B+K PRECISION®

Model: 9801

Programmable AC Power Source

PROGRAMMING MANUAL

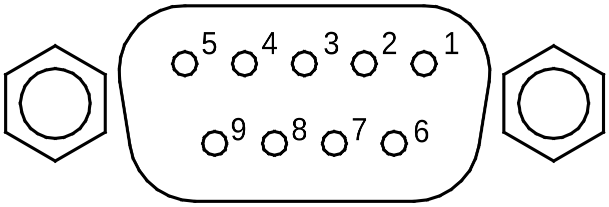
Table of Contents

1 Remote Operation

1.1 Interface Connection

RS-232

For RS-232 connectivity, refer to the diagram below for pin out information. The RS-232 is labeled in the rear panel and it is a female DB-9 interface.



PIN	Description
1	-
2	Transmit Data
3	Receive Data
4	-
5	GND
6	-
7	-
8	-
9	-

A straight pin-to-pin DB9 female to DB9 male serial cable is required for using the RS-232 interface. Do not use a null modem or crossover DB9 serial cable.

Refer to the user manual for details on configuring all serial settings as required for RS-232 communication.

USBTMC

The standard USB port is a USBTMC-compliant port that can be used for remote communication. There are no settings in the menu system for USB configuration. The only requirement is that NI-VISA is installed on the computer, which can be downloaded at http://www.ni.com/visa/.

2 Remote Commands

2.1 Parameter Definitions

The 9800 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 RS-232, or USB interface. SCPI IEEE-488.2 also supports multi-unit control allowing a user to control up to 32 power supplies.

The following table lists all of the 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
<NL>	New line, hex code 0x0Ah
<Rtn>	Return, hex code 0x0Dh

All commands should be ended with the <Rtn> and <NL> and there should be a space between command and numerical parameter.

2.2 IEEE488.2 Common Commands

Here's a list and description of all common SCPI commands supported by the instrument.

***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 can set the parameter of standard event enable register. Setting parameter can determine which bit of standard event register is 1 and the byte will enable ESB of status byte register as 1.
Command syntax: *ESE <NR1>
Parameter: 0~255
The value when power on: Refer to *PSC command
Example: *ESE 128
Query syntax: *ESE?
Returned parameter: <NR1>
The bit definition of the standard event enabled register:

Bit Position	7	6	5	4	3	2	1	0
Bit Name	PON	Not used	CME	EXE	DDE	QYE	Not used	OPC
Bit Weight	128		32	16	8	4		1

PON Power-on
CME Command error
EXE Execution error
DDE Device-dependent error
QYE Query error
OPC Operation complete

***ESR?**
This command can read the value of standard event status register. After executing this command, standard event status register is reset. Bit definition of standard event status register is the same as the standard event status enable register.
Query syntax: *ESR?
Parameter: None
Returned parameter: <NR1>

***IDN?**
This command can read information about power supply. The returns parameter contains 4 segments divided by comma.
Query syntax: *IDN?
Parameter: None
Returned parameter: <AARD> segment description
B&K Precision Manufacturer
9801 Product model
XXXXXX Product serial number
VX． XX –VX． XX Software version
Example: B&K Precision, 9801, 00000000000004, V1.01-V1.00

***OPC**

When all commands before this command are executed, bit OPC in standard event register will be set to 1.
Command syntax: *OPC
Parameter: None
Query syntax: *OPC?
Returned parameter: <NR1>

***RST**
This command resets the power supply to default settings.
Command syntax: *RST
Parameter: None

***SRE**
This command can set the parameter of state byte enable register. Setting parameter can determine which byte value of state byte register is 1 and the byte will set RQS of state byte register to 1. Bit definition of state byte enable register is the same as the state byte register.
Command syntax: *SRE <NR1>
Parameter: 0~255
Query syntax: *SRE?
Returned parameter: <NR1>

***STB?**
This command can read the data from status byte register.
Query syntax: *STB?
Parameter: None
Returned parameter: <NR1>

***TRG**
When power supply trigger source is a command from via BUS, this command will give a trigger signal. And its function is the same as "TRIGger" command.
Query syntax: *TRG
Parameter: None
Returned parameter: None

