FAQ 3 — Example Measurement Tasks

Use the examples in this section to set up and make measurements by sending commands to your SmartLink™ using a terminal emulator or NetAcq software.

Measurement Tasks

Configure SmartLink™ to Measure VDC

You must configure a channel or set of channels to measure DC Volts before taking a measurement. You can make differential or single-ended measurements. Use the following format for this command.

:config <chan_list> vdc <ranges> <DIFF | SE> <"chan_tag">

To Specify a Channel List you specify the <chan_list> parameter using numbers separated by commas, a range of channels separated by a dash, or a combination of the two as shown in the following channel list examples.

1,2,3,7,8
1,2,4-6
2-4,6-8

To Specify the Voltage Range you set the <ranges> parameter to one of the following values: .2, 2, 20, 40, or Auto. SmartLink™ chooses the appropriate range when you set the <ranges> parameter to Auto.

To Specify the Measurement Type you set the <DIFF | SE> parameter to either DIFF or SE.

To Specify a Channel Tag you use the <"chan_tag"> parameter to create a comment string that will be returned with each measurement. When you store or transmit the measurement to the display, the comment string is stored or displayed with the data. The default tag is "Channel-nn", where nn is the channel number. Maximum length for the string is 12 characters.

Examples:

:config 1 vdc 2 diff "Ch1 2vdc"	Configures channel 1 to measure DC volts using the 2 volt range, making a differential measurement with "Ch1 2vdc" as the channel tag.
:config 1-4 vdc .2 se	Configures channels 1 through 4 to measure DC volts using the 200 millivolt range, making a single-ended measurement with "Channel n" as the channel tag (n is the channel number). "Channel n" is the default tag if you do not specify one.
:config 1,3-4,6-8 vdc Auto diff	Configures channels 1,3,4,6,8 to measure DC volts using autorange to select the correct range, making a differential measurement with "Channel n" as the channel tag (n is the channel number).

Configure SmartLink™ to Measure Ohms

You must configure a channel or set of channels to measure Ohms before taking a measurement. You can make four-wire or single-ended measurements. Use the following format for this command.

:config <chan_list> ohms <ranges> <4W|4WOC|SE|SEOC> <"chan_tag">

To Specify a List of Channels you list channel numbers as described for DC Volts.

To Specify the Ohms Range you set the <ranges> parameter to one of the following values: 200, 2k, 20k, 200k, 2M, 20M, 200M, or Auto. SmartLink™ chooses its own range when you set the <ranges> parameter to Auto.

To Specify the Connection Type you set the <4W|4WOC SE|SEOC> parameter to one of the four choices listed.

To Specify a Channel Tag you use the <"chan_tag"> parameter as described for DC Volts.

Examples:

:config 1 ohms 2k 4W "Ch1 2K"	Configures channel 1 to measure Ohms using the 2000 ohm range, making a four-wire measurement with "Ch1 2K" as the channel tag.
:config 1-4 ohms Auto se	Configures channels 1 through 4 to measure ohms using autorange to select the correct range, making a four-wire measurement with "Channel n" as the channel tag (n is the channel number). "Channel n" is the default tag if you do not specify one.
:config 1,3-4,6-8 ohms 200 se	Configures channels 1,3,4,6,8 to measure ohms using the 200 ohm range, making a single-ended measurement with "Channel n" as the channel tag.

Take a Measurement using SmartLink™

Make sure you have configured the channel(s) to measure the correct physical parameter (Ohms, DC Volts, etc) as described above.

The general form of the measure command is as follows:

:meas? <chan_list> <#_of_readings | ON | OFF>

To Specify a List of Channels you list channel numbers as described for DC Volts.

To Specify the Number of Readings you set the "#_of_readings" parameter to an integer number. The default value for the number of readings is one.

Examples:

:meas? 1 1	Measure the input to channel 1, one time.
:meas? 1 5	Measure the input to channel 1, 5 times.

:meas? 1-4	Measure the input to channels 1,2,3,4 one time.
:meas? 1-4 1	Measure the input to channels 1,2,3,4 one time.
:meas? 1-4 10	Measure the input to channels 1,2,3,4 in sequence. Repeat the sequence 10 times.
:meas? 8,3,5,1-2 10	Measure the input to channels 1,2,3,5,8 in sequence. Repeat the sequence 10 times. The channels will be measured in sequence from lowest to highest regardless of the order you specify them in the channel list.

Find the Maximum and Minimum Values in a Set of Measurement Data

The :stats command has the following format:

:stats:max? <chan_list> **or** :stats:min? <chan_list>

To Configure Channels for the correct physical parameter (Ohms, DC Volts, etc) you follow the same procedure as described for DC Volts or Ohms.

To Find Max and Min Values of Measured Channel Data perform the following steps in order.

