



OWH98 series digital power meter Programming Manual (Three Phase)

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Dec. 2025 edition V1.0.0

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1. SCPI Introduction

SCPI (Standard Commands for Programmable Instruments) is a standardized instrument programming language based on the existing standards IEEE 488.1 and IEEE 488.2, and follows the floating-point arithmetic rules in IEEE754 standard, ISO646 information exchange 7-bit coding symbols (equivalent to ASCII programming) and other standards. This section introduces the format, symbols, s, and abbreviation rules of SCPI commands.

This chapter mainly covers the following:

- Instruction format
- **Description**
- Abbreviation rule
- Communication interface and communication settings
- List of instructions

Instruction format

Programming commands consist of keywords, delimiters, fields and terminators. Take the following command as an example:

:VOLTage:RANGe 150

VOLTage and RANGe are command keywords, ":" and spaces are separators, "150" is an argument (some commands have multiple s, separated by "|"), and the line break or carriage return after the command is the command terminator.

For the convenience of **Description**, the following conventions are adopted for various symbols that appear subsequently:

- Square brackets "[]" indicate that optional keywords or s may be omitted.
- The curly braces ' {} ' indicate argument options in the command string.
- The angle bracket "< >" indicates that a numeric must be provided.
- The vertical line "|" is used to separate the options of multiple optional s.
- Terminator: Line break < LF > (0x0A) or carriage return < CR > (0x0D)

Description

The data types of programming s include numerical, character, Boolean and other types. Regardless of the type, it is represented by ASCII code string, as detailed in the table below.

Symbols	Description	Examples
<NR1>	Integrate	123 0123
<NR2>	Fixed-point float number	123. 12.3 0.123 .123
<NR3>	Float number	123 12.3 123E+3
<NRF>	Possibly < NR1 >, < NR2 > or < NR3 >	
<Boolean>	Boolean data	0 1 ON OFF

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35 Abbreviation rule

36 All commands are case-recognizing and can be all in uppercase or lowercase.

37 If you want to abbreviate, you must enter all the capital letters in the .

38 Communication interface and 39 communication settings

40 For detailed instructions, please refer to "Chapter 6 Communication Settings"
41 and "Chapter 8 Communication Interfaces" in "OWH9800 Series Digital Power
42 Meter User Manual".

43 List of instructions

Commands	Function
Common commands	
*IDN?	Query instrument information
*RST	Restore factory default configuration
*STB	Query the status byte register
*SAV	Save current configuration to non-volatile memory
Display correlation	
:DISPlay:MODe	Set Measurement Mode (Normal/Harmonic)
Harmonic correlation	
:HARMonics:ORDer:ELEMeNt<x>?	Set the maximum and minimum values of the number of channel <x> harmonic analysis
:HARMonics:ELEMeNt	Set the phase of the harmonic mode
:HARMonics:DISPlay:MODE	Set or query the display view of harmonic mode
:HARMonics:LIST:VALue:ELEMeNt<x>?	Query channel < x > list harmonic data

	(ORDER range determined by ORDER)
:MEASure:VOLTage:THD:ELEMEnt<x>?	Query channel < x > voltage total harmonic distortion
:MEASure:CURRent:THD:ELEMEnt<x>?	Query channel < x > current total harmonic distortion
:MEASure:VOLTage:HARMonic:ORDER:ELEMEnt<x>?	Query the effective value of a certain harmonic voltage of channel < x >
:MEASure:CURRent:HARMonic:ORDER:ELEMEnt<x>?	Query the effective value of a harmonic current of channel < x >
:MEASure:VHDF:HARMonic:ORDER:ELEMEnt<x>?	Harmonic distortion of a certain harmonic voltage of the query channel < x > relative to the fundamental voltage
:MEASure:IHDF:HARMonic:ORDER:ELEMEnt<x>?	Query channel < x > Harmonic distortion of a certain harmonic current relative to fundamental current
Hold correlation	
:HOLD	Turn on or off the hold state
Input correlation	
: [INPut:]VOLTage:RANGe:ELEMEnt<x>	Set/Query Voltage Range
: [INPut:]CURRent:RANGe:ELEMEnt<x>	Set/query current range
: [INPut:]RANGe:CF	Set/query the value of CF
Measurement correlation	
:MEASure:FREQuency:VOLTage:ELEMEnt<x>?	Query channel <x> voltage frequency
:MEASure:VOLTage:ELEMEnt<x>?	Query channel <x> voltage
:MEASure:CURRent:ELEMEnt<x>?	Query channel <x> current
:MEASure:POWEr:REAL:ELEMEnt<x>?	Query channel <x> active power
:MEASure:POWEr:APPARENT:ELEMEnt<x>?	Query channel <x> apparent power
:MEASure:POWEr:REACTIVE:ELEMEnt<x>?	Query channel <x> reactive power
:MEASure:PFACtor:ELEMEnt<x>?	Query channel <x> power factor
:MEASure:PHASe:ELEMEnt<x>?	Query channel <x> phase angle
:MEASure:VOLTage:PEAK:MAXimum:ELEMEnt<x>?	Query channel <x> maximum voltage peak