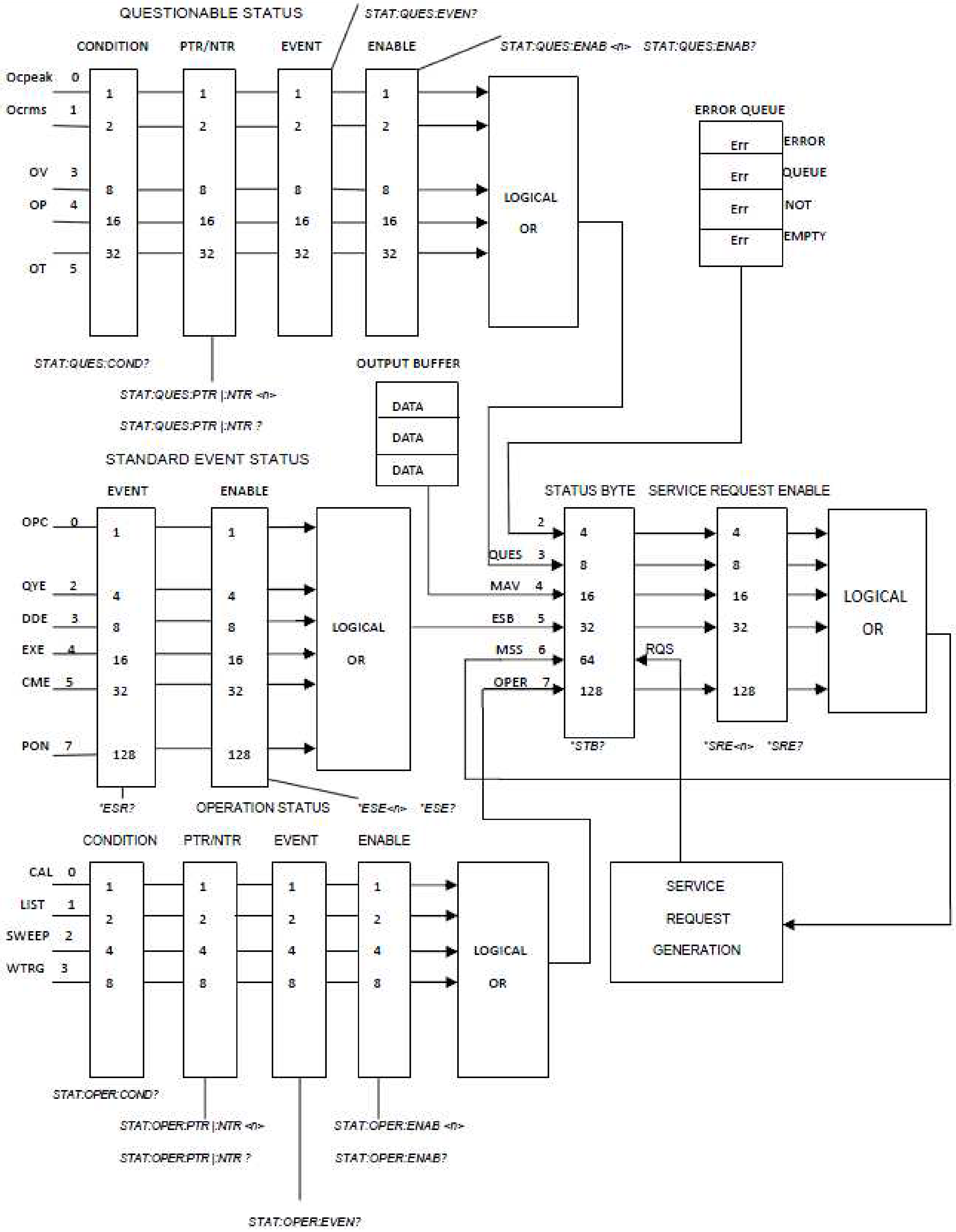
***SAV**
This command can save the current setups of power supply to specified memory. The memory is divided into 10 groups, each contain 0~9 (10 total) setups. Up to 100 setups can be saved in total.
Command syntax: *SAV<NRf>
Parameter: 0~9

***RCL**
This command can recall the setups you saved previously from the specified memory location.
Command syntax: *RCL<NRf>

Parameter: 0~9

2.3 STATUS Subsystem

You can get the current status of the power supply by reading the operation status registers. The power supply records the different status of the instrument through the four status register group. The four status register groups are: status byte register, standard event register, query status register and operation status register. Status byte register records the information of the other status registers.


QUESTIONABLE STATUS
STAT:QUES:EVEN?
CONDITION
PTR/NTR
EVENT
ENABLE
STAT:QUES:ENAB <n>
STAT:QUES:ENAB?
Ocpeak 0
Ocrms 1
OV 3
OP 4
OT 5
1
2
8
16
32
LOGICAL OR
ERROR QUEUE
Err
Err
Err
Err
ERROR QUEUE NOT EMPTY
STAT:QUES:COND?
STAT:QUES:PTR |:NTR <n>
STAT:QUES:PTR |:NTR ?
OUTPUT BUFFER
DATA
DATA
DATA
STANDARD EVENT STATUS
EVENT
ENABLE
OPC 0
QYE 2
DDE 3
EXE 4
CME 5
PON 7
1
4
8
16
32
128
LOGICAL OR
STATUS BYTE
SERVICE REQUEST ENABLE
2
QUES 3
MAV 4
ESB 5
MSS 6
OPER 7
4
8
16
32
64
128
RQS
LOGICAL OR
*STB?
*SRE<n>
*SRE?
*ESR?
OPERATION STATUS
*ESE<n>
*ESE?
CONDITION
PTR/NTR
EVENT
ENABLE
CAL 0
LIST 1
SWEEP 2
WTRG 3
1
2
4
8
LOGICAL OR
SERVICE REQUEST GENERATION
STAT:OPER:COND?
STAT:OPER:PTR |:NTR <n>
STAT:OPER:PTR |:NTR ?
STAT:OPER:ENAB <n>
STAT:OPER:ENAB?
STAT:OPER:EVEN?

STATUS Subsystem

STATus:QUEStionable[:EVENt]?

