

## Vertical Command Group

### Vertical Overview

You use the commands in the Vertical Command Group to control the vertical setup of all live (channel) waveforms for acquisition and to control the display of channel, reference, and math waveforms. This group contains commands to set up vertical parameters for electrical or optical signals, depending on the sampling module in use.

The `SElect : <wfm>` command also selects the waveform that many commands in other command groups use.

You may replace `VOLts` with `SCALE` in the vertical commands. This provides program compatibility with earlier models of Tektronix oscilloscopes.

## Vertical Commands

Command	Description
CH<x>?	Returns vertical parameters for the specified channel
CH<x>:BANdwidth?	Returns the bandwidth of the specified channel
CH<x>:BANdwidth	Sets the bandwidth of the specified channel
CH<x>:COUPling?	Returns the coupling setting for the specified channel
CH<x>:COUPling	Sets the coupling for the specified channel
CH<x>:DESKew?	Returns the deskew time for the specified channel
CH<x>:DESKew	Sets the deskew time for the specified channel
CH<x>:LABEL:NAME?	Returns the label defined for the channel waveform
CH<x>:LABEL:NAME	Defines the label for the channel waveform
CH<x>:LABEL:XPOS?	Returns the X display coordinate for the channel waveform label
CH<x>:LABEL:XPOS	Sets the X display coordinate for the channel waveform label
CH<x>:LABEL:YPOS?	Returns the Y display coordinate for the channel waveform label
CH<x>:LABEL:YPOS	Sets the Y display coordinate for the channel waveform label
CH<x>:OFFSet?	Returns the channel offset setting
CH<x>:OFFSet	Sets the channel offset
CH<x>:POSition?	Returns the channel vertical position
CH<x>:POSition	Sets the channel vertical position
CH<x>:PRObe?	Returns the gain, resistance, units, and ID of the probe that is attached to the specified channel
CH<x>:PROBECal?	Returns the probe calibration status
CH<x>:PRObe:GAIN?	Returns the gain of the probe that is attached to the specified channel
CH<x>:PRObe:ID?	Returns the type and serial number of the probe that is attached to the specified channel
CH<x>:PRObe:ID:TYPe	Returns the type of probe that is attached to the specified channel
CH<x>:PRObe:ID:SERnumber?	Returns the serial number of the probe that is attached to the specified channel
CH<x>PRObe:RESistance?	Returns the resistance of the probe that is attached to the specified channel
CH<x>:PRObe:UNITs?	Returns the units of the probe that is

	attached to the specified channel
CH<x>:PROBEFunc:EXTatten?	Returns the user-specified attenuation
CH<x>:PROBEFunc:EXTatten	Sets the attenuation value for the specified channel to the specified scale factor
CH<x>:PROBEFunc:EXTDBatten?	Returns the user-specified attenuation, in decibels
CH<x>:PROBEFunc:EXTDBatten	Sets the attenuation value for the specified channel to the specified value, in decibels
CH<x>:PROBEFunc:EXTUnits?	Returns the user-specified unit of measurement for the external attenuator
CH<x>:PROBEFunc:EXTUnits	Sets the unit of measurement for the external attenuator of the specified channel
CH<x>:SCAle?	Returns the vertical scale (per div) of the specified channel
CH<x>:SCAle	Sets the vertical scale (per div) of the specified channel
CH<x>:TERmination?	Returns channel input termination
CH<x>:TERmination	Sets channel input termination
MATH<x>:POSition?	Returns the vertical position for math display
MATH<x>:POSition	Sets the vertical position for math display
MATH<x>:SCAle?	Returns the vertical scale (per div) for math display
MATH<x>:SCAle	Sets the vertical scale (per div) for math display
REF<x>:LABel?	Returns a branch query containing the waveform label name and the coordinates at which the label is displayed
REF<x>:LABel:NAME?	Returns the label of the designated waveform
REF<x>:LABel:NAME	Sets the label of the designated waveform
REF<x>:LABel:XPOS?	Returns the position of the reference waveform label on the X axis
REF<x>:LABel:XPOS	Sets the position of the reference waveform label on the X axis
REF<x>:LABel:YPOS?	Returns the position of the reference waveform label on the Y axis
REF<x>:LABel:YPOS	Sets the position of the reference waveform label on the Y axis
REF<x>:POSition?	Returns the vertical position of the specified reference waveform
REF<x>:POSition	Sets the vertical position of the specified reference waveform
REF<x>:SCAle?	Returns the vertical scale of the

	specified reference waveform
REF<x>:SCALE	Sets the vertical scale of the specified reference waveform
SElect?	Return information on which waveforms are ON/OFF and which is the selected waveform.
SElect:<wfm>?	Returns whether the specified channel is on or off
SElect<wfm>	Turns on the specified waveform
SElect:CONTRol?	Returns the waveform and time base selected for front-panel control.
SElect:CONTRol <wfm>	Sets the waveform controlled by front panel.

