



## HUT-APE

Hybrid Universal Transceiver – Advanced Power Extension  
Power Supply for SMPTE-Based Camera Chains

And

## SB-APE, QS4-APE, & VB-APE

Remote Power Extenders

### USER MANUAL



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## Document Revisions







Revision	Description	Date	Author
A	Initial	5/5/22	SDP
B	Add SB/QS4/VB-APE Remote Models	9/7/2023	SDP

## Declaration of Conformity

Test	Standard	Dates	Initials	Results
Radiated Emissions	EN 55032 / FCC / VCCI	11/22/21, 11/23/21	<u>KHa</u>	Pass
Conducted Emissions	EN 55032	11/22/21, 11/23/21	<u>KHa</u>	Pass
ESD Immunity	EN 61000-4-2	12/6/21	KH	Pass
Radiated Immunity	EN 61000-4-3	12/3/21	KH	Pass
EFT Immunity	EN 61000-4-4	11/30/21, 12/6/21	KH	Pass
Surge Immunity	EN 61000-4-5	12/1/21	KH	Pass
Conducted Immunity	EN 61000-4-6	12/2/21	KH	Pass
Voltage Dips and Drops	EN 61000-4-11	11/30/21, 12/6/21	KH	Pass
Voltage Harmonics	EN 61000-3-2	11/24/21	MM	Pass
Voltage Flicker	EN 61000-3-3	11/24/21	MM	Pass
Other				

## Safety Info





- Do not use this apparatus near water.
- Clean only with lint free dry cloth.
- Do not block any ventilation openings.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Do not defeat the safety purposes of the grounding- type plug. A ground type plug has two blades and a third grounding prong. The third prong is provided for your safety. If the provided plug does not fit in to your outlet, consult an electrician for replacement of the obsolete outlet.
- Install in accordance with the MultiDyne® installation instructions.
- Install all peripheral equipment (cameras, routers, etc.) in accordance with the manufacturer's instructions and safety requirements.
- Protect the power cord from being walked on or pinching particularly at plugs, convenience receptacles, and point where they exit from the apparatus.
- Only use attachments/accessories specified by MultiDyne®.
- Use only with the cart, rack, stand, tripod, bracket, or table specified by MultiDyne®, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
- Follow all local Electrical Codes for Grounding, Lightning Arrestment and Surge Protection. Unplug this apparatus during lightning storms or when unused for extended periods of time.
- All Electrical Work to the facility must be performed by a qualified Licensed Electrician. All local Electrical Codes must be followed and, if necessary, must be inspected by a Local or State Inspector.
- All servicing of MultiDyne equipment must be performed at the factory by a MultiDyne trained service technician or engineer.
- Throughout this manual, several Warnings and Cautions and Notes may be presented to alert the user to important safety or operating information.
- Always adhere to local building, safety and fire prevention codes during the installation and operation of this product.
- Use only power cords that were shipped with specified for this product and certified for the country of use.
- Connect the unit only to a power source with the specified voltage rating.
- Unless otherwise stated in the Installation Instructions, and in adherence to local Electrical Codes, MultiDyne® Equipment should only be plugged into a standard 15-amp dedicated circuit.

	<b>Warning</b> –indicate danger that requires proper procedures or practices to prevent injury or death to personnel.
	<b>Cautions</b> indicate proper procedures or practices to prevent damage to equipment or property.
	<b>Warning</b> –The safe operation of this product requires that a protective earth connection be provided. A grounding conductor in the equipment's mains supply cord provides this protective earth. To reduce the risk of electrical shock to the operator and service personnel, this ground conductor must be connected to an earthed ground. The mains plug shall remain readily operable.
	<b>Warning</b> –The apparatus shall not be exposed to dripping or splashing and that no objects filled with liquids, such as vases, shall be placed on the apparatus.
	<b>Warning</b> - This symbol on the equipment indicates for use at altitudes not exceeding 2000 m.
	<b>Warning</b> - Contact your local authority for further details on the correct disposal of this waste, in accordance with your national legislation.