:MEASure:VOLTage:PEAK:MINimum:EL EMent<x>?	Query channel <x> minimum voltage peak
:MEASure:CURRent:PEAK:MAXimum:EL EMent<x>?	Query channel <x> maximum current peak
:MEASure:CURRent:PEAK:MINimum:EL EMent<x>?	Query channel <x> minimum current peak
:MEASure:CFU:ELEMEnt<x>?	Query channel <x> voltage peak factor
:MEASure:CFI:ELEMEnt<x>?	Query channel <x> current peak factor
:MEASure:EFFiciency<x>?	Query the value of efficiency η
:MEASure:EFFiciency:ETA<x>	Set or query an efficiency equation
:MEASure:EFFiciency:UDEF<x>	Set or query user-defined formulas in efficiency equations
:MEASure:Wiring	Set or query wiring types
Digital display regular mode related	
:NUMeric[:NORMal]:DISPlay:MODE	Set or query the display view of the general mode harmonic
:NUMeric[:NORMal]:ITEM	Set or query the current value page in regular mode
:NUMeric[:NORMal]:OPTION	Query/set the option content of the current page
:NUMeric[:NORMal]:NUMber	Set/query the number of data transferred
:NUMeric[:NORMal]:VALue?	Query the numerical data of the current page
Update rate correlation	
:RATE	Set the update rate
Alarm related	
:ALARm:ERRor?	Query alarm information
:ALARm:SWitch:ELEMEnt<x>	Query or set channel < x > alarm switch
:ALARm:DELay:ELEMEnt<x>	Query or set channel < x > alarm delay
:ALARm:CURRent:High:ELEMEnt<x>	Query or set the < x > upper limit of alarm current channel
:ALARm:CURRent:Low:ELEMEnt<x>	Query or set the lower limit of alarm current

	channel < x >
:ALARm:POWer:High:ELEMenT<x>	Query or set the < x > upper limit of alarm power channel
:ALARm:POWer:Low:ELEMenT<x>	Query or set the lower limit of alarm power channel < x >
:ALARm:VOLTagE:High:ELEMenT<x>	Query or set the < x > upper limit of the alarm voltage channel
:ALARm:VOLTagE:Low:ELEMenT<x>	Query or set the lower limit of alarm voltage channel < x >

44

45 **2. IEEE488.2 Public Commands**

46 This chapter mainly covers the following commands:

- 47 ● [*IDN?](#)
- 48 ● [*RST](#)
- 49 ● [*STB?](#)
- 50 ● [*SAV](#)

51

52 ***IDN?**

	*IDN?	
Function Description	Query instrument information.	
	None.	
Description	None.	
	<Factory>,<model>,<serial number>,XX.X.X.X.X <model>: Instrument model. <serial number>: Instrument serial number. XX.X.X.X.X: Instrument software version.	
Example		*IDN?
	Return	Factory, Model,2322011,V1.0.2.0.

53 ***RST**

	*RST	
Function Description	Restore the instrument to the factory default configuration.	
	None.	
Description	Except for the communication configuration s (instruction type, baud rate, address), the other configuration s are restored to the factory default state.	
	None.	
Example		*RST

54 ***STB?**

	*STB?	
Function	Query the status byte register.	

Description		
	None.	
Description	If the return value is 4, indicates that the status byte register is set to 00000100; This means that the error queue is not empty, that is, an error was generated.	
	None.	
Example		*STB?
	Return	4

55 ***SAV**

	*SAV	
Function Description	Save the current configuration to non-volatile memory for the next power-on call	
	None.	
Description	None.	
	None.	
Example		*SAV

56

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58

59 **3. Display control commands**

60 This chapter mainly covers the following commands:

- 61 ● :DISPlay:MODe

62

63

64 **:DISPlay:MODE**

	:DISPlay:MODE {NORM HARMONIC 0 1} :DISPlay:MODE?	
Function Description	Set or query the measurement mode.	
	NORM HARMONIC 0 1	
Description	0 NORM=normal mode, 1 HARMONIC= harmonic mode	
	NORM HARMONIC	
Example		:DISP:MOD HARMONIC //Set the measurement mode to HARMONIC.
	Query	:DISP:MOD? //Query the current measurement mode.
	Return	HARMONIC

65

4. Harmonic measurement command

This chapter mainly covers the following commands:

- [:HARMonics:ORDer:ELEMenT<x>](#)
- [:HARMonics:DISPlay:MODE](#)
- [:HARMonics:LIST:VALue:ELEMenT<x>?](#)
- [:MEAS:VOLT:HARM:ORDER:ELEMenT<x>?](#)
- [:MEAS:CURR:HARM:ORDER:ELEMenT<x>?](#)
- [:MEAS:VHDF:HARM:ORDER:ELEMenT<x>?](#)
- [:MEAS:IHDF:HARM:ORDER:ELEMenT<x>?](#)

