CORTEX-AC Series Bidirectional Programmable AC Power Supply SCPI Programming Guide

Nexus Series Bidirectional Programmable AC Power Supply SCPI Programming Guide

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1 Overview

This product utilizes SCPI (Standard Commands for Programmable Instruments) standard programmable instrument commands for remote control.

2 Communication Protocol

Commands and response messages are transmitted in ASCII format. A recommended minimum delay of 15 ms between commands is advised. This product features a command buffer capable of receiving multiple continuous commands. Commands are executed sequentially in the order received.

2.1 Commonly Used Symbols

1) Angle Brackets <>

Angle brackets indicate that the enclosed content is a command parameter, which must be replaced by a valid value when invoked. For example, <NR1> denotes a specific numeric data format and must be replaced by an integer without a decimal point when invoked.

2) Vertical Bar |

The vertical bar separates multiple parameters; only one parameter can be selected each time the command is used.

3) Square Brackets [ ]

Square brackets indicate optional keywords; the command executes regardless of whether these keywords are included. For example, [SOURce:]CHANnel? means that [SOURce:] is optional.

4) Curly Braces {}

Curly braces indicate that the parameter is one option among multiple choices.

5) Terminator < LF>

Each command must include a terminator <LF>, which corresponds to the hexadecimal value 0x0A.

2.2 Parameter Format

Remote control input commands and power supply response commands support three formats: numeric, boolean, and string.

1) Numeric Format

The numeric format for programming commands is as followsTable 1shown below.

Table 1 Numeric Format for Programming Commands

Symbol	Description	Parameter Example
NR1	Number without decimal point	123
NR2	Number with decimal point, including NR1	12.3
NR3	Number with decimal point and exponent	1.23E+2
NRF	<NR1> or <NR2>	123/12.3
DSC	Character parameter used to specify a finite set of parameter values	MANUal

2) Boolean format

When input, Boolean parameter <Bool> can be represented by ON|OFF or 0|1.

When responding, Boolean parameter <Bool> is represented exclusively by 0|1.

3) String format

Query command string response:

<S RD >: returns an arbitrary ASCII string.

2.3 Overview of SCPI commands

2.3.1 Types of SCPI commands

SCPI defines two types of commands: common commands and instrument-specific commands.

1) Common commands

Common commands are generally independent of specific operations and control overall device functions. Such commands typically comprise a three-letter mnemonic followed by an asterisk:

*RST (Reset Command)

*IDN? (Instrument Identification Query)

2) Instrument Commands

Instrument commands execute specific functions of this device. They are organized in a tree structure with the "root" at the top, comprising multiple subsystems, each subsystem consists of a root keyword followed by one or more hierarchical keywords. See the SCPI command tree in the following4.5section.

2.3.2 SCPI Command Structure

SCPI commands consist of one or more message units, each terminated by a Terminator. The Terminator is not part of the syntax; it is implicitly present at the end of each message unit.

As shown in Figure 1As shown, this is the instruction structure of a compound command. A detailed explanation is provided below.

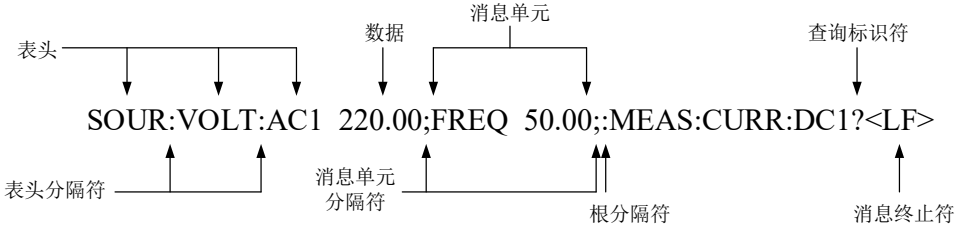

Figure 1Instruction Structure

1) Header

Figure 1The headers include SOUR, VOLT, AC1, FREQ, MEAS, CURR, and DC1.

Headers are commands recognized by the PRE series. They may be in long or short format.

Long format headers are fully spelled out, such as VOLTAGE and MEASURE.

Short format headers consist of only the first three or four letters, such as VOLT and MEAS.

SCPI commands are case-insensitive and may be entered in uppercase or lowercase. However, when abbreviating, all uppercase letters in the command structure must be entered, for example:

MEASure:TPOWer:ACTIve?

Can be abbreviated as:

MEAS:TPOW:ACTI?

MeaS:Tpow:ACTI?

Meas:tpow:acti?

A shortened command header can improve program execution speed.

If a command contains multiple headers, they must be separated using a colon (header separator), for example:

SOUR:VOLT:AC1 220.00

The header and parameters are separated by one space. The header is followed by multiple parameters, separated by ','. For example:

PROG:LIST:CONT 100,10,50

2) Query identifier

If a command ends with a question mark (query identifier), for example:

MEAS:CURR:DC1?

This indicates that the command is a query command, and after execution the instrument returns the corresponding response.

3) Message unit separator

When two or more message units are combined into a compound message, separate them with semicolons, for example:

SOUR:VOLT:AC1 220.00;FREQ 50.00

4) Root separator

When a colon appears before the first header of a message unit, it becomes the root separator, that is, the root node of the command tree. In the following example, please note the difference between the root separator and the column header separator:

MEAS:CURR:DC1? All colons are 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

You do not need to add a colon before a root-level command, because each root-level command has an implied colon

before it.

5) Message Terminator

The Message Terminator notifies this product that the end of the message has been reached, and its corresponding hexadecimal value is 0x0A. In the examples in this manual, an implied Message Terminator is assumed at the end of each example.

3 Common Commands

The common commands available on this product are Table 2shown.

Table 2 Common commands

Command	Function Description
***IDN?**	Instrument Identification Query
***RST**	System Parameter Reset
***TRG**	Programming experiment trigger
ABORt	Programming experiment stop
***STB?**	Query status register (Status Byte)
***CLS**	Clear status register

The following provides a detailed description of each common command.

***IDN?**

Command Description	Query the product's "brand", "device model", "serial number", and "device version" information.
Return Format	<SRD>
Command Example	*IDN? ACTIONPOWER,CORTEX-AC20B,E1022G0017,01.01.01.01

***RST**

Command Description	After the command is executed, the product performs the following operations: 1) If the device is in a fault state, reset the device fault. 2) System parameters are restored to the factory default values. For details, see the description of each command. 3) User-defined data is cleared, such as custom waveform data. Note: 1) Some parameters are not reset by this command, such as communication parameters. 2) In the case of parallel operation, when acting as the master unit, the parallel settings are retained, and parameters associated with the Number of Parallel Units are restored to their default values based on the Number of Parallel Units at the time the device receives this command.
Command Example	*RST

***TRG**	
Command Description	Programming trigger command. Under normal circumstances, before sending the programming trigger command, it is necessary to enter the programming enabled state first.
Command Example	*TRG

ABORt	
Command Description	Programming exit command. After this command is executed, the programming test will be terminated, and the current programming enabled state will be exited.
Command Example	ABOR

***STB?**	
Command Description	Status register (Status Byte) query. For the definition of the status register, see the Status Reporting chapter.
Command Example	*STB?

***CLS**	
Command Description	Clear the status register. The following registers will be cleared: 1) Status Byte 2) Error Queue 3) Questionable Status 4) Operation Status For the definition of the status register, see the Status Reporting chapter.
Command Example	*CLS

4 Instrument commands

The subsystem commands available for this product include Table 3 shown.

Table 3 SCPI Subsystem

Subsystem	Description
MEASure	Measurement Subsystem
SOURce	Source Subsystem
LOAD	Load Subsystem
OUTPut	Output Subsystem
SYSTem	System Subsystem
PROTection	Protection Subsystem
PROGram	Programming Subsystem
CEVent	Event Subsystem
MEMory	Storage Subsystem

4.1 MEASure Subsystem

The MEASure subsystem is used to query this product's operating parameter values. The MEASure subsystem consists of measurement commands for voltage, current, power, frequency, harmonics, and more.

4.1.1 Voltage Measurement Command

MEASure:VOLTage:ACDC#?	
Command Description	Returns the RMS voltage of the selected phase #. (Unit: V) When the product Output Phase Count is Three-Phase or Split-Phase, #= 1 indicates φ1, #= 2 indicates φ2, and #= 3 indicates φ3. When the product Output Phase Count is Single-Phase, #= 1 indicates φ1 ; #= 2 and #= 3 return invalid values.
Return Format	<NR2>
Command Example	MEAS:VOLT:ACDC1? 220.0

MEASure:VOLTage:AC#?	
Command Description	Returns the AC voltage component of the selected phase #. (Unit: V) When the Coupling Mode for this product is AC or AC+DC, if the Output Phase Count is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, #=3 indicates φ3; If the Output Phase Count is Single-Phase, #=1 indicates φ1; the return values for #=2 and #=3 are invalid. When the Coupling Mode for this product is DC, the return values for #=1, #=2, and #=3 are all

	invalid.
Return Format	<NR2>
Command Example	MEAS:VOLT:AC1? 220.0

MEASure:VOLTage:DC#?	
Command Description	Returns the DC voltage component of the selected phase #. (Unit: V) When the Coupling Mode for this product is DC or AC+DC, if the Output Phase Count is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, #=3 indicates φ3; If the Output Phase Count is Single-Phase, #=1 indicates φ1; the return values for #=2 and #=3 are invalid. When the power Coupling Mode is AC, the return values for #=1, #=2, and #=3 are all invalid.
Return Format	<NR2>
Command Example	MEAS:VOLT:DC1? 100.0

MEASure:VOLTage:VLL#?	
Command Description	Returns the RMS line voltage of the selected line #. (Unit: V) When the Coupling Mode of this product is AC or AC+DC, if the Output Phase Count is Three-Phase or Split-Phase, #=1 indicates U_{12}, #=2 indicates U_{23}, and #=3 indicates U_{31} ; If the Output Phase Count is Single-Phase, the return values for #=1, #=2, and #=3 are all invalid. When the Coupling Mode of this product is DC, the return values for #=1, #=2, and #=3 are all invalid.

Return Format	<NR2>
Command Example	MEAS:VOLT:VLL1? 380.0

MEASure:VOLTage:THD#?	
Command Description	Returns the voltage THD of the selected phase #. (Unit: %) When the Coupling Mode for this product is AC or AC+DC, if the Output Phase Count is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, #=3 indicates φ3; If the Output Phase Count is Single-Phase, #=1 indicates φ1; the return values for #=2 and #=3 are invalid. When the Coupling Mode of this product is DC, the return values for #=1, #=2, and #=3 are all invalid.
Return Format	<NR2>
Command Example	MEAS:VOLT:THD1? 5.0

MEASure:VOLTage:PEAK#?	
Command Description	Returns the voltage peak value of the selected phase #. (Unit: V) When the Output Phase Count of this product is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3. When the Output Phase Count of this product is Single-Phase, #=1 indicates φ1, and the return values for #=2 and #=3 are invalid.
Return Format	<NR2>

Command Example	MEAS:VOLT:PEAK1? 311.0

4.1.2 Current Measurement Command

MEASure:CURRent:ACDC#?	
Command Description	Returns the RMS current value of the selected phase #. (Unit: A) When the Output Phase Count of this product is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3. When the Output Phase Count of this product is Single-Phase, #=1 indicates φ1, and the return values for #=2 and #=3 are invalid.
Return Format	<NR2>
Command Example	MEAS:CURR:ACDC1? 10.0

MEASure:CURRent:AC#?	
Command Description	Returns the AC component of the current for the selected phase #. (Unit: A) When the Coupling Mode for this product is AC or AC+DC, if the Output Phase Count is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, #=3 indicates φ3; If the Output Phase Count is Single-Phase, #=1 indicates φ1; the return values for #=2 and #=3 are invalid. When the Coupling Mode for this product is DC, the return values for #=1, #=2, and #=3 are all invalid.

Return Format	<NR2>
Command Example	MEAS:CURR:AC1? 10.0

MEASure:CURRent:DC#?

Command Description	Returns the DC component of the current for the selected phase #. (Unit: A) When the Coupling Mode of this product is DC or AC+DC, if the Output Phase Count is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3; If the Output Phase Count is Single-Phase, #=1 indicates φ1; the return values for #=2 and #=3 are invalid. When this product's Coupling Mode is AC, the return values for #=1, #=2, and #=3 are all invalid.
Return Format	<NR2>
Command Example	MEAS:CURR:DC1? 10.0

MEASure:CURRent:CRESt#?

Command Description	Returns the current crest factor of the selected phase #. When the Coupling Mode for this product is AC or AC+DC, if the Output Phase Count is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, #=3 indicates φ3; If the Output Phase Count is Single-Phase, #=1 indicates φ1; the return values for #=2 and #=3 are invalid. When this product's Coupling Mode is DC, the return values for #=1, #=2, and #=3 are all invalid.
Return Format	<NR2>
Command Example	MEAS:CURR:CRES1?

	1.414

MEASure:CURRent:THD#?	
Command Description	Returns the current THD for the selected phase #. (Unit: %) When this product's Coupling Mode is AC or AC+DC, if the Output Phase Count is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3; If the Output Phase Count is Single-Phase, #=1 indicates φ1; the return values for #=2 and #=3 are invalid. When this product's Coupling Mode is DC, the return values for #=1, #=2, and #=3 are all invalid.
Return Format	<NR2>
Command Example	MEAS:CURR:THD1? 5.0

MEASure:CURRent:PEAK#?	
Command Description	Returns the peak current of the selected phase #. (Unit: A) When the Output Phase Count of this product is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3. When the Output Phase Count of this product is Single-Phase, #=1 indicates φ1, and the return values for #=2 and #=3 are invalid.
Return Format	<NR2>
Command Example	MEAS:CURR:PEAK1? 14.14

MEASure:CURRent:INRush#?	
Command Description	Returns the inrush current of the selected phase #. (Unit: A) When the Output Phase Count of this product is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3. When the Output Phase Count of this product is Single-Phase, #=1 indicates φ1, and the return values for #=2 and #=3 are invalid.
Return Format	<NR2>
Command Example	MEAS:CURR:INR1? 20.0

4.1.3 Power Measurement Command

MEASure:POWer:ACTive#?	
Command Description	Returns the Active Power of the selected phase #. (Unit: kW) When the Output Phase Count of this product is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3. When the Output Phase Count of this product is Single-Phase, #=1 indicates φ1, and the return values for #=2 and #=3 are invalid.
Return Format	<NR2>
Command Example	MEAS:POW:ACT1? 5.0

MEASure:POWer:APParent#?	
Command Description	Returns the apparent power of the selected phase #. (Unit: k VA) When this product's Coupling Mode is AC or AC+DC, if the Output Phase Count is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3; If the Output Phase Count is Single-Phase, #=1 indicates φ1; the return values for #=2 and #=3 are invalid. When the Coupling Mode of this product is DC, the return values for #=1, #=2, and #=3 are all invalid.
Return Format	<NR2>
Command Example	MEAS:POW:APP1? 5.0

MEASure:POWer:REACtive#?	
Command Description	Returns the reactive power of the selected phase #. (Unit: k v ar) When this product's Coupling Mode is AC or AC+DC, if the Output Phase Count is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3; If the Output Phase Count is Single-Phase, #=1 indicates φ1; the return values for #=2 and #=3 are invalid. When the Coupling Mode of this product is DC, the return values for #=1, #=2, and #=3 are all invalid.
Return Format	<NR2>
Command Example	MEAS:POW:REAC1? 0.0

MEASure:POWer:PFACtor#?	
Command Description	Returns the power factor of the selected phase #. When this product's Coupling Mode is AC or AC+DC, if the Output Phase Count is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3; If the Output Phase Count is Single-Phase, #=1 indicates φ1; the return values for #=2 and #=3 are invalid. When the Coupling Mode of this product is DC, the return values for #=1, #=2, and #=3 are all invalid.
Return Format	<NR2>
Command Example	MEAS:POW:PFAC1? 0.99

MEASure:TPOWer:ACTive?	
Command Description	Returns the total Active Power. (Unit: kW)
Return Format	<NR2>
Command Example	MEAS:TPOW:ACT? 15.0

MEASure:TPOWer:APParent?	
Command Description	Returns the total apparent power. (Unit: kVA) When the Coupling Mode of this product is DC, the return value is invalid.
Return Format	<NR2>

Command Example	MEAS:TPOW:APP? 15.0

MEASure:TPOWer:REACTive?	
Command Description	Returns the total reactive power. (Unit: kvar) When the Coupling Mode of this product is DC, the return value is invalid.
Return Format	<NR2>
Command Example	MEAS:TPOW:REAC? 0.0

MEASure:TPOWer:PFACtor?	
Command Description	Returns the total power factor. When the Coupling Mode of this product is DC, the return value is invalid.
Return Format	<NR2>
Command Example	MEAS:TPOW:PFAC? 0.99

4.1.4 Frequency Measurement Command

MEASure:FREQuency#?	
Command Description	Returns the output frequency of the selected phase #. (Unit: Hz) When this product's Coupling Mode is AC or AC+DC, if the Output Phase Count is Three-Phase or

	Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3; If the Output Phase Count is Single-Phase, #=1 indicates φ1; the return values for #=2 and #=3 are invalid. When the Coupling Mode of this product is DC, the return values for #=1, #=2, and #=3 are all invalid.
Return Format	<NR2>
Command Example	MEAS:FREQ1? 50.0

4.1.5 Harmonic Measurement Command

MEASure:HARMonic:VOLTage#?	
Command Description	Returns the voltage harmonic content of selected phase #. (Unit: %) A total of 100 data items are returned, separated by ",". The 1st data item is the voltage fundamental content, the 2nd data item is the voltage 2nd harmonic content, and so on. When this product's Coupling Mode is AC or AC+DC, if the Output Phase Count is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3; If the Output Phase Count is Single-Phase, #=1 indicates φ1; the return values for #=2 and #=3 are invalid. When the Coupling Mode of this product is DC, the return values for #=1, #=2, and #=3 are all invalid.
Return Format	<NR2>,<NR2>,...,<NR2>
Command Example	MEAS:HARM:VOLT1? 100.0,1.0,...,0.0

MEASure:HARMonic:CURRent#?	
Command Description	Returns the current harmonic content of selected phase #. (Unit: %) A total of 100 data items are returned, separated by ",". The first data item is current fundamental content, and the second data item is current 2nd harmonic content; subsequent items follow the same pattern. When this product's Coupling Mode is AC or AC+DC, if the Output Phase Count is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3; If the Output Phase Count is Single-Phase, #=1 indicates φ1; the return values for #=2 and #=3 are invalid. When the Coupling Mode of this product is DC, the return values for #=1, #=2, and #=3 are all invalid.
Return Format	<NR2>,<NR2>,...,<NR2>
Command Example	MEAS:HARM:CURR1? 100.0,1.0,...,0.0

4.1.6 Phase Measurement Command

MEASure:PHASe#?	
Command Description	Returns the voltage phase of the selected phase #. (Unit: °) When this product's Coupling Mode is AC or AC+DC, if the Output Phase Count is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3; If the Output Phase Count is Single-Phase, #=1 indicates φ1; the return values for #=2 and #=3 are invalid. When the Coupling Mode of this product is DC, the return values for #=1, #=2, and #=3 are all invalid.

