


PRO Series Bidirectional Programmable DC Power Supplies SCPI Programming Guide



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1 Overview

The PRD is remotely controlled using SCPI (Standard Commands for Programmable Instruments). The SCPI is compliant with the IEEE488.2 specification.

2 Communication protocols

Commands and response messages are transmitted in ASCII and the response message must be fully read before a new command can be transmitted, otherwise the retained response message will be lost and an interrogation interrupt error will occur. The recommended delay between commands is a minimum of 15ms, with some commands requiring longer times.

2.1 Commonly used symbols

1 Pointed brackets <>

The pointed brackets indicate that the content is a command parameter, which will be replaced by a valid value when used. For example, <NR1> indicates a specific form of numeric data, which is replaced by a number without a decimal point when used.

2 Vertical line |

The vertical line is used to separate multiple parameters, only one of which can be selected at a time when using the command.

3 Square brackets []

Square brackets indicate that the contents are omissible keywords and the command will be executed whether or not the keyword is omitted. For example: [SOURce:]CHANnel? indicates that [SOURce:] can be omitted.

4 curly brackets {}

The curly brackets indicate that one of the parameters is a multiple choice.

5 Terminator <LF>

The terminator <LF> is added to each instruction and its corresponding hexadecimal value is 0x0A.

2.2 Parameter format

The remote control input commands and power response commands are available in numeric, boolean and string formats.

1. Digital format

The numerical format of the programming instructions is shown in Table 1.

Table 1 Numerical format of programming instructions

Symbols	Description	Example parameters
NR1	Numbers without decimal points	123
NR2	Numbers with decimal points	12.3

Symbols	Description	Example parameters
NR3	Numbers with decimal points and exponents	1.23E+2
NRF	<NR1> or <NR2> and MAX/MIN	MAX
DSC	Character parameters	MANUal

2. Boolean format

On input the Boolean parameter <Bool> can be represented by ON|OFF or 0|1. In response the Boolean parameter <Bool> is only represented by 0|1.

3. String format

Query command string return:

<SRD>: Replies to an arbitrary ASCII string.

2.3 Introduction to the SCPI command

2.4 SCPI instruction type

SCPI has two types of instructions, common instructions and instrumentation instructions.

1 Common Instructions

Common commands are usually not related to a specific operation and are used to control the overall function of the PRD. Common commands all consist of a three-letter helper character and an asterisk:

*RST (reset command)

*IDN? (instrument identification search)

2 Instrument instructions

Instrument commands perform specific PRD functions. They are organised into a tree structure, with a 'root' at the top, comprising several subsystems, each consisting of a root keyword and one or several hierarchical keywords.

2.5 SCPI **instruction structure**

The SCPI instruction consists of one or more message units ending in a terminator. The terminator is not part of the syntax and is implicitly included at the end of the

message unit.

The instruction structure of a compound instruction is shown in Figure 1 and is explained in detail below.

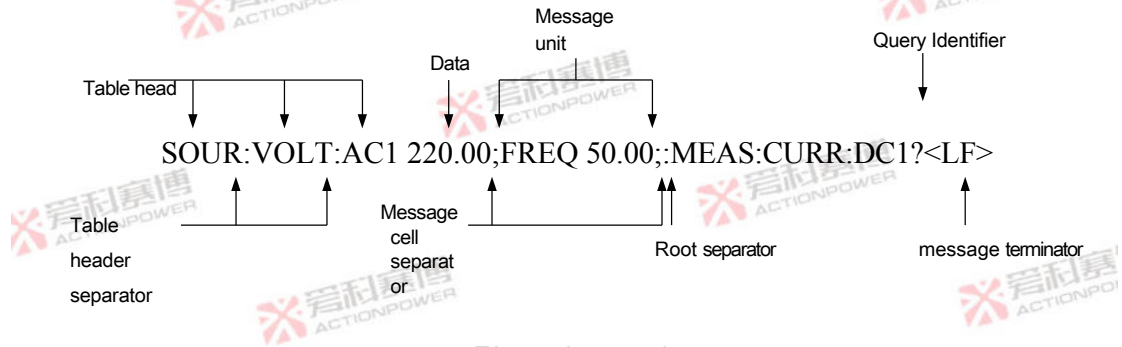


Fig. 1 Instruction structure

1 Table head

Error! Source not found. The headers in the table are SOUR, VOLT, AC1, FREQ, MEAS, CURR, DC1. The headers are the instructions recognized by the PRD. It can be in either long or short format.

Long format Table headers are fully spelled out, e.g. VOLTAGE, MEASURE.

Short format The table header contains only the first three or four letters, e.g. VOLT, MEAS.

The SCPI command is case insensitive and can be used in all upper or lower case. However, to abbreviate, all capital letters in the command format must be entered, e.g:

MEASure:TPOWer:ACTIve?

can be abbreviated as:

MEAS:TPOW:ACTI?

MeaS:Tpow:ACTI?

Meas:tpow:acti?

Short table headers speed up program execution.

If the command has multiple table headers, they must be separated by a colon (table header separator), e.g:

sour:volt:ac1 220.00

Table headers and parameters are separated by 1 'space'. The header is followed by multiple parameters, separated by ',', e.g:

PROG:LIST:CONT 100,10,50

2 Query Identifier

If there is a question mark (query identifier) at the end of the command, e.g:

MEAS:CURR:DC1?

Indicates that this command is a query command and the instrument will return the corresponding response message after execution

3 Message cell separator

When two or more message units are combined into a composite message, separate these units with a semicolon, e.g:

sour:volt:ac1 220.00;freq 50.00

4 Root separator

When the colon precedes the first table header of a message unit, it becomes the root separator, i.e. the root node of the command tree. In the following example, note the difference between the root separator and the table header separator:

MEAS:CURR:DC1? All colons are table header separators

:MEAS:CURR:DC1? Only the first colon is the root separator

MEAS:CURR:DC1?;;SOUR:VOLT:AC1 220.00 Only the third colon is the root separator

There is no need to prefix root-level commands with a colon, as each root-level command is preceded by an implied colon.

5 Message terminator

The message terminator informs the PRD that the end of the message has been reached and corresponds to a hexadecimal value of 0x0A. In the examples in this manual, each example has an assumed message terminator at the end of it.

2.6 Order of execution

The PRD executes instructions in the order in which they are received; sending them out of order may cause unpredictable problems.

3 Common Instructions

The common instructions available in the PRD are shown in Table 2.

Table 2 Available common instructions

Orders	Function description
*IDN?	Identification Query
*RST	Reset Command
*TRG	Trigger to Sequencer (Trigger to Sequencer)
ABORT	Stop triggered action
*SAV <n>	Parameter storage instructions
*RCL <n>	Parameter reading instructions
*STB?	Status word register lookup
*CLS	Status clear command

Each common instruction is described in detail below.

Command *IDN?

Format

Instruction Look up the PRD's "Brand", "Device Model", "Serial Number"

Description and "Device Version" information.

For a specific description of this information.

Return data <SRD>
format

Example
command
ds

*IDN?

actionpower,prd2006,1020010001,03.00.01.01.01

Command
Format

*RST

Instruction


Reset the PRD to the factory state, the system parameters are restored to the factory default values and the communication parameters will

Description

Will be retained.

Example
command
ds

*RST

Command Format	*TRG
Instruction	Programming trigger instructions. Only one programming experiment can be executed at the same time, to trigger
Description	For another programming experiment, please first retire  the current programming enable state.
Example commands	*TRG

Command
Format

ABORT

Instruction
Description

Programming back instruction. The instruction, when executed, terminates the programming experiment and retires the current programming Enabled state.

Example
commands

ABOR

Command
Format

*SAV <n>

Instruction
Description

Storage of user parameters to a specified location, 10 groups of user parameters are supported.

Parameter	1~10
range	
Example	*SAV 1
commands	
Command	*RCL <n>
Format	

Instruction	Reads the user parameters from the specified location.
Description	
Parameter range	1~10
Example commands	*RCL 1
Command Format	*STB?
Instruction	Status word register read.
Description	

on

Example *STB?

comman 128

ds

Comman *CLS

d Format

Instructio Status register clear, this instruction clears the following registers:

n 1. Status Byte

Descripti

on

2. Error Queue

3. Questionable Status Event



Example
commands

*CLS

4 Instrument instructions

The subsystem commands available to the PRD are shown in Table 3.

Table 3 Available SCPI subsystem commands

Subsystem commands	Description
MEASure	This type of instruction is used to query the value of the PRD's operating parameters.
SOURce	These instructions are used to set the parameters of the PRD, including voltage parameters, current parameters, protection parameters, etc.
PROGram	These instructions are used to program transient experiments.
SYSTEM	These instructions execute the corresponding system commands, including power reset and error message query.
STATus	These commands are used to query the power supply operation and protection status.
OUTPut	This command is used to control the power supply input  .
TRIGger	These instructions are used to set the trigger source, trigger input and program the trigger input  mode of the power supply.
CEVent	This type of command is used for event function setting
MEMory	These instructions are used for data logging control
SOLar	These instructions are used to program photovoltaic experiments

4.1 Measurement instructions

The measurement commands are used to query the values of the PRD operating parameters. The measurement commands consist of voltage, current, internal resistance, other measurement commands, etc.

4.1.1 Voltage measurement commands

Command	MEASure:VOLTage?
Format	
Instruction	Return voltage RMS (in V).
Description	
Return data	<NR2>
format	
Example	MEAS:VOLT?
commands	220.00

4.1.2 Current measurement commands

Command	MEASure:CURRent?
Format	

Instruction	Return current RMS (in A)
Description	
Return data	<NR2>
format	
Example	MEAS:CURR?
commands	10.23

4.1.3 Power measurement commands

Command	MEASure:POWER?
Format	
Instruction	Return active power (in kW).
Description	
Return data	<NR2>
format	

Example MEAS:POW?

commands 10.23

4.1.4 Internal resistance measurement instructions

Command MEASure:RESistance?
Format

Instruction	Return the internal resistance value in Ω .
Description	
Return data	<NR2>
format	
Example	MEAS:RES?
commands	120.0

4.1.5 Energy measurement instructions

Command	MEASure:ENERgy?
Format	
Instruction	Return of accumulated energy
Description	(in kWh).
Return data	<NR2>
format	

Example MEAS:ENER?

commands 120.0

4.1.6 Capacity measurement instructions

Command MEASure:CAPAcity?
Format

Instruction Return capacity (in Ah).

Description

Return data <NR2>

format

Example MEAS:CAPA?

commands 120.0

4.1.7 Other measurement commands

Command MEASure:ALL?

Format

Instruction	Returns 6 measured parameter values, separated by ",". The
Description	list of parameters is as follows: <ol style="list-style-type: none">1. Voltage RMS2. Current RMS3. Active power4. Internal resistance5. Energy

6. Capacity

Return data <NR2>,<NR2>,<NR2>.....,<NR2>
format
Example MEAS:ALL?
commands 220.0,5.00,220.0,56.0,31.0,25.6

4.2 Set-up instructions

The set commands modify various settings of the PRD, such as the delivery mode, voltage parameters, protection parameters, etc. The SOURce part of these commands is optional.

4.2.1 Voltage setting commands

Command	[SOURce:]VOLTage[:DC]
Format	
Instruction	Set the voltage given value (in V).
Description	
Parameter range	<0~UMAX> (UMAX: PRD whole machine maximum voltage)
Parameter form	<NRF>

Example	sour:volt:dc 220.00
commands	
Enquiry	[SOURce:]VOLTage[:DC]?
Instructions	
Instruction	Returns the given value of the voltage.
Description	
Return value form	<NR2>

Example commands	SOUR:VOLT:DC? 220.00
Command Format	[SOURce:]VOLTage:ULIMit
Description	Sets the upper limit of the voltage given (in V).
Parameter range	<0~UMAX> (UMAX: PRD whole machine maximum voltage)
Parameter form	<NRF>
Example commands	SOUR:VOLT:ULIM 10.00
Enquiry	[SOURce:]VOLTage:ULIMit?

Instructions

Instruction Returns the upper voltage limit value.

Description

Return value <NR2>

form

Example SOUR:VOLT:ULIM?

commands

10.00

Command	[SOURce:]VOLTage:LLIMit
Format	
Instruction	Sets the lower limit for the voltage
Description	given (in V).
Parameter range	<0~UMAX> (UMAX: maximum voltage of the whole machine)
Parameter form	<NRF>
Example commands	SOUR:VOLT:LLIM MAX
Enquiry Instructions	[SOURce:]VOLTage:LLIMit?

Instruction	Returns the lower limit value for the
Description	voltage given.
Return value	<NR2>
form	
Example	SOUR:VOLT:LLIM?
commands	240.00

Command Format	[SOURce:]VOLTage:PROTection
Instruction Description	Set the overvoltage protection threshold (in V).
Parameter range	<0.000 to 110% of rated voltage>
Parameter form	<NRF>
Example commands	SOUR:VOLT:PROT 50.00
Enquiry	[SOURce:]VOLTage:PROTection?
Instructions	
Instruction	Returns the overvoltage

Description	protection threshold.
Return value	<NR2>
form	
Example	SOUR:VOLT:PROT?
commands	50.00

Command	[SOURce:]VOLTage:SLEW
Format	
Instruction	Set the voltage swing rate (in V/ms).
Description	
Parameter	<0.010~999.0>
range	
Parameter	<NRF>
form	
Example	SOUR:VOLT:SLEW MAX
commands	
Enquiry	[SOURce:]VOLTage:SLEW?
Instructions	
Instruction	Returns the voltage swing rate.
Description	

Return value	<NR2>
form	
Example	SOUR:VOLT:SLEW?
commands	50.0
Command	[SOURce:]VOLTage:RISE
Format	

Instruction Set the voltage rise time (in ms).

Description

Parameter <0~999999>

range

Parameter <NR1>

form

Example SOUR:VOLT:RISE 50

commands

Enquiry [SOURce:]VOLTage:RISE?

Instructions

Instruction Returns the voltage rise time.

Description

Return value <NR1>

form

Example	SOUR:VOLT:RISE?
commands	50
Command	[SOURce:]VOLTage:FALL
Format	
Instruction	Set the voltage down time (in ms).
Description	

Parameter <0~999999>
range

Parameter <NR1>
form

Example SOUR:VOLT:FALL 20
commands

Enquiry [SOURce:]VOLTage:FALL?
Instructions

Instruction Return voltage down time.
Description

Return value <NR1>
form

Example SOUR:VOLT:FALL?
commands 20

Command	[SOURce:]VOLTage:SPEEd
Format	
Instruction	Set the response speed.
Description	
Parameter	<FAST MEDIum SLOW>
range	

Parameter <DSC>
form
Example SOUR:VOLT:SPE SLOW
commands
Enquiry [SOURce:]VOLTage:SPEed?
Instructions
Instruction Returns the response rate.
Description
Return value <DSC>
form
Example SOUR:VOLT:SPE?
commands SLOW

Command	[SOURce:]VOLTage:EXTernal
Format	
Instruction	Set voltage external give
Description	enable
Parameter	<ON OFF 0 1>
range	
Parameter form	<Bool

Example commands	SOUR:VOLT:EXT ON
Enquiry	[SOURce:]VOLTage:EXTernal?
Instructions	
Instruction	Returns the voltage to the externally given enable state.
Description	
Return value	<Bool
form	
Example commands	SOUR:VOLT:EXT? 1
Command Format	[SOURce:]VOLTage:SENSe:LIMit
Instruction	Set the upper voltage

Description	telemetry limit.
Parameter range	<0.000 to 110% of rated voltage>
Parameter form	<NRF>
Example commands	sour:volt:sens:lim 50.00

Enquiry [SOURce:]VOLTage:SENSe:LIMit?
Instructions
Instruction Returns the upper voltage telemetry limit.
Description
Return value <NR2>
form
Example SOUR:VOLT:SENS:LIM?
commands 50.00

Command [SOURce:]VOLTage:SENSe:DEVIation
Format
Instruction Setting the voltage telemetry difference
Description

Parameter range	<0.000 to 2% of rated voltage>
Parameter form	<NRF>
Example commands	SOUR:VOLT:SENS:DEV 3.0
Enquiry Instructions	[SOURce:]VOLTage:SENSe:DEViation?

Instruction	Returns the voltage telemetry difference.
Description	
Return value	<NR2>
form	
Example	SOUR:VOLT:SENS:DEV?
commands	3.0

4.2.2 Current setting commands

Command	[SOURce:]CURRent:POSitive
Format	
Instruction	Set the source current given value (in
Description	A).
Parameter	<0~IMAX> (IMAX: maximum current
range	of the whole machine)
Parameter	<NRF>

form

Example SOUR:CURR:POS 220.00

commands

Enquiry [SOURce:]CURRent:POSitive?

Instructions

Instruction Returns the source current to the
Description given value.

Return value <NR2>
form

Example SOUR:CURR:POS?
commands 220.00

Command [SOURce:]CURRent:NEGative

Format

Instruction Set the load current given value (in A).

Description

Parameter <0~IMAX> (IMAX: maximum current of the whole machine)
range

Parameter <NRF>
form

Example SOUR:CURR:NEG 220.00
commands

Enquiry	[SOURce:]CURRent:NEGative?
Instructions	
Instruction	Returns the given value of the load current.
Description	
Return value	<NR2>
form	
Example	SOUR:CURR:NEG?
commands	

220.00

Command [SOURce:]CURRent:ULIMit

Format

Instruction Set the upper limit of the current give (in A).

