B&K PRECISION®

2840 Series Resistance Meter

Programming Manual

Model: 2840, 2841

Contents

Chapter 1

Introduction to SCPI

SCPI (Standard Commands for Programmable Instruments), a command language for controlling instrument functions over GPIB, RS-232, USB,and Ethernet interface, etc. SCPI is layered on top of the hardware portion of IEEE 488.2.

1.1   Conventions Used in This Guide

Angle brackets	< >	Items within angle brackets are parameter abbreviations. For example, <NR1> indicates a specific form of numerical data.
Vertical bar	|	Vertical bars separate alternative parameters. For example, NORM | TEXT indicates that either "NORM" or "TEXT" can be used as a parameter.
Square Brackets	[ ]	Items within square brackets are optional. The representation [SOURce:] VOLTage means that SOURce: may be omitted.
Braces	{}	Braces indicate parameters that may be repeated zero or more times. It is used especially for showing arrays. The notation <A><,B> shows that parameter "A" must be entered, while parameter "B" may be omitted or may be entered one or more times.

1.2   Types of SCPI Commands

SCPI commands are grouped into common and subsystem commands. A subset of the common commands is present on all instruments. Subsystem commands are specific to the instrument class and model.

1.2.1   Common

Common commands are for controlling and reading overall instrument functions, such as, ID, reset, status, and synchronization. All common commands consist of a three-letter mnemonic preceded by an asterisk i.e. ex:*IDN?, *RST, *SRE 8.

1.2.2   Subsystem

Subsystem commands perform specific instrument functions, and are organized into a tree structure with the "root" at the top. For example many instruments include a "SYSTem" subsection. This then branches out to subcommands like setting the instrument to remote mode, "SYSTem:REMote".

1.2.3 Multiple Commands in a Message

Multiple SCPI commands can be combined and sent as a single message. There are two important conditions when sending several commands within a single message:

- Use a semicolon to separate commands within a message.

- There is an implied header path that affects how commands are interpreted by the electronic load.

The header path can be thought of as a string that gets inserted before each command within a message. For the first command in a message, the header path is a null string. For each subsequent command the header path is defined as the characters that make up the headers of the previous command in the message up to and including the last colon separator. An example of a message with two commands:

"CURR:LEV 3;PROT:STAT OFF ".

This shows the use of the semicolon separating the two commands, and also illustrates the header path concept. The leading header "CURR" of the second command was omitted because after the "CURR:LEV 3" command, the header path is defined as "CURR". It is syntactically incorrect to include the "CURR" explicitly in the second command, since the result after combining it with the header path would be "CURR:CURR:PROT:STAT OFF", a nonexistent command.

1.2.4 Moving Among Subsystems

In order to combine commands from different subsystems, a reset of the header path is needed. Adding a preceding colon (:) accomplishes this. For example, clearing the output protection and checking the Operation Condition register in one message as follows:

PROTection:CLEAr; :STATus:OPERation:CONDition?

Commands from different subsystems may be combined as well as those of the same subsystem:

POWer:LEVel 200;PROTection 28;:CURRent:LEVel 3;PROTection:STATe ON

The optional header LEVel maintains the correct path within the voltage and current subsystems. The use of the root specifier signals a move between subsystems.

Common commands do not affect the header path, and may be inserted anywhere in a message.

VOLTage 17.5;*TRG

OUTPut OFF;*RCL 2;OUTPut ON

1.2.5 Case Sensitivity

Common commands and SCPI commands are not case sensitive. You can use upper or lower case and any case combination.

Example:

*RST = *rst

:DATA? = :data?

:SYSTem:PRESet = :system:preset

Simple integer	<nr1>	the usual range of numbers depending on the command
Decimal number	<nr2>	Digits with an explicit decimal point. Example: 0.0123
Exponential number	<nr3>	Digits with an explicit decimal point and an exponent. Example: 2.73E+2
Any format number	<nrf>	Extended format that includes <nr1>, <nr2> and <nr3>.
String	<str>	String representation of a value Ex: AUTO, ON
Boolean value	<bool>	Boolean values, On, Off 1 or 0

Table 1.1: SCPI parameter units

1.2.6 Long-form and Short-form Versions

A SCPI command word is sent in its long-form or short-form version. The command descriptions provide the long-form version and indicate the short-form with upper case characters.

