

# ThunderSync5-C16-PD

## User Manual



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## 2. Introduction

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The ThunderSync5-C16-PD has been designed to provide high-speed data transfer to USB compliant devices and expand the endpoint limits.

The ThunderSync5-C16-PD can charge attached USB devices without using a local computer. The ThunderSync5-C16-PD allows any USB compliant device to be charged at its optimum rate (up to 3A). The firmware can be updated to ensure the ThunderSync5-C16-PD can manage the latest devices. It is ready to charge out-of-the-box and sync devices when attached to a host computer.

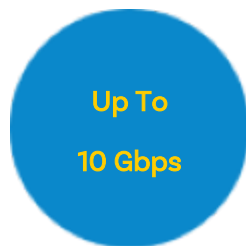
When a local (host) computer is attached, the host can control the operation of each port using software provided by Cambrionix. Device charging and synchronisation can be

monitored through Cambrionix's Connect Application, the Application Programming Interface (API) or Command Line Interface (CLI). Cambrionix's monitoring and control software can be downloaded from <https://www.cambrionix.com/software>

The ThunderSync5-C16-PD includes a Thunderbolt™ 5 connection to the host. It supports speeds of up to 10 Gbps for devices capable of SuperSpeed USB operation. It also delivers up to 480 Mbps for devices that support Hi-Speed USB.

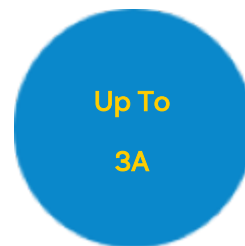
### 2.1. Key Features

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#### Transfer Data Seamlessly

Each high-speed port can transfer data up to 10 Gbps



#### Power


Each port can charge devices up to 3 A at 60 (W)

## 3. Safety

This user manual is for informational purposes only, it contains information for the start-up and operation of this product. Note: the contents and the product described are subject to change without notice. To avoid injuries and damage, observe the safety instructions in the user manual.

This manual has been arranged to follow the IEC/ICEE 82079-1 standard. This is to facilitate the easier understanding and location of information relating to the ThunderSync5-C16-PD. Any errors or omissions can be reported using our support ticket system (see [Help and Support](#)). This way, any issues that are discovered can be acted on quickly and we can update the documentation to reflect this.

Understanding and observing the instructions in this user manual are prerequisites for hazard-free use and safety during operation. This user manual cannot cover all possible applications. If you would like additional information or if problems arise that are not sufficiently addressed in this manual, please ask your distributor or contact us directly using the means preferred, which are located on the back cover of this manual.

	<b>⚠ CAUTION</b>
	<p style="text-align: center; color: blue;"><b>Personal Injury and Damage to the product</b></p> <p style="text-align: center;">Always observe the safety instructions in this user manual</p>


### 3.1. Signal word panel

Depending on the probability of serious consequences, potential dangers are identified with a signal word, the corresponding safety colour, and if appropriate, the safety alert symbol.

<b>⚠ CAUTION</b>
<p style="text-align: center;">Indicates a potentially hazardous situation that, if not avoided, may result in moderate or minor (reversible) injury.</p>



<b>CAUTION</b>
<p style="text-align: center;">Indicates a potentially hazardous situation which, if not avoided, may result in damage to the product and its functions, or to property in its proximity.</p>



## 3.2. Safety alert symbol

	<p>Use of the safety alert symbol indicates a risk of injury.</p> <p>Observe all measures that are marked with the safety alert symbol in order to avoid injury</p>
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## 3.3. Pictograms


These symbols will be used throughout this documentation to alert to any potential dangers or any actions that must be taken.


Warning Signs	
 <p>Electrical hazard</p>	 <p>Fire Hazard</p>


Mandatory action signs	
 <p>Read operating instructions</p>	 <p>Mandatory regulation</p>

## 3.4. Product modification

Cambrionix products are designed and manufactured to meet the requirements of UK and international safety regulations. Modifications to the product could affect safety and render the product non-compliant with relevant safety standards, resulting in injury or damage to the product.


	<b>⚠ CAUTION</b>
	<p style="text-align: center; color: blue;"><b>An electric shock or personal injury may occur</b></p> <p style="text-align: center;">Do not modify the product in any way.</p> <p style="text-align: center;">Do not dismantle the product.</p>


	<b>⚠ CAUTION</b>
	<p style="text-align: center; color: blue;"><b>Fire, or personal injury may occur</b></p> <p style="text-align: center;">Do not obstruct air vents on the product.</p> <p style="text-align: center;">Do not cover the product in or place near combustible material.</p>

	<b>CAUTION</b>
	<p style="text-align: center; color: blue;"><b>Damage to your product may occur</b></p> <p style="text-align: center;">Do not bend or compress any part of the product.</p>

### 3.5. Power supply


This section describes the safety precautions you must follow when using the external power supply.


	<b>⚠ CAUTION</b>
	<p style="text-align: center; color: blue;"><b>An electric shock or personal injury may occur</b></p> <p style="text-align: center;">Do not use a damaged power cord or plug, or a loose power socket.</p> <p style="text-align: center;">Do not touch the power plug with wet hands.</p> <p style="text-align: center;">Do not allow liquids to come into contact with the unit or power supply.</p>


	CAUTION
	<p><b>Damage to your product may occur</b></p> <p>Do not short circuit the Power Supply Unit (PSU) supplied with your product.</p> <p>Do not disconnect the power cord while the product is being used.</p> <p>Do not bend or pull the power cord with excessive force.</p> <p>Do not use a power supply that exceeds the power supply specifications within this manual</p>


### 3.6. Storage and Installation

This section describes safety precautions you must follow when installing and storing your ThunderSync5-C16-PD.

	⚠ CAUTION
	<p><b>An electric shock or personal injury may occur</b></p> <p>Do not place the power cord near heat sources.</p> <p>Connect the plug only to an earthed socket.</p>


	CAUTION
	<p><b>Damage to your Cambrionix product may occur</b></p> <p>Operate the product only in an environment where the ambient temperature is inside the operating temperature range.</p> <p>Operate the product only in an environment where the relative humidity is inside the operating range.</p> <p>Be careful not to leave the power cord underneath a heavy object.</p>

	<b>⚠ CAUTION</b>
	<p style="text-align: center; color: blue;"><b>Overheated power sockets may cause a fire</b></p> <p>Do not overload the power socket that your hub is connected to. Insert the power plug all the way into the socket so that it is not loose.</p>

	<b>CAUTION</b>
	<p style="text-align: center; color: blue;"><b>Overloading the brackets may cause failure</b></p> <p>The rack brackets for all our products are not designed to be used in a mobile application, bracket failure could occur if the units are not supported fully e.g Shock during road transport.</p>

### 3.7. Cleaning your ThunderSync5-C16-PD

Cleaning the product is generally not required, although in some instances it may be necessary if excess dirt/ dust/ hair has accumulated, or if minor liquid spillages have occurred on the module during operation or storage.

	<b>⚠ CAUTION</b>
	<p style="text-align: center; color: blue;"><b>Electric shock or personal injury may occur</b></p> <p style="text-align: center;">If there is a dirt/ spillage over a ventilation slot, external data/ power connector or product aperture, please remove power from the unit without touching the liquid and seek advise before reapplying power</p>

- Ensure that the product is switched off and the power cord is removed from the product. Hold the power cable by the plug and do not touch either the plug or the power cord with wet or damp hands as an electrical shock may result
- Wipe the product with a clean, dry and soft cloth. Do not use detergents which contain alcohol, solvent or surface-active agents. Do not spray water or detergent directly onto the product
- Mildly dampen a soft and dry cloth in water and wring thoroughly to clean the product as required
- Dry the product thoroughly once the cleaning has finished
- Reconnect the power cord and use your product as advised once cleaning is complete

## 4. Getting Started


This manual provides a reference for end-users installing for the first time and using their hub afterwards. As well as a guide for product safety-related information.

The ThunderSync5-C16-PD is intended to be used in an indoor static environment in which the environment falls within the tested specifications to provide charge, sync and management functionality. Please see the [Product Specifications](#) section of this manual for information on the environment specifications.

### 4.1. Unpacking your product

When you have received your product, please check the packing slip inside the box to ensure all contents and quantities are correct before opening. This is to avoid retesting and repackaging any items that are not required.

When opening the packaging, use a suitable method to open the box i.e, do not use a knife. This is to ensure the product is not damaged.

	<b>⚠ CAUTION</b>
	<p style="text-align: center; color: blue;"><b>Personal Injury and Damage to the product</b></p> <p style="text-align: center;">There will be a label on the hub advising you to read the User manual before use. This will need to be removed before use as it may be covering host ports, vents etc.</p>

### 4.2. What's Included

- Thunderbolt™ 5 Cable (to provide communication between the host system and hub)
- ThunderSync5-C16-PD Hub
- 2m Mains power cable (Country specified on order including fuse for the UK plugs)
- Power Supply Unit

### 4.3. Consumables and Placing Orders

If you require any spare parts, such as cables, these can be ordered by quoting the product part number listed in the [Product Specifications](#).

These can be ordered from the reseller or solution partner you purchased your ThunderSync5-C16-PD from, or from Cambrionix directly.



To find one of our partners local to you please visit [www.cambrionix.com/about-cambrionix/partners-distributors](http://www.cambrionix.com/about-cambrionix/partners-distributors) where you can learn about the local vendors and distributors that can assist you and find their contact information.

