DM34460 Series
6½ Digit TrueVolt Digital Multimeter

KEYSIGHT

PROGRAMMING GUIDE

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Safety considerations

WARNING OPERATING IN REMOTE MODE

When operating in remote mode, measurements will be triggered by remote computer and will not be updated continuously on the instrument display. Always refer to the remote computer for actual measurement.

1 Remote Operation

Introduction to the SCPI Language

Range, Resolution and Integration Time

Power-On and Reset State

SCPI Status Registers

SCPI Error Messages

This chapter describes the remote operation for the Keysight DM34460 Series 6½ digit TrueVolt digital multimeter.

Introduction to the SCPI Language

SCPI (Standard Commands for Programmable Instruments) is an ASCII-based instrument command language designed for test and measurement instruments. SCPI commands are based on a hierarchical structure, also known as a tree system. In this system, associated commands are grouped together under a common node or root, thus forming subsystems. A portion of the SENSe subsystem is shown below to illustrate the tree system.

SENSe:
VOLTage:
DC:RANGe <range>|MIN|MAX|DEF
DC:RANGe? [MIN|MAX]

SENSe is the root keyword of the command, VOLTage and RESistance are second-level keywords. A colon (:) separates a command keyword from a lower-level keyword.

Syntax Conventions

The format used to show commands is illustrated below:

```
VOLTage:DC:RANGe <range>|MIN|MAX|DEF
```

The command syntax shows most commands (and some parameters) as a mixture of upper- and lowercase letters. The upper-case letters indicate the abbreviated spelling for the command. For shorter program lines, you can send the abbreviated form. For better program readability, you can send the long form.

For example, in the above syntax statement, VOLT and VOLTAGE are both acceptable forms. You can use upper- or lower-case letters. Therefore, VOLTAGE, volt, and Volt are all acceptable. Other forms, such as VOL and VOLTAG, are not valid and will generate an error.

- A vertical bar (|) separates multiple parameter choices for a given command string. For example, <range>|MIN|MAX|DEF in the above command indicates that you can specify a numeric range parameter, or "MIN", "MAX", or "DEF". The bar is not sent with the command string.
- Triangle brackets (< >) indicate that you must specify a value for the enclosed parameter. For example, the above syntax statement shows the <range> parameter enclosed in triangle brackets. The brackets are not sent with the command string. You must specify a value for the parameter (for example "VOLT:DC:RANG 10") unless you select one of the other options shown in the syntax (for example "VOLT:DC:RANG MIN").
- Some parameters are enclosed in square brackets ([ ]). This indicates that the parameter is optional and can be omitted. The brackets are not sent with the command string. If you do not specify a value for an optional parameter, the instrument chooses a default value.

Command Separators

A colon (:) is used to separate a command keyword from a lower-level keyword. You must insert a blank space to separate a parameter from a command keyword. If a command requires more than one parameter, you must separate adjacent parameters using a comma as shown below:

```
CONF:VOLT:DC 10,0.003
```

A semicolon (;) is used to separate commands within the same subsystem, and can also minimize typing. For example, sending the following command string:

```
CALCULATE:LIM ON; LIM?
```

... is the same as sending the following two commands:

```
CALCULATE:LIM ON
CALCULATE:LIM?
```

Use a colon and a semicolon to link commands from different subsystems. For example, in the following command string, an error is generated if you do not use both the colon and semicolon:

```
CONF:VOLT:DC;:INIT;:FETC?
```

Using the MIN, MAX, and DEF Parameters

For many commands, you can substitute "MIN" or "MAX" in place of a parameter. In some cases you may also substitute "DEF". For example, consider the following command:

```
VOLTage:DC:RANGe <range>|MIN|MAX|DEF
```

Instead of selecting a specific value for the <range> parameter, you can substitute MIN to set the range to its minimum value, MAX to set the range to its maximum value, or DEF to set the range to its default value.

Querying Parameter Settings

You can query the current value of most parameters by adding a question mark (?) to the command. For example, the following command sets the beeper to ON :

```
SYStem:BEEPer:STATe ON
```

You can then query the beeper state by sending:

```
SYStem:BEEPer:STATe?
```

SCPI Command Terminators

A command string sent to the instrument must terminate with a <new line> (<NL>) character. The IEEE- 488 EOI (End-Or-Identify) message is interpreted as a <NL> character and can be used to terminate a command string in

place of a <NL> character. A <carriage return> followed by a <NL> is also accepted. Command string termination will always reset the current SCPI command path to the root level.

IEEE-488.2 Common Commands

The IEEE-488.2 standard defines a set of common commands that perform functions such as reset, selftest, and status operations. Common commands always begin with an asterisk (*), are three characters in length, and may include one or more parameters. The command keyword is separated from the first parameter by a blank space. Use a semicolon (;) to separate multiple commands as shown below:

```
*RST; *CLS; *ESE 32; *OPC?
```

SCPI Parameter Type

The SCPI language defines several data formats to be used in program messages and response messages.

Numeric Parameters

Commands that require numeric parameters will accept all commonly used decimal representations of numbers including optional signs, decimal points, and scientific notation. Special values for numeric parameters such as MIN, MAX, and DEF are also accepted. You can also send engineering unit suffixes with numeric parameters (e.g., M, k, m, or u). If a command accepts only certain specific values, the instrument will automatically round the input numeric parameters to the accepted values. The following command requires a numeric parameter for the range value:

```
VOLTage:DC:RANGe <range>|MIN|MAX|DEF
```

NOTE Because the SCPI parser is case-insensitive, there is some confusion over the letter "M" (or "m"). For your convenience, the instrument interprets "mV" (or "MV") as millivolts, but "MHZ" (or "mhz") as megahertz. Likewise "MΩ" (or "mΩ") is interpreted as megohms. You can use the prefix "MA" for mega. For example, "MAV" is interpreted as megavolts.

Discrete Parameters

Discrete parameters are used to program settings that have a limited number of values (like IMMediate, INTernal, or BUS). They have a short form and a long form just like command keywords. You can mix upper- and lower-case letters. Query responses will always return the short form in all upper-case letters. The following command requires a discrete parameters for the temperature units:

```
UNIT:TEMPerature C|F
```

Boolean Parameters

Boolean parameters represent a single binary condition that is either true or false. For a false condition, the instrument will accept "OFF" or "0". For a true condition, the instrument will accept "ON" or "1". When you query a boolean setting, the instrument will always return "0" or "1". The following command requires a boolean parameter:

```
SYSTem:BEEPer:ENABle OFF|0|ON|1
```

ASCII String Parameters

ASCII string parameters can contain virtually any set of ASCII characters. A quoted ASCII string parameter must begin and end with matching quotes; either with a single quote or a double quote. You can include the quote delimiter as part of the string by typing it twice without any characters in between. The following command uses a quoted ASCII string parameter:

```
FUNC <quoted ASCII string>
```

For example, the following commands select the AC voltage function (double or single quotes are allowed).

```
FUNC "VOLT:AC" or FUNC 'VOLT:AC'
```

An unquoted ASCII string parameter does not use quotation marks. The following command uses an unquoted ASCII string parameter:

```
CALibration:SECure:CODE <unquoted ASCII string>
```

For example, the following command uses an unquoted ASCII string to set a new calibration security code (calibration memory must be unsecured):

```
CAL:SEC:CODE T3ST_DUT165
```

Using Device Clear

Device Clear is an IEEE-488 low-level bus message that you can use to return the instrument to a responsive state. Different programming languages and IEEE-488 interface cards provide access to this capability through their own unique commands. The status registers, the error queue, and all configuration states are left unchanged when a Device Clear message is received.

Device Clear performs the following actions:

- If a measurement is in progress, it is aborted.
- The instrument returns to the trigger "idle" state.
- The instrument's input and output buffers are cleared.
- The instrument is prepared to accept a new command string.

NOTE The ABORt command is the recommended method to terminate a measurement.

Syntax Conventions

- Braces (**{}**) enclose the parameter choices for a given command string. The braces are not sent with the command string.
- A vertical bar (**|**) separates multiple parameter choices for a given command string. The bar is not sent with the command string.
- Triangle brackets (**< >**) indicate that you must specify a value for the enclosed parameter. For example, the above syntax statement shows the <range> parameter enclosed in triangle brackets. The brackets are not sent with the command string. You must specify a value for the parameter (e.g., "VOLT:DC:RANG 10").
- Some parameters are enclosed in square brackets (**[]**). The square brackets indicate that the parameter is optional and can be omitted. The brackets are not sent with the command string. If you do not specify a value for an optional parameter, the instrument chooses a default value.

Calculation (Math) Commands

- CALCulate:AVERage:AVERage?
  CALCulate:AVERage:COUNt?
  CALCulate:AVERage:MAXimum?
  CALCulate:AVERage:MINimum?
- CALCulate:LIMit:LOWer[:DATA]
  CALCulate:LIMit:LOWer[:DATA]?
- CALCulate:LIMit:UPPer[:DATA]
  CALCulate:LIMit:UPPer[:DATA]
- CALCulate:SCALe:DB:REFerence
  CALCulate:SCALe:DB:REFerence?
- CALCulate:SCALe:DBM:REFerence
  CALCulate:SCALe:DBM:REFerence?

Calibration Commands

- CALibration:COUNt?
- CALibration:SECure:CODE
  CALibration:SECure:STATe
  CALibration:SECure:STATe?
- CALibration:STORe
- CALibration:STRing
  CALibration:STRing?

Capacitance Configuration Commands

- CONFigure?
- CONFigure:CAPacitance
- [SENSe:]CAPacitance:NULL[:STATe]
- [SENSe:]CAPacitance:NULL[:STATe]?
- [SENSe:]CAPacitance:NULL:VALue
- [SENSe:]CAPacitance:NULL:VALue?
- [SENSe:]CAPacitance:NULL:VALue:AUTO
- [SENSe:]CAPacitance:NULL:VALue:AUTO?
- [SENSe:]CAPacitance:RANGe
- [SENSe:]CAPacitance:RANGe?
- [SENSe:]CAPacitance:RANGe:AUTO
- [SENSe:]CAPacitance:RANGe:AUTO?
- [SENSe:]CAPacitance:SECondary {"OFF"|"CALCulate:DATA"}
- [SENSe:]CAPacitance:SECondary?

Continuity and Diode Configuration Commands

- CONFigure?
- CONFigure:CONTinuity
- CONFigure:DIODe

AC Current Configuration

- CONFigure?
- CONFigure:CURRent:AC
- [SENSe:]CURRent:AC:SECondary {"OFF"|"CALCulate:DATA"|"FREQuency"|"CURRent[:DC]"}
- [SENSe:]CURRent:AC:SECondary?
- [SENSe:]CURRent:{AC|DC}:RANGe
- [SENSe:]CURRent:{AC|DC}:RANGe?
- [SENSe:]CURRent:{AC|DC}:RANGe:AUTO
- [SENSe:]CURRent:{AC|DC}:RANGe:AUTO?

DC Current Configuration

- CONFigure:CURRent[:DC]
- CONFigure?
- [SENSe:]CURRent:{AC|DC}:RANGe
- [SENSe:]CURRent:{AC|DC}:RANGe
- [SENSe:]CURRent:{AC|DC}:RANGe:AUTO
- [SENSe:]CURRent:{AC|DC}:RANGe:AUTO?
- [SENSe:]CURRent[:DC]:RESolution
- [SENSe:]CURRent[:DC]:RESolution?
- [SENSe:]CURRent[:DC]:SECondary {"OFF"|"CALCulate:DATA"|"CURRent:AC"|"PTPeak"}
- [SENSe:]CURRent[:DC]:SECondary?

Frequency/Period Configuration Commands

- CONFigure:FREQuency
- CONFigure:PERiod
- [SENSe:]{FREQuency|PERiod}:APERture
- [SENSe:]{FREQuency|PERiod}:APERture?
- [SENSe:]{FREQuency|PERiod}:RANGe:LOWer
- [SENSe:]{FREQuency|PERiod}:RANGe:LOWer?
- [SENSe:]{FREQuency|PERiod}:VOLTage:RANGe
- [SENSe:]{FREQuency|PERiod}:VOLTage:RANGe?
- [SENSe:]{FREQuency|PERiod}:VOLTage:RANGe:AUTO
- [SENSe:]{FREQuency|PERiod}:VOLTage:RANGe:AUTO?
- [SENSe:]FREQuency:SECondary {"OFF"|"CALCulate:DATA"|"PERiod"|"VOLTage:AC"}
- [SENSe:]FREQuency:SECondary?

IEEE-488 Commands

- *CAL
- *CLS
- *ESE <enable_value>
  *ESE?
- *ESR?
- *IDN?
- *OPC
  *OPC?
- *OPT?
- *PSC {0|1}
  *PSC?
- *RST
- *SRE
  *SRE?
- *STB?
- *TRG
- *TST?
- *WAI

Measurement Commands

- MEASure[:SCALar]:CAPacitance?
- MEASure[:SCALar]:CONTinuity?
- MEASure[:SCALar]:CURRent:AC?
- MEASure[:SCALar]:CURRent[:DC]?
- MEASure[:SCALar]:DIODe?
- MEASure[:SCALar]:FREQuency?
- MEASure[:SCALar]:FRESistance?
- MEASure[:SCALar]:PERiod?
- MEASure[:SCALar]:RESistance?
- MEASure[:SCALar]:TEMPerature?
- MEASure[:SCALar][:VOLTage]:AC?
- MEASure[:SCALar][:VOLTage][:DC]?
- MEASure[:SCALar][:VOLTage][:DC]:RATio

Measurement Configuration Commands

- ABORt
- INITiate[:IMMediate]
- READ?
- R?
- TRIGger:SOURce {IMMediate|BUS|INTernal}
- TRIGger:SOURce?

Reading Memory Commands

- FETCh?

Resistance Configuration Commands

- CONFigure?
- CONFigure:FRESistance
- CONFigure:RESistance
- [SENSe:]{RESistance|FRESistance}:RANGe
- [SENSe:]{RESistance|FRESistance}:RANGe?

- [SENSe:]{RESistance|FRESistance}:RANGe:AUTO
- [SENSe:]{RESistance|FRESistance}:RANGe:AUTO
- [SENSe:]{RESistance|FRESistance}:RESolution
- [SENSe:]{RESistance|FRESistance}:RESolution?

State Storage Commands

- *RCL {0|1|2|3|4}
- *SAV {0|1|2|3|4}
- MEMory:STATe:RECall:AUTO{OFF|ON}
  MEMory:STATe:RECall:AUTO?

Status System Commands

- STATus:OPERation:CONDition?
- STATus:OPERation:ENABle
  STATus:OPERation:ENABle?
- STATus:OPERation[:EVENt]?
- STATus:PRESet
- STATus:QUEStionable:CONDition?
- STATus:QUEStionable:ENABle
  STATus:QUEStionable:ENABle?
- STATus:QUEStionable[:EVENt]?
- SAMPle:COUNt
  SAMPle:COUNt?
- SAMPle:TIMer
  SAMPle:TIMer?

System-Related Commands

- DISPlay[:STATe]
- DISPlay[:STATe]?
- HCOPy:SDUMp:DATA?
- HCOPy:SDUMp:DATA:FORMat{PNG|BMP}
  HCOPy:SDUMp:DATA:FORMat?
- SYSTem:BEEPer[:IMMediate]
- SYSTem:BEEPer:STATe
  SYSTem:BEEPer:STATe?

- SYSTem:ERRor?
- SYSTem:LFRequency
  SYSTem:LFRequency?
- SYSTem:COMMunicate:LAN:CONTrol?
- SYSTem:COMMunicate:LAN:DHCP;
  SYSTem:COMMunicate:LAN:DHCP?
- SYSTem:COMMunicate:LAN:DNS1
  SYSTem:COMMunicate:LAN:DNS2
- SYSTem:COMMunicate:LAN:DOMain?
- SYSTem:COMMunicate:LAN:GATEway;
  SYSTem:COMMunicate:LAN:GATEway?
- SYSTem:COMMunicate:LAN:HOSTname;
  SYSTem:COMMunicate:LAN:HOSTname?
- SYSTem:COMMunicate:LAN:IPADdress;
  SYSTem:COMMunicate:LAN:IPADdress?
- SYSTem:COMMunicate:LAN:MAC?
- SYSTem:COMMunicate:LAN:SMASk;
  SYSTem:COMMunicate:LAN:SMASk?
- SYSTem:COMMunicate:LAN:TELNet:WMESsage;
  SYSTem:COMMunicate:LAN:TELNet:WMESsage?
- SYSTem:COMMunicate:LAN:UPDate
- SYSTem:COMMunicate:TCPip:CONTrol?
- SYSTem:DATE <year>, <month>, <day>;
  SYSTem:DATE?
- SYSTem:LOCal
- SYSTem:PRESet
- SYSTem:SECurity:IMMediate
- SYSTem:TIME <hour>, <minute>, <second>;
  SYSTem:TIME?
- SYSTem:VERSion?

Temperature Configuration Commands

- CONFigure?
- CONFigure:TEMPerature
- [SENSe:]TEMPerature:NPLC

- [SENSe:]TEMPerature:NPLC?
- [SENSe:]TEMPerature:NULL[:STATe]
- [SENSe:]TEMPerature:NULL[:STATe]?
- [SENSe:]TEMPerature:NULL:VALue
- [SENSe:]TEMPerature:NULL:VALue?
- [SENSe:]TEMPerature:NULL:VALue:AUTO
- [SENSe:]TEMPerature:NULL:VALue:AUTO?
- [SENSe:]TEMPerature:SECondary {"OFF"|"CALCulate:DATA"|"SENSe:DATA"}
- [SENSe:]TEMPerature:SECondary?
- UNIT:TEMPerature <units>
- UNIT:TEMPerature?

Thermistor Configuration

- [SENSe:]TEMPerature:TRANsducer:{FTHermistor|THERmistor}:TYPE 5000
- [SENSe:]TEMPerature:TRANsducer:{FTHermistor|THERmistor}:TYPE?
- [SENSe:]TEMPerature:TRANsducer:{FRTD|RTD}:RESistance[:REFerence]
- [SENSe:]TEMPerature:TRANsducer:{FRTD|RTD}:RESistance[:REFerence]?
- [SENSe:]TEMPerature:TRANsducer:TYPE {FRTD|RTD|FTHermistor|THERmistor}
- [SENSe:]TEMPerature:TRANsducer:TYPE?
- [SENSe:]TEMPerature:ZERO:AUTO
- [SENSe:]TEMPerature:ZERO:AUTO?

Triggering Commands

- *TRG
- INITiate[:IMMediate]
- READ?
- TRIGger:SOURce {IMMediate|BUS|INTernal}
- TRIGger:SOURce?
- TRIGger:DELay
- TRIGger:DELay?
- TRIGger:DELay:AUTO {OFF|ON}
- TRIGger:DELay:AUTO?

AC Voltage Configuration

- CONFigure?
- CONFigure[:VOLTage]:AC
- [SENSe]:FUNCtion[:ON]<function>
- [SENSe]:FUNCtion[:ON]?
- [SENSe:]VOLTage:{AC|DC}:RANGe
- [SENSe:]VOLTage:{AC|DC}:RANGe?
- [SENSe:]VOLTage:{AC|DC}:RANGe:AUTO
- [SENSe:]VOLTage:{AC|DC}:RANGe:AUTO?

DC Voltage Configuration

- CONFigure?
- CONFigure[:VOLTage][:DC]
- [SENSe]:FUNCtion[:ON]<function>
- [SENSe]:FUNCtion[:ON]?
- [SENSe:]VOLTage:{AC|DC}:RANGe
- [SENSe:]VOLTage:{AC|DC}:RANGe?
- [SENSe:]VOLTage:{AC|DC}:RANGe:AUTO
- [SENSe:]VOLTage:{AC|DC}:RANGe:AUTO?
- [SENSe:]VOLTage[:DC]:IMPedance:AUTO
- [SENSe:]VOLTage[:DC]:IMPedance:AUTO?
- [SENSe:]VOLTage[:DC]:RESolution
- [SENSe:]VOLTage[:DC]:RESolution?

Range, Resolution and Integration Time (shown in Aperture and NPLCs)

The following table shows the integration time (in PLC and seconds) for each range and resolution.

To determine the PLC for a specified range and resolution:

1. Locate the range in the left column. Measurement units do not apply (i.e. for 1 V or 1 A, use the 1 range; for 100 V or 100 Ω, use the 100 range).
2. From the range value, follow the corresponding row of resolutions to the right until the specified resolution lies within two adjacent columns for your DMM model.
3. The NPLC value at the top of the left-adjacent column is the NPLC "setting" for the given range and resolution.

For example: for the DM34461A, a specified 10 VDC range and 10 µV resolution, locate range 10 in the table. Moving to the right, the 10 µV resolution (1E-5) is found in the column under 10 NPLC.

Model	DM34460A					DM34461A				
PLC	100	10	1	0.2	0.02	100	10	1	0.2	0.02
Aperture (60 Hz Power)	1.67s	0.167s	16.7ms	3ms	0.3ms	1.67s	0.167s	16.7ms	3ms	0.3ms
Aperture (50 Hz Power)	2s	0.2s	20ms			2s	0.2s	20ms		
ResFactor[1]	3ppm	10ppm	30ppm	100ppm	300ppm	0.3ppm	1ppm	3ppm	10ppm	100ppm
Range	Resolution									
1 m	3E-9	1E-8	3E-8	1E-7	3E-7	3E-10	1E-9	3E-9	1E-8	1E-7
10 m	3E-8	1E-7	3E-7	1E-6	3E-6	3E-9	1E-8	3E-8	1E-7	1E-6
100 m	3E-7	1E-6	3E-6	1E-5	3E-5	3E-8	1E-7	3E-7	1E-6	1E-5
1	3E-6	1E-5	3E-5	1E-4	3E-4	3E-7	1E-6	3E-6	1E-5	1E-4
10	3E-5	1E-4	3E-4	1E-3	3E-3	3E-6	1E-5	3E-5	1E-4	1E-3
100	3E-4	1E-3	3E-3	1E-2	3E-2	3E-5	1E-4	3E-4	1E-3	1E-2
1 k	3E-3	1E-2	3E-2	1E-1	3E-1	3E-4	1E-3	3E-3	1E-2	1E-1
10 k	3E-2	1E-1	3E-1	1	3	3E-3	1E-2	3E-2	1E-1	1
100 k	3E-1	1	3	10	30	3E-2	1E-1	3E-1	1	10
1 M	3	10	30	100	300	3E-1	1	3	10	100
10 M	30	100	300	1 k	3 k	3	10	30	100	1 k
100 M	300	1 k	3 k	10 k	30 k	30	100	300	1 k	10 k

1 ResFactor x Range = Resolution.

Resolution and Integration Time for DC Measurements

Setting the integration time also sets the measurement resolution. This table shows the relationship between integration time in power line cycles (PLC) and resolution.

Integration Time			Resolution (DM34460A)	Resolution (DM34461A)
Power Line Cycles	Aperture (60 Hz Power)	Aperture (50 Hz Power)		
0.02 PLC (MINimum)	0.3 ms		300 ppm × Range (MAXimum)	100 ppm × Range (MAXimum)
0.2 PLC	3 ms		100 ppm × Range	10 ppm × Range
1 PLC	16.7 ms	20 ms	30 ppm × Range	3 ppm × Range
10 PLC (DEFault)	0.167 s	0.2 s	10 ppm × Range (DEFault)	1 ppm × Range (DEFault)
100 PLC (MAXimum)	1.67 s	2 s	3 ppm × Range (MINimum)	0.3 ppm × Range (MINimum)

Automatic Trigger Delays

If TRIGger:DELay:AUTO is on, the instrument selects the trigger delay for you, as shown in the tables below.

NOTE

All frequency and period measurements have an automatic trigger delay of 1 second.
The continuity and diode functions ignore the trigger delay.
The 2-wire and 4-wire temperature measurements use the corresponding 2-wire and 4-wire resistance measurement delays.

DC Voltage Default Delays

PLC	0.001	0.002	0.006	0.02	0.06	0.2	1	10	100
Aperture (60 Hz Power)	20 µs	40 µs	100 µs	0.3 ms	1 ms	3 ms	16.7 ms	0.167 s	1.67 s
Aperture (50 Hz Power)							20 ms	0.2 s	2 s

Range	Delay		
All	100 µs	130 µs	160 µs

DC Current Default Delays

PLC	0.001	0.002	0.006	0.02	0.06	0.2	1	10	100
Aperture (60 Hz Power)	20 µs	40 µs	100 µs	0.3 ms	1 ms	3 ms	16.7 ms	0.167 s	1.67 s
Aperture (50 Hz Power)							20 ms	0.2 s	2 s

Range	Delay	
All	1 ms	1.5 ms

Resistance (2-wire) Default Delays

PLC	0.001	0.002	0.006	0.02	0.06	0.2	1	10	100
Aperture (60 Hz Power)	20 µs	40 µs	100 µs	0.3 ms	1 ms	3 ms	16.7 ms	0.167 s	1.67 s
Aperture (50 Hz Power)							20 ms	0.2 s	2 s

Range	Delay		
100 Ω	80 µs	100 µs	130 µs
1 kΩ	110 µs	130 µs	160 µs
10 kΩ	130 µs	160 µs	190 µs
100 kΩ	540 µs	670 µs	800 µs
1 MΩ	5 ms	6 ms	7.5 ms

10 MΩ	60 ms	70 ms	84 ms
100 MΩ			

Resistance (4-wire) Default Delays

PLC	0.001	0.002	0.006	0.02	0.06	0.2	1	10	100
Aperture (60 Hz Power)	20 µs	40 µs	100 µs	0.3 ms	1 ms	3 ms	16.7 ms	0.167 s	1.67 s
Aperture (50 Hz Power)							20 ms	0.2 s	2 s
Range	Delay								
100 Ω	1 ms						1.5 ms		
1 kΩ									
10 kΩ									
100 kΩ									
1 MΩ	10 ms						15 ms		
10 MΩ	100 ms								
100 MΩ									

AC Voltage Default Delays

	Filter (Hz)		
Range	3	20	200
All	2.5 s	0.625 s	0.025 s

AC Current Default Delays

	Filter (Hz)		
Range	3	20	200
All	1.66 s	0.25 s	0.025 s

Frequency and Period

The default delay for frequency and period is 1 s, regardless of aperture (gate time) setting.

Power-On and Reset State

These tables show factory default settings. Parameters marked with a bullet (•) are nonvolatile and are not affected by power-on or system reset. Other parameters are volatile and are reset to the indicated values at power-on or after *RST or SYSTem:PRESet.

NOTE The power-on/reset state may differ from these values if you have enabled power-on state recall mode.

Factory Default Settings

Measurement Configuration	Factory Setting
Function	DC Volts
Range	Autorange (for all functions)
Integration Time	NPLC On, 10 power line cycles (PLC)*
Resolution	Resolution equivalent to 10 PLC
Autozero	On*
Frequency or Period Aperture (Gate Time)	100 ms*
Input Impedance	10 MΩ (fixed for all DC voltage ranges)
AC Input Filter (bandwidth)	20 Hz (medium filter)
Temperature Transducer Type	FRTD
RTD Reference Resistance	100 Ω
Nulls (individual functions)	Off; reference = 0.0, auto reference enabled (for all measurement functions)
Current Terminals	3 A
Secondary Measurements	Off
Screen Shot Format	PNG
Calibration Value	0.0
Current Switch Mode	Continuous
Resistance (2- and 4-wire)	
Offset Compensation	Off
Low Power Measurements	Off
Temperature	
Offset Compensation (2- and 4- wire RTD)	Off
Low Power Measurements(2- and 4- wire RTD or thermistor)	Off

* For all DC measurement functions.

Math Operations	Factory Setting
Math State	Disabled

Scale Function	Null
Null and dB Relative Value	Set to 0.0 with auto reference enabled
Upper and Lower Limits	0.0
Histogram (DM34461A only)	Bin counts cleared; 100 bins; auto binning enabled
Statistics	Cleared
dBm Reference Resistance	600 Ω
Calculate Scale	
Reference	0.0

Triggering Operations	Factory Setting
Trigger Count	1
Trigger Source	Immediate
Trigger Delay	Auto Delay
Sample Count	1
Trigger Slope	Negative
Triggering:	
Sample Source	Immediate
Sample Timer	1 s
Trigger Level	0.0

System-Related Operations	Factory Setting
Beeper Mode	On
Thousands Separator	On
Display State	On
Reading Memory	Cleared
Error Queue	See note
Stored States	No Change
Calibration State	Secured

Data Settings	Factory Setting
Data Transfer	
Separator	Comma
Header	Off
Reading Limits	Off

NOTE The Error Queue is cleared at power on. It is not cleared by *RST or SYSTem:PRESet.

Input/Output Configuration	Factory Setting
LAN Settings:[2]	
DHCP	On
Auto IP	On
IP Address	169.254.4.61
Subnet Mask	255.255.0.0
Default Gateway	0.0.0.0
DNS Server	0.0.0.0
Host Name	K-DM34460A-nnnn (for 34460A)[3] K-DM34461A-nnnn (for 34461A)
LAN Services[1]	Enable All (VISA LAN, Sockets, Telnet, Web Server, mDNS, HiSLIP)

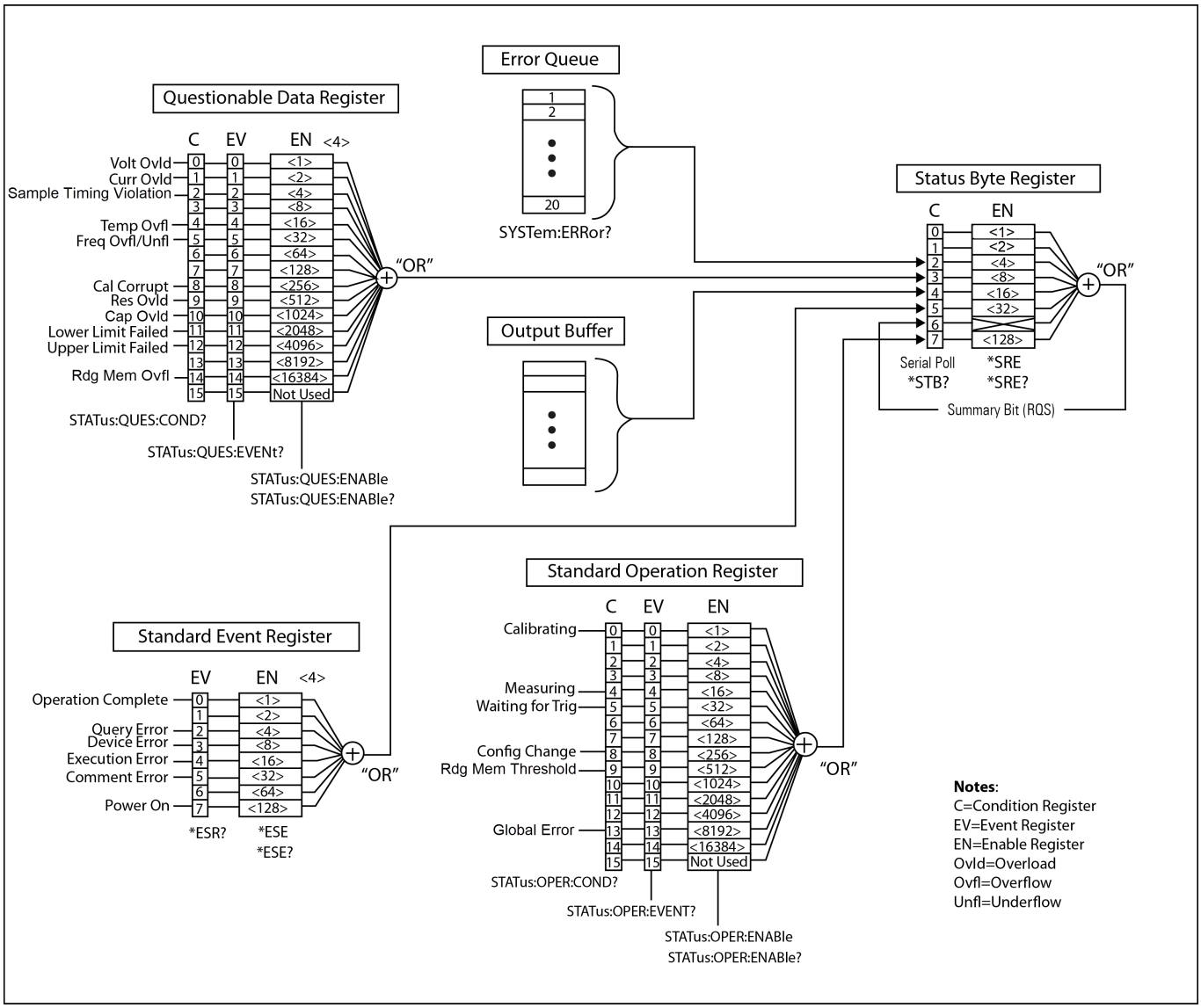
1 Interface enable or LAN service changes take effect only after you cycle power.
2 LAN setting changes require a LAN restart. From SCPI you must cycle power.
3 Where nnnn represents the last 4 digits of the instrument serial number.

NOTE The instrument uses LAN port 5024 for SCPI Telnet sessions and port 5025 for SCPI Socket sessions.

SCPI Status Registers

All SCPI instruments implement status registers in the same way. The status system records various instrument conditions in four register groups: the Status Byte register, the Standard Event register, the Standard Operation register, and the Questionable Data register groups. The Status Byte register records high-level summary information reported in the other register groups.

The figure below illustrates the SCPI status system used by the instrument.



What is an event register?

An event register is a read-only register that reports defined conditions within the instrument. Bits in an event register are latched. Once an event bit is set, subsequent state changes are ignored. Bits in an event register are automatically cleared by a query of that register (such as *ESR? or STAT:QUES:EVEN?) or by sending the *CLS (clear status) command. A reset (*RST) or device clear will not clear bits in event registers. Querying an event register returns a decimal value of the binary-weighted sum of all bits set in the register.

The Questionable Data register

The following table lists the bit definitions for the Questionable Data register:

Bit	Bit name	Decimal Value	Definition
0	Voltage Overload	1	Only reported as event. Read the Event Register.
1	Current Overload	2	Only reported as event. Returns 0. Read the Event Register.
2	Sample Timing Violation	4	A sample timing violation has occurred involving the SAMPle:TIMer command. Sample timing may not be valid.
3	Not Used	8	(Reserved for future use)
4	Temperature Overload	16	Only reported as event. Returns 0. Read the Event Register.
5	Frequency Overload/Underflow	32	Only reported as event. Returns 0. Read the Event Register.
6	Not Used	64	(Reserved for future use)
7	Not Used	128	(Reserved for future use)
8	Calibration Corrupt	256	At least one calibration constant is corrupt.
9	Resistance Overload	512	Only reported as event. Returns 0. Read the Event Register.
10	Capacitance Overload	1024	Only reported as event. Returns 0. Read the Event Register.
11	Lower Limit Failed	2048	The most recent measurement failed the lower limit test.
12	Upper Limit Failed	4096	The most recent measurement failed the upper limit test.
13	Not Used	8192	(Reserved for future use)
14	Memory Overflow	16384	Reading memory is full. One or more (oldest) measurements have been lost.
15	Not Used	32768	(Reserved for future use)

The Standard Operation register

The following table lists the bit definitions for the Standard Operation register:

Bit	Bit name	Decimal Value	Definition
0	Calibrating	1	Instrument is performing a calibration.
1	Not Used	2	(Reserved for future use)
2	Not Used	4	(Reserved for future use)
3	Not Used	8	(Reserved for future use)
4	Measuring	16	Instrument is initiated, and is making or about to make a measurement.
5	Waiting for Trigger	32	Instrument is waiting for a trigger.
6	Not Used	64	(Reserved for future use)
7	Not Used	128	(Reserved for future use)
8	Configuration Change	256	Instrument configuration has been changed since the last INIT, READ? or MEASure?, either from the front panel or from SCPI.
9	Memory Threshold	512	Programmed number of measurements (DATA:POINts:EVENt:THReshold) have been stored in measurement memory.
10	Not Used	1024	(Reserved for future use)
11	Not Used	2048	(Reserved for future use)
12	Not Used	4096	(Reserved for future use)
13	Global Error	8192	Set if any remote interface has an error in its error queue; cleared otherwise.
14	Not Used	16384	(Reserved for future use)
15	Not Used	32768	(Reserved for future use)

The Standard Event register

The following table lists the bit definitions for the Standard Event register:

Bit	Bit name	Decimal Value	Definition
0	Operation Complete	1	All commands prior to and including *OPC have been executed.
1	Not Used	2	0 is returned.
2	Query Error	4	The instrument tried to read the output buffer but it was empty. Or, a new command line was received before a previous query has been read. Or, both the input and output buffers are full.
3	Device-Specific Error	8	A device-specific error, including a self-test error or calibration error, occurred (an error in the -300 range or any positive error has been generated). See SCPI Error Messages for the complete SCPI error message list.
4	Execution Error	16	An execution error occurred (an error in the -200 range has been generated).
5	Command Error	32	A command syntax error occurred (an error in the -100 range has been generated).
6	Not Used	64	0 is returned.
7	Power On	128	Power has been cycled since the last time the event register was read or cleared.

The Status Byte register

This register summarizes the information from all other status groups as defined in the IEEE 488.2 Standard Digital Interface for Programmable Instrumentation.

The following table lists the bit definitions for the Status Byte register:

Bit	Bit name	Decimal Value	Definition
0	Not used	1	(Reserved for future use)
1	Not used	2	(Reserved for future use)
2	Error Queue	4	One or more errors have been stored in the Error Queue. Use SYSTem:ERRor? to read and delete errors.
3	Questionable Data Summary	8	One or more bits are set in the Questionable Data Register (bits must be enabled, seeSTATus:QUEStionable:ENABle).
4	Message Available	16	Data is available in the instrument's output buffer.
5	Standard Event Summary	32	One or more bits are set in the Standard Event Register (bits must be enabled, see *ESE).
6	Master Summary	64	One or more bits are set in the Status Byte Register and may generate a Request for Service (RQS). Bits must be enabled using *SRE.
7	Standard Operation Summary	128	One or more bits are set in the Standard Operation Register (bits must be enabled, see STATus:OPERation:ENABle).

2 SCPI Programming

ABORt Subsystem
CALCulate Subsystem
CALibration Subsystem
CONFigure Subsystem
DATA Subsystem
DISPlay Subsystem
FETCh Subsystem
FORMat Subsystem
HCOpy Subsystem
IEEE-488.2 Common Subsystem
INITiate Subsytem
LXI Subsystem
MEASure Subsystem
MEMory Subsystem
R Subsystem
READ Subsystem
SAMPle Subsystem
SENSe Subsystem
STATus Subsystem
SYSTem Subsystem
TEST ALL Subsystem
TRIGger Subsystem
UNIT Subsystem

This chapter describes the subsystem commands available to the Keysight DM34460 Series 6½ digit digital multimeter.