Description

Parameter <0~IMAX> (IMAX: maximum current of the whole machine)
range

Parameter <NRF>

form

Example SOUR:CURR:ULIM 10.00

commands

Enquiry [SOURce:]CURRent:ULIMit?

Instructions

Instruction	Returns the current given upper limit value.
Description	
Return value	<NR2>
form	
Example	SOUR:CURRE:ULIM?
commands	10.00

Command	[SOURce:]CURRent:LLIMit
Format	
Instruction	Sets the lower limit for current giving
Description	(in A).
Parameter range	<-IMAX~0> (IMAX: maximum current of the whole machine)
Parameter form	<NRF>
Example commands	SOUR:CURR:LLIM 240.0
Enquiry	[SOURce:]CURRent:LLIMit?
Instructions	
Instruction	Returns the current given lower limit.

Description

Return value <NR2>

form

Example SOUR:CURR:LLIM?

commands 240.00

Command	[SOURce:]CURRent:PROTection
Format	
Instruction	Set the overcurrent protection threshold (in A).
Description	
Parameter	<0.000~ 110% of the rated current of the whole machine>
range	
Parameter	<NRF>
form	
Example	SOUR:CURR:PROT 50.00
commands	
Enquiry	[SOURce:]CURRent:PROTection?
Instructions	
Instruction	Returns the overcurrent protection threshold.
Description	

Return value	<NR2>
form	
Example	SOUR:CURR:PROT?
commands	50.00
Command Format	[SOURce:]CURRent:SLEW

Instruction Set the current swing rate (in A/ms).

Description

Parameter <0.010~999.0>

range

Parameter <NRF>

form

Example SOUR:CURR:SLEW 50.0

commands

Enquiry [SOURce:]CURRent:SLEW?

Instructions

Instruction Return current swing rate.

Description

Return value <NR2>

form

Example SOUR:CURR:SLEW?

commands 50.0

Command [SOURce:]CURRent:RISE

Format

Instruction Sets the current rise time (in ms).

Description

Parameter <0~999999>
range
Parameter <NR1>
form
Example SOUR:CURR:RISE 50
commands
Enquiry [SOURce:]CURRent:RISE?
Instructions
Instruction Return current rise time.
Description
Return value <NR1>
form
Example SOUR:CURR:RISE?
commands 50

Command	[SOURce:]CURRent:FALL
Format	
Instruction	Set the current drop time (in ms).
Description	
Parameter range	<0~999999>

Parameter <NR1>
form
Example SOUR:CURR:FALL 20
commands
Enquiry [SOURce:]CURRent:FALL?
Instructions
Instruction Return current drop time.
Description
Return value <NR1>
form
Example SOUR:CURR:FALL?
commands 20
Command [SOURce:]CURRent:EXTernal

Format	
Instruction	Set current external give
Description	enable
Parameter	<ON OFF 0 1>
range	
Parameter form	<Bool

Example commands	SOUR:CURR:EXT ON
Enquiry	[SOURce:]CURRent:EXTernal?
Instructions	
Instruction	Return to current external give enable state.
Description	
Return value	<Bool
form	
Example commands	SOUR:CURR:EXT? 1

4.2.3 Power setting commands

Command	[SOURce:]POWer:POSitive
Format	
Instruction	Set the source power given (in kW).

Description

Parameter range <0~PMAX> (PMAX: maximum power of the whole machine)

Parameter form <NRF>

Example commands SOUR:POW:POS 220.00

Enquiry [SOURCE:]POWER:POSitive?
Instructions
Instruction Returns the source power given value.
Description
Return value <NR2>
form
Example SOUR:POW:POS?
commands 220.00

Command [SOURCE:]POWER:NEGative
Format
Instruction Set load power given value (in kW)
Description
Parameter <0~PMAx> (PMAx: maximum power of the whole machine)

range

Parameter <NRF>

form

Example SOUR:POW:NEG 220.00

commands

Enquiry [SOURce:]POWer:NEGative?

Instructions

Instruction Returns the given value of the load power.

Description

Return value <NR2>

form

Example SOUR:POW:NEG?

commands 220.00

Command [SOURce:]POWER:ULIMit

Format

Instruction Set the upper limit of the power give (in kW).

Description

Parameter <0~PMAx> (PMAx: maximum power of the whole machine)

range

Parameter <NRF>

form

Example SOUR:POW:ULIM 10.00

commands

Enquiry [SOURce:]POWer:ULIMit?

Instructions

Instruction Returns the power given upper limit.

Description

Return value <NR2>

form

Example SOUR:POW:ULIM?

commands 10.00

Command [SOURce:]PoweR:LLIMit

Format

Instruction Sets the lower limit for power giving (in

Description kW).

Parameter <-PMAx~0> (PMAx: maximum power

range of the whole machine)

Parameter <NRF>

form

Example SOUR:POW:LLIM 240.0

commands

Enquiry [SOURce:]POWer:LLIMit?

Instructions

Instruction Returns the power given lower limit

Description value.

Return value <NR2>

form

Example commands	SOUR:POW:LLIM? 240.00
Command Format	[SOURce:]POWer:PROTection
Instruction	Set the power protection threshold
Description	(in kW).
Parameter range	<0.000~ 110% of the rated power of the whole machine>
Parameter form	<NRF>
Example commands	SOUR:POW:PROT 50.00
Enquiry	[SOURce:]POWer:PROTection?

Instructions

Instruction Returns the power protection

Description threshold.

Return value <NR2>

form

Example SOUR:POW:PROT?

commands

50.00

Command [SOURce:]POWer:RISE
Format
Instruction Set the power rise time (in ms).
Description
Parameter <0~999999>
range
Parameter <NR1>
form
Example SOUR:POW:RISE 50
commands
Enquiry [SOURce:]POWer:RISE?
Instructions

Instruction	Returns the power rise time.
Description	
Return value form	<NR1>
Example	SOUR:POW:RISE?
commands	50

Command	[SOURce:]POWer:FALL
Format	
Instruction	Set the power down time (in ms).
Description	
Parameter	<0~999999>
range	
Parameter	<NR1>
form	
Example	SOUR:POW:FALL 20
commands	
Enquiry	[SOURce:]POWer:FALL?
Instructions	
Instruction	Return power down time.

Description

Return value <NR1>

form

Example SOUR:POW:FALL?

commands 20

Command	[SOURce:]POWer:EXTernal
Format	
Instruction	Set power external give enable
Description	
Parameter	<ON OFF 0 1>
range	
Parameter	<Bool
form	
Example	SOUR:POW:EXT ON
commands	
Enquiry	[SOURce:]POWer:EXTernal?
Instructions	
Instruction	Return to the power external give enable state.
Description	

Return value <Bool

form

Example SOUR:POW:EXT?

commands 1

4.2.4 Internal resistance setting command

Command [SOURce:]RESistance[:STATe]
Format

Instruction Set internal resistance enable.

Description

Parameter <ON|OFF|0|1>

range

Parameter <Bool

form

Example SOUR:RES:STAT ON

commands

Enquiry [SOURce:]RESistance:STATe?

Instructions

Instruction Return to internal resistance enable state.

Description

Return value <Bool

form

Example SOUR:RES:STAT?

commands 1

Command [SOURce:]RESistance:POSitive

Format

Instruction Set the source internal resistance given value (in Ω).

Description

Parameter range <RMIN~RMAX> (RMIN: minimum resistance of the whole machine, RMAX: maximum resistance of the whole machine)

(Resistance)

Parameter form <NRF>

Example commands sour:res:pos 220.00

Enquiry [SOURce:]RESistance:POSitive?

Instructions

Instruction Returns the given value of the internal resistance of the source.

Description

Return value <NR2>

form

Example SOUR:RES:POS?

commands 220.00

Command [SOURce:]RESistance:NEGative

Format

Instruction Sets the given value of the internal resistance of the load (in Ω).

Description

Parameter range <RMIN~RMAX> (RMIN: minimum resistance of the whole machine, RMAX: maximum resistance of the whole machine)

(Resistance)

Parameter form <NRF>

Example commands sour:res:neg 220.00

Enquiry [SOURce:]RESistance:NEGative?

Instructions

Instruction Returns the given value of the internal resistance of the load.

Description

Return value <NR2>

form

Example SOUR:RES:NEG?

commands 220.00

Command [SOURce:]RESistance:ULIMit

Format

Instruction Set the upper limit of the internal resistance given (in Ω).

Description

Parameter range <RMIN~RMAX> (RMIN: minimum resistance of the whole machine, RMAX: maximum resistance of the whole machine)

(Resistance)

Parameter form <NRF>

Example commands SOUR:RES:ULIM 10.00

Enquiry [SOURce:]RESistance:ULIMit?

Instructions

Instruction Returns the upper limit of the given internal resistance.

Description

Return value <NR2>

form

Example SOUR:RES:ULIM?

commands 10.00

Command [SOURce:]RESistance:LLIMit

Format

Instruction Set the lower limit of the internal resistance given (in Ω).

Description

Parameter range <RMIN~RMAX> (RMIN: minimum resistance of the whole machine, RMAX: maximum resistance of the whole machine)

(Resistance)

Parameter form <NRF>

Example commands sour:res:llim 240.0

Enquiry [SOURce:]RESistance:LLIMit?

Instructions

Instruction Returns the lower limit of the given internal resistance.

Description

Return value <NR2>

form

Example	SOUR:RES:LLIM?
commands	240.00

Command	[SOURce:]RESistance:EXTernal
Format	
Instruction	Set internal resistance
Description	external give enable

Parameter <ON|OFF|0|1>
range

Parameter <Bool
form

Example SOUR:RES:EXT ON
commands

Enquiry [SOURce:]RESistance:EXTernal?

Instructions


Instruction Return power external give enable.


Description

Return value <Bool
form

Example SOUR:RES:EXT?
commands 1

4.3 Input Instructions

When the control mode is remote under power supply standby conditions, the power supply can be operated and shut down by giving the  command.

Command	OUTPut[:STATe]
Format	
Instruction	Control of power
Description	delivery  .

Parameter <0|OFF|1|ON> (0|OFF=Stop, 1|ON=Run)

range

Parameter <Bool

form

Example OUTPUT:STAT ON

commands

Enquiry OUTPUT[:STATe]?

Instructions

Instruction Return to power control status.


Description

Return value <Bool

form

Example OUTPUT:STAT?

commands 1

Command	OUTPut:DELAy:RUN
Format	
Instruction	Set the transmission  on delay time (in ms).
Description	
Parameter range	<0~999999>
Parameter form	<NR1>

Example OUTPUT:DEL:RUN 500

commands

Enquiry OUTPUT:DElay:RUN?

Instructions

Instruction Return to lose  On delay time (in ms).

Description

Return value <NR1>


form


Example OUTPUT:DEL:RUN?

commands 500

Command OUTPUT:DElay:STOP

Format

Instruction	Set the transmission  disconnection delay time (in ms).
Description	
Parameter range	0~999999
Parameter form	<NR1>
Example commands	OUTP:DEL:STOP 500

Enquiry OUTPUT:DElay:STOP?
Instructions
Instruction Return to lose  Disconnect delay time (in ms).
Description
Return value <NR1>
form
Example OUTP:DEL:STOP?
commands 500

Command OUTPut:AUTorun
Format
Instruction Set the power supply to run automatically.
Description

Parameter range	<0 OFF 1 ON> (0 OFF=disable, 1 ON=enable)
Parameter form	<Bool
Example commands	OUTP:AUT ON
Enquiry Instructions	OUTPut:AUTorun?

Instruction	Return to automatic operation of the power supply.
Description	
Return value	<Bool
form	
Example	OUTP:AUT?
commands	1

4.4 Trigger instructions

Command	TRIGger:INPUt
Format	
Instruction	Setting the trigger source
Description	
Parameter range	<INTernal EXTernal> (INTernal=internal, EXTernal=external)
Parameter form	<DSC>
Example commands	TRIG:INPU EXT
Enquiry	TRIGger:INPUt?
Instructions	
Instruction	Return the current trigger source

Description

Return value <DSC>

form

Example TRIG:INPU?

commands EXTernal

Command	TRIGger:OUTPut
Format	
Instruction	Setting the trigger method
Description	
Parameter	<OFF ONCE STEP CYCLe> (OFF=off, ONCE = single, STEP
range	(= single step, CYCLe = single loop)
Parameter	<DSC>
form	
Example	TRIG:OUTP STEP
commands	
Enquiry	TRIGger:OUTPut?
Instructions	
Instruction	Return to trigger method
Description	

Return value <DSC>

form

Example TRIG:OUTP?

commands STEP

Command	TRIGger:DElay
Format	
Instruction	Setting the trigger delay time
Description	
Parameter	<0~999999>
range	
Parameter	<NR1>
form	
Example	TRIG:DEL 100
commands	
Enquiry	TRIGger:DElay?
Instructions	
Instruction	Return to trigger delay
Description	

Return value <NR1>

form

Example TRIG:DEL?

commands 100

4.5 Recording instructions

Command	MEMory:RATE
Format	
Instruction	Set the data logging sampling rate
Description	
Parameter range	<0~3> (0=1SPS, 1=2SPS, 2=5SPS, 3=10SPS)
Parameter form	<NR1>
Example commands	MEM:RATE 100
Enquiry	MEMory:RATE?
Instructions	
Instruction	Return data recording sampling rate

Description

Return value <NR1>

form

Example MEM:RATE?

commands 100

Command	MEMory:COUNter
Format	
Instruction	Set the number of data records
Description	
Parameter	<1~9999999>
range	
Parameter	<NR1>
form	
Example	MEM:COUN 100
commands	
Enquiry	MEMory:COUNter?
Instructions	
Instruction	Returns the number of data records
Description	

Return value <NR1>

form

Example MEM:COUN?

commands 100

Command
Format MEMory:CONDition

Instruction Setting the data logging trigger method

Description

Parameter <CEVEnt|IMMediate> (CEVEnt=Event Trigger,
range IMMEDIATE=Immediate Touch)
(issued)

Parameter <DSC>
form

Example MEM:COND CEVE
commands

Enquiry MEMory:CONDition?

Instructions

Instruction Return data record trigger method

Description

Return value <DSC>

form

Example MEM:COND?

commands CEVEnt

Command
Format MEMory:STATe

Instruction Data logging trigger command

Description

Parameter <ON|OFF|0|1>

range

Parameter <Bool

form

Example MEM:STAT ON

commands

Enquiry MEMory:STATe?

Instructions

Instruction Return to data logging trigger status

Description

Return value <Bool

form

Example	MEM:STAT?
commands	1

4.6 Event instructions

Command	CEvent:CASe#
Format	
Instruction	Set the event trigger source, # indicates the event
Description	number, the value range is 1~10

Parameter range <NONE|VOLTage|CURRent|POWER|TEMPerature> (NONE= None, VOLTage = voltage, CURRent = current, POWER = power
TEMPerature = temperature)

Parameter form <DSC>

Example commands CEV:CAS1 VOLT

Enquiry CEVent:CASE#?

Instructions

Instruction Return the selected event # trigger source, #=1~10

Description

Return value form <DSC>

Example CEV:CAS1?

commands VOLT

Command
Format CEVent:VALue#

Instruction	Set the event trigger threshold, # indicates the event number, the
Description	value range is 1~10
Parameter	<0~100>
range	
Parameter	<NRF>
form	
Example	CEV:VAL1 25.3
commands	
Enquiry	CEVent:VALue#?
Instructions	
Instruction	Returns the selected event trigger threshold, #=1~10
Description	
Return value	<NR2>
form	

Example CEV:VAL1?

commands 25.3

Command CEVent:DElay#

Format

Instruction Set the event trigger time (in ms), # indicates the event serial
Description number, the value range

1~10

Parameter <0~999999>

range

Parameter <NR1>

form

Example CEV:DEL1 255

commands

Enquiry CEVent:DElay#?

Instructions

Instruction Returns the selected event trigger time, #=1~10

Description

Return value <NR1>

form

Example CEV:DEL1?

commands 255

Command CEVent:ACTion#

Format

Instruction Set the event action mode, # indicates the event
Description number, the value range is 1~10

Parameter range <WARNing|ALARm|RECORD> (WARNing=Warning, ALARm=Report)
(Alert, RECORD = Record)

Parameter form <DSC>

Example commands CEV:ACT1 WARN

Enquiry CEVent:ACTion#?

Instructions

Instruction Returns the selected event action method, #=1~10

Description

Return value form <DSC>

Example commands CEV:ACT1
WARN

Command	CEVent:DIRrection#
Format	
Instruction	Set the event action direction, # indicates the event
Description	number, the value range is 1~10

Parameter <UP|DOWN> (UP=greater than, DOWN=less than)
range

Parameter <DSC>
form

Example CEV:DIR1 DOWN
commands

Enquiry CEVent:DIRection#?
Instructions

Instruction Returns the direction of the selected event action, #=1~10
Description

Return value <DSC>
form

Example CEV:DIR1?
commands DOWN

4.7 Status instructions

Command Format STATus:OPERation:CONDition?

Command Description Reads the real-time operation status of the power supply, this operation status register is a read-only register.

Bit definitions for the operation registers:

Bit	7	6	5	4	3	2	1	0
Bit	15	14	13	12	11	10	9	8
Status						OWI	DISK	SSA

CV: constant

voltage

operation CC:

constant current

operation CP:

constant power

operation CR:

constant

resistance

operation

MODE: Power Mode 0-Source 1-

Load RUN: Power Run

REMOTE: this remote control mode 1 - remote control 0 - this control

TWI: Trigger

Waiting SSA:

Programming

Status

DISK: Disk operation status 1 - success 0 - failure

OWI: Loss  Waiting status 1 - Waiting 0 - Normal

Return <NR1>

value form

Example STAT:OPER:COND?

commands 64

Command STATus:OPERation:EVENT?