## CH<x>?

### Description

This query-only command returns the vertical parameters for the specified channel. The channel is specified by x, which ranges from 1 through 4. This command is similar to selecting Vertical Setup from the Vertical menu.

### Group

Vertical

### Syntax

CH<x>?

### Example

CH1?

This query might return :CH1:BANDWIDTH 1.0000E+09; COUPLING DC; DESKEW 0.0000E+00; OFFSET 0.0000E+00; POSITION 0.0000E+00; SCALE 5.0000E-01; TERMINATION 1.0000E+06; PROBCAL INIT; PROBE:GAIN 1.0000E+00; RESISTANCE 1.0000E+06; UNITS "V" ; ID:TYPE "1X"; SERNUMBER "N/A"; :CH1:PROBEFUNC:EXTATTEN 1.0000E+00; EXTUNITS "None"; :CH1:LABEL:NAME ""; XPOS 5 ; YPOS 5, showing the vertical parameters for channel 1.

## CH<x>:BANDwidth

### Description

This command sets or queries the selectable low-pass bandwidth limit filter of the specified channel. This is equivalent to selecting Bandwidth from the Vertical menu.

### Group

Vertical

### Syntax 1

CH<x>:BANDwidth {TWEnty|TWOfifty|FULl|<NR3>}

### Syntax 2

CH<x>:BANDwidth?

### Arguments

- TWEnty  
This sets the upper bandwidth limit to 20 MHz.
- TWOfifty  
This sets the upper bandwidth limit to 250 MHz.
- FULl  
This disables any optional bandwidth limiting. The specified channel operates at its maximum attainable bandwidth.
- <NR3>  
This represents a double-precision ASCII string, which is then rounded to available bandwidths using geometric rounding and sets the upper bandwidth.

### Example 1

CH1:BANDwidth TWEnty

This command sets the bandwidth of channel 1 to 20 MHz.

### Example 2

CH2:BANDwidth?

This query might return :CH2:BANDWIDTH 1.0000E+09, indicating that there is no bandwidth limiting on channel 2.

## CH<x>:COUPling

### Description

This command sets or queries the input attenuator coupling setting for the specified channel. This command is equivalent to selecting Coupling from the Vertical menu.

### Group

Vertical

### Syntax 1

CH<x>:COUPling {AC|DC|GND}

### Syntax 2

CH<x>:COUPling?

### Arguments

- AC  
This sets the specified channel to AC coupling.
- DC  
This sets the specified channel to DC coupling.
- GND  
This sets the specified channel to ground. Only a flat, ground-level waveform will be displayed.

### Example 1

CH2:COUPling AC

This command sets channel 2 to AC coupling.

### Example 2

CH3:COUPling?

This query might return :CH3:COUPling DC, indicating that channel 3 is set to DC coupling.

## CH<x>:DESKew

### Description

This command sets or queries the deskew time for the specified channel. The channel is specified by x, which can range from 1 through 4. This command is equivalent to selecting Deskew from the Vertical Setup menu.

You can adjust the deskew time to add an independent, channel-based delay time to the delay (set by the horizontal position control and common to all channels) from the common trigger point to first sample taken for each channel. This lets you compensate individual channels for different delays introduced by their individual input hook ups.

### Group

Vertical

### Syntax 1

CH<x>:DESKew <NR3>

### Syntax 2

CH<x>:DESKew?

### Argument

- <NR3>

This is the deskew time for this channel, ranging from -25 ns to +25 ns with a resolution of 1 ps. Out-of-range values are clipped.

### Example 1

CH4:DESKew 5.0E-9

This command sets the deskew time for channel 4 to 5 ns.

### Example 2

CH2:DESKew?

This query might return :CH2:DESKew 2.0000E-09, indicating that the deskew time for channel 2 is set to 2 ns.



## **CH<x>:LABEL:NAME**

### **Description**

This command sets or queries the label attached to the displayed waveform for the specified channel. This command is equivalent to selecting Label from the Vertical menu.

### **Group**

Vertical

### **Syntax 1**

CH<x>:LABEL:NAME <str>

### **Syntax 2**

CH<x>:LABEL:NAME?

### **Argument**

- <str>

This is an alphanumeric character string, ranging from 1 through 32 characters in length.

### **Example 1**

CH2:LABEL:NAME "Pressure"

This command changes the waveform label for the CH2 waveform to "Pressure".

### **Example 2**

CH3:LABEL:NAME?

This query might return :CH3:LABEL:NAME "CH3", indicating that the waveform label for the CH 3 waveform is "CH3".

## CH<x>:LABEL:XPOS

### Description

This command sets or queries the X screen offset at which the label (attached to the displayed waveform of the specified channel) is displayed, relative to the left edge of the screen. Channels are specified by x, which ranges from 1 through 4. This command is equivalent to selecting Label from the Vertical menu and either viewing or setting X Pos.