ABORt Subsystem

Command Summary

- ABORt

ABORt

This command aborts a measurement in progress, returning the instrument to the trigger idle state.

Parameter	Typical Return
(none)	(none)
Aborts the measurement in progress: ABORt	

Remarks

- Use this to abort a measurement when the instrument is waiting for a trigger, or for aborting a long measurement or series of measurements.

CALCulate Subsystem

The DM34460 Series 6½ Digit Digital Multimeter can perform several mathematical, statistical, and limit calculation functions using the CALCulate commands.

Command Summary

Select and Enable Functions

- CALCulate:SCALe:FUNCtion
- CALCulate:SCALe:FUNCtion?
- CALCulate:SCALe:REFerence:AUTO
- CALCulate:SCALe:REFerence:AUTO?
- CALCulate:SCALe:[:STATe]
- CALCulate:SCALe:[:STATe]?
- CALCulate:TCHart[:STATe]
- CALCulate:TCHart[:STATe]?
- CALCulate:TRANsform:HISTogram[:STATe]
- CALCulate:TRANsform:HISTogram[:STATe]?

Limit Functons

This subsystem specifies measurements and indicates when a limit has been exceeded.

- CALCulate:LIMit:CLEar[:IMMediate]
- CALCulate:LIMit:LOWer
- CALCulate:LIMit:LOWer?
- CALCulate:LIMit[:STATe]
- CALCulate:LIMit[:STATe]?
- CALCulate:LIMit:UPPer
- CALCulate:LIMit:UPPer?

Mathematical Functions

- CALCulate:AVERage:ALL?
- CALCulate:AVERage:AVERage?
- CALCulate:AVERage:COUNt?
- CALCulate:AVERage:MAXimum?
- CALCulate:AVERage:MINimum?
- CALCulate:AVERage:PTPeak?

- CALCulate:AVERage:SDEViation?
- CALCulate:AVERage:CLEar[:IMMediate]
- CALCulate:AVERage[:STATe]
- CALCulate:AVERage[:STATe]?
- CALCulate:CLEar
- CALCulate:SCALe:DB:REFerence
- CALCulate:SCALe:DB:REFerence?
- CALCulate:SCALe:DBM:REFerence
- CALCulate:SCALe:DBM:REFerence?
- CALCulate:TRANsform:HISTogram:ALL?
- CALCulate:TRANsform:HISTogram:DATA?
- CALCulate:TRANsform:HISTogram:CLEar
- CALCulate:TRANsform:HISTogram:COUNt?
- CALCulate:TRANsform:HISTogram:POINts
- CALCulate:TRANsform:HISTogram:POINts?
- CALCulate:TRANsform:HISTogram:RANGe:AUTO
- CALCulate:TRANsform:HISTogram:RANGe:AUTO?
- CALCulate:TRANsform:HISTogram:RANGe:{LOWer|UPPer} {<value>|MIN|MAX|DEF}
- CALCulate:TRANsform:HISTogram:RANGe:{LOWer|UPPer}? [{MIN|MAX|DEF}]

CALCulate:AVERage:ALL?
CALCulate:AVERage:PTPeak?
CALCulate:AVERage:SDEViation?

This query returns the arithmetic mean (average) and standard deviation value of all measurements taken since the statistics were last cleared. The peak-to-peak statistics is not returned by CALCulate:AVERage:ALL?.

Queries listed above returns individual values.

Parameter	Typical Return
(none)	(none)
Returns the statistics of 100 frequency measurements: CALC:AVER:ALL?	

Remarks

- Statistics are cleared when the measurement function changes or when any of these commands is executed:
  CALCulate:AVERage:STATe ON
  CALCulate:AVERage:CLEar
  INITiate
  MEASure:<function>?
  READ?
  *RST
  SYSTem:PRESet
- All values are returned in the form +1.23450000E+01.
- When dB or dBm scaling is used, the CALC:AVER:SDEV query returns +9.91000000E+37 (not a number).

CALCulate:AVERage:AVERage?

This query returns the mathematical average of all readings taken since averaging was enabled.

Parameter	Typical Return
(none)	+2.61920000E+01 (If no data is available , "0" is returned.)
Returns the average of the readings taken: CALC:AVER:AVER?	

Remarks

- Statistics are cleared when the measurement function changes or when any of these commands is executed:
  CALCulate:AVERage:STATe ON
  CALCulate:AVERage:CLEar
  INITiate
  MEASure:<function>?
  READ?
  *RST
  SYSTem:PRESet
- All values are returned in the form +1.23450000E+01.

CALCulate:AVERage:CLEar[:IMMediate]

This command clears all computed statistics: minimum, maximum, average, peak-to-peak, count and standard deviation.

Parameter	Typical Return
(none)	(none)
Clears the stored statistics data: CALC:AVER:CLE	

Remarks

- Does not clear measurement in reading memory.
- Statistics are cleared when the measurement function changes or when any of these commands is executed:
  CALCulate:AVERage:STATe ON
  CALCulate:AVERage:CLEar
  INITiate
  MEASure:<function>?
  READ?
  *RST
  SYSTem:PRESet
- To clear statistics, limits, histogram data, and measurement data, use CALCulate:CLEar[:IMMediate].

CALCulate:AVERage:COUNt?

This query returns the number of readings taken since averaging was enabled.

Parameter	Typical Return
(none)	+20 (If no data is available , "0" is returned.)
Returns the number of readings taken since statistics were enabled: CALC:AVER:COUN?	

Remarks

- Statistics are cleared when the measurement function changes or when any of these commands is executed:
  CALCulate:AVERage:STATe ON
  CALCulate:AVERage:CLEar
  INITiate
  MEASure:<function>?
  READ?
  *RST
  SYSTem:PRESet
- All values are returned in the form +1.23450000E+01.

CALCulate:AVERage:MAXimum?

This query returns the maximum value found since averaging was enabled.

Parameter	Typical Return
(none)	+1.37370000E+03 (If no data is available , "0" is returned)
Returns the maximum value found: CALC:AVER:MAX?	

Remarks

- Statistics are cleared when the measurement function changes or when any of these commands is executed:
  CALCulate:AVERage:STATe ON
  CALCulate:AVERage:CLEar
  INITiate
  MEASure:<function>?
  READ?
  *RST
  SYSTem:PRESet
- All values are returned in the form +1.23450000E+01.

CALCulate:AVERage:MINimum?

This query returns the minimum value found since averaging was enabled.

Parameter	Typical Return
(none)	+4.27150000E-03 (If no data is available , "0" is returned)
Returns the minimum value found: CALC:AVER:MIN?	

Remarks

- Statistics are cleared when the measurement function changes or when any of these commands is executed:
  CALCulate:AVERage:STATe ON
  CALCulate:AVERage:CLEar
  INITiate
  MEASure:<function>?
  READ?
  *RST
  SYSTem:PRESet
- All values are returned in the form +1.23450000E+01.

CALCulate:AVERage[:STATe]{ON|1|OFF|0}
CALCulate:AVERage[:STATe]?

This command enables or disables statistics computation.

Parameter	Typical Return

ON|1|OFF|0 Default: OFF	0 (OFF) or 1 (ON)
Enables the statistics computation: CALC:AVER:STAT ON	

Remarks

- Statistics are cleared when the measurement function changes or when any of these commands is executed:
  CALCulate:AVERage:STATe ON
  CALCulate:AVERage:CLEar
  INITiate
  MEASure:<function>?
  READ?
  *RST
  SYSTem:PRESet
- The instrument turns this setting OFF when the measurement function is changed or after *RST or SYSTem:PRESet.

CALCulate:CLEar[:IMMediate]

This command clears all limits, histogram data, statistics, and measurements.

Parameter	Typical Return
(none)	(none)
Clears all limits, histogram data, statistics, and measurements: CALC:CLE:IMM	

Remarks

- Items are cleared synchronously; histogram, statistics, and limit data all restart at the same time that measurements restart.

CALCulate:LIMit:CLEar[:IMMediate]

This command clears front panel indications of limits being exceeded and clears bit 11 ("Lower Limit Failed") and bit 12 ("Upper Limit Failed") in the Condition Register of the Questionable Data Register event register group. The corresponding event register bits are unaffected.

A condition register continuously monitors the state of the instrument. Condition register bits are updated in real time; they are neither latched nor buffered.

An event register is a read-only register that latches events from the condition register. While an event bit is set, subsequent events corresponding to that bit are ignored.

Parameter	Typical Return
(none)	(none)
Clears the limit test result: CALC:LIM:CLE	

Remarks

- Does not clear measurements in reading memory.
- The instrument clears front panel indications of limits being exceeded and clears bits 11 and 12 in the Questionable Data Register when the measurement function changes, or when any of the following commands is executed:
  CALCulate:LIMit:STATe ON
  INITiate
  MEASure:<function>?
  READ?
  CALCulate:LIMit:CLEar
  *RST
  SYSTem:PRESet
- To clear statistics, limits, histogram data, and measurement data, use CALCulate:CLEar[:IMMediate].

CALCulate:LIMit:LOWer[:DATA] {<value>|MIN|MAX|DEF}
CALCulate:LIMit:LOWer[:DATA]?[{MIN|MAX|DEF}]

This command sets the lower limit.

Parameter	Typical Return
-1.0E+15 to -1.0E-15 Default: 0	-1.00000000E-00
Sets the lower limit to -0.25: CALC:LIM:LOW -0.25	

Remarks

- You can assign a lower limit. The lower limit must always be less than or equal to the upper limit.
- *Limit crossing*: If a reading is less than the specified lower limit, bit 11 ("Lower Limit Failed") is set in the Questionable Data Register. See STATus Subsystem Introduction for further information.
- CONFigure resets limit to 0.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

CALCulate:LIMit[:STATe]{ON|1|OFF|0}
CALCulate:LIMit[:STATe]?

This command enables or disables limit testing.

Parameter	Typical Return
ON|1|OFF|0 Default: OFF	0 (OFF) or 1 (ON)
Clears front panel indications of limits: CALC:LIM:STAT ON	

Remarks

- The instrument clears front panel indications of limits being exceeded and clears bits 11 and 12 in the Questionable Data Register when the measurement function changes, or when any of the following commands is executed:
  CALCulate:LIMit:STATe ON
  INITiate
  MEASure:<function>?
  READ?
  CALCulate:LIMit:CLEar
  *RST
  SYSTem:PRESet
- The instrument turns this setting OFF when the measurement function is changed or after *RST or SYSTEM:PRESet.

CALCulate:LIMit:UPPer[:DATA] {<value>|MIN|MAX|DEF}
CALCulate:LIMit:UPPer[:DATA]?[{MIN|MAX|DEF}]

This command sets the upper limit.

Parameter	Typical Return
+1.0E-15 to 1.0E+15 Default: 0	+1.00000000E+00
Sets the upper limit to 10.25: CALC:LIM:UPP 10.25	

Remarks

- You can assign an upper limit. The lower limit must always be less than or equal to the upper limit.
- *Limit crossing*: A measurement greater than the specified upper limit sets bit 12 ("Upper Limit Failed"). See STATus Subsystem Introduction for further information.
- CONFigure resets limit to 0.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

CALCulate:SCALe:DB:REFerence {<reference>|MIN|MAX|DEF}
CALCulate:SCALe:DB:REFerence? [{MIN|MAX|DEF}]

This command stores a reference value in the instrument's dB reference register. When the dB function is enabled, this value is subtracted from each voltage measurement after the measurement is converted to dBm.

Parameter	Typical Return
-200.0 dBm to +200.0 dBm Default: 0	+3.00000000E+02
Sets the dB reference value to -10.0 dBm: CALC:DB:REF -10.0	

Remarks

- Specifying a reference value disables automatic reference selection (CALCulate:SCALe:REFerence:AUTO OFF).
- The dB relative value parameter is relative to the dBm reference resistance set with CALCulate:SCALe:DBM:REFerence.
- The instrument sets the reference value to 0.0 with automatic reference selection enabled after a Factory Reset (*RST), an Instrument Preset (SYSTem:PRESet), or a change in measurement function.

CALCulate:SCALe:DBM:REFerence {<reference>|MIN|MAX|DEF}
CALCulate:SCALe:DBM:REFerence? [{MIN|MAX|DEF}]

This command selects the reference resistance for converting voltage measurements to dBm. This reference value affects the dBm and dB scaling functions.

Parameter	Typical Return
50|75|93|110|124|125|135|150|250|300|500|600|800|900|1000|1200|8000 Ω Default: 600	+3.00000000E+02
Sets the dBm reference resistance to 300 ohms: CALC:DBM:REF 300	

Remarks

- The instrument sets the reference value to its default value after a Factory Reset (*RST), an Instrument Preset (SYSTem:PRESet), or a change in measurement function.

CALCulate:SCALe:FUNCtion {DB|DBM}
CALCulate:SCALe:FUNCtion?

This command selects the operation performed by the scaling function.

Parameter	Typical Return
DB|DBM	DB or DBM
Enables the DB scaling function referenced to the next measurement taken: CALC:SCAL:FUNC DB	

Remarks

- DB performs a relative dB computation. The result is the difference between the input signal and the stored DB relative value reference (CALCulate:SCALe:DB:REFerence), with both values converted to dBm (dB = measurement in dBm – relative value in dBm). For the dB function, the reference value can be automatically selected using the first measurement converted to dBm as the reference value (see CALCulate:SCALe:REFerence:AUTO), or it can be specified by CALCulate:SCALe:DB:REFerence. dB scaling applies to ACV and DCV measurements only.
- DBM performs a dBM computation. The result is logarithmic and is based on a calculation of power delivered to a reference resistance (CALCulate:SCALe:DBM:REFerence), relative to 1 milliwatt. (dBm = $10 \times \log_{10}(\text{measurement}^2 / \text{reference resistance} / 1\ \text{mW})$). dBm scaling applies to ACV and DCV meas-

urements only.

- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

CALCulate:SCALe:REFerence:AUTO {ON|1|OFF|0}
CALCulate:SCALe:REFerence:AUTO?

This command enables or disables automatic reference selection for the dB scaling functions.

Parameter	Typical Return
ON|1|OFF|0 Default: ON	0 (OFF) or 1 (ON)
Enables the DB function with automatic reference selection: CALC:SCAL:REF:AUTO ON	

Remarks

- ON: the first measurement made is used as the reference for all subsequent measurements, and automatic reference selection is disabled:
  - For the dB scaling function, the first measurement is converted to dBm, and CALCulate:SCALe:DB:REFerence is set to the result.
- OFF: CALCulate:SCALe:DB:REFerence specifies the reference for DB scaling.
- The instrument enables automatic reference selection when the scaling function is enabled (CALCulate:SCALe:STATe is ON).
- This parameter is set to its default value after a Factory Reset (*RST), an Instrument Preset (SYSTem:PRESet), or a change in measurement function.
- You must execute CALCulate:SCALe:FUNCtion before executing CALCulate:SCALe[:STATe], otherwise an incompatibility error will be generated.
- Scaling is set to OFF when you change measurement functions (for example, changing from DCV to ACV). You must re-enable scaling after changing measurement functions.

CALCulate:SCALe:[:STATe] {ON|1|OFF|0}
CALCulate:SCALe:[:STATe]?

This command enables or disables the scaling function.

Parameter	Typical Return
ON|1|OFF|0 Default: OFF	0 (OFF) or 1 (ON)
Enables the scaling function: CALC:SCAL:STAT ON	

Remarks

- Enabling the scaling function also enables automatic null value selection (CALCulate:SCALe:REFerence:AUTO).
- This parameter is set to its default value after a Factory Reset (*RST), an Instrument Preset (SYSTem:PRESet), or a change in measurement function.
- Scaling is set to OFF when you change measurement functions (for example, changing from DCV to ACV). You must re-enable scaling after changing measurement functions.

CALCulate:TCHart[:STATe]{ON|1|OFF|0}
CALCulate:TCHart[:STATe]?

This command enables or disables trend chart data when controlling the instrument from remote.

Parameter	Typical Return
ON|1|OFF|0 Default: OFF	0 (OFF) or 1 (ON)
Enables trend chart data on measurements: CALC:TCH:STAT ON	

Remarks

- Applies only to the DM34461A.
- You must enable this (ON) before sending INIT or READ? to see trend chart data when controlling the instrument from remote. If it is disabled or enabled after INIT or READ?, viewing the trend chart results in a chart with no data.
- Trend chart data must be disabled (OFF) to make measurements at the highest speed (50 kHz).
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

CALCulate:TRANsform:HISTogram:ALL?
CALCulate:TRANsform:HISTogram:DATA?

The ALL form of the query returns a comma-separated list of the lower and upper range values, the number of measurements, and the bin data collected since the last time the histogram data was cleared. The DATA form returns only the bin data.

Parameter	Typical Return
(none)	+9.99383828E+00,
Returns the computed histogram, including the lower an dupper range values, the total measurement count, and the bin data: CALC:TRAN:HIST:ALL?	

Remarks

- Applies only to the DM34461A.
- The bin data includes the following, in order:

  The number of measurements less than the lower range value

  The number of measurements in the each of the bins, starting at the lower range value bin

  The number of measurements greater than the upper range value
- Range values are real numbers returned in the form +1.00000000E+00. The number of measurements and bin data are signed, positive integers returned in the form +100.

CALCulate:TRANsform:HISTogram:CLEar[:IMMediate]

This command clears the histogram data and restarts histogram ranging if it is enabled (CALCulate:TRANsform:HISTogram:RANGe:AUTO ON).

Parameter	Typical Return
(none)	(none)
Clears the histogram data: CALC:TRAN:HIST:CLE	

Remarks

- Applies only to the DM34461A.
- Does not clear measurements in reading memory.
- To clear statistics, limits, histogram data, and measurement data, use CALCulate:CLEar[:IMMediate].

CALCulate:TRANsform:HISTogram:COUNt?

This command returns the number of measurements collected since the last time the histogram was cleared.

Parameter	Typical Return
(none)	+87
Returns the number of measurements used to compute the current histogram: CALC:TRAN:HIST:COUN?	

Remarks

- Applies only to the DM34461A.

CALCulate:TRANsform:HISTogram:POINts {<value>|MIN|MAX|DEF}
CALCulate:TRANsform:HISTogram:POINts?[{MIN|MAX|DEF}]

This command sets the number of bins between the lower and upper range values for the histogram. Two additional bins always exist: one for measurements below the lower range and one for measurements above the upper range.

Parameter	Typical Return
10|20|50|100|250|500|MIN|MAX|DEF Default: 100	+100
Sets the upper and lower range values for the histogram: CALC:TRAN:HIST:POIN	

Remarks

- Applies only to the DM34461A.
- You can specify the lower and upper range values using CALCulate:TRANsform:HISTogram:RANGe:{LOWer|UPPer}. Lower and upper range values are computed automatically if CALCulate:TRANsform:HISTogram:RANGe:AUTO is ON.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

CALCulate:TRANsform:HISTogram:RANGe:AUTO {ON|1|OFF|0}
CALCulate:TRANsform:HISTogramRANGe:AUTO?

This command enables or disables automatic selection of the histogram's lower and upper range values.

Parameter	Typical Return
ON|1|OFF|0 Default: ON	0 (OFF) or 1 (ON)
Enables the histogram's range values automatically: CALC:TRAN:HIST:RANG:AUTO ON	

Remarks

- Applies only to the DM34461A.
- ON: the instrument uses the first 1,000 measurements to set the lower and upper range values.
- OFF: the lower and upper range values are specified by CALCulate:TRANsform:HISTogram:RANGe:{LOWer|UPPer}.
- Setting the lower and upper range values CALCulate:TRANsform:HISTogram:RANGe:{LOWer|UPPer} disables automatic selection of the lower and upper range values CALCulate:TRANsform:HISTogram:RANGe:AUTO is OFF.
- The instrument restarts automatic range value selection (if enabled) when INITiate, MEASure? or READ? is executed.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

CALCulate:TRANsform:HISTogram:RANGe:{LOWer|UPPer} {<value>|MIN|MAX|DEF}
CALCulate:TRANsform:HISTogram:RANGe:{LOWer|UPPer}? [{MIN|MAX|DEF}]

This command sets the histogram's lower and upper range values. Setting the lower or upper range value (CALCulate:TRANsform:HISTogram:RANGe:{LOWer|UPPer}) disables automatic selection of the lower and upper range values (CALCulate:TRANsform:HISTogram:RANGe:AUTO OFF).

Parameter	Typical Return
-1.0E+15 to -1.0E-15 or +1.0E-15 to 1.0E+15 Default: 0.0	+1.00000000E+06
Sets the histogram's lower range values: CALC:TRAN:HIST:RANG:LOW	

Remarks

- Applies only to the DM34461A.
- If automatic range value selection is enabled (CALCulate:TRANsform:HISTogram:RANGe:AUTO ON), the query returns the computed range value. If no histogram data exists, 9.91E37 (Not a Number) is returned.
- Lower and upper range values are computed automatically if CALCulate:TRANsform:HISTogram:RANGe:AUTO is ON.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

CALCulate:TRANsform:HISTogram[:STATe] {ON|1|OFF|0}
CALCulate:TRANsform:HISTogram[:STATe]?

This command enables or disables histogram computation.

Parameter	Typical Return
ON|1|OFF|0 Default: OFF	0 (OFF) or 1 (ON)
Enables the histogram computation: CALC:TRAN:HIST:STAT ON	

Remarks

- Applies only to the DM34461A.
- The instrument turns this setting OFF when the measurement function is changed or after *RST or SYSTem:PRESet.

CALibration Subsystem

The CALibration commands are used to calibrate the DM34460 Series 6½ Digit Digital Multimeter. Please note that the use of these commands requires a detailed knowledge of the appropriate calibration procedures, which are described in the Keysight DM34460 Series 6½ Digit Digital Multimeter Service Guide. Please refer to that guide before attempting to calibrate the instrument. Improper use of the CALibration commands can adversely affect the accuracy and reliability of the instrument.

NOTE Read the calibration procedure before calibrating. Improper calibration can reduce accuracy and reliability.

Command Summary

- CALibration:COUNt?
- CALibration:DATE?
- CALibration:SECure:CODE
- CALibration:SECure:STATe
- CALibration:SECure:STATe?
- CALibration:STORe
- CALibration:STRing
- CALibration:STRing?
- CALibration:TEMPerature?
- CALibration:TIME?

CALibration:COUNt?

This query returns the calibration count. Read and record the initial count when you first receive your instrument.

Parameter	Typical Return
(none)	+117
Returns the calibration count: CAL:COUN?	

Remarks

- Because the value increments each time you store the calibration constants, a complete calibration adds many counts. The calibration count also increments whenever you save a calibration string, change the calibration password, or override the calibration security.
- You can perform this query regardless of whether the instrument is secured.
- This setting is non-volatile; it will not be changed by power cycling or *RST or SYSTem:PRESet.

See also

- SYSTem:SECurity:COUNt?

CALibration:DATE?

This query returns the date of the last calibration in the format yyyy,mm,dd.

Parameter	Typical Return
(none)	(none)
Returns the calibration date: CAL:DATE?	

Remarks

- You can perform this query regardless of whether the instrument is secured.
- The date is based on the instrument's real-time clock. Set the date for the instrument's real-time clock with SYSTem:DATE and SYSTem:TIME.
- This setting is non-volatile; it will not be changed by power cycling or *RST or SYSTem:PRESet.

See also

- SYSTem:DATE
- SYSTem:TIME

CALibration:SECure:CODE <new_code>

This command sets the security code (calibration password) to prevent unauthorized calibrations.

NOTE You must unsecure the instrument to calibrate it or to change the calibration code or security code.

Parameter	Typical Return
Unquoted string of up to 12 characters. Must start with letter (A-Z) May contain letters, numbers (0-9) and underscores	(none)
Sets a new calibration security code: CAL:SEC:CODE T3ST_DUT165	

Remarks

- To change the code: unsecure calibration memory with the old code, then set the new code.
- If you forget your security code, you can override the security feature. See the Keysight DM34460 Series 6½ Digit Digital Multimeter Service Guide for more information.
- When shipped from the factory, the instrument is secured, with the security code (calibration password) set to DM3446XA.
- This setting is non-volatile; it will not be changed by power cycling or *RST or SYSTem:PRESet.

CALibration:SECure:STATe {ON|1|OFF|0}[, <code>]
CALibration:SECure:STATe?

This command unsecures or secures the instrument for calibration.

NOTE **You must unsecure the instrument to calibrate it or to change the calibration code or security code.**

Parameter	Typical Return
ON|1|OFF|0 Default: ON	0 (OFF) or 1 (ON)
Unsecures the instrument: CAL:SEC:STAT OFF	

Remarks

- The <code> is optional to secure the instrument, but must be correct if provided.
- When shipped from the factory, the instrument is secured, with the security code (calibration password) set to DM3446XA.
- Front panel and remote interface calibration share the same code.
- This setting is non-volatile; it will not be changed by power cycling or *RST or SYSTem:PRESet.

CALibration:STORe

This command takes calibration constants in volatile memory (CALibration:ALL?), and places them in nonvolatile memory, where they are not changed by cycling power, *RST, or SYSTem:PRESet. Do this at the end of calibration to avoid losing changes.

NOTE **You must unsecure the instrument to calibrate it or to change the calibration code or security code.**

Parameter	Typical Return
(none)	(none)
Stores calibration results into the non-volatile memory: CAL:STOR	

CALibration:STRing "<string>"
CALibration:STRing?

This command stores a message in calibration memory. Common messages include the last calibration date, calibration due date, or calibration department contact information. You can perform this query regardless of whether the instrument is secured.

NOTE **You must unsecure the instrument to calibrate it or to change the calibration code or security code.**

Parameter	Typical Return
Quoted string of up to 40 characters. May contain letters, numbers, spaces, and other common characters.	"CAL: 21 Nov 2010"
Stores a message in the calibration memory: CAL:STR "CAL: 21 Nov 2010" or CAL:STR 'CAL: 21 Nov 2010'	

Remarks

- This string may be stored only from the remote interface, but you can read the message from the front panel or remote interface.
- Storing a calibration message overwrites the previous message.
- This setting is non-volatile; it will not be changed by power cycling or *RST or SYSTem:PRESet.

CALibration:TEMPerature?

This command returns the temperature of the last calibration in °C.

Parameter	Typical Return
(none)	+2.42850208E+001
Returns the calibration temperature: CAL:TEMP?	

Remarks

- You can perform this query regardless of whether the instrument is secured.
- This setting is non-volatile; it will not be changed by power cycling or *RST or SYSTem:PRESet.

CALibration:TIME?

This command returns the amount of time since the last calibration in the format hh,mm,ss.sss.

Parameter	Typical Return

(none)	20,15,30.000
Returns the calibration time: CAL:TIME?	

Remarks

- You can perform this query regardless of whether the instrument is secured.
- This setting is non-volatile; it will not be changed by power cycling or *RST or SYSTem:PRESet.

See also

- SYSTem:TIME
- SYSTem:DATE

CONFigure Subsystem

The CONFigure commands are the most concise way to configure measurements. Like the MEASure? queries, these commands use default measurement configuration values. However, these commands do not automatically start measurements, so you can modify measurement attributes before initiating the measurement.

NOTE Use the INITiate or READ? to initiate measurement.

Command Summary

- CONFigure?
- CONFigure:CAPacitance
- CONFigure:CONTinuity
- CONFigure:CURRent:AC
- CONFigure:CURRent[:DC]
- CONFigure:DIODe
- CONFigure:{FREQuency|PERiod}
- CONFigure:FRESistance
- CONFigure:RESistance
- CONFigure:TEMPerature
- CONFigure[:VOLTage]:AC
- CONFigure[:VOLTage][:DC]
- CONFigure[:VOLTage][:DC]:RATio

Default Settings for the CONFigure Command

The CONFigure commands select the function, range and resolution in one command. Specify <resolution> in the measurement's units (V, A, Hz, Ω, and so on). All other parameters are set to their default values (below).

Measurement Parameter	Default Setting
AC Input Filter (bandwidth)	20 Hz (medium filter)
Autozero	OFF if resolution setting results in NPLC < 1 ON if resolution setting results in NPLC ≥ 1
Range	AUTO (including voltage range for frequency and period measurements)
Samples per Trigger	1 sample
Trigger Count	1 trigger
Trigger Delay	Automatic delay
Trigger Source	Immediate
Trigger Slope	NEGative
Math Functions	Disabled. Other parameters are unchanged.
Per-function Null State	Disabled

Using the CONFigure Command

The following program segment shows how to use the CONFigure command with the READ? command to make a measurement. The CONFigure command configures the instrument for DC voltage measurements.

```
CONF:VOLT:DC
READ?
```

Typical Response:
+4.27150000E-00
50000E-00

The following program segment configures the instrument for 2-wire resistance measurements, triggers the instrument to make one measurement using the INITiate command. The FETC? command retrieves the reading. The 10 kΩ range is selected with 100 Ω resolution.

```
CONF:RES 10000,100
INIT
FETC?
```

Typical Response: +5.95850000E+03

CONFigure?

The query returns a quoted string indicating the present function, range, and resolution. The short form of the function name (CURR:AC, FREQ) is always returned.

Parameter	Typical Return
(none)	"VOLT +1.000000E+01,+3.00000000E-06"
Returns the present configuration of the instrument: CONF?	

Remarks

- The *RST command will set all measurement parameters to their factory settings, clear reading memory, and clear all stored statistical data.

CONFigure:CAPacitance [{<range>|AUTO|MIN|MAX|DEF} [, {<resolution>|MIN|MAX|DEF}]]

This command sets all capacitance measurement parameters and trigger parameters to their default values.

Parameter	Typical Return
<range>: 1 nF|10 nF|100 nF|1 µF|10 µF|100 µF Default: AUTO	(none)
<resolution>: optional and ignored; fixed at 6½ digits.	
Configure capacitance measurements using the 1 µF range. Make and read two measurements:CONF:CAP	

Remarks

- You can allow the instrument to automatically select the measurement range using auto ranging or you can select a fixed range using manual ranging. Auto ranging is convenient because the instrument decides which range to use for each measurement based on the input signal. For fastest measurements, use manual ranging on each measurement (some additional time may be required for auto ranging since the instrument has to make a range selection).
- If you select auto ranging (by specifying "AUTO" or "DEF"), an error will be generated if you specify a discrete value for the <resolution> parameter. When auto ranging is combined with a discrete resolution, the instrument cannot accurately resolve the integration time (especially if the input is continuously changing). If your application requires auto ranging, be sure to specify "DEF" for the <resolution> parameter or omit the parameter from the command.
- Auto range thresholds:
  Down range at: <10% of range
  Up range at: >120% of range
- Overload only occurs when the algorithm times out because the applied capacitance is too large for the algorithm to measure. If you apply a DC voltage or a short to the input terminals in capacitance measurement mode, the instrument reports an overload.
- If the input signal is greater than can be measured on the selected range (manual ranging), the instrument gives an overload indication: "OL" from the front panel or "±9.9E+37" from the remote interface.
- Use READ? or INITiate to start the measurement.

See also

- CONFigure?
- FETCh?
- INITiate[:IMMediate]
- READ?

CONFigure:CONTinuity

This command sets all continuity measurement parameters and trigger parameters to their default values.

Parameter	Typical Return
(none)	(none)
Configures the instrument for continuity measurements:CONF:CONT	

Remarks

- The range and resolution are fixed at 1 kΩ for continuity tests (a 2-wire resistance measurement).
- The meter beeps (even if beep is disabled) for each measurement that is less than or equal to the continuity threshold (≤10 Ω), and the actual resistance reading is displayed on the front panel.
- From 10 Ω to 1.2 kΩ the meter displays the actual resistance reading with no beep.
- If the reading exceeds 1.2 kΩ, the meter displays "OPEN" on the front panel (no beep).
- The FETCh?, READ?, and MEASure:CONTinuity? commands return the measured resistance, regardless of its value.

See also

- CONFigure?
- FETCh?
- INITiate[:IMMediate]
- READ?

CONFigure:CURRent:AC [<range>|AUTO|MIN|MAX|DEF [,<resolution>|MIN|MAX|DEF]]

First, this command resets all AC current measurement parameters and trigger parameters to their default values. Then, it configures the instrument for AC current measurements but does not initiate a measurement.

Parameter	Typical Return
<range>: 100 µA|1 mA|10 mA|100 mA|1 A|3 A Default: AUTO	(none)
<resolution>: optional and ignored; fixed at 6½ digits.	
Configures the AC current measurements using the 1 A range:CONF:CURR:AC 1	

Remarks

- You can allow the instrument to automatically select the measurement range using auto ranging or you can select a fixed range using manual ranging. Auto ranging is convenient because the instrument decides which range to use for each measurement based on the input signal. For faster measurements, use manual ranging on each measurement (some additional time is required for auto ranging since the instrument has to make a range selection).
- If you select auto ranging (by specifying "AUTO" or "DEF"), an error will be generated if you specify a discrete value for the <resolution> parameter. When auto ranging is combined with a discrete resolution, the instrument cannot accurately resolve the integration time (especially if the input signal is continuously changing). If your application requires auto ranging, be sure to specify "DEF" for the <resolution> parameter or omit the parameter from the command.
- Auto range thresholds:
  Down range at: <10% of range
  Up range at: >120% of range
- If the input signal is greater than can be measured on the selected range (manual ranging), the instrument gives an overload indication: "Overload" from the front panel or "±9.9E+37" from the remote interface.
- .To control the measurement rate for AC measurements, change the trigger delay or AC filter bandwidth.
- Use READ? or INITiate to start the measurement.

See also

- CONFigure?
- FETCh?
- INITiate[:IMMediate]
- READ?

CONFigure:CURRent[:DC] [<range>|AUTO|MIN|MAX|DEF [,<resolution>|MIN|MAX|DEF]]

First, this command resets all DC current measurement parameters and trigger parameters to their default values. Then, it configures the instrument for DC current measurements but does not initiate the measurement.

Parameter	Typical Return
<range>: 100 µA|1 mA|10 mA|100 mA|1 A|3 A Default: AUTO	(none)
<resolution>: See Resolution Table or Range, Resolution and NPLC. The default is equivalent to 10 PLC. Specify <resolution> in the measurement's units (V, A, Hz, Ω, and so on).	
Configures the DC current measurements using the 1 A range: `CONF:CURR:DC 1`	

Remarks

- You can allow the instrument to automatically select the measurement range using auto ranging or you can select a fixed range using manual ranging. Auto ranging is convenient because the instrument decides which range to use for each measurement based on the input signal. For faster measurements, use manual ranging on each measurement (some additional time is required for auto ranging since the instrument has to make a range selection).
- If you select auto ranging (by specifying "AUTO" or "DEF"), an error will be generated if you specify a discrete value for the <resolution> parameter. When auto ranging is combined with a discrete resolution, the instrument cannot accurately determine the integration time (especially if the input signal is continuously changing). If your application requires auto ranging, be sure to specify "DEF" for the <resolution> parameter or omit the parameter from the command.
- Auto range thresholds:
  Down range at: <10% of range
  Up range at: >120% of range
- If the input signal is greater than can be measured on the selected range (manual ranging), the instrument gives an overload indication: "Overload" from the front panel or "±9.9E+37" from the remote interface.
- To control the measurement rate for AC measurements, change the trigger delay or AC filter bandwidth.
- Use READ? or INITiate to start the measurement.

See also:

- CONFigure?
- FETCh?
- INITiate[:IMMediate]
- READ?

CONFigure:DIODe

This command resets all diode test parameters and trigger parameters to their default values.

Parameter	Typical Return
(none)	(none)
Configures, makes and reads a default diode measurement:CONF:DIOD	

Remarks

- The range and resolution are fixed for diode tests: The range is 1 Vdc (with a 1 mA current source output).
- The voltage is returned if it is in the 0 and 5.05 volt range. The instrument beeps when the signal transitions to the 0.3 to 0.8 volt threshold (unless beep is disabled). If the signal is greater than 5.05 volts, OPEn is displayed on the front panel and "+9.9E+37" is returned from the remote interface.
- The FETCh?, READ?, and MEASure:DIODe? commands return the measured voltage, regardless of its value.
- Use READ? or INITiate to start the measurement.

See also

- CONFigure?
- FETCh?
- INITiate[:IMMediate]
- READ?

CONFigure:FREQuency [{<range>|MIN|MAX|DEF} [, {<resolution>|MIN|MAX|DEF}]]

This command sets all frequency measurement parameters and trigger parameters to their default values. Also specifies the frequency range and resolution.

Parameter	Typical Return
<range>:3 Hz to 300 kHz Default: 20 Hz	(none)
<resolution>: See table below. Specify <resolution> in the measurement's units (V, A, Hz, Ω, and so on).	
Configures the frequency measurements using the default aperture and the 200 Hz (fast) AC filter:CONF:FREQ	

Remarks

- The frequency <range> parameter is required only to specify the measurement resolution parameter. It is not necessary to send a new command for each new frequency or period to be measured. The <range> and <resolution> parameters affect the aperture (gate time) as follows:

Resolution	Aperture
100 ppm x <range> (MAXimum)	10 ms
10 ppm x >range> (DEFault)	100 ms
1 ppm x <range> (MINimum)	1 s

- The input signal for frequency measurements has an AC voltage component. Use [SENSe:]{FREQuency|PERiod}:VOLTage:RANGe:AUTO to disable or enable voltage autoranging or use CONFigure:{FREQuency|PERiod} to select voltage autoranging by default. Use [SENSe:]{FREQuency|PERiod}:VOLTage:RANGe to select a fixed voltage range for frequency measurements.
- Auto range thresholds:
  Down range at: <10% of range
  Up range at: >120% of range
- Selecting a fixed range ([SENSe:]<function>:RANGe) disables autoranging.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

See also

- CONFigure?
- FETCh?

- INITiate[:IMMediate]
- READ?
- [SENSe:]FREQuency:VOLTage:RANGe

CONFigure:FRESistance [{<range>|AUTO|MIN|MAX|DEF} [, {<resolution>|MIN|MAX|DEF}]]

This command sets all 4-wire resistance measurement parameters and trigger parameters to their default values. Also specifies the range and resolution.