Example:

Long Form	Short Form	Mixed
:SYSTem:PRESet	:SYST:PRES	:SYSTem:PRES

Note: Each command word must be in long-form or short-form, and not something in between. For example, :SYSTe:PRESe is illegal and will generate an error.

1.2.7 Query commands

Query commands are signified by a "?" at the end. Most commands include a query version for reading back a configured value, or for retrieving data from an operation. The syntax for a query command is listed in "Query Syntax" heading of each command, if available. At the command level, a query command consists of a write command followed by a read. The write-read pair must be sent in sequence.

1.3 Data Types

Chapter 2

DISPlay

2.1 DISPlay:PAGE

Description	Set or query which display page to show on the screen.
Command Syntax	DISPlay:PAGE <STR>
Parameters	MEASurement, COMPare, MSETup, BIN, BSETup, TSETup, STATistics, SYSTem, FLISt
Example	disp:page meas
Query Syntax	DISPlay:PAGE?
Returned Parameters	MEAS, COMP, MSET, BIN, BSET, TSET[1], STAT, SYST, FLIS

2.2 DISPlay:STATe

Description	Set or query the state of showing measurements on the screen.
Command Syntax	DISPlay:STATe <BOOL>
Parameters	on, off
Example	disp:state on
Query Syntax	DISPlay:STATe?
Returned Parameters	0 for off and 1 for on

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[1] 2841 Only

Chapter 3

FUNCtion

3.1 FUNCtion:IMPedance

Description	Set or query the measurement mode.
Command Syntax	FUNCtion:IMPedance <STR>
Parameters	**R** resistance
	RT resistance and temperature – 2841 Only
	T temperature – 2841 Only
	LPR low power resistance
	LPRT low power resistance and temperature – 2841 Only
Example	Set to normal power resistance and temperature measurement.
	func:imp rt
Query Syntax	FUNCtion:IMPedance?
Returned Parameters	R, RT [1], T [2], LPR, LPRT [3]

3.2 FUNCtion:IMPedance:RES:RANGe

Description	Resistance measurement range.
Note	Values that are not the actual range setting will be evaluated and the range that contains the value is selected. For example, 110m is greater than the 20m range and less than the 200m range, so 200m is selected.
	The return value, and the screen show the range in use and selected.
Command Syntax	FUNCtion:IMPedance:RES:RANGe <NR2>
Parameters	Range
	Values may be sent in many formats: Ex. 20m, 0.020, 2E-2, 0.000002k
Example	func:imp:res:range 200E-3
Query Syntax	FUNCtion:IMPedance:RES:RANGe?
Returned Parameters	<nr3>

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[1]2841 only
[2]see 1
[3]see 1

3.3 FUNCtion:IMPedance:RES:RANGe:AUTO

Description	Automatic ranging mode for the resistance measurement.
Command Syntax	FUNCtion:IMPedance:RES:RANGe:AUTO <Bool>
Parameters	ON, 1, OFF, or 0 (not case sensitive)
Example	func:imp:res:range:auto on
Query Syntax	FUNCtion:IMPedance:RES:RANGe?
Returned Parameters	1 for on, and 0 for off

3.4 FUNCtion:IMPedance:LPR:RANGe

Description	The resistance range in Low Power Resistance measurement mode.
Command Syntax	FUNCtion:IMPedance:LPR:RANGe <nrf>
Parameters	2000.00E−3, 20.0000E+0, 200.000E+0, 2000.00E+0
Example	func:imp:lpr:range 2
Query Syntax	FUNCtion:IMPedance:LPR:RANGe?
Returned Parameters	<nrf>

3.5 FUNCtion:IMPedance:LPR:RANGe:AUTO

Description	Automatic ranging mode for the low power mode resistance measurement.
Command Syntax	FUNCtion:IMPedance:LPR:RANGe:AUTO <Bool>
Parameters	ON, 1, OFF, or 0 (not case sensitive)
Example	func:imp:lpr:range:auto on
Query Syntax	FUNCtion:IMPedance:LPR:RANGe?
Returned Parameters	1 for on, and 0 for off