Format

Instruction Query operation event register

Description

Parameter <NR1>
form

Example STAT:OPER:EVEN?

commands 8

Command STATus:OPERation:ENABLE

Format

Instruction Set the operation event enable register

Description

Parameter <0~65535>

range

Parameter <NR1>

form

Example STAT:OPER:ENAB 125

commands

Enquiry STATus:OPERation:ENABle?

Instructions

Instruction Return to Operation Event Enable Register

Description

Return <NR1>

value form

Example STAT:OPER:ENAB?

commands

Command Format STATus:QUESTionable:CONDition?

Command Description Reads the real-time operational status of the power supply, this operational status register is a read-only register.

Bit	7	6	5	4	3	2	1	0
Operation register bit definitions								
Bit	15	14	13	12	11	10	9	8
Status								

Alarm: protection

status Warning: alarm

status CEvent: event

status PROGRAM:

programming status

SAS: photovoltaic

status BatSim: battery

simulation status

Return <NR1>

value form

Example STAT:QUES:COND?

commands 64

Command STATus:QUESTionable:EVENT?

Format

Instruction Search the Suspicious Events Register

Description

Return <NR1>

value form

Example STAT:QUES:EVEN?

commands 8

Command STATus:QUEStionable:ENABLE
Format
Instruction Set the suspicious event enable register
Description

Parameter range <0~65535>

Parameter form <NR1>

Example commands STAT:QUES:ENAB 125

Query commands STATus:QUESTionable:ENABLE?

Command Description Return the form of the suspicious event enable

register return value <NR1>

Example commands STAT:QUES:ENAB?
125

Command Format STATus:QUESTionable:ALARm:CONDition?

Command Description Reads the real-time protection status of the power supply, this operation status register is a read-only register.

Bit	7	6	5	4	3	2	1	0
Status	POWF	PARF	COMF	OTP	SENF	OPP	OCP	OVP

Bit definitions for the operation registers:

Bit	15	14	13	12	11	10	9	8
Status	FUSE	LVOL	OVOL	LSOC	OSOC	CHAF	SLAF	INSF

OVP: transmission overvoltage

OCP: Over-current

transmission OPP:

Over-power

transmission

SENF: Telemetry

protection OTP:

Over-temperature

air outlet COMF:

Communication

timeout PARF:

Parallel protection

POWF:

Abnormal power

supply INSF:

Internal protection

SLAF: Slave

protection

CHAF:

Interlocking

protection

OSOC: Battery Simulation Charging SOC Protection

LSOC: Battery simulated

discharge SOC protection OVOL:

Battery simulated charge

voltage protection LVOL:

Battery simulated discharge

voltage protection FUSE:

Battery simulated fuse current

protection

Return
value form

<NR1>

Example STAT:QUES:ALAR:COND?

commands 64

Command STATus:QUEStionable:ALARm:EVENT?

Format

Instruction Query Protection Status Event Register

Description

Return <NR1>

value form

Example STAT:QUES:ALAR:EVEN?

commands 8

Command STATus:QUESTionable:ALARm:ENABLE

Format

Instruction Set the protection status event enable register

Description

Parameter <0~65535>

range

Parameter <NR1>

form

Example stat:ques:alar:enab 125

commands

Enquiry STATus:QUEStionable:ALARm:ENABle?

Instructions

Instruction Query protection status event enable register

Description

Return < NR1>

value form

Example commands STAT:QUES:ALAR:ENAB?

125

Command Format STATus:QUESTionable:WARNing:CONDition?

Command Description Reads the real-time alarm status of the power

supply, this operation status register is a read-only register.

Bit definitions for the operation registers.

Bit	7	6	5	4	3	2	1	0
Bit	SYCL	WFL	INVL	LSOP	OSOP	SASL	WAIT	PARA
Bit	15	14	13	12	11	10	9	8
Statu								
s								

PARA: Parallel Alarm

WAIT: Power Loss

Alarm

SASL: PV data overrun alarm.

OSOC: Battery simulated

charging SOC alarm LSOC:

Battery simulated discharging

SOC alarm

OVOL: Battery analog charging voltage alarm
LVOL: Battery analog
discharge voltage alarm CYCL:
Cycle cut-off alarm
Return <NR1>
value form
Example STAT:QUES:WARN:COND?
commands 64
Command STATus:QUESTionable:WARNing:EVENT?
Format
Instruction Query Alarm Status Event Register
Description

Return <NR1>

value form

Example STAT:QUES:WARN:EVEN?

commands 8

Command STATus:QUEStionable:WARNing:ENABLE
Format

Instruction Set alarm status event enable register

Description

Parameter <0~65535>

range

Parameter <NR1>

form

Example stat:ques:warn:enab 125

commands

Enquiry STATus:QUEStionable:WARNing:ENABLE?

Instructions

Instruction Query Alarm Status Event Enable

Description Register

Return < NR1>

value form

Example STAT:QUES:WARN:ENAB?

commands 125

Command Format STATus:QUESTIONable:CEVent:CONDition?

Command Description Reads the event status of the power supply in real time, this operation status register is a read-only register. Bit

Bit	7	6	5	4	3	2	1	0
Definitions for the operation registers	Eve7	Eve6	Eve5	Eve4	Eve3	Eve2	Eve1	Eve0
Bit	15	14	13	12	11	10	9	8
Status							Eve10	Eve9

Eve1: Event 1 1 - 0 - means not
Status indicates occurred
 occurrence

Eve2: Event 2 1 - 0 - means not
Status indicates occurred
 occurrence

Eve3: Event 3 1 - 0 - means not
Status indicates occurred

	occurrence	
Eve4: Event 4	1 -	0 - means not
Status	indicates	occurred
	occurrence	
Eve5: Event 5	1 -	0 - means not
Status	indicates	occurred
	occurrence	
Eve6: Event 6	1 -	0 - means not
Status	indicates	occurred
	occurrence	
Eve7: Event 7	1 -	0 - means not
Status	indicates	occurred
	occurrence	

Eve8: Event 8 Status 1 - indicates occurrence 0 - indicates non-occurrence

Eve9: Event 9 Status 1 - indicates occurrence 0 - indicates

non-occurrence Eve10: Event 10 Status 1 - indicates occurrence 0 - indicates non-occurrence

Return <NR1>

value form

Example STAT:QUES:CEV:COND?

commands 64

Command STATus:QUEStionable:CEVent:EVENT?

Format

Instruction Query Event Status Event Register

Description

Return <NR1>

value form

Example STAT:QUES:CEV:EVEN?

commands 8

Command STATus:QUEStionable:CEVent:ENABLE
Format

Instruction Set event status event enable register

Description

Parameter <0~65535>
range

Parameter <NR1>
form

Example stat:ques:cev:enab 125
commands

Enquiry STATus:QUEStionable:CEVent:ENABLE?

Instructions

Instruction Query Event Status Event Enable

Description Register

Return < NR1>

value form

Example STAT:QUES:CEV:ENAB?

commands 125

Command Format STATus:QUEStionable:PROGram:CONditiOn?

Command Description Reads the real-time programming status of the

power supply, this operation status register is a read-only

register. Bit definitions for the operation registers:

Bit	7	6	5	4	3	2	1	0
Statu	15	14	13	12	11	10	9	8
s								

ANYW: Arbitrary wave

programming enable

STEP: Step

programming enable

LIST: List programming

enable WAVE: Wave

programming enable

ADVA: Adva

programming enable

Return value form <NR1>

Command example STAT:QUES:PROG:COND?

Command STATus:QUESTIONable:PROGRAM:EVENT?

Format

Instruction Querying the programming event register

Description

Parameter <NR1>

form

Example STAT:QUES:PROG:EVEN?

commands 8

Command STATus:QUESTIONable:PROGRAM:ENABLE

Format

Instruction	Set the programming event enable register
Description	
Parameter	<0~65535>
range	
Parameter	<NR1>
form	

Example commands STAT:QUES:PROG:ENAB 125

Query command STATus:QUESTionable:PROG:ENABLE?

Instruction Description Return to the programming event enable register

return value form <NR1>

Example commands STAT:QUES:PROG:ENAB?

12

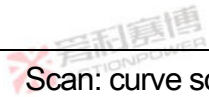
Command Format STATus:QUESTionable:SOLar:CONDition?

Command Description Reads the real-time PV status of the power supply,

this operation status register is a read-only register. Bit

Bit	7	6	5	4	3	2	1	0
Definitions for the operation register	Def	Def	Def	Def	Def	Def	Def	Def
Bit	15	14	13	12	11	10	9	8
Status								

Stat: Static curve enable



Scan: curve scan enable

Sequ: Curve sequence enable, contains static MPPT curve sequences and weather curve sequences



Dyna: Dynamic curve

enable Cust: Custom

curve enable Array: Static

shadow masking enable

Cloud: Dynamic Shadow Masking Enabled

Return

<NR1>

value form

Example

STAT:QUES:SOL:COND?

commands

64



Command STATus:QUEStionable:SOLar:EVENT?
Format
Instruction Query PV Status Event Register
Description

Return <NR1>

value form

Example STAT:QUES:SOL:EVEN?

commands 8

Command STATus:QUESTIONable:SOLar:ENABLE

Format

Instruction Set PV status event enable register

Description

Parameter <0~65535>

range

Parameter <NR1>

form

Example stat:ques:sol:enab 125

commands

Enquiry STATus:QUEStionable:SOLar:ENABle?

Instructions

Instruction Query PV Status Event Enable Register

Description

Return < NR1>

value form

Example commands STAT:QUES:SOL:ENAB?

125

Command Format STATus:QUESTionable:BATSim:CONDition?

Command Description Reads the real-time battery simulation status of the

power supply, this operation status register is a read-only register.

Bit	7	6	5	4	3	2	1	0
Operation register bit definitions:								Stat
Bit	15	14	13	12	11	10	9	8
Status								

Stat: Battery simulation

enable state return value form <NR1>

Command example STAT:QUES:BATS:COND?

1

Instruction Querying the Battery Simulation Status Event Register

Description

Return <NR1>

value form

Example STAT:QUES:BATS:EVEN?

commands 1

Command STATus:QUESTIONable:BATSim:ENABLE

Format

Instruction Set the battery simulation status event enable register

Description

Parameter <0~65535>

range

Parameter <NR1>

form

Example stat:ques:bats:enab 125

commands

Enquiry STATus:QUEStionable:BATSim:ENABLE?

Instructions

Instruction Querying the Battery Simulation Status Event Enable Register

Description

Return < NR1 >

value form

Example STAT:QUES:BATS:ENAB?

commands 1

4.8 System commands

The system instructions contain an error instruction and a reset instruction.

4.8.1 Reset command

Command	SYSTem:RESet
Format	
Instruction	The device is
Description	reset.
Example commands	SYST:RES

4.8.2 System error command

Command Format	SYSTem:ERRor?
Command Description	Returns an error message from the instrument error

event queue. Returns 0, "No error" if there are no errors. The supported error messages are shown in the following table:

Error	Description
-0, "No error"	No errors

-100, "Command error"	Command error
-102, "Syntax error"	Grammatical errors
-109, "Missing parameter"	Missing parameter after command
-200, "Execution error"	Command execution error
-201, "Invalid while in local"	Local mode
-220, "Parameter error"	Command parameter error
-222, "Data out of range"	Parameter overrun
-350, "Queue overflow"	Error queue overflow
-400, "Query error"	Enquiry error
-401, "Buffer Error"	Buffer overflow

Return value form <NR1>,<AADR>

Command example SYST:ERR?

-100, "Command error"

4.8.3 Other option commands

Command SYSTem:POWeron

Format

Instruction Boot option

Description settings.

Parameter `<MANUa|AUTO>` (MANUa=manual, AUTO=automatic).
range

Parameter `<DSC>`

form

Example `SYST:POW MANU`

commands

Enquiry `SYSTEM:POWERon?`

Instructions

Instruction `Back to the boot option settings`

Description

Return value `<DSC>`

form

Example SYST:POW?

commands MANU

Command SYSTem:PNUMber?

Format

Instruction Check the number of parallel machines

Description

Example SYST:PNUM?

commands

3

Command Format	SYSTEM:MAGIcbox?
Description	Check Box model (0=none 1=photovoltaic 2=battery 3=car)
Example commands	SYST:MAGI? 1
Command Format	SYSTEM:MODE

Instruction	Power function mode setting command.
Description	
Parameter range	<NORMal SAS BATSim> (NORMal = source load mode, SAS = photovoltaic mode) (e.g., BATSim = battery simulation mode).
Parameter form	<DSC>

Example commands SYST:MODE SAS

Enquiry SYSTEM:MODE?

Instructions

Instruction Return to power function mode

Description

Return value <DSC>

form

Example commands SYST:MODE?
 SAS

Command SYSTEM:INTerface

Format

Instruction Set up the power communication interface.

Description

Parameter range <LOCAL|LAN|USB> (LOCAL = local control, LAN = remote LAN, USB =

(Remote control USB).

Parameter form <DSC>

Example commands

Enquiry SYSTem:INTerface?

Instructions

Instruction Return to power communication interface

Description

Return value <DSC>

form

Example SYST:INT?

commands

Command SYSTem:STEP?

Format

Instruction Query the number of steps currently being executed in a

Description	programming experiment
Example	SYST:STEP?
commands	5

Command Format	SYSTEM:LOOP?
Instruction	Query the current number of cycles executed by the programming experiment
Description	
Example commands	SYST:LOOP? 10
Command Format	SYSTEM:FZERo
Instruction	Voltage to zero enable.
Description	

on	
Parameter range	<ON OFF 0 1>.
Parameter form	<Bool
Example commands	SYST:FZER ON
Enquiry	SYSTEM:FZERo?
Instructions	
Instruction	Return voltage to zero enable
Description	

Return value <Bool

form

Example SYST:FZER?

commands

Command SYSTEM:FIRMware?

Format

Instruction Check firmware version, Firmware version 1 (rectifier), Firmware

Description version 2 (display control), Firmware

Version 3 (M7), Firmware version 4 (M4), Firmware version 5
(FPGA)

Return value <SRD>

form

Example

SYST:FIRM?

commands

01.101.01.01, 01.101.01.01, 01.101.01.01, 01.101.01.01, 01.101.01.01,
01.101.01.01

Command Format SYSTEM:CCLEar

Instruction Clear the status of triggered events

Description

Description

Example command

SYST:CCLE

Command Format SYSTEM:MCLEar

Instruction Accumulated power zero command

Description

on	
Example command ds	SYST:MCLE
Command Format	SYSTEM:SENSe
Instruction Description	Remote compensation enable.
Parameter range	<ON OFF 0 1>.
Parameter form	<Bool

Example commands

SYST:SENS ON

Enquiry

SYSTEM:SENSe?

Instructions

Instruction

Return to Remote Compensation Enable

Description

Return value

<Bool

form

Example

SYST:SENS?

commands

1

Command

SYSTEM:SRATe

Format

Instruction

Set the sampling rate.

Description

Parameter range <0~4> (0=10SPS, 1=50SPS, 2=500SPS, 3=5000SPS.
(4 = 25,000 SPS).

Parameter form <NR1>

Example commands	SYST:SRAT 2
Enquiry	SYSTEM:SRATE?
Instructions	
Instruction	Return sampling rate
Description	
Return value	<NR1>
form	
Example commands	SYST:SRAT? 2
Command	SYSTEM:CALibration
Format	
Instruction	Self-calibration command.

