IDT Hub Control

Cross-platform User Manual

for Windows™ and MAC™ OS X™

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1. Terms and Conditions

For more detailed information, see the "**Terms and Conditions**" as stated in the camera manual and the IDT web site.

2. System Overview

2.1. Supported platforms

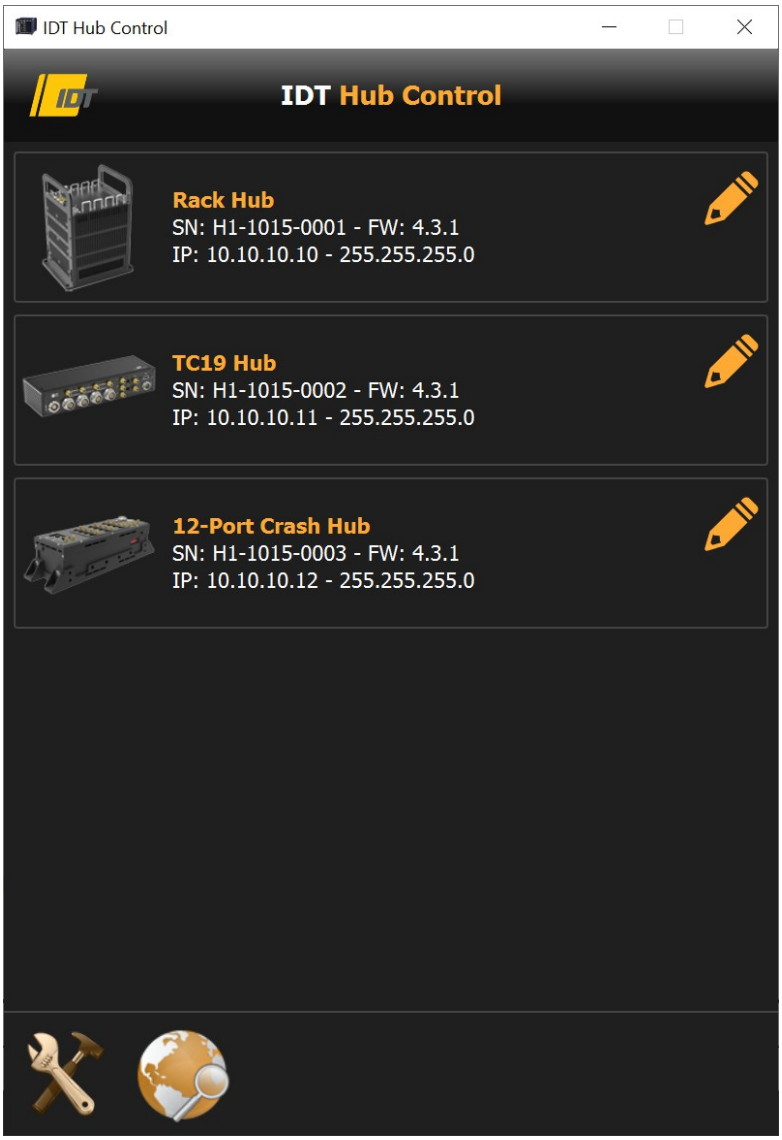
Motion Inspector supports the following platforms:

- Microsoft Windows XP, Vista, 7, 8, 8.1 and 10 (32 and 64 bits).
- Apple MAC OS/X 10.10 (Yosemite) and newer.

The cross-platform manual provides instructions on using Motion Inspector on the above platforms. The icons below denote differences in setup, procedures and commands between Windows and OS X.

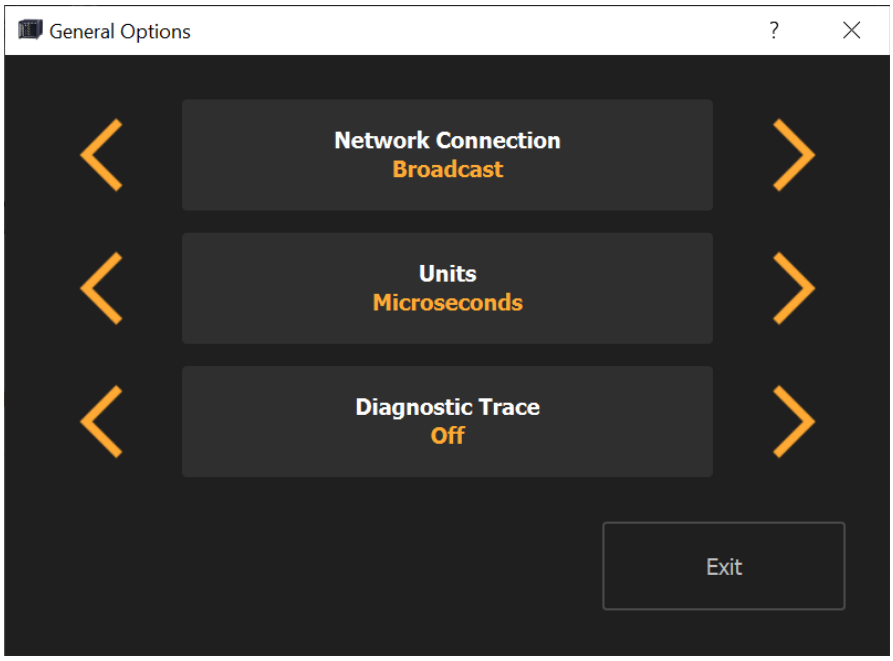
3. IDT Hub™ Control

The IDT Hub Control allows the user to control one or more Rack-Hub, TC18/19/30 Hub or 12-Port Crash Hub. Once the program is started, the window below appears.



3.1. General options

Click the options button to open the dialog box below.



Network connection: select the network adapter connected to the device. If you select "Broadcast" the software will search for devices from each adapter in your computer.

Units: the timing data (pulse width and delay) may be displayed in microseconds or degrees (0 to 360 as percentage of the period).

Diagnostic trace: enable and disable the trace. The trace file (rm_trace.txt) is stored in your home directory.

3.2. Edit device information

Hub name and IP address may be changed:

- Click “edit device name” button (pencil icon).
- Change name, IP address or sub-net mask.
- Click “edit device name” button again (pencil icon).
- Open device.
- Close device and software.
- Power cycle hub.

3.3. Rack Hub Device operation

Every detected rack-hub is shown as a black button. A single click on the button opens the device window.

As shown in the illustration above, the 5-slot High G Rack Hub system has main slot and four open slots to be configured with the following available modules (left to right):

Battery module.

Camera module for cameras with 16 pin LEMO connection (NR and Nx).

Camera module for cameras with 19 pin M-LEMO connection (iN, Nx-Air, Os, Os-Airborne, and Crash-Cam)

LED module for the VERITAS™ Crash LED's.