## 4.4. Connecting to the mains

Connect the Power Supply Unit (PSU) to the hub using the Molex Mini Fit 6 pin plug. Connect the power cable to the PSU. Making sure you adhere to local safety regulations, connect the power cable to the 100 – 250 VAC mains power outlet and switch the hub on using. When the device is switched on, a LED next to the power input will be illuminated. The hub is now ready to charge attached devices.

## 4.5. Connecting to a Host

Throughout this manual we will refer to a "host system" this is the system you will be using to connect and control your devices and hubs. This could be any host system such as a Windows PC, macOS system or Linux PC.

Once the power is connected, connect the ThunderSync5-C16-PD to your host system using a Thunderbolt™ 5 cable, one of these is supplied with your hub and we recommend using this cable to connect with. If your host system does not have a matching port to the cable supplied still use the cable, but also use an adaptor cable to finish the connection at your host. Using an incorrect host cable may result in the hub and all subsequent ports not being recognised by your host.

In order for the ThunderSync5-C16-PD to connect to the host system the host will require a Thunderbolt™ connection, this can be checked easily if you look at the port it has the Thunderbolt™ logo. If your host system does not have a Thunderbolt™ connection natively it is possible to add a Thunderbolt™ port by using an expansion card. Not all host systems will allow a Thunderbolt™ add-in card and it is recommended that you check the requirements of the particular add in card for your host. Some basic requirements for the add in card are;

- Thunderbolt Header on the Motherboard
- Available PCIe slot
- Space for the card to sit inside the casing, including a gap for the port to be accessed from

Cambrionix recommend using the Thunderbolt™ cable that is provided with our ThunderSync5-C16-PD. If you are looking at purchasing your own cable, to achieve 80 Gbps a suitable cable would be either:

- up to 0.8m passive
- up to 2m active.

The difference between active and passive is that active cables have internal signal-boosting electronics, whereas passive cables do not.

A Thunderbolt™ 5 cable is fully backwards compatible and can be used with older generations of Thunderbolt™ ports on your computer. When connected to a host device with an earlier Thunderbolt™ version, data transfer speeds will automatically adjust to match the maximum supported speed of the host. You can also use a Thunderbolt™ 2 cable with a Thunderbolt™ 2-to-5 adapter, though speeds will be further reduced based on the older connection standard.

Cambrionix recommend using cables certified by Intel®, all cables marked with the Thunderbolt™ logo should have certification.

Only one host can be connected to a hub at one time, and only one cable will be required to connect to the host system.

Please note that USB specifications require a minimum 100 mA charge current to be available during data transfer. As indicated in above, if the attached device has a BC1.2 compliant CDP port, the device can draw up to 3A whilst transferring data.

## 4.6. Connecting devices to your ThunderSync5-C16-PD

Throughout this manual we will refer to "devices" this relates to the device you are connecting to the ThunderSync5-C16-PD this could be any USB device such as a phone, tablet, USB drive or any other USB connected device.

Once you have your hub setup the next thing is to connect your devices to start using the ThunderSync5-C16-PD. We would always recommend using the OEM cable supplied by the manufacturer of the device, so whatever cable is provided with the device use that cable to connect to the hub.

If your device has a USB plug (male connector) on it already then you can connect the device directly into the hub.

If the cable (or plug fitted to device) is not the same USB type as the socket (female connectors) on the ThunderSync5-C16-PD then you will require an adaptor or a different cable.

### Cables

Some USB cables are data transfer only, and some are power delivery only. There are also options that can handle both tasks. Be sure to verify a cable's abilities before purchasing it and select a cable which can handle the speeds and power transfer that you require.

## 4.7. Charging

Your ThunderSync5-C16-PD will allow your device to charge at the maximum rate possible up to 3A. The way that charging takes place is the ThunderSync5-C16-PD will provide the device with

a capability to charge and the devices USB charging controller will determine the maximum amount of charge it wants to draw down.

Although a maximum charge rate of 3A is possible, the device itself determines the exact rate and as such you may not see the maximum amount of charging on every device type that is connected.

## 4.8. Registration

You may register your product at [www.cambrionix.com/product-registration](http://www.cambrionix.com/product-registration)

## 4.9. Help and Support

FAQs and help can be found on the Help page here

- [https://www.cambrionix.com/help\\_pages/help](https://www.cambrionix.com/help_pages/help).

You can raise a support ticket for more in depth support here

- <https://support.cambrionix.com>

You can also download any of our manuals and keep up to date at the link here

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

When contacting support, please supply the product information for the hub in question. This can be found on the Device Information Plate which is either on the underside or back of the unit.

Providing serial and Purchase order numbers, can help identify your specific product and speed up the process.

## 5. Using your Cambrionix Hub

This section provides guidance on using your hub effectively, either in charge-only or sync-and-charge applications. You will also find detailed information on managing your hub, adjusting port modes, connecting multiple hubs to a single host, and utilising Cambrionix Software for enhanced functionality.

### 5.0.1 Port LED States

Your ThunderSync5-C16-PD has inbuilt LEDs used to show the state of the ports, devices and the power state. These LEDs can be configured to support your use case; this can be controlled either by using the API to send commands directly or through separate software. When the hub is powered on all the available LED's will flash once and then revert to the default behaviour mentioned below.

Colour	Behaviour
Solid Green	The device is connected, the port is on, and the device is fully charged.
Pulsing Green	The device is connected, the port is on, and the device is charging.
Yellow	Hub is resetting
Red	Fatal error
LED Off	No Device is detected

Table 5-1

### 5.0.2 Fan Behaviour

Your ThunderSync5-C16-PD has an inbuilt fan used to cool the product when internal temperatures rise above a set threshold. On power up the fan will spin for approximately a second before turning off. For more information on the temperatures that trigger the fan please see the fan properties section in the [Hub Specifications](#).

When looking into the specifications you will see five different temperatures relating to fan speed and temperatures some information on how this relates to your product please see below table:

Start Temperature (°C)	The Temperature at which the fan will initially turn on
50% Speed Start Temperature (°C)	The Temperature at which the fan will increase to 50% speed
Max Airflow Temperature (°C)	The Temperature at which the fan will increase to 100% speed
Drop to 50% Speed Temperature (°C)	The Temperature at which the fan will decrease to 50% speed
Stop Temperature (°C)	The Temperature at which the fan will turn off

## 5.1. Using Without Connecting to a Host

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When the hub is powered on and not connected to a local host computer, it automatically switches to charging mode using its intelligent charging algorithm. Simply connect your devices to any available port (excluding the Host Port) using USB-compliant cables to begin charging.

Once the devices are connected, the algorithm will detect the highest charge rate allowable for each attached device. Charging at the optimum rate (up to 3A) specified by the manufacturer will commence once profiling is complete. Depending on the state of charge of the device attached, this may take tens of seconds.

## 5.2. Using When Connected to a Host

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### 5.2.1 Connecting the Hub to a host computer

You must use the Thunderbolt™ host port numbered '1' which is the closest connector to the power supply input on the rear of the hub to connect to your host system. There are two ports on the rear, one port to connect the host and the other port to daisy chain hubs.

Connect the ThunderSync5-C16-PD to your host system using a Thunderbolt™ 5 cable. Using an incorrect host cable may result in the hub and all subsequent ports not being recognised by your host. You can use an optical cable to connect to your host as the ThunderSync5-C16-PD is self powered. Thunderbolt™ 5 cables are backwards compatible to Thunderbolt™ 3 connections.

The ThunderSync5-C16-PD must be connected physically to a host in order to communicate with the hub and devices. If you wish to connect to a hub remotely (not on the physical host it is connected to) it will still need to be connected to a host and have access to the Cambrionix Hub API which can then be connected to if the relevant steps have been taken, more information on remote access can be seen in the Cambrionix Hub API user manual, which can be viewed from the website. <https://www.cambrionix.com/cambrionix-api>

### 5.2.2 Authorising Thunderbolt™ hubs on Linux®

With Linux® systems, it is necessary to authorise/enrol the ThunderSync5-C16-PD before it connects.

To do this, you will need to use "boltctl," which is used to control the Thunderbolt™ device manager. "boltctl" is the command-line interface to interact with boltctl, the system daemon that manages Thunderbolt™ 3™ devices. Using "boltctl", input the following commands to authorise and enrol your ThunderSync5-C16-PD.

Some useful information on this can be found at the following link.

<https://manpages.ubuntu.com/manpages/focal/en/man1/boltctl.1.html>

## power [-t | --timeout seconds]

Power up the Thunderbolt™ controller. If the Thunderbolt™ controller is not in "native enumeration mode", it can be completely powered down by the host firmware/BIOS. On supported systems, there is an interface to "force" power the Thunderbolt™ controller. If supported, this command will request the daemon to do so. The daemon will keep track of all client requests and will release the force power override when the last request is released.

## authorize DEVICE

Authorize a currently unauthorized device identified via its unique id (uuid) DEVICE. If a key is stored in the database, it will be used, given the security level of the domain supports secure device connection. Use boltctl list to find out the uuid of a device.

## enrol [--policy default] DEVICE

Authorize and record the device with the unique id DEVICE in the database. If the domain supports a secure connection a new key will be generated and stored in the database alongside the device and vendor name. The key, if created, will be used in the future to authorize the device securely.

### 5.2.3 Charging

When the Host Port is connected to a local computer, the hub defaults to Sync mode and charge currents are determined according to USB Implementers Forum (USBIF) specifications. If the attached device complies with USB-IF Battery Charging specification BC1.2 and supports Charging Downstream Port (CDP), the hub can provide high-speed charging. Information on the different charging levels can be found in the [Port Specifications](#) section.

