Commands

:Capture? Sets up High Speed Measurement

Capture takes the selected number of readings at the selected rate, and puts them into memory. After all of the readings have been taken, they are automatically transmitted to the client computer. Triggering is also supported.

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

<chan_list>	Any valid channel for the specific instrument.
<#_of_rdgs|All>	Number of Readings per Channel
<Immediate|Level <chan#> <level> <Hi|Lo>>	Trigger immediately or on a level
<interval_usec>	Measurement interval in micro-seconds
<ASCII|Binary>	Transmit the results in ASCII or Binary. Only ASCII is currently supported. Binary will be supported in future versions of the firmware.

:Comm? Shows Communication Port

Returns the communication port that is currently being used to receive information (e.g. local, RS232, etc.).

:Config CHANS Configure Channels for Measurement or Output

Sets up instrument hardware to its specific measurement or output configuration.

:Config <chan_list> Accel <Piezo|Cap> <fs_accel_g> <mV/g> <AC|DC> <30K|10K|1K|100> <"chan_tag">

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

:Config <chan_list> DewPoint <"chan_tag">

:Config <chan_list> DigIn <#_of_bits> <ActiveHigh|ActiveLow> <DIFF|SE> <"chan_tag">

:Config <chan_list> DigOut <#_of_bits> <ActiveHigh|ActiveLow>
<initial_state> <"chan_tag">

:Config <chan_list> Force Piezo <fs_force_lb> <mV/lb> <AC|DC>
<30K|10K|1K|100> <"chan_tag">

:Config <chan_list> Horsepower <torque_chan#> <rpm_chan#>
<"chan_tag">

:Config <chan_list> Humidity <type_code> <"chan_tag">

:Config <chan_list> IAC <range> <shuntohms> <DIFF|SE>
<CoupleAC|CoupleDC> <"chan_tag">

:Config <chan_list> IDC <range> <shuntohms> <DIFF|SE> <"chan_tag">

:Config <chan_list> Ohms <range> <4W|SE|4WOC|SEOC> <"chan_tag">

:Config <chan_list> Pressure Piezo <fs_psi> <mV/psi> <AC|DC>
<30K|10K|1K|100> <"chan_tag">

:Config <chan_list> Pressure Gage <fs_psi> <bridge_type> <gage_factor>
<poisson_ratio> <exitation_voltage>
<"chan_tag">

:Config <chan_list> Pressure Xmit <fs_psi> <fs_volts> <zero_volts>
<VDIFF|VSE|IDIFF<shuntohms>> <"chan_tag">

:Config <chan_list> RPM Encoder <pulses_per_revolution> <"chan_tag">

:Config <chan_list> Strain Gage <fs_strain_uE> <bridge_type>
<gage_factor> <poisson ratio>
<excitation_voltage> <"chan_tag">

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

:Config <chan_list> Temp TC <tc_type> <OpenTCOn|OpenTCOff>
IntRJ|<RefJcnTemp> <"chan_tag">

:Config <chan_list> Temp Thrmstr <type_code> <range>
<4W|SE|4WOC|SEOC> <"chan_tag">

:Config <chan_list> Torque GageDC <rated_cap> <p_scale_factor>
<n_scale_factor> excitation_voltage>
<"chan_tag">

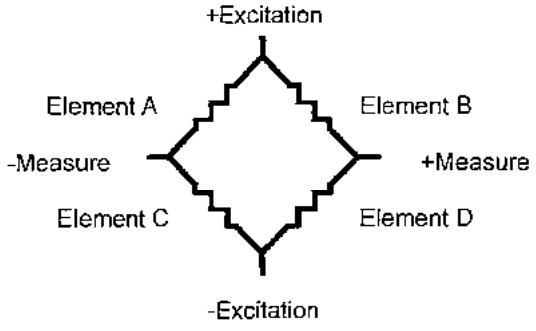
:Config <chan#> VAC <range> <DIFF|SE> <AC|DC> <"chan_tag">