1 Clear all previously-recorded data in channels 1 through 4 (we will use these channels for this example) using the following command:

:stats:clear 1-4 **or** :stats:clear all

2 Use the :meas? command to make 10 measurements on channels 1-4 as follows:

:meas? 1-4 10

3 Use the :stats command to find the maximum or minimum values for all the channels, or a specified channel as follows:

:stats:max?	Finds the maximum reading for channel 1 (default channnel), from all 10 measurements.
:stats:max? 3	Finds the maximum reading for channel 3, from all 10 measurements.
:stats:max? 2,3	Finds the maximum readings for channels 2 and 3, from all 10 measurements.
:stats:min?	Finds the maximum reading for channel 1 (default channnel), from all 10 measurements.
:stats:min? 3	Finds the minimum reading for channel 3, from all 10 measurements.
:stats:min? 2,3	Finds the minimum readings for channels 2 and 3, from all 10 measurements.

FAQ 4 — Averaging With SmartLink™

Introduction

SmartLink™ currently computes two types of averages — a repeating average and a moving average. You use a different command to compute each type of average.

Use the **:config:meas:average** command when you want a repeating average and the **:config:filter:dig:mvgavg** command when you want a moving average.

Using a Repeating Average

The **:config:meas:average** command configures all the instrument's analog channels to average the same number of readings. Use this command to specify the number of readings to be averaged into each measurement. The SmartLink™ will take the number of readings you specify, sum them, divide by the number of readings, and return this value as the result of the measurement.

You should use a repeating average when you want to increase the accuracy of a single measurement. Clearly, the measurement will take longer than if you collect a single reading from the channel. For example, if you choose to average over 10 readings the measurement will take more than 10 times as long as with a single reading.

EXAMPLE COMMAND SEQUENCE

1 Configure the SmartLink™ to average **n** new readings for each measurement.

:config:meas:average n, where n is an integer between 1 and 100

2 Take a measurement from channel 1 that will be the average of **n** readings.

:meas? 1

3 Turn the repeating average off.

:config:meas:average 1

Using a Moving Average

The **:config:filter:dig:mvgavg** command configures only the specified list of analog channels. Use this command to specify the number of readings to be averaged into each measurement taken from the specified channels.

Each time a **:Meas?** command is issued, one new measurement is taken and averaged with the last measurements, up to **n**. This new measurement is made by taking one new measurement, discarding the oldest measurement and then computing the average in the same way as with a repeating average. The advantage of this type of average is that you get an averaged measurement with each new measurement.

You should use a moving average when you want accurately monitor the value of a slowly varying input signal such as temperature. This technique allows an accurate, averaged measurement at the same speed as a single measurement.

FAQ 4 — AVERAGING WITH SMARTLINK™

EXAMPLE COMMAND SEQUENCE

You must first configure a channel to calculate the moving average of n readings and then activate digital filtering for that channel before the instrument will return a moving average as the measurement result.

1 Configure the SmartLink™ to compute the moving average of the last **n** readings after each reading from channel 4.

:config:filter:dig:mvgavg 4 n, where n is an integer between 1 and 50

2 Activate moving average for channel 4.

:filter:dig 4 on

3 Take a measurement from channel 4.

:meas? 1

4 Deactivate moving average for channel 4.

:filter:dig 4 off

FAQ 5 — Download SmartLink™ Firmware

CAUTION – This procedure should be performed by someone with experience downloading software.

When you upgrade your SmartLink™ firmware you will use NetAcq software to download new firmware from your PC to the instrument through its Local Port.

If you have not installed or used NetAcq, refer to the Getting Started section of the *User's Manual and Prorammer's Reference* that was shipped with your instrument.

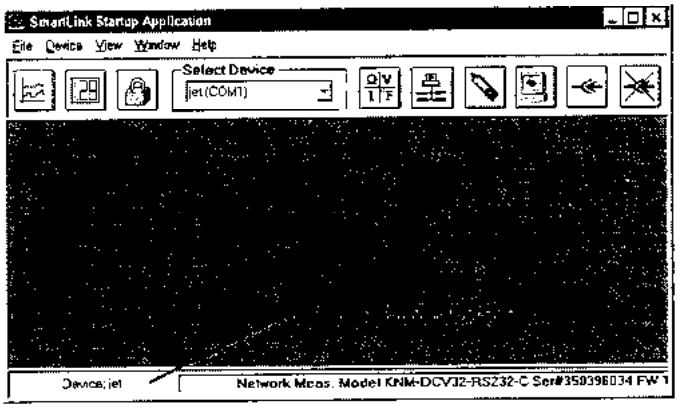
Preparing to Download Firmware

1 Place the version of appcode you wish to install in the same directory that contains your NetAcq files.

2 Use NetAcq to establish a connecion to your instrument.

Downloading Firmware to SmartLink™

1 Move the cursor so that it is pointing to the bottom status bar as shown below and click with the left mouse button.



2 Press CTRL f on your keyboard.