### Group

Vertical

### Syntax 1

CH<x>:LABEL:XPOS <NR1>

### Syntax 2

CH<x>:LABEL:XPOS?

### Argument

- <NR1>

This is the location (in pixels) where the waveform label for the selected channel is displayed, relative to the left edge of the screen. Arguments should be integers ranging from 0 through 500.

### Example 1

CH3:LABEL:XPOS 50

This command moves the waveform label for the CH3 waveform, so that it begins 50 pixels to the right of the left edge of the screen.

### Example 2

CH2:LABEL:XPOS?

This query might return :CH2:LABEL:XPOS 50, indicating that the waveform label for the CH2 waveform is currently 50 pixels to the right of the left edge of the screen.

## CH<x>:LABEL:YPOS

### Description

This command sets or queries the Y screen offset at which the label (attached to the displayed waveform of the specified channel) is displayed, relative to the top edge of the screen. Channels are specified by x, which ranges from 1 through 4. This command is equivalent to selecting Label from the Vertical menu and either viewing or setting Y Pos.

### Group

Vertical

### Syntax 1

CH<x>:LABEL:YPOS <NR1>

### Syntax 2

CH<x>:LABEL:YPOS?

### Argument

- <NR1>

This is the location (in pixels) where the waveform label for the selected channel is displayed, relative to the top edge of the screen. Arguments should be integers ranging from 0 to 400.

### Example 1

CH3:LABEL:YPOS -25

This command moves the waveform label for the CH3 waveform to just beneath (25 pixels below) the top of the screen.

### Example 2

CH2:LABEL:YPOS?

This query might return :CH2:LABEL:YPOS 0, indicating that the waveform label for the CH2 waveform is currently located just beneath the top of the screen.

## CH<x>:OFFSet

### Description

This command sets or queries the vertical offset for the specified channel. The channel is specified by x, which can range from 1 through 4. This command is equivalent to selecting Offset from the Vertical menu.

This command offsets the vertical acquisition window (moves the level at the vertical center of the acquisition window) for the selected channel. Visualize offset as scrolling the acquisition window towards the top of a large signal for increased offset values, and scrolling towards the bottom for decreased offset values. The resolution of the vertical window sets the offset increment for this control.

Offset adjusts only the vertical center of the acquisition window for channel waveforms to help determine what data is acquired. The instrument always displays the input signal minus the offset value. The channel reference marker will move to the vertical graticule position given by the negative of the offset value divided by the scale factor, unless that position is off-screen. If the computed coordinate for the reference mark is off-screen, the mark moves to the nearest screen limit and changes from a right-pointing arrow (→) to an arrow pointing in the appropriate off-screen direction.

The settable range of a channel offset is either  $\pm 100$  V,  $\pm 10$  V or  $\pm 1.0$  V, depending on the vertical scale factor.

Vertical Scale Adjust Factors			
When Internal scale adjust gain is:	From 0.001 to 0.1	From 0.101 to 01.0	From 1.01 to 100.0
Product of Offset range, probe gain and transducer gain is:	$\pm 1.0$ V	$\pm 10.0$ V	$\pm 100.0$ V

**Note:** The above table describes oscilloscope behavior only when no probe is attached and when the external attenuation factor is 1.0.

### Group

Vertical

### Related Commands

CH<x>POSition (see page 437)

### Syntax 1

CH<x>:OFFSet <NR3>

### Syntax 2

CH<x>:OFFSet?

### Argument

- <NR3>

This is the offset value for the specified channel, ranging from -1.6V through 1.6V.

### Example 1

CH3:OFFSet 2.0E-3

This command sets the offset for channel 3 to 2mV.

### Example 2

CH2:OFFSet?

This query might return :CH4:OFFSet 1.0000E-03, indicating that the offset for channel 4 is set to 1 mV.

## CH<x>:POSition

### Description

This command sets or queries the vertical position of the specified channel. The channel is specified by x, which ranges from 1 through 4. The position value is applied to the signal before it is digitized. This command is equivalent to selecting Position/Scale from the Vertical menu and either viewing or setting Position.

Increasing the position value of a waveform causes the waveform to move up, and decreasing the position value causes the waveform to move down. Position adjusts only the display position of a waveform, whether channel, math, or reference waveform. The position value determines the vertical graticule coordinate at which input signal values, equal the present offset setting for that channel, are displayed. For example, if the position for Channel 3 is set to 2.0 and the offset is set to 3.0, then input signals equal to 3.0 units are displayed 2.0 divisions above the center of the screen.

### Group

Vertical

### Related Commands

CH<x>:OFFSet (see page 436), REF<x>:POSition (see page 457), MATH<x>:POSition (see page 206)

### Syntax 1

CH<x>:POSition <NR3>

### Syntax 2

CH<x>:POSition?

### Argument

- <NR3>

This is the position value, in divisions from the center graticule, ranging from 8 to -8 divisions.