Return Format	<NR2>, <NR2>, <NR2>, ..., <NR2>
Command Example	MEAS:PHAS2? 240.0

4.1.7 Islanding Measurement Command

MEASure:ISLand:RCURrent#?	
Command Description	Returns the resistive current value for selected phase #. (Unit: A) When the Output Phase Count of this product is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3. When the Output Phase Count of this product is Single-Phase, #=1 indicates φ1, and the return values for #=2 and #=3 are invalid.
Return Format	<NR2>
Command Example	MEAS:ISL:RCUR1? 10.0

MEASure:ISLand:LCURrent#?	
Command Description	Returns the inductive current value for selected phase #. (Unit: A) When the Output Phase Count of this product is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3. When the Output Phase Count of this product is Single-Phase, #=1 indicates φ1, and the return values for #=2 and #=3 are invalid.

Return Format	<NR2>
Command Example	MEAS:ISL:LCUR1? 10.0

MEASure:ISLand:CCURrent#?

Command Description	Returns the capacitive current value for selected phase #. (Unit: A) When the Output Phase Count of this product is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3. When the Output Phase Count of this product is Single-Phase, #=1 indicates φ1, and the return values for #=2 and #=3 are invalid.
Return Format	<NR2>
Command Example	MEAS:ISL:CCUR1? 10.0

MEASure:ISLand:RACTive#?

Command Description	Returns the Active Power value for selected phase #. (Unit: kW) When the Output Phase Count of this product is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3. When the Output Phase Count of this product is Single-Phase, #=1 indicates φ1, and the return values for #=2 and #=3 are invalid.
Return Format	<NR2>

Command Example	MEAS:ISL:RACT2? 5.0

MEASure:ISLand:LREactive#?	
Command Description	Returns the inductive reactive power value for selected phase #. (Unit: kVar) When the Output Phase Count of this product is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3. When the Output Phase Count of this product is Single-Phase, #=1 indicates φ1, and the return values for #=2 and #=3 are invalid.
Return Format	<NR2>
Command Example	MEAS:ISL:LRE2? 5.0

MEASure:ISLand:CREactive#?	
Command Description	Returns the capacitive reactive power value of the selected phase #. (Unit: kVar) When the Output Phase Count of this product is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3. When the Output Phase Count of this product is Single-Phase, #=1 indicates φ1, and the return values for #=2 and #=3 are invalid.
Return Format	<NR2>
Command Example	MEAS:ISL:CRE2?

	1.0

MEASure:ISLand:QF#?	
Command Description	Returns the quality factor of the selected phase #. (Unit: None) When the Output Phase Count of this product is Three-Phase or Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3. When the Output Phase Count of this product is Single-Phase, #=1 indicates φ1, and the return values for #=2 and #=3 are invalid.
Return Format	<NR2>
Command Example	MEAS:ISL:QF2? 0.0

MEASure:ISLand:TIME?	
Command Description	Returns the islanding time. (Unit: m s) The time from the start of islanding until this product meets the stop conditions.
Return Format	<NR1>
Command Example	MEAS:ISL:TIME? 234

4.1.8 Other measurement commands

MEASure:TIME:TRAN?	
Command Description	Returns the load switching time. (Unit: ms) The return value is valid only when this product's operating mode is Load Mode (Load) and the Load Mode is CR.
Return Format	<NR2>
Command Example	MEAS:TIME:TRAN? 100

MEASure:TIME:RUN:HOUR?	
Command Description	Returns the load duration. (Unit: h) The return value is valid only when this product's operating mode is Load Mode (Load). OUTPut:TIME
Return Format	<NR2>
Command Example	MEASure:TIME:RUN:HOUR? 100

MEASure:TIME:RUN:MINute?	
Command Description	Returns the load duration. (Unit:min)

	The return value is valid only when this product's operating mode is Load Mode (Load) and the Load Mode is CR.
Return Format	<NR2>
Command Example	MEAS:TIME:TRAN? 100

MEASure:TIME:RUN:SECond?

Command Description	Returns the load duration. (Unit: s) The return value is valid only when this product's operating mode is Load Mode (Load) and the Load Mode is CR.
Return Format	<NR2>
Command Example	MEAS:TIME:TRAN? 100

MEASure:ALL?

Command Description	Returns 63 operating parameter values, separated by ",". The parameter list is as follows: φ1、φ2、φ3 RMS Voltage (Unit: V) φ1、φ2、φ3 Voltage THD φ1、φ2、φ3 AC Voltage Component (Unit: V) φ1、φ2、φ3 DC Voltage Component (Unit: V) φ1、φ2、φ3 Peak Voltage (Unit: V)

	φ1、φ2、φ3 Voltage Phase Angle (Unit: °) φ1、φ2、φ3 Output Frequency (Unit: Hz) U_{12}, U_{23}, U_{31} Line Voltage RMS (Unit: V) φ1、φ2、φ3 RMS Current (Unit: A) φ1、φ2、φ3 Current THD φ1、φ2、φ3 Current AC Component (Unit: A) φ1、φ2、φ3 Current DC Component (Unit: A) φ1、φ2、φ3 Peak Current (Unit: A) φ1、φ2、φ3 Current Crest Factor φ1、φ2、φ3 Apparent Power (Unit: kVA) φ1、φ2、φ3 Active Power (Unit: kW) φ1、φ2、φ3 Reactive Power (Unit: kvar) Total Apparent Power (Unit: kVA) Total Active Power (Unit: kW) Total reactive power (unit: kvar) Power factor of φ1, φ 2, and φ 3 Total power factor Inrush current of φ1, φ 2, and φ 3 (unit: A) Operating duration (unit: h) Transfer time (unit: ms) If the Output Phase Count of this product is Single-Phase, φ1 indicates the Single-Phase operating parameter, and the return values of φ2 and φ3 are invalid.

	For the effect of this product's Coupling Mode on data validity, refer to the description of each measurement command.
Return Format	<NR2>,<NR2>,...,<NR2>,<NR1>,<NR1>
Command Example	MEAS:ALL? 220.0,220.0,220.0,5.0,5.0,5.0,220.0,220.0,220.0,0.0,0.0,0.0,311.0,311.0,311.0,0.0,240.0,120.0,50.0,50.0,50.0,380.0,380.0,380.0,10.00,10.00,10.00,5.0,5.0,5.0,10.0,10.0,10.0,0.0,0.0,0.0,14.14,14.14,14.14,1.414,1.414,1.414,2.2,2.2,2.2,2.2,2.2,2.2,0.0,0.0,0.0,15.0,15.0,0.0,0.99,0.99,0.99,0.99,20.0,20.0,20.0,2,100

4.2 SOURce Subsystem

The SOURce subsystem is used to set parameter values such as setpoints and limits in Source Mode. The SOURce subsystem consists of setting commands for voltage, current, power, internal resistance, and other settings.

4.2.1 Voltage Setting Commands

[SOURce]:VOLTage:CHANnel	
Command Description	Sets the Output Phase Count in Source Mode. This can only be set while in standby.
Parameter Range	<THRee|EACH|SINGle>, default value is THRee. THRee: Three-Phase EACH: Split-Phase SINGle: Single-Phase
Parameter Format	<DSC>
Query Command	**[SOURce]:VOLTage:CHANnel?**
Return Format	<DSC>
Command Example	SOUR:VOLT:CHAN THR SOUR:VOLT:CHAN? THRee

[SOURce]:VOLTage:COUPling	
Command Description	Sets the Coupling Mode in Source Mode. This can only be set while in standby.
Parameter Range	<AC|DC|ACDC>, default value is AC.

	AC: AC DC: DC ACDC: AC+DC
Parameter Format	<DSC>
Query Command	[SOURce]:VOLTage:COUPling?
Return Format	<DSC>
Command Example	SOUR:VOLT:COUP AC SOUR:VOLT:COUP? AC

[SOURce]:VOLTage:WAVeform	
Command Description	Sets the output waveform in Source Mode. This setting is supported only in standby mode. The waveform definition list is as follows: 0: Sine wave 1: Pulse wave 2: Triangle wave 3: Clipped wave 4: Positive half-wave 5: Negative half-wave 6: Leading-Edge Half Wave 7: Trailing-Edge Half Wave 8~37: DST1~DST30 38: 2-pulse wave

	39: 6-pulse wave 40: 12-pulse wave 41:1 8-pulse wave 42: 24-pulse wave 4 3~142: Shape 1~S hape100 (Current version supports 43~57)
Parameter Range	0~ 142, default value: 0.
Parameter Format	<NR1>
Query Command	**[SOURce]:VOLTage:WAVeform?**
Return Format	<NR1>
Command Example	SOUR:VOLT:WAV 0 SOUR:VOLT:WAV? 0

[SOURce]:VOLTage:DCYCle	
Command Description	Set the duty cycle of the Source Mode pulse waveform. Effective only when the output waveform is set to pulse. (Unit: %)
Parameter Range	0.00~100.00, default value: 50.00.
Parameter Format	<NRF>
Query Command	**[SOURce]:VOLTage:DCYCle?**
Return Format	<NRF>
Command Example	SOUR:VOLT:DCYC 50.00 SOUR:VOLT:DCYC? 50.0

[SOURce]:VOLTage:SYMMetry	
Command Description	Set the symmetry of the Source Mode triangle waveform. Effective only when the output waveform is set to triangle. (Unit: %)
Parameter Range	0.00~100.00, default value: 50.00.
Parameter Format	<NRF>
Query Command	**[SOURce]:VOLTage:SYMMetry?**
Return Format	<NRF>
Command Example	SOUR:VOLT:SYMM 50.00 SOUR:VOLT:SYMM? 50.0

[SOURce]:VOLTage:CSINewave	
Command Description	Set the clipping percentage in Source Mode. Effective only when the output waveform is set to clipped wave. (Unit: %)
Parameter Range	0.00~50.00, default value: 0.00.
Parameter Format	<NRF>
Query Command	**[SOURce]:VOLTage:CSINewave?**
Return Format	<NRF>
Command Example	SOUR:VOLT:CSIN 0.00 SOUR:VOLT:CSIN? 0.0

[SOURce]:VOLTage:LEAD	
Command Description	Set the conduction angle percentage in Source Mode. Effective only when the output waveform is set to Leading-Edge Half Wave. (Unit: %)
Parameter Range	0.00~100.00, default value: 50.00.
Parameter Format	<NRF>
Query Command	**[SOURce]:VOLTage:LEAD?**
Return Format	<NRF>
Command Example	SOUR:VOLT:LEAD 50.00 SOUR:VOLT:LEAD? 50.0

[SOURce]:VOLTage:WMODe	
Command Description	Set Source Mode to custom waveform mode; this takes effect when the output waveform is set to Shape#.
Parameter Range	<PEAK|RMS >, the default value is PEAK. PEAK: Peak Mode RMS: RMS Mode
Parameter Format	<DSC>
Query Command	**[SOURce]:VOLTage:WMODe?**
Return Format	<DSC>
Command Example	SOUR:VOLT:WMOD PEAK SOUR:VOLT:WMOD?

	PEAK

[SOURce]:VOLTage:TRAil	
Command Description	Set the turn-off angle percentage in Source Mode; this takes effect when the output waveform is set to Trailing-Edge Half Wave. (Unit:%)
Parameter Range	0.00~100.00, default value: 50.00.
Parameter Format	<NRF>
Query Command	**[SOURce]:VOLTage:TRAil?**
Return Format	<NRF>
Command Example	SOUR:VOLT:TRA 50.00 SOUR:VOLT:TRA? 50.0

[SOURce]:VOLTage:AC#	
Command Description	Set the AC voltage set value for the selected phase #. (Unit: V) When the Coupling Mode of this product in Source Mode is AC or AC+DC: If the Output Phase Count in Source Mode is Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3; If Source Mode Output Phase Count is Three-Phase, #=1 indicates φ1, the values of φ2, φ3 automatically remain consistent with φ1 ; If Source Mode Output Phase Count is Single-Phase, #=1 indicates φ1, and the setting values for #=2 and #=3 are invalid.

	When the product Coupling Mode in Source Mode is DC: the setting values for #=1, #=2, and #=3 are all invalid.
Parameter Range	0.00~ Maximum AC Voltage, the default value is 220.00.
Parameter Format	<NRF>
Query Command	**[SOURce]:VOLTage:AC#?**
Return Format	<NRF>
Command Example	SOUR:VOLT:AC1 220.00 SOUR:VOLT:AC1? 220.0

[SOURce]:VOLTage:DC#	
Command Description	Set the DC voltage setpoint for the selected phase #. (Unit: V) When the product Source Mode Coupling Mode is DC or AC+DC: If Source Mode Output Phase Count is Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3; If the Output Phase Count in Source Mode is Three-Phase, #=1 indicates φ1, and the values of φ2 and φ3 are automatically kept the same as φ1; If the Output Phase Count in Source Mode is Single-Phase, #=1 indicates φ1; the values set for #=2 and #=3 are invalid.

	When the Coupling Mode in Source Mode of this product is AC: the values set for #=1, #=2, and #=3 are all invalid.
Parameter Range	- Maximum DC Voltage ~ Maximum DC Voltage, with a default value of 0.0.
Parameter Format	<NRF>
Query Command	**[SOURce]:VOLTage:DC#?**
Return Format	<NRF>
Command Example	SOUR:VOLT:DC1 10.00 SOUR:VOLT:DC1? 10.0

[SOURce]:VOLTage:PHASe#	
Command Description	Sets the phase setpoint for the selected phase #. (Unit: °) When the Coupling Mode of this product in Source Mode is AC or AC+DC: If the Output Phase Count in Source Mode is Split-Phase or Three-Phase,#=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3; If Source Mode Output Phase Count is Single-Phase, #=1 indicates φ1, and the setting values for #=2 and #=3 are invalid. When the product Coupling Mode in Source Mode is DC: the setting values for #=1, #=2, and #=3 are all invalid.

Parameter Range	0.0~359.9; the default value for φ1 is 0.0, for φ2 is 240.0, and for φ3 is 120.0.
Parameter Format	<NRF>
Query Command	**[SOURce]:VOLTage:PHASe#?**
Return Format	<NRF>
Command Example	SOUR:VOLT:PHAS2 240.00 SOUR:VOLT:PHAS2? 240.0

[SOURce]:VOLTage:FREQuency	
Command Description	Set the output frequency setpoint. (Unit: Hz) This setting is valid when the product Source Mode Coupling Mode is AC or AC+ DC.
Parameter Range	0.001~ maximum frequency, default is 50.000.
Parameter Format	<NRF>
Query Command	**[SOURce]:VOLTage:FREQuency?**
Return Format	<NRF>
Command Example	SOUR:VOLT:FREQ 50.0 SOUR:VOLT:FREQ? 50.0

[SOURce]:VOLTage:SRATe:AC	
Command Description	Set the AC voltage slew rate. (Unit: V/ms) This setting is valid when the product Source Mode Coupling Mode is AC or AC+DC.

Parameter Range	0.01~3000.00, default is 500.00.
Parameter Format	<NRF>
Query Command	**[SOURce]:VOLTage:SRATe:AC?**
Return Format	<NRF>
Command Example	SOUR:VOLT:SRAT:AC 500.00 SOUR:VOLT:SRAT:AC? 500.0

[SOURce]:VOLTage:SRATe:DC	
Command Description	Set the DC voltage slew rate. (Unit: V/ms) This setting is valid when the product Source Mode Coupling Mode is DC or AC+DC.
Parameter Range	0.01~3000.00, default is 500.00.
Parameter Format	<NRF>
Query Command	**[SOURce]:VOLTage: SRATe:DC?**
Return Format	<NRF>
Command Example	SOUR:VOLT:SRAT:DC 500.00 SOUR:VOLT:SRAT:DC? 500.0

[SOURce]:VOLTage:SRATe:FREQ	
Command Description	Set the frequency slew rate. (Unit: Hz/ms) This setting is valid when the product Source Mode Coupling Mode is AC or AC+DC.

Parameter Range	0.0001~20000.0000, default: 100.0000.
Parameter Format	<NRF>
Query Command	**[SOURce]:VOLTage:SRATe:FREQ?**
Return Format	<NRF>
Command Example	SOUR:VOLT:SRAT:FREQ 100.0000 SOUR:VOLT:SRAT:FREQ? 200.0

[SOURce]:VOLTage:SPEed

Command Description	Set the Source Mode response speed.
Parameter Range	<FAST|MIDium|SLOW>, default: MIDium. SLOW: Slow MIDium: Medium FAST: Fast
Parameter Format	<DSC>
Query Command	**[SOURce]:VOLTage:SPEed?**
Return Format	<DSC>
Command Example	SOUR:VOLT:SPE MID SOUR:VOLT:SPE? MID

[SOURce]:VOLTage:SLEW

Command Description	Set the voltage slew rate. (Unit: V/us)
Parameter Range	0.020~10.000, default: 1.000.
Parameter Format	<NRF>
Query Command	**[SOURce]:VOLTage:SLEW?**
Return Format	<NRF>
Command Example	SOUR:VOLT:SLEW 1.000 SOUR:VOLT:SLEW? 1.0

[SOURce]:VOLTage:OFFSr

Command Description	Set the Source Mode power-off slew rate. (Unit: V/us)
Parameter Range	0.0020~10.0000, default: 2.0000.
Parameter Format	<NRF>
Query Command	**[SOURce]:VOLTage:OFFSr?**
Return Format	<NRF>
Command Example	SOUR:VOLT:OFFS 2.0000 SOUR:VOLT:OFFS? 2.0

[SOURce]:VOLTage:ANGLe:ON

Command Description	Set the Source Mode power-on angle. (Unit: °)
Parameter Range	0.0~359.9, default value is 0.0.