3.4. Rack Hub Base

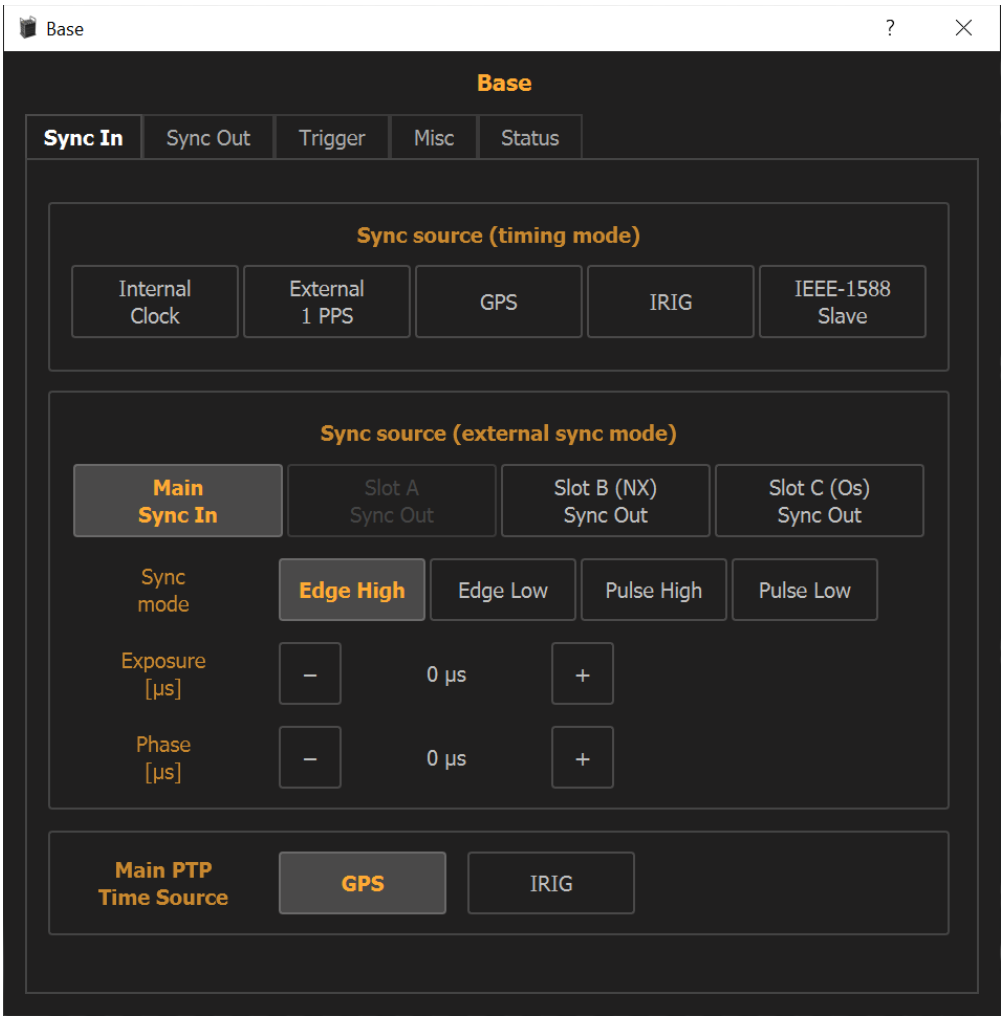
Base module provides up to 1.5 KW of power conditioning capability, GPS antenna, IRIG, and 1 PPS inputs for synchronization and time stamping, IEEE-1588 (PTP) for time encoding over the network infrastructure, Gigabit network connectivity, real time status feedback of the complete system with its modules and a configurable shock sensor.

Main module is the permanent module of the High G Rack Hub system and it is the host device for all other modules. As such it provides the required infrastructure for the seamless operation regardless of the final user configuration as follows:

- Power Management.
- Gigabit Network Connectivity with IEEE-1588 (PTP).
- GPS, IRIG, 1 PPS inputs.
- Real-time system status monitoring.
- Triggering, timing and synchronization configurations.

3.4.1. Sync In

The Sync In page configures the source of synchronization of the modules (cameras and LED).



The selection of the sync in source is divided into two sections.

Sync source group 1 (timing mode)

Timing signals are generated by the internal clock and are aligned to the external sync source that provides a 1 PPS signal (except internal clock mode). Sync out, camera modules timing and LED timing can be independently configured.

Internal clock: timing signals are internally generated.

External 1 PPS: signals are internally generated and reference input signal is a 1 Hz square wave with TTL levels.

GPS: signals are internally generated and the reference input signal is retrieved by GPS through the GPS antenna. The power status LED on the housing of the TC hub will blink when a GPS lock is present.

IRIG: signals are internally generated and the reference input signal is retrieved by IRIG through the connector #2 (see the rack hub setup guide).

IEEE-1588: signals are internally generated and the reference signal is generated by an external PTP server through the Ethernet.

Sync source group 2 (external sync mode)

Sync in signal is retrieved from an external source. The external signal frequency is used to synchronize the camera modules and the LED module.

The source of the signal may be:

Main Sync In: the “sync in” SMA connector of the base.

Slot A, Slot B, Slot C sync out: if a slot contains a camera module, the sync out of the cameras can be used as Sync In of the other camera/LED modules (main/secondary). If a slot does not contain a camera module, the corresponding button is grayed out.

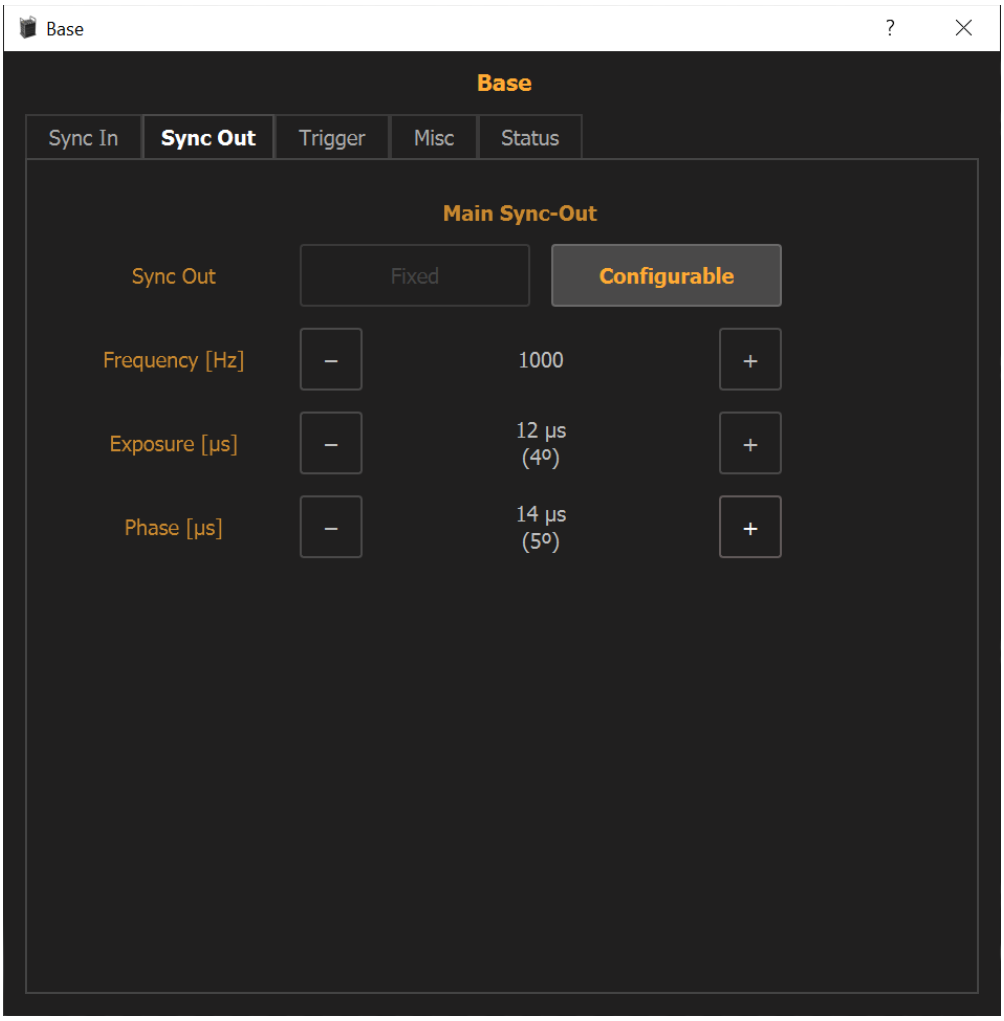
The signal taken from the “sync in” can be configured.

Edge-High, Edge-Low: the leading edge (or the falling edge) of the external signal is used to generate the sync signal. The pulse width (exposure) and the delay (phase) may be configured.

Pulse High, Pulse Low: the external sync signal frequency and pulse width are used to generate the sync signal. The delay (phase) of the signal may be configured.

3.4.2. Sync Out

This page controls the configuration of the main sync out. The sync out signal may be used to sync other devices, such as lights or data acquisition devices.