Description

Parameter <VOLTage|CURRent>.

range

Parameter <DSC>

form

Example SYST:CAL CURR

commands

Command Format	SYSTem:ANYPort:POLarity:IN#
Description	Sets the Port input polarity, # indicates the Port serial number, the value range is 1~6
Parameter range	<POSitive NEGative> (POSitive=positive, NEGative=negative)
Parameter form	<DSC>
Example commands	SYST:ANYP:POL:IN1 POS
Enquiry	SYSTem:ANYPort:POLarity:IN#?
Instructions	
Instruction	Returns the input polarity of the selected Port, # indicates the

Description	Port serial number, the value range is 1~6
Return value form	< DSC >
Example commands	SYST:ANYP:POL:IN1? POS

Command	SYSTem:ANYPort:POLarity:OUT#
Format	
Instruction	Sets the Port input polarity, # indicates the Port serial number,
Description	the value range is 1~6
Parameter	<POSitive NEGative> (POSitive=positive, NEGative=negative)
range	
Parameter	<DSC>
form	
Example	SYST:ANYP:POL:OUT1 POS
commands	
Enquiry	SYSTem:ANYPort:POLarity:OUT#?
Instructions	
Instruction	Returns the polarity of the selected Port, # indicates the Port serial
Description	number, the value range is 1~6

Return value	<DSC>
form	
Example	SYST:ANYP:POL:OUT1?
commands	POSitive
Command	SYSTEM:ANYPort:FUNCTION:IN#
Format	

Instruction	Set the Port input function, # indicates the Port serial number, the
Description	value range is 1~6
Parameter	<NONE ANALogy TRIG DAISy RUN RESet ESTOp> (NONE=
range	None, ANALogy = external give enable, TRIG = trigger, DAISy =
	chain
	(RUN = start/stop, RESet = reset, ESTOp = emergency stop)
Parameter	<DSC>
form	
Example	SYST:ANYP:FUNC:IN1 TRIG
commands	
Enquiry	SYSTEM:ANYPort:FUNCtion:IN#?
Instructions	
Instruction	Returns the selected Port input function, # indicates the Port serial
Description	number, the value range is 1~6

Return value	<DSC>
form	
Example	SYST:ANYP:FUNC:IN1?
commands	TRIG
Command	SYSTem:ANYPort:FUNCTion:OUT#
Format	

Instruction	Set the Port input function, # indicates the Port serial number,
Description	the value range is 1~6
Parameter range	<NONE DAISy TRIG RUN CV FAULT VINDicate CINDicate PSIGnal > (NONE=none, DAISy=chain, TRIG=trigger, RUN=run, CV=CV status, FAULT=protection status, VINDicate=voltage prompt. (CINDicate=current prompt, PSIGnal=general)
Parameter form	<DSC>
Example commands	SYST:ANYP:FUNC:OUT1 TRIG
Enquiry	SYSTEM:ANYPort:FUNCTION:OUT#?
Instructions	
Instruction	Return to the selected Port port input function, # indicates the
Description	Port serial number, the value range is 1~6

Return value <DSC>

form

Example SYST:ANYP:FUNC:OUT1?

commands TRIG

Command	SYSTem:REFeRence
Format	
Instruction	Setting the analogue
Description	feed range
Parameter range	< 5 10> (in V)
Parameter form	<NR1>
Example commands	SYST:REF 10
Enquiry	SYSTem:REFeRence?
Instructions	
Instruction	Return to analogue

Description	given range
Return value	<NR1>
form	
Example	SYST:REF?
commands	10

Command Format	SYSTEM:WAVEform:STORe
Instruction	Store custom waveform data to a specified location.
Description	
Parameter range	<4 5 6 7 8 9 ... 30>
Parameter form	<NR1>
Example command	SYST:WAVE:STOR 10
Command	SYSTEM:WAVEform: LOAD

d Format

Instruction Read custom waveform data from a specified location

n

Description

on

Parameter range <4|5|6|7|8|9|... |30>

Parameter range

Parameter form <NR1>

er form

Example command SYST:WAVE:LOAD 10

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Command	SYSTem:WAVEform:DATA#
Format	
Instruction	Sending 4096 points of custom waveforms, the data is sent in 8
Description	groups, one group of 512 Point data, # indicates custom waveform grouping serial number, supports #=1~8.
Parameter range	<-32768~32767>
Parameter form	<NR1>.....<NR1>
Example commands	SYST:WAVE:DATA3 1024,256.....1024,255
Enquiry Instructions	SYSTem:WAVEform:DATA#?

Instruction	Returns the selected grouped custom waveform data, # indicates
Description	the custom waveform grouping order Number, support #=1~8, data return is divided into 8 groups, a group of 512 points data.
Return value form	<NR1>.....<NR1>
Example commands	SYST:WAVE:DATA5? 1024,256.....1024,255

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4.9 Programming instructions

4.9.1 ANYWave programming instructions

Command	PROG:ANYWave:INITiate
Format	
Instruction	ANYWave programming
Description	enable command
Example	PROG:ANYW:INIT
commands	

Command	PROG:ANYWave:MODE
Format	
Instruction	ANYWave programming
Description	mode selection
Parameter	<VOLTage CURRent>

range

Parameter <DSC>

form

Example PROG:ANYW:MODE CURR

commands

Enquiry PROGram:ANYWave:MODE?

Instructions

Instruction Back to ANYWave Programming Mode Selection

Description

Return value <DSC>

form

Example PROG:ANYW:MODE?

commands CURRent

Command PROGram:ANYWave:VOLTage[:DATA]

Format

Instruction	The parameter list for setting the
Description	ANYWave programming voltage mode parameters is defined as follows: <ol style="list-style-type: none">1. Voltage waveforms2. Voltage amplitude3. Voltage bias4. Voltage frequency

	5. Voltage percentage
Parameter range	<1~30>,<0~UMAX>,<0~UMAX>,<0.01~10000>,<0~100> (UMAX: maximum voltage for the whole machine)
Parameter form	<NR1><NR2><NR2><NR2><NR2><NR2>
Example commands	prog:anyw.volt:dat 2,220.0,1.2,50.0,30.0
Enquiry	PROGram:ANYWave:VOLTage:DATA?
Instructions	
Instruction	Return to ANYWave Programming Voltage Mode Parameters
Description	
Return value form	<NR1><NR2><NR2><NR2><NR2><NR2>

Example	PROG:ANYW:VOLT:DATA?
commands	2,220.0,1.2,50.0,30.0
Command	PROG:ANYWave:CURRent[:DATA]
Format	
Instruction	Setting the ANYWave programming current mode parameters
Description	

The list of parameters is defined as follows:

1. Current waveforms
2. Current amplitude
3. Current bias
4. Current frequency
5. Current percentage

Parameter range	<1~30>,<0~IMAX>,<-IMAX~IMAX>,<0.01~10000>,<0~100> (IMAX: maximum current of the whole machine)
Parameter form	<NR1><NR2><NR2><NR2><NR2><NR2>
Example command	prog:ANYW:CURR:DATA 2,220.0,1.2,50.0,30.0

ds

Enquiry

PROGRAM:ANYWave:CURRENT:DATA?

Instructio

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Instructio

Back to ANYWave Programming Current Mode Parameters

n

Descripti

on

Return value <NR1><NR2><NR2><NR2><NR2>

form

Example PROG:ANYW:CURR:DATA?

commands 2,220.0,1,2,50.0,30.0

Command PROGram:ANYWave:LOAD

Format

Instruction Load the ANYWave programming data command from the specified

Description memory location

Parameter <1~10>

range

Parameter <NR1>

form

Example PROG:ANYW:LOAD 1

commands

Command PROGram:ANYWave:STORe

Format

Instruction Store ANYWave programming data to a specified location command

Description

Parameter range	<1~10>
Parameter form	<NR1>
Example commands	PROG:ANYW:STOR 1

4.9.2 STEP programming instructions

Command	PROGRAM:STEP:INITiate
Format	
Instruction	STEP programming
Description	enable command
Example commands	PROG:STEP:INIT

Command	PROGram:STEP:MODE
Format	
Instruction	STEP programming mode
Description	selection
Parameter	<VOLTage CURRent>
range	
Parameter	<DSC>
form	

Example commands	PROG:STEP:MODE CURRent
Enquiry	PROG:STEP:MODE?
Instructions	
Instruction	Back to programming mode selection
Description	
Return value	<DSC>
form	
Example commands	PROG:STEP:MODE? CURRent
Command	PROG:STEP:TRIGer
Format	
Instruction	STEP programming trigger mode

Description

Parameter range <AUTO|MANUal> (AUTO=automatic, MANUal=single shot)

Parameter form <DSC>

Example commands
PROG:STEP:TRIG AUTO

Enquiry	PROG:STEP:TRIGer?
Instructions	
Instruction	Back to STEP Programming Trigger Mode
Description	
Return value	<DSC>
form	
Example	PROG:STEP:TRIG?
commands	AUTO
Command	PROG:STEP:COUNTER
Format	
Instruction	STEP programming cycle count
Description	
Parameter	<1~100>
range	

Parameter	<NR1>
form	
Example	PROG:STEP:COUN 50
commands	
Enquiry	PROG:STEP:COUNter?
Instructions	
Instruction	Back to STEP Programming Cycles
Description	

Return value <NR1>

form

Example PROG:STEP:COUN?

commands 50

Command PROGram:STEP:CONTinuous

Format

Instruction STEP Programming Continuous Trigger Enable

Description

Parameter <0|OFF|1|ON>

range

Parameter <Bool

form

Example PROG:STEP:CONT ON

commands

Enquiry PROGRAM:STEP:CONTInuous?

Instructions

Instruction Return to STEP Programming Continuous Trigger Enable status

Description

Return value <Bool

form

Example
comman
ds

PROG:STEP:CONT?
ON

Comman
d Format

PROGram:STEP:VOLTage[:DATA]

Instructio
n

The parameter list for setting
the STEP programming

Descripti
on

voltage mode parameters is
defined as follows:

1. Starting voltage
2. End voltage
3. Magnitude of change
4. Hold time (in 100us)

Parameter range

<0~UMAX>, <0~UMAX>, <0~UMAX>, <0~99999999>
(UMAX: maximum voltage for the whole machine)

Parameter form <NR2><NR2><NR2><NR1>

Example prog:step:volt:dat 120.0,220.0,5.0,100

commands

Enquiry PROGRAM:STEP:VOLTage:DATA?

Instructions

Instruction Back to STEP Programming Voltage Mode Parameters

Description

Return value form <NR2><NR2><NR2><NR1>

Example PROG:STEP:VOLT:DATA?

commands 120.0,220.0,5.0,100

Command PROGRAM:STEP:CURRent[:DATA]

Format

Instruction The list of parameters for
Description setting the STEP programming
 current mode parameters is
 defined as follows:
 1. Starting current

2. Ending current
3. Magnitude of change
4. Hold time (in 100us)

Parameter range <-IMAX~IMAX>,<-IMAX~IMAX>,<0~IMAX>,<0~9999999>
(IMAX: maximum current for the whole machine)

Parameter form <NR2><NR2><NR2><NR1>

Example commands PROG:STEP:Curr:DATA 120.0,220.0,5.0,100

Enquiry PROGram:STEP:CURRent:DATA?

Instructions

Instruction Description Back to STEP Programming Current Mode Parameters

Instruction Description

Return value <NR2><NR2><NR2><NR1>

form

Example PROG:STEP:CURR:DATA?

commands 120.0,220.0,5.0,100

Command	PROGram:STEP:LOAD
Format	
Instruction	Load STEP programming data instructions
Description	from a specified memory location
Parameter range	<1~10>
Parameter form	<NR1>
Example commands	PROG:STEP:LOAD 1
Command	PROGram:STEP:STORe
Format	

Instruction	Instructions for storing STEP programming
Description	data to a specified location
Parameter range	<1~10>
Parameter form	<NR1>
Example commands	PROG:STEP:STOR 1

4.9.3 LIST Programming Instructions

Command	PROG:LIST:INITiate
Format	
Instruction	LIST programming enable
Description	command
Example	PROG:LIST:INIT
commands	

Command	PROG:LIST:MODE
Format	
Instruction	LIST Programming mode
Description	selection
Parameter	<VOLTage CURRent>

range

Parameter <DSC>

form

Example PROG:LIST:MODE CURRent

commands

Enquiry PROGram:LIST:MODE?

Instructions

Instruction Back to LIST Programming Mode

Description

Return value <DSC>

form

Example PROG:LIST:MODE?

commands CURRent

Command PROGram:LIST:TRIGer

Format

Instruction LIST Programming trigger mode settings

Description

Parameter <AUTO|MANUal> (AUTO=automatic, MANUal=single shot)

range

Parameter <DSC>

form

Example PROG:LIST:TRIG AUTO

commands

Enquiry PROGram:LIST:TRIGer?

Instructions

Instruction Back to LIST Programming Trigger Mode

Description

Return value <DSC>

form

Example PROG:LIST:TRIG?

commands AUTO

Command PROGram:LIST:SEGMeNt

Format

Instruction Setting the number of LIST programming steps

Description

Parameter <1~200>

range

Parameter <NR1>

form

Example PROG:LIST:SEGM 50

commands

Enquiry PROGram:LIST:SEGMENT?

Instructions

Instruction Back to LIST Programming Steps

Description

Return value <NR1>
form

Example commands PROG:LIST:SEGM?
50

Command PROGram:LIST:COUNter
Format

Instruction Set the number of LIST programming cycles

Description

Parameter range <0~99999999>

Parameter form <NR1>

Example commands PROG:LIST:COUN 50

Enquiry PROGram:LIST:COUNter?

Instructions

Instruction Back to LIST Number of programming cycles

Description

Return value <NR1>

form

Example PROG:LIST:COUN?

commands

Command PROGram:LIST:CONTInuous

Format

Instruction Setting the LIST programming continuous trigger state

Description

Parameter <0|OFF|1|ON>

range

Parameter <Bool

form

Example PROG:LIST:CONT ON

commands

Enquiry PROGram:LIST:CONTInuous?

Instructions

Instruction	Return to LIST Programming Continuous Trigger Enable Status
Description	
Return value form	<Bool
Example commands	PROG:LIST:CONT? 1

Command	PROG:LIST:VOLTage:DATA#
Format	
Instruction	Set the selected step LIST programming voltage mode data,
Description	# indicates the step, in the range 1 to 100. the list of parameters is defined as follows:
	<ol style="list-style-type: none"> 1. Voltage feed 2. Voltage hold time (in 100us)
Parameter range	<0~UMAX>,<0~99999999> (UMAX: maximum voltage of the whole machine)
Parameter form	<NR2><NR1>
Example commands	PROG:LIST:VOLT:DATA1 220.0,50

Enquiry	PROG:LIST:VOLTage:DATA#?
Instructions	
Instruction	Returns the selected step LIST programming voltage mode
Description	data, # indicates the first step, parameter range The range is 1-100.

Return value <NR2><NR1>
form

Example PROG:LIST:VOLT:DATA1?

commands 220.0,50

Command PROGram:LIST:CURRent:DATA#

Format

Instruction Set the selected step LIST programming current mode data, #

Description indicates the step, in the range

1 to 100. the list of parameters is defined as follows:

1. Current Feed
2. Current holding time (in 100us)

Parameter <-IMAX~IMAX>,<0~9999999> (IMAX: maximum current of the

range whole machine)

Parameter <NR2><NR1>

form

Example PROG:LIST:CURR:DATA1 220.0,50

commands

Enquiry	PROGram:LIST:CURRent:DATA#?
Instructions	
Instruction	Returns the selected step LIST programming current mode data, #
Description	indicates the first step, in the range 1-100.
Return value form	<NR2><NR1>
Example commands	PROG:LIST:CURR:DATA1? 220.0,50
Command	PROGram:LIST:LOAD
Format	
Instruction	Load LIST programming data command from specified memory
Description	location

Parameter	<NR1>
form	
Example	PROG:LIST:LOAD 1
commands	

Command Format	PROG:LIST:STORe
Instruction	Store LIST programming data to a specified location command
Description	
Parameter form	<NR1>
Example commands	PROG:LIST:STOR 1

4.9.4 WAVE programming instructions

Command Format	PROG:WAVE:INITiate
----------------	--------------------

Instruction	WAVE programming
Description	enable command
Example	PROG:WAVE:INIT
commands	
Command	PROG:WAVE:MODE
Format	
Instruction	WAVE programming
Description	mode selection
Parameter range	<VOLTage CURRent>

Parameter <DSC>
form
Example PROG:WAVE:MODE CURRent
commands
Enquiry PROGram:WAVE:MODE?
Instructions
Instruction Back to WAVE Programming Mode Selection
Description
Return value <DSC>
form
Example PROG:WAVE:MODE?
commands CURRent
Command PROGram:WAVE:TRIGer
Format

Instruction	Setting the WAVE programming trigger mode
Description	
Parameter range	<AUTO MANUa> (AUTO=automatic, MANUa=single shot)
Parameter form	<DSC>
Example commands	PROG:WAVE:TRIG AUTO

Enquiry	PROG:WAVE:TRIGer?
Instructions	
Instruction	Return to WAVE programming trigger mode
Description	
Return value	<DSC>
form	
Example	PROG:WAVE:TRIG?
commands	AUTO

Command	PROG:WAVE:SEGMENT
Format	
Instruction	Setting the number of WAVE programming steps
Description	
Parameter	<1~200>

range

Parameter <NR1>

form

Example PROG:WAVE:SEGM 50

commands

Enquiry PROGram:WAVE:SEGMENT?

Instructions

Instruction Return to WAVE Programming Steps

Description

Return value <NR1>

form

Example PROG:WAVE:SEGM?

commands 50

Command PROGram:WAVE:COUNter

Format

Instruction Setting the number of WAVE programming cycles

Description

Parameter <0~9999999>

range

Parameter <NR1>

form

Example PROG:WAVE:COUN 50

commands

Enquiry PROGram:WAVE:COUNter?

Instructions

Instruction Return the number of WAVE programming cycles

Description

Return value <NR1>

form

Example PROG:WAVE:COUN?

commands 50

Command PROGram:WAVE:CONTInuous

Format

Instruction Setting the WAVE programming continuous trigger state

Description

Parameter <0|OFF|1|ON>

range

Parameter <Bool

form

Example PROG:WAVE:CONT ON

commands

Enquiry PROGRAM:WAVE:CONTInuous?

Instructions

Instruction Return to WAVE programming continuous trigger enable status

Description

Return value <Bool
form

Example commands	PROG:WAVE:CONT? 1
Command Format	PROG:WAVE:VOLTage:DATA#
Instruction Description	Set the WAVE programming voltage mode data for the selected step, # indicates the first step and the range is 1 to 100:
Parameter range	1. Voltage feed 2. Voltage change time < 0~UMAX>,< 0~9999999> (UMAX: maximum voltage of the whole machine)
Parameter	<NR2><NR1>

er form

Example

PROG:WAVE:VOLT:DATA1 220.0,50

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ds

Enquiry

PROG:WAVE:VOLTage:DATA#?

