

# Command Line Interface

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User Manual

CLI

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## 2. Introduction

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This manual describes how to control products via their control interface. The Command Line Interface (CLI) enables the hub or hubs to be integrated into a larger system that is controlled by a host computer. A Serial terminal emulator must be installed to be able to use the CLI, and the emulator requires access to the COM port, so no other software, such as Cambrionix connect, can access the port at the same time. An example emulator that can be used is puTTY which can be downloaded from the following link.

[www.putty.org](http://www.putty.org)

Commands that are issued via the COM port are referred to as commands. Some settings modified by commands in this document are volatile – that is, the settings are lost when the hub is rebooted or powered off, please see individual commands for detail.

Throughout this manual optional parameters are shown in square brackets: [ ]. ASCII control characters are shown within <> brackets.

This document and commands are subject to change. Data should be parsed such to be tolerant of both upper and lower case, white space, additional new line characters ...etc.

You can download the latest version of this manual from our website at the following link.

[www.cambrionix.com/cli](http://www.cambrionix.com/cli)

### 2.1. Device location

The system appears as a virtual serial port (also called a VCP). On Microsoft Windows™, the system will appear as a numbered communication (COM) port. The COM port number can be found by accessing device manager.

On macOS®, a device file is created in the /dev directory. This is of the form /dev/tty.usbserial S where S is an alpha-numeric serial string unique to each device in the Universal Series.

### 2.2. USB Drivers

Communication to our products is enabled through a virtual COM port, this communication requires USB drivers.

On Windows 7 or later, a driver may automatically be installed (if Windows is configured to download drivers from the internet automatically). If this is not the case, the driver can be downloaded from [www.ftdichip.com](http://www.ftdichip.com). The VCP drivers are required. For Linux® or Mac® computers, the default OS drivers should be used.

## 2.3. Communication Settings

The default communications settings are as below.

Communication setting	Value
Number of bits per second (baud)	115200
Number of data bits	8
Parity	None
Number of stop bits	1
Flow control	None


ANSI terminal emulation should be selected. Command sent must be terminated with

```
<CR><LF>
```

Lines received by the hub are terminated with

```
<CR><LF>
```

The hub will accept back-to-back commands, however, the host computer should wait for a response before issuing a new command.

	<b>CAUTION</b>
	<p style="text-align: center; color: blue;"><b>The hub may become unresponsive</b></p> <p>For serial communications you must wait for a response from any commands before issuing a new command. Failure to do so can cause the hub to become unresponsive and require a full power reset.</p>

## 2.4. Boot text and command prompt

At boot, the hub will issue a string of ANSI escape sequences to reset an attached terminal emulator. The title block follows this, then a command prompt.

The command prompt received is as below

```
>>
```

Except in boot mode where it is as below

```
boot>>
```

To reach a new boot prompt, send <ETX>. This cancels any partial command string.

## 2.5. Products and their Firmware

Below is a list of products, their part numbers and the Firmware type it uses.

Firmware	Part Number	Product Name
Universal	PP15S	PowerPad15S
Universal	PP15C	PowerPad15C
Universal	PP8S	PowerPad8S
Universal	SS15	SuperSync15
Universal	TS3-16	ThunderSync3-16
SMART	TS3-C10	ThunderSync3-C10
Universal	U16S Spade	U16S Spade
Universal	U8S	U8S
PDSync	PDSync-C4	PDSync-C4
Universal	ModIT-Max	ModIT-Max
Motor Control	Motor control board	ModIT-Max

## 2.6. Command structure

Each command follows the below format.

```
Command mandatory-parameters [optional-parameters]<CR><LF>
```

The command will need to be entered first, if no parameters exist for the command then this will need to be followed immediately by <CR> and <LF> to send the command.

Not every command has mandatory parameters but if they are applicable then these will need to be entered for the command to work, once the command and mandatory parameters are entered then <CR> <LF> will be required to signify the end of a command.

Optional parameters are shown inside square brackets e.g. [port]. These do not need to be entered for the command to be sent, but if they are included they will need to be followed by <CR> <LF> to signify the end of a command. Only one <CR><LF> is required at the end of each command even if there are multiple parameters such as the format shown above.

Throughout the user manual we signify optional parameters with square brackets, these are not part of the command but just to show the parameters are optional, so if you see "[p]" in the command syntax then all that would need to be input is "p".

## 2.7. Response structure

Each command will receive it's specific response followed by <CR><LF>, a command prompt and then a space. The response is terminated as shown below.

```
>>
```

Some command responses are "live" meaning there will be a continuous response from the product until the command is cancelled by sending an <ETX> command. In these instances you will not receive the standard response as above until <ETX> command has been sent. If you disconnect the product it will not stop the data stream and reconnecting will result in the continuation of the data stream.

### 3. Commands

Below is a list of commands that are supported by all products

Command	Description
<a href="#">bd</a>	Product description
<a href="#">cef</a>	Clear error flags
<a href="#">cls</a>	Clear terminal screen
<a href="#">crf</a>	Clear rebooted flag
<a href="#">health</a>	Show voltages, temperature, errors and boot flag
<a href="#">host</a>	Show if USB host is present, and set mode change
<a href="#">id</a>	Show id string
<a href="#">l</a>	Live view (Periodically sends responses on the current state of the product)
<a href="#">ledb</a>	Sets the LED pattern using a bit format
<a href="#">leds</a>	Sets the LED pattern using a string format
<a href="#">limits</a>	Show voltage and temperature limits
<a href="#">loge</a>	Log state and events
<a href="#">mode</a>	Sets the mode for one or more ports
<a href="#">reboot</a>	Reboots the product
<a href="#">remote</a>	Enter or exit mode where LEDs are controlled manually or automatically
<a href="#">sef</a>	Set error flags
<a href="#">state</a>	Show state for one or more ports
<a href="#">system</a>	Show system hardware and firmware information

Below is a table of commands specific to the Universal Firmware

Command	Description
<a href="#">beep</a>	Makes the product beep
<a href="#">clcd</a>	Clear LCD
<a href="#">en_profile</a>	Enables or disables profile
<a href="#">get_profiles</a>	Get list of profiles associated with a port
<a href="#">keys</a>	Read key click event flags



Command	Description
<a href="#">lcd</a>	Write a string to the LCD display
<a href="#">list_profiles</a>	List all profiles on system
<a href="#">logc</a>	Log current
<a href="#">sec</a>	Set or get security mode
<a href="#">serial_speed</a>	Change serial interface speed
<a href="#">set_delays</a>	Change internal delays
<a href="#">set_profiles</a>	Set profiles associated with a port

Below is a list of commands specific to the PDSync and TS3-C10 Firmware

Command	Description
<a href="#">detail</a>	show state for one or more ports
<a href="#">logp</a>	Log current
<a href="#">power</a>	set product max power or get product power for one or more ports
<a href="#">qcmode</a>	set quick charge mode for one or more ports.

Below is a list of commands specific to the MotorControl Firmware

Command	Description
<a href="#">gate</a>	Open, close or stop gates
<a href="#">keyswitch</a>	Show state of keyswitch
<a href="#">proxy</a>	Distinguish commands meant for Motorcontrol board
<a href="#">stall</a>	Set stall current for motors,
<a href="#">rgb</a>	Set LEDs to RGB override enable on ports
<a href="#">rgb_led</a>	Set LEDs on ports to RGBA value in hex

## 3.1. Notes

1. Some products don't support all the commands. See the [Supported Products](#) section for details.
2. All commands meant for the Motor control board must be prefixed with the [proxy](#) command.

## 3.2. bd (Product Description)

The bd command provides a description of the architecture of the product. This includes all upstream and downstream ports. This is to provide external software the architecture of the USB connection tree.

**Syntax:** (see 'Command structure')

```
bd
```

**Response:** (see Response structure)

Name value pairs indicating the presence of features of the product. This is followed by a description of each USB hub in turn, listing what is attached to each port of that hub. Each port of a hub will be attached to a charging port, an expansion port, a downstream hub, a USB device or is unused.

The features are indicated by these entries:

Parameter	Value
Ports	The number of USB ports
Sync	A '1' indicates the product provides sync capability
Temp	A '1' indicates the product can measure temperature
EXTPSU	A '1' indicates the product is supplied with an external PSU that is greater than 5V

The attachment section can have the following entries, all indices are 1 based:

Parameter	Value	Description
Nodes	n	A number indicating the number of nodes this description set includes. A node will be either a USB hub or a USB controller.
Node i Type	type	i is an index indicating which node this is. type is an entry from the Node Table below.
Node i Ports	n	A number indicating how many ports this node has.