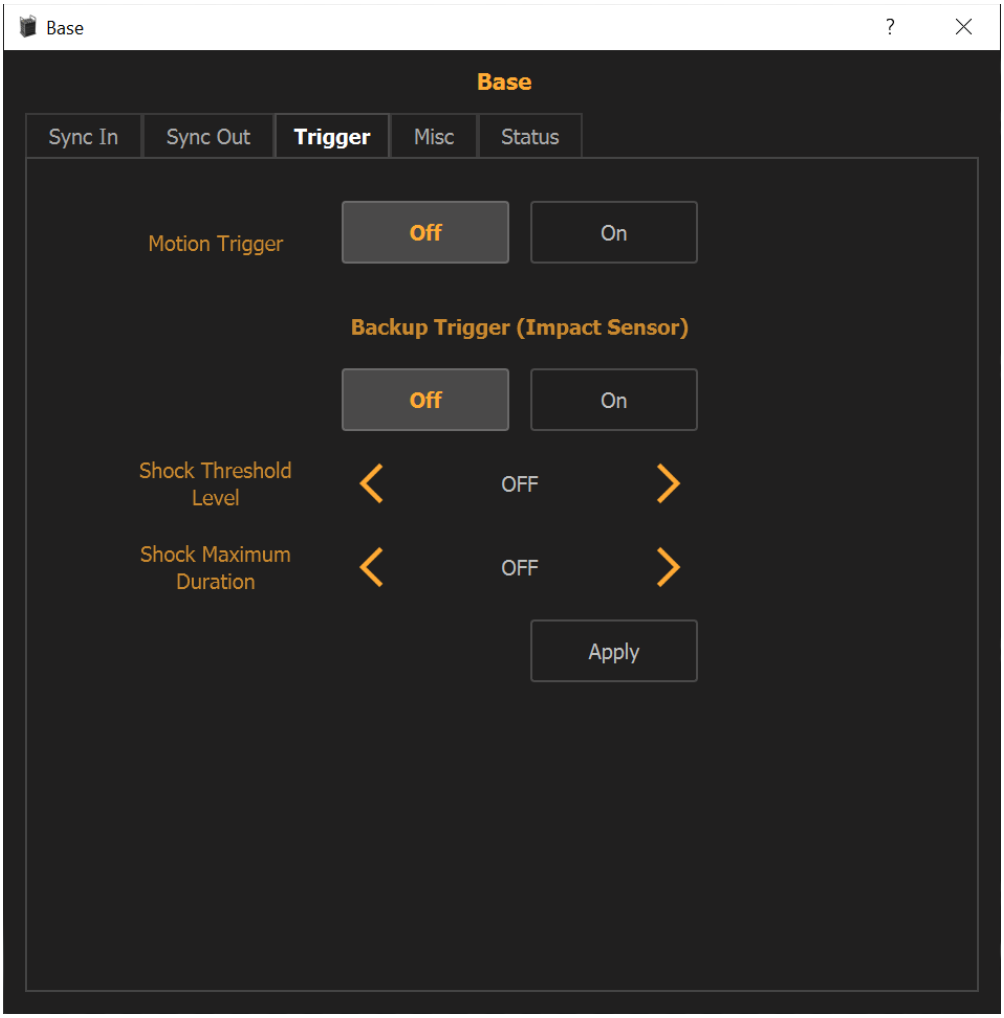


The status of the sync out signal depends on the configuration of the sync in.

Fixed: if the sync in is set to one of the external sync sources (main sync in, Slot A, Slot B or Slot C sync out) the sync out signal is automatically driven by the sync in signal.

Configurable: if the sync in is set to one of the timing mode sources (internal, 1PPS, GPS, IRIG or IEEE-1588) the sync out signal is configurable. Frequency, exposure and phase can be modified.

3.4.3. Trigger



Motion trigger: if this option is on and one of the camera is triggered, the trigger is routed to all the cameras connected to the rack hub. This is useful when the camera is configured to get a motion trigger. When the motion condition is true, one camera triggers and the rack hub sends the trigger to all the other cameras without any external signal.

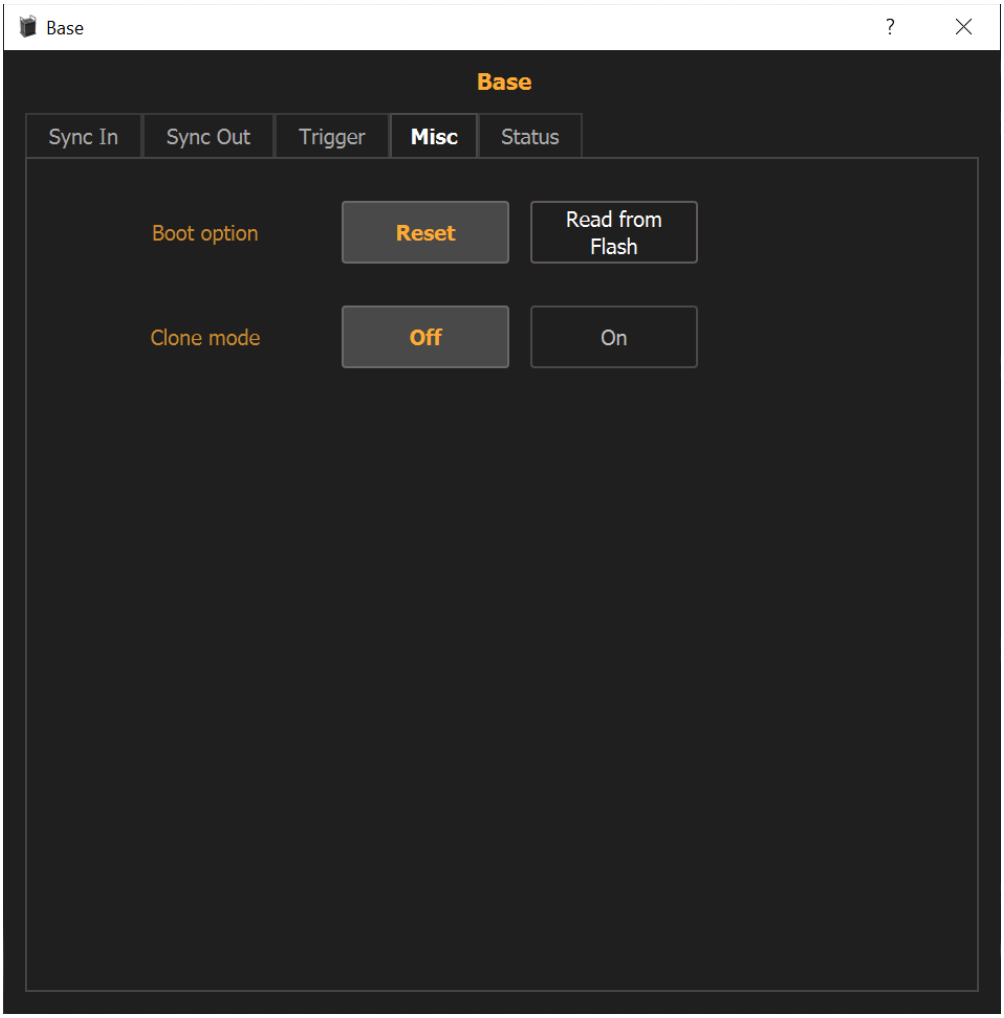
Impact sensor trigger (backup): IDT hubs are equipped with an impact sensor that can be configured to backup trigger in crash tests. If backup trigger is enabled, the following parameters may be configured.

Threshold level: the minimum shock level that generates the trigger.

Duration: the maximum duration of the shock that generates the trigger.

Trigger occurs if the level is above the “threshold level” for an amount of time shorter than the “maximum duration”.