3.6 FUNCtion:CURRent

Description	The measurement current range for measuring in the 200mΩ range.
Note	2841 Only
Command Syntax	FUNCtion:CURRent <str>
Parameters	1A or 0.1A
Example	func:curr 1A
Query Syntax	FUNCtion: CURRent?
Returned Parameters	<str>

3.7   FUNCtion:ADJust:CLEAr

Description	Execute or clear 0 ADJ.
Command Syntax	FUNCtion:ADJust:CLEAr
Parameters	**0** it indicates that the 0CAJ has completed successfully and open 0 CAJ after the completion.
	1 it indicates that the measured value of resistance exceeds 400 dgt, namely operation failed.
Example	func:adj:clear
Query Syntax	FUNCtion:ADJust?
Returned Parameters	<nr1>

3.8   FUNCtion:MEASMODE

Description	Measurement speed.
Note	2841 Only
Command Syntax	FUNCtion:MEASMODE <str>
Parameters	SLOW or FAST
Example	func:measmode fast
Query Syntax	FUNCtion:MEASMODE?
Returned Parameters	<str> SLOW or FAST

3.9   FUNCtion:FDETect

Description	Measurement fault detection time
Note	2841 Only
Command Syntax	FUNCtion:FDETect <nr2>
Parameters	Time in seconds
Example	func:fdet 5
Query Syntax	FUNCtion:FDETect?
Returned Parameters	<nr2>

3.10 FUNCtion:FDETect:AUTO

Description	Automatic fault detection
Note	2841 Only
Command Syntax	FUNCtion:FDETect:AUTO <bool>
Parameters	1, on, 0, or off
Example	func:fdet:auto on
Query Syntax	FUNCtion:FDETect:AUTO?
Returned Parameters	<nr1> 1 or 0 for on and off

3.11 FUNCtion:CALibration:MODE

Description	Calibration mode
Note	2841 Only
Command Syntax	FUNCtion:CALibration:MODE <str>
Parameters	AUTO or MANUAL
Example	func:cal:mode auto
Query Syntax	FUNCtion:CALibration:MODE?
Returned Parameters	<str>

3.12 FUNCtion:OVC

Description	Instrument offset voltage compensation state.
Note	2841 Only
Command Syntax	FUNCtion:OVC <nr1>
Parameters	0 or 1
Example	func:ovc 1
Query Syntax	FUNCtion:OVC?
Returned Parameters	0 or 1 for off and on respectively

Chapter 4

APERture

4.1 APERture

Description	The measurement speed.
Command Syntax	APERture <str>
Parameters	FAST, MEDium, SLOW1 or SLOW2
Example	APER SLOW1
Query Syntax	APERture?
Returned Parameters	<str>

4.2 APERture:AVERage

Description	The number of readings to average.
Command Syntax	APERture:AVERage <nr1>
Parameters	number of samples, 1 to 255
Example	aper:aver 16
Query Syntax	APERture:AVERage?
Returned Parameters	<nr1>

Chapter 5

TRIGger

5.1 TRIGger[:IMMediate]

Description	Send a bus trigger.
Command Syntax	TRIGger[:IMMediate]
Parameters	none
Example	trig

5.2 TRIGger:SOURce

Description	The source of a trigger.
Command Syntax	TRIGger:SOURce <str>
Parameters	**INTernal** Be automatically triggered by the instrument and be the defaut setting of the instrument.
	MANual Be triggered by pressing the TRIGGER button on the panel.
	EXTernal Be triggered by the HANDLER interface.
	BUS Be triggered by the RS232 interface or the GPIB interface.
Example	trig:source bus
Query Syntax	TRIGger:SOURce?
Returned Parameters	<str> ex. INT

5.3 TRIGger:DELay

Description	i=Instrument measurement delay time after triggering.
Command Syntax	TRIGger:DELay <nr2>
Parameters	Delay time from 0 to 9.999 seconds
Example	trig:del 2.123
Query Syntax	TRIGger:DELay?
Returned Parameters	<nr2>

5.4   TRIGger:DELay:AUTO

Description	Enable/disable the measurement delay after a trigger.
Command Syntax	TRIGger:DELay:AUTO <bool>
Parameters	1, on, 0, or off
Example	trig:del:auto 0
Query Syntax	TRIGger:DELay:AUTO?
Returned Parameters	1 for on and 0 for off

Chapter 6

FETCh

6.1 FETCh[:IMP]?

Description Fetch the last measurement taken.