76

:HARMonics:ORDer:ELEment<x>

Command Format	:HARMonics:ORDer:ELEment<x> {<min>,<max>} :HARMonics:ORDer:ELEment<x>?	
Function Description	Set or query the harmonic measurement range.	
Parameter	<x>,<min>,<max> < x > , < min > , < max >	
Description	<x>== channel number (1 1A 1B 1C) <min>= Number of starts (1-63) <max>= Number of ends (1-63) <min> <= <max>	
Return Format	Float data.	
Example	Send	:HARM:ORD:ELEment1A 1,50 //Set the measuring range to 1-50.
	Query	:HARM:ORD:ELEment1A? //Query the measurement range.
	Return	1,50

77

:HARMonics:DISPlay:MODE

Command Format	:HARMonics:DISPlay:MODE {NUMERIC WAVE 0 1} :HARMonics:DISPlay:MODE?	
Function Description	Set or query the harmonic data display view.	
Parameter	NUMERIC WAVE 0 1	
Description	0 NUMERIC: NUMERIC view 1 WAVE: Waveform view	
Return Format	NUMERIC WAVE	
Example	Send	:HARM:DISP:MODE WAVE

		//Set the display view to waveform view.
	Query	:HARM:DISP:MODE? //Query display view mode.
	Return	WAVE

78 **:HARMonics:LIST:VALue:ELEMeNt<x>?**

Command Format	:HARMonics:LIST:VALue:ELEMeNt<x>? {<type>}	
Function Description	Query a list of harmonic data.	
Parameter	<x>= channel number (1 1A 1B 1C) <type>= harmonic type {VOLT CURR 0 1}.	
Description	Returns the harmonic RMS of the degree min-max according to the: HARMonics: ORDeR command.	
Return Format	Float data.	
Example	Query	:HARM:ORD:ELEMeNt1A 1,3 :HARM:LIST:VAL:ELEMeNt? VOLT //Query the harmonic data voltage list.
	Return	10.2,9.8,20.3

79 **:MEASure:VOLTage:HARMonic:ORDeR:ELEMeNt**

80 **<x>?**

Command Format	:MEAS:VOLT:HARM:ORDER:ELEMeNt<x>? {<index>}
Function Description	Query the harmonic voltage RMS for a specified number of times.
Parameter	<x>= channel number (1 1A 1B 1C) <index>= harmonic order (1-63).

Description	Harmonic voltage effective value (unit: V).	
Return Format	Float data.	
Example	Query	:MEAS:VOLT:HARM:ORDER:ELEMent1A? 3 //Query the voltage RMS of the third harmonic.
	Return	5.2

81 **:MEASure:CURRent:HARMonic:ORDer:ELEMent**
82 **<x>?**

Command Format	:MEAS:CURR:HARM:ORDER:ELEMent<x>? {<index>}	
Function Description	Query the harmonic current RMS for a specified number of times.	
Parameter	<x> = channel number (1 1A 1B 1C) <index>= harmonic order (1-63).	
Description	Harmonic current effective value (unit: A).	
Return Format	Float data.	
Example	Query	:MEAS:VOLT:HARM:ORDER:ELEMent1A? 3 //Query the current RMS of the third harmonic.
	Return	5.2

83 **:MEASure:VHDF:HARMonic:ORDer:ELEMent<x>**
84 **?**

Command Format	:MEAS:VHDF:HARM:ORDER? {<index>}
Function	Query the specified sub-harmonic voltage distortion

Description	(relative to fundamental).	
Parameter	<x>= channel number (1 1A 1B 1C) <index>= harmonic order (1-63).	
Description	Percent distortion (in%).	
Return Format	Float data.	
Example	Query	:MEAS:VHDF:HARM:ORDER:ELEMent1A? 3 //Query the voltage distortion of the third harmonic.
	Return	5.2

85 **:MEASure:IHDF:HARMonic:ORDER:ELEMent<x>**
86 **?**

Command Format	:MEAS:IHDF:HARM:ORDER? {<index>}	
Function Description	Query the specified sub-harmonic current distortion (relative to fundamental).	
Parameter	<x>= channel number (1 1A 1B 1C) <index>= harmonic order (1-63).	
Description	Percent distortion (in%).	
Return Format	Float data.	
Example	Query	:MEAS:IHDF:HARM:ORDERELEMent1A? 3 //Query the current distortion of the third harmonic.
	Return	5.2

87

88 **5. Hold control command**

89 This chapter mainly covers the following commands:

- 90 ● [:HOLD](#)

91

92 **:HOLD**

Command Format	:HOLD {OFF ON 0 1} :HOLD?	
Function Description	Enables or disables hold function.	
Parameter	OFF ON 0 1	
Description	OFF 0: Disable data hold; ON 1: Enable data hold.	
Return format	0 1	
Example	Send	:HOLD ON //Set enable hold retention.
	Query	:HOLD? //Query data hold status.
	Return	1

93

94 **6. Input control commands**

95 This chapter mainly covers the following commands:

- 96 ● [:\[INPut:\]VOLTage:RANGe:ELEMenT<x>](#)
- 97 ● [:\[INPut:\]CURRent:RANGe:ELEMenT<x>](#)
- 98 ● [:\[INPut:\]RANGe:CF](#)