3.4.4. Misc

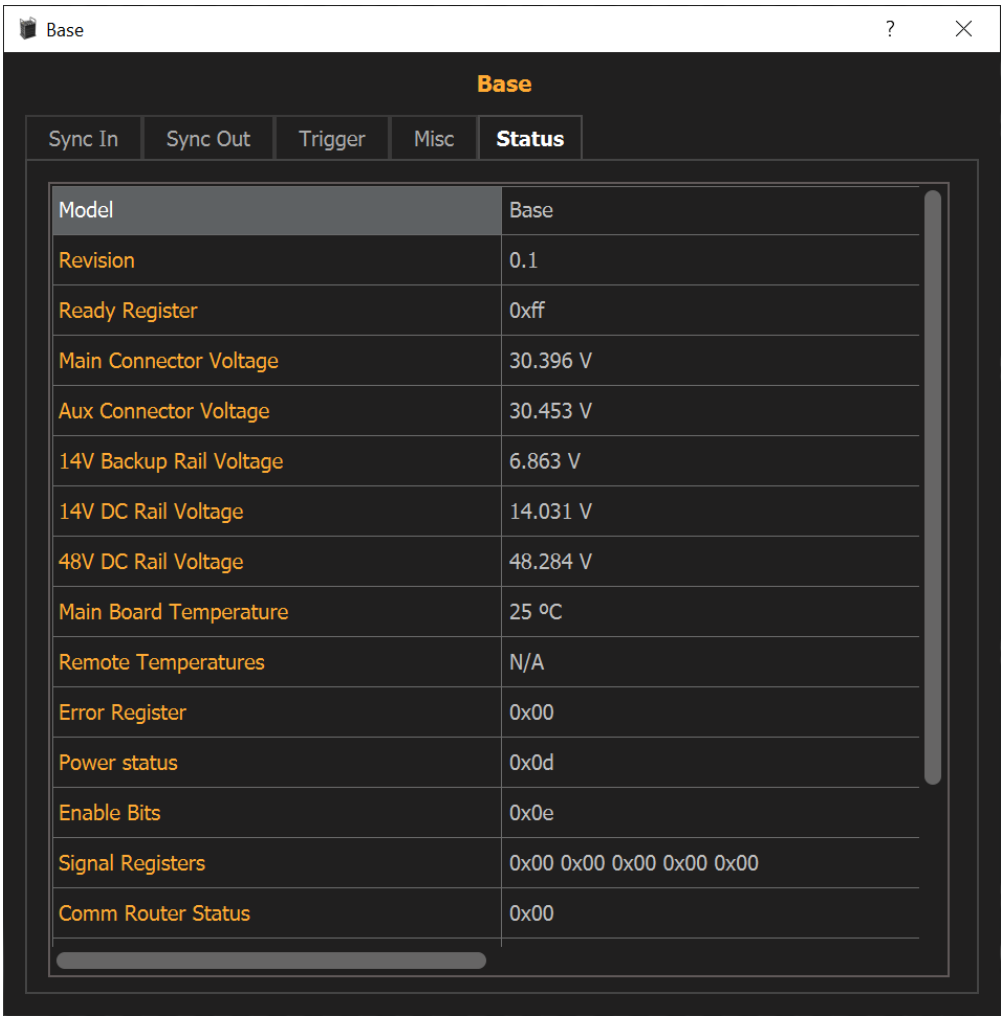


Boot option: the user may select which configuration the device loads after reboot. If the selection is reset, the configuration is reset. Otherwise the device loads from the flash memory the latest saved configuration.

Clone mode: if this option is on, each timing parameter (frequency, exposure or phase) that is modified on one of the modules (camera or LED) is automatically set the same channel of the other modules.

3.4.5. Status

The status of the battery may be displayed (see below).



Some of the parameters show some general information values.

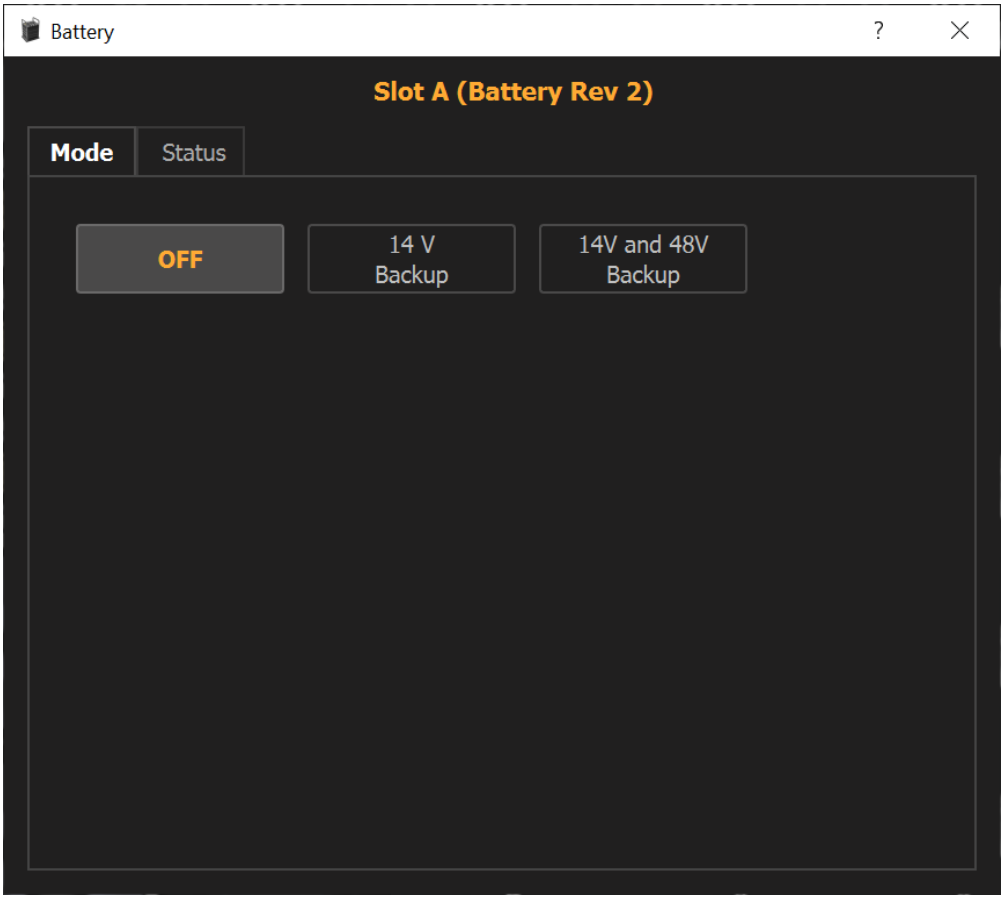
Impact count: returns the number of times the impact sensor has been triggered.

PTP mode: the PTP can be configured as master or slave.

PTP IP address: if the rack hub as a master PTP, it has also an IP address and a sub-net mask.OK, thank you

3.5. Rack Hub Battery module

The Battery module supports the autonomous operation without external sources. If you click on the module the dialog box below appears.



Battery can be configured into three modes:

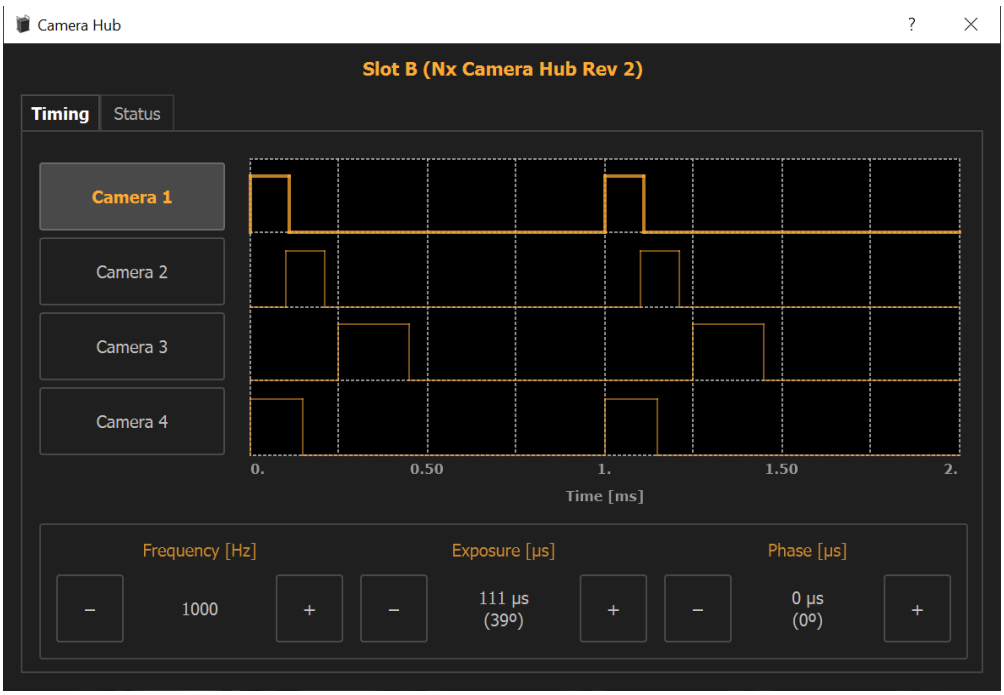
- **Off**: battery is off.
- **14 v backup**: battery backups only modules with 14 v power.
- **14 v and 48 v backup**: battery backups any module.

