Table of Contents

1. Introduction to the SCPI Language

1.1. Communication Interfaces

Computers communicate with the ODP Series power supply by sending and receiving commands over USB or RS232 interface. Command is sent and identified in the form of ASCII character strings for users to easily control the power supply and do user-defined development. Operations that you can do with a computer and a power supply include: Set the power supply and output voltage or current from the power supply.
Connection: Please connect the USB Device port at the rear panel of the power supply with the corresponding USB interface on the computer using an USB cable, or connect the RS232 port at the rear panel of the power supply with the corresponding RS232 interface on the computer using an RS232 cable.

1.2. Command Syntax

The command systems of ODP series present a hierarchy structure (tree system) and each command consists of a “Root” keyword and one or multiple sub-keywords. The keywords are separated by ":" and are followed by the parameter settings available, "?" is added at the end of the command string to indicate query and the command and parameter are separated by "space".
For example,
:VOLT:OUT:IDN1 < value >
:MEASure:VOLTage?

VOLT is the root keyword of the command, OUT and IDN1 are the second-level and third-level keywords respectively, all the keywords are separated by “:”. <value> denotes the parameter that users can set, the default unit of the numerical parameters are listed in Appendix Ⅰ; “?” denotes query; the command :VOLT:OUT:IDN1 and parameter are separated by “space”. All the command strings begin with ":" or "*" and have no terminator.

1.3. Symbol Description

Following symbols are usually used to assist to explain the parameters contained in a command.

a) Braces { }
   The options enclosed in a { } are parameters available in the command. Only one option could be selected every time, and all the options are separated by “|”. For example, {ON|OFF} indicateds that ON or OFF can be selected.

b) Triangle Brackets < >

The parameter enclosed in < > must be replaced by an effective value.

For example,

:VOLT:OUT:IDN1 < value >

wherein, <value> must be a numerical value, such as:

:VOLT:OUT:IDN1 20

1.4. Programmed Parameter Type

The commands contain 5 kinds of parameters, different parameters have different setting methods.

a) Boolean Parameters

The parameters could be “OFF” or “ON” (“0” or “1”), for example,

:FIXed:SWITch {ON|OFF}

“OFF” denotes turn off switch of fixed output. “On” denotes turn on the switch of fixed output.

b) Consecutive Real Number Parameters

The parameters could be any value within the effective range and with the required precision, for example,

VOLT{<voltage>}

For sine wave, <voltage> could be any real number between 0.000Vpp and 30.00Vpp.

1.5. Command Abbreviation

Abbreviation is allowed. But if abbreviation is used, all the capital letters specified in commands must be written completely. For example,

:OUTPut:FIXed {3.3V|5.0V} also can be:

:OUTP:FIX {3.3V|5.0V}

1.6. Available Command for Different Model

a) ODP3031

Fixed output setting is only available for single channel power supply.

For ODP3031, channel 2 relative commands are not available due to only 1 channel.

b) ODP3032

The corresponding commands of fixed output setting are invalid.

2. Common Commands

*CLS

Clear all the event registers in the register set and clear the error queue.

*ESE

Set enable register for the standard event register set.

Parameter

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

Explanation

The bit 1 and bit 6 of the standard event register are not used and are always treated as 0, therefore, the range of <value> are the decimal numbers corresponding to the binary numbers ranging from 00000000 (0 in decimal) to 11111111 (255 in decimal) and of which the bit 1 and bit 6 are 0.

Definitions of the Bits in ESE Register:

Bit	weights	Name	Enable
7	128	PON	Power On
6 (Not used)	64	URQ	User Request
5	32	CME	Command Error
4	16	EXE	Execution Error
3	8	DDE	Dev. Dependent Error
2	4	QYE	Query Error
1 (Not used)	2	RQL	Request Control
0	1	OPC	Operation Complete

Return Format

The query returns an integer which equals to the sum of the weights of all the bits that have already been set in the register. For example, the query returns "144" if bit 4 (16 in decimal) and 7 (128 in decimal) are enabled.

Example

The command below enables bit 4 (16 in decimal) of the enable register.

*ESE 16

The query below returns "16".

*ESE?

*ESE?

Query which bit in ESE register is enabled.

Example

The command below enables bit 4 (16 in decimal) of the enable register.

*ESE 16

The query below returns "16".

*ESE?

*ESR?

Description

Query the event register for the standard event register set.

Parameter

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

Explanation

The bit 1 and bit 6 of the standard event register are not used and are always treated as 0, therefore, the query returns the decimal numbers corresponding to the binary numbers ranging from 00000000 (0 in decimal) to 11111111 (255 in decimal) and of which the bit 1 and bit 6 are 0.