Parameter	Value	Description
Hub <i> Port <p>	Hub <j>	The USB hub <i> has a down-stream hub <j> connected to its port <p>
	Control Port	The USB hub <i> has the USB serial port attached to port <p>
	Expansion Port <e>	The USB hub <i> has an expansion port attached to port <p>
	Port <c>	The USB hub <i> has the charging port <c> attached to port <p>
	Optional Hub <j>	The USB hub <i> may have a down-stream hub <j> connected to its port <p> but this is optional so may not be fitted
	Turbo Hub <j>	The USB hub <i> has a USB hub capable of operating in Turbo mode attached to port <p>
	USB3 Hub <j>	The USB hub <i> has a USB 3.x hub attached to port <p>
	Unused Port	The USB hub <i> has nothing attached to its port <p>

Node type can be one of the following:

Node Type	Description
Hub j	A USB 2.0 hub index j
Optional Hub j	A USB hub that may be fitted, index j
Root r	A USB controller with a root hub which also means the USB bus number will change
Turbo Hub j	A USB hub capable of operating in Turbo mode with index j
USB3 Hub j	A USB 3.x hub with index j

## Example

```
>> bd
Ports: 15
Sync: 1
Temp: 1
EXTPSU: 1
Console: none
Nodes : 5
Node 1 Type : USB3 Hub 1
Node 1 Ports : 5
Hub 1 Port 1 : Turbo Hub 2
Hub 1 Port 2 : Turbo Hub 5
Hub 1 Port 3 : Turbo Hub 3
Hub 1 Port 4 : Turbo Hub 4
Hub 1 Port 5 : Control Port
Node 2 Type : Turbo Hub 2
Node 2 Ports : 4
Hub 2 Port 1 : Port 1
Hub 2 Port 2 : Port 2
Hub 2 Port 3 : Port 9
Hub 2 Port 4 : Port 8
Node 3 Type : Turbo Hub 3
Node 3 Ports : 4
Hub 3 Port 1 : Port 3
Hub 3 Port 2 : Port 4
Hub 3 Port 3 : Port 11
Hub 3 Port 4 : Port 10
Node 4 Type : Turbo Hub 4
Node 4 Ports : 4
Hub 4 Port 1 : Port 5
Hub 4 Port 2 : Unused Port
Hub 4 Port 3 : Port 13
Hub 4 Port 4 : Port 12
Node 5 Type : Turbo Hub 5
Node 5 Ports : 4
Hub 5 Port 1 : Port 6
Hub 5 Port 2 : Port 7
Hub 5 Port 3 : Port 15
Hub 5 Port 4 : Port 14
```

### 3.3. cef (Clear error flags)

The CLI has error flags which will signify if a specific error has occurred. The flags will only be cleared by using the cef command or through a product reset or power on / off cycle. Once the error flag has been cleared the ports will remain in the error mode and be turned 'off'. To turn the ports back on you will need to power cycle the hub or turn the ports back on using the [mode \(Hub mode\)](#) command.

"UV"	Under-voltage event occurred
"OV"	Over-voltage event occurred
"OT"	Over-temperature (over-heat) event occurred

If the error condition persists, the hub will set the flag again after it is cleared.

**Syntax: (see Command structure)**

```
cef
```

**Response: (see Response structure)**

```
>>
```

### 3.4. cls (Clear screen)

---

Sends ANSI escape sequences to clear and reset the terminal screen.

**Syntax:** (see Command structure)

```
cls
```

**Response:** (see Response structure)

```
>>
```

### 3.5. crf (Clear rebooted flag)

---

The rebooted flag is to inform you if the hub has rebooted in between commands and can be cleared using the crf command.

If the rebooted flag is found to be set, then previous commands changing the volatile settings will have been lost.

**Syntax: (see Command structure)**

```
crf
```

**Response: (see Response structure)**

```
>>
```

## 3.6. health (System health)

The health command displays the supply voltages, PCB temperature, error flags and the rebooted flag.

**Syntax:** (see Command structure)

```
health
```

**Response:** (see Response structure)

parameter: value pairs, one pair per row.

Parameter	Description	Value	
Voltage Now	Present supply voltage		
Voltage Min	Lowest supply voltage seen		
Voltage Max	Highest supply voltage seen		
Voltage Flags	List of voltage supply rail error flags, separated by spaces		No flags: voltage is acceptable
		UV	Under-voltage event occurred
		OV	Over-voltage event occurred
Temperature Now	PCB temperature, °C	>100 C	Temperature is above 100°C
		<0.0 C	Temperature is below 0°C
		tt.t C	Temperature, e.g. 32.2°C
Temperature Min	Lowest PCB temperature seen, °C	<0.0 C	Temperature is below 0°C
Temperature Max	Highest PCB temperature seen, °C	>100 C	Temperature is above 100°C
Temperature Flags	Temperature error flags		No flags: temperature is acceptable
		OT	Over-temperature (over-heat) event occurred
Rebooted Flag	Used to detect if system has booted	R	System has booted or rebooted
			Flag cleared using crf command



## Example

```
>> health
System up for:      69928 seconds
5V Now:    5.23
5V Min:    5.22
5V Max:    5.23
5V Flags:
12V Now: 12.10
12V Min: 12.06
12V Max: 12.16
12V Flags:
Temperature Now (C): 37.4
Temperature Max (C): 37.6
Temperature Flags:
PWM %:  0.0
Rebooted flag: R
```

\*output from a SS15

## 3.7. host (Host detection)

The hub monitors the host USB socket for an attached host computer. In auto mode if the product detects a host it will change to sync mode.

The host command can be used to determine if a host computer is attached. It can also be used to prevent the hub from automatically changing modes.

**Syntax: (see Command structure)**

```
host [mode]
```

### Table for mode in the Universal Firmware

Mode	Description
auto	The mode of all populated ports changes automatically when a host is connected or disconnected
manual	Only commands can be used to change modes. The presence or absence of a host will not change the mode

### Table for mode in the PDSync and TS3-C10 Firmware

Mode	Description
auto	The ports will enable sync connectivity as the host comes and goes. Charging is always enabled unless the port is turned off.
off	If the host is no longer detected, all charging ports will be turned off.

**Response if parameter is supplied: (see Response structure)**

```
>>
```

**Response if no parameter is supplied:**

```
Present: (value) Mode change: (value)
```

Parameter	Description	Value
Present	Whether a host is present or not	Yes / No
Mode change	The mode the hub is in	Auto / Manual

## Table for present in all firmware

Present	Description
yes	host is detected
no	host is not detected

## Notes

1. The presence of the host computer is still reported if the mode is set to manual.
2. On charge only products the host command is present, but as the products are charge only and cannot obtain device information the command is redundant.
3. Only the U8S can report the host to be not present as it is the only product that has a separate control and host connection.
4. The default host mode is auto for all products.

## Examples

To set host mode to manual:

```
host manual >>
```

To determine if a host is present, and the get the mode:

```
host Present: no Mode change: auto >>
```

And with a host attached:

```
host Present: yes Mode change: auto >>
```

### 3.8. id (Product identity)

The id command is used to identify the product and also provides some basic information about the firmware running on the product.

**Syntax:** (see Command structure)

```
id
```

**Response:** (see Response structure)

A single line of text containing multiple name:value pairs separated by commas, that can be used to identify the product.

```
mfr,mode,hw,hwid,fw,bl,sn.group,fc
```

Name	Value
<i>mfr</i>	Manufacturer string (eg, cambrionix)
<i>mode</i>	A string to describe which operating mode the firmware is in (eg, main)
<i>hw</i>	The part number of the hardware <a href="#">Part numbers</a> )
<i>hwid</i>	A hexadecimal value used internally to identify the product (eg, 0x13)
<i>fw</i>	A pseudo number representing the firmware revision (eg, 1.68)
<i>bl</i>	A pseudo number representing the bootloader revision (eg, 0.15)
<i>sn</i>	A serial number. If not used will show all zeros (eg, 000000)
<i>group</i>	Used on some products to order firmware updates which is useful when updating products that are daisy-chained together so that down-stream products are updated and rebooted first.
<i>fc</i>	Firmware Code is used to denote which firmware type the product accepts

#### Example

```
id mfr:cambrionix,mode :main,h-
w:PP15S,hwid:0x13,fw:1.68,bl:0.15,sn:000000,group:-,fc:un >>
```

### 3.9. ledb (LED bit flash pattern)

The ledb command can be used to assign a flash bit pattern to an individual LED.

**Syntax: (see Command structure)**

```
ledb port row ptn [control]
```

port: is the port number, starting at 1

row: is the LED row number, starting at 1. Typically these are arranged as follows:

Row	LED Function
1	Charged
2	Charging
3	Sync mode

ptn: can be specified as decimal (range 0..255), hexadecimal (range 00h to ffh) or binary (range 00000000b to 11111111b). Hexadecimal number must end with 'h'. Binary numbers must end with 'b'. More significant digits can be omitted for all radices. For example, '0b' is the same as '00000000b'. Hexadecimal numbers are not case-sensitive. The valid pattern characters can be seen in the [LED control](#)

#### Control

using the [H | R] optional parameters

Parameter	Description
H	takes over control of the LED without a remote command
R	releases control of the LED back to normal operation.

#### Example

To flash the charging LED on port 8 at 50/50 duty cycle, use:

```
ledb 8 2 11110000b >>
```

To turn on the port 1 charged LED continuously (i.e. no flashing):

```
ledb 1 1 ffh >>
```

To turn off the port 1 sync LED:

```
ledb 1 3 0 >>
```

## Notes

1. When no LEDs are present the commands is not found.
2. The LED state is not re-established when remote mode is exited and then re-entered.

