PROGRAMMING MANUAL

Programmable Triple Output Power Supply

MODEL: 9130B Series (9130B, 9131B, 9132B)

V051415

The 9130B Series power supplies support communication protocols, which include standard SCPI commands and a few proprietary commands that follow the SCPI convention. The SCPI interface enables users to operate the power supply through a computer or a terminal equipped with IEEE-488.2 GPIB, RS-232, or USB interface. SCPI IEEE-488.2 also supports multi-unit control allowing a user to control up to 32 power supplies.

Table 6.1 - SCPI numerical parameters

Symbol	Response Formats
<bool>	Boolean value, can be 1 or “ON”, 0 or “OFF”
<NR1>	Integer value, can be zero, positive or negative integer number
<NRf>	Flexible numerical value, can be zero, positive or negative float point numeric value
<string>	String value, characters enclosed in single or double quotes
<NL>	New line, hex code 0x0Ah
<Rtn>	Return, hex code 0x0Dh

1.1 SCPI commands

IEEE488.2 common commands

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

SCPI essential commands

SYSTem

:VERSion?
:ERRor?
:REMote
:LOCal
:BEEPer
:RWLock
:COMMunicate:GPIB:RDEVice:ADDRess
:COMMunicate:GPIB:RDEVice:ADDRess?
:MODUle?
:INTerface
:MEMory
:GROUP
:GROUP?
:TRAcking
:PARAllel
STATus
:QUEStionable
[:EVENt]?
:CONDition?
:ENABle <n>
:ENABle?
:INSTrument[:EVENt]?
:INSTrument:ENABle
:INSTument:ENABle?
:INSTument:ENABle?
:INSTrument:ISUMmary1[:EVENt]?
:INSTrument:ISUMmary1:ENABle
:INSTument:ISUMmary1:ENABle?
:INSTrument:ISUMmary1:CONDition?
:INSTrument:ISUMmary2[:EVENt]?
:INSTrument:ISUMmary2:ENABle
:INSTument:ISUMmary2:ENABle?
:INSTrument:ISUMmary2:CONDition?
:INSTrument:ISUMmary3[:EVENt]?
:INSTument:ISUMmary3:ENABle?
:INSTrument:ISUMmary3:CONDition?
:OPERation
:EVENt]?
:ENABle
:ENABle?
:CONDition?
:INSTrument[:EVENt]?
:INSTrument:ENABle
:INSTrument:ENABle?

:INSTrument:ISUMmary1[:EVENt]?
:INSTrument:ISUMmary1:ENABle
:INSTrument:ISUMmay1:ENABle?
:INSTrument:ISUMmary1:CONDition?
:INSTrument:ISUMmary2[:EVENt]?
:INSTrument:ISUMmary2:ENABle
:INSTrument:ISUMmay2:ENABle?
:INSTrument:ISUMmary2:CONDition?
:INSTrument:ISUMmary3[:EVENt]?
:INSTrument:ISUMmary3:ENABle
:INSTrument:ISUMmay3:ENABle?
:INSTrument:ISUMmary3:CONDition?

Output setup commands

[SOURce:]
OUTPut
[:STATe][:ALL]
[:STATe][:ALL]?
:TIMer[:STATe]
:TIMer[:STATe]?
:TIMer:DATA
:TIMer:DATA?
:TRACk[:STATe]
:TRACk[:STATe]?
:SERies[:STATe]
:SERies[:STATe]?
:PARallel[:STATe]
:PARallel[:STATe]?
CHANnel?
CHANnel
:OUTPut[:STATe]
:OUTPut[:STATe]?
VOLTage
[:LEVel][:IMMediate][:AMPLitude]
[:LEVel][:IMMediate][:AMPLitude]?
[:LEVel]:UP[:IMMediate][:AMPLitude]
[:LEVel]:DOWN[:IMMediate][:AMPLitude]
[:LEVel][:IMMediate]:STEP[:INCRement]
[:LEVel][:IMMediate]:STEP[:INCRement]?
[:LEVel]:TRIGgered[:AMPLitude]
[:LEVel]:TRIGgered[:AMPLitude]?
:PROTection[:LEVel]
:PROTection[:LEVel]?
:PROTection:STATe

:PROTection:STATe?
:PROTection:TRIPed?
:PROTection:CLEar
:LIMIT[:LEVel]
:LIMIT[:LEVel]?
CURRent
[:LEVel][:IMMediate][:AMPLitude]
[:LEVel][:IMMediate][:AMPLitude]?
[:LEVel]:UP[:IMMediate][:AMPLitude]
[:LEVel]:DOWN[:IMMediate][:AMPLitude]
[:LEVel][:IMMediate]:STEP[:INCRement]
[:LEVel][:IMMediate]:STEP[:INCRement]?
[:LEVel]:TRIGgered[:IMMediate][:INCRement]
[:LEVel]:TRIGgered[:IMMediate][:INCRement]?

Display commands
DISPlay
[:WINDow][:STATe]
[:WINDow][:STATe]?
[:WINDow]:TEXT[:DATA]
[:WINDow]:TEXT[:DATA]?
[:WINDow]:TEXT:CLEar

Trigger commands
TRIGger[:IMMediate]
:DELey
:DELey?

Channel combination commands
[:SELect]?
:NSELect
:NSELect?
:COMbine:SERies
:COMbine:PARAllel
:COMbine:TRAck
:COMbine:OFF
:COMbine?
:COUPle[:TRIGger]
:COUPle[:TRIGger]?

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

[:VOLTage][:DC]?
:POWer[:DC]?
:CURRent:ALL[:DC]?
[:VOLTage]:ALL[:DC]?

