns DEFAULT, USER1, USER2, USER3 or USER4.

Example

```
:PRES:KEY USER1    /*Define the setting recalled by Preset at the front panel to
                     the first group of user-defined setting*/
:PRES:KEY?         /*Query the setting recalled by Preset at the front panel and
                     the query returns USER1*/
```

Related Command :PRESet[:APPLy]

:PRESet:USER[<n>]:SET:CURRent

Syntax :PRESet:USER[<n>]:SET:CURRent {<current>|MINimum|MAXimum}

:PRESet:USER[<n>]:SET:CURRent? [MINimum|MAXimum]

Description Set the current value of the current channel in the specified user-defined setting.

Query the current value of the current channel in the specified user-defined setting.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2|3|4	None
<current>	Real	Current range of the current channel	Refer to Table 2-3

Explanation

- When [<n>] is 1, 2, 3 or 4, the system sets the related parameters of the first, second, third or fourth group of user-defined setting respectively. When [<n>] is omitted, the system sets the parameters of the user-defined setting currently selected by default.
- For the current range of the current channel, please refer to Table 2-1.
- By default, this command sets the parameter of the channel currently selected. For multi-channel models, if you want to set the corresponding parameters of other channels, please use the :INSTrument:NSELect, :INSTrument[:SELEct] or :INSTrument[:SELect] command to set the desired channel as the current channel.
- You can send the :PRESet:USER[<n>]:SET:DEFault command to restore the parameters of the specified user-defined setting to the default values.

Return Format The query returns the current value, for example, 1.5000.

Example

:PRES:USER1:SET:CURR 1.5 /*Set the current of the current channel in the first group of user-defined setting to 1.5A*/

:PRES:USER1:SET:CURR? /*Query the current of the current channel in the first group of user-defined setting and the query returns 1.5000*/

Related Commands

:INSTrument:NSELect

:INSTrument[:SELEct]

:INSTrument[:SELect]

:PRESet:USER[<n>]:SET:DEFault

:PRESet:USER[<n>]:SET:DEFault

Syntax :PRESet:USER[<n>]:SET:DEFault

Description Restore the parameters of the specified user-defined setting to default values.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2|3|4	None

Explanation

- For the default voltage/current values of each channel in the user-defined settings, please refer to Table 2-3; the default OVP/OCP values are the maximum OVP/OCP values of the current channel.
- When [<n>] is 1, 2, 3 or 4, the system sets the related parameters of the first, second, third or fourth group of user-defined setting respectively. When [<n>] is omitted, the system sets the parameters of the user-defined setting currently selected by default.

:PRESet:USER[<n>]:SET:OCP

Syntax :PRESet:USER[<n>]:SET:OCP {ON|OFF}[,<current>|MINimum|MAXimum]

:PRESet:USER[<n>]:SET:OCP? [MINimum|MAXimum]

Description Enable or disable the overcurrent protection (OCP) function of the current channel in the specified user-defined setting and set the overcurrent protection value.

Query the status and value of the overcurrent protection (OCP) function of the current channel in the specified user-defined setting.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2|3|4	None
{ON|OFF}	Bool	ON|OFF	OFF
<current>	Real	Refer to the "Explanation"	

Explanation

- When [<n>] is 1, 2, 3 or 4, the system sets the related parameters of the first, second, third or fourth group of user-defined setting respectively. When [<n>] is omitted, the system sets the parameters of the user-defined setting currently selected by default.
- By default, this command sets the parameters of the channel currently selected. For multi-channel models, if you want to set the parameters of other channels, please use the :INSTrument:NSELect, :INSTrument[:SELEct] or :INSTrument[:SELect] command to set the desired channel as the current channel.
- For multi-channel models, the range of <current> is the OCP settable range of of the current channel and the default is the default OCP value (refer to Table 2-2) of the current channel; for DP811A, the range of <current> is from 0.1mA to 11A and the default is 03.3000A; for DP811, the range of <current> is from 10mA to 11A and the default is 03.30A.

Return Format The query returns the status and value (separated by comma) of the OCP function of the current channel in the specified user-defined setting, for example, ON,1.5000.

Example

```
:PRES:USER1:SET:OCP ON,1.5      /*Enable the OCP function of the current channel in the first group of user-defined setting and set the OCP value to 1.5A*/
:PRES:USER1:SET:OCP?            /*Query the status and value of the OCP function of the current channel in the first group of user-defined setting and the query returns ON,1.5000*/
```

Related Commands

:INSTrument:NSELect

:INSTrument[:SELEct]

:INSTrument[:SELect]

:PRESet:USER[<n>]:SET:OTP

Syntax :PRESet:USER[<n>]:SET:OTP {ON|OFF}

:PRESet:USER[<n>]:SET:OTP?

Description Enable or disable the over-temperature protection (OTP) function of the specified user-defined setting.

Query the status of the over-temperature protection (OTP) function of the specified user-defined setting.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2|3|4	None
{ON|OFF}	Bool	ON|OFF	ON

Explanation When [<n>] is 1, 2, 3 or 4, the system sets the related parameters of the first, second, third or fourth group of user-defined setting respectively. When [<n>] is omitted, the system sets the parameters of the user-defined setting currently selected by default.

Return Format The query returns ON or OFF.

Example

```
:PRES:USER1:SET:OTP ON      /*Enable the OTP function of the first group of the user-defined setting*/
:PRES:USER1:SET:OTP?        /*Query the status of the OTP function of the first group of the user-defined setting and the query returns ON*/
```

:PRESet:USER[<n>]:SET:OVP

Syntax :PRESet:USER[<n>]:SET:OVP {ON|OFF}[,<voltage>|MINimum|MAXimum]

:PRESet:USER[<n>]:SET:OVP? [MINimum|MAXimum]

Description Enable or disable the overvoltage protection (OVP) function of the current channel in the specified user-defined setting and set the overvoltage protection value.

Query the status and value of the overvoltage protection (OVP) function of the current channel in the specified user-defined setting.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2|3|4	None
{ON|OFF}	Bool	ON|OFF	OFF
<voltage>	Real	Refer to the "Explanation"	

Explanation

- When [<n>] is 1, 2, 3 or 4, the system sets the related parameters of the first, second, third or fourth group of user-defined setting respectively. When [<n>] is omitted, the system sets the parameters of the user-defined setting currently selected by default.
- By default, this command sets the parameters of the channel currently selected. For multi-channel models, if you want to set the parameters of other channels, please use the :INSTrument:NSELect, :INSTrument[:SELEct] or :INSTrument[:SELect] command to set the desired channel as the current channel.
- For multi-channel models, the range of <voltage> is the OVP settable range of the current channel and the default is the default OVP value (refer to Table 2-2) of the current channel; for DP811A, the range of <voltage> is from 1mV to 44V and the default is 33.000V; for DP811, the range of <voltage> is from 10mV to 44V and the default is 33.00V.

Return Format The query returns the status and value (separated by comma) of the OVP function of the current channel in the specified user-defined setting, for example, ON,8.800.

Example

```
:PRES:USER1:SET:OVP ON,8.8    /*Enable the OVP function of the current channel
                                in the first group of user-defined setting and set
                                the OVP value to 8.8V*/
:PRES:USER1:SET:OVP?          /*Query the status and value of the OVP function of
                                the current channel in the first group of
                                user-defined setting and the query returns
                                ON,8.800*/
```

Related Commands

:INSTrument:NSELect

:INSTrument[:SELEct]

:INSTrument[:SELect]

:PRESet:USER[<n>]:SET:SURE

Syntax :PRESet:USER[<n>]:SET:SURE

Description Confirm the parameter and status settings of the specified user-defined setting.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2|3|4	None

Explanation

- Executing this command will save the channel voltage, current, OVP and OCP status, OVP and OCP values, channel track status as well as the OTP status of the specified user-defined setting.
- When [<n>] is 1, 2, 3 or 4, the system sets the related parameters of the first, second, third or fourth group of user-defined setting respectively. When [<n>] is omitted, the system sets the parameters of the user-defined setting currently selected by default.

:PRESet:USER[<n>]:SET:TRACk

Syntax :PRESet:USER[<n>]:SET:TRACk {ON|OFF}

:PRESet:USER[<n>]:SET:TRACk?

Description Enable or disable the track function of the current channel in the specified user-defined setting.

Query the status of the track function of the current channel in the specified user-defined setting.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2|3|4	None
{ON|OFF}	Bool	ON|OFF	OFF

Explanation

- This command is only applicable to channels supporting the track function: CH2 and CH3 of DP831A/DP831 as well as CH1 and CH2 of DP832A/DP832.
- When [<n>] is 1, 2, 3 or 4, the system sets the related parameters of the first, second, third or fourth group of user-defined setting respectively. When [<n>] is omitted, the system sets the parameters of the user-defined setting currently selected by default.
- By default, this command sets the status of the track function of the channel currently selected. For multi-channel models, if you want to set the parameters of other channels, please use the :INSTrument:NSELect, :INSTrument[:SELEct] or :INSTrument[:SELect] command to set the desired channel as the current channel.

Return Format The query returns ON or OFF. For channels that do not support the track function, the query returns NONE.

Example

```
:PRES:USER1:SET:TRAC ON      /*Enable the track function of the current channel in the first group of user-defined setting*/
:PRES:USER1:SET:TRAC?        /*Query the status of the track function of the current channel in the first group of user-defined setting and the query returns ON*/
```

Related Commands :INSTrument:NSELect

:INSTrument[:SELEct]

:INSTrument[:SELect]

:PRESet:USER[<n>]:SET:VOLTage

Syntax :PRESet:USER[<n>]:SET:VOLTage {<voltage>|MINimum|MAXimum}

:PRESet:USER[<n>]:SET:VOLTage? [MINimum|MAXimum]

Description Set the voltage of the current channel of the specified user-defined setting.

Query the voltage of the current channel of the specified user-defined setting.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2|3|4	None
<voltage>	Real	Voltage range of the current channel	Refer to Table 2-3

Explanation

- When [<n>] is 1, 2, 3 or 4, the system sets the related parameters of the first, second, third or fourth group of user-defined setting respectively. When [<n>] is omitted, the system sets the parameters of the user-defined setting currently selected by default.
- For the voltage range of the current channel, please refer to Table 2-1.
- By default, this command sets the parameters of the channel currently selected. For multi-channel models, if you want to set the parameters of other channels, please use the :INSTrument:NSELect, :INSTrument[:SELEct] or :INSTrument[:SELect] command to set the desired channel as the current channel.
- You can send the :PRESet:USER[<n>]:SET:DEFault command to restore the parameters of the specified user-defined setting to the default values.

Return Format The query returns the voltage, for example, 5.000.

Example

```
:PRES:USER1:SET:VOLT 5      /*Set the voltage of the current channel in the first group of user-defined setting to 5V*/
:PRES:USER1:SET:VOLT?       /*Query the voltage of the current channel in the first group of user-defined setting and the query returns 5.000*/
```

Related Commands

:INSTrument:NSELect

:INSTrument[:SELEct]

:INSTrument[:SELect]

:PRESet:USER[<n>]:SET:DEFault

:RECAll Commands

Command List:

- :RECAll:LOCal
- :RECAll:EXTErnal

:RECAll:LOCal

Syntax :RECAll:LOCal {1|2|3|4|5|6|7|8|9|10}

Description Recall the instrument state file stored in the specified storage location in the internal memory of the instrument.

Parameter

Name	Type	Range	Default
{1|2|3|4|5|6|7|8|9|10}	Discrete	1|2|3|4|5|6|7|8|9|10	None

Explanation

- {1|2|3|4|5|6|7|8|9|10} represent the corresponding storage locations in the internal memory of the instrument respectively.
- You can also send the *RCL or :MEMory[:STATe]:LOAD command to recall the instrument state file stored in the internal memory of the instrument.

Example :RECA:LOC 1 /*Recall the instrument state file stored in storage location 1 in the internal memory of the instrument*/

Related Commands *RCL
:MEMory[:STATe]:LOAD

:RECAll:EXTErnal

Syntax :RECAll:EXTErnal <file_name>

Description Recall the instrument state file stored in the root directory of the external memory of the instrument.

Parameter

Name	Type	Range	Default
<file_name>	ASCII string	Refer to the "Explanation"	None

Explanation

- <file_name> is the specified filename and does not include the filename suffix ".RSF".
- You can also send the :MMEMory:LOAD command to recall the instrument state file stored in the current operation directory of the external memory of the instrument.

Example :RECA:EXTE STA /*Recall the instrument state file named STA.RSF in the root directory of the external memory of the instrument*/

Related Command :MMEMory:LOAD

:RECorder Commands

Command List:

:RECorder:DESTination?

Syntax :RECorder:DESTination?

Description Query the storage directory of the record file.

Explanation

- Before enabling the recorder, use the :RECorder:MEMory or :RECorder:MMEMory command to set the storage directory.
- When the recorder is turned off, the instrument stores the record file to the specified storage directory using the specified filename.

Return Format The query returns the current storage directory of record file, for example, C:\REC 10:RIGOL.ROF.

Related Commands

:RECorder:MEMory

:RECorder:MMEMory

:RECorder[:STATe]

:RECorder:MEMory

Syntax :RECorder:MEMory {1|2|3|4|5|6|7|8|9|10},<filename>

Description Store the record file to the specified storage location in the internal memory with the specified filename.

Parameter

Name	Type	Range	Default
{1|2|3|4|5|6|7|8|9|10}	Discrete	1|2|3|4|5|6|7|8|9|10	10
<filename>	ASCII string	Refer to the "Explanation"	RIGOL.ROF

Explanation

- At most 10 record files can be stored in the DP800 internal memory. {1|2|3|4|5|6|7|8|9|10} represents the 10 record file storage locations in the internal memory respectively.
- <filename> is the filename of the record file. Its format is <name>.ROF; wherein, <name> is the name of the file and can be Chinese characters, English characters or numbers (a Chinese character is counted as two characters) with up to 9 characters; .ROF is the suffix of the record file and can be omitted.
- You cannot set the record period and storage directory when the recorder is enabled (:RECorder[:STATe]); please set the desired storage directory before enabling the recorder.
- You can use the :RECorder:MMEMory command to store the record file to the external memory with the specified filename or use the :RECorder:DESTination? command to query the current storage directory.
- When the recorder is turned off, the instrument stores the record file to the specified storage directory using the specified filename.

Example

```
:REC:MEM 5,TEST1    /*Store the record file to record file storage location 5 in the internal memory with the filename "TEST1.ROF"*/
```

Related Commands

:RECorder:DESTination?

:RECorder:MMEMory

:RECorder[:STATe]

:RECorder:MMEMory

Syntax :RECorder:MMEMory <dest>

Description Store the record file to the specified storage directory in the external memory.

Parameter

Name	Type	Range	Default
<dest>	ASCII string	Valid directory of the external memory	None

Explanation

- This command is only available when an USB storage device (D disk) is detected.
- <dest> is the specified storage directory in the external memory. Its format is <name>.ROF; wherein, <name> is the name of the file and can be Chinese characters, English characters or numbers (a Chinese character is counted as two characters); .ROF is the suffix of the record file and cannot be omitted.
- You cannot set the record period and storage directory when the recorder is enabled (:RECorder[:STATe]); please set the desired storage directory before enabling the recorder.
- You can use the :RECorder:MEMory command store the record file to the internal memory with the specified filename or use the :RECorder:DESTination? command to query the current storage directory.
- When the recorder is turned off, the instrument stores the record file to the specified storage directory using the specified filename.

Example

```
:REC:MMEM D:\RA.ROF    /*Store the record file to the external memory with the
                         filename "RA.ROF"*/
```

Related Commands :RECorder:DESTination?

:RECorder:MEMory

:RECorder[:STATe]

:RECorder:PERIod

Syntax :RECorder:PERIod <value>

:RECorder:PERIod?

Description Set the record period of the recorder.

Query the current record period of the recorder.

Parameter

Name	Type	Range	Default
<value>	Integer	1s to 99999s	1s

Explanation

- The record period refers to the time interval at which the instrument samples and records the output of each channel when the recorder is enabled.
- You cannot set the record period and storage directory when the recorder is enabled (:RECorder[:STATe]); please set the desired storage directory before enabling the recorder.

Return Format The query returns an integer from 1 to 99999.

Example

```
:REC:PERI 5      /*Set the record period of the recorder to 5s*/
:REC:PERI?       /*Query the current record period of the recorder and the query
                   returns 5*/
```

Related Command :RECorder[:STATe]

:RECorder[:STATe]

Syntax :RECorder[:STATe] {ON|OFF}

:RECorder[:STATe]?

Description Enable or disable the recorder.

Query the status of the recorder.

Parameter

Name	Type	Range	Default
{ON|OFF}	Bool	ON|OFF	OFF

Explanation

- When the recorder is enabled, you cannot set the record period and storage directory. The instrument samples and records the output of each channel at the time interval equaling the current record period.
- During the recording, make sure that the output of each channel is enabled. For the channel of which the output is disabled, the corresponding recorded data will be 0.
- When the recorder is disabled, the recording finishes and the instrument stores the record file to the storage directory currently set.

Return Format The query returns ON or OFF.

Example

:REC ON /*Enable the recorder*/

:REC? /*Query the current status of the recorder and the query returns ON*/

Related Commands

:RECorder:DESTination?

:RECorder:MEMory

:RECorder:MMEMory

:RECorder:PERIod

:SOURce Commands

The :SOURce commands are used to set the voltage, current, OVP and OCP values of the specified channel. Although the :APPLy command provides the most straightforward method to program the power supply over the remote interfaces, the :SOURce commands give you more flexibility to change individual parameters.

Command List:

- [:SOURce[<n>]]:CURRent[:LEVel][:IMMediate][:AMPLitude]
- [:SOURce[<n>]]:CURRent[:LEVel][:IMMediate]:STEP[:INCRement]
- [:SOURce[<n>]]:CURRent[:LEVel]:TRIGgered[:AMPLitude]
- [:SOURce[<n>]]:CURRent:PROTection:CLEar
- [:SOURce[<n>]]:CURRent:PROTection[:LEVel]
- [:SOURce[<n>]]:CURRent:PROTection:STATe
- [:SOURce[<n>]]:CURRent:PROTection:TRIPped?
- [:SOURce[<n>]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]
- [:SOURce[<n>]]:VOLTage[:LEVel][:IMMediate]:STEP[:INCRement]
- [:SOURce[<n>]]:VOLTage[:LEVel]:TRIGgered[:AMPLitude]
- [:SOURce[<n>]]:VOLTage:PROTection:CLEar
- [:SOURce[<n>]]:VOLTage:PROTection[:LEVel]
- [:SOURce[<n>]]:VOLTage:PROTection:STATe
- [:SOURce[<n>]]:VOLTage:PROTection:TRIPped?
- [:SOURce[<n>]]:VOLTage:RANGe

Note: When [:SOURce[<n>]] or [<n>] is omitted, the parameter of the channel currently selected will be set by default.

[:SOURce[<n>]]:CURRent[:LEVel][:IMMediate][:AMPLitude]

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

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

Description Set the current of the specified channel.

Query the current of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Integer	1|2|3	1
<current>	Real	Refer to Table 2-1	

Explanation

- When [:SOURce[<n>]] or [<n>] is omitted, the command sets the corresponding parameter of the channel currently selected by default.
- When <current> is selected, the system sets the current of the specified channel directly; when MINimum or MAXimum is selected, the system sets the current of the specified channel to the minimum or maximum (refer to Table 2-1) within the current range of this channel (multi-channel models) or the range currently selected of the channel (single-channel model); when UP or DOWN is selected, the system increases or reduces the current at the step set by the [:SOURce[<n>]]:CURRent[:LEVel][:IMMediate]:STEP[:INCRement] command.
- You can also send the :APPLy command to set the voltage and current of the specified channel.

Return Format The query returns the current of the specified channel, for example, 1.5000.

Example

```
:CURR 1.5      /*Set the current of the current channel to 1.5A*/
:CURR?         /*Query the current setting value of the current channel and the query returns 1.5000*/
```

Related Commands :APPLy

[:SOURce[<n>]]:CURRent[:LEVel][:IMMediate]:STEP[:INCRement]

[:SOURce[<n>]]:CURRent[:LEVel][:IMMediate]:STEP[:INCRement]

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

[:SOURce[<n>]]:CURRent[:LEVel][:IMMediate]:STEP[:INCRement]? [{DEFault}]

Description Set the step of the current change of the specified channel.

Query the step of the current change of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Integer	1|2|3	1
<numeric value>	Real	0 to the maximum current of the specified channel	Refer to the "Explanation"

Explanation

- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the corresponding parameter of the channel currently selected.
- <numeric value> is the step value specified. DEFault denotes the default value. The default values of <numeric value> are as shown in the table below.

Model	Default Value of <numeric value>
DP831A	CH1/CH2/CH3: 0.0001A
DP832A/DP832[1]	CH1/CH2/CH3: 0.001A
DP821A	CH1: 0.0001A; CH2: 0.001A
DP811A	CH1: 0.0001A
DP831[1]	CH1/CH2/CH3: 0.001A
DP821[1]	CH1: 0.001A; CH2: 0.01A
DP811[1]	CH1: 0.01A

Note[1]: When DP831 (DP832, DP821 or DP811) is installed with the high resolution option, its default step is the same with that of DP831A (DP832A, DP821A or DP811A).

- When the parameter in the [:SOURce[<n>]]:CURRent[:LEVel][:IMMediate][:AMPLitude] command is set to UP or DOWN, the current will increase or decrease at the step set by this command when this command is executed.

Return Format The query returns the step of the current change of the specified channel, for example, 0.1000A.

Example

```
:CURR:STEP 0.1      /*Set the step of the current change of the current channel to 0.1A*/
:CURR:STEP?         /*Query the step of the current change of the current channel and the query returns 0.1000A*/
```

Related Command [:SOURce[<n>]]:CURRent[:LEVel][:IMMediate][:AMPLitude]

[:SOURce[<n>]]:CURRent[:LEVel]:TRIGgered[:AMPLitude]

Syntax [:SOURce[<n>]]:CURRent[:LEVel]:TRIGgered[:AMPLitude] {<current>|MIN|MAX}

[:SOURce[<n>]]:CURRent[:LEVel]:TRIGgered[:AMPLitude]? {|MIN|MAX}

Description Set the trigger current of the specified channel.

Query the trigger current of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Integer	1|2|3	1
<current>	Real	0 to the maximum current of the specified channel	0.1A

Explanation

- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the corresponding parameter of the channel currently selected.
- When the trigger source (:TRIGger[:SEQuence]:SOURce or :TRIGger:IN:CHTYpe) is set to "IMM" (immediate trigger), the system executes a complete trigger operation (the voltage/current of the specified channel change to the trigger voltage/current currently set immediately) when executing the :INITiate or :TRIGger:IN:IMMEdiate command.
- When the trigger source (:TRIGger[:SEQuence]:SOURce or :TRIGger:IN:CHTYpe) is set to "BUS" (bus trigger, namely software trigger), the system generates a trigger by executing the *TRG command after executing the :INITiate or :TRIGger:IN:IMMEdiate command to initialize the trigger system. Then, the power supply executes a trigger operation (the voltage/current of the specified channel change to the trigger voltage/current currently set) after the specified delay time (if the delay time is set, :TRIGger[:SEQuence]:DELay).
- You can also send the :TRIGger:IN:CURRent command to set the trigger current of the specified channel.

Return Format The query returns the trigger current of the specified channel, for example, 1.0000A.

Example

```
:CURR:TRIG 1      /*Set the trigger current of the current channel to 1A*/
:CURR:TRIG?       /*Query the trigger current of the current channel and the query
                    returns 1.0000A*/
```

Related Commands

:TRIGger[:SEQuence]:SOURce

:TRIGger:IN:CHTYpe

:INITiate

:TRIGger:IN:IMMEdiate

*TRG

:TRIGger[:SEQuence]:DELay

:TRIGger:IN:CURRent

[:SOURce[<n>]]:CURRent:PROTection:CLEar

Syntax [:SOURce[<n>]]:CURRent:PROTection:CLEar

Description Clear the circuit and label of the OCP occurred on the specified channel and turn on the output of the corresponding channel.

Parameter

Name	Type	Range	Default
[<n>]	Integer	1|2|3	1

Explanation

- You can send the [:SOURce[<n>]]:CURRent:PROTection:TRIPped? command to query whether OCP occurred on the specified channel.
- Before executing the command, make sure that the reason that causes the OCP on the specified channel is cleared (you can decrease the output current to be below the OCP value or increase the OCP value to be greater than the output current); otherwise, the command is invalid. Executing this command will clear the circuit and label of the OCP occurred on the specified channel and turn on the output of the corresponding channel.
- When [:SOURce[<n>]] or [<n>] is omitted, the system clears the circuit and label of the OCP occurred on the current channel.
- You can send the :OUTPut:OCP:CLEAR command to only clear the label of the OCP occurred on the specified channel.

Example

:CURR:PROT:TRIP? /*Query whether OCP occurred on the current channel and the query returns YES*/

(Operation: decrease the output current to be below the OCP value or increase the OCP value to be greater than the output current)

:CURR:PROT:CLE /*Clear the circuit and label of the OCP occurred on the current channel*/

:CURR:PROT:TRIP? /*Query whether OCP occurred on the current channel and the query returns NO*/

Related Commands

:OUTPut:OCP:CLEAR

[:SOURce[<n>]]:CURRent:PROTection:TRIPped?

[:SOURce[<n>]]:CURRent:PROTection[:LEVel]

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

[:SOURce[<n>]]:CURRent:PROTection[:LEVel]? [{MINimum|MAXimum}]

Description Set the overcurrent protection (OCP) value of the specified channel.

Query the overcurrent protection (OCP) value of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Integer	1|2|3	1
<current>	Real	Refer to Table 2-2	

Explanation

- When the overcurrent protection function of the specified channel is enabled ([:SOURce[<n>]]:CURRent:PROTection:STATe), the output turns off automatically when the output current exceeds the overcurrent protection value currently set. You can send the [:SOURce[<n>]]:CURRent:PROTection:TRIPped? command to query whether overcurrent protection occurred on the specified channel currently.
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the corresponding parameter of the channel currently selected.
- You can also send the :OUTPut:OCP:VALue command to set the OCP value of the specified channel.

Return Format The query returns the overcurrent protection value of the specified channel, for example, 5.0000.

Example

```
:CURR:PROT 5     /*Set the OCP value of the current channel to 5A*/
:CURR:PROT?      /*Query the OCP value of the current channel and the query
                   returns 5.0000*/
```

Related Commands

[:SOURce[<n>]]:CURRent:PROTection:STATe

[:SOURce[<n>]]:CURRent:PROTection:TRIPped?

:OUTPut:OCP:VALue

[:SOURce[<n>]]:CURRent:PROTection:STATe

Syntax [:SOURce[<n>]]:CURRent:PROTection:STATe {ON|OFF}

[:SOURce[<n>]]:CURRent:PROTection:STATe?