## 3.10. leds (LED string flash pattern)

The leds command can be used to assign a string of flash patterns to one row of LEDs. This is much faster for controlling an entire row of LEDs. Just three uses of the leds command can set all the LEDs on the system.

### Syntax: (see Command structure)

```
leds row [ptnstr]
```

row: is address as for ledb above.

[ptnstr] is a string of characters, one per port, starting at port 1. Each character represents a different flash pattern to be assigned to the port. A string of characters will assign flash patterns to the ports. The valid pattern characters can be seen in the [LED control](#)

### Example

To set up the following flash pattern on the row containing LED one:

Port	LED function
1	Unchanged
2	On
3	Flash fast
4	Single pulse
5	Off
6	On continuously
7	On continuously
8	Unchanged

Issue the command:

```
leds 1 x1fp011 >>
```

Note that the first LED (port 1) needed to be skipped using the x character. Port 8 was not altered as the pattern string only contained 7 characters.



## Notes

1. When no LEDs are present the commands is not found.
2. The LED state is not re-established when remote mode is exited and then re-entered.

## 3.11. limits (system limits)

---

To show the limits (thresholds) at which the under-voltage, over-voltage and over-temperature errors are triggered, issue the limits command.

### Syntax (see Command structure)

```
limits
```

### Example

```
>> limits
5V Min:    4.50
5V Max:    5.58
Input Min:  9.59
Input Max: 20.00
Temperature (C): 75.0
```

\*output from SS15

### Notes

1. The limits are fixed in the firmware and cannot be changed by a command.
2. The measurements are sampled every 1ms. The voltages must be over or under voltage for 20ms before a flag is raised.
3. The temperature is measured every 10ms. A running average of 32 samples are used to give the result.
4. If the downstream voltage is sampled twice in a row outside product specifications then the ports will be shutoff

## 3.12. logc (Log port current)

For the Universal firmware the logc command is used to display the current for all ports at a pre-set time interval. Alongside current temperature and fan speed.

The logging for both instances can be stopped by sending q or <ETX>.

### Universal Firmware Syntax: (see Command structure)

```
logc seconds
```

seconds is the interval between responses in the range 1..32767

### Response: (see Response structure)

CSV (comma separated values).

### Example

```
>> logc 2
Logging seconds, mA, degrees C, PWM%% with period (mins:secs): 00:02
Press Ctrl-C to stop

000000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000,
0000, 0000, 0000, 37.4, 0.0
000002, 0000, 0000, 0000, 0000, 0000, 0000, 0078, 0000, 0000, 0000, 0000, 0000,
0000, 0000, 0000, 37.4, 0.0
000004, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000,
0000, 0000, 0000, 37.4, 0.0
000006, 0000, 0000, 0000, 0000, 0000, 0000, 0067, 0000, 0000, 0000, 0000, 0000,
0000, 0000, 0000, 37.4, 0.0
000008, 0000, 0000, 0000, 0000, 0000, 0000, 0055, 0000, 0000, 0000, 0000, 0000,
0000, 0000, 0000, 37.4, 0.0
000010, 0000, 0000, 0000, 0000, 0000, 0000, 0067, 0000, 0000, 0000, 0000, 0000,
0000, 0000, 0000, 37.4, 0.0
```

### Notes

1. The parameter is specified in seconds, but is confirmed as minutes:seconds for convenience:
2. Current logging works in both charge and sync modes.
3. The output is rounded to 1mA prior to display

### 3.13. logp (Log port power)

For the PDSync and TS3-C10 firmware the logp command is used to display the current and voltage for all ports at a pre-set time interval.

The logging for both instances can be stopped by pressing q or CTRL C.

**Syntax:** (see Command structure)

```
logp [seconds]
```

[seconds] is the interval between responses in the range 1..32767

**Response:** (see Response structure)

CSV (comma separated values).

#### Example

```
>>logp
Logging current with period (mins:secs): 00:01 Press q or CTRL C to stop

000000, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000
000001, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000
000002, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000
000003, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000
000004, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000
000005, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000
000006, 0000, 0000, 0000, 0000, 0956, 0000, 0000, 0000
000007, 0000, 0000, 0000, 0000, 1005, 0000, 0000, 0000
000008, 0000, 0000, 0000, 0000, 1005, 0000, 0000, 0000
000009, 0000, 0000, 0000, 0000, 1024, 0000, 0000, 0000
000010, 0000, 0000, 0000, 0000, 1005, 0000, 0000, 0000
000011, 0000, 0000, 0000, 0000, 1034, 0000, 0000, 0000
000012, 0000, 0000, 0000, 0000, 0000, 0000, 0000, 0000
```

#### Notes

1. The parameter is specified in seconds, but is confirmed as minutes:seconds for convenience:
2. Current logging works in both charge and sync modes.
3. The output is rounded to 1mA prior to display

## 3.14. loge (Log events)

The loge command is used to report port status change events and periodically report the state of all ports.

The logging is stopped by sending <ETX>

**Syntax:** (see Command structure)

```
loge [seconds]
```

[seconds] is the interval between responses in the range 0..32767

**Response:** (see Response structure)

CSV (comma separated values).

### Example

Here is a device being attached to port 4, left for 6 seconds, and then removed:

```
>> loge
Logging events
Press Ctrl-C to stop

System up for 70632
1, 0000, R D I, 0, 0, x, 0.00
2, 0000, R D I, 0, 0, x, 0.00
3, 0000, R D I, 0, 0, x, 0.00
4, 0000, R D I, 0, 0, x, 0.00
5, 0000, R D I, 0, 0, x, 0.00
6, 0000, R D I, 0, 0, x, 0.00
7, 0078, R A P, 1, 0, x, 0.00
8, 0000, R D I, 0, 0, x, 0.00
9, 0000, R D I, 0, 0, x, 0.00
10, 0000, R D I, 0, 0, x, 0.00
11, 0000, R D I, 0, 0, x, 0.00
12, 0000, R D I, 0, 0, x, 0.00
13, 0000, R D I, 0, 0, x, 0.00
14, 0000, R D I, 0, 0, x, 0.00
15, 0000, R D I, 0, 0, x, 0.00
```

### Notes

1. Commands are accepted while in this mode but commands are not echoed and the command prompt is not issued.
2. If a seconds value of '0' is specified then the periodic reporting is disabled and only port status change events will be reported. If no seconds parameter is supplied a default value of 60s will be used.
3. A time stamp in seconds is output before each event or periodic report the time stamp is the time the hub is switched on.

## 3.15. mode (Hub mode)

Each port can be placed into one of four modes by using the mode command.

**Syntax:** (see [Command structure](#))

```
mode m [p] [cp]
```

Parameter	Description
m	A valid mode character
p	The port number
cp	The charging profile

**Response:** (see [Response structure](#))

```
>>
```

### mode parameters for Universal Firmware

Parameter	Description	Value
Charge	The port is readied for charging a device, and can detect if a device is attached or detached. If a device is attached, the charger profiles enabled for that port are tried one by one. Then the device is charged using the profile that yielded the highest current. During the above, the port is disconnected from the host USB bus.	c
Sync	The port is attached to the host USB bus via a USB hub. The device may draw charging current from VBUS depending on the device capabilities.	s
Biased	Port is detected but no charging or syncing will take place.	b
Off	Power to the port is removed. No charging occurs. No device attach or detach detection is possible.	o

### mode parameters for PDSync and TS3-C10 Firmware

Parameter	Description	Value
Sync	The device can charge whilst communicating with the host connected to the hub.	c
Off	Power (VBUS) to the port is removed. No charging occurs. No device attach or detach detection is possible.	o

## The port parameter

[p], is optional. It can be used to specify the port number. If left blank, all ports are affected by the command.

## The charging profile parameter

[cp] is optional but can only be used when putting a single port into charge mode. If specified then that port will directly enter charge mode using the chosen profile.

Profile parameter	Description
0	Intelligent charging algorithm which will select a profile 1-6
1	2.1A (Apple and others with short detection time)
2	BC1.2 Standard (This covers the majority of Android phones and other devices)
3	Samsung
4	2.1A (Apple and others with long detection time)
5	1.0A (Typically used by Apple)
6	2.4A (Typically used by Apple)

## Examples

To turn off all ports:

```
mode o >>
```

To put just port 2 in charge mode:

```
mode c 2 >>
```

To put just port 4 in charge mode using profile 1:

```
mode c 4 1 >>
```



## 3.16. Reboot (reboot the product)

---

Reboots the product.

**Syntax:** (see [Command structure](#))

```
reboot [watchdog]
```

If the watchdog parameter is included then the system will lock into an infinite, unresponsive loop whilst the watchdog timer expires. The expiration takes several seconds, after which the system will reboot.

If the reboot command is issued without a parameter, the reboot command is executed immediately.

**Response:** (see [Response structure](#))

```
>>
```

The reboot command is a soft reset which will only affect software. To perform a full product reset you will need to power-cycle the hub.

Rebooting sets the 'R' (rebooted) flag, which is reported by the health and state commands.

## 3.17. remote (Remote control)

Some products have interface devices such as indicators, switches and displays which can be used to interact with the hub directly. The function of these interfaces can be controlled via commands. This command disables normal function, and allows control via commands instead.