Query Syntax FETCh[:IMP]?

Returned Parameters The data got from the commands can be divided into three types according to different functions and display page.

1. On the measurement display page, compare display interface, bin display page and statistical interface and the measurement function is one-parameter mode (functions are R, T, LPR): Data format: <primary parameter>, <system status>;
<primary parameter>= the measured value of the current parameter and the format is NR3 (when the temperature conversion function is enabled and on the measurement display interface, the primary parameter is the temperature increment ΔT), when existing outrange or measurement error, the returned value is "+9.90000E+37".
System status:

   -1 No data in the buffer zone.

   0 Ordinary measurement data.

   +1 Measurement status error.

2. On the measurement display page, compare display interface, bin display page and statistical interface and the measurement function is two-parameter mode (functions are R-T, LPR-T): Data format: <primary parameter>, <secondary parameter>, <system status>; <primary parameter>= the measurement of the current primary parameter and the format is NR3 (when the temperature conversion function is enabled and on the measurement display interface, the primary parameter is the temperature incrementΔT), when existing outrange or measurement error, the returned value is "+9.90000E+37".
<secondary parameter>= the measurement of the current secondary parameter and the format is NR3, when existing outrange or measurement error, the returned value is "+9.90000E+37". The system status is the same as above.

3. There is no return value for other display page.

6.2 FETCh:AUTO

Description	Set the automatic mode switch to send each measurement result to the output buffer.
Command Syntax	FETCh:AUTO <bool>
Parameters	on, 1, off, 0
Example	fetch:auto 1

Chapter 7

TEMPerature

The following commands are available on the 2841 only.

7.1 TEMPerature:CORRect:STATe

Description	The state of the temperature correction function. Sets the TC/Δt mode to TC.
Note	Turning the temperature correction function on stops the temperature conversion function.
Command Syntax	TEMPerature:CORRect:STATe <bool>
Parameters	on, 1, off, 0
Example	temp:correct:state on
Query Syntax	TEMPerature:CORRect:STATe?
Returned Parameters	1 or 0 (on and off respectively)

7.2 TEMPerature:CORRect:PARameter

Description	Sets the "reference temperature" and "temperature coefficient" of the temperature correction function.
Command Syntax	TEMPerature:CORRect:PARameter <nr2>,<nr1>
Parameters	<Reference Temp.>,<Temp. Coefficient> The reference temperature range is -10.0 to 99.9°C The temperature coefficient range is -99999 to 99999 ppm/°C
Example	temp:corr:par 25,3390
Query Syntax	TEMPerature:CORRect:PARameter?
Returned Parameters	<nr2>,<nr1>

7.3 TEMPerature:CONVersion:DELTa:STATe

Description The state of the temperature conversion function. Sets the TC/Δt mode to Δt.

Command Syntax TEMPerature:CONVersion:DELTa:STATe <bool>

Parameters 1, on, 0, or off

Example temp:conv:delta:state on

Query Syntax TEMPerature:CONVersion:DELTa:STATe?

Returned Parameters <nr1> 1 for on, and 0 for off

7.4 TEMPerature:CONVersion:DELTa:PARameter

Description The "initial resistance" , "initial temperature" and "constant k" of the instrument temperature conversion function settings.

Command Syntax TEMPerature:CONVersion:DELTa:PARameter <nr3>,<nr2>,<nr2>

Parameters The parameters, in order:

Initial resistance 0 to 110.000E+6 units:Ω

Initial temperature -10.0 to 99.9 units:$^\circ$C

Constant -999.9 to 999.9 units:$^\circ$C

Example temp:con:delta:par 100,20,235

Query Syntax TEMPerature:CONversion:DELTa:PARameter?

Returned Parameters <nr3>,<nr2>,<nr1>

7.5 TEMPerature:SENSor

Description The type of temperature sensor connected.

Command Syntax TEMPerature:SENSor <str>

Parameters PT or ANALog

Example temp:sensor pt

Query Syntax TEMPerature:SENSor?

Returned Parameters <str> PT or ANAL

7.6 TEMPerature:PARameter

Description 2 points to use when the temperature sensor is an analog input to base the voltage/temperature correction.