### Example 1

CH2:POSition 1.3E+00

This command positions the Channel 2 input signal 1.3 divisions above the center graticule.

### Example 2

CH1:POSition?

This query might return :CH1:POSITION -1.3000E+00, indicating that the current position of Channel 1 is 1.3 divisions below the center graticule.

## **CH<x>:PRObe?**

### **Description**

This query-only command returns all information concerning the probe that is attached to the specified channel. The channel is specified by x, which ranges from 1 through 4.

### **Group**

Vertical

### **Related Commands**

CALibrate:PRObestate:CH<x>? (see page 43), CH<x>:PROBECal? (see page 439)

### **Syntax**

CH<x>:PROBE?

### **Example**

CH2:PROBE?

This query might return :CH2:PROBE:GAIN 1.0000E-01; RESISTANCE 1.0000E+07;UNITS "V";ID:TYPE "10X";SERNUMBER "N/A" for a 10x probe, indicating that the attenuation factor for the probe attached to channel 2 is 100.0 mV (assuming that probe units are set to volts).

## **CH<x>:PROBECal?**

### **Description**

This query-only command returns the probe calibration state for the selected channel. The channel is specified by x, which ranges from 1 through 4. This command is equivalent to selecting Probe Cal from the Vertical menu.

### **Group**

Vertical

### **Related Commands**

CALibrate:PRObestate:CH<x>? (see page 43)

### **Syntax**

CH<x>:PROBECal?

### **Outputs**

- **FAIL**

This signifies that the probe calibration has failed for the selected channel.

- **INIT**

This signifies that the probe calibration has not yet been run for the selected channel.

- **PASS**

This signifies the probe calibration has passed for the selected channel.

### **Example**

CH2:PROBECal?

This query might return :CH2:PROBECAL PASS, indicating that the probe calibration has passed for channel 2.

## **CH<x>:PRObe:GAIN?**

### **Description**

This query-only command returns the gain factor of the probe that is attached to the specified channel. The channel is specified by x, which ranges from 1 through 4. The "gain" of a probe is the output divided by the input transfer ratio. For example, a common 10x probe has a gain of 0.1.

### **Group**

Vertical

### **Related Commands**

CH<x>:SCALE (see page 449)

### **Syntax**

CH<x>:PRObe:GAIN?

### **Example**

CH2:PRObe:GAIN?

This query might return :CH2:PROBE:GAIN 0.1000E+00, indicating that the attached 10x probe delivers 0.1 V to the channel 2 BNC for every 10 V applied to the probe input.



## **CH<x>:PRObe:ID?**

### **Description**

This query-only command returns the type and serial of the probe that is attached to the specified channel. The channel is specified by x, which ranges from 1 through 4.

### **Group**

Vertical

### **Syntax**

CH<x>:PRObe:ID?

### **Example**

CH2:PRObe:ID?

This query might return :CH2:PROBE:ID:TYPE "10X";SERNUMBER "N/A", indicating that a passive 10x probe of unknown serial number is attached to channel 2.

## **CH<x>:PRObe:ID:TYPe?**

### **Description**

This query-only command returns the type of probe that is attached to the specified channel. The channel is specified by x, which ranges from 1 through 4. Level 2 (or higher) probes supply their exact product nomenclature; for Level 0 or 1 probes, a generic 'type string' of "nnX" is returned.

### **Group**

Vertical

### **Syntax**

CH<x>:PRObe:ID:TYPe?

### **Example**

CH1:PRObe:ID:TYPe?

This query might return :CH1:PROBE:ID:TYPE "P6203", indicating that P6203-type probe is attached to channel 1.

## **CH<x>:PRObe:ID:SERnumber?**

### **Description**

This query-only command returns the serial number of the probe that is attached to the specified channel. The channel is specified by x, which ranges from 1 through 4.

**Note:** For Level 0 and 1 probes, the serial number will be "N/A".

### **Group**

Vertical

### **Syntax**

CH<x>:PRObe:ID:SERnumber?

### **Example**

CH1:PRObe:ID:SERnumber?

This query might return :CH1:PROBE:ID:SERNUMBER "B010289", indicating that the serial number of the probe attached to channel 1 is B010289.

## **CH<x>:PRObe:RESistance?**

### **Description**

This query-only command returns the resistance factor of the probe that is attached to the specified channel. The channel is specified by x, which ranges from 1 through 4.

### **Group**

Vertical

### **Syntax**

CH<x>:PRObe:RESistance?

### **Example**

CH2:PRObe:RESistance?

This query might return :CH2:PROBE:RESISTANCE 10.0000E+06, indicating that the input resistance of the probe attached to Channel 2 is 10.0 megOhms.

## **CH<x>:PRObe:UNIts?**

### **Description**

This query-only command returns a string describing the units of measure for the probe attached to the specified channel. The channel is specified by x, which ranges from 1 through 4.