### Entering remote control mode

The indicators will be turned off when entering remote control mode. The display will be unaffected and previous text will remain. Use `clcd` to clear the display. To disable the console control from the firmware, and allow it to be controlled via commands, issue the `remote` command without parameters:

### Syntax: (see Command structure)

```
remote [mode]
```

To leave remote control mode, and allow the console to be controlled by the firmware, issue an `exit` command parameter.

Parameter	Description
<code>exit</code>	The LEDs will be reset and the LCD cleared when leaving remote control mode.
<code>kexit</code>	Tells the hub to enter remote control mode, but exit automatically when a console key is pressed:

### Notes

1. In remote `kexit` mode, the `keys` command will not return key press events.
2. You can move from remote mode into remote `kexit` mode, and vice-versa.
3. Charging, syncing and security still operate in remote mode. However, their status will not be reported to the console, and the user will need to poll the status flags (using the `state` and `health` commands) to determine the system state.
4. If the `keys`, `lcd`, `clcd`, `leds` or `ledb` commands are issued when not in remote or remote `kexit` mode, then an error message will be shown, and the command will not be executed.

## 3.18. sef (Set Error flags)

It can be useful to set the error flags to examine the system behaviour when an error occurs.

**Syntax:** (see Command structure)

```
sef flags
```

flags is one or more of the below parameters, when sending multiple flags a space is required between each parameter.

Parameter	Description
3UV	3V rail under-voltage
3OV	3V rail over-voltage
5UV	5V rail under-voltage
5OV	5V rail over-voltage
12UV	12V rail under-voltage
12OV	12V rail over-voltage
OT	PCB over-temperature

### Example

To set the 5UV and OT flags:

```
sef 5UV OT
```

### Notes

1. Calling sef without parameters is valid, and sets no error flags.
2. Error flags may be set using sef on any product even if the flag is not relevant to the hardware.

### 3.19. state (List port state)

After a port is placed into a particular mode (e.g. charge mode) it can transition into a number of states. The state command is used to list the state of each port. It also shows the current being delivered to the device, any error flags, and the charge profile employed.

**Syntax:** (see Command structure)

```
state [p]
```

[p] is the port number.

**Response:** (see Response structure)

- Comma separated parameters, one row per port.
  - Row format: p, current\_mA, flags, profile\_id, time\_charging,time\_charged,energy

#### Notes

- For the PDSync-C4 the port numbers include 0 which is the information for the host port
- For the PDSync-C4 there is a slight difference in response which is as follows.
  - Row format: p, voltage\_10mV, current\_mA, flags, time\_charging, time\_charged, energy

Parameter	Description
p	The port number pertaining to the row
voltage_10mV	Voltage being delivered to the mobile device, in 10mV (millivolt) steps
current_mA	Current being delivered to the mobile device, in mA (milliamperes)
flags	See below tables
profile_id	The unique profile ID number. "0" if not charging or profiling
time_charging	Time in seconds the port has been charging
time_charged	Time in seconds that the port has been charged for ( x means not valid yet).
energy	Energy the device has consumed in watthours ( calculated every second)

Note : See product manual for current measurement resolution.

#### Flags for the Universal firmware range

List of case-sensitive flag characters, separated by spaces. O, S, B, I, P, C, F are mutually exclusive. A, D are mutually exclusive.

Flag	Description
O	Port is in OFF mode
S	Port is in SYNC mode
B	Port is in Biased mode
I	Port is in charge mode, and is IDLE
P	Port is in charge mode, and is PROFILING
C	Port is in charge mode, and is CHARGING
F	Port is in charge mode, and is has FINISHED charging
A	Device is ATTACHED to this port
D	No device is attached to this port. Port is DETACHED
T	Device has been stolen from port: THEFT
E	ERRORs are present. See health command
R	System has REBOOTED. See crf command
r	Vbus is being reset during mode change

## Flags for the PDSync and TS3-C10 firmware range

3 flags are always returned for the Powerync firmware

List of case-sensitive flag characters, separated by spaces. Flags may mean different things in different columns	
1st flag	Description
A	Device is ATTACHED to this port
D	No device is attached to this port. Port is DETACHED
P	Port has established a PD contract with device
C	A cable providing Type-C signaling has been detected, but there is no device attached. This can occur, for example, when a type-C to type-A adapter is plugged in to a port. The adapter provides type-C signaling even when there is no downstream device attached.
2nd flag	
I	Port is IDLE
S	Port is the host port and is connected
C	Port is CHARGING

F	Port has FINISHED charging
O	Port is in OFF mode
c	Power is enabled on port but no device is detected
<b>3rd flag</b>	
-	Quick charge mode is disallowed
+	Quick charge mode is allowed but not enabled
q	Quick charge mode is enabled but not in use
Q	Quick charge mode is in use

## Flags for the Motor Control firmware range

Case sensitive flag characters. One of o, O, c, C, U will always be present. T and S are only present when their condition is detected.

Flag	Description
o	Gate is opening
O	Gate is open
c	Gate is closing
C	Gate is closed
U	Gate position is unknown, neither open nor closed and not moving
S	A stall condition was detected for this gate when it was last commanded to move
T	A timeout condition was detected for this gate when it was last commanded to move. ie the gate did not finish moving in a reasonable time nor did it stall.

## Examples

A device connected to port 5 of a PP15S, which is charging at 1044mA using profile\_id 1

```
>>state
1, 0000, D I, 0, 0, x, 0.00
2, 0000, D I, 0, 0, x, 0.00
3, 0000, D I, 0, 0, x, 0.00
4, 0000, D I, 0, 0, x, 0.00
5, 1044, A C, 1, 5, x, 0.01
6, 0000, D I, 0, 0, x, 0.00
7, 0000, D I, 0, 0, x, 0.00
8, 0000, D I, 0, 0, x, 0.00
```

Another device attached to port 8 of a PP15S. This is being profiled using profile\_id 2 prior to charging:

```
>>state
1, 0000, D I, 0, 0, x, 0.00
2, 0000, D I, 0, 0, x, 0.00
3, 0000, D I, 0, 0, x, 0.00
4, 0000, D I, 0, 0, x, 0.00
5, 0927, A C, 1, 10, x, 0.05
6, 0000, D I, 0, 0, x, 0.000
7, 0000, D I, 0, 0, x, 0.00
8, 0048, A P, 2, 5, x, 0.01
```

A global system error on a PP15S reported by the EE flag:

```
>>state
1, 0000, E D I, 0, 0, x, 0.00
2, 0000, E D I, 0, 0, x, 0.00
3, 0000, E D I, 0, 0, x, 0.00
4, 0000, E D I, 0, 0, x, 0.00
5, 0927, E A C, 1, 15, x, 0.00
6, 0000, E D I, 0, 0, x, 0.00
7, 0000, E D I, 0, 0, x, 0.00
8, 0048, E A P, 2, 2, x, 0.01
```

Using a PDSync-C4 a device is attached to port 2 and is charging, quickcharge is disabled for the entire hub. Those host port is also attached to communicate with the hub.

```
>> state
0, 0522, 0000, A S -, 0, x, 0.00
1, 0000, 0000, D I -, 0, x, 0.00
2, 0499, 0059, A C -, 4638, x, 0.25
3, 0000, 0000, D I -, 0, x, 0.00
4, 0000, 0000, D I -, 0, x, 0.00
```

## 3.20. system (View system parameters)

To view system parameters, issue the system command.

**Syntax:** (see Command structure)

```
system
```

**Response:** (see Response structure)

First row: system title text.

Subsequent rows: parameter:value pairs, one pair per row.

```
Title text Hardware: Firmware: Compiled: Group: Panel ID:
```

Parameter	Description	Possible values
<i>Hardware</i>	Part number	
<i>Firmware</i>	Firmware version string	In a “n.nn” format, n is a decimal number 0..9
<i>Compiled</i>	Release time and date of the Firmware	
<i>Group</i>	Group letter read from PCB jumpers	1 character, 16 values: “-”, “A” .. “O” “-” means no group jumper is fitted
<i>Panel ID</i>	Panel ID number of front panel product	“None” if no panel was detected Otherwise “0” .. “15”
<i>LCD</i>	Presence of LCD display	“Absent” or “Present” If product can support an LCD

### Notes

1. The system title text may change across firmware releases.
2. The 'Panel ID' is updated at power-up or reboot.
3. The 'LCD' parameter can only become 'Present' at power-up or reboot. It can become 'Absent' during run-time if the LCD is no longer detected. Only applicable to products with removable displays.



## 3.21. beep (Make product beep)

Makes the sounder beep for a specified amount of time. The beep is performed as a background task - so the system can process other commands whilst the beep is produced.

**Syntax:** (see Command structure)

```
beep [ms]
```

Parameter	Description
ms	the length of beep in milliseconds (range 0..32767)

**Response:** (see Response structure)

```
>>
```

### Notes

1. The time [ms] has a resolution of 10ms
2. A beep will not be interrupted by a shorter or zero-length beep.
3. The beep from an alarm is overridden by the continuous tone from a beep command. when the continuous beep completes, the system will return to the alarm beep.
4. Sending <BEL> from the terminal will cause a short beep to be generated.
5. Beeps are only audible on products with sounders fitted.