The ThunderSync5-C16 is equipped with Power Delivery (PD) technology, specifically compliant with the PD 3.0 standard. However, it is important to note that this product does not support Quick Charge (QC) functionality. This means that while it can efficiently deliver power based on PD 3.0 specifications, it is not compatible with QC fast-charging protocols commonly used by certain devices.

### 5.2.4 Data Transfer

If you wish to transfer data, change applications, restore or update your mobile device, a data connection to a local host computer is required. The Cambrionix Hub API and software is compatible with macOS®, Windows™ and Linux® operating systems and can transfer data between these operating systems and many mobile operating systems such as iOS™ and Android™. In order to transfer data, connect the host port to your local (host) computer using a Thunderbolt™ 5 compliant cable. Any devices connected to the hub will now appear as if they were connected to the host computer's USB port.

## 5.2.5 Communication Interface and Protocol

The ThunderSync5-C16-PD appears as a virtual COM port (VCP). On Microsoft Windows™, the system will appear as a COM port, the COM port number can be found in device manager. On macOS®, a device file is created in the / directory. S is an alpha-numeric serial string unique to each device

```
/dev/tty.usbserial S
```

Devices incorporate a USB to UART converter IC from FTDI International. 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, or if a Mac® or Linux® platform is used, the driver may 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.

The default communications settings are as below, ANSI terminal emulation should be selected.

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

Table 5-2

## 5.3. Managing Ports & Your ThunderSync5-C16-PD

Each port on your ThunderSync5-C16-PD can be managed either individually, or all together. You can turn the ports off and on, change the port mode, or change various other settings applicable to the ThunderSync5-C16-PD more information can be found in the [Cambrionix Connect](#) section under Internal hub settings. This can be done through Cambrionix Connect, the CLI or by connecting to the hub via the API.

### 5.3.1 Port Modes

Sync	Turn specific ports or the whole hub to sync mode
Off	Turn specific ports on or off or switch the whole hub on or off (no power and no data channels open, mimics unplugging the device)

Table 5-3

### 5.3.2 Switching port modes

You can switch between port modes by using Cambrionix Connect, the CLI or by connecting to the hub via the API. If you switch a port off then this will stop any connection taking place to the USB device and would mimic unplugging the USB device completely from the host system.

### 5.3.3 Charging Profiles

To ensure attached devices charge at their optimum rate, our smart USB hubs come with the below intelligent charging profiles built in:

1	900mA
2	1.5A
3	3A

Table 5-4

### 5.3.4 Firmware

The firmware can be kept up to date using our Cambrionix Connect software. As part of delivering an easy user experience, our Cambrionix Connect application is now a set-and-forget solution. The Cambrionix Connect application will discover your USB hub’s firmware and present an update for you.

To update the firmware, first, go to the firmware section of Cambrionix Connect. Here you can see the available Firmware versions to install to the hub.



The current firmware version on the hub is displayed in the firmware section alongside the hub's name. This will appear red if a newer version is available or green if it is the most up to date.

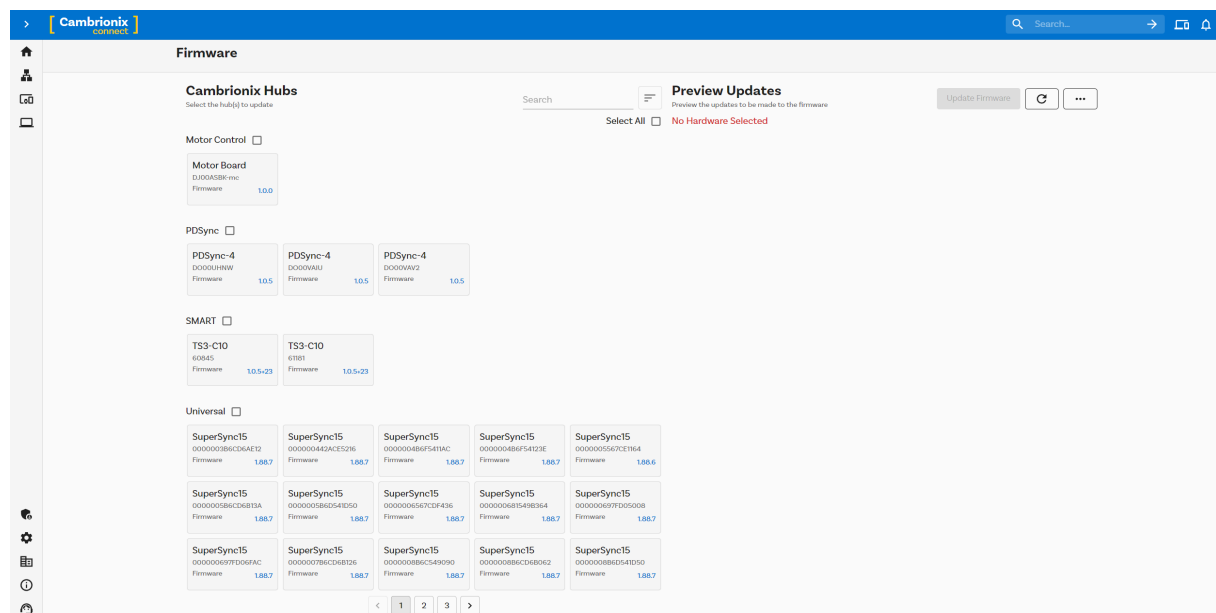




Figure 5.1

To install the firmware onto the hub click the hub(s) connected that you want to update, the latest firmware will be automatically selected, if you wish to change the firmware version you are updating to then this can also be done. Once selected press the update button at the top and the update will commence.

If you are running in an offline environment then there are other ways to update the firmware on your hub. One way would be to use the Command Line Updater, this can be downloaded from our website along with the user manual from the following link [cambrionix.com/cambrionix-clu](https://cambrionix.com/cambrionix-clu).

An alternative would be to download the firmware file and manually add this to the Hub API there is more information in the Cambrionix Hub API user manual which can be downloaded from the following link [cambrionix.com/cambrionix-api](https://cambrionix.com/cambrionix-api).

	<b>CAUTION</b>
	<p style="text-align: center; color: blue; font-weight: bold;">Your Hub may not function correctly</p> <p style="text-align: center;">Do not downgrade firmware onto a new product</p>

	<b>CAUTION</b>
	<p><b>Your Cambrionix Firmware may get corrupted</b></p> <p>Do not interrupt the Firmware update process.</p> <p>Do not disconnect the power during the update process.</p>

<b>CAUTION</b>
<p><b>A new version may be available</b></p> <p>Ensure you have the latest version of Firmware installed on your hub. These updates will often contain new features, fixes for bugs and performance improvements</p>

## 6. Power Management

---

The ThunderSync5-C16-PD hub supports Power Delivery (PD) charging across multiple ports, providing flexible power distribution for connected devices. By default, all ports are set to a 60W limit, but this can be adjusted using the Command Line Interface (CLI), API, or the Cambrionix Connect application. Detailed instructions on how to modify these settings can be found in the relevant user manual.

The hub's firmware is designed to intelligently distribute power while ensuring that every connected port receives at least 4.5W. When a port is assigned a higher power profile, such as 60W or 45W, the system will allocate the maximum available power only after reserving a minimum of 4.5W for all unoccupied or lower-power ports. The total available power is dynamically managed, ensuring optimal distribution without exceeding the hub's overall capacity. If multiple high-power devices are connected simultaneously, the firmware will adjust allocations based on availability, ensuring that no port falls below the 4.5W threshold.

This adaptive power management feature ensures efficient and reliable charging for multiple devices, making the ThunderSync5-C16-PD an ideal solution for high-performance, multi-device environments.

The Power limits that can be set are:

- 4.5W
- 15W
- 27W
- 36W
- 45W
- 60W

## 7. Software

---

Cambrionix provides interfaces by which the Hub can be monitored and managed:

- Cambrionix Connect
- Cambrionix Hub API
- Command Line Instructions

Cambrionix connect will use the Cambrionix Hub API to interact with the hub through a user-friendly application. The API can be used to provide other protocols that send translated string commands. The Hub uses string commands to communicate with the host system. These can be sent via the virtual serial port directly. If another piece of software is accessing the virtual serial port that the hubs is connected through the API will not be able to communicate with the hub.

There are different channels for both our Cambrionix Connect application and the API. The channels are Beta and Release. We would recommend using the release version of both the API and Cambrionix Connect.

We will push bug fixes and updates through Beta before it is merged into the Release version. If you have found a bug that we have a fix for, the Beta releases may already have addressed these and implemented fixes.

### 7.0.1 Installing Software

Cambrionix has software that can be used to manage the devices and your hub using different host systems. This section has instructions and information on using our software on three of the most popular host systems.

Our software is available to download from <https://www.cambrionix.com/software>, you will find software available for Windows™, Mac® and Linux® Systems.

Linux® OS systems tested with our software are Ubuntu 20.04 LTS or Debian 9; some other OS versions based on the two mentioned will work. Some different Linux® OS versions may work, but we dont test against other distributions.

To install on Mac® and Windows™ systems, download the install files from the above link, once downloaded run the install process and dialogue boxes will help you through installation and initial set-up.