Definitions of the Bits in ESE Register:

Bit	weights	Name	Enable
7	128	PON	Power On
6 (Not used)	64	URQ	User Request
5	32	CME	Command Error
4	16	EXE	Execution Error
3	8	DDE	Dev. Dependent Error
2	4	QYE	Query Error
1 (Not used)	2	RQL	Request Control
0	1	OPC	Operation Complete

Return Format

The query returns an integer which equals to the sum of the weights of all the bits that have already been set in the register. For example, the query returns "144" if bit 4 (16 in decimal) and 7 (128 in decimal) are enabled.

Example

The query below returns "24" (bit 3 and bit 4 have already been set).

*ESR?

*IDN

Return the ID character string of the instrument.

Description

The query returns the ID character string of the instrument.

Return Format

OWON,<model>,<serial number>,X.XX.XX

<model>：the model number of the instrument.

<serial number>：the serial number of the instrument.

X.XX.XX：the software version of the instrument.

Example

OWON,SDS6062,1247048,v3.0.2

*OPC

Set the "Operation Complete" bit in the standard event register to 1 after the current operation is finished.

*OPC?

Query whether the current operation is finished.

Explanation

Note the difference between the *OPC? and *OPC commands: the latter sets the "Operation Complete" bit (bit 0) in the standard event register to 1 after the current operation is finished.

Return Format

The query returns "1" if the current operation is finished, otherwise returns "0".

*RST

Restore the instrument to its default value.

*SRE

Set enable register for the state byte register set.

Parameter

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

Explanation

The bit 0 and bit 1 of the state byte register are not used and are always treated as 0, therefore, the range of <value> are the decimal numbers corresponding to the binary numbers ranging from 00000000 (0 in decimal) to 11111111 (255 in decimal) and of which the bit 0 and bit 1 are 0.

Definitions of the Bits in SRE:

Bit	Weights	Name	Enable
7	128	OPER	Operation Status Reg
6	64	---	Not used
5	32	ESB	Event Status Bit
4	16	MAV	Message Available
3	8	---	Not used
2	4	MSG	Message
1 (Not used)	2	USR	User
0 (Not used)	1	TRG	Trigger

Return Format

The query returns an integer which equals to the sum of the weights of all the bits that have already been set in the register. For example, the query returns "144" if bit 4 (16 in decimal) and 7 (128 in decimal) are enabled.

Example

The command below enables bit 4 (16 in decimal) of the enable register.

*SRE 16

The query below returns "16".

*SRE?

*STB?

Query the condition register for the state byte register set.

*TST?

Perform self-test and return the test result.

If the returned bit is "0", the corresponding item of the instrument passed this test, while "1" indicates a failure.

*WAI

Wait for the finish of the operation.

3. Select working mode

1. [SENS]:FUNC:PLATform {COMMon|PROGram}
   COMMon :Switch to Common working mode
   PROGram :Switch to Programmable working mode

2. [SENS]:FUNC:MODE {IND|PAR|SER|DUAL}
   IND :Switch to Independent mode
   PAR :Switch to Parallel mode
   SER :Switch to Serial mode
   DUAL :Switch to Dual-supply mode

4. Set output voltage

1. [SENS]:VOLT:OUT:{IND1|IND2|PAR|SER|PDUAl|NDUAl} < value >
   IND1 < value > :
   Set output voltage for channel 1 under independent mode <0.000－30.00>

   IND2 < value > :
   Set output voltage for channel 2 under independent mode <0.000－30.00>

   PAR < value > :
   Set output voltage for Parallel mode <0.000－30.00>

   SER < value > :
   Set output voltage for Serial mode <0.000－60.00>

   PDUAl < value > :
   Set output voltage for positive supply under Dual-supply mode <0.000－30.00>

   NDUAl < value > :
   Set output voltage for negative supply under dual-supply mode <0.000－30.00>

2. [SENS]:VOLT:OVP:{IND1|IND2|PAR|SER|PDUAl|NDUAl} < value >
   IND1 < value > :
   Set protective voltage for channel 1 under Independent mode<0.100 - 31.50>

   IND2 < value > :
   Set protective voltage for channel 2 under Independent mode<0.100 - 31.50>

PAR < value > :
Set protective voltage for Parallel mode <0.100 - 31.50>

SER < value > :
Set protective voltage for Serial mode <0.100 - 63.00>

PDUAl < value > :
Set protective voltage for positive supply under Dual-supply mode <0.100 - 31.50>

NDUAl < value > :
Set protective voltage for negative supply under Dual-supply mode <0.100 - 31.50>

5. Set output current

1. [SENS]:CURR:OUT:{IND1|IND2|PAR|SER|PDUAl|NDUAl} < value >
IND1 < value > :
Set output current for channel 1 under independent mode <0.020－3.000>