3.6. Rack Hub Camera module (16-pin and 19-pin LEMO)

The Camera modules (19-pin and 16-pin LEMO) support the operation of up to 4 cameras per module. The Camera modules allow for transparent mix or match of different camera models.

3.6.1. Timing configuration

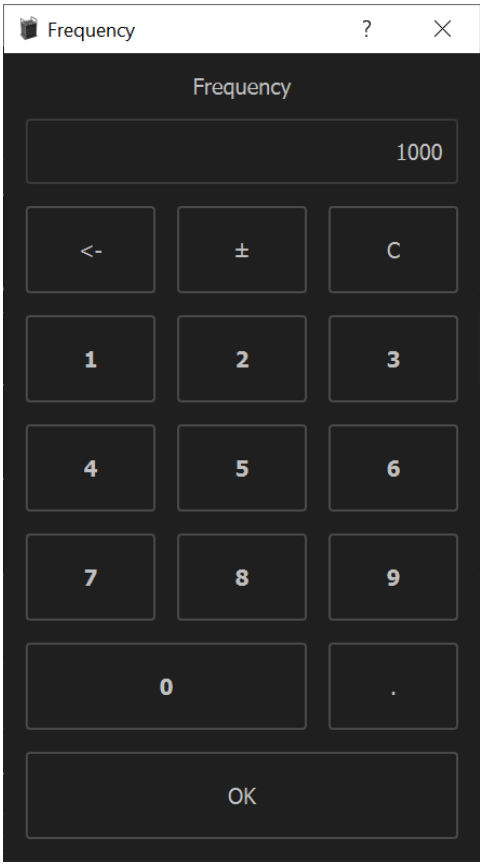
Each camera frame period, exposure and phase may be independently configured. The camera timing can be configured only if the main sync in source is internal, external 1 PPS, GPS, IRIG or IEEE-1588 (PTP).



Click on camera buttons to select the camera, then edit the frequency, exposure and phase.

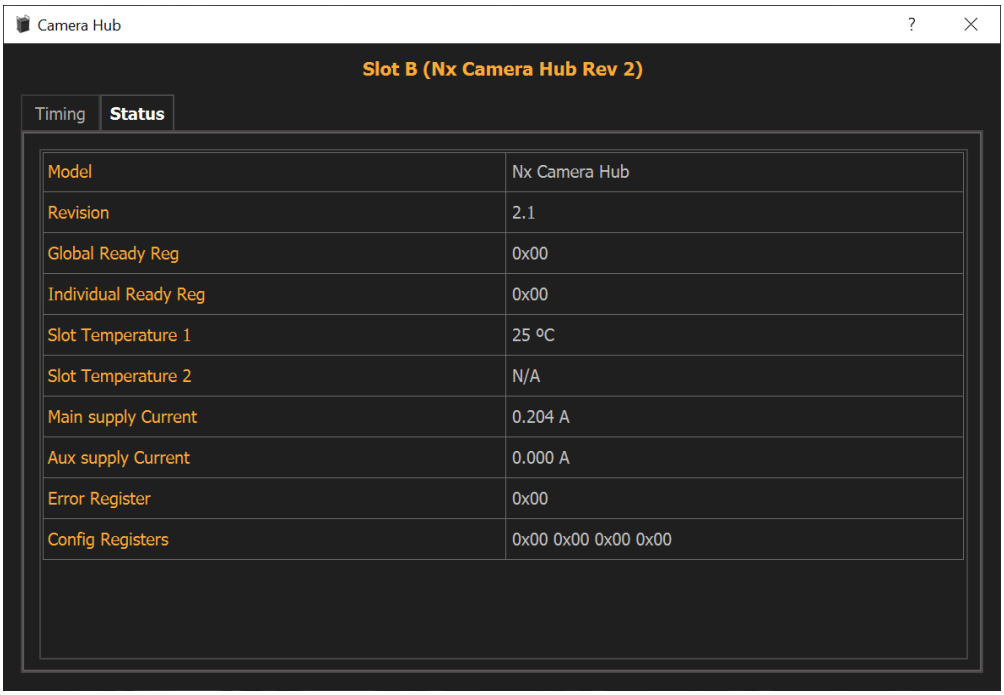
3.6.2. Touch Pad

Click or tap to one of the white labels (frequency, exposure or delay) to activate the touch pad and enter the values (see below).



3.6.3. Status

The status of the module may be displayed. The parameters are self-explanatory.



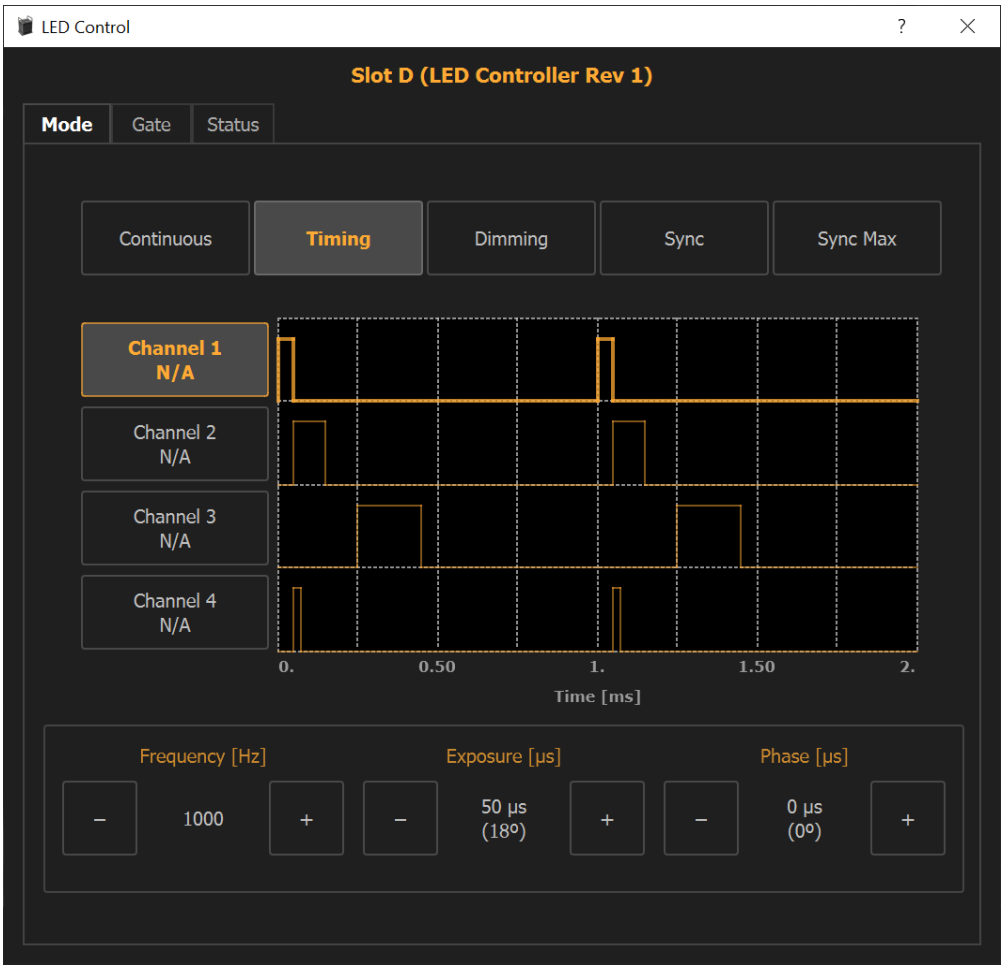
3.7. Rack Hub LED module

LED module supports the operation of up to 4 Crash-LED's each rated at 160W in continuous operation.