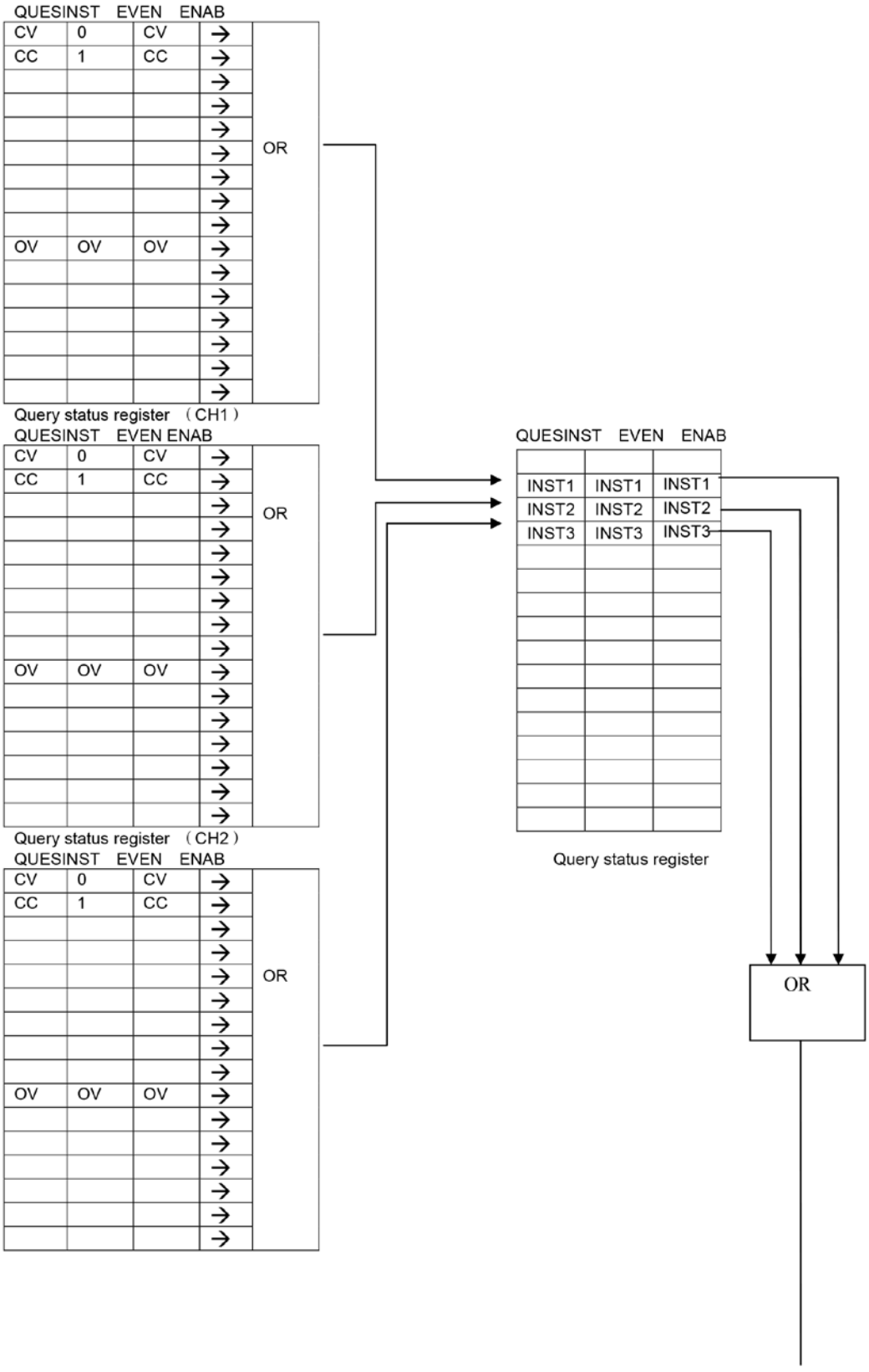
Apply Commands

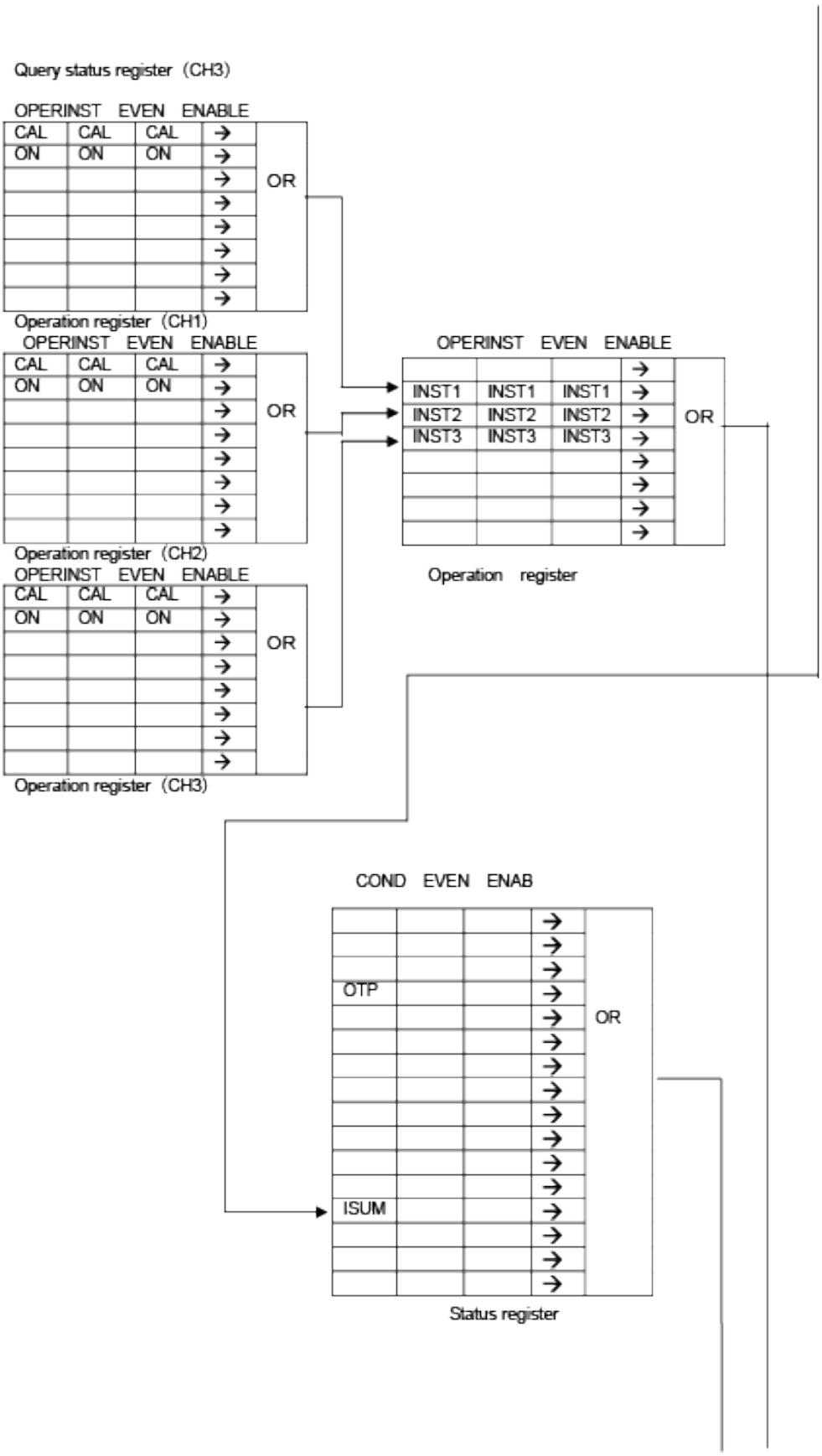
[SOURce:]APPLY
APPLY
:VOLTage
[:LEVel][:IMMediate][:AMPLitude]
[:LEVel][:IMMediate][:AMPLitude]?
:CURRent
[:LEVel][:IMMediate][:AMPLitude]
[:LEVel][:IMMediate][:AMPLitude]?