For Linux® systems, download the Applmage file from the website at the above link. Once downloaded, you will need to make the file executable. This can be done by selecting the Applmage file, go to Properties > Permissions, and check the option to allow it to be executed as a program, or by making it executable via terminal `sudo chmod +x Connect(version-number).Applmage`once the file is executable run the Applmage by double-clicking it in your file manager or executing it from the terminal

## 7.0.2 Cambrionix Connect

Cambrionix Connect is an application that can be run from a browser by visiting <https://connect.cambrionix.com> or it can be downloaded from <https://www.cambrionix.com/connect>. Cambrionix Connect allows you to switch the ports on and off and set the port mode. Cambrionix Connect's home page shows the hubs available, by selecting a hub you can obtain the following information about all the ports:

- Status (Attached/disconnected)
- Mode (Charge/Sync/Off)
- Profile (Charging profile)
- Duration (How long the device has been attached)
- End time (Time the battery reaches a threshold (full) level)
- Current (Quick charge current in mA)
- Energy (Present energy rate)

Tick boxes adjacent to each port symbol allow that port mode to be changed when the "enable port controls" is selected. Cambrionix Connect shows the hub rail voltages, time since switched on, total current and power, and temperature. Further details on Cambrionix Connect are available on our website. <https://www.cambrionix.com/connect>

	<b>CAUTION</b>
	<p style="text-align: center; color: blue;"><b>A new version may be available</b></p> <p>Ensure you have the latest version of Cambrionix Connect installed on your host system. These updates will often contain new features, fixes for bugs and performance improvements</p>

## 7.0.3 Internal Hub Settings

Within your hub, there are some specific controllable settings called 'internal hub settings'. These are a variety of different settings for your ThunderSync5-C16-PD.

You can navigate to the Internal hub settings by opening Cambrionix Connect and selecting the hub you want to connect to. Once you have chosen the connected hub, navigate to the below icon on the top right of the screen from Cambrionix Connect



Figure 7.1

Once you have pressed this you will be taken to the Internal hub settings section where you can view and change the Internal hub settings, including reverting back to default factory settings.


Setting name	Description	Default value
Local Name	Optional, "Local Name", set by the user. Limit of 31 characters. This name will appear in the device's system information if set.	Empty
Attach Threshold (mA)	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	10
Flags	Change various flags	None selected
Stagger Delay (ms)	Introduce a delay between ports turning on when either host is detected or mode is switched to Sync. 0-9999ms	3000
Stagger Offset (ms)	An additional delay to add before starting the staggered process. 0-9999ms	0

Table 7-1

There is more information on the Internal hub settings and how to manage them in our CLI manual. which can be found at the link [here](#).

## 7.0.4 Cambrionix Hub API

The Cambrionix Hub API allows you to monitor and control each port in detail and to integrate these functions into your own workflow processes. The API comprises a daemon (which is a program running in the background) that can be downloaded from <https://www.cambrionix.com/cambrionix-api> and installed on the host machine. Port information and control can be provided through the API. Calls are sent as a request to the API to "Get" port, device or Hub information, or "Set" port functions. A library of sample code is downloaded along with the API from the following link <https://www.cambrionix.com/cambrionix-api> and can be found within the program files under 'examples'. These can help you integrate many of these functions into your process work-flow alongside the complete user manual.

	<b>CAUTION</b>
	<p><b>A new version may be available</b></p> <p>Ensure you have the latest version of API installed on your host system. These updates will often contain new features, fixes for bugs and performance improvements</p>

## 7.0.5 Updating Software

By using Cambrionix Connect you will be able to automatically download and install the most up to date software (Cambrionix Connect and the Cambrionix Hub API)

By going into the settings section on the left-hand side of Cambrionix Connect, you can navigate to the general tab, and under this can see the options for keeping both Cambrionix Connect and the API up to date.

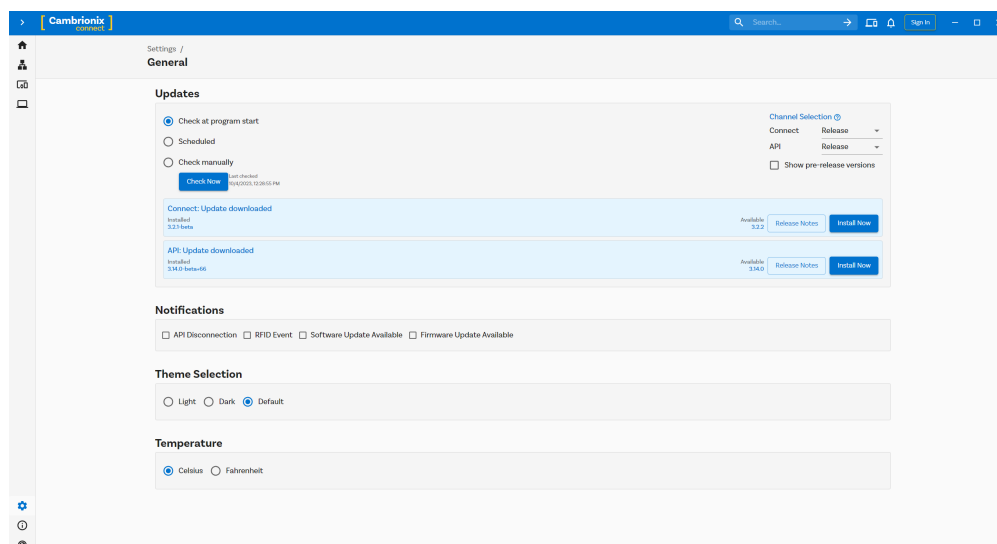


Figure 7.2

By default Cambrionix Connect will check for updates regularly or, if you prefer, you can change to a manual update selection. You can also select which version of the software you would like to use between the Beta or Release options. You can also select historic versions of the API and Cambrionix Connect to install.

When you have some software updates available, you can select install now to begin the installation process; a progress bar will appear to show the installation status. From this bar, you can also view the release notes for the version of the software you are looking at.

## 7.0.6 Removing Software

If you wish to uninstall the software (Cambrionix Connect, Cambrionix Hub API and the Cambrionix Recorder Service) from your host system, the following steps can do this.

### Windows™

To remove the software from a Windows™ system, you can do so by going into "Add or remove programs" finding the software you wish to remove, selecting it and pressing "uninstall"

### macOS®

To remove the software from a macOS® system, locate the application in the Finder, drag the application to the Trash, or select the application and choose File > Move to Trash. You may be asked to enter the name and password of an administrator account on your Mac®. Then to completely delete the application, choose Finder > Empty Trash.

Alternatively, use the below instructions.

```
sudo /Library/Cambrionix/ApiService/bin/CambrionixApiService --remove
sudo /Library/Cambrionix/ApiService/bin/CambrionixRecorderService --remove
```

### Linux®

To remove software on Linux® there are two options.

The first is to use the Software centre, then either the list of installed applications or the search bar to find the software you wish to remove. Once you have selected the application, click on the remove button and you will be prompted for a password, enter the password and the software will be removed.

The second way you can remove software is by using the command line. All you need to do is to use the command in the following fashion:

```
sudo apt remove program_name
```

Table 7-2

Variable	Description
<i>program_name</i>	The file name of the program including any version numbers



You'll be asked to enter your account password. When you enter it, nothing is visible on the screen. You will need to confirm removal, it will ask for your confirmation, press the enter key or Y key: Keep in mind that you'll have to use the exact package name in the apt remove command otherwise, it will show 'unable to locate package error'. You can type the first few letters of the program you want to uninstall, and then hit the tab key. It will show all the installed packages that match those letters at the beginning of their names.

### 7.0.7 Command Line Instructions (CLI)

Command Line Instructions can be used to control and monitor the functions of the hub and attached devices. To use the command-line interface a serial terminal emulator must be installed on the host computer. Examples include PuTTY, Serial, ZTerm, and Minicom. If you would like more information, please look at our more in-depth information here:

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

Two example commands can be seen below, you can use these commands to check hub information and health.

Command	Action
system	Show hardware and firmware information
health	Show voltages, temperatures, errors and boot flag

Table 7-3

## 8. Product Specifications

### 8.1. Features

TS5-C16-PD Features	
19-inch Rack Mountable	no
Dedicated control port	no
Fan Assisted Cooling	yes
Selective upstream port	no
Internal Temperature Monitoring	yes
Indicator LED	yes
User Replaceable Fuse	no
Internal Battery	no

Table 8-1

USB Downstream Port Features	
Configurable enumeration delay	yes
USB BC 1.2 Support	yes
USB Type-C Rev 1.3 Support	yes
USB Power Delivery 2.0 Support	yes
USB Power Delivery 3.0 Support	yes
Independent Hi-Speed Enable and Disable	no
Independent SuperSpeed Enable and Disable	no
Individual Enable and Disable	no
Individual port voltage measurement, Vbus	yes
Individual port current measurement, Vbus	yes
Individual CC voltage measurement, Vconn	no
Individual CC current measurement, Vconn	no
Link speed detection	no
Programmable port current limits	no
RGB Indicator LEDs	yes
Individual Colour Indicator LEDs	no

Table 8-2

### 8.2. TS5-C16-PD Specifications

TS5-C16-PD Properties					
Colour	Nom	Black		Number of USB Upstream Ports	Nom -
Control Port Connector Type	Nom	-		Number of USB Upstream Ports	Nom -
Dimensions Depth (mm)	Nom	124		Number of USB2 Type-A Downstream Ports	Nom -
Dimensions Height (mm)	Nom	30		Number of USB2 Type-A Expansion Ports	Nom -
Dimensions Width (mm)	Nom	306		Number of USB2 Type-A Upstream Ports	Nom -
Downstream Connector Type	Nom	Type-C		Number of USB2 Type-B Upstream Ports	Nom -
Electrostatic Discharge, air (kV)	Max	-		Number of USB2 Type-C Downstream Ports	Nom -
Electrostatic Discharge, Vesd (kV)	Max	-		Number of USB2 Type-C Expansion Ports	Nom -
Enclosure Material	Nom	Steel		Number of USB2 Type-C Upstream Ports	Nom -