99

100

: [INPut:]VOLTage:RANGe:ELEMeNt<x>

Command Format	:INP:VOLT:RANG:ELEMeNt<x> {<range>} :INP:VOLT:RANG:ELEMeNt<x>?	
Function Description	Set or query the voltage range.	
Parameter	<x>= channel number (1-2) <range>= channel 1 range value {AUTO 75V 150V 300V 600V 0 1 2 3 4} <range>== channel 2 range value {AUTO 50V 100V 500V 1000V 0 1 2 3 4}	
Description	None.	
Return Format	Integer data.	
Example	Send	:INP:VOLT:RANG:ELEMENT1 300 //Set the channel 1 range value to 300V.
	Query	:INP:VOLT:RANG:ELEMENT1? //Query the channel 1 range value.
	Return	300

101

: [INPut:]CURRent:RANGe:ELEMeNt<x>

Command Format	:INP:CURR:RANG:ELEMeNt<x> {<range>} :INP:CURR:RANG:ELEMeNt<x>?	
Function Description	Set or query the current range.	
Parameter	<x>= channel number (1-2) <range>= channel 1/2 range value {AUTO 0.2A 1A 4A 20A 0 1 2 3 4}	
Description	None.	
Return Format	Integer data.	

Example	Send	:INP:CURR:RANG:ELEMENT2 5 //Set the channel 2 range value to 5A.
	Query	:INP:CURR:RANG:ELEMENT2? //Query the channel 2 range value.
	Return	5

102 **: [INPut:]RANGe:CF**

Command Format	:INP:RANG:CF {<value>} :INP:RANG:CF?	
Function Description	Set or Query the peak factor.	
Parameter	<value>= peak factor {3 6}	
Description	None.	
Return Format	Float data.	
Example	Send	:INP:RANG:CF 3.0 //Set the peak factor to 3.0.
	Query	:INP:RANG:CF? //Query peak factor.
	Return	3.0

103

7. Measurement command

This chapter mainly covers the following commands:

- [:MEASure:FREQuency:VOLTage:ELEMent<x>?](#)
- [:MEASure:VOLTage:ELEMent<x>?](#)
- [:MEASure:CURRent:ELEMent<x>?](#)
- [:MEASure:POWer:REAL:ELEMent<x>?](#)
- [:MEASure:POWer:APParent:ELEMent<x>?](#)
- [:MEASure:POWer:REACtive:ELEMent<x>?](#)
- [:MEASure:PFACtor:ELEMent<x>?](#)
- [:MEASure:PHASe:ELEMent<x>?](#)
- [:MEASure:VOLTage:PEAK:MAXimum:ELEMent<x>?](#)
- [:MEASure:VOLTage:PEAK:MINimum:ELEMent<x>?](#)
- [:MEASure:CURRent:PEAK:MAXimum:ELEMent<x>?](#)
- [:MEASure:CURRent:PEAK:MINimum:ELEMent<x>?](#)
- [:MEASure:CFU:ELEMent<x>?](#)
- [:MEASure:CFI:ELEMent<x>?](#)
- [:MEASure:EFFiciency<x>?](#)
- [:MEASure:EFFiciency:ETA<x>](#)
- [:MEASure:EFFiciency:UDEF<x>](#)
- [:MEASure:Wiring](#)
- [:MEASure:VOLTage:THD?](#)
- [:MEASure:CURRent:THD?](#)

127

:MEASure:FREQuency:VOLTage:ELEMenT<x>?

Command Format	:MEAS:FREQ:VOLT:ELEMenT<x>?	
Function Description	Query the specified channel voltage frequency.	
Parameter	<x>= channel number (1 1A 1B 1C 2)	
Description	None.	
Return Format	Float data, the default unit is Hz.	
Example	Query	:MEAS:FREQ:VOLT:ELEMENT1? //Query channel 1 voltage frequency.
	Return	50.0
	Query	:MEAS:FREQ:VOLT:ELEMENT1B? //Query the voltage frequency of phase B.
	Return	51.0

128

:MEASure:VOLTage:ELEMenT<x>?

Command Format	:MEAS:VOLT:ELEMenT<x>?	
Function Description	Query the valid value of the specified channel voltage.	
Parameter	<x>= channel number (1 1A 1B 1C 1SIGMA 2)	
Description	None.	
Return Format	Float data, the default unit is V.	
Example	Query	:MEAS:VOLT:ELEMENT1? //Query the effective value of channel 1 voltage.
	Return	220.5
	Query	:MEAS:VOLT:ELEMENT1SIGMA?