Instructio

ns

Instruction Description	Returns the WAVE programming voltage mode data for the selected step, # indicates the first step, range for 1-100.
Return value form	<NR2><NR1>
Example commands	PROG:WAVE:VOLT:DATA1? 220.0,50
Command Format	PROG:WAVE:CURRent:DATA#

Instruction	Set the WAVE programming current mode data for the
Description	selected step, # indicates the first step and ranges from 1 to 100: <ol style="list-style-type: none">1. Current Feed2. Current change time
Parameter range	<-IMAX~IMAX>,< 0~9999999> (IMAX: maximum current of the whole machine)

Parameter form	<NR2><NR1>
Example commands	PROG:WAVE:CURR:DATA1 220.0,50
Enquiry	PROG:WAVE:CURR:DATA#?
Instructions	
Instruction	Returns the WAVE programming current mode data for the selected
Description	step, # indicates the first step, range for 1-100.
Return value form	<NR2><NR1>
Example commands	PROG:WAVE:CURR:DATA1? 220.0,50

Command	PROGram:WAVE:LOAD
Format	
Instruction	Load WAVE programming data command from the specified memory
Description	location
Parameter form	<NR1>

Example
command
ds

PROG:WAVE:LOAD 1

Command
Format

PROG:WAVE:STORE

Instruction

Store WAVE programming data to a specified location command

Description

Parameter
form

<NR1>

Example
command
ds

PROG:WAVE:STOR 1

4.9.5 ADVAnced programming instructions

Command PROGram:ADVAnced:INITiate

Format

Instruction ADVAnced programming

Description enable command

Example PROG:ADVA:INIT

commands

Command PROGram:ADVAnced:MODE

Format

Instruction ADVAnced programming mode selection

Description

Parameter <VOLTage|CURRent>

range

Parameter <DSC>

form

Example PROG:ADVA:MODE CURRent

commands

Enquiry PROGRAM:ADVAnced:MODE?

Instructions

Instruction Back to ADVAnced Programming Mode Selection

Description

Return value <DSC>

form

Example PROG:ADVA:MODE?

commands CURRent

Command PROGram:ADVAnced:TRIGer

Format

Instruction ADVAnced programming trigger mode

Description

Parameter `<AUTO|MANUa>` (AUTO=automatic, MANUa=single shot)
range

Parameter `<DSC>`

form

Example `PROG:ADVA:TRIG AUTO`

commands

Enquiry `PROG:ADVAnced:TRIGer?`

Instructions

Instruction Return to ADVAnced programming trigger mode

Description

Return value `<DSC>`

form

Example PROG:ADVA:TRIG?

commands AUTO

Command PROGRAM:ADVANCED:SEGMENT

Format

Instruction Setting the number of ADVANCED programming steps

Description

Parameter <1~100>

range

Parameter <NR1>

form

Example PROG:ADVA:SEGM 50

commands

Enquiry PROGram:ADVAnced:SEGMent?

Instructions

Instruction Return the number of ADVAnced programming steps

Description

Return value <NR1>

form

Example PROG:ADVA:SEGM?

commands 50

Command PROGram:ADVAnced:COUNter

Format

Instruction Setting the number of ADVAnced programming cycles

Description

Parameter <0~9999999>

range

Parameter <NR1>

form

Example commands	PROG:ADVA:COUN 50
Enquiry	PROG:ADVANCED:COUNTER?
Instructions	
Instruction	Return the number of ADVANCED programming cycles
Description	
Return value	<NR1>
form	
Example commands	PROG:ADVA:COUN? 50
Command	PROG:ADVANCED:CONTINUOUS
Format	
Instruction	Setting the ADVANCED programming continuous trigger state
Description	

Parameter	<0 OFF 1 ON>
range	
Parameter	<Bool
form	
Example	PROG:ADVA:CONT ON
commands	
Enquiry	PROGram:ADVAnced:CONTInuous?
Instructions	

Instruction Return to ADVAnced programming continuous trigger enable state

Description

Return value <Bool

form

Example PROG:ADVA:CONT?

commands 1

Command PROGram:ADVAnced:VOLTage:DATA#

Format

Instruction Set the ADVAnced programming voltage mode data for the
Description selected step, # indicates the first step and ranges from 1 to
100:

1. Voltage bias
2. Voltage amplitude
3. Frequency
4. Change time (in 100us)

5. Hold time (in 100us)

6. Starting phase

7. Percentage

8. Sequence combinations

9. Number of repetitions

10. Waveform

Parameter range <0~UMAX>,<0~UMAX>,<0.01~10000>,<0~9999999>,<0~9999999>,<0~360>,<0~100>,<0~99>,<0~9999999>,<0~30> (UMAX: maximum voltage of the whole machine)

Parameter form <NR2><NR2><NR2><NR2><NR2><NR1><NR1><NR2><NR2><NR2><NR2><NR2

NR1><NR1><NR1>

Example prog:adva:volt:dat1

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	5.0,220.0,12.3,56.3,500,700,120.0,240.0,1,2,3
Enquiry	PROG:ADVANCED:VOLTAGE:DATA1?
Instructions	
Instruction Description	Returns the ADVANCED programming voltage mode data for the selected step, # indicates which step. The range is 1 to 100.
Return value form	<NR2><NR2><NR2><NR2><NR2><NR1><NR1><NR2><NR2><NR2><NR2><NR2>
Example	NR1><NR1><NR1> PROG:ADVA:VOLT:DATA1?
commands	5.0,220.0,12.3,56.3,500,700,120.0,240.0,1,2,3
Command	PROG:ADVANCED:CURRENT:DATA#

Format

Instruction Sets the ADVAnced programming current mode data for the

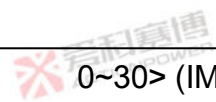
Description selected step, # indicates which step.

The parameters, ranging from 1 to 100, are defined in the following list:

Parameter
range

1. Current bias
2. Current amplitude
3. Frequency
4. Change time (in 100us)
5. Hold time (in 100us)
6. Starting phase
7. Percentage
8. Sequence combinations
9. Number of repetitions
10. Waveform

<-IMAX~IMAX>,<0~IMAX>,<0.01~10000>,<0~9999999>.
<0~99999999>,<0~360>,<0~100>,<0~99>,<0~99999999>,<0~99999
99>,<



	0~30> (IMAX: maximum current for the whole machine)
Parameter form	<NR2><NR2><NR2><NR2><NR2><NR1><NR1><NR2><NR2><NR2><NR2><NR2>
Example	NR1><NR1><NR1> PROG:ADVA:CURR:DATA1
commands	5.0,220.0,12.3,56.3,500,700,120.0,240.0,1,2,3
Enquiry	PROG:ADVAnced:CURR:ent:DATA#?
Instructions	
Instruction Description	Returns the ADVAnced programming current mode data for the selected step, # indicates which step. Parameters in the range of 1 to 100
Return value form	<NR2><NR2><NR2><NR2><NR2><NR1><NR1><NR2><NR2><NR2><NR2><NR2>



NR1><NR1><NR1>

Example

PROG:ADVA:CURR:DATA1?

commands

5.0,220.0,12.3,56.3,500,700,120.0,240.0,1,2,3

Command	PROG:ADVANCED:LOAD
Format	
Instruction	Load the Advanced programming data command
Description	from the specified memory location
Parameter range	<1~10>
Parameter form	<NR1>
Example commands	PROG:ADVA:LOAD 1
Command	PROG:ADVANCED:STORE
Format	
Instruction	Store Advanced programming data to a specified

Description	location command
Parameter range	<1~10>
Parameter form	<NR1>
Example commands	PROG:ADVA:STOR 1

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4.10 SAS Directive

4.10.1 SAS measurement instructions

Command	SOLar:PARAMeter?
Format	
Instruction	Returns information on the theoretical
Description	characteristics of the current execution curve. The list of parameters is as follows:
	1. Pmp
	2. Vmp
	3. Imp
	4. Voc
	5. Isc
Return data	<NR2><NR2><NR2><NR2><NR2><NR2>

format

Example

SOL:PARA?

commands

10.1,20.2,30.3,40.2,50.3

Command	SOLar:RECOrd:NUMBer?
Format	
Instruction	Returns the number of dynamic measurement parameter
Description	records.
Return data format	<NR1>
Example commands	SOL:RECO:NUMB? 20
Command	SOLar:RECOrd:DATA?
Format	

Instruction Returns data from dynamic measurement parameter

Description records, 17 data per record, with the following list of parameters:

1. Curve step number
2. Curve serial number
3. Curve theory Vmp (in V)

-
4. Curve theory Pmp (in kW)
 5. Curve Irr (in W/m²)
 6. Curve T (in °C)
 7. Maximum theoretical energy of the curve (in kWh)
 8. Curved maximum power Pmp (in kW)
 9. MPPT power point voltage Vmp in V
 10. MPPT power point current Imp (in A)
 11. Open circuit voltage Voc (in V)
 12. Short-circuit current Isc (in A)
 13. Real-time voltage (in V)
 14. Real-time current (in A)
 15. Real-time power (in kW)

	16. Real-time energy (in kWh)
	17. Real-time efficiency (in %)
Return data format	<NR2><NR2>.....<NR2><NR2>
Example commands	SOL:RECO:DATA? 1,1,11.2,112.3,45.5,113.5,12.3,15.9,48.3,12.6,42.1. 48.3,12.6,42.1,48.3,12.6,42.1

4.10.2 Static curve setting commands

Command	SOLar:ENDState
Format	
Instruction	Instructions for setting the end state of a
Description	photovoltaic experiment

Parameter <HOLD|BACK> (HOLD = hold, BACK =
range retreat(0))
Parameter <DSC>
form

Example commands	SOL:ENDS HOLD
Enquiry Instructions	SOLar:ENDState?
Instruction Description	Return to end of PV experiment status
Return value form	<DSC>
Example commands	SOL:ENDS? HOLD
Command Format	SOLar:INITiate

Instruction	Static workspace data
Description	update command
Example commands	SOL:INIT

Command	SOLar:SREVise
Format	
Instruction	Sinda standard curve correction instructions.
Description	
Parameter	<ON OFF 0 1>.
range	
Parameter	<Bool
form	
Example	SOL:SREV ON
commands	
Enquiry	SOLar:SREVise?
Instructions	
Instruction	Return to Sinda standard curve correction status
Description	

Return value	<Bool
form	
Example	SOL:SREV?
commands	1
Command	SOLar:PERIod
Format	

Instruction Setting the measurement period for PV parameters

Description

Parameter <10~1000>

range

Parameter <NR1>

form

Example SOL:PERI 100

commands

Enquiry SOLar:PERIod?

Instructions

Instruction Return data recording sampling rate

Description

Return value <NR1>

form

Example SOL:PERI?

commands 100

Command SOLar:MODE

Format

Instruction Photovoltaic Experimental Standards Selection Directive

Description

Parameter range <SANDia|EN50530|SIMPlE>

Parameter <DSC>

form

Example SOL:MODE SAND

commands

Enquiry SOLar:MODE?

Instructions

Instruction Back to Photovoltaic Experimental Standards

Description

Return value <DSC>

form

Example SOL:MODE?

commands SAND

Command SOLar:SANDia:MODE

Format

Instruction Sandia Standard Mode Selection

Description

Parameter range <BASic|ADVAnced> (BASic=Basic, ADVAnced=Advanced)

Parameter <DSC>
form
Example SOL:SAND:MODE BASI
commands
Enquiry SOLar:SANDia:MODE?
Instructions
Instruction Back to Sandia Standard Mode
Description
Return value <DSC>
form
Example SOL:SAND:MODE?
commands BASI
Command SOLar:SANDia:BASlC:VOC

Format

Instruction Set SANDia standard BASIC mode open circuit voltage (Voc)

Description

Parameter <0~UMAX> (UMAX: maximum voltage of the whole machine)

range

Parameter <NR2>

form

Example sol:sand:basi:voc 220.00
commands

Enquiry SOLar:SANDia:BASlC:VOC?

Instructions

Instruction Back to SANDia Standard BASlC Mode Open Circuit Voltage (Voc)

Description

Return value <NR2>

form

Example SOL:SAND:BASt:VOC?
commands 220.00

Command SOLar:SANDia:BASlC:VMP

Format

Instruction Setting SANDia Standard BASlC Mode MPPT Power Point Voltage

Description	(Vmp)
Parameter range	<0~UMAX> (UMAX: maximum voltage of the whole machine)
Parameter form	<NR2>
Example commands	sol:sand:basi:vmp 220.00

Enquiry SOLar:SANDia:BASlc:VMP?
Instructions
Instruction Back to SANDia Standard BASlc Mode MPPT Power Point Voltage
Description (Vmp)
Return value <NR2>
form
Example SOL:SAND:BASl:VMP?
commands 220.00

Command SOLar:SANDia:BASlc:ISC
Format
Instruction Setting the SANDia standard BASlc mode short-circuit current (Isc)
Description
Parameter <0~IMAX> (IMAX: maximum current of the whole machine)

range

Parameter <NR2>

form

Example sol:sand:basi:isc 220.00

commands

Enquiry SOLar:SANDia:BASlc:ISC?

Instructions

Instruction Back to SANDia Standard BASIC Mode Short Circuit Current (Isc)

Description

Return value <NR2>

form

Example SOL:SAND:BASI:ISC?

commands 220.00

Command SOLar:SANDia:BASIC:IMP

Format

Instruction <0~IMAX> (IMAX: maximum current of the whole machine)

Description

Parameter Setting SANDia Standard BASIC Mode MPPT Power Point Current

range (Imp)

Parameter <NR2>

form

Example sol:sand:basi:imp 220.00

commands

Enquiry SOLar:SANDia:BASlc:IMP?

Instructions

Instruction Back to SANDia Standard BASlc Mode MPPT Power Point Current
Description (Imp)

Return value <NR2>

form

Example SOL:SAND:BASI:IMP?

commands 220.00

Command SOLar:SANDia:ADVanced:PMP

Format

Instruction Set SANDia Standard ADVanced Mode MPPT Maximum Power

Description (Pmp)

(Unit: kW)

Parameter <0~PMAx> (PMAx: maximum power of the whole machine)

range

Parameter <NR2>

form

Example	sol:sand:adva:pmp 220.00
commands	
Enquiry	SOLar:SANDia:ADVAnced:PMP?
Instructions	
Instruction	Back to SANDia Standard ADVAnced Mode MPPT Maximum Power
Description	(Pmp)

Return value <NR2>

form

Example SOL:SAND:ADVA:PMP?

commands 220.00

Command SOLar:SANDia:ADVAnced:VMP

Format

Instruction Setting the SANDia standard ADVAnced mode MPPT power point

Description voltage
(Vmp)

Parameter <0~PMAx> (PMAx: maximum power of the whole machine)

range

Parameter <NR2>

form

Example sol:sand:adva:vmpp 220.00

commands

Enquiry SOLar:SANDia:ADVanced:VMP?

Instructions

Instruction Back to SANDia Standard ADVanced Mode MPPT Power Point
Description Voltage

(Vmp)

Return value <NR2>

form

Example SOL:SAND:ADVA:VMP?

commands 220.00

Command SOLar:SANDia:ADVAnced:FF

Format

Instruction Sets the SANDia standard ADVAnced mode FF parameter

Description

Parameter <0.3~0.95>

range

Parameter <NR2>

form

Example	sol:sand:adva:ff 220.00
commands	
Enquiry	SOLar:SANDia:ADVAnced:FF?
Instructions	
Instruction	Return to SANDia Standard ADVAnced Mode FF parameters
Description	

Return value <NR2>

form

Example SOL:SAND:ADVA:FF?

commands 220.00

Command SOLar:SANDia:ADVAnced:BETA

Format

Instruction Set SANDia standard ADVAnced mode BETA parameters

Description

Parameter <-2.0~0>

range

Parameter <NR2>

form

Example sol:sand:adva:beta 220.00

commands

Enquiry SOLar:SANDia:ADVAnced:BETA?

Instructions

Instruction Return to SANDia Standard ADVAnced Mode BETA Parameters

Description

Return value form <NR2>

Example commands	SOL:SAND:ADVA:BETA? 220.00
Command Format	SOLar:SANDia:ADVAnced:IRR
Description	Sets the SANDia standard ADVAnced mode IRR parameter
Parameter range	<0~3000>
Parameter form	<NR2>
Example commands	sol:sand:adva:irr 220.00
Enquiry	SOLar:SANDia:ADVAnced:IRR?

Instructions

Instruction Return to SANDia Standard ADVAnced Mode IRR Parameters

Description

Return value <NR2>

form

Example SOL:SAND:ADVA:IRR?

commands

220.00

Command SOLar:SANDia:ADVAnced:IRRRef

Format

Instruction Sets the SANDia standard ADVAnced mode IRRRef parameter

Description

Parameter <0~3000>

range

Parameter <NR2>

form

Example sol:sand:adva:irrr 220.00

commands

Enquiry SOLar:SANDia:ADVAnced:IRRRef?

Instructions

Instruction	Return to SANDia Standard ADVAnced Mode IRRRef Parameters
Description	
Return value form	<NR2>
Example	SOL:SAND:ADVA:IRRR?
commands	220.00

Command	SOLar:SANDia:ADVanced:T
Format	
Instruction	Sets the SANDia standard ADVanced
Description	mode T parameter
Parameter range	<-40~150>
Parameter form	<NR2>
Example commands	sol:sand:adva:t 220.00
Enquiry	SOLar:SANDia:ADVanced:T?
Instructions	
Instruction	Return to SANDia Standard ADVanced

Description	Mode T Parameters
Return value form	<NR2>
Example commands	SOL:SAND:ADVA:T? 220.00

Command	SOLar:SANDia:ADVAnced:TREF
Format	
Instruction	Setting the SANDia standard ADVAnced mode TREF parameters
Description	
Parameter	<-40~150>
range	
Parameter	<NR2>
form	
Example	sol:sand:adva:tref 220.00
commands	
Enquiry	SOLar:SANDia:ADVAnced:TREF?
Instructions	
Instruction	Return to SANDia Standard ADVAnced Mode TREF Parameters
Description	

Return value	<NR2>
form	
Example	SOL:SAND:ADVA:TREF?
commands	220.00
Command	SOLar:EN50530:MODE
Format	
Instruction	EN50530 Standard mode selection
Description	

Parameter <BASlC|ADVAnced> (BASlC=Basic, ADVAnced=Advanced)

range

Parameter <DSC>

form

Example sol:en50530:modebasi

commands

Enquiry SOLar:EN50530:MODE?