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

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

<#_of_bits>	The number of bits to associate with this digital input or output channel. If more bits are specified than exist in subsequent channels, an error is generated. Note that a single channel can be associated with several subsequent bits, while still allowing the individual subsequent bits to be accessed individually. The response format is always the decimal equivalent of the binary pattern, e.g. 1011 is an 11. The first bit is the most significant.
<30K|10K|1K|100>	Filter frequencies available in DYN11 & 12 models.
<4W|SE|4WOC|SEOC>	Identifies the number of wires and measurement connections for a channel. SE is Single Ended, which is a common ground configuration. 4W is a 4-wire measurement, which increases accuracy. Note that if a common mode voltage exists, and is connected to SE channels, the unit may be damaged or destroyed. (See specifications for acceptable limits for each SmartLink™.) 4WOC is 4-wire mode with offset compensation enabled. SEOC is Single Ended with offset compensation enabled. Offset voltage compensation enhances accuracy; eliminating it maximizes measurement speed. Offset compensation is an additional measurement of the combined voltage offset which exists in a resistance measurement path when no excitation is supplied. By using this zero-excitation measurement as a correction factor, errors due to thermal voltages created at contact points can be eliminated.
<AC|DC>	Selects AD or DC coupling on DYN11 & 12 models.
<ActiveHigh|ActiveLow>	For output, ActiveHigh causes a digital "1" to be interpreted as an "ON" or +5V level. ActiveLow causes a digital "1" to be interpreted as an "OFF" or 0V level. For input, the threshold level is ≥2.5V for ON, <2.5V for OFF.

<chan#>	This refers to a calculated channel, measurement which can be any channel number that is not a valid channel. For example, if your SmartLink™ has 18 measurement channels, Channel 19 is the first valid calculated channel.
<chan#A>	Sets the input channels for a multi-channel calculation.
<chan#B>	Sets the input channels for a multi-channel calculation.
<chan_list>	Any valid channel for the specific instrument. For valid channels, see the SmartLink™ connection diagram in this manual. Specify as a comma separated list, hyphenated range, or any combination. Even if a SE (single ended) or DIFF (differential) channel is part of a 4W (4 wire) channel, it can still be measured independently. Configuring invalid channels is an error.
<"chan_tag">	Allows the user to set a label for each channel in a SmartLink™. This label can be stored and/or transmitted with each reading. Default is "chnn" where nn is the channel number. Max length of the string is 12 characters, and the string cannot contain any spaces.
<bridge_type>	For bridge strain gage measurements, this indicates the bridge configuration being used, as indicated below.



The formula for strain is uE = (1/GageFactor) * (delta R/R) * 1e6

Type	Element A	Element B	Element C	Element D
1, ¼ Bridge	R	R	ε	R
2, ¼ Bridge	- νε	R	ε	R
3, ½ Bridge	- ε	R	ε	R
4, ½ Bridge	R	ε	ε	R
5, Full Bridge	−νε	ε	ε	−νε
6, Full Bridge	−ε	νε	ε	−νε
7, Full Bridge	-ε	ε	ε	−ε

R indicates a fixed value resistor
ε and -ε indicates a strain gage aligned with the principle strain.
νε and -νε indicates a strain gage aligned with the Poisson strain

<DIFF|SE> For voltage, this identifies the number of wires and measurement connections for a channel. DIFF is Differential, a two-wire measurement which allows a common mode voltage to be present between low of one channel and low of other channels, or to ground. SE is Single Ended, which is a common ground configuration. Note that if a common mode voltage exists, and is connected to SE channels, the unit may be damaged or destroyed. See specifications for acceptable common mode voltage limits for each SmartLink™.

<excitation_voltage> Sets the bridge excitation voltage. Acceptable values are shown below:

Model	Voltages
BRG11, 12	1,2,4,10V
TRQ31	1,2,4,10V

<fs_accel_g> Selects the full scale acceleration in g's.