## Laser Safety Information

This unit is classified as a CLASS 1 LASER PRODUCT according to EN60825-1 (EU) and FDA 21CFR 1040.10 (USA). Class 1 laser products are considered safe and do not result in biological hazard if used according to these instructions.



	<b>Warning</b> – Use of controls, adjustments, or performance of procedures other than those specified herein may result in hazardous radiation exposure.
	<b>Warning</b> – Never look directly into the end of the optical fiber while either end of the system is operating.
	<b>Warning</b> – Never clean an optical fiber connector on equipment or cable that is carrying light.
	<b>Warning</b> – Always use dust caps on fiber optic connectors when cables are not connected. This will protect the connector from damage and accidental exposure of a human eye to an operating laser.

## High Voltage Warnings

### High Operating Voltage, 325 V<sub>DC</sub>!!!

**Safety lockout mechanisms are employed to prevent potentially lethal shock hazard!!!**

**The QS4-APE and SB-APE products are designed to operate in combination with the MultiDyne HUT-APE AC mains operated power supply *ONLY*; attempting to power these devices by any other power source is prohibited as it could create a dangerous safety risk to the user as well as causing permanent damage to the device!!!**

## Overview

The HUT-APE system is an HDTV camera power supply compatible with multiple, popular HDTV camera manufacturers. It enables you to replace long runs of the bulky and expensive hybrid fiber cable that connects your camera and CCU with inexpensive fibers alone. It does this by moving the camera power injection from the CCU side to the cam side. It consists of a breakout adapter, known as the HUT-BS, that attaches to the SMPTE connector on your CCU. This enables you to connect two fibers going to the cam side using ST connectors, and it also tricks the CCU into thinking that your camera is still attached by the hybrid fiber cable. At the cam side of these fibers is the HUT-APE, which takes these two fibers and routes them to a SMPTE hybrid fiber connector. It also plugs into local mains power and injects various DC voltage for your camera into that same SMPTE connector, which now connects to the camera via a much shorter length of hybrid fiber cable. The HUT-APE performs the same safety checks on this cable as your CCU does, and it also allows remote powering down of your camera from the CCU side.

The **SB/QS4-APE** remote power extenders are covered independently in [Section 3](#).

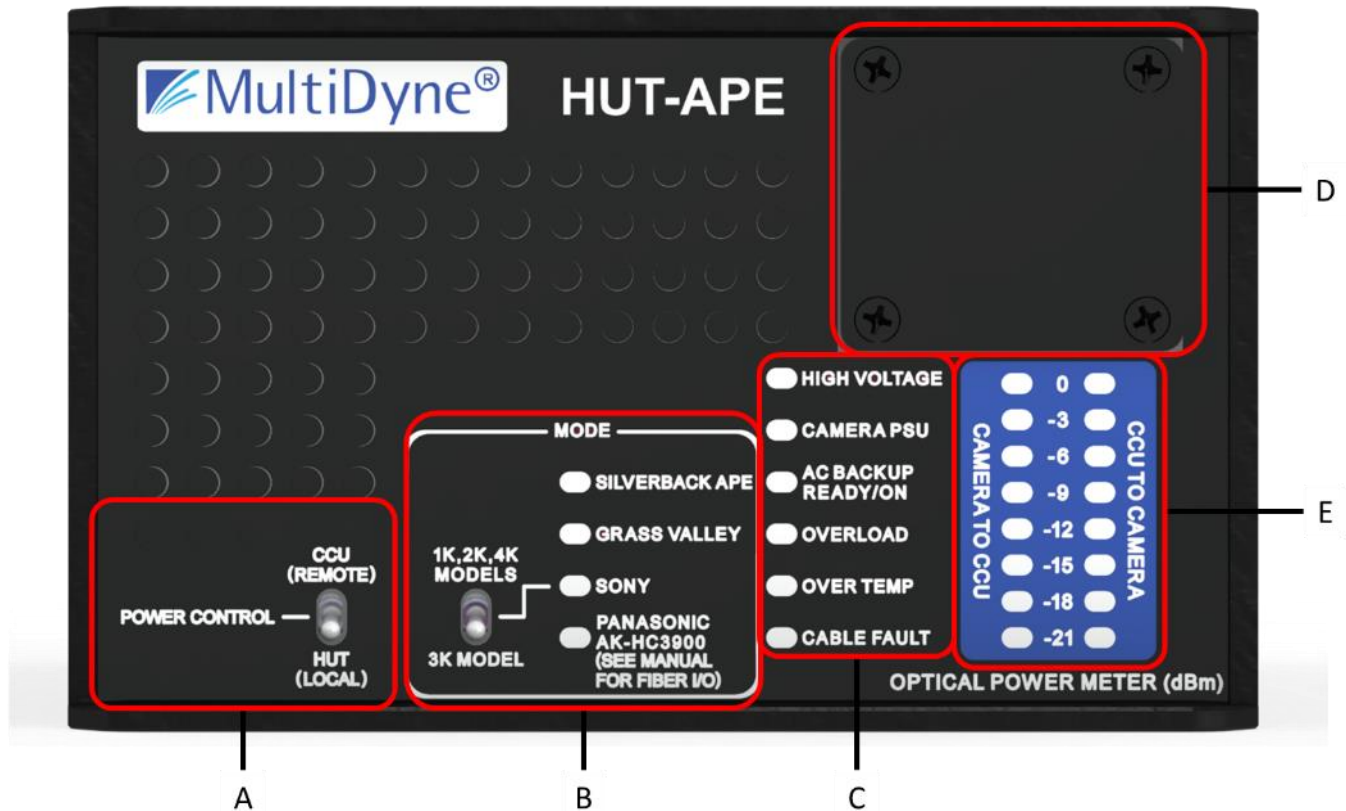
The **VB-APE** remote power extender is covered in [Section 4](#).