Description Enable or disable the overcurrent protection (OCP) function of the specified channel.

Query the status of the overcurrent protection (OCP) function of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Integer	1|2|3	1
{ON|OFF}	Bool	ON|OFF	OFF

Explanation

- When the overcurrent protection function is enabled, the output turns off automatically when the output current exceeds the overcurrent protection value currently set. You can send the [:SOURce[<n>]]:CURRent:PROTection:TRIPped? command to query whether overcurrent protection occurred on the specified channel.
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the corresponding parameter of the channel currently selected.
- You can also send the :OUTPut:OCP[:STATe] command to enable or disable the OCP function of the specified channel.
- You can send the [:SOURce[<n>]]:CURRent:PROTection[:LEVel] command to query the current OCP value of the specified channel.

Return Format The query returns ON or OFF.

Example

```
:CURR:PROT:STAT ON     /*Enable the OCP function of the current channel*/
:CURR:PROT:STAT?       /*Query the status of the OCP function of the current
                       channel and the query returns ON*/
```

Related Commands

[:SOURce[<n>]]:CURRent:PROTection:TRIPped?

:OUTPut:OCP[:STATe]

[:SOURce[<n>]]:CURRent:PROTection[:LEVel]

[:SOURce[<n>]]:CURRent:PROTection:TRIPped?

Syntax [:SOURce[<n>]]:CURRent:PROTection:TRIPped?

Description Query whether OCP occurred on the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Integer	1|2|3	1

Explanation

- OCP refers to that the output turns off automatically when the actual output current of the channel exceeds the overcurrent protection value.
- When [:SOURce[<n>]] or [<n>] is omitted, the system queries whether OCP occurred on the current channel.
- You can also send the :OUTPut:OCP:ALAR? or :OUTPut:OCP:QUES? command to query whether OCP occurred on the specified channel.
- You can send the [:SOURce[<n>]]:CURRent:PROTection:CLEar command to clear the circuit and label of the OCP occurred on the specified channel.

Return Format The query returns YES or NO.

Example

```
:CURR:PROT:TRIP?    /*Query whether OCP occurred on the current channel and the query returns YES*/
```

Related Commands

:OUTPut:OCP:ALAR?

:OUTPut:OCP:QUES?

[:SOURce[<n>]]:CURRent:PROTection:CLEar

[:SOURce[<n>]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]

Syntax

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

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

Description

Set the voltage of the specified channel.

Query the voltage of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Integer	1|2|3	1
<voltage>	Real	Refer to Table 2-1	

Explanation

- When [:SOURce[<n>]] or [<n>] is omitted, the command sets the parameter of the channel currently selected by default.
- When <voltage> is selected, the system sets the voltage of the specified channel directly; when MINimum or MAXimum is selected, the system sets the voltage of the specified channel to the minimum or maximum (refer to Table 2-1) within the voltage range of this channel (multi-channel models) or the range currently selected of this channel (single-channel model); when UP or DOWN is selected, the system increases or reduces the voltage at the step set by the [:SOURce[<n>]]:VOLTage[:LEVel][:IMMediate]:STEP[:INCRement] command.
- You can also send the :APPLy command to set the voltage and current of the specified channel.

Return Format

The query returns the voltage setting value of the specified channel, for example, 7.500.

Example

```
:VOLT 7.5      /*Set the voltage of the current channel to 7.5V*/
:VOLT?         /*Query the voltage setting value of the current channel and the query returns 7.500*/
```

Related Commands

:APPLy

[:SOURce[<n>]]:VOLTage[:LEVel][:IMMediate]:STEP[:INCRement]

[:SOURce[<n>]]:VOLTage[:LEVel][:IMMediate]:STEP[:INCRement]

Syntax

[:SOURce[<n>]]:VOLTage[:LEVel][:IMMediate]:STEP[:INCRement] {<numericvalue>|DEFault}

[:SOURce[<n>]]:VOLTage[:LEVel][:IMMediate]:STEP[:INCRement]? [{DEFault}]

Description

Set the step of the voltage change of the specified channel.

Query the step of the voltage change of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Integer	1|2|3	1
<numeric value>	Real	0 to the maximum voltage of the specified channel	Refer to the "Explanation"

Explanation

- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the corresponding parameter of the channel currently selected.
- <numeric value> is the step value specified. DEFault denotes the default value. The default values of <numeric value> are as shown in the table below.

Model	Default Value of <numeric value>
DP831A/DP832A/DP821A/DP811A	0.001V
DP831[1]	CH1: 0.001V; CH2/CH3: 0.01V
DP832/DP821/DP811[1]	0.01V

Note[1]: When DP831 (DP832, DP821 or DP811) is installed with the high resolution option, its default step value is the same with that of DP831A (DP832A, DP821A or DP811A).

- When the parameter in the [:SOURce[<n>]]:VOLTage[:LEVel][:IMMediate][:AMPLitude] command is set to UP or DOWN, the voltage will increase or decrease at the step set by this command when this command is executed.

Return Format

The query returns the step of the voltage change of the specified channel, for example, 0.100V.

Example

```
:VOLT:STEP 0.1      /*Set the step of the voltage change of the current channel to 0.1V*/
:VOLT:STEP?         /*Query the step of the voltage change of the current channel and the query returns 0.100V*/
```

Related Command

[:SOURce[<n>]]:VOLTage[:LEVel][:IMMediate][:AMPLitude]

[:SOURce[<n>]]:VOLTage[:LEVel]:TRIGgered[:AMPLitude]

Syntax [:SOURce[<n>]]:VOLTage[:LEVel]:TRIGgered[:AMPLitude] {<voltage>|MIN|MAX}

[:SOURce[<n>]]:VOLTage[:LEVel]:TRIGgered[:AMPLitude? {MIN|MAX}

Description Set the trigger voltage of the specified channel.

Query the trigger voltage of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Integer	1|2|3	1
<voltage>	Real	0 to the maximum voltage of the specified channel	0V

Explanation

- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the corresponding parameter of the channel currently selected.
- When the trigger source (:TRIGger[:SEQuence]:SOURce or :TRIGger:IN:CHTYpe) is set to "IMM" (immediate trigger), the system executes a complete trigger operation (the voltage/current of the specified channel change to the trigger voltage/current currently set immediately) when executing the :INITiate or :TRIGger:IN:IMMEdiate command.
- When the trigger source (:TRIGger[:SEQuence]:SOURce or :TRIGger:IN:CHTYpe) is set to "BUS" (bus trigger, namely software trigger), the system generates a trigger by executing the *TRG command after executing the :INITiate or :TRIGger:IN:IMMEdiate command to initialize the trigger system. Then, the power supply executes a trigger operation (the voltage/current of the specified channel change to the trigger voltage/current currently set) after the specified delay time (if the delay time is set, :TRIGger[:SEQuence]:DELay).
- You can also send the :TRIGger:IN:VOLTage command to set the trigger voltage of the specified channel.

Return Format The query returns the trigger voltage of the specified channel, for example, 1.000V.

Example

```
:VOLT:TRIG 1      /*Set the trigger voltage of the current channel is 1V*/
:VOLT:TRIG?       /*Query the trigger voltage of the current channel and the query returns 1.000V*/
```

Related Commands

:TRIGger[:SEQuence]:SOURce

:TRIGger:IN:CHTYpe

:INITiate

:TRIGger:IN:IMMEdiate

*TRG

:TRIGger[:SEQuence]:DELay

:TRIGger:IN:VOLTage

[:SOURce[<n>]]:VOLTage:PROTection:CLEar

Syntax [:SOURce[<n>]]:VOLTage:PROTection:CLEar

Description Clear the circuit and label of the OVP occurred on the corresponding channel and turn on the output of the corresponding channel.

Parameter

Name	Type	Range	Default
[<n>]	Integer	1|2|3	1

Explanation

- You can send the [:SOURce[<n>]]:VOLTage:PROTection:TRIPped? command to query whether OVP occurred on the specified channel.
- Before executing the command, make sure that the reason that causes the OVP on the specified channel is cleared (you can decrease the output voltage to be below the OVP value or increase the OVP value to be greater than the output voltage); otherwise, the command is invalid. Executing this command will clear the circuit and label of the OVP occurred on the specified channel and turn on the output of the corresponding channel.
- When [:SOURce[<n>]] or [<n>] is omitted, the system clears the circuit and label of the OVP occurred on the current channel.
- You can send the :OUTPut:OVP:CLEAR command to only clear the label of the OVP occurred on the specified channel.

Example

:VOLT:PROT:TRIP? /*Query whether OCP occurred on the current channel and the query returns YES*/

(Operation: decrease the output voltage to be below the OVP value or increase the OVP value to be greater than the output voltage)

:VOLT:PROT:CLE /*Clear the circuit and label of the OVP occurred on the current channel*/

:VOLT:PROT:TRIP? /*Query whether OVP occurred on the current channel and the query returns NO*/

Related Commands

[:SOURce[<n>]]:VOLTage:PROTection:TRIPped?

:OUTPut:OVP:CLEAR

[:SOURce[<n>]]:VOLTage:PROTection[:LEVel]

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

[:SOURce[<n>]]:VOLTage:PROTection[:LEVel]? [{MINimum|MAXimum}]

Description Set the overvoltage protection (OVP) value of the specified channel.

Query the overvoltage protection (OVP) value of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Integer	1|2|3	1
<voltage>	Real	Refer to Table 2-2	

Explanation

- When the overvoltage protection function of the specified channel is enabled ([:SOURce[<n>]]:VOLTage:PROTection:STATe), the output turns off automatically when the output voltage exceeds the overvoltage protection limit currently set. You can send the [:SOURce[<n>]]:VOLTage:PROTection:TRIPped? command to query whether overvoltage protection occurred on the specified channel currently.
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the corresponding parameter of the channel currently selected.
- You can also send the :OUTPut:OVP:VALue command to set the OVP value of the specified channel.

Return Format The query returns the overvoltage protection value of the specified channel, for example, 8.800.

Example

```
:VOLT:PROT 8.8      /*Set the OVP value of the current channel to 8.8V*/
:VOLT:PROT?         /*Query the OVP value of the current channel and the query returns 8.800*/
```

Related Commands

[:SOURce[<n>]]:VOLTage:PROTection:STATe

[:SOURce[<n>]]:VOLTage:PROTection:TRIPped?

:OUTPut:OVP:VALue

[:SOURce[<n>]]:VOLTage:PROTection:STATe

Syntax [:SOURce[<n>]]:VOLTage:PROTection:STATe {ON|OFF}

[:SOURce[<n>]]:VOLTage:PROTection:STATe?

Description Enable or disable the overvoltage protection (OVP) function of the specified channel.

Query the status of the overvoltage protection (OVP) function of the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Integer	1|2|3	1
{ON|OFF}	Bool	ON|OFF	OFF

Explanation

- When the overvoltage protection function of the specified channel is enabled ([:SOURce[<n>]]:VOLTage:PROTection:STATe), the output turns off automatically when the output voltage exceeds the overvoltage protection limit currently set. You can send the [:SOURce[<n>]]:VOLTage:PROTection:TRIPped? command to query whether overvoltage protection occurred on the specified channel currently.
- When [:SOURce[<n>]] or [<n>] is omitted, the system sets the corresponding parameter of the channel currently selected.
- You can also send the :OUTPut:OVP[:STATe] command to enable or disable the OVP function of the specified channel.
- You can send the [:SOURce[<n>]]:VOLTage:PROTection[:LEVel] command to query the current OVP value of the specified channel.

Return Format The query returns ON or OFF.

Example

```
:VOLT:PROT:STAT ON      /*Enable the OVP function of the current channel*/
:VOLT:PROT:STAT?        /*Query the status of the OVP function of the current
                          channel and the query returns ON*/
```

Related Commands

[:SOURce[<n>]]:VOLTage:PROTection:STATe

[:SOURce[<n>]]:VOLTage:PROTection:TRIPped?

:OUTPut:OVP[:STATe]

[:SOURce[<n>]]:VOLTage:PROTection[:LEVel]

[:SOURce[<n>]]:VOLTage:PROTection:TRIPped?

Syntax [:SOURce[<n>]]:VOLTage:PROTection:TRIPped?

Description Query whether OVP occurred on the specified channel.

Parameter

Name	Type	Range	Default
[<n>]	Integer	1|2|3	1

Explanation

- OVP refers to that the output turns off automatically when the actual output voltage of the channel exceeds the OVP value.
- When [:SOURce[<n>]] or [<n>] is omitted, the system queries whether OVP occurred on the current channel.
- You can also send the :OUTPut:OVP:ALAR? or :OUTPut:OVP:QUES? command to query whether OVP occurred on the specified channel.
- You can send the [:SOURce[<n>]]:VOLTage:PROTection:CLEar command to clear the circuit and label of the OVP occurred on the specified channel.

Return Format The query returns YES or NO.

Example

```
:VOLT:PROT:TRIP?      /*Query whether OVP occurred on the current channel and
                       the query returns YES*/
```

Related Commands

:OUTPut:OVP:ALAR?

:OUTPut:OVP:QUES?

[:SOURce[<n>]]:VOLTage:PROTection:CLEar

[:SOURce[<n>]]:VOLTage:RANGe

Syntax [:SOURce[<n>]]:VOLTage:RANGe {P20V|P40V|LOW|HIGH}

[:SOURce[<n>]]:VOLTage:RANGe?

Description Select the range of the channel.

Query the range currently selected of the channel.

Parameter

Name	Type	Range	Default
[<n>]	Integer	1	1
{P20V|P40V|LOW|HIGH}	Discrete	P20V|P40V|LOW|HIGH	None

Explanation

- This command is only applicable to single-channel model (DP811A/DP811). [:SOURce[<n>]] or [<n>] can be omitted.
- P20V or LOW represents Range1: 20V/10A and P40V or HIGH represents Range2: 40V/5A.
- You can also send the :OUTPut:RANGe command to select the current range.

Return Format The query returns the rated voltage and current of the range selected, for example, 20V/10A.

Example

```
:VOLT:RANG P20V      /*Select Range1: 20V/10A as the current range*/
:VOLT:RANG?          /*Query the range currently selected and the query returns 20V/10A*/
:VOLT:RANG HIGH      /*Select Range2: 40V/5A as the current range*/
:VOLT:RANG?          /*Query the range currently selected and the query returns 40V/5A*/
```

Related Command :OUTPut:RANGe

:STATus Commands

Command List:

:STATus:QUEStionable:CONDition?

Syntax :STATus:QUEStionable:CONDition?

Description Query the condition register of the questionable status register.

Explanation

- This command is only applicable to the single-channel models.
- This command returns a decimal value corresponding to the sum of the binary weights of all the bits in the register. For the definitions of the bits in the questionable status register and their corresponding decimal values, refer to Table 1-4.
  For example, when the query returns 0, the power supply is turned off or in the unregulated mode; when the query returns 1, the power supply is in CC mode; when the query returns 2, the power supply is in CV mode; when the query returns 3, power supply failure occurs.

Return Format The query returns a decimal value corresponding to the sum of the binary weights of all the bits in the register, for example, 1.

Example

```
:STAT:QUES:COND?      /*Query the condition register of the questionable status register and the query returns 1*/
```

:STATus:QUEStionable:ENABle

Syntax :STATus:QUEStionable:ENABle <enable value>

:STATus:QUEStionable:ENABle?

Description Enable the bits in the enable register of the questionable status register.

Query the bits currently enabled in the enable register of the questionable status register.

Parameter

Name	Type	Range	Default
<enable value>	Discrete	Refer to the "Explanation"	None

Explanation

- <enable value> is a decimal value corresponding to the sum of the binary weights of the bits to be enabled in the enable register of the questionable status register. For the definitions of the bits in the questionable status registers of the multi-channel models and single-channel model and their corresponding decimal values, refer to Table 1-1 and Table 1-4.
  Take the single-channel model (DP811A) as an example. To enable bit0 (Voltage, CC mode) and bit4 (Overtemperature) in the enable register of the questionable status register, set <enable value> to 17 (according to $2^0+2^4=17$).
- After the bits in the enable register of the questionable status register are enabled, the system reports the states of the corresponding bits to the status byte register.
- When <enable value> is set to 0, executing this command will clear the enable register of the questionable status register.

Return Format The query returns a decimal value corresponding to the sum of the binary weights of the bits to be enabled in the enable register of the questionable status register, for example, 17.

Example

```
:STAT:QUES:ENAB 17      /*Enable bit0 and bit4 in the enable register of the
                          questionable status register*/
:STAT:QUES:ENAB?        /*Query the bits currently enabled in the enable register
                          of the questionable status register and the query
                          returns 17*/
```

:STATus:QUEStionable[:EVENt]?

Syntax :STATus:QUEStionable[:EVENt]?

Description Query the event register of the questionable status register.

Explanation

- This command returns a decimal value (corresponding to the sum of the binary weights of all the bits in the register) and clears the status of the register. For the definitions of the bits in the questionable status register of the multi-channel models and single-channel model and their corresponding decimal values, refer to Table 1-1 and Table 1-4 respectively.
  For example, take the single-channel model DP811A as an example. If the instrument is in CC mode and OTP occured, the bit0 (Voltage, CC mode) and bit4 (Overtemperature) in the event register of the questionable status register are set and this command returns 17 (according to $2^0+2^4=17$).
- The bits in the event register of the questionable status register are latched and reading the register will clear it. You can also use the *CLS command to clear the register.

Return Format The query returns a decimal value corresponding to the sum of the binary weights of all the bits in the register, for example, 17.

Example

```
:STAT:QUES?     /*Query the event register of the questionable status register and
                  the query returns 17*/
```

Related Command *CLS

:STATus:QUEStionable:INSTrument:ENABle

Syntax :STATus:QUEStionable:INSTrument:ENABle <enable value>

:STATus:QUEStionable:INSTrument:ENABle?

Description Enable the bits in the enable register of the channel questionable status register.

Query the bits enabled in the enable register of the channel questionable status register.

Parameter

Name	Type	Range	Default
<enable value>	Discrete	Refer to the "Explanation"	None

Explanation

- This command is only applicable to multi-channel models.
- <enable value> is a decimal value corresponding to the sum of the binary weights of the bits to be enabled in the enable register of the channel questionable status register. For the definitions of the bits in the channel questionable status register and their corresponding decimal values, refer to Table 1-2.
  For example, to enable bit1 (INST1 event summary, event SUMMARY bit of CH1), bit2 (INST2 event summary, event SUMMARY bit of CH2) and bit3 (INST3 Event Summary, event SUMMARY bit of CH3) in the enable register of the channel questionable status register, set <enable value> to 14 (according to $2^1+2^2+2^3=14$).
- After the bits in the enable register of the channel questionable status register are enabled, the system reports the states of the corresponding bits to the status byte register.
- When <enable value> is set to 0, executing this command will clear the enable register of the channel questionable status register.

Return Format The query returns a decimal value corresponding to the sum of the binary weights of the bits to be enabled in the enable register of the channel questionable status register, for example, 14.

Example

```
:STAT:QUES:INST:ENAB <14>      /*Enable bit1, bit2 and bit3 (INST(n) event
                                 summary, event SUMMARY bit of CH(n), n is
                                 1, 2 and 3) in the enable register of the
                                 channel questionable status register*/
:STAT:QUES:INST:ENAB?          /* Query the bits currently enabled in the
                                 enable register of the channel questionable
                                 status register and the query returns 14*/
```

:STATus:QUEStionable:INSTrument[:EVENt]?

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

Description Query the event register of the channel questionable status register.

Explanation

- This command is only applicable to multi-channel models.
- This command returns a decimal value (corresponding to the sum of the binary weights of all the bits in the register) and clears the status of the register. For the definitions of the bits in the channel questionable status register and their corresponding decimal values, refer to Table 1-2.
  For example, if questionable events occur on CH1 and CH3 of the instrument, the bit1 (INST1 event summary, event SUMMARY bit of CH1) and bit3 (INST3 Event Summary, event SUMMARY bit of CH3) in the event register of the channel questionable status register are set and this command returns 10 (according to $2^1+2^3=10$).
- The bits in the event register of the channel questionable status register are latched and reading the register will clear it. You can also use the *CLS command to clear the register.

Return Format The query returns a decimal value corresponding to the sum of the binary weights of all the bits in the register, for example, 10.

Example :STAT:QUES:INST? /* Query the event register of the channel questionable status register and the query returns 10*/

Related Command *CLS

:STATus:QUEStionable:INSTrument:ISUMmary[<n>]:COND?

Syntax :STATus:QUEStionable:INSTrument:ISUMmary[<n>]:COND?

Description Query the condition register of the specified channel questionable status SUMMARY register.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2|3	None

Explanation

- This command is only applicable to multi-channel models. Multi-channel models contain multiple channel questionable status SUMMARY registers and [<n>] represents the questionable status SUMMARY registers of CH1, CH2 and CH3 respectively when it is 1, 2 and 3. When [<n>] is omitted, the system queries the condition register of the questionable status SUMMARY register of the current channel.
- This command returns a decimal value corresponding to the sum of the binary weights of all the bits in the register. For the definitions of the bits in the channel questionable status SUMMARY register and their corresponding decimal values, refer to Table 1-3.
  For example, when the query returns 0, the power supply is turned off or in the unregulated mode; when the query returns 1, the power supply is in CC mode; when the query returns 2, the power supply is in CV mode; when the query returns 3, power supply failure occurs.

Return Format The query returns a decimal value corresponding to the sum of the binary weights of all the bits in the register, for example, 1.

Example :STAT:QUES:INST:ISUM1:COND? /*Query the condition register of the CH1 questionable status SUMMARY register and the query returns 1*/

:STATus:QUEStionable:INSTrument:ISUMmary[<n>]:ENABle

Syntax :STATus:QUEStionable:INSTrument:ISUMmary[<n>]:ENABle <enable value>

:STATus:QUEStionable:INSTrument:ISUMmary[<n>]:ENABle?

Description Enable the bits in the enable register of the channel questionable status SUMMARY register.

Query the bits currently enabled in the enable register of the channel questionable status SUMMARY register.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2|3	None
<enable value>	Discrete	Refer to the "Explanation"	None

Explanation

- This command is only applicable to multi-channel models. Multi-channel models contain multiple channel questionable status SUMMARY registers and [<n>] represents the questionable status SUMMARY registers of CH1, CH2 and CH3 respectively when it is 1, 2 and 3. When [<n>] is omitted, the system queries the enable register of the questionable status SUMMARY register of the current channel.
- <enable value> is a decimal value corresponding to the sum of the binary weights of the bits to be enabled in the enable register of the channel questionable status SUMMARY register. For the definitions of the bits in the channel questionable status SUMMARY register and their corresponding decimal values, refer to Table 1-3.
  For example, to enable bit0 (Voltage, CC mode) and bit3 (OCP) in the enable register of the channel questionable status SUMMARY register, set <enable value> to 9 (according to $2^0+2^3=9$).
- After the bits in the enable register of the channel questionable status SUMMARY register are enabled, the system reports the states of the corresponding bits to the questionable status register.
- When <enable value> is set to 0, executing this command will clear the enable register of the channel questionable status SUMMARY register.

Return Format The query returns a decimal value corresponding to the sum of the binary weights of the bits to be enabled in the enable register of the channel questionable status SUMMARY register, for example, 9.

Example

```
:STAT:QUES:INST:ISUM1:ENAB 9      /*Enable bit0 (Voltage, CC mode) and bit3 (OCP) in the enable register of the CH1 questionable status SUMMARY register*/
:STAT:QUES:INST:ISUM1:ENAB?       /*Query the bits enabled in the enable register of the CH1 questionable status SUMMARY register and the query returns 9*/
```

:STATus:QUEStionable:INSTrument:ISUMmary[<n>][:EVENt]?

Syntax :STATus:QUEStionable:INSTrument:ISUMmary[<n>][:EVENt]?

Description Query the event register of the specified channel SUMMARY questionable status register.

Parameter

Name	Type	Range	Default
[<n>]	Discrete	1|2|3	None

Explanation

- This command is only applicable to multi-channel models. Multi-channel models contain multiple channel questionable status SUMMARY registers and [<n>] represents the questionable status SUMMARY registers of CH1, CH2 and CH3 respectively when it is 1, 2 and 3. When [<n>] is omitted, the system queries the event register of the questionable status SUMMARY register of the current channel.
- This command returns a decimal value (corresponding to the sum of the binary weights of all the bits in the register) and clears the status of the register. For the definitions of the bits in the channel questionable status SUMMARY register and their corresponding decimal values, refer to Table 1-3.
  For example, if CH1 of the instrument changes from CV (constant voltage) mode to CC (constant current) mode, the bit0 (VOLTAGE, CC mode) in the event register of the channel questionable status SUMMARY register are set and this command returns 1 (according to 2^0=1).
- The bits in the event register of the channel questionable status SUMMARY register are latched and reading the register will clear it. You can also use the *CLS command to clear the register.

Return Format The query returns a decimal value corresponding to the sum of the binary weights of all the bits in the event register of the channel questionable status SUMMARY register, for example, 1.

Example

```
:STAT:QUES:INST:ISUM1?      /*Query the event register of the CH1 questionable
                              status SUMMARY register and the query returns
                              1*/
```

Related Command *CLS

:STORe Commands

Command List:

- :STORe:LOCal
- :STORe:EXTErnal

:STORe:LOCal

Syntax :STORe:LOCal {1|2|3|4|5|6|7|8|9|10},<file_name>

Description Store the current instrument state to the specified location in the internal memory of the instrument with the specified filename.

Parameter

Name	Type	Range	Default
{1|2|3|4|5|6|7|8|9|10}	Discrete	1|2|3|4|5|6|7|8|9|10	None
<file_name>	ASCII string	Refer to the "Explanation"	None

Explanation

- {1|2|3|4|5|6|7|8|9|10} represent the corresponding storage locations in the internal memory of the instrument respectively.
- If a state file has already been stored in the specified storage location, this command will directly save the current instrument state to the specified storage location (overwrite the original file directly). If the state file stored in the specified storage location is locked (refer to the :MEMory[:STATe]:LOCK command), this command is invalid (will not overwrite the original file).
- <file_name> is the specified filename (does not include the filename suffix ".RSF") and cannot exceed 9 bytes (1 Chinese character occupies 2 bytes).
- You can also send the *SAV or :MEMory[:STATe]:STORe command to store the current instrument state to the specified storage location in the internal memory of the instrument.

Example

```
:STOR:LOC 1,123      /*Store the current instrument state to storage location 1 of
                       state file in the internal memory of the instrument with the
                       filename "123.RSF"*/
```

Related Commands

*SAV

:MEMory[:STATe]:LOCK

:MEMory[:STATe]:STORe

:STORe:EXTErnal

Syntax :STORe:EXTErnal <file_name>

Description Store the current instrument state to the root directory of the external memory of the instrument with the specified filename.