Instructions

Instruction Back to EN50530 Standard mode selection

Description

Return value <DSC>

form

Example SOL:EN50530:MODE?

commands BASI

Command SOLar:EN50530:BASlC:VOC

Format

Instruction Setting EN50530 standard BASlC mode open circuit voltage (Voc)

Description

Parameter range <0~UMAX> (UMAX: maximum voltage of the whole machine)

Parameter <NR2>
form

Example sol:en50530:basi:voc 220.00

commands

Enquiry SOLar:EN50530:BASlC:VOC?

Instructions

Instruction Back to EN50530 Standard BASlC Mode Open Circuit Voltage (Voc)

Description

Return value <NR2>
form

Example SOL:EN50530:BASl:VOC?

commands 220.00

Command SOLar:EN50530:BASlC:VMP

Format

Instruction	Setting EN50530 standard BASIC mode MPPT power point voltage
Description	(Vmp)
Parameter range	<0~UMAX> (UMAX: maximum voltage of the whole machine)
Parameter form	<NR2>

Example commands sol:en50530:basi:vmp 220.00

Enquiry SOLar:EN50530:BASlC:VMP?

Instructions

Instruction Back to EN50530 Standard BASlC Mode MPPT Power Point Voltage

Description (Vmp)

Return value <NR2>

form

Example commands SOL:EN50530:BASl:VMP?
 220.00

Command SOLar:EN50530:BASlC:ISC

Format

Instruction Setting EN50530 standard BASlC mode short-circuit current (Isc)

Description

Parameter range <0~IMAX> (IMAX: maximum current of the whole machine)

Parameter form <NR2>

Example commands sol:en50530:basi:isc 220.00

Enquiry SOLar:EN50530:BASlc:ISC?
Instructions
Instruction Back to EN50530 Standard BASlc Mode Short Circuit Current (Isc)
Description
Return value <NR2>
form
Example SOL:EN50530:BASl:ISC?
commands 220.00

Command SOLar:EN50530:BASlc:IMP
Format
Instruction Setting EN50530 Standard BASlc Mode MPPT Power Point Current
Description (Imp)
Parameter <0~IMAX> (IMAX: maximum current of the whole machine)

range

Parameter <NR2>

form

Example sol:en50530:basi:imp 220.00

commands

Enquiry SOLar:EN50530:BASlC:IMP?

Instructions

Instruction	Back to EN50530 Standard BASIc Mode MPPT Power Point Current
Description	(Imp)
Return value	<NR2>
form	
Example	SOL:EN50530:BASI:IMP?
commands	220.00
Command	SOLar:EN50530:ADVAnced:PMP
Format	
Instruction	Set EN50530 standard ADVAnced mode maximum power (Pmp)
Description	(single) (Bit: kW)
Parameter	<0~PMAX> (PMAX: maximum power of the whole machine)
range	

Parameter	<NR2>
form	
Example	sol:en50530:adva:pmp 220.00
commands	
Enquiry	SOLar:EN50530:ADVAnced:PMP?
Instructions	

Instruction Back to EN50530 Standard ADVAnced Mode Maximum Power

Description (Pmp)

Return value <NR2>

form

Example SOL:EN50530:ADVA:PMP?

commands 220.00

Command SOLar:EN50530:ADVAnced:VMP

Format

Instruction Setting the EN50530 standard ADVAnced mode MPPT power point

Description voltage

(Vmp)

Parameter <0~UMAX> (UMAX: maximum voltage of the whole machine)

range

Parameter	<NR2>
form	
Example	sol:en50530:adva:vmp 220.00
commands	
Enquiry	SOLar:EN50530:ADVAnced:VMP?
Instructions	

Instruction Back to EN50530 Standard ADVAnced Mode MPPT Power Point
Description Voltage
(Vmp)
Return value <NR2>
form
Example SOL:EN50530:ADVA:VMP?
commands 220.00

Command SOLar:EN50530:ADVAnced:IRR
Format

Instruction Setting the EN50530 standard ADVAnced mode IRR parameters
Description
Parameter < 0~3000>
range

Parameter	<NR2>
form	
Example	sol:en50530:adva:irr 220.00
commands	
Enquiry	SOLar:EN50530:ADVAnced:IRR?
Instructions	

Instruction Return to EN50530 Standard ADVAnced Mode IRR Parameters

Description

Return value <NR2>

form

Example SOL:EN50530:ADVA:IRR?

commands 220.00

Command solar:en50530:advanced:t

Format

Instruction Setting the EN50530 standard ADVAnced mode T parameter

Description

Parameter <-40~150>

range

Parameter <NR2>

form

Example sol:en50530:adv:t 220.00

commands

Enquiry SOLar:EN50530:ADVAnced:T?

Instructions

Instruction Back to EN50530 Standard ADVAnced Mode T Parameters

Description

Return value <NR2>

form

Example sol:en50530:adv:t? 220.00

commands

Command SOLar:EN50530:ADVanced:TECH

Format

Instruction Battery panel type selection

Description

Parameter <CSI|THINfilm|USER> (CSI=monocrystalline silicon, THINfilm=thin film

range type.

(USER=Custom)

Parameter <DSC>

form

Example	sol:en50530:adva:tech user
commands	
Enquiry	SOLar:EN50530:ADVAnced:TECH?
Instructions	
Instruction	Back to Panel Types
Description	

Return value <DSC>

form

Example sol:en50530:adva:tech? user

commands

Command SOLar:EN50530:ADVAnced:COEFficient

Format

Instruction Custom panel parameter setting commands with the following list
Description of parameters:

1. Ffu
2. Ffi
3. CG.
4. CV
5. CR
6. α

7. β	
Parameter range	< 0.300~0.950 > , < 0.300~0.950 > , < 0.100~9.999 > , < 0.100~99.999 > , < 0.100~9.999 > , < 0~1.000 > , < -2.000~0 >
Parameter form	<NR2><NR2><NR2><NR2><NR2><NR2><NR2><NR2><NR2>
Example commands	sol:en50530:adva:coef 0.3,0.3,0.1,0.1,0.1,1.0,-1.3
Enquiry	SOLar:EN50530:ADVANCED:COEFFICIENT?
Instructions	
Instruction	Query custom panel parameters
Description	
Return value form	<NR2>

Example	SOL:EN50530:ADVA:COEF?
commands	0.3,0.3,0.1,0.1,0.1,1.0,-1.3

Command Format	SOLar:SIMPlE:VOC
-------------------	------------------

Instruction Setting the SIMPLe standard open circuit voltage (Voc)

Description

Parameter <0~UMAX> (UMAX: maximum voltage of the whole machine)

range

Parameter <NR2>

form

Example sol:simp:voc 220.00

commands

Enquiry SOLar:SIMPLe:VOC?

Instructions

Instruction Return to SIMPLe Standard Open Circuit Voltage (Voc)

Description

Return value <NR2>

form

Example SOL:SIMP:VOC?

commands 220.00

Command SOLar:SIMPlE:VMP

Format

Instruction Setting the SIMPlE standard MPPT power point voltage (Vmp)

Description

Parameter range <0~UMAX> (UMAX: maximum voltage of the whole machine)

Parameter <NR2>

form

Example sol:simp:vmp 220.00

commands

Enquiry SOLar:SIMPlE:VMP?

Instructions

Instruction Return to SIMPlE Standard MPPT Power Point Voltage (Vmp)

Description

Return value <NR2>

form

Example SOL:SIMP:VMP?

commands 220.00

Command SOLar:SIMPlE:ISC

Format

Instruction Setting the SIMPlE standard short-circuit current (Isc)

Description

Parameter range <0~IMAX> (IMAX: maximum current of the whole machine)

Parameter <NR2>

form

Example sol:simp:isc 220.00

commands

Enquiry SOLar:SIMPlE:ISC?

Instructions

Instruction Back to SIMPlE Standard Short Circuit Current (Isc)

Description

Return value <NR2>

form

Example SOL:SIMP:ISC?

commands 220.00

Command SOLar:SIMPlE:IMP

Format

Instruction Setting SIMPlE Standard MPPT Power Point Current (Imp)

Description

Parameter <0~IMAX> (IMAX: maximum current of the whole machine)

range

Parameter <NR2>

form

Example commands	sol:simp:imp 220.00
Enquiry	SOLar:SIMPle:IMP?
Instructions	
Instruction	Back to SIMPle Standard MPPT Power Point Current (Imp)
Description	
Return value	<NR2>
form	
Example commands	SOL:SIMP:IMP? 220.00

4.10.3 Curve scan programming instructions

Command	SOLar:STATic:INITiate
Format	
Instruction	Curve scan experiment

Description	enable command
Example commands	SOL:STAT:INIT
Command Format	SOLar:STATic:MODE

Instruction Setting the curve scanning mode

Description

Parameter <PERcentage|ADVanced> (PERcentage= V/I percentage mode.
range (ADVanced= Irr/T Advanced mode)

Parameter <DSC>
form

Example SOL:STAT:MODE PERC
commands

Enquiry SOLar:STATic:MODE?

Instructions

Instruction Query curve scanning mode

Description

Return value <DSC>
form

Example	SOL:STAT:MODE?
commands	PERC
Command	SOLar:STATic:SLEW
Format	

Instruction Set curve scan time (in s)

Description

Parameter <1~86400>

range

Parameter <NR1>

form

Example SOL:STAT:SLEW 10

commands

Enquiry SOLar:STATic:SLEW?

Instructions

Instruction Query curve scan time

Description

Return value <NR1>

form

Example SOL:STAT:SLEW?

commands 10

Command SOLar:STATic:RATE

Format

Instruction Setting the curve switching rate

Description

Parameter range < 0 ~ 8 > [0] 1ms [1] 5ms [2] 10ms [3] 20ms [4] 50ms
[5] 100ms [6] 200ms [7] 500ms [8] 1000ms

Parameter form <NR1>

Example SOL:STAT:RATE 100

commands

Enquiry SOLar:STATic:RATE?

Instructions

Instruction Query curve switching rate

Description

Return value form <NR1>

form

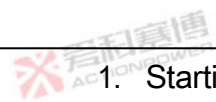
Example SOL:STAT:RATE?

commands 100

Command SOLar:STATic:PERCentage[:DATA]

Format

Instruction Set the V/I percentage mode scan parameters, which are listed
Description below:



1. Starting voltage
2. Termination voltage
3. Starting current
4. Termination current



Parameter range <1~100>,<1~100>,<1~100>,<1~100>



Parameter form <NR2><NR2><NR2><NR2><NR2>



Example commands sol:stat:perc:dat 1.3,1.5,2.3,2.6



Enquiry SOLar:STATic:PERCentage[:DATA]?



Instructions

Instruction Query V/I percentage mode scan parameters



Description

Return value <NR2><NR2><NR2><NR2><NR2>

form

Example SOL:STAT:PERC:DATA?

commands 1.3,1.5,2.3,2.6

Command	SOLar:STATic:ADVAnced[:DATA]
Format	
Instruction	Set the Irr/T advanced mode scan parameters,
Description	which are listed below: <ol style="list-style-type: none">1. Starting light2. Termination of light3. Starting temperature4. Termination temperature
Parameter range	<0~3000>,<0~3000>,<-40~150>,<-40~150>
Parameter form	<NR2><NR2><NR2><NR2><NR2>

Example	sol:stat:adva:dat 1.2,1.3,1.4,1.6
commands	
Enquiry	SOLar:STATic:ADVAnced[:DATA]?
Instructions	
Instruction	Query Irr/T advanced mode scan parameters
Description	

Return value form <NR2><NR2><NR2><NR2><NR2>

Example sol:stat:adva:dat?

commands 1.2,1.3,1.4,1.6

Command SOLar:LOAD

Format

Instruction Loading static curve workspace data from a specified storage

Description location

Parameter <1~30>

range

Parameter <NR1>

form

Example SOL:LOAD 20

commands

Command SOLar:STORe

Format

Instruction Storing static curve workspace data to a specified location

Description

Parameter range <1~30>

Parameter form <NR1>

Example commands SOL:STOR 20

4.10.4 Custom curve programming instructions

Command Format SOLar:CUSTom:INITiate

Instruction Description Custom curve data update

Example commands SOL:CUST:INIT

Command SOLar:CUSTom:LOAD

Format

Instruction	Load custom curve data from a
Description	specified storage location
Parameter	<1~30>
range	
Parameter	<NR1>
form	
Example	SOL:CUST:LOAD 20
commands	

Command	SOLar:CUSTOm:STORE
Format	
Instruction	Store custom curve data to a specified location
Description	
Parameter range	<1~30>
Parameter form	<NR1>
Example commands	SOL:CUST:STOR 20
Command	SOLar:CUSTOm:UDATa#
Format	

Instruction	The voltage custom waveform is sent down for 1024 points
Description	and the data is sent down in 2 groups, one Group 512 points of data, # indicates custom waveform grouping number, #=1~2 is supported.
Parameter range	-32768~32767
Parameter form	<NR2>.....<NR2>

Example commands	SOL:CUST:UDAT1 1024,256.....1024,256 SOL:CUST:UDAT2 1025,256.....1024,256
Enquiry	SOLar:CUSTom:UDATa#?
Instructions	
Instruction	Returns the custom waveform data for the selected group, #
Description	indicates the custom waveform group Group number, support #=1~2, data return is divided into 2 groups, one group 512 points data.
Return value form	<NR2>.....<NR2>

Example SOL:CUST:UDAT1?
commands 1024,256.....1024,255

 SOL:CUST:UDAT2?
 1025,256.....1024,256

Command	SOLar:CUSTom:CDATa#
Format	
Instruction	Sending 1024 points of current custom waveforms, the data is sent
Description	in 2 groups, one Group 512 points of data, # indicates custom waveform grouping number, #=1~2 is supported.
Parameter range	-32768~32767
Parameter form	<NR2>.....<NR2>
Example commands	SOL:CUST:CDAT1 1024,256.....1024,255 SOL:CUST:CDAT2 1025,256.....1024,256
Enquiry Instructions	SOLar:CUSTom:CDATa#?

Instruction	Returns the selected group's custom current waveform data, with
Description	# indicating the custom waveform division Group number, support #=1~2, data return is divided into 2 groups, one group 512 points data.
Return value form	<NR2>.....<NR2>

Example SOL:CUST:CDAT1?
commands 1024,256.....1024,255
SOL:CUST:CDAT2?
1025,256.....1024,256

4.10.5 Dynamic MPPT programming instructions

Command SOLar:DYNAmic:INITiate
Format
Instruction Dynamic curve
Description experiment enable
Example SOL:DYNA:INIT
commands
Command SOLar:DYNAmic:SEGment

Format

Instruction Set the number of

Description dynamic curve
experiment steps

Parameter range <0~100>

Parameter <NR1>
form

Example SOL:DYNA:SEGM 10

commands

Enquiry SOLar:DYNAMic:SEGMENT?

Instructions

Instruction Query the number of dynamic curve experiment steps

Description

Return value <NR1>
form

Example SOL:DYNA:SEGM?
commands 10

Command SOLar:DYNAMic:SETUp

Format

Instruction Set dynamic curve experiment preparation time (in s)

Description

Parameter <0~3600>

range

Parameter <NR1>

form

Example commands	SOL:DYNA:SETU 10
Enquiry	SOLar:DYNAMIC:SETUp?
Instructions	
Instruction	Query dynamic curve experiment preparation time
Description	
Return value	<NR1>
form	
Example commands	SOL:DYNA:SETU? 10
Command	SOLar:DYNAMIC:RATE
Format	
Instruction	Setting the dynamic curve switching rate

Description

Parameter < 0 ~ 8 > [0] 1ms [1] 5ms [2] 10ms [3] 20ms [4] 50ms

range [5] 100ms [6] 200ms [7] 500ms [8] 1000ms

Parameter <NR1>

form

Example commands	SOL:DYNA:RATE 100
Enquiry	SOLar:DYNAMIC:RATE?
Instructions	
Instruction	Query dynamic curve switching rates
Description	
Return value	<NR1>
form	
Example commands	SOL:DYNA:RATE? 100
Command	SOLar:DYNAMIC:DATA#
Format	

Instruction	Set the dynamic curve programming data for the selected step, #
Description	indicates the first step and the range is 1~100. The list of parameters is defined as follows: The list of parameters is defined as follows
	1. Curve enable

2. Initial light intensity
3. Termination of light intensity
4. Initial ambient temperature
5. Termination ambient temperature
6. Number of curve repetitions
7. Rise time (in s)
8. High retention time (in s)
9. Descent time (in s)
10. Low holding time in s

Parameter	<0~1>,<0~3000>,<0~3000>,<-40~150>,<-40~150>.
range	<0~9999999>,<0~86400>,<0~86400>,<0~86400>,<0~86400>,<0~86400>
	00>

Parameter form	<NR1>< NR2 ><NR2>.....<NR1><NR1>
Example commands	sol:dyna:dat1 1,1500,1600,50,100,500,845,855,875,888
Enquiry	SOLar:DYNAmic:DATA#?
Instructions	
Instruction	Queries the programming data of the selected step of the
Description	dynamic curve# indicates the first step, the range is 1~100.
Return value form	<NR1>< NR2 ><NR2>.....<NR1><NR1>
Example commands	SOL:DYNA:DATA1? 1,1500,1600,50,100,500,845,855,875,888

4.10.6 Curve sequence programming instructions

Command	SOLar:SEQUence:INITiate
Format	
Instruction	Curve sequence
Description	experiment enable
Example	SOL:SEQU:INIT
commands	

Command	SOLar:SEQUence:MODE
Format	
Instruction	Setting up the curve sequence experiment mode
Description	
Parameter range	<STATic DYNAmic> (STATic=voltage power mode, DYNAmic=light) (Temperature mode)
Parameter form	<DSC>
Example commands	SOL:SEQU:MODE STAT
Enquiry Instructions	SOLar:SEQUence:MODE?

