

SmartLink™ Commands Tutorial

Measurement Setup Process

You can take quick measurements with your SmartLink™ right out of the box, using the instrument's default configurations and the **:Meas?** command.

For more complex measurements, you will want to use the three-step process outlined below to be certain you are getting measurement results that meet your needs.

Before you can take measurements or configure channels, you must already have established communication with the instrument. You configure the communications port on SmartLink™ using its Local Port and the **:Config:Comm** commands.

You should also set the instrument's internal time and date using the **:Time** and **:Date** commands at this time; although it is not mandatory.

Once you have established communication and set the time and date, you can complete the following tasks to ensure the measurement you make will give you the results you want.

- 1. Configure the SmartLink™ Instrument.**
- 2. Activate SmartLink™ Configurations.**
- 3. Activate the Measurement.**

Keep in mind that you can take measurements with your SmartLink™ right out of the box, using the instrument's default configurations and the **:Meas?** command. You then only have to change those configurations that are necessary to meet your needs.

Please read the following sections in the order they appear to get the most benefit from this quick tutorial.

*Configure the SmartLink™ Instrument***CONFIGURE SMARTLINK™ CHANNELS**

- 1 Configure channels to measure the correct parameters with an appropriate measurement style (e.g. DCVolts-differential, DCVolts-single ended, 4-wire ohms-offset compensated, etc.) using **:Config <chan_list>** commands.

```
:Config <chan_list> VDC <range> <DIFF|SE>
<"chan_tag">
```

Configuration is often as easy as setting a range, and whether it is a single ended or differential measurement.

```
:Config <chan_list> Temp RTD <PT385|PT3916|<User r0
alpha beta delta>> <range> <SE|4W|4WOC|SEOC>
<"chan_tag">
```

Directly set the sensor type, and the SmartLink handles the full conversion to engineering units.

```
:Config <chan#> Calculated <chan#A> <math_func>
<chan#B> <"chan_tag">
```

Calculated channels allow differences, additions, and other inter-channel math.

```
:Config <chan_list> Strain Gage<fs_strain_uE>
<bridge_type> <gage_factor> <poisson_ratio>
<excitation_voltage> <"chan_tag">
```

All the parameters associated with a sensor are included in the single configuration command.

```
:Config <chan_list> Weight Gage <rated_cap>
<p_scale_factor> <n_scale_factor>
<excitation_voltage> <"chan_tag">
```

Most parameters have reasonable defaults, often eliminating the need to configure.

- 2 Configure units for each measurement parameter (e.g. FtLb for torque, K for temperature, etc.) using **:Config:Units** commands.

CONFIG UNITS

```
:Config:Units:Accel <g>
:Config:Units:Accel?
:Config:Units:Ohms <Ohms|Kohms|Mohms>
:Config:Units:Ohms?
:Config:Units:Temp <C|F|K>
:Config:Units:Temp?
:Config:Units:Torque <FtLb|InLb|Nm|KgM|InOz>
:Config:Units:Torque?
:Config:Units:VDC <Volts|mVolts>
:Config:Units:VDC?
:Config:Units:Weight <Lb|N|Kg|Oz>
:Config:Units:Weight?
:Config:Units:Strain <uE|mV>
:Config:Units:Strain?
```

Set engineering units for measurements. These are used globally in the SmartLink.

CONFIGURE SMARTLINK™ DATA CONDITIONING

- 1 Configure the instrument to average a number of readings for each measurement using **:Config:Meas** or **:Config:Filter** commands.

CONFIG MEAS

```

:Config:Meas:Averge <#_rdgs_per_meas>
:Config:Meas:Averge?
:Config:Meas:Azero <On|Off|Once>
:Config:Meas:Azero?
:Config:Meas:Off
:Config:Meas?
:Config:Meas:Rsln <data_bytes>
:Config:Meas:Rsln?
    
```

Set how many readings are averaged in the A/D before a measurement is complete.

Auto Zero allows the SmartLink to self-calibrate real-time. If you do not want any time gaps in measurements, turn this off.

Choose 1 to 4 bytes to store and transmit measurements.

Since the digital filter is a moving average filter you get new readings at nearly the same rate as with unaveraged measurements.