Parameter

Name	Type	Range	Default
<file_name>	ASCII string	Refer to the "Explanation"	None

Explanation

- <file_name> is the specified filename (does not include the filename suffix ".RSF") and cannot exceed 17 bytes (1 Chinese character occupies 2 bytes).
- If a file with the same filename has already been stored in the root directory of the external memory of the instrument, this command is invalid (will not overwrite the original file).
- You can also send the :MMEMory:STORe command to store the current instrument state to the external memory.

Example

```
:STOR:EXTE 123      /*Store the current instrument state to the root directory of the
                      external memory of the instrument with the filename
                      "123.RSF"*/
```

Related Command :MMEMory:STORe

:SYSTem Commands

Command List:

- :SYSTem:VERSion?

:SYSTem:BEEPer:IMMediate

Syntax :SYSTem:BEEPer:IMMediate

Description Send this command and the beeper immediately sounds.

:SYSTem:BEEPer[:STATe]

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

:SYSTem:BEEPer[:STATe]?

Description Enable or disable the beeper.

Query the status of the beeper.

Parameter

Name	Type	Range	Default
{ON|OFF}	Bool	ON|OFF	ON

Explanation When the beeper is enabled, the instrument generates prompt sound when error occurs during front panel operation or remote operation.

Return Format The query returns ON or OFF.

Example :SYST:BEEP ON /*Enable the beeper*/

:SYST:BEEP? /*Query the status of the beeper and the query returns ON*/

:SYSTem:BRIGhtness

Syntax :SYSTem:BRIGhtness {<brightness>|MINimum|MAXimum}

:SYSTem:BRIGhtness? [{MINimum|MAXimum}]

Description Set the brightness of the screen.

Query the brightness of the screen.

Parameter

Name	Type	Range	Default
<brightness>	Integer	1 to 100	50 (factory setting)

Return Format The query returns an integer, for example, 60.

Example :SYST:BRIG 60 /*Set the brightness of the screen to 60%*/

:SYST:BRIG? /*Query the brightness of the screen and the query returns 60*/

:SYSTem:COMMunicate:GPIB:ADDRess

Syntax :SYSTem:COMMunicate:GPIB:ADDRess <gpibaddress>

:SYSTem:COMMunicate:GPIB:ADDRess?

Description Set the GPIB address.

Query the current GPIB address.

Parameter

Name	Type	Range	Default
<gpibaddress>	Integer	0 to 30	2

Explanation Before using the GPIB interface, extend a GPIB interface using the USB-GPIB interface converter; then, connect the instrument and PC using GPIB cable and set the GPIB address.

Return Format The query returns an integer, for example, 7.

Example :SYST:COMM:GPIB:ADDR 7 /*Set the GPIB address*/

:SYST:COMM:GPIB:ADDR? /*Query the current GPIB address and the query returns 7*/

:SYSTem:COMMunicate:LAN:APPLy

Syntax :SYSTem:COMMunicate:LAN:APPLy

Description Apply the network parameters currently set.

Explanation The new setting will only take into effect when this command is executed after the LAN parameters are set.

Example :SYST:COMM:LAN:APPL /*Apply the network parameters currently set*/

:SYSTem:COMMunicate:LAN:AUTOip[:STATe]

Syntax :SYSTem:COMMunicate:LAN:AUTOip[:STATe] {ON|OFF}

:SYSTem:COMMunicate:LAN:AUTOip[:STATe]?

Description Enable or disable the auto IP configuration mode.

Query the status of the auto IP configuration mode.

Parameter

Name	Type	Range	Default
{ON|OFF}	Bool	ON|OFF	ON

Explanation

- Before using the LAN interface, connect the instrument and PC or the network of the PC using network cable.
- The instrument provides three IP configuration modes: DHCP, Auto IP and Manual IP.
- In auto IP configuration mode, the instrument acquires the IP address from 169.254.0.1 to 169.254.255.254 and subnet mask 255.255.0.0 according to the current network configuration automatically.
- When all the three configuration modes are set to "On", the priority order of parameter configuration is "DHCP", "AutoIP" and "ManualIP". Therefore, to enable the "AutoIP" mode, the "DHCP" mode must be turned off.
- The three IP configuration modes cannot all be set to "Off" at the same time.
- The new setting will only take into effect when the :SYSTem:COMMunicate:LAN:APPLy command is executed to apply the network parameter currently set after this command is send.

Return Format The query returns ON or OFF.

Example

```
:SYST:COMM:LAN:AUTO ON     /*Enable the auto IP configuration mode*/
:SYST:COMM:LAN:AUTO?       /*Query the status of the auto IP configuration mode
                            and the query returns ON*/
```

Related Commands

:SYSTem:COMMunicate:LAN:DHCP[:STATe]

:SYSTem:COMMunicate:LAN:MANualip[:STATe]

:SYSTem:COMMunicate:LAN:APPLy

:SYSTem:COMMunicate:LAN:DHCP[:STATe]

Syntax :SYSTem:COMMunicate:LAN:DHCP[:STATe] {ON|OFF}

:SYSTem:COMMunicate:LAN:DHCP[:STATe]?

Description Enable or disable the DHCP mode.

Query the status of the DHCP mode.

Parameter

Name	Type	Range	Default
{ON|OFF}	Bool	ON|OFF	ON

Explanation

- In DHCP mode, the DHCP server in the current network assigns network parameters (such as the IP address) for the instrument.
- When all the three configuration modes are set to "On", the priority order of parameter configuration is "DHCP", "AutoIP" and "ManualIP".
- The three IP configuration modes cannot all be set to "Off" at the same time.
- The new setting will only take into effect when the :SYSTem:COMMunicate:LAN:APPLy command is executed to apply the network parameter currently set after this command is send.

Return Format The query returns ON or OFF.

Example

```
:SYST:COMM:LAN:DHCP ON      /*Enable the DHCP mode*/
:SYST:COMM:LAN:DHCP?        /*Query the status of the DHCP mode and the query
                             returns ON*/
```

Related Commands

:SYSTem:COMMunicate:LAN:AUTOip[:STATe]

:SYSTem:COMMunicate:LAN:MANualip[:STATe]

:SYSTem:COMMunicate:LAN:APPLy

:SYSTem:COMMunicate:LAN:DNS

Syntax :SYSTem:COMMunicate:LAN:DNS <dns>

:SYSTem:COMMunicate:LAN:DNS?

Description Set the DNS (Domain Name Service) address.

Query the current DNS address.

Parameter

Name	Type	Range	Default
<dns>	ASCII string	Refer to the "Explanation"	None

Explanation

- This command is only available when the manual IP configuration mode is enabled (:SYSTem:COMMunicate:LAN:MANualip[:STATe]).
- The format of <dns> is nnn.nnn.nnn.nnn; the first nnn ranges from 1 to 223 (except 127), the other three range from 0 to 255.
- You are recommended to ask your network administrator for an address available.
- The new setting will only take into effect when the :SYSTem:COMMunicate:LAN:APPLy command is executed to apply the network parameter currently set after this command is send.

Return Format The query returns the DNS address, for example, 172.16.3.2.

Example

```
:SYST:COMM:LAN:DNS 172.16.3.2    /*Set the DNS address to 172.16.3.2*/
:SYST:COMM:LAN:DNS?              /*Query the current DNS address and the query returns 172.16.3.2*/
```

Related Commands :SYSTem:COMMunicate:LAN:MANualip[:STATe]

:SYSTem:COMMunicate:LAN:APPLy

:SYSTem:COMMunicate:LAN:GATEway

Syntax :SYSTem:COMMunicate:LAN:GATEway <gateway>

:SYSTem:COMMunicate:LAN:GATEway?

Description Set the default gateway.

Query the current default gateway.

Parameter

Name	Type	Range	Default
<gateway>	ASCII string	Refer to the "Explanation"	None

Explanation

- This command is only available when the manual IP configuration mode is enabled (:SYSTem:COMMunicate:LAN:MANualip[:STATe]).
- The format of <gateway> is nnn.nnn.nnn.nnn; the first nnn ranges from 1 to 223 (except 127), the other three range from 0 to 255.
- You are recommended to ask your network administrator for a gateway address available.
- The new setting will only take into effect when the :SYSTem:COMMunicate:LAN:APPLy command is executed to apply the network parameter currently set after this command is send.

Return Format The query returns the default gateway, for example, 172.16.3.1.

Example

```
:SYST:COMM:LAN:GATE 172.16.3.1    /*Set the default gateway*/
:SYST:COMM:LAN:GATE?              /*Query the current default gateway and the
                                    query returns 172.16.3.1*/
```

Related Commands :SYSTem:COMMunicate:LAN:MANualip[:STATe]

:SYSTem:COMMunicate:LAN:APPLy

:SYSTem:COMMunicate:LAN:IPADdress

Syntax :SYSTem:COMMunicate:LAN:IPADdress <ip>

:SYSTem:COMMunicate:LAN:IPADdress?

Description Set the IP address.

Query the current IP address.

Parameter

Name	Type	Range	Default
<ip>	ASCII string	Refer to the "Explanation"	None

Explanation

- This command is only available when the manual IP configuration mode is enabled (:SYSTem:COMMunicate:LAN:MANualip[:STATe]).
- The format of <ip> is nnn.nnn.nnn.nnn; the first nnn ranges from 1 to 223 (except 127), the other three range from 0 to 255.
- You are recommended to ask your network administrator for an address available.
- The new setting will only take into effect when the :SYSTem:COMMunicate:LAN:APPLy command is executed to apply the network parameter currently set after this command is send.

Return Format The query returns the IP address, for example, 172.16.3.128.

Example

```
:SYST:COMM:LAN:IPAD 172.16.3.128     /*Set the IP address*/
:SYST:COMM:LAN:IPAD?                 /*Query the current IP address and the
                                       query returns 172.16.3.128*/
```

Related Commands :SYSTem:COMMunicate:LAN:MANualip[:STATe]

:SYSTem:COMMunicate:LAN:APPLy

:SYSTem:COMMunicate:LAN:MAC?

Syntax :SYSTem:COMMunicate:LAN:MAC?

Description Query the MAC address.

Explanation The MAC (Media Access Control) address is also called hardware address and is used to define the location of the network device. For a power supply, the MAC address is unique and is usually used to recognize the instrument when assigning IP address for the instrument. The MAC address (48 bits, namely 6 bytes) is usually expressed in hexadecimal form, for example, 00-2A-A0-AA-E0-56.

Return Format The query returns the MAC address, for example, 00-2A-A0-AA-E0-56.

:SYSTem:COMMunicate:LAN:MANualip[:STATe]

Syntax :SYSTem:COMMunicate:LAN:MANualip[:STATe] {ON|OFF}

:SYSTem:COMMunicate:LAN:MANualip[:STATe]?

Description Enable or disable the manual IP configuration mode.

Query the status of the manual IP configuration mode.

Parameter

Name	Type	Range	Default
{ON|OFF}	Bool	ON|OFF	ON

Explanation

- In manual IP configuration mode, users define the network parameters (such as the IP address).
- When all the three configuration modes are set to "On", the priority order of parameter configuration is "DHCP", "AutoIP" and "ManualIP". Therefore, to enable the "ManualIP" mode, the "DHCP" mode and "AutoIP" mode must be turned off.
- The three IP configuration modes cannot all be set to "Off" at the same time.
- The new setting will only take into effect when the :SYSTem:COMMunicate:LAN:APPLy command is executed to apply the network parameter currently set after this command is send.

Return Format The query returns ON or OFF.

Example

```
:SYST:COMM:LAN:MAN ON        /*Enable the manual IP configuration mode*/
:SYST:COMM:LAN:MAN?          /*Query the status of the manual IP configuration
                               mode and the query returns ON*/
```

Related Commands :SYSTem:COMMunicate:LAN:AUTOip[:STATe]

:SYSTem:COMMunicate:LAN:DHCP[:STATe]

:SYSTem:COMMunicate:LAN:APPLy

:SYSTem:COMMunicate:LAN:SMASK

Syntax :SYSTem:COMMunicate:LAN:SMASK <submask>

:SYSTem:COMMunicate:LAN:SMASK?

Description Set the subnet mask.

Query the current subnet mask.

Parameter

Name	Type	Range	Default
<submask>	ASCII string	Refer to the "Explanation"	None

Explanation

- This command is only available when the manual IP configuration mode is enabled (:SYSTem:COMMunicate:LAN:MANualip[:STATe]).
- The format of <submask> is nnn.nnn.nnn.nnn; wherein, the range of nnn is from 0 to 255.
- You are recommended to ask your network administrator for a subnet mask available.
- The new setting will only take into effect when the :SYSTem:COMMunicate:LAN:APPLy command is executed to apply the network parameter currently set after this command is send.

Return Format The query returns the subnet mask, for example, 255.255.255.0.

Example

```
:SYST:COMM:LAN:SMASK 255.255.255.0    /*Set the subnet mask*/
:SYST:COMM:LAN:SMASK?                 /*Query the current subnet mask and the query returns 255.255.255.0*/
```

Related Commands :SYSTem:COMMunicate:LAN:MANualip[:STATe]

:SYSTem:COMMunicate:LAN:APPLy

:SYSTem:COMMunicate:RS232:BAUD

Syntax :SYSTem:COMMunicate:RS232:BAUD {4800|7200|9600|14400|19200|38400|57600|115200|128000}

:SYSTem:COMMunicate:RS232:BAUD?

Description Set the baud rate of the RS232 interface and the unit is Baud.

Query the baud rate of the RS232 interface.

Parameter

Name	Type	Range	Default
{4800|7200|9600|14400|19200|38400|57600|115200|128000}	Discrete	4800|7200|9600|14400|19200|38400|57600|115200|128000	9600

Explanation Before using the RS232 interface, connect the RS232 interface to the PC or data terminal equipment (DTE) using a RS232 cable and set the interface parameters (such as the baud rate and parity) that match the PC and data terminal equipment.

Return Format The query returns the baud rate of the RS232 interface, for example, 19200.

Example

```
:SYST:COMM:RS232:BAUD 19200    /*Set the baud rate of the RS232 interface to 19200*/
:SYST:COMM:RS232:BAUD?         /*Query the baud rate of the RS232 interface and the query returns 19200*/
```

:SYSTem:COMMunicate:RS232:DATABit

Syntax :SYSTem:COMMunicate:RS232:DATABit {5|6|7|8}

:SYSTem:COMMunicate:RS232:DATABit?

Description Set the data bit of the RS232 interface.

Query the data bit of the RS232 interface.

Parameter

Name	Type	Range	Default
{5|6|7|8}	Discrete	5|6|7|8	8

Return Format The query returns 5, 6, 7 or 8.

Example :SYST:COMM:RS232:DATAB 8 /*Set the data bit of the RS232 interface to 8*/

:SYST:COMM:RS232:DATAB? /*Query the data bit of the RS232 interface and the query returns 8*/

:SYSTem:COMMunicate:RS232:FLOWCrl

Syntax :SYSTem:COMMunicate:RS232:FLOWCrl {ON|OFF}

:SYSTem:COMMunicate:RS232:FLOWCrl?

Description Enable or disable the hardware flow control.

Query the status of the hardware flow control.

Parameter

Name	Type	Range	Default
{ON|OFF}	Bool	ON|OFF	OFF

Explanation This power supply uses RTS/CTS hardware flow control mode. The instrument monitors the status of the CTS pin. When the status is "True", the instrument sends data; when the status is "False", the instrument stops sending data. The instrument sets the CTS pin to "False" when the input buffer area is almost full and sets the CTS pin to "True" when the input buffer area is available again.

Return Format The query returns ON or OFF.

Example :SYST:COMM:RS232:FLOWC ON /*Enable the hardware flow control*/

:SYST:COMM:RS232:FLOWC? /*Query the status of the hardware flow control and the query returns ON*/

:SYSTem:COMMunicate:RS232:PARItybit

Syntax :SYSTem:COMMunicate:RS232:PARItybit {NONE|ODD|EVEN}

:SYSTem:COMMunicate:RS232:PARItybit?

Description Set the parity mode.

Query the current parity mode.

Parameter

Name	Type	Range	Default
{NONE|ODD|EVEN}	Discrete	NONE|ODD|EVEN	NONE

Explanation NONE, ODD and EVEN represent to set the parity mode to "None", "Odd" and "Even" respectively.

Return Format The query returns NONE, ODD or EVEN.

Example :SYST:COMM:RS232:PARI ODD /*Set the parity mode to odd*/

:SYST:COMM:RS232:PARI? /*Query the current parity mode and the query returns ODD*/

:SYSTem:COMMunicate:RS232:STOPBit

Syntax :SYSTem:COMMunicate:RS232:STOPBit {1|2}

:SYSTem:COMMunicate:RS232:STOPBit?

Description Set the stop bit.

Query the current stop bit.

Parameter

Name	Type	Range	Default
{1|2}	Discrete	1|2	1

Return Format The query returns 1 or 2.

Example :SYST:COMM:RS232:STOPB 2 /*Set the stop bit to 2*/

:SYST:COMM:RS232:STOPB? /*Query the current stop bit and the query returns 2*/

:SYSTem:CONTrast

Syntax :SYSTem:CONTrast {<value>|MINimum|MAXimum}

:SYSTem:CONTrast? [{MINimum|MAXimum}]

Description Set the contrast of the screen.

Query the contrast of the screen.

Parameter

Name	Type	Range	Default
<value>	Integer	1 to 100	25 (factory setting)

Return Format The query returns an integer, for example, 50.

Example :SYST:CONT 50 /*Set the contrast of the screen to 50%*/

:SYST:CONT? /*Query the contrast of the screen and the query returns 50*/

:SYSTem:ERRor?

Syntax :SYSTem:ERRor?

Description Query and clear the error messages in the error queue.

Explanation You can also send the *RST command to restore the instrument to the factory state (refer to "**Appendix B: Factory Setting**") and clear the error queue.

Return Format The query returns the number and content of the error message, for example, -113,"Undefined header; keyword cannot be found".

Related Command *RST

:SYSTem:KLOCk

Syntax :SYSTem:KLOCk <key>,{ON|OFF|0|1}

:SYSTem:KLOCk? <key>

Description Lock or unlock the specified key.

Query whether the specified key is locked.

Parameter

Name	Type	Range	Default
<key>	Discrete	Refer to the "Explanation"	None
{ON|OFF|1|0}	Bool	ON|OFF|1|0	OFF

Explanation

- <key> is used to specify the key and the range is as follows.

DISPLAY|STORAGE|UTILITY|HELP|TIMER|ADVANCE|PRESET|	/*Function keys*/
CH1|CH2|CH3|	/*Channel selecting keys*/
RANGE1|RANGE2|[1]	/*Range selecting keys*/
M1|M2|M3|M4|M5|	/*Menu keys*/
NUM0|NUM1|NUM2|NUM3|NUM4|NUM5|NUM6|NUM7|NUM8|NUM9|DOT|	/*Numeric keys*/
LEFT|RIGHT|UP|DOWN|	/*Direction keys*/
OUTPUT1|OUTPUT2|OUTPUT3|OUTPUTALL|	/*Output on/off keys*/
KNOB|OK|BACK|DIAL|	/*Knob, OK, Back and dial keys*/
ALL	/*All the keys (except the power switch key) and knob at the front panel*/

Note[1]: The parameters are applicable to the single-channel models.

- ON|1 denotes locking the specified key; OFF|0 denotes unlocking the specified key.

Return Format The query returns 1 or 0.

Example

:SYST:KLOC CH1,ON /*Lock the **CH1** key*/

:SYST:KLOC? CH1 /*Query whether the **CH1** key is locked and the query returns 1*/

:SYSTem:KLOCk:STATe

Syntax :SYSTem:KLOCk:STATe {ON|OFF}

:SYSTem:KLOCk:STATe?

Description Enable or disable the remote lock.

Query the status of the remote lock.

Parameter

Name	Type	Range	Default
{ON|OFF}	Bool	ON|OFF	OFF

Explanation

- When the instrument is in remote lock mode, all the keys at the front panel (except the output switch key  of each channel,  and the power switch key ) are not available and  is displayed in the status bar on the user interface ( is not displayed).
- You can also send the :SYSTem:RWLock command to enable or disable the remote lock.

Return Format The query returns ON or OFF.

Example

```
:SYST:KLOC:STAT ON      /*Enable the remote lock*/
:SYST:KLOC:STAT?        /*Query the status of the remote lock and the query
                          returns ON*/
```

Related Command :SYSTem:RWLock

:SYSTem:LANGuage:TYPE

Syntax :SYSTem:LANGuage:TYPE {EN|CH|JAP|KOR|GER|POR|POL|CHT|RUS}

:SYSTem:LANGuage:TYPE?

Description Set the system language.

Query the current system language type.

Parameter

Name	Type	Range	Default
{EN|CH|JAP| KOR|GER|POR| POL|CHT|RUS}	Discrete	EN|CH|JAP| KOR|GER|POR| POL|CHT|RUS	CH

Return Format The query returns English, Chinese, Japanese, Korean, German, Portuguese, Polish, Chinese(T) or Russian.

Example

```
:SYST:LANG:TYPE EN      /*Set the system language to English*/
:SYST:LANG:TYPE?        /*Query the current system language type and the query
                          returns English*/
```

:SYSTem:LOCal

Syntax :SYSTem:LOCal

Description The power supply returns from remote mode to local mode.

Explanation

- When the instrument is in remote mode, all the front panel keys (except the output switch key  of each channel,  , the power switch key  and **Back**) are not available and  is displayed in the status bar in the user interface; when this command is sent, the instrument returns from remote mode to local mode, all the front panel operations are available and  in the status bar in the user interface disappears.
- You can send the :SYSTem:REMote command to return the power supply from local mode to remote mode.

Related Command :SYSTem:REMote

:SYSTem:LOCK

Syntax :SYSTem:LOCK {ON|OFF}

:SYSTem:LOCK?

Description Lock or unlock the front panel.

Query whether the front panel is locked.

Parameter

Name	Type	Range	Default
{ON|OFF}	Bool	ON|OFF	OFF

Explanation DP800 allows users to lock the front panel keys to avoid danger caused by mis-operation. The front panel will be locked and the instrument will work in remote mode when this command is excuted. Besides,  and  are displayed in the status bar in the user interface. At this point, all the front panel keys (except the output switch key  of each channel, the power switch key  and **Back**) are not available. Pressing **Back** at the front panel can return the instrument from remote mode to local mode; but the front panel keys (except the output switch key  of each channel and the power switch key ) are still not available.

Return Format The query returns ON or OFF.

Example

```
:SYST:LOCK ON      /*Lock the front panel*/
:SYST:LOCK?        /*Query whether the front panel is locked and the query
                    returns ON*/
```

:SYSTem:ONOFFSync

Syntax :SYSTem:ONOFFSync {ON|OFF}

:SYSTem:ONOFFSync?

Description Turn on or off the on/off sync function.

Query whether the on/off sync function is turned on.

Parameter

Name	Type	Range	Default
{ON|OFF}	Bool	ON|OFF	OFF

Explanation

- The specified channels of DP831A, DP831, DP832A and DP832 support the track function; you can turn on or off the on/off sync function according to your need.
- When the on/off sync function is turned on, the system will track the output status of the channel; when the on/off sync function is turned off, the system will not track the output status of the channel.

Return Format The query returns ON or OFF.

Example

```
:SYST:ONOFFS ON      /*Turn on the on/off sync function*/
:SYST:ONOFFS?        /*Query whether the on/off sync function is turned on and
                       the query returns ON*/
```

Related Command :SYSTem:TRACKMode

:SYSTem:OTP

Syntax :SYSTem:OTP {ON|OFF}

:SYSTem:OTP?

Description Enable or disable the over-temperature protection (OTP) function.

Query the status of the over-temperature protection function.

Parameter

Name	Type	Range	Default
{ON|OFF}	Bool	ON|OFF	ON

Explanation When the OTP function is enabled, the instrument turns off the output automatically when the temperature inside the instrument reaches the limit.

Return Format The query returns ON or OFF.

Example

```
:SYST:OTP ON    /*Enable the OTP function*/
:SYST:OTP?      /*Query the status of the OTP function and the query returns ON*/
```

:SYSTem:POWEron

Syntax :SYSTem:POWEron {DEFault|LAST}

:SYSTem:POWEron?

Description Select the instrument configuration to be used at power-on.

Query the instrument configuration to be used at power-on.

Parameter

Name	Type	Range	Default
{DEFault|LAST}	Discrete	DEFault|LAST	DEFault

Explanation

- LAST: the instrument uses the system configuration (including all the system parameters and states except the channel output on/off states) before the last power-off at power-on.
- DEFault: the instrument uses the factory default values at power-on (except those parameters that will not be affected by reset; refer to "**Appendix B: Factory Setting**").

Return Format The query returns DEFAULT or LAST.

Example

```
:SYST:POWE LAST    /*Set the instrument to use the system configuration before
                     the last power-off at power-on*/
:SYST:POWE?        /*Query the instrument configuration to be used at power-on
                     and the query returns LAST*/
```

:SYSTem:REMote

Syntax :SYSTem: REMote

Description Return the power supply from local mode to remote mode.

Explanation

- When the instrument is in local mode, all the front panel keys are available and  is not displayed in the status bar in the user interface. Executing this command will return the instrument from local mode to remote mode; at this point, all the front panel keys (except the output switch key  of each channel,  , the power switch key  and **Back**) are not available and  is displayed in the status bar in the user interface.
- You can send the :SYSTem:LOCal command to return the power supply from remote mode to local mode.

Related Command :SYSTem:LOCal

:SYSTem:RGBBrightness

Syntax :SYSTem:RGBBrightness {<RGBbrightness>|MINimum|MAXimum}

:SYSTem:RGBBrightness? [{MINimum|MAXimum}]

Description Set the RGB brightness of the screen.

Query the RGB brightness of the screen.

Parameter

Name	Type	Range	Default
<RGBbrightness>	Integer	1 to 100	50 (factory setting)

Return Format The query returns an integer from 1 to 100, for example, 47.

Example :SYST:RGBB 47 /*Set the RGB brightness of the screen to 47%*/

:SYST:RGBB? /*Query the RGB brightness of the screen and the query returns 47*/

:SYSTem:RWLock

Syntax :SYSTem:RWLock[:STATe] [ON|OFF]

Description Turn on or off the remote lock.

Parameter

Name	Type	Range	Default
[ON|OFF]	Bool	ON|OFF	OFF

Explanation

- When the instrument is in remote lock mode, all the keys at the front panel (except the output switch key  of each channel,  and the power switch key ) are not available and  is displayed in the status bar on the user interface ( is not displayed).
- When [ON|OFF] is omitted, the system turns on the remote lock.
- You can also send the :SYSTem:KLOCk:STATe command to turn on or off the remote lock.

Return Format The query returns ON or OFF.

Example :SYST:RWL ON /*Turn on the remote lock*/

Related Command :SYSTem:KLOCk:STATe

:SYSTem:SAVer

Syntax :SYSTem:SAVer {ON|OFF}

:SYSTem:SAVer?