This command can be used to read the value in query event register. After executing this command, the query event register will be cleared.
Query syntax: STATus:QUEStionable[:EVENt]?
Parameter: None
Returned parameter: <NR1>
Relative command: STATus:QUEStionable:ENABle
The bit definition of query event enable register:

Bit Position	7	6	5	4	3	2	1	0
Bit Name	Not used	Not used	OT	OP	OV	Not used	OCrms	OC Peak
Bit Weight			32	16	8		2	1

STATus:QUEStionable:CONDition?

This command is used to read the value of query condition register. When a bit of QUES condition changes, the bit value corresponding in QUEST event register is 1.
Query syntax： STATus:QUEStionable: CONDition?
Parameter: None
Returned parameter: <NR1>

STATus:QUEStionable:ENABle

This command can set the parameter of quest event enable register. Setting parameter can determine which bit value of quest event register is 1 and the bit will enable QUES.
Command syntax： STATus:QUEStionable:ENABle <NR2>
Parameter: 0~65535
Default set: Refer to *PSC command
Example: STATus:QUEStionable:ENABle 128
Query syntax: STATus:QUEStionable:ENABle?
Returned parameter: <NR1>

STATus: QUEStionable:NTRansition

This command is used to edit the negative transition trigger register of operation event. The parameter determines which bits of operation event register is 1 and will change the OPER of status byte register to be 1.
Command syntax: STATus: QUEStionable:NTRansition <NR1>
Parameter: 0~255
Example: STATus: QUEStionable:NTRansition 128
Query syntax: STATus: QUEStionable:NTRansition?

STATus: QUEStionable:PTRansition

This command is used to edit the positive transition trigger register of operation event. The parameter determines which bits of operation event register is 1 and will change the OPER of status byte register to be 1.

Command syntax: STATus: QUEStionable:PTRansition <NR1>

Parameter: 0~255

Example: STATus: QUEStionable:PTRansition 128

Query syntax: STATus: QUEStionable:PTRansition?

STATus:OPERation[:EVENt]?

This command can read the parameter from operation event register. After executing this order, operation event register is reset.

Query syntax: STATus:OPERation [:EVENt]?

Parameter: None

Returned parameter: <NR1>

Relative command: STATus: OPERation:ENABle

Bit definition of operation event register:

Bit Position	7	6	5	4	3	2	1	0
Bit Name	Not used	Not used	Not used	Not used	WTG	SWEEP	LIST	CAL
Bit Weight					8	4	2	1

STATus:OPERation:CONDition?

This command can read the parameter from the operation condition register. When the parameter of operation condition register changes, the bit corresponding in operation event register is 1.

Query syntax: STATus: OPERation: CONDition?

Parameter: None

Returned parameter: <NR1>

STATus:OPERation:ENABle

This command can set the parameter of operation event enable register. Setting parameter can determine which bit value of operation event register is 1 and the bit will change OPER of status byte register to be 1.

Command syntax: STATus: OPERation:ENABle <NR1>

Parameter: 0~255

Example: STATus: OPERation:ENABle 128

Query syntax: STATus: OPERation:ENABle?

Returned parameter: <NR1>

STATus:OPERation:NTRansition

This command is used to edit the negative transition trigger register of operation event. The

parameter determines which bits in operation event register is 1 and will change the OPER bit of status byte register to be set to 1.
Command syntax: STATus:OPERation:NTRansition <NR1>
Parameter: 0~255
Example: STATus:OPERation:NTRansition 128
Query syntax: STATus:OPERation:NTRansition?

STATus:OPERation:PTRansition
This command edits the positive transition trigger register of operation event. The parameter determines which bits of operation event register is 1 and will change the OPER bit of status byte register to be set to 1.
Command syntax: STATus:OPERation:PTRansition <NR1>
Parameter: 0~255
Example: STATus:OPERation:PTRansition 128
Query syntax: STATus:OPERation:PTRansition?

2.4 SYSTEM Subsystem

SYSTem:ERRor?
This command is used to read the error code and the error information.
Command syntax: SYST:ERR?
Parameter: None
Returned parameter: <NR1>,<SRD>
The following is the error code and the definition:
(101) Too many numeric suffices
(110) No input command
(114) Invalid Numeric suffix
(116) Invalid value
(117) Invalid dimensions
(120) Parameter overflowed
(130) Wrong units for parameter
(140) Wrong type of parameter
(150) Wrong number of parameter
(160) Unmatched quotation mark
(165) Unmatched bracket
(170) Invalid command
(180) No entry in list
(190) Too many dimensions
(191) Too many char
(-200) Execution error
(-221) Settings conflict
(-222) Data out of range
(-223) Too much data

(-224) Illegal parameter value
(-225) Out of memory
(-230) Data Corrupt or Stale
(-270) Macro error
(-310) System error
(-350) Too many errors [errors beyond 9 lost due to queue overflow]
(-400) Query error
(-410) Query INTERRUPTED
(-420) Query UNTERMINATED
(-430) Query DEADLOCKED
(-440) Query UNTERMINATED
(0) No error
(1) Module Initialization Lost
(2) Mainframe Initialization Lost
(3) Module Calibration Lost
(4) Eeprom failure
(5) RST checksum failed
(10) RAM selftest failed
(40) Flash write failed
(41) Flash erase failed
(213) RS-232 buffer overrun
(216) RS-232 receiver framing
(217) RS-232 receiver parity
(218) RS-232 receiver overrun
(220) Front panel uart overrun
(221) Front panel uart framing
(222) Front panel uart parity
(223) Front panel buffer overrun
(224) Front panel timeout
(225) Front Crc Check error
(226) Front Cmd Error
(401) CAL switch prevents
(402) CAL password is incorrect
(403) CAL not enabled
(404) readback cal are incorrect
(405) programming cal are incorrect
(406) Incorrect sequence of cal
(603) FETCH of data was not acquired
(604) Measurement overrange

SYSTem:VERSion?