TS5-C16-PD Properties					
Expansion Connector Type	Nom	Thunderbolt™ 5	Number of USB3 Type-A Downstream Ports	Nom	-
Form Factor	Nom	Desktop	Number of USB3 Type-A Expansion Ports	Nom	-
Fuse Type	Nom	-	Number of USB3 Type-A Upstream Ports	Nom	-
Host Connector Type	Nom	Thunderbolt™ 5	Number of USB3 Type-C Upstream Ports	Nom	-
Manufacturing Origin	Nom	UK	Output Power, Max (W)	Max	300
Mass (kg)	Nom	1.2	Part Number	Nom	200638
Model Number	Nom	TS5-C16-PD	Power Efficiency at maximum load (%)	Min	-
Number of Thunderbolt 3 Expansion Ports	Nom	-		Nom	-
Number of Thunderbolt 3 Upstream Ports	Nom	-		Max	-
Number of Thunderbolt 5 Upstream Ports	Nom	1	Power Type	Nom	DC
Number of Thunderbolt 5 Expansion Ports	Nom	1	Product Name	Nom	ThunderSync5-C16-PD
Number of USB Control Ports	Nom	-	Vbus Source Power (W)	Max	300
Number of USB Downstream Ports	Nom	16			
Number of USB Expansion Ports	Nom	-			

Table 8-3

TS5-C16-PD Environmental Properties		
Ambient Operating Temperature (°C)	Min	0
	Max	35
Relative Humidity Range (%)	Min	20
	Max	80
Storage Relative Humidity Range (%)	Min	5
	Max	95
Storage Temperature (°C)	Min	-20
	Max	60
Operating Altitude Max (m)	Max	2000

Table 8-4

Fan Properties		
Airflow (m3/hr)	Min	-
	Nom	-
	Max	9.8
Acoustic Noise (dB A)	Min	-
	Nom	-
	Max	41
Start Temperature (°C)	Nom	40
50% Speed Start Temperature (°C)	Nom	50
Max Airflow Temperature (°C)	Nom	60
Drop to 50% Speed Temperature (°C)	Nom	55
Drop to Minimum Fan Speed Temperature (°C)	Nom	45
Stop Temperature (°C)	Nom	35

### TS5-C16-PD Environmental Properties

### Fan Properties

Minimum Fan Speed (%)	Nom	50
Fan Diameter (mm)	Nom	54

Table 8-5

### Boxed Properties

Dimensions, Depth (cm)	Nom	17
Dimensions, Height (cm)	Nom	12
Dimensions, Width (cm)	Nom	39
Mass (kg)	Nom	2.5

Table 8-6

### Power LED Properties

Colour	Nom	RGB	LED Wavelength, Green (nm)	Min	-
Diameter (mm)	Nom	-		Nom	-
LED Wavelength, Red (nm)	Min	-		Max	-
	Nom	-	LED Wavelength, Blue (nm)	Min	-
	Max	-		Nom	-
Luminous Intensity (mcd)	Nom	-		Max	-

Table 8-7

## 8.3. Power Specifications

### TS5-C16-PD Power Input Properties

Connector Type	Nom	Molex Mini Fit 6 pin
Voltage, Vsupply (V)	Min	-
	Nom	24
	Max	-
Voltage Measurement Rate (Hz)	Nom	-
Voltage Measurement Accuracy, Vsupply (%FSR)	Nom	-
Power, Psupply (W)	Min	-
	Max	-

### AC Power Input Properties

Operating Current @ 115VAC (A)	Min	-
	Max	-
Operating Current @ 230VAC (A)	Min	-
	Max	-
Operating Voltage, Vsupply (VAC)	Min	100
	Max	240
Under Voltage Threshold (VAC)	Min	-
	Nom	-

TS5-C16-PD Power Input Properties		
Power, no devices attached (W)	Min	-
	Nom	-
	Max	-

Table 8-8

AC Power Input Properties		
Over Voltage Threshold (VAC)	Max	-
	Min	-
	Nom	-
	Max	-
Voltage Measurement Resolution, Vsupply (mVAC)	Nom	-
Frequency Range (Hz)	Min	50
	Max	60

Table 8-9

TS5-C16-PD DC Power Input Properties		
Under Voltage (V)	Min	-
	Nom	-
	Max	-
Current, Isupply (A)	Min	-
	Max	15
Over Voltage (V)	Min	-
	Nom	-
	Max	-
Voltage Measurement Resolution, Vsupply (mV)	Nom	-

Table 8-10

PSU Properties		
Dimensions, Depth (mm)	Nom	170
Dimensions, Height (mm)	Nom	40
Dimensions, Width (mm)	Nom	84
Input Connector Type	Nom	C14
Input Power Type	Nom	AC
Output Connector Type	Nom	Molex Mini Fit 6 pin
Output Power Max (W)	Max	360
Output Power Type	Nom	DC
Part Number	Nom	200656
Power Efficiency, at maximum load (%)	Min	-
	Nom	88
	Max	-

Table 8-11

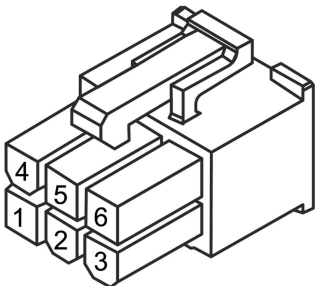
Power connection pin layout		
	Pin	Function
	1	+Vo
	2	+Vo
	3	+Vo
	4	-Vo
	5	-Vo
	6	-Vo

Table 8-12

\* -V is connected to AC input ground.

## 8.4. Port Specifications

USB Downstream Port Properties					
Short Circuit Detection Time (ms)	Max	-		Vbus Output Current, ALT CDP Mode (A)	Max -
Short Circuit Response Time (µs)	Max	-		Vbus Output Current, CDP Mode (A)	Max 3
USB D Logic Low Voltage (V)	Min	-		Vbus Output Current, DCP Mode (A)	Max 3
	Max	-		Vbus Output Current, SDP Mode (A)	Max 0.9
USB D Logic High Voltage (V)	Min	-		Vbus Output Power (W)	Max 60
	Max	-		Vbus Output Voltage (V)	Min 4.8
USB Hi-Speed Data Rate (Mbps)	Nom	480			Nom -
USB SuperSpeed Data Rate (Gbps)	Nom	10			Max 21
Vbus Current Measurement Accuracy (%FSR)	Min	-		Vbus Source Power (W)	Max -
	Max	-		Vbus Voltage Measurement Accuracy (%FSR)	Min -
Vbus Current Measurement Range (A)	Min	-			Max -
	Max	-		Vbus Voltage Measurement Range (V)	Min -
Vbus Current Measurement Rate (Hz)	Nom	-			Max -
Vbus Current Measurement Resolution (mA)	Nom	-		Vbus Voltage Measurement Rate (Hz)	Nom -
Vbus Current Setpoint Resolution (mA)	Nom	-		Vbus Voltage Measurement Resolution (mV)	Nom -
Vbus Output Current (A)	No	3		Vbus Voltage Ripple (mV)	Max -
				Vbus Voltage Setpoint Resolution (mV)	Nom -

Table 8-13

Table 8-14

Upstream Port Properties		
Vbus Input Current (mA)	Min	-
	Nom	
	Max	-
Vbus Input Power (W)	Min	-
	Nom	-
	Max	-
Vbus Input Voltage (V)	Min	-
	Nom	-
	Max	-
Connection speed (Gbps)	Nom	80

Indicator LED Properties		
LED Wavelength, Red (nm)	Min	-
	Nom	-
	Max	-
LED Wavelength, Green (nm)	Min	-
	Nom	-
	Max	-
LED Wavelength, Blue (nm)	Min	-
	Nom	-
	Max	-
Diameter (mm)	Nom	-
Luminous Intensity (mcd)	Nom	-

Table 8-15

USB Type-C Port Properties		
Vconn, Output Current (A)	Max	-

USB3 Downstream Port Properties		
USB SuperSpeed Data Rate (Gbps)	Max	-

USB Type-C Port Properties		
Vconn, Output Voltage (V)	Min	-
	Nom	-
	Max	-
Vconn, Output Voltage Ripple (mV)	Max	-

Table 8-16

USB3 Downstream Port Properties		
USB SS TX Logic Low Voltage (V)	Min	-
	Max	-
USB SS TX/RX Logic High Voltage (V)	Min	-
	Max	-

Table 8-17

## Ports Lifetime

Standard USB connections have a minimum rated lifetime of 1,500 cycles of insertion and removal. USB-C receptacles have a minimum rated lifetime of 10,000 cycles of insertion and removal. This is an industry-standard.

One thing you can do to prolong the lifetime of the ports on your ThunderSync5-C16-PD is to use "sacrificial cables" in between the hub and your charging cables so when you repeatedly connect/ disconnect you are only going to wear the cables rather than the hub.