Parameter	Typical Return
<range>: 100 Ω|1 kΩ|10 kΩ|100 kΩ|1 MΩ|10 MΩ|100 MΩ|AUTO|DEFault Default: AUTO	(none)
<resolution>: See Resolution Table or Range, Resolution and NPLC. The default is equivalent to 10 PLC. Specify <resolution> in the measurement's units (V, A, Hz, Ω, and so on).	
Configures the instrument for 4-wire resistance measurements using the 100 Ω range with default resolution:CONF:FRES 100	

Remarks

- You can allow the instrument to automatically select the measurement range using auto ranging or you can select a fixed range using manual ranging. Auto ranging is convenient because the instrument decides which range to use for each measurement based on the input signal. For faster measurements, use manual ranging on each measurement (some additional time is required for auto ranging since the instrument has to make a range selection).
- If you select auto ranging (by specifying "AUTO" or "DEF"), an error will be generated if you specify a discrete value for the <resolution> parameter. When auto ranging is combined with a discrete resolution, the instrument cannot accurately resolve the integration time (especially if the input signal is continuously changing). If your application requires auto ranging, be sure to specify "DEF" for the <resolution> parameter or omit the parameter from the command.
- Auto range thresholds:
  Down range at: <10% of range
  Up range at: >120% of range
- If the input signal is greater than can be measured on the selected range (manual ranging), the instrument gives an overload indication: "Overload" from the front panel or "±9.9E+37" from the remote interface.
- Use READ? or INITiate to start the measurement.

See also

- CONFigure?
- FETCh?
- INITiate[:IMMediate]
- READ?

CONFigure:PERiod [{<range>|MIN|MAX|DEF} [, {<resolution>|MIN|MAX|DEF}]]

This command sets all measurement and trigger parameters to their default values for period measurements. Also specifies the period range and resolution.

Parameter	Typical Return
<range>:3.33 µs to 333.33 ms Default: 50 ms	(none)
<resolution>: See table below. Specify <resolution> in the measurement's units (V, A, Hz, Ω, and so on).	
Configures the period measurements using the default aperture:CONF:PER	

Remarks

- The period<*range*> parameter is required only to specify the measurement resolution parameter. It is not necessary to send a new command for each new period to be measured. The <range> and <resolution> parameters affect the aperture (gate time) as follows:

Resolution	Aperture
100 ppm x <range> (MAXimum)	10 ms
10 ppm x >range> (DEFault)	100 ms
1 ppm x <range> (MINimum)	1 s

- The input signal for frequency measurements has an AC voltage component. Use [SENSe:]{FREQuency|PERiod}:VOLTage:RANGe:AUTO to disable or enable voltage autoranging or use CONFigure:{FREQuency|PERiod} to select voltage autoranging by default. Use [SENSe:]{FREQuency|PERiod}:VOLTage:RANGe to select a fixed voltage range for frequency measurements.
- Auto range thresholds:
  Down range at: <10% of range
  Up range at: >120% of range
- Selecting a fixed range ([SENSe:]<function>:RANGe) disables autoranging.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

See also

- CONFigure?
- FETCh?
- INITiate[:IMMediate]
- READ?
- [SENSe:]FREQuency:VOLTage:RANGe

CONFigure:RESistance [{<range>|AUTO|MIN|MAX|DEF} [, {<resolution>|MIN|MAX|DEF}]]

This command sets all 2-wire resistance measurement parameters and trigger parameters to their default values. Also specifies the range and resolution.

Parameter	Typical Return
<range>: 100 Ω|1 kΩ|10 kΩ|100 kΩ|1 MΩ|10 MΩ|100 MΩ|AUTO|DEFault Default: AUTO	(none)
<resolution>: See Resolution Table or Range, Resolution and NPLC. The default is equivalent to 10 PLC. Specify <resolution> in the measurement's units (V, A, Hz, Ω, and so on).	
Configures the instrument for 2-wire resistance measurements using the 100 Ω range with default resolution:CONF:RES 100	

Remarks

- You can allow the instrument to automatically select the measurement range using auto ranging or you can select a fixed range using manual ranging. Auto ranging is convenient because the instrument decides which range to use for each measurement based on the input signal. For faster measurements, use manual ranging on each measurement (some additional time is required for auto ranging since the instrument has to make a range selection).
- If you select auto ranging (by specifying "AUTO" or "DEF"), an error will be generated if you specify a discrete value for the <resolution> parameter. When auto ranging is combined with a discrete resolution, the instrument cannot accurately resolve the integration time (especially if the input signal is continuously changing). If your application requires auto ranging, be sure to specify "DEF" for the <resolution> parameter or omit the parameter from the command.
- Auto range thresholds:
  Down range at: <10% of range
  Up range at: >120% of range
- If the input signal is greater than can be measured on the selected range (manual ranging), the instrument gives an overload indication: "Overload" from the front panel or "±9.9E+37" from the remote interface.
- Use READ? or INITiate to start the measurement.

See also:

- CONFigure?
- FETCh?
- INITiate[:IMMediate]
- READ?

CONFigure:TEMPerature [{FRTD|RTD|FTHermistor|THERmistor|DEFault} [, {<type>|DEFault} [,1 [,{<resolution>|MIN|MAX|DEF}]]]]

This command sets all temperature measurement parameters and trigger parameters to their default values. Also specifies the transducer and the measurement resolution.

Parameter	Typical Return
<probe_type>:FRTD|RTD|FTHermistor|THERmistor Default: FRTD	(none)
<type>: 85 (only possible value for RTD/FRTD), 5000 (only possible value for THERmistor/FTHermistor)	
<resolution>: See Resolution Table or Range, Resolution and NPLC. The default is equivalent to 10 PLC.	
Configures the 2-wire thermistor measurements:CONF:TEMP THER	

Remarks

- For temperature measurements, the instrument internally selects the range–you cannot select the range to be used.
- The <*resolution*>parameter only determines the integration time; it does not specify the resolution of the temperature measurement. This parameter is optional; however, if you specify <*resolution*>, you must also specify "1" as the implied range parameter. For example: `CONF:TEMP RTD,85,1,0.000001` selects the 10 PLC integration time on the DM34461A.
- To change temperature units, use UNIT:TEMPerature.
- For RTD and thermistor measurements, the instrument autoranges to the correct range for the transducer resistance measurement. For thermocouple measurements, the 100 mV range is selected.
- If the input signal is greater than can be measured on the selected range (manual ranging), the instrument gives an overload indication: "Overload" from the front panel or "±9.9E+37" from the remote interface.
- Use READ? or INITiate to start the measurement.

See also

- CONFigure?
- FETCh?
- INITiate[:IMMediate]
- READ?
- UNIT:TEMPerature

CONFigure[:VOLTage]:AC [<range>|AUTO|MIN|MAX|DEF [,<resolution>|MIN|MAX|DEF]]

This command resets all AC voltage measurement parameters and trigger parameters to their default values. Then, it configures the instrument for AC voltage measurements but does not initiate the measurement.

WARNING The SAFETY LIMIT on the front HI/LO input terminals is 750 VAC (rms) for a sinusoidal waveform or 1000 V (peak) for any other waveform. Connections to AC MAINS are further limited to CAT II (300V). See the "Safety Information" section in the Keysight DM34460 Series 6½ Digit Digital Multimeter User's Guide for a complete discussion of the safety features, and the safe operation of this instrument.

Parameter	Typical Return
<range>: 100 mV|1 V|10 V |100 V|1000 V Default: AUTO	(none)
<resolution>: optional and ignored; fixed at 6½ digits.	
Configures the instrument for AC voltage measurements using the 100 V range:CONF:VOLT:AC 100	

Remarks

- You can allow the instrument to automatically select the measurement range using auto ranging or you can select a fixed range using manual ranging. Auto ranging is convenient because the instrument decides which range to use for each measurement based on the input signal. For faster measurements, use manual ranging on each measurement (some additional time is required for auto ranging since the instrument has to make a range selection).
- If you select auto ranging (by specifying "AUTO" or "DEF"), an error will be generated if you specify a discrete value for the <resolution> parameter. When auto ranging is combined with a discrete resolution, the instrument cannot accurately resolve the integration time (especially if the input signal is continuously changing). If your application requires auto ranging, be sure to specify "DEF" for the <resolution> parameter or omit the parameter from the command.
- Auto range thresholds:
  Down range at: <10% of range
  Up range at: >120% of range
- If the input signal is greater than can be measured on the selected range (manual ranging), the instrument gives an overload indication: "Overload" from the front panel or "±9.9E+37" from the remote interface.
- To control the measurement rate for AC measurements, change the trigger delay or AC filter bandwidth.
- Use READ? or INITiate to start the measurement.

See also:

- CONFigure?
- FETCh?
- INITiate[:IMMediate]
- READ?

CONFigure[:VOLTage][:DC] [<range>|AUTO|MIN|MAX|DEF [,<resolution>|MIN|MAX|DEF]]

First, this command resets all DC voltage measurement parameters and trigger parameters to their default values. Then, it configures the instrument for DC voltage measurements but does not initiate the measurement.

WARNING The SAFETY LIMIT on the front HI/LO input terminals is 750 VAC (rms) for a sinusoidal waveform or 1000 V (peak) for any other waveform. Connections to AC MAINS are further limited to CAT II (300V). See the "Safety Information" section in the Keysight DM34460 Series 6½ Digit Digital Multimeter User's Guide for a complete discussion of the safety features, and the safe operation of this instrument.

Parameter	Typical Return
<range>: 100 mV|1 V|10 V|100 V|1000 V Default: AUTO	(none)
<resolution>: See Resolution Table or Range, Resolution and NPLC. The default is equivalent to 10 PLC. Specify <resolution> in the measurement's units (V, A, Hz, Ω, and so on).	
Configures the instrument for DC voltage measurements using the 100 V range:CONF:VOLT:DC 100	

Remarks

- You can allow the instrument to automatically select the measurement range using auto ranging or you can select a fixed range using manual ranging. Auto ranging is convenient because the instrument decides which range to use for each measurement based on the input signal. For faster measurements, use manual ranging on each measurement (some additional time is required for auto ranging since the instrument has to make a range selection).
- If you select auto ranging (by specifying "AUTO" or "DEF"), an error will be generated if you specify a discrete value for the <resolution> parameter. When auto ranging is combined with a discrete resolution, the instrument cannot accurately resolve the integration time (especially if the input signal is continuously changing). If your application requires auto ranging, be sure to specify "DEF" for the <resolution> parameter or omit the parameter from the command.
- Auto range thresholds:
  Down range at: <10% of range
  Up range at: >120% of range
- If the input signal is greater than can be measured on the selected range (manual ranging), the instrument gives an overload indication: "Overload" from the front panel or "±9.9E+37" from the remote interface.
- Use READ? or INITiate to start the measurement.

See also:

- CONFigure?
- FETCh?
- INITiate[:IMMediate]
- READ?

CONFigure[:VOLTage][:DC]:RATio [{<range>|AUTO|MIN|MAX|DEF}[,{<resolution>|MIN|MAX|DEF}]]

This command sets all measurement and trigger parameters to their default values for DC voltage to DC voltage ratio measurements. Also specifies the range and resolution.

To calculate a ratio, the instrument measures a DC reference voltage applied to the Sense terminal and the DC signal voltage applied to the Input terminals. It then uses the formula:

Ratio = DC signal voltage / DC reference voltage

Parameter	Typical Return
<range>: 100 mV|1 V|10 V|100 V|1000 V Default: AUTO	(none)
<resolution>: See Resolution Table or Range, Resolution and NPLC. The default is equivalent to 10 PLC.	
Configures the instrument for DC voltage ratio measurements using the 100 V range with 1 mV resolution: CONF:VOLT:DC:RAT 100,0.001	

Remarks

- The The Sense terminals have a maximum measurable input of ±12 VDC. Autoranging is automatically selected for reference voltage measurements on the Sense terminals.
- The Input LO and Sense LO terminals must have a common reference and cannot have a voltage difference greater than
  ±2 V.
- The specified measurement range applies only to the signal connected to the Input terminals. The signal on the Input terminals can be any DC voltage up to 1,000 V.
- For the Input terminals, you can allow the instrument to select the measurement range by autoranging or you can select a fixed range using manual ranging. Autoranging decides which range to use for each measurement based on the input signal. For faster measurements, use manual ranging on each measurement (additional time is required for autoranging to select a range).If you select auto ranging (by specifying "AUTO" or "DEF"), an error will be generated if you specify a discrete value for the <resolution> parameter. When auto ranging is combined with a discrete resolution, the instrument cannot accurately determine the integration time (especially if the input signal is continuously changing).
- If your application requires auto ranging, be sure to specify "DEF" for the <resolution> parameter or omit the parameter from the command.
- Auto range thresholds:
  Down range at: <10% of range
  Up range at: >120% of range
- If the input signal is greater than can be measured on the selected range (manual ranging), the instrument gives an overload indication: "Overload" from the front panel or "±9.9E+37" from the remote interface.
- Use READ? or INITiate to start the measurement.

See also

- CONFigure?
- MEASure[:VOLTage]:{AC|DC}?

DATA Subsystem

This subsystem allows you to configure and remove data from reading memory. The instrument clears all measurements from reading memory when the measurement configuration changes, or when any of these commands are executed: INITiate, MEASure:<function>?, READ?, *RST, SYSTem:PRESet.

Command Summary

- DATA:LAST?
- DATA:POINts?
- DATA:POINts:EVENt:THReshold <count>
- DATA:POINts:EVENt:THReshold?
- DATA:REMove? <num_readings> [,WAIT]

DATA:LAST?

This query returns the last measurement taken. You can execute this query at any time, even during a series of measurements.

Parameter	Typical Return
(none)	(none)
Returns the last reading log by the meter: DATA:LAST?	

Remarks

- User can execute this command at any time, even during a series of measurements.
- The instrument will not clears log readings from non-volatile memory after a Factory Reset (*RST), after an Instrument Preset (SYSTem:PRESet), or when power is cycled.

DATA:POINts?

This query returns the total number of measurements currently in reading memory. You can execute this query at any time, even during a series of measurements.

Parameter	Typical Return
(none)	(none)
Returns the number of readings in reading memory: DATA:POIN?	

Remarks

- You can store up to 50,000 measurements in the reading memory of the DM34460A and 2,000,000 measurements on the DM34461A.
- The instrument will not clears log readings from non-volatile memory after a Factory Reset (*RST), after an Instrument Preset (SYSTem:PRESet), or when power is cycled.

DATA:POINts:EVENt:THReshold <count>
DATA:POINts:EVENt:THReshold?

This command sets the number of measurements to store in reading memory before setting bit 9 in the Standard Operation Register group event register to 1. An event register is a read-only register that latches events from the condition register. While an event bit is set, subsequent events corresponding to that bit are ignored.

NOTE For more information on the SCPI Status System, see Status Subsystem Introduction.

Parameter	Typical Return
DM34460A: 1 to 50,000 DM34461A: 1 to 2,000,000	+125
The default value is 1 for both models.	

Sets the reading memory threshold to 125 measurements: DATA:POIN:EVEN:THR 125

Remarks

- To report any subsequent events, the measurement count must first drop below the programmed threshold before reaching the threshold again.
- Use STATus:OPERation:ENABle to enable the Memory Threshold bit (bit 9 in the Standard Operation Event register) to be reported to the Status Byte.
- Once the Memory Threshold bit (bit 9 in the Standard Operation Event register) is set, it remains set until cleared by STATus:OPERation:EVENt? or *CLS.
- The Standard Operation Condition register shows the current condition. See STATus Subsystem Introduction for further information.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

DATA:REMove? <num_readings> [,WAIT]

This command reads and erases <num_readings> measurements from the reading memory. If fewer than <num_readings> measurements are available, the query returns an error unless the WAIT parameter is specified, in which case the query waits until <num_readings> measurements are available.

Parameter	Typical Return
DM34460A: 1 to 50,000 DM34461A: 1 to 2,000,000	(none)

Reads and erases the three oldest readings from reading memory: DATA:REMove?3

Remarks

- The R? and DATA:REMove? queries can be used during a long series of readings to periodically remove readings from memory that would normally cause the reading memory to overflow. R? does not wait for all readings to complete. It sends the readings that are complete at the time the instrument receives the command. Use Read? or Fetch? if you want the instrument to wait until all readings are complete before sending readings.
- If reading memory overflows, new measurements overwrite the oldest measurements stored; the most recent measurements are always preserved. No error is generated, but the Reading Mem Ovfl bit (bit 14) is set in the Questionable Data Register's condition register (see Status System Introduction).

DISPlay Subsystem

This subsystem controls the instrument's display.

Command Summary

- DISPlay[:STATe]
- DISPlay[:STATe]?
- DISPlay:TEXT[:DATA] "<string>"
- DISPlay:TEXT[:DATA]?
- DISPlay:TEXT:CLEar
- DISPlay:VIEW {NUMeric|HISTogram|TCHart|METer}
- DISPlay:VIEW?

DISPlay[:STATe] {ON|1|OFF|0}
DISPlay[:STATe]?

This command enables or disables the entire front panel display. When disabled, the display dims, and all annunciators are disabled. However, the screen remains on.

Parameter	Typical Return
ON|1|OFF|0 Default: ON	0 (OFF) or 1(ON)
Turns display off: DISP OFF	

Remarks

- Disabling the display improves command execution speed from the remote interface and provides basic security.
- Sending DISPlay:TEXT[:DATA] "<string> will display the text even with DISPlay[:STATe] is OFF.
- The display is enabled when you return to local (front panel) operation by pressing the [Local] key.

DISPlay:TEXT:CLEar

This command clears the text message from the display.

Parameter	Typical Return
(none)	(none)
Clears displayed message: DISP:TEXT:CLE	

Remarks

- With DISPlay ON, DISP:TEXT:CLEar returns the display to its normal mode.
- With DISPlay OFF, DISP:TEXT:CLEar clears the message and the display remains disabled. To enable the display, send DISPlay ON or press the front panel [Local] key.
- The display text is unaffected by *RST. It is cleared at power-on.

DISPlay:TEXT[:DATA] "<string>"
DISPlay:TEXT[:DATA]?

This command displays a text message on the front panel display.

Parameter	Typical Return
A quoted string of up to 40 characters. You can use letters (A-Z), numbers (0-9) and special characters such as @, %, *, and so forth. Default ""	"Test in progress..."
Shows message on display: DISP:TEXT"Test in progress..."	

Remarks

- Sending DISPlay:TEXT[:DATA] "<string> will display the text even with DISPlay[:STATe] is OFF.
- While a message is displayed, information relating to the current instrument operation is not sent to the front panel display.
- The display text is unaffected by *RST. It is cleared at power-on.

DISPlay:VIEW {NUMeric|HISTogram|TCHart|METer}
DISPlay:VIEW?

This command specifies whether measurement data is displayed in numeric, bar meter, histogram (DM34461A only), or trend chart (DM34461A only) form.

Parameter	Typical Return
NUMeric|HISTogram|TCHart|METer Default: NUMeric.	HIST
Displays histogram: DISP:VIEW HIST	

Remarks

- The histogram and trend chart are not available on the DM34460A.
- The display is not turned on if the display state is OFF.
- This parameter is set to its default value after a Factory Reset *RST or Instrument Preset SYSTem:PRESet.

Command Summary

- FETCh?

FETCh?

This command waits for measurements to complete and copies all available measurements to the instrument's output buffer. The readings remain in reading memory.

Parameter	Typical Return
(none)	(none)
Retrieves the reading from the instrument's output buffer: `FETC?`	

Remarks

- The FETCh? query does not erase measurements from the reading memory. You can send the query multiple times to retrieve the same data.
- You can store up to 50,000 measurements in the reading memory of the DM34460A, or 2,000,000 measurements on the DM34461A. If reading memory overflows, new measurements overwrite the oldest measurements stored; the most recent measurements are always preserved. No error is generated, but the Reading Mem Ovfl bit (bit 14) is set in the Questionable Data Register's condition register (see Status System Introduction).
- The instrument clears all measurements from reading memory when the measurement configuration changes, or when any of these commands are executed: INITiate, MEASure:<function>?, READ?, *RST, SYSTem:PRESet.

Command Summary

- FORMat:OUTput

FORMat:OUTput {1|2}
FORMat:OUTput?

This command set the returned measurement data format to with or without measurement unit during remote operation.

Parameter	Typical Return
1|2	1 or 2

1: Displays measurement values without measurement unit.
2: Displays measurement values with measurement unit.

Set the output display format to display measurement values with measurement unit: FORM:OUT 2

Remarks

- Only available for ASCII format.
- The query returns whether the measurement unit is included or vice-versa.
- Refer to table below for output unit for each of the measurement function.

Measurement Function	Unit
DC Voltage	VDC
AC Voltage	VAC
DC Current	ADC
AC Current	AAC
Resistance	OHMS
Frequency	HZ
Diode	VDC
Continuity Test	OHMS
Capacitance	F
Temperature	CEL or FAH

HCOpy Subsystem

The HCOPy subsystem produces display images ("screen shots").

Example

The following example captures and returns the display image in BMP format.

```
HCOP:SDUM:DATA:FORM BMP
HCOP:SDUM:DATA?
```

Command Summary

- HCOpy:SDUMp:DATA?
- HCOpy:SDUMp:DATA:FORMat{PNG|BMP}
- HCOPy:SDUMp:DATA:FORMat?

HCOPy:SDUMp:DATA?

This command returns the front panel display ("screen shot").

Parameter	Typical Return
(none)	(A definite-length binary block containing the image.) A definite-length block data allows any type of device-dependent data to be transmitted as a series of 8-bit binary data bytes. This is particularly useful for transferring large quantities of data or 8-bit extended ASCII codes.
Capture and return the display image: HCOP:SDUM:DATA?	

Remarks

- The image format (PNG or BMP) is specified by HCOPy:SDUMp:DATA:FORMat.

HCOPy:SDUMp:DATA:FORMat{PNG|BMP}
HCOPy:SDUMp:DATA:FORMat?

This command specifies the format for front panel images returned by HCOPy:SDUMp:DATA?.

Parameter	Typical Return
PNG|BMP Default: PNG	PNG or BMP
Specify BMP as the image format: HCOP:SDUM:DATA:FORM BMP	

IEEE-488 Common Commands

These commands and queries are associated with the IEEE 488.2 standard.

Command Summary

- *CAL?
- *CLS
- *ESE
- *ESE?
- *ESR?
- *IDN?
- *LRN?
- *OPC
- *OPC?
- *OPT?
- *PCS {0|1}
- *PCS?
- *RCL {0|1|2|3|4}
- *RST
- *SAV {0|1|2|3|4}
- *SRE
- *SRE?
- *STB?
- *TRG
- *TST?
- *WAI

Standard Event Register

The following table describes the Standard Event Register.

Bit Number	Bit Name	Decimal Value	Definition
0	Operation Complete	1	All commands prior to and including *OPC have been executed.
1	Not Used	2	0 is returned.
2	Query Error	4	The instrument tried to read the output buffer but it was empty. Or, a new command line was received before a previous query has been read. Or, both the input and output buffers are full.
3	Device- Specific Error	8	A device-specific error, including a self-test error or calibration error, occurred (an error in the -300 range or any positive error has been generated). See SCPI Error Messages for the complete SCPI Error Message list.
4	Execution Error	16	An execution error occurred (an error in the -200 range has been generated).
5	Command Error	32	A command syntax error occurred (an error in the -100 range has been generated).
6	Not Used	64	0 is returned.
7	Power On	128	Power has been cycled since the last time the event register was read or cleared.

Status Byte Register

The following table describes the Status Byte Register.

Bit Number	Bit Name	Decimal Value	Definition
0	Not Used	1	(Reserved for future use)
1	Not Used	2	(Reserved for future use)
2	Error Query	4	One or more errors have been stored in the Error Queue. Use SYSTem:ERRor? to read and delete errors.
3	Questionable Data Summary	8	One or more bits are set in the Questionable Data Register (bits must be enabled, see STATus:QUEStionable:ENABle).
4	Message Available	16	Data is available in the instrument's output buffer.
5	Standard Event Summary	32	One or more bits are set in the Standard Event Register (bits must be enabled, see *ESE).
6	Master Summary	64	One or more bits are set in the Status Byte Register and may generate a Request for Service (RQS). Bits must be enabled using *SRE.
7	Standard Operation Summary	128	One or more bits are set in the Standard Operation Register (bits must be enabled, see STATus:OPERation:ENABle).

*CAL?

Calibration Query. This command performs autocalibration (autocal) and returns the result.

Parameter	Typical Return
(none)	+0 (no error) or +1 (cal error)
Performs autocalibration, return result: CAL?	

Remarks

- Autocalibration takes just a few seconds to complete.
- Autocalibration compensates for drift caused by time and temperature change in DC voltage and resistance measurements, and adjusts some aspects of other measurement functions.
- Following the autocalibration, the instrument returns to the instrument state that existed before the autocalibration.

*CLS

Clear Status Command. This command clears the event registers in all register groups. This command also clears the Error queue.

Parameter	Typical Return
(none)	(none)
Clears the event register bits and error queue: *CLS	

*ESE <enable_value>
*ESE?

Event Status Enable Command and Query. This command enables bits in the enable register for the Standard Event Register group. The selected bits are then reported to bit 5 of the Status Byte Register. An enable register defines which bits in the event register will be reported to the Status Byte register group. You can write to or read from an enable register.

NOTE For more information on the SCPI Status System for the DM34460 Series 6½ Digit Digital Multimeter, see the Status System Introduction section.

Parameter	Typical Return
Decimal sum of the bits in the register Default: 0	+48
Enables bit 4 (decimal value = 16) in the enable register: *ESE 16	

Remarks

- Use *PSC command to control whether the Standard Event enable register is cleared at power on. For example, *PSC 0 preserves the enable register contents through power cycles.

- *CLS clears the event register, but not the enable register.
- The <enable> setting is nonvolatile; it does not change after a Factory Reset (*RST) , Instrument Prese (SYSTem:PRESet), Status Preset (STATus:PRESet) or Clear Status (*CLS).

*ESR?

Standard Event Status Register Query. This query queries the event register for the Standard Event Register group. This is a read-only register that latches events from the condition register. While an event bit is set, subsequent events corresponding to that bit are ignored.

Parameter	Typical Return
(none)	+24
Reads the event register (bits 3 and 4 are set): *ESR?	

Remarks

- In order to be reported to the Standard Event Register, the corresponding bits in the event register must be enabled using the *ESE command.
- Any or all conditions can be reported to the Standard Event summary bit through the enable register. To set the enable register mask, write a decimal value to the register using *ESE.
- Once a bit is set, it remains set until cleared by reading the event register or by sending *CLS (clear status).

*IDN?

Identification Query. This query returns the instrument's identification string.

Parameter	Typical Return
(none)	(see below)
Returns the instrument's identification string: *IDN?	

Remarks

- The identification string contains these four comma separated fields:
  - Manufacturer name, Model number, Serial number, Revision code

- The returned string has the following format:
  Keysight Technologies,DM34460A,<Serial Number>,**h.ff.ff-pp.pp-mm.mm-gg.gg-bb**

  Keysight Technologies,DM34461A,<Serial Number>,**h.ff.ff-pp.pp-mm.mm-gg.gg-bb**

  Where:

  h. - Hardware revision

  ff.ff - Main firmware revision

  pp.pp - Front panel firmware revision

  mm.mm - Measurement board firmware revision

  gg.gg - Measurement board FPGA revision

  bb - Measurement board revision

*LRN?

This command returns an ASCII string of all of the commands required to put the instrument into its current state.

Parameter	Typical Return
(none)	An ASCII string of SCPI commands, delimited with semicolons (";") between commands.
Returns the learn string: `*LRN?`	

Remarks

- Some parameters can be set with either [SENSe:]FREQuency or [SENSe:]PERiod versions of the same command. The *LRN string always returns the FREQuency version of the command, even if the parameter was set via the PERiod version. Similarly, parameters that can be set with RESistance or FRESistance versions of the same command always return the FRESistance version.

*OPC

This command sets the "Operation Complete" (bit 0) in the Standard Event register at the completion of the current operation.

Parameter	Typical Return
(none)	(none)
Sets the "Operation Complete" bit: `*OPC`	

Remarks

- Other commands may be executed before Operation Complete bit is set.
- The difference between *OPC and *OPC? is that *OPC sets a status bit when the operation completes, and *OPC? outputs "1" when the operation completes.

*OPC?

This query returns "1" to the output buffer at the completion of the current operation. Other commands cannot be executed until this command completes.

Parameter	Typical Return
(none)	1
Returns 1 when the measurement complete: *OPC?	

Remarks

- Use this command is to synchronize your application with the instrument.
- The difference between *OPC and *OPC? is that *OPC sets a status bit when the operation completes, and *OPC? outputs "1" when the operation completes.

*OPT?

This command returns a string identifying any installed options.

Parameter	Typical Return
(none)	0 (options that are not installed)
Returns the installed options: *OPT?	

*PSC {0|1}
*PSC?

Power-On Status Clear. This command enables (1) or disables (0) the clearing of certain enable registers at power on:

- Questionable Data Register:
  STATus:QUEStionable:ENABle
- Standard Operation Register:
  STATus:OPERation:ENABle
- Status Byte Register:
  *SRE (Service Request Enable)
- Standard Event Register:
  *ESE (Event Status Enable)

NOTE The *PSC command does not affect the clearing of the condition or event registers, just the enable registers. For more information on the SCPI Status System for the DM34460 Series, see the Status System Introduction section.

Parameter	Typical Return

0|1 Default: 1	0 or 1
Disables the power-on clearing of the affected registers: *PSC 0	

*RCL {0|1|2|3|4}

This command recalls the instrument state stored in the specified storage location. The state file STATE_<n>.sta in the root folder of the internal flash file system, where <n> is the number specified.

Parameter	Typical Return
0|1|2|3|4	(none)
Recalls the instrument state previously stored in location 1: *RCL 1	

Remarks

- *RCL <n> is equivalent to MMEMory:LOAD:STATe "INT:\STATE_n.sta".
- The state file created by *SAV 0, called STATE_0.sta, resides in the root folder of the internal flash file system. It is overwritten with the power-down state of the instrument when power is cycled.
- The instrument state enable settings are stored in nonvolatile memory. They do not change when power has been off, after a Factory Reset (*RST) or after an Instrument Preset (SYSTem:PRESet).

*RST

This command resets instrument to factory default state. This is similar to SYSTem:PRESet. The difference is that *RST resets the instrument for SCPI operation, and SYSTem:PRESet resets the instrument for front panel operation. As a result, *RST turns the histogram and statistics off, and SYSTem:PRESet turns them on.

Parameter	Typical Return
(none)	(none)
Resets the instrument: *RST	

Remarks

- This command does not affect any previously-stored instrument states (see *SAV).

*SAV {0|1|2|3|4}

This command stores (saves) the current instrument state in the specified storage location. The state file STATE_<n>.sta in the root folder of the internal flash file system, where <n> is the number specified.

Parameter	Typical Return
0|1|2|3|4	(none)
Stores the current instrument state in location 1: *SAV 1	

Remarks

- *SAV <n> is equivalent to MMEMory:STORe:DATA "INT:\STATE_n.sta".
- The state file created by *SAV 0, called STATE_0.sta, resides in the root folder of the internal flash file system. It is overwritten with the power-down state of the instrument when power is cycled.
- The instrument state enable settings are stored in nonvolatile memory. They do not change when power has been off, after a Factory Reset (*RST) or after an Instrument Preset (SYSTem:PRESet).

*SRE <enable_value>
*SRE?

Service Request Enable. This command enables bits in the enable register for the Status Byte Register group. An enable register defines which bits in the event register will be reported to the Status Byte register group. You can write to or read from an enable register.

Parameter	Typical Return
Decimal sum of the bits in the register Default: 0	+24
Enables bit 4 (decimal value = 16) in the enable register: `*SRE 16`	

Remarks

- To enable specific bits, specify the decimal value corresponding to the binary-weighted sum of the bits in the register. The selected bits are summarized in the "Master Summary" bit (bit 6) of the Status Byte Register. If any of the selected bits change from 0 to 1, the instrument generates a Service Request signal.
- *CLS (clear status) clears the event register, but not the enable register. An event register is a read-only register that latches events from the condition register. While an event bit is set, subsequent events corresponding to that bit are ignored.
- *PSC (power-on status clear) determines whether Status Byte enable register is cleared at power on. For example, *PSC 0 preserves the enable register contents through power cycles.
- The Status Byte enable register is not cleared by *RST.

*STB?

Read Status Byte Query. This query queries the condition register for the Status Byte Register group and and returns a decimal value equal to the binary-weighted sum of all bits set in the register.

A condition register continuously monitors the state of the instrument. Condition register bits are updated in real time; they are neither latched nor buffered.

Parameter	Typical Return
(none)	+40
Reads the condition register: `*STB?`	

Remarks

- Similar to a Serial Poll, but processed like any other instrument command. This register is read-only; bits are not cleared when read.
- Returns same result as a Serial Poll, but the "Master Summary" bit (bit 6) is not cleared by *STB?.
- Power cycle and *RST clear all bits in the condition register.

*TRG

This query triggers the instrument if TRIGger:SOURce BUS is selected.

Parameter	Typical Return
(none)	(none)
Triggers the instrument: TRIG:SOUR BUS,*TRG	

Remarks

- After setting the trigger source, you must send INITiate to place the multimeter in the "wait-for-trigger" state. The *TRG command is not accepted unless the multimeter is in the "wait-for-trigger" state.

*TST?

This query performs a basic self-test of the instrument and returns a pass/fail indication. The TEST:ALL? self-test is more comprehensive than the *TST? self-test.

Parameter	Typical Return
(none)	+0 (pass) or +1 (one or more tests failed)
Performs a self-test: *TST?	

Remarks

- The self-test takes just a few seconds to complete.
- If one or more tests fail, "+1" is returned and an error is stored in the error queue. For a complete listing of the error messages related to self-test failures, see Self-test Error Messages.
- Following the test, the instrument returns to the instrument state that existed before the self-test.

*WAI

This command configures the instrument's output buffer to wait for all pending operations to complete before executing any additional commands over the interface.

Parameter	Typical Return
(none)	(none)
Waits until all pending operations complete: *WAI	

Remarks

- Configuration changes and measurements are considered pending operations. Therefore, *WAI causes these changes to occur and complete.

Command Summary

- INITiate[:IMMediate]

INITiate[:IMMediate]

This command changes the state of the triggering system from the "idle" state to the "wait-for-trigger", and clears the previous set of measurements from reading memory. Measurements begin when the specified trigger conditions are satisfied following the receipt of INITiate.

Parameter	Typical Return
(none)	(none)
Uses a software trigger to start the measurements: TRIG:SOUR IMM, INIT	

Remarks

- Storing measurements in reading memory with INITiate is faster than sending measurements to the instrument's output buffer using READ? (provided you do not send FETCh? until done). The INITiate command is also an "overlapped" command. This means that after executing INITiate, you can send other commands that do not affect the measurements.
- You can store up to 50,000 measurements in the reading memory of the DM34460A, or 2,000,000 measurements on the DM34461A. If reading memory overflows, new measurements overwrite the oldest measurements stored; the most recent measurements are always preserved. No error is generated, but the Reading Mem Ovfl bit (bit 14) is set in the Questionable Data Register's condition register (see Status System Introduction).
- To retrieve the measurements from the reading memory, use FETCh?. Use DATA:REMove? or R? to read and erase all or part of the available measurements.
- Use ABORt to return to idle.

LXI Subsystem

This subsystem supports LAN eXtensions for Instrumentation (LXI) functionality.

Command Summary

- LXI:IDENtify[:STATe]{OFF|ON}
- LXI:IDENtify[:STATe]?
- LXI:MDNS:ENABle{OFF|ON}
- LXI:MDNS:ENABle?
- LXI:MDNS:HNAMe[:RESolved]?
- LXI:MDNS:SNAMe:DESired
- LXI:MDNS:SNAMe:DESired?
- LXI:MDNS:SNAMe[:RESolved]?
- LXI:MDNS[:STATe]{OFF|ON}
- LXI:MDNS[:STATe]?
- LXI:RESet
- LXI:RESTart

LXI:IDENtify[:STATe] {ON|1|OFF|0}
LXI:IDENtify[:STATe]?

This command shows or removes the LXI Web Identify indicator on the display.

Parameter	Typical return
ON|1|OFF|0 Default: OFF	0 (OFF) or 1 (ON)
Turns on the LXI Web Identify indicator: LXI:IDEN ON	

Remarks

- The indicator helps you identify the device associated with the LAN address.
- Press the [Local] key or send *RST to turn off the indicator.

LXI:MDNS:ENABle {ON|1|OFF|0}
LXI:MDNS:ENABle?

This command enables or disables the multicast Domain Name System (mDNS), which provides the capabilities of a DNS server for service discovery in a small network that without a DNS server.

Parameter	Typical return
ON|1|OFF|0 Default: ON	0 (OFF) or 1 (ON)
Turns mDNS ON: LXI:MDNS:ENAB ON	

Remarks

- This setting is non-volatile; it is not changed by power cycling or a Factory Reset (*RST) or an Instrument Preset.
- This parameter is set to its default value when the instrument is shipped from the factory and after SYSTem:SECurity:IMMediate.

LXI:MDNS:HNAMe[:RESolved]?

This command returns the resolved (unique) mDNS hostname in the form K-<model number>-<serial>-N , where <serial> is the last 4 digits of the instrument's serial number. The N is an integer appended if necessary to make the name unique. The desired name may be truncated, if necessary, to make room for the appended integer.

Parameter	Typical return
(none)	"K-DM34461A-0035", where yyyy is the last four digits of the serial number.
Returns the resolved mDNS hostname: LXI:MDNS:HNAMe:RESolved?	

LXI:MDNS:SNAMe:DESired "<name>"
LXI:MDNS:SNAMe:DESired?

This command sets the desired mDNS service name.

Parameter	Typical return
<name> = Quoted string of up to 63 characters. Default: "Keysight <model number> Digital Multimeter - <serial number>"	"Keysight DM34460A Digital Multimeter - CN00000001"
Sets the mDNS service name: LXI:MDNS:SNAM:DES "DM34460A"	

Remarks

- This setting is non-volatile; it is not changed by power cycling or a Factory Reset (*RST).
- This parameter is set to its default value when the instrument is shipped from the factory and after SYSTem:SECurity:IMMediate.

LXI:MDNS:SNAMe[:RESolved]?

The resolved mDNS service name will be the desired service name (LXI:MDNS:SNAMe:DESired), possibly with " (<N>)" appended. The N is an integer appended if necessary to make the name unique. The desired name may be truncated, if necessary, to make room for the appended integer.

Parameter	Typical return
(none)	"Keysight DM34460A Digital Multimeter- CN00000001"
Returns the resolved mDNS service: LXI:MDNS:SNAM:RES?	

LXI:MDNS[:STATe] {ON|1|OFF|0}
LXI:MDNS[:STATe]?

This command enables (On) or disables (Off) the multicast Domain Name System (mDNS), which provides the capabilities of a DNS server for service discovery in a small network without a DNS server.

Parameter	Typical return
ON|1|OFF|0 Default: ON	0 (OFF) or 1 (ON)
Enables mDNS service: LXI:MDNS ON	

LXI:RESet

This command resets LAN settings to a known operating state, beginning with DHCP, and clears the Web Interface password. If DHCP fails, it uses Auto-IP.

Parameter	Typical return
(none)	(none)
Resets the LAN settings: LXI:RES	

Remarks

- Depending on your network, the LAN interface may take several seconds to restart after this command is sent.