### **Group**

Vertical

### **Related Commands**

CH<x>:PROBEFunc:EXTUnits (see page 448)

### **Syntax**

CH<x>:PRObe:UNIts?

### **Example**

CH4:PRObe:UNIts?

This query might return :CH4:PROBE:UNITS "V", indicating that the units of measure for the probe attached to channel 4 are volts.

## CH<x>:PROBEFunc:EXTatten

### Description

This command instructs the oscilloscope when to make vertical settings (offset and scale) for the specified channel effective. The vertical settings become effective at the input of the external network or transducer (of a specified input-output transfer ratio) when the output is connected to the input of the probe attached to the channel.

The channel is specified by x, which ranges from 1 through 4. There is also a corresponding query, which returns the user-specified attenuation. Note that, as the name implies, this command deals with an attenuation factor, not a gain factor, unlike CH<x>:PRObe? (Note that this command returns a value independent of the External Attenuation). For example, if you specify a 20x attenuation factor for channel 1, then the commands return the following values (assuming that a 1x probe is presently attached, since the external attenuation is used in combination with the probe attenuation):

```
CH1:PRObe:EXTA?      20.00E+0
CH1:PRObe?           1.0E+0
```

This command is equivalent to selecting Attenuation from the Vertical command and then viewing or setting Ext Atten.

### Group

Vertical

### Related Commands

CH<x>:PROBEFunc:EXTDBatten (see page 447)

### Syntax 1

CH<x>:PROBEFunc:EXTatten <NR3>

### Syntax 2

CH<x>:PROBEFunc:EXTatten?

### Argument

- <NR3>

This is the attenuation value, which is specified as a multiplier in the range from 1.00E-10 to 1.00E+10.

### Example 1

```
CH1:PROBEFunc:EXTatten 167.00E-3
```

This command specifies an external 'gain of six' network, which is connected between the user's input signal and the input of the probe attached to channel 1.

### Example 2

```
CH2:PROBEFunc:EXTatten?
```

This query might return :CH2:PROBEFunc:EXTATTEN 1.0000E+00, indicating that the probe attached to channel 2 is connected directly to the user's signal.

## CH<x>:PROBEFunc:EXTDBatten

### Description

This command instructs the oscilloscope to make the vertical scale and offset settings for a specified channel effective at the input of an external network or transducer (with a specified input ÷ output transfer ratio in decibels). It is assumed that the input of the probe for the specified channel is connected to the output of this network or transducer. The channel is specified by x, which ranges from 1 through 4

There is also a corresponding query, which returns the user-specified attenuation, in decibels. Note that 1X = 0 dB, 10X = 20 dB, 100X = 40 dB etc.

This command is equivalent to selecting Attenuation from the Vertical menu and then either viewing or setting Ext Att(dB).

### Group

Vertical

### Related Commands

CH<x>:PROBEFunc:EXTatten (see page 446)

### Syntax 1

CH<x>:PROBEFunc:EXTDBatten <NR3>

### Syntax 2

CH<x>:PROBEFunc:EXTDBatten?

### Argument

- <NR3>

This is the attenuation value, which is specified in the range from -200.00 to 200.00.dB.

### Example 1

CH3:PROBEFunc:EXTDBatten 2.5

This command specifies an external 2.5 dB attenuator on channel 3.

### Example 2

CH1:PROBEFunc:EXTDBatten?

This query might return :CH1:PROBEFUNC:EXTDBATTEEN 2.5000E+00, indicating that the attenuation for channel 1 is 2.5 dB.

## CH<x>:PROBEFunc:EXTUnits

### Description

This command sets the unit of measurement for the external attenuator of the specified channel. The channel is specified by x, which ranges from 1 through 4. There is also a corresponding query that returns the user-specified unit of measurement for the external attenuator. Unless these units are set to the factory default string value of "None", they become the attenuated units of measure for that channel. It is assumed that the probe connected to the specified channel is of the correct type to receive the output of the user's external transducer or network.

### Group

Vertical

### Related Commands

CH<x>:PRObe:UNIts? (see page 445)

### Syntax 1

```
CH<x>:PROBEFunc:EXTUnits <str>
```

### Syntax 2

```
CH<x>:PROBEFunc:EXTUnits?
```

### Argument

- <str>

This can contain a string of up to eight characters to indicate the attenuation unit of measurement for the specified channel. However, most oscilloscope attenuators only display the first two characters.

### Example 1

```
CH4:PROBEFunc:EXTUnits "Pa"
```

This command sets the unit of measurement for the Channel 4 external attenuator.

### Example 2

```
CH2:PROBEFunc:EXTUnits?
```

This query might return :CH2:PROBEFunc:EXTUNITS "Pa", indicating that the Channel 2 external attenuator units of measurement are pascals.



## CH<x>:SCAle

### Description

This command sets or queries the vertical scale of the specified channel. The channel is specified by x, which can range from 1 through 4. Sending this command is equivalent to selecting Vertical Setup from the Vertical menu and then viewing or setting the Scale.