Description Enable or disable the screen saver function.

Query the status of the screen saver function.

Parameter

Name	Type	Range	Default
{ON|OFF}	Bool	ON|OFF	OFF

Explanation When the screen saver function is enabled, the instrument will enter the screen saver mode automatically after standing by for 25 minutes and will enter the black screen state after another 12.5 minutes.

Return Format The query returns ON or OFF.

Example :SYST:SAV ON /*Enable the screen saver function*/

:SYST:SAV? /*Query the status of the screen saver function and the query returns ON*/

:SYSTem:SELF:TEST:BOARD?

Syntax :SYSTem:SELF:TEST:BOARD? [{TOP|BOTTOM}]

Description Query the self-test results of TopBoard and BottomBoard.

Parameter

Name	Type	Range	Default
{TOP|BOTTOM}	Discrete	TOP|BOTTOM	None

Explanation

- TOP: query the self-test result of TopBoard; BOTTOM: query the self-test result of BottomBoard; when the parameter {TOP|BOTTOM} is omitted, the command queries the self-test results of TopBoard and BottomBoard at the same time.
- You can also send the *TST? command to query the self-test results of the instrument (including the self-test results of the TopBoard, BottomBoard and fan).

Return Format The query returns PASS or FAIL. When the parameter {TOP|BOTTOM} is omitted, the query returns the self-test results of TopBoard and BottomBoard (separated by comma) at the same time, for example, PASS,PASS.

Example :SYST:SELF:TEST:BOARD? /*Query the self-test results of TopBoard and BottomBoard and the query returns PASS,PASS*/

Related Command *TST?

:SYSTem:SELF:TEST:FAN?

Syntax :SYSTem:SELF:TEST:FAN?

Description Query the self-test result of the fan.

Explanation You can also send the *TST? command to query the self-test results (including the self-test results of the TopBoard, BottomBoard and fan).

Return Format The query returns PASS or FAIL.

Related Command *TST?

:SYSTem:SELF:TEST:TEMP?

Syntax :SYSTem:SELF:TEST:TEMP?

Description Query the self-test result of the temperature.

Return Format The query returns the temperature value and the unit is ℃, for example, 23.67.

:SYSTem:TRACKMode

Syntax :SYSTem:TRACKMode {SYNC|INDE}

:SYSTem:TRACKMode?

Description Set the track mode.

Query the current track mode.

Parameter

Name	Type	Range	Default
{SYNC|INDE}	Discrete	SYNC|INDE	SYNC

Explanation

- The specified channels of DP831A, DP831, DP832A and DP832 support the track function. You can select the desired track mode according to your need.
- SYNC: synchronous mode. For two channels (the channels should be of the same instrument) that support the track function, the track function of the other channel will be enabled or disabled at the same time when the track function of a channel is enabled or disabled.
- INDE: independent mode. For two channels (the channels should be of the same instrument) that support the track function, the status of the track function of the other channel will not be affected when the track function of a channel is enabled or disabled.

Return Format The query returns SYNC or INDE.

Example

```
:SYST:TRACKM SYNC      /*Set the track mode to synchronous*/
:SYST:TRACKM?          /*Query the current track mode and the query returns
                         SYNC*/
```

Related Command :SYSTem:ONOFFSync

:SYSTem:VERSion?

Syntax :SYSTem:VERSion?

Description Query the SCPI version number of the system.

Return Format The query returns a string (the SCPI version number of the system) in YYYY.V form; wherein, YYYY represents the year of the version, V represents the edition of the year, for example, 1999.0.

Example :SYST:VERS? /*Query the SCPI version number of the system and the query returns 1999.0*/

:TIMEr Commands

Command List:

:TIMEr:CYCLEs

Syntax :TIMEr:CYCLEs {N|I}[,<value>]

:TIMEr:CYCLEs?

Description Set the number of cycles of the timer.

Query the current number of cycles of the timer.

Parameter

Name	Type	Range	Default
{N|I}	Discrete	N|I	N
<value>	Integer	1 to 99999	1

Explanation

- The number of cycles is defined as the number of times that the instrument performs timing output according to the preset voltage/current. You can set the number of cycles to infinite (I) or a specified value (N,<value>).
- The total number of groups in timing output = the number of groups × the number of cycles; wherein, the number of groups is set by the :TIMEr:GROUPs command.
- The power supply will terminate the timer function when the total number of groups of outputs is finished. At this point, the state of the power supply depends on the setting of the :TIMEr:ENDState command.

Return Format The query returns I or N,<value>, for example, N,20.

Example

```
:TIME:CYCLE N,20    /*Set the number of cycles of the timer to 20*/
:TIME:CYCLE?        /*Query the current number of cycles of the timer and the
                     query returns 20*/
```

Related Commands :TIMEr:ENDState

:TIMEr:GROUPs

:TIMEr:ENDState

Syntax :TIMEr:ENDState {OFF|LAST}

:TIMEr:ENDState?

Description Set the end state of the timer.

Query the current end state of the timer.

Parameter

Name	Type	Range	Default
{OFF|LAST}	Discrete	OFF|LAST	OFF

Explanation

- The end state refers to the state of the instrument after it finishes outputting the total number of groups of voltage/current values when the number of cycles is a finite value.
- OFF: the instrument turns off the output automatically after finishing the output.
- LAST: the instrument stops at the output state of the last group after finishing the output.
- The total number of groups in timing output = the number of groups × the number of cycles; wherein, the number of groups and the number of cycles are set by the:TIMEr:GROUPs and :TIMEr:CYCLEs commands respectively.

Return Format The query returns OFF or LAST.

Example

```
:TIME:ENDS LAST     /*Set the end state of the timer to "Last"*/
:TIME:ENDS?         /*Query the current end state of the timer and the query
                      returns LAST*/
```

Related Commands :TIMEr:CYCLEs

:TIMEr:GROUPs

:TIMEr:GROUPs

Syntax :TIMEr:GROUPs <value>

:TIMEr:GROUPs?

Description Set the number of output groups of the timer.

Query the current number of output groups of the timer.

Parameter

Name	Type	Range	Default
<value>	Integer	1 to 2048	1

Explanation

- The number of output groups is defined as the number of groups of preset voltage/current values that the power supply outputs in each cycle.
- The total number of groups in timing output = the number of groups × the number of cycles; wherein, the number of cycles is set by the :TIMEr:CYCLEs command.
- The power supply will terminate the timer function when the total number of groups of outputs is finished. At this point, the state of the power supply depends on the setting of the :TIMEr:ENDState command.

Return Format The query returns an integer from 1 to 2048, for example, 25.

Example

```
:TIME:GROUP 25      /*Set the number of output groups of the timer to 25*/
:TIME:GROUP?        /*Query the current number of output groups of the timer and
                      the query returns 25*/
```

Related Commands :TIMEr:CYCLEs

:TIMEr:ENDState

:TIMEr:PARAmeter

Syntax :TIMEr:PARAmeter <secnum>,<volt>,<curr>,<time>

:TIMEr:PARAmeter? <firnum>[,<timercount>]

Description Set the timer parameters of the specified group.

Query the timer parameters of the specified groups.

Parameter

Name	Type	Range	Default
<secnum>	Integer	0 to 2047	None
<volt>	Real	The voltage range of the current channel	CH1/CH2: 1V CH3: -1V
<curr>	Real	The current range of the current channel	1A
<time>	Real	1s to 99999s	1s
<firnum>	Integer	0 to 2047	None
<timercount>	Integer	1 to 2048	1

Explanation

- <secnum> is the group number of the specified group of timer parameters; <volt>, <curr> and <time> are the voltage, current and time of the specified group of timer parameters respectively and their units are V, A and s respectively.
- The query command queries the specified groups of timer parameters (the numbers of the groups are continuous). <firnum> is the group number of the first group of timer parameters to be queried. <timercount> is the total number of groups of timer parameters to be queried.
- When <timercount> is omitted, the command queries a single group of timer parameters by default.
- You can also send the :OUTPut:TIMEr command to set or query the timer parameters.

Return Format The query returns a string starting with **#**.
For example, **#90000000361,8.000,1.0000,10;2,6.000,1.0000,10;**;
wherein, **#9000000036** is the data block header;
1,8.000,1.0000,10;2,6.000,1.0000,10; are the specified timer parameters.

- The data block header is used to describe the length information of the data stream and starts with #. For example, the number "9" in **#9000000036** denotes that the 9-bit data (000000036) following it is used to denote the data stream length (36 bytes).
- The format of each group of timer parameters is "number,voltage,current,time" and multiple groups of timer parameters are separated by ";". For example, **1,8.000,1.0000,10;2,6.000,1.0000,10;** denotes two groups of timer parameters; the number of the first group of timer parameters is 1, the voltage is 8.000V, the current is 1.0000A and the time is 10s; the number of the second group of timer parameters is 2, the voltage is 6.000V, the current is 1.0000A and the time is 10s.

Example

```
:TIME:PARA 1,8,1,10 /*Set the timer parameters of the first group to 8V, 1A, 10s*/
:TIME:PARA 2,6,1,10 /*Set the timer parameters of the second group to 6V, 1A,
                      10s*/
:TIME:PARA? 1,2     /*Query two groups of timer parameters starting from the
                      first group and the query returns
                      #90000000361,8.000,1.0000,10;2,6.000,1.0000,10;*/
```

Related Command :OUTPut:TIMEr

:TIMEr[:STATe]

Syntax :TIMEr[:STATe] {ON|OFF}

:TIMEr[:STATe]?

Description Enable or disable the timing output function.

Query the status of the timing output function.

Parameter

Name	Type	Range	Default
{ON|OFF}	Bool	ON|OFF	OFF

Explanation

- Enabling the timer will change the output state of the channel; make sure that the change in the output state will not affect the device connected to the power supply before enabling the timer.
- The timing output is valid only when both the timer and the channel output are enabled.
- When the timer is enabled, the timer parameters cannot be modified.
- For multi-channel models, you can send the :INSTrument[:SELEct], :INSTrument[:SELect] or :INSTrument:NSELect command to switch the current channel, set the timer parameters of the channel selected and enable or disable the timer.
- The timer and delayer (:DELAY[:STATe]) cannot be enabled at the same time.
- You can also send the :OUTPut:TIMEr:STATe command to turn on or off the timer output function.

Return Format The query returns ON or OFF.

Example

```
:TIME ON      /*Enable the timing output*/
:TIME?        /*Query the status of the timing output and the query returns ON*/
```

Related Commands :INSTrument[:SELEct]

:INSTrument[:SELect]

:INSTrument:NSELect

:DELAY[:STATe]

:OUTPut:TIMEr:STATe

:TIMEr:TEMPlet:CONSTruct

Syntax :TIMEr:TEMPlet:CONSTruct

Description Send this command and the instrument will create the timer parameters according to the templet currently selected and the parameters set.

:TIMEr:TEMPlet:FALLRate

Syntax :TIMEr:TEMPlet:FALLRate <value>

:TIMEr:TEMPlet:FALLRate?

Description Set the fall index of ExpFall.

Query the fall index of ExpFall.

Parameter

Name	Type	Range	Default
<value>	Integer	0 to 10	0

Explanation When the templet currently selected is ExpFall (:TIMEr:TEMPlet:SELect), the timer parameters created cannot reach the minimum due to the characteristic of the exponential function. The range of the timer parameters created is related to the fall index currently set. The larger the fall index is, the larger the range of the timer parameters will be.

Return Format The query returns an integer from 0 to 10, for example, 5.

Example :TIME:TEMP:FALLR 5 /*Set the fall index of ExpFall to 5*/

:TIME:TEMP:FALLR? /*Query the fall index of ExpFall and the query returns 5*/

Related Command :TIMEr:TEMPlet:SELect

:TIMEr:TEMPlet:INTErval

Syntax :TIMEr:TEMPlet:INTErval <value>

:TIMEr:TEMPlet:INTErval?

Description Set the time interval.

Query the current time interval.

Parameter

Name	Type	Range	Default
<value>	Integer	1s to 99999s	1s

Explanation

- The time interval refers to the time required for the instrument to output each group of timer parameters created using the templet currently selected.
- The Pulse templet does not support this parameter.

Return Format The query returns an integer from 1 to 99999, for example, 15.

Example :TIME:TEMP:INTE 15 /*Set the time interval to 15s*/

:TIME:TEMP:INTE? /*Query the current time interval and the query returns 15*/

:TIMEr:TEMPlet:INVErt

Syntax :TIMEr:TEMPlet:INVErt {ON|OFF}

:TIMEr:TEMPlet:INVErt?

Description Enable or disable the invert function of the templet currently selected.

Query whether the invert function of the templet currently selected is enabled.

Parameter

Name	Type	Range	Default
{ON|OFF}	Bool	ON|OFF	OFF

Explanation

- When the invert function is enabled, the instrument will first turn the preset waveform upside down and then create timer parameters.
- Only the Sine, Pulse and Ramp templets support this function.

Return Format The query returns ON or OFF.

Example :TIME:TEMP:INVE ON /*Enable the invert of the templet currently selected*/

:TIME:TEMP:INVE? /*Query whether the invert of the templet currently selected is enabled and the query returns ON*/

:TIMEr:TEMPlet:MAXValue

Syntax :TIMEr:TEMPlet:MAXValue {<value>|MINimum|MAXimum}

:TIMEr:TEMPlet:MAXValue? [MINimum|MAXimum]

Description Set the maximum voltage or current of the templet currently selected.

Query the maximum voltage or current of the templet currently selected.

Parameter

Name	Type	Range	Default
<value>	Real	Voltage or current range of the channel currently selected	Refer to the "Explanation"

Explanation

- This command sets the maximum voltage or current (depend on the :TIMEr:TEMPlet:OBJect command). When the editing object is voltage, this command sets the maximum voltage; when the editing object is current, this command sets the maximum current.
- For the DP800 series (except CH3 (-30V/2A) of DP831A/DP831), the maximum voltage and current of all the templets are 1V and 1A. For CH3 (-30V/2A) of DP831A/DP831, the maximum voltage and current of all the templets are -1V and 1A.
- When the Pulse templet is used, this command is used to set the high level.

Return Format The query returns the maximum voltage or current of the templet currently selected, for example, 5.000 or 5.3000.

Example

```
:TIME:TEMP:OBJ V,2      /*Set the current editing object to voltage and set the current to 2A*/
:TIME:TEMP:MAXV 5       /*Set the maximum voltage of the templet currently selected to 5V*/
:TIME:TEMP:MAXV?        /*Query the maximum voltage of the templet currently selected and the query returns 5.000*/
```

Related Commands :TIMEr:TEMPlet:OBJect

:TIMEr:TEMPlet:SELect

:TIMEr:TEMPlet:MINValue

Syntax :TIMEr:TEMPlet:MINValue {<value>|MINimum|MAXimum}

:TIMEr:TEMPlet:MINValue? [MINimum|MAXimum]

Description Set the minimum voltage or current of the templet currently selected.

Query the minimum voltage or current of the templet currently selected.

Parameter

Name	Type	Range	Default
<value>	Real	Voltage or current range of the channel currently selected	0

Explanation

- This command sets the minimum voltage or current (depend on the :TIMEr:TEMPlet:OBJect command). When the editing object is voltage, this command sets the minimum voltage; when the editing object is current, this command sets the minimum current.
- When the Pulse templet is used, this command is used to set the low level.

Return Format The query returns the minimum voltage or current of the templet currently selected, for example, 0.100 or 0.1000.

Example

:TIME:TEMP:OBJ C,1.5 /*Set the current editing object to current and set the voltage to 1.5V*/

:TIME:TEMP:MINV 0.1 /*Set the minimum current of the templet currently selected to 0.1A*/

:TIME:TEMP:MINV? /*Query the minimum current of the templet currently selected and the query returns 0.1000*/

Related Commands :TIMEr:TEMPlet:OBJect

:TIMEr:TEMPlet:SELect

:TIMEr:TEMPlet:OBJect

Syntax :TIMEr:TEMPlet:OBJect {V|C},{<value>|MINimum|MAXimum}

:TIMEr:TEMPlet:OBJect? [MINimum|MAXimum]

Description Select the editing object of the templet and set the current or voltage.

Query the editing object of the templet currently selected as well as the corresponding current or voltage.

Parameter

Name	Type	Range	Default
{V|C}	Discrete	V|C	V
<value>	Real	Voltage or current range of the channel currently selected	0

Explanation When V is selected, the editing object is set to voltage and <value> is used to set the current value; when C is selected, the editing object is set to current and <value> is used to set the voltage value.

Return Format The query returns the editing object currently selected and the corresponding voltage or current value (separated by comma), for example, V,2.0000. Wherein, V denotes that the editing object currently selected is voltage; 2.0000 denotes that the current currently set is 2A.

Example

```
:TIME:TEMP:OBJ V,2    /*Set the editing object of the templet to voltage and set the current to 2A*/
:TIME:TEMP:OBJ?       /*Query the editing object of the templet as well as the corresponding current or voltage and the query returns V,2.0000*/
```

:TIMEr:TEMPlet:PERIod

Syntax :TIMEr:TEMPlet:PERIod <value>

:TIMEr:TEMPlet:PERIod?

Description Set the period of Pulse.

Query the period of Pulse.

Parameter

Name	Type	Range	Default
<value>	Integer	2s to 99999s	10s

Explanation

- The actual range of <value> is related to the positive pulse width (:TIMEr:TEMPlet:WIDTh) currently set. The actual range available is from (positive pulse width+1s) to 99999s.
- When Pulse is selected (:TIMEr:TEMPlet:SELect), if you want to output more than two groups of timer parameters, you can increase the number of cycles (:TIMEr:CYCLEs) to output the timer parameters created by the Pulse templet repeatedly.

Return Format The query returns an integer from 2 to 99999, for example, 15.

Example

```
:TIME:TEMP:PERI 15     /*Set the period of Pulse to 15s*/
:TIME:TEMP:PERI?       /*Query the period of Pulse and the query returns 15*/
```

Related Commands

:TIMEr:TEMPlet:SELect

:TIMEr:TEMPlet:WIDTh

:TIMEr:CYCLEs

:TIMEr:TEMPlet:SELect

:TIMEr:TEMPlet:POINTs

Syntax :TIMEr:TEMPlet:POINTs <value>

:TIMEr:TEMPlet:POINTs?

Description Set the total number of points.

Query the total number of points.

Parameter

Name	Type	Range	Default
<value>	Integer	10 to 2048	10

Explanation

- The total number of points refers to the number of groups of timer parameters created using the templet currently selected.
- When the total number of points (denoted by **P**) and the current number of output groups (denoted by **G**, :TIMEr:GROUPs) are different, **P** groups of parameters will be created using the templet; then, the number of output groups will change to **P** automatically.
- The Pulse templet does not support this parameter.

Return Format The query returns an integer from 10 to 2048, for example, 50.

Example

```
:TIME:TEMP:POINT 50    /*Set the total number of points to 50*/
:TIME:TEMP:POINT?      /*Query the total number of points and the query returns
                        50*/
```

Related Command

:TIMEr:GROUPs

:TIMEr:TEMPlet:RISERate

Syntax :TIMEr:TEMPlet:RISERate <value>

:TIMEr:TEMPlet:RISERate?

Description Set the rise index of ExpRise.

Query the rise index of ExpRise.

Parameter

Name	Type	Range	Default
<value>	Integer	0 to 10	0

Explanation When the templet currently selected is ExpRise (:TIMEr:TEMPlet:SELect), the timer parameters created cannot reach the maximum due to the characteristic of the exponential function. The range of the timer parameters created is related to the rise index currently set. The larger the rise index is, the larger the range of the timer parameters will be.

Return Format The query returns an integer from 0 to 10, for example, 5.

Example :TIME:TEMP:RISER 5 /*Set the rise index of ExpRise to 5*/

:TIME:TEMP:RISER? /*Query the rise index of ExpRise and the query returns 5*/

Related Command :TIMEr:TEMPlet:SELect

:TIMEr:TEMPlet:SELect

Syntax :TIMEr:TEMPlet:SELect {SINE|SQUARE|RAMP|UP|DN|UPDN|RISE|FALL}

:TIMEr:TEMPlet:SELect?

Description Select the desired templet type.

Query the templet type currently selected.

Parameter

Name	Type	Range	Default
{SINE|SQUARE|RAMP| UP|DN|UPDN|RISE|FALL}	Discrete	SINE|SQUARE|RAMP| UP|DN|UPDN|RISE|FALL	SINE

Return Format The query returns SINE, SQUARE, RAMP, UP, DN, UPDN, RISE or FALL.

Example :TIME:TEMP:SEL UP /*Select the UP templet*/

:TIME:TEMP:SEL? /*Query the templet type currently selected and the query returns UP*/

:TIMEr:TEMPlet:SYMMetry

Syntax :TIMEr:TEMPlet:SYMMetry <value>

:TIMEr:TEMPlet:SYMMetry?

Description Set the symmetry of RAMP.

Query the symmetry of RAMP.

Parameter

Name	Type	Range	Default
<value>	Integer	0 to 100	50

Explanation Symmetry refers to the ratio of the duration of the rising edge within a period to the whole period.

Return Format The query returns an integer from 0 to 100, for example, 60.

Example :TIME:TEMP:SYMM 60 /*Set the symmetry of RAMP to 60%*/

:TIME:TEMP:SYMM? /*Query the symmetry of RAMP and the query returns 60*/

:TIMEr:TEMPlet:WIDTh

Syntax :TIMEr:TEMPlet:WIDTh <value>

:TIMEr:TEMPlet:WIDTh?

Description Set the positive pulse width of Pulse.

Query the positive pulse width of Pulse.

Parameter

Name	Type	Range	Default
<value>	Integer	1s to 99998s	5s

Explanation

- Pulse width refers to the duration of high level within a period.
- The actual range available of <value> is related to the period currently set (:TIMEr:TEMPlet:PERIod). The actual range available is from 1s to (period-1s).

Return Format The query returns an integer, for example, 14.

Example :TIME:TEMP:WIDT 14 /*Set the pulse width of Pulse to 14s*/

:TIME:TEMP:WIDT? /*Query the pulse width of Pulse and the query returns 14*/

Related Command :TIMEr:TEMPlet:PERIod

:TRIGger Commands

For DP831A/DP832A/DP821A/DP811A, the instrument is installed with the trigger option when it leaves factory and users can directly use the trigger function. For DP831/DP832/DP821/DP811, the trigger is an optional function; to use this function, please order the corresponding option and install the option correctly (:LIC:SET).

Command List:

:TRIGger:IN:CHTYpe

Syntax :TRIGger:IN:CHTYpe {BUS|IMM}

:TRIGger:IN:CHTYpe?

Description Select the trigger source type.

Query the trigger source type currently selected.

Parameter

Name	Type	Range	Default
{BUS|IMM}	Discrete	BUS|IMM	BUS

Explanation

- The trigger source types include BUS (bus trigger) and IMM (immediate trigger). For the bus trigger (BUS; also called software trigger), the power supply receives trigger from the bus; namely, the power supply receives trigger via software. For immediate trigger (IMM), the power supply receives immediate trigger from the remote interface.
- When the trigger source type is "IMM" (immediate trigger), the power supply will execute a complete trigger operation (the voltage/current of the specified channel changes to the trigger voltage/current currently set immediately) immediately without any delay when you execute the :INITiate or :TRIGger:IN:IMMEdiate command.
- When the trigger source type is "BUS" (bus trigger; namely software trigger), after you execute the :INITiate or :TRIGger:IN:IMMEdiate command to initialize the trigger system, the power supply generates a trigger when you execute the *TRG command and then executes a trigger operation (the voltage/current of the specified channel changes to the trigger voltage/current currently set) after waiting for the specified delay time (if you have set the delay time; refer to the :TRIGger[:SEQuence]:DELay command).
- When the trigger source type is "BUS" (bus trigger; namely software trigger), you can ensure the synchronization of the operations by executing the *WAI command. After you execute the *WAI command, the power supply will only execute the new command after all the previous operations are finished.
- When the trigger source type is "BUS" (bus trigger; namely software trigger), you can make the system report the completion of the operation by executing the *OPC command. When you execute the *OPC? command, the system will return "1" to the output buffer when the operation is completed; when you execute the *OPC command, the system will set bit0 (OPC bit; operation completed) in the standard event register when the operation is completed.
- You can also send the :TRIGger[:SEQuence]:SOURce command to select the trigger source type.

Return Format The query returns BUS or IMM.

Example

```
:TRIG:IN:CHTY BUS      /*Set the trigger source type to BUS (bus trigger; namely
                         software trigger)*/
:TRIG:IN:CHTY?         /*Query the trigger source type currently selected and the
                         query returns BUS*/
```

Related Commands

:INITiate

:TRIGger:IN:IMMEdiate

*TRG

:TRIGger[:SEQuence]:DELay

*WAI

*OPC

:TRIGger[:SEQuence]:SOURce

:TRIGger:IN:CURRent

Syntax :TRIGger:IN:CURRent {CH1|CH2|CH3},<current>

Description Set the trigger current of the specified channel.

Parameter

Name	Type	Range	Default
{CH1|CH2|CH3}	Discrete	CH1|CH2|CH3	None
<current>	Real	0 to the maximum current of the specified channel	0.1A

Explanation

- When the trigger source type (refer to the :TRIGger[:SEQuence]:SOURce or :TRIGger:IN:CHTYpe command) is set to "IMM" (immediate trigger), the power supply will execute a complete trigger operation (the voltage/current of the specified channel changes to the trigger voltage/current currently set immediately) immediately when you execute the :INITiate or :TRIGger:IN:IMMEdiate command.
- When the trigger source type (refer to the :TRIGger[:SEQuence]:SOURce or :TRIGger:IN:CHTYpe command) is set to "BUS" (bus trigger; namely software trigger), after you execute the :INITiate or :TRIGger:IN:IMMEdiate command to initialize the trigger system, the power supply generates a trigger when you execute the *TRG command and then executes a trigger operation (the voltage/current of the specified channel changes to the trigger voltage/current currently set) after waiting for the specified delay time (if you have set the delay time; refer to the :TRIGger[:SEQuence]:DELay command).
- You can also send the [:SOURce[<n>]]:CURRent[:LEVel]:TRIGgered[:AMPLitude] command to set the trigger current of the specified channel.

Example

```
:TRIG:IN:CURR CH1,1      /*Set the trigger current of CH1 to 1A*/
```

Related Commands

:TRIGger[:SEQuence]:SOURce

:TRIGger:IN:CHTYpe

:INITiate

:TRIGger:IN:IMMEdiate

*TRG

:TRIGger[:SEQuence]:DELay

[:SOURce[<n>]]:CURRent[:LEVel]:TRIGgered[:AMPLitude]

:TRIGger:IN[:ENABle]

Syntax :TRIGger:IN[:ENABle] [D0|D1|D2|D3,]{ON|OFF}

:TRIGger:IN[:ENABle]? [D0|D1|D2|D3]

Description Enable or disable the trigger input function of the specified data line.