LXI:RESTart

This command restarts the LAN with the current settings as specified by the SYSTem:COMMunicate:LAN commands.

Parameter	Typical return
(none)	(none)
Restarts the LAN interface: LXI:REST	

Remarks

- Depending on your network, the LAN interface may take several seconds to restart after this command is sent.

MEASure Subsystem

The MEASure queries are the easiest way to program the instrument for measurements. When you execute this command, the instrument immediately performs the measurement (see Triggering the Multimeter for details). The reading is sent directly to the instrument's output buffer.

NOTE A MEASure query is functionally equivalent to sending CONFigure followed immediately by READ?. The difference is that CONFigure commands allow you to change parameters between the CONFigure and the READ?.

Command Summary

- MEASure[:SCALar]:CAPacitance?
- MEASure[:SCALar]:CONTinuity?
- MEASure[:SCALar]:CURRent:AC?
- MEASure[:SCALar]:CURRent[:DC]?
- MEASure[:SCALar]:DIODe?
- MEASure[:SCALar]:FREQuency?
- MEASure[:SCALar]:FRESistance?
- MEASure[:SCALar]:PERiod?
- MEASure[:SCALar]:RESistance?
- MEASure[:SCALar]:TEMPerature?
- MEASure[:SCALar][:VOLTage]:AC?
- MEASure[:SCALar][:VOLTage][:DC]?
- MEASure[:SCALar][:VOLTage][:DC]:RATio

Default Settings for the MEASure?

With the MEASure? queries, you can select the function, range, and resolution all in one command. All other measurement parameters are set to their default values as shown below.

Measurement Parameter:	Default Setting:
AC Input Filter (bandwidth)	20 Hz (medium filter)
Autozero	OFF if resolution setting results in NPLC < 1 ON if resolution setting results in NPLC ≥ 1
Range	AUTO (including voltage range for frequency and period measurements)
Samples per Trigger	1 sample
Trigger Count	1 trigger
Trigger Delay	Automatic delay
Trigger Source	Immediate
Trigger Slope	NEGative
Math Functions	Disabled. Other parameters are unchanged.
Per-function Null State	Disabled

Using the MEASure? Query

The following example configures DC voltage measurements, internally triggers the instrument to take a measurement, and reads the measurement. The default range (autorange) and resolution (10 PLC) are used for the measurement.

```
MEAS:VOLT:DC?
```

Typical Response: +4.23450000E-03

The following example configures the instrument for 2-wire resistance measurements, triggers the instrument to take a measurement, and reads the measurement. The 1 kΩ range is selected with 0.1 Ω resolution.

```
MEAS:RES? 1000,0.1
```

Typical Response: +3.27150000E+02

MEASure[:SCALar]:CAPacitance?[{<range>|AUTO|MIN|MAX|DEF} [, {<resolution>|MIN|MAX|DEF}]]

This command sets all capacitance parameters and trigger parameters to their default values for capacitance measurements and immediately triggers a measurement. The results are sent directly to the instrument's output buffer.

Parameter	Typical Return
<range>: 1 nF|10 nF|100 nF|1 µF|10 µF|100 µF Default: AUTO	(none)
<resolution>: optional and ignored; fixed at 6½ digits.	
Configures the instrument for capacitance measurements:MEAS:CAP?	

Remarks

- You can allow the instrument to automatically select the measurement range using auto ranging or you can select a fixed range using manual ranging. Auto ranging is convenient because the instrument decides which range to use for each measurement based on the input. For fastest measurements, use manual ranging on each measurement (some additional time is required for auto ranging since the instrument has to make a range selection).
- Auto range thresholds:
  Down range at: <10% of range
  Up range at: >120% of range
- If the input signal is greater than can be measured on the selected range (manual ranging), the instrument gives an overload indication: "OL" from the front panel or "±9.9E+37" from the remote interface.
- If the TRIGger:SOURce is set to BUS, the MEASure? command overwrites the BUS trigger (sets it to IMMediate), triggers the DMM and returns a measurement.

See also

- CONFigure?
- FETCh?
- READ?

MEASure[:SCALar]:CONTinuity?

This command sets all measurement parameters and trigger parameters to their default values for continuity test and immediately triggers a measurement. The results are sent directly to the instrument's output buffer.

Parameter	Typical Return
(none)	(none)
Configures the instrument for continuity measurements:MEAS:CONT?	

Remarks

- The range and resolution are fixed at 1 kΩ for continuity tests (a 2-wire resistance measurement).
- The meter beeps (even if beep is disabled) for each measurement that is less than or equal to the continuity threshold (≤10 Ω), and the actual resistance reading is displayed on the front panel.
  - From 10 Ω to 1.2 kΩ the meter displays the actual resistance reading with no beep.
  - If the reading exceeds 1.2 kΩ, the meter displays "OPEN" on the front panel (no beep).
  - The FETCh?, READ?, and MEASure:CONTinuity? queries return the measured resistance, regardless of its value.

See also

- CONFigure?
- FETCh?
- READ?

MEASure[:SCALar]:CURRent:AC?[{<range>|AUTO|MIN|MAX|DEF} [, {<resolution>|MIN|MAX|DEF}]]

This command sets all AC current measurement parameters and trigger parameters to their default values. The results are sent directly to the instrument's output buffer.

Parameter	Typical Return
<range>: 100 µA|1 mA|10 mA|100 mA|1 A|3 A Default: AUTO	(none)
<resolution>: optional and ignored; fixed at 6½ digits. Specify <resolution> in the measurement's units (V, A, Hz, Ω, and so on).	
Configures the instrument for AC current measurements using the 1 A range:MEAS:CURR:AC? 1	

Remarks

- You can allow the instrument to automatically select the measurement range using auto ranging or you can select a fixed range using manual ranging. Auto ranging is convenient because the instrument decides which range to use for each measurement based on the input signal. For fastest measurements, use manual ranging on each measurement (some additional time is required for auto ranging since the instrument has to make a range selection).
- If you select auto ranging (by specifying "AUTO" or "DEF"), an error will be generated if you specify a discrete value for the <resolution> parameter. When auto ranging is combined with a discrete resolution, the instrument cannot accurately resolve the integration time (especially if the input signal is continuously changing). If your application requires auto ranging, be sure to specify "DEF" for the <resolution> parameter or omit the parameter from the command.
- Auto range thresholds:
  Down range at: <10% of range
  Up range at: >120% of range

- If the input signal is greater than can be measured on the selected range (manual ranging), the instrument gives an overload indication: OL from the front panel or "±9.9E+37" from the remote interface.
- If the TRIGger:SOURce is set to BUS, the MEASure? command overwrites the BUS trigger (sets it to IMMediate), triggers the DMM and returns a measurement.

See also

- CONFigure?
- FETCh?
- READ?

MEASure[:SCALar]:CURRent[:DC]?[{<range>|AUTO|MIN|MAX|DEF} [, {<resolution>|MIN|MAX|DEF}]]

This command sets all DC current measurement parameters and trigger parameters to their default values. The results are sent directly to the instrument's output buffer.

Parameter	Typical Return
<range>: 100 µA|1 mA|10 mA|100 mA|1 A|3 A Default: AUTO	(none)
<resolution>: See Resolution Table or Range, Resolution and NPLC. The default is equivalent to 10 PLC. Specify <resolution> in the measurement's units (V, A, Hz, Ω, and so on).	
Configures the instrument for DC current measurements using the 1 A range:MEAS:CURR:DC? 1	

Remarks

- You can allow the instrument to automatically select the measurement range using auto ranging or you can select a fixed range using manual ranging. Auto ranging is convenient because the instrument decides which range to use for each measurement based on the input signal. For faster measurements, use manual ranging on each measurement (some additional time is required for auto ranging since the instrument has to make a range selection).
- If you select auto ranging (by specifying "AUTO" or "DEF"), an error will be generated if you specify a discrete value for the <resolution> parameter. When auto ranging is combined with a discrete resolution, the instrument cannot accurately resolve the integration time (especially if the input signal is continuously changing). If your application requires auto ranging, be sure to specify "DEF" for the <resolution> parameter or omit the parameter from the command.
- Auto range thresholds:
  Down range at: <10% of range
  Up range at: >120% of range
- If the input signal is greater than can be measured on the selected range (manual ranging), the instrument gives an overload indication: OL (positive overload) or -OL (negative overload) from the front panel or "±9.9E+37" from the remote interface.
- If the TRIGger:SOURce is set to BUS, the MEASure? command overwrites the BUS trigger (sets it to IMMediate), triggers the DMM and returns a measurement.

See also

- CONFigure?
- FETCh?
- READ?

MEASure[:SCALar]:DIODe?

This command sets all diode test parameters and trigger parameters to their default values. The results are sent directly to the instrument's output buffer.

Parameter	Typical Return
(none)	(none)
Configures, makes, and reads a default diode measurement:MEAS:DIOD?	

Remarks

- The range and resolution are fixed for diode tests: the range is 1 VDC (with a 1 mA current source output).
- The voltage is displayed on the front panel if it is between 0 and 5.05 V. The instrument beeps when the signal transitions into the range between 0.3 and 0.8 V (unless beeper is disabled). If the signal exceeds 5.05 V, the front panel shows "OPEN", and the value returned from SCPI is 9.9E37.
- If FETCh?, READ?, and MEASure[:SCALar]:DIODe? queries return the measured voltage, regardless of its value.

See also

- CONFigure?
- FETCh?
- READ?

MEASure[:SCALar]:FREQuency?[{<range>|MIN|MAX|DEF} [, {<resolution>|MIN|MAX|DEF}]]

This command sets all measurement parameters and trigger parameters to their default values for frequency measurements and immediately triggers a measurement. The results are sent directly to the instrument's output buffer.

Parameter	Typical Return
<range>: 3 Hz to 300 kHz Default: 20 Hz	(none)
<resolution>: See table below. Specify <resolution> in the measurement's units (V, A, Hz, Ω, and so on).	
Configures the instrument for frequency measurements:MEAS:FREQ?	

Remarks

- The frequency <range> parameter is required only to specify the measurement resolution parameter. It is not necessary to send a new command for each new frequency to be measured. The <range> and <resolution> parameters affect the aperture (gate time) as follows:

Resolution	Aperture
100 ppm × <range> (MAXimum)	10 ms
10 ppm × <range> (DEFault)	100 ms
1 ppm × <range> (MINimum)	1 s

- The input signal for frequency measurements has an AC voltage component. By default, this command uses autorange to select the voltage range.
- With no signal applied "0" is returned.

MEASure[:SCALar]:FRESistance?[{<range>|AUTO|MIN|MAX|DEF} [, {<resolution>|MIN|MAX|DEF}]]

This command sets all measurement and trigger parameters to their default values for 4-wire resistance (FRESistance) measurements, and immediately triggers a measurement. The results are sent directly to the instrument's output buffer.

Parameter	Typical Return
<range>: 100 Ω|1 kΩ|10 kΩ|100 kΩ|1 MΩ|10 MΩ|100 MΩ|AUTO|DEFault Default: AUTO	(none)
<resolution>: See Resolution Table or Range, Resolution and NPLC. The default is equivalent to 10 PLC. Specify <resolution> in the measurement's units (V, A, Hz, Ω, and so on).	
Configures the 4-wire resistance measurements using the 100 Ω range with default resolution:MEAS:FRES? 100	

Remarks

- You can allow the instrument to automatically select the measurement range using auto ranging or you can select a fixed range using manual ranging. Auto ranging is convenient because the instrument decides which range to use for each measurement based on the input signal. For faster measurements, use manual ranging on each measurement (some additional time is required for auto ranging since the instrument has to make a range selection).
- If you select auto ranging (by specifying "AUTO" or "DEF"), an error will be generated if you specify a discrete value for the <resolution> parameter. When auto ranging is combined with a discrete resolution, the instrument cannot accurately resolve the integration time (especially if the input signal is continuously changing). If your application requires auto ranging, be sure to specify "DEF" for the <resolution> parameter or omit the parameter from the command.
- Auto range thresholds:
  Down range at: <10% of range
  Up range at: >120% of range
- If the input signal is greater than can be measured on the selected range (manual ranging), the instrument gives an overload indication: OL from the front panel or "±9.9E+37" from the remote interface.
- If the TRIGger:SOURce is set to BUS, the MEASure? command overwrites the BUS trigger (sets it to IMMediate), triggers the DMM and returns a measurement.

See also

- CONFigure?
- FETCh?
- READ?

MEASure[:SCALar]:PERiod?[{<range>|MIN|MAX|DEF} [, {<resolution>|MIN|MAX|DEF}]]

This command sets all measurement parameters and trigger parameters to their default values for period measurements and immediately triggers a measurement. The results are sent directly to the instrument's output buffer.

Parameter	Typical Return
<range>: 3.33 µs to 333.33 ms Default: 50 ms	(none)
<resolution>: See table below. Specify <resolution> in the measurement's units (V, A, Hz, Ω, and so on).	
Configures the instrument for period measurements:MEAS:PER?	

Remarks

- The period <range> parameter is required only to specify the measurement resolution parameter. It is not necessary to send a new command for each new period to be measured. The <range> and <resolution> parameters affect the aperture (gate time) as follows:

Resolution	Aperture
100 ppm × <range> (MAXimum)	10 ms
10 ppm × <range> (DEFault)	100 ms
1 ppm × <range> (MINimum)	1 s

- The input signal for period measurements has an AC voltage component. By default, this command uses autorange to select the voltage range.
- With no signal applied "0" is returned.

MEASure[:SCALar]:RESistance?[{<range>|AUTO|MIN|MAX|DEF} [, {<resolution>|MIN|MAX|DEF}]]

This command sets all measurement and trigger parameters to their default values for 2-wire (RESistance) measurements, and immediately triggers a measurement. The results are sent directly to the instrument's output buffer.

Parameter	Typical Return
<range>: 100 Ω|1 kΩ|10 kΩ|100 kΩ|1 MΩ|10 MΩ|100 MΩ|AUTO|DEFault Default: AUTO	(none)
<resolution>: See Resolution Table or Range, Resolution and NPLC. The default is equivalent to 10 PLC. Specify <resolution> in the measurement's units (V, A, Hz, Ω, and so on).	
Configures the 2-wire resistance measurements using the 100 Ω range with default resolution:MEAS:RES? 100	

Remarks

- You can allow the instrument to automatically select the measurement range using auto ranging or you can select a fixed range using manual ranging. Auto ranging is convenient because the instrument decides which range to use for each measurement based on the input signal. For faster measurements, use manual ranging on each measurement (some additional time is required for auto ranging since the instrument has to make a range selection).

- If you select auto ranging (by specifying "AUTO" or "DEF"), an error will be generated if you specify a discrete value for the <resolution> parameter. When auto ranging is combined with a discrete resolution, the instrument cannot accurately resolve the integration time (especially if the input signal is continuously changing). If your application requires auto ranging, be sure to specify "DEF" for the <resolution> parameter or omit the parameter from the command.
- Auto range thresholds:
  Down range at: <10% of range
  Up range at: >120% of range
- If the input signal is greater than can be measured on the selected range (manual ranging), the instrument gives an overload indication: OLfrom the front panel or "±9.9E+37" from the remote interface.
- If the TRIGger:SOURce is set to BUS, the MEASure? command overwrites the BUS trigger (sets it to IMMediate), triggers the DMM and returns a measurement.

See also

- CONFigure?
- FETCh?
- READ?

MEASure[:SCALar]:TEMPerature?[{FRTD|RTD|FTHermistor|THERmistor|DEFault} [, {<type>|DEFault} [,1 [,{<resolution>|MIN|MAX|DEF}]]]]

This command sets all temperature measurement parameters and trigger parameters to their default values for temperature measurements and immediately triggers a measurement. The results are sent directly to the instrument's output buffer.

Parameter	Typical Return
<probe_type>: FRTD|RTD|FTHermistor|THERmistor Default: FRTD	(none)
<type>: 85 (only possible value for RTD/FRTD), 5000 (only possible value for THERmistor/FTHermistor)	
<resolution>: See Resolution Table or Range, Resolution and NPLC. The default is equivalent to 10 PLC.	
Configures the instrument for 5 kΩ thermistor measurement is made with 0.1 °C resolution:MEAS:TEMP? THER,5000,1,0.1	

Remarks

- For temperature measurements, the instrument internally selects the range; you cannot select the range to be used. The range ("1" is the only allowed value) is used only in conjunction with resolution to determine NPLC.
- The <resolution>parameter only determines the integration time; it does not specify the resolution of the temperature measurement. This parameter is optional; however, if you specify <resolution>, you must also specify "1" as the implied range parameter.
- To change temperature units, use UNIT:TEMPerature.

- For RTD and thermistor measurements, the instrument autoranges to the correct range for the transducer resistance measurement. For thermocouple measurements, the 100 mV range is selected.
- If the input signal is greater than can be measured on the specified manual range, the instrument displays the word Overload on front panel and returns "9.9E37" from the remote interface.

MEASure[:SCALar][:VOLTage]:AC?[{<range>|AUTO|MIN|MAX|DEF} [, {<resolution>|MIN|MAX|DEF}]]

This command sets all AC voltage measurement parameters and trigger parameters to their default values. The reading is sent directly to the instrument output buffer.

WARNING **The SAFETY LIMIT on the front HI/LO input terminals is 750 VAC (rms) for a sinusoidal waveform or 1000 V (peak) for any other waveform. Connections to AC MAINS are further limited to CAT II (300V). See the "Safety Information" section in the Keysight DM34460 Series 6½ Digit Digital Multimeter User's Guide for a complete discussion of the safety features, and the safe operation of this instrument.**

Parameter	Typical Return
<range>: 100 mV|1 V|10 V|100 V|1000 V|AUTO Default: AUTO	(none)
<resolution>: optional and ignored; fixed at 6½ digits. Specify <resolution> in the measurement's units (V, A, Hz, Ω, and so on).	
Configures the instrument for AC voltage measurements using the 10 V range with 1 mV resolution: `MEAS:VOLT:AC? 10,0.001`	

Remarks

- You can allow the instrument to automatically select the measurement range using auto ranging or you can select a fixed range using manual ranging. Auto ranging is convenient because the instrument decides which range to use for each measurement based on the input signal. For faster measurements, use manual ranging on each measurement (some additional time is required for auto ranging since the instrument has to make a range selection).
- If you select auto ranging (by specifying "AUTO" or "DEF"), an error will be generated if you specify a discrete value for the <resolution> parameter. When auto ranging is combined with a discrete resolution, the instrument cannot accurately resolve the integration time (especially if the input signal is continuously changing). If your application requires auto ranging, be sure to specify "DEF" for the <resolution> parameter or omit the parameter from the command.
- Auto range thresholds:
  Down range at: <10% of range
  Up range at: >120% of range
- If the input signal is greater than can be measured on the selected range (manual ranging), the instrument gives an overload indication: OL from the front panel or "±9.9E+37" from the remote interface.

See also

- CONFigure?
- FETCh?

- READ?

MEASure[:SCALar][:VOLTage][:DC]?[{<range>|AUTO|MIN|MAX|DEF} [, {<resolution>|MIN|MAX|DEF}]]

This command sets all primary DC voltage measurement parameters and trigger parameters to their default values. The reading is sent directly to the instrument output buffer.

Parameter	Typical Return
<range>: 100 mV|1 V|10 V|100 V|1000 V|AUTO Default: AUTO	(none)
<resolution>: See Resolution Table or Range, Resolution and NPLC. The default is equivalent to 10 PLC. Specify <resolution> in the measurement's units (V, A, Hz, Ω, and so on).	
Configures the instrument for DC voltage measurements using the 10 V range with 1 mV resolution:MEAS:VOLT:DC? 10,0.001	

Remarks

- You can allow the instrument to automatically select the measurement range using auto ranging or you can select a fixed range using manual ranging. Auto ranging is convenient because the instrument decides which range to use for each measurement based on the input signal. For faster measurements, use manual ranging on each measurement (some additional time is required for auto ranging since the instrument has to make a range selection).
- If you select auto ranging (by specifying "AUTO" or "DEF"), an error will be generated if you specify a discrete value for the <resolution> parameter. When auto ranging is combined with a discrete resolution, the instrument cannot accurately resolve the integration time (especially if the input signal is continuously changing). If your application requires auto ranging, be sure to specify "DEF" for the <resolution> parameter or omit the parameter from the command.
- Auto range thresholds:
  Down range at: <10% of range
  Up range at: >120% of range
- If the input signal is greater than can be measured on the selected range (manual ranging), the instrument gives an overload indication: OL (positive overload) or -OL (negative overload) from the front panel or "±9.9E+37" from the remote interface.

See also

- CONFigure?
- FETCh?
- READ?

MEASure[:SCALar][:VOLTage][:DC]:RATio?{<range>|AUTO|MIN|MAX|DEF} [, {<resolution>|MIN|MAX|DEF}]]

This command sets all measurement parameters and trigger parameters to their default values for DC voltage ratio measurements and immediately triggers a measurement. The results are sent directly to the instrument's output buffer.

To calculate a ratio, the instrument measures a DC reference voltage applied to the Sense terminal and the DC signal voltage applied to the Input terminals. It then uses the formula:

Ratio = DC signal voltage / DC reference voltage

Parameter	Typical Return
<range>: 100 mV|1 V|10 V|100 V|1000 V|AUTO|DEFault Default: AUTO	(none)
<resolution>: See Resolution Table or Range, Resolution and NPLC. The default is equivalent to 10 PLC.	
Configures DC voltage ratio measurements using the 100 V range with 1 mV resolution: `MEAS:VOLT:DC:RAT?100,0.01`	

Remarks

- The Sense terminals have a maximum measurable input of ±12 VDC. Autoranging is automatically selected for reference voltage measurements on the Sense terminals.
- The Input LO and Sense LO terminals must have a common reference and cannot have a voltage difference greater than ±2 V.
- The specified measurement range applies only to the signal connected to the Input terminals. The signal on the Input terminals can be any DC voltage up to 1,000 V.
- For the Input terminals, you can allow the instrument to select the measurement range by autoranging or you can select a fixed range using manual ranging. Autoranging decides which range to use for each measurement based on the input signal. For faster measurements, use manual ranging on each measurement (additional time is required for autoranging to select a range).
- Autoranging (AUTO or DEFault), will generate an error if you specify a <resolution> because the instrument cannot accurately resolve the integration time (especially if the input continuously changes). If your application requires autoranging, specify DEFault for the <resolution> or omit the <resolution> altogether.
- Autoranging goes down a range at less than 10% of range and up a range at greater than 120% of range.
- If the input signal is greater than can be measured on the specified manual range, the instrument displays the word Overload on front panel and returns "9.9E37" from the remote interface.

General Purpose File Management

The MMEMory subsystem's general purpose file management commands are listed below. The MMEMory subsystem also includes two other types of commands:

- STATe and PREFerence File Management
- Data Transfer Commands

Command Summary

- MMEMory:LOAD:PREFerences<file>
- MMEMory:STORe:PREFerences<file>
- MMEMory:LOAD:STATe<file>
- MMEMory:STORe:STATe<file>
- MMEMory:STATe:RECall:AUTO{OFF|ON}
- MMEMory:STATe:RECall:AUTO?
- MMEMory:STATe:RECall:SELect<file>
- MMEMory:STATe:RECall:SELect?
- MMEMory:STATe:VALid?<file>
- MMEMory:CATalog[:ALL]?
- MMEMory:CDIRectory
- MMEMory:CDIRectory?
- MMEMory:MDIRectory
- MMEMory:RDIRectory
- MMEMory:COPY
- MMEMory:DELete
- MMEMory:DOWNload:DATA
- MMEMory:DOWNload:FNAMe
- MMEMory:DOWNload:FNAMe?
- MMEMory:FORMat:READing:CSEParato
- MMEMory:FORMat:READing:CSEParator?
- MMEMory:FORMat:READing:INFormatio
- MMEMory:FORMat:READing:INFormation?

- MMEMory:FORMat:READing:RLIMit
- MMEMory:FORMat:READing:RLIMit?
- MMEMory:MOVE
- MMEMory:STORe:DATA RDG_STORE
- MMEMory:UPLoad?

STATe and PREFerence Files Management

These MMEMory subsystem commands save and load instrument states (state files) and preferred settings for non-volatile parameters (preference files). In general, state files store volatile settings associated with measurements. Preferences are non-volatile parameters associated with the instrument, but not any specific measurement. The following table summarizes what information is in each file.

State File	Preference File
State Files for the DM34460/DM34461 have this information:	Preference Files for the DM34460/DM34461 have this information:
Active measurement function Ranges Integration time/resolution (NPLC) Auto range Auto zero Auto impedance (Input Z) AC bandwidth Trigger and sample settings Math settings (enables, null value(s), limits, ...) Data threshold for status bit Temperature units Default file system directory Display selection and settings (numeric, meter, histogram, trend chart, ...) Numeric front panel digit masking DBM reference resistance	I/O, settings; mDNS settings Display brightness Screen saver enable, brightnes Numeric separator (comma, space, none) and decimal point symbol Beeper and key click enable Help language Power-on status clear enable, status enables, transition filters Power-on state (*RST, user-defined, last) Power-on message text Label enable, text
State Files for the DM34461 has this additional information:	Preference Files for the DM34461 has this additional information:
Trend chart and histogram display settings Data Log and Digitize mode settings Temperature probe settings	Data Log mode file format settings

Data Transfer Commands

These commands transfer files into and out of the instrument's mass memory.

Folder and file formats

Many MMEMory commands refer to folders and files. These have specific structures, described below.

Format for a <folder>

- The format for <folder> is "[[<drive>:]<path>]", where <drive> can be INTernal or USB, and <path> is a folder path, and <filespec> specifies a subset of files.
- INTernal specifies the internal flash file system. USB specifies a front panel USB storage device.
- If <drive> is specified, <path> is interpreted as an absolute folder path. Absolute paths begin with "\" or "/" and start at the root folder of <drive>.
- If <drive> is omitted, <path> is relative to the folder specified by MMEMory:CDIRectory. Relative paths must NOT begin with \ or /.
- Folder and file names cannot contain the following characters: \ / : * ? " < > |
- The <folder> parameter cannot exceed 240 characters.
- The specified folder must exist and cannot be marked as hidden or system. The exception is MMEMory:MDIRectory, which creates a folder. For MMEMory:MDIRectory, all folder levels above the new one must exist.

Format for a <file>

- The format for a file name is "[[<drive>:]<path>]<file_name>", where <drive> can be INTernal or USB, and <path>is a folder path.
- INTernal specifies the internal flash file system. USB specifies a front panel USB storage device.
- If <drive> is specified, <path> is interpreted as an absolute folder path. Absolute paths begin with "\" or "/" and start at the root folder of <drive>.
- If <drive> is omitted, <path> is relative to the folder specified by MMEMory:CDIRectory. Relative paths must NOT begin with \ or /.
- Folder and file names cannot contain the following characters: \ / : * ? " < > |
- The combination of folder and file name cannot exceed 240 characters.

Mass Memory (MMEMory) and State Storage

States saved by the front panel can be accessed from remote, and vice versa. For example, configure the instrument as desired and insert a USB drive into the front panel. Then enter the following commands. If you do not have a USB drive change "USB:\" to "INT:\" to use the instrument's internal flash drive instead.

```
MMMEMory:CDIRectory "USB:\"
MMEMory:MDIRectory "States"
MMEMory:STORe:STATE "USB:\States\State1"
```

To return to this state at any time:

```
MMEMory:LOAD:STATE "USB:\States\State1"
```

You can also recall a state file from the front panel by pressing [Utility] > Store/Recall.

MMEMory:CATalog[:ALL]? [<folder>[<filespec>]]

This command returns a list of files in the specified folder.

Parameter	Typical Return
Any valid folder name; defaults to folder selected by MMEMory:CDIRectory	+1000000000,+327168572, "command.exe,,375808", "MyDCVMeas.sta,STAT,8192",MyData.csv,ASC,11265"
Lists all files in the folder MyData on the front panel USB storage device:MEM:CAT? "USB:\MyData" Lists all state files in the root directory of internal memory:MEM:CAT? "INT:*.sta"	

Remarks

- If <filespec> is omitted or is *.*, the command or query acts on all files. You can also use the * as a generic wild-card: *.sta, abc*.*, and so on.
- The catalog takes the following form:
  <mem_used>,<mem_free>{,"<file listing>"}
  The instrument returns two numbers and a string for each file in the folder. The first number is the number of bytes used on the drive. The second indicates the number of bytes available. Each <file listing> is in the format "<file_name>,<file_type>,<file_size>" (including the quotation marks), where <file_name> is the name of the file including file extension, if any; <file_type> is either STAT for STATe (.sta) files, ASC for DATA (.csv) files, PREF for PREFerence (.prf) files, FOLD for folders, or null for all other file extensions; <file_size> is the file size in bytes.
- If no files exist, only <mem_used>,<mem_free> is returned.
- Because the instrument uses a small amount of space in the flash file system for internal use, the <mem_used> value is never zero.

MMEMory:CDIRectory <folder>
MMEMory:CDIRectory?

MMEMory:MDIRectory <folder>
MMEMory:RDIRectory <folder>

MMEMory:CDIRectory selects the default folder for MEMory subsystem commands. This folder must exist and is used when folder or file names do not include a drive and folder name. They query returns the current default folder.

MMEMory:MDIRectory makes a new directory (folder) on the mass storage medium.

MMEMory:RDIRectory removes a directory (folder) on the mass storage medium.

Parameter	Typical Return
Any directory name, including the mass storage unit specifier Default INT:\	"INT:\BACKUP"
Makes and removes a new directory named "test" on the internal mass memory system: MEM:MDIR "test" MEM:RDIR "test" Selects the \BACKUP folder on the internal flash file system as the default folder:MEM:CDIR "INT:\BACKUP" Returns the default folder for MEMory subsystem commands:MEM:CDIR?	

Remarks

- This parameter is set to its default value after a Factory Reset *RST or Instrument Preset SYSTem:PRESet.
- You can only remove an empty folder. Otherwise, the instrument generates a "Directory not empty" error.

MMEMory:COPY <file1>,<file2>

This command copies <file1> to <file2>. Each file name must include the file extension.

Parameter	Typical Return
Any valid file name (both files)	(none)
Copies state file from the root directory to the folder "Backup" on the internal flash file system: `MEM:COPY "INT:\MyVoltMeas.sta","INT:\Backup"`	

Remarks

- The source file and folder must exist and cannot be marked as hidden or system.
- The destination folder must exist and cannot be marked as hidden or system.
- If the destination file exists, it will be overwritten, unless marked as hidden or system.
- To copy a file to a file of the same name in a different folder, specify just the <drive> and/or <path> for <destination>.

MMEMory:DELete {<file>|<filespec>}

This command deletes a file. To delete a folder, use MMEMory:RDIRectory.

Parameter	Typical Return
Any valid file name including file extension, or a <filespec>, as described below	(none)
Deletes a file from the root directory of the internal flash file system: `MEM:DEL "INT:\MySetup.sta"`	

Remarks

- A <filespec> may include the * as a wildcard character: *.bmp, *.sta, abc*.*, and so on.
- The specified folder must exist and cannot be marked as hidden or system.
- SYSTem:SECurity:IMMediate deletes and sanitizes all files.

MMEMory:DOWNload:DATA <binary_block>

This command downloads data from the host computer to a file whose name has been specified by MMEMory:DOWNload:FNAMe.
The data in <binary_block> is written to the selected file.

NOTE Any data previously stored in the file is lost when you execute this command.

Parameter	Typical Return
Any IEEE-488.2 definite- or indefinite-length block	(none)
Writes "Hello" to the file "\Myfile" on internal storage: MEM:DOWN:FNAM "INT:\Myfile"MEM:DOWN:DATA #15Hello	

MMEMory:DOWNload:FNAMe <file>
MMEMory:DOWNload:FNAMe?

This command creates or opens the specified filename prior to writing data to that file with MMEMory:DOWNload:DATA.

Parameter	Typical Return
Any valid file name	(none)
Writes "Hello" to the file "\Myfile" on internal storage: MEM:DOWN:FNAM "INT:\Myfile"MEM:DOWN:DATA #15Hello	

Remarks

- The specified folder must exist and cannot be marked as hidden or system.
- If the destination file exists, it will be overwritten, unless marked as hidden or system.
- The file is created if it does not already exist.

MMEMory:FORMat:READing:CSEParato{COMMa|SEMicolon|TAB}
MMEMory:FORMat:READing:CSEParator?

This command specifies the character used to separate the columns in stored data.

Parameter	Typical Return
COMMa|SEMicolon|TAB Default: COMMa	TAB, COMM or SEM
Specifies tabs as the column separator: MEM:FORM:READ:CSEP TAB	

Remarks

- Applies only to the DM34461A.
- Affects the format for the .csv file created by theMMEMory:STORe:DATA command, or by the data logging/digitizing features in the DM34461A.

MMEMory:FORMat:READing:INFormation {OFF|ON}
MMEMory:FORMat:READing:INFormation?

This command disables/enables header information and reading numbers in stored data.

Parameter	Typical Return
OFF|ON Default: OFF	OFF or ON

Enables the format for the .csv file: MEM:FORM:READ:INF ON

Remarks

- Applies only to the DM34461A.
- The format for the .csv file (MMEMory:STORe:DATA), or by the data logging/digitizing features in the DM34461A, is affected as follows:
  OFF = one reading per row, no other header or reading information.
  ON = enables a file header and reading numbers. The file header contains the start date and start time of the first reading and, if the sample source is timer (SAMPle:SOURce:TIMer), the sample interval. Each data row includes a reading number and the reading.
- Affects the .dat (binary) file created by MMEMory:STORe:DATA as follows:
  OFF = one reading per row, no other header or per reading information.
  ON = one time stamp row consisting of eight 16-bit integers for: year, month, day of week, day, hour, minute, and milliseconds. 32-bit integer reading number and 64-bit IEEE-754 reading.

MMEMory:FORMat:READing:RLIMit {OFF|ON}
MMEMory:FORMat:READing:RLIMit?

This command when enabled, limits the maximum number rows per stored .csv data file to one million, including any header row, if enabled.

Parameter	Typical Return
OFF|ON Default: ON	OFF or ON
Disable row limits for the .csv file: MEM:FORM:READ:RLIM OFF	

Remarks

- Applies only to the DM34461A.
- Affects the format for the .csv file created by the MMEMory:STORe:DATA command, or by the data logging/digitizing features in the DM34461A.
- This feature enables you to accommodate common spreadsheet, database and data analysis programs that have limitations of 1 million rows per file.
  ON - Readings are stored in files named dat00001.csv, dat00002.csv, dat00003.csv ...
  OFF - Readings are is stored in a single file named dat00001.csv. The file size is limited to 2^{32} = 4.294967296 GBytes (the maximum allowed by the FAT32 file system).

MMEMory:LOAD:PREFerences <file>
MMEMory:STORe:PREFerences <file>

LOAD: Reboots the instrument and loads the nonvolatile I/O settings and user preferences from a file. The specified file cannot be empty or marked as hidden or system.

STORE: Stores nonvolatile I/O settings and user preferences to a file. If the destination file exists, it will be overwritten, unless marked as hidden or system.

CAUTION **When loading a preferences file that specifies a static IP address, be careful that this does not result in two instruments with the same IP address on your LAN. This could cause LAN configuration errors on both instruments.**

Parameter	Typical Return
Any valid file name The .prf file extension is optional. If you do not include this extension, the instrument firmware will automatically append it.	(none)
Stores the current nonvolatile I/O settings and user preferences into the specified file: `MEM:STOR:PREF "INT:\MyPreferences"`	
Load nonvolatile I/O settings and user preferences from the specified file:`MEM:LORD:PREF "INT:\MyPreferences"`	

Remarks

- See the State File/Preferences File table for a listing of the information contained in each file.
- The specified folder must exist and cannot be marked as hidden or system.

MMEMory:LOAD:STATe <filename>
MMEMory:STORe:STATe <filename>

This command loads an instrument state from a state file or saves the current instrument state to a state file. The file name optionally includes the folder name and the .sta file extension. If you do not include this extension, the instrument firmware will automatically append it.

Parameter	Typical Return
Any valid file name	(none)
Stores the current instrument state to the specified state file in the root directory of the internal flash file system: `MEM:STOR:STAT "INT:\MySetup"`	
Loads the instrument state from MySetup.sta saved by the previous command:`MEM:LORD:STAT "INT:\MySetup.sta"`	

Remarks

- See the State File/Preferences File table for a listing of the information contained in each file.
- The specified folder must exist and cannot be marked as hidden or system.
- The specified file cannot be empty or marked as hidden or system.
- The state file created by *SAV 0, called STATE_0.sta, resides in the root folder of the internal flash file system. It is overwritten with the power-down state of the instrument when power is cycled.

MMEMory:MOVE <file1>,<file2>

This command moves and/or renames <file1> to <file2>. Each file name must include the file extension.

Parameter	Typical Return
Any valid file name (both files)	(none)
Moves the specified state file from the currently selected default directory to the folder "Backup" on the internal flash file system: MEM:MOVE "MyVoltMeas.sta","INT:\Backup"	

Remarks

- To rename a file, specify the same folder for <file1> and <file2>.
- To move a file to a file of the same name in a different folder, you can specify just the <drive>:<path> for <file2>.

MMEMory:STATe:RECall:AUTO{ON|1|OFF|0}
MMEMory:STATe:RECall:AUTO?

This command disables or enables the automatic recall of the power-down state (state 0) when power is turned on. Select "ON" to automatically recall the power-down state (location 0) when power is turned on. Select "OFF" to issue a Factory Reset (*RST) at power-on.

Parameter	Typical Return
ON|1|OFF|0 Default: ON	0 (OFF) or 1 (ON)
Enables automatic recall of the power-down state: MEM:STAT:REC:AUTO ON	

Remarks

- When shipped from the factory, the instrument is configured to automatically recall the power-down state file when power is restored.
- This setting is non-volatile; it is not changed by power cycling, a Factory Reset (*RST), or an Instrument Preset.

MMEMory:STATe:RECall:SELect <file>
MMEMory:STATe:RECall:SELect?

This command selects which instrument state to use at power-on if the automatic recall mode is enabled MMEMory:STATe:RECall:AUTO ON. If the automatic recall mode is disabled MMEMory:STATe:RECall:AUTO OFF, a Factory Reset *RST is issued at power-on.

Parameter	Typical Return
Any valid file name	"INT:\MyVoltMeas"
Selects the power-down state to be used at power-on:MEM:STAT:REC:SEL "INT:\STATE_0"	

Remarks

- The specified folder must exist and cannot be marked as hidden or system.
- The state file created by *SAV 0, called STATE_0.sta, resides in the root folder of the internal flash file system. It is overwritten with the power-down state of the instrument when power is cycled.