This command is used to query the current SCPI version. The returned parameter is a string like”YYYY.V”, in which the YYYY is the year of that version, V is the software version of that year.

Command syntax: SYST:VERS?

Parameter: None
Returned parameter: <NRf>

SYSTem:REMote
This command is used to switch to the remote control mode (PC control).
Parameter: None

SYSTem:LOCal
This command is used to switch the instrument to local control mode (front panel control).
Command syntax: SYST:LOCal
Parameter: None

SYSTem:RWLock
This command is the same function as SYSTem:REMote, except this command can lock “LOCAL” button as well. When this command is executed, the “Local” button will be disabled.
Command syntax: SYSTem:RWLock
Parameter: None

SYSTem:POSetup
This command configures the power on state of the instrument.
Command syntax: SYSTem:POSetup <string>
Parameter: RST|SAV0
Query syntax: SYSTem:POSetup?
Returned parameter: <string>

SYSTem:POSetup?
Command syntax: SYSTem:POSetup?
Parameter: None
Returned parameter: RST|SAV0

SYSTem:CLEar
This command is used to clear the error codes and information.
Command syntax: SYSTem:CLEar
Parameter: None
Returned parameter: None

SYSTem:BEEPer
This command is used to enable or disable the beeper.
Command syntax: SYSTem:BEEPer
Command syntax: SYSTem:BEEPer<bool>
Parameters: 0|1|ON|OFF
Query syntax: SYSTem:BEEPer?
Returned value 0 corresponds to the off state of beeper.
Returned value 1 corresponding to the on state of beeper.

Return parameters:<bool>

SYSTem:INTerface
This command is used to select the communication interfaces.
Command syntax：SYSTem:INTerface <string>
Parameter:< USB|RS232|LAN>

2.5 TRIGGER Subsystem

TRIGger[:IMMediate]
This command is used to create a trigger signal. It will give a trigger signal in BUS trigger source mode. The function is the same as command *TRG.
Command syntax: TRIGger[:IMMediate]
Parameter: None
Related commands: *TRG

TRIGger:SOURce
This command is used to select the trigger source. Power supply can receive trigger signals directly from front panel by pushing "Trigger" button or receive from a BUS trigger signal (usin *TRG command).
Command syntax: TRIG:SOURce <string>
Parameters: MANUAL |BUS |EXTern
Query syntax: TRIGger:SOURce?
Return parameter: <string>

2.6 SOURCE Subsystem

[SOURce:]OUTPut[:STATe]
This command is used to control the output state of the power supply.
Command syntax: [SOURce:]OUTPut [:STATe] <bool>
Parameter: 0|1|ON|OFF
Query syntax: [SOURce:]OUTPut[:STATe]?
Return parameter: <bool>

[SOURce:]RANGe
This command is used to set the voltage and current ranges.
Command syntax: [SOURce:]RANGe <string>
Parameter: AUTO|HIGH
Query syntax: [SOURce:]RANGe?
Return parameter: <string>

[SOURce:]FREQuency[:IMMediate]

This command is used to set the output frequency value.
Command syntax: [SOURce:]FREQuency[:IMMediate] <NRf>
Parameter: MIN TO MAX|MIN|MAX|DEF
Unit: Hz
Query syntax: [SOURce:]FREQuency[:IMMediate]?
Return parameter: <NRf>

[SOURce:]PHASe:STARt

This command is used to set the start phase angle.
Command syntax: [SOURce:]PHASe:STARt <NRf>
Parameter: MIN TO MAX|MIN|MAX|DEF
Unit: °
Query syntax: [SOURce:]PHASe:STARt?
Return parameter: <NRf>

[SOURce:]PHASe:END

This command is used to set the stop phase angle.
Command syntax: [SOURce:]PHASe:END <NRf>
Parameter: MIN TO MAX|MIN|MAX|DEF
Unit: °
Query syntax: [SOURce:]PHASe:END?
Return parameter: <NRf>

[SOURce:]DIMMer[:PHASe]?

This command is used to set the phase of the phase angle dimming function.
Command syntax: [SOURce:]DIMMer[:PHASe]<NRf>
Parameters: MIN TO MAX|MIN|MAX|DEF
Unit: °
Query syntax: [SOURce:]DIMMer[:PHASe]?
Parameter: None
Return parameter: <NRf>

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

This command is used to set a voltage output of the power supply.
Command syntax: [SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude] <NRf>
Parameters: MIN TO MAX|MIN|MAX|DEF
Unit: V
Query syntax: [SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude]?
Return parameter: <NRf>

2.7 CONFIG Commands

CONFig[SOURce:]VOLTage[:LEVel]:MINimum

This command is used to set the lower limitation (Volt-Min) of the output voltage.
Command syntax: CONFig[SOURce:]VOLTage[:LEVel]:MINimum <NRf>
Parameter: MIN TO MAX|MIN|MAX|
Unit: V
Query syntax: CONFig[SOURce:]VOLTage[:LEVel]:MINimum?
Return parameter: <NRf>