Instruction	Query curve sequence experimental mode
Description	
Return value form	<DSC>
Example	SOL:SEQU:MODE?
commands	STATic

Command	SOLar:SEQUence:SEGMENT
Format	
Instruction	Set the number of
Description	experimental steps in the curve sequence
Parameter	<0~1000>
range	
Parameter	<NR1>
form	
Example	SOL:SEQU:SEGM 10
commands	
Enquiry	SOLar:SEQUence:SEGMENT?
Instructions	

Instruction	Query the number of
Description	experimental steps in a curve sequence
Return value form	<NR1>
Example commands	SOL:SEQU:SEGM? 10

Command	SOLar:SEQuence:SETUp
Format	
Instruction	Set-up time for curve sequence experiments (in s)
Description	
Parameter	<0~3600>
range	
Parameter	<NR1>
form	
Example	SOL:SEQu:SETU 10
commands	
Enquiry	SOLar:SEQuence:SETUp?
Instructions	
Instruction	Query curve sequence experiment preparation time
Description	

Return value	<NR1>
form	
Example	SOL:SEQU:SETU?
commands	10
Command	SOLar:SEQUence:STATic:DATA#
Format	
Instruction	Set the experimental voltage power mode programming data for
Description	the selected step curve sequence, # indicates the first

The list of parameters is defined as follows:

1. Voltage
2. Power (in kW)
3. Time (in s)

Parameter range <0~UMAX>,<0~PMAX>,<0~86400> (UMAX: maximum power of the whole machine)

(pressure, PMAX: maximum power of the whole machine)

Parameter form <NR2><NR2><NR1>

Example commands sol:sequ:stat:dat1 1,2,1,3,6

Enquiry Instructions SOLar:SEQUence:STATic:DATA#?

Instruction	Queries the experimental voltage power mode programming data
Description	for the selected step curve sequence, # indicates the first A few steps, ranging from 1 to 1000.
Return value form	<NR2><NR2><NR1>

Example commands	SOL:SEQU:STAT:DATA? 1,2,1,3,6
Command Format	SOLar:SEQUence:DYNAmic:DATA#
Instruction	Set the programming data for the experimental light
Description	temperature mode for the selected step of the curve sequence, # indicates the first step and ranges from 1 to 1000. the list of parameters is defined as follows: <ul style="list-style-type: none"> 1. Light (W/m²) 2. Temperature 3. Time (in s)
Parameter	<0~3000>,<-40~150>,<0~86400>

range

Parameter

<NR2><NR2><NR1>

form

Example
commands

sol:sequ:dynas:dat1 5,20,80

Enquiry	SOLar:SEQUence:DYNAmic:DATA#?
Instructions	
Instruction	Query the programming data for the experimental light and
Description	temperature mode of the selected step curve sequence, # indicates the first Steps, range 1 to 1000.
Return value	<NR2><NR2><NR1>
form	
Example	SOL:SEQU:DYNA:DATA1?
commands	5,20,80

4.10.7 Shade masking programming instructions

Command	SOLar:ARRAY:INITiate
Format	
Instruction	Static shadow masking

Description	curve update
Example commands	SOL: ARRA: INIT
Command Format	SOLar:ARRAy:SERies

Instruction Set the number of array cascades

Description

Parameter <1~50>

range

Parameter <NR1>

form

Example SOL:ARRA:SER 30

commands

Enquiry SOLar:ARRAy:SERies?

Instructions

Instruction Query the number of array cascades

Description

Return value <NR1>

form

Example SOL:ARRA:SER?

commands 30

Command SOLar:ARRAy:PARAllel

Format

Instruction Set the number of parallel connections to the array

Description

Parameter <1~50>
range

Parameter <NR1>
form

Example SOL:ARRA:PARA 30
commands

Enquiry SOLar:ARRAy:PARAllel?

Instructions

Instruction Query the number of arrays in parallel

Description

Return value <NR1>
form

Example SOL:ARRA:PARA?
commands 30

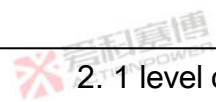
Command SOLar: ARRy: SHADow

Format

Instruction Set the curve masking parameters, the list of parameters is

Description defined as follows:

1. 1 level of shaded light (in W/m²)

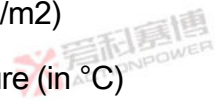


2. 1 level of shading temperature (in °C)

.....



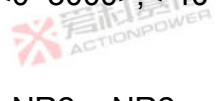
11. 6 levels of shaded light (in W/m2)



12. 6 levels of shading temperature (in °C)



Parameter range <0~3000>,<-40~150>.....<0~3000>,<-40~150>



Parameter form <NR2><NR2>.....<NR2><NR2>



Example commands SOL: ARRA: SHAD



500.5,10.5,700.5,30.5,900.5,50.5,1100.5,70.5,1300.5,90.5,1500.5,110.5



Enquiry Instructions SOLar: ARRAy: SHADow?



Instruction	Query curve masking parameters
Description	
Return value form	<NR2><NR2>.....<NR2><NR2>

Example	SOL:ARRA:SHAD?
comman ds	730.3,18.4,830.6,38.4,930.3,58.8,1030.3,78.9,1130.2,98.1,1230. 4,118.9
Comman d Format	SOLar:ARRAy:DATA#
Instructio n	Sets the array masking level data for the selected row, # indicates the first row and the range is
Descripti on	1 to 50. The list of parameters is defined as follows: The list of parameters is defined as follows:

1. # Row 1 column rank

.....

49. # Rows 50 Columns Level

Parameter range

<0~6>.....<0~6>

Parameter <NR1>.....<NR1>
form

Example SOL:ARRA:DATA1 4,.....2.
commands

Enquiry SOLar:ARRAy:DATA#?
Instructions

Instruction Query the array masking level data for the selected row, #
Description indicates the first row and the range is
1 to 50.

Return value <NR1>.....<NR1>
form

Example SOL:ARRA:DATA1?
commands 3.....5

Command	SOLar:CLOud:INITiate
Format	
Instruction	Dynamic shadow masking enable
Description	
Example commands	SOL:CLO:INIT

Command	SOLar:CLOUd:DIRectio
Format	
Instruction	Set the direction of
Description	shadow occlusion movement
Parameter	<0~7>
range	
Parameter	<NR1>
form	
Example	SOL:CLO:DIR 5
commands	
Enquiry	SOLar:CLOUd:DIRectio?
Instructions	

Instruction	Querying the direction
Description	of movement by shadow obscuring
Return value form	<NR1>
Example commands	SOL:CLO:DIR? 5
Command Format	SOLar:CLOud:SETUp

Instruction Set shadow masking preparation time (in:s)

Description

Parameter <0~86400>

range

Parameter <NR1>

form

Example SOL:CLO:SETU 5560

commands

Enquiry SOLar:CLOud:SETUp?

Instructions

Instruction Query shade masking lead time

Description

Return value <NR1>

form

Example SOL:CLO:SETU?

commands 5

Command SOLar:CLoud:SLEW

Format

Instruction Set the total shadow masking movement time (in:s)

Description

Parameter <0~86400>
range

Parameter <NR1>
form

Example SOL:CLO:SLEW 5560
commands

Enquiry SOLar:CLoud:SLEW?

Instructions

Instruction Query the total movement time for shadow blocking

Description

Return value <NR1>
form

Example SOL:CLO:SLEW?
commands 5560

4.11 Battery simulation instructions

4.11.1 Battery simulation measurement instructions

Command	BATSim:PARAMeter?
Format	

Instruction	Returns the current battery simulation real time information. The
Description	list of parameters is as follows: <ol style="list-style-type: none">1. Battery status 0 - Stop 1 - Charge 2 - Discharge 3 - Pause 4 - Rest2. Actual SOC3. Actual internal resistance4. Actual temperature5. Actual capacity6. Battery charge percentage7. Battery charging capacity8. Battery charging energy9. Battery discharge percentage10. Battery discharge capacity

11. Battery discharge energy

Return data
format

Example

commands

12. Number of cycles

13. Open circuit voltage OCV

<NR1><NR2>...<NR2><NR1><NR2>

BATS:PARA?

2,122.3,322.1,122.3,82.3,65.1,17.2,98.3,100.8.

8.98,76.55,20,24.0

Command

BATSim:PACKage:INformation?

Format

Instruction	Returns the battery pack information. The list of parameters is as
Description	follows:

1. Initial capacity
2. Voltage at 100% SOC
3. Voltage at 0% SOC

-
4. Total ohmic internal resistance with SOC at 50%
 5. Capacity
 6. Charging SOC protection value
 7. Discharge SOC protection value
 8. Charging voltage protection value
 9. Discharge voltage protection value
 10. Charging SOC alarm value
 11. Discharge SOC alarm value
 12. Charging voltage alarm value
 13. Discharge voltage alarm value

Return data <NR1>...<NR2>

format

Example BATS:PACK:INF?

100.8,122.2,62.7,332.3,182.6,15.1,67.1,100.3,100.8.

8.1,16.4,40.6,24.0

Command BATSIm:RECOrd:NUMBer?

Format

Instruction Returns the number of dynamic measurement parameter

Description records.

Return data <NR1>

format

Example BATS:RECO:NUMB?

commands 1

Command BATSIm:RECOrd:DATA?

Format

Instruction Returns dynamic measurement parameter record data, 18 data

Description per record, parameter columns

The table is as follows:

-
1. No.
 2. Voltage (in V)
 3. Current (in A)
 4. Power (in kW)
 5. Capacity (in Ah)
 6. Energy (in kWh)
 7. SOC (in %)
 8. OCV (in V)
 9. DCR (in m Ω)
 10. Temperature (in $^{\circ}\text{C}$)
 11. Charging capacity (in Ah)
 12. Discharge capacity (in Ah)

13. Charging energy (in kWh)
 14. Discharge energy (in kWh)
 15. Number of cycles
 16. Battery status ([0] Stop [1] Charge [2] Discharge [3] Pause [4] Resting)
 17. Alarm status (bit0: charging SOC alarm, bit1: discharging SOC alarm, bit2: charging voltage alarm, bit3: discharging voltage alarm, bit4: cycle cut-off alarm)
 18. Protection status (bit0: charging SOC protection, bit1: discharging SOC protection (protection, bit2: charge voltage protection, bit3: discharge voltage protection, bit4: fuse current protection)
- Return data <NR2><NR2>.....<NR2><NR2>

format

Example BATS:RECO:DATA?
commands 1,122.3,11.2,112.3,45.5,113.5,12.3,15.9,48.3,12.6,42.1.
 48.3,12.6,42.1,2,1,0,0

4.11.2 Battery simulation control commands

Command BATSIm:INITiate
Format

Instruction Battery simulation
Description update

 instructions
Example BATS:INIT

commands

Command BATSIm:PAUSE
Format

Instruction	Battery simulation
Description	pause command
Example commands	BATS:PAUS

Command Format	BATSim:CONTinue
Instruction	Battery simulation continue command
Description	
Example commands	BATS:CONT

Command Format	BATSim:STORe
Instruction	Store the battery simulation data to
Description	the specified location.
Parameter	<1~10>

range

Parameter <NR1>

form

Example BATS:STOR 10

commands

Command BATSim: LOAD

Format

Instruction Load battery simulation data from a

Description specified storage location

Parameter range	<1~10>
Parameter form	<NR1>
Example commands	BATS: LOAD 1

4.11.3 Battery model parameter setting commands

Command	BATSim:MODE
Format	
Instruction	Setting mode
Description	
Parameter	<BASic ADVAnced USER>

range

Parameter <DSC>

form

Example BATSim:MODE BASic

commands

Enquiry BATS:MODE?

Instructions

Instruction Return Mode

Description

Return value <DSC>
form

Example BATS:MODE?

commands BASic

Command BATSim:TECHnology

Format

Instruction Setting up battery technology

Description

Parameter <0~6> [0] Lithium iron phosphate [1] Lithium ternary [2]

range Lithium titanate [3] Manganese

Lithium acid [4] Lithium cobaltate [5] Nickel-hydrogen batteries

[6] Lead-acid batteries

Parameter <NR1>

form

Example BATS:TECH 2

commands

Enquiry BATSim:TECHnology?

Instructions

Instruction Back to Battery Technology

Description

Return value <NR1>

form

Example BATS:TECH?

commands 2

Command BATSim:DElay

Format

Instruction Setting the start delay time (in s)

Description

Parameter <0~9999999>

range

Parameter <NR1>

form

Example BATS:DEL 60

commands

Enquiry BATSim:DElay?

Instructions

Instruction Return to start delay time

Description

Return value <NR1>

form

Example commands BATS:DEL?
60

Command Format BATSIm:PERIod

Instruction Setting the measurement period (in ms)

Description

Parameter range <10~10000>

Parameter form <NR1>

Example commands BATS:PERI 200

Enquiry BATSIm:PERIod?

Instructions

Instruction Return to measurement period

Description

Return value <NR1>

form

Example BATS:PERI?

commands

200

Command	BATSim:TEMPerature
Format	
Instruction	Set the temperature influence enable switch
Description	
Parameter	<ON OFF 0 1>
range	
Parameter form	<Bool
Example commands	BATS:TEMP ON
Enquiry Instructions	BATSim:TEMPerature?

Instruction	Return to Temperature Affect Enable Switch
Description	
Return value form	<Bool
Example commands	BATS:TEMP? 1

Command	BATSim:PRECharge
Format	
Instruction	Set pre-charge time (in s)
Description	
Parameter range	<1~9999999>
Parameter form	<NR1>
Example commands	BATS:PREC 3600
Enquiry	BATSim:PRECharge?
Instructions	
Instruction	Return to pre-charge time

Description

Return value <NR1>

form

Example BATS:PREC?

commands 3600

Command BATSIm:CELL:SOC
Format
Instruction Set initial SOC (in %)
Description
Parameter <0~100>
range
Parameter <NR2>
form
Example BATS:CELL:SOC 50.0
commands
Enquiry BATSIm:CELL:SOC?
Instructions
Instruction Return to initial SOC
Description

Return value <NR2>

form

Example BATS:CELL:SOC?

commands 50.0

Command BATSIm:CELL:TEMPerature
Format

Instruction Set initial temperature (in °C)

Description

Parameter <-20~65>

range

Parameter <NR2>

form

Example BATS:CELL:TEMP 35.0

commands

Enquiry BATS:CELL:TEMPerature?

Instructions

Instruction Return to initial temperature

Description

Return value <NR2>

form

Example BATS:CELL:TEMP?

commands 35.0

Command BATSim:CELL:DCR

Format

Instruction Set 50% SOC corresponding to ohmic internal resistance (in mΩ)

Description

Parameter range <0~999999>

Parameter form <NR2>

Example commands BATS:CELL:DCR 10.0

Enquiry BATS:CELL:DCR?

Instructions

Instruction Return 50% SOC corresponding to ohmic internal resistance

Description

Return value form <NR2>

Example	BATS:CELL:DCR?
commands	10.0
Command	BATSim:CELL:CAPacity
Format	
Instruction	Set individual capacity (in Ah)
Description	
Parameter range	<0~999999>

Parameter <NR2>

form

Example BATS:CELL:CAP 10.0

commands

Enquiry BATSIm:CELL:CAPacity?

Instructions

Instruction Return to single unit capacity

Description

Return value <NR2>

form

Example BATS:CELL:CAP?

commands 10.0

Command BATSIm:PACKage:R

Format

Instruction Set the cable impedance R (in $m\Omega$)

Description

Parameter <0~999999>

range

Parameter <NR2>

form

Example commands
BATS:PACK:R 120.0

Enquiry
BATSim:PACKage:R?

Instructions
Instruction
Return cable impedance R

Description
Return value
<NR2>

form

Example commands
BATS:PACK:R?
120.0

Command
BATSim:PACKage:SERies

Format

Instruction
Setting the number of strings

Description

Parameter <1~999999>
range

Parameter <NR1>
form

Example BATS:PACK:SER 20
commands

Enquiry BATSim:PACKage:SERies?
Instructions
Instruction Return the number of tandems
Description
Return value <NR1>
form
Example BATs:PACK:SER?
commands 20

Command BATSim:PACKage:PARAllel
Format
Instruction Setting the number of parallel connections
Description
Parameter <1~999999>

range

Parameter <NR1>

form

Example BATS:PACK:PARA 20

commands

Enquiry BATSim:PACKage:PARAllel?

Instructions

Instruction Return the number of parallel connections

Description

Return value <NR1>

form

Example BATS:PACK:PARA?

commands

20

Command

BATSim:EFFiciency:CHARge

Format

Instruction Set charging efficiency (in %)

Description

Parameter <0~100>

range

Parameter <NR2>

form

Example BATS:EFF:CHAR 80.0

commands

Enquiry BATSim:EFFiciency:CHARge?