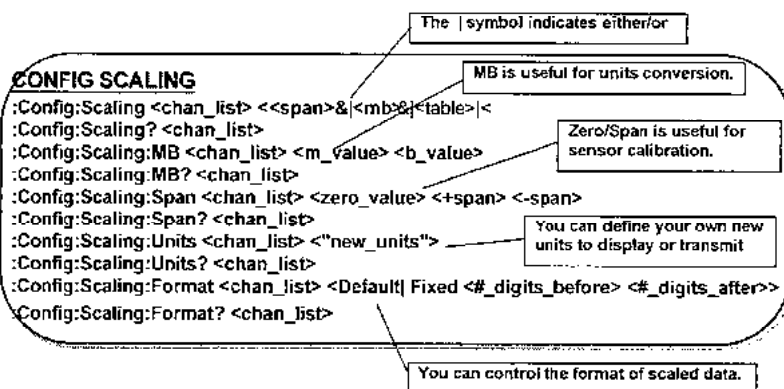
CONFIG FILTER

```

:Config:Filter:Dig:MvgAvg <chan_list> <#_of_meas>
:Config:Filter:Dig:MvgAvg? <chan_list>
    
```

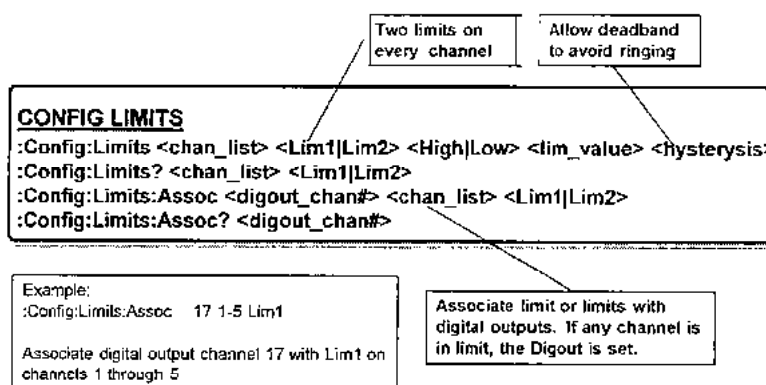
When using a Moving Average Digital Filter, it is important to note that the first "N" readings are not fully filtered. If they must be filtered, use the **:config:meas:average** command

- 2 Configure the instrument to scale data from each reading using the :Config:Scaling commands.



CONFIGURE SMARTLINK™ LIMIT CONDITIONS

- 1 Configure the instrument so it will check measurement data to see if it falls within desired limits, and specify what action the instrument takes when data is outside these limits using the :Config:Limits commands.



CONFIGURE SMARTLINK™ CHANNEL SCANNING & MEASUREMENT TIMING

You can configure the instrument to measure a list of channels at a specific time, at regular intervals of time, or after a trigger condition occurs in two ways.

Using the *:Config:Meas:Trig* command

Using the *:Config:Scan* command

Using the *:Config:Meas:Trig* command

If you want the instrument to take a single measurement under certain conditions you use the *:Config:Meas:Trig <Immediate|TrigIn|DigIn|<chan#>>* command to specify the conditions.

You must then issue the *:Meas? <chan_list> <#_of_rdgs>* command to cause the instrument to watch for those conditions and take the number of readings specified by *<#_of_rdgs>* from each of the channels specified in *<chan_list>*.

Using the :Config:Scan command

You can configure the instrument to scan a set of channels at regular intervals of time or after a specified trigger condition occurs using the :Config:Scan commands.

You must first define the channels you wish to scan using the :Config:Scan <chan_list> command and then define the conditions that will cause the scan to start using the :Config:Scan:Initiate command.

Measure & Capture are special cases of Scan. Use Scan to get detail control over your measurement

Config SCAN

```
:Config:Scan <chan_list>
:Config:Scan?
:Config:Scan:Interval <nn:mm:ss.ssssss>
:Config:Scan:Interval?
:Config:Scan:Initiate <Immediate | Trigh
    <Either | Rising | Falling> <%_pretrigger>
    | Level <chan#> <level> <Hi|Lo> <%_pretrigger>>
:Config:Scan:Initiate?
:Config:Scan:Data <MemOnly | ProcessMem |
    MemProcessXmit | ProcessXmit | XmitOnly>
:Config:Scan:Data?
```

Start the scan now, or based on a hardware trigger, or based on the value of an input

MemOnly: Store to memory, then stop (Fast).

ProcessMem: Process to Engrg units, then store to memory (slower).

MemProcesXmit: Store to memory fast, then process and transmit later.

ProcessXmit: Process and transmit real-time (slower).

CONFIGURE SMARTLINK™ DATA COLLECTION

- 1 Configure which data as well as which fields in the data will be transmitted to memory or to the display using the **:Config:Data** commands.