CONFig[SOURce:]VOLTage[:LEVel]:MAXimum

This command is used to set the upper limitation (Volt-Max) of the output voltage.
Command syntax: CONFig[SOURce:]VOLTage[:LEVel]:MAXimum <NRf>
Parameter: MIN TO MAX|MIN|MAX|
Unit: V
Query syntax: CONFig[SOURce:]VOLTage[:LEVel]:MAXimum?
Return parameter: <NRf>

CONFig[SOURce:]FREQuency:MINimum

This command is used to set the lower limitation (Freq-Min) of the output frequency.
Command syntax: CONFig[SOURce:]FREQuency:MINimum <NRf>
Parameter: MIN TO MAX|MIN|MAX|
Unit: Hz
Query syntax: CONFig[SOURce:]FREQuency:MINimum?
Return parameter: <NRf>

CONFig[SOURce:]FREQuency:MAXimum

This command is used to set the upper limitation (Freq-Max) of the output frequency.
Command syntax: CONFig[SOURce:]FREQuency:MAXimum <NRf>
Parameter: MIN TO MAX|MIN|MAX|
Unit: Hz
Query syntax: CONFig[SOURce:]FREQuency:MAXimum?
Return parameter: <NRf>

CONFig:PROTect:CURRent:RMS

This command is used to set the RMS current protection point (Irms-Protect).
Command syntax: CONFig:PROToct:CURRent:RMS <NRf>
Parameter: MIN TO MAX|MIN|MAX|
Unit: A
Query syntax: CONFig:PROToct:CURRent:RMS?
Return parameter: <NRf>

CONFig:PROTect:CURRent:RMS:MODe

This command is used to set the RMS current protection (Irms-Protect) delay mode.
Command syntax: CONFig:PROToct:CURRent:RMS:MODe <NRf>
Parameter: DELay | IMMediate

Query syntax: CONFig:PROToct:CURRent:RMS:MODe?
Return parameter: <NRf>

CONFig:PROTect:CURRent:PEAK
This command is used to set the peak current protection point (Ipeak-Protect).
Command syntax: CONFig:PROToct:CURRent:PEAK <NRf>
Parameter: MIN TO MAX|MIN|MAX|
Unit: A
Query syntax: CONFig:PROToct:CURRent:PEAK?
Return parameter: <NRf>

CONFig:PROTect:CURRent:PEAK:MODe
This command is used to set the peak current protection (Ipeak-Protect) delay mode.
Command syntax: CONFig:PROToct:CURRent:PEAK:MODe <NRf>
Parameter: DELay | IMMediate
Query syntax: CONFig:PROToct:CURRent:PEAK:MODe?
Return parameter: <NRf>

CONFig:BNC[:PORT][:FUNCtion]
This command is used to configure the BNC terminal functionality.
Command syntax: CONFig:BNC[:PORT][:FUNCtion]<NRf>
Parameter: I-TRigger|I-RI|O-PHase|O-ON
Example: CONF:BNC I-TR
Query syntax: CONFig:BNC[:PORT][:FUNCtion]?
Return parameter: <NRf>

CONFig:DIMMer:MODe
This command is used to configure the dimmer mode to either leading/trailing edge or off.
Command syntax: CONFig:DIMMer:MODe <NRf>
Parameter: LEADingedge|TRAilingedge|OFF
Query syntax: CONFig:DIMMer:MODe?
Return parameter: <NRf>

CONFig:LIST:STARt:MODe
This command is used to configure the mode to start/initiate a list program. This controls the List-Set setting in the menu.
Command syntax: CONFig:LIST:STARt:MODe <NRf>
Parameter: ON/OFF | TRIGGER
Example: CONF:LIST:STAR ON/OFF
Query syntax: CONFig:LIST:STARt:MODe?
Return parameter: <NRf>

2.8 MEASURE and FETCH Commands

MEASure[:SCALar]:VOLTage[:AC]?
This command is used to query the actual output AC voltage.
Command syntax: MEASure[:SCALar]:VOLTage[:AC]?
Return parameter: <NRf>
Return parameter unit: V
Example: MEAS:VOLT?

FETCh[:SCALar]:VOLTage[:AC]?
This command is used to read the output AC voltage which is in the sample cache. After sending the command, the readings will be sent to the computer. This command does not affect the instrument settings. This command does not trigger a measurement operation, and queries only the latest available reading. Before reading the new reading, the command returns old readings.
Command syntax: FETCh:VOLTage?
Return parameter: <NRf>
Return parameter unit: V

MEASure[:SCALar]:CURRent[:AC]?
This command is used to query the actual output AC current.
Command syntax: MEASure[:SCALar]:CURRent[:AC]?
Return parameter: <NRf>
Return parameter unit: A
example: MEAS:CURR?

FETCh[:SCALar]:CURRent[:AC]?
This command is used to read the output AC current which is in the sample cache. After sending the command, the readings will be sent to the computer. This command does not affect the instrument settings. This command does not trigger a measurement operation, and queries only the latest available reading. Before reading the new reading, the command returns the old readings.
Command syntax: FETCh:CURRent?
Return parameter: <NRf>
Return parameter unit: A

MEASure[:SCALar]:POWer[:AC][:REAL]?
This command is used to query the actual output active power.
Command syntax: MEASure[:SCALar]:POWer[:AC][:REAL]?
Return parameter: <NRf>
Return parameter unit: W
Example: MEAS:POWer?