## Key Features

- High-efficiency power supply delivers up to 325W of power
- Natively compatible with specific Sony, Grass Valley, and Panasonic Camera models
- 2RU tall, 1/3 RU wide form factor allows three units to fit in standard 19" rackmount side-by-side
- Dual AC inputs provide auto-failover protection preventing camera dropouts
- Built-in optical power meter for easy system setup and status monitoring
- Fiber patch panel is interchangeable between the front or rear panel

## 1. Feature Descriptions

### 1.1. Front Panel



#### A. POWER CONTROL

**CCU (REMOTE)** – This switch position selects the HUT-APE operating mode to monitor the optical power received from the CCU and use it as a mechanism to electronically switch the output voltage, thereby enabling remote ON/OFF control capability for the connected camera.

**HUT (LOCAL)** – This switch position enables the HUT-APE to switch the output voltage on or off based solely on the sense line control signals from the camera.

#### B. MODE

Upon power-up, or whenever the unit is powered on with no SMPTE cable attached, the HUT-APE enters the “search” mode, monitoring the SMPTE port for a valid load device connection (MultiDyne APE; Grass Valley, Sony, or Panasonic Cameras). When one of these products is detected, the HUT-APE will halt searching, configure itself for the detected load’s operating parameters and illuminate the appropriate LED. **The SONY switch must be set to the appropriate model series for correct camera detection, see bottom label for camera list.**

**APE Series** – Green LED indicating the MultiDyne Advanced Power Extender (APE) is connected to the SMPTE output. See [Section 3](#) for details.

**GRASS VALLEY** – Green LED indicating a Grass Valley LDX camera is connected to the SMPTE output.

**SONY** – Green LED indicating a Sony 1K, 2K, 3K, 4K, or 5K series camera is connected to the SMPTE output.

**PANASONIC AK-HC3900** – Green LED indicating a Panasonic AK-HC3900 camera is connected to the SMPTE output. See [Section 7](#) for reference on the note about *Fiber I/O*.

## C. Status Indicators

**HIGH VOLTAGE** – This indicator is off when the HUT-APE is in the start-up/standby mode (i.e., low voltage output), lights up green when the camera is connected and its power switch is in the ON position, and red if the high voltage is on but the output voltage is lower than the specified operating range.

Each of the camera systems, as well as the MultiDyne APE power supply, initially power-up using a low voltage in the 15 – 45 VDC range to operate low power detection and startup circuitry providing a handshake between the camera and the CCU thereby establishing a valid connection.