		//Query the sum voltage RMS of phases A, B and C.
	Return	300.0

129 **:MEASure:CURRent:ELEMeNt<x>?**

Command Format	:MEAS:CURR:ELEMeNt<x>?	
Function Description	Query the effective value of the specified channel current.	
Parameter	<x>= channel number (1 1A 1B 1C 1SIGMA 2)	
Description	None.	
Return Format	Float data, the default unit is A.	
Example	Query	:MEAS:CURR:ELEMENT1? //Query the effective value of channel 1 current.
	Return	1.2
	Query	:MEAS:CURR:ELEMENT1SIGMA? //Query the sum current RMS of phases A, B, and C.
	Return	300.0

130 **:MEASure:POWer:REAL:ELEMeNt<x>?**

Command Format	:MEAS:POW:REAL:ELEMeNt<x>?	
Function Description	Query the active power of the specified channel.	
Parameter	<x>= channel number (1 1A 1B 1C 1SIGMA 2)	
Description	None.	

Return Format	Float data, the default unit is W.	
Example	Query	:MEAS:POW:REAL:ELEM1? //Query channel 1 active power.
	Return	1500.3

131 **:MEASure:POWer:APParent:ELEMeNt<x>?**

Command Format	:MEAS:POW:APP:ELEMeNt<x>?	
Function Description	Query the apparent power of the specified channel.	
Parameter	<x>= channel number (1 1A 1B 1C 1SIGMA)	
Description	None.	
Return Format	Float data, the default unit is VA.	
Example	Query	:MEAS:POW:APP:ELEMENT1? //Query channel 1 apparent power.
	Return	264.6

132 **:MEASure:POWer:REACtive:ELEMeNt<x>?**

Command Format	:MEAS:POW:REAC:ELEMeNt<x>?	
Function Description	Query the specified channel reactive power.	
Parameter	<x>= channel number (1 1A 1B 1C 1SIGMA)	
Description	None.	
Return Format	Float data, the default unit is var.	
Example	Query	:MEAS:POW:REAC:ELEMENT1? //Query channel 1 reactive power.

	Return	0.0
--	---------------	-----

133 **:MEASure:PFACtor:ELEMeNt<x>?**

Command Format	:MEAS:PFAC:ELEMeNt<x>?	
Function Description	Query the specified channel power factor.	
Parameter	<x>= channel number (1 1A 1B 1C 1SIGMA)	
Description	None.	
Return Format	Float data.	
Example	Query	:MEAS:PFAC:ELEMENT1? //Query channel 1 power factor.
	Return	1.0

134 **:MEASure:PHASe:ELEMeNt<x>?**

Command Format	:MEAS:PHAS:ELEMeNt<x>?	
Function Description	Query the specified channel phase angle degree.	
Parameter	<x>= channel number (1 1A 1B 1C 1SIGMA)	
Description	None.	
Return Format	Float data, default unit °.	
Example	Query	:MEAS:PHAS:ELEMENT1? //Query channel 1 phase angle degrees.
	Return	0.0

135 **:MEASure:VOLTage:PEAK:MAXimum:ELEMeNt<**
 136 **x>?**

Command Format	:MEAS:VOLT:PEAK:MAX:ELEMeNt<x>?	
Function Description	Query the maximum voltage peak of the specified channel.	
Parameter	<x>= channel number (1 1A 1B 1C 2)	
Description	None.	
Return Format	Float data, default unit V.	
Example	Query	:MEAS:VOLT:PEAK:MAX:ELEMENT1? //Query channel 1 maximum voltage peak.
	Return	311.1

137 **:MEASure:VOLTage:PEAK:MINimum:ELEMeNt<x**
 138 **>?**

Command Format	:MEASure:VOLTage:PEAK:MIN:ELEMeNt<x>?	
Function Description	Query the minimum voltage peak for the specified channel.	
Parameter	<x>= channel number (1 1A 1B 1C 2)	
Description	None.	
Return Format	Float data, default unit V.	
Example	Query	:MEAS:VOLT:PEAK:MIN:ELEMENT1?//Qu ery Channel 1 Minimum Voltage Peak.
	Return	-311.1

139 **:MEASure:CURRent:PEAK:MAXimum:ELEment<**
 140 **x>?**

Command Format	:MEASure:CURRent:PEAK:MAXimum:ELEment<x>?	
Function Description	Query the specified channel maximum current peak.	
Parameter	<x>= channel number (1 1A 1B 1C 2)	
Description	None.	
Return Format	Float data, default unit A.	
Example	Query	:MEAS:CURR:PEAK:MAX:ELEMENT1?//Q Query the maximum current peak of channel 1.
	Return	1.7

141 **:MEASure:CURRent:PEAK:MINimum:ELEment<**
 142 **x>?**

Command Format	:MEAS:CURR:PEAK:MIN:ELEment<x>?	
Function Description	Query the minimum current peak for the specified channel.	
Parameter	<x>= channel number (1 1A 1B 1C 2)	
Description	None.	
Return Format	Float data, default unit A.	
Example	Query	:MEAS:CURR:PEAK:MIN:ELEMENT1? //Query channel 1 minimum current peak.
	Return	-1.7

143

:MEASure:CFU:ELEMeNt<x>?

Command Format	:MEAS:CFU:ELEMeNt<x>?	
Function Description	Query the specified channel voltage peak factor.	
Parameter	<x>= channel number (1 1A 1B 1C 2)	
Description	None.	
Return Format	Integer data.	
Example	Query	:MEAS:CFU:ELEMENT1? //Query the channel 1 voltage peak factor.
	Return	1

144

:MEASure:CFI:ELEMeNt<x>?