## 8.5. Drawings

### 8.5.1 ThunderSync5-C16-PD

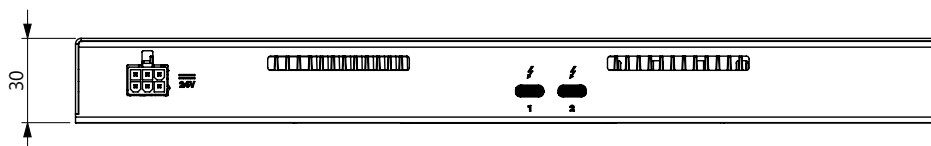


Figure 8.1

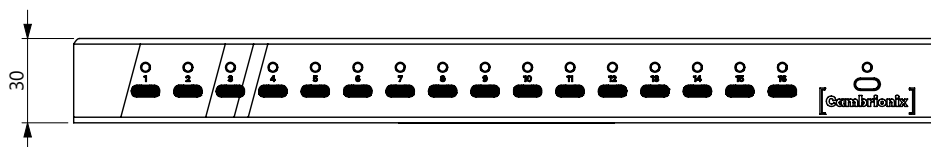


Figure 8.2

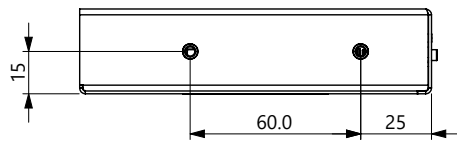


Figure 8.3

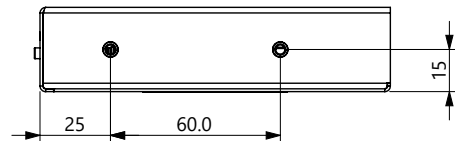


Figure 8.4

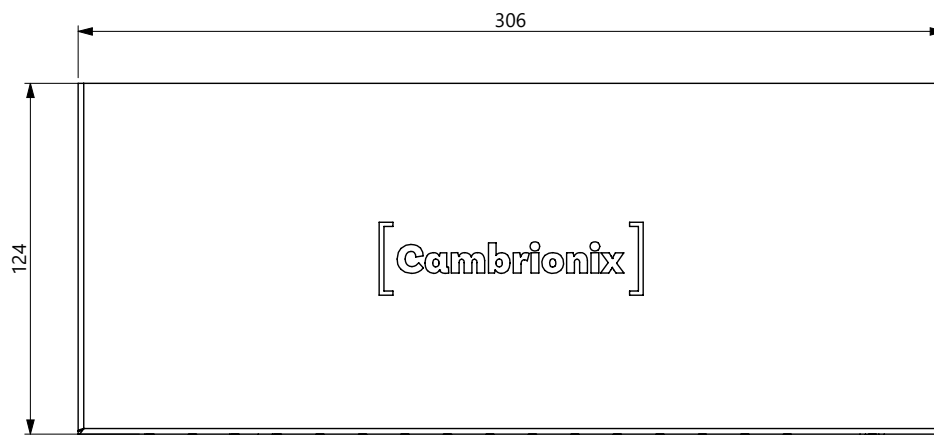


Figure 8.5

## 8.6. Hub Architecture

Below is a diagram of the internal architecture for the ThunderSync5-C16-PD.

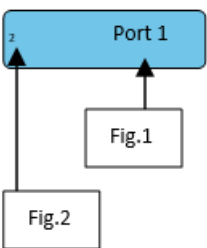
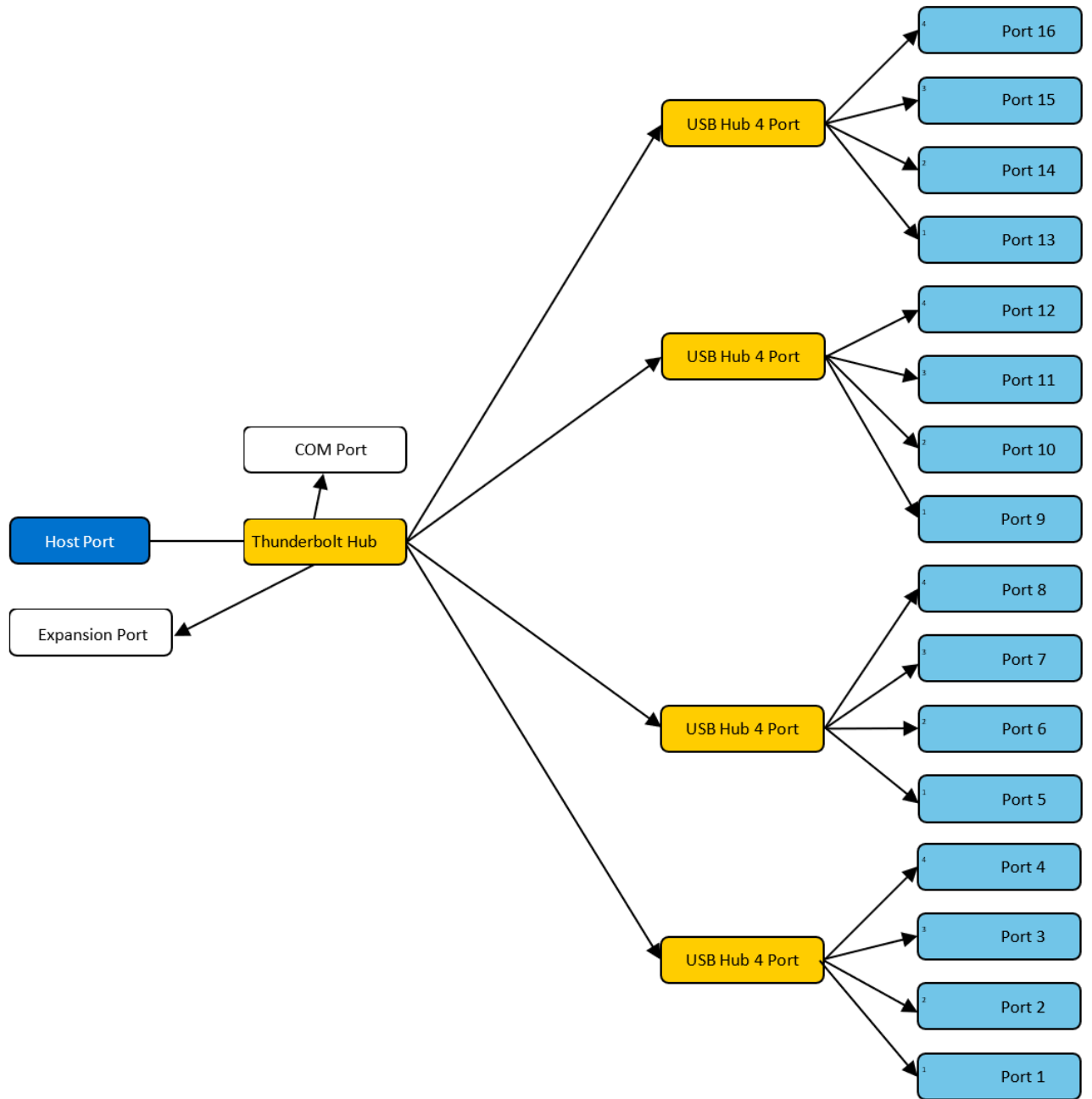
	Fig	Description
	1	This is the external physical port number
	2	This is present if this component is connected to an internal hub, if it is present the number represents the port number on the internal hub

Table 8-18



Background colour	Description
	An External physical port you can connect a USB device to
	The Host port that you will connect the host computer to
	An Internal hub which can then connect to external ports or other internal components
	Any other components which includes expansion ports and internal chips

Table 8-19



## 9. Mounting Accessories

The ThunderSync5-C16-PD is designed for flexible deployment in a range of professional environments. To support this, Cambrionix offers a selection of mounting accessories that enhance usability and help integrate the hub seamlessly into your workspace. There are two methods of mounting the ThunderSync5-C16-PD:

### Rack-mount Shelf Installation

Ideal for structured environments such as server racks or AV cabinets, the ThunderSync5-C16-PD can be installed using an optional rackmount shelf. This shelf is designed to house both the hub and its power supply unit (PSU) side by side, ensuring a clean and professional setup.

### Surface Mounting

The ThunderSync5-C16-PD can also be surface mounted using dedicated brackets. These reversible brackets allow for installation in multiple orientations, either screwed down onto a surface such as a desk or trolley, or screwed up into the underside of a shelf or workbench.

### 9.1. Rack-mount

This guide will help you assemble and install your ThunderSync5-C16-PD and Power Supply into the Cambrionix Rack-mount Accessory Tray.

Quantity	Item	Part Number
1	Rack Mount Tray	200661
4	M4 x 6mm T20 Screw	200647
1	Velcro Strap	200684

Tools required: T20 Torx Driver

### Instructions

1. Place the Rack Mount Tray on your work surface, with the raised edge towards you.
2. Remove any cable ties from the Power Supply.
3. Place the Power Supply on the left-hand side of the tray.

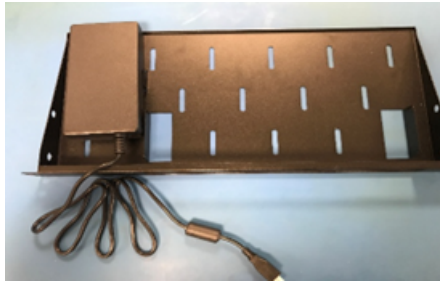


Figure 9.1

4. Route the Power Supply cable through the centre of the tray, ready to connect to the hub later.

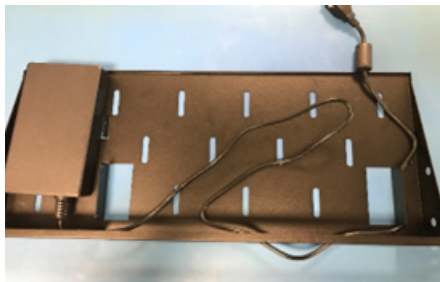


Figure 9.2

5. Place the ThunderSync5-C16 hub into the centre of the tray.
6. Align the front of the hub so it is level with the front edge of the tray.

