Philtec RS232/USB API for model UCM
ASCII Command Line Interface
2021-10-09

General command information:

The RC-UCM command line interface uses command strings with "label value" pairs to send and receive configuration and target data. All commands sent to the sensor are prefixed with a forward slash character '/' (ASCII 47) and terminated with a line feed (ASCII 10) or carriage return (ASCII 13). Responses from the sensor are terminated with a line feed. **Commands and labels are case sensitive**.

Default terminal RS-232 configuration:

    Format   :8bits, no parity, 1 stop bit
    Flow Control   :none
    Default speed   :19.2Kbps

USB Virtual Com port configuration (FTDI interface chip):

    Format   :8bits, no parity, 1 stop bit
    Flow Control   :none
    Default speed   :19.2Kbps

Note: FTDI USB driver is included in Windows 10. Installer can be downloaded from www.ftdichip.com if needed.

Quick Start using terminal program:

1. Attach remote module to UCM
2. Attach power and RS-232 or USB cable.
        UCM status light will turn on after several seconds (< 10 seconds)
        If status light remains off, remote module was not detected or UCM failed to boot.
3. Use a terminal program to connect to the com port (see configuration above)
        Note: Any application that can communicate with the com ports should work.
4. Send "/idn?" + LF (ASCII 10). Sensor will respond with model and serial information.
5. Send "/getConfig" + LF. Configuration settings will be displayed.
6. Send "/module cmd getCal" +LF. Reads calibration table data and descriptions from module.

Note: If remote module is changed, send "/reboot" command to resynchronize the UCM (or toggle power).

Summary of top level commands:

/getTarget	Reads target distance, amplifier temperature, and sensor signals
/T	Shortened command string of /getTarget (same sensor response)
/getConfig	Reads all configuration data except calibrations.
/setConfig	Sets configuration data.
/setFactoryConfig	Sets serial number and other factory configurations.
	Note: Changes to factory configurations are not recommended (contact Philtec)
/idn?	Reads sensor model and serial number
/reboot	Reboots sensor firmware
/setGain	auto gain setting to optimize module and UCM gain setups
/setRCgain	auto RCgain setting to establish maximum voltage at maximum range
/setSigOffset	auto signal offset adjust (typically only used at factory)
/module	module specific commands, power control and reset

Summary of label value pairs:

Read and write (getConfig, setConfig)

bps	bps setting of RS-232 port (USB virtual com port bps is not adjustable)
calTable	calibration table for distance lookup
gain	light source intensity adjustment
sign	signature string. 24 character max user defined string for sensor
uom	unit of measure
RCgain	16bit value, value for UCM gain multiplier adjustment (typically set by factory cal)
sigGain	8bit value, additional gain applied to signal from module
sigOffset	16bit value, adjusts offset voltage from module (typically a factory adjustment)
ttlLvl	floating point value (voltage) of comparator (0-5)

Read Only (getConfig)

bpsRange	list of available bps values
calTableMax	maximum calibration slot number available
cmdLenMax	maximum command line length including line feed
fwVer	firmware version
HWcode	hardware code of sensor
HWver	hardware version
modelCode	model code of DMS sensor
serial	serial number of DMS sensor

Read Only (getTarget or T)

ranV   voltage from random channel of RC optics
adjV   voltage from adjacent channel of RC optics
out   voltage from standard output

Label Value pair definitions:

Read and Write (getConfig, setConfig)

calTable
default:1
range:1-calTableMax
Description:
The DMS sensor has 24 calibration table slots for different target surfaces. The standard factory calibrations are a mirror (specular) surface in calTable 1 and a dull (diffuse) surface in calTable 2. Most targets will use table 2 but additional calibrations can be added with the /setCal command.
Note: future sensor firmware versions (>3.102) will use "calTable" for both getConfig and setConfig for consistency.

gain
default:25
range:0-100
Description:
The sensor's light source intensity is controlled by the "gain" setting. A setting of 100 is full power (used for most targets). Reflective targets may require a reduction in gain to avoid saturating the optical input. Optical input can be monitored with the snr value (see below). A gain setting of 0 will turn off the sensor's LED.
Note: use of setGain command is recommend for optimum gain setup.

uom
default:micron
range: micron, um, mm, nm, mI (note:um=micron, mI=mill-Inch)
Description:
Distance values will be sent in the selected unit of measure.   Micron can be selected by either the full text "micron" or the abbreviation "um". Configuration output labels will always use "um".

sign
Default:"" (blank)
Range:string of up to 24 characters
Description:
Each sensor can save a description string which is called the signature. This string is not used by the sensor but can be useful for describing the sensor's purpose.

bps
Default: 19200
Range: bpsA value
Description:
The sensor's RS-232 communication bps is controlled by the "bps" value. Sending a value not in the range list will leave the bps setting at its current value. When a new value is sent with the setConfig

command, the sensor will confirm the change using the current bps speed and then switch to the new setting for all further communications. Note: the sensor always starts at 19200 at power up and then switches to the final setting. If you are unsure of the sensor's bps setting, connect using bps 19200 and the sensor will display the final bps setting before switching.
Note: bps value for USB virtual com port is not adjustable

ttlLvl
Default: 0
Range: 0-5
Description:
TTL level voltage is compared to the SNR output. If ttlLvl is higher than SNR, the SPEED output is high (approximately 5V). Otherwise, the SPEED output is 0.