FETCh[:SCALar]:POWer[:AC][:REAL]?
This command is used to read the output power which is in the sample cache. After sending the command, the readings will be sent to the computer. This command does not affect the instrument settings. This command does not trigger a measurement operation, and queries only the latest available reading. Before reading the new reading, the command returns the old readings.
Command syntax: FETCh:POWer?
Return parameter: <NRf>
Return parameter unit: W

MEASure[:SCALar]:POWer[:AC]:APParent?
This command is used to query the actual output apparent power.
Command syntax: MEASure[:SCALar]:POWer[:AC]:APParent?
Return parameter: <NRf>
Return parameter unit: VA
Example: MEAS:POWer:APP?

FETCh[:SCALar]:POWer[:AC]:APParent?
This command is used to read the output apparent power which is in the sample cache. After sending the command, the readings will be sent to the computer. This command does not affect the instrument settings. This command does not trigger a measurement operation, and queries only the latest available reading. Before reading the new reading, the command returns the old readings.
Command syntax: FETCh:POWer:APParent?
Return parameter: <NRf>
Return parameter unit: VA

MEASure[:SCALar]:POWer[:AC]:PFACtor?
This command is used to query the actual power factor.
Command syntax: MEASure[:SCALar]:POWer[:AC]:PFACtor?
Return parameter: <NRf>
Example: MEAS:POWer:PFAC?

FETCh[:SCALar]:POWer[:AC]:PFACtor?
This command is used to read the power factor which is in the sample cache. After sending the command, the readings will be sent to the computer. This command does not affect the instrument settings. This command does not trigger a measurement operation, and queries only the latest available reading. Before reading the new reading, the command returns the old readings.
Command syntax: FETCh:POWer:PFACtor?
Return parameter: <NRf>

MEASure[:SCALar]:FREQuency?

This command is used to query the actual output frequency.
Command syntax: MEASure[:SCALar]:FREQuency?
Parameter: None
Return parameter: <NRf>
Return parameter unit: Hz
Example: MEAS:FREQ?

FETCh[:SCALar]:FREQuency?

This command is used to read the output frequency which is in the sample cache. After sending the command, the readings will be sent to the computer. This command does not affect the instrument settings. This command does not trigger a measurement operation, and queries only the latest available reading. Before reading the new reading, the command returns the old readings.
Command syntax: FETCh:FREQuency?
Return parameter: <NRf>
Return parameter unit: Hz

MEASure[:SCALar]:CURRent[:AC]:PEAK?

This command is used to query the actual output AC current peak.
Command syntax: MEASure[:SCALar]:CURRent[:AC]:PEAK?
Return parameter: <NRf>
Return parameter unit: A
Example: MEAS:CURR:PEAK?

FETCh[:SCALar]:CURRent[:AC]:PEAK?

This command is used to read the output AC current peak which is in the sample cache. After sending the command, the readings will be sent to the computer. This command does not affect the instrument settings. This command does not trigger a measurement operation, and queries only the latest available reading. Before reading the new reading, the command returns the old readings.
Command syntax: FETCh:CURR:PEAK?
Return parameter: <NRf>
Return parameter unit: A

MEASure[:SCALar]:CURRent[:AC]:PEAK:MAXimum?

This command is used to query the actual maximum output AC current peak.
Command syntax: MEASure[:SCALar]:CURRent[:AC]:PEAK:MAXimum?
Return parameter: <NRf>
Return parameter unit: A
Example: MEAS:CURR:PEAK:MAX?

FETCh[:SCALar]:CURRent[:AC]:PEAK:MAXimum?

This command is used to read the maximum output AC current peak which is in the sample

cache. After sending the command, the readings will be sent to the computer. This command does not affect the instrument settings. This command does not trigger a measurement operation, and queries only the latest available reading. Before reading the new reading, the command returns the old readings.
Command syntax: FETCh:CURR:PEAK:MAX?
Return parameter: <NRf>
Return parameter unit: A

2.9 LIST Commands

LIST:STATe
This command is used to set the state of list mode.
Command syntax: LIST:STATe <string>
Parameter: < DISable|ENABle >
Query syntax: LIST:STATe?
Return parameter: <string>

LIST:RECall
This command is used to recall a list file.
Command syntax: LIST:RECall <NR1>
Parameter: 0 ~ 9
Example: LIST:REC 6
Query syntax: LIST:RECall?
Return parameter: <NR1>

LIST:STEP:COUNt
This command is used to set the number of steps in a list file.
Command syntax: LIST:STEP:COUNt <NR1>
Parameter: 1 ~ 100
Example: LIST:STEP:COUN 5
Query syntax: LIST:STEP:COUNt?
Return parameter: <NR1>

LIST:REPeat
This command is used to edit the number of repeat times of the list file.
Command syntax：LIST:REPeat <NR1>
Parameter: 1 ~ 10000
Example: LIST:REP 20
Query syntax: LIST:REPeat?
Return parameter: <NR1>