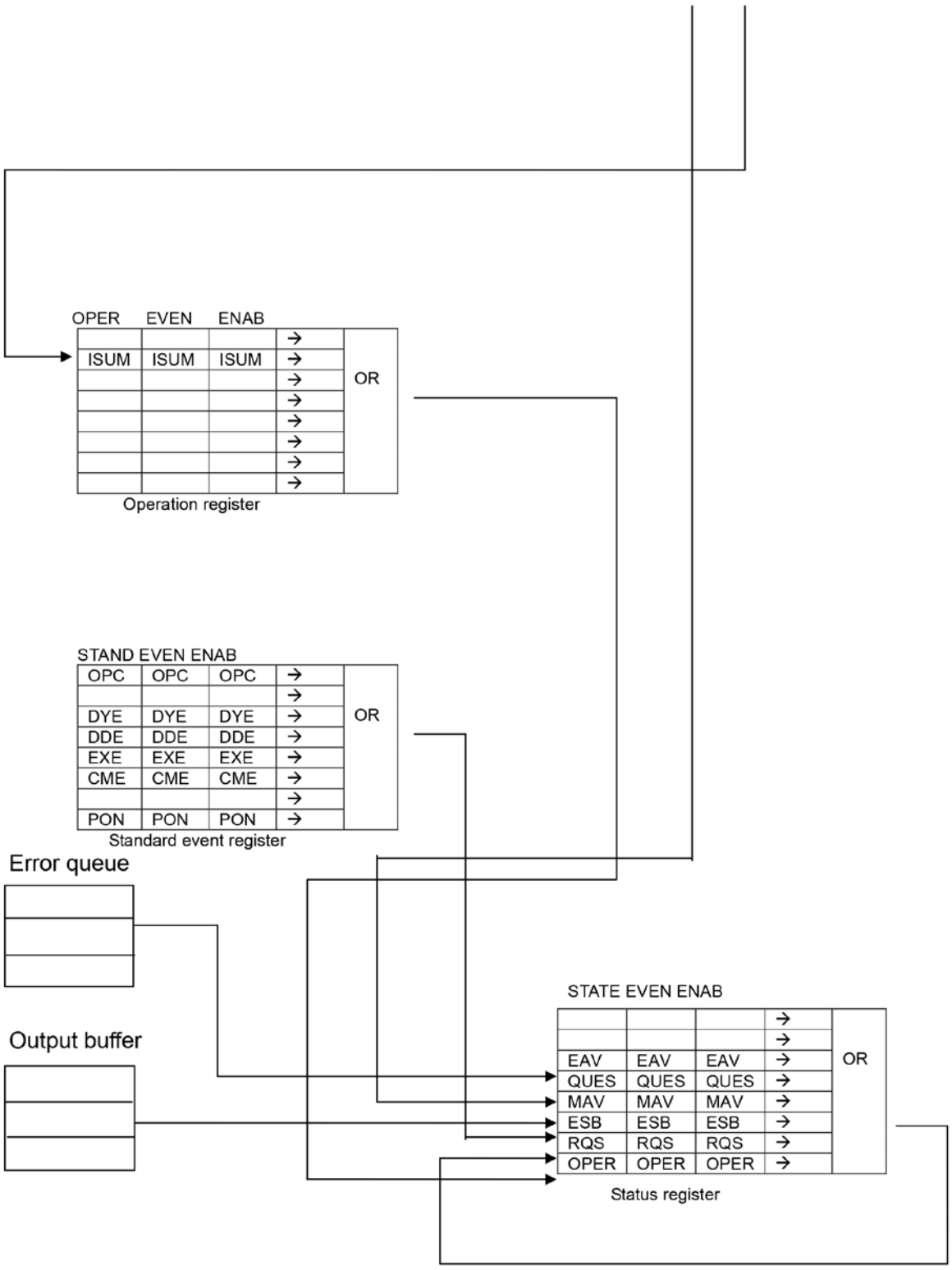
:OUTput?

Users can ensure the present status of power supply by reading the value of operation status register. The status of the power supply is stored in four status registers they are; Status byte register, standard event register, query status register and operation status register. Status byte register records the information of other status registers.