**CAMERA PSU** – Lights up red when no communication has been established between the HUT-APE and one of the above compatible devices or green when a functional link is detected.

**AC BACKUP READY/ON** – Off if no secondary/backup source is present; lights up green when the HUT-APE is operating on the main power source with the backup power source present (“normal” dual AC source operating mode), lights red when the main power has dropped/failed with the unit now relying on the backup power source, and then alternates between red and green when the main power source is re-applied, and monitored for 30 seconds to verify stability before another seamless transition back to the main power source; in which case the LED returns to solid green.

The HUT-APE is equipped with “Main” and “Backup” AC inlets that provides seamless transition to a secondary AC mains power source in case the main power source either drops below the specified operating voltage range of the HUT-APE (brown-out condition) or fails completely. No variation in the HUT-APE output voltage will occur, thereby maintaining glitch-free video/sound performance from the connected camera system.

**OVERLOAD** – Off under normal operating conditions, lights up red when the HUT-APE output is loaded beyond 90% of the total output rating, and flashes between red and orange if the over-current detection has been triggered, placing the HUT-APE in the 20 second retry interval cycle.

**OVER TEMP** – This Indicator displays multiple fault conditions related to the cooling of the HUT-APE

1. Locked rotor indication – If the rotor is locked by an obstruction or failure of the motor, the LED will light red.
2. Internal overheating – If the internal operating temperature exceeds a safe limit for the electronic components, the LED will flash red as the HUT-APE enters a 2-minute shutdown

period (high voltage to camera is disabled) to allow for cooling. If the internal temperature has returned to safe operating level after this time, the output power will be re-applied. If the internal temperature does not recover from the overheated condition, the output will remain off and the LED will continue to flash red.

**CABLE FAULT** – Lights red if the SMPTE cable: 1. Is not connected to one of the specified cameras or APE power supply (cable open), 2. Has an internal electrical conductor broken (cable open), or 3. Has a short between any of the internal electrical conductors (cable shorted).

The HUT-APE checks and monitors conditions of the SMPTE cable during both the “search” phase and while in normal operation (high voltage output enabled). Each of the internal conductors are monitored, the red and gray sense wires, the black and white power wires, and the ground shield. When a fault is detected in the standby/startup mode (low voltage output), the HUT-APE will prohibit the high voltage output from being enabled. If the system is already in normal operation and a fault occurs, the high voltage will immediately be disabled, and the HUT-APE will protect itself from output short conditions.

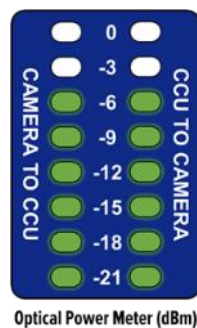
#### D. Fiber Plate

The fiber port connections can be installed on the front or rear panels to conveniently handle various installation requirements. See the [Moving the Fiber Plate](#) section for details.

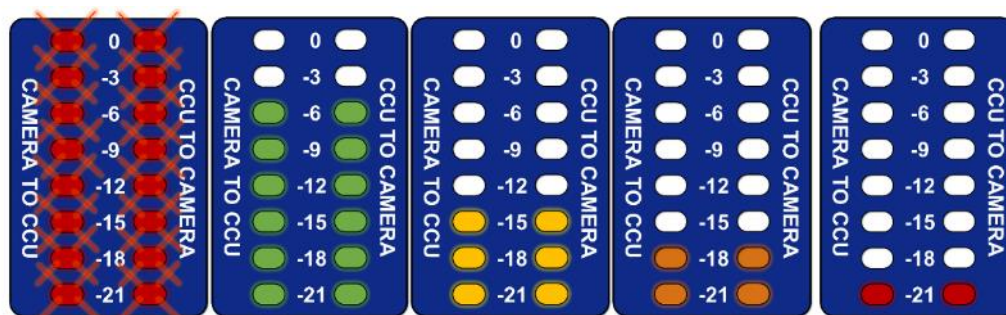
#### E. Optical Power Meter

Two columns of 8 LEDs each form meters to display the optical power level in dBm for both the *CCU-to-Camera* and the *Camera-to-CCU* fiber optic paths.