Query the status of the trigger input function of the specified data line.

Parameter

Name	Type	Range	Default
[D0|D1|D2|D3]	Discrete	D0|D1|D2|D3	D0
{ON|OFF}	Bool	ON|OFF	OFF

Explanation

- If [D0|D1|D2|D3] is omitted, the command sets the trigger input function of the data line currently selected.
- After enabling the trigger input function, the specified source under control (:TRIGger:IN:SOURce) will turn on the output, turn off the output or toggle the output state according to the setting of the :TRIGger:IN:RESPonse command when the input signal on the specified data line meets the current trigger type (:TRIGger:IN:TYPE).

Return Format The query returns Dn,ON or Dn,OFF; wherein, n=0, 1, 2 or 3.

Example

```
:TRIG:IN D1,ON    /*Enable the trigger input function of D1*/
:TRIG:IN? D1      /*Query the status of the trigger input function of D1 and the
                    query returns D1,ON*/
```

Related Commands

:TRIGger:IN:TYPE

:TRIGger:IN:RESPonse

:TRIGger:IN:SOURce

:TRIGger:IN:IMMEdiate

Syntax :TRIGger:IN:IMMEdiate

Description Initialize the trigger system.

Explanation

- When the trigger source type (refer to the :TRIGger[:SEQuence]:SOURce or :TRIGger:IN:CHTYpe command) is set to "IMM" (immediate trigger), the power supply will execute a complete trigger operation immediately when yopu execute this command.
- When the trigger source type (refer to the :TRIGger[:SEQuence]:SOURce or :TRIGger:IN:CHTYpe command) is set to "BUS" (bus trigger; namely software trigger), the trigger system will be initialized when you execute this command; after that, send the*TRG command to trigger the power supply and the power supply will execute a trigger operation after waiting for the specified delay time (if you have set the delay time; refer to the :TRIGger[:SEQuence]:DELay command).
- You can also send the :INITiate command to initialize the trigger system.

Related Commands

:TRIGger[:SEQuence]:SOURce

:TRIGger:IN:CHTYpe

*TRG

:TRIGger[:SEQuence]:DELay

:INITiate

:TRIGger:IN:RESPonse

Syntax :TRIGger:IN:RESPonse [D0|D1|D2|D3,]{ON|OFF|ALTER}

:TRIGger:IN:RESPonse? [D0|D1|D2|D3]

Description Set the output response of the trigger input of the specified data line.

Query the output response of the trigger input of the specified data line.

Parameter

Name	Type	Range	Default
[D0|D1|D2|D3]	Discrete	D0|D1|D2|D3	D0
{ON|OFF|ALTER}	Discrete	ON|OFF|ALTER	OFF

Explanation

- If [D0|D1|D2|D3] is omitted, the command sets the output response of the data line currently selected.
- ON: when the input signal of the specified data line meets the trigger type set (:TRIGger:IN:TYPE), turn on the output of the channel currently selected as the source under control (:TRIGger:IN:SOURce).
- OFF: when the input signal of the specified data line meets the trigger type set (:TRIGger:IN:TYPE), turn off the output of the channel currently selected as the source under control (:TRIGger:IN:SOURce).
- ALTER: when the input signal of the specified data line meets the trigger type set (:TRIGger:IN:TYPE), toggle the output state of the channel currently selected as the source under control (:TRIGger:IN:SOURce).

Return Format The query returns ON, OFF or ALTER.

Example

```
:TRIG:IN:RESP D1,ON     /*Set the output response of the trigger input of D1 to output on*/
:TRIG:IN:RESP? D1       /*Query the output response of the trigger input of D1 and the query returns ON*/
```

Related Commands :TRIGger:IN:SOURce

:TRIGger:IN:TYPE

:TRIGger:IN:SENSitivity

Syntax :TRIGger:IN:SENSitivity [D0|D1|D2|D3,]{LOW|MID|HIGH}

:TRIGger:IN:SENSitivity? [D0|D1|D2|D3]

Description Set the trigger sensitivity of the trigger input of the specified data line.

Query the trigger sensitivity of the trigger input of the specified data line.

Parameter

Name	Type	Range	Default
[D0|D1|D2|D3]	Discrete	D0|D1|D2|D3	D0
{LOW|MID|HIGH}	Discrete	LOW|MID|HIGH	LOW

Explanation

- If [D0|D1|D2|D3] is omitted, the command sets the trigger sensitivity of the data line currently selected.
- Selecting relatively lower trigger sensitivity can avoid mis-trigger at the noise.

Return Format The query returns LOW, MID or HIGH.

Example

```
:TRIG:IN:SENS D1,HIGH    /*Set the trigger sensitivity of the trigger input of D1 to high*/
:TRIG:IN:SENS? D1        /*Query the trigger sensitivity of the trigger input of D1 and the query returns HIGH*/
```

:TRIGger:IN:SOURce

Syntax :TRIGger:IN:SOURce [D0|D1|D2|D3,][CH1[,CH2[,CH3]]]

:TRIGger:IN:SOURce? [D0|D1|D2|D3]

Description Set the source under control of the trigger input of the specified data line.

Query the source under control of the trigger input of the specified data line.

Parameter

Name	Type	Range	Default
[D0|D1|D2|D3]	Discrete	D0|D1|D2|D3	D0
[CH1[,CH2[,CH3]]][1]	ASCII string	Refer to the "Explanation"	CH1

Explanation

- If [D0|D1|D2|D3] is omitted, the command sets the source under control of the data line currently selected.
- One or more of CH1, CH2 and CH3 can be selected as the source under control at the same time. When [CH1[,CH2[,CH3]]] is omitted, CH1 will be selected as the source under control of the trigger input of the specified data line.

Return Format The query returns the name of the source under control. If the source under control contains multiple channels, the channels are separated by commas, for example, CH1 or CH1,CH2.

Example

```
:TRIG:IN:SOUR D1,CH1,CH2    /*Set the source under control of the trigger input of D1 to CH1 and CH2*/
:TRIG:IN:SOUR? D1           /*Query the source under control of the trigger input of D1 and the query returns CH1,CH2*/
```

Note[1]: For this command, the channel ranges cannot be used as command parameters.

:TRIGger:IN:TYPE

Syntax :TRIGger:IN:TYPE [D0|D1|D2|D3,]{RISE|FALL|HIGH|LOW}

:TRIGger:IN:TYPE? [D0|D1|D2|D3]

Description Set the trigger type of the trigger input of the specified data line.

Query the trigger type of the trigger input of the specified data line.

Parameter

Name	Type	Range	Default
[D0|D1|D2|D3]	Discrete	D0|D1|D2|D3	D0
{RISE|FALL|HIGH|LOW}	Discrete	RISE|FALL|HIGH|LOW	RISE

Explanation

- If [D0|D1|D2|D3] is omitted, the command sets the trigger type of the trigger input of the data line currently selected.
- You can select to trigger on the rising edge (RISE), falling edge (FALL), high level (HIGH) or low level (LOW) of the input signal.
- For the input signal, high level is from 2.5V to 3.3V, low level is from 0V to 0.8V and the noise immunity is 0.4V.

Return Format The query returns RISE, FALL, HIGH or LOW.

Example

```
:TRIG:IN:TYPE D1,FALL    /*Set the trigger type of the trigger input of D1 to the
                           falling edge */
:TRIG:IN:TYPE? D1        /*Query the trigger type of the trigger input of D1 and
                           the query returns FALL*/
```

:TRIGger:IN:VOLTage

Syntax :TRIGger:IN:VOLTage {CH1|CH2|CH3},<voltage>

Description Set the trigger voltage of the specified channel.

Parameter

Name	Type	Range	Default
{CH1|CH2|CH3}	Discrete	CH1|CH2|CH3	None
<voltage>	Real	0 to the maximum voltage of the specified channel	0V

Explanation

- When the trigger source type (refer to the :TRIGger[:SEQuence]:SOURce or :TRIGger:IN:CHTYpe command) is set to "IMM" (immediate trigger), the power supply will execute a complete trigger operation (the voltage/current of the specified channel changes to the trigger voltage/current currently set immediately) immediately when you execute the :INITiate or :TRIGger:IN:IMMEdiate command.
- When the trigger source type (refer to the :TRIGger[:SEQuence]:SOURce or :TRIGger:IN:CHTYpe command) is set to "BUS" (bus trigger; namely software trigger), after you execute the :INITiate or :TRIGger:IN:IMMEdiate command to initialize the trigger system, the power supply generates a trigger when you execute the *TRG command and then executes a trigger operation (the voltage/current of the specified channel changes to the trigger voltage/current currently set) after waiting for the specified delay time (if you have set the delay time; refer to the :TRIGger[:SEQuence]:DELay command).
- You can also send the [:SOURce[<n>]]:VOLTage[:LEVel]:TRIGgered[:AMPLitude] command to set the trigger voltage of the specified channel.

Example

```
:TRIG:IN:VOLT CH1,1      /*Set the trigger voltage of CH1 to 1V*/
```

Related Commands

:TRIGger[:SEQuence]:SOURce

:TRIGger:IN:CHTYpe

:INITiate

:TRIGger:IN:IMMEdiate

*TRG

:TRIGger[:SEQuence]:DELay

[:SOURce[<n>]]:VOLTage[:LEVel]:TRIGgered[:AMPLitude]

:TRIGger:OUT:CONDition

Syntax :TRIGger:OUT:CONDition [D0|D1|D2|D3,]{OUTOFF|OUTON|>V|<V|=V|>C|<C|=C|>P|<P|=P|AUTO}[,<value>|MINimum|MAXimum]

:TRIGger:OUT:CONDition? [D0|D1|D2|D3][,MINimum|MAXimum]

Description Set the trigger condition of the trigger output of the specified data line.

Query the trigger condition of the trigger output of the specified data line.

Parameter

Name	Type	Range	Default
[D0|D1|D2|D3]	Discrete	D0|D1|D2|D3	D0
{OUTOFF|OUTON|>V|<V|=V|>C|<C|=C|>P|<P|=P|AUTO}	Discrete	OUTOFF|OUTON|>V|<V|=V|>C|<C|=C|>P|<P|=P|AUTO	OUTOFF
<value>	Real	Refer to the "Explanation"	

Explanation

- If [D0|D1|D2|D3] is omitted, the command sets the trigger condition of the trigger output of the data line currently selected.
- When OUTOFF, OUTON or AUTO is selected, <value> is omitted; when >V, <V, =V, >C, <C, =C, >P, <P or =P is selected, <value> is the corresponding voltage, current or power.
- For multi-channel models, the range of <value> is the voltage/current/power range of the channel currently selected and the default is 0.5*(the rated voltage/current of CH1) or 0.25*(the rated power of CH1).
- Output Trigger: includes OUTOFF and OUTON, namely triggers when the output of the specified control source is turned off or on.
- Voltage Trigger: includes >V, <V and =V, namely trigger when the output voltage of the specified control source meets the trigger condition set.
- Current Trigger: includse >C, <C and =C, namely trigger when the output current of the specified control source meets the trigger condition set.
- Power Trigger: includes >P, <P and =P, >P, namely trigger when the output power of the specified control source meets the trigger condition set.
- Auto Trigger: the instrument triggers automatically when enabled.
- You only need to set <value> (the voltage, current or power specified in the trigger condition) when voltage trigger (>V, <V, =V), current trigger (>C, <C, =C) or power trigger (>P, <P, =P) is selected.

Return Format When the condition is set to OUTOFF, OUTON or AUTO, the query returns OUTOFF, OUTON or AUTO; when the condition is set to >V, <V, =V, >C, <C, =C, >P, <P or =P, the query returns the condition and the voltage/current/power, for example, >V,8.800.

Example

```
:TRIG:OUT:COND D1,>V,8.8    /*Set the trigger condition of the trigger output of
                              D1 to >V and set the voltage to 8.8V*/
:TRIG:OUT:COND? D1          /* Query the trigger condition of the trigger output of
                              D1 and the query returns >V,8.800*/
```

:TRIGger:OUT:DUTY

Syntax :TRIGger:OUT:DUTY [D0|D1|D2|D3,]<value>

:TRIGger:OUT:DUTY? [D0|D1|D2|D3]

Description Set the duty cycle of the square waveform of the trigger output on the specified data line.

Query the duty cycle of the square waveform of the trigger output on the specified data line.

Parameter

Name	Type	Range	Default
[D0|D1|D2|D3]	Discrete	D0|D1|D2|D3	D0
<value>	Integer	10 to 90	50

Explanation

- Duty cycle is defined as the percentage that the high level takes up within a whole square waveform period.
- If [D0|D1|D2|D3] is omitted, the command sets the duty cycle of the square waveform of the trigger output on the data line currently selected.

Return Format The query returns an integer from 10 to 90.

Example

```
:TRIG:OUT:DUTY D1,60    /*Set the duty cycle of the square waveform of the
                          trigger output on D1 to 60%*/
:TRIG:OUT:DUTY? D1      /*Query the duty cycle of the square waveform of the
                          trigger output on D1 and the query returns 60*/
```

Related Command :TRIGger:OUT:SIGNal

:TRIGger:OUT[:ENABle]

Syntax :TRIGger:OUT[:ENABle] [D0|D1|D2|D3,]{ON|OFF}

:TRIGger:OUT[:ENABle]? [D0|D1|D2|D3]

Description Enable or disable the trigger output function of the specified data line.

Query the status of the trigger output function of the specified data line.

Parameter

Name	Type	Range	Default
[D0|D1|D2|D3]	Discrete	D0|D1|D2|D3	D0
{ON|OFF}	Bool	ON|OFF	OFF

Explanation

- If [D0|D1|D2|D3] is omitted, the command enables or disables the trigger output function of the data line currently selected.
- When the trigger output function is enabled, the specified data line outputs the specified level or square waveform according to the setting of the output signal (:TRIGger:OUT:SIGNal) when the output signal of the specified control source (:TRIGger:OUT:SOURce) meets the trigger condition set (:TRIGger:OUT:CONDition).

Return Format The query returns Dn,ON or Dn,OFF; wherein, n=0, 1, 2 or 3.

Example

```
:TRIG:IN D1,ON    /*Enable the trigger output function of D1*/
:TRIG:IN? D1      /*Query the status of the trigger output function of D1 and the
                    query returns D1,ON*/
```

Related Commands :TRIGger:OUT:SOURce

:TRIGger:OUT:CONDition

:TRIGger:OUT:SIGNal

:TRIGger:OUT:PERIod

Syntax :TRIGger:OUT:PERIod [D0|D1|D2|D3,]<value>

:TRIGger:OUT:PERIod? [D0|D1|D2|D3]

Description Set the period of the square waveform of the trigger output on the specified data line.

Query the period of the square waveform of the trigger output on the specified data line.

Parameter

Name	Type	Range	Default
[D0|D1|D2|D3]	Discrete	D0|D1|D2|D3	D0
<value>	Real	0.000100s to 2.500000s	1s

Explanation

- If [D0|D1|D2|D3] is omitted, the command sets the period of the square waveform of the trigger output on the data line currently selected.
- The units supported by <value> include s, ms and us. The default unit is s.

Return Format The query returns a value from 0.000100 to 2.500000.

Example

:TRIG:OUT:PERI D1,0.005 /*Set the period of the square waveform of the trigger output on D1 to 5ms*/

:TRIG:OUT:PERI? D1 /*Query the period of the square waveform of the trigger output on D1 and the query returns 0.005000*/

Related Command :TRIGger:OUT:SIGNal

:TRIGger:OUT:POLArity

Syntax :TRIGger:OUT:POLArity [D0|D1|D2|D3,]{POSItive|NEGAtive}

:TRIGger:OUT:POLArity? [D0|D1|D2|D3]

Description Set the polarity of the trigger output signal of the specified data line.

Query the polarity of the trigger output signal of the specified data line.

Parameter

Name	Type	Range	Default
[D0|D1|D2|D3]	Discrete	D0|D1|D2|D3	D0
{POSItive|NEGAtive}	Discrete	POSItive|NEGAtive	POSItive

Explanation

- If [D0|D1|D2|D3] is omitted, the command sets the polarity of the trigger output signal of the data line currently selected.
- POSItive: output the currently specified output signal (:TRIGger:OUT:SIGNal, :TRIGger:OUT:DUTY and :TRIGger:OUT:PERIod) when the trigger condition is met.
  NEGAtive: turn the currently specified output signal (:TRIGger:OUT:SIGNal, :TRIGger:OUT:DUTY and :TRIGger:OUT:PERIod) upside down and then output the signal when the trigger condition is met.

Return Format The query returns POSITIVE or NEGATIVE.

Example

```
:TRIG:OUT:POLA D1,NEGAtive    /* Set the polarity of the trigger output signal of
                                 D1 to negative */
:TRIG:OUT:POLA? D1            /* Query the polarity of the trigger output signal of
                                 D1 and the query returns NEGATIVE*/
```

Related Commands

:TRIGger:OUT:SIGNal

:TRIGger:OUT:DUTY

:TRIGger:OUT:PERIod

:TRIGger:OUT:SIGNal

Syntax :TRIGger:OUT:SIGNal [D0|D1|D2|D3,]{LEVEL|SQUARE}

:TRIGger:OUT:SIGNal? [D0|D1|D2|D3]

Description Set the type of the trigger output signal of the specified data line.

Query the type of the trigger output signal of the specified data line.

Parameter

Name	Type	Range	Default
[D0|D1|D2|D3]	Discrete	D0|D1|D2|D3	D0
{LEVEL|SQUARE}	Discrete	LEVEL|SQUARE	LEVEL

Explanation

- If [D0|D1|D2|D3] is omitted, the command sets the type of the trigger output signal of the data line currently selected.
- When LEVEL is selected, the specified data line outputs level signal (high level is from 2.6V to 3.5 V, low level is from 0V to 0.4V) when the trigger condition is met; when SQUARE is selected, the specified data line outputs the specified square waveform (:TRIGger:OUT:DUTY and :TRIGger:OUT:PERIod) when the trigger condition is met.

Return Format The query returns LEVEL or SQUARE.

Example

```
:TRIG:OUT:SIGN D1,LEVEL   /* Set the type of the trigger output signal of D1 to level */
:TRIG:OUT:SIGN? D1        /* Query the type of the trigger output signal of D1 and the query returns LEVEL*/
```

Related Commands :TRIGger:OUT:DUTY

:TRIGger:OUT:PERIod

:TRIGger:OUT:SOURce

Syntax :TRIGger:OUT:SOURce [D0|D1|D2|D3,]{CH1|CH2|CH3}

:TRIGger:OUT:SOURce? [D0|D1|D2|D3]

Description Set the control source of the trigger output of the specified data line.

Query the control source of the trigger output of the specified data line.

Parameter

Name	Type	Range	Default
[D0|D1|D2|D3]	Discrete	D0|D1|D2|D3	D0
{CH1|CH2|CH3}[1]	Discrete	CH1|CH2|CH3	CH1

Explanation

- If [D0|D1|D2|D3] is omitted, the command sets the control source of the trigger output of the data line currently selected.
- Any of CH1, CH2 and CH3 can be selected as the control source of the trigger output.

Return Format The query returns the name of the control source, for example, CH1.

Example

```
:TRIG:OUT:SOUR D1,CH1   /*Set the control source of D1 to CH1*/
:TRIG:OUT:SOUR? D1      /*Query the control source of D1 and the query returns CH1*/
```

Note[1]: For this command, the channel ranges cannot be used as command parameters.

:TRIGger[:SEQuence]:DELay

Syntax :TRIGger[:SEQuence]:DELay {<seconds>|MIN|MAX}

:TRIGger[:SEQuence]:DELay?

Description Set the trigger delay.

Query the current trigger delay.

Parameter

Name	Type	Range	Default
<seconds>	Integer	0s to 3600s	0s

Explanation

- Trigger delay refers to the time from when the trigger is detected on the specified trigger source to when the corresponding output changes accordingly.
- The trigger delay is only valid when the trigger source is set to "BUS" (bus trigger, namely software trigger).
- When the trigger source (:TRIGger[:SEQuence]:SOURce or :TRIGger:IN:CHTYpe) is set to "IMM" (immediate trigger), the system executes a complete trigger operation (the voltage/current of the specified channel changes to the trigger voltage/current currently set immediately) immediately after executing the :INITiate or :TRIGger:IN:IMMEdiate command and there is no delay.
- When the trigger source (:TRIGger[:SEQuence]:SOURce or :TRIGger:IN:CHTYpe) is set to "BUS" (bus trigger, namely software trigger), the system generates a trigger by executing the *TRG command after executing the :INITiate or :TRIGger:IN:IMMEdiate command to initialize the trigger system. Then, the power supply executes a trigger operation (the voltage/current of the specified channel change to the trigger voltage/current currently set) after the specified delay time (if the delay time is set, :TRIGger[:SEQuence]:DELay).
- When trigger coupling is currently set, for all the coupling channels, the trigger delay time is the same (the value set by this command).

Return Format The query returns an integer from 0 to 3600, for example, 3.

Example

```
:TRIG:DEL 3      /*Set the trigger delay to 3s*/
:TRIG:DEL?       /*Query the current trigger delay and the query returns 3*/
```

Related Commands

:TRIGger[:SEQuence]:SOURce

:TRIGger:IN:CHTYpe

:INITiate

:TRIGger:IN:IMMEdiate

*TRG

:TRIGger[:SEQuence]:SOURce

Syntax :TRIGger[:SEQuence]:SOURce {BUS|IMM}

:TRIGger[:SEQuence]:SOURce?

Description Select the trigger source.

Query the trigger source currently selected.

Parameter

Name	Type	Range	Default
{BUS|IMM}	Discrete	BUS|IMM	BUS

Explanation

- The trigger sources include BUS (bus trigger) and IMM (immediate trigger). In bus trigger, also called software trigger, the power supply receives trigger from the bus, namely the power supply receives trigger via software. In immediate trigger, the power supply receives immediate trigger via the remote interface.
- When the trigger source is set to "IMM" (immediate trigger), the system executes a complete trigger operation (the voltage/current of the specified channel changes to the trigger voltage/current currently set immediately) immediately after executing the :INITiate or :TRIGger:IN:IMMEdiate command and there is no delay.
- When the trigger source is set to "BUS" (bus trigger, namely software trigger), the system generates a trigger by executing the *TRG command after executing the :INITiate or :TRIGger:IN:IMMEdiate command to initialize the trigger system. Then, the power supply executes a trigger operation (the voltage/current of the specified channel change to the trigger voltage/current currently set) after the specified delay time (if the delay time is set, :TRIGger[:SEQuence]:DELay).
- When the trigger source is set to "BUS" (bus trigger, namely software trigger), the *WAI command can ensure the synchronization. After executing the *WAI command, the power supply will only execute new command when all the pending operations are completed.
- When the trigger source is set to "BUS" (bus trigger, namely software trigger), you can use the *OPC command to report that the operation is completed. The *OPC? command will return "1" to the output buffer and the *OPC command will set the bit0 (OPC bit, operation complete) in the standard event register when the operation is finished.
- You can also send the :TRIGger:IN:CHTYpe command to select the trigger source type.

Return Format The query returns BUS or IMM.

Example

```
:TRIG:SOUR BUS      /*Set the trigger source to BUS (bus trigger, namely software trigger)*/
:TRIG:SOUR?         /*Query the trigger source currently selected and the query returns BUS*/
```

Related Commands

:INITiate

:TRIGger:IN:IMMEdiate

*TRG

:TRIGger[:SEQuence]:DELay

*WAI

*OPC

:TRIGger:IN:CHTYpe

Chapter 3 Application Examples

This chapter provides some application examples of the SCPI commands. A series of SCPI commands are combined to realize the main functions of the power supply.

Note:

1 The examples in this chapter are based on DP831A. For other models, the ranges of some parameters might be different. When using the commands, please make proper adjustment according to the model of your instrument.

2 Before using the examples in this chapter, please select the desired communication interface (USB, LAN, RS232 or GPIB) and make correct connections (refer to the introductions in **"To Build Remote Communication"**). Besides, you have to install Ultra Sigma or other PC software for sending commands on your PC.

3 The content enclosed in "/*" and "*/" after each command in this chapter is annotation for easier understanding and is not a part of the command.

Main topics of this chapter:

CV Output

Requirement

Use the SCPI commands to realize the following functions:
CH1 CV output; set the output voltage to 5V, the output current to 5A and the overcurrent protection value to 5.3A.

Method 1

```
1  *IDN?                  /*Query the ID string of the power supply to check whether the remote
                            communication is normal*/
2  :INST CH1              /*Select CH1*/
3  :CURR 5                /*Set the current of CH1 to 5A*/
4  :CURR:PROT 5.3         /*Set the overcurrent protection value of CH1 to 5.3A*/
5  :CURR:PROT:STAT ON     /*Enable the overcurrent protection function of CH1*/
6  :VOLT 5                /*Set the voltage of CH1to 5V*/
7  :OUTP CH1,ON           /*Enable the output of CH1*/
```

Method 2

```
1  *IDN?                  /*Query the ID string of the power supply to check whether the remote
                            communication is normal*/
2  :CURR:PROT 5.3         /*Set the overcurrent protection value of CH1 to 5.3A*/
3  :CURR:PROT:STAT ON     /*Enable the overcurrent protection function of CH1*/
4  :APPL CH1,5,5          /*Select CH1, set the voltage to 5V and current to 5A*/
5  :OUTP CH1,ON           /*Enable the output of CH1*/
```

Track Function

Some channels of DP800 support the track function, including CH2 and CH3 of DP831A/DP831 as well as CH1 and CH2 of DP832A/DP832.

Requirement

Use the SCPI commands to realize the following functions by taking DP831A as an example:
Enable the track function of CH3; change the voltage setting value of CH3 from -5V to -30V; at this point, the voltage setting value of CH2 changes accordingly.

Method

```
1  *IDN?                  /*Query the ID string of the power supply to check whether the remote
                            communication is normal*/
2  :OUTP:TRAC CH3,ON      /*Enable the track function of CH3*/
3  :APPL CH3,-5,1         /*Set the voltage of CH3 to -5V and the current to 1A*/
4  :APPL? CH2,VOLT        /*Query the voltage of CH2 and the query returns 5.000*/
5  :APPL CH3,-30,1        /*Change the voltage of CH3 to -30V*/
6  :APPL? CH2,VOLT        /*Query the voltage of CH2 and the query returns 30.000*/
```

Timing Output

Requirement

Use the SCPI commands to realize the following functions:

- Set the timer parameters of CH1: set the number of groups to 25, the number of cycles to 20 and the end state to last; use the Sine templet to create the timer parameters; set the editing object to voltage and the current to 2A; set the templet maximum to 8V and the templet minimum to 0V; set the total number of points to 25 and the time interval to 5s; enable the invert.
- Save the timer parameters edited.
- Enable the timing output.