Definitions of each status register as follows:


QUESINST EVEN ENAB
CV 0 CV
CC 1 CC
OV OV OV
OR
Query status register （CH1）
QUESINST EVEN ENAB
CV 0 CV
CC 1 CC
OV OV OV
OR
Query status register （CH2）
QUESINST EVEN ENAB
CV 0 CV
CC 1 CC
OV OV OV
OR
QUESINST EVEN ENAB
INST1 INST1 INST1
INST2 INST2 INST2
INST3 INST3 INST3
Query status register
OR


Query status register (CH3)
OPERINST EVEN ENABLE
CAL CAL CAL
ON ON ON
OR
Operation register (CH1)
OPERINST EVEN ENABLE
CAL CAL CAL
ON ON ON
OR
Operation register (CH2)
OPERINST EVEN ENABLE
CAL CAL CAL
ON ON ON
OR
Operation register (CH3)
OPERINST EVEN ENABLE
INST1 INST1 INST1
INST2 INST2 INST2
INST3 INST3 INST3
OR
Operation register
COND EVEN ENAB
OTP
ISUM
OR
Status register


OPER
EVEN
ENAB
ISUM
ISUM
ISUM
OR
Operation register
STAND EVEN ENAB
OPC
OPC
OPC
DYE
DYE
DYE
DDE
DDE
DDE
EXE
EXE
EXE
CME
CME
CME
PON
PON
PON
OR
Standard event register
Error queue
Output buffer
STATE EVEN ENAB
EAV
EAV
EAV
QUES
QUES
QUES
MAV
MAV
MAV
ESB
ESB
ESB
RQS
RQS
RQS
OPER
OPER
OPER
OR
Status register

SCPI command description

IEEE488.2 common commands

***CLS**

This command clears the following registers:
Standard event register
Query event register
Operation event register
Status byte register
Error code
Command syntax: ***CLS**
Parameter: None

***ESE**

This command edits the value of standard event enable register. The program parameters determine which bit of standard event register is 1. This will cause ESB bit of status byte register to be set to 1. Command syntax: ***ESE** <NRf>
Parameters: 0-255
Power on value: Refer *PSC command
Example: *ESE 128
Query syntax: ***ESE**?
Return parameter: <NR1> Return parameter
Relevant command: ***ESR**? ***PSC *STB**? **Relevant command**

Bit definitions of standard event enable register

Bit	7	6	5	4	3	2	1	0
Name	PON	No Use	CME	EXE	DDE	QYE	No use	OPC
Value	128		32		16	8	4	1
PON Power-On CME Command error EXE Execution					DDE Device-dependent error QYE Query error OPC Operation complete			

***ESR?**

This command reads the value of standard event register. The value of standard event register will be cleared to zero after it is carried out. The bit definition of standard event register is the same as standard event enable register.
Query syntax:***ESR**?
Parameter: None

Return parameter: <NR1>
Relevant command: ***CLS *ESE *ESE**? ***OPC**

***IDN?**
This command reads relevant information about the power supply. Its returned parameters include four segments, which are separated by commas.
Query syntax:***IDN**?
Parameters: None
Return parameter example: B&K Precision, 9130B, 123456, V1.06-V1.04

***OPC**
OPC bit of the standard event register is 1 when all the commands before this command have been carried out.
Command syntax: ***OPC**
Parameter: None
Query syntax: ***OPC**?
Return parameter: <NR1>

***PSC**
This command is used to control the power supply when there is a service request when the unit is repowered.
1 OR ON: When the power supply is powered on, the values of status byte enable register, operation event enable register, query event enable register and standard event enable register will set to zero.
0 OR OFF:
The values of the status byte enable register, operation event enable register, query event enable register and standard event enable register will be saved to NVM which could be recalled once the unit is repowered.
Command syntax: ***PSC <bool>**
Parameter: 0|1|ON|OFF
Query syntax: ***PSC**?
Return parameter: 0|1
Relevant command: ***ESE *SRE STAT:OPER:ENAB STAT:QUES:ENAB**

***RST**
This command resets the power supply to the following default settings.
OUTP OFF CURR MAX
VOLT:PROT MAX VOLT MIN VOLT:PROT:STAT OFF
Command syntax:***RST>**
Parameter: None

***SRE**
This command edits the value of status byte enable register. The Program parameters determine which bit of status byte register is 1. This will affect the RQS bit of status byte register setting it to 1. Bit definition of the status byte enable register is the same as status byte

register.
Command syntax: ***SRE** <NRf>
Parameter: 0-255
Powered on value: refer to *PSC command
Example: *SRE 128
Query syntax: ***SRE**?
Return parameter: <NR1>
Relevant command: ***ESE *ESR**? ***PSC**

***STB?**
This command reads the value of status byte register. The value of status byte register will be cleared when this is carried out.
Query syntax: ***STB**? **Query syntax**
Parameter: None
Return parameter: <NR1>
Relevant command: ***CLS *ESE *ESR**

Bit definition of status register:

Bit	7	6	5	4	3	2	1	0
Name	OPER	RQS	ESB	MAV	QUE	EAV	no use	no use
Value	128	64	32	16	8	4		

***TRG**
When the trigger source of power supply is in command mode, a trigger signal will be generated. This function is same as **[SYSTem:]TRIGger** command**.**
Command syntax: ***TRG**
Parameter: None

***SAV**
This command will save the present setting of power supply to a specified storage area. The parameters are: current setup, voltage setup e, Max. voltage and stepped voltage.
Command syntax: ***SAV<NRf>**
Parameter: 1-36
Example: ***SAV 3**
Relevant command: ***RCL**

***RCL**
This command recovers setup value of power supply from specified storage area.
Command syntax: ***RCL<NRf>**

Parameter: 1-36
Example: ***RCL 3**
Relevant command: ***SAV**

***TST?**
This query command will cause the power supply to run a self-test, and report errors.
Query syntax: *TST?
Parameter: None
Return parameter: <NR1> 0 means the power supply passed the self-test.
Non-zero means there is an error.

***WAI**
Prohibits the instrument from executing any new commands until all pending overlapped commands have been completed.
Command syntax: WAI?
Parameter: None
Relevant command: *OPC

***PSC**
This command indicates whether it needs to send service query when the power supply is powered on.
1/ON: Clean up all enable registers when power supply powered on.
0/OFF: The values of all registers are the same as last saving when power supply powered on.
Command syntax: *PSC <NR1>
Parameter: 0/1/ON/OFF
Query syntax: *PSC?