Each waveform has a vertical scale parameter. For a signal with constant amplitude, increasing the Scale causes the waveform to be displayed smaller. Decreasing the scale causes the waveform to be displayed larger.

Scale affects all waveforms, but affects channel waveforms differently from other waveforms:

- For channel waveforms, this setting controls the vertical size of the acquisition window as well as the display scale. The range and resolution of scale values depends on the probe attached and any other external factors you have specified.
- For reference and math waveforms, this setting controls the display only, graphically scaling these waveforms and having no affect on the acquisition hardware.

### Group

Vertical

### Related Commands

CH<x>OFFSet (see page 436), CH<x>:POSition (see page 437), REF<x>:SCAle (see page 458), MATH<x>:SCAle (see page 207)

### Syntax 1

CH<x>:SCAle <NR3>

### Syntax 2

CH<x>:SCAle?

### Argument

- <NR3>

This is the vertical channel scale in units per division.

### Example 1

CH4:SCAle 100E-03

This command sets the channel 4 scale to 100 mV per division.

### Example 2

CH2:SCAle?

This query might return :CH2:SCALE 1.0000E+00, indicating that the current scale setting of channel 2 is 1 volt per division.

## CH<x>:TERmination

### Description

This command sets the connected/disconnected status of a 50 ohm resistor, which may be connected between the specified channel's coupled input and oscilloscope ground. The channel is specified by x, which ranges from 1 through 4. There is also a corresponding query that requests the termination parameter and translates this enumeration into one of the two float values. This command is equivalent to selecting Termination from the Vertical menu or toggling between termination values from the VERTICAL area of the front-panel.

### Group

Vertical

### Syntax 1

CH<x>:TERmination <NR3>

### Syntax 2

CH<x>:TERmination?

### Argument

- <NR3>

This specifies the channel input resistance, which can be specified as 50 or 1,000,000.

### Example 1

CH4:TERmination 50.0E+0

This command establishes 50 ohm impedance on channel 1.

### Example 2

CH2:TERmination?

This query might return :CH2:TERMINATION 1.0000E+06, indicating that channel 2 is set to 1 MegOhm.

## MATH<x>:POSition?

### Description

This command sets or queries the vertical position of the specified Math waveform. The Math waveform is specified by x, which can range from 1 through 4. The position value is usually applied to the signal before it is digitized. The highest three units/div scale ranges of a given math are implemented by changing the way the acquired data is displayed. When the instrument is operating in any of these highest three scale ranges, the position control operates only on the signal after it is digitized. Note that if a signal that exceeds the range of the digitizer in one of these three scale ranges is repositioned, the displayed waveform will contain clipped values on-screen. This command is equivalent to selecting Position/Scale from the Math menu and then entering a Vert Pos value or adjusting the front-panel Vertical **POSITION** knob.

Increasing the position value of a waveform causes the waveform to move up, and decreasing the position value causes the waveform to move down. Position adjusts only the display position of a waveform, whether channel, math, or reference waveform. The position value determines the vertical graticule coordinate at which input signal values, equal the present offset setting for that reference, are displayed. For example, if the position for Math 3 is set to 2.0 and the offset is set to 3.0, then the input signals equal to 3.0 are displayed 2.0 divisions above the center of the screen.

### Groups

Math, Vertical

### Related Commands

CH<x>POSition (see page 437), REF<x>:POSition (see page 457)

### Syntax 1

MATH<x>:POSition <NR3>

### Syntax 2

MATH<x>:POSition?

### Argument

- <NR3>

This is the desired position in divisions from the center graticule.

### Example 1

MATH2:POSition 1.3E+00

This command positions the Math 2 input signal 1.3 divisions higher than a position of 0.

### Example 2

MATH1:POSition?

This query might return :MATH1:POSITION -1.3000E+00, indicating that the current position of Math 1 is 1.3 divisions below the center graticule.

## MATH<x>:SCAlE

### Description

This command sets or queries the vertical scale of the specified math waveform. The math waveform is specified by x, which can range from 1 through 4. This command is equivalent to selecting Position/Scale from the Math menu and then entering a Vert Scale value or adjusting the front-panel Vertical **SCALE** knob.

Each waveform has a vertical scale parameter. For a signal with constant amplitude, increasing the Scale causes the waveform to be displayed smaller. Decreasing the scale causes the waveform to be displayed larger.

Scale affects all waveforms. For reference and math waveforms, the scale setting controls the display only, graphically scaling these waveforms and having no effect on the acquisition hardware.

In addition to using the MATH<x>:SCAlE command, autoscaling occurs when a math is first defined and enabled, or when a math string changes. After the math is calculated for the first time, the instrument determines the min + max of that waveform data. Then, the math position is set so that (min + max)/2 is in the center of the screen. In addition, the instrument sets the math scale so that the range of the min and max cover 6 divisions.