## 3.22. clcd (Clear LCD)

---

The lcd is cleared by using the clcd command.

**Syntax:** (see Command structure)

```
clcd
```

**Response:** (see Response structure)

```
>>
```

### Notes

1. This is only applicable to products fitted with displays.

## 3.23. `get_profiles` (get port profiles)

---

To get the profiles assigned to a port, use the `get_profiles` command. For more information on profiles see [Charging profiles](#)

**Syntax:** (see [Command structure](#))

```
get_profiles p
```

p: is the port number

**Response:** (see [Response structure](#))

Port profiles are listed and defined whether they are enabled or disabled

### Example

To get the profiles assigned to port 1:

```
>> get_profiles 1
1, enabled
2, enabled
3, enabled
4, enabled
5, disabled
6, disabled
```

## 3.24. set\_profiles (set port profiles)

To assign profiles to an individual port, use the `set_profiles` command. For more information on profiles see [Charging profiles](#)

**Syntax:** (see [Command structure](#))

```
set_profiles p [cp]
```

Parameter	Description
p	Port number
cp	Charging profile

To assign all system profiles to a port, issue `set_profiles` without a list of profiles.

**Response:** (see [Response structure](#))

```
>>
```

### Example

To set profiles 2 and 3 for port 5:

```
set_profiles 5 2 3
```

To assign all profiles to port 8:

```
set_profiles 8
```

### Notes

1. Use [get\\_profiles](#) to obtain list of profiles set on each port.

## 3.25. list\_profiles (List global profiles)

---

The list of profiles can be obtained by using the list\_profiles command: For more information on profiles see [Charging profiles](#)

**Syntax:** (see Command structure)

```
list_profiles
```

**Response:** (see Response structure)

Each profile listed has 2 parameters separated by a comma: profile\_id, enabled\_flag.

The profile\_id is a unique number that always corresponds to one profile type. It is a positive integer starting at 1. A profile\_id of 0 is reserved for when the absence of a profile is to be indicated.

enabled\_flag can be enabled or disabled depending on whether the profile is active on the product.

### Example

```
>> list_profiles
1, enabled
2, enabled
3, enabled
4, enabled
5, disabled
6, disabled
```

## 3.26. en\_profile (Enable / disable profiles)

The en\_profile command is used to enable and disable each profile. The effect applies to all ports.

**Syntax:** (see Command structure)

```
en_profile i e
```

Parameter	Description	Value
i	Profile parameter	see below table
e	Enable flag	1 = enabled 0 = disabled

Profile parameter	Description
0	Intelligent charging algorithm which will select a profile 1-6
1	2.1A (Apple and others with short detection time)
2	BC1.2 Standard (This covers the majority of Android phones and other devices)
3	Samsung
4	2.1A (Apple and others with long detection time)
5	1.0A (Typically used by Apple)
6	2.4A (Typically used by Apple)

**Response:** (see Response structure)

```
>>
```

### Example

To disable a profile for all ports use the command:

```
en_profile 2 0 >>
```

### Operation with no enabled profiles

If all profiles for a port are disabled, the port will transition into the Biased port state. This permits device attach and detach detection to work, but no charging will occur. Security (theft detection) will still operate if all profiles are disabled, as will the attach (AA) and detach (DD) flags reported by the state command.

## Notes

1. This command has an immediate effect. If the command is issued whilst a port is profiling, then the command will only have an effect if that profile has not yet been reached.

## 3.27. keys (Key states)

---

The product may be fitted with up to three buttons. When a button is pressed, a key 'click' flag is set. This flag remains set until it is read. To read the key click flags, use the keys command. The result is a comma-separated list, with one flag per key:

**Syntax: (see Command structure)**

```
keys
```

Keys A, B and C are listed respectively. A '1' means the key has been pressed since the keys command was last called. The flags are cleared after keys is run:

### Notes

- The keys command only works in [remote \(Remote control\)](#) mode. It does not work in remote kexit mode
- This command will only work on products with buttons installed.



## 3.28. lcd (Write to the LCD)

If an LCD is attached, it can be written to by using this command.

**Syntax:** (see 'Command structure')

```
lcd row col string
```

Parameter	Description
row	0 is the first row, 1 is for the second row
col	The column number, starting at 0
string	Displayed on the LCD. It may contain spaces before, within and after.

### Example

To write “Hello, world” on the far left of the second row:

```
lcd 1 0 Hello, world >>
```

### Displaying Icons

As well as ASCII characters, the LCD can display several custom icons. These are accessed by sending the escape sequence <ESC> c, where c is the character '1' .. '8':

c	Icon
1	Empty battery
2	Continuously animated battery
3	Cambrionix filled 'o' glyph
4	Full battery
5	Padlock
6	Egg timer
7	Custom numeral 1 (aligned to right of bitmap)
8	Custom numeral 1 (aligned to middle of bitmap)

## 3.29. sec (Device security)

The product can log if a device was unexpectedly removed from a port. The sec command can be used to put all ports into an 'armed' security state. If a device is removed in the armed state, then an alarm can be triggered, and the T flag is shown.

**Syntax: (see Command structure)**

```
sec [arm|disarm]
```

**Response to no parameters: (see Response structure)**

```
armed|disarmed >>
```

**Response to arm|disarm parameter: (see Response structure)**

```
>>
```

### Examples

To arm the system:

```
sec arm >>
```

To disarm the system:

```
sec disarm >>
```

To obtain the armed state:

```
sec disarmed >>
```

### Notes

- If theft detection is needed, but no device charging or syncing is desired, set the ports to Biased mode. If using Biased mode and the device battery runs out then the alarm will be raised
- To clear all theft bits and silence a sounding alarm, disarm then re-arm the system.

## 3.30. serial\_speed (Set serial speed)

Sets the serial speed.

**Syntax:** (see Command structure)

```
serial_speed [speed]
```

Parameter	Description
test	Test whether the product supports an increase in serial speed from current speed
fast	Increase serial speed
slow	Reduce serial speed

**Response:** (see Response structure)

```
Response >>
```

Response	Description
OK	The product supports an increase in speed
Error	The product does not support an increase in speed

You should flush the serial buffer after the first “serial\_speed fast“ before the speed is changed to 1Mbaud. If during operation at 1Mbaud any serial errors are detected the speed is automatically dropped to 115200baud without warning. The host code must be aware of this and take suitable action. If the link regularly fails do not to try increase the speed again.

### Example

To increase the serial speed to 1Mbaud use the following sequence:

```
serial_speed test OK >> serial_speed fast
```

If any error is detected in the above sequence the speed increase won't occur or will be reset.

Before exiting the host should return the speed back to 115200baud with the following command

```
serial_speed slow
```

Failure to do so will result in the first characters being lost until the hub detects the incorrect baud rate as serial errors and drops back to 115200baud.

## 3.31. set\_delays (Set delays)

Sets internal delays

**Syntax:** (see Command structure)

```
set_delays port_reset_delay_ms attach_blanking_ms deattach_count deattach_sync_count
```

Parameter	Description	Default values
port_reset_delay_ms	Time left unpowered when changing modes. (ms)	400
attach_blanking_ms	Time device attach detection will be delayed to avoid a quick insert and removal. (ms)	2000
deattach_count	Reserved for future use.	30
deattach_sync_count	A number value to set the depth of filtering a deattach event in sync mode	14

**Response:** (see Response structure)

```
>>
```

### Notes

- The use of this command may prevent correct charging.
- ADET\_PIN gives a false positive (it shows a device is attached when none is present). It remains in this erroneous state for about 1 second after leaving PORT\_MODE\_OFF.

## 3.32. boot (Enter boot-loader)

---

Boot mode is used to update the firmware within the hub. We do not provide public information about using the hub in boot mode.

If you find the product in boot mode, you can return to normal operation by sending the reboot command or by power-cycling the system.

**Syntax:** (see [Command structure](#))

```
boot
```

**Response:** (see [Response structure](#))

```
boot>>
```

### 3.33. gate (Gate command)

The gate command is used to control the movement of gates.

**Syntax:** (see Command structure)

```
gate position port [strength]
```

Parameter	Description
position	The desired gate command (stop open close)
port	Either the port number or 'all' for all ports
strength	An integer that alters the speed of movement (0-2047)

**Response:** (see Response structure)

```
>>
```

### 3.34. proxy

---

In order to distinguish commands targeted at the Motor Control Board from those for the host unit itself, there is a host unit command 'proxy' which takes as its arguments the commands for the Motor Control Board.

The user must prefix all the commands meant for the Motor Control board with 'proxy' when they are sent to the host unit's command line interface.

**Syntax: (see Command structure)**

```
proxy
```

## 3.35. keyswitch

To show the current position of the keyswitch issue the keyswitch command.

**Syntax:** (see Command structure)

```
keyswitch
```

**Response:** (see Response structure)

```
keyswitch: (parameter) >>
```

Parameter	Description
Open	The keyswitch is in the open position.
Closed	The keyswitch is in the closed position.