IMPORTANT: No more than one LED module can be assembled into the Rack Hub given its power supply limitations.

3.7.1. Timing mode

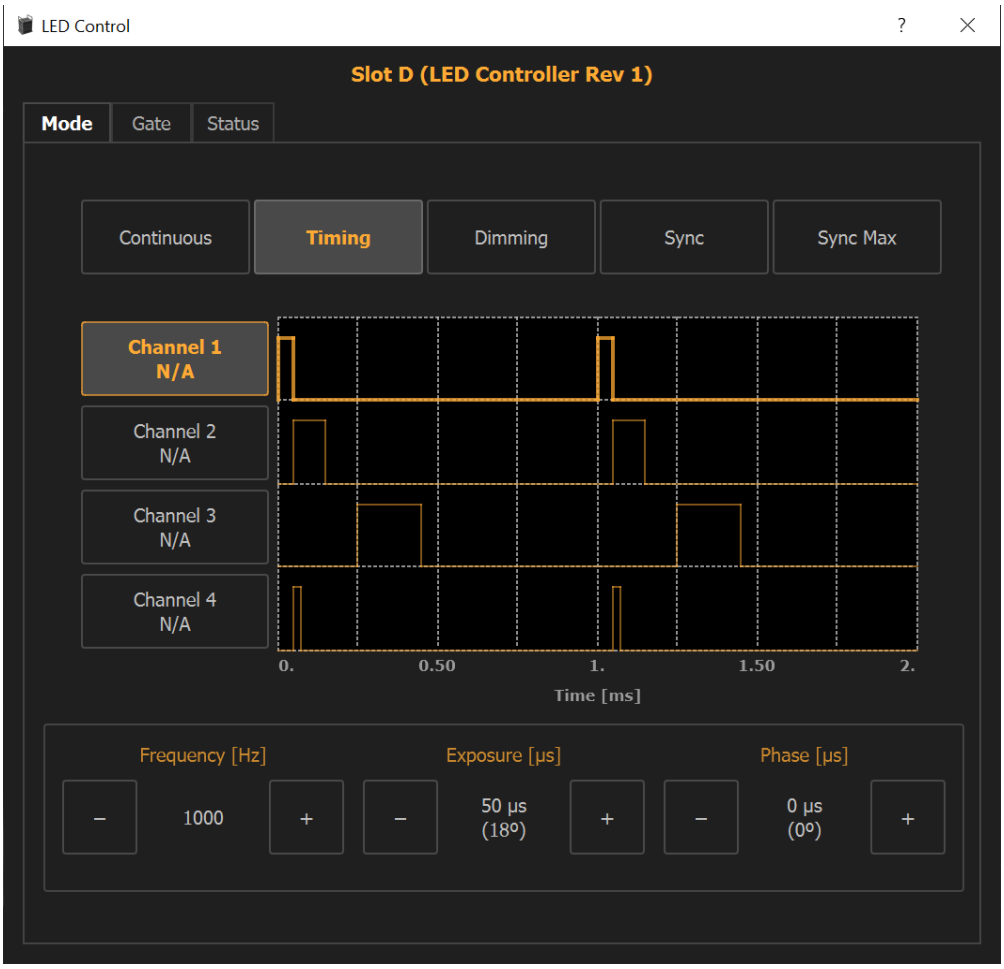
Each channels may be pulsed with an independent frequency, pulse width (exposure) and delay (phase). The timing can be configured only if the main sync in source is internal, external 1 PPS, GPS, IRIG or IEEE-1588 (PTP).



Click on channel buttons to select the channel, then edit frequency, exposure and phase.

3.7.2. Dimming mode

In dimming mode, the output signals are continuous. The user may control the intensity of each channel separately (with the sliders, the plus and minus buttons).



Each set of levels may be stored in a “preset” configuration (buttons with numbers 1, 2, 3,4).

To store a level configuration in a preset, press the button for more than 2 seconds until the message “Current levels saved to preset #N” appears.

To recall a preset, just click the corresponding button.

3.7.3. Other modes

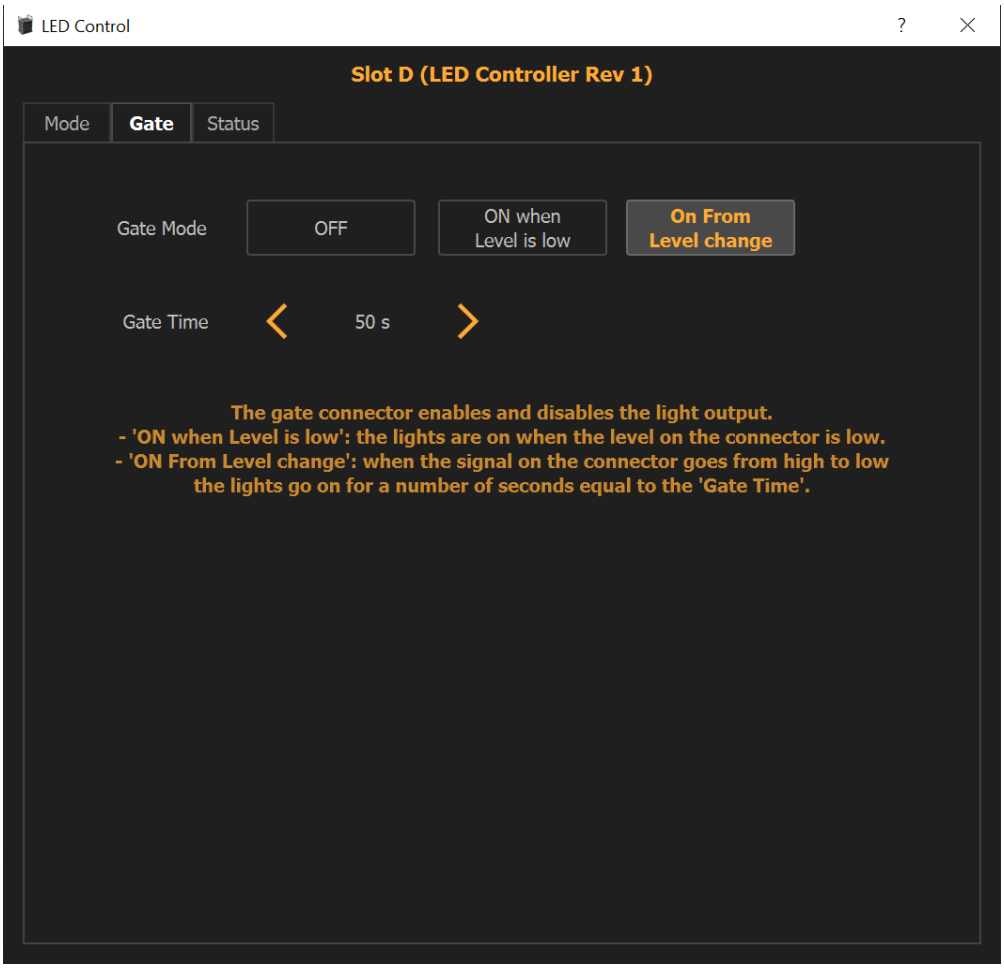
Continuous: the light channels are continuously on at full power. The channels are not pulsed.

Sync: the light channels follow the main base “sync in” signal. The base “sync in” source is set to Main sync in, Slot A, Slot B or Slot C sync out.

Sync Max: not implemented yet.

3.7.4. Gate

The light emission may be controlled with an external signal via the “Gate” SMA connector.



Gate mode may be:

OFF: gate does not control the light emission.

On when the level is low: if the signal on the connector goes from high to low the lights are on. The lights are turned off when the signal goes back to high level.