Command Syntax TEMPerature:PARameter <nr2>,<nr2>,<nr2>,<nr2>

Parameters In order <V1>,<T1>,<V2>,<T2>:

V1 0 to 2.00 reference voltage 1, unit: V

T1 -99.9 to 999.9 reference temperature 1, unit: $^\circ$C

V2 0 to 2.00 reference voltage 2, unit: V

T2 -99.9 to 999.9 reference temperature 2, unit: $^\circ$C

Example temp:par 0,0,1,500

Query Syntax TEMPerature:PARameter?

Returned Parameters <nr2>,<nr2>,<nr2>,<nr2>
the same format as the command form.

Chapter 8

COMParator

8.1 COMParator[:STATe]

Description	State of instrument comparator function.
Command Syntax	COMParator[:STATe] <bool>
Parameters	1, on, 0, or off
Example	comp on
Query Syntax	COMParator[:STATe]?
Returned Parameters	1 for on and 0 for off

8.2 COMParator:BEEPer

Description	The state of the comparator beep behavior. Beep if the condition is true, either the value measured is IN range or it is HL or out of the set range.
Note	The instrument behavior is unusual. An error is shown on screen even when the command is formatted properly and accepted.
Command Syntax	COMParator:BEEPer <str>
Parameters	OFF, HL or IN
Example	comp:beep HL
Query Syntax	COMParator:BEEPer?
Returned Parameters	OFF, HL or IN

8.3 COMParator:MODE

Description	The comparator limit mode of the instrument, either absolute tolerance or proportional.	
Command Syntax	COMParator:MODE <str>	
Parameters	**ATOLerance**	absolute tolerance
	PTOLerance	proportional tolerance

Example comp:mode ptol

Query Syntax comp?

Returned Parameters ATOL or PTOL

8.4 COMParator:UPPer

Description The upper comparator limit.

Note This value must be larger than the lower limit.

Command Syntax COMParator:UPPer <nr3>

Parameters 0 to 2.2E+6 units: Ω

Example comp:upper 18E-3

Query Syntax COMParator:UPPer?

Returned Parameters <nr3>

8.5 COMParator:LOWer

Description The lower comparator limit.

Note This value must be smaller than the upper limit.

Command Syntax COMParator:LOWer <nr3>

Parameters 0 to 2.2E+6 units: Ω

Example comp:low 10E-3

Query Syntax COMParator:LOWer?

Returned Parameters <nr3>

8.6 COMParator:REFerence

Description The reference or nominal resistance value for use with the comparator function.

Command Syntax COMParator:REFerence <nr3>

Parameters 0 to 2.2E+6 units: Ω

Example comp:ref 50E-3

Query Syntax COMParator:REFerence?

Returned Parameters <nr3>

8.7   COMParator:PERCent

Description   The percentage threshold for the comparator. The percentage is relative to the "reference" value set, NOM on screen in comparator mode.

Command Syntax   COMParator:PERCent <nr2>

Parameters   0 to 99.999 units: %

Example   comp:per 10%

Query Syntax   COMParator:PERCent?

Returned Parameters   <nr2>

8.8   COMParator:RESult

Description   Query the current comparator result.

Note   ERR happens when there is a measurement error and the comparator function is enabled.

Query Syntax   COMParator:RESult?

Returned Parameters   <str>
HI, IN, LO, OFF, or ERR

8.9   COMParator:COUNter[:STATe]

Description   Supposed to enable, disable and return the state of the counter function. Not working with current firmware. Leaving command as a placeholder.

Command Syntax   COMParator:COUNter[:STATe] <bool>

Parameters   1, on, 0 or off

Example   comparator:counter on

Query Syntax   COMParator:COUNter[:STATe]?

Returned Parameters   <nr1> 1 or 0

8.10   COMParator:CLEAr

Description   Supposed to clear the counter in comparator mode. Not working with current firmware. Leaving command as a placeholder.