- When shipped from the factory, the instrument is configured to automatically recall the power-down state file when power is restored.
- This setting is non-volatile; it is not changed by power cycling, a Factory Reset *RST, or an Instrument Preset SYSTem:PRESet.

MMEMory:STATe:VALid? <file>

This command returns 1 if the specified state file exists and contains a valid state file. Returns 0 otherwise.

Parameter	Typical Return
Any valid file name	1
Returns the status of MyState.sta in the root folder of the internal flash file system:MEM:STAT:VAL? "INT:\MyState.sta"	

Remarks

- The specified folder must exist and cannot be marked as hidden or system.
- The specified file cannot be empty or marked as hidden or system.
- Use this query before sending *RCL or MMEMory:LOAD:STATe to determine whether a state has been stored in the file.

MMEMory:STORe:DATA RDG_STORE, <file>

This command stores all measurements in reading memory to the specified data file. The file name optionally includes the folder name and the .csv or .dat file extension.

Parameter	Typical Return
Any valid file name	(none)
Stores all measurements in reading memory to MyVoltMeas.csv in the root folder of the internal flash file system: MEM:STOR:DATA RDG_STORE,"INT:\MyVoltMeas"	

Remarks

- If a .csv file extension is specified, or if no file extension is specified, the date is stored in ASCII format. If the .dat file extension is specified, the data is stored in binary format.
- The format of the file is affected by MMEMory:FORMat:READing:CSEParator, MMEMory:FORMat:READing:INFormation, and MMEMory:FORMat:READing:RLIMit.
- The destination folder must exist and cannot be marked as hidden or system.
- If the destination file exists, it will be overwritten, unless marked as hidden or system.

MMEMory:UPLoad? <filename>

This command uploads the contents of a file from the instrument to the host computer.

Parameter	Typical Return
Any valid file name	IEEE 488.2 definite-length block

Uploads the state file "Myfile.sta" in the root directory of the internal flash file system to the host computer: MEM:UPL? "INT:\Myfile.sta"

R Subsystem

Command Summary

- R?

R?[<max_readings>]

This command reads and erases all measurements from reading memory. The measurements are read and erased from the reading memory starting with the oldest measurement first.

Parameter	Typical Return
DM34460A: 1 to 50,000 (readings) DM34461A: 1 to 2,000,000 (readings) Default is all readings in memory.	(none)
Reads and removes the three oldest readings: R? 3	

Remarks

- The R? and DATA:REMove? queries can be used during a long series of readings to periodically remove readings from memory that would normally cause the reading memory to overflow. R? does not wait for all readings to complete. It sends the readings that are complete at the time the instrument receives the command. Use Read? or Fetch? if you want the instrument to wait until all readings are complete before sending readings.
- If you do not specify a value for <*max_readings*>, all measurements are read and erased.
- No error is generated if the reading memory contains less readings than requested. In this case, all available readings in memory are read and deleted.
- The number of readings returned may be less than that requested depending on the amount of reading memory in your instrument. You can store up to 50,000 measurements in the reading memory of the DM34460A or 2,000,000 measurements on the DM34461A. If reading memory overflows, new measurements overwrite the oldest measurements stored; the most recent measurements are always preserved. No error is generated, but the Reading Mem Ovfl bit (bit 14) is set in the Questionable Data Register's condition register (see Status System Introduction).
- The instrument clears all measurements from reading memory when the measurement configuration changes, or when any of these commands are executed: INITiate, MEASure:<function>?, READ?, *RST, SYSTem:PRESet.

READ Subsystem

Command Summary

- READ?

READ?

This command starts a new set of measurements, waits for all measurements to complete, and transfers all available measurements. Sending READ? is similar to sending INITiate followed immediately by FETCh?.

Parameter	Typical Return
(none)	(none)
Transfers measurements from reading memory:READ?	

Remarks

- The FETch? query does not erase measurements from the reading memory. You can send the query multiple times to retrieve the same data.
- You can store up to 50,000 measurements in the reading memory of the DM34460A or 2,000,000 measurements on the DM34461A. If reading memory overflows, new measurements overwrite the oldest measurements stored; the most recent measurements are always preserved. No error is generated, but the Reading Mem Ovfl bit (bit 14) is set in the Questionable Data Register's condition register (see Status System Introduction).
- The instrument clears all measurements from reading memory when the measurement configuration changes, or when any of these commands are executed: INITiate, MEASure:<function>?, READ?, *RST, SYSTem:PRESet.

SAMPle Subsystem

The SAMPle commands are used with the TRIGger commands to set up the triggering parameters. Use the SAMPle commands to set a sample count, sample source, and delay time for triggered sampling.

NOTE It is recommended that all triggered measurements be made using an appropriate fixed manual range. That is, turn autorange off (SENSe:<function>:RANGe:AUTO OFF), or set a fixed range using the SENSe:<function>:RANGe, CONFigure, or MEASure command.

Command Summary

- SAMPle:COUNt
- SAMPle:COUNt?
- SAMPle:COUNt:PRETrigger
- SAMPle:COUNt:PRETrigger?
- SAMPle:SOURce
- SAMPle:SOURce?
- SAMPle:TIMer
- SAMPle:TIMer?

SAMPle:COUNt {<count>|MIN|MAX|DEF}
SAMPle:COUNt? [{MIN|MAX|DEF}]

This command specifies the number of measurements (samples) the instrument takes per trigger.

Parameter	Typical Return
DM34460A: 1 to 1,000,000 ($1x10^6$) DM34461A: 1 to 1,000,000,000 ($1x10^9$) Default: 1	+1
Sets the sample count to 4: SAMP:COUN 4	

Remarks

- The front panel sample annunciator ("*") turns on during each measurement at slower rates. The annunciator toggles at a fixed rate for fast measurements.
- You can use the specified sample count in conjunction with a trigger count (TRIGger:COUNt), which sets the number of triggers to be accepted before returning to the "idle" trigger state. The total number of measurements returned are the product of the sample count and trigger count.
- You can store up to 50,000 measurements in the reading memory of the DM34460A, 2,000,000 measurements on the DM34461A. If reading memory overflows, new measurements overwrite the oldest measurements stored; the most recent measurements are always preserved. No error is generated, but the Reading Mem Ovfl bit (bit 14) is set in the Questionable Data Register's condition register (see Status System Introduction).
- MAX selects 1 billion readings. However, when pretrigger is selected, the maximum is 50,000 readings (without the MEM option) or 2,000,000 readings (with the MEM option).
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

SAMPle:COUNt:PRETrigger {<count>|MIN|MAX|DEF}
SAMPle:COUNt:PRETrigger? [{MIN|MAX|DEF}]

This command allows collection of the data being digitized before the trigger. Reserves memory for pretrigger samples up to the specified number of pretrigger samples.

NOTE It is recommended that all triggered measurements be made using an appropriate fixed manual range. That is, turn autorange off (SENSe:<function>:RANGe:AUTO OFF), or set a fixed range using the SENSe:<function>:RANGe, CONFigure, or MEASure command.

Parameter	Typical Return
<count>: 0 to 1,999,999 Default: 0	+999999
Sets the pretrigger sample count to 5000: SAMP:COUN:PRET 5000	

Remarks

- Pretrigger applies to all measurement functions except CONTinuity and DIODe test.
- Use SAMPle:COUNt to set the total number of samples to take, then use SAMPle:COUNt:PRETrigger to set the number of pretrigger samples to take.
  For example, with a sample count of 50,000, and a pretrigger sample count of 20,000, up to 20,000 samples are taken before the trigger, then 30,000 samples are taken after the trigger occurs.
  The sample count and pretrigger count do not affect when the trigger occurs. If the memory allocated for pre-trigger samples fills up, the oldest readings are discarded. In the example above, the 20,000 most recent pre-trigger samples are saved, even if more than 20,000 samples occur before the trigger. If the trigger occurs before the pretrigger count is satisfied, only the actual pretrigger samples taken are saved.
  In all cases, after the trigger is received, only sample count minus specified pretrigger count readings are taken. In this example, if the trigger occurs after 5 pretrigger samples have been taken (instead of the specified 20,000), only 30,000 post-trigger samples are taken. This is because memory was reserved for 20,000 pre-trigger samples.
- If a trigger occurs during a measurement, that measurement is considered to be a pretrigger sample.
- After setting the sample count and pretrigger sample count, you must place the DMM in the "wait-for-trigger" state using INITiate or READ?.
- The pretrigger sample count must be less than the sample count set with the SAMPle:COUNt command, and there must be at least one post-trigger sample:
  Pretrigger Sample Count ≤ Sample Count - 1
- If any of the calculation functions are on (CALC:STAT ON), the pretrigger count is limited to 10,000 samples.
- CONFigure and MEASure? set the pretrigger sample count to "0".
- The instrument sets the pretrigger sample count to "0" after a Factory Reset (*RST command) or a Preset (SYSTem:PRESet command).

See also

- SAMPle:COUNt

SAMPle:SOURce {IMMediate|TIMer}
SAMPle:SOURce?

This query determines sample timing, with TRIGger:DELay and SAMPle:TIMer to determine sample timing, when the sample count is greater than one.

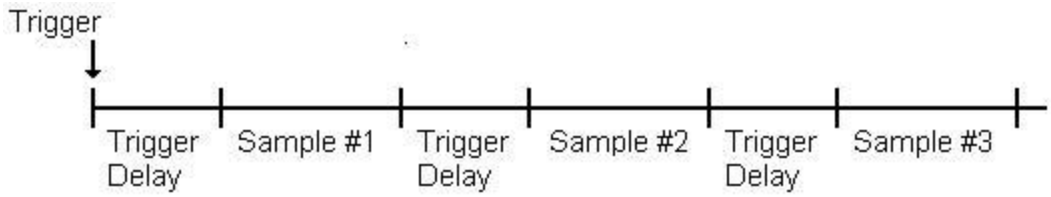
NOTE **It is recommended that all triggered measurements be made using an appropriate fixed manual range. That is, turn autorange off (SENSe:<function>:RANGe:AUTO OFF), or set a fixed range using the SENSe:<function>:RANGe, CONFigure, or MEASure command.**

Parameter	Typical Return
IMMediate|TIMer Default: IMMediate	IMM or TIM
Sets sample source to timer: SAMP:SOUR TIM	

Operation

In all cases, the first sample is taken one trigger delay time after the trigger (the delay being set with the TRIGger:DELay command). Beyond that, the timing mechanism depends on whether you select IMMediate (default) or TIMer as the source:

- IMMediate - The first sample starts one trigger delay time after the trigger, and then the trigger delay time is inserted between the first and second samples, the second and third, and so on:



  The sample timing *is not* deterministic because the delay time (set with TRIGger:DELay) is inserted *after* each sample completes. The actual time required to take each sample depends on the integration time and autoranging time. In this case, the SAMPle:TIMercommand has no effect.

- TIMer - The first sample starts one trigger delay time after the trigger. However, the second sample starts one sample interval after the start of the first sample, and so on:

  The sample timing *is* deterministic because the start of each sample is determined by the sample interval, set with the SAMPle:TiMer command (TRIGger:DELay affects only the start of the first sample). Integration and autoranging affect the sampling time for each sample, but not the sample interval as long as the sample interval is longer than the sampling time.

Remarks

- This command has no effect if the sample count is 1 (see SAMPle:COUNt).
- After setting the sample count, sample source, and the sample interval or trigger delay time, you must place the instrument in the "wait-for-trigger" state using the INITiate or READ? command. A trigger is not accepted from the selected trigger source (see TRIGger:SOURce command) until the instrument is in the "wait-for-trigger" state.
- The instrument sets the sample source to "IMM" after a Factory Reset (*RST command) or an instrument Preset (SYSTem:PRESet command).

See also

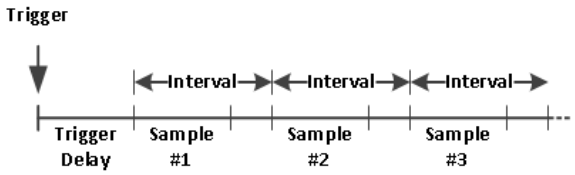
- TRIGger:COUNt
- TRIGger:DELay
- TRIGger:SOURce

- SAMPle:COUNt
- SAMPle:TIMer

SAMPle:TIMer {<interval>|MIN|MAX|DEF}
SAMPle:TIMer? [{MIN|MAX|DEF}]

This command sets a sample interval for timed sampling when the sample count is greater than one.

The first sample is taken one trigger delay time after the trigger (delay set by TRIGger:DELay). The second sample starts one sample interval after the start of the first sample, and so forth, as shown below:



Note that the sample timing is determinant because the start of each sample is determined by the sample interval. Integration and autoranging affect the sampling time for each sample, but not the sample interval as long as the sample interval is longer than the sampling time. Periodic sampling continues until the sample count (set with the SAMPle:COUNt command) is satisfied.

NOTE It is recommended that all triggered measurements be made using an appropriate fixed manual range. That is, turn autorange off (SENSe:<function>:RANGe:AUTO OFF), or set a fixed range using the SENSe:<function>:RANGe, CONFigure, or MEASure command. When autorange is left on, the starting time of a sample becomes uncertain (when a range change occurs) and when ranging exceeds the interval between samples; then all subsequent samples become offset from their desired start points.

Parameter	Typical Return
<interval>: MIN (see bullet points below) to 3600 seconds (~1 µs steps).	+3.60000000E+003
Sets the sample interval to 0.1 seconds: SAMP:TIM 0.1	

Remarks

- The value of MIN is measurement dependent. It depends on such things as the integration time, autozero on or off, autorange on or off, and the measurement range. Basically, MIN is automatically determined so that the sample interval is always greater than the sampling time (see above illustration). Execute SAMPle:TIMer? MIN to determine the recommended interval for the current measurement configuration.
- Since the minimum value changes depending on configuration, a command order dependency exists. You must completely configure the measurement before setting the sample timer to MIN, or you may generate an error. A complete configuration includes such things as math statistics or scaling.
- When using autorange, the MIN value is the *recommended* value, not the *absolute minimum* value. With autorange enabled, MIN is calculated assuming a single range change will occur for every measurement (not multiple ranges, just one range up or down per measurement). You can specify an <*interval*> between the absolute minimum (assumes no range changes) and the recommended MIN value, but it may generate a timing violation error when making measurements. Applying a value less than the absolute minimum will generate an error.

- To determine the absolute minimum value for the present configuration, set the sample time to 20 µs (which may generate a settings conflict error), then read back the current sample timer value using the SAMPle:TIMer? query. The sample source must be set to timer with a sample count or trigger count greater than 1, for the settings conflict error to occur. The settings conflict error causes the timer to be set to the absolute minimum value.
- The sample time resolution is 1 µs, the aperture resolution is 2 us, and the actual hardware resolution is not exactly 1 µs. There are cases where a sample time value, rounded to the nearest hardware resolution, will result in a smaller value than aperture when rounded to 2 µs. This will create error *-221,"Settings conflict; cannot meet requested timing; SAMP:TIM changed"*. For example, the following sequence of commands generates error -221 and sets the sample time to +2.00100000E-003.

  ```
  *RST
  FUNC "VOLT:DC"
  VOLT:DC:NPLC 0.002
  VOLT:DC:RANGE:AUTO OFF
  VOLT:DC:ZERO:AUTO OFF
  TRIG:DEL 0
  TRIG:SOUR BUS
  SAMP:COUN 2
  SAMP:TIM 0.002
  SAMP:SOUR TIM
  ```

  This error can also occur if you attempt to set both values an odd number of µs. For example, setting both values to 23 µs, generates error -221 and sets the sample timer to 24 µs.
- After setting the sample count, source, and delay time, you must place the meter in the "wait-for-trigger" state using the INITiate or READ?command. A trigger is not accepted from the selected trigger source (see TRIGger:SOURce command) until the instrument is in the "wait-for-trigger" state.
- The interval may be set to any value from the absolute minimum described above to 3600 seconds. However, the value is rounded to the nearest step. For dc measurements, the step size is 1 µs. For ac measurements, it is ac bandwidth dependent.
- The instrument sets the sample timer to 1 second after a reset (*RSTcommand) or an instrument preset (SYSTem:PRESetcommand).

See also

- TRIGger:COUNt
- TRIGger:DELay
- TRIGger:SOURce
- SAMPle:COUNt
- SAMPle:TIMer

SENSe Subsystem

The SENSe subsystem configures measurements. The most basic SENSe command is [SENSe:]FUNCtion [:ON], which selects the measurement function. All other SENSe commands are associated with specific measurement types:

Command Summary

[SENSe:]CURRent Subsystem

This subsystem configures AC and DC current measurements.

- [SENSe:]CURRent:AC:BANDwidth
- [SENSe:]CURRent:AC:BANDwidth?
- [SENSe:]CURRent:AC:SECondary
- [SENSe:]CURRent:AC:SECondary?
- [SENSe:]CURRent:{AC|DC}:NULL[:STATe]
- [SENSe:]CURRent:{AC|DC}:NULL[:STATe]?
- [SENSe:]CURRent:{AC|DC}:NULL:VALue
- [SENSe:]CURRent:AC|DC:NULL:VALue?
- [SENSe:]CURRent:{AC|DC}:NULL:VALue:AUTO
- [SENSe:]CURRent:{AC|DC}:NULL:VALue:AUTO?
- [SENSe:]CURRent:{AC|DC}:RANGe
- [SENSe:]CURRent:{AC|DC}:RANGe?
- [SENSe:]CURRent:{AC|DC}:RANGe:AUTO
- [SENSe:]CURRent:{AC|DC}:RANGe:AUTO?
- [SENSe:]CURRent[:DC]:NPLC
- [SENSe:]CURRent[:DC]:NPLC?
- [SENSe:]CURRent[:DC]:RESolution
- [SENSe:]CURRent[:DC]:RESolution?
- [SENSe:]CURRent[:DC]:SECondary
- [SENSe:]CURRent[:DC]:SECondary?
- [SENSe:]CURRent[:DC]:ZERO:AUTO
- [SENSe:]CURRent[:DC]:ZERO:AUTO?
- [SENSe:]CURRent:SWITch:MODE
- [SENSe:]CURRent:SWITch:MODE?

[SENSe:]VOLTage Subsystem

This subsystem configures AC voltage, DC voltage, and ratio measurements.

- [SENSe:]VOLTage:AC:BANDwidth
- [SENSe:]VOLTage:AC:BANDwidth?
- [SENSe:]VOLTage:AC:SECondary
- [SENSe:]VOLTage:AC:SECondary?
- [SENSe:]VOLTage:{AC|DC}:NULL[:STATe]
- [SENSe:]VOLTage:{AC|DC}:NULL[:STATe]?
- [SENSe:]VOLTage:{AC|DC}:NULL:VALue
- [SENSe:]VOLTage:{AC|DC}:NULL:VALue?
- [SENSe:]VOLTage:{AC|DC}:NULL:VALue:AUTO
- [SENSe:]VOLTage:{AC|DC}:NULL:VALue:AUTO?
- [SENSe:]VOLTage:{AC|DC}:RANGe
- [SENSe:]VOLTage:{AC|DC}:RANGe?
- [SENSe:]VOLTage:{AC|DC}:RANGe:AUTO
- [SENSe:]VOLTage:{AC|DC}:RANGe:AUTO?
- [SENSe:]VOLTage[:DC]:IMPedance:AUTO
- [SENSe:]VOLTage[:DC]:IMPedance:AUTO?
- [SENSe:]VOLTage[:DC]:NPLC
- [SENSe:]VOLTage[:DC]:NPLC?
- [SENSe:]VOLTage[:DC]:RATio:SECondary
- [SENSe:]VOLTage[:DC]:RATio:SECondary?
- [SENSe:]VOLTage[:DC]:RESolution
- [SENSe:]VOLTage[:DC]:RESolution?
- [SENSe:]VOLTage[:DC]:SECondary
- [SENSe:]VOLTage[:DC]:SECondary?
- [SENSe:]VOLTage[:DC]:ZERO:AUTO
- [SENSe:]VOLTage[:DC]:ZERO:AUTO?

[SENSe:]Capacitance Subsystem

This subsystem configures capacitance measurements.

- [SENSe:]CAPacitance:NULL[:STATe]
- [SENSe:]CAPacitance:NULL[:STATe]?
- [SENSe:]CAPacitance:NULL:VALue
- [SENSe:]CAPacitance:NULL:VALue?
- [SENSe:]CAPacitance:NULL:VALue:AUTO
- [SENSe:]CAPacitance:NULL:VALue:AUTO?
- [SENSe:]CAPacitance:RANGe
- [SENSe:]CAPacitance:RANGe?
- [SENSe:]CAPacitance:RANGe:AUTO
- [SENSe:]CAPacitance:RANGe:AUTO?
- [SENSe:]CAPacitance:SECondary
- [SENSe:]CAPacitance:SECondary?

[SENSe:]{FREQuency|PERiod} Subsystem

This subsystem configures frequency and period measurements.

- [SENSe:]{FREQuency|PERiod}:APERture
- [SENSe:]{FREQuency|PERiod}:APERture?
- [SENSe:]{FREQuency|PERiod}:NULL[:STATe]
- [SENSe:]{FREQuency|PERiod}:NULL[:STATe]?
- [SENSe:]{FREQuency|PERiod}:NULL:VALue
- [SENSe:]{FREQuency|PERiod}:NULL:VALue?
- [SENSe:]{FREQuency|PERiod}:NULL:VALue:AUTO
- [SENSe:]{FREQuency|PERiod}:NULL:VALue:AUTO?
- [SENSe:]{FREQuency|PERiod}:RANGe:LOWer
- [SENSe:]{FREQuency|PERiod}:RANGe:LOWer?
- [SENSe:]{FREQuency|PERiod}:TIMeout:AUTO
- [SENSe:]{FREQuency|PERiod}:TIMeout:AUTO?
- [SENSe:]{FREQuency|PERiod}:VOLTage:RANGe
- [SENSe:]{FREQuency|PERiod}:VOLTage:RANGe?
- [SENSe:]{FREQuency|PERiod}:VOLTage:RANGe:AUTO

- [SENSe:]{FREQuency|PERiod}:VOLTage:RANGe:AUTO?
- [SENSe:]FREQuency:SECondary
- [SENSe:]FREQuency:SECondary?
- [SENSe:]PERiod:SECondary
- [SENSe:]PERiod:SECondary?

[SENSe:]{RESistance|FRESistance} Subsystem

This subsystem configures two- and four-wire resistance measurements.

- [SENSe:]{RESistance|FRESistance}:NPLC
- [SENSe:]{RESistance|FRESistance}:NPLC?
- [SENSe:]{RESistance|FRESistance}:NULL[:STATe]
- [SENSe:]{RESistance|FRESistance}:NULL[:STATe]?
- [SENSe:]{RESistance|FRESistance}:NULL:VALue
- [SENSe:]{RESistance|FRESistance}:NULL:VALue?
- [SENSe:]{RESistance|FRESistance}:NULL:VALue:AUTO
- [SENSe:]{RESistance|FRESistance}:NULL:VALue:AUTO?
- [SENSe:]{RESistance|FRESistance}:RANGe
- [SENSe:]{RESistance|FRESistance}:RANGe?
- [SENSe:]{RESistance|FRESistance}:RANGe:AUTO
- [SENSe:]{RESistance|FRESistance}:RANGe:AUTO?
- [SENSe:]{RESistance|FRESistance}:RESolution
- [SENSe:]{RESistance|FRESistance}:RESolution?
- [SENSe:]{FRESistance|RESistance}:SECondary
- [SENSe:]{FRESistance|RESistance}:SECondary?
- [SENSe:]RESistance:ZERO:AUTO
- [SENSe:]RESistance:ZERO:AUTO?

[SENSe:]TEMPerature Subsystem

This subsystem configures temperature measurements.

- [SENSe:]TEMPerature:NPLC
- [SENSe:]TEMPerature:NPLC?
- [SENSe:]TEMPerature:NULL[:STATe]

- [SENSe:]TEMPerature:NULL[:STATe]?
- [SENSe:]TEMPerature:NULL:VALue
- [SENSe:]TEMPerature:NULL:VALue?
- [SENSe:]TEMPerature:NULL:VALue:AUTO
- [SENSe:]TEMPerature:NULL:VALue:AUTO?
- [SENSe:]TEMPerature:SECondary
- [SENSe:]TEMPerature:SECondary?
- [SENSe:]TEMPerature:TRANsducer:{FRTD|RTD}:RESistance[:REFerence]
- [SENSe:]TEMPerature:TRANsducer:{FRTD|RTD}:RESistance[:REFerence]?
- [SENSe:]TEMPerature:TRANsducer:TYPE {FRTD|RTD|FTHermistor|THERmistor}
- [SENSe:]TEMPerature:TRANsducer:TYPE?
- [SENSe:]TEMPerature:TRANsducer:{FTHermistor|THERmistor}:TYPE 5000
- [SENSe:]TEMPerature:TRANsducer:{FTHermistor|THERmistor}:TYPE?
- [SENSe:]TEMPerature:ZERO:AUTO
- [SENSe:]TEMPerature:ZERO:AUTO?

Miscellaneous

- [SENSe:]DATA2?
- [SENSe:]DATA2:CLEar[:IMMediate]
- [SENSe]:FUNCtion [:ON]<function>
- [SENSe]:FUNCtion[:ON]?

[SENSe:]CAPacitance:NULL[:STATe] {ON|1|OFF|0}
[SENSe:]CAPacitance:NULL[:STATe]?

This query turns the null function on or off for capacitance measurements.

Parameter	Typical Return
ON|1|OFF|0 Default: ON	0 (OFF) or 1 (ON)
Turns null function on: CAP:NULL ON	

Remarks

- To set a fixed null value, use:[SENSe:]CAPacitance:NULL:VALue.
- Enabling the scaling function also enables automatic null value selection ([SENSe:]CAPacitance:NULL:VALue:AUTO).
- The instrument disables the null function after a Factory Reset (*RST), Instrument Preset (SYSTem:PRESet), or CONFigure function.

[SENSe:]CAPacitance:NULL:VALue{<value>|MIN|MAX|DEF}
[SENSe:]CAPacitance:NULL:VALue?[{MIN|MAX|DEF}]

This command stores a null value for capacitance measurements. The null value is subtracted from each sample if the null state is turned on.

Parameter	Typical Return
<value>:-120 to +120 µF Default: 0	-1.20000000E-04
Measures the capacitance null value:CAP:NULL:VAL	

Remarks

- Specifying a null value disables automatic null value selection([SENSe:]CAPacitance:NULL:VALue:AUTO OFF).
- To use the null value, turn on the null state with the [Sense:]CAPacitance:NULL[:STATe] command.
- This parameter is set to its default value after a Factory Reset (*RST), Instrument Preset (SYSTem:PRESet), or CONFigure function.

[SENSe:]CAPacitance:NULL:VALue:AUTO {ON|1|OFF|0}
[SENSe:]CAPacitance:NULL:VALue:AUTO?

This command enables or disables automatic null value selection for capacitance measurements.

Parameter	Typical Return
ON|1|OFF|0 Default: ON	0 (OFF) or 1 (ON)
Uses the AUTO null function:CAP:NULL:VAL:AUTO ON	

Remarks

- When automatic reference selection is ON, the first measurement made is used as the null value for all subsequent measurements.[SENSe:]CAPacitance:NULL:VALue is set to this value. Automatic null value selection will be disabled.
- When automatic null value selection is disabled (OFF), the null value is specified by:[SENSe:]CAPacitance:NULL:VALue.
- The instrument enables automatic null value selection when the null function is enabled ([SENSe:]CAPacitance:NULL:STATe ON).
- This parameter is set to its default value after a Factory Reset (*RST), Instrument Preset (SYSTem:PRESet), or CONFigure function.

[SENSe:]CAPacitance:RANGe {<range>|MIN|MAX|DEF}
[SENSe:]CAPacitance:RANGe? [{MIN|MAX|DEF}]

This command selects a fixed range for capacitance measurements.

Parameter	Typical Return
<range>: 1 nF|10 nF|100 nF|1 µF|10 µF|100 µF Default: AUTO	+1.00000000E-09
Selects the 1 nF range:CAP:RANG 1 nF or CAP:RANG 0.000000001 or CAP:RANG 1.0E-9	

Remarks

- Selecting a fixed range ([SENSe:]<function>:RANGe) disables autoranging.
- If the input signal is greater than can be measured on the specified fixed range, the instrument displays Overload on front panel and returns "9.9E37" from the remote interface.
- This parameter is set to its default value after a Factory Reset (*RST command) or Instrument Preset (SYSTem:PRESet).

[SENSe:]CAPacitance:RANGe:AUTO {OFF|ON|ONCE}
[SENSe:]CAPacitance:RANGe:AUTO?

This command disables or enables autoranging for capacitance measurements.

Parameter	Typical Return
OFF|ON|ONCE Default: ON	0 (OFF) or 1 (ON)
Disables autoranging: CAP:RANG:AUTO OFF	

Remarks

- Autoranging goes down a range at less than 10% of range and up a range at greater than 120% of range. For capacitance measurements only, when autorange is off, the instrument does not report an overload for readings greater than 120% of range. Overload only occurs when the algorithm times out because the applied capacitance is too large for the algorithm to measure. If you apply a DC voltage or a short to the input terminals in capacitance measurement mode, the instrument reports an overload.
- ONCE performs an immediate autorange, and then sets autoranging to OFF. (Thus, the query returns "0".)
- Selecting a discrete range (see [SENSe:]CAPacitance:RANGe command) disables autoranging.
- This parameter is set to its default value after a Factory Reset (*RST command) or Instrument Preset (SYSTem:PRESet).

[SENSe:]CAPacitance:SECondary {"OFF"|"CALCulate:DATA"}
[SENSe:]CAPacitance:SECondary?

This command selects the secondary measurement function for capacitance measurements.

Parameter	Typical Return
"OFF"|"CALCulate:DATA" Default: OFF	"CALC:DATA"
Makes capacitance measurement and retrieves secondary measurement: `CAP:SEC "CALC:DATA`	

Remarks

- "CALCulate:DATA" - (Applies only to DM34461A.) The measurement value before any math operations are done (including NULL).
- Use READ? or INITiate to start the measurement. Use [SENSe:]DATA2? to retrieve the secondary measurement.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

[SENSe:]CURRent:AC:BANDwidth {<filter>|MIN|MAX|DEF}
[SENSe:]CURRent:AC:BANDwidth? [{MIN|MAX|DEF}]

This command sets the bandwidth for AC current measurements.

The instrument uses three different AC filters that enable you either to optimize low frequency accuracy or to achieve faster AC settling times following a change in input signal amplitude.

Parameter	Typical Return
<range>: 3 Hz|20 Hz|200 Hz Default: 20 Hz	+2.00000000E+01
Makes and reads an AC current measurement using the 3 Hz filter bandwidth: `CURR:AC:BAND 3`	

Remarks

- If you enter the lowest expected frequency that you intend to encounter, the command will select the appropriate <filter>. For example, if you enter 15 Hz, the slow filter (3 Hz) is selected. If you enter 190 Hz, the medium filter (20 Hz) is selected to provide the appropriate low cutoff.
- Set the lowest frequency that you expect to encounter. Lower bandwidths result in longer settling delays, as shown:

Input Frequency	Default Settling Delay
3 Hz - 300 kHz (Slow)	1.66 s/measurement
20 Hz - 300 kHz (Medium)	0.25 s/measurement
200 Hz - 300 kHz (Fast)	0.025 s/measurement

- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

[SENSe:]CURRent:AC:SECondary {"OFF"|"CALCulate:DATA"|"FREQuency"|"CURRent[:DC]"}
[SENSe:]CURRent:AC:SECondary?

This query selects the secondary measurement function for AC current measurements.

Parameter	Typical Return
"OFF"|"CALCulate:DATA"|"FREQuency"|"CURRent[:DC]" Default: OFF	"CALC:DATA"
Selects frequency as the secondary measurement:CURR:AC:SEC "FREQ"	

Remarks

- "CALCulate:DATA" - (Applies only to the DM34461A.) The measurement value before any math operations are done (including NULL).
- "FREQuency" - The frequency measurement of the input signal.
- "CURRent[:DC]" – The DC current measurement of the input signal. Applies only when using the instrument from the front panel. Setting is ignored for measurements made from a remote interface. If you require both AC and DC current measurements from remote, program each function separately, see CONFigure:CURRent:{AC|DC}.
- This parameter is set to its default value after a Factory Reset (*RST)or Instrument Preset (SYSTem:PRESet).

[SENSe:]CURRent:{AC|DC}:NULL[:STATe] {ON|1|OFF|0}
[SENSe:]CURRent:{AC|DC}:NULL[:STATe]?

This command enables or disables the null function for AC or DC current measurements.

NOTE This parameter setting is not shared between AC and DC measurements. The parameters are independent for AC and DC measurements.

Typical Return

<mode>: ON|1|OFF|0 Default: OFF	0 (OFF) or 1 (ON)
Enables the AC null function: CURR:AC:NULL:STAT ON	

Remarks

- Enabling the scaling function also enables automatic null value selection ([SENSe:]CURRent:{AC|DC}:NULL:VALue:AUTO ON).
- To set a fixed null value, use: [SENSe:]CURRent:{AC|DC}:NULL:VALue.
- The instrument disables the null function after a Factory Reset (*RST), Instrument Preset (SYSTem:PRESet) or CONFigure function.

[SENSe:]CURRent:{AC|DC}:NULL:VALue{|MIN|MAX|DEF}
[SENSe:]CURRent:{AC|DC}:NULL:VALue? [{MIN|MAX|DEF}]

This command sets the null value for AC or DC current measurements.

NOTE This parameter setting is not shared between AC and DC measurements. The parameters are independent for AC and DC measurements.

	Typical Return
-12 to 12 A Default: 0	+1.04530000E+00
Uses the null function to subtract 100 mA from the measurements:CURR:AC:NULL:VAL 100 mA	

Remarks

- Specifying a null value disables automatic null value selection ([SENSe:]CURRentAC|DC:NULL:VALue:AUTO OFF).
- To use the null value, the null state must be on ([SENSe:]CURRent:AC|DC:NULL:STATe ON).
- This parameter is set to its default value after a Factory Reset (*RST), Instrument Preset (SYSTem:PRESet) or CONFigure function.

[SENSe:]CURRent:{AC|DC}:NULL:VALue:AUTO {ON|1|OFF|0}
[SENSe:]CURRent:{AC|DC}:NULL:VALue:AUTO?

This command enables or disables automatic null value selection for AC or DC current measurements.

NOTE This parameter setting is not shared between AC and DC measurements. The parameters are independent for AC and DC measurements.

	Typical Return
ON|1|OFF|0 Default: ON	0 (OFF) or 1 (ON)
Makes a set of measurements using automatic null value selection:CURR:AC:NULL:VAL:AUTO ON	

Remarks

- When automatic reference selection is ON, the first measurement made is used as the null value for all subsequent measurements. [SENSe:]CURRent:{AC|DC}:NULL:VALue is set to this value. Automatic null value selection will be disabled.
- When automatic null value selection is disabled (OFF), the null value is specified by:[SENSe:]CURRent:{AC|DC}:NULL:VALue.
- The instrument enables automatic null value selection when the null function is enabled ([SENSe:]CURRent:{AC|DC}:NULL:STATe ON).
- This parameter is set to its default value after a Factory Reset (*RST), Instrument Preset (SYSTem:PRESet) or CONFigure function.

[SENSe:]CURRent:{AC|DC}:RANGe {<range>|MIN|MAX|DEF}
[SENSe:]CURRent:{AC|DC}:RANGe? [{MIN|MAX|DEF}]

This command selects the measurement range for AC and DC current measurements.

NOTE This parameter setting is not shared between AC and DC measurements. The parameters are independent for AC and DC measurements.

Parameter	Typical Return
<range>: 100 µA|1 mA|10 mA|100 mA|1 A|3 A Default: AUTO	+1.00000000E-01
Selects the 100 mA range: CURR:AC:RANG 0.1	

Remarks

- Selecting a fixed range ([SENSe:]<function>:RANGe) disables autoranging.
- If the input signal is greater than can be measured on the specified manual range, the instrument displays the word Overload on front panel and returns "9.9E37" from the remote interface.
- Changing the value of this parameter always changes the measurement resolution. The number of PLCs (NPLC) stays fixed, and this results in a change of resolution in terms of the units of the measurement.
  For example, if you have a measurement with 1 µA resolution on the 100 mA range, changing to the 1 A range results in a resolution of 10 µA.
- TThis parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

[SENSe:]CURRent:{AC|DC}:RANGe:AUTO{OFF|ON|ONCE}
[SENSe:]CURRent:{AC|DC}:RANGe:AUTO?

This command disables or enables autoranging for AC or DC current measurements. Autoranging is convenient because it automatically selects the range for each measurement based on the input signal.

Specifying ONCE performs an immediate autorange and then turns autoranging off.

NOTE This parameter setting is not shared between AC and DC measurements. The parameters are independent for AC and DC measurements.

Parameter	Typical Return
OFF|ON|ONCE Default: ON	(none)
Disables auto ranging: CURR:AC:RANG:AUTO OFF	

Remarks

- Autoranging goes down a range at less than 10% of range and up a range at greater than 120% of range.
- With autoranging enabled, the instrument selects the range based on the input signal.
- Selecting a fixed range ([SENSe:]<function>:RANGe) disables autoranging.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

[SENSe:]CURRent[:DC]:NPLC {<PLC>|MIN|MAX|DEF}
[SENSe:]CURRent[:DC]:NPLC? [{MIN|MAX|DEF}]

This command sets the integration time in number of power line cycles (PLC) for DC current measurements. Integration time is the period that the instrument's analog-to-digital (A/D) converter samples the input signal for a measurement. A longer integration time gives better measurement resolution but slower measurement speed.

Parameter	Typical Return
DM34460A: 0.02| 0.2|1| 10| 100 DM34461A: 0.001| 0.002| 0.006| 0.02| 0.06|0.2|1|10|100 Default: 10 See Range, Resolution and NPLC for more information.	+1.00000000E+00
Configures DC current measurements using a 10 PLC integration time:CURR:DC:NPLC 10	

Remarks

- Only integration times of 1, 10, or 100 PLC provide normal mode (line frequency noise) rejection.
- Setting the integration time also sets the measurement resolution. Resolution Table shows the relationship between integration time and resolution.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (System:PRESet).

See also

- [SENSe:]CURRent[:DC]:RESolution

[SENSe:]CURRent[:DC]:RESolution {<resolution>|MIN|MAX|DEF}
[SENSe:]CURRent[:DC]:RESolution? [{MIN|MAX|DEF}]

This command selects the measurement resolution for DC current measurements. Specify the resolution in the same units as the selected measurement function, not in number of digits.