Command Format	:MEAS:CFI:ELEMeNt<x>?	
Function Description	Query the specified channel current peak factor.	
Parameter	<x>= channel number (1 1A 1B 1C 2)	
Description	None.	
Return Format	Integer data.	
Example	Query	:MEAS:CFI:ELEMENT1? //Query the channel 1 current peak factor.
	Return	1

145

:MEASure:EFFiciency<x>?

Command Format	:MEAS:EFFICIENCY<x>?
-----------------------	----------------------

Function Description	Query the specified channel efficiency value.	
Parameter	<x>= channel number (1-2)	
Description	None.	
Return Format	Float data, the default unit is%.	
Example	Query	:MEAS:EFFICIENCY1? //Query channel 1 efficiency value.
	Return	95.5

146 **:MEASure:EFFiciency:ETA<x>**

Command Format	:MEAS:EFFI:ETA<x> { P<x> P1A P1B P1C P1SIGMA P2 UDEF1 UDEF2} .(P<x> P1A P1B P1C P1SIGMA P2 UDEF1 UDEF2 } :MEAS:EFFI:ETA<x>?	
Function Description	Set or query the efficiency equation.	
Parameter	<x>= channel number (1-2)	
Description	None.	
Return Format	None.	
Example	Send	:MEAS:EFFI:ETA1 P1,P2 //Set the channel 1 efficiency equation as P1, P2.
	Query	:MEAS:EFFI:ETA1? //Query the channel 1 efficiency equation.
	Return	P1, P2

147 **:MEASure:EFFiciency:UDEF<x>**

Command	:MEAS:EFFI:UDEF<x>
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Format	{[P<x> P1A P1B P1C P1SIGMA P2][,(P<x> P1A P1B P1C P1SIGMA P2)][,(P<x> P1A P1B P1C P1SIGMA P2)][,(P<x> P1A P1B P1C P1SIGMA P)]} :MEAS:EFFI:UDEF<x>?	
Function Description	Set or query custom efficiency formulas.	
Parameter	<x>= channel number (1-2)	
Description	None.	
Return Format	None.	
Example	Send	:MEAS:EFFI:UDEF1 P1A,P1B,P1C,P2 //Set the custom efficiency formula of channel 1 to P1A, P1B, P1C, P2.
	Query	:MEAS:EFFI:UDEF1? //Query channel 1 custom efficiency formula.
	Return	P1A,P1B,P1C,P2

148

:MEASure:Wiring

Command	:MEAS:W {0 1 2 3}	
Format	:MEAS:W?	
Function Description	Set or query the wiring type.	
Parameter	0,1,2,3	
Description	0:CH1(1P2W) CH2(1P2W) 1:CH1(1P3W) CH2(1P2W) 2:CH1(3P3W) CH2(1P2W) 3:CH1(3P4W) CH2(1P2W)	
Return Format	Float data, the default unit is%.	
Example	Send	:MEAS:W 1

		//Set the wiring type to 1.
	Query	:MEAS:W? //Query the wiring type.
	Return	1

149

:MEASure:VOLTage:THD?

Command Format	:MEAS:VOLT:THD?	
Function Description	Query voltage total harmonic distortion.	
Parameter	None.	
Description	None.	
Return Format	Float data, the default unit is%.	
Example	Query	:MEAS:VOLT:THD? //Query voltage total harmonic distortion.
	Return	3.2

150

:MEASure:CURREnt:THD?

Command Format	:MEAS:CURR:THD?	
Function Description	Query current total harmonic distortion.	
Parameter	None.	
Description	None.	
Return Format	Float data, the default unit is%.	
Example	Query	:MEAS:CURR:THD? //Query current total harmonic distortion.
	Return	5.1

151

8. Digital display command

This chapter mainly covers the following commands:

- [:NUMeric\[:NORMal\]:DISPlay:MODE](#)
- [:NUMeric:NORMal:ITEM](#)
- [:NUMeric:NORMal:OPTION](#)
- [:NUMeric:NORMal:NUMBER](#)
- [:NUMeric:NORMal:VALue?](#)

160 **:NUMeric[:NORMal]:DISPlay:MODE**

161 **: NUMeric [: NORMal]: DISPlay: MODE**

Command Format	:NUMeric[:NORMal]:DISPlay:MODE {NUMERIC WAVE 0 1} :NUMeric[:NORMal]:DISPlay:MODE?	
Function Description	Set or Query a general data display view.	
Parameter	NUMERIC 0 = NUMERIC view, WAVE 1 = waveform view	
Description	None.	
Return Format	NUMERIC, WAVE.	
Example	Send	:NUM:DISP:MODE WAVE //Set the general data display view to WAVE.
	Query	:NUM:DISP:MODE? //Query general data display view mode.
	Return	WAVE