Parameter Format	<NRF>
Query Command	**[SOURce]:VOLTage:ANGLe:ON?**
Return Format	<NRF>
Command Example	SOUR:VOLT:ANGL:ON 0.0 SOUR:VOLT:ANGL:ON? 0.0

[SOURce]:VOLTage:ANGLe:OFF

Command Description	Set the Source Mode turn-off angle. (Unit: °)
Parameter Range	0.0~359.9, default value is 0.0.
Parameter Format	<NRF>
Query Command	**[SOURce]:VOLTage:ANGLe:OFF?**
Return Format	<NRF>
Command Example	SOUR:VOLT:ANGL:OFF 0.0 SOUR:VOLT:ANGL:OFF? 0.0

[SOURce]:VOLTage:TPHase:SYNC

Command Description	Set Source Mode transient angle enable.
Parameter Range	<ON|OFF|1|0>, default value is 0. ON/1: Enable OFF/0: Disable

Parameter Format	<Bool>
Query Command	**[SOURce]:VOLTage:TPHase:SYNC?**
Return Format	<Bool>
Command Example	LOAD:VOLT:TPH:SYNC OFF LOAD:VOLT:TPH:SYNC? 0

[SOURce]:VOLTage:TPHase:VALue	
Command Description	Set the Source Mode transient angle. (Unit: °)
Parameter Range	0.0~359.9, default value is 0.
Parameter Format	<NRF>
Query Command	**[SOURce]:VOLTage:TPHase:VALue?**
Return Format	<NRF>
Command Example	SOUR:VOLT:TPH:VAL 0.0 SOUR:VOLT:TPH:VAL? 0.0

[SOURce]:VOLTage:SYNCdelay	
Command Description	Set the external synchronization delay time. (Unit: ms)
Parameter Range	0~999999, default value is 0.
Parameter Format	<NR1>
Query Command	**[SOURce]:VOLTage:SYNCdelay?**

Return Format	<NR1>
Command Example	SOUR:VOLT:SYNC 0 SOUR:VOLT:SYNC? 0

[SOURce]:VOLTage:ACULimit

Command Description	Set the AC voltage upper limit. (Unit: V)
Parameter Range	0.00~ Maximum AC Voltage, default value: Maximum AC Voltage.
Parameter Format	<NRF>
Query Command	**[SOURce]:VOLTage:ACULimit?**
Return Format	<NRF>
Command Example	SOUR:VOLT:ACUL 450.00 SOUR:VOLT:ACUL? 450.0

[SOURce]:VOLTage:ACLLimit

Command Description	Set the AC voltage lower limit. (Unit: V)
Parameter Range	0.00~ Maximum AC Voltage, default is 0.00.
Parameter Format	<NRF>
Query Command	**[SOURce]:VOLTage:ACLLimit?**
Return Format	<NRF>
Command Example	SOUR:VOLT:ACLL 0.00

	SOUR:VOLT:ACLL? 0.0

[SOURce]:VOLTage:DCULimit	
Command Description	Set the DC voltage upper limit. (Unit: V)
Parameter Range	- Maximum DC Voltage ~ Maximum DC Voltage, default is: Maximum DC Voltage.
Parameter Format	<NRF>
Query Command	**[SOURce]:VOLTage:DCULimit?**
Return Format	<NRF>
Command Example	SOUR:VOLT:DCUL 636.00 SOUR:VOLT:DCUL? 636.0

[SOURce]:VOLTage:DCLLimit	
Command Description	Set the DC voltage lower limit. (Unit: V)
Parameter Range	- Maximum DC Voltage ~ Maximum DC Voltage, default is: -Maximum DC Voltage.
Parameter Format	<NRF>
Query Command	**[SOURce]:VOLTage:DCLLimit?**
Return Format	<NRF>
Command Example	SOUR:VOLT:DCLL -636.00 SOUR:VOLT:DCLL? -636.0

[SOURce]:VOLTage:FULimit	
Command Description	Set the frequency upper limit. (Unit: Hz)
Parameter Range	0.001~ Maximum Frequency, default is Maximum Frequency.
Parameter Format	<NRF>
Query Command	**[SOURce]:VOLTage:FULimit?**
Return Format	<NRF>
Command Example	SOUR:VOLT:FUL 200.000 SOUR:VOLT:FUL? 200.0

[SOURce]:VOLTage:FLLimit	
Command Description	Sets the lower frequency limit. (Unit: Hz)
Parameter Range	0.001~ maximum frequency, default: 0.001.
Parameter Format	<NRF>
Query Command	**[SOURce]:VOLTage:FLLimit?**
Return Format	<NRF>
Command Example	SOUR:VOLT:FLL 0.001 SOUR:VOLT:FLL? 0.001

4.3 LOAD Subsystem

The LOAD subsystem is used to set parameters such as setpoints and limits in Load Mode. The LOAD subsystem consists of setup commands for current, voltage, power, resistance and other settings.

4.3.1 Current Setup Command

LOAD:CURRent:CHANnel	
Command Description	Sets the Load Mode Output Phase Count. Supported only in standby mode.
Parameter Range	<THRee|EACH|SINGle>, default: THRee. THRee: Three-Phase EACH: Split-Phase SINGle: Single-Phase
Parameter Format	<DSC>
Query Command	**LOAD:CURRent:CHANnel?**
Return Format	<DSC>
Command Example	LOAD:CURR:CHAN EACH LOAD:CURR:CHAN? EACH

LOAD:CURRent:SMODe	
Command Description	Sets the split-phase mode in Load Mode. Supported only in standby mode.

Parameter Range	<TCHannel| D CHannel| S CHannel>, default is TCHannel. TCHannel: Three-Phase (φ1φ2φ3) DCHannel: Two-phase (φ1φ2) SCHannel: Single-Phase (φ1)
Parameter Format	<DSC>
Query Command	**LOAD:CURRent:SMODe?**
Return Format	<DSC>
Command Example	LOAD:CURR:SMOD TCH LOAD:CURR:CHAN? TCHannel

LOAD:CURRent:MODE	
Command Description	Set the Load Mode. This can only be configured in standby mode.
Parameter Range	<CC|CP|CR|RLC|PQ>, default is CC. CC: Constant Current Mode CP: Constant Power Mode CR: Constant Resistance Mode RLC: RLC Mode PQ: PQ Mode
Parameter Format	<DSC>
Query Command	**LOAD:CURRent:MODE?**
Return Format	<DSC>
Command Example	LOAD:CURR:MODE RLC

	LOAD:CURR:MODE? RLC

LOAD:CURRent:COUPling	
Command Description	Set the Load Mode Coupling Method. This can only be configured in standby mode. This setting is effective when the Load Mode is CC, CP, or CR.
Parameter Range	<AC|DC|ACDC>, Default is AC. AC: AC DC: DC ACDC: AC+DC
Parameter Format	<DSC>
Query Command	**LOAD:CURRent:COUPling?**
Return Format	<DSC>
Command Example	LOAD:CURR:COUP DC LOAD:CURR:COUP? DC

LOAD:CURRent:CFPF	
Command Description	Set the C F/PF mode. This setting is supported only in standby mode. This setting takes effect when the Load Mode is CC or CP.
Parameter Range	<PF|CF|BPF|BCF>, Default is PF. PF： PF only

	CF： CF only BPF: Both, PF priority BCF: Both, CF priority
Parameter Format	<DSC>
Query Command	**LOAD:CURRent:CFPF?**
Return Format	<DSC>
Command Example	LOAD:CURR:CFPF CF LOAD:CURR:CFPF? CF

LOAD:CURRent:WAVeform	
Command Description	Set the output waveform for Load Mode. This setting is supported only in standby mode. This setting takes effect when the Load Mode is CC or CP and the C F/PF mode is PF. The waveform definitions are as follows: 0: Sine wave 1: Pulse wave 2: Triangle wave 3: Clipped wave 4: Positive half-wave 5: Negative half-wave 6: Leading-Edge Half Wave 7: Trailing-Edge Half Wave

	8~37： DST1~DST30 38: 2-pulse wave 39: 6-pulse wave 40: 12-pulse wave 41:1 8-pulse wave 42: 24-pulse wave 43~142: Shape1~Shape100 (Current version supports 43~57)
Parameter Range	0~142, Default is 0.
Parameter Format	<NR1>
Query Command	**LOAD:CURRent:WAVeform?**
Return Format	<NR1>
Command Example	LOAD:CURR:WAV 0 LOAD:CURR:WAV? 0

LOAD:CURRent:DCYCle	
Command Description	Set the duty cycle of the Load Mode pulse waveform. This takes effect when the output waveform is set to pulse waveform. (Unit: %)
Parameter Range	0.00~100.00, Default value: 50.0 0.
Parameter Format	<NRF>
Query Command	**LOAD:CURRent:DCYCle?**
Return Format	<NRF>
Command Example	LOAD:CURR:DCYC 50.00

	LOAD:CURR:DCYC? 50.0

LOAD:CURRent:SYMMetry	
Command Description	Sets the Load Mode triangle wave symmetry. Takes effect when the output waveform is set to triangle wave. (Unit: %)
Parameter Range	0.00~100.00, Default value: 50.00.
Parameter Format	<NRF>
Query Command	**LOAD:CURRent:SYMMetry?**
Return Format	<NRF>
Command Example	LOAD:CURR:SYMM 50.00 LOAD:CURR:SYMM? 50.0

LOAD:CURRent:CSINewave	
Command Description	Sets the Load Mode clipping percentage. Takes effect when the output waveform is set to clipping waveform. (Unit: %)
Parameter Range	0.00~50.00, Default value: 0.00.
Parameter Format	<NRF>
Query Command	**LOAD:CURRent:CSINewave?**
Return Format	<NRF>
Command Example	LOAD:CURR:CSIN 0.00

	LOAD:CURR:CSIN? 0.0

LOAD:CURRent:LEAD	
Command Description	Sets the Load Mode conduction angle percentage. Takes effect when the output waveform is set to Leading-Edge Half Wave. (Unit: %)
Parameter Range	0.00~100.00, Default value: 50.00.
Parameter Format	<NRF>
Query Command	**LOAD:CURRent:LEAD?**
Return Format	<NRF>
Command Example	LOAD:CURR:LEAD 50.00 LOAD:CURR:LEAD? 50.0

LOAD:CURRent:TRAil	
Command Description	Set the Load Mode turn-off angle percentage. This setting takes effect when the output waveform is set to Trailing-Edge Half Wave. (Unit:%)
Parameter Range	0.00~100.00, Default value: 50.00.
Parameter Format	<NRF>
Query Command	**LOAD:CURRent:TRAil?**
Return Format	<NRF>
Command Example	LOAD:CURR:TRA 50.00

	LOAD:CURR:TRA? 50.0

LOAD:CURRent:WMODe	
Command Description	Set the custom waveform mode for Load Mode. This setting takes effect when the output waveform is set to Shape#.
Parameter Range	<PEAK|RMS >, the default value is PEAK. PEAK: Peak Mode RMS: RMS Mode
Parameter Format	<DSC>
Query Command	LOAD:CURRent:WMODe?
Return Format	<DSC>
Command Example	LOAD:CURR:WMOD PEAK LOAD:CURR:WMOD? PEAK

LOAD:CURRent:AC#	
Command Description	Set the AC current for the selected phase #. (Unit: A) This setting is effective when the Load Mode is CC. When the Load Mode Coupling Method of this product is AC or AC+DC: If the Load Mode Output Phase Count is Split-Phase, #=1 represents φ1, #=2 represents φ2, and #=3 represents φ3;

	If the Load Mode Output Phase Count is Three-Phase, #=1 represents φ1, the values of φ2 and φ3 automatically remain the same as φ1 ; If the Load Mode Output Phase Count is Single-Phase, #=4 indicates φ1, and the setting values for #=1, #=2, and #=3 are invalid. When the product Load Mode Coupling Method is DC: the setting values for #=1, #=2, #=3, and #=4 are all invalid.
Parameter Range	#=1, 2, 3: 0.00~ Maximum Three-Phase Current per Unit*Number of Parallel Units, default value is 0.00. #=4: 0.00~ Maximum Single-Phase Current per Unit*Number of Parallel Units, default value is 0.00.
Parameter Format	<NRF>
Query Command	**LOAD:CURRent:AC#?**
Return Format	<NRF>
Command Example	LOAD:CURR:AC1 0.00 LOAD:CURR:AC1? 0.0

LOAD:CURRent:DC#	
Command Description	Set the direct current set value for the selected phase #. (Unit: A) This setting is effective when the Load Mode is CC. When the product Load Mode Coupling Mode is DC or AC+DC: If the Load Mode Output Phase Count is Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3;

	If the Load Mode Output Phase Count is Three-Phase, #=1 indicates φ1, and the values of φ2 and φ3 are automatically kept consistent with φ1; If the Load Mode Output Phase Count is Single-Phase, #=4 indicates φ1, and the settings for #=1, #=2, and #=3 are invalid. When the Coupling Mode of this product's Load Mode is AC, the settings for #=1, #=2, #=3, and #=4 are all invalid.
Parameter Range	#=1, 2, 3:-Maximum Three-Phase Current per Unit*Number of Parallel Units ~ Maximum Three-Phase Current per Unit*Number of Parallel Units, default value is 0.00. #=4:-Maximum Single-Phase Current per Unit*Number of Parallel Units ~ Maximum Single-Phase Current per Unit*Number of Parallel Units, default value is 0.00.
Parameter Format	<NRF>
Query Command	**LOAD:CURRent:DC#?**
Return Format	<NRF>
Command Example	LOAD:CURR:DC1 0.00 LOAD:CURR:DC1? 0.0

LOAD:CURRent:CF#	
Command Description	Set the crest factor for the selected phase #. When the Load Mode is CC or CP, this setting is valid only when the C F/PF mode is CF, BPF, or BCF. When the product Load Mode Coupling Mode is A C or AC+DC: If the Load Mode Output Phase Count is Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3;

	If the Load Mode Output Phase Count is Three-Phase, #=1 indicates φ1, and the values of φ2 and φ3 are automatically kept consistent with φ1; If the Load Mode Output Phase Count is Single-Phase, #=4 indicates φ1, and the settings for #=1, #=2, and #=3 are invalid. When the product Load Mode Coupling Mode is DC: the settings for #=1, #=2, #=3, and #=4 are all invalid.
Parameter Range	1.414~5.000, the default value is 1.414.
Parameter Format	<NRF>
Query Command	**LOAD:CURRent:CF#?**
Return Format	<NRF>
Command Example	LOAD:CURR:CF1 1.414 LOAD:CURR:CF1? 1.414

LOAD:CURRent:PF#	
Command Description	Set the power factor for the selected phase #. Inductive is positive, and capacitive is negative. When the Load Mode is CC or CP, this setting is valid only when the C F/PF mode is PF, BPF, or BCF. When the product Load Mode Coupling Mode is A C or AC+DC: If the Load Mode Output Phase Count is Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3; If the Load Mode Output Phase Count is Three-Phase, #=1 indicates φ1, and the values of φ2 and φ3 are automatically kept consistent with φ1; If the Load Mode Output Phase Count is Single-Phase, #=4 indicates φ1, and the settings for #=1,

	#=2, and #=3 are invalid. When the product Load Mode Coupling Mode is DC: the settings for #=1, #=2, #=3, and #=4 are all invalid.
Parameter Range	-1.000~1.000, default is 1. 000.
Parameter Format	<NRF>
Query Command	**LOAD:CURRent:PF#?**
Return Format	<NRF>
Command Example	LOAD:CURR:PF1 1.000 LOAD:CURR:PF1? 1.0

LOAD:CURRent:SRATe:AC

Command Description	Set the AC current slew rate. (Unit: A/ms)
Parameter Range	0.01~3000.00, default is 50.0 0.
Parameter Format	<NRF>
Query Command	**LOAD:CURRent:SRATe:AC?**
Return Format	<NRF>
Command Example	LOAD:CURR:SRAT:AC 50.00 LOAD:CURR:SRAT:AC? 50.0

LOAD:CURRent:SRATe:DC

Command Description	Set the DC current slew rate. (Unit: A/ms)
Parameter Range	0.01~3000.00, default is 5 0.00.
Parameter Format	<NRF>
Query Command	**LOAD:CURRent:SRATe:DC?**
Return Format	<NRF>
Command Example	LOAD:CURR:SRAT:DC 50.00 LOAD:CURR:SRAT:DC? 50.00

LOAD:CURRent:SPEed

Command Description	Set the Load Mode response speed.
Parameter Range	<SLOW|MIDium|FAST>, default is MIDium. SLOW: Slow MIDium: Medium FAST: Fast
Parameter Format	<DSC>
Query Command	**LOAD:CURRent:SPEed?**
Return Format	<DSC>
Command Example	LOAD:CURR:SPE MID LOAD:CURR:SPE? MIDium

LOAD:CURRent:FRANge	
Command Description	Set the frequency range.
Parameter Range	<LOW|HIGH>, default is LOW. LOW: Low frequency HIGH: High frequency
Parameter Format	<DSC>
Query Command	**LOAD:CURRent:FRANge?**
Return Format	<DSC>
Command Example	LOAD:CURR:FRAN LOW LOAD:CURR:FRAN? LOW

LOAD:CURRent:SLEW	
Command Description	Set the current slew rate. (Unit: A/us)
Parameter Range	0.001~5.000, default: 2.000.
Parameter Format	<NRF>
Query Command	**LOAD:CURRent:SLEW?**
Return Format	<NRF>
Command Example	LOAD:CURR:SLEW 2.000 LOAD:CURR:SLEW? 2.0

LOAD:CURRent:OFFSr	
Command Description	Set the Load Mode turn-off slew rate. (Unit: A/us)
Parameter Range	0.001~5.000, default: 1. 000.
Parameter Format	<NRF>
Query Command	**LOAD:CURRent:OFFSr?**
Return Format	<NRF>
Command Example	LOAD:CURR:OFFS 1.000 LOAD:CURR:OFFS? 1.0

LOAD:CURRent:ANGLe:ON	
Command Description	Set the Load Mode turn-on angle. (Unit: °)
Parameter Range	0. 0~359.9, default: 0.0.
Parameter Format	<NRF>
Query Command	**LOAD:CURRent:ANGLe:ON?**
Return Format	<NRF>
Command Example	LOAD:CURR:ANGL:ON 0.0 LOAD:CURR:ANGL:ON? 0.0

LOAD:CURRent:ANGLe:OFF	
Command Description	Set the Load Mode turn-off angle. (Unit: °)
Parameter Range	0.0~359.9, default: 0.0.
Parameter Format	<NRF>
Query Command	**LOAD:CURRent:ANGLe:OFF?**
Return Format	<NRF>
Command Example	LOAD:CURR:ANGL:OFF 0.0 LOAD:CURR:ANGL:OFF? 0.0

LOAD:CURRent:TPHase:SYNC	
Command Description	Enable the Load Mode transient angle.
Parameter Range	<ON|OFF|1|0>, default value is 0. ON/1: Enable OFF/0: Disable
Parameter Format	<Bool>
Query Command	**LOAD:CURRent:TPHase:SYNC?**
Return Format	<Bool>
Command Example	LOAD:CURR:TPH:SYNC OFF LOAD:CURR:TPH:SYNC? 0

LOAD:CURRent:TPHase:VALue	
Command Description	Set the transient angle for Load Mode. (Unit: °)
Parameter Range	0. 0~359.9, default: 0.0.
Parameter Format	<NRF>
Query Command	**LOAD:CURRent:TPHase:VALue?**
Return Format	<NRF>
Command Example	LOAD:CURR:TPH:VAL 0.0 LOAD:CURR:TPH:VAL? 0.0

LOAD:CURRent:ACULimit	
Command Description	Set the upper limit for AC current. (Unit: A)
Parameter Range	0.00~ Maximum Three-Phase Current per Unit*Number of Parallel Units, default is Maximum Three-Phase Current per Unit*Number of Parallel Units. Note: When the Load Mode Output Phase Count is set to Single-Phase, the parameter setting range remains unchanged, the actual limit is the set value* 3, and the actual default is Maximum Three-Phase Current per Unit* 3* Number of Parallel Units.
Parameter Format	<NRF>
Query Command	**LOAD:CURRent:ACULimit?**
Return Format	<NRF>
Command Example	LOAD:CURR:ACUL 35.00 LOAD:CURR:ACUL?