Parameter	Typical Return

<resolution>: See Resolution Table or Range, Resolution and NPLC. The default is equivalent to 10 PLC. Spe- cify <resolution> in the measurement's units (V, A, Hz, Ω, and so on).	+3.00000000E-05
Sets the measurement resolution to maximum: CURR:DC:RES MAX	

Remarks

- You can specify MIN (best resolution) or MAX (worst resolution) instead of <resolution>.
- To achieve normal mode (line frequency noise) rejection, use a resolution that corresponds to an integration time that is an integral number of power line cycles.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (System:PRESet).

See also

- [SENSe:]CURRent[:DC]:NPLC

[SENSe:]CURRent[:DC]:SECondary {"OFF"|"CALCulate:DATA"|"CURRent:AC"|"PTPeak"}
[SENSe:]CURRent[:DC]:SECondary?

This command selects the secondary measurement function for DC current measurements.

Parameter	Typical Return
"OFF"|"CALCulate:DATA"|"CURRent:AC"|"PTPeak" Default: OFF	"CALC:DATA"
Selects peak-to-peak as the secondary measurement:CURR:DC:SEC "PTP"	

Remarks

- "CALCulate:DATA" - (Applies only to the DM34461A.) The measurement value before any math operations are done (including NULL).
- "CURRent:AC" - The AC current measurement of the input signal. Applies only when using the instrument from the front panel. Setting is ignored for measurements made from a remote interface. If you require both AC and DC current measurements from remote, program each function separately, see CONFigure:CURRent:{AC|DC}.
- "PTPeak" - The peak-to-peak, maximum, and minimum values of the input signal.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset.

[SENSe:]CURRent[:DC]:ZERO:AUTO{OFF|ON|ONCE}
[SENSe:]CURRent[:DC]:ZERO:AUTO?

This command disables or enables the autozero mode for DC current measurements.

Parameter	Typical Return
OFF|ON|ONCE Default: ON	0 (OFF) or 1 (ON)
Configures DC current measurements and perform an immediate autozero:CURR:DC:ZERO:AUTO ONCE	

Remarks

- ON (default): the DMM internally measures the offset following each measurement. It then subtracts that measurement from the preceding reading. This prevents offset voltages present on the DMM's input circuitry from affecting measurement accuracy.
- OFF: the instrument uses the last measured zero measurement and subtracts it from each measurement. It takes a new zero measurement each time you change the function, range or integration time.
- ONCE: the instrument takes one zero measurement and sets autozero OFF. The zero measurement taken is used for all subsequent measurements until the next change to the function, range or integration time. If the specified integration time is less than 1 PLC, the zero measurement is taken at 1 PLC to optimize noise rejection. Subsequent measurements are taken at the specified fast (< 1 PLC) integration time.
- The autozero mode is set indirectly when you set the resolution and integration time with CONFigure:CURRent:DC or MEASure:CURRent:DC?. Autozero is automatically turned OFF when you select an integration time less than 1 PLC with these commands.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset.

[SENSe:]CURRent:SWITch:MODE {FAST|CONTinuous}
[SENSe:]CURRent:SWITch:MODE?

This command selects the FAST or CONTinuous range change mode for AC and DC current measurements.

Parameter	Typical Return
FAST|CONTinuous Default: CONT	CONT
Specifies CONTinuous mode:CURR:SWIT:MODE CONT	

Remarks

- The DMM measures AC or DC current by measuring the voltage drop across one of several internal current shunts and then calculating the current. A different shunt is used depending on the selected current range. In CONTinuous mode (default), when changing current ranges, the DMM switches a low impedance in parallel with the first shunt before switching to the next shunt. This eliminates the momentary open circuit when changing ranges, but can take up to three times longer to change ranges than the FAST mode. In FAST mode, when a range change causes the DMM to switch from one shunt to another, a momentary open circuit occurs on the current input terminals. In most cases, this open circuit does not adversely affect your current measurements. However, if an open circuit adversely affects your circuitry or measurements, you can use CONTinuous mode.
- The switch mode applies to the 3A current terminals only.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset.

[SENSe:]DATA2?

This command retrieves the secondary measurement.

Parameter	Typical Return

(none)	See example below
Selects peak-to-peak as the secondary measurement:VOLT:DC:SEC "PTP"	

Remarks

- Returns 1, 2, or 3 values depending on the active secondary measurement. For example, ratio returns 2 values (main and sense terminal measurements); PTPeak returns 3 values (minimum peak, maximum peak, peak-to-peak).
- If there is currently no valid secondary measurement specified, the query returns "9.91000000E+37" (which is the IEEE488.2 definition of Not a Number - usually referred to as NaN).
- Configure secondary measurements using [SENSe:]CAPacitance:SECondary, [SENSe:]CURRent:AC:SECondary, [SENSe:]CURRent:DC:SECondary, [SENSe:]FREQuency:SECondary, [SENSe:]PERiod:SECondary, [SENSe:]TEMPerature:SECondary, [SENSe:]VOLTage:AC:SECondary, [SENSe:]VOLTage:DC:SECondary, or [SENSe:]VOLTage[:DC]:RATio:SECondary.
- Use READ? or INITiate to start the measurement. Use DATA2? to retrieve the secondary measurement.
- The instrument clears all measurements from reading memory when the measurement configuration changes, or when any of these commands are executed: INITiate, MEASure:<function>?, READ?, *RST, SYSTem:PRESet.

[SENSe:]DATA2:CLEar[:IMMediate]

This command clears the latest result(s) of the secondary measurement. This is typically used to clear the accumulated history of the peak-to-peak function ([SENSe:]VOLT:[DC:]SECondary "PTPeak" or [SENSe:]CURRent:[DC:]SECondary "PTPeak").

Parameter	Typical Return
(none)	(Data returned in this order: DCV reading, Min Peak, Max Peak, Peak-to-Peak)
Clears peak-to-peak secondary measurement data:DATA2:CLE	

[SENSe:]{FREQuency|PERiod}:APERture {<seconds>|MIN|MAX|DEF}
[SENSe:]{FREQuency|PERiod}:APERture? [{MIN|MAX|DEF}]

This command sets the aperture time (gate time) for frequency and period measurements.

NOTE This parameter is shared between frequency and period measurements. Setting or querying the parameter with the FREQuency version of this command is identical to setting or querying it with the PERiod version.

Parameter	Typical Return
10 ms|100 ms|1 s Default: 100 ms	+1.00000000E-01
Sets the aperture to 100 ms: FREQ:APER 0.1	

Remarks

- The aperture for frequency and period measurements does not autorange.
- The measurement resolution is related to the aperture (gate time) as follows:

Resolution	Aperture
10 ppm x <range>(DEFault)	10 ms
1 ppm x <range>	100 ms
0.1 ppm x <range>(MINimum)	1 s

- This parameter is set to its default value after a Factory Reset (*RST) or an Instrument Preset (SYSTem:PRESet).

[SENSe:]{FREQuency|PERiod}:NULL[:STATe] {ON|1|OFF|0}
[SENSe:]{FREQuency|PERiod}:NULL[:STATe]?

This command enables or disables the null function for frequency and period measurements.

Parameter	Typical Return
ON|1|OFF|0 Default: OFF	0 (OFF) or 1 (ON)
Enables the null function: FREQ:NULL:STAT ON	

Remarks

- Enabling the scaling function also enables automatic null value selection ([SENSe:]{FREQuency|PERiod}:NULL:VALue:AUTO ON).
- To set a fixed null value, use: [SENSe:{FREQuency|PERiod}:NULL:VALue.
- The instrument disables the null function after a Factory Reset (*RST), Instrument Preset (SYSTem:PRESet), or CONFigure function.

[SENSe:]{FREQuency|PERiod}:NULL:VALue {|MIN|MAX|DEF}
[SENSe:]{FREQuency|PERiod}:NULL:VALue? [{MIN|MAX|DEF}]

This command stores a null value for frequency and period measurements.

Parameter	Typical Return
Frequency: -1.2E6 to +1.2E6 Period: -1.2 to +1.2 seconds Default: 0	+1.00000000E-02
Uses the null function to subtract 1kHz from the measurements: FREQ:NULL:VAL 1 kHz	

Remarks

- Specifying a null value disables automatic null value selection ([SENSe:]{FREQuency|PERiod}:NULL:VALue:AUTO OFF).

- To use the null value, the null state must be on ([SENSe:]{FREQuency|PERiod}:NULL:STATe ON).
- This parameter is set to its default value after a Factory Reset (*RST), Instrument Preset (SYSTem:PRESet), or CONFigure function.

[SENSe:]{FREQuency|PERiod}:NULL:VALue:AUTO {ON|1|OFF|0}
[SENSe:]{FREQuency|PERiod}:NULL:VALue:AUTO?

This command enables or disables automatic null value selection for frequency and period measurements.

NOTE **Unlike the SENSe:FREQuency and SENSe:PERiod range and aperture commands, this parameter is not shared between frequency and period measurements. The null parameters are independent for frequency and period measurements.**

Parameter	Typical Return
ON|1|OFF|0 Default: OFF	0 (OFF) or 1 (ON)
Enables automatic null value selection: FREQ:NULL:VAL:AUTO ON	

Remarks

- When automatic reference selection is ON, the first measurement made is used as the null value for all subsequent measurements. [SENSe:]{FREQuency|PERiod}:NULL:VALue is set to this value. Automatic null value selection will be disabled.
- When automatic null value selection is disabled (OFF), the null value is specified by: [SENSe:]{FREQuency|PERiod}:NULL:VALue.
- The instrument enables automatic null value selection when the null function is enabled ([SENSe:]{FREQuency|PERiod}:NULL:STATe ON).
- This parameter is set to its default value after a Factory Reset (*RST command) or an Instrument Preset (SYSTem:PRESet command).

[SENSe:]{FREQuency|PERiod}:RANGe:LOWer {<freq>|MIN|MAX|DEF}
[SENSe:]{FREQuency|PERiod}:RANGe:LOWer? [{MIN|MAX|DEF}]

This command sets the AC bandwidth used to detect the signal during frequency and period measurements.

NOTE **This parameter is shared between frequency and period measurements. Setting or querying the parameter with the FREQuency version of this command is identical to setting or querying it with the PERiod version.**

The instrument uses three different AC filters that enable you either to optimize low frequency accuracy or to achieve faster AC settling times following a change in input signal amplitude. The instrument selects the slow (3 Hz), medium (20 Hz) or fast (200 Hz) filter based on the cutoff frequency specified by this command. Specify the lowest frequency that you expect to encounter.

Parameter	Typical Return
3 Hz|20 Hz|200 Hz Default: 20 Hz	+6.27530000E+03

Makes and reads a frequency measurement using the 3 Hz filter bandwidth: FREQ:RANG:LOW 3

Remarks

- If you enter the lowest expected frequency that you intend to encounter, the command will select the appropriate <filter>. For example, if you enter 15 Hz, the slow filter (3 Hz) is selected. If you enter 190 Hz, the medium filter (20 Hz) is selected to provide the appropriate low cutoff.
- Sets the lowest frequency that you expect to encounter. Lower bandwidths result in longer settling delays, as shown:

Input Frequency	Default Settling Delay
3 Hz - 300 kHz (Slow)	1.66 s/measurement
20 Hz - 300 kHz (Medium)	0.25 s/measurement
200 Hz - 300 kHz (Fast)	0.025 s/measurement

- This parameter is set to its default value after a Factory Reset (*RST command) or an Instrument Preset (SYSTem:PRESet command).

[SENSe:]{FREQuency|PERiod}:TIMeout:AUTO {ON|1|OFF|0}
[SENSe:]{FREQuency|PERiod}:TIMeout:AUTO?

This command controls how long the instrument waits before timing out on a frequency or period measurement when no signal is present.

Parameter	Typical Return
ON|1|OFF|0 Default: OFF	0 (OFF) or 1 (ON)

Enables the automatic timeout: TIM:AUTO ON

Remarks

- When set to OFF, the instrument waits 1 second before timing out. When set to ON, the wait time varies with AC filter bandwidth; for the faster bandwidths, the instrument waits a shorter time before timing out and returning 0.0. This is advantageous in manufacturing test systems where a DUT failure may result in no signal; in this case, the failure can be detected sooner, speeding up test throughput.
- This setting is non-volatile; it will not be changed by power cycling or Factory Reset (*RST) or an Instrument Preset (SYSTem:PRESet).

[SENSe:]{FREQuency|PERiod}:VOLTage:RANGe {<range>|MIN|MAX|DEF}
[SENSe:]{FREQuency|PERiod}:VOLTage:RANGe? [{MIN|MAX|DEF}]

This command selects a fixed voltage range for frequency and period measurements.

NOTE This parameter is shared between frequency and period measurements. Setting or querying the parameter with the FREQuency version of this command is identical to setting or querying it with the PERiod version.

WARNING The SAFETY LIMIT on the front HI/LO input terminals is 750 VAC (rms) for a sinusoidal waveform or 1000 V (peak) for any other waveform. Connections to AC MAINS are further limited to CAT II (300V). See the "Safety Information" section in the Keysight DM34460 Series 6½ Digit Digital Multimeter User's Guide for a complete discussion of the safety features, and the safe operation of this instrument.

Parameter	Typical Return
<range>: 100 mV|1 V|10 V|100 V|1000 V Default: 10 V	+1.04530000E+03

Selects the 10 VAC range for frequency measurements: `FREQ:VOLT:RANG 10`

Remarks

- The input signal for frequency or period measurements has an AC voltage component. Use this command to select a fixed voltage range for frequency and period measurements. Use [SENSe:]{FREQuency|PERiod}:VOLTage:RANGe:AUTO to disable or enable voltage autoranging or use CONFigure:{FREQuency|PERiod} to select voltage autoranging by default.
- Selecting a discrete range will disable auto ranging.
- If the input voltage is too large for the selected voltage range (manual ranging), the instrument displays the word Overload on the front panel and returns "9.9E37" from the remote interface. Autoranging can be enabled for the input voltage.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

[SENSe:]{FREQuency|PERiod}:VOLTage:RANGe:AUTO {OFF|ON|ONCE}
[SENSe:]{FREQuency|PERiod}:VOLTage:RANGe:AUTO?

This command disables or enables voltage autoranging for frequency and period measurements. Autoranging is convenient because it automatically selects the range for each measurement based on the input signal.

Specifying ONCE performs an immediate autorange and then turns autoranging off.

NOTE This parameter is shared between frequency and period measurements. Setting or querying the parameter with the FREQuency version of this command is identical to setting or querying it with the PERiod version.

WARNING The SAFETY LIMIT on the front HI/LO input terminals is 750 VAC (rms) for a sinusoidal waveform or 1000 V (peak) for any other waveform. Connections to AC MAINS are further limited to CAT II (300V). See the "Safety Information" section in the Keysight DM34460 Series 6½ Digit Digital Multimeter User's Guide for a complete discussion of the safety features, and the safe operation of this instrument.

Parameter	Typical Return
OFF|ON|ONCE Default: ON	0 (OFF) or 1 (ON)

Disables auto ranging: `FREQ:VOLT:RANG:AUTO OFF`

Remarks

- The input signal for frequency or period measurements has an AC voltage component. Use this command to disable or enable voltage autoranging or use CONFigure:{FREQuency|PERiod} to select voltage autoranging by default. Use [SENSe:]{FREQuency|PERiod}:VOLTage:RANGe to select a fixed voltage range for frequency and period measurements.
- Autoranging goes down a range at less than 10% of range and up a range at greater than 120% of range.
- Selecting a fixed range ([SENSe:]<function>:RANGe) disables autoranging.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

[SENSe:]FREQuency:SECondary {"OFF"|"CALCulate:DATA"|"PERiod"|"VOLTage:AC"}
[SENSe:]FREQuency:SECondary?

This command selects the secondary measurement function for frequency measurements.

Parameter	Typical Return
"OFF"|"CALCulate:DATA"|"PERiod"|"VOLTage:AC" Default: "OFF"	"CALC:DATA"
Selects period as the secondary measurement: FREQ:SEC "PERiod"	

Remarks

- "CALCulate:DATA" - (Applies only to the DM34461A.) The measurement value before any math operations are done (including NULL).
- "PERiod" - The period measurement of the input signal.
- "VOLTage:AC" - The AC voltage measurement of the input signal.
- This parameter is set to its default value after a Factory Reset (*RST) or an Instrument Preset (SYSTem:PRESet).

[SENSe:]PERiod:SECondary {"OFF"|"CALCulate:DATA"|"FREQuency"|"VOLTage:AC"}
[SENSe:]PERiod:SECondary?

This command selects the secondary measurement function for period measurements

Parameter	Typical Return
"OFF"|"CALCulate:DATA"|"FREQuency"|"VOLTage:AC" Default: "OFF"	"CALC:DATA"
Selects frequency as the secondary measurement: PER:SEC "FREQ"	

Remarks

- "CALCulate:DATA" - (Applies only to the DM34461A.) The measurement value before any math operations are done (including NULL).
- "FREQuency" - The frequency measurement of the input signal.

- "VOLTage:AC" - The AC voltage measurement of the input signal.
- This parameter is set to its default value after a Factory Reset (*RST) or an Instrument Preset (SYSTem:PRESet).

[SENSe]:FUNCtion[:ON]"<function>"
[SENSe]:FUNCtion[:ON]?

This command selects the measurement function (all function-related measurement attributes are retained).

Parameter	Typical Return
<function>: CAPacitance|CONTinuity|CURRent:AC|CURRent [:DC]|DIODe|FREQuency|FRESistance|PERiod|RESistance |TEMPerature|VOLTage:AC|VOLTage[:DC]|VOLTage[:DC]:RATio	The short form of the selected function is returned in quotation marks, with no optional keywords: "CONT", "CURR:AC", "CURR", "DIOD", and so on.
Selects the AC voltage function:FUNC "VOLT:AC"	

Remarks

- If you change the measurement function, all measurement attributes of the previous function (range, resolution, etc.) are remembered. If you return to the original function, all previously-defined measurement attributes will be restored.
- Changing the measurement function disables scaling, limit testing, histogram, statistics, and trend chart data collection (CALC:SCAL:STAT, CALC:LIM:STAT, CALC:TRAN:HIST:STAT, CALC:AVER:STAT, and CALC:TCH:STAT set to OFF).
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

[SENSe:]{RESistance|FRESistance}:NPLC {<PLC>|MIN|MAX|DEF}
[SENSe:]{RESistance|FRESistance}:NPLC? [{MIN|MAX|DEF}]

This command sets the integration time in number of power line cycles (PLC) for all resistance measurements. Integration time is the period that the instrument's analog-to-digital (A/D) converter samples the input signal for a measurement. A longer integration time gives better measurement resolution but slower measurement speed.

NOTE This parameter is common to 2-wire and 4-wire resistance measurements. Using the FRESistance version of this command or query is identical to using the RESistance version.

Parameter	Typical Return
DM34460A: 0.02|0.2|1|10|100 DM34461A: 0.001|0.002|0.006|0.02|0.06|0.2|1|10|100 Default: 10 See Range, Resolution and NPLC for more information.	+1.00000000E+01
Sets the 10 PLC integration time : RES:NPLC 10	

Remarks

- Only integration times of 1, 10, or 100 PLC provide normal mode (line frequency noise) rejection.
- Setting the integration time also sets the measurement resolution. Resolution Table shows the relationship between integration time and resolution.
- This parameter is set to its default value after a Factory Reset (*RST).

[SENSe:]{RESistance|FRESistance}:NULL[:STATe] {ON|1|OFF|0}
[SENSe:]{RESistance|FRESistance}:NULL[:STATe]?

This command enables or disables the null function for all resistance measurements.

Parameter	Typical Return
ON|1|OFF|0 Default: OFF	0 (OFF) or 1 (ON)
Enables the resistance null function: RES:NULL:STAT ON	

Remarks

- Enabling the scaling function also enables automatic null value selection ([SENSe:]{RESistance|FRESistance}:NULL:VALue:AUTO ON).
- To set a fixed null value, use: [SENSe:]{RESistance|FRESistance}:NULL:VALue.
- The instrument disables the null function after a Factory Reset (*RST), Instrument Preset (SYSTem:PRESet), or CONFigure function.

[SENSe:]{RESistance|FRESistance}:NULL:VALue {<value>|MIN|MAX|DEF}
[SENSe:]{RESistance|FRESistance}:NULL:VALue? [{MIN|MAX|DEF}]

This command stores a null value for all resistance measurements.

NOTE This parameter is common to 2-wire and 4-wire resistance measurements. Using the FRESistance version of this command or query is identical to using the RESistance version.

Parameter	Typical Return
-120 MΩ to +120 MΩ Default: 0	+1.04530000E+02
Uses the null function to store 100 mΩ of wiring resistance: RES:NULL:VAL .1	

Remarks

- Specifying a null value disables automatic null value selection ([SENSe:]{RESistance|FRESistance}:NULL:VALue:AUTO OFF).
- To use the null value, the null state must be on ([SENSe:]{RESistance|FRESistance}:NULL:STATe ON).
- This parameter is set to its default value after a Factory Reset (*RST), Instrument Preset (SYSTem:PRESet), or CONFigure function.

[SENSe:]{RESistance|FRESistance}:NULL:VALue:AUTO {ON|1|OFF|0}
[SENSe:]{RESistance|FRESistance}:NULL:VALue:AUTO?

This command enables or disables automatic null value selection for all resistance measurements.

NOTE This parameter is common to 2-wire and 4-wire resistance measurements. Using the FRESistance version of this command or query is identical to using the RESistance version.

Parameter	Typical Return
ON|1|OFF|0 Default: OFF	0 (OFF) or 1 (ON)
Enables the automatic null value selection: RES:NULL:VAL:AUTO ON	

Remarks

- When automatic reference selection is ON, the first measurement made is used as the null value for all subsequent measurements. [SENSe:]{RESistance|FRESistance}:NULL:VALue is set to this value. Automatic null value selection will be disabled.
- When automatic null value selection is disabled (OFF), the null value is specified by: [SENSe:]{RESistance|FRESistance}:NULL:VALue.
- The instrument enables automatic null value selection when the null function is enabled ([SENSe:]{RESistance|FRESistance}:NULL:STATe ON).
- This parameter is set to its default value after a Factory Reset (*RST), Instrument Preset (SYSTem:PRESet), or CONFigure function.

[SENSe:]{RESistance|FRESistance}:RANGe {<range>|MIN|MAX|DEF}
[SENSe:]{RESistance|FRESistance}:RANGe? [{MIN|MAX|DEF}]

This command selects the measurement range for resistance measurements.

NOTE This parameter is common to 2-wire and 4-wire resistance measurements. Using the FRESistance version of this command or query is identical to using the RESistance version.

Parameter	Typical Return
100 Ω|1 kΩ|10 kΩ|100 kΩ|1 MΩ|10 MΩ|100 MΩ Default: 1 kΩ	+1.00000000E+03
Selects the 10 kΩ range resistance measurement: RES:RANG 10E+3	

Remarks

- Selecting a fixed range ([SENSe:]<function>:RANGe) disables autoranging.
- If the input signal is greater than can be measured on the specified manual range, the instrument displays the word Overload on front panel and returns "9.9E37" from the remote interface.

See also

- [SENSe:]{RESistance|FRESistance}:RANGe:AUTO

[SENSe:]{RESistance|FRESistance}:RANGe:AUTO {OFF|ON|ONCE}
[SENSe:]{RESistance|FRESistance}:RANGe:AUTO?

This command disables or enables auto ranging for resistance measurements. Autoranging is convenient because it automatically selects the range for each measurement based on the input signal.

Specifying ONCE performs an immediate autorange and then turns autoranging off.

Parameter	Typical Return
OFF|ON|ONCE Default: ON	0 (OFF) or 1 (ON)
Disables auto ranging: RES:RANG:AUTO OFF	

Remarks

- Autoranging goes down a range at less than 10% of range and up a range at greater than 120% of range.
- With autoranging enabled, the instrument selects the range based on the input signal.
- Selecting a fixed range ([SENSe:]<function>:RANGe) disables autoranging.
- The parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

[SENSe:]{RESistance|FRESistance}:RESolution {<resolution>|MIN|MAX|DEF}
[SENSe:]{RESistance|FRESistance}:RESolution? [{MIN|MAX|DEF}]

This command selects the measurement resolution for resistance measurements. Specify the resolution in the same units as the selected measurement function, not in number of digits.

NOTE This parameter is common to 2-wire and 4-wire resistance measurements. Using the FRESistance version of this command or query is identical to using the RESistance version.

Parameter	Typical Return
<resolution>: See Resolution Table or Range, Resolution and NPLC. The default is equivalent to 10 PLC. Specify <resolution> in the measurement's units (V, A, Hz, Ω, and so on).	+3.00000000E+00
Configures 2-wire resistance measurements with a 3 Ω resolution: RES:RES 3	

Remarks

- You can specify MIN (best resolution) or MAX (worst resolution) instead of <resolution>.
- To achieve normal mode (line frequency noise) rejection, use a resolution that corresponds to an integration time that is an integral number of power line cycles.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

See also

- [SENSe:]{RESistance|FRESistance}:NPLC

[SENSe:]{FRESistance|RESistance}:SECondary {"OFF"|"CALCulate:DATA"}
[SENSe:]{FRESistance|RESistance}:SECondary?

This command selects the secondary measurement function for all resistance measurements.

Parameter	Typical Return
"OFF"|"CALCulate:DATA" Default: OFF	"CALC:DATA"
Disables the resistance secondary measurement: RES:SEC "OFF"	

Remarks

- "CALCulate:DATA" - (Applies only to the DM34461A.)The measurement value before any math operations are done (including NULL).
- Use READ? or INITiate to start the measurement. Use [SENSe:]DATA2? to retrieve the secondary measurement.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

[SENSe:]RESistance:ZERO:AUTO {OFF|ON|ONCE}
[SENSe:]RESistance:ZERO:AUTO?

This command disables or enables the autozero mode for 2-wire resistance measurements.

ON (default): the DMM internally measures the offset following each measurement. It then subtracts that measurement from the preceding reading. This prevents offset voltages present on the DMM's input circuitry from affecting measurement accuracy.

OFF: the instrument uses the last measured zero measurement and subtracts it from each measurement. It takes a new zero measurement each time you change the function, range or integration time.

ONCE: the instrument takes one zero measurement and sets autozero OFF. The zero measurement taken is used for all subsequent measurements until the next change to the function, range or integration time. If the specified integration time is less than 1 PLC, the zero measurement is taken at 1 PLC to optimize noise rejection. Subsequent measurements are taken at the specified fast (< 1 PLC) integration time.

Parameter	Typical Return
OFF|ON|ONCE Default: ON	0 (OFF) or 1 (ON)
Performs an immediate autozero: RES:ZERO:AUTO ONCE	

Remarks

- Does not affect 4-wire resistance measurements, which are always made with autozero ON.
- The autozero mode is set indirectly when you set the resolution and integration time using CONFigure:RESistance, CONFigure:FRESistance or MEASure[:SCALar]:FRESistance?, MEASure[:SCALar]:RESistance?. Autozero is automatically turned OFF when you select an integration time less than 1 PLC with these commands.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

[SENSe:]TEMPerature:NPLC {<PLC>|MIN|MAX|DEF}
[SENSe:]TEMPerature:NPLC? [{MIN|MAX|DEF}]

This command sets the integration time in number of power line cycles (PLC) for temperature measurements. Integration time is the period that the instrument's analog-to-digital (A/D) converter samples the input signal for a measurement. A longer integration time gives better measurement resolution but slower measurement speed.

Parameter	Typical Return
DM34460A: 0.02|0.2|1|10|100 DM34461A: 0.001|0.002|0.006|0.02|0.06|0.2|1|10|100 Default: 10 See Range, Resolution and NPLC for more information.	+1.00000000E+01
Selects a 10 PLC integration time for temperature measurement: TEMP:NPLC 10	

Remarks

- Only integration times of 1, 10, or 100 PLC provide normal mode (line frequency noise) rejection.
- Setting the integration time also sets the measurement resolution. Resolution Table shows the relationship between integration time and resolution.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

[SENSe:]TEMPerature:NULL[:STATe] {ON|1|OFF|0}
[SENSe:]TEMPerature:NULL[:STATe]?

This command enables or disables the null function for temperature measurements.

Parameter	Typical Return
ON|1|OFF|0 Default: OFF	0 (OFF) or 1 (ON)
Enables the null function for temperature measurement: TEMP:NULL:STAT ON	

Remarks

- Enabling the scaling function also enables automatic null value selection ([SENSe:]TEMPerature:NULL:VALue:AUTO ON).
- To set a fixed null value, use: [SENSe:]TEMPerature:NULL:VALue.

- The instrument disables the null function after a Factory Reset (*RST), Instrument Preset (SYSTem:PRESet), or CONFigure function.

[SENSe:]TEMPerature:NULL:VALue {<value>|MIN|MAX|DEF}
[SENSe:]TEMPerature:NULL:VALue? [{MIN|MAX|DEF}]

This command stores a null value for temperature measurements.

Parameter	Typical Return
-1.0E15 to +1.0E15 Default: 0	+2.50000000E+01
Sets the null function to subtract 25°: TEMP:NULL:VAL 25	

Remarks

- Specifying a null value disables automatic null value selection ([SENSe:]TEMPerature:NULL:VALue:AUTO OFF).
- To use the null value, the null state must be on ([SENSe:]TEMPerature:NULL:STATe ON).
- This parameter is set to its default value after a Factory Reset (*RST), Instrument Preset (SYSTem:PRESet), or CONFigure function.

[SENSe:]TEMPerature:NULL:VALue:AUTO {ON|1|OFF|0}
[SENSe:]TEMPerature:NULL:VALue:AUTO?

This command enables or disables automatic null value selection for temperature measurements.

Parameter	Typical Return
ON|1|OFF|0 Default: OFF	0 (OFF) or 1 (ON)
Uses automatic null value selection: TEMP:NULL:VAL:AUTO ON	

Remarks

- When automatic reference selection is ON, the first measurement made is used as the null value for all subsequent measurements. [SENSe:]TEMPerature:NULL:VALue is set to this value. Automatic null value selection will be disabled.
- When automatic null value selection is disabled (OFF), the null value is specified by: [SENSe:]TEMPerature:NULL:VALue.
- The instrument enables automatic null value selection when the null function is enabled ([SENSe:]TEMPerature:NULL:STATe ON).
- This parameter is set to its default value after a Factory Reset (*RST), Instrument Preset (SYSTem:PRESet), or CONFigure function.

[SENSe:]TEMPerature:SECondary {"OFF"|"CALCulate:DATA"|"SENSe:DATA"}
[SENSe:]TEMPerature:SECondary?

This command selects the secondary measurement function for temperature measurements.

Parameter	Typical Return
"OFF"|"CALCulate:DATA"|"SENSe:DATA" Default: OFF	"CALC:DATA"
Selects the raw sensor value measurement: TEMP:SEC "SENS:DATA"	

Remarks

- "CALCulate:DATA" - (Applies only to the DM34461A.) The measurement value before any math operations are done (including NULL).
- "SENSe:DATA" is the raw sensor value; resistance for thermistor/RTD and voltage.
- Use READ? or INITiate to start the measurement.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

[SENSe:]TEMPerature:TRANsducer:{FRTD|RTD}:RESistance[:REFerence] {<reference>|MIN|MAX|DEF}
[SENSe:]TEMPerature:TRANsducer:{FRTD|RTD}:RESistance[:REFerence]? [{MIN|MAX|DEF}]

This command selects the nominal resistance (R_0) for 2-wire and 4-wire RTD measurements. R_0 is the nominal resistance of an RTD at 0 °C.

Parameter	Typical Return
80 Ω to 120 Ω Default: 100 Ω.	+1.00100000E+02
Selects an FRTD with an R_0 of 100.1 Ω: TEMP:TRAN:FRTD:RES 100.1	

Remarks

- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

[SENSe:]TEMPerature:TRANsducer:TYPE {FRTD|RTD|FTHermistor|THERmistor}
[SENSe:]TEMPerature:TRANsducer:TYPE?

This command selects the transducer probe type to use for temperature measurements. The supported probes are 2-wire and 4-wire RTDs, 2-wire and 4-wire thermistors (2.2 kΩ 44004 type, 5 kΩ 44007 type and 10 kΩ 44006 type, see Thermistor Requirements).

Parameter	Typical Return
FRTD|RTD|FTHermistor|THERmistor Default: FRTD	FRTD, RTD, FTH, or THER
Selects FRTD as the transducer probe type to measure temperature: TEMP:TRAN:FRTD	

Remarks

- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

[SENSe:]TEMPerature:TRANsducer:{FTHermistor|THERmistor}:TYPE 5000
[SENSe:]TEMPerature:TRANsducer:{FTHermistor|THERmistor}:TYPE?

This command selects the thermistor type for 2-wire and 4-wire temperature measurements. Choosing the THERmistor or the FTHermistor command form makes no difference, as both commands affect the same parameter.

Parameter	Typical Return
5000 (only available choice)	+5000
Selects a thermistor type for temperature measurement: TEMP:TRAN:FTH:TYPE 5000	

[SENSe:]TEMPerature:ZERO:AUTO {OFF|ON|ONCE}
[SENSe:]TEMPerature:ZERO:AUTO?

This command disables or enables the autozero mode for 2-wire resistance measurements.

ON (default): the DMM internally measures the offset following each measurement. It then subtracts that measurement from the preceding reading. This prevents offset voltages present on the DMM's input circuitry from affecting measurement accuracy.

OFF: the instrument uses the last measured zero measurement and subtracts it from each measurement. It takes a new zero measurement each time you change the function, range or integration time.

ONCE: the instrument takes one zero measurement and sets autozero OFF. The zero measurement taken is used for all subsequent measurements until the next change to the function, range or integration time. If the specified integration time is less than 1 PLC, the zero measurement is taken at 1 PLC to optimize noise rejection. Subsequent measurements are taken at the specified fast (< 1 PLC) integration time.

Parameter	Typical Return
OFF|ON|ONCE Default: ON	0 (OFF) or 1 (ON)
Performs an immediate autozero: TEMP:ZERO:AUTO ONCE	

Remarks

- Does not affect 4-wire resistance measurements, which are always made with autozero ON.
- The autozero mode is set indirectly when you set the resolution and integration time using CONFigure:TEMPerature or MEASure:TEMPerature?. Autozero is automatically turned OFF when you select an integration time less than 1 PLC with these commands.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

[SENSe:]VOLTage:AC:BANDwidth {<filter>|MIN|MAX|DEF}
[SENSe:]VOLTage:AC:BANDwidth? [{MIN|MAX|DEF}]

This command sets the bandwidth for AC voltage measurements.

The instrument uses three different AC filters that enable you either to optimize low frequency accuracy or to achieve faster AC settling times following a change in input signal amplitude. The instrument selects the slow (3 Hz), medium (20 Hz) or fast (200 Hz) filter based on the cutoff frequency specified by this command. Specify the lowest frequency that you expect to encounter.

Parameter	Typical Return
3 Hz|20 Hz|200 Hz Default: 20 Hz	+2.00000000E+01
Selects the 3 Hz filter bandwidth: VOLT:AC:BAND 3	

Remarks

- If you enter the lowest expected frequency that you intend to encounter, the command will select the appropriate <filter>. For example, if you enter 15 Hz, the slow filter (3 Hz) is selected. If you enter 190 Hz, the medium filter (20 Hz) is selected to provide the appropriate low cutoff.
- Set the lowest frequency that you expect to encounter. Lower bandwidths result in longer settling delays, as shown:

Input Frequency	Default Settling Delay
3 Hz - 300 kHz (Slow)	2.5000 s/measurement
20 Hz - 300 kHz (Medium)	0.6250 s/measurement
200 Hz - 300 kHz (Fast)	0.0250 s/measurement

- The parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

[SENSe:]VOLTage:AC:SECondary {"OFF"|"CALCulate:DATA"|"FREQuency"|"VOLTage[:DC]"}
[SENSe:]VOLTage:AC:SECondary?

This command selects the secondary measurement function for AC voltage measurements.

Parameter	Typical Return
"OFF"|"CALCulate:DATA"|"FREQuency"|"VOLTage [:DC]" Default "OFF"	"CALC:DATA"
Selects frequency as the secondary measurement: VOLT:AC:SEC "FREQ"	

Remarks

- "CALCulate:DATA" - (Applies only to the DM34461A.) The measurement value before any math operations are done (including NULL).
- "FREQuency" - The frequency measurement of the input signal.

- "VOLTage[:DC]" - The DC voltage measurement of the input signal. Applies only when using the instrument from the front panel. Setting is ignored for measurements made from a remote interface. If you require both AC and DC voltage measurements from remote, program each function separately, see CONFigure[:VOLTage]:AC or CONFigure[:VOLTage][:DC].
- Use READ? or INITiate to start the measurement.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

[SENSe:]VOLTage:{AC|DC}:NULL[:STATe]{ON|1|OFF|0}
[SENSe:]VOLTage:{AC|DC}:NULL[:STATe]?

This command enables or disables the null function for AC or DC voltage measurements.

NOTE This parameter setting is not shared between AC and DC measurements. The parameters are independent for AC and DC measurements.

Parameter	Typical Return
ON|1|OFF|0 Default: OFF	0 (OFF) or 1 (ON)
Enables the null function for AC voltage measurement: VOLT:AC:NULL:STAT ON	

Remarks

- Enabling the scaling function also enables automatic null value selection ([SENSe:]VOLTage:{AC|DC}:NULL:VALue:AUTO ON).
- To set a fixed null value, use: [SENSe:]VOLTage:{AC|DC}:NULL:VALue.
- The null function is not available for DC ratio measurements.
- The instrument disables the null function after a Factory Reset (*RST), Instrument Preset (SYSTem:PRESet) or CONFigure function.

[SENSe:]VOLTage:{AC|DC}:NULL:VALue {|MIN|MAX|DEF}
[SENSe:]VOLTage:{AC|DC}:NULL:VALue? [{MIN|MAX|DEF}]

This command stores a null value for voltage measurements.

NOTE This parameter setting is not shared between AC and DC measurements. The parameters are independent for AC and DC measurements.

Parameter	Typical Return
-1200 to +1200 V Default: 0	+1.00000000E-02
Uses the null function to subtract 100 mV from the measurements: VOLT:AC:NULL:VAL 100 mV	

Remarks

- Specifying a null value disables automatic null value selection ([SENSe:]VOLTage:{AC|DC}:NULL:VALue:AUTO OFF).
- To use the null value, the null state must be on ([SENSe:]VOLTage:{AC|DC}:NULL:STATe ON).
- The null function is not available for DC ratio measurements.
- This parameter is set to its default value after a Factory Reset (*RST), Instrument Preset (SYSTem:PRESet) or CONFigure function.

[SENSe:]VOLTage:{AC|DC}:NULL:VALue:AUTO {ON|1|OFF|0}
[SENSe:]VOLTage:{AC|DC}:NULL:VALue:AUTO?

This command enables or disables automatic null value selection for AC voltage or DC voltage measurements.

NOTE This parameter setting is not shared between AC and DC measurements. The parameters are independent for AC and DC measurements.