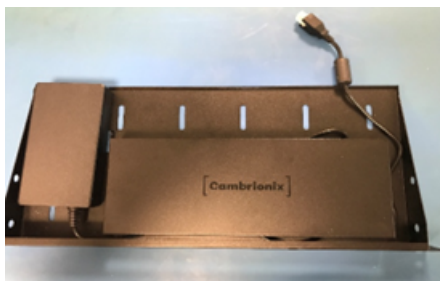


Figure 9.3

7. Using a T20 Torx driver and the screws provided, secure the hub to the tray:
8. Fit 2 screws on the right-hand side.



Figure 9.4

9. Fit 1 screw on the front left side.
10. Gently lift the Power Supply and rest it temporarily on top of the ThunderSync5-C16.
11. Fit 1 screw on the rear left side of the hub.
12. Place the Power Supply back into position on the left-hand side of the tray.

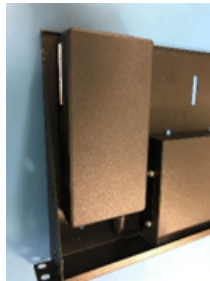


Figure 9.5

13. Secure the Power Supply using the Velcro strap provided.
14. Connect the Power Supply cable to the ThunderSync5-C16.
15. Neatly route and store any excess cable underneath the hub.



Figure 9.6

## 9.2. Surface Mount

This guide will help you install the surface mount brackets onto your ThunderSync5-C16-PD.

Quantity	Item	Part Number
2	Surface Mount Bracket	200661
4	M4 x 6mm T20 Screw	200647

Tools required: T20 Torx Driver

### Instructions

1. Decide on the required orientation of the surface mount brackets, depending on how you wish to install the hub:
  - Downward mounting – onto a desk or flat surface
  - Upward mounting – into the underside of a surface
2. Position the brackets so that the holes in the brackets align with the corresponding holes on the sides of the hub.
3. Using the screws provided, fasten the brackets to the hub. Ensure all screws are tightened securely.
4. With the brackets now attached, use appropriate screws or fixings (not supplied) to mount the hub to your desired surface.

## 9.3. Accessory-drawings

### 9.3.1 ThunderSync5-C16-PD Rack-mount Accessory

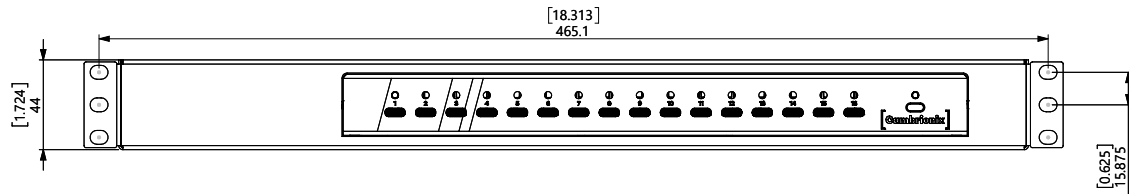


Figure 9.1

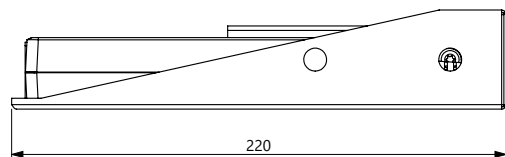


Figure 9.2

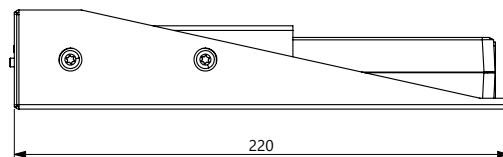


Figure 9.3

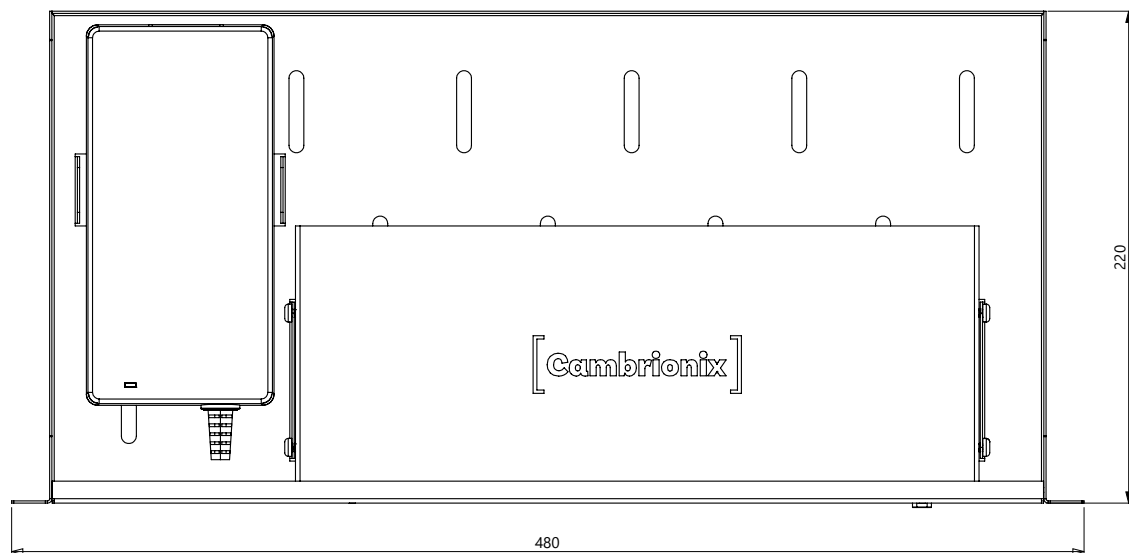


Figure 9.4

### 9.3.2 ThunderSync5-C16-PD Surface-mount Accessory

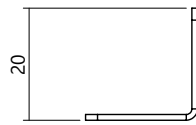


Figure 9.1

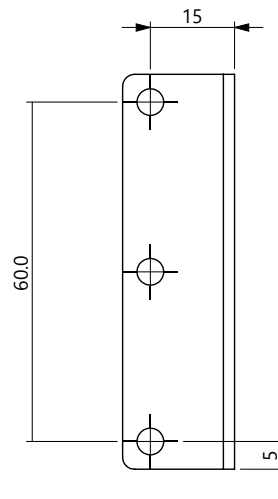


Figure 9.2

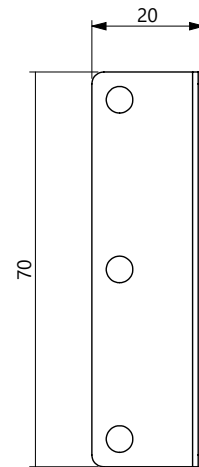


Figure 9.3

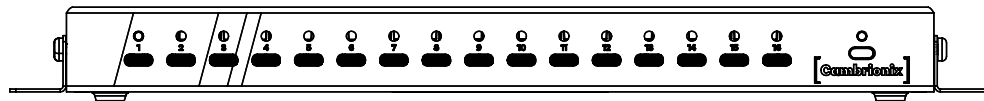


Figure 9.4

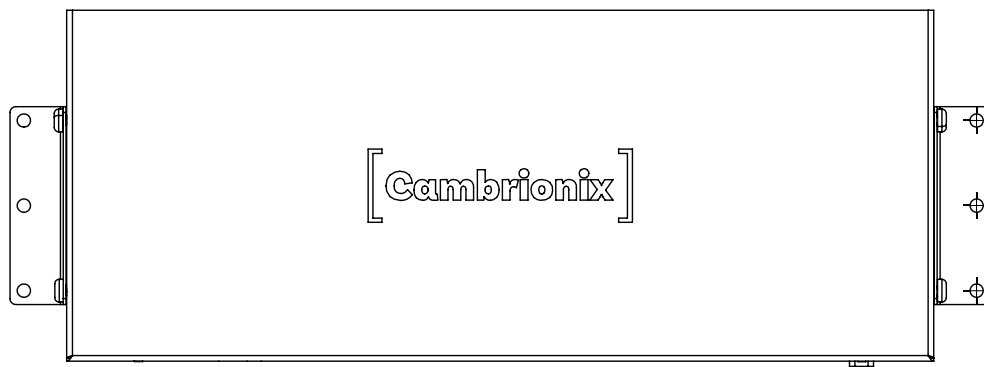


Figure 9.5



## 10. Troubleshooting

---

If you experience any issues with your ThunderSync5-C16-PD ; please try the following troubleshooting steps, if the issue is not addressed in this section, please get in touch with your local vendor or Cambrionix. To contact Cambrionix Support please see [Help and Support](#).

### 10.1. Common troubleshooting tips

Some tips and information to check first.

- If you directly connect the same device to the port the hub is in, does it appear to the OS.
- If you plug a device (phone, USB stick) into the hub, does it appear to the OS (device manager/ system info etc.).
- Are you using a Thunderbolt™ host cable? (USB Type-C does not equal Thunderbolt™)
- Is the Thunderbolt™ cable connected to a Thunderbolt™ port?
- Try switching the cables with ones that are working/ use cable from a hub that is working.

### 10.2. Logging through Cambrionix Connect

If you are experiencing a bug or an issue, we may ask you to obtain some logs of the behaviour, to see in more detail what is happening. To get logs of the behaviour use the following steps to get a zip file of the logs.