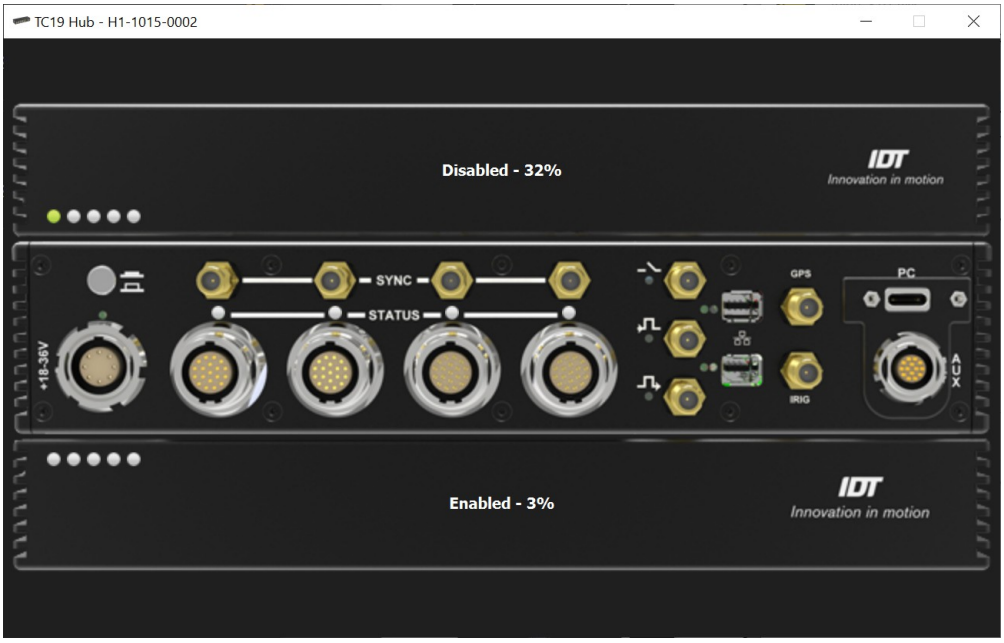
On from level change: when the signal of the connector goes from high to low, the lights turn on and stay on for a number of seconds configured in the “Gate time” parameter. The maximum allowed number for the gate time is 1000.

3.7.5. Status

The module status is shown. The parameters are self-explanatory.

3.8. TC19/30 Device operation

Every detected TC19/30 Hub includes a main module with support for four cameras and top and/or bottom battery modules.



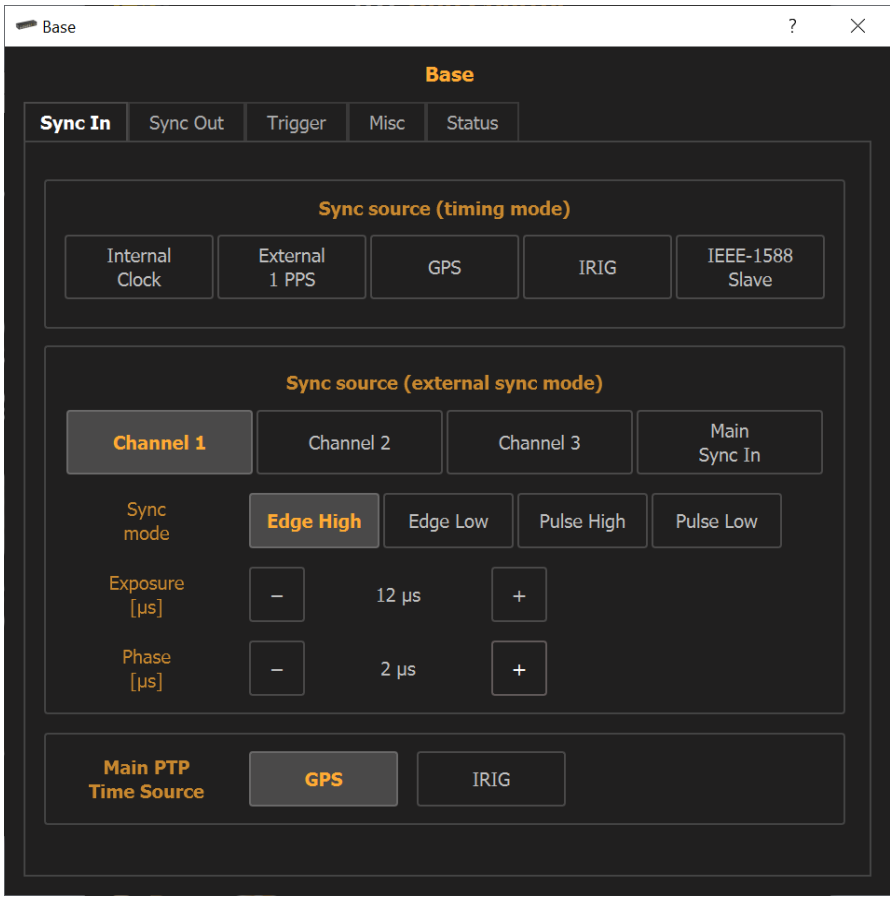
3.9. TC19/30 Hub Base

The Base module provides GPS antenna, IRIG, and 1 PPS inputs for synchronization and time stamping, IEEE-1588 (PTP) for time encoding over the network infrastructure, Gigabit network connectivity, real time status feedback of the complete system with its modules and a configurable shock sensor.

Main module is the host device for all other modules. As such it provides the required infrastructure for the seamless operation regardless of the final user configuration as follows:

- Power Management.
- Gigabit Network Connectivity with IEEE-1588 (PTP).
- GPS, IRIG, 1 PPS inputs.
- Real-time system status monitoring.
- Triggering, timing and synchronization configurations.

The configuration of main parameters is mostly equivalent to rack-hub. See “Rack Hub Main” topic for more information. The selection of sync source in external sync mode is different from Rack-Hub. The external sync source may be channel 1 to 3 or main sync in.



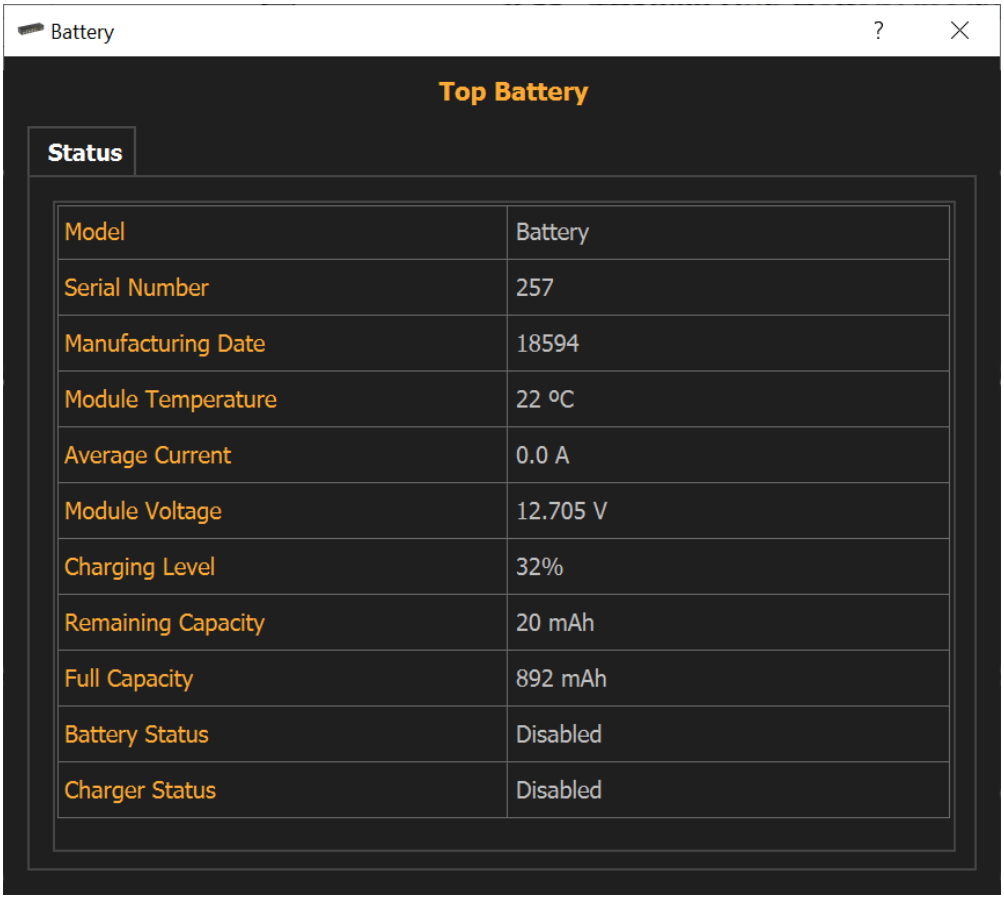
3.10. TC19/30 Hub Camera module

The TC19/30 Hub includes the support for four cameras and the sync out signals for additional lights.