Parameter	Typical Return
ON|1|OFF|0 Default: OFF	0 (OFF) or 1 (ON)
Enables automatic null value selection: VOLT:AC:NULL:VAL:AUTO ON	

Remarks

- When automatic reference selection is ON, the first measurement made is used as the null value for all subsequent measurements.[SENSe:]VOLTage:{AC|DC}:NULL:VALue is set to this value. Automatic null value selection will be disabled.
- When automatic null value selection is disabled (OFF), the null value is specified by:[SENSe:]VOLTage:{AC|DC}:NULL:VALue.
- The instrument enables automatic null value selection when the null function is enabled ([SENSe:]VOLTage:{AC|DC}:NULL:STATe ON).
- The null function is not available for DC ratio measurements.
- This parameter is set to its default value after a Factory Reset (*RST), Instrument Preset (SYSTem:PRESet) or CONFigure function.

[SENSe:]VOLTage:{AC|DC}:RANGe {<range>|MIN|MAX|DEF}
[SENSe:]VOLTage:{AC|DC}:RANGe? [{MIN|MAX|DEF}]

This command selects a fixed measurement range for AC and DC voltage measurements and DC ratio measurements.

NOTE This parameter setting is not shared between AC and DC measurements. The parameters are independent for AC and DC measurements.

WARNING The SAFETY LIMIT on the front HI/LO input terminals is 750 VAC (rms) for a sinusoidal waveform or 1000 V (peak) for any other waveform. Connections to AC MAINS are further limited to CAT II (300V). See the "Safety Information" section in the Keysight DM34460 Series 6½ Digit Digital Multimeter User's Guide for a complete discussion of the safety features, and the safe operation of this instrument.

Parameter	Typical Return
<range>: 100 mV|1 V|10 V|100 V|1000 V AC default: 10 V DC default: 1000 V	+1.00000000E+01
Selects the 10 volt range: VOLT:AC:RANG 10	

Remarks

- Selecting a fixed range ([SENSe:]<function>:RANGe) disables autoranging.
- If the input signal is greater than can be measured on the specified manual range, the instrument displays the word Overload on front panel and returns "9.9E37" from the remote interface.
- The instrument is set to the default range, with autoranging enabled ([SENSe:]VOLTage:{AC|DC}:RANGe:AUTO ON), after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

[SENSe:]VOLTage:{AC|DC}:RANGe:AUTO {OFF|ON|ONCE}
[SENSe:]VOLTage:{AC|DC}:RANGe:AUTO?

This command disables or enables autoranging for AC and DC voltage measurements and for DC ratio measurements. Autoranging is convenient because it automatically selects the range for each measurement based on the input signal.

Specifying ONCE performs an immediate autorange and then turns autoranging off.

NOTE This parameter setting is not shared between AC and DC measurements. The parameters are independent for AC and DC measurements.

WARNING The SAFETY LIMIT on the front HI/LO input terminals is 750 VAC (rms) for a sinusoidal waveform or 1000 V (peak) for any other waveform. Connections to AC MAINS are further limited to CAT II (300V). See the "Safety Information" section in the Keysight DM34460 Series 6½ Digit Digital Multimeter User's Guide for a complete discussion of the safety features, and the safe operation of this instrument.

Parameter	Typical Return
OFF|ON|ONCE Default: ON	0 (OFF) or 1 (ON)
Disables auto ranging: VOLT:AC:RANG:AUTO OFF	

Remarks

- Autoranging goes down a range at less than 10% of range and up a range at greater than 120% of range.
- With autoranging enabled, the instrument selects the range based on the input signal.

- Selecting a fixed range ([SENSe:]<function>:RANGe) disables autoranging.
- The instrument enables auto ranging after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

[SENSe:]VOLTage[:DC]:IMPedance:AUTO {ON|1|OFF|0}
[SENSe:]VOLTage[:DC]:IMPedance:AUTO?

This command disables or enables the automatic input impedance mode for DC voltage measurements.

Parameter	Typical Return
ON|1|OFF|0 Default: OFF	0 (OFF) or 1 (ON)
Disables the automatic input impedance mode: VOLT:IMP:AUTO OFF	

Remarks

- This command affects DC voltage measurements only.
- Normally, the instrument's input resistance is fixed at 10 MΩ for all DC voltage measurements to minimize noise pickup.
- In the default mode ("AUTO OFF"), the input impedance for DC voltage measurements is fixed at 10 MΩ for all ranges. — In the automatic input impedance mode ("AUTO ON"), the input impedance for dc voltage measurements is automatically selected according to range. The impedance is set to "HI-Z" (>10 GΩ) for the 100 mV and 1 V ranges. The 10 V, 100 V and 1000 V ranges remain at a 10 MΩ input impedance.
- This setting is reset to the default (fixed, 10 MΩ) by the *RST and SYSTem:PRESet commands.

[SENSe:]VOLTage[:DC]:NPLC {<PLC>|MIN|MAX|DEF}
[SENSe:]VOLTage[:DC]:NPLC? [{MIN|MAX|DEF}]

This command sets the integration time in number of power line cycles (PLC) for DC voltage and ratio measurements. Integration time is the period that the instrument's analog-to-digital (A/D) converter samples the input signal for a measurement. A longer integration time gives better measurement resolution but slower measurement speed.

Parameter	Typical Return
DM34460A: 0.02|0.2|1|10|100 DM34461A: 0.001|0.002|0.006|0.02|0.06|0.2|1|10|100 Default: 10 See Range, Resolution and NPLC for more information.	+1.00000000E+01
Uses a 10 PLC integration time: VOLT:DC:NPLC 10	

Remarks

- Only integration times of 1, 10, or 100 PLC provide normal mode (line frequency noise) rejection.
- Setting the integration time also sets the measurement resolution. Resolution Table shows the relationship between integration time and resolution. See [SENSe:]VOLTage[:DC]:RESolution.

- This parameter is set to its default value after a Factory Reset (*RST command) or Instrument Preset (SYSTem:PRESet).

[SENSe:]VOLTage[:DC]:RATio:SECondary {"OFF"|"CALCulate:DATA"|"SENSe:DATA"}
[SENSe:]VOLTage[:DC]:RATio:SECondary?

This command selects the secondary measurement function for DC ratio measurements.

Parameter	Typical Return
"OFF"|"CALCulate:DATA"|"SENSe:DATA" Default: "OFF"	"CALC:DATA"
Selects "SENSe:DATA" as the secondary measurement: VOLT:RAT:SEC "SENS:DATA"	

Remarks

- "CALCulate:DATA" - (Applies only to the DM34461A.) The measurement value before any math operations are done (including NULL).
- "SENSe:DATA" - The DC signal voltage and the DC reference voltage measurements.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

[SENSe:]VOLTage[:DC]:RESolution {<resolution>|MIN|MAX|DEF}
[SENSe:]VOLTage[:DC]:RESolution? [{MIN|MAX|DEF}]

This command selects the measurement resolution for DC voltage measurements and ratio measurements. Specify the resolution in the same units as the selected measurement function, not in number of digits.

Parameter	Typical Return
<resolution>: See Resolution Table or Range, Resolution and NPLC. The default is equivalent to 10 PLC. Specify <resolution> in the measurement's units (V, A, Hz, Ω, and so on).	+3.00000000E-05
Sets the measurement resolution to 3 µV: VOLT:DC:RES 3E-6	

Remarks

- You can specify MIN (best resolution) or MAX (worst resolution) instead of <resolution>.
- To achieve normal mode (line frequency noise) rejection, use a resolution that corresponds to an integration time that is an integral number of power line cycles.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

[SENSe:]VOLTage[:DC]:SECondary {"OFF"|"CALCulate:DATA"|"VOLTage:AC"|"PTPeak"}
[SENSe:]VOLTage[:DC]:SECondary?

This command selects the secondary measurement function for DC voltage measurements.

Parameter	Typical Return

"OFF"|"CALCulate:DATA"|"VOLTage:AC"|"PTPeak" Default: "OFF"	"CALC:DATA"
Selects peak-to-peak as the secondary measurement: VOLT:DC:SEC "PTP"	

Remarks

- "CALCulate:DATA" - (Applies only to the DM34461A.) The measurement value before any math operations are done (including NULL).
- "VOLTage:AC" - The AC voltage measurement of the input signal. Applies only when using the instrument from the front panel. Setting is ignored for measurements made from a remote interface. If you require both AC and DC voltage measurements from remote, program each function separately, see CONFigure[:VOLTage]:AC or CONFigure[:VOLTage][:DC].
- "PTPeak" - The peak-to-peak, maximum, and minimum values of the input signal.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

[SENSe:]VOLTage[:DC]:ZERO:AUTO {OFF|ON|ONCE}
[SENSe:]VOLTage[:DC]:ZERO:AUTO?

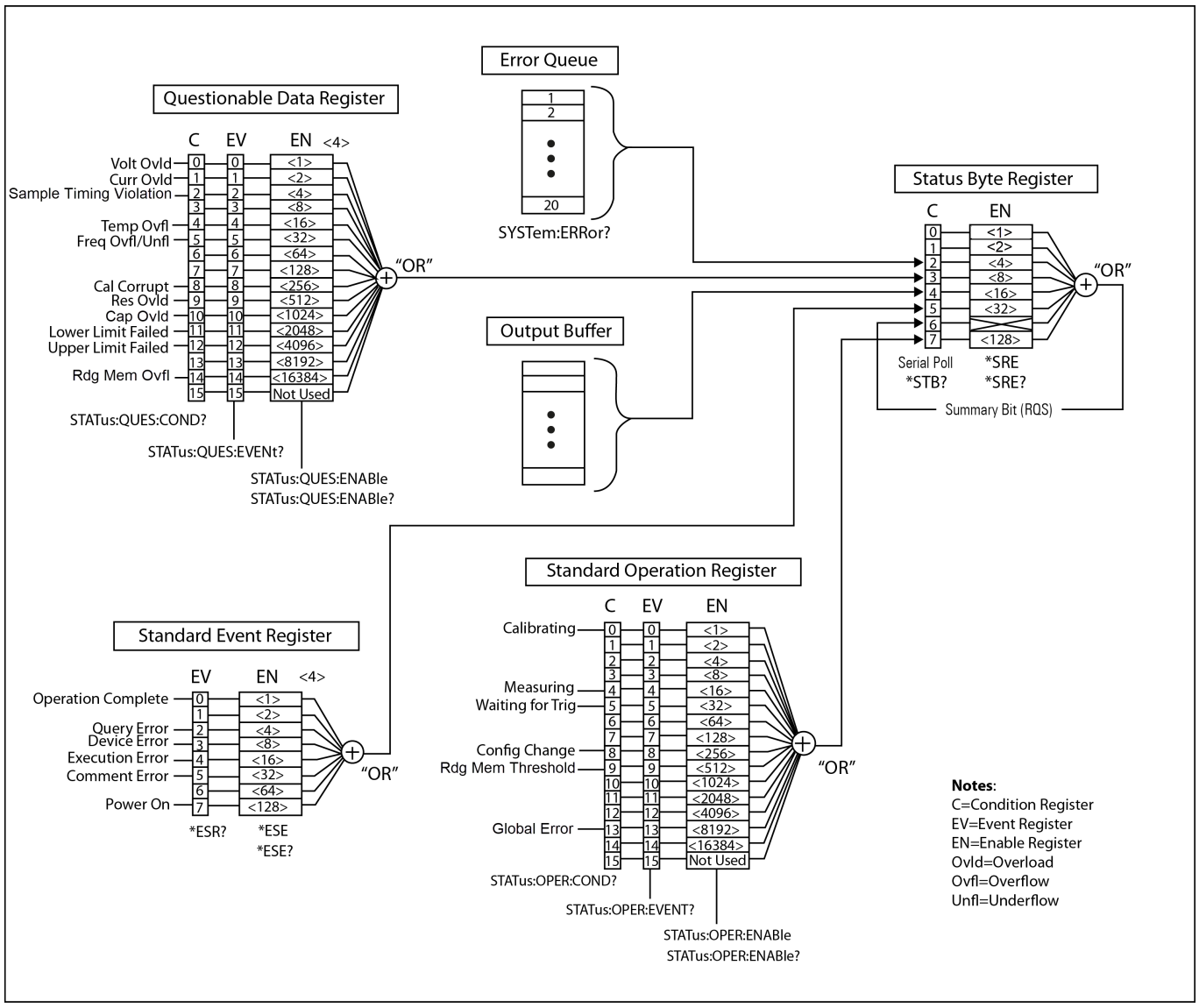
This command disables or enables the autozero mode for DC voltage and ratio measurements.

- ON (default) - the DMM internally measures the offset following each measurement. It then subtracts that measurement from the preceding reading. This prevents offset voltages present on the DMM's input circuitry from affecting measurement accuracy.
- OFF - the instrument uses the last measured zero measurement and subtracts it from each measurement. It takes a new zero measurement each time you change the function, range or integration time.
- ONCE - the instrument takes one zero measurement and sets autozero OFF. The zero measurement taken is used for all subsequent measurements until the next change to the function, range or integration time. If the specified integration time is less than 1 PLC, the zero measurement is taken at 1 PLC to optimize noise rejection. Subsequent measurements are taken at the specified fast (< 1 PLC) integration time.

Parameter	Typical Return
OFF|ON|ONCE Default ON	0 (OFF) or 1 (ON)
Configures DC voltage measurements and immediately autozero: VOLT:DC:ZERO:AUTO ONCE	

Remarks

- The autozero mode is set indirectly when you set the resolution and integration time using CONFigure:VOLTage:DC, CONFigure:VOLTage:DC:RATio, MEASure:VOLTage:DC?, or MEASure:VOLTage:DC:RATio?. Autozero is automatically turned OFF when you select an integrationtime less than 1 PLC with these commands.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).


Error Queue
1
2
20
SYSTem:ERRor?
Questionable Data Register
C EV EN <4>
Volt Ovld
Curr Ovld
Sample Timing Violation
Temp Ovfl
Freq Ovfl/Unfl
Cal Corrupt
Res Ovld
Cap Ovld
Lower Limit Failed
Upper Limit Failed
Rdg Mem Ovfl
<1>
<2>
<4>
<8>
<16>
<32>
<64>
<128>
<256>
<512>
<1024>
<2048>
<4096>
<8192>
<16384>
Not Used
"OR"
STATus:QUES:COND?
STATus:QUES:EVENt?
STATus:QUES:ENABle
STATus:QUES:ENABle?
Output Buffer
Status Byte Register
C EN
"OR"
Serial Poll
*STB?
*SRE
*SRE?
Summary Bit (RQS)
Standard Operation Register
C EV EN
Calibrating
Measuring
Waiting for Trig
Config Change
Rdg Mem Threshold
Global Error
"OR"
STATus:OPER:COND?
STATus:OPER:EVENT?
STATus:OPER:ENABle
STATus:OPER:ENABle?
Standard Event Register
EV EN <4>
Operation Complete
Query Error
Device Error
Execution Error
Comment Error
Power On
"OR"
*ESR?
*ESE
*ESE?
Notes:
C=Condition Register
EV=Event Register
EN=Enable Register
Ovld=Overload
Ovfl=Overflow
Unfl=Underflow

The following table lists the bit definitions for the Questionable Data Register:

NOTE The overload bits are set once per INITiate command. If you clear an overload bit, it is not set again until a new INITiate is sent.

Bit Number	Bit Name	Decimal Value	Definition
0	Voltage Overload	1	Only reported as event. Returns 0. Read the Event Register.
1	Current Overload	2	Only reported as event. Returns 0. Read the Event Register.
2	Sample Timing Violation	4	A sample timing violation has occurred involving the SAMPle:TIMer command. Sample timing may not be valid.
3	Not Used	8	(Reserved for future use)
4	Temperature Overload	16	Only reported as event. Returns 0. Read the Event Register.
5	Frequency Overload/ Underflow	32	Only reported as event. Returns 0. Read the Event Register.
6	Not Used	64	(Reserved for future use)
7	Not Used	128	(Reserved for future use)
8	Calibration Corrupt	256	At least one calibration constant is corrupt.
9	Resistance Overload	512	Only reported as event. Returns 0. Read the Event Register.
10	Capacitance Overload	1024	Only reported as event. Returns 0. Read the Event Register.
11	Lower Limit Failed	2048	The most recent measurement failed the lower limit test.
12	Upper Limit Failed	4096	The most recent measurement failed the upper limit test.
13	Not Used	8192	(Reserved for future use)
14	Memory Overflow	16384	Reading memory is full. One or more (oldest) measurements have been lost.
15	Not Used	32768	(Reserved for future use)

The following table lists the bit definitions for the Standard Operation Register:

Bit Number	Bit Name	Decimal Value	Definition
0	Calibrating	1	Instrument is performing a calibration.
1	Not Used	2	(Reserved for future use)
2	Not Used	4	(Reserved for future use)
3	Not Used	8	(Reserved for future use)
4	Measuring	16	Instrument is initiated, and is making or about to make a measurement.
5	Waiting for Trigger	32	Instrument is waiting for a trigger.
6	Not Used	64	(Reserved for future use)
7	Not Used	128	(Reserved for future use)
8	Configuration Change	256	Instrument configuration has been changed since the last INIT, READ? or MEASure?, either from the front panel or from SCPI.
9	Memory Threshold	512	Programmed number of measurements (DATA:POINts:EVENt:THReshold) have been stored in measurement memory.
10	Not Used	1024	(Reserved for future use)
11	Not Used	2048	(Reserved for future use)
12	Not Used	4096	(Reserved for future use)
13	Global Error	8192	Set if any remote interface has an error in its error queue; cleared otherwise.
14	Not Used	16384	(Reserved for future use)
15	Not Used	32768	(Reserved for future use)

Command Summary

- STATus:OPERation:CONDition?
- STATus:OPERation:ENABle
- STATus:OPERation:ENABle?
- STATus:OPERation[:EVENt]?
- STATus:PRESet
- STATus:QUEStionable:CONDition?
- STATus:QUEStionable:ENABle
- STATus:QUEStionable:ENABle?
- STATus:QUEStionable[:EVENt]?

STATus:OPERation:CONDition?

This command returns the sum of the bits in the condition register for the Standard Operation Register group. This register is read-only; bits are not cleared when read.

A condition register continuously monitors the state of the instrument. Condition register bits are updated in real time; they are neither latched nor buffered.

Parameter	Typical Return
(none)	+32
Reads the condition register (bit 5 is set): STAT:OPER:COND?	

Remarks

- The condition register bits reflect the current condition. If a condition goes away, the corresponding bit is cleared in the condition register.

STATus:OPERation:ENABle <enable_value>
STATus:OPERation:ENABle?

This command enables bits in the enable register for the Standard Operation Register group. The selected bits are then reported to the Status Byte. An enable register defines which bits in the event register will be reported to the Status Byte register group. You can write to or read from an enable register.

Parameter	Typical Return
A decimal value that corresponds to the binary-weighted sum of the bits in the register.	+32
Enables bit 5 (decimal value = 32) in the enable register: STAT:OPER:ENAB 32	

Remarks

- Use the <enable> parameter to specify which bits will be reported to the Status Byte. The decimal value specified corresponds to the binary-weighted sum of the bits you wish to enable in the register. For example, to enable bit 5 (decimal value = 32) and bit 9 (decimal value = 512), the corresponding decimal value would be 544 (32 + 512).
- A STATus:PRESet clears all bits in the enable register.
- The <enable> setting is nonvolatile; it does not change after a Factory Reset (*RST) , Instrument Preset (SYSTem:PRESet), Status Preset (STATus:PRESet) or Clear Status (*CLS).
- The *PSC controls whether the enable register is cleared at power on.

STATus:OPERation[:EVENt]?

This command returns the sum of the bits in the event register for the Standard Operation Register group. An event register is a read-only register that latches events from the condition register. While an event bit is set, subsequent events corresponding to that bit are ignored. The register bits are cleared when you read the register.

Parameter	Typical Return

(none)	+512
Reads the event register (bit 9 is set): STAT:OPER:EVEN?	

Remarks

- Once a bit is set, it remains set until cleared by reading the event register or by sending *CLS (clear status).

STATus:PRESet

This command clears Questionable Data enable register and Standard Operation enable register.

Parameter	Typical Return
(none)	(none)
Clears enable register bits: STAT:PRES	

STATus:QUEStionable:CONDition?

This query returns the sum of the bits in the condition register for the Questionable Data Register group. This register is read-only; bits are not cleared when read.

A condition register continuously monitors the state of the instrument. Condition register bits are updated in real time; they are neither latched nor buffered.

Parameter	Typical Return
(none)	+4096
Reads the condition register (bit 12 is set): STAT:QUES:COND?	

Remarks

- The condition register bits reflect the current condition. If a condition goes away, the corresponding bit is cleared in the condition register.

STATus:QUEStionable:ENABle <enable_value>
STATus:QUEStionable:ENABle?

This command enables bits in the enable register for the Questionable Data Register group. The selected bits are then reported to the Status Byte. An enable register defines which bits in the event register will be reported to the Status Byte register group. You can write to or read from an enable register.

Parameter	Typical Return
A decimal value that corresponds to the binary-weighted sum of the bits in the register.	+512
Enables bit 9 (decimal value 512) in the enable register: STAT:QUES:ENAB 9	

Remarks

- Use the <enable_value> parameter to specify which bits will be reported to the Status Byte. The decimal value specified corresponds to the binary-weighted sum of the bits you wish to enable in the register. For example, to enable bit 0 (decimal value = 1), bit 1 (decimal value = 2), and bit 12 (decimal value = 4096), the corresponding decimal value would be 4099 (1 + 2 + 4096).
- The STATus:PRESet clears all bits in the enable register.
- The <enable> setting is nonvolatile; it does not change after a Factory Reset (*RST) , Instrument Preset (SYSTem:PRESet), Status Preset (STATus:PRESet) or Clear Status (*CLS).
- The *PSC command controls whether the enable register is cleared at power on.

STATus:QUEStionable[:EVENt]?

This query returns the event register for the Questionable Data Register group. An event register is a read-only register that latches events from the condition register. While an event bit is set, subsequent events corresponding to that bit are ignored. The register bits are cleared when you read the register.

Parameter	Typical Return
(none)	+1024
Reads the event register (bit 10 is set): STAT:QUES?	

Remarks

- Once a bit is set, it remains set until cleared by reading the event register or by sending *CLS (clear status).

SYSTem Subsystem

The SYSTem subsystem includes general commands and remote interface configuration commands.

Command Summary

- SYSTem:BEEPer[:IMMediate]
- SYStem:BEEPer:STATe
- SYStem:BEEPer:STATe?
- SYSTem:CLICk:STATe
- SYSTem:CLICk:STATe?
- SYSTem:COMMunicate:LAN:CONTrol?
- SYSTem:COMMunicate:LAN:DHCP;
  SYSTem:COMMunicate:LAN:DHCP?
- SYSTem:COMMunicate:LAN:DNS1;
  SYSTem:COMMunicate:LAN:DNS1?
- SYSTem:COMMunicate:LAN:DNS2;
  SYSTem:COMMunicate:LAN:DNS2?
- SYSTem:COMMunicate:LAN:DOMain?
- SYSTem:COMMunicate:LAN:GATEway;
  SYSTem:COMMunicate:LAN:GATEway?
- SYSTem:COMMunicate:LAN:HOSTname;
  SYSTem:COMMunicate:LAN:HOSTname?
- SYSTem:COMMunicate:LAN:IPADdress;
  SYSTem:COMMunicate:LAN:IPADdress?
- SYSTem:COMMunicate:LAN:MAC?
- SYSTem:COMMunicate:LAN:SMASk;
  SYSTem:COMMunicate:LAN:SMASk?
- SYSTem:COMMunicate:LAN:TELNet:PROMpt;
  SYSTem:COMMunicate:LAN:TELNet:PROMpt?
- SYSTem:COMMunicate:LAN:TELNet:WMESsage;
  SYSTem:COMMunicate:LAN:TELNet:WMESsage?
- SYSTem:COMMunicate:LAN:UPDate
- SYSTem:COMMunicate:LAN:WINS[{1|2}]
- SYSTem:COMMunicate:LAN:WINS[{1|2}]? [{CURRent|STATic}]
- SYSTem:COMMunicate:TCPip:CONTrol?
- SYSTem:DATE <year>, <month>, <day>;
  SYSTem:DATE?

- SYSTem:ERRor?
- SYSTem:HELP?
- SYSTem:LABel "<string>"
- SYSTem:LABel?
- SYSTem:LFRequency
- SYSTem:LOCal
- SYSTem:PRESet
- SYSTem:SECurity:COUNt?
- SYSTem:SECurity:IMMediate
- SYSTem:TEMPerature?
- SYSTem:TIME <hour>, <minute>, <second>;
  SYSTem:TIME?
- SYSTem:UPTime?
- SYSTem:VERSion?
- SYSTem:WMESsage "<string>"
- SYSTem:WMESsage?

SYSTem:BEEPer[:IMMediate]

This command issues a single beep.

Parameter	Typical Return
(none)	(none)
Issues a single beep: SYST:BEEP	

Remarks

- Programmed beeps may be useful for program development and troubleshooting.
- You can issue a beep with this command regardless of the current beeper state (SYSTem:BEEPer:STATe).

SYSTem:BEEPer:STATe {ON|1|OFF|0}
SYSTem:BEEPer:STATe?

This command disables or enables the beeper tone during continuity, diode, or probe hold measurements, or when an error is generated from the front panel or remote interface.

Parameter	Typical Return
ON|1|OFF|0 Default: ON	0 (OFF) or 1 (ON)
Disables beeper state: SYST:BEEP:STAT OFF	

Remarks

- A beep is always emitted (even with beeper state OFF) when SYSTem:BEEPer is sent.
- This setting is non-volatile; it is not changed by power cycling, a Factory Reset (*RST), or an Instrument Preset (SYSTem:PRESet).

SYSTem:CLICk:STATe {ON|1|OFF|0}
SYSTem:CLICk:STATe?

This command disables or enables the click heard when a front panel key or softkey is pressed.

Parameter	Typical Return
ON|1|OFF|0 Default: ON	0 (OFF) or 1 (ON)
Disables keyboard click: SYST:CLIC:STAT OFF	

Remarks

- Does not affect the beeper for diode and continuity tests, errors and so on.
- This setting is non-volatile; it is not changed by power cycling, a Factory Reset *RST or an Instrument Preset (SYSTem:PRESet).

SYSTem:COMMunicate:LAN:CONTrol?

This query reads the initial Control connection port number for Socket communications. This connection is used to send and receive commands and queries.

Parameter	Typical return
(none)	5000 (0 if the interface does not support sockets)
Returns the Control connection port number: SYST:COMM:LAN:CONT?	

Remarks

- Use the Control socket connection to send a Device Clear (DCL) to the instrument or to detect pending Service Request (SRQ) events.

SYSTem:COMMunicate:LAN:DNS1"<address>"
SYSTem:COMMunicate:LAN:DNS1?[{CURRent|STATic}]

This command assigns static IP addresses of Domain Name System (DNS) servers. A primary server address may be assigned. If DHCP is available and enabled, DHCP will auto-assign these server addresses. These auto-assigned server addresses take precedence over the static addresses assigned with this command. Contact your LAN administrator for details.

NOTE **If you change this setting, you must send SYSTem:COMMunicate:LAN:UPDate to activate the new setting.**

Parameter	Typical return
Command: "nnn.nnn.nnn.nnn" Default: "0.0.0.0" Query: {CURRent|STATic} Default: CURRent	"198.105.232.4"
Sets a static DNS1 address: SYST:COMM:LAN:DNS1 "198.105.232.4"	

Remarks

- CURRent: returns address currently being used by the instrument.
- STCTic: returns static address from non-volatile memory. This address is used if DHCP is disabled or unavailable.
- SYSTem:SECurity:IMMediate sets this parameter to its default value.
- The assigned DNS server addresses are used if DHCP is disabled or unavailable. Otherwise, the DNS server addresses are auto-assigned by DHCP.
- The DNS server addresses are stored in nonvolatile memory. They do not change when power has been off, after a Factory Reset (*RST) or after an Instrument Preset (SYSTem:PRESet).

SYSTem:COMMunicate:LAN:DNS2"<address>"
SYSTem:COMMunicate:LAN:DNS2?[{CURRent|STATic}]

This command assigns static IP addresses of Domain Name System (DNS) servers. A secondary server address may be assigned. If DHCP is available and enabled, DHCP will auto-assign these server addresses. These auto-assigned server addresses take precedence over the static addresses assigned with this command. Contact your LAN administrator for details.

NOTE If you change this setting, you must send SYSTem:COMMunicate:LAN:UPDate to activate the new setting.

Parameter	Typical return
Command: "nnn.nnn.nnn.nnn" Default: "0.0.0.0" Query: {CURRent|STATic} Default: CURRent	"198.105.232.4"
Sets a static DNS2 address: SYST:COMM:LAN:DNS2 "198.105.232.4"	

Remarks

- CURRent: returns address currently being used by the instrument.
- STATic: returns static address from non-volatile memory. This address is used if DHCP is disabled or unavailable.
- SYSTem:SECurity:IMMediate sets this parameter to its default value.
- The assigned DNS server addresses are used if DHCP is disabled or unavailable. Otherwise, the DNS server addresses are auto-assigned by DHCP.
- The DNS server addresses are stored in nonvolatile memory. They do not change when power has been off, after a Factory Reset (*RST) or after an Instrument Preset (SYSTem:PRESet).

SYSTem:COMMunicate:LAN:DHCP{ON|1|OFF|0}
SYSTem:COMMunicate:LAN:DHCP?

This command enables (On) or disables (Off) instrument's use of DHCP. The acronym DHCP stands for Dynamic Host Configuration Protocol, a protocol for assigning dynamic IP addresses to networked devices. With dynamic addressing, a device can have a different IP address every time it connects to the network.

ON: instrument tries to obtain an IP address from a DHCP server. If a DHCP server is found, it assigns a dynamic IP address, Subnet Mask, and Default Gateway to the instrument.

OFF or DHCP unavailable: instrument uses the static IP address, Subnet Mask, and Default Gateway during power-on.

NOTE If you change this setting, you must send SYSTem:COMMunicate:LAN:UPDate to activate the new setting.

Parameter	Typical return
ON|1|OFF|0 Default: ON	0 (OFF) or 1 (ON)
Disables DHCP: SYST:COMM:LAN:DHCP OFF	

Remarks

- Most corporate LANs have a DHCP server.
- SYSTem:SECurity:IMMediate sets this parameter to its default value.
- If a DHCP LAN address is not assigned by a DHCP server, then an Auto-IP address is obtained after approximately 2 minutes. An Auto-IP address has the form 169.254.nnn.nnn.
- This setting is non-volatile; it is not changed by power cycling, a Factory Reset (*RST), or an Instrument Preset (SYSTem:PRESet).

SYSTem:COMMunicate:LAN:DOMain?

This query returns the domain name assigned to the instrument.

Parameter	Typical return
(none)	"example.com"
Returns the domain name being used by the instrument: SYST:COMM:LAN:DOM?	

Remarks

- If Dynamic Domain Name System (DNS) is available on your network and your instrument uses DHCP, the domain name is assigned by the Dynamic DNS service at power-on.
- A null string (" ") indicates that no domain name is assigned.

SYSTem:COMMunicate:LAN:GATEway "<address>"
SYSTem:COMMunicate:LAN:GATEway?[{CURRent|STATic}]

This command assigns a default gateway for the instrument. The specified IP Address sets the default gateway, which allows the instrument to communicate with systems that are not on the local subnet. Thus, this is the default gateway where packets are sent that are destined for a device not on the local subnet, as determined by the Subnet Mask setting. Contact your LAN administrator for details.

NOTE If you change this setting, you must send SYSTem:COMMunicate:LAN:UPDate to activate the new setting.

Parameter	Typical return
Command: "nnn.nnn.nnn.nnn" Default: "0.0.0.0" Query: {CURRent|STATic} Default: CURRent	"198.105.232.1"
Sets a default gateway address:SYST:COMM:LAN:GATE "198.105.232.1"	

Remarks

- CURRent: returns address currently being used by the instrument.
- STATic: returns static address from non-volatile memory. This address is used if DHCP is disabled or unavailable.
- SYSTem:SECurity:IMMediate sets this parameter to its default value.
- If DHCP is enabled (SYSTem:COMMunicate:LAN:DHCP ON), the specified default gateway is not used. However, if the DHCP server fails to assign a valid IP address, the currently configured default gateway is used.
- This setting is non-volatile; it is not changed by power cycling, a Factory Reset (*RST) or an Instrument Preset (SYSTem:PRESet).

SYSTem:COMMunicate:LAN:HOSTname"<name>"
SYSTem:COMMunicate:LAN:HOSTname?[{CURRent|STATic}]

This command assigns a hostname to the instrument. A hostname is the host portion of the domain name, which is translated into an IP address. If Dynamic Domain Name System (Dynamic DNS) is available on your network and your instrument uses DHCP, the hostname is registered with the Dynamic DNS service at power-on. If DHCP is enabled (SYSTem:COMMunicate:LAN:DHCP ON), the DHCP server can change the specified hostname.

NOTE If you change this setting, you must send SYSTem:COMMunicate:LAN:UPDate to activate the new setting.

Parameter	Typical return
A string of up to 15 characters. Must start with letter (A-Z). May contain letters, numbers (0-9), or dashes ("-") Default: "K-<*instrument model number*>-nnnn", where "nnnn" is the last four digits of the instrument's serial number.	"LAB1-DM34460A"
Define a hostname: SYST:COMM:LAN:HOST "LAB1-DMM"	

Remarks

- If no hostname exists, a null string ("") is returned.
- For the query form, specify "CURRent" (default) to read the value currently being used by the instrument. Specify "STATic" to read the host name currently stored in nonvolatile memory within the instrument (may not be the actual name used by the instrument if DHCP is enabled).

- This setting is non-volatile; it is not changed by power cycling, a Factory Reset (*RST) or an Instrument Preset (SYSTem:PRESet).
- This parameter is set to its default value when the instrument is shipped from the factory and after SYSTem:SECurity:IMMediate.

SYSTem:COMMunicate:LAN:IPADdress"<address>"
SYSTem:COMMunicate:LAN:IPADdress?[{CURRent|STATic}]

This command assigns a static Internet Protocol (IP) address for the instrument. If DHCP is enabled (SYSTem:COMMunicate:LAN:DHCP ON), the specified static IP address is not used. Contact your LAN administrator for details.

NOTE If you change this setting, you must send SYSTem:COMMunicate:LAN:UPDate to activate the new setting.

Parameter	Typical return
Command: "nnn.nnn.nnn.nnn" Query: {CURRent|STATic} Default: CURRent	"169.254.149.35"
Sets a static IP address:SYST:COMM:LAN:IPAD "169.254.149.35"	

Remarks

- SYSTem:SECurity:IMMediate sets this parameter to its default value.
- For the query form, specify "CURRent" (default) to read the value currently being used by the instrument. Specify "STATic" to read the host name currently stored in nonvolatile memory within the instrument (may not be the actual name used by the instrument if DHCP is enabled).
- This setting is non-volatile; it is not changed by power cycling, a Factory Reset (*RST) or an Instrument Preset (SYSTem:PRESet).
- This parameter is set to its default value when the instrument is shipped from the factory and after SYSTem:SECurity:IMMediate.

SYSTem:COMMunicate:LAN:MAC?

This query returns the instrument's Media Access Control (MAC) address as an ASCII string of 12 hexadecimal characters (0-9 and A-F) enclosed in quotation marks.

NOTE Your LAN administrator may need the MAC address to assign a static IP address for this device.

Parameter	Typical return
(none)	"0030D3001041"
Returns the MAC address: SYST:COMM:LAN:MAC?	

Remarks

- The MAC address is also known as the link-layer address, the Ethernet (station) address, LANIC ID or Hardware Address. This is an unchangeable 48-bit address assigned by the manufacturer to each unique Internet device.

SYSTem:COMMunicate:LAN:SMASk"<mask>"
SYSTem:COMMunicate:LAN:SMASk?[{CURRent|STATic}]

This command assigns a subnet mask for the instrument to use in determining whether a client IP address is on the same local subnet. When a client IP address is on a different subnet, all packets must be sent to the Default Gateway. Contact your LAN administrator for details.

NOTE If you change this setting, you must send SYSTem:COMMunicate:LAN:UPDate to activate the new setting.

Parameter	Typical return
Command: "nnn.nnn.nnn.nnn" Default: "255.255.255.0" Query: {CURRent|STATic} Default: CURRent	"255.255.255.0"
Sets the subnet mask:SYST:COMM:LAN:SMAS "255.255.255.0"	

Remarks

- If DHCP is enabled (SYSTem:COMMunicate:LAN:DHCP ON), the specified subnet mask is not used. However, if the DHCP server fails to assign a valid IP address, the instrument uses the Auto-IP subnet mask.
- A value of "0.0.0.0" or "255.255.255.255" indicates that subnetting is not being used.
- SYSTem:SECurity:IMMediate sets this parameter to its default value.
- CURRent: returns address currently being used by the instrument.
- STATic: returns static address from non-volatile memory. This address is used if DHCP is disabled or unavailable.
- The setting is non-volatile; it is not changed by power cycling, a Factory Reset (*RST) or an Instrument Preset (SYSTem:PRESet).

SYSTem:COMMunicate:LAN:TELNet:PROMpt"<string>"
SYSTem:COMMunicate:LAN:TELNet:PROMpt?

This command sets the command prompt seen when communicating with the instrument via Telnet.

Parameter	Typical return
String of up to 15 characters Default is Instrument Model Number: DM34460A> or DM34461A>	"Command>"
Sets the command prompt: SYST:COMM:LAN:TELN:PROM "Command>"	

Remarks

- The instrument uses LAN port 5024 for SCPI Telnet sessions and port 5025 for SCPI Socket sessions.
- Telnet session are typically started from a host computer shell:
  telnet <*IP_address*> <*port*>
  For example:
  telnet 169.254.4.10 5024
  To exit a Telnet session, press <Ctrl-D>.
- This setting is non-volatile; it is not changed by power cycling, a Factory Reset (*RST), or an Instrument Preset (SYSTem:PRESet).
- SYSTem:SECurity:IMMediate sets this parameter to its default value.

SYSTem:COMMunicate:LAN:TELNet:WMESsage"<string>"
SYSTem:COMMunicate:LAN:TELNet:WMESsage?

This command sets welcome message seen when communicating with instrument via Telnet.

Parameter	Typical return
Quoted string of up to 63 characters Default: "Welcome to Keysight's <*instrument model number*> Digital Multimeter"	"Welcome to the Telnet Session"
Defines a welcome message: SYST:COMM:LAN:TELN:WMES "Welcome to the Telnet Session"	

Remarks

- The instrument uses LAN port 5024 for SCPI Telnet sessions and port 5025 for SCPI Socket sessions.
- This setting is non-volatile; it is not changed by power cycling, a Factory Reset (*RST), or an Instrument Preset (SYSTem:PRESet).
- SYSTem:SECurity:IMMediate sets this parameter to its default value.