LIST:STEP:VOLTage

This command is used to edit the voltage level for a single step in the list file.
Command syntax：LIST:STEP:VOLTage <NR1>,<NRf>
Parameter 1: 0 ~ 99
Parameter 2: Voltage, unit: V
Example: LIST:STEP:VOLT 1, 30
Query syntax: LIST:STEP:VOLTage? <NR1>
Query Example: LIST:STEP:VOLT? 1
Return Parameter: <NRf>

LIST:STEP:FREQuency

This command is used to edit the frequency for a single step in the list file.
Command syntax：LIST:STEP: FREQuency <NR1>,<NRf>
Parameter 1: 0 ~ 99
Parameter 2: Frequency, unit: Hz
Example: LIST:STEP:FREQ 2, 60
Query syntax: LIST:STEP: FREQuency? <NR1>
Query Example: LIST:STEP:FREQ? 2
Return Parameter: <NRf>

LIST:STEP:SLOPe

This command is used to edit the slope time for a single step in the list file.
Command syntax：LIST:STEP:SLOPe <NR1>,<NRf>
Parameter 1: 0 ~ 99
Parameter 2: Slope time, unit: s
Example: LIST:STEP:SLOPe 3, 5.5
Query syntax: LIST:STEP:SLOPe? <NR1>
Query Example: LIST:STEP:SLOPe? 3
Return Parameter: <NRf>

LIST:STEP:DWELl:UNIT

This command is used to edit the dwell time **units** for a single step in the list file.
Command syntax：LIST:STEP:DWELl:UNIT <NR1>,< string >
Parameter 1: 0 ~ 99
Parameter 2: SECond|MINUte|HOUR
Example: LIST:STEP:DWELl:UNIT 2, SEC
Query syntax: LIST:STEP:DWELl:UNIT? <NR1>
Query Example: LIST:STEP:DWELl:UNIT? 3
Return Parameter: <string>

LIST:STEP:DWELl

This command is used to edit the dwell time for a single step in the list file.
Command syntax：LIST:STEP:DWELl <NR1>,<NRf>

Parameter 1: 0 ~ 99
Parameter 2: Dwell time
Example: LIST:STEP:DWELl 3, 20
Query syntax: LIST:STEP:DWELl? <NR1>
Query Example: LIST:STEP:DWEL? 3
Return Parameter: <NRf>

LIST:STEP:SD:STATe
This command is used to enable or disable the disturbance simulation status for a single step in the list file.
Command syntax：LIST:STEP:SD:STAT <NR1>,<string>
Parameter 1: 0 ~ 99
Parameter 2: DISable|ENABle
Example: LIST:STEP:SD:STAT 3, DIS
Query syntax: LIST:STEP:SD:STAT? <NR1>
Query Example: LIST:STEP:SD:STAT? 2
Return Parameter: <string>

LIST:STEP:SD:CONTinue
This command is used to turn on or off the continuous trigger for disturbance simulation for a single step in the list file.
Command syntax：LIST:STEP:SD:CONTinue <NR1>,<bool>
Parameter 1: 0 ~ 99
Parameter 2: OFF|ON|0|1
Example: LIST:STEP:SD:CONT 3, ON
Query syntax: LIST:STEP:SD:CONTinue? <NR2>
Query Example: LIST:STEP:SD:CONT? 2
Return Parameter: <bool>

LIST:STEP:SD:VOLTage
This command is used to set the voltage surge for disturbance simulation for a single step in the list file.
Command syntax：LIST:STEP:SD:VOLTage <NR1>,<NRf>
Parameter 1: 0 ~ 99
Parameter 2: Voltage, unit: V
Example: LIST:STEP:SD:VOLT 2, 30
Query syntax: LIST:STEP:SD:VOLTage? <NR2>
Query Example: LIST:STEP:SD:VOLT? 2
Return Parameter: <NRf>

LIST:STEP:SD:SITe
This command is used to set the initial time the disturbance occurs for a single step in the list file.

Command syntax：LIST:STEP:SD:SITe <NR1>,<NRf>
Parameter 1: 0 ~ 99
Parameter 2: Time, unit: ms
Example: LIST:STEP:SD:SIT 5, 10
Query syntax: LIST:STEP:SD:SITe? <NR1>
Query Example: LIST:STEP:SD:SIT? 2
Return Parameter: <NRf>

LIST:STEP:SD:TIMe
This command is used to set the duration of the disturbance for a single step in the list file.
Command syntax：LIST:STEP:SD:SITe <NR1>,<NRf>
Parameter 1: 0 ~ 99
Parameter 2: Time, unit: ms
Example: LIST:STEP:SD:TIM 3, 20
Query syntax: LIST:STEP:SD:TIMe? <NR1>
Query Example: LIST:STEP:SD:TIM? 2
Return Parameter: <NRf>

LIST:SAVe:BANK
This command is used to save a list file into a specified memory location.
Command syntax：LIST:SAVe:BANK <NR1>
Parameter: 0 ~ 9
Example: LIST:SAV:BANK 0

LIST:RUN:STEP:COUNt?
This command is used to query the step currently running
Query syntax：LIST:RUN:STEP:COUNt?
Parameter: None

LIST:RUN:STEP:REPeat?
This command is used to query the step currently running
Query syntax：LIST:RUN:STEP:REPeat?
Parameter: None

2.10 SWEEP Commands

SWEep:STATe
This command is used to set the state of sweep mode.
Command syntax: SWEep:STATe <string>
Parameter: < DISable|ENABle >
Example: SWE:STAT ENAB
Query syntax: SWEep:STATe?