IND2 < value > :
Set output current for channel 2 under independent mode <0.020－3.000>

PAR < value > :
Set output voltage for Parallel mode <0.100－6.000>

SER < value > :
Set output voltage for Serial mode <0.020－3.000>

PDUAl < value > :
Set output current for positive supply under dual-supply mode <0.020－3.000>

NDUAl < value > :
Set output current for negative supply under dual-supply mode <0.020－3.000>

2. [SENS]:CURR:OCP:{IND1|IND2|PAR|SER|PDUAl|NDUAl} < value >
IND1 < value > :
Set protective current for channel 1 under Independent mode <0.020 - 3.150>

IND2 < value > :
Set protective current for channel 2 under Independent mode <0.020 - 3.150>

PAR < value > :
Set protective current for Parallel mode <0.020 - 6.300>

SER < value > :
Set protective current for Serial mode <0.020 - 3.150>

PDUAl < value > :
Set protective voltage for positive supply under Dual-supply mode <0.020－3.150>

NDUAl < value > :
Set protective voltage for negative supply under Dual-supply mode <0.020－3.000>

6. Output Switch Control

1. [SENS]:OUTPut:{ SWItch1|SWItch2} {ON|OFF}
   ON：Enable output switch status
   OFF：Disable output switch status

2. [SENS]:PROTect:{VOLT|CURR}:{IND1|IND2|PAR|SER|PDUAl|NDUAl}:SWITch {ON|OFF}
   ON：Enable voltage or current Protective Switch
   OFF：Disable voltage or current Protective Switch

7. Set programmable output value

1. [SENS]:VOLT:POVP:{IND1|IND2|PAR|SER|PDUAl|NDUAl} <value>
   IND1 < value > :
   Set programmable protective voltage for channel 1 under Independent mode <0.100-31.50>

   IND2 < value > :
   Set programmable protective voltage for channel 2 under Independent mode <0.100-31.50>

   PAR < value > :
   Set programmable protective voltage for Parallel mode <0.100 - 31.50>

   SER < value > :
   Set programmable protective voltage for Serial mode <0.100-63.00>

   PDUAl < value > :
   Set programmable protective voltage for positive supply under Dual-supply mode <0.100-31.50>

2. [SENS]:CURR:POCP:{IND1|IND2|PAR|SER|PDUAl|NDUAl} < value >

IND1 <value> :

Set programmable protective current for channel 1 under Independent mode <0.020 - 3.150>

IND2 <value> :

Set programmable protective current for channel 2 under Independent mode <0.020 - 3.150>

PAR <value> :

Set programmable protective current for Parallel mode <0.020 - 6.300>

SER <value> :

Set programmable protective current for Serial mode <0.020 - 3.150>

PDUAl <value> :

Set programmable protective current for positive supply under Dual-supply mode <0.020－3.150>

NDUAl <value> :

Set programmable protective current for negative supply under Dual-supply mode <0.020－3.150>

8. Protection switch control

1. [SENS]:PROTect:{VOLT|CURR}:{IND1|IND2|PAR|SER|PDUAl|NDUAl}:SWITch {ON|OFF}

ON：Enable programmable voltage or current protection switch

OFF：Disable programmable voltage or current protection switch

9. Set Timer Range

1. [SENS]:TRANge: {IND1|IND2|PAR|SER|DUAL} <value>

:IND1 <value> :Set time range for channel 1 under Independent mode <1-99>

:IND2 <value> :Set time range for channel 2 under Independent mode <1-99>

:PAR <value> :Set time range Parallel mode <1-99>

:SER <value> :Set time range Serial mode <1-99>

:DUAL <value> :Set time range Dual-supply mode <1-99>

10. Set Timer loop mode

1. [SENS]:ROUNd: {IND1|IND2|PAR|SER|DUAL} {SEQUence|LOOP}
   :IND1 {SEQUence|LOOP} :
   Set the loop mode for channel 1 under independent mode

   :IND2 {SEQUence|LOOP} :
   Set the loop mode for channel 2 under independent mode

   :PAR {SEQUence|LOOP} :
   Set the loop mode for Parallel mode

   :SER {SEQUence|LOOP} :
   Set the loop mode for Serial mode

   :DUAL {SEQUence|LOOP} :
   Set the loop mode for Dual-supply mode

11. Fixed Output **(only for ODP3031)**

1. [SENS]:OUTPut:FIXed {3.3V|5.0V}
   :3.3v :Output fixed 3.3V
   :5.0v :Output fixed 5.0V

2. [SENS]:FIXed:SWITch {ON|OFF}
   ON：Enable Fixed output switch
   OFF：Disable Fixed output switch