Specify information to send with each reading

CONFIG DATA
:Config:Data:Fields
<<Read&|Units&|Chan&|Chan_Tag&|Rnum&|Time&|Date&|Limits&|Stat>|All>
:Config:Data:Fields?

Examples:
:config:data:fields Read&Units *sends the reading and units only, eg:*
0.71983 Volts
:config:data:fields Read&Units&chan *sends the reading and units only, eg:*
-0.74002 Volts Ch#3
:config:data:fields ALL *sends all fields, eg:*
-0.75408 Volts Ch#3 Channel-3 R#15 17:40:41.773 01/01/1996 InLim1 InLim2 OK

- 2 Configure the way data is stored and the format in which it will be stored using the **:Config:DataMem** commands.

CONFIG DATAMEM
:Config:DataMem:Mode <WrapWhenFull| StopWhenFull>
:Config:DataMem:Mode?

Preserve (Stop when full) or
Overwrite (wrap when full)

Activate SmartLink™ Configurations

There are a number of configurations you set up with **:Config** commands that you must activate before SmartLink™ will use them.

ACTIVATE FILTERING CONFIGURATIONS

You activate filtering configurations for specified channels using the **:Filter:Dig** commands. You must activate filtering before you tell the instrument to take a measurement using the **:Meas?** Command.

```
FILTER  
:Filter:Dig <chan_list> <On|Off>  
:Filter:Dig? <chan_list>
```

ACTIVATE SCALING CONFIGURATIONS

You activate scaling configurations for specified channels using the **:Scaling** command.

```
SCALING  
:Scaling <chan_list> <On|Off>  
:Scaling? <chan_list>
```

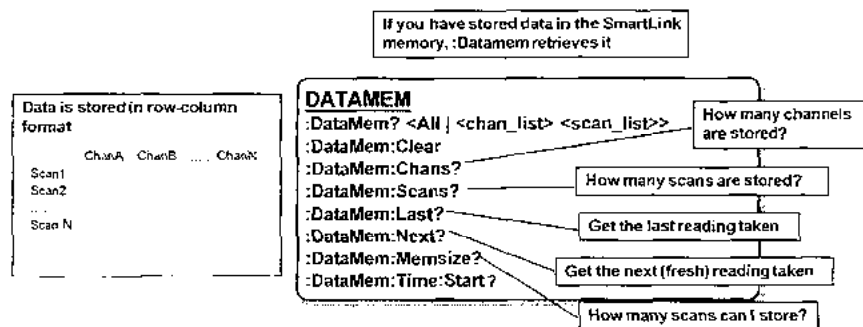
ACTIVATE LIMITS CONFIGURATIONS

You activate limits configurations for specified channels using the **:Limits** commands.

```
LIMITS  
:Limits <<chan_list>|All> <On|Off>  
:Limits? <chan_list>  
:Limits:Status? <chan_list>
```

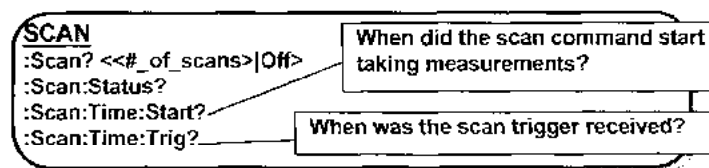

ACTIVATE DATA STORAGE CONFIGURATIONS

You activate data storage configurations using the **:DataMem** commands.



ACTIVATE SCAN CONFIGURATIONS

You activate Scan configurations using the **:Scan** commands.



Activate the Measurement

There are three ways to cause SmartLink™ to take a measurement.

ISSUE THE :MEAS? COMMAND.

A single command (Meas) for normal measurements,
a single command (Capture) for high speed
measurements.

MEASURE
:Meas? <chan_list> <<#_of_rdgs>|Off>

Channel lists have the same format as Excel
row & columns... 1,2,5-7 is channels 1,2,5,6,7

ISSUE THE :SCAN? COMMAND.

SCAN
:Scan? <<#_of_scans>|Off>

ISSUE THE :CAPTURE? COMMAND.

MEASURE
:Capture? <chan_list> <#_of_rdgs|All> <Immediate| Level <chan#> <level> <Hi|Lo>>
<interval_usec> <ASCII|Binary>

Set the interval between start of scans. If the interval is shorter than
the time it takes to complete the scan, it goes continuously.

Initiate now, based on the
level of any channel

**Note: All commands in Italics will be available in future firmware upgrades.*