SYSTem:COMMunicate:LAN:UPDate

This command stores any changes made to the LAN settings into non-volatile memory and restarts the LAN driver with the updated settings.

Parameter	Typical return
(none)	(none)
(see below)	

Remarks

- Must be sent after changing the settings for DHCP, DNS, gateway, hostname, IP address, subnet mask, or WINS.

- Make all changes to the LAN settings before sending this command.

  Example

  The following example configures the instrument to use statically assigned LAN settings.

```
SYST:COMM:LAN:DHCP OFF
SYST:COMM:LAN:DNS "198.105.232.4"
SYST:COMM:LAN:DNS2 "198.105.232.5"
SYST:COMM:LAN:GAT "198.105.232.1"
SYST:COMM:LAN:HOST "LAB1-DMM"
SYST:COMM:LAN:IPAD "198.105.232.101"
SYST:COMM:LAN:SMAS "255.255.255.0"
SYST:COMM:LAN:WINS "198.105.232.4"
SYST:COMM:LAN:WINS "198.105.232.5"
SYST:COMM:LAN:UPD
```

  The following example configures the instrument back to use DHCP.

```
SYST:COMM:LAN:DHCP ON
SYST:COMM:LAN:UPD
```

SYSTem:COMMunicate:LAN:WINS[{1|2}]"<address>"
SYSTem:COMMunicate:LAN:WINS[{1|2}]? [{CURRent|STATic}]

This query assigns the static IP addresses of the Windows Internet Name System (WINS) servers. A primary and a secondary server address may be assigned. If DHCP is available and enabled, DHCP will auto-assign these server addresses. These auto-assigned server addresses take precedence over the static addresses assigned with this command. Contact your LAN administrator for details.

NOTE **If you change this setting, you must send SYSTem:COMMunicate:LAN:UPDate to activate the new setting.**

Parameter	Typical Return
Command: "nnn.nnn.nnn.nnn" Default: "0.0.0.0" Query: {CURRent|STATic} Default: CURRent	"198.105.232.4"
Sets a static primary WINS address: SYST:COMM:LAN:WINS "198.105.232.4"	

Remarks

- The WINS addresses are stored in nonvolatile memory. They do not change when power has been off, after a Factory Reset (*RST) or after an Instrument Preset (SYSTem:PRESet).
- SYSTem:SECurity:IMMediate sets this parameter to its default value.
- CURRent: returns address currently being used by the instrument.

- STATic: returns static address from non-volatile memory. This address is used if DHCP is disabled or unavailable.

SYSTem:COMMunicate:TCPip:CONTrol?

This query returns the initial socket control connection port number. After the control port number is obtained, a control socket connection can be opened.

Parameter	Typical Return
(none)	5000 (0 if sockets are not supported)
Queries the control connection port number: SYST:COMM:TCP:CONT?	

Remarks

- The control socket connection can only be used by a client to send a Device Clear to the instrument or to detect Service Request (SRQ) events.
- Refer to "Using Sockets" in the User's Guide for more information.

SYSTem:DATE <year>, <month>, <day>
SYSTem:DATE?

This command sets the instrument's real-time clock. Use SYSTem:TIME to set the time.

Parameter	Typical Return
<year> 2000 to 2099 <month> 1 to 12 <day> 1 to 31	+2011,+07,+26
Sets the date to April 1, 2020: SYST:DATE 2020,4,1	

Remarks

- The real-time clock is used for Mass Memory (MMEMory) system file time stamps.
- The real-time clock is battery-backed and retains the date and time when power is off.
- The date and time are not affected by *RST or SYSTem:PRESet.
- The real-time clock does not adjust itself for time zone changes or daylight savings time. Be sure to set the date and time when you first receive your instrument.

SYSTem:ERRor[:NEXT]?

This command reads and clears one error from the error queue. See SCPI Error Messages for the complete SCPI error message list.

Parameter	Typical Return
(none)	-113,"Undefined header"
Reads and clears the first error in the error queue: SYST:ERR?	

Remarks

- Up to 20 errors can be stored in the instrument's error queue. Each remote interface I/O session (USB, VXI-11, Telnet/Sockets) has its own interface-specific error queue. Errors appear in the error queue of the I/O session that caused the error. For example, if an error was generated by a command sent over USB, send SYSTem:ERRor? from USB to read the error queue. Errors generated by instrument hardware are broadcast to all I/O sessions.
- Error retrieval is first-in-first-out (FIFO), and errors are cleared as you read them. The instrument beeps each time an error is generated (unless disabled by SYSTem:BEEPer:STATe OFF).
- If more than 20 errors have occurred, the most recent error stored in the queue is replaced with -350,"Queue overflow". No additional errors are stored until you remove errors from the queue. If no errors have occurred when you read the error queue, the instrument responds with +0,"No error".
- Errors have the following format (the error string may contain up to 255 characters).
  <error code>,<error string>
  Where:
  <error code> = a positive or negative integer
  <error string> = a quoted ASCII string up to 255 characters

See also

- *SRE

SYSTem:HELP?

This command returns a complete list of the instrument's SCPI commands.

Parameter	Typical Return
(none)	(see below)
Returns the list of SCPI commands: SYST:HELP?	

Remarks

- The query returns Definite Length Block Data, which allows any type of data to be transmitted as a series of 8-bit data bytes. The first line is a pound sign (#) followed by one digit representing the number of digits in the decimal integer to follow. This digit is followed by a decimal integer indicating the number of data bytes to follow, followed by the first New Line. (For example, "#47947" in the first line means that there are 7947 data bytes to follow.) The rest of the block has one command per line, each terminated by a New Line character (ASCII character 10).
  The beginning of a returned list is shown below. Note that the actual contents may vary, depending on the firmware revision:

  #48085

  :ABORt/nquery/

  :CALibration:ADC?/qonly/

  :CALibration:ALL?/qonly/

  :CALibration:COUNt?/qonly/

  :CALibration:DATA

  In this list,

  /nquery/ indicates a command with no query.

  /qonly/ indicates a query with no command form.

  All other commands consist of a command and query.

- Syntax for each command is found in the Command Quick Reference.
- The list may include commands or queries not described in this document. These are deprecated commands included for compatibility with older instruments.

SYSTem:LABel "<string>"
SYSTem:LABel?

This command places a message in a large font on the bottom half of the instrument's front panel display.

Parameter	Typical Return
A quoted string of up to 40 characters. You can use letters (A-Z), numbers (0-9) and special characters such as @, %, *, and so forth. Default: ""	"Battery DCI"
Sets the message to be displayed on the screen: SYST:LAB "Battery DCI"	
Removes the label area from the screen: SYST:LAB ""	

Remarks

- If you enter a string longer than 40 characters, the instrument truncates the string after the first 40 characters.
- The font size changes based on the length of the message and whatever other information is shown on the display.
- The value of this parameter is not affected *RST or SYSTem:PRESet.

SYSTem:LFRequency
SYSTem:LFRequency?

This command queries the line frequency.

Parameter	Typical Return
(none)	+50
Queries the line frequency: SYST:LFR?	

Remarks

- At power on, the DMM sets the line frequency to the actual line frequency of either 50 Hz or 60 Hz (400 Hz is detected as 50 Hz).
- The line frequency value is not affected by *RST or SYSTem:PRESet.

SYSTem:LOCal

This command sets the instrument state to local, clears the Remote display annunciator, and enables front-panel operation.

Parameter	Typical Return
(none)	(none)
Sets the instrument state to local: SYST:LOC	

SYSTem:PRESet

This command is nearly identical to *RST. The difference is that *RST resets the instrument for SCPI operation, and SYSTem:PRESet resets the instrument for front panel operation. As a result, *RST turns the histogram and statistics off, and SYSTem:PRESet turns them on.

Parameter	Typical Return
(none)	(none)
Resets the instrument: SYST:PRES	

SYSTem:SECurity:COUNt?

This command returns the instrument's security count.

Parameter	Typical Return
(none)	+22
Returns the instrument's security count: SYST:SEC:COUN?	

Remarks

- The security count is incremented by 1 every time you perform an action, other than calibration, that requires the instrument to be unsecured. This includes enabling or disabling interfaces, sanitizing memory per the NISPOM standard (SYSTem:SECurity:IMMediate), updating firmware, changing the security code, or overriding the calibration security.
- The act of securing or unsecuring the instrument does not increment the counter.
- Be sure to read the security count upon receiving your instrument.

See also

- CALibration:COUNt?

SYSTem:SECurity:IMMediate

This command sanitizes all user-accessible instrument memory except for the calibration constants and reboots the instrument.

CAUTION The NISPOM Sanitize softkey and the SYSTem:SECurity:IMMEdiate command are equivalent. They are for customers, such as military contractors, who must comply with NISPOM.

This feature destroys all user-defined state information, measurement data, and user defined I/O settings such as the IP address. This feature is not recommended for use in routine applications because of the possibility of unintended data loss.

Parameter	Typical Return
(none)	(none)
Sanitizes all user-accessible instrument memory: SYST:SEC:IMM	

Remarks

- Typically used before removing an instrument from a secure area.
- Initializes all instrument settings to their Factory Reset (*RST) values. It also destroys all user-defined state and preference information (seeMMEMory Subsystem - STATe and PREFerence Files).
- Increments the security count.

SYSTem:TEMPerature?

This command returns the instrument's internal temperature in °C.

Parameter	Typical Return
(none)	+2.85000000E+01
Returns the instrument's internal temperature: SYST:TEMP?	

Remarks

- The value returned is not affected by UNIT:TEMPerature.

SYSTem:TIME <hour>, <minute>, <second>
SYSTem:TIME?

The command sets the time for the instrument's real-time clock. Use SYSTem:DATE to set the date.

Parameter	Typical Return
<hour> 0 to 23 <minute> 0 to 59 <second> 0 to 60	20,15,30
Sets instrument time to 20:15:30 (8:15:30 PM): SYST:TIME 20,15,30	

Remarks

- The real-time clock is used for Mass Memory (MMEMory) system file time stamps.
- The real-time clock is battery-backed and retains the date and time when power is off.
- The date and time are not affected by *RST or SYSTem:PRESet.
- The real-time clock does not adjust itself for time zone changes or daylight savings time. Be sure to set the date and time when you first receive your instrument.

SYSTem:UPTime?

This command returns the amount of time that the instrument has been running since the last power-on.

Parameter	Typical Return
(none)	+8,+2,+13,+50
Returns time that the instrument has been running: SYST:UPT?	

Remarks

- Typically used to verify that the instrument is warmed up sufficiently before calibration.
- The numbers returned indicate days, hours, minutes, and seconds, respectively.

SYSTem:VERSion?

This command returns the version of SCPI (Standard Commands for Programmable Instruments) that the instrument complies with. There is no front panel equivalent. See Introduction to the Introduction to the SCPI Language for

details.

Parameter	Typical Return
(none)	1997.0
Returns the SCPI version: SYST:VERS?	

SYSTem:WMESsage "<string>"
SYSTem:WMESsage?

This command displays a power-on message.

Parameter	Typical Return
A quoted string of up to 40 characters. You can use letters (A-Z), numbers (0- 9) and special characters such as @, %, *, and so forth. Default: ""	"RETURN TO JOE AT POST D6"
Displays a power-on message: SYST:WMES "RETURN TO JOE AT POST D6"	

Remarks

- Specifying a null string ("") disables the power-on message.
- This setting is non-volatile; it is not changed by power cycling, a Factory Reset (*RST), or an Instrument Preset (SYSTem:PRESet).
- This parameter is set to its default value when the instrument is shipped from the factory and after SYSTem:SECurity:IMMediate.

Command Summary

- TEST:ALL?

Test:ALL?

This command runs an instrument self-test and returns a pass/fail indication. The TEST:ALL? self-test is more comprehensive than the *TST? self-test.

CAUTION **You must remove all input connections to the instrument before running the full self-test.**

Parameter	Typical Return
(none)	(none)
Runs a self-test: TEST:ALL?	

Remarks

- If one or more tests fail, the query returns +1 and stores an error in the error queue. For a complete listing of the error messages related to self-test failures, see Self-test Error Messages.
- Following the test, the instrument returns to the instrument state that existed before the self-test.

TRIGger Subsystem

The TRIGger subsystem configures the triggering that controls measurement acquisition.

NOTE Recommendation: All triggered measurements should be made using an appropriate fixed manual range. That is, turn autorange off or set a fixed range using the CONFigure, or MEASure command.

Command Summary

- TRIGger:COUNt
- TRIGger:COUNt?
- TRIGger:DELay
- TRIGger:DELay?
- TRIGger:DELay:AUTO
- TRIGger:DELay:AUTO?
- TRIGger:LEVel
- TRIGger:LEVel?
- TRIGger:SLOPe {POSitive|NEGative}
- TRIGger:SLOPe?
- TRIGger:SOURce {IMMediate|BUS|INTernal}
- TRIGger:SOURce?

TRIGger:COUNt {<count>|MIN|MAX|DEF|INFinity}
TRIGger:COUNt?[{MIN|MAX|DEF}]

This command selects the number of triggers that are accepted by the instrument before returning to the "idle" trigger state.

Parameter	Typical Return
DM34460A: 1 to 1,000,000 ($1x10^6$) or continuous (INFinity) DM34461A: 1 to 1,000,000,000 ($1x10^9$) or continuous (INFinity) Default: 1	+1.00000000E+00 For a continuous trigger (INFinity), the query returns "9.9E37".
Selects 10 sets trigger: TRIG:COUN 10	

Remarks

- You can use the specified trigger count in conjunction with a sample count (SAMPle:COUNt), which sets the number of samples to be made per trigger. In this case, the number of measurements returned is the sample count multiplied by the trigger count.
- You can store up to 50,000 measurements in the reading memory of the DM34460A, or 2,000,000 measurements on the DM34461A. If reading memory overflows, new measurements overwrite the oldest measurements stored; the most recent measurements are always preserved. No error is generated, but the Reading Mem Ovfl bit (bit 14) is set in the Questionable Data Register's condition register (see Status System Introduction).
- A variable trigger count is not available from the front panel. If you set the trigger count and then go to local (front panel), the instrument ignores the trigger count setting; however, when you return to remote, the trigger count returns to the previous value you selected.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

TRIGger:DELay {<seconds>|MIN|MAX|DEF}
TRIGger:DELay?[{MIN|MAX|DEF}]

This command sets the delay between the trigger signal and the first measurement. This may be useful in applications where you want to allow the input to settle before taking a measurement or for pacing a burst of measurements.

Selecting a specific trigger delay disables the automatic trigger delay (TRIGger:DELay:AUTO OFF).

NOTE For AC measurements (voltage or current), there is a relationship between the bandwidth setting ([SENSe:]VOLTage:AC:BANDwidth or [SENSe:]CURRent:AC:BANDwidth) and the default trigger delay setting. This delay ensures that there is sufficient settling time for the AC measurement. See Automatic Trigger Delays for further information.

Parameter	Typical Return

0 to ~3600 seconds (~1 µs steps) Default: 1 s Step size for DC measurements is approximately 1 µs. Step size depends on AC bandwidth for AC measurements.	+2.00000806E+00
Sets a 2-second trigger delay: TRIG:DEL 2	

Remarks

- Due to internal quantization, the actual delay that you set may be slightly different than your specified value. The increment is approximately 1 µs.
- By default, TRIGger:DELay:AUTO is ON. The instrument automatically determines the delay based on function, range and integration time (see Automatic Trigger Delays). However, you may need to set a delay longer than the automatic delay for long cables, high capacitance or high impedance signals.
- If you specify a trigger delay with this command, that delay is used for all functions (except CONTinuity and DIODe) and ranges. The CONTinuity and DIODe tests ignore the trigger delay setting.
- If you have configured the instrument for more than one measurement per trigger (SAMPle:COUNt>1), the delay is inserted after the trigger and between consecutive measurements.
- The instrument selects automatic trigger delay after a Factory Reset (*RST) or an Instrument Preset (SYSTem:PRESet).

TRIGger:DELay:AUTO {ON|1|OFF|0}
TRIGger:DELay:AUTO?

This command disables or enables automatic trigger delay. If enabled, the instrument determines the delay based on function, range, and integration time or bandwidth.

Parameter	Typical Return
ON|1|OFF|0 Default: ON	0 (OFF) or 1 (ON)
Enables the automatic trigger delay: TRIG:DEL:AUTO ON	

Remarks

- Selecting a specific trigger delay using TRIGger:DELay disables the automatic trigger delay.
- This parameter is set to its default value after a Factory Reset (*RST) or an Instrument Preset (SYSTem:PRESet).

TRIGger:LEVel {<level>|MIN|MAX|DEF}
TRIGger:LEVel? [{MIN|MAX|DEF}]

This command sets the level on which a trigger occurs when level triggering is enabled (TRIGger:SOURce set to INTernal).

NOTE It is recommended that all triggered measurements be made using an appropriate fixed manual range. That is, turn autorange off, or set a fixed range using the CONFigure, or MEASure command.

Parameter	Typical Return
<level> (see bullet points below) Default: 0	+2.00000000E+01
Sets the trigger level to 0.75 volts: TRIG:LEV 0.75	

Remarks

- Supported only for AC and DC voltage, AC and DC current, frequency, period, 2-wire resistance, 4-wire resistance, RTD and thermistor temperature measurements. Resistance and temperature measurements must have offset compensation and low power disabled.
- To use the trigger level you must select INTernal as the trigger source with the TRIGger:SOURce command.
- If you are using a wide aperture (NPLC or aperture mode) and the signal level varies significantly within the aperture, you may get an unexpected variation in the magnitude of the triggered measurement from the specified trigger level.
- This parameter is set to its default value after a Factory Reset (*RST) or an Instrument Preset (SYSTem:PRESet).
- Specify <level> in the fundamental units for the function (volts, ohms, amps, hertz, or seconds). The table below shows the allowable values for <level> for each measurement function, range, and input terminals (for DCI and ACI).

Measurement Function	Range/Input Terminals	<level> Parameter Value
DCV	100 mV to 100 V range, fixed range	±120% of range
	1000 V range, fixed range	±1000 V
	Autorange	±1000 V
DCI	3 A terminals, fixed range	±120% of range
	3 A terminals, autorange	±3.6 A
RESistance/FRESistance	All ranges, fixed range	0 to +120% of range
	Autorange	0 to +1.2 GΩ
ACV	100 mV to 100 V ranges, fixed range	0 to +120% of range
	750 V range, fixed range	0 to +1000 V
	Autorange	0 to +1000 V
ACI	3 A terminals, fixed range	0 to +120% of range
	3 A terminals, autorange	0 to +3.6 A
FREQuency	*N/A	3 Hz to 300 kHz
PERiod	*N/A	3.33333333 µs to 0.333333333 s

*N/A = Not Applicable.

See also

- TRIGger:SOURce
- TRIGger:DELay

TRIGger:SLOPe {POSitive|NEGative}
TRIGger:SLOPe?

This command selects whether the instrument uses the rising edge (POS) or the falling edge (NEG) of the rising or falling edge of the input signal when level triggering is selected.

Parameter	Typical Return
POSitive|NEGative Default: NEG	POS or NEG
Selects the positive trigger slope: TRIG:SLOP POS	

Remarks

- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

See also

- TRIGger:SOURce

TRIGger:SOURce {IMMediate|BUS|INTernal}
TRIGger:SOURce?

This command selects the trigger source for measurements.

NOTE **It is recommended that all triggered measurements be made using an appropriate fixed manual range. That is, turn autorange off or set a fixed range using theCONFigure, or MEASure command.**

Source	Description
IMMediate	The trigger signal is always present. When you place the instrument in the "wait-for-trigger" state, the trigger is issued immediately.
BUS	The instrument is triggered by *TRG over the remote interface once the DMM is in the "wait-for- trigger" state.
INTernal	The INTernal source provides level triggering capability. To trigger on a level on the input signal, select INTernal for the source, and set the level and slope with the TRIGger:LEVel and TRIGger:SLOPe commands.

Parameter	Typical Return
IMMediate|BUS|INTernal Default: IMMediate	IMM, BUS, or INT
Selects the bus (software) trigger source: TRIG:SOUR BUS	

Remarks

- After selecting the trigger source, you must place the instrument in the "wait-for-trigger" state by sending INITiate or READ?. A trigger is not accepted from the selected trigger source until the instrument is in the "wait-for-trigger" state.

- Recommendation: All triggered measurements should be made using an appropriate fixed manual range. That is, turn autorange off or set a fixed range using the CONFigure, or MEASure command.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

Command Summary

- UNIT:TEMPerature

UNIT:TEMPerature {C|F|K}
UNIT:TEMPerature?

This command selects the units (°C, °F or Kelvin) to be used for all temperature measurements except the SYSTem:TEMPerature? query.

Parameter	Typical Return
C|F|K Default: C	C, F or K
Sets the temperature result in °F: UNIT:TEMP F	

Remarks

- The command also accepts CEL or FAR, but the query returns C or F.
- This parameter is set to its default value after a Factory Reset (*RST) or Instrument Preset (SYSTem:PRESet).

See also

- CONFigure:TEMPerature
- MEASure:TEMPerature?
- [SENSe]:FUNCtion[:ON]

3 SCPI Error Messages

SCPI Error Messages
Command Errors
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Miscellaneous Errors

This chapter describes the SCPI error codes and error messages returned from the Keysight DM34460 Series 6½ digit TrueVolt digital multimeter.

SCPI Error Messages

The DM34460 Series 6½ Digit Digital Multimeter returns error messages in accordance with the SCPI standard.

- Up to 20 errors can be stored in the instrument's error queue. Each remote interface I/O session (USB, VXI-11, Telnet/Sockets) has its own interface-specific error queue. Errors appear in the error queue of the I/O session that caused the error. For example, if an error was generated by a command sent over USB, send SYSTem:ERRor? from USB to read the error queue. Errors generated by instrument hardware are broadcast to all I/O sessions.
- The instrument beeps each time an error is generated (unless disabled by SYSTem:BEEPer:STATe OFF). The front panel Error annunciator turns on when one or more errors are in the error queue.
- A special global error queue holds all power-on and hardware-related errors (for example, overtemperature).
- Error retrieval is first-in-first-out (FIFO), and errors are cleared as you read them. When you have read all of the interface-specific errors, the errors in the global error queue are retrieved. When you have read all errors from the interface-specific and global error queues, the Error annunciator turns off.
- If more than 20 errors have occurred, the most recent error stored in the queue is replaced with -350,"Queue overflow". No additional errors are stored until you remove errors from the queue. If no errors have occurred when you read the error queue, the instrument responds with +0,"No error".
- The front panel reports errors from all I/O sessions and the global error queue. To read the error queue from the front panel, press Help > View remote command error queue.
- Error conditions are also summarized in the Status Byte Register. For more information on the SCPI Status System, see Status Subsystem Introduction.
- The interface-specific error queues are cleared by the *CLS (Clear Status) command and when power is cycled. All errors are cleared when you read the error queue. The error queue is not cleared by a Factory Reset (*RST) or an Instrument Preset (SYSTem:PRESet).
- Front Panel:
  If the Error annunciator is on, there are errors in the error queue. The Remote annunciator is likely on as well. Press the Local key to return to local operation (the Remote annunciator goes off). Then press [Help], select "View remote command error queue" in the menu and press Select. Use the menu navigation "arrow" keys to view the error messages. Press Back to exit and clear the error queue.
- SCPI:
  SYSTem:ERRor? Read and clear one error from the queue

To read errors

SYSTem:ERRor? *Read and clear one error from the queue*

Errors have the following format (the error string may contain up to 80 characters):

-113,"Undefined header"

Command Errors

Error Code	Error Messages
0	No error
-100	Command error
-101	Invalid character
-102	Syntax error
-103	Invalid separator
-104	Data type error
-105	GET not allowed
-108	Parameter not allowed
-109	Missing parameter
-110	Command header error
-111	Header separator error
-112	Program mnemonic too long
-113	Undefined header
-114	Header suffix out of range
-120	Numeric data error
-121	Invalid character in number
-123	Exponent too large
-124	Too many digits
-128	Numeric data not allowed
-130	Suffix error
-131	Invalid suffix
-134	Suffix too long
-138	Suffix not allowed
-140	Character data error
-141	Invalid character data
-144	Character data too long
-148	Character data not allowed
-150	String data error
-151	Invalid string data
-158	String data not allowed
-160	Block data error
-161	Invalid block data
-168	Block data not allowed

Execution Errors

Error Code	Error Messages
-200	Execution error
-203	Command protected
-203	Command protected; feature not available on this model
-203	Command protected; instrument must be unsecured
-203	Command protected; large memory requires license MEM
-203	Command protected; License required
-203	Command protected; requires license DIG
-203	Command protected; requires license LAN
-203	Command protected; requires license SEC
-203	Secure option: Instrument security is unlocked
-210	Trigger error
-211	Trigger ignored
-213	Init ignored
-214	Trigger deadlock
-220	Parameter error
-221	Settings conflict
-221	Settings conflict; *TRG when TRIG:SOUR BUS not selected; trigger ignored
-221	Settings conflict; CALC not allowed in current measurement function; CALC:STAT OFF set
-221	Settings conflict; CALC:SCAL:REF 0.0 not compatible with CALC:SCAL:FUNC PCT; CALC:SCAL:STATE OFF set
-221	Settings conflict; cannot delete state selected and enabled for automatic power-on recall
-221	Settings conflict; cannot meet requested timing; SAMP:TIM changed
-221	Settings conflict; cannot meet requested timing; TRIG:DEL changed
-221	Settings conflict; histogram lower range > upper range; CALC:TRAN:HIST:RANG:AUTO ON set
-221	Settings conflict; histogram not allowed in current measurement function; CALC:TRAN:HIST:STAT OFF set
-221	Settings conflict; internal trigger not allowed in current measurement function; TRIG:SOUR IMM selected
-221	Settings conflict; limit test not allowed in current measurement function; CALC:LIM:STAT OFF set
-221	Settings conflict; lower limit > upper limit; CALC:LIM:UPP set to CALC:LIM:LOW value
-221	Settings conflict; offset compensation not allowed with low power ohms; low power disabled
-221	Settings conflict; pretrigger count limited to 10,000 with CALC enabled; SAMP:COUN:PRET changed
-221	Settings conflict; pretrigger not supported on current measurement function; SAMP:COUN:PRET 0 set
-221	Settings conflict; pretrigger SAMP:COUN:PRETrig >= SAMP:COUN; SAMP:COUN:PRET changed
-221	Settings conflict; SAMP:COUN limited to memory size in pretrigger mode; SAMP:COUN changed
-221	Settings conflict; scaling not allowed in current measurement function; CALC:SCAL:STAT OFF set
-221	Settings conflict; smoothing not allowed in current measurement function; CALC:SMO:STAT OFF set

-221	Settings conflict; statistics not allowed in current measurement function; CALC:AVER:STAT OFF set
-221	Settings conflict; TRIG:LEVel value < minimum for current measurement function/range; TRIG:LEV MIN selected
-221	Settings conflict; TRIG:LEVel value > maximum for current measurement function/range; TRIG:LEV MAX selected
-221	Settings conflict; trigger count must be 1 in pretrigger mode; TRIG:COUN 1 set
-221	Settings conflict; trigger source is BUS
-222	Data out of range
-222	Data out of range; value clipped to lower limit
-222	Data out of range; value clipped to upper limit
-222	Data out of range; value requires license DIG
-222	Data out of range; value requires license MEM
-223	Too much data
-224	Illegal parameter value
-225	Out of memory; measurement data overrun
-230	Data corrupt or stale
-231	Data questionable; requested sample timing not met
-240	Hardware error; cannot communicate with measurement hardware
-240	Hardware error; CPU board initialization failed
-240	Hardware error; measurement FPGA FIFO overflow
-240	Hardware error; measurement hardware initialization failed
-241	Hardware missing
-250	Mass storage error: file read/write error
-250	Mass storage error; internal file system could not be opened
-250	Mass storage error; USB file system could not be opened
-253	Corrupt media; file system corruption detected; reformat needed
-253	Corrupt media; internal file system format failed
-253	Corrupt media; internal file system scan failed
-253	Corrupt media; USB file system scan failed
-256	File name not found
-256	File or folder name not found
-257	File name error
-257	File name error; access denied
-257	File name error; drive name missing or not recognized
-257	File name error; file or folder already exists
-257	File name error; file too large
-257	File name error; folder is default folder
-257	File name error; folder not empty
-257	File name error; invalid character in name

-257	File name error; not a folder name
-257	File name error; path is a folder name
-257	File name error; path name missing
-257	File name error; path too long
-257	File name error; relative path not allowed
-257	File name error; unknown file extension
-270	Macro error
-272	Macro execution error
-273	Illegal macro label
-276	Macro recursion error
-277	Macro redefinition not allowed
-292	Referenced name does not exist"

Instrument Errors (+200...)

Error Code	Error Messages
+251	Unsupported temperature transducer type
+263	Not able to execute while instrument is measuring
+292	State file size error
+293	State file corrupt
+294	Preference file size error
+295	Preference file corrupt

Device-Specific Errors

Error Code	Error Messages
-310	System error
-310	System error: secondary processor aborted due to error
-310	System error; internal software error
-310	System error; out of memory
-310	System error; software initialization failed
-313	Calibration memory lost
-313	Calibration memory lost; due to firmware revision change
-314	Save/recall memory lost; due to firmware revision change
-314	Save/recall memory lost; memory corruption detected
-315	Configuration memory lost
-315	Configuration memory lost; due to firmware revision change
-315	Configuration memory lost; memory corruption detected
-330	Self-test failed
-350	Queue overflow
+400	Data storage is disabled

Query Errors

Error Code	Error Messages
-400	Query error
-410	Query INTERRUPTED
-420	Query UNTERMINATED
-430	Query DEADLOCKED
-440	Query UNTERMINATED after indefinite response

Network Errors

Error Code	Error Messages
+100	Network Error
+110	LXI mDNS Error

Miscellaneous Errors (+300... and +500..)

Error Code	Error Messages
+311	Not able to specify resolution with Auto range
+320	Secondary processor communications error: boot message queue overflowed
+320	Secondary processor communications error: command returned error status
+320	Secondary processor communications error: communications restart failed
+320	Secondary processor communications error: communications restart succeeded
+320	Secondary processor communications error: data packet error detected
+320	Secondary processor communications error: read error detected
+320	Secondary processor communications error: write error detected
+514	Not allowed; Instrument locked by another I/O session
+532	Cannot achieve requested resolution
+540	Cannot use overload as math reference
+541	Cannot use zero as math reference for PCT scaling function
+542	Measured dB reference too small

Self-Test Errors

The DM34460 Series self-test (see the *TST? command) performs a series of tests on the instrument hardware. Any failure of these tests will generate a SCPI error number -330, with additional test failure information. Refer to the Keysight DM34460 Series 6½ Digit Digital Multimeter Service Guide for more information.

The form of this error message is as follows:

Where **test#** is the number of the test that failed and **testname** describes the test.

The following is the list of test numbers and descriptions:

Error Code	Error Messages
+611	Self-test failed; Real Time Clock reset, check battery
+612	Self-test failed; keyboard processor not responding
+613	Self-test failed; unable to communicate with power controller
+614	Self-test failed; unable to sense line frequency
+615	Self-test failed; measurement processor not responding
+616	Self-test failed; calibration memory reading error
+617	Self-test failed; FPGA unconfigured
+618	Self-test failed; FPGA bus error
+619	Self-test failed; FPGA clock
+620	Self-test failed; shift register
+621	Self-test failed; overload sense stuck on
+622	Self-test failed; ADC generic error
+623	Self-test failed; ADC integrator saturated
+624	Self-test failed; Coarse ADC error
+625	Self-test failed; ADC offset
+626	Self-test failed; ADC noise
+627	Self-test failed; Fine ADC generic error
+628	Self-test failed; Fine ADC off-scale low
+629	Self-test failed; Fine ADC off-scale high
+630	Self-test failed; Fine ADC range
+631	Self-test failed; Fine ADC bits stuck
+632	Self-test failed; Fine ADC slope
+633	Self-test failed; Fine ADC linearity
+634	Self-test failed; low DC zero
+635	Self-test failed; high DC zero
+636	Self-test failed; +7V reference
+637	Self-test failed; -10V reference
+638	Self-test failed; x1 gain, zero input

+639	Self-test failed; x10 gain, zero input
+640	Self-test failed; x100 gain, zero input
+641	Self-test failed; precharge
+642	Self-test failed; x1 gain, non-zero input
+643	Self-test failed; x10 gain, non-zero input
+644	Self-test failed; x100 gain, non-zero input
+645	Self-test failed; 100uA current source
+646	Self-test failed; 10uA current source
+647	Self-test failed; 2 ohm shunt
+648	Self-test failed; AC offset
+649	Self-test failed; frequency input
+650	Self-test failed; input switch
+651	Self-test failed; autocal 10 V range full scale
+652	Self-test failed; autocal 10 V range tenth scale
+653	Self-test failed; autocal 1 V range full scale
+654	Self-test failed; autocal 1 V range tenth scale
+655	Self-test failed; autocal 100 mV range full scale
+656	Self-test failed; autocal 100 V range reference
+657	Self-test failed; autocal 10 kOhm range full scale
+658	Self-test failed; autocal 10 kOhm range tenth scale
+659	Self-test failed; autocal 1 kOhm range full scale
+660	Self-test failed; autocal 100 kOhm tenth scale
+661	Self-test failed; autocal 1 MOhm half scale
+662	Self-test failed; autocal 100 KOhm to 1 MOhm transfer
+663	Self-test failed; autocal 1 MOhm to 10 MOhm transfer
+664	Self-test failed; autocal 10 MOhm internal resistor
+665	Self-test aborted; high ac voltage present on input terminals
+666	Self-test aborted; high dc voltage present on input terminals

Calibration Errors

The following errors indicate failures that may occur during a calibration. Refer to the Keysight DM34460 Series 6½ Digit Digital Multimeter Service Guide for more information.

Error Code	Error Messages
+701	Calibration error; security defeated
+702	Calibration error; calibration memory is secured
+703	Calibration error; secure code provided was invalid
+704	Calibration error: secure code too long
+705	Calibration error; calibration aborted
+706	Calibration error: provided value out of range
+707	Calibration error: computed correction factor out of range
+708	Calibration error: signal measurement out of range
+708	Calibration error; signal frequency out of range
+709	Calibration error: no calibration for this function/range
+710	Calibration error: full scale correction out of range
+711	Calibration error: calibration string too long
+712	Calibration failed
+713	Calibration error; ADC calibration failed; ADC configuration 'ACI' did not converge
+713	Calibration error; ADC calibration failed; ADC configuration 'ACV' did not converge
+713	Calibration error; ADC calibration failed; ADC configuration 'DCV' did not converge
+713	Calibration error; ADC calibration failed; DC offset for setup 'ACI'
+713	Calibration error; ADC calibration failed; DC offset for setup 'ACV'
+713	Calibration error; ADC calibration failed; DC offset for setup 'DCV'
+713	Calibration error; ADC calibration failed; feedbackLutGainTune unsupported LUT goal
+713	Calibration error; ADC calibration failed; feedbackLutTune search did not converge
+713	Calibration error; ADC calibration failed; feedbackPiCancel did not converge for setup 'ACI'
+713	Calibration error; ADC calibration failed; feedbackPiCancel did not converge for setup 'ACV'
+713	Calibration error; ADC calibration failed; feedbackPiCancel did not converge for setup 'DCV'
+713	Calibration error; ADC calibration failed; fine merge for setup 'ACI'
+713	Calibration error; ADC calibration failed; fine merge for setup 'ACV'
+713	Calibration error; ADC calibration failed; fine merge for setup 'DCV'
+713	Calibration error; ADC calibration failed; fine offset for setup 'ACI'
+713	Calibration error; ADC calibration failed; fine offset for setup 'ACV'
+713	Calibration error; ADC calibration failed; fine offset for setup 'DCV'
+713	Calibration error; ADC calibration failed; fineDcCancel found non-monotonic value in setup 'ACI'
+713	Calibration error; ADC calibration failed; fineDcCancel found non-monotonic value in setup 'ACV'

+713	Calibration error; ADC calibration failed; fineDcCancel found non-monotonic value in setup 'DCV'
+713	Calibration error; ADC calibration failed; LUT gain for setup 'ACI'
+713	Calibration error; ADC calibration failed; LUT gain for setup 'ACV'
+713	Calibration error; ADC calibration failed; LUT gain for setup 'DCV'
+713	Calibration error; ADC calibration failed; LUT goal incompatible with ACV
+713	Calibration error; ADC calibration failed; PI offset for setup 'ACI'
+713	Calibration error; ADC calibration failed; PI offset for setup 'ACV'
+713	Calibration error; ADC calibration failed; PI offset for setup 'DCV'
+713	Calibration error; DCV 10M input impedance gain adjustment out of range
+715	Calibration error; must perform +100mV DCV calibration before -100mV
+715	Calibration error; must perform +100uA DCI calibration before -100uA
+715	Calibration error; must perform +10V DCV calibration before -10V
+715	Calibration error; must perform 10MOhm calibration before 100MOhm
+720	Calibration error; DCV offset out of range
+721	Calibration error; DCI offset out of range
+722	Calibration error; RES offset out of range
+723	Calibration error; FRES offset out of range
+724	Calibration error; extended resistance self cal failed
+725	Calibration error; 1000V DC correction out of range
+726	Calibration error; ACV offset out of range
+727	Calibration error; ACI offset out of range
+730	Calibration error; precharge DAC convergence failed
+731	Calibration error; A/D turnover correction out of range
+732	Calibration error; AC flatness calibration failed
+733	Calibration error; AC low frequency correction out of range
+734	Calibration error; AC flatness calibration restarted by function/range change
+735	Calibration error; 1 kHz AC flatness frequency point must be last frequency point in sequence
+736	Calibration error; DCI 100uA range self-cal failed
+740	Calibration data lost: secure state
+740	Calibration information lost; count, security state, security code, string
+741	Calibration data lost: string data
+742	Calibration data lost: corrections
+746	System information write failure
+747	System information read failure
+748	Calibration memory write failure
+749	Calibration memory read failure
+750	Autocalibration corrections lost lost; due to firmware revision change

+750	Autocalibration corrections lost
+751	Autocalibration memory write failure
+752	Autocalibration memory read failure
+753	Autocalibration measurement out of range
+760	Operation aborted; high voltage present on input terminals

Miscellaneous Errors

Error Code	Error Messages
+800	Nonvolatile memory write failure
+810	State has not been stored
+820	Model and serial numbers not restored
+821	Controller and measurement board model numbers do not match
+822	Controller and measurement board serial numbers do not match
+823	Incorrect firmware loaded for this model number

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