### Group

Math, Vertical

### Related Commands

CH<x>:SCAlE (see page 449), REF<x>:SCAlE (see page 458)

### Syntax 1

MATH<x>:SCAlE <NR3>

### Syntax 2

MATH<x>:SCAlE?

### Argument

- <NR3>

This is the scale, in volts, amps or watts per division. The range is from 100.0E-36 through 100.0E+36.

### Example 1

MATH4:SCAlE 100E-03

This command sets the Math 4 scale to 100 mV per division.

### Example 2

CH2:SCAlE?

This query might return :MATH2:SCALE 1.0000E+00, indicating that the current scale setting of Math 2 is 1 volt per division.

## **REF<x>:LABel?**

### **Description**

This query-only command returns a branch query containing the waveform label name and the coordinates at which the label (attached to the displayed waveform of the specified reference) is displayed. References are specified by x, which ranges from 1 through 4. This command is equivalent to selecting Reference Waveforms from the File menu and then choosing Label from the drop-down list.

### **Group**

Vertical

### **Related Commands**

REF<x>:LABel:NAME (see page 454), REF<x>:LABel:XPOS (see page 455), REF<x>:LABel:YPOS (see page 456)

### **Syntax**

REF<x>:LABel?

### **Argument**

None.

### **Example**

REF1:LABel?

This query will return :REF1:LABel:NAME "Myname";:XPOS-200;:YPOS 50.

## **REF<x>:LABel:NAME**

### **Description**

This command sets or queries the label of the designated waveform. References are specified by x, which ranges from 1 through 4. This command is equivalent to selecting Reference Waveforms from the File menu and then choosing Reference Setup from the drop-down list. Then select the tab associated with the reference for which you want to create a label and then enter a label in the Label box.

### **Group**

Vertical

### **Related Commands**

REF<x>:LABel? (see page 453)

### **Syntax 1**

REF<x>:LABel:NAME <String>

### **Syntax 2**

REF<x>:LABel:NAME?

### **Argument**

- <String>

This is the character string that will be used for the reference waveform label name.

### **Example 1**

REF3:LABel:NAME?

This query might return :REF3:LABEL:NAME "Signal2", indicating that the label name for Reference 3 is currently set to "Signal2".

### **Example 2**

REF4:LABel:NAME "My Reference"

This command sets the label name of Reference 4 to "My Reference".

## REF<x>:LABel:XPOS

### Description

This command sets or queries the X screen offset at which the label (attached to the displayed waveform of the specified reference) is displayed, relative to the left edge of the screen. References are specified by x, which ranges from 1 through 4. This command is equivalent to selecting Reference Waveforms from the File menu and then choosing Reference Setup from the drop-down list. Then either view or set X Position.

### Group

Vertical

### Related Commands

REF<x>:LABel? (see page 453)

### Syntax 1

REF<x>:LABel:XPOS <NR1>

### Syntax 2

REF<x>:LABel:XPOS?

### Argument

- <NR1>

This is the location (in pixels) where the waveform label for the selected reference is displayed, relative to the left edge of the screen. Arguments should be integers ranging from 0 through 500.

### Example 1

REF4:LABel:XPOS 10

This command moves the waveform label for the REF3 waveform, so that it begins 10 pixels to the right of the left edge of the screen.

### Example 2

REF2:LABel:XPOS?

This query might return :REF2:LABel:XPOS 150, indicating that the x-axis for the REF 2 waveform is currently 150 pixels to the right of the left edge of the screen.

## REF<x>:LABel:YPOS

### Description

This command sets or queries the Y screen offset at which the label (attached to the displayed waveform of the specified reference) is displayed, relative to the top edge of the screen. References are specified by x, which ranges from 1 through 4. This command is equivalent to selecting Reference Waveforms from the File menu and then choosing Reference Setup from the drop-down list. Then either view or set Y Position.

### Group

Vertical

### Related Commands

REF<x>:LABel? (see page 453)

### Syntax 1

REF<x>:LABel:YPOS <NR1>

### Syntax 2

REF<x>:LABel:YPOS?

### Argument

This is the location (in pixels) where the waveform label for the selected reference is displayed, relative to the top edge of the screen. Arguments should be integers ranging from 0 to 400.

### Example 1

REF3:LABel:YPOS -10

This command moves the waveform label for the REF3 waveform to just beneath (10 pixels) the top of the screen.

### Example 2

REF2:LABel:YPOS?

This query might return :REF2:LABel:YPOS 0, indicating that the waveform label for the REF2 waveform is currently located just beneath the top of the screen.



## REF<x>:POSition

### Description

This command sets or queries the vertical position of the specified reference waveform. The reference waveform is specified by x, which ranges from 1 through 4. This command is equivalent to selecting Reference Waveforms from the File menu, choosing Reference Setup from the drop-down list and then entering the desired Position value.