## 3.36. rgb

The `rgb` command is used to set one or more ports into LED override mode. In order to set the individual RGB LED levels on a port, the port must first be set into LED override mode which will stop the mirroring of the host unit's LEDs onto that port. On entering LED override mode the LEDs on that port will all be turned off.

**Syntax:** (see [Command structure](#))

```
rgb override [p]
```

Override parameter	Description
start	Used to enter RGB override mode
leave	Used to exit override mode

p is the port number.

**Response:** (see [Response structure](#))

```
>>
```

## 3.37. rgb\_led

The `rgb_led` command is used to set the RGB LED levels on one or more ports to the value specified.

**Syntax:** (see [Command structure](#))

```
rgb_led p level
```

Override parameter	Description
p	A single port or a range of ports.
level	An eight digit hex number that represents the levels to set for the RGB LEDs. in the format 'aarrggbb'

level parameters	Description
aa	Sets the maximum level for the LEDs on this port, the other LEDs are all scaled from this setting
rr	Sets the level for the Red LED
gg	Sets the level for the Green LED
bb	Sets the level for the Blue LED

**Response:** (see [Response structure](#))

```
>>
```

## 3.38. stall

The stall command is used to set the current at which it is determined that a gate has stalled.

**Syntax:** (see Command structure)

```
stall current
```

Parameter	Description
current	The value in mA that will be used as the level of current draw by the motor above which it is determined that a gate has stalled.

**Response:** (see Response structure)

```
>>
```

## 4. Deprecated Methods

---

These commands exist to support backwards compatibility only and should not be used. These methods may be removed in future versions.

Command	Description
<a href="#">l (Live view)</a>	Live view provides a continuous stream of data to view the port states and flags.

## 4.1. I (Live view)

**!This method is deprecated!**

Live view provides a continuous stream of data to view the port states and flags. Ports can be commanded using single key presses as per the table below. This command cannot be used within the Cambrionix Connect application.

### Syntax (see Command structure)

1

Live view is designed to be interactive using a terminal. It makes extensive use of ANSI escape sequences to control the cursor position. Do not try to script the control of the live view.

The terminal size (rows, columns) must be large enough or the display will be corrupted. The hub attempts to set the number of rows and columns of the terminal when entering live view mode.

### Commands :

Type the below commands to interact with live view.

Select a port by typing a 2-digit port number (e.g. 01) to toggle all ports use /

Command	Description
/	Toggle all ports
o	Turn port off
c	Turn port to charge only
s	Turn port to sync mode
q / <ETX>	Quit live view

## Example

```
cambrionix SuperSync15 15 Port USB Charge+Sync (live view)

Port  Flags    mA   State           Profile    Start    End    Energy
> 01          0   Charge (idle)
 02          0   Charge (idle)
 03          0   Charge (idle)
 04          0   Charge (idle)
 05          0   Charge (idle)
 06          0   Charge (idle)
 07  A        55   Profiling      Profile 3
 08          0   Charge (idle)
 09          0   Charge (idle)
 10          0   Charge (idle)
 11          0   Charge (idle)
 12          0   Charge (idle)
 13          0   Charge (idle)
 14          0   Charge (idle)
 15          0   Charge (idle)

Host present: Yes
5V Rail 5.23V          Input : 12.12V    Temperature: 37.4C
Total Current:    55mA    Total Power :    0W
Seconds since power on: 70162

Flags:    A:Attached, E:System Error, e:Port Error
Commands: o)ff c)harge s)ync q)uit live view
          Type 2-digit port number (e.g. 01). / toggles all ports
          Selection: --
```

## 5. Errors

Failed commands will respond with an error code of the form below.

\*Ennn: Explanation

“nnn” is always a three digit decimal number.

### Command error codes

Error code	Error name	Description
400	ERR_COMMAND_NOT_RECOGNISED	Command is not valid
401	ERR_EXTRANEIOUS_PARAMETER	Too many parameters
402	ERR_INVALID_PARAMETER	Parameter is not valid
403	ERR_WRONG_PASSWORD	Invalid password
404	ERR_MISSING_PARAMETER	Mandatory parameter missing
405	ERR_SMBUS_READ_ERR	Internal system management communication read error
406	ERR_SMBUS_WRITE_ERR	Internal system management communication write error
407	ERR_UNKNOWN_PROFILE_ID	Invalid profile ID
408	ERR_PROFILE_LIST_TOO_LONG	Profile list exceeds limit
409	ERR_MISSING_PROFILE_ID	Required profile ID missing
410	ERR_INVALID_PORT_NUMBER	Port number not valid for this product
411	ERR_MALFORMED_HEXADECIMAL	Invalid hexadecimal value
412	ERR_BAD_HEX_DIGIT	Invalid hex digit
413	ERR_MALFORMED_BINARY	Invalid binary
414	ERR_BAD_BINARY_DIGIT	Invalid binary digit
415	ERR_BAD_DECIMAL_DIGIT	Invalid decimal digit
416	ERR_OUT_OF_RANGE	Not within defined range
417	ERR_ADDRESS_TOO_LONG	Address exceeds character limit
418	ERR_MISSING_PASSWORD	Required password missing
419	ERR_MISSING_PORT_NUMBER	Required port number missing

Error code	Error name	Description
420	ERR_MISSING_MODE_CHAR	Required mode character missing
421	ERR_INVALID_MODE_CHAR	Invalid mode character
422	ERR_MODE_CHANGE_SYS_ERR_FLAG	System error on mode change
423	ERR_CONSOLE_MODE_NOT_REMOTE	Remote mode required for product
424	ERR_PARAMETER_TOO_LONG	Parameter has too many characters
425	ERR_BAD_LED_PATTERN	Invalid LED pattern
426	ERR_BAD_ERROR_FLAG	Invalid error flag

## Example

Specifying a non-existent port to the mode command:

```
>> mode c 17 *E410: Port number must be 1..8
```

## 5.1. Fatal errors

When the system encounters a fatal error, the error is reported to the terminal immediately in the following format:

```
*FATAL ERROR Ennn: Explanation
```

"nnn" is a three-digit error reference number.  
"Explanation" describes the error.

When a fatal error has occurred the CLI will only respond to <ETX> and <CR>. If either of these are received, then the system will enter boot mode. If <ETX> or <CR> are not received within the watchdog timeout period (approximately 9 seconds) then the system will reboot.

## Important

If a fatal error occurs whilst a command is sending a <ETX> or ENTER character to the hub, then boot mode will be entered. If the product enters boot mode then you will need to send the reboot command to return to normal operation.

Boot mode is indicated by receiving the below response (sent on a new line)

```
boot>>
```

In boot mode, non-bootloader commands will be responded to with:



```
*E900: Invalid bootloader command
```

For testing purposes, boot mode can be entered by using the boot command.

## 6. Charging profiles

When a device is attached to a hub, the product can provide a variety of different charging levels. Each of these different variations is called a 'profile'. Some devices will not charge properly unless presented with the correct profile. A device not presented with a charging profile it recognises will draw less than 500mA as per USB specifications.

When a device is attached to the product, and it is in 'charge mode', it tries each profile in turn. Once all the profiles have been tried, the hub selects the profile that drew the highest current.

In some cases it may not be desirable for the hub to scan all the profiles in this way. For example, if only devices from one manufacturer are attached, then only that specific profile will need to be active. This reduces the time delay when a user attaches a device, and sees evidence of the device charging properly.

The hub provides the means to limit the profiles tried, both on a 'global' level (across all ports) and on a port-by-port basis.

Profile parameter	Description
0	Intelligent charging algorithm which will select a profile 1-6
1	2.1A (Apple and others with short detection time)
2	BC1.2 Standard (This covers the majority of Android phones and other devices)
3	Samsung
4	2.1A (Apple and others with long detection time)
5	1.0A (Typically used by Apple)
6	2.4A (Typically used by Apple)

## 7. Port modes

The port modes are defined by the 'host' and 'mode' commands.

By default, hubs are in auto host mode when powered on or when the hub is rebooted. Which means if there is a host present or becomes present (i.e. the host computer is turned on or a powered host computer is attached to the hub), then all ports will change into sync mode.

If an attached host is no longer detected (i.e. a powered host computer was detached from the hub or the host computer was switched off), then all ports will enter charge mode.

The port modes can be altered using the mode command and switched manually from one mode to another.

Charge	Turn specific ports or the whole hub to charge mode
Sync	Turn specific ports or the whole hub to sync mode (data and power channels open)
Biased	Detect the presence of a device but it will not sync or charge it.
Off	Turn specific ports on or off or switch the whole hub on or off. (no power and no data channels open)

Not all products have each mode available, check individual product user manuals for the modes that are supported.

## 8. LED control

There are two methods to control to the LEDs in remote control mode: **ledb** and **leds**. First, however, the operation of the LEDs will be described.

The flash pattern is an 8-bit byte. Each bit is repeatedly scanned in sequence from MSB to LSB (i.e. left to right). A '1' bit turns the LED on, and a '0' turns it off. For example, a bit pattern of decimal 128 (binary 10000000b) would pulse the LED briefly. A bit pattern of decimal 127 (binary 01111111b) would see the LED on for most of the time, only turning off briefly.