Read Only (getConfig)

bpsRange
Description:
List of available bps values. List value is quote encapsulated.

calTableMax
Description:
Maximum calibration slot available in sensor (slots from 1 to calTableMax value).

cmdLenMax
Description:
Maximum command line length including line feed character. Sensor has a circular buffer which will discard characters once this line length has been reached.

HWcode
Description: Model code of DMS hardware.
DMS   full size DMS
DMSv2   full size DMS version 2
mDMS   mini DMS (4 position gain system)
mDMSv2   mini DMS (single gain system)
muDMS   muDMS (USB)
microRS   microDMS with RS-232
microUSB   microDMS with USB
UCM   universal control module
oMod   optical module (connects to UCM amplifier)

serial
Description:
Serial number of DMS sensor.

Read Only (getTarget or T)

out
range: 0-7 (floating point)
Description:

Standard output voltage from RC-UCM amplifier. This voltage output is typically read by an external DAQ.

adjV
range: 0-7 (floating point)
Description:
Adjacent output voltage channel from RC optical detector, target reflect voltage from D optical detector.
Note: adjV is compared to ttlLvl voltage for speed output (output is 5V if adjV is > ttlLvl)

ranV
range: 0-7 (floating point)
Description:
Random output voltage channel from RC optical detector, light source feedback from D optical detector

Command Definitions:

Command syntax notes:
>Optional parameters surrounded with square brackets [].
>Parameters requiring user selected data are surrounded with angle brackets <>.
>Optional parameters with user selected data are surrounded by both [<>].

>Sensor responses depend on variable data (distance, temperature).
>Values are substituted with value codes in format description as follows:
>String: sss
>Integer: ##
>Float: #.### (note: sensor uses . (ASCII 46) for decimal mark)

/getConfig
Description: returns all configuration data in "label value" pairs.
Response format:
getConfig avg ## calTable ## uom ss setTemp ## gain ### Dpeak #.### TformatDef ### Tformat ###
fwVer #.### serial #### modelCode ss sign "sss" bps ######
note: keys with "_mod" suffix are stored in probe module

/getTarget
/T
Note: /T and /getTarget are the same command.
Description: returns current voltage on output and internal signals.
Example:
To Sensor: /getTarget
Response: T ranV 0.010500 adjV 0.009938 out 2.042875

/setConfig [<label>] [<value>]
Description: sets configuration data (except serial and model type).
setConfig uses "label value" pairs to set configuration. Command line arguments are separated by a space (ASCII 32). Multiple "label value" pairs can be used on a single line but total line length cannot exceed 250 characters. Each configuration change will be confirmed in the response line.
Example:
Change calibration table to 3:

To Sensor: /setConfig calTable 3
Response: setConfig calTable 3

/getCal [calTable <calibration slot>]
Note for RC-UCM model: getCal used in conjunction with module command
Description: returns calibration table data.
Command arguments, if any, determine which data is returned and in what point table format. By default, the currently selected calibration point table (calTable) is sent in ASCII format. The "calFmt descr" argument will limit the response to only the calTable value, description, gain, and number of points (point data omitted). See "Binary Data Formats" below for details of the "calFmt binTable" format.
Example:
Send the description for the currently selected calibration (calTable):
To Sensor: /module cmd getCal descr
Response: getCal calTable xx descr "sss" gain xxx points xxx
Send the description for all available calibrations:
To Sensor: /module cmd getCal descr all
Response: getCal calTable xx descr "sss" gain xxx points xxx
Above line repeated for all available calibrations
Response after last calibration: getCal end

Without the "descr" argument the getCal command also sends the calibrations points (distance, signal, snr). Note that the snr value is 0 and is reserved for future use.
Example:
Send all data for currently selected calibration table:
To Sensor: /module cmd getCal
Response: getCal calTable xx descr "sss" gain xxx points xxx "<distance> <signal> <snr> …."
Note: distance, signal, and snr will be repeated for each point of the calibration.
The entire group of calibration points are quote encapsulated.
Send all data for all available calibrations:
To Sensor: /module cmd getCal calTable all
Response: getCal calTable xx descr "sss" gain xxx points xxx "<distance> <signal> <snr> …."
Note: data repeated for all available calibrations
Response after last calibration: getCal end

The gain displayed is the gain that was used for the calibration, not the currently selected gain.
The unit of measure for distance is the currently selected uom (may be different that the uom used during calibration)

/setCal calTable ## gain ### uom <uom> descry "sss" [channel #]
Description: create new calibration table with 255 points maximum.
Please contact factory for software to add new calibrations.