Method

```
1   *IDN?                  /*Query the ID string of the power supply to check whether the remote
                             communication is normal*/
2   :INST CH1              /*Select CH1*/
3   :TIME:GROUP 25         /*Set the number of groups to 25*/
4   :TIME:CYCLE N,20       /*Set the number of cycles to 20*/
5   :TIME:ENDS LAST        /*Set the end state to last*/
6   :TIME:TEMP:SEL SINE    /*Select Sine templet*/
7   :TIME:TEMP:OBJ V,2     /*Set the editing object to voltage and set the current to 2A*/
8   :TIME:TEMP:MAXV 8      /*Set the maximum to 8V*/
9   :TIME:TEMP:MINV 0      /*Set the minimum to 0V*/
10  :TIME:TEMP:POINT 25    /*Set the total number of points to 25*/
11  :TIME:TEMP:INTE 5      /*Set the time interval to 5s*/
12  :TIME:TEMP:INVE ON     /*Enable the invert*/
13  :TIME:TEMP:CONST       /*Create the timer parameters*/
14  :MEM:STOR RTF,1        /*Save the timer parameters edited in internal memory*/
15  :OUTP CH1,ON           /*Enable the output of CH1*/
16  :TIME ON               /*Enable the timing output*/
```

Delay Output

Requirement

Use the SCPI commands to realize the following functions:

- Set the delayer parameters of CH1: set the number of groups to 25, the number of cycles to 20 and the end state to last; select 1 0 pattern to generate state; set the time generation method to monotonic increase, the time base value to 2s and the step to 5s; set the stop condition to ">V" and the voltage to 8V.
- Save the delayer parameters edited.
- Enable the delay output.

Method

```
1   *IDN?                      /*Query the ID string of the power supply to check whether the remote
                                 communication is normal*/
2   :INST CH1                  /*Select CH1*/
3   :DELAY:GROUP 25            /*Set the number of groups to 25*/
4   :DELAY:CYCLE N,20          /*Set the number of cycles to 20*/
5   :DELAY:ENDS LAST           /*Set the end state to last*/
6   :DELAY:STAT:GEN 10P        /*Select 1 0 pattern to generate state*/
7   :DELAY:TIME:GEN INC,2,5    /*set the time generation method to monotonic increase, the time base
                                 value to 2s and the step to 5s */
8   :DELAY:STOP >V,8           /*Set the stop condition to ">V" and the voltage to 8V*/
9   :MEM:STOR RDF,1            /*Save the delayer parameters edited in internal memory*/
10  :OUTP CH1,ON               /*Enable the output of CH1*/
11  :DELAY ON                  /*Enable the delay output*/
```

To Trigger the Power Supply

Requirement

Use the SCPI commands to realize the following functions:

- Set the trigger source to "BUS" and the delay time to 3s.
- Set the trigger voltage and trigger current of CH1 to 3V and 1A.
- Trigger the power supply. The power supply executes the trigger operation after 3s (delay time) and the voltage/current of CH1 changes to 3V/1A.

Method

```
1   *IDN?                  /*Query the ID string of the power supply to check whether the
                             remote communication is normal*/
2   :TRIG:SOUR BUS         /*Set the trigger source to "BUS" (bus trigger, namely software trigger)*/
3   :TRIG:DEL 3            /*Set the delay time to 3s*/
4   :SOUR1:VOLT:TRIG 3     /*Set the trigger voltage of CH1 to 3V*/
5   :SOUR1:CURR:TRIG 1     /*Set the trigger current of CH1 to 1A*/
6   :INIT                  /*Initialize the trigger system*/
7   *TRG                   /*The power supply executes the trigger operation after 3s (delay time) and
                             the voltage/current of CH1 changes to 3V/1A*/
```

To Use the Recorder

Requirement

Use the SCPI commands to realize the following functions:

Set the record period to 2s and the storage directory of the record file to C:\REC 1:RIGOL.ROF; enable the recorder, wait for about 2 minutes and disable the recorder.

Method

```
1   *IDN?                  /*Query the ID string of the power supply to check whether the remote
                             communication is normal*/
2   :OUTP CH1,ON           /*Enable the output of CH1; otherwise, the recorded data of CH1 will be 0*/
3   :OUTP CH2,ON           /*Enable the output of CH2; otherwise, the recorded data of CH2 will be 0*/
4   :OUTP CH3,ON           /*Enable the output of CH3; otherwise, the recorded data of CH3 will be 0*/
5   :REC:PERI 2            /*Set the record period to 2s*/
6   :REC:MEM 1,RIGOL.ROF   /*Set the storage directory of the record file to C:\REC 1:RIGOL.ROF*/
7   :REC ON                /*Enable the recorder*/
/*Wait for about 2 minutes...*/
8   :REC OFF               /*Disable the recorder*/
```

To Use the Analyzer

Requirement

Use the SCPI commands to realize the following functions:

- Open the C:\REC 1:RIGOL.ROF file; set the start time to 1s (it is assumed that the record period of C:\REC 1:RIGOL.ROF is 1s. Note that the range of the start time is from the record period of the record file opened to the end time) and the end time to 100s.
- Execute the analysis.
- Read the analysis results.

Method

```
1   *IDN?                 /*Query the ID string of the power supply to check whether the remote
                            communication is normal*/
2   :ANAL:MEM 1           /*Open the C:\REC 1:RIGOL.ROF file*/
3   :ANAL:STARTT 1        /*Set the start time to 1s*/
4   :ANAL:ENDT 100        /*Set the end time to 100s*/
5   :ANAL:ANAL            /*Execute the analysis*/
6   :ANAL:RES?            /*Read the analysis results*/
```

To Use the Monitor

Requirement

Use the SCPI commands to realize the following functions:

- Monitor CH1.
- Set the monitor condition: >Voltage, >Current or >Power; set the voltage to 5V, the current to 3A and the power to 15W; set the stop mode to OutpOff, Warning and Beeper.
- Enable the monitor.

Method

```
1   *IDN?                 /*Query the ID string of the power supply to check whether the
                            remote communication is normal*/
2   :INST CH1             /*Select CH1*/
3   :MONI:VOLT:COND >V,OR /*Set the voltage monitor condition to ">V" and the logic relation to
                            "OR"*/
4   :MONI:VOLT 5          /*Set the voltage of the monitor condition to 5V*/
5   :MONI:CURR:COND >C,OR /*Set the current monitor condition to ">C" and the logic relation to
                            "OR"*/
6   :MONI:CURR 3          /*Set the current of the monitor condition to 3A*/
7   :MONI:POWER:COND >P   /*Set the power monitor condition to ">P"*/
8   :MONI:POWER 15        /*Set the power of the monitor condition to 15W*/
9   :MONI:STOP OUTOFF,ON  /*Enable the "OutpOff" stop mode*/
10  :MONI:STOP WARN,ON    /*Enable the "Warning" stop mode*/
11  :MONI:STOP BEEPER,ON  /*Enable the "Beeper" stop mode*/
12  :MONI ON              /*Enable the monitor*/
```

To Use the Trigger

Trigger Input

Requirement

Use the SCPI commands to realize the following functions:

- Set the trigger input parameters of D0: set the source under control to CH1, the trigger type to falling edge, the output response to ON and the trigger sensitivity to low.
- Enable the trigger input function of D0.

Method

```
1  *IDN?                    /*Query the ID string of the power supply to check whether the remote
                             communication is normal*/
2  :TRIG:IN:SOUR D0,CH1     /*Set the source under control of the trigger input of D0 to CH1*/
3  :TRIG:IN:TYPE D0,FALL    /*Set the trigger type of the trigger input of D0 to falling edge*/
4  :TRIG:IN:RESP D0,ON      /*Set the output response of the trigger input of D0 to ON*/
5  :TRIG:IN:SENS D0,LOW     /*Set the trigger sensitivity of the trigger input of D0 to low*/
6  :TRIG:IN D0,ON           /*Enable the trigger input function of D0*/
```

Trigger Output

Requirement

Use the SCPI commands to realize the following functions:

- Set the trigger output parameters of D1: set the control source to CH2, the trigger condition to "Voltage>5V", the output signal to square waveform (0.5s period and 60% duty cycle) and the polarity of the signal to negative.
- Enable the trigger output function of D1.

Method

```
1  *IDN?                        /*Query the ID string of the power supply to check whether the
                                 remote communication is normal*/
2  :TRIG:OUT:SOUR D1,CH2        /*Set the control source of the trigger output of D1 to CH2*/
3  :TRIG:OUT:COND D1,>V,5       /*Set the trigger condition of the trigger output of D1 to
                                 "Voltage>5V"*/
4  :TRIG:OUT:SIGN D1,SQUARE     /*Set the trigger output signal of D1 to square waveform*/
5  :TRIG:OUT:PERI D1,0.5        /*Set the period of the square waveform of the trigger output on D1
                                 to 0.5s*/
6  :TRIG:OUT:DUTY D1,60         /*Set the duty cycle of the square waveform of the trigger output on
                                 D1 to 60%*/
7  :TRIG:OUT:POLA D1,NEGA       /*Set the polarity of the trigger output signal of D1 to negative*/
8  :TRIG:OUT D1,ON              /*Enable the trigger output function of D1*/
```

Chapter 4 Programming Demos

This chapter provides the demos for programming and controlling the power supply using SCPI commands under Excel, MATLAB, LabVIEW, Visual Basic and Visual C++ environment on the basis of NI-VISA.

NI-VISA (National Instrument-Virtual Instrument Software Architecture) is an advanced application programming interface developed by NI (National Instrument) for communicating with various instrument buses. It can communicate with instrument in the same method regardless of the type of the instrument interface (GPIB, USB, LAN/Ethernet or RS232).

The instruments communicate with NI-VISA via various interfaces are called "resources". The VISA descriptor (namely the resource name) is used to describe the accurate name and location of the VISA resource. If LAN interface is currently used for communicating with the instrument, the VISA descriptor is :TCPIP0::172.16.2.13::INSTR. Before programming, please acquire the correct VISA descriptor.

Main topics of this chapter:

Programming Preparations

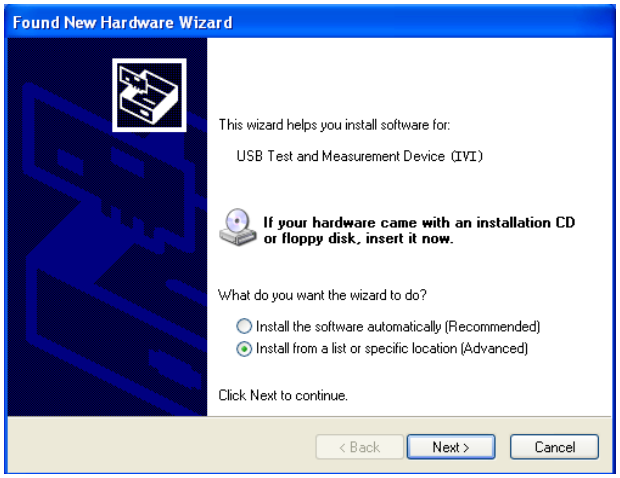
Before programming, you need to make the following preparations:

1 Install the Ultra Sigma common PC software. You can acquire this software from the resource CD of the standard accessories or download it from **RIGOL** official website (www.rigol.com); then, install it according to the instructions. After installing the Ultra Sigma, the NI-VISA library will be installed automatically. Here, the default installation path is C:\Program Files\IVI Foundation\VISA.

2 Here, the USB interface of the power supply is used to communicate with the PC and please use USB cable to connect the USB DEVICE interface at the rear panel of the power supply to the PC.
You can also use LAN, RS232 or GPIB (with the USB-GPIB interface converter provided by **RIGOL**) to communicate with PC. Note that the end mark of the command sent through RS232 interface is "\r\n".

3 Turn on the instrument after connecting the power supply and PC.

4 At this point, the "Found New Hardware Wizard" dialog box appears on the PC. Please follow the instructions to install the "USB Test and Measurement Device (IVI)".



5 Acquire the USB VISA descriptor of the power supply. Press **Utility** and the VISA descriptor is displayed at the bottom of the interface. Here, the VISA descriptor of the power supply is USB0::0x1AB1::0x0E11::DP8A000001::INSTR.

By now, the programming preparations are finished.

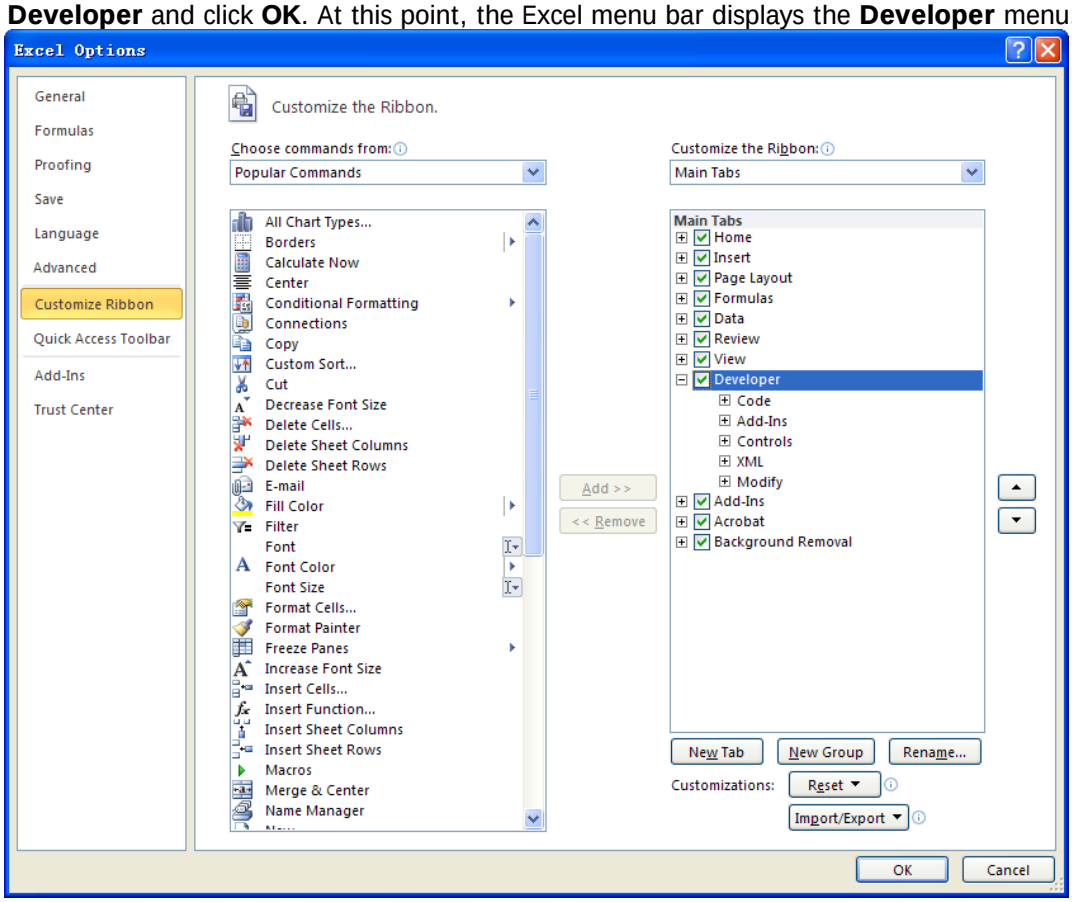
Excel Programming Demo

The program used in this demo: Microsoft Excel 2010

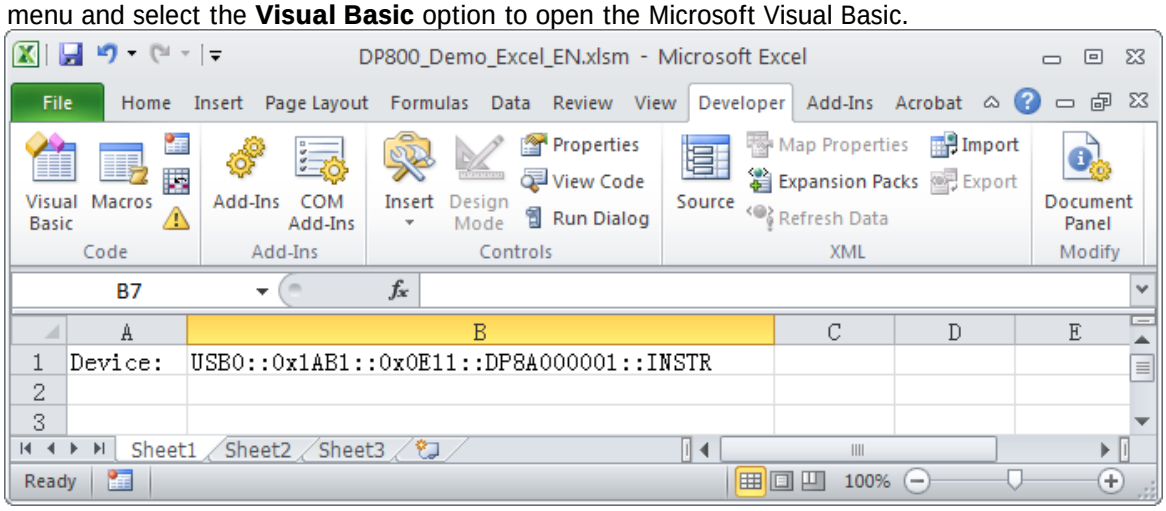
The function realized in this demo: send the *IDN? Command to read the device information.

1 Create a new Excel file that enables the Macros. In this demo, the file is named as DP800_Demo_Excel.xlsm.

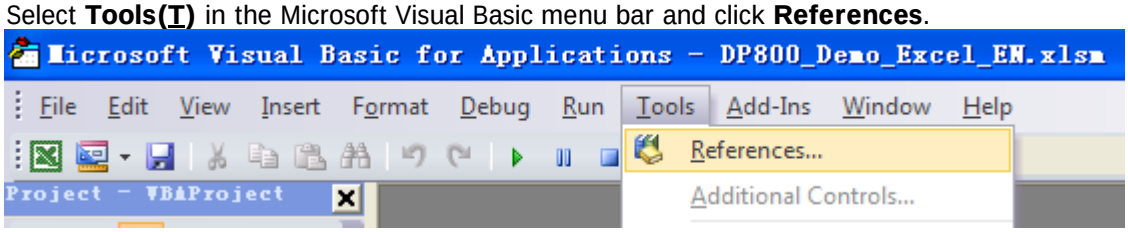
2 Run the DP800_Demo_Excel.xlsm file. Click **File→Options** at the upper-left corner of the Excel file to open the interface as shown in the figure below. Click **Customize Ribbon** at the left, check **Developer** and click **OK**. At this point, the Excel menu bar displays the **Developer** menu.



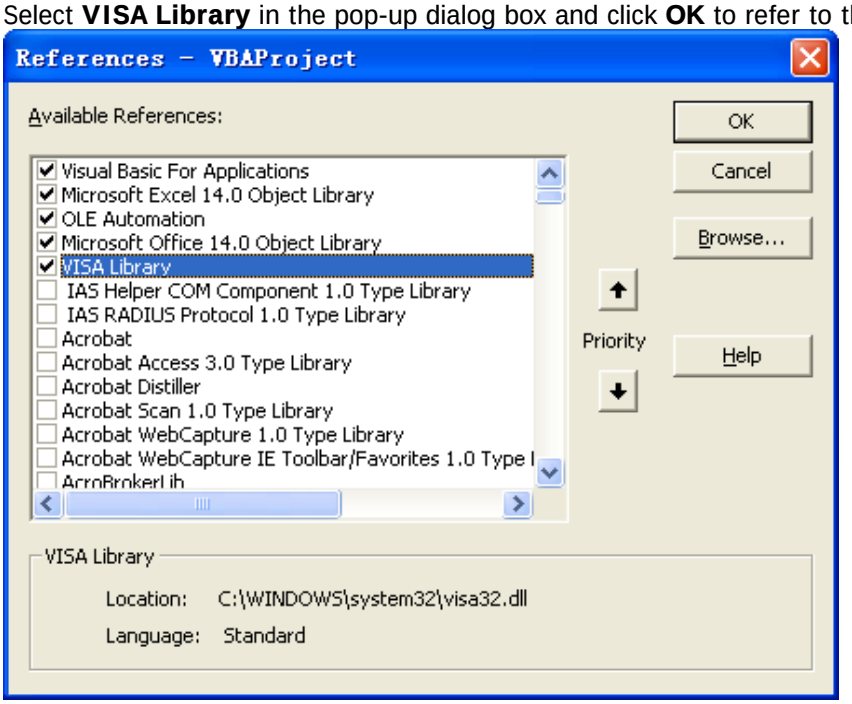
3 Enter the VISA descriptor into a cell of the file as shown in the figure below. Click the **Developer** menu and select the **Visual Basic** option to open the Microsoft Visual Basic.



4 Select **Tools(T)** in the Microsoft Visual Basic menu bar and click **References**.



Select **VISA Library** in the pop-up dialog box and click **OK** to refer to the VISA Library.

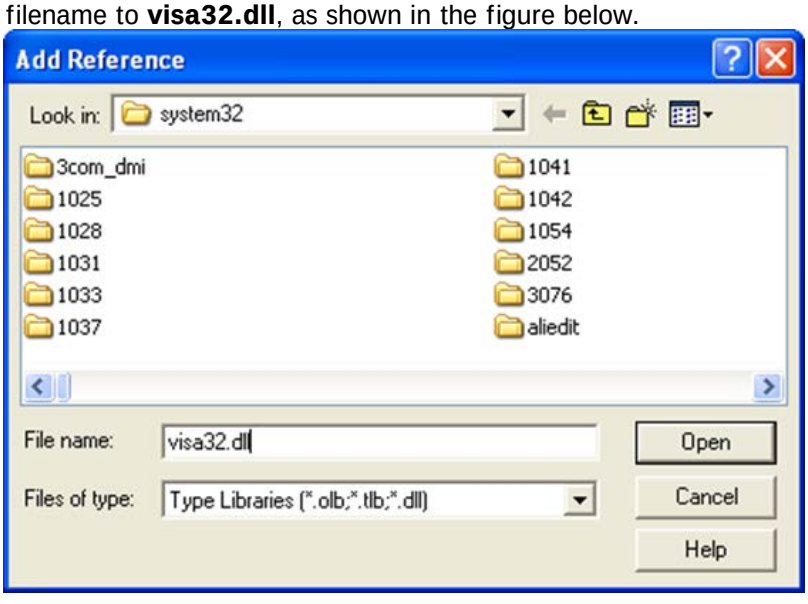


Explanation:

If you cannot find VISA Library in the list at the left of the figure above, please follow the method below to find it.

(1) Make sure that your PC has installed the NI-VISA library.

(2) Click **Browse...** at the right and set the search range to **C:\WINDOWS\system32** and the filename to **visa32.dll**, as shown in the figure below.



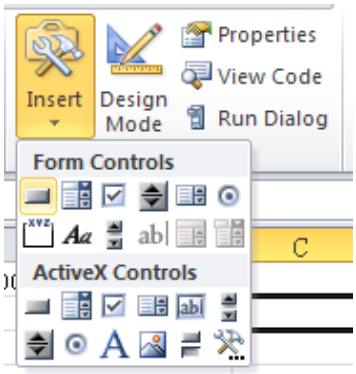
5 Click **View Code** in the **Developer** menu to enter the Microsoft Visual Basic interface. Add the

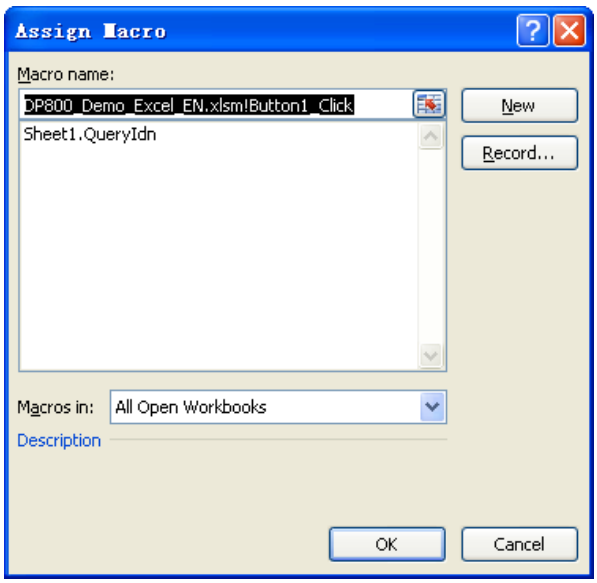
following codes and save the file.

Note: If the Excel file created at step 2 does not enable the Macros, at this point, the prompt message "The following features cannot be saved in macro-free workbooks" will be displayed. In this situation, please save the Excel file as a file using the Macros.

```
Sub QueryIdn()

    Dim viDefRm As Long
    Dim viDevice As Long
    Dim viErr As Long
    Dim cmdStr As String
    Dim idnStr As String * 128
    Dim ret As Long

    'Turn on the device, the device resource descriptor is in CELLS(1,2) of SHEET1'
    viErr = visa.viOpenDefaultRM(viDefRm)
    viErr = visa.viOpen(viDefRm, Sheet1.Cells(1, 2), 0, 5000, viDevice)

    'Send request, read the data, the return value is in CELLS(2,2) of SHEET1'
    cmdStr = "*IDN?"
    viErr = visa.viWrite(viDevice, cmdStr, Len(cmdStr), ret)
    viErr = visa.viRead(viDevice, idnStr, 128, ret)
    Sheet1.Cells(2, 2) = idnStr

    'Turn off the device'
    visa.viClose (viDevice)
    visa.viClose (viDefRm)

End Sub
```

6 Add button control: click **Insert** in the **Developer** menu, select the desired button in **Form Controls** and put it into the cell of the Excel. At this point, the **Assign Macro** interface is displayed, select "Sheet1.QueryIdn" and click "OK".





By default, the button mane is "Button 1". Right-click the button and select **Edit Text** in the pop-up menu to change the button name to "*IDN?".

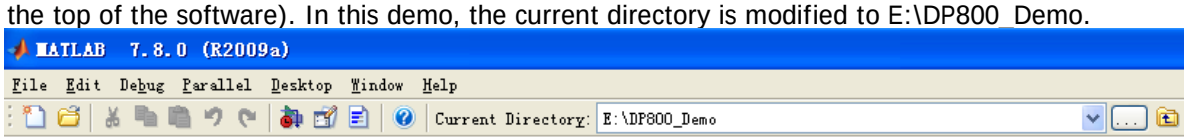
7 Click ***IDN?** to run the program. The return value will be displayed in CELLS(2,2) of SHEET1.

MATLAB Programming Demo

The program used in this demo: MATLAB R2009a

The function realized in this demo: read the output voltage, current and power measured internally on CH1.

1 Run the MATLAB software and modify the current directory (namely modify the **Current Directory** at the top of the software). In this demo, the current directory is modified to E:\DP800_Demo.