	35.0

LOAD:CURRent:ACLLimit

Command Description	Set the lower limit for AC current. (Unit: A)
Parameter Range	0.00~ Maximum Three-Phase Current per Unit*Number of Parallel Units, default is 0.00. Note: When the Load Mode Output Phase Count is set to Single-Phase, the parameter setting range remains unchanged, the actual limit is the set value* 3, and the actual default is 0.00.
Parameter Format	<NRF>
Query Command	**LOAD:CURRent:ACLLimit?**
Return Format	<NRF>
Command Example	LOAD:CURR:ACLL 0.00 LOAD:CURR:ACLL? 0.0

LOAD:CURRent:DCULimit

Command Description	Set the DC current upper limit. (Unit: A)
Parameter Range	-Maximum Three-Phase Current per Unit*Number of Parallel Units ~ Maximum Three-Phase Current per Unit*Number of Parallel Units; the default value is Maximum Three-Phase Current per Unit*Number of Parallel Units. Note: When the Load Mode Output Phase Count is set to Single-Phase, the parameter setting range remains unchanged, the actual limit is the set value* 3, and the actual default is Maximum Three-Phase Current per Unit* 3* Number of Parallel Units.

Parameter Format	<NRF>
Query Command	**LOAD:CURRent:DCULimit?**
Return Format	<NRF>
Command Example	LOAD:CURR:DCUL 35.00 LOAD:CURR:DCUL? 35.0

LOAD:CURRent:DCLLimit

Command Description	Set the DC current lower limit. (Unit: A)
Parameter Range	-Maximum Three-Phase Current per Unit*Number of Parallel Units~Maximum Three-Phase Current per Unit*Number of Parallel Units; the default value is -Maximum Three-Phase Current per Unit*Number of Parallel Units. Note: When Load Mode Output Phase Count is set to Single-Phase, the parameter setting range remains unchanged. The actual limit is the set value* 3, and the actual default value is -Maximum Three-Phase Current per Unit* 3* Number of Parallel Units.
Parameter Format	<NRF>
Query Command	**LOAD:CURRent:DCLLimit?**
Return Format	<NRF>
Command Example	LOAD:CURR:DCLL -35.00 LOAD:CURR:DCLL? -35.0

4.3.2 Power Setting Command

LOAD:POWer:APParent#	
Command Description	Sets the apparent power of the selected phase #. (Unit: kVA) This setting is valid when the Load Mode is CP. When this product's Load Mode Coupling Method is AC or AC+DC: If the Load Mode Output Phase Count is Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3; If the Load Mode Output Phase Count is Three-Phase, #=1 indicates φ1, and the values of φ2 and φ3 automatically remain consistent with φ1; If the Load Mode Output Phase Count is Single-Phase, #=4 indicates φ1, while the settings for #=1, #=2, and #=3 are invalid. When this product's Load Mode Coupling Method is DC, the settings for #=1, #=2, #=3, and #=4 are all invalid.
Parameter Range	#=1, 2, 3: 0.00 ~Maximum Three-Phase Power per Unit*Number of Parallel Units, default value is 0.00. #=4: 0.00 ~Maximum Single-Phase Power per Unit*Number of Parallel Units, default value is 0.00.
Parameter Format	<NRF>
Query Command	**LOAD:POWer:APParent#?**
Return Format	<NRF>
Command Example	LOAD:POW:APP1 0.00 LOAD:POW:APP1? 0.00

LOAD:POWer:ACTive#	
Command Description	Set the Active Power for the selected phase #. (Unit: kW) This setting is valid when the Load Mode is CP. When the Load Mode Coupling Method of this product is DC: If the Load Mode Output Phase Count is Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3; If the Load Mode Output Phase Count is Three-Phase, #=1 indicates φ1, and the values of φ2 and φ3 automatically remain consistent with φ1; If the Load Mode Output Phase Count is Single-Phase, #=4 indicates φ1, while the settings for #=1, #=2, and #=3 are invalid. When the Load Mode Coupling Method of this product is AC or AC+DC: the setting values of #=1, #=2, #=3, and #=4 are all invalid.
Parameter Range	#=1, 2, 3: -Maximum Three-Phase Power per Unit*Number of Parallel Units~Maximum Three-Phase Power per Unit*Number of Parallel Units, default value is 0.00. #=4: -Maximum Single-Phase Power per Unit*Number of Parallel Units~Maximum Single-Phase Power per Unit*Number of Parallel Units, default value is 0.00.
Parameter Format	<NRF>
Query Command	**LOAD:POWer:ACTive#?**
Return Format	<NRF>
Command Example	LOAD:POW:ACT1 0.00 LOAD:POW:ACT1? 0.00

LOAD:IMPedance:PQ:TDATa	
Command Description	Set load PQ mode parameters. This setting is valid when the Load Mode Output Phase Count is Three-Phase or Split-Phase. There are 9 parameters in total, as listed below: φ 1 PQ Mode P φ1 PQ Mode Q_L (unit: Ω) φ 1 PQ Mode Q_C (unit: mH) φ 2 PQ Mode P φ2 PQ Mode Q_L (unit: Ω) φ 2 PQ Mode Q_C (unit: mH) φ 3 PQ Mode P φ3 PQ Mode Q_L (unit: Ω) φ 3 PQ Mode Q_C (unit: mH) Note: when the Load Mode Output Phase Count is Three-Phase, the parameters for φ 2 and φ 3 must not be omitted.
Parameter Range	For details, see Table 1 3 in Section 8.3 of the user manual for the corresponding ranges and default values of the apparent power item for three/split-phase
Parameter Format	<NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2>
Query Command	**LOAD:IMPedance:PQ:TDATa?**
Return Format	<NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2>
Command Example	LOAD:IMP:PQ:TDAT 1000.0,1000.0,1000.0,1000.0,1000.0,1000.0,1000.0,1000.0,1000.0 LOAD:IMP:PQ:TDAT?

	1000.0,1000.0,1000.0, 1000.0,1000.0,1000.0, 1000.0,1000.0,1000.0

LOAD:IMPedance:PQ:SDATa	
Command Description	Set load PQ mode parameters. This setting is valid when the Load Mode Output Phase Count is Single-Phase. A total of 3 parameters are listed below: Single-Phase PQ Mode P Single-Phase PQ Mode Q_L (Unit: Ω) Single-Phase PQ Mode Q_C (Unit: mH)
Parameter Range	For details, see Table 1 3 in Section 8.3 of the user manual for the corresponding ranges and default values of the apparent power item for Single-Phase
Parameter Format	<NR2,NR2,NR2>
Query Command	**LOAD:IMPedance:PQ:SDATa?**
Return Format	<NR2,NR2,NR2 >
Command Example	LOAD:IMP:PQ:SDAT 1000.0,1000.0,1000.0 LOAD:IMP:PQ:SDAT? 1000.0,1000.0,1000.0

4.3.3 Resistance Setting Command

LOAD:IMPedance:R#	
Command Description	Set the specified resistance. (Unit: Ω)

	This setting is valid when the Load Mode is CR. If the Load Mode Output Phase Count is Split-Phase, #=1 indicates φ1, #=2 indicates φ2, and #=3 indicates φ3; If the Load Mode Output Phase Count is Three-Phase, #=1 indicates φ1, and the values of φ2 and φ3 are automatically kept consistent with φ1; If the Load Mode Output Phase Count is Single-Phase, #=1 indicates φ1, and the setting values for #=2 and #=3 are invalid.
Parameter Range	0.001~1000.000, default value: 1000.
Parameter Format	<NRF>
Query Command	**LOAD:IMPedance:R#?**
Return Format	<NRF>
Command Example	LOAD:IMP:R1 1000 LOAD:IMP:R1? 1000

LOAD:IMPedance:RLC:DATA	
Command Description	Set load R LC mode RLC topology and parameters. A total of 1 8 parameters are listed below: φ 1 RLC topology selection φ1 RLC mode R (unit: Ω) φ1 RLC mode L (unit: mH) φ1 RLC mode R_L (unit: Ω) φ1 RLC mode C (unit: uF)

	φ1 RLC mode R_C (unit: Ω) φ 2 RLC topology selection φ2 RLC mode R (unit: Ω) φ2 RLC mode L (unit: mH) φ2 RLC mode R_L (unit: Ω) φ2 RLC Mode C (Unit: uF) φ2 RLC Mode R_C (Unit: Ω) φ 3 RLC Topology Selection φ3 RLC Mode R (Unit: Ω) φ3 RLC Mode L (Unit: mH) φ3 RLC Mode R_L (Unit: Ω) φ3 RLC Mode C (Unit: uF) φ3 RLC Mode R_C (Unit: Ω) Note: When the Load Mode Output Phase Count is Three-Phase, φ 2 and φ 3 parameters cannot be omitted.
Parameter Range	φ1, φ 2, φ 3 RLC Topology Selection: 0~11, default value: 0 ; φ1, φ 2, φ 3 RLC Mode R: 0.001~1000.0, default value: 1000.0 ; φ 1, φ 2, φ 3 RLC Mode L: 1.000~5000.0, default value: 5000. 0 ; φ 1, φ 2, φ 3 RLC Mode R L: 0.000~1000.0, default value: 0. 000 ; φ 1, φ 2, φ 3 RLC Mode C: 1.000~5000.0, default value: 1. 000 ; φ 1, φ 2, φ 3 RLC Mode R C: 0~1000.0, default value: 0.000 ;
Parameter Format	<NR1,NR2,NR2,NR2,NR2,NR2,NR1,NR2,NR2,NR2,NR2,NR2,NR1,NR2,NR2,NR2,NR2,NR2>
Query Command	**LOAD:IMPedance:RLC:DATA?**

Return Format	<NR1,NR2,NR2,NR2,NR2,NR2,NR1,NR2,NR2,NR2,NR2,NR2,NR1,NR2,NR2,NR2,NR2,NR2>
Command Example	LOAD:IMP:RLC:DATA 0,1000.0,5000.0,0.0,1.0,0.0,0,1000.0,5000.0,0.0,1.0,0.0,0,1000.0,5000.0,0.0,1.0,0.0 LOAD:IMP:RLC:DATA? 0,1000.0,5000.0,0.0,1.0,0.0,0,1000.0,5000.0,0.0,1.0,0.0,0,1000.0,5000.0,0.0,1.0,0.0

4.4 OUTPut Subsystem

The OUTPut subsystem is used to control the product's output status and set related time parameters. The OUTPut subsystem consists of commands such as output control and time settings.

4.4.10utput control commands

OUTPut[:STATe]	
Command Description	When this product's communication port is set to a remote interface (such as LAN, USB, or MagicBus), this command controls whether the product outputs or enters standby.
Parameter Range	<ON|OFF|1|0>, default value is 0. ON/1: Output OFF/0: Standby
Parameter Format	<Bool>
Query Command	**OUTPut[:STATe]?**
Return Format	<Bool>
Command Example	OUTP:STAT ON OUTP:STAT? 1

4.5 SYSTem Subsystem

The SYSTem Subsystem is used to set and query various system parameters of this product. The SYSTem Subsystem consists of setting commands for the system, Anypor t interface, waveform, etc. as well as query commands for various system information.

4.5.1System setting commands

SYSTem:MODE	
Command Description	Sets the operating mode of this product; this can only be set in standby mode.
Parameter Range	<SOURce|LOAD>, default is SOURce. SOURce: Source LOAD: Load
Parameter Format	<DSC>
Query Command	**SYSTem:MODE?**
Return Format	<DSC>
Command Example	SYST:MODE SOUR SYST:MODE? SOURce

SYSTem:RESet	
Command Description	Reset command. After this product receives the command, it performs the following operations: 1) If the device is in a fault state, reset the device fault.

	2） Clear alarm messages.
Command Example	SYSTem:RESet

SYSTem:INTerface	
Command Description	Set the communication port of the power supply
Parameter Range	< SCReen|LAN|USB>, default value is SCReen. SCReen: Display screen, local control LAN: Rear-panel LAN port, remote control USB: Rear-panel USB Type B port, remote control
Parameter Format	<DSC>
Query Command	**SYSTem:INTerface?**
Return Format	<DSC>
Command Example	SYST:INT SCR SYST:INT? SCReen

4.5.2 Anyport interface commands

SYSTem:ANYPort:POLarity:IN#	
Command Description	Set the polarity of the Anyport digital input interface. # indicates the digital input interface number, with a range of 1 to 6.
Parameter Range	< POSitive|NEGative>, default value is POSitive.

	POSitive: Positive, active high NEGative: Negative, active low
Parameter Format	<DSC>
Query Command	**SYSTem:ANYPort:POLarity:IN#?**
Return Format	<DSC>
Command Example	SYST:ANYP:POL:IN1 POS SYST:ANYP:POL:IN1? POSitive

SYSTem:ANYPort:POLarity:OUT#	
Command Description	Set the polarity of the Anyport digital output interface. # indicates the digital output interface number, with a range of 1 to 6.
Parameter Range	< POSitive|NEGative>, default value is POSitive. POSitive: Positive, active high NEGative: Negative, active low
Parameter Format	<DSC>
Query Command	**SYSTem:ANYPort:POLarity:OUT#?**
Return Format	<DSC>
Command Example	SYST:ANYP:POL:OUT1 POS SYST:ANYP:POL:OUT1? POSitive

SYSTem:ANYPort:FUNCtion:IN#	
Command Description	Set the Anyport digital input interface function; # indicates the digital input interface number, ranging from 1 to 6.
Parameter Range	<NONE|ANAlogy|TRIG|DAISy|RUN|RESet|ESTOp|SYNin>, default is NONE. NONE: No function ANAlogy: External setpoint enable TRIG: Trigger DAISy: Interlock RUN: Start/Stop RESet: Reset ESTOp: Emergency stop SYNin: External sync input
Parameter Format	<DSC>
Query Command	**SYSTem:ANYPort:FUNCtion:IN#?**
Return Format	<DSC>
Command Example	SYST:ANYP:FUNC:IN1 TRIG SYST:ANYP:FUNC:IN1? TRIG

SYSTem:ANYPort:FUNCtion:OUT#	
Command Description	Set the Anyport digital in put interface function; # indicates the digital out put interface number, ranging from 1 to 6.

Parameter Range	<NONE|DAISy|TRIG|RUN|CV|FAULt|VINDicate|CINDicate|PSIGnal|SYNout>, default is NONE. NONE: No function DAISy: Interlock TRIG: Trigger RUN: Run CV: CV status FAULt: Fault status VINDicate: Voltage indication CINDicate: Current indication PSIGnal: General-purpose SYNin: External sync output
Parameter Format	<DSC>
Query Command	**SYSTem:ANYPort:FUNCtion:OUT#?**
Return Format	<DSC>
Command Example	SYST:ANYP:FUNC:OUT1 DAIS SYST:ANYP:FUNC:OUT1? DAISy

SYSTem:ANYPort:ENABle:IN#	
Command Description	Set Anyport digital input port status, # indicates the digital input port number, ranging from 1 to 6.
Parameter Range	<ON|OFF|1|0>, default is 0. ON/1: On (enabled)

	OFF/0: Off (disabled)
Parameter Format	<Bool>
Query Command	**SYSTem:ANYPort:ENABle:IN#?**
Return Format	<Bool>
Command Example	SYST:ANYP:ENAB:IN1 ON SYST:ANYP:ENAB:IN1? 1

SYSTem:ANYPort:ENABle:OUT#	
Command Description	Set Anyport digital output port status, # indicates the digital output port number, ranging from 1 to 6.
Parameter Range	<ON|OFF|1|0>, default is 0. ON/1: On (enabled) OFF/0: Off (disabled)
Parameter Format	<Bool>
Query Command	**SYSTem:ANYPort:ENABle:OUT#?**
Return Format	<Bool>
Command Example	SYST:ANYP:ENAB:OUT1 ON SYST:ANYP:ENAB:OUT1? 1

SYSTem:REFerence:RANGe

Command Description	Set Anyport analog input range. (Unit: V)
Parameter Range	<5|10>, default is 5V. 5： 5V 10： 10V
Parameter Format	<DSC>
Query Command	**SYSTem:REFerence:RANGe?**
Return Format	<DSC>
Command Example	SYST:REF:RANG 10 SYST:REF:RANG? 10

SYSTem:REFerence:ENABle:IN#	
Command Description	Set Anyport analog input port status, # indicates the analog input port number, ranging from 1 to 4.
Parameter Range	<ON|OFF|1|0>, default is 0. ON/1: On (enabled) OFF/0: Off (disabled)
Parameter Format	<Bool>
Query Command	**SYSTem:REFerence:ENABle:IN#?**
Return Format	<Bool>
Command Example	SYST:REF:ENAB:IN1 ON SYST:REF:ENAB:IN1?

	1

SYSTem:REFerence:ENABle:OUT#	
Command Description	Set the switching status of the Anyport analog output interface, # indicates the analog output interface number, range 1 to 4.
Parameter Range	<ON|OFF|1|0>, default is 0. ON/1: On (enabled) OFF/0: Off (disabled)
Parameter Format	<Bool>
Query Command	**SYSTem:REFerence:ENABle:OUT#?**
Return Format	<Bool>
Command Example	SYST:REF:ENAB:OUT1 ON SYST:REF:ENAB:OUT1? 1

SYSTem:REFerence:TYPE:IN#	
Command Description	Set the function of the Anyport analog input interface, # indicates the analog input interface number, range 1 to 3. Note: The function of analog input interface 4 is fixed and does not need to be selected.
Parameter Range	<AMP|RMS|IMME>, default is AMP. AMP: Track amplitude RMS: Track RMS value

	IMME: Real-time tracking
Parameter Format	<DSC>
Query Command	**SYSTem:REFerence:TYPE:IN#?**
Return Format	<DSC>
Command Example	SYST:REF:TYPE:IN1 AMP SYST:REF:TYPE:IN1? AMP

SYSTem:REFerence:TYPE:OUT#	
Command Description	Set the function of the Anyport analog output interface, # indicates the analog output interface number, range 1 to 2.
Parameter Range	<0~17>, default is 0. 0: φ1 Urms, φ1 voltage RMS value 1: φ2 Urms, φ2 voltage RMS value 2: φ3 Urms, φ3 voltage RMS value 3: φ1 Irms, φ1 current RMS value 4: φ2 Irms, φ2 current RMS value 5: φ3 Irms, φ3 current RMS value 6: φ1 P, φ1 Active Power 7: φ2 P, φ2 Active Power 8: φ3 P, φ3 Active Power 9: φ1 S, φ1 apparent power 10: φ2 S, φ2 apparent power

	11: φ3 S, φ3 apparent power 12: φ1 Q, φ1 reactive power 13: φ2 Q, φ2 reactive power 14: φ3 Q, φ3 reactive power 15: ΣP, total Active Power 16: ΣS, total apparent power 17: ΣQ, total reactive power
Parameter Format	<DSC>
Query Command	**SYSTem:REFerence:TYPE:OUT#?**
Return Format	<DSC>
Command Example	SYST:REF:TYPE:OUT1 4 SYST:REF:TYPE:OUT1? 4

4.5.3 Waveform configuration commands

SYSTem:WAVEform:DATA#	
Command Description	Used to set the 4096 points of the custom waveform Shape. The data is downloaded in 8 groups, with 512 data points in each group. # indicates the custom waveform group number, ranging from 1 to 8.
Parameter Range	-32768~32767
Parameter Format	<NR1>……<NR1>
Query Command	**SYSTem:WAVEform:DATA#?**

Return Format	<NR1>……<NR1>
Command Example	SYST:WAVE:DATA3 1024,256……1024,255 SYST:WAVE:DATA3? 1024,256……1024,255

SYSTem:WAVEform:STORe

Command Description	Stores the waveform data of the custom waveform Shape in the specified location.
Parameter Range	1~100
Parameter Format	<NR1>
Command Example	SYST:WAVE:STOR 10 SYST:WAVE:STOR? 10

SYSTem:WAVEform:LOAD

Command Description	Reads the waveform data of the custom waveform Shape from the specified location.
Parameter Range	1~100
Parameter Format	<NR1>
Command Example	SYST:WAVE:LOAD 10 SYST:WAVE:LOAD? 10

4.6 PROTection subsystem

The PROTection subsystem is used to set related protection parameters. The PROTection subsystem consists of commands for various protection thresholds and protection times.