Return parameter: <string>

SWEep:RECall
This command is used to recall a sweep setup file.
Command syntax: SWEep:RECall <NR1>
Parameter: 0 ~ 9
Example: SWE:REC 4
Query syntax: SWEep:RECall?
Return parameter: <NR1>

SWEep:STARt:VOLTage
This command is used to edit the sweep starting voltage.
Command syntax: SWEep:STARt:VOLTage <sNRf>
Parameter: MINimum|MAXimum|<NRf>
Parameter unit: V
Example: SWE:STAR:VOLT 5
Query syntax: SWE:STAR:VOLT?
Return parameter: <NRf>

SWEep:END:VOLTage
This command is used to edit the sweep starting voltage.
Command syntax: SWEep:END:VOLTage <sNRf>
Parameter: MINimum|MAXimum|<NRf>
Parameter unit: V
Example: SWE:END:VOLT 5
Query syntax: SWE:END:VOLT?
Return parameter: <NRf>

SWEep:STEP:VOLTage
This command is used to edit the sweep voltage step.
Command syntax： SWEep:STEP:VOLTage <NRf>
Parameter : MINimum|MAXimum|<NRf>
Parameter unit: V
Example: SWE:STEP:VOLT 10.2
Query syntax: SWEep:STEP:VOLTage?
Return Parameter: <NRf>

SWEep:STEP:TIMe:UNIT
This command is used to set the sweep time unit for a single step.
Command syntax： SWEep:STEP:VOLTage <NRf>
Parameter: SECond|MINUte|HOUR
Example: SWE:STEP:TIM:UNIT SEC
Query syntax: SWEep:STEP:VOLTage?

Return Parameter: <NRf>

SWEep:STEP:TIMe

This command is used to edit the sweep time for a single step.
Command syntax： SWEep:STEP:TIMe <NRf>
Parameter 1: MINimum|MAXimum|<NRf>
Parameter unit: ms
Example: SWE:STEP:TIM 2, 60
Query syntax: SWEep:STEP:TIMe?
Return Parameter: <NRf>

SWEep:STARt:FREQuency

This command is used to edit the sweep starting frequency.
Command syntax: SWEep:STARt:FREQuency <NRf>
Parameter: MINimum|MAXimum|<NRf>
Parameter unit: Hz
Example: SWE:STAR:FREQ 50
Query syntax: SWEe:STARt:FREQuency?
Return parameter: <NRf>

SWEep:END:FREQuency

This command is used to edit the sweep ending frequency.
Command syntax： SWEep:END:FREQuency <NRf>
Parameter: MINimum|MAXimum|<NRf>
Parameter unit: Hz
Example: SWE:END:FREQ 100
Query syntax: SWEep:END: FREQuency?
Return Parameter: <NRf>

SWEep:STEP:FREQuency

This command is used to edit the sweep frequency step.
Command syntax： SWEep:STEP:FREQuency <NRf>
Parameter : MINimum|MAXimum|<NRf>
Parameter unit: Hz
Example: SWE:STEP:FREQ 10
Query syntax: SWEep:STEP:FREQuency?
Return Parameter: <NRf>

SWEep:SAVe:BANK

This command is used to save a sweep file into a specified memory location.
Command syntax： SWEep:SAVe:BANK <NR1>
Parameter: 0 ~ 9
Example: SWE:SAV:BANK 0

SWEep:MEASure[:SCALar]:VOLTage[:AC]?
This command is used to query the output AC voltage at the sweep maximum power point.
Query syntax: SWEep:MEASure[:SCALar]:VOLTage[:AC]?
Return parameter: <NRf>
Return parameter unit: V

SWEep:MEASure[:SCALar]:CURRent[:AC]?
This command is used to query the output AC current at the sweep maximum power point.
Query syntax: SWEep:MEASure[:SCALar]:CURRent[:AC]?
Return parameter: <NRf>
Return parameter unit: A

SWEep:MEASure[:SCALar]:POWer[:AC][:REAL]?
This command is used to query the output active power at the sweep maximum power point.
Query syntax: **SWEep:**MEASure[:SCALar]:POWer[:AC][:REAL]?
Return parameter: <NRf>
Return parameter unit: W

SWEep:MEASure[:SCALar]:POWer[:AC]:APParent?
This command is used to query the output apparent power at the sweep maximum power point.
Query syntax: **SWEep:**MEASure[:SCALar]:POWer[:AC]:APParent?
Return parameter: <NRf>
Return parameter unit: VA

SWEep:MEASure[:SCALar]:POWer[:AC]:PFACtor?
This command is used to query the power factor at the sweep maximum power point.
Query syntax: **SWEep:**MEASure[:SCALar]:POWer[:AC]:PFACtor?
Return parameter: <NRf>
Return parameter unit: None

SWEep:MEASure[:SCALar]:FREQuency?
This command is used to query the output frequency at the sweep maximum power point.
Query syntax: **SWEep:**MEASure[:SCALar]:FREQuency?
Parameter: None
Return parameter: <NRf>
Return parameter unit: Hz

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