Pattern Character	LED function	Flash pattern
0 (number)	Off	00000000
1	On continuously (not flashing)	11111111
f	Flash fast	10101010
m	Flash medium speed	11001100
s	Flash slowly	11110000
p	Single pulse	10000000
d	Double pulse	10100000
O (Capital letter)	Off (no remote command needed)	00000000
C	On (no remote command needed)	11111111
F	Flash fast (no remote command needed)	10101010
M	Flash medium speed (no remote command needed)	11001100
S	Flash slowly (no remote command needed)	11110000
P	Single pulse (no remote command needed)	10000000
D	Double pulse (no remote command needed)	10100000
R	Release “no remote command needed “ LEDs back to normal use	
x	unchanged	unchanged

In auto mode the defaults can be seen in the table below, some products may vary so please see individual product user manuals to confirm LED functions.

[www.cambrionix.com/product-user-manuals](http://www.cambrionix.com/product-user-manuals)

LED Type	Meaning	Conditions	Indicator Light Display
Power	Power Off	<ul style="list-style-type: none"> <li>Soft power off (standby) or no power</li> </ul>	Off
Power	Power On No Host Connected	<ul style="list-style-type: none"> <li>Power on</li> <li>No fault with the product</li> </ul>	Green
Power	Power On Host Connected	<ul style="list-style-type: none"> <li>Power on</li> <li>No fault with the product</li> <li>Host connected</li> </ul>	Blue
Power	Fault with code	<ul style="list-style-type: none"> <li>Major fault condition</li> </ul>	Red Flashing (Fault code pattern)
Port	Device Disconnected / Port Disabled	<ul style="list-style-type: none"> <li>Device disconnected or port disabled</li> </ul>	Off
Port	Not Ready / Warning	<ul style="list-style-type: none"> <li>Device resetting, starting, changing mode of operation or updating firmware</li> </ul>	Yellow
Port	Charge Mode Profiling	<ul style="list-style-type: none"> <li>Fault with connected device</li> </ul>	Green Flashing (on/off in once second intervals)
Port	Charge Mode Charging	<ul style="list-style-type: none"> <li>Port in charge mode</li> <li>Device connected and charging</li> </ul>	Green Pulsing (dim/brightens in one second intervals)
Port	Charge Mode Charged	<ul style="list-style-type: none"> <li>Port in charge mode</li> <li>Device connected, and charge threshold met or unknown</li> </ul>	Green
Port	Sync Mode	<ul style="list-style-type: none"> <li>Port in sync mode</li> </ul>	Blue
Port	Fault	<ul style="list-style-type: none"> <li>Fault with connected device</li> </ul>	Red


## 9. Internal hub Settings

### 9.1. Introduction

Cambrionix products have Internal settings which are used to store settings which need to remain even after the product has had power removed. This section describes how to apply Internal hub setting changes along with their affect on the product they are applied to.

There are two methods for changing the product settings:

- Entering the required command settings.
- Change the settings on the Cambrionix Connect application.

	<b>CAUTION</b>
	Changing Internal hub settings on a Cambrionix product may cause the product to function incorrectly.

For a list of Internal settings applicable to your product please see the individual products user manual.

[www.cambrionix.com/product-user-manuals](http://www.cambrionix.com/product-user-manuals)

### 9.2. Internal hub settings

Notes:

- Only if a command succeeds will there be a visible response within the terminal window.
- The command settings\_unlock needs to be entered prior to a settings\_set or settings\_reset command
- The 'settings\_set' command must be entered if you wish to change a setting

Setting	Usage
<a href="#">settings_unlock</a>	This command unlocks the memory for writing
<a href="#">settings_set</a>	Allows the use of subsequent commands to alter settings
<a href="#">settings_display</a>	Displays the current internal hub settings
<a href="#">settings_reset</a>	This command resets the memory back to the default settings
<a href="#">local_name</a>	Sets the local name
<a href="#">attach_threshold</a>	Sets the attach current threshold
<a href="#">default_profile</a>	Sets the default profile to be used by each port
<a href="#">remap_ports</a>	This setting allows you to map ports numbers on Cambrionix products

Setting	Usage
<a href="#">ports_on</a>	Sets a port to be always powered regardless of attach status.
<a href="#">sync_chrg</a>	Enable CDP on a per port basis
<a href="#">alt_sync_chrg</a>	Enable alternative method CDP to support some hardware.
<a href="#">charged_threshold</a>	Sets the charged_threshold
<a href="#">temperature_max</a>	Sets Maximum temperature before the shut-down of ports (°C)
<a href="#">stagger</a>	Introduce a delay between ports turning on
<a href="#">stagger_offset</a>	The delay before starting the staggered process.

### 9.2.1 settings\_unlock

---

This command unlocks the memory for writing. This command must be used before 'settings\_set' and 'settings\_reset'.

It is not possible to change internal hub settings without entering this command.

**Syntax:** (see 'settings\_set')

```
settings_unlock
```

**Response:** (see Response structure)

```
Unlocked
```



## 9.2.2 settings\_set

This command allows the use of commands to alter settings on the hubs internal settings. This will be the 'command' that is sent, the setting you wish to change becomes the 'mandatory parameter' and then the value you wish to change to is the 'optional parameter'

It is not possible to change internal hub settings without entering this command, you must enter the 'settings\_unlock' command before you can use this command.

### Syntax

```
settings_set
```

### Command structure

Each command follows the below format.

```
Command mandatory-parameters [optional-parameters]<CR><LF>
```

The command will need to be entered first, if no parameters exist for the command then this will need to be followed immediately by <CR> and <LF> to send the command.

Not every command has mandatory parameters but if they are applicable then these will need to be entered for the command to work, once the command and mandatory parameters are entered then <CR> and <LF> will be required to signify the end of a command.

Optional parameters are shown inside square brackets e.g. [port]. These do not need to be entered for the command to be sent, but if they are included they will need to be followed by <CR> and <LF> to signify the end of a command.

### 9.2.3 local\_name

---

Sets the local name.

**Syntax:** (see 'settings\_set')

```
local_name local-name
```

*local-name* is the local (alternative) name of the relating to the hardware. The name cannot contain '%' or '\'. Maximum length of the name is 20 characters.

**Response:** (see Response structure)

```
Setting updated
```

### Example

```
settings_unlock  
settings_set local_name Room2
```

## 9.2.4 attach\_threshold

---

Sets the attach current threshold with a single digit number.

The attach threshold is the device current (mA) level at which the hub can determine that a device (iPhone etc.) has been attached to a port. The attach threshold may need to be increased if the device (iPhone etc.) is connected to a Cambrionix port with a cable which includes an LED or other electronics. It may also need to be increased if you are using a device (iPhone etc.) with a 3rd party sled/holder/case (such as a barcode scanner or battery pack) which contains electronics or charging pass-through

**Syntax: (see 'settings\_set')**

```
attach_threshold attach-threshold-value
```

*attach-threshold-value* is the attach threshold value in 10mA steps 0-90

**Response: (see Response structure)**

```
Setting updated
```

### Example

```
settings_unlock  
settings_set attach_threshold 3
```

## 9.2.5 default\_profile

---

Sets the default profile to be used by each port.

**Syntax:** (see 'settings\_set')

```
default_profile profile-list
```

*profile-list* is a space separated list of the profile number to be applied to each port in ascending order. Specifying a profile of '0' for any port means that there is no default profile applied to that port, this is the default behaviour on reset. All ports must have an entry in the list.

For more details on the profiles available on your product please see the information in the individual products user manual.

[www.cambrionix.com/product-user-manuals](http://www.cambrionix.com/product-user-manuals)

**Response:** (see Response structure)

```
Setting updated
```

## Example

```
settings_unlock
settings_set default_profile 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

## 9.2.6 remap\_ports

---

This setting allows you to map ports numbers on the Cambrionix products to port numbers on your own product, which may not have the same number order.

**Syntax: (see 'settings\_set')**

```
remap_ports port-map
```

*port-map* is the port numbers in the order you wish to them to be displayed

**Response: (see Response structure)**

```
Setting updated
```

### Example

```
settings_set remap_ports 1 3 10 6 8 11 13 15 2 4 5 7 9 12 14
```

## 9.2.7 ports\_on

Sets a port to be always powered regardless of attach status. This must only be used in conjunction with a default profile

**Syntax:** (see 'settings\_set')

```
company_name ports-on-list
```

*ports-on-list* is a space separated list of flags for each port in ascending order. A '1' denotes that the port will be always powered. A '0' denotes default behaviour which is that the port will not be powered until an attached device is detected

**Response:** (see Response structure)

```
Setting updated
```

## Example

```
settings_unlock
settings_set ports_on 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0
```

## 9.2.8 sync\_chrg

Enable CDP\* on a per port basis, note this cannot be turned off on Thunderbolt products.

\*Charging Downstream Port (CDP) Being enabled means that a port is capable of transferring data and charging the device at the same time with a higher current than just data syncing alone. With CDP enabled the hub can supply up to 1.5A

**Syntax:** (see 'settings\_set')

```
sync_chrg CDP-list
```

*CDP-list* is the list of ports on the product '1' denotes that CDP is enabled for a port and a "0" means CDP is disabled

**Response:** (see Response structure)

```
Setting updated
```

## Example

```
settings_unlock
settings_set sync_chrg 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

### 9.2.9 alt\_sync\_chrg

Enable alternative CDP\* on a per port basis, note this cannot be turned off on Thunderbolt products. This has no effect if Sync Charge for that port is disabled.