4.6.1Protection Threshold Command

PROTection:LEVel:VOLTage	
Command Description	Set the RMS overvoltage threshold. (Unit: V)
Parameter Range	0.00~ Maximum DC Voltage+ 10, default: Maximum DC Voltage+ 10.
Parameter Format	<NRF>
Query Command	**PROTection:LEVel:VOLTage?**
Return Format	<NRF>
Command Example	PROT:LEV:VOLT 636.00 PROT:LEV:VOLT? 636.0

PROTection:LEVel:AC	
Command Description	Set the AC overvoltage threshold. (Unit: V)
Parameter Range	0.00~ Maximum AC Voltage+ 10, default: Maximum AC Voltage+ 10.
Parameter Format	<NRF>
Query Command	**PROTection:LEVel:AC?**
Return Format	<NRF>

Command Example	PROT:LEV:AC 450.00 PROT:LEV:AC? 450.0

PROTection:LEVel:POSitive	
Command Description	Set the positive DC overvoltage threshold. (Unit: V)
Parameter Range	0.00~ Maximum DC Voltage+ 10, default: Maximum DC Voltage+ 10.
Parameter Format	<NRF>
Query Command	**PROTection:LEVel:POSitive?**
Return Format	<NRF>
Command Example	PROT:LEV:POS 636.00 PROT:LEV:POS? 636.0

PROTection:LEVel:NEGative	
Command Description	Set the negative DC overvoltage threshold. (Unit: V)
Parameter Range	- Maximum DC Voltage-10~0.00, default: - Maximum DC Voltage-10.
Parameter Format	<NRF>
Query Command	**PROTection:LEVel:NEGative?**
Return Format	<NRF>
Command Example	PROT:LEV:NEG -636.00 PROT:LEV:NEG?

	-636.00

PROTection:LEVel:FVOLtage	
Command Description	Set the fast peak overvoltage threshold. (Unit: V)
Parameter Range	0.00~ peak voltage, default value: peak voltage.
Parameter Format	<NRF>
Query Command	**PROTection:LEVel:FVOLtage?**
Return Format	<NRF>
Command Example	PROT:LEV:FVOL 650.00 PROT:LEV:FVOL? 650.0

PROTection:LEVel:LVOLtage	
Command Description	Set the load AC undervoltage threshold. (Unit: V)
Parameter Range	10.00~ Maximum AC Voltage, default value: 10.00.
Parameter Format	<NRF>
Query Command	**PROTection:LEVel:LVOLtage?**
Return Format	<NRF>
Command Example	PROT:LEV:LVOL 10.00 PROT:LEV:LVOL? 10.0

PROTection:LEVel:CURRent	
Command Description	Set the RMS overcurrent threshold. (Unit: A)
Parameter Range	0.00~ 1.05* Maximum Three-Phase Current per Unit*Number of Parallel Units, default value: 1.05* Maximum Three-Phase Current per Unit*Number of Parallel Units.
Parameter Format	<NRF>
Query Command	**PROTection:LEVel:CURRent?**
Return Format	<NRF>
Command Example	PROT:LEV:CURR 36.75 PROT:LEV:CURR? 36.75

PROTection:LEVel:ACTive	
Command Description	Set the Active Power threshold. (Unit: kW)
Parameter Range	0.000~1.05* Maximum Three-Phase Power per Unit* 3* Number of Parallel Units, default is 1.05* Maximum Three-Phase Power per Unit* 3* Number of Parallel Units.
Parameter Format	<NRF>
Query Command	**PROTection:LEVel:ACTive?**
Return Format	<NRF>
Command Example	PROT:LEV:ACT 20.000 PROT:LEV:ACT? 20.000

PROTection:LEVel:APParent	
Command Description	Set the Apparent Power threshold. (Unit: kVA)
Parameter Range	0.000~1.05* Maximum Three-Phase Power per Unit* 3* Number of Parallel Units, default is 1.05* Maximum Three-Phase Power per Unit* 3* Number of Parallel Units.
Parameter Format	<NRF>
Query Command	**PROTection:LEVel:APParent?**
Return Format	<NRF>
Command Example	PROT:LEV:APP 20.000 PROT:LEV:APP? 20.0

PROTection:LEVel:HFReq	
Command Description	Set the overfrequency threshold. (Unit: Hz)
Parameter Range	0.001~ maximum frequency, default is the maximum frequency.
Parameter Format	<NRF>
Query Command	**PROTection:LEVel:HFReq?**
Return Format	<NRF>
Command Example	PROT:LEV:HFR 2000.000 PROT:LEV:HFR? 2000.000

PROTection:LEVel:LFReq	
Command Description	Set the underfrequency threshold. (Unit: Hz)
Parameter Range	0.001~ maximum frequency, default is 0.001.
Parameter Format	<NRF>
Query Command	**PROTection:LEVel:LFReq?**
Return Format	<NRF>
Command Example	PROT:LEV:LFR 0.001 PROT:LEV:LFR? 0.001

4.6.2 Protection Delay Command

PROTection:TDELay:VOLTage	
Command Description	Set the RMS overvoltage delay. (Unit: ms)
Parameter Range	1~3000, default value is 100.
Parameter Format	<NR1>
Query Command	**PROTection:TDELay:VOLTage?**
Return Format	<NR1>
Command Example	PROT:TDEL:VOLT 100 PROT:TDEL:VOLT? 100

PROTection:TDELay:AC	
Command Description	Set the AC overvoltage delay. (Unit: ms)
Parameter Range	1~3000, default value is 100.
Parameter Format	<NR1>
Query Command	**PROTection:TDELay:AC?**
Return Format	<NR1>
Command Example	PROT:TDEL:AC 100 PROT:TDEL:AC? 100

PROTection:TDELay:POSitive	
Command Description	Set the DC positive overvoltage delay. (Unit: ms)
Parameter Range	1~3000, default value is 100.
Parameter Format	<NR1>
Query Command	**PROTection:TDELay:POSitive?**
Return Format	<NR1>
Command Example	PROT:TDEL:POS 100 PROT:TDEL:POS? 100

PROTection:TDELay:NEGative

Command Description	Set the DC negative overvoltage delay. (Unit: ms)
Parameter Range	1~3000, default value is 100.
Parameter Format	<NR1>
Query Command	**PROTection:TDELay:NEGative?**
Return Format	<NR1>
Command Example	PROT:TDEL:NEG 100 PROT:TDEL:NEG? 100

PROTection:TDELay:CURRent

Command Description	Set the RMS overcurrent delay. (Unit: ms)
Parameter Range	1~3000, default value is 100.
Parameter Format	<NR1>
Query Command	**PROTection:TDELay:CURRent?**
Return Format	<NR1>
Command Example	PROT:TDEL:CURR 100 PROT:TDEL:CURR? 100

PROTection:TDELay:ACTive

Command Description	Set the Active Power delay. (Unit: ms)
Parameter Range	1~3000, default value is 100.

Parameter Format	<NR1>
Query Command	**PROTection:TDELay:ACTive?**
Return Format	<NR1>
Command Example	PROT:TDEL:ACT 100 PROT:TDEL:ACT? 100

PROTection:TDELay:APParent

Command Description	Set the apparent power delay. (Unit: ms)
Parameter Range	1~3000, default value is 100.
Parameter Format	<NR1>
Query Command	**PROTection:TDELay:APParent?**
Return Format	<NR1>
Command Example	PROT:TDEL:APP 100 PROT:TDEL:APP? 100

PROTection:TDELay:HFReq

Command Description	Set the overfrequency delay. (Unit: ms)
Parameter Range	1~3000, default value is 100.
Parameter Format	<NR1>
Query Command	**PROTection:TDELay:HFReq?**

Return Format	<NR1>
Command Example	PROT:TDEL:HFR 100 PROT:TDEL:HFR? 100

PROTection:TDELay:LFReq

Command Description	Set the underfrequency delay. (Unit: ms)
Parameter Range	1~3000, default value is 100.
Parameter Format	<NR1>
Query Command	**PROTection:TDELay:LFReq?**
Return Format	<NR1>
Command Example	PROT:TDEL:LFR 100 PROT:TDEL:LFR? 100

PROTection:TDELay:LVOLtage

Command Description	Set the load AC undervoltage delay. (Unit: ms)
Parameter Range	1~3000, default value is 20.
Parameter Format	<NR1>
Query Command	**PROTection:TDELay:LVOLtage?**
Return Format	<NR1>
Command Example	PROT:TDEL:LVOL 20

	PROT:TDEL:LVOL? 20

4.7 PROGram Subsystem

The PROGram subsystem is used to set various programming parameters. The PROGram subsystem consists of programming control commands such as List, W ave, Advanced and HARMonic.

4.7.1 LIST Programming Command

PROGram:LIST:INITiate	
Command Description	LIST programming enable command. After the device receives this command, it enters the test preparation state. At this time, the programmed test data will be locked. If the device is in the output state and receives the * TRG test trigger command, the LIST programmed test will enter the triggered state and begin executing the preset test steps. Note: When the LIST programming trigger input is set to external input, the test will be triggered through the Any port input interface. For detailed settings, see the relevant section on Any port.
Command Example	PROG:LIST:INIT

PROGram:LIST:SEGMent	
Command Description	Set the number of steps for the LIST programmed test.
Parameter Range	1~300
Parameter Format	<NR1>
Query Command	**PROGram:LIST:SEGMent?**
Return Format	<NR1>

Command Example	PROG:LIST:SEGM 10 PROG:LIST:SEGM? 10

PROGram:LIST:DATA#	
Command Description	Set the LIST programming test parameters for the selected step #. There are 9 parameters in total, as listed below: ProgEn (Programming Enable, 1: Enable, 0: Disable) φ 1, φ2, φ3 Uac (AC voltage, unit: V) φ 1, φ2, φ3 U dc (DC voltage, unit: V) Freq (frequency, unit: H z) Dwell (dwell time, unit: 100 μs) Where # indicates the number of LIST programming experiment steps, ranging from 1 to 300. Note 1: 1) If the Output Phase Count is Three-Phase, the values of φ2 and φ3 automatically match φ1. 2) If the Output Phase Count is Single-Phase, the set value of φ1 is valid, while the set values of φ2 and φ3 are invalid but cannot be omitted. Note 2: 1) If the Coupling Mode is AC, the Udc set values for φ 1, φ2, and φ3 are invalid but cannot be omitted. 2) If Coupling Mode is DC, the Uac and Freq setting values for φ 1, φ2, and φ3 are all invalid, but must not be omitted.
Parameter Range	Prog En, programming enable: 0~1

	φ 1, φ 2, φ 3 Uac, AC voltage: 0.00~ 450.00 φ 1, φ 2, φ 3Uac, DC voltage:- 636.00 ~ 636. 00 Freq, frequency: 0.001~200.000 Dwell, dwell time: 0~ 9999999
Parameter Format	<NR1,NRF,NRF,NRF,NRF,NRF,NRF,NRF,NR1>
Query Command	**PROGram:LIST:DATA#?**
Return Format	<NR1,NRF,NRF,NRF,NRF,NRF,NRF,NRF,NR1>
Command Example	PROG:LIST:DATA1 1,220.00,220.00,220.00,0.00,0.00,0.00,50.000,10000 PROG:LIST:DATA1? 1,220.0,220.0,220.0,0.0,0.0,0.0,50.0,10000

PROGram:LIST:COUNt	
Command Description	Set the number of cycles for the LIST programming experiment.
Parameter Range	0~9999999, 0 indicates infinite looping. The default value is 0.
Parameter Format	<NR1>
Query Command	**PROGram:LIST:COUNt?**
Return Format	<NR1>
Command Example	PROG:LIST:COUN 10 PROG:LIST:COUN? 10

PROGram:LIST:ENDState

Command Description	Sets the end state of the LIST programming experiment.
Parameter Range	<STEady|HOLD|STANdby>, default is STEady. STEady: Steady state. After the experiment ends, this product returns to the steady-state parameters and continues running. HOLD: Hold. After the experiment ends, this product continues running with the parameters of the last step. STANdby: Standby. After the experiment ends, this product stops running and enters standby mode.
Parameter Format	<DSC>
Query Command	**PROGram:LIST:ENDState?**
Return Format	<DSC>
Command Example	PROG:LIST:ENDS STE PROG:LIST:ENDS? STEady

PROGram:LIST:CONTinuous

Command Description	Sets the continuous trigger for the LIST programming experiment. When enabled, the programming-enabled state is not exited after the experiment ends, and you can directly send the trigger command* TRG to restart the experiment.
Parameter Range	<ON|OFF|1|0>, default is OFF. ON/1: Enable (On) OFF/0: Disabled (Off)
Parameter Format	<Bool>

Query Command	**PROGram:LIST:CONTinuous?**
Return Format	<Bool>
Command Example	PROG:LIST:CONT OFF PROG:LIST:CONT? 0

PROGram:LIST:TRIGer	
Command Description	Set the trigger mode for the LIST programmed test.
Parameter Range	<AUTO|MANual>, the default value is AUTO. AUTO: Automatic. After receiving * TRG or an external trigger command, this product executes all programmed test steps. MANual: Single-step. After receiving * TRG or an external trigger command, this product executes only one programmed test step.
Parameter Format	<DSC>
Query Command	**PROGram:LIST:TRIGer?**
Return Format	<DSC>
Command Example	PROG:LIST:TRIG AUTO PROG:LIST:TRIG? AUTO

PROGram:LIST:INPut	
Command Description	Set the trigger input for the LIST programmed test.

Parameter Range	<INTernal|EXTernal>, the default value is INTernal. INTernal: Internal. Triggers the test through the display or via the external communication command *TRG. EX Ternal: External. Triggers the test through the Anyport digital input interface. For details, see the Anyport interface command section.
Parameter Format	<DSC>
Query Command	**PROGram:LIST:INPut?**
Return Format	<DSC>
Command Example	PROG:LIST:INP INT PROG:LIST:INP? INTernal

PROGram:LIST:DELay	
Command Description	Set the LIST programmed test trigger delay time. (Unit: ms)
Parameter Range	0~999999, the default value is 0.
Parameter Format	<NR1>
Query Command	**PROGram:LIST:DELay?**
Return Format	<NR1>
Command Example	PROG:LIST:DEL 0 PROG:LIST:DEL? 0

PROGram:LIST:OUTPut	
Command Description	Set the LIST programmed test trigger output mode. Used to output a narrow pulse through the Anyport interface at the specified moment in the test. The Anyport interface must be enabled; for details, see the relevant section on the Anyport interface.
Parameter Range	< ONCE|STEP|CYCLe>, the default value is ONCE. ONCE: Output a pulse only when the test enters the trigger state each time STEP: Output a pulse at every step of the test CYCLe: Output a pulse in each cycle of the test
Parameter Format	<DSC>
Query Command	**PROGram:LIST:OUTPut?**
Return Format	<DSC>
Command Example	PROG:LIST:OUTP ONCE PROG:LIST:OUTP? ONCE

PROGram:LIST:RMSMode	
Command Description	Set the LIST programmed test RMS Mode.
Parameter Range	<AUTO|ENABle|DISable>, the default value is AUTO. AUTO: Automatic. When the programmed waveform is a sine wave, clipped wave, built-in harmonic, or custom waveform, and the custom waveform mode is RMS Mode, RMS Mode is automatically enabled. The output voltage is closed-loop controlled, and the output voltage is

	automatically adjusted to match the set value. Otherwise, RMS Mode is automatically disabled, and the output voltage is open-loop. ENABle: Enable. Forcibly enables output voltage RMS adjustment. DISable: Disable. Forcibly disables output voltage RMS adjustment.
Parameter Format	<DSC>
Query Command	**PROGram:LIST:RMSMode?**
Return Format	<DSC>
Command Example	PROG:LIST:RMSM AUTO PROG:LIST:RMSM? AUTO

4.7.2 WAVE programming command

PROGram:WAVE:INITiate	
Command Description	WAVE programming enable command. After the product receives this command, it enters the test preparation state. At this time, the programmed test data is locked. If the product is in the output state and receives the * TRG test trigger command, the WAVE programming test enters the trigger state and begins executing the preset test steps. Note: When the WAVE programming trigger input is set to external input, the experiment will be triggered through the Any port input interface. For details, see the relevant section on Any port.
Command Example	PROG:WAVE:INIT

PROGram:WAVE:SEGMent

Command Description	Set the number of steps for the WAVE programming experiment.
Parameter Range	1~300
Parameter Format	<NR1>
Query Command	**PROGram:WAVE:SEGMent?**
Return Format	<NR1>
Command Example	PROG:WAVE:SEGM 1 PROG:WAVE:SEGM? 1

PROGram:WAVE:DATA#	
Command Description	Set the WAVE programming experiment parameters for the selected step #, for a total of 9 parameters, as listed below: ProgEn (Programming Enable, 1: Enable, 0: Disable) φ 1, φ2, φ3 Uac (AC voltage, unit: V) φ 1, φ2, φ3 U dc (DC voltage, unit: V) Freq (frequency, unit: H z) Ramp (transition time, unit: 100 μs) Here, # indicates the step number of the WAVE programming experiment, ranging from 1~ 300. Note 1: 1) If the Output Phase Count is Three-Phase, the values of φ2 and φ3 automatically match φ1. 2) If the Output Phase Count is Single-Phase, the set value of φ1 is valid, while the set values of φ2 and φ3 are invalid but cannot be omitted. Note 2:

	1) If the Coupling Mode is AC, the Udc set values for φ 1, φ2, and φ3 are invalid but cannot be omitted. 2) If Coupling Mode is DC, the Uac and Freq setting values for φ 1, φ2, and φ3 are all invalid, but must not be omitted.
Parameter Range	ProgEn, programming enable: 0~1 φ 1, φ2, φ3 Uac, AC voltage: 0.00~450.00 φ 1, φ2, φ3Uac, DC voltage: -636.00~636.00 Freq, frequency: 0.001~200.000 Ramp, Change Time: 0~ 9999999
Parameter Format	<NR1,NRF,NRF,NRF,NRF,NRF,NRF,NRF,NR1>
Query Command	**PROGram:WAVE:DATA#?**
Return Format	<NR1,NRF,NRF,NRF,NRF,NRF,NRF,NRF,NR1>
Command Example	PROG:WAVE:DATA1 1,220.00,220.00,220.00,0.00,0.00,0.00,50.000,10000 PROG:WAVE:DATA1? 1,220.0,220.0,220.0,0.0,0.0,0.0,50.0,10000

PROGram:WAVE:COUNt	
Command Description	Sets the number of cycles for the WAVE programming experiment.
Parameter Range	0~9999999, 0 indicates an infinite loop
Parameter Format	<NR1>
Query Command	**PROGram:WAVE:COUNt?**
Return Format	<NR1>
Command Example	PROG:WAVE:COUN 10

	PROG:WAVE:COUN? 10

PROGram:WAVE:ENDState	
Command Description	Set the end status of the WAVE programming test.
Parameter Range	<STEady|HOLD|STANdby>, default is STEady. STEady: Steady state. After the experiment ends, this product returns to the steady-state parameters and continues running. HOLD: Hold. After the experiment ends, this product continues running with the parameters of the last step. STANdby: Standby. After the experiment ends, this product stops running and enters standby mode.
Parameter Format	<DSC>
Query Command	**PROGram:WAVE:ENDState?**
Return Format	<DSC>
Command Example	PROG:WAVE:ENDS STE PROG:WAVE:ENDS? STEady

PROGram:WAVE:CONTinuous	
Command Description	Set continuous triggering for the WAVE programming test. When enabled, the unit remains in programming-enabled status after the test ends, and you can directly send the trigger

	command*TRG to restart the test.
Parameter Range	<ON|OFF|1|0>, default is OFF. ON/1: Enable (On) OFF/0: Disabled (Off)
Parameter Format	<Bool>
Query Command	**PROGram:WAVE:CONTinuous?**
Return Format	<Bool>
Command Example	PROG:WAVE:CONT OFF PROG:WAVE:CONT? 0

PROGram:WAVE:TRIGer	
Command Description	Set the trigger mode for the WAVE programming test.
Parameter Range	<AUTO|MANual>, default is AUTO. AUTO: Automatic. After receiving *TRG or an external trigger command, the unit executes all steps of the programming test. MANual: Single-step. After receiving *TRG or an external trigger command, the unit executes only one step of the programming test.
Parameter Format	<DSC>
Query Command	**PROGram:WAVE:TRIGer?**
Return Format	<DSC>
Command Example	PROG:WAVE:TRIG AUTO PROG:WAVE:TRIG?