Command Syntax   COMParator:CLEAr

Parameters   n/a

Example   comp:clear

Chapter 9

BIN

9.1 BIN[:STATe]

Description	Setting of the BIN comparator function.
Command Syntax	BIN[:STATe] <bool>
Parameters	1, on, 0 or off
Example	bin on
Query Syntax	BIN[:STATe]?
Returned Parameters	1 or 0 for on and off respectively

9.2 BIN:BEEPer

Description	The beep mode when in BIN mode. Beeping on passing (gd) or failing (ng) is set via this command.
Command Syntax	BIN:BEEPer <str>
Parameters	**OFF** Beep does not sound
	NG Beep sounds when measuring values outside of the BIN limits.
	GD Beep sounds when a measured value is within BIN limits.
Example	bin:beeper gd
Query Syntax	BIN:BEEPer?
Returned Parameters	OFF, GD or NG

9.3 BIN:MODE

Description	Configure BIN mode to use absolute (ATOLerance) ranges of values based on direct entry or by a percent deviation (PTOLerance) from the nominal values configured.
Command Syntax	BIN:MODE <str>
Parameters	**ATOLerance** Absolute value ranges

PTOLerance Percent deviation from the nominal values

Example bin:mode ptol

Query Syntax BIN:MODE?

Returned Parameters ATOL or PTOL

9.4 BIN:COLOr:NG

Description The color of a BIN icon when a value measures as Not Good for that bin.

Command Syntax BIN:COLOr:NG <str>

Parameters OFF, GRAY, RED, GREEN

Example bin:color:ng red

Query Syntax BIN:COLOr:NG?

Returned Parameters OFF, GRAY, RED, GREEN

9.5 BIN:COLOr:GD

Description The color of a BIN icon when a value measures as Good for that bin.

Command Syntax BIN:COLOr:GD <str>

Parameters OFF, GRAY, RED, GREEN

Example bin:color:ng green

Query Syntax BIN:COLOr:GD?

Returned Parameters OFF, GRAY, RED, GREEN

Related Commands

9.6 BIN:UPPer

Description The upper limit value of a particular BIN when in absolute tolerance mode.

Command Syntax BIN:UPPer <nr1>,<nr3>

Parameters <bin>,<resistance>

    <bin> Bin number (0-9)[1] or (0-2)[2]

    <resistance> 0 to 2.2E+6, the upper limit resistance value in Ohms

Example bin:upper

Query Syntax BIN:UPPer?<nr1>

Returned Parameters <nr3>

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[1]2841

[2]2840

9.7 BIN:LOWer

Description The lower limit value of a particular BIN when in absolute tolerance mode.

Command Syntax BIN:UPPer <nr1>,<nr3>

Parameters <bin>,<resistance>

  <bin> Bin number (0-9)[3] or (0-2)[4]

  <resistance> 0 to 2.2E+6, the lower limit resistance value in Ohms

Example bin:upper

Query Syntax BIN:UPPer?<nr1>

Returned Parameters <nr3>

9.8 BIN:REFerence

Description The nominal value for a particular BIN. The percentage (PTOLerance) uses this.

Command Syntax BIN:REFerence <nr1>,<nr3>

Parameters <bin>,<tolerance>

  <bin> Bin number (0-9)[5] or (0-2)[6]

  <resistance> 0 to 2.2E+6, the nominal resistance value

Example bin:ref 0,20E-3

Query Syntax BIN:REFerence?

Returned Parameters <nr3>

9.9 BIN:PERCent

Description The value tolerance for a particular bin nominal value

Command Syntax BIN:PERCent <nr1>,<nr3>

Parameters <bin>,<tolerance>

  <bin> Bin number (0-9)[7] or (0-2)[8]

  <tolerance> 0 to 99.999, the percent tolerance

Example bin:perc 5

Query Syntax BIN:PERCent?

Returned Parameters <nr3>

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[3] 2841
[4] 2840
[5] 2841
[6] 2840
[7] 2841
[8] 2840

9.10   BIN:ENABle

Description   Enable or disable bins. The parameter of this command represents each of the bins as a bit. The parameter is a decimal representation of the bits.

Command Syntax   BIN:ENABle <nr1>

Parameters   **Model 2840:** has 3 bins, so the range of values is 0-7.

bin #	2	1	0
bit #	3	2	1
decimal	4	2	1

To determine the parameter, add the decimal values for each bin desired.
Example: Bins 1 and 3
<nr1> = 1 + 4 = 5
Model 2841: There are 10 bins encoded using 10 bits.

bin #	9	8	7	6	5	4	3	2	1	0
bit #	10	9	8	7	6	5	4	3	2	1
decimal	512	256	128	64	32	16	8	4	2	1

Example: Bins 10,9,4,3,2,1 enabled
<nr1> = 512+256+8+4+2+1 = 783

Example   bin:enable 783

9.11   BIN:RESult

Description   Retrieves the lowest (in the event of multiple qualifying bins) number matching bin if any. The return value is encoded in the same style as the BIN:ENABle (section 9.10) command. That is, the bin result will be the decimal representation of the bin bit.