Increasing the position value of a waveform causes the waveform to move up, and decreasing the position value causes the waveform to move down. Position adjusts only the display position of a waveform. The position value determines the vertical graticule coordinate at which signal values are displayed. For example, if the position for Reference 3 is set to 2.0, the signal represented by that reference will be displayed at 2.0 divisions above the center of the screen.

**Note:** References are static. All position and scale changes are applied in a post-processing mode.

### Group

Vertical

### Related Commands

CH<x>:POSition (see page 437), MATH<x>:POSition (see page 206)

### Syntax 1

REF<x>:POSition <NR3>

### Syntax 2

REF<x>:POSition?

### Argument

- <NR3>

This is the desired position, in divisions from the central graticule. The range is from -5 to 5 divisions.

### Example 1

REF2:POSition 1.3E+00

This command positions the Reference 2 input signal 1.3 divisions above the center graticule.

### Example 2

REF1:POSition?

This query might return :REF1:POSITION -1.3000E+00, indicating that the current position of Reference 1 is 1.3 divisions below the center graticule.

## REF<x>:SCAlE

### Description

This command sets or queries the vertical scale of the specified reference waveform. The reference is specified by x, which can range from 1 through 4.

Each waveform has a vertical scale parameter. For a signal with constant amplitude, increasing the Scale causes the waveform to be displayed smaller. Decreasing the scale causes the waveform to be displayed larger.

Scale affects all waveforms, but affects reference and math waveforms differently from channel waveforms:

- For reference and math waveforms, this setting controls the display only, graphically scaling these waveforms and having no affect on the acquisition hardware.
- For channel waveforms, this setting controls the vertical size of the acquisition window as well as the display scale. The range and resolution of scale values depends on the probe attached and any other external factors you have specified.

### Group

Vertical

### Related Commands

CH<x>:SCAlE (see page 449), MATH<x>:SCAlE (see page 207)

### Syntax 1

REF<x>:SCAlE <NR3>

### Syntax 2

REF<x>:SCAlE?

### Argument

- <NR3>

This is the gain, in user units per division..

### Example 1

REF4:SCAlE 100E-03

This command sets the Reference 4 scale to 100 mV per division.

### Example 2

CH2:SCAlE?

This query might return :REF2:SCALE 1.0000E+00, indicating that the current scale setting of Reference 2 is 1 volt per division.

## **SElect?**

### **Description**

This query-only command returns the selected waveform that is affected by the front-panel controls and the display status (on or off) of all waveforms. This query command is equivalent to selecting Measurement Setup from the Measure menu and viewing the Source waveform setting.

### **Group**

Vertical

### **Syntax**

SElect?

### **Example**

SElect?

This query might return :SELECT:CH1 1;CH2 0;CH3 0;CH4 0;MATH1 0;MATH2 0;MATH3 0;MATH4 0;REF1 0;REF2 0;REF3 0;REF4 0;CONTROL CH1

## **SElect:<wfm>**

### **Description**

This command turns on a specified waveform. This action also resets the acquisition. The query returns whether the channel is on or off but does not indicate whether it is the selected waveform.

### **Group**

Vertical

### **Syntax 1**

SElect:<wfm> {ON|OFF|<NR1>}

### **Syntax 2**

SElect:<wfm>?

### **Arguments**

- ON

This turns on the display of the specified waveform. This waveform also becomes the selected waveform.

- OFF

This turns off the display of the specified waveform.

- <NR1>

A 0 turns off the display of the specified waveform; any other value turns on the display of the specified waveform.

### **Example**

SElect:CH2 ON

This command turns the channel 2 display on and selects channel 2.

SElect:REF1?

This query might return :SELECT:REF1, indicating that REF1 is the selected waveform.

## **SElect:CONTRol <wfm>**

### **Description**

This command sets or queries the waveform that is selected as the 'implied' recipient of channel-related commands that support legacy style programs. The command form also performs the equivalent of a **SELECT:<wfm> ON** command. This command is equivalent to selecting Measurement Setup from the Measure menu and either viewing or setting the Source waveform.

### **Group**

Vertical

### **Syntax 1**

**SElect:CONTRol** (CH<x>|MATH<x>|REF<x>)

### **Syntax 2**

**SElect:CONTRol?**

### **Arguments**

- CH<x>

This selects the specified channel waveform as the waveform that is affected by the front-panel controls. The valid channel waveform range is from 1 through 4.

- MATH<x>

This selects the specified math waveform as the waveform that is affected by the front-panel controls. The valid math waveform range is from 1 through 4.

- REF<x>

This selects the specified reference waveform as the waveform that is affected by the front-panel controls. The valid reference waveform range is from 1 through 4.

### **Example 1**

**SElect:CONTRol** CH2

This command resets acquisition, displays channel 2, and causes the selected waveform to be the implied object of waveform-manipulating commands.

### **Example 2**

**SElect:CONTRol?**

This query might return **:SELECT:CONTROL MATH3**, indicating that math 3 is the implied object of waveform-manipulating commands.