SYSTem:ERRor?
This command reads error code and error information of the power supply
Command syntax: **SYST:ERR?**
Parameter: None
Return parameter: (NR1), (SRD)

SYSTem:VERSion?
This command queries the software version, for example, 1.02.
Command syntax: **SYST:VERS?**
Parameter: None
Return parameter: <NR2>

SYSTem:REMote
This command sets SOURCE METER as remote control mode
Command syntax: **SYST:REM**
Parameter: None
Query syntax: None

SYSTem:LOCal
This command sets SOURCE METER as panel controlled mode.
Command syntax: **SYST:LOC**
Parameter: None
Query syntax:None

SYSTem:RWLock[:STATe]
This command sets whether LOCAL key of SOURCE METER is available.
Command syntax: **SYST:RWL**
Parameter: None

SYSTem:COMMunicate:GPIB:RDEVice:ADDRess
This command sets device address of GPIB under communication.
Command syntax: **SYSTem:COMMunicate:GPIB:RDEVice:ADDRess** {<NR1>}
Parameter: 0~30
Query syntax: **SYSTem:COMMunicate:GPIB:RDEVice:ADDRess?**
Return parameter: <NR1>

SYSTem:BEEPer
This command makes the instrument sound beeper.
Command syntax: **SYSTem:BEEPer**
Parameter: None

SYSTem:INTerface
This command selects the communication interface to be used; you need to connect the right communication cable before using this command.
Command syntax: SYSTem: INTerface {<NR1>}
Parameter: RS232, USB, GPIB

SYSTem:MEMory:GROUP
This command exchanges storage groups; there are totally 36 groups for storing parameters: four groups of nine parameters.
Command syntax: SYSTem:MEMory:GROUP {<NR1>}
Parameter: Group No. 1-4
Query syntax: "SYSTem:MEMory:GROUP?",

STATus:QUEStionable[:EVENt]?
This command reads the value of the query event register. Values of the query event register will be cleared after the command is carried out.
Query syntax: **STATus:QUEStionable[:EVENt]?**
Parameter: None
Return parameter:<NR1>Relevant command: **STATus:QUEStionable:ENABle**

Bit definition of query event register:

Bit	7	6	5	4	3	2	1	0
Name	no use	no use	no use	no use	no use	no use	CC	CV
Value						4	2	1
Bit	15	14	13	12	11	10	9	8
Name	no use	no use	no use	no use	no use	no use	OV	
Value								

STATus:QUEStionable:CONDition?
This command read values of query condition register. When one value of the query position register changes, its relevant bit of query event register will be set to 1.
Query syntax: **STATus:QUEStionable: CONDition?**
Parameter: None
Return parameter: <NR1>

STATus:QUEStionable:ENABle
This command edits the values of query event enable register. Program parameters determine which bit of query event register is set to 1. This will cause the QUES bit of status byte register to be set to 1.
Command syntax: **STATus:QUEStionable:ENABle** <NRf>
Parameter : 0~255
Value of powered on: Refer to *PSC command
Example: **STATus:QUEStionable:ENABle** 128
Query syntax: **STATus:QUEStionable:ENABle**?
Return parameter: <NR1>
Relevant command: ***PSC**

STATus:PRESet
This command resets the status register.
Command syntax: **STATus:PRESet**
Parameter: None

STATus:QUEStionable:INSTrument[:EVENt]?
This command queries the channel event register.
Query syntax: STATus:QUEStionable:INSTrument[:EVENt]?
Parameter: None
Return parameter: <Nrf>

STATus:QUEStionable:INSTrument:ENABle
This command modifies the values of instrument query enable register.
Command syntax: **STATus:QUEStionable:INSTrument:ENABle**
Parameter: Register value
Query syntax: **STATus:QUEStionable:INSTument:ENABle?**
Return parameter: Register value

STATus:QUEStionable:INSTrument:ISUMmary1[:EVENt]?
This command queries the instrument event register.
Query syntax: **STATus:QUEStionable:INSTrument:ISUMmary1 [:EVENt]?**
Parameter: None

STATus:QUEStionable:INSTrument:ISUMmary1:ENABle
This command modifies query enable register value of channel 1.
Command syntax: **STATus:QUEStionable:INSTrument:ISUMmary1:ENABle**
Parameter: Register value
Query syntax: **STATus:QUEStionable:INSTument:ISUMmary1:ENABle?**

STATus:QUEStionable:INSTrument:ISUMmary1:CONDition?
This command queries query status register value of channel 1.
Query syntax: **STATus:QUEStionable:INSTrument:ISUMmary1:CONDition?**
parameter: None

STATus:QUEStionable:INSTrument:ISUMmary2[:EVENt]?
This command queries the instrument event register.
Query syntax: **STATus:QUEStionable:INSTrument:ISUMmary2[:EVENt]?**
Parameter: None

STATus:QUEStionable:INSTrument:ISUMmary2:ENABle
This command modifies the query enable register value of channel 2.
Command syntax: **STATus:QUEStionable:INSTrument:ISUMmary2:ENABle**
Parameter: Register value
Query syntax: **STATus:QUEStionable:INSTument:ISUMmary2:ENABle?**

STATus:QUEStionable:INSTrument:ISUMmary2:CONDition?
This command queries the query status register value of channel 2.
Query syntax: **STATus:QUEStionable:INSTrument:ISUMmary2:CONDition?**
Parameter: None

STATus:QUEStionable:INSTrument:ISUMmary3[:EVENt]?
This command queries the instrument event register.
Query syntax: **STATus:QUEStionable:INSTrument:ISUMmary3[:EVENt]?**
Parameter: None

STATus:QUEStionable:INSTrument:ISUMmary3:ENABle

This command modifies the query enable register value of channel 3.
Command syntax:**STATus:QUEStionable:INSTrument:ISUMmary3:ENABle**
Parameter: Register value
Query syntax: **STATus:QUEStionable:INSTument:ISUMmary3:ENABle?**