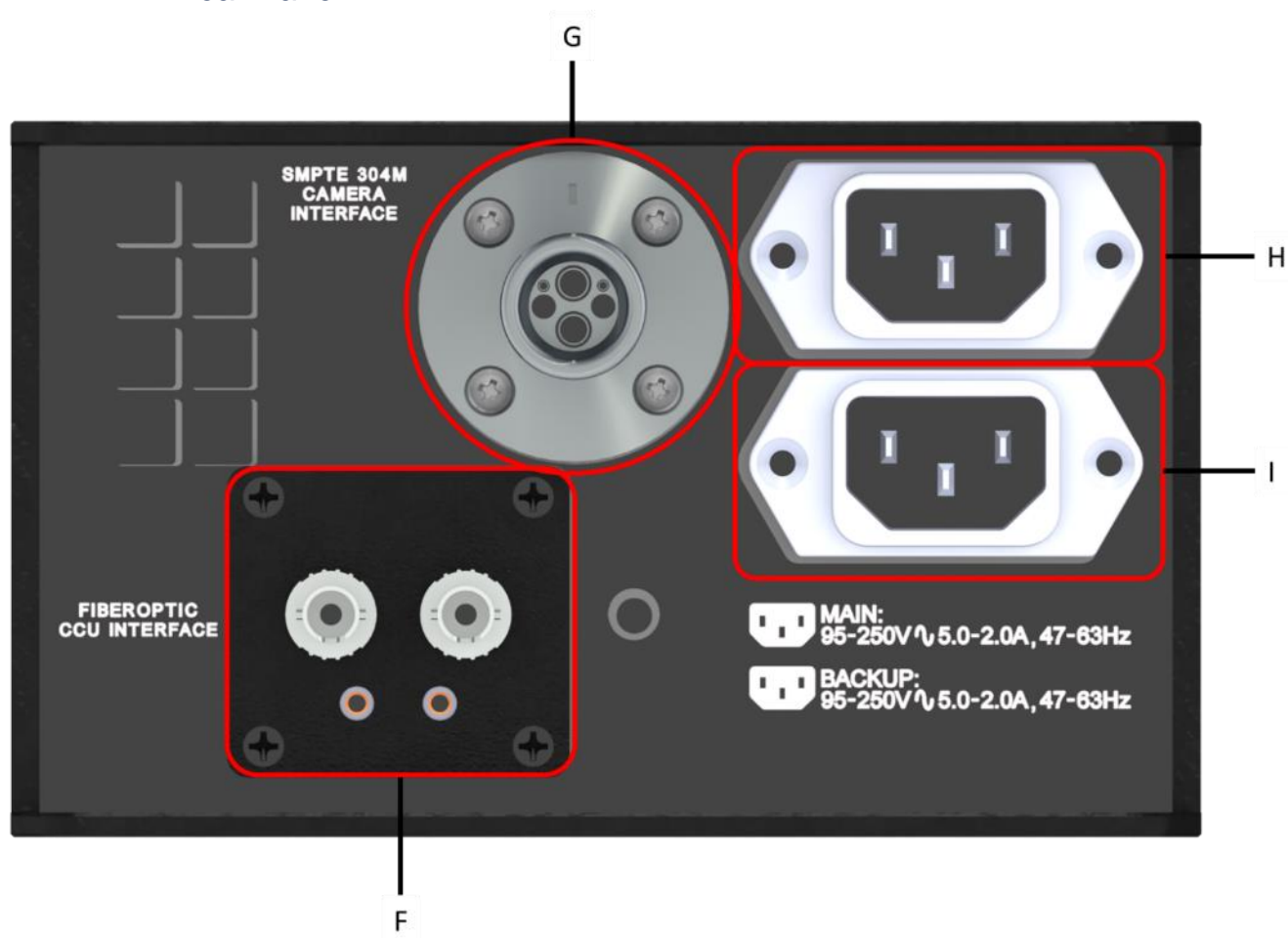
This example shows a good operating status. The optical power from both the CCU and camera is at -6 dBm.



This graphic shows the LED display change as the range of optical power, from overload (>0 dBm) to minimum detectable signal (-21 dBm), changes. Optical power greater than 0 dBm will cause all the LEDs to blink red. Optical power less than -21 dBm cannot be read on the meter.