12. Query Commands

1. :SCPI:DISPlay? Query whether the device supports SCPI
2. :MEASure:POWer:CHANnel1? Query output power of channel1
3. :MEASure:CURRent:CHANnel1? Query output current of channel1
4. :MEASure:VOLTage:CHANnel1? Query output voltage of channel1
5. :MEASure:POWer:CHANnel2? Query output power of channel2
6. :MEASure:CURRent:CHANnel2? Query output current of channel2
7. :MEASure:VOLTage:CHANnel2? Query output voltage of channel2

Appendix Ⅰ： Default Unit

a) Default unit of numerical parameters

Parameter	Default unit
Voltage	V
Current	A

Appendix Ⅱ： Commands Reference

Query Commands:

":SCPI:DISPlay?",
"::MEASure:POWer:CHANnel1?",
"::MEASure:POWer:CHANnel2?",
"::MEASure:CURRent:CHANnel1?",
"::MEASure:CURRent:CHANnel2?",
"::MEASure:VOLTage:CHANnel1?",
"::MEASure:VOLTage:CHANnel2?",
"*ESE?",
"*ESR?",
"*SRE?",
"*STB?",
"*OPC?",
"*IDN?",
"*TST?"

Setting Commands:

":FUNCtion:PLATform"
":FUNCtion:MODE",

":VOLTage:OUT:IND1",
":VOLTage:OUT:IND2",
":VOLTage:OUT:PAR",
":VOLTage:OUT:SER",
":VOLTage:OUT:PDUAl",
":VOLTage:OUT:NDUAl",

":VOLTage:OVP:IND1",
":VOLTage:OVP:IND2",
":VOLTage:OVP:PAR",
":VOLTage:OVP:SER",
":VOLTage:OVP:PDUAl",

":VOLTage:OVP:NDUAl",

":CURRent:OUT:IND1",
":CURRent:OUT:IND2",
":CURRent:OUT:PAR",
":CURRent:OUT:SER",
":CURRent:OUT:PDUAl",
":CURRent:OUT:NDUAl",

":CURRent:OVP:IND1",
":CURRent:OVP:IND2",
":CURRent:OVP:PAR",
":CURRent:OVP:SER",
":CURRent:OVP:PDUAl",
":CURRent:OVP:NDUAl",

":OUTPut:SWItch1",
":OUTPut:SWItch2",

":PROTect:VOLTage:IND1:SWITch",
":PROTect:VOLTage:IND2:SWITch",
":PROTect:VOLTage:PAR:SWITch",
":PROTect:VOLTage:SER:SWITch",
":PROTect:VOLTage:PDUAl:SWITch",
":PROTect:VOLTage:NDUAl:SWITch",

":PROTect:CURRent:IND1:SWITch",
":PROTect:CURRent:IND2:SWITch",
":PROTect:CURRent:PAR:SWITch",
":PROTect:CURRent:SER:SWITch",
":PROTect:CURRent:PDUAl:SWITch",
":PROTect:CURRent:NDUAl:SWITch",

":PVOLtage:OVP:IND1",
":PVOLtage:OVP:IND2",
":PVOLtage:OVP:PAR",
":PVOLtage:OVP:SER",
":PVOLtage:OVP:PDUAl",
":PVOLtage:OVP:NDUAl",

":PCURrent:OCP:IND1",
":PCURrent:OCP:IND2",
":PCURrent:OCP:PAR",
":PCURrent:OCP:SER",

":PCURrent:OCP:PDUAl",
":PCURrent:OCP:NDUAl",

":PROTect:PVOLtage:IND1:SWITch",
":PROTect:PVOLtage:IND2:SWITch",
":PROTect:PVOLtage:PAR:SWITch",
":PROTect:PVOLtage:SER:SWITch",
":PROTect:PVOLtage:PDUAl:SWITch",
":PROTect:PVOLtage:NDUAl:SWITch",

":PROTect:PCURrent:IND1:SWITch",
":PROTect:PCURrent:IND2:SWITch",
":PROTect:PCURrent:PAR:SWITch",
":PROTect:PCURrent:SER:SWITch",
":PROTect:PCURrent:PDUAl:SWITch",
":PROTect:PCURrent:NDUAl:SWITch",

":TRANge:IND1",
":TRANge:IND2",
":TRANge:PAR",
":TRANge:SER",
":TRANge:DUAL",

":ROUNd:IND1",
":ROUNd:IND2",
":ROUNd:PAR",
":ROUNd:SER",
":ROUNd:DUAL",

":OUTPut:FIXed",
":FIXed:SWITch",

"*ESE",
"*CLS",
"*SRE",
"*OPC",
"*WAI",
"*RST",
":SCPI:DISPlay",