2 Click **File → New → Blank M-File** in the MATLAB interface to create an empty M file.

3 Add the following codes in the M file:

```
dp800 = visa( 'ni','USB0::0x1AB1::0x0E11::DP8A000001::INSTR' ); %Create VISA object

fopen( dp800 );   %Open the VISA object created

fprintf(dp800, ':MEAS:ALL? CH1' );   %Send request

meas_CH1 = fscanf(dp800);   %Read data

fclose(dp800);   %Close the VISA object

display(meas_CH1)   %Display the device information read
```

4 Save the M file under the current directory. In this demo, the M file is named as DP800_Demo_MATLAB.m.

5 Run the M file and the following running result is displayed in the command window.

```
meas_CH1 =

1.0259,0.0416,0.043
```

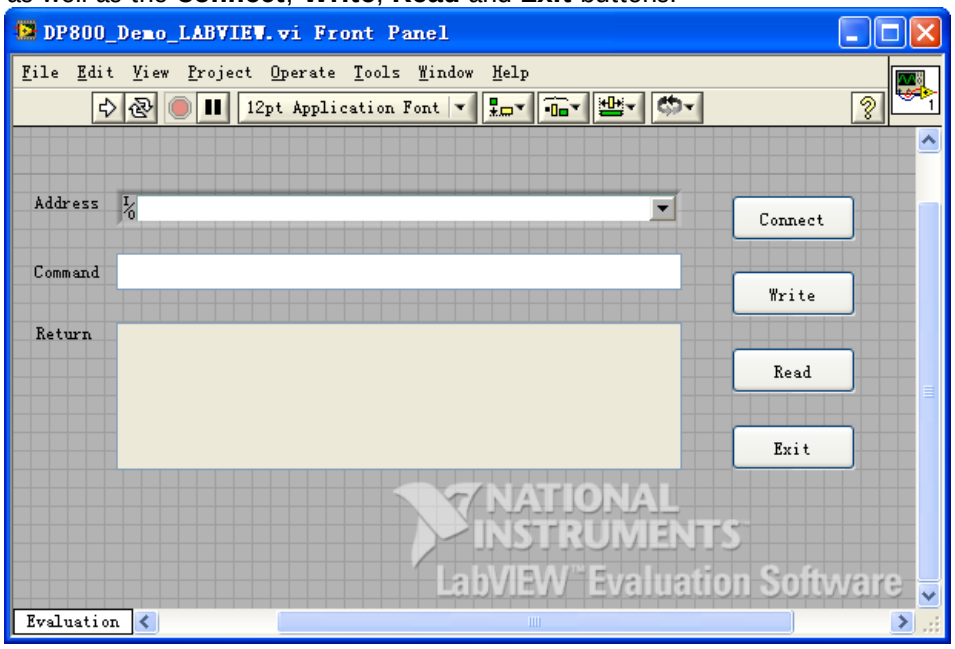
LabVIEW Programming Demo

The program used in this demo: LabVIEW 2009

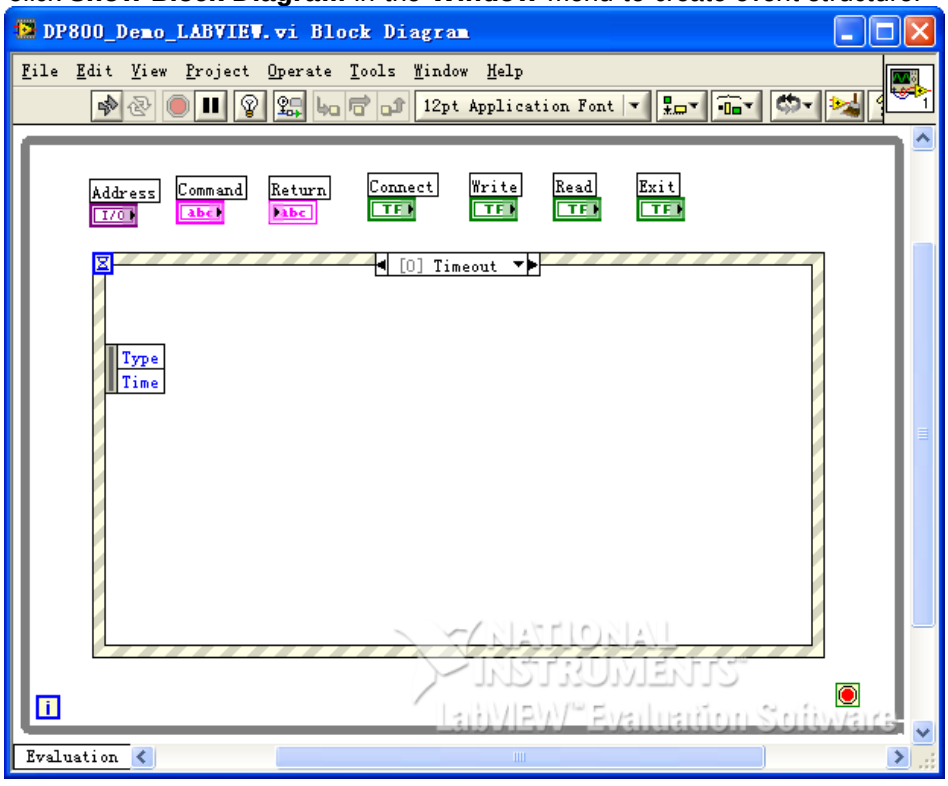
The functions realized in this demo: search for the instrument address, connect the instrument, send command and read the return value.

1 Run LabVIEW 2009, create a VI file and name it as DP800_Demo_LABVIEW.

2 Add controls in the front panel interface, including the **Address** bar, **Command** bar and **Return** bar as well as the **Connect**, **Write**, **Read** and **Exit** buttons.

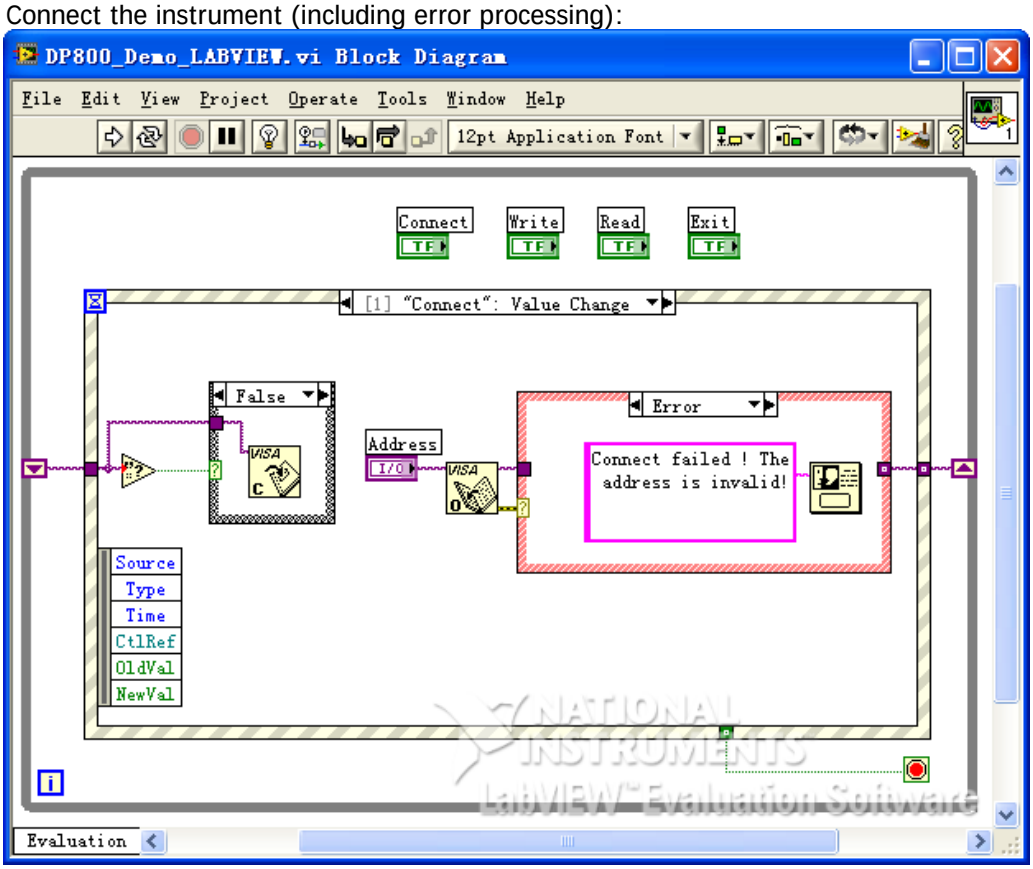


3 Click **Show Block Diagram** in the **Window** menu to create event structure.

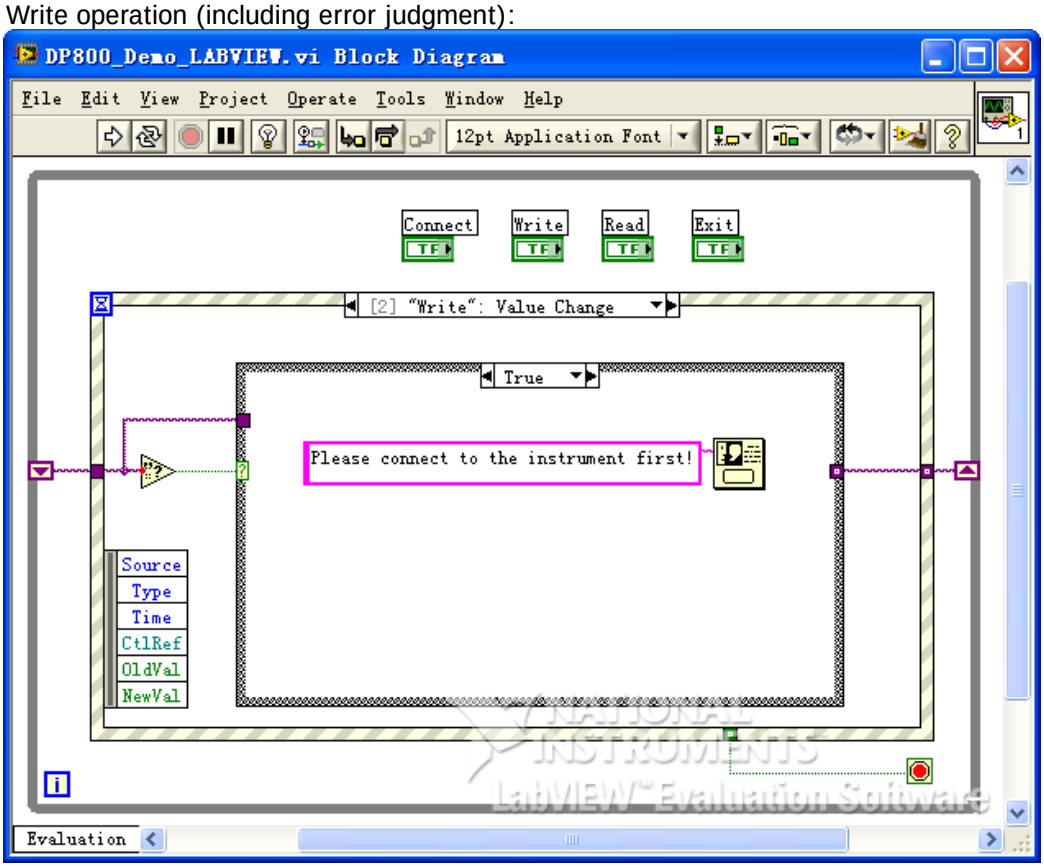


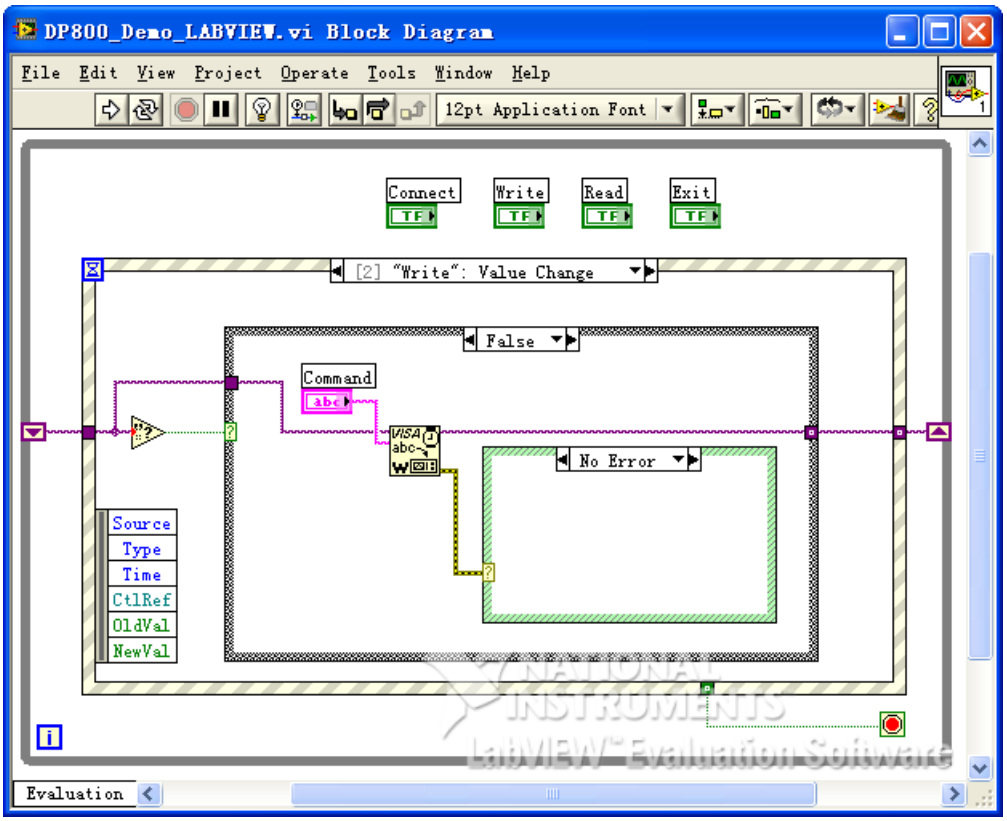
4 Add events, including connecting instrument, write operation, read operation and exit.

(1) Connect the instrument (including error processing):

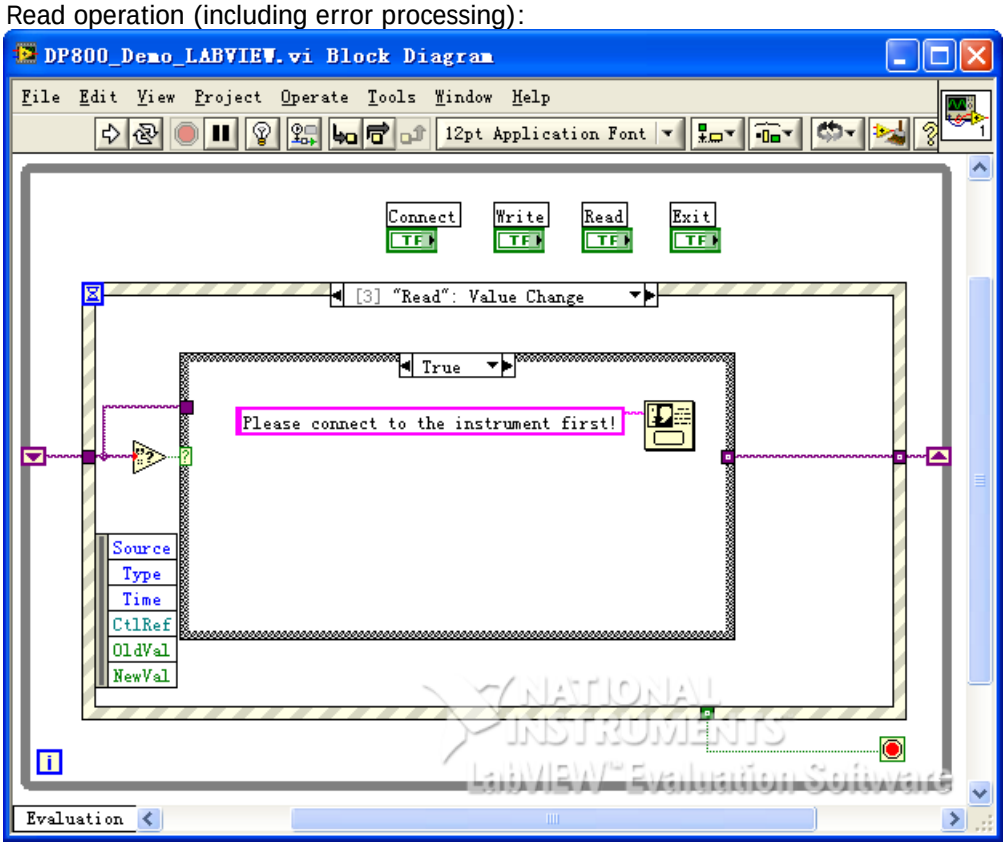


(2) Write operation (including error judgment):

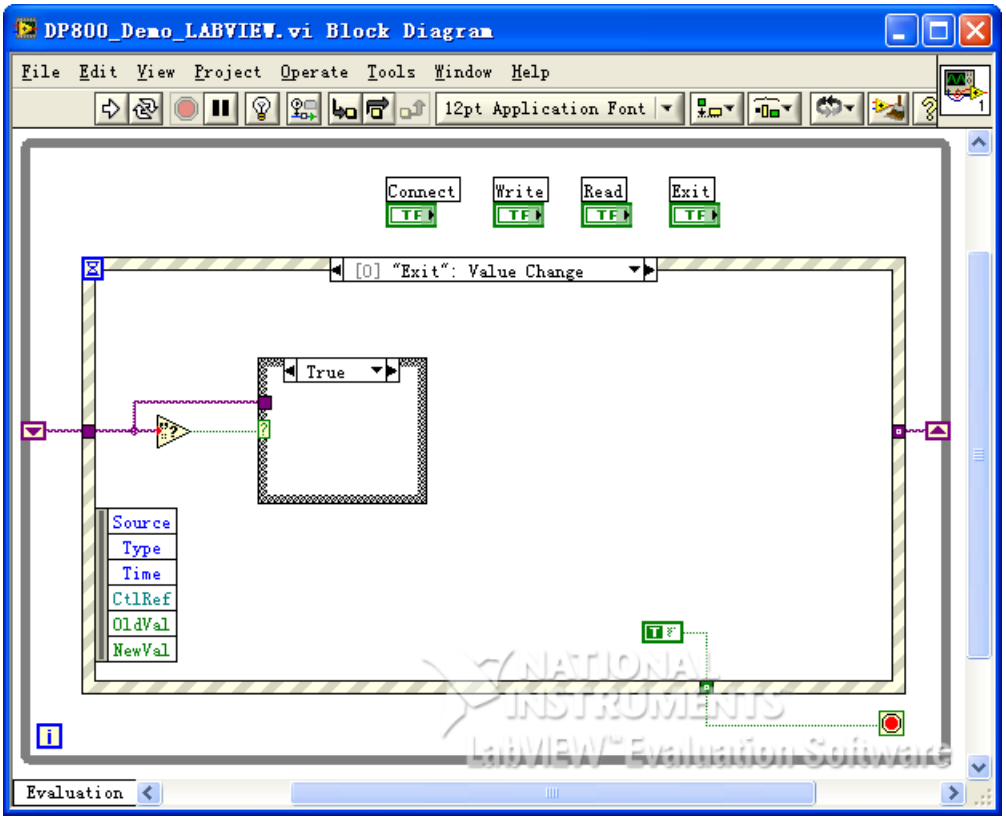




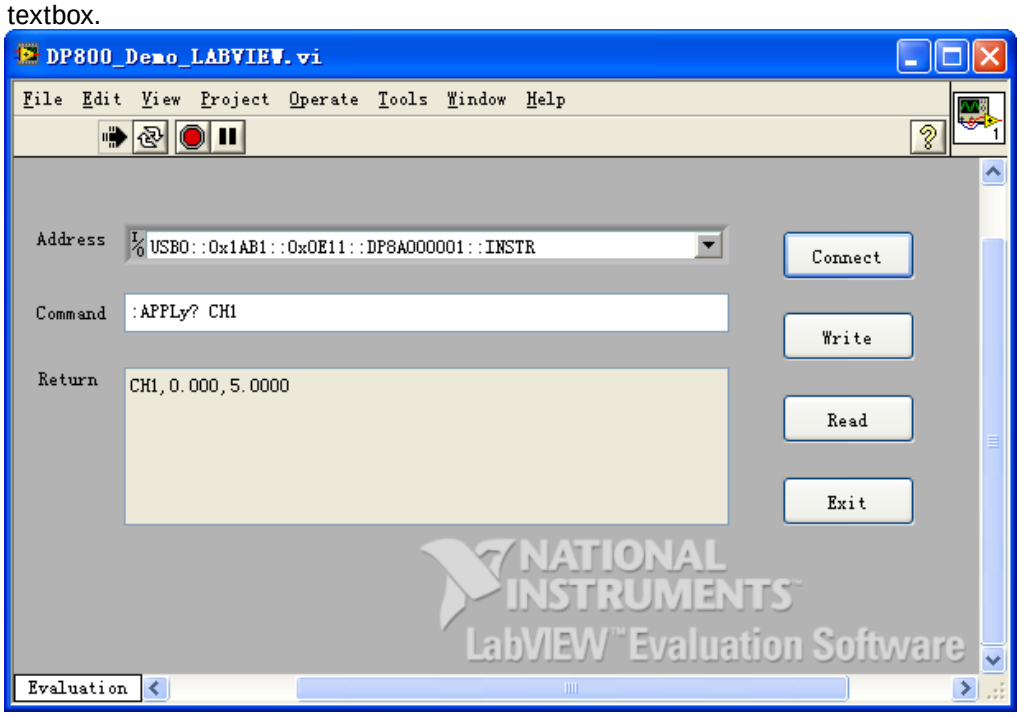
(3) Read operation (including error processing):



(4) Exit:



5 Run the program and the interface as shown in the figure below is displayed. Click the **Address** dropdown box and select the VISA resource name; click **Connect** to connect the instrument; enter the command into the **Command** textbox and click **Write** to write the command into the instrument. If the command is a query command, click **Read** and the return value is displayed in the **Return** textbox.



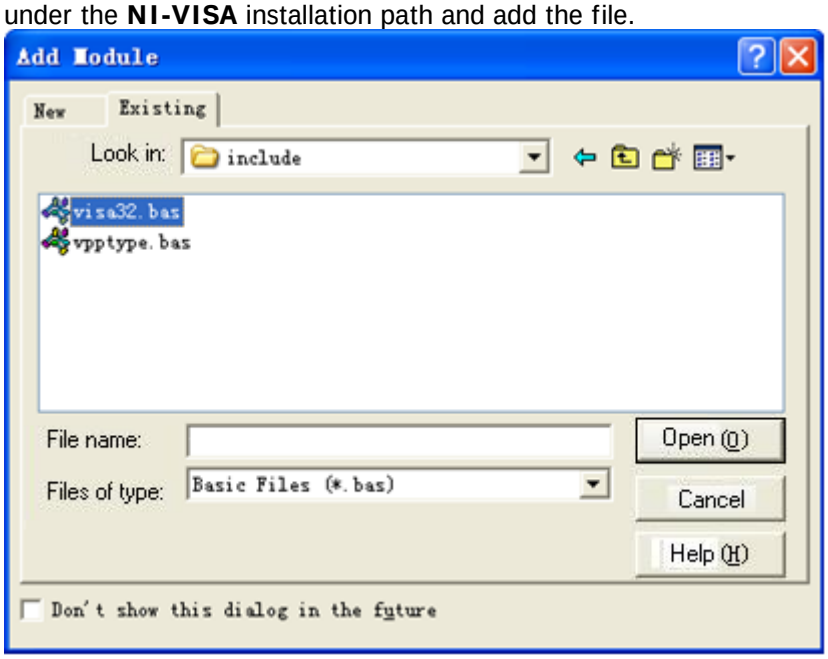
Visual Basic Programming Demo

The program used in this demo: Visual Basic 6.0

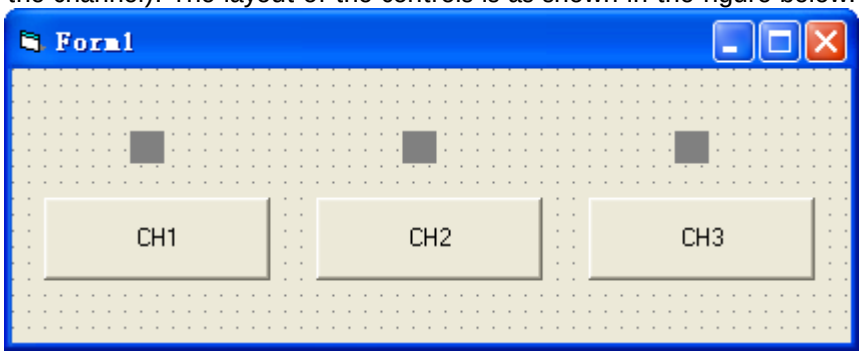
The function realized in this demo: enable the three channels of the power supply and show the colors of the channels by taking DP831A as an example.

1 Build a standard application program project (Standard EXE) and name it as DP800_Demo_VB.

2 Click the **Existing** tab of **Project→Add Module**. Search for the **visa32.bas** file in the **include** folder under the **NI-VISA** installation path and add the file.



3 Add three **CommandButton** controls to represent CH1, CH2 and CH3 respectively. Add three Text controls (Label1(0), Label1(1) and Label1(2)) to represent the status of the three channels respectively (by default, the Text control is gray; when the channel is enabled, it displays the color of the channel). The layout of the controls is as shown in the figure below.



4 Open the **General** tab in **Project→Project1 Properties** and select **Form1** in the **Startup Object** dropdown box.

5 Double-click **CH1** to enter the programming environment. Add the following codes to control CH1, CH2 and CH3. The codes of CH1 are as shown below; the codes of CH2 and CH3 are similar.