## 1.2. Rear Panel



### F. Fiber Plate

The HUT-APE has multiple fiber I/O options, including ST/UPC, LC/UPC, SC/UPC, or Neutrik® opticalCon® Duo. By default, it is installed on the rear panel from the factory. The fiber port plate can be moved to the front panel to conveniently handle various installation requirements. See the [Moving the Fiber Plate](#) section for details.

### G. Lemo® SMPTE 304M Plug (FXW.3K.93C)

Power Supply Output. Connect directly to camera or APE Series Power Extenders with SMPTE ST311 hybrid cable.

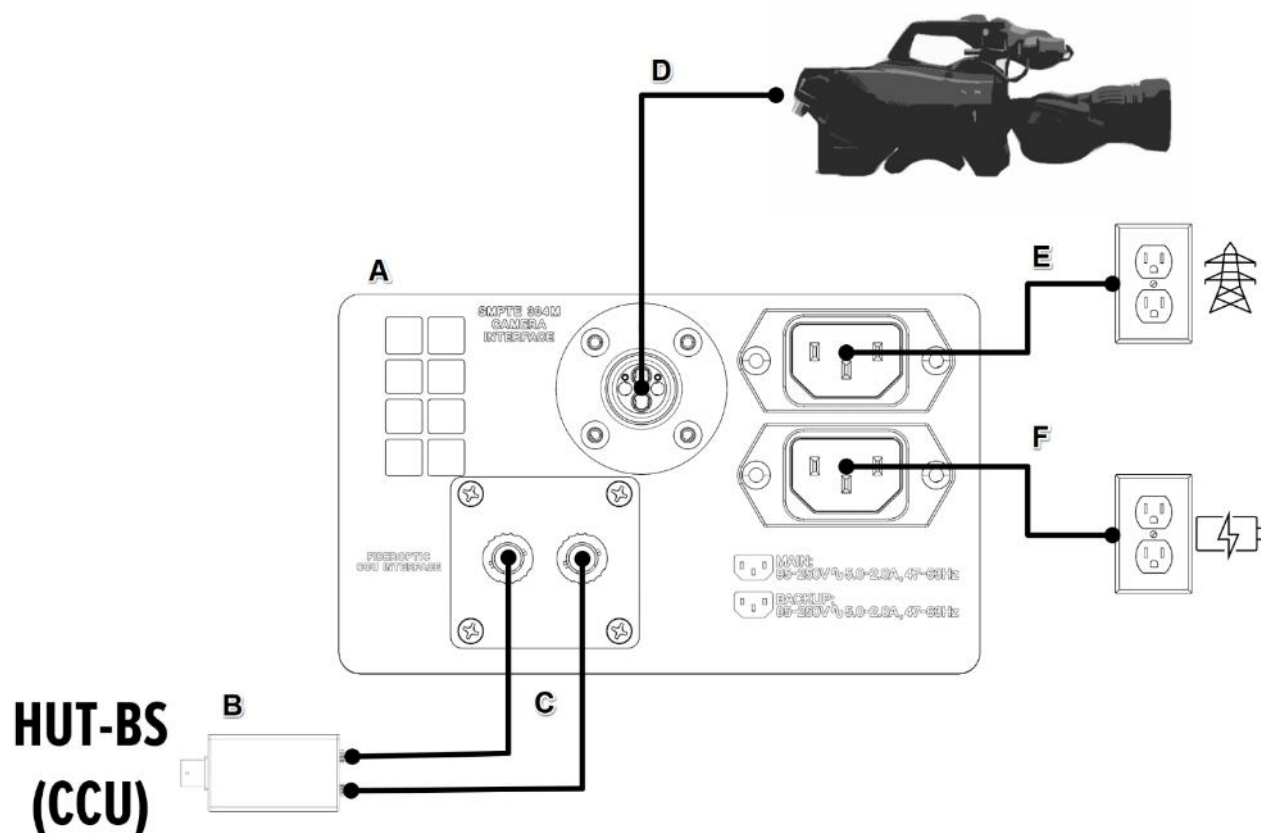
### H. MAIN AC Input

Primary AC power input. If only one power source is available, use this input.