<fs_psi> For a particular sensor or transmitter, this indicates the full scale pressure the sensor/transmitter is capable of outputting. The gain setting is determined by this value.

<fs_strain_uE>	For a particular sensor or transmitter, this indicates the full scale strain the sensor/transmitter is capable of outputting. The gain setting is determined by this value.
<fs_volts>	For a particular sensor transmitter, this indicates the full scale voltage output associated with the <fs_pressure> parameter.
<gage_factor>	The strain gage factor. Allowable values from 0 to 200 mV, default is 2 mV.
<initial_state>	When power is first applied to a SmartLink™, the digital outputs will be initialized to this state. Acceptable values are 0 or 1. The actual voltage level is set with the (ActiveHigh|ActiveLow) parameter.
<IntRJ|RefJcnTemp>	Allows using an external reference junction by specifying the external reference junction temperature. The default is IntRJ, the internal reference junction.
<math_func>	Acceptable values are +, -, /, *. Note that spaces must surround this field, e.g. 5 + 7, not 5+7.
<mV/g>	Sensiitivity in millivolts per gravitational unit.
<OpenTCOn|OpenTCOff>	Sets open thermocouple detector circuitry on or off. Default is OpenTCOn.
<Piezo|Cap>	Selects either Piezo or Capacitive for the channel.
<poisson_ratio>	The Poisson Ratio. Allowable values from 0.0 to 1.0, default is 0.2.
<pulses_per_revolution>	For RPM inputs, this is the number of pulses the instrument will receive for each full revolution of the shaft.

<PT385|PT3916|<User r0 alpha beta delta>>

Sets the RTD type. The first two choices are shown below, as well as the acceptable values for the User type.

Type	R0	Alpha	Beta	Delta
PT385	100	0.00385	0.111	0.507
PT3916	100	0.003916	0.11	0.511
User-(max)	10,000	0.1	.2	1
-(min)	1	0	0	0

<range>

Ranges for various functions are listed in the following table. Enter AUTO to select auto-ranging. Use of any other values causes an Execution Error. Default is AUTO.

BRG11	BRG12	DCV11	DCV12	DCV31	DCV32
Volts:	Volts:	Volts:	Volts:	Volts:	Volts:
0.2	0.2	0.2	0.2	0.2	0.2
		2	2	2	2
		20	20	20	20
		40	40	40	40
		Ohms:	Ohms:	Ohms:	Ohms:
		200	200	200	200
		2k	2k	2k	2k
		20k	20k	20k	20k
		200k	200k	200k	200k
		2M	2M	2M	2M
		20M	20M	20M	20M
		200M	200M	200M	200M

RTD31	RTD32	THD01	DCV31	DCV32	TRQ31
Ohms:	Ohms:	none	Ohms:	Ohms:	none
200	200		200	200	
2k	2k		2k	2k	
20k	20k		20k	20k	
200k	200k		200k	200k	
2M	2M		2M	2M	
20M	20M		20M	20M	
200M	200M		200M	200M	

<rpm_chan#> Tells the instrument which channel represents the RPM input, if one exists.

<tc_type> Sets the Thermocouple type being used on a specific channel. Acceptable values are J, K, T, E, R, S, B, N. Default is J.

<type_code> The empirical expression that is used for the resistance-temperature relationship of a negative temperature (NTC) coefficient thermistor is the Steinhart and Hart equation. It may be found explicit in T, where:
$\mathbf{1/T = a + b(LnR) + c(LnR)^3}$

T = Kelvin units (°C + 273.15)
a,b,c = coefficients derived from measurements
LnR = the natural logarithm of resistance (in ohms).

To find **a**, **b**, and **c**, a thermistor is necessary at three different temperatures. The temperatures should be evenly spaced at least 10°C apart. Three simultaneous equations are solved using the three measured sets of resistance's and temperatures and the Steinhart and Hart equation, above. The equations derive **a**, **b** and **c** for any temperature range. Provided below are the coefficients for the range 0°C to 100°C with 50°C as the mid-point.