	AUTO

PROGram:WAVE:INPut	
Command Description	Set the trigger input for the WAVE programming experiment.
Parameter Range	<INTernal|EXTernal>, default is INTernal. INTernal: Internal; triggers the experiment via the display or the external communication command *TRG. EXTernal: External; triggers the experiment via the Anyport digital input interface. For details, see the Anyport interface command section.
Parameter Format	<DSC>
Query Command	**PROGram:WAVE:INPut?**
Return Format	<DSC>
Command Example	PROG:WAVE:INP INT PROG:WAVE:INP? INTernal

PROGram:WAVE:DELay	
Command Description	Set the trigger delay time for the WAVE programming experiment. (Unit: ms)
Parameter Range	0~999999, default value is 0.
Parameter Format	<NR1>
Query Command	**PROGram:WAVE:DELay?**
Return Format	<NR1>

Command Example	PROG:WAVE:DEL 0 PROG:WAVE:DEL? 0

PROGram:WAVE:OUTPut	
Command Description	Set the trigger output mode for the WAVE programming experiment. Used to output a narrow pulse through the Anyport interface at the specified moment in the test. The Anyport interface must be enabled; for details, see the relevant section on the Anyport interface.
Parameter Range	<ONCE|STEP|CYCLe> ONCE: Output a pulse only when the test enters the trigger state each time STEP: Output a pulse at every step of the test CYCLe: Output a pulse in each cycle of the test
Parameter Format	<DSC>
Query Command	**PROGram:WAVE:OUTPut?**
Return Format	<DSC>
Command Example	PROG:WAVE:OUTP ONCE PROG:WAVE:OUTP? ONCE

PROGram:WAVE:RMSMode	
Command Description	Set the WAVE programming experiment to RMS Mode.
Parameter Range	<AUTO|ENABle|DISable>, the default value is AUTO.

	AUTO: Automatic. When the programmed waveform is a sine wave, clipped wave, built-in harmonic, or custom waveform, and the custom waveform mode is RMS Mode, RMS Mode is automatically enabled. The output voltage is closed-loop controlled, and the output voltage is automatically adjusted to match the set value. Otherwise, RMS Mode is automatically disabled, and the output voltage is open-loop. ENABle: Enable. Forcibly enables output voltage RMS adjustment. DISable: Disable. Forcibly disables output voltage RMS adjustment.
Parameter Format	<DSC>
Query Command	**PROGram:WAVE:RMSMode?**
Return Format	<DSC>
Command Example	PROG:WAVE:RMSM AUTO PROG:WAVE:RMSM? AUTO

4.7.3 STEP Programming Command

PROGram:STEP:INITiate	
Command Description	STEP Programming enable command. After this product receives this command, it enters the experiment preparation state. At this point, the programmed experiment data is locked. If this product is in the output state and receives the * TRG experiment trigger command, the STEP programming experiment enters the triggered state and begins executing the preset experiment steps. Note: When the STEP programming trigger input is set to external input, the experiment is

	triggered through the Any port input interface. For detailed settings, see the relevant section on Any port.
Command Example	PROG:STEP:INIT

PROGram:STEP:DATA#	
Command Description	Set the STEP programming experiment parameters, 32 parameters in total, as listed below: φ 1, φ2, φ3 Uac Start (AC voltage start value, unit: V) φ 1, φ2, φ3 U d c Start (DC voltage starting value, unit: V) Freq Start (Frequency starting value, unit: H z) φ 1, φ2, φ3 Uac E nd (AC voltage ending value, unit: V) φ 1, φ2, φ3 U d c E nd (DC voltage ending value, unit: V) Freq E nd (Frequency ending value, unit: H z) φ 1, φ2, φ3 Uac Δ (AC voltage step value, unit: V) φ 1, φ2, φ3 U d c Δ (DC voltage step value, unit: V) Freq Δ (Frequency step value, unit: H z) φ 1, φ2, φ3 P hase (Phase, unit: °) φ 1, φ2, φ3 P ercent (waveform parameter, unit: %) φ 1, φ2, φ3 W aveform (Waveform) D egree (initial phase angle, unit: °) Time (time for each step, unit: 100 us) Note 1: 1) If the Output Phase Count is Three-Phase, except for the setting values of φ 1, φ2, φ3 Phase, the values of φ2 and φ3 are automatically kept the same as φ1.

	2) If the Output Phase Count is Single-Phase, the set value of φ1 is valid, while the set values of φ2 and φ3 are invalid but cannot be omitted. Note 2: 3) When the Coupling Mode of this product is AC, the setting values of φ 1, φ2, φ3 Udc Start, Udc End, and Udc Δ are invalid but must not be omitted. 4) When the Coupling Mode of this product is DC, the setting values of φ 1, φ2, φ3 Uac Start, Uac End, Uac Δ, Phase, Percent, WaveForm, as well as the setting values of Freq and Degree, are all invalid but must not be omitted. Note 3: 1) For definitions of WaveForm (waveform) parameters, see the description of the [SOURce]:VOLTage:WAVeform command. 2) Percent (waveform parameter): parameter definitions vary depending on the selected waveform. For details, see the settings for each waveform.
Parameter Range	φ 1, φ2, φ3 Uac Start, AC voltage start value: 0.00~450.00 φ 1, φ2, φ3 U d c Start, DC voltage start value:-636.00~636.00 Freq Start, frequency start value: 0.001~200.000 φ 1, φ2, φ3 Uac E nd, AC voltage end value: 0.00~450.00 φ 1, φ2, φ3 U d c E nd, DC voltage end value:-636.00~636.00 Freq E nd, frequency end value: 15.000~200.000 φ 1, φ2, φ3 Uac Δ, AC voltage step value: 0.00~450.00 φ 1, φ2, φ3 U d c Δ, DC voltage step value:-1272.00~1272.00 Freq Δ, frequency step value: 0.001~200.000 φ 1, φ2, φ3 P hase, phase: 0.0 ~ 359.9 φ 1, φ2, φ3 P ercent, waveform parameter: 0.00 ~ 100.00 (clipping: 0.00 ~ 50.00)

	φ 1, φ2, φ3 W aveform, waveform: 0 ~142, see VOLTage:WAVeform command for details D egree, phase angle: 0. 0~359.9 Time, duration of each step: 0~9999999
Parameter Format	<NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR1,NR1,NR1,NR2,NR1>
Query Command	**PROGram:STEP:DATA?**
Return Format	<NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR1,NR1,NR1,NR2,NR1>
Command Example	PROG:STEP:DATA 220.00,220.00,220.00,0.00,0.00,0.00,50.000,240.00,240.00,240.00,10.00,10.00,10.00,60.000,2.00,2.00,2.00,1.00,1.00,1.00,1.000,0.0,240.0,120.0,50.00,50.00,50.00,0,0,0,90.0,10000 PROG:STEP:DATA? 220.00,220.00,220.00,0.00,0.00,0.00,50.000,240.00,240.00,240.00,10.00,10.00,10.00,60.000,2.00,2.00,2.00,1.00,1.00,1.00,1.000,0.0,240.0,120.0,50.00,50.00,50.00,0,0,0,90.0,10000

PROGram:STEP:COUNt	
Command Description	Set the number of cycles for the STEP program test
Parameter Range	0~9999999, 0 indicates an infinite loop
Parameter Format	<NR1>
Query Command	**PROGram:STEP:COUNt?**
Return Format	<NR1>
Command Example	PROG:STEP:COUN 10 PROG:STEP:COUN?

	10

PROGram:STEP:ENDState	
Command Description	Set the end status of the STEP program test.
Parameter Range	<STEady|HOLD|STANdby>, default is STEady. STEady: Steady state. After the experiment ends, this product returns to the steady-state parameters and continues running. HOLD: Hold. After the experiment ends, this product continues running with the parameters of the last step. STANdby: Standby. After the experiment ends, this product stops running and enters standby mode.
Parameter Format	<DSC>
Query Command	**PROGram:STEP:ENDState?**
Return Format	<DSC>
Command Example	PROG:STEP:ENDS STE PROG:STEP:ENDS? STEady

PROGram:STEP:CONTinuous	
Command Description	Set continuous triggering for the STEP program test. When enabled, the test will not exit the programming-enabled state after completion, and you can directly send the trigger command *TRG to restart the test.

Parameter Range	<ON|OFF|1|0>, default is OFF. ON/1: Enable (On) OFF/0: Disabled (Off)
Parameter Format	<Bool>
Query Command	**PROGram:STEP:CONTinuous?**
Return Format	<Bool>
Command Example	PROG:STEP:CONT OFF PROG:STEP:CONT? 0

PROGram:STEP:TRIGer	
Command Description	Set the trigger mode for the STEP program test.
Parameter Range	<AUTO|MANual>, default is AUTO. AUTO: Automatic. After receiving *TRG or an external trigger command, the unit executes all steps of the programming test. MANual: Single. After receiving *TRG or an external trigger command, this product executes only one step of the program test.
Parameter Format	<DSC>
Query Command	**PROGram:STEP:TRIGer?**
Return Format	<DSC>
Command Example	PROG:STEP:TRIG AUTO PROG:STEP:TRIG? AUTO

PROGram:STEP:INPut	
Command Description	Set the trigger input for the STEP program test.
Parameter Range	<INTernal|EXTernal>, default is INTernal. INTernal: Internal; triggers the experiment via the display or the external communication command *TRG. EXTernal: External; triggers the experiment via the Anyport digital input interface. For details, see the Anyport interface command section.
Parameter Format	<DSC>
Query Command	**PROGram:STEP:INPut?**
Return Format	<DSC>
Command Example	PROG:STEP:INP INT PROG:STEP:INP? INTernal

PROGram:STEP:DELay	
Command Description	Set the trigger delay time for the STEP program test. (Unit: ms)
Parameter Range	0~999999, default value is 0.
Parameter Format	<NR1>
Query Command	**PROGram:STEP:DELay?**
Return Format	<NR1>
Command Example	PROG:STEP:DEL 0

	PROG:STEP:DEL? 0

PROGram:STEP:OUTPut	
Command Description	Set to STEP programming experiment trigger output mode. Used to output a narrow pulse through the Anyport interface at the specified moment in the test. The Anyport interface must be enabled; for details, see the relevant section on the Anyport interface.
Parameter Range	<ONCE|STEP|CYCLe> ONCE: Output a pulse only when the test enters the trigger state each time STEP: A pulse is output at each step of the experiment CYCLe: Output a pulse in each cycle of the test
Parameter Format	<DSC>
Query Command	**PROGram:STEP:OUTPut?**
Return Format	<DSC>
Command Example	PROG:STEP:OUTP ONCE PROG:STEP:OUTP? ONCE

PROGram:STEP:RMSMode	
Command Description	Set STEP to program the experiment in RMS Mode.
Parameter Range	AUTO: Automatic. When the programmed waveform is a sine wave, clipped wave, built-in harmonic, or custom waveform, and the custom waveform mode is RMS Mode, RMS Mode is

	automatically enabled. The output voltage is closed-loop controlled, and the output voltage is automatically adjusted to match the set value. Otherwise, RMS Mode is automatically disabled, and the output voltage is open-loop. ENABle: Enable. Forcibly enables output voltage RMS adjustment. DISable: Disable. Forcibly disables output voltage RMS adjustment.
Parameter Format	<DSC>
Query Command	**PROGram:STEP:RMSMode?**
Return Format	<DSC>
Command Example	PROG:STEP:RMSM AUTO PROG:STEP:RMSM? AUTO

4.7.4 PULSe programming command

PROGram:PULSe:INITiate	
Command Description	Source Mode PULSe programming enable command. After this product receives this command, it enters the experiment preparation state. At this time, the programmed experiment data is locked. If this product is in the output state and receives the * TRG experiment trigger command, the PULSe programming experiment enters the triggered state and begins executing the preset experiment steps. Note: When the PULSe programming trigger input is set to external input, the experiment is triggered through the Any port input interface. For specific settings, refer to the relevant section on Any port.
Command Example	PROG:PULS:INIT

PROGram:PULSe:COUNt	
Command Description	Set the cycle count for the Source Mode PULSe programming experiment.
Parameter Range	<0~9999999>, default is 0.
Parameter Format	< NR1 >
Query Command	**PROGram:PULSe:COUNt?**
Return Format	< NR1 >
Command Example	PROG:PULS:COUN 10 PROG:PULS:COUN? 10

PROGram:PULSe:OUTPut	
Command Description	Set the Source Mode PULSe programming experiment trigger output mode. Used to output narrow pulses through the Anyport interface at specified moments during the experiment; must be enabled through the Anyport interface. For details, see the relevant section.
Parameter Range	< ONCE|STEP|CYCLe>, default is ONCE ONCE: Output a pulse only when the test enters the trigger state each time STEP: Output a pulse at every step of the test CYCLe: Output a pulse in each cycle of the test
Parameter Format	< DSC >
Query Command	**PROGram:PULSe:OUTPut?**
Return Format	< DSC >

Command Example	PROG:PULS:OUTP STEP PROG:PULS:OUTP? STEP

PROGram:PULSe:CONTinuous	
Command Description	Set Source Mode PULSe programming experiment continuous triggering.
Parameter Range	<ON|OFF|1|0>, default is 0. ON/1: Enable OFF/0: Disabled
Parameter Format	< Bool >
Query Command	**PROGram:PULSe:CONTinuous?**
Return Format	< Bool >
Command Example	PROG:PULS:CONT ON PROG:PULS:CONT? 1

PROGram:PULSe:TRIGer	
Command Description	Set the Source Mode PULSe programming experiment trigger mode.
Parameter Range	<AUTO|MANual>, the default value is AUTO. AUTO: Automatic MANual: Manual
Parameter Format	< DSC >

Query Command	**PROGram:PULSe:TRIGer?**
Return Format	< DSC >
Command Example	PROG:PULS:TRIG AUTO PROG:PULS:TRIG? AUTO

PROGram:PULSe:INPut	
Command Description	Set the Source Mode PULSe programming experiment trigger input.
Parameter Range	<INTernal|EXTernal>, default is INTernal. INTernal: Internal EX Ternal: External
Parameter Format	< DSC >
Query Command	**PROGram:PULSe:INPut?**
Return Format	< DSC >
Command Example	PROG:PULS:INP INT PROG:PULS:INP? INTernal

PROGram:PULSe:DELay	
Command Description	Set the Source Mode PULSe programming experiment trigger delay time (unit: m s).
Parameter Range	<0~999999>, default value is 0.

Parameter Format	< NR1 >
Query Command	**PROGram:PULSe:DELay?**
Return Format	< NR1 >
Command Example	PROG:PULS:DELay 300 PROG:PULS:DELay? 300

PROGram:PULSe:RMSMode

Command Description	Set Source Mode PULSe programming experiment RMS Mode
Parameter Range	<AUTO|ENABle|DISable>, the default value is AUTO. AUTO: Automatic ENABle: Enable DISable: Disable
Parameter Format	< DSC >
Query Command	**PROGram:PULSe:RMSMode?**
Return Format	< DSC >
Command Example	PROG:PULS:RMSM AUTO PROG:PULS:RMSM? AUTO

PROGram:PULSe:ENDState

Command Description	Set the end state of Source Mode PULSe.

