Programming Manual

BA8100

EIS Battery Analyzer

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BK PRECISION

Contents

About Commands & Queries

This section lists and describes the remote control commands and queries recognized by the instrument. All commands and queries can be executed in either local or remote state.

The description, command syntax, query syntax, example and respond can be found in a section. The commands are given in both long and short form. All examples are shown in short form. Queries perform actions such as obtaining information, and are recognized by the question mark (?) following the header.

1.1 How They are Listed

The commands are listed by subsystem and alphabetical order according to their short form.

1.2 How They are Described

In the descriptions themselves, a brief explanation of the function performed is given. This is followed by a presentation of the formal syntax, with the header given in Upper-and-Lower-Case characters and the short form derived from it in ALL UPPER-CASE characters. Where applicable, the syntax of the query is given with the format of its response.

1.3 When can they be used?

The commands and queries listed here can be used for BA8100 EIS Battery Analyzer.

1.4 Command Notation

The following notation is used in the commands:

< > Angular brackets enclose words that are used as placeholders, of which there are two types: the header path
and the data parameter of a command.

:= A colon followed by an equals sign separates a placeholder from the description of the type and range of values that
may be used in a command instead of the placeholder.

{ } Braces enclose a list of choices, one of which one must be made.

[ ] Square brackets enclose optional items.

… An ellipsis indicates that the items both to its left and right may be repeated a number of times.

Common Command Introduction

IEEE standard defines the common commands used for querying the basic inSyntaxion of the instrument or executing basic operations. These commands usually start with "*" and the length of the keywords of the command is usually 3 characters.

Short	Long	Subsystem	Description
***IDN**	*IDN	SYSTEM	Returns a string that uniquely identifies the instrument.
***RCL**	*RCL	SYSTEM	Recalls a saved instrument state.
***SAV**	*SAV	SYSTEM	Saves instrument state.

Table 2.1 Common Commands

2.1 *IDN?

Description The *IDN? query causes the instrument to identify itself. The response comprises manufacturer, model, serial number, software version and firmware version.

Query *IDN?

Response *IDN, <device id>,<model>,<serial number>, <software version>, <hardware version>.

<device id>:=“B&K Precision” is used to identify instrument.

<model>:= A model identifier less than 14 characters will contain the model number.

<serial number>:= Number that uniquely identifies the instrument.

<software version>:= A serial numbers about software version.

<hardware version>:=The hardware level field, should contain inSyntaxion about all separately revisable subsystems. This inSyntaxion can be contained in single or multiple revision codes.

Example *IDN?

Returns: B&KPRECISION,BA8100,546I21101,1.10

2.2 *RCL

Description The *RCL command recalls a saved instrument state. Memory slot 0 contains the default configuration.

Syntax *RCL <NR1>
<NR1> := {0 to 9}

Example *RCL 0

2.3 *SAV

Description The *RCL command recalls a saved instrument state.

Syntax *RCL <NR1>
<NR1> := {0 to 9}

Example *RCL 1

Input Commands

Input commands provide remote access to configure all input memu options.

:IM:INPut:CURRent:GAIN

:IM:INPut:GAIN:AUTO

:IM:INPut:SAMPle:AUTO

:IM:INPUT:SAMPle:CYCLe

:IM:INPut:VOLTage:GAIN

3.1 :IM:INPut:CURRent:GAIN

Description Sets or queries the input current ADC gain.

Syntax :IM:INPut:CURRent:GAIN <NR1>
<NR1>: = {0 | x 2, 1 | x 10, 2 | x 30, 3 | x 60, 4 | x 90, 5 | x150, 6 | x 300, 7 | x 450}

Default 7 | x 450

Query :IM:INPut:CURRent:GAIN?

Example :IM:INPUT:CURRENT:GAIN 2

Response <NR1>, corresponding to the gain selection above.

3.2 :IM:INPut:GAIN:AUTO

Description Sets or queries the Auto Gain Control (AGC) state.

Syntax :IM:INPut:GAIN:AUTO <Bool>
<Bool> := {0 | OFF or 1 | ON}

Default 1 | OFF

Query :IM:INPut:GAIN:AUTO?

Example :IM:INP:GAIN:AUTO 1

Response <Bool>, AGC Control State

3.3 :IM:INPut:SAMPle:AUTO

Description Sets or queries the sample rate.

Syntax :IM:INPut:SAMPle:AUTO <boolean>
<bool> = {0 | OFF or 1 | ON}

Query :IM:INPut:SAMPle:AUTO?

Example :IM:INPUT:SAMPL:AUTO 1

Response <bool>, sample rate state

3.4 :IM:INPUT:SAMPle:CYCLe

Description Sets or queries the sample rate in ms.

Syntax :IM:INPUT:SAMPle:CYCLe <NRF1>
<NR1> := { 10 to 10000 ms }

Query :IM:INPUT:SAMPle:CYCLe?

Response <NR1>, 10 to 1000ms

Example :IM:INPUT:SAMP:CYCL 1000

3.5 :IM:INPut:VOLTage:GAIN

Description Sets or queries the voltage ADC gain.