Thermistor Type	25°C resistance (in OHMS)	a	b	c
001A	100	0.0017709	0.0003406	1.479E-07
002A	300	0.0015632	0.0003108	9.747E-08
003A	1K	0.0013130	0.0002906	1.023E-07
004	2252	0.0014733	0.0002372	1.074E-07
005	3K	0.0014051	0.0002369	1.019E-07
007	5K	0.0012880	0.0002356	9.557E-08
017	6K	0.0012474	0.0002350	9.466E-08
016	10K	0.0011303	0.0002339	8.863E-08
006	10K	0.0010295	0.0002391	1.568E-07
008	30K	0.0009354	0.0002211	1.275E-07
011	100K	0.0008253	0.0002045	1.144E-07
014	300K	0.0008207	0.0001848	1.014E-07
015	1M	0.0008142	0.0001670	8.819E-08

You can use the Steinhart and Hart equation in two ways by knowing the **a**, **b** and **c** values for a thermistor. If resistance is known and temperature is desired, use the original equation above. If the resistance is desired and the temperature is known, use the following equation:

$$R = e \exp [(\beta - (\alpha/2))^{1/3} - (\beta + (\alpha/2))^{1/3}]$$

where $\alpha = (a-(1/T))/c$ and $\beta = [(b/3c)^3 + \alpha 2/4]^{1/2}$

<type_code> Identifies the type of humidity sensor used. Always is "BulkC".

Query:

:Config? <chan_list>. Responds with detail channel configuration. Format of the response is identical to the format of the command shown above.

See also: :Config:Meas and :Config:Units.

Examples:

:config 1 Ohms 20 4w chan1	config chan 1
:config 2,4 RTD PT385 4WOC	config chan 2 and 4
:config 3-6 VDC 2 DIFF	config chan 3,4,5 and 6

Instrument applicability:

BRG11	BRG12	DCV11	DCV12	DCV31	DCV32
calculated, DigIn, DigOut, RPM, Strain, Weight, VDC	calculated, DigIn, DigOut, RPM, Strain, Weight, VDC	calculated, DigIn, DigOut, OHMS, Pressure, Strain, TempRTD, TempThermst, VDC	calculated, DigIn, DigOut, OHMS, Pressure, Strain, TempRTD, TempThermst, VDC	calculated, DigIn, DigOut, OHMS, Pressure, Strain, TempRTD, TempThermst, VDC	calculated, DigIn, DigOut, OHMS, Pressure, Strain, TempRTD, TempThermst, VDC

RTD31	RTD32	THD01	DCV31	DCV32	TRQ31
calculated, DigIn, DigOut, OHMS, Temp/RTD	calculated, DigIn, DigOut, OHMS, Temp/RTD	calculated, dewpoint, Humidity, OHMS, Temp/Therm, VDC	calculated, DigIn, DigOut, OHMS, Temp/Therm,	calculated, DigIn, DigOut, OHMS, Temp/Therm	calculated, DigIn, DigOut, Horse-power, RPM, Strain, Torque, Weight, VDC

:Config:Comm:EthernetID? Query Ethernet Address

Allows the user to determine the unique Ethernet ID number hard-coded in instrument firmware.

Query:

:Config:Comm:EthernetID? Responds with the Ethernet ID number

:Config:Comm:ENet Set Ethernet IP Address

Sets up Ethernet IP Address

:Config:Comm:ENet <IPAddress>

<IPAddress>	The Internet protocol address is specified by your network system administrator. The address is in string format (xxx.xxx.xxx.xxx) . This parameter is not required if Boot P is running on the network server. Default is 0.0.0.0

Query:

:Config:Comm:ENet? Responds with the user-entered IP address. Format of the response is identical to the format of the command shown above.

See also: Communication Section