### I. BACKUP AC Input

Secondary AC power input. Connect to backup generator or other power source.

## 1.3. Connection Diagram

**A. HUT-APE****B. HUT-BS (See section [HUT-BS](#))**

Connect hybrid connector to CCU hybrid connector either directly or with SMPTE ST 311 patch cable.

**C. SINGLEMODE FIBEROPTIC CABLE**

Connect dry (unpowered) fiber cables between the fiber connector(s) on HUT-BS and the "dry" fiber connector(s) on the HUT-APE.

**D. HYBRID FIBEROPTIC SMPTE ST 311 CABLE**

Connect a length of hybrid fiber cables between the HUT-APE and the hybrid connector on the camera / Silverback-APE.

**E. PRIMARY AC**

Use the included AC power cable to connect HUT to AC mains.

**F. SECONDARY AC**

Use the included AC power cable to connect HUT to backup generator.

## 2. HUT-BS (CCU Side)



The Base unit, known as HUT-BS, has a SMPTE hybrid receptacle panel mount connector for connection to the CCU and 2 ST/UPC or duplex LC connectors for the fibers to the HUT-APE. As on the HUT-APE, the ST/LC/SC connectors are labeled FROM CCU and TO CCU. The same considerations concerning the fiber labels should be observed, as on the HUT-APE.

The HUT-BS acts as a breakout for the optical ports in the CCU SMPTE connector. It also tricks the CCU into thinking a camera is attached by a SMPTE hybrid fiber cable. This is necessary to enable the CCU to leave standby mode so that it can accept video from the camera. It has 2 LEDs located on the panel with the ST connectors, labeled Power and HV. The Power LED is green the CCU is supplying power to the HUT-BS, and the HUT-BS is attempting to spoof the CCU. The HV LED is green when the CCU is supplying high voltage. This means that the HUT-BS has successfully spoofed the CCU into thinking a camera is attached. Otherwise, the CCU will not leave standby mode.

For proper operation, the HUT-BS must be set for the type of camera system being used. There are 2 versions of HUT-BS: one with dip switches, and a rugged version with metal bat handle switches. Set the HUT-BS for the camera type according to the following tables:

Front Panel DIP Switch Settings:

Manufacturer	SW1	SW2	SW3	SW4	SW5	SW6	SW7
<b>Grass Valley</b>							
<b>Panasonic</b>	down	down	up	up	up	up	up
<b>Sony</b>	down	up	up	up	up	down	down

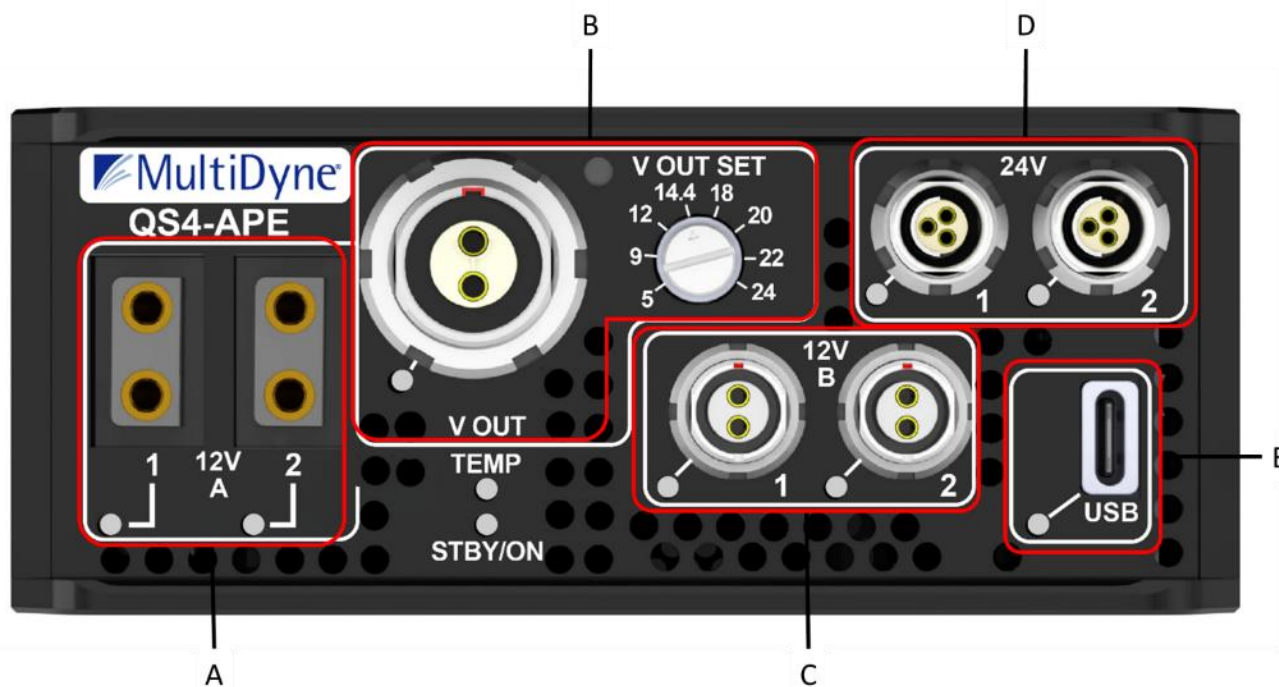
### 3. SilverBack SB-APE and QS4-APE Remote Power Extension