\*Charging Downstream Port (CDP) Being enabled means that a port is capable of transferring data and charging the device at the same time with a higher current than just data syncing alone. With CDP enabled the hub can supply up to 1.5A

**Syntax: (see 'settings\_set')**

```
sync_chrg alternative-CDP-list
```

*alternative-CDP-list* is the list of ports on the product '1' denotes that alternative CDP is enabled for a port and a "0" means alternative CDP is disabled

**Response: (see Response structure)**

```
Setting updated
```

### Example

```
settings_unlock
settings_set alt_sync_chrg 1 1 1 1 1 0 1 1 1 1 1 1 1 1
```



## 9.2.10 charged\_threshold

---

Sets the charged current threshold with a single digit number.

The charged threshold is used to determine if the device is probably charged. If the drawn power goes below this mark for 2 minutes, then we set a charged flag

**Syntax:** (see 'settings\_set')

```
charged_threshold charged-threshold-value
```

*charged-threshold-value* is the charged threshold value in 0.1mA steps 0-2500 must have leading zeros to make a four digit number

**Response:** (see Response structure)

```
Setting updated
```

### Example

```
settings_unlock  
settings_set charged_threshold 2000
```

### 9.2.11 temperature\_max

---

Sets Maximum temperature before the shut-down of ports (°C)

**Syntax:** (see 'settings\_set')

```
temperature_max maximum-temperature
```

*maximum-temperature* is the maximum temperature the hub can get to before automatically shutting down all the ports.

**Response:** (see Response structure)

```
Setting updated
```

### Example

```
settings_unlock  
settings_set maximum_temperature 70
```

## 9.2.12 stagger

---

Introduce a delay between ports turning on when either host is detected or mode is switched to Sync.

**Syntax: (see 'settings\_set')**

```
stagger port-stagger
```

*port-stagger* is the amount of time in ms between ports turning on 0-9999ms

**Response: (see Response structure)**

```
Setting updated
```

## Example

```
settings_unlock  
settings_set stagger 3000
```

### 9.2.13 stagger\_offset

---

An additional delay to add before starting the [stagger](#) process.

**Syntax:** (see 'settings\_set')

```
stagger port-stagger-offset
```

*port-stagger-offset* is the amount of time in ms before the [stagger](#) process starts 0-9999ms

**Response:** (see Response structure)

```
Setting updated
```

### Example

```
settings_unlock  
settings_set stagger_offset 1000
```

## 10. Supported Products

Here you can find a table with all commands and which products they are valid for.

	U8S	U16S Spade	PP15S	PP8S	PP15C	SS15	TS2- 16	TS3- 16	TS3- C10	PDSync- C4	ModIT- Max
bd	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
cef	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
cls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
crf	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
health	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
host	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
id	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
l	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ledb	✓	✓					✓	✓	✓	✓	✓
leds	✓	✓					✓	✓	✓	✓	✓
limits	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
loge	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
mode	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
reboot	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
remote	✓	✓					✓	✓	✓	✓	✓
sef	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
state	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
system	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
beep	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
clcd	✓	✓					✓				
en_profile	✓	✓	✓	✓	✓	✓	✓	✓			✓
get_profiles	✓	✓	✓	✓	✓	✓	✓	✓			✓
keys	✓	✓					✓				

	U8S	U16S Spade	PP15S	PP8S	PP15C	SS15	TS2- 16	TS3- 16	TS3- C10	PDsync- C4	ModIT- Max
lcd	✓	✓					✓				
list_ profiles	✓	✓	✓	✓	✓	✓	✓	✓			✓
logc	✓	✓	✓	✓	✓	✓	✓	✓			✓
sec	✓	✓					✓				
serial_ speed	✓	✓	✓	✓	✓	✓	✓	✓			✓
set_ delays	✓	✓	✓	✓	✓	✓	✓	✓			✓
set_ profiles	✓	✓	✓	✓	✓	✓	✓	✓			✓
detail	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
logp									✓	✓	
power									✓	✓	
qcmode										✓	
gate											✓
keyswitc h											✓
proxy											✓
stall											✓
rgb											✓
rgb_led											✓

## 11. ASCII Table

dec	hex	oct	char	Ctrl char
0	0	000	<NULL>	ctrl-@
1	1	001	<SOH>	ctrl-A
2	2	002	<STX>	ctrl-B
3	3	003	<ETX>	ctrl-C
4	4	004	<EOT>	ctrl-D
5	5	005	<ENQ>	ctrl-E
6	6	006	<ACK>	ctrl-F
7	7	007	<BEL>	ctrl-G
8	8	010	<BS>	ctrl-H
9	9	011	<TAB>	ctrl-I
10	a	012	<LF>	ctrl-J
11	b	013	<VT>	ctrl-K
12	c	014	<FF>	ctrl-L
13	d	015	<CR>	ctrl-M
14	e	016	<SOH>	ctrl-N
15	f	017	<SI>	ctrl-O
16	10	020	<DLE>	ctrl-P
17	11	021	<DC1>	ctrl-Q
18	12	022	<DC2>	ctrl-R
19	13	023	<DC3>	ctrl-S
20	14	024	<DC4>	ctrl-T
21	15	025	<NAK>	ctrl-U
22	16	026	<SYN>	ctrl-V
23	17	027	<ETB>	ctrl-W
24	18	030	<CAN>	ctrl-X
25	19	031	<EM>	ctrl-Y

dec	hex	oct	char	Ctrl char
26	1a	032	<SUB>	ctrl-Z
27	1b	033	<ESC>	ctrl-[
28	1c	034	<FS>	ctrl-\
29	1d	035	<GS>	ctrl-]
30	1e	036	<RS>	ctrl-^
31	1f	037	<US>	ctrl-_
32	20	040	space	
33	21	041	!	
34	22	042	"	
35	23	043	#	
36	24	044	\$	
37	25	045	%	
38	26	046	&	
39	27	047	'	
40	28	050	(	
41	29	051	)	
42	2a	052	*	
43	2b	053	+	
44	2c	054	,	
45	2d	055	-	
46	2e	056	.	
47	2f	057	/	
48	30	060	0	
49	31	061	1	
50	32	062	2	
51	33	063	3	
52	34	064	4	
53	35	065	5	



dec	hex	oct	char	Ctrl char
54	36	066	6	
55	37	067	7	
56	38	070	8	
57	39	071	9	
58	3a	072	:	
59	3b	073	;	
60	3c	074	<	
61	3d	075	=	
62	3e	076	>	
63	3f	077	?	
64	40	100	@	
65	41	101	A	
66	42	102	B	
67	43	103	C	
68	44	104	D	
69	45	105	E	
70	46	106	F	
71	47	107	G	
72	48	110	H	
73	49	111	I	
74	4a	112	J	
75	4b	113	K	
76	4c	114	L	
77	4d	115	M	
78	4e	116	N	
79	4f	117	O	
80	50	120	P	
81	51	121	Q	

dec	hex	oct	char	Ctrl char
82	52	122	R	
83	53	123	S	
84	54	124	T	
85	55	125	U	
86	56	126	V	
87	57	127	W	
88	58	130	X	
89	59	131	Y	
90	5a	132	Z	
91	5b	133	[	
92	5c	134	\	
93	5d	135	]	
94	5e	136	^	
95	5f	137	_	
96	60	140	`	
97	61	141	a	
98	62	142	b	
99	63	143	c	
100	64	144	d	
101	65	145	e	
102	66	146	f	
103	67	147	g	
104	68	150	h	
105	69	151	i	
106	6a	152	j	
107	6b	153	k	
108	6c	154	l	
109	6d	155	m	

dec	hex	oct	char	Ctrl char
110	6e	156	n	
111	6f	157	o	
112	70	160	p	
113	71	161	q	
114	72	162	r	
115	73	163	s	
116	74	164	t	
117	75	165	u	
118	76	166	v	
119	77	167	w	
120	78	170	x	
121	79	171	y	
122	7a	172	z	
123	7b	173	{	
124	7c	174		
125	7d	175	}	
126	7e	176	~	
127	7f	177	DEL	

## 12. Terminology

Term	Explanation
U8 devices	Any device in the U8 sub-series. E.g. U8C, U8C-EXT, U8S, U8S-EXT
U16 devices	Any device in the U16 sub-series. E.g. U16C, U16S Spade
VCP	Virtual COM port
/dev/	Devices directory on Linux® and macOS®
IC	Integrated Circuit
PWM	Pulse width modulation. The duty cycle is the percent of time the PWM is in the high (active) state
Sync mode	Synchronisation mode (hub provides USB connection to host computer)
Port	USB socket on the front of hub that is used to connect mobile devices.
MSB	Most significant bit
LSB	Least significant bit
Internal hub	Non-Volatile RAM

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