The configuration of the camera module parameters is equivalent to the rack-hub. See the “Rack-Hub Camera module” topic for more information.

3.11. TC19/30 Hub Battery module

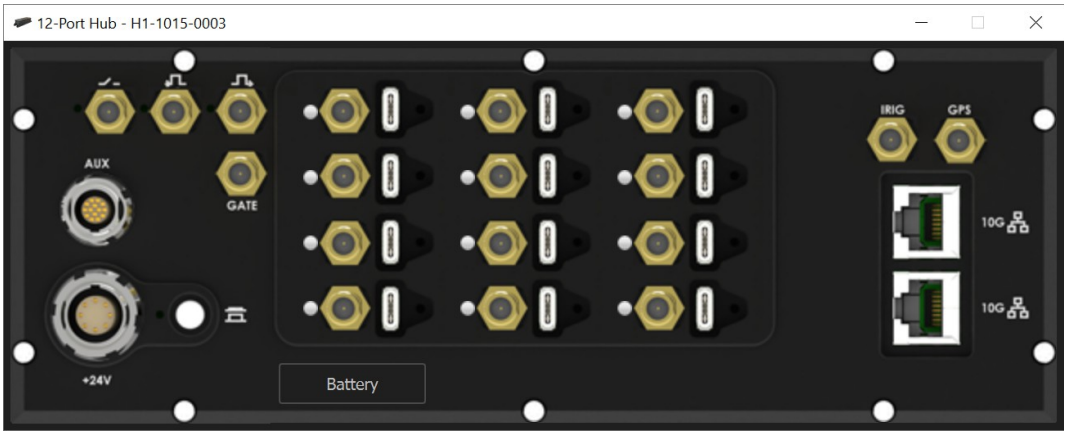
A top and a bottom additional battery modules can be connected to the TC19/30 Hub. The battery module cannot configured, only the status can be displayed.



Model	Battery
Serial Number	257
Manufacturing Date	18594
Module Temperature	22 ºC
Average Current	0.0 A
Module Voltage	12.705 V
Charging Level	32%
Remaining Capacity	20 mAh
Full Capacity	892 mAh
Battery Status	Disabled
Charger Status	Disabled

3.12. 12-Port Crash Hub device operation

Each 12 Port Crash Hub has a base module and a camera module that supports up to 12 cameras. An optional battery can be connected to the power connector.



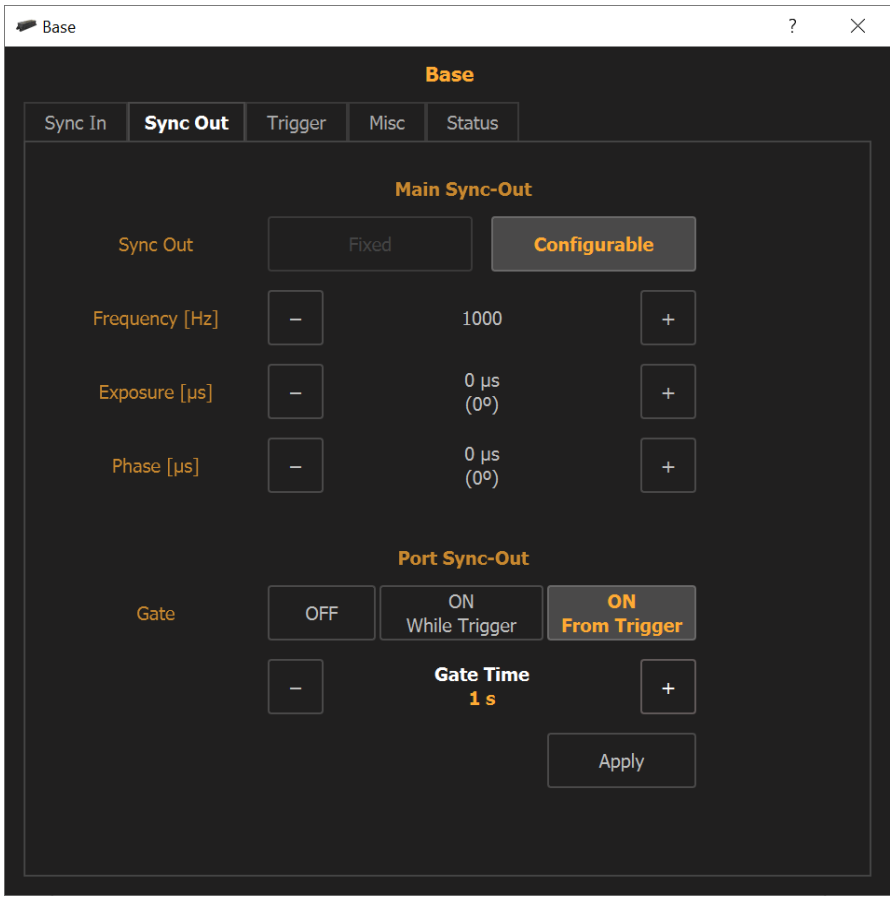
3.13. 12-Port Crash Hub Base

The Base module provides GPS antenna, IRIG, and 1 PPS inputs for synchronization and time stamping, IEEE-1588 (PTP) for time encoding over the network infrastructure, Gigabit network connectivity, real time status feedback of the complete system with its modules and a configurable shock sensor.

Main module is the host device for all other modules. As such it provides the required infrastructure for the seamless operation regardless of the final user configuration as follows:

- Power Management.
- 10 Gigabit Network Connectivity with IEEE-1588 (PTP).
- GPS, IRIG, 1 PPS inputs.
- Real-time system status monitoring.
- Triggering, timing and synchronization configurations.

The configuration of main parameters is mostly equivalent to the TC Hub. Cameras sync out have gate capabilities (see below).



3.14. 12-Port Crash Hub Camera module

The 12 Port crash hub supports up to twelve cameras. Camera timing configuration is organized in three groups of four cameras each. For more information, refer to the Rack Hub camera module topic.

3.15. 12-Port Crash Hub Battery module

An optional battery can be connected to the 12 pin LEMO power connector. If a battery is detected, a “Battery” button is shown in the hub main dialog box.

4. Appendix

4.1. Error messages

When charging battery at high temperature

If battery temperature gets above "charging protection temperature limit", the Hub disables the battery chargers. If the Power supply is connected, the software displays pop-up: "**Charger Halted! Battery temperature out of charging range.**"

When battery is discharging

If battery voltage (in discharge mode) gets low, the Hub warns the user by "**flashing status LEDs**" and the software displays pop-up: "**Battery is getting low. Please, connect power supply.**"

If battery voltage (in discharge mode) gets below a critical point, the Hub turns the cameras OFF, warns the user by "**flashing power LED**" and the software displays pop-up: "**Battery is very low and cameras have been shut down. Please, wait for unit to cool down and restart Hub." ***

When battery is "out of sync"

In very rare cases, one of the elements may not charge. If the hub detects this event, the software displays pop-up: "**Battery out of sync / Please follow steps below: / 1. Disconnect Power Supply / 2. Disconnect battery / 3. Reconnect battery / 4. Hub on; Fully drain / 3. Disconnect battery; Wait 30 minutes / 4. Reconnect battery; Fully charge**" *

When user tries to shut down Hub while temperature is too high / Cool Down Mode

If the user tries to turn off the hub and the battery temperature is above the charging limit, then the hub enters a "**cool down mode": turns the cameras OFF, flashes the power LED and stays in this mode until the battery temperature gets below the charging limit. At this point the hub turns itself off**. When the hub enters the cool down mode and software displays

Pop-up: "**Hub is in cool-down mode and will turn itself off when battery's temperature is below charging limit.**"