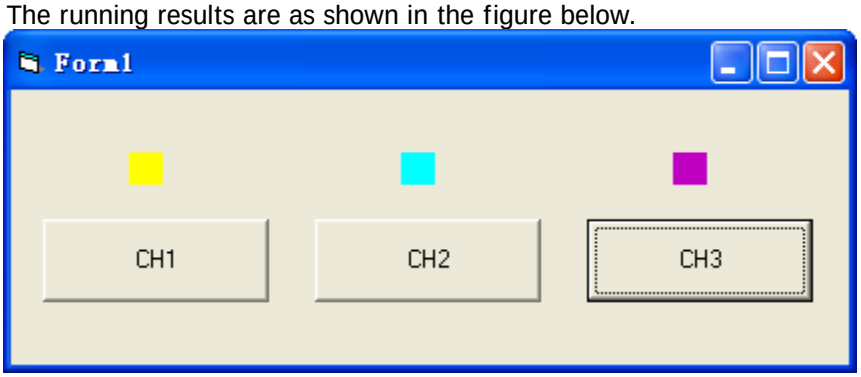
```
Dim defrm As Long
Dim vi As Long
Dim strRes As String * 200
Dim list As Long
```

```
Dim nmatches As Long
Dim matches As String * 200

' Acquire the usb resource of visa
Call viOpenDefaultRM(defrm)
Call viFindRsrc(defrm, "USB?*", list, nmatches, matches)

' Turn on the device
Call viOpen(defrm, matches, 0, 0, vi)

' Send command to query the CH1 status
Call viVPrintf(vi, ":OUTP? CH1" + Chr$(10), 0)

' Acquire the status of CH1
Call viVScanf(vi, "%t", strRes)

If strRes = "ON" Then

' Send the setting command
Call viVPrintf(vi, ":OUTP CH1,OFF" + Chr$(10), 0)
Label1(0).ForeColor = &H808080    'Gray

Else

Call viVPrintf(vi, ":OUTP CH1,ON" + Chr$(10), 0)
Label1(0).ForeColor = &HFFFF&    'Yellow

End If

' Turn off the resource
Call viClose(vi)
Call viClose(defrm)
```

6 Running results

1) Click **CH1** to enable CH1 and the control above **CH1** turns yellow;
2) Click **CH2** to enable CH2 and the control above **CH2** turns blue;
3) Click **CH3** to enable CH3 and the control above **CH3** turns rosy.

The running results are as shown in the figure below.



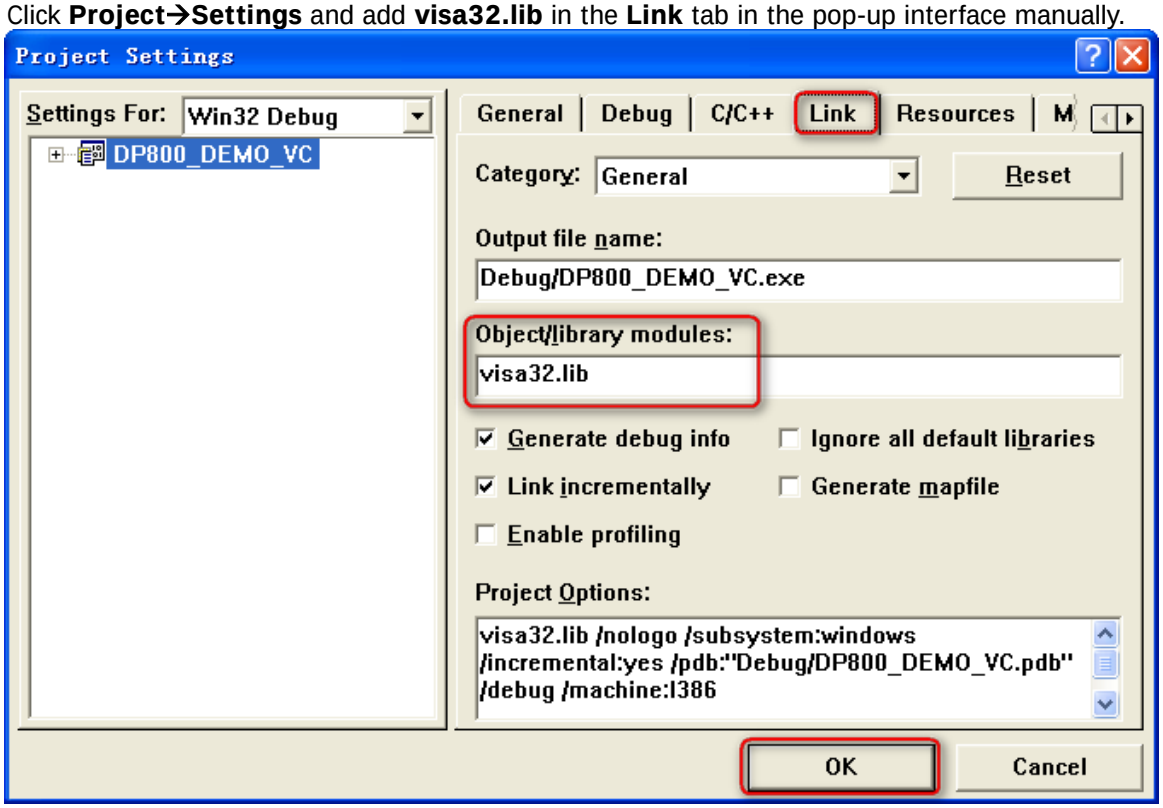
Visual C++ Programming Demo

The program used in this demo: Microsoft Visual C++ 6.0

The functions realized in this demo: search for the instrument address, connect the instrument, send command and read the return value.

1 Run Microsoft Visual C++ 6.0, create a MFC project based on dialog box and name it as DP800_Demo_VC。

2 Click **Project→Settings** and add **visa32.lib** in the **Link** tab in the pop-up interface manually.

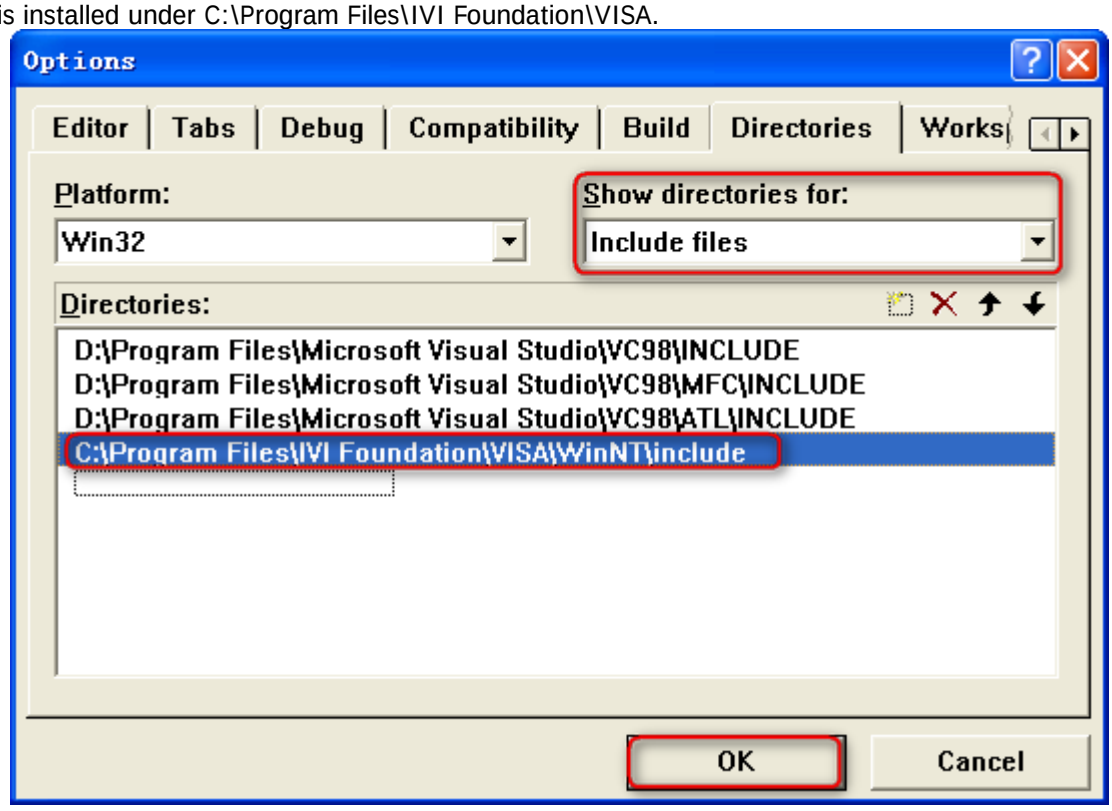


3 Click **Tools→Options** and add the **Include** and **Lib** paths in the **Directories** tab in the pop-up interface.

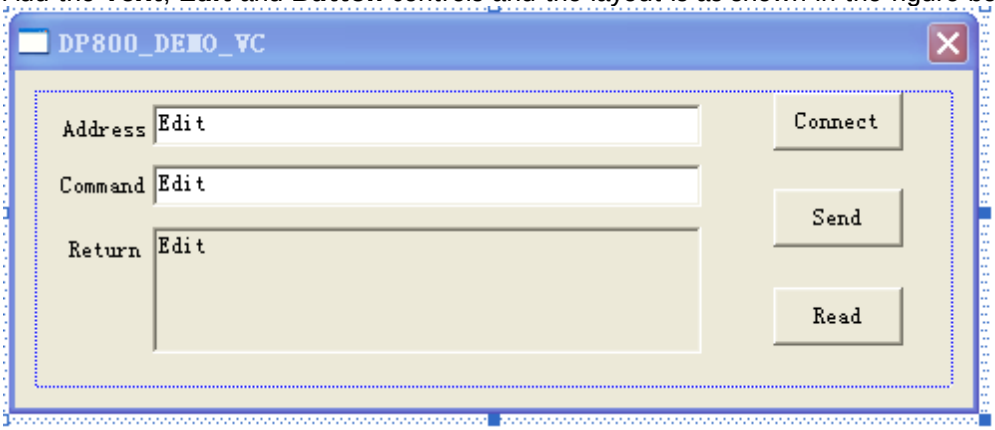
Select **Include files** in **Show directories for** and double-click the blank in **Directories** to add the path of **Include**: C:\Program Files\IVI Foundation\VISA\WinNT\include.

Select **Library files** in **Show directories for** and double-click the blank in **Directories** to add the path of **Lib**: C:\Program Files\IVI Foundation\VISA\WinNT\lib\msc.

Note:
The two pathes added here are related to the NI-VISA installation path on your PC. Here, the NI-VISA is installed under C:\Program Files\IVI Foundation\VISA.

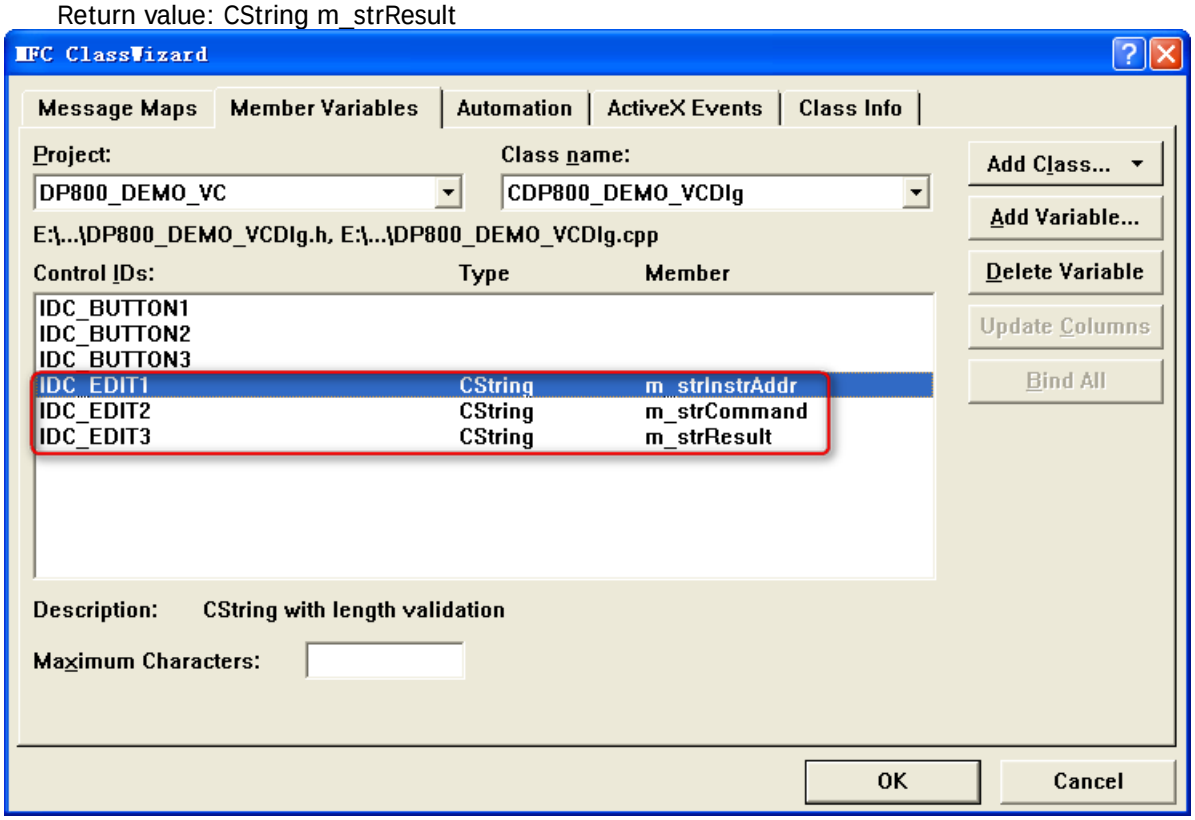


4 Add the **Text**, **Edit** and **Button** controls and the layout is as shown in the figure below.



5 Click **View→ClassWizard** and add the control variables in the **Member Variables** tab in the pop-up interface.

Instrument address: CString m_strInstrAddr
Command: CString m_strCommand
Return value: CString m_strResult



6 Encapsulate the write and read operations of VISA.

1) Encapsulate the write operation of VISA for easier operation.

```
bool CDP800_DEMO_VCDlg::InstrWrite(CString strAddr, CString strContent) //write function
{
    ViSession defaultRM,instr;
    ViStatus status;
    ViUInt32 retCount;
    char * SendBuf = NULL;
    char * SendAddr = NULL;
    bool bWriteOK = false;
    CString str;

    //Change the address's data style from CString to char*
    SendAddr = strAddr.GetBuffer(strAddr.GetLength());
    strcpy(SendAddr,strAddr);
    strAddr.ReleaseBuffer();

    //Change the command's data style from CString to char*
    SendBuf = strContent.GetBuffer(strContent.GetLength());
    strcpy(SendBuf,strContent);
    strContent.ReleaseBuffer();

    //open the VISA instrument
    status = viOpenDefaultRM(&defaultRM);
    if (status < VI_SUCCESS)
    {
        AfxMessageBox("No VISA instrument was opened !");
```

```
            return false;
        }

        status = viOpen(defaultRM, SendAddr, VI_NULL, VI_NULL, &instr);
        //write command to the instrument
        status = viWrite(instr, (unsigned char *)SendBuf, strlen(SendBuf), &retCount);

        //close the instrument
        status = viClose(instr);
        status = viClose(defaultRM);

        return bWriteOK;
}
```

2) Encapsulate the read operation of VISA for easier operation.

```
bool CDP800_DEMO_VCDlg::InstrRead(CString strAddr, CString *pstrResult)
//Read from the instrument
{
        ViSession defaultRM,instr;
        ViStatus status;
        ViUInt32 retCount;
        char * SendAddr = NULL;
        unsigned char RecBuf[MAX_REC_SIZE];
        bool bReadOK = false;
        CString str;

        //Change the address's data style from CString to char*
        SendAddr = strAddr.GetBuffer(strAddr.GetLength());
        strcpy(SendAddr,strAddr);
        strAddr.ReleaseBuffer();

        memset(RecBuf,0,MAX_REC_SIZE);

        //open the VISA instrument
        status = viOpenDefaultRM(&defaultRM);
        if (status < VI_SUCCESS)
        {
            // Error Initializing VISA...exiting
            AfxMessageBox("No VISA instrument was opened !");
            return false;
        }

        //open the instrument
        status = viOpen(defaultRM, SendAddr, VI_NULL, VI_NULL, &instr);

        //read from the instrument
        status = viRead(instr, RecBuf, MAX_REC_SIZE, &retCount);

        //close the instrument
        status = viClose(instr);
        status = viClose(defaultRM);

        (*pstrResult).Format("%s",RecBuf);

        return bReadOK;
}
```

7 Add the control message response code.

1) Connect the instrument

```
void CDP800_DEMO_VCDlg::OnConnect()
{
    // TODO: Add your control notification handler code here
    ViStatus status;
    ViSession defaultRM;
    ViString expr = "?*";
    ViPFindList findList = new unsigned long;
    ViPUInt32 retcnt = new unsigned long;
    ViChar instrDesc[1000];
    CString strSrc = "";
    CString strInstr = "";
    unsigned long i = 0;
    bool bFindDP = false;

    status = viOpenDefaultRM(&defaultRM);
    if (status < VI_SUCCESS)
    {
        // Error Initializing VISA...exiting
        MessageBox("No VISA instrument was opened ! ");
        return ;
    }

    memset(instrDesc,0,1000);

    // Find resource
    status = viFindRsrc(defaultRM,expr,findList, retcnt, instrDesc);

    for (i = 0;i < (*retcnt);i++)
    {
        // Get instrument name
        strSrc.Format("%s",instrDesc);
        InstrWrite(strSrc,"*IDN?");
        ::Sleep(200);
        InstrRead(strSrc,&strInstr);

    // If the instrument(resource) belongs to the DP series then jump out from the loop
        strInstr.MakeUpper();
        if (strInstr.Find("DP") >= 0)
        {
            bFindDP = true;
            m_strInstrAddr = strSrc;
            break;
        }

        //Find next instrument
        status =   viFindNext(*findList,instrDesc);
    }

    if (bFindDP == false)
    {
        MessageBox("Didn't find any DP!");
    }
    UpdateData(false);
}
```

2) Write operation

```
void CDP800_DEMO_VCDlg::OnSend()
{
    // TODO: Add your control notification handler code here
    UpdateData(true);
    if (m_strInstrAddr.IsEmpty())
    {
        MessageBox("Please connect to the instrument first!");
    }
    InstrWrite(m_strInstrAddr,m_strCommand);
    m_strResult.Empty();
    UpdateData(false);
}
```

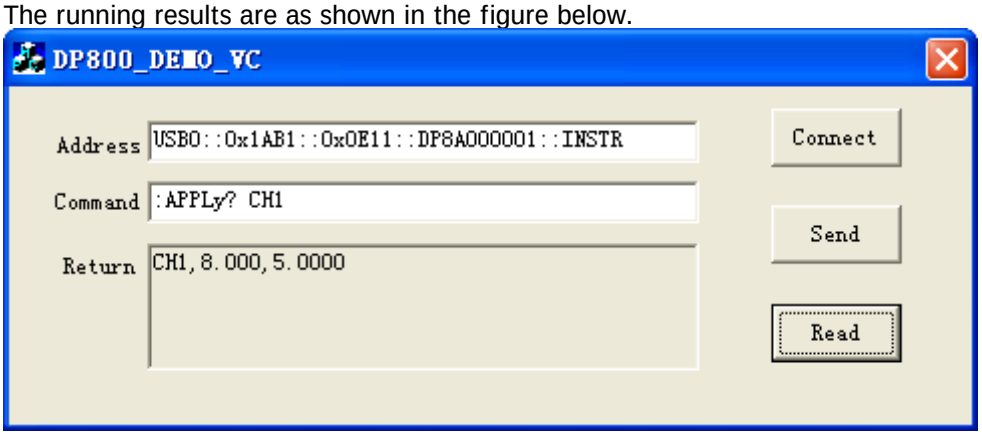
3) Read operation

```
void CDP800_DEMO_VCDlg::OnRead()
{
    // TODO: Add your control notification handler code here
    UpdateData(true);
    InstrRead(m_strInstrAddr,&m_strResult);
    UpdateData(false);
}
```

8 Running results.

1) Click **Connect** to search for the power supply and connect it;
2) Enter the command in to the **Command** textbox, for example, :APPLy? CH1;
3) Click **Send** to send the command;
4) Click **Read** to read the return value.

The running results are as shown in the figure below.



Chapter 5 Appendix

Appendix A: Command List

Appendix B: Factory Setting

Note: These parameters with * don't change when the instrument is restored to its factory settings (restarting the instrument when "Default" is selected in **Utility** → **System** →**PowerOn** or sending the *RST command can restore the instrument to its factory settings).

Channel Parameters		
DP831A	Voltage/Current Setting Values	CH1: 0.000V/5.0000A CH2: 00.000V/2.0000A CH3: -00.000V/2.0000A
	Voltage/Current Limits	CH1: 8.800V/5.5000A CH2: 33.000V/2.2000A CH3: -33.000V/2.2000A
	OVP/OCP On/Off	CH1/CH2/CH3: Off/Off
	Output On/Off	CH1/CH2/CH3: Off
	Track On/Off	CH1: None CH2/CH3: Off
	Current Channel	CH1
DP832A	Voltage/Current Setting Values	CH1: 00.000V/3.000A CH2: 00.000V/3.000A CH3: 0.000V/3.000A
	Voltage/Current Limits	CH1: 33.000V/3.300A CH2: 33.000V/3.300A CH3: 5.500V/3.300A
	OVP/OCP On/Off	CH1/CH2/CH3: Off/Off
	Output On/Off	CH1/CH2/CH3: Off
	Track On/Off	CH1/CH2: Off CH3: None
	Current Channel	CH1
DP821A	Voltage/Current Setting Values	CH1: 00.000V/1.0000A CH2: 0.000V/10.000A
	Voltage/Current Limits	CH1: 66.000V/1.1000A CH2: 8.800V/11.000A
	OVP/OCP On/Off	CH1/CH2: Off/Off
	Output On/Off	CH1/CH2: Off
	Sense On/Off	CH1: None CH2: Off
	Current Channel	CH1
DP811A	Voltage/Current Setting Values	00.000V/05.0000A
	Voltage/Current Limits	22.000V/11.0000A
	OVP/OCP On/Off	Off/Off
	Output On/Off	Off
	Sense On/Off	Off
	Current Range	Range1
DP831[1]	Voltage/Current Setting Values	CH1: 0.000V/5.000A CH2: 00.00V/2.000A CH3: -00.00V/2.000A
	Voltage/Current Limits	CH1: 8.800V/5.500A CH2: 33.00V/2.200A CH3: -33.00V/2.200A
	OVP/OCP On/Off	CH1/CH2/CH3: Off/Off
	Output On/Off	CH1/CH2/CH3: Off

	Track On/Off	CH1: None CH2/CH3: Off
	Current Channel	CH1
DP832[1]	Voltage/Current Setting Values	CH1: 00.00V/3.000A CH2: 00.00V/3.000A CH3: 0.00V/3.000A
	Voltage/Current Limits	CH1: 33.00V/3.300A CH2: 33.00V/3.300A CH3: 5.50V/3.300A
	OVP/OCP On/Off	CH1/CH2/CH3: Off/Off
	Output On/Off	CH1/CH2/CH3: Off
	Track On/Off	CH1/CH2: Off CH3: None
	Current Channel	CH1
DP821[1]	Voltage/Current Setting Values	CH1: 00.00V/1.000A CH2: 0.00V/10.00A
	Voltage/Current Limits	CH1: 66.00V/1.100A CH2: 8.80V/11.00A
	OVP/OCP On/Off	CH1/CH2: Off/Off
	Output On/Off	CH1/CH2: Off
	Sense On/Off	CH1: None CH2: Off
	Current Channel	CH1
DP811[1]	Voltage/Current Setting Values	00.00V/05.00A
	Voltage/Current Limits	22.00V/11.00A
	OVP/OCP On/Off	Off/Off
	Output On/Off	Off
	Sense On/Off	Off
	Current Range	Range1

Display*	
Luminance	50%
Contrast	25%
RGB Brightness	50%
Display Mode	Normal
Display Theme[2]	Green

System Setting	
Language*	Chinese
Power-on Setting*	Default
Print Destination	USB Disk
Print Copies	1
Print Format	BMP
Print Invert	Yes
Print Color	Grayscale
OTP	On
Beeper	On
Screen Saver	Off
Keyboard Lock Password*	Off
Track Mode	Synchronous

On/Off Sync	Disable
Preset Key	Default

I/O Setting*	
GPIB Address	2
RS232	
Baud Rate	9600
Data Bit	8
Stop Bit	1
Parity Bit	None
Hardware Flow Control	Off
LAN	
DHCP	On
Auto IP	On
Manual IP	Off

Timer	
Channel	CH1
Timer On/Off	Off
Output Groups	1
Timer Parameters	Volt: 1V; Curr: 1A; Set: 1s
Cycles	1
End State	Output Off
Templet	Sine
Sine	
Object	Voltage
Current	0A
Max Value	1V
Min Value	0V
Points	10
Interval	1s
Inverted	Off

Delayer	
Channel	CH1
Delayer On/off	Off
Output Groups	1
Delayer Parameter	State: Off, On alternately
Cycles	1
End State	Output Off
State Generation	0 1Patt
Time Generation	FixTime
FixTime	On Delay: 1s; Off Delay: 1s
Increase/Decline	Base Value: 1s; Step: 1s
Stop Condition	None

Recorder	
Recorder Switch	Off

Record Period	1s
Destination	C:\REC 10:RIGOL.ROF

Analyzer	
Channel Number	CH1
Analysis Object	Voltage
Display	Curve
Current Time	1s
Start Time	1s
End Time	2s
Group	0
Median	0V
Mode	0V
Average	0V
Variance	0V
Range	0V
Min Value	0V
Max Value	0V
Mead Deviation	0V

Monitor	
Channel	CH1
Monitor Switch	Off
Monitor Condition	>Volt
Voltage	Half of the rated value of CH1 (for DP811A/DP811, it is half of the rated value of Range 1)
Current	Half of the rated value of CH1 (for DP811A/DP811, it is half of the rated value of Range 1)
Power	The product of voltage times current
Stop Mode	Output Off, Warning, Beeper

Trigger	
Direction	In
Trigger Input	
Data Line	D0
Source under Control	CH1
Trigger Type	RiseEdge
Output Response	Output Off
Sensitivity	Low
Enable	No
Trigger Output	
Data Line	D0
Control Source	CH1
Trigger Condition	Output Off
Output Signal	Level
Square	Period: 1s; Duty: 50%
Polarity	Positive
Enable	No

Store	
Browser	Directory
Directory	C:/
File	The first file
File Type	*.rsf

Note[1]: When DP831 (DP832, DP821 or DP811) is installed with the high resolution option, its channel parameters are the same with those of DP831A (DP832A, DP821A or DP811A).
Note[2]: This parameter is applicable to DP831, DP832, DP821 and DP811.

Appendix C: Warranty

RIGOL warrants that its products mainframe and accessories will be free from defects in materials and workmanship within the warranty period.

If a product is proven to be defective within the respective period, **RIGOL** guarantees the free replacement or repair of products which are approved defective. To get repair service, please contact with your nearest **RIGOL** sales or service office.

RIGOL does not provide other warranty items except the one being provided by this warranty statement. The warranty items include but not being subjected to the hint guarantee items related to tradable characteristic and any particular purpose. **RIGOL** will not take any responsibility in cases regarding to indirect, particular and ensuing damage.