STATus:QUEStionable:INSTrument:ISUMmary3:CONDition?
This command queries status register value of channel 3.
Query syntax: **STATus:QUEStionable:INSTrument:ISUMmary3:CONDition?**
Parameter: None

STATus:OPERation[:EVENt]?
This command reads the values of the operation event register. Values of the operation event register will be cleared after this is carried out.
Query syntax: **STATus: OPERation [:EVENt]?**
Parameter: None
Return parameter:<NR1>

Bit definition of operation event register:

Bit No.	7	6	5	4	3	2	1	0
Name	no use	no use	no use	no use	no use	no use	ON	CAL
Value							2	1

STATus:OPERation:CONDition?
This command reads the values of operation position register. When one bit of the operation position register changes, its relevant bit of operation event register will be set to 1.
Query syntax: **STATus: OPERation: CONDition?**
Parameter: None
Return parameter: <NR1>

STATus:OPERation:ENABle
Command syntax: **STATus: OPERation:ENABle** <NRf>
Parameter:0~255
Value of powered on: Refer to *PSC command
Example: **STATus: OPERation:ENABle** 128
Query syntax: **STATus: OPERation:ENABle**?
Return parameter: <NR1>
Relevant command: ***PSC**

STATus:OPERation:INSTrument[:EVENt]?
This command queries values of instrument operation event register.

Query syntax: **STATus:OPERation:INSTrument[:EVENt]?**
Parameter: None

STATus:OPERation:INSTrument:ENABle
This command modifies the values of the operation enable register.
Command syntax: **STATus:OPERation:INSTrument:ENABle**
Parameter: Register value
Query syntax: **STATus:OPERation:INSTrument:ENABle?**
Return parameter: Register value

STATus:OPERation:INSTrument:ISUMmary1[:EVENt]?
This command queries the operation event register value of channel 1.
Query syntax: STATus:OPERation:INSTrument:ISUMmary1[:EVENt]?
Parameter: None

STATus:OPERation:INSTrument:ISUMmary1:ENABle
This command modifies the operation of the enable register value of channel 1.
Command syntax: STATus:OPERation:INSTrument:ISUMmary1:ENABle
Parameter: Register value
Query syntax: **STATus:OPERation:INSTrument:ISUMmay1:ENABle?**

STATus:OPERation:INSTrument:ISUMmary1:CONDition?
This command queries the operation status register value of channel 1.
Query syntax: STATus:OPERation:INSTrument:ISUMmary1:CONDition?
Parameter: None

STATus:OPERation:INSTrument:ISUMmary2[:EVENt]?
This command queries the operation event register value of channel 2.
Query syntax: STATus:OPERation:INSTrument:ISUMmary2[:EVENt]?
Parameter: None

STATus:OPERation:INSTrument:ISUMmary2:ENABle
This command modifies the operation enable register value of channel 2.
Command syntax: STATus:OPERation:INSTrument:ISUMmary2:ENABle
Parameter: Register value
Query syntax: STATus:OPERation:INSTrument:ISUMmay2:ENABle?

STATus:OPERation:INSTrument:ISUMmary2:CONDition?
This command queries the operation status register value of channel 2.
Query syntax: STATus:OPERation:INSTrument:ISUMmary2:CONDition?
Parameter: None

STATus:OPERation:INSTrument:ISUMmary3[:EVENt]?
This command queries the operation event register value of channel 3.
Query syntax: STATus:OPERation:INSTrument:ISUMmary3[:EVENt]?

Parameter: None

STATus:OPERation:INSTrument:ISUMmary3:ENABle
This command modifies the operation enable register value of channel 3.
Command syntax: STATus:OPERation:INSTrument:ISUMmary3:ENABle
Parameter: Register value
Query syntax: STATus:OPERation:INSTrument:ISUMmay3:ENABle?

STATus:OPERation:INSTrument:ISUMmary3:CONDition?
This command queries the operation status register value of channel 3.
Query command: STATus:OPERation:INSTrument:ISUMmary3:CONDition?
Parameter: None

OUTPut[:STATe][:ALL]
This command controls the on/off of the power supply output.
Command syntax: **OUTPut [:STATe] <bool>**
Parameter: 0|1|ON|OFF
*RST value: OFF Query syntax: **OUTPut:STATe[:ALL]?**
Return parameter: 0|1

OUTPut:TIMer[:STATe]
This command controls the timer status of the power supply output.
Command syntax: **OUTPut:TIMer[:STATe]**
Parameter: 0|1|ON|OFF
*RST value:OFF
Query syntax: **OUTPut:TIMer:STATe?**
Return parameter:0|1

OUTPut:TIMer:DELay
This command is used to set timer
Command syntax **OUTPut:TIMer:DELay**
Parameter: 0.1-99999.9
Unit: S
Query syntax: **OUTPut:TIMer:DATA?**

OUTPut:TRACk[:STATe]
This command sets the following status of channel 1 and channel 2.
Command syntax: OUTPut:TRACk[:STATe]
Parameter: 0|1|ON|OFF
Query syntax: **[SOURce:]OUTPut:TRACk[:STATe]**?
Note: If there is series/parallel or sync state between channel 3 and channel 1/channel 2, this command will output an error when it is carried out.

OUTPut:SERies[:STATe]

This command sets the series status of channel 1 and channel 2
Command syntax: OUTPut:SERies[:STATe]
Parameter: 0|1|ON|OFF
Query syntax: **OUTPut:SERies[:STATe]**?
Note: If there is series/parallel or sync state between channel 3 and channel 1/channel 2, this command will output an error when it is carried out.

OUTPut: PARallel [:STATe]
This command sets the parallel status of channel 1 and channel 2.
Command syntax: OUTPut: PARallel [:STATe]
Parameter: 0|1|ON|OFF
Query syntax: **OUTPut: PARallel [:STATe]**?
Note: if there is series/parallel or sync state between channel 3 and channel 1/channel 2, this command will output an error when it is carried out.

[SOURce:]CHANnel:OUTPut[:STATe]
This command controls the channel output status of power supply. The channel must be selected first using **INST** command before sending this command.
Command syntax: [SOURce:]CHANnel:OUTPut[:STATe] {<NRf>}
Parameter: 0|1|ON|OFF
Query syntax: [SOURce:]CHANnel:OUTPut[:STATe]?

[SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude]
This command sets the current value of power supply.
Command syntax: [SOURce:]CURRent [:LEVel] <NRf>
Parameter: MIN TO MAX|MIN|MAX|UP|DOWN|DEF
Unit: A| mA
*RST value: MIN
Example: CURR 3A, CURR 30mA, CURR MAX, CURR MIN
Query syntax: **[SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude]**?
Parameter:[MIN|MAX]
Example: CURR?, CURR? MAX, CURR?MIN
Return parameter: <NR2>

[SOURce:]CURRent[:LEVel]:UP[:IMMediate][:AMPLitude]
This command adds a step current value to the present channel.
Command syntax: [SOURce:]CURRent[:LEVel]:UP[:IMMediate][:AMPLitude]
Parameter: None

SOURce:]CURRent[:LEVel]:DOWN[:IMMediate][:AMPLitude]
This command reduces a step current value to the present channel.
Command syntax: [SOURce:]CURRent[:LEVel]:DOWN[:IMMediate][:AMPLitude]
Parameter: None

[SOURce:]CURRent[:LEVel][:IMMediate]:STEP[:INCRement]
This command sets the step value of present current.
Command syntax:[SOURce:]CURRent[:LEVel][:IMMediate]:STEP[:INCRement]
Parameter: Current value
Unit:A|mA|uA
Query syntax: **[SOURce:]CURRent[:LEVel][:IMMediate]:STEP[:INCRement]?**

[SOURce:]CURRent[:LEVel]:TRIGgered[:IMMediate][:INCRement]
This command sets trigger current.
Command syntax: [SOURce:]CURRent[:LEVel]:TRIGgered[:IMMediate][:INCRement]
Parameter: Current value |Min|Max|Def|Up|Down
Unit:A|mA|uA
Query command: **[SOURce:]CURRent[:LEVel]:TRIGgered[:IMMediate][:INCRement]?**

[SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude]
This command sets the voltage value of the power supply.
Command syntax: [SOURce:]VOLTage[:LEVel] <NRf>
Parameter: MIN TO MAX|MIN|MAX|UP|DOWN|DEF Unit:V | mV | kV
*RST value :MAX
Query syntax: [SOURce:]VOLTage[:LEVel]?
Parameter: [MIN|MAX]
Return parameter: <NR2>

[SOURce:]VOLTage[:LEVel]:UP[:IMMediate][:AMPLitude]
This command adds one step value to the present channel.
Command syntax: [SOURce:]VOLTage[:LEVel]:UP[:IMMediate][:AMPLitude]
Parameter: None

SOURce:]VOLTage [:LEVel]:DOWN[:IMMediate][:AMPLitude]
This command reduces one step value to the present channel.
Command syntax: [SOURce:]VOLTage [:LEVel]:DOWN[:IMMediate][:AMPLitude]
Parameter: None

[SOURce:]VOLTage [:LEVel][:IMMediate]:STEP[:INCRement]
This command sets step value of present voltage.
Command syntax: [SOURce:]VOLTage[:LEVel][:IMMediate]:STEP[:INCRement]
Parameter: Voltage value
Unit : kV|V|mV|uV
Query syntax: **[SOURce:]VOLTage[:LEVel][:IMMediate]:STEP[:INCRement]?**

[SOURce:]VOLTage [:LEVel]:TRIGgered[:IMMediate][:INCRement]
This command sets triggered voltage for triggered output.
Command syntax: [SOURce:]VOLTage[:LEVel]:TRIGgered[:IMMediate][:INCRement]
Parameter: Voltage value |Min|Max|Def|Up|Down
Unit: kV|V|mV|uV

Query command: **[SOURce:]VOLTage[:LEVel]:TRIGgered[:IMMediate][:INCRement]?**

[SOURce:]VOLTage:PROTection:STATe
This command sets the over voltage protection status of the power supply.
Command syntax: [SOURce:]VOLTage:PROTection:STATe <bool>
Parameter: 0 | 1 | ON | OFF
Unit: None
*RST value: OFF
Example: VOLT:PROT:STAT 1, VOLT :PROT:STAT ON
Query syntax: **[SOURce:]VOLTage:PROTection:STATe**?
Parameter : None
Example: VOLT:PROT:STAT?
Return parameter: <0|1>

[SOURce:]VOLTage:PROTection[:LEVel]
This command sets the software voltage upper limit of the power supply.
Command syntax: [SOURce:]VOLTage:PROTection[:LEVel]
Parameter: MIN TO MAX|MIN|MAX
Unit: V | mV
*RST value: MAX
Example: VOLT:PROT 30V, VOLT PROT MAX
Query syntax: **[SOURce:]VOLTage:PROTection[:LEVel]**?
Parameter: [MIN|MAX]
Example: VOLT:PROT?, VOLT PROT? MAX
Return parameter: <NR2>

[SOURce:]VOLTage:PROTection:TRIPed?
This command is used to query present trigger status of OVP.
Command syntax: [SOURce:]VOLTage:PROTection:TRIPed?
Parameter: None

[SOURce:]VOLTage:PROTection:CLEar
This command clears present protection status of OVP.
Command syntax: [SOURce:]VOLTage:PROTection:CLEar
Parameter: None

[SOURce:]VOLTage:LIMIT[:LEVel]
This command sets the present output voltage upper limit.
Command syntax: [SOURce:]VOLTage:LIMIT[:LEVel]
Parameter: Voltage value|Min|Max|def
Query syntax: **[SOURce:]VOLTage:LIMIT[:LEVel]?**

DISPlay[:WINDow][:STATe]
This command changes the display status.