162 **:NUMeric:NORMal:ITEM**

Command Format	:NUM:NORM:ITEM {<page>} :NUM:NORM:ITEM?	
Function Description	Set or query the general mode numeric display page.	
Parameter	<page>=Set up ITEM page {4ITEM 8ITEM 16ITEM 0 1 2}	
Description	None.	
Return Format	4ITEM, 8ITEM, 16ITEM, 0, 1, 2.	
Example	Send	:NUM:NORM:ITEM 4ITEM

		//Set the general mode value display page to 4ITEM.
	Query	:NUM:NORM:ITEM? //Query the general mode numeric display page.
	Return	4ITEM

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:NUMeric:NORMal:OPTION

Command Format	:NUM:NORM:OPTION {<option>[,<Function>][,<Element>]} :NUM:NORM:OPTION? <option>	
Function Description	Set or query the currently displayed page (4ITEM, 8ITEM, 16ITEM) options.	
Parameter	< option > = (option number), 4item pages 1 to 4, 8item pages 1 to 8, 16item pages 1 to 16 <Function> = {U I P S Q lambda pha fU Upk+ Upk- lpk+ lpk- CfU CfI n 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14} < Element > = {0 1 2 3 4}, 0: sum Σ , 1: channel 1 phase A, 2: channel 1 phase B, 3: channel 1 phase C, 4: channel 2	
Description	None.	
Return Format	None.	
Example	Send	:NUM:NORM:ITEM 4ITEM :NUM:NORM:OPTION 1, U, 1 //Set the current display page option to 1, U, 1.
	Query	:NUM:NORM:OPTION? //Query the current display page options.
	Return	U1rms

	Send	:NUM:NORM:OPTION 1,U,0 //Set the current display page options to 1, U, 0.
	Query	:NUM:NORM:OPTION? //Query three-phase summation *.
	Return	U1Srms

164 **:NUMeric:NORMal:NUMber**

Command Format	:NUM:NORM:NUM {<count>} :NUM:NORM:NUM?	
Function Description	Set or query the amount of data to read back, auxiliary :NUMeric:NORMal:VALue? command	
Parameter	<count>= number of data items 4item page max = 4, 8item page max = 8, 16item page max = 16	
Description	None.	
Return Format	None.	
Example	Send	:NUM:NORM:NUM 4 //Set the number of readback data to 4.
	Query	:NUM:NORM:NUM? //The amount of data read back in the query.
	Return	4

165 **:NUMeric:NORMal:VALue?**

Command Format	:NUM:NORM:VAL?<option>
Function	Query the current display page (4ITEM, 8ITEM,

Description	16ITEM) data.	
Parameter	<option>= Sets the individual option index that needs to be read back	
Description	Based on the previous instruction, the corresponding result is returned. The NUMber of returned data is determined by the NUMeric [:NORMal]:NUMber command. The meaning of each data ITEM is determined by: NUMeric:NORMal:ITEM and NUMeric:NORMal:OPTION decides.	
Return Format	None.	
Example	Query	:NUM:NORM:ITEM 4ITEM :NUM:NORM:OPTION 1, U,1 :NUM:NORM:OPTION 2, I,1 :NUM:NORM:OPTION 3, U,4 :NUM:NORM:NUM 3 :NUM:NORM:VAL? //Query the data of the currently displayed page.
	Return	220.5, 1.2, 264.6
	Query	:NUM:NORM:ITEM 4ITEM :NUM:NORM:VAL? 1 //Query the first item of data on the 4ITEM page.
	Return	220.5

167 **9. System control command**

168 This chapter mainly covers the following commands:

- 169 ● [:RATE](#)

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171 **:RATE**

Command Format	:RATE {<value>} :RATE?	
Function Description	Set or query the data update rate.	
Parameter	<value>= update interval {0.1 s 0.2 s 0.5 s 1s 2s 5s 0 1 2 3 4 5}	
Description	None.	
Return Format	0.1 s, 0.2 s, 0.5 s, 1s, 2s, 5s, 0s, 1s, 2s, 3s, 4s, 5s.	
Example	Send	:RAT 0.1s //Set the data update rate to 0.1 s.
	Query	:RAT? //Query data update rate.
	Return	0.1s

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10. Alarm system command

This chapter mainly covers the following commands:

- [:ALARm:ERRor?](#)
- [:ALARm:SWitch:ELEMent<x>](#)
- [:ALARm:DELaY:ELEMent<x>](#)
- [:ALARm:CURRent:High:ELEMent<x>](#)
- [:ALARm:CURRent:Low:ELEMent<x>](#)
- [:ALARm:POWEr:High:ELEMent<x>](#)
- [:ALARm:POWEr:Low:ELEMent<x>](#)
- [:ALARm:VOLTagE:High:ELEMent<x>](#)
- [:ALARm:VOLTagE:Low:ELEMent<x>](#)

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:ALARm:ERRor?