Parameter Range	<STEady|HOLD|STANdby>, default is STEady. STEady: Steady state HOLD: Hold STANdby: Standby
Parameter Format	< DSC >
Query Command	**PROGram:PULSe:ENDState?**
Return Format	< DSC >
Command Example	PROG:PULS:ENDS STE PROG:PULS:ENDS? STEady

PROGram:PULSe:DATA	
Command Description	Set the selected PULSe programming experiment parameters in Source Mode, a total of 35 parameters, listed below: φ1 pulse Uac AC voltage (unit: V) φ2 pulse Uac AC voltage (unit: V) φ3 pulse Uac AC voltage (unit: V) φ1 pulse Udc DC voltage (unit: V) φ2 pulse Udc DC voltage (unit: V) φ3 Pulse Udc DC Voltage (Unit: V) Pulse Freq Frequency (Unit: H z) φ 1 Pulse P hase Phase (Unit: °) φ2 Pulse P hase Phase (Unit: °)

	φ3 Pulse P hase Phase (Unit: °) φ 1 Pulse P ercent Percentage (Unit: %) φ2 Pulse P ercent Percentage (Unit: %) φ3 Pulse P ercent Percentage (Unit: %) φ1 Pulse Waveform Waveform φ2 Pulse Waveform Waveform φ3 Pulse Waveform Waveform Pulse D egree: Phase Angle (Unit: °) φ1 Fundamental Uac AC Voltage (Unit: V) φ2 Fundamental Uac AC Voltage (Unit: V) φ3 Fundamental Uac AC Voltage (Unit: V) φ1 Fundamental Udc DC Voltage (Unit: V) φ2 Fundamental Udc DC Voltage (Unit: V) φ3 Fundamental Udc DC Voltage (Unit: V) Fundamental Freq Frequency (Unit: H z) φ1 Fundamental P hase Phase (Unit: °) φ2 Fundamental P hase Phase (Unit: °) φ3 Fundamental P hase (°) φ1 Fundamental P ercent (%) φ2 Fundamental P ercent (%) φ3 Fundamental P ercent (%) φ1 Fundamental Waveform φ2 Fundamental Waveform

	φ3 Fundamental Waveform Fundamental P eriod Period (unit: 100 us) Fundamental Width Pulse Width (unit: 100 us)
Parameter Range	φ 1, φ2, φ3 Pulse Uac AC Voltage: 0.00~300.00,0.00~450.00, default value is 10 ; φ 1, φ2, φ3 Pulse Uac DC voltage: - 636.00~636.00, default value: 0 ; φ 1, φ2, φ3 Pulse Freq Frequency: 0.001~2000.000, default value: 1000 ; φ 1, φ2, φ3 Pulse P hase Phase: 0.0 ~ 359.9, default values: φ 1= 0, φ 2= 2 40, φ 3= 1 20 ; φ 1, φ2, φ3 Pulse P ercent Percentage: 0.00 ~ 100.00, default value: 5 0 ; φ 1, φ2, φ3 Pulse Waveform Waveform: 0~142, default value: 0 ; φ1、φ2、φ3 Pulse D egree phase angle: 0~ 359.9, default: 0 ; φ1、φ2、φ3 Fundamental Uac AC voltage: 0.00~300.00,0.00~450.00, default: 220 ; φ1、φ2、φ3 Fundamental Uac DC voltage: - 636.00~636.00, default: 0 ; φ 1、φ2、φ3 Fundamental Freq Frequency: 0.001 ~ 2000.000, default: 5 0 ; φ 1、φ2、φ3 Fundamental P hase phase: 0.0 ~ 359.9, defaults: φ 1= 0, φ 2= 2 40, φ 3= 1 20 ; φ 1, φ2, φ3 Fundamental P ercent Percentage: 0.00 ~ 100.00, default value is 5 0 ; φ 1, φ2, φ3 Fundamental Waveform Waveform: 0~142, default value is 0 ; φ 1, φ2, φ3 Fundamental Period Period: 0~ 9999999, default value is 1000 ; φ 1, φ2, φ3 Fundamental Width Pulse width: 0~ 9999999, default value is 200 ;
Parameter Format	< NR2,NR2,NR2,NR2,NR2,NR2,NR2, NR2,NR2, NR2, NR2,NR2, NR2,NR1, NR1, NR1,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2, NR2,NR2, NR2, NR2,NR2, NR2,NR1, NR1, NR1, NR1, NR1,>
Query Command	**PROGram: PULSe:DATA?**
Return Format	< NR2,NR2,NR2,NR2,NR2,NR2,NR2, NR2,NR2, NR2, NR2,NR2, NR2,NR1, NR1, NR1,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2, NR2,NR2, NR2, NR2,NR2, NR2,NR1, NR1, NR1, NR1, NR1,>

Command Example	PROGram:PULS:DATA 220.00,220.00,220.00,0.00,0.00,0.00,50.000,240.0,240.0,240.0,50.00,50.00,50.00,4,4,5,280.0,220.00,220.00,220.00,0.00,0.00,0.00,50.000,240.0,240.0,240.0,50.00,50.00,50.00,4,4,5,10000,10000 PROGram:PULS:DATA? 220.00,220.00,220.00,0.00,0.00,0.00,50.000,240.0,240.0,240.0,50.00,50.00,50.00,4,4,5,280.0,220.00,220.00,220.00,0.00,0.00,0.00,50.000,240.0,240.0,240.0,50.00,50.00,50.00,4,4,5,10000,10000

4.7.5 ADVanced Programming command

PROGram:ADVanced:INITiate	
Command Description	ADVanced Programming enable command. After receiving this command, the product enters the experiment preparation state. At this point, the programmed experiment data is locked. If the product is in the output state and receives the * TRG experiment trigger command, the ADVanced programming experiment enters the triggered state and begins executing the preset experiment steps. Note: When the trigger input for the ADVanced Programming is set to external input, the experiment will be triggered through the Any port input interface. For specific settings, see the relevant section on Any port.
Command Example	PROG:ADV:INIT

PROGram:ADVanced:SEGMent	
Command Description	Set the number of steps for the ADVanced Programming experiment.

Parameter Range	1~300
Parameter Format	<NR1>
Query Command	**PROGram:ADVanced:SEGMent?**
Return Format	<NR1>
Command Example	PROG:ADV:SEGM 10 PROG:ADV:SEGM? 10

PROGram:ADVanced:DATA#	
Command Description	Set the ADVanced Programming experiment parameters for the selected step #, 25 parameters in total, as listed below: ProgEn (Programming Enable, 1: Enable, 0: Disable) φ 1, φ2, φ3 Uac (AC voltage, unit: V) φ 1, φ2, φ3 U dc (DC voltage, unit: V) Freq (frequency, unit: Hz) Ramp (transition time, unit: 100 μs) Dwell (dwell time, unit: 100 μs) φ1, φ 2, φ 3 Phase (phase, unit: °) φ 1、φ2、φ3 Percent (waveform parameter, unit: %) Degree (initial phase, unit: °) Degree En (initial phase enable, 1: enabled, 0: disabled) Link (sequence combination) Count (repeat count)

	φ1, φ 2, φ 3 WaveForm (waveform) Trig In (Trigger input enable, 1: enabled, 0: disabled) Trig Out (Trigger output enable, 1: enabled, 0: disabled) Where # indicates the number of ADVanced programming steps, ranging from 1 to 300. Note 1: 1) If the Output Phase Count is Three-Phase, except for the setting values of φ 1, φ2, φ3 Phase, the values of φ2 and φ3 are automatically kept the same as φ1. 2) If the Output Phase Count is Single-Phase, the set value of φ1 is valid, while the set values of φ2 and φ3 are invalid but cannot be omitted. Note 2: 1) When the product Coupling Mode is AC, the Udc setting values for φ 1, φ2, and φ3 are invalid, but cannot be omitted. 2) When the product Coupling Mode is DC, the setting values of Uac, Phase, Percent, and WaveForm for φ 1, φ2, and φ3, as well as the setting values of Freq, Degree, and Degree En, are all invalid, but cannot be omitted. Note 3: 1) For definitions of WaveForm (waveform) parameters, see the description of the [SOURce]:VOLTage:WAVeform command. 2) Percent (waveform parameter): its definition varies depending on the selected waveform. For details, see the settings for each waveform.
Parameter Range	ProgEn, Programming Enable:0 ~1 φ 1、φ2、φ3 Uac, AC Voltage:0.00~450.00 φ 1、φ2、φ3 Udc, DC Voltage:- 636.00~636.00

	Freq, frequency: 0.001~200.000 Ramp, Transition Time:0~ 9999999 Dwell, dwell time: 0~ 9999999 φ1、φ2、φ3 Phase:0.0~359.9 φ1、φ2、φ3 Percen t:0.00~100.00 (Clipping: 0.00~50.00) Degree, Start Phase:0.0~359.9 DegreeEn, Start Phase Enable:0~ 1 Link, Sequence Combination:0~ 300 Count, Repeat count: 0~ 9999999 φ1, φ2, φ3 waveform, Waveform: 0 ~142, for details, see the VOLTage:WAVeform command Trig In, Trigger input enable: 0 ~1 Trig Out, Trigger output enable: 0 ~1
Parameter Format	<NR1,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR1,NR1,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR1,NR1,NR1,NR1,NR1,NR1,NR1,NR1>
Query Command	**PROGram:ADVanced:DATA#?**
Return Format	<NR1,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR1,NR1,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR1,NR1,NR1,NR1,NR1,NR1,NR1,NR1>
Command Example	PROGram:ADVanced:DATA1 1,220.00,220.00,220.00,0.00,0.00,0.00,50.000,10000,10000,0.0,240.0,120.0,50.00,50.00,50.00,0.0,0,0,0,0,0,0,0,0 PROGram:ADVanced:DATA1? 1,220.0,220.0,220.0,0.0,0.0,0.0,0.0,50.0,10000,10000,0.0,240.0,120.0,50.0,50.0,50.0,0.0,0,0,0,0,0,0,0,0,0

PROGram:ADVanced:COUNt

Command Description	Set the cycle count for the ADVanced programming experiment.
Parameter Range	0~9999999
Parameter Format	<NR1>
Query Command	**PROGram:ADVanced:COUNt?**
Return Format	<NR1>
Command Example	PROG:ADV:COUN 10 PROG:ADV:COUN? 10

PROGram:ADVanced:ENDState

Command Description	Set the end state of the ADVanced programming experiment.
Parameter Range	<STEady|HOLD|STANdby>, default is STEady. STEady: Steady state. After the experiment ends, this product returns to the steady-state parameters and continues running. HOLD: Hold. After the experiment ends, this product continues running with the parameters of the last step. STANdby: Standby. After the experiment ends, this product stops running and enters standby mode.
Parameter Format	<DSC>
Query Command	**PROGram:ADVanced:ENDState?**
Return Format	<DSC>
Command Example	PROG:ADV:ENDS STE

	PROG:ADV:ENDS? STEady

PROGram:ADVanced:CONTinuous	
Command Description	Sets the continuous trigger for the LIST programming experiment. When enabled, the programming-enabled state is not exited after the experiment ends, and you can directly send the trigger command* TRG to restart the experiment.
Parameter Range	<ON|OFF|1|0>, default is OFF. ON/1: Enable (On) OFF/0: Disabled (Off)
Parameter Format	<Bool>
Query Command	**PROGram:ADVanced:CONTinuous?**
Return Format	< Bool >
Command Example	PROG:ADV:CONT OFF PROG:ADV:CONT? 0

PROGram:ADVanced:TRIGer	
Command Description	Set the trigger mode for the ADVanced programming experiment.
Parameter Range	<AUTO|MANual>, the default value is AUTO. AUTO: Automatic. After receiving * TRG or an external trigger command, this product executes all programmed test steps.

	MANual: Single-step. After receiving * TRG or an external trigger command, this product executes only one programmed test step.
Parameter Format	<DSC>
Query Command	**PROGram:ADVanced:TRIGer?**
Return Format	<DSC>
Command Example	PROG:ADV:TRIG AUTO PROG:ADV:TRIG? AUTO

PROGram:ADVanced:INPut	
Command Description	Set the trigger input for the ADVanced programming experiment.
Parameter Range	<INTernal|EXTernal>, default is INTernal. INTernal: Internal. Triggers the test through the display or via the external communication command *TRG. EX Ternal: External. Triggers the test through the Anyport digital input interface. For details, see the Anyport interface command section.
Parameter Format	<DSC>
Query Command	**PROGram:ADVanced:INPut?**
Return Format	<DSC>
Command Example	PROG:ADV:INP INT PROG:ADV:INP? INTernal

PROGram:ADVanced:DELay	
Command Description	Set the trigger delay time for the ADVanced programming experiment. (Unit: ms)
Parameter Range	<0~999999>, the default value is 0.
Parameter Format	<NR1>
Query Command	**PROGram:ADVanced:DELay?**
Return Format	<NR1>
Command Example	PROG:ADV:DEL 0 PROG:ADV:DEL? 0

PROGram:ADVanced:OUTPut	**B**	**S**
Command Description	Set the trigger output mode for the ADVanced programming experiment. Used to output a narrow pulse through the Anyport interface at the specified moment in the test. The Anyport interface must be enabled; for details, see the relevant section on the Anyport interface.	
Parameter Range	<ONCE|STEP|CYCLe> ONCE: Output a pulse only when the test enters the trigger state each time STEP: Output a pulse at every step of the test CYCLe: Output a pulse in each cycle of the test Note: By enabling Trig Out in the single-step programming data configuration, a pulse can be output at the start of any step or multiple steps. At this point, set the trigger output mode of ADVanced Programming Experiment to STEP.	

Parameter Format	<DSC>
Query Command	**PROGram:ADVanced:OUTPut?**
Return Format	<DSC>
Command Example	PROG:ADV:OUTP STEP PROG:ADV:OUTP? STEP

PROGram:ADVanced:RMSMode	**B**	**S**
Command Description	Set the ADVanced Programming Experiment RMS Mode.	
Parameter Range	<AUTO|ENABle|DISable>, the default value is AUTO. AUTO: Automatic. When the programmed waveform is a sine wave, clipped wave, built-in harmonic, or custom waveform, and the custom waveform mode is RMS Mode, RMS Mode is automatically enabled. The output voltage is closed-loop controlled, and the output voltage is automatically adjusted to match the set value. Otherwise, RMS Mode is automatically disabled, and the output voltage is open-loop. ENABle: Enable. Forcibly enables output voltage RMS adjustment. DISable: Disable. Forcibly disables output voltage RMS adjustment.	
Parameter Format	<DSC>	
Query Command	**PROGram:ADVanced:RMSMode?**	
Return Format	<DSC>	
Command Example	PROG:ADV:RMSM AUTO PROG:ADV:RMSM? AUTO	

4.7.6 HARMonic Programming Command

PROGram:HARMonic:INITiate	
Command Description	HARMonic programming enable command. After the product receives this command, it enters the experiment enabled state. At this time, the programming experiment data will be locked. If the product is in the output state and receives the *TRG experiment trigger command, the programming experiment enters the triggered state and begins outputting harmonic waveforms according to the preset harmonic parameters. In the HARMonic programming experiment trigger state, after sending a new set of experiment parameters, you can directly send the HARMonic programming enable command again to update the experiment parameters and output them, without needing to send the *TRG experiment trigger command again. Note 1: The following conditions must be met for this product to enter the HARMonic programming enabled state: 1) The Coupling Mode is AC or AC+DC 2) Select the sine waveform 3) Output frequency setting range: 4 0Hz~200Hz Note 2: When the HARMonic programming trigger input is set to external input, the experiment will be triggered through the Any port input interface. For details, refer to the relevant section on Any port.
Command Example	PROG:HARM:INIT

PROGram:HARMonic:DATA#	
Command Description	Set the HARMonic programming experiment parameters for the selected harmonic order #. There are 6 parameters in total, as listed below: φ1# harmonic voltage THD (Units: %) φ1# harmonic voltage phase (Units: °) φ2 # harmonic voltage THD (Units: %) φ2 # harmonic voltage phase (Units: °) φ3 # harmonic voltage THD (Units: %) φ3 # harmonic voltage phase (Units: °) Where # denotes the harmonic order, and the range is divided into two levels: 1) Output frequency is [4 0 Hz~ 70Hz], #= 2 ~ 100 2) Output frequency is (70 ~ 200Hz], #= 2 ~ 25 Note 1: When the HARMonic programming experiment is in the triggered state, the output frequency parameter can still be modified, but its range must not exceed the level selected when the experiment started. Note 2: If the Output Phase Count is Three-Phase, the values of φ2 and φ3 automatically match φ1. If the Output Phase Count is Single-Phase, the setting value of φ1 is valid, the setting values of φ2 and φ3 are invalid but cannot be omitted.
Parameter Range	φ1# harmonic voltage THD: 0.00~40.00 φ1# harmonic voltage phase: 0.0~359.9 φ2 # harmonic voltage THD: 0.00~40.00

	φ2 # harmonic voltage phase: 0.0~359.9 φ3 # harmonic voltage THD: 0.00~40.00 φ3 # harmonic voltage phase: 0.0~359.9
Parameter Format	<NR2,NR2,NR2,NR2,NR2,NR2>
Query Command	**PROGram:HARMonic:DATA#?**
Return Format	<NR2,NR2,NR2,NR2,NR2,NR2>
Command Example	PROGram:HARMonic:DATA1 5.00,0.0,3.00,180.0,1.00,0.0 PROGram:HARMonic:DATA1? 5.0,0.0,3.0,180.0,1.0,0.0

PROGram:HARMonic:INPut	
Command Description	Set the trigger input for HARMonic Programming Lab.
Parameter Range	<INTernal|EXTernal>, default is INTernal. INTernal: Internal; triggers the experiment via the display or the external communication command *TRG. EXTernal: External; triggers the experiment via the Anyport digital input interface. For details, see the Anyport interface command section.
Parameter Format	<DSC>
Query Command	**PROGram:HARMonic:INPut?**
Return Format	<DSC>
Command Example	PROG:HARM:INP INT PROG:HARM:INP?