Command syntax: DISPlay[:WINDow][:STATe]
Parameter: ON/OFF
Query command: **DISPlay[:WINDow][:STATe]?**

DISPlay[:WINDow]:TEXT[:DATA]
This command displays established character.
Command syntax: DISPlay[:WINDow]:TEXT[:DATA]
Parameter: Character string, add double quotation marks.
Query syntax: **DISPlay[:WINDow]:TEXT[:DATA]?**

DISPlay[:WINDow]:TEXT:CLEar
This command clears characters on the display and returns the display back to normal status.
Command syntax: DISPlay[:WINDow]:TEXT:CLEar
Parameter: None

TRIGger:DELay
This command sets trigger delay time which will be carried out when instrument receive trigger signal.
Command syntax: TRIGger:DELay {<NR1>}
Parameter: 0.1-99999.9
Parameter: S
Query: TRIGger:DELay?

INSTrument[:SELect]
This command is used to exchange present channel.
Command syntax: INSTrument[:SELect] {<NR1>}
Parameter: CH1|CH2|CH3

Example: INST CH2
Query: INSTrument[:SELect]?

INSTrument:NSELect
This command exchanges present channel; this function is the same as INSTrument[:SELect] except different parameters.
Command syntax: INSTrument:NSELect {<NR1>}
Parameter:1-3
Query: INSTrument:NSELect?

INSTrument:COMbine:SERies
This command sets the series connection of assigned channels and each channel. Channels are separated by commas.
Command syntax: INSTrument:COMbine:SERies {<NR2>}
Parameter 1:CH1|CH2

Parameter 2:CH1|CH2
Example: INST:COM:SER CH1, CH2 (Sets CH1 and CH2 in series)
Example: INST:COM:SER NONE (This will disable series mode)

INSTrument:COMbine:PARAllel
This command sets parallel the connection of assigned channels.
Command syntax: INSTrument:COMbine:PARAllel {<NR2>}
Parameter 1:CH1|CH2|CH3|OFF
Parameter 2:CH1|CH2|CH3
Optional parameter 3: CH1|CH2|CH3
Example: INST:COM:PARA CH1,CH2 (Sets CH1 and CH2 in parallel)
Example: INST:COM:PARA NONE (This will disable parallel mode)

INSTrument:COMbine:TRACk
This command sets the assigned channels as synchronized.
Command syntax: INSTrument:COMbine:TRAck
Parameter 1:CH1|CH2|CH3
Parameter 2:CH1|CH2|CH3
Optional parameter 3:CH1|CH2|CH3
Example: INST:COM:TRAC CH1,CH2,CH3 (Sets all channels to tracking mode)
Example: INST:COM:TRAC NONE (This will disable tracking mode)

INSTrument:COUPle[:TRIGger]
This command is prepared for trigger command *TRG, and indicates which channel is affected by *TRG. When the channel is not assigned, *TRG command only affects the present channel. Each channel must be separated by commas.
Parameter: CH1|CH2|CH3
Query:INSTrument:COUPle[:TRIGger]?
Example: INSTrument:COUPle[:TRIGger] CH1, CH2

MEASure[:SCALar]:VOLTage[:DC]?
FETCh[:VOLTage][:DC]?
This command reads the output voltage of the power supply.
Command syntax: **MEASure[:SCALar]:VOLTage[:DC]?**
Parameter: None
Return parameter: <NR2>
Return parameter unit: V
Example: **MEAS:VOLT?**

MEASure[:SCALar]:CURRent[:DC]?
FETCh:CURRent[:DC]?
This command reads the output current of the power supply.

Command syntax: **MEASure[:SCALar]:CURRent[:DC]?**

MEASure[:SCALar]:POWer[:DC]?
This command reads the output power of the power supply.
Command syntax: **MEASure[:SCALar]:POWer?**
Parameter: None
Return parameter: <NR2>
Return parameter unit: W
Example: **MEAS:POW?**

MEASure[:SCALar]:CURRent:ALL[:DC]?
This command returns the measured current value of all three channels at the same time.
Command syntax: MEASure[:SCALar]:CURRent:ALL[:DC]?
Return syntax: <CH1 current>, <CH2 current>, <CH3 current>

MEASure[:SCALar][:VOLTage]:ALL[:DC]?
This command returns the measured voltage value of all three channels at the same time.
Command syntax: MEASure[:SCALar][:VOLTage]:ALL[:DC]?
Return syntax: <CH1 voltage>, <CH2 voltage>, <CH3 voltage>

[SOURce:]APPLY
Change channels and set current and voltage value at the same time.
Parameter 1: CH1|CH2|CH3
Optional parameter 2: Voltage |Max|Min|Def|Up|Down
Optional parameter 3: Current |Max|Min|Def|Up|Down
Query: [SOURce:]APPLY? <CH1|CH2|CH3>
Return syntax: <voltage>, <current>
Example: APPL CH1,1,2 (sets channel 1 with 1V, 2 A)

[SOURce:]APPLY:VOLTage[:LEVel][:IMMediate][:AMPLitude]
This command sets the output voltage of three channels without changing channel at the same time.
Parameter 1: Voltage of channel 1
Optional parameter 2: Voltage of channel 2
Optional parameter 3: Voltage of channel 3
Unit: V
Example: APPL:VOLT 3,3,1
Query syntax: [SOURce:]APPLy:VOLTage[:LEVel][:IMMediate][:AMPLitude]?
Return syntax: <CH1 voltage>, <CH2 voltage>, <CH3 voltage>

[SOURce:]APPLY:CURRent[:LEVel][:IMMediate][:AMPLitude]
Sets output current of all three channels without changing channel at the same time.
Parameter 1: Current of channel 1

Optional parameter 2: Current of channel 2
Optional parameter 3: Current of channel 3
Unit: A
Example: APPL:CURR 1,1,0.6
Query syntax: [SOURce:]APPLy:CURRent[:LEVel][:IMMediate][:AMPLitude]?
Return syntax: <CH1 current>, <CH2 current>, <CH3 current>

[SOURce:]APPLY:OUTput
Sets output state of all three channels without changing channel.
Parameter 1: Current of channel 1
Optional parameter 2: Current of channel 2
Optional parameter 3:Current of channel 3
Unit: A
Example: APPL:OUT 1,1,0
Query syntax: [SOURce:]APPLY:OUTput?
Return syntax: <CH1 output state>, <CH2 output state>, <CH3 output state>