Command Format	:ALAR:ERR?	
Function Description	Query alarm information.	
Parameter	None.	
Description	None.	
Return Format	Error code and description.	
Example	Query	:ALARm:ERRor? //Query alarm information.
	Return	None

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:ALARm:SWitch:ELEMent<x>

Command Format	:ALAR:SW:ELEMent<x> {ON OFF 1 0} :ALAR:SW:ELEMent<x>?	
Function Description	Set or Query the alarm system status of the specified channel.	
Parameter	<x>= channel number (1-2); ON 1: Enable the alarm system; OFF 0: Disables the alarm system.	
Description	None.	
Return Format	ON, OFF.	
Example	Send	:ALAR:SW:ELEMENT1 ON //Set up channel 1 to enable the alarm system.
	Query	:ALAR:SW:ELEMENT1? //Query the status of the channel 1 alarm system.

	Return	ON
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:ALARm:DELay:ELEMent<x>

Command Format	:ALAR:DEL:ELEMent<x> {<count>} :ALAR:DEL:ELEMent<x>?	
Function Description	Set or Query the number of alarm delays for the specified channel.	
Parameter	<x>= channel number (1-2); < count > = number of delays (1-9999)	
Description	None.	
Return Format	Integer data.	
Example	Send	:ALAR:DEL:ELEMENT1 1000 //Set the number of alarm delays for channel 1 to 1000.
	Query	:ALAR:DEL:ELEMENT1? //Query the number of alarm delays for channel 1.
	Return	1000

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:ALARm:CURRent:High:ELEMent<x>

Command Format	:ALAR:CURR:HIGH:ELEMent<x> {<value>} :ALAR:CURR:HIGH:ELEMent<x>?	
Function Description	Set or Query the upper current threshold for the specified channel.	
Parameter	<x>= channel number (1-2)	
Description	None.	
Return Format	Float data.	
Example	Send	:ALAR:CURR:HIGH:ELEMENT1 5.0

		//Set the upper current threshold for channel 1 to 5.0.
	Query	:ALAR:CURR:HIGh:ELEMENT1?//Query the upper current threshold of channel 1.
	Return	5.0

189 **:ALARm:CURRent:Low:ELEMeNt<x>**

Command Format	:ALAR:CURR:Low:ELEMeNt<x> {<value>} :ALAR:CURR:Low:ELEMeNt<x>?	
Function Description	Set or Query the current lower threshold for the specified channel.	
Parameter	<x>= channel number (1-2)	
Description	None.	
Return Format	Float data.	
Example	Send	:ALAR:CURR:LOW:ELEMENT1 0.1 //Set the lower current threshold for channel 1 to 0.1.
	Query	:ALAR:CURR:LOW:ELEMENT1? //Query the current lower limit threshold for channel 1.
	Return	0.1

190 **:ALARm:POWer:High:ELEMeNt<x>**

Command Format	:ALAR:POW:HIGh:ELEMeNt<x> {<value>} :ALAR:POW:HIGh:ELEMeNt<x>?	
Function Description	Set or Query the upper power threshold for the specified channel.	

Parameter	<x>= channel number (1-2)	
Description	None.	
Return Format	Float data.	
Example	Send	:ALAR:POW:HIGh:ELEMENT1 1000.0 //Set the upper power threshold of channel 1 to 1000.0.
	Query	:ALAR:POW:HIGh:ELEMENT1? //Query the upper power threshold of channel 1.
	Return	1000.0

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:ALARM:POWer:Low:ELEment<x>

Command Format	:ALAR:POW:LOW:ELEment<x> {<value>} :ALAR:POW:LOW:ELEment<x>?	
Function Description	Set or Query the power lower threshold for the specified channel.	
Parameter	<x>= channel number (1-2)	
Description	None.	
Return Format	Float data.	
Example	Send	:ALAR:POW:LOW:ELEMENT1 10.0 //Set the lower power threshold for channel 1 to 10.0.
	Query	:ALAR:POW:LOW:ELEMENT1? //Query the power lower limit threshold of channel 1.
	Return	10.0

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:ALARm:VOLTage:High:ELEment<x>

Command Format	:ALAR:VOLT:HIGH:ELEment<x> {<value>} :ALAR:VOLT:HIGH:ELEment<x>?	
Function Description	Set or Query the upper voltage threshold for the specified channel.	
Parameter	<x>= channel number (1-2)	
Description	None.	
Return Format	Float data.	
Example	Send	:ALAR:VOLT:HIGH:ELEMENT1 250.0 //Set the upper voltage threshold for channel 1 to 250.0.
	Query	:ALAR:VOLT:HIGH:ELEMENT1? //Query the upper voltage threshold for channel 1.
	Return	250.0

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:ALARm:VOLTage:Low:ELEment<x>

Command Format	:ALAR:VOLT:LOW:ELEment<x> {<value>} :ALAR:VOLT:LOW:ELEment<x>?	
Function Description	Set or Query the lower voltage threshold for the specified channel.	
Parameter	<x>= channel number (1-2)	
Description	None.	
Return Format	Float data.	
Example	Send	:ALAR:VOLT:LOW:ELEMENT1 85.0 //Set the lower voltage threshold for channel 1 to 85.0.

	Query	:ALAR:VOLT:LOW:ELEMENT1? //Query the lower voltage threshold for channel 1.
	Return	85.0

194