Note   In the event that 2 or more bins contain the value measured, the lowest number bin will determine the result.

Query Syntax   BIN:RESult?

Returned Parameters   **Model 2840:**

bin #	2	1	0
bit #	3	2	1
decimal	4	2	1

Model 2841:

bin #	9	8	7	6	5	4	3	2	1	0
bit #	10	9	8	7	6	5	4	3	2	1
decimal	512	256	128	64	32	16	8	4	2	1

Example: return value is 4
A return value of 4 matches the decimal value for Bin 2, the bin found to match.
Example: return value is 256
A return value of 256 matches the decimal value for Bin 8, the bin found

to match.

Chapter 10

STATistics

10.1 STATistics[:STATe]

Description	The state of the statistics function. Prior to enabling statistics, the display page must be on statistics. See section 2.1
Command Syntax	STATistics[:STATe] <bool>
Parameters	1, on, 0, or off
Example	stat on
Query Syntax	STATistics[:STATe]?
Returned Parameters	1 for on and 0 for off

10.2 STATistics:MODE

Description	The "edge" or limit mode to use.
Note	If statistics is active (STATistics[:STATe] on) this command is ignored and the value left unchanged. Disable statistics to enable changeability.
Command Syntax	STATistics:MODE <str>
Parameters	ATOLerance or PTOLerance
Example	stat:mode atol
Query Syntax	STATistics:MODE?
Returned Parameters	PTOL or ATOL

10.3 STATistics:UPPer

Description	The upper comparison limit when in Absolute Tolerance mode.
Note	If statistics is active (STATistics[:STATe] on) this command is ignored and the value left unchanged. Disable statistics to enable changeability.
Command Syntax	STATistics:UPPer <nr3>

Parameters 0 to 2.2E+6 units Ω

Example stat:upper 100e-3

Query Syntax STATistics:UPPer?

Returned Parameters <nr3>

10.4 STATistics:LOWer

Description The lower comparison limit when in Absolute Tolerance mode.

Note If statistics is active (STATistics[:STATe] on) this command is ignored and the value left unchanged. Disable statistics to enable changeability.

Command Syntax STATistics:LOWer <nr3>

Parameters 0 to 2.2E+6 units Ω

Example stat:lower 50e-3

Query Syntax STATistics:LOWer?

Returned Parameters <nr3>

10.5 STATistics:REFerence

Description The nominal or reference value to use for comparison.

Note If statistics is active (STATistics[:STATe] on) this command is ignored and the value left unchanged. Disable statistics to enable changeability.

Command Syntax STATistics:REFerence <nr3>

Parameters 0 to 2.2E+6 units Ω

Example stat:ref 75.0e-3

Query Syntax STATistics:REFerence?

Returned Parameters

10.6 STATistics:PERCent

Description The percent deviation from the reference value to use for comparison.

Note If statistics is active (STATistics[:STATe] on) this command is ignored and the value left unchanged. Disable statistics to enable changeability.

Command Syntax STATistics:PERCent <nr2>

Parameters 0 to 99.999%

Example stat:percent 10

Query Syntax STATistics:PERCent?

Returned Parameters <nr2>

10.7   STATistics:CLEAr

Description	Command for clearing statistical data.
Note	If statistics is active (STATistics[:STATe] on) this command is ignored and the value left unchanged. Disable statistics to issue this command.
Command Syntax	STATistics:CLEAr
Parameters	none
Example	stat:clear

10.8   STATistics:NUMBer

Description	The number of statistical samples and how many of them are within the comparison settings.
Note	Information incomplete.
Query Syntax	STATistics:NUMBer?
Returned Parameters	**<nr1>,<nr1>** total sample count, In range sample count

10.9   STATistics:MEAN

Description	The mean sample value.
Query Syntax	STATistics:MEAN?
Returned Parameters	<nr3>

10.10   STATistics:MAXimum

Description	The maximum sample value and sample number
Note	If the statistical values are invalid, no samples taken for example, the return value is 9.90000E+37,0.
Query Syntax	STATistics:MAXimum?
Returned Parameters	**<nr3>,<nr1>** Max value, Sample number of max value

10.11   STATistics:MINimum

Description	The minimum sample value and sample number
Note	If the statistical values are invalid, no samples taken for example, the return value is 9.90000E+37,0.
Query Syntax	STATistics:MINimum?
Returned Parameters	**<nr3>,<nr1>** Min value, Sample number of min value

10.12 STATistics:COUNt

Description The statistical comparison results

Query Syntax STATistics:COUNt?