	INTernal

PROGram:HARMonic:DELay	
Command Description	Set the trigger delay for HARMonic Programming Lab. (ms)
Parameter Range	0~999999, default value is 0.
Parameter Format	<NR1>
Query Command	**PROGram:HARMonic:DELay?**
Return Format	<NR1>
Command Example	PROG:HARM:DELay 0 PROG:HARM:DELay? 0

PROGram:HARMonic:OUTPut	
Command Description	Set the trigger output mode for HARMonic Programming Lab. Used to output narrow pulses through the Anyport interface at specified moments during the experiment; must be enabled through the Anyport interface. For details, see the relevant section.
Parameter Range	<ONCE|BASE>, default value: ONCE. ONCE: Single-shot; outputs a pulse only when each experiment enters the triggered state BASE: Fundamental wave; outputs a pulse at each zero crossing of the fundamental wave
Parameter Format	<DSC>
Query Command	**PROGram:HARMonic:OUTPut?**
Return Format	<DSC>

Command Example	PROG:HARM:OUTP ONCE PROG:HARM:OUTP? ONCE

4.7.7INTerharm programming command

PROGram:INTerharm:INITiate	
Command Description	Source Mode INTerharm (interharmonic) programming enable command. After the product receives this command, it enters the experiment preparation state. At this point, the programmed experiment data is locked. If the product is in the output state and receives the * TRG experiment trigger command, the INTerharm programmed experiment enters the triggered state and begins executing the preset experiment steps. Note: When the INTerharm programming trigger input is set to external input, the experiment is triggered through the Any port input interface. For specific settings, see the relevant section on Any port.
Command Example	PROG:INT:INIT

PROGram:INTerharm:COUNt	
Command Description	Set Source Mode INTerharm programming experiment cycle count.
Parameter Range	<0~9999999>, default is 0.
Parameter Format	< NR1>
Query Command	**PROGram:INTerharm:COUNt?**

Return Format	< NR1 >
Command Example	PROG:INT:COUN 10 PROG:INT:COUN? 10

PROGram:INTerharm:SEGMent

Command Description	Set Source Mode INTerharm programming experiment step count.
Parameter Range	<1~300>, default value is 1.
Parameter Format	< NR1 >
Query Command	**PROGram:INTerharm:SEGMent?**
Return Format	< NR1 >
Command Example	PROG:INT:SEGM 10 PROG:INT:SEGM? 10

PROGram:INTerharm:OUTPut

Command Description	Set Source Mode INTerharm programming experiment trigger output mode. Used to output narrow pulses through the Anyport interface at specified moments during the experiment; must be enabled through the Anyport interface. For details, see the relevant section.
Parameter Range	< ONCE|STEP|CYCLe|BASE>, default value is ONCE. ONCE: Output a pulse only when the test enters the trigger state each time STEP: Output a pulse at every step of the test

	CYCLe: Output a pulse in each cycle of the test BASE: Fundamental
Parameter Format	< DSC >
Query Command	**PROGram:INTerharm:OUTPut?**
Return Format	< DSC >
Command Example	PROG:INT:OUTP ONCE PROG:INT:OUTP? ONCE

PROGram:INTerharm:CONTinuous

Command Description	Source Mode INTerharm programming experiment continuous trigger command.
Parameter Range	<ON|OFF|1|0>, default is 0. ON/1: Enable OFF/0: Disabled
Parameter Format	< Bool >
Query Command	**PROGram:INTerharm:CONTinuous?**
Return Format	< Bool >
Command Example	PROG:INT:CONT ON PROG:INT:CONT? 1

PROGram:INTerharm:TRIGer

Command Description	Set Source Mode INTerharm programming experiment trigger mode.
Parameter Range	< AUTO|MANual >, default value is AUTO. AUTO: Automatic MANual: Manual
Parameter Format	< DSC >
Query Command	**PROGram:INTerharm:TRIGer?**
Return Format	< DSC >
Command Example	PROG:INT:TRIG AUTO PROG:INT:TRIG? AUTO

PROGram:INTerharm:INPut	
Command Description	Set Source Mode INTerharm programming experiment trigger input.
Parameter Range	<INTernal|EXTernal>, default is INTernal. INTernal: Internal EX Ternal: External
Parameter Format	< DSC >
Query Command	**PROGram:INTerharm:INPut?**
Return Format	< DSC >
Command Example	PROG:INT:INP INT PROG:INT:INP? INT

PROGram:INTerharm:DELay	
Command Description	Set Source Mode INTerharm programming experiment trigger delay time (unit: ms).
Parameter Range	<0~999999>, default value is 0.
Parameter Format	< NR1 >
Query Command	**PROGram:INTerharm:DELay?**
Return Format	< NR1 >
Command Example	PROG:INT:DEL 300 PROG:INT:DEL? 300

PROGram:INTerharm:DATA#	
Command Description	Set the INTerharm programming experiment parameters for selected step # in Source Mode, a total of 7 parameters, listed below: ProgEn Programming enable Value Interharmonic content of step #t hd Start Starting interharmonic frequency of step # (unit: H z) End End frequency of interharmonics for step # (unit: H z) Δ Interharmonic step frequency for step # (unit: Hz) D well dwell time (unit: hundred us) P ause pause interval (unit: hundred us)
Parameter Range	Set the INTerharm programming test parameters for the selected step #, a total of 25 parameters,

	as listed below: ProgEn Programming enable: 0 ~1, default value: 1; Value Interharmonic content t hd for step #: 0.00~40.00, default value: 0; Start Start frequency of interharmonics for step #: 0.001~2000.000, default value: 1 5 ; End End frequency of interharmonics for step #: 0.001~2000.000, default value: 400 ; Δ Interharmonic step frequency for step #: 0.001~2000.000, default value: 5 ; D well execution time: 0~ 9999999, default value: 5 0000 ; P ause interval time: 0~ 9999999, default value: 10000 ;
Parameter Format	< NR1,NR2,NR2,NR2,NR2,NR1,NR1 >
Query Command	**PROGram:INTerharm:DATA#?**
Return Format	< NR1,NR2,NR2,NR2,NR2,NR1,NR1 >
Command Example	PROG:INT:DATA1 1,22.00,50.000,50.000,50.000,455,455 PROG:INT:DATA1? 1,22.00,50.000,50.000,50.000,455,455

4.7.8 ISLand Programming Command

PROGram:ISLand:INITiate	
Command Description	ISL and programming enable command. After receiving this command, the product enters the experiment preparation state. At this point, the programmed experiment data is locked. If the product is in the output state and receives the * TRG experiment trigger command, the ISL and programmed experiment enters the triggered state and begins executing the preset experiment steps.

	Note: When the ISL and programming trigger input is set to external input, the experiment is triggered through the Any port input interface. For detailed settings, refer to the Any port section.
Command Example	PROG:ISL:INIT

PROGram:ISLand:MODE	
Command Description	Set the Load Mode for ISLand programming.
Parameter Range	<RLC|PQ>, default is RLC. RLC: RLC Mode PQ: PQ Mode
Parameter Format	< DSC>
Query Command	**PROGram:ISLand:MODE?**
Return Format	<DSC>
Command Example	PROG:ISL:MODE RLC PROG:ISL:MODE? RLC

PROGram:ISLand:PENable	
Command Description	Set the starting phase enable for ISLand programming.
Parameter Range	<ON|OFF|1|0>, default value is 0. ON/1: Enable OFF/0: Disable

Parameter Format	< Bool >
Query Command	**PROGram:ISLand:PENable?**
Return Format	< Bool >
Command Example	PROG:ISL:PEN ON PROG:ISL:PEN? 1

PROGram:ISLand:PHASe	
Command Description	Set the starting angle for ISLand programming. (Unit: °)
Parameter Range	0.0~359.9, default is 0. 0.
Parameter Format	<NRF>
Query Command	**PROGram:ISLand:PHASe?**
Return Format	<NRF>
Command Example	PROG:ISL:PHAS 30.0 PROG:ISL:PHAS? 30.0

PROGram:ISLand:ESENable	
Command Description	Set the emergency-stop input stop enable for ISLand programming.
Parameter Range	<ON|OFF|1|0>, default value is 0. ON/1: Enable

	OFF/0: Disable
Parameter Format	< Bool >
Query Command	**PROGram:ISLand:ESENable?**
Return Format	< Bool >
Command Example	PROG:ISL:ESEN ON PROG:ISL:ESEN? 1

PROGram:ISLand:VSENable	
Command Description	Set the voltage stop enable for ISLand programming.
Parameter Range	<ON|OFF|1|0>, default value is 0. ON/1: Enable OFF/0: Disable
Parameter Format	< Bool >
Query Command	**PROGram:ISLand:VSENable?**
Return Format	< Bool >
Command Example	PROG:ISL:VSEN ON PROG:ISL:VSEN? 1

PROGram:ISLand:VSValue

Command Description	Set the voltage stop threshold for ISLand programming.
Parameter Range	0.00~450.00, default is 0.00.
Parameter Format	<NRF>
Query Command	**PROGram:ISLand:VSValue?**
Return Format	<NRF>
Command Example	PROG:ISL:VSV 20.00 PROG:ISL:VSV? 20.0

PROGram:ISLand:CSENable	
Command Description	Set the current stop enable for ISLand programming.
Parameter Range	<ON|OFF|1|0>, default value is 0. ON/1: Enable OFF/0: Disable
Parameter Format	< Bool >
Query Command	**PROGram:ISLand:CSENable?**
Return Format	< Bool >
Command Example	PROG:ISL:CSEN ON PROG:ISL:CSEN? 1

PROGram:ISLand:TCSValue	
Command Description	Set the current stop threshold for ISLand programming. Valid only when the Output Phase Count in Source Mode is Three-Phase.
Parameter Range	0.00~ Maximum Three-Phase Current per Unit*Number of Parallel Units, default value is 0.00.
Parameter Format	<NRF>
Query Command	**PROGram:ISLand:TCSValue?**
Return Format	<NRF>
Command Example	PROG:ISL:TCSV 20.00 PROG:ISL:TCSV? 20.0

PROGram:ISLand:SCSValue	
Command Description	Set the current stop threshold for ISLand programming ; valid only when the Output Phase Count in Source Mode is Single-Phase.
Parameter Range	0.00~ Maximum Single-Phase Current per Unit*Number of Parallel Units, default value is 0.00.
Parameter Format	<NRF>
Query Command	**PROGram:ISLand:SCSValue?**
Return Format	<NRF>
Command Example	PROG:ISL:SCSV 20.0 PROG:ISL:SCSV? 20.0

PROGram:ISLand:PSENable	
Command Description	Set the Active Power stop enable for ISLand programming.
Parameter Range	<ON|OFF|1|0>, default value is 0. ON/1: Enable OFF/0: Disable
Parameter Format	< Bool >
Query Command	**PROGram:ISLand:PSENable?**
Return Format	< Bool >
Command Example	PROG:ISL:PSEN ON PROG:ISL:PSEN? 1

PROGram:ISLand:TPSValue	
Command Description	Set the Active Power stop threshold for ISLand programming ; valid only when the Output Phase Count in Source Mode is Three-Phase.
Parameter Range	0.00~ Maximum Three-Phase Power per Unit*Number of Parallel Units, default value is 0.00.
Parameter Format	<NRF>
Query Command	**PROGram:ISLand:TPSValue?**
Return Format	<NRF>
Command Example	PROG:ISL:TPSV 1.000 PROG:ISL:TPSV? 1.0

PROGram:ISLand:SPSValue	
Command Description	Set the Active Power shutdown threshold for ISLand programming. This is valid only when the Output Phase Count in Source Mode is Single-Phase.
Parameter Range	0.00~ the maximum single-unit single-phase power * Number of Parallel Units; the default value is 0.00.
Parameter Format	<NRF>
Query Command	**PROGram:ISLand:SPSValue?**
Return Format	<NRF>
Command Example	PROG:ISL:SPSV 1.000 PROG:ISL:SPSV? 1.0

PROGram:ISLand:TRLCdata	
Command Description	Set the Three-Phase parameters for ISLand programming R LC mode, with a total of 9 parameters, as listed below: φ1 RLC mode R (unit: Ω) φ1 RLC mode L (unit: mH) φ1 RLC mode C (unit: uF) φ2 RLC mode R (unit: Ω) φ2 RLC mode L (unit: mH) φ2 RLC Mode C (Unit: uF)

	φ3 RLC Mode R (Unit: Ω) φ3 RLC Mode L (Unit: mH) φ3 RLC Mode C (Unit: uF)
Parameter Range	P RE20 product: φ1, φ 2, φ 3 RLC Mode R: 0.001~1000.0, default value: 1000.0 ; φ1, φ 2, φ 3 RLC mode L: 1.0 0~5000.0 ; the default value is 5000.0 ; φ1, φ 2, φ 3 RLC mode C: 1.00~5000.0 ; the default value is 1.0 ; P RO product: φ1, φ 2, and φ 3 RLC mode R: 0.0001~10000.0, the default value is 1000.0 ; φ1, φ 2, and φ 3 RLC mode L: 0.1~50000.0, the default value is 5000.0 ; φ1, φ 2, and φ 3 RLC mode C: 0.1~50000.0, the default value is 1.0 ;
Parameter Format	<NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2 >
Query Command	**PROGram:ISLand:TRLCdata?**
Return Format	< NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2>
Command Example	PROG:ISL:TRLC 1000.0,5000.0,5000.0,1000.0,5000.0,5000.0,1000.0,5000.0,5000.0 PROG:ISL:TRLC? 1000.0,5000.0,5000.0,1000.0,5000.0,5000.0,1000.0,5000.0,5000.0

PROGram:ISLand:SRLCdata	
Command Description	Set the Single-Phase parameters for ISLand programming R LC mode, with a total of 3 parameters, as listed below: Single-Phase RLC mode R (unit: Ω) Single-Phase RLC mode L (unit: mH)

	Single-Phase RLC mode C (unit: uF)
Parameter Range	P RE20 product: Single-Phase RLC Mode R: 0.001~1000.0, default: 0.0 ; Single-Phase RLC Mode L: 1.0 0~5000.0, default: 0.0 ; Single-Phase RLC Mode C: 1.00~5000.0, default: 0.0 ; P RO product: Single-Phase RLC Mode R: 0.0001~10000.0, default: 0.0 ; Single-Phase RLC Mode L: 0.1~50000.0, default: 0.0 ; Single-Phase RLC Mode C: 0.1~50000.0, default: 0.0 ;
Parameter Format	< NR2,NR2,NR2 >
Query Command	**PROGram:ISLand:SRLCdata?**
Return Format	< NR2,NR2,NR2 >
Command Example	PROG:ISL:SRLC 1000.0,5000.0,5000.0 PROG:ISL:SRLC? 1000.0,5000.0,5000.0

PROGram: ISLand:TPQData	
Command Description	Set ISLand programmable PQ Mode Three-Phase parameters. A total of 9 parameters are listed below: φ 1 PQ Mode P φ1 PQ Mode Q_L (unit: Ω) φ 1 PQ Mode Q_C (unit: mH)

	φ 2 PQ Mode P φ2 PQ Mode Q_L (unit: Ω) φ 2 PQ Mode Q_C (unit: mH) φ 3 PQ Mode P φ3 PQ Mode Q_L (unit: Ω) φ 3 PQ Mode Q_C (unit: mH)
Parameter Range	0.00~ Maximum Three-Phase Power per Unit* 3*Number of Parallel Units, default value: 0.00.
Parameter Format	<NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2>
Query Command	**PROGram:ISLand:TPQData?**
Return Format	<NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2,NR2>
Command Example	PROG:ISL:TPQD 3.0,1.0,1.0,3.0,1.0,1.0,1.0,1.0,1.0 PROG:ISL:TPQD? 3.0,1.0,1.0,3.0,1.0,1.0,1.0,1.0,1.0

PROGram: ISLand:SPQData	
Command Description	Set the Single-Phase parameters for ISLand programming PQ Mode. A total of 3 parameters are provided, as listed below: Single-Phase PQ Mode P Single-Phase PQ Mode Q_L (Unit: Ω) Single-Phase PQ Mode Q_C (Unit: mH)
Parameter Range	0.00~ the maximum single-unit single-phase power * Number of Parallel Units; the default value is 0.00.
Parameter Format	<NR2,NR2,NR2>

Query Command	**PROGram:ISLand:SPQData?**
Return Format	<NR2,NR2,NR2 >
Command Example	PROG:ISL:SPQD 5.0,1.0,1.0 PROG:ISL:SPQD? 5.0,1.0,1.0

5 Status Report

The IEEE488.2 standard defines a standardized status register system. This section provides a detailed description of the status registers and illustrates the relationships among the status registers in chart form.

5.1 Status Commands

5.1.1 Operation Status

STATus:OPERation:CONDition?	
Command Description	Reads the real-time operating status of the power supply. This Operation Status register is read-only. This register has a total of 1 6 bits, defined as follows: B it 15~14, Coupling Mode: [00] AC [0 1] DC [10] AC+DC Bit13~12, Output Phase Count: 【 00 】Three-Phase【0 1 】Split-Phase【 10 】Single-Phase Bit11, Reset Status: 【 1 】Reset Bit10, Protection Status: 【 1 】Protection Active Bit9, Output Waiting Status: 【 1 】Output Not Ready 【 0 】Output Enabled Bit8, Disk Operation Status: 【 1 】Operation Successful【 0 】Operation in Progress or Failed Bit7, Programming Status: 【 1 】Programming in Progress 【 0 】Programming Not Running Bit6, Trigger Wait: 【 1 】Waiting for Experiment Trigger 【 0 】Triggered Bit5, Communication Interface: 【 1 】Remote Control 【 0 】Local Control (Display) Bit4, operating status: 【 1 】Running Bit3, source/load status: 【 1 】Load 【 0】Source

	Bit2, internal resistance status: 【 1 】 On (Enabled) 【 0 】 Off (Disabled) Bit1, DC limit status: 【 1 】 On (Enabled) 【 0 】 Off (Disabled) Bit0, AC limit status: 【 1 】 On (Enabled) 【 0 】 Off (Disabled) Note: For disk operation status, after a disk operation command is issued, this flag will first be set to 0, and will be set to 1 after the operation succeeds.
Return Format	<NR1>
Command Example	STAT:OPER:COND? 65535 (All bits are 1)

5.1.2 QUEStionable status

STATus:QUEStionable:ALARm:CONDition?	
Command Description	Read the real-time fault register status of the power supply. This status register is read-only. This register contains a total of 1 6 bits, with bit definitions as follows: Bit15~14, reserved Bit13, undervoltage fault L VP: 【 1 】 Fault 【0】 Normal Bit12, underfrequency fault L FP: 【 1 】 Fault 【0】 Normal Bit11, overfrequency fault 0 FP: 【 1 】 Fault 【0】 Normal Bit10, interlock fault C HAF: 【 1 】 Fault 【0】 Normal Bit9, slave fault S LAF: 【 1 】 Fault 【0】 Normal Bit8, Internal Fault I NSF: [1] Fault [0] Normal Bit7, Power Supply Fault P OWF: [1] Fault [0] Normal

	Bit6, Parallel Communication Fault P ARF: [1] Fault [0] Normal Bit5, Communication Timeout Fault C OMF: [1] Fault [0] Normal Bit4, Air Outlet Overtemperature Fault O TP: [1] Fault [0] Normal Bit3, Telemetry Fault S ENF: [1] Fault [0] Normal Bit2, Output Overpower Fault O PP: [1] Fault [0] Normal Bit1, Output overcurrent fault O CP: [1] Fault [0] Normal Bit0, Output overvoltage fault OVP: [1] Fault [0] Normal
Parameter Format	< NR1 >
Command Example	STAT:QUES:ALAR:COND? 64

STATus:QUEStionable:WARNing:CONDition?

Command Description	Read the status of the power supply real-time alarm register. This status register is read-only. This register has a total of 1 6 bits, with bit definitions as follows: Bit15~9, Reserved Bit8, U SBTMC queue empty alarm T MCE: [1] Alarm [0] Normal Bit7, Emergency stop alarm E MST: [1] Alarm [0] Normal Bit6, I P conflict alarm I PAF: [1] Alarm [0] Normal Bit5, AC load R LC/PQ calculation exceeds limit L REL: [1] Alarm [0] Normal Bit4, AC load programming data out of range L PDL: [1] Alarm [0] Normal Bit3, AC source programming data out of range S PDL: [1] Alarm [0] Normal Bit2, cutoff voltage alarm L VL: [1] Alarm [0] Normal Bit1, parallel operation waiting W AIT: [1] Alarm [0] Normal

	Bit0, parallel redundancy alarm P ARA: [1] Alarm [0] Normal
Parameter Format	< NR1 >
Command Example	STAT:QUES:WARN:COND? 64

Appendix 1

Cortex-AC Series															
Model	CA06-450	CA7.5-450	CA09-450	CA12-450	CA15-450	CA20-450	CA22-450								
Maximum Three-Phase Current per Unit/A_rms	30	30	35	35	35	35	35								
Maximum Single-Phase Current per Unit/A_rms	90	90	105	105	105	105	105								
Maximum Three-Phase Power per Unit/kVA	2	2.5	3	4	5	6.667	7.333								
Maximum Single-Phase Power per Unit/kVA	6	7.5	9	12	15	20	22								
Maximum AC Voltage/V	470	470	470	470	470	470	470								
Maximum DC Voltage/V	636	636	636	636	636	636	636								
Peak Voltage/V	700	700	700	700	700	700	700								
Maximum Frequency/Hz	200	200	200	200	200	200	200								

Version Revision History

Date	Version	Revision Details
2024 Jul.	V0.971	1. Added Nexus Series 2. Revised the model appendix
2025 Apr.	V0.972	1. Added standalone programming commands 2. Added standalone measurement commands