Instructions

Instruction Back to charging efficiency

Description

Return value <NR2>

form

Example BATS:EFF:CHAR?

commands 80.0

Command BATSim:Efficiency:DISCharge

Format

Instruction Set discharge efficiency (in %)

Description

Parameter <0~100>

range

Parameter <NR2>

form

Example BATS:EFF:DISC 90

commands

Enquiry BATSim:EFFiciency:DISCharge?

Instructions

Instruction Return to discharge efficiency

Description

Return value <NR2>
form

Example commands BATS:EFF:DISC?
 90

Command BATSIm:CYCLe:SWITch
Format

Instruction Setting the cycle test switch

Description

Parameter <ON|OFF|0|1>
range

Parameter <Bool
form

Example commands BATS:CYCL:SWIT ON

Enquiry BATSIm:CYCLe:SWITch?

Instructions

Instruction Return to cycle test switch setting value

Description

Return value <Bool

form

Example BATS:CYCL:SWIT?

commands

ON

Command BATSIm:CYCLe:COUNter

Format

Instruction Set the number of cycles

Description

Parameter <1~999999>

range

Parameter <NR1>

form

Example BATS:CYCL:COUN 100

commands

Enquiry BATSIm:CYCLe:COUNter?

Instructions

Instruction	Return the number of cycles
Description	
Return value	<NR1>
form	
Example	BATS:CYCL:COUN?
commands	100

Command	BATSim:CYCLe:SOC
Format	
Instruction	Set pack SOC cut-off value (in %)
Description	
Parameter range	<0~100>
Parameter form	<NR2>
Example commands	BATS:CYCL:SOC 80.0
Enquiry	BATSim:CYCLe:SOC?
Instructions	
Instruction	Return to pack SOC cut-off value

Description

Return value <NR2>

form

Example BATS:CYCL:SOC?

commands 80.0

Command BATSIm:CYCLe:CAPacity
Format
Instruction Setting the battery pack capacity cut-off (in Ah)
Description
Parameter <0~999999>
range
Parameter <NR2>
form
Example BATS:CYCL:CAP 150.0
commands
Enquiry BATSIm:CYCLe:CAPacity?
Instructions
Instruction Return to battery pack capacity cut-off value
Description

Return value <NR2>

form

Example BATS:CYCL:CAP?

commands 150.0

Command BATSIm:CYCLe:CAPacity
Format

Instruction Setting the battery pack capacity cut-off (in Ah)

Description

Parameter <0~999999>

range

Parameter <NR2>

form

Example BATS:CYCL:CAP 150.0

commands

Enquiry BATSim:CYCLe:CAPacity?

Instructions

Instruction Return to battery pack capacity cut-off value

Description

Return value <NR2>

form

Example BATS:CYCL:CAP?

commands 150.0

4.11.4 Instructions for setting protection and alarm parameters

Command BATSim:PROTection:SWITch
Format

Instruction Setting the protection switch

Description

Parameter <ON|OFF|0|1>

range

Parameter <Bool

form

Example BATS:PROT:SWIT ON

commands

Enquiry BATSim:PROTectio:n:SWITch?

Instructions

Instruction Return to protective switch setting value

Description

Return value <Bool

form

Example BATS:PROT:SWIT?
commands

Command BATSIm: WARNing:SWITCh
Format
Instruction Setting the alarm switch
Description

Parameter `<ON|OFF|0|1>`
range

Parameter `<Bool`
form

Example `BATS:WARN:SWIT ON`
commands

Enquiry `BATSim: WARNing:SWITch?`

Instructions

Instruction `Return to alarm switch settings`

Description

Return value `<Bool`
form

Example BATS:WARN:SWIT?

commands

Command BATSim:PROTection:FUSe

Format

Instruction Setting the fusing current (in A)

Description

Parameter range <0~110% of the rated current of the whole machine>

Parameter <NR2>
form
Example BATS:PROT:FUS 10.0
commands
Enquiry BATSim:PROTection:FUSe?
Instructions
Instruction Return fusing current
Description
Return value <NR2>
form
Example BATS:PROT:FUS?
commands 10.0
Command BATSim:PROTection:SOC:CHARge

Format

Instruction Set charge SOC protection (in %)

Description

Parameter <0~100>

range

Parameter <NR2>

form

Example commands
Enquiry BATS:PROT:SOC:CHAR 85.0
Instructions
Instruction Back to Charging SOC Protection
Description
Return value <NR2>
form

Example commands
BATS:PROT:SOC:CHAR?
85.0

Command BATS:PROT:ection:SOC:DISCharge
Format
Instruction Set discharge SOC protection (in %)

Description

Parameter <0~100>
range

Parameter <NR2>
form

Example BATS:PROT:SOC:DISC 20.0
commands

Enquiry BATSIm:PROTection:SOC:DISCharg?

Instructions

Instruction Return to discharge SOC protection

Description

Return value <NR2>

form

Example BATS:PROT:SOC:DISC?

commands 20.0

Command BATSIm:PROTection:VOLTage:CHARge

Format

Instruction Set charge voltage protection (in V)

Description

Parameter <0~ 110% of rated voltage >

range

Parameter <NR2>

form

Example BATS:PROT:VOLT:CHAR 200.0

commands

Enquiry BATSim:PROTection:VOLTAge:CHARge?

Instructions

Instruction Return to charge voltage protection

Description

Return value <NR2>

form

Example BATS:PROT:VOLT:CHAR?

commands 200.0

Command BATSim:PROTect:VOLTage:DISCharg

Format

Instruction Set discharge voltage protection (in V)

Description

Parameter <0~ 110% of rated voltage >

range

Parameter <NR2>

form

Example BATS:PROT:VOLT:DISC 20.0

commands

Enquiry BATSim:PROTection:VOLTAge:DISCharge?

Instructions

Instruction Return to discharge voltage protection

Description

Return value <NR2>

form

Example BATS:PROT:VOLT:DISC?

commands 20.0

Command BATSim:WARNing:SOC:CHARge

Format

Instruction Set charging SOC alarms (in %)

Description

Parameter <0~100>

range

Parameter <NR2>

form

Example BATS:WARN:SOC:CHAR 80.0

commands

Enquiry BATSim:WARNing:SOC:CHARge?

Instructions

Instruction Return to charging SOC alarms

Description

Return value <NR2>

form

Example commands	BATS:WARN:SOC:CHAR? 80.0
Command Format	BATSim:WARNing:SOC:DISCharge
Instruction	Setting the discharge SOC alarm (in %)
Description	
Parameter range	<0~100>
Parameter form	<NR2>
Example commands	BATS:WARN:SOC:DISC 30.0
Enquiry	BATSim:WARNing:SOC:DISCharge?

Instructions

Instruction Return to discharge SOC alarms

Description

Return value <NR2>

form

Example BATS:WARN:SOC:DISC?

commands

30.0

Command	BATSim:WARNing:VOLTage:CHARge
Format	
Instruction	Setting the charge voltage alarm (in V)
Description	
Parameter range	<0~ 110% of rated voltage >
Parameter form	<NR2>
Example commands	BATS:WARN:VOLT:CHAR 180.0
Enquiry Instructions	BATSim:WARNing:VOLTage:CHARge?

Instruction Return to Charging Voltage Alarm

Description

Return value <NR2>

form

Example BATS:WARN:VOLT:CHAR?

commands 180.0

Command	BATSim:WARNing:VOLTage:DISCharge
Format	
Instruction	Setting the discharge voltage warning (in V)
Description	
Parameter	<0~ 110% of rated voltage >
range	
Parameter	<NR2>
form	
Example	BATS:WARN:VOLT:DISC 15.0
commands	
Enquiry	BATSim:WARNing:VOLTage:DISCharge?
Instructions	
Instruction	Return to discharge voltage alarm
Description	

Return value <NR2>

form

Example BATS:WARN:VOLT:DISC?

commands 15.0

4.11.5 Advanced parameter setting commands

Command	BATSim:ADVAnced:COUNT
Format	
Instruction	Set points
Description	
Parameter range	<2~200 >
Parameter form	<NR1>
Example commands	BATS:ADVA:COUN 30
Enquiry	BATSim:ADVAnced:COUNT?
Instructions	
Instruction	Return points

Description

Return value <NR1>

form

Example BATS:ADVA:COUN?

commands 30

Command	BATSim:ADVAnced:SOC
Format	
Instruction	Set up battery individual SOCs, 200 in total (in %)
Description	
Parameter	<0~999999 >
range	
Parameter	<NR2>...<NR2>
form	
Example	BATS:ADVA:SOC 10.5,120.5...200.5
commands	
Enquiry	BATSim:ADVAnced:SOC?
Instructions	
Instruction	Back to Battery Cell SOC
Description	

Return value	<NR2>...<NR2>
form	
Example	BATS:ADVA:SOC?
commands	10.5,120.5...200.5

Command	BATSim:ADVAnced:OCV
Format	

Instruction Set up battery cells OCV, 200 in total (in V)

Description

Parameter <0~999999>

range

Parameter <NR2>...<NR2>

form

Example BATS:ADVA: OCV 10.5,120.5...200.5

commands

Enquiry BATSIm:ADVAnced:OCV?

Instructions

Instruction Back to battery cells OCV

Description

Return value <NR2>...<NR2>

form

Example	BATS:ADVA:OCV?
commands	10.5,120.5...200.5

4.11.6 User parameter setting commands

Command	BATSim:USER:ORDE
Format	R

Instruction Setting the number of steps

Description

Parameter <0~3 >

range

Parameter <NR1>

form

Example BATS:USER:ORD 3

commands

Enquiry BATS:USER:ORDER?

Instructions

Instruction Return to order

Description

Return value <NR1>

form

Example	BATS:USER:ORD?
commands	3
Command	BATSim:USER:COUNT
Format	
Instruction	Set points
Description	

Parameter <2~200 >
range

Parameter <NR1>
form

Example BATS: USER:COUN 30
commands

Enquiry BATSIm: USER:COUNT?

Instructions

Instruction Return points

Description

Return value <NR1>
form

Example BATS: USER:COUN?
commands 30

Command BATSIm:USER:SOC
Format

Instruction Set up battery individual SOCs, 200 in total (in %)

Description

Parameter <0~999999>
range

Parameter <NR2>...<NR2>
form

Example BATS:USER:SOC 10.5,120.5...200.5

commands

Enquiry BATSIm:USER:SOC?

Instructions

Instruction Back to Battery Cell SOC

Description

Return value <NR2>...<NR2>
form

Example BATS:USER:SOC?
commands 10.5,120.5...200.5

Command BATSIm:USER:OCV

Format

Instruction Set up battery cells OCV, 200 in total (in V)

Description

Parameter <0~999999>

range

Parameter <NR2>...<NR2>

form

Example commands BATS:USER:OCV 10.5,120.5...200.5

Enquiry BATSim:USER:OCV?

Instructions

Instruction Back to battery cells OCV

Description

Return value <NR2>...<NR2>

form

Example commands BATS:USER:OCV?

10.5,120.5...200.5

Command BATSim:USER:DCIR

Format

Instruction Internal resistance of battery cells in ohms, 200 in total (in mΩ)

Description

Parameter <0~999999>

range

Parameter <NR2>...<NR2>

form

Example BATS:USER:DCIR 100.5,130.5...190.5

commands

Enquiry BATSIm:USER:DCIR?
Instructions
Instruction Return to Battery Cell Ohms Internal Resistance
Description
Return value <NR2>...<NR2>
form
Example BATS:USER:DCIR?
commands 100.5,130.5...190.5

Command BATSIm:USER:RFIRst
Format
Instruction Set polarization internal resistance R1, 200 in total (in mΩ)
Description
Parameter <0~999999>

range

Parameter <NR2>...<NR2>

form

Example BATS:USER:RFIR 110.5,120.5...800.5

commands

Enquiry BATSim:USER:RFIRst?

Instructions

Instruction Return to polarisation internal resistance R1

Description

Return value <NR2>...<NR2>

form

Example BATS:USER:RFIR?

commands 110.5,120.5...800.5

Command BATSIm:USER:CFIRst

Format

Instruction Set polarisation capacitor C1, 200 in total (in F)

Description

Parameter <0~999999>

range

Parameter <NR2>...<NR2>

form

Example BATS:USER:CFIR 23.5,20.5...30.5

commands

Enquiry BATSim:USER:CFIRst?

Instructions

Instruction Return to polarisation capacitance C1

Description

Return value <NR2>...<NR2>
form

Example BATS:USER:CFIR?
commands 23.5,20.5...30.5

Command BATSim:USER:RSECond
Format

Instruction Set internal resistance of polarisation R2, 200 in mΩ

Description
Parameter <0~999999>
range

Parameter <NR2>...<NR2>
form

Example BATS:USER:RSEC 110.5,120.5...800.5

commands

Enquiry BATSim:USER:RSECond?

Instructions

Instruction Return to polarization internal resistance R2

Description

Return value <NR2>...<NR2>

form

Example commands	BATS:USER:RSEC? 110.5,120.5...800.5
Command Format	BATSim:USER:CSECond
Instruction	Set polarisation capacitor C2, 200 in total (in F)
Description	
Parameter range	<0~999999>
Parameter form	<NR2>...<NR2>
Example commands	BATS:USER:CSEC 23.5,20.5...30.5
Enquiry	BATSim:USER:CSECond?

Instructions

Instruction Return to polarisation capacitance C2

Description

Return value <NR2>...<NR2>

form

Example BATS:USER:CSEC?

commands

23.5,20.5...30.5

Command	BATSim:USER:RTHird
Format	
Instruction	Set polarization internal resistance R3, 200 in mΩ
Description	
Parameter	<0~999999>
range	
Parameter	<NR2>...<NR2>
form	
Example	bats:user:rth 110.5,120.5...800.5
commands	
Enquiry	BATSim:USER:RTHird?
Instructions	

Instruction	Return to polarisation internal resistance R3
Description	
Return value form	<NR2>...<NR2>
Example commands	BATS:USER:RTH? 110.5,120.5...800.5

Command	BATSim:USER:CTHird
Format	
Instruction	Set polarisation capacitor C3, 200 in total
Description	(in F)
Parameter range	<0~999999>
Parameter form	<NR2>...<NR2>
Example commands	bats:user:cth 23.5,20.5...30.5
Enquiry	BATSim:USER:CTHird?
Instructions	
Instruction	Return to polarisation capacitor C3

Description

Return value <NR2>...<NR2>

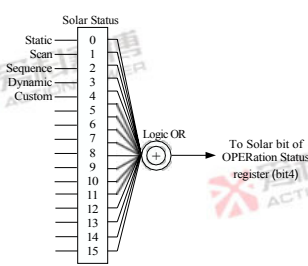
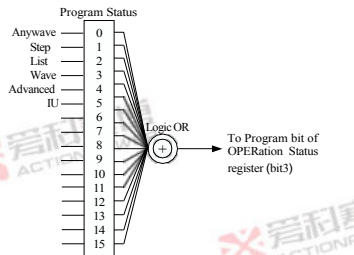
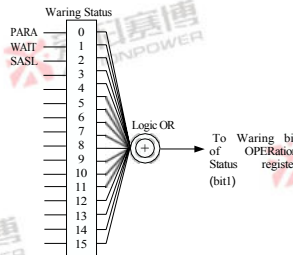
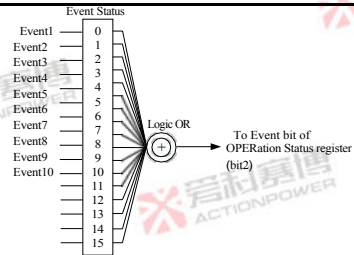
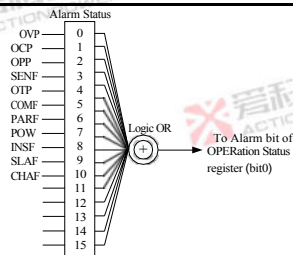
form

Example BATS:USER:CTH?

commands 23.5,20.5...30.5

5 Status Report

IEEE 488.2 requires SCPI to implement a status reporting mechanism, and the PRD implements a "minimal status reporting structure for SCPI devices, including an OPERation Status register and a Suspicious Data/Signal Status register (QUEStionnable data/signal Status register). The structure of the PRD status report is illustrated in Figure 2.



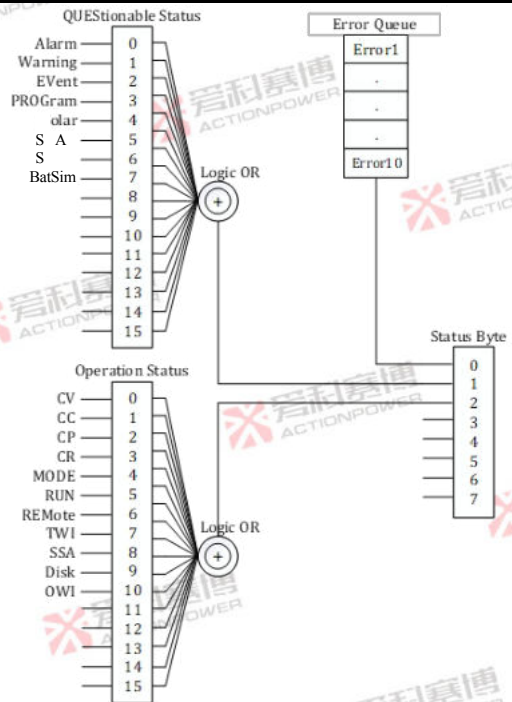


Fig. 2 Schematic diagram of the PRD status report structure

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Version revision record

Date	Versions	Revised content
August 2021	V1.0	Complete this brochure
May 2022	V1.1	Add SAS shade masking command
October 2022	V1.2	Add battery simulation command