Syntax :IM:INPut:VOLTage:GAIN <NR1>
<NR1>: = {0 | x 2, 1 | x 10, 2 | x 30, 3 | x 60, 4 | x 90, 5 | x150, 6 | x 300, 7 | x 450}

Default 7 | x 450

Query :IM:INPut:VOLTage:GAIN?

Example :IM:INPUT:VOLTage:GAIN 2

Response <NR1>, corresponding to the gain selection above

Output Commands

Output commands provide remote access for configuration of all output menu options.

:IM:LOAD:CURRent:AMPLitude

:IM:LOAD:CURRent:OFFSet

:IM:OUTPut:SINe:FREQuency

4.1 :IM:LOAD:CURRent:AMPLitude

Description Sets or queries the current amplitude of the AC signal.

Syntax :IM:LOAD:CURRent:AMPLitude <NR2> or <CRD>
<NR2> := { 0.00 to 500.0 mArms}
<CRD> := {MIN | MAX}

Default 100.0 mArms

Query :IM:LOAD:CURRent:AMPLitude?

Example :IM:OUTPUT:AMPLITUDE 100.000

Response <NR2>, 0.000 to 500.000 mArms <CRD> MAX |MIN

4.2 :IM:LOAD:CURRent:OFFSet

Description Sets or queries the sink DC current offset.

Syntax :IM:LOAD:CURRent:OFFSet <NR2>
<NR2> := {0.00 to 3.00 A}

Default 0.50 A

Query :IM:LOAD:CURRent:OFFSet?

Example :IM:LOAD:CURRent:OFFSet 1.00

Response <NR2>, 0.000 to 3.000 A

4.3 :IM:OUTPut:SINe:FREQuency

Description Sets or queries the sink Direct Digital Synthesis (DDS) Sine Wave Frequency.

Syntax :IM:OUTPut:SINe:FREQuency <NRF+> or <CRD>
<NRf> := {0 to 200 KHz}
<crd> := {MIN | MAX}

Default 1000.000

Query :IM:OUTPut:SINe:FREQuency?

Response <NRf>, 0 to 200 KHz <CRD> , MIN | MAX

Example :IM:OUTPUT:SINE:FREQ 9e3

Setting Commands

The settings commands enable/disable the input state or the phase state.

:IM:PHASe:STATe

:OUTPut

5.1 :IM:PHASe:STATe

Description Sets or queries the phase retrieve format.

Syntax :IM:PHASe:STATe <bool> <bool> := {0 | ±180 or 1 | +360}

Default 0

Query :IM:PHASe:STATe?

Example :IM:PHAS:STAT 1

Response <bool>, 0 or 1

5.2 :OUTPut

Description Sets or queries the input's state.

Syntax :OUTPut <bool>
<bool> := {0 | OFF or 1 | ON}

Default OFF

Query :OUTPut?

Example :OUTP 1

Response <bool>, 0 or 1

Query Commands

The Query commands provide remote: voltage, current,and resistance measurement.
Measurement status check and BATTERY ANALYZER firmware version check can also be queried.

:IM:MEASure:CURRent?

:MEASure:CURRent?

:IM:MEASure:VOLTage?

:MEASure:VOLTage?

:IM:MEASure:RESistance?

:IM:MEAS:VALue?

:IM:MEAS:SUMMary?

:IM:MEASure:RESistance:RECTangular?

:IM:MEASure:RESistance:RECTangular:PARallel?

:IM:MEASure:QUALity:VALue?

:IM:MEASure:DISSipation:VALue

:IM:MEASure:CAPacitance?

:IM:MEASure:CAPacitance:PARallel?

:IM:MEASure:INDuctance?

:IM:MEASure:INDuctance:PARallel?

:IM:MEASure:READy?

:IM:VERSion?

6.1 :IM:MEASure:CURRent?

Description Queries the RMS current value, which returns the current value in scientific format and corresponding phase angle in degrees.

Query :IM:MEASure:CURRent?

Example :IM:MEAS:CURR?

Response <NRf> <NR2>

6.2 :MEASure:CURRent?

Description Queries the DC load current value.

Query :MEASure:CURRent?

Example :MEAS:CURR?

Response <NR2>

6.3 :IM:MEASure:VOLTage?

Description Queries the RMS voltage value, which returns the current value in scientific format and corresponding phase angle in degrees.

Query :IM:MEASure:VOLTage?

Example :IM:MEAS:VOLT?

Response <NRf> <NR2>

6.4 :MEASure:VOLTage?

Description Queries the DC load voltage value.

Query :MEASure:VOLTage?

Example :MEAS:VOLT?

Response <NR2>

6.5 :IM:MEASure:RESistance?

Description Queries the impedance value, returning it in scientific format and corrsponding phase angle in degrees (polar form).

Query :IM:MEASure:RESistance?

Example :IM:MEAS:RES?

Response <NRf> <NR2>

6.6 :IM:MEAS:VALue?

Description Queries the: AC voltage, current, and impedance . The command returns the three values in scientific format with corresponding phase angle in degrees.

Query :IM:MEASure:VALue?

Example :IM:MEAS:VAL?