1. Open Cambrionix Connect (if this is not already downloaded, then go onto our website and download both the API and Cambrionix Connect)  
<https://www.cambrionix.com/software>
2. Once inside, select the Computers tab.
3. Select localhost or the name of the local computer you are obtaining logs from
4. Then, click on the “Hub API”
5. From here, you should see a section titled 'API Logging Sections'. Expand the 'Advanced logging settings' downwards.
6. Click the “select all” tick box and then the save button.
7. After this is enabled, use the hub in a way that causes the issue you are seeing.
8. Wait for the issue to occur

9. Note the time and date that the issue occurs. Then, go back to the API page in Cambrionix Connect and press the zip logs.
10. Once you have the logs un-tick the “select all” box and save your settings.
11. Send the logs to us for us to take a look at

The API keeps a maximum of 20 logs at 256 Mb each, so the latest one is usually smaller. If a crash occurs, you would see a smaller log file and the next instance of API shuffles the existing ones

## Default locations

Log messages generated by the CambrionixApiService go to syslog.

Using Windows the logs will default to the below location

```
C:\ProgramData\Cambrionix
```

Using macOS the logs will default to the below location

```
Library>Logs>Cambrionix
```

Using Linux the logs will default to the below location

```
/var/log/cambrionix
```

## 10.3. Hardware Failure

If the Hardware fails, the LEDs can flash in a pattern to determine the type of failure. If no LEDs are on the downstream ports, this will be the red power LED flashing in a pattern.

The unit will blink(B) four times, followed by eight long(L) or short(S) flashes, which then repeat. The flashes are a number in binary which match a number in our error code list.

i.e if the LED flashes the following - BBBB SLSSSLSS, the binary number is 01000100.

## 10.4. Device connection

If you are seeing any device connection issues please read through the following trouble shooting steps to see if this resolves the observed behaviour.

## Device Detection

Lightning cables have the capacity to draw a small amount of current, even when no device is connected to them. This behaviour can cause a USB hub to interpret the cable as a device with a low power draw, resulting in the hub's LEDs turning on. Additionally, in the case of a Cambrionix Connect system, this may lead to the appearance of an "unknown device" in the interface.

This current draw is a characteristic of lightning cables, as they negotiate power automatically upon connection, regardless of whether a device is attached or not. Consequently, the hub may mistakenly identify the cable itself as an active device, despite the absence of any connected peripherals.

## Device issues when updating

We have found that during updates on some devices the connection can be dropped or lost on the device, this is due to devices going in and out of the bootloader and requiring different power levels. In most instances disabling CDP has resolved this issue for our customers.

You can disable CDP through Internal hub settings either by going through the advanced settings and turning "Sync charge" off or through the API and disabling it via code. For example, the instructions would be below using the command line.

```
settings_unlock  
settings_set sync_chrg 0000000000000000
```

## Unstable device connection

Some devices can have unstable connections with your host system through USB hubs. We have only observed this behaviour in a very few amount of devices, disabling CDP and setting the ports to always be on has resolved all issues and the connections are stable.

You can disable CDP through Internal hub settings either by going through the advanced settings and turning "Sync charge" off or through the API and disabling it via code. For example, using the command line, the instructions would be as below.

```
settings_unlock  
settings_set sync_chrg 0000000000000000
```

You can set the ports to always be on through Internal hub settings through the advanced settings and turning "Ports On" settings to always on for each port. When you set the port to

always be on you will need to set a default profile on each port for when the port(s). There is a description for each profile within Cambrionix connect.

## Battery information for Android

If you are observing an issue displaying battery information on Android devices ensure firstly you have ADB tool installed and open then try these things in order.

1. Check that developer options are enabled on the android device, and then that USB debugging is also enabled.
2. If you have done this step and it still does not work, go to Developer Options and click 'Revoke USB debugging authorisations'. Unplug the cable and reconnect.
3. If this still doesn't work, turn off the developer options at the top, re-enable it, and re-enable 'USB Debugging'.
4. You can get detailed info directly from ADB at each step to diagnose things:

```
adb.exe shell dumpsys battery # Use -s SERIAL_NUMBER as first options  
if you have more than 1 Android attached
```

## Unknown devices

Sometimes, within Cambrionix Connect and device manager, the connected device may show up as an unknown device.

This can be due to the host system needing to be trusted on the device. This can be done on the device itself on the initial connection.

This could also be due to an insufficient number of endpoints available on the USB controller in the host system. This limitation within the USB controller can only be resolved if you connect fewer USB devices to the controller in question.

For Apple devices there is a setting called "USB accessories" which can be activated, Once activated it will reduce the amount of times a device will need to be unlocked/ trusted. More information can be found at the link <https://support.apple.com/en-gb/HT208857>.

## Cannot connect any more devices

Sometimes, you may reach the endpoint limit of your USB controller and this may stop you from being able to attach any more devices to your host system.

You can create more space is to change connections from USB3 to USB2. You can change the connection by disabling USB3 in the BIOS on startup.

A much simpler way is to use USB2 cables instead of USB3 cables, limiting the connection to USB2.

## Port overcurrent behaviour

When a port encounters an overcurrent event, the port is shut down and an error flag (e) is applied to the port, the port stays disabled until the device is removed or the port state is reset (turned to off mode then back to charge) if the short isn't removed the port will shut down again

The error flag for the port can be seen in the state command see the example below where port 4 had overcurrent applied.

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

## 10.5. Hub connection issues

If you there are issues with the hub and connecting to your host system, please see below troubleshooting solutions.

### Hub not connecting to host

If you see that the ThunderSync5-C16-PD is not connecting to the host system, one of the issues may be caused by the USB drivers on your host system not being up to date. It is good practice to ensure you have the latest drivers and updates installed on your host system, which is usually handled by the OS, but sometimes may require an update directly from the USB host controllers manufacturer, which will be found on their website.

USB drivers required are FTDI drivers, which can be found on the site <https://ftdichip.com/drivers/>.

### Cannot access the COM port

You may get an error message stating "COM (and then a number) could not be opened (Access is denied)".

This is because an application has control over the COM port that the hub is connected to, and no subsequent application can access the hub. To resolve this, you will need to close any other applications that are using the COM port before trying to use the COM port.

## 10.6. Using with a headless system

If you are using a headless system with no GUI, then and you require to enable logging for support issues, you can use the following command to create the logging cfg file manually:

```
echo*=DEBUG>/etc/opt/cambrionix/cambrionix.log.cfg
```

Then after re-producing the problem, you can zip the logs from the folder

```
/var/log/cambrionix
```

You may delete the file below when you are finished with it.

```
/etc/opt/cambrionix/cambrionix.log.cfg
```

## 10.7. Software troubleshooting

Some users have noted that the API can cause a high level of CPU usage. This can sometimes be linked to the API recorder service. If you are finding this and you are not using it then we would recommend to uninstall it from your system entirely. Information on how to uninstall programs can be found in the [Removing Software](#) section.

## 11. Returns and Damaged Products

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If you wish to return or fix a damaged product first look at the terms on our website

[www.cambrionix.com/terms-conditions](http://www.cambrionix.com/terms-conditions)

Before a product is returned please contact support using the methods detailed in the [Help and Support](#) section.

### 11.1. What if my order arrives with an issue?

- If you have received your order in a damaged box and/or the product has physical damage please contact Cambrionix Customer Support or your distribution partner. Please provide photos of the damaged box and/or product when contacting Customer support.
- If an item in your order does not have physical damage but is not functioning properly or will not power on, please contact Customer Support or your distribution partner and provide as much information as possible and including any steps followed to troubleshoot internally.
- Please include photos of the damaged box and product when contacting Customer Support.

Note: If you have received your order in a damaged box and the damage was indicated to the courier, please provide us with a copy of the delivery note detailing this.

### 11.2. What happens after I have requested a Return?

- If you have not purchased the Product(s) direct from Cambrionix please contact the vendor the item was originally purchased from for their returns process.
- Once you have notified Cambrionix of your return, Cambrionix will arrange for the collection of the product(s), or provide instructions and details for you to return the product direct.
- When returning your product(s), please only send back the items that were advised through the support process.
- Return your product(s) in the original packaging where you can. Where original packaging is not available, use suitable packing methods, which will ensure that the product cannot be subject to impact damage. i.e. double-walled cardboard box with 50mm of soft material.
- Product(s) not returned in their original condition may result in additional costs, please refer to the warranty and terms section on our [website](#).

- Where Cambrionix arranges collection, return shipping will be free, unless Cambrionix notified you otherwise.
- When contacting us about returning a product please provide the following information.
  - Collection Address
  - Weights and Dimensions WxDxH (m) of shipment
  - Preferred collection date and time.
  - Product serial number(s) (this can be found on a label on the rear or underside of the unit)
  - Purchase order number(s)



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- Proprietary Methods: Detailed descriptions and implementations of our proprietary methods are also protected.

As such, requests for access to the source code or other protected information will be respectfully declined. We appreciate your understanding and cooperation.

## Cambrionix Patents

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Title	Link	Application Number	Grant Number
Syncing and Charging Port	<a href="#">GB2489429</a>	1105081.2	2489429
CAMBRIONIX	<a href="#">UK00002646615</a>	2646615	00002646615
CAMBRIONIX VERY INTELLIGENT...	<a href="#">UK00002646617</a>	2646617	00002646617

## Terms and Conditions

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The use of Cambrionix hubs is subject to the Cambrionix Terms and Conditions, the document can be downloaded and viewed using the following link.

<https://downloads.cambrionix.com/documentation/en/Cambrionix-Terms-and-Conditions.pdf>

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