Returned Parameters **<nr1>,<nr1>,<nr1>,<nr1>** High, In, Low, and Measurement error counts

10.13 STATistics:DEViation

Description The statistics standard deviation

Query Syntax STATistics:DEViation?

Returned Parameters <nr3>

10.14 STATistics:VARiance

Description The statistical sample variance

Query Syntax STATistics:VARiance?

Returned Parameters <nr3>

10.15 STATistics:CP

Description The Process Capability indicies (Cp, Cpk)

Query Syntax STATistics:CP?

Returned Parameters **<nr2>,<nr2>** Cp, Cpk

Chapter 11

IO

These commands refer to the handler of the instrument.

11.1   IO:OUT

Description Set the value output by the pins.

Note 2841 only

Command Syntax IO:OUT <nr1>

Parameters A decimal representation of the pin states.

Data Bit	7	6	5	4	3	2	1	0
Output Bit	OUT7	OUT6	OUT5	OUT4	OUT3	OUT2	OUT1	OUT0
Pin	50	25	49	24	48	23	47	22

Example io:out 128 (Pin 7 high and the rest low)

11.2   IO:IN

Description State of the handler pins RTIG and PRINT, see the user manual for details.

Note 2841 only

Query Syntax io:in?

Returned Parameters <nr1> decimal representation of the pin states.

Chapter 12

SYStem

12.1 SYSTem:BEEPer:STATe

Description	The state of the beep feature
Command Syntax	SYSTem:BEEPer:STATe <bool>
Parameters	1, on, 0, off
Example	system:beeper:state off
Query Syntax	SYSTem:BEEPer:STATe?
Returned Parameters	1 for on and 0 for off

12.2 SYSTem:LFRequency

Description	The AC line frequency powering the meter. This helps reduce noise and improve accuracy.
Command Syntax	SYSTem:LFRequency <nr1>
Parameters	50 or 60 unit Hertz or cps
Example	system:lfr 60
Query Syntax	SYSTem:LFRequency?
Returned Parameters	<nr1> 50 or 60

12.3 SYSTem:SAVE

Description	Save the current configuration of the unit.
Command Syntax	SYSTem:SAVE <nr1>,<str>
Parameters	Table location, File name
	Table location 1 through 30
	File name 15 or fewer character without a file extension
Example	syst:save 8,bkp

12.4   SYSTem:LOAD

Description	Recall a set of settings from memory
Command Syntax	SYSTem:LOAD <nr1>
Parameters	The table location number desired
Example	syst:load 8

12.5   SYSTem:EXTernalout

Description	Output of the comparator results to the handler interface.
Note	2841 only
Command Syntax	SYSTem:EXTernalout <str>
Parameters	BIN or BCD The representation of the results.
Example	syst:ext bcd
Query Syntax	SYSTem:EXTernalout?
Returned Parameters	<str> - BIN or BCD

12.6   SYSTem:EOC:MODE

Description	End of Conversion indication mode
Command Syntax	SYSTem:EOC:MODE <str>
Parameters	HOLD or PULSe
Example	syst:eoc:mode pulse
Query Syntax	SYSTem:EOC:MODE?
Returned Parameters	<str>

12.7   SYSTem:EOC:PULSe

Description	EOC pulse width
Command Syntax	SYSTem:EOC:PULSe <nr2>
Parameters	pulse width in seconds
Example	SYSTem:EOC:PULS 0.02
Query Syntax	SYSTem:EOC:PULSe?
Returned Parameters	<nr2>

12.8 SYSTem:RESet

Description	Reset the unit. This brings the operator to the main display page.
Command Syntax	SYSTem:RESet
Parameters	none
Example	system:reset

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