Response <NRf> <NR2> <NRf> <NR2> <NRf> <NR2>

6.7 :IM:MEAS:SUMMary?

Description Queries the: AC voltage, current, impedance, DC voltage, and DC current.

Query :IM:MEASure:SUMMary?

Example :IM:MEAS:SUMM?

Response <NRf> <NR2> <NRf> <NR2> <NRf> <NR2> <NR2>

6.8 :IM:MEASure:RESistance:RECTangular?

Description Queries the series impedance value, and returns the value in rectangular format

Query :IM:MEASure:RESistance:RECTangular?

Example :IM:MEAS:RES:RECT?

Response <NRf> <NRf>

6.9 :IM:MEASure:RESistance:RECTangular:PARallel?

Description Queries the series impedance value, and returns the value in rectangular format

Query :IM:MEASure:RESistance:RECTangular:PARallel?

Example :IM:MEAS:RES:RECT:PARallel?

Response <NRf> <NRf>

6.10 :IM:MEASure:QUALity:VALue?

Description Queries the quality factor measurement.

Query :IM:MEASure:QUALity:VALue?

Example :IM:MEAS:QUAL:VAL?

Response <NR2>

6.11 :IM:MEASure:DISSipation:VALue

Description Queries the dissipation factor measurement.

Query :IM:MEASure:DISSipation:VALue?

Example :IM:MEAS:DISS:VAL?

Response <NR2>

6.12 :IM:MEASure:CAPacitance?

Description Queries the series capacitance measurement.

Query :IM:MEASure:CAPacitance?

Example :IM:MEAS:CAP?

Response <NRf> <NRf>

6.13 :IM:MEASure:CAPacitance:PARallel?

Description Queries the parallel capacitance measurement.

Query :IM:MEASure:CAPacitance?

Example :IM:MEAS:CAP?

Response <NRf> <NRf>

6.14 :IM:MEASure:INDuctance?

Description Queries the series inductance measurement.

Query :IM:MEASure:INDuctance?

Example :IM:MEAS:IND?

Response <NRf> <NRf>

6.15 :IM:MEASure:INDuctance:PARallel?

Description Queries the parallel inductance measurement.

Query :IM:MEASure:INDuctance:PARallel?

Example :IM:MEAS:IND:PAR?

Response <NRf> <NRf>

6.16 :IM:MEASure:READy?

Description Queries to chekc if the measured values are ready.

Query :IM:MEASure:READy?

Example :IM:MEAS:READY?

Response <bool>

6.17 :IM:VERSion?

Description Queries the instrument's hardware version.

Query :IM:VERSion?

Example :IM:VERS?

Response <NR2>

Protection Commands

The protection commands provide remote access to configure all protection parameters.

:IM:LOAD:VOLTage:OVER

:IM:LOAD:VOLTage:UNDer

:IM:LOAD:VOLTage:TIMe

:OUTPut:PROTection:CLEar

:STATus:QUEStionable?

7.1 :IM:LOAD:VOLTage:OVER

Description Sets or queries the threshold voltage at which the output will be disabled.

Syntax :IM:LOAD:VOLTage:OVER <NR2> or <CRD>
<NR2> := {0 to 1000 V}
<CRD> := {MIN | MAX}

Query :IM:LOAD:VOLTage:OVER?

Default 1000.00

Example :IM:LOAD:VOLT:OVER 80.00

Response <NR2>

Note:

The default value for Over Voltage Protection is 1000.00 V. The instrument will not have any over voltage protection out the box if this value is not adjusted.

7.2 :IM:LOAD:VOLTage:UNDer

Description Sets or queries the threshold voltage at which the output will be disabled.

Syntax :IM:LOAD:VOLTage:UNDer <NR2> or <CRD> <NR2> := {0 to 1000 V}
<CRD> := {MIN | MAX}

Query :IM:LOAD:VOLTage:UNDer?

Default 0.00

Example :IM:LOAD:VOLT:UNDer 10.00

Response <NR2>

Note:

The default value for Over Voltage Protection is 1000.00 V. The instrument will not have any over voltage protection out the box if this value is not adjusted.

7.3 :IM:LOAD:VOLTage:TIMe

Description Sets or queries the threshold time at which the input will be disabled.

Syntax IM:LOAD:PROTection:TIMe <NR1> or <CRD>
<NR1> := {0 to 60 min}
<CRD> := {MIN | MAX}

Query IM:LOAD:PROTection:TIMe?

Default 0

Example IM:LOAD:PROT:TIM 30

Response <NR1>

7.4 :OUTPut:PROTection:CLEar

Description Clears all the protection events of the questionable event register.

Syntax :OUTPut:PROTection:CLEar

Example :OUTP:PROT:CLE

7.5 :STATus:QUEStionable?

Description Queries the value of the questionable register.

Query STATus:QUEStionable?

Example STAT:QUES?

Response <NR1>

Bit	Bit Name	Decimal Value	Definition
0	ON	1	Input ON/OFF state
1	not used	2	not used
2	ACF	4	Time-out auto cut off
3	OVP	8	Over voltage protection
4	UVP	16	Under voltage protection
5	CAL	32	Calibration data loss

Table 7.1 Questionable Status Summary