#### Overview

The **QS4-APE** and **SB-APE** [SilverBack] products, combined with MultiDyne's HUT-APE, provide a remote power extension and distribution solution for various television broadcast electronic devices such as cameras, prompters, viewfinders, lights, etc., through SMPTE Hybrid Video Cable.

- The QS4-APE model is a versatile “throw-down” unit providing a selectable 5 V<sub>DC</sub>, 9 V<sub>DC</sub>, 12 V<sub>DC</sub>, 14.4 V<sub>DC</sub>, 18 V<sub>DC</sub>, 20 V<sub>DC</sub>, 22 V<sub>DC</sub> or 24 V<sub>DC</sub> [main output](#) via a LEMO EEG.2B.302.CLL connector for general applications, as well as multiple accessory outputs: 2, D-Tap/P-Tap 12 V<sub>DC</sub> outputs; 2, LEMO EEG.0B.302.CLL connector 12 V<sub>DC</sub> outputs; 2, Fischer DBP 102 A052-139 connector 24 V<sub>DC</sub> outputs and a “power only” USB-C port to operate and charge devices such as cell phones, computer tablets etc. with up to 15 W<sub>DC</sub> available power.
- The SB-APE model is tailored specifically to “camera-back” operation, where the APE power supply is integrally joined with MultiDyne's camera docking SilverBack product. The main output from the SB-APE model is ported to one of three selectable outputs to provide optimal flexibility: A 3-Pin Female XLR for 24 V<sub>DC</sub> output, a 4-Pin Female XLR for 12 V<sub>DC</sub> output or a battery emulator plate affixed to the SB-APE to dock directly onto the camera's battery plate. The voltage output to the camera is automatically adjusted to 12 V<sub>DC</sub> or 24 V<sub>DC</sub> based on configuration information detected from the battery plate on the camera. Additionally, the same complement of accessory outputs mentioned above for the QS4-APE model are also present on the SB-APE model.

### 3.1 QS4-APE Front Panel



#### A. 12 VDC Port A

Two industry standard D-TAP/P-TAP connectors provide 12 VDC at up to 10 ADC from either a single connector, or the shared total between them, to power remote accessories.

#### B. Main Variable Output

The main output is the only variable output port in the APE system. The main output can be set to any of the 8 voltages listed above in the “[Overview](#)” section and is connected singularly to one LEMO EEG.2B.302.CLL connector. The 25ADC rating of this connector allows the lower selectable voltages, 5 VDC to 12 VDC, to support the total output power capabilities of the APE.

#### C. 12 VDC Port B

Two LEMO EEG.0B.302.CLL 2-pin connectors provide 12 VDC at up to 10 ADC in either a single connector, or the shared total between them, to power remote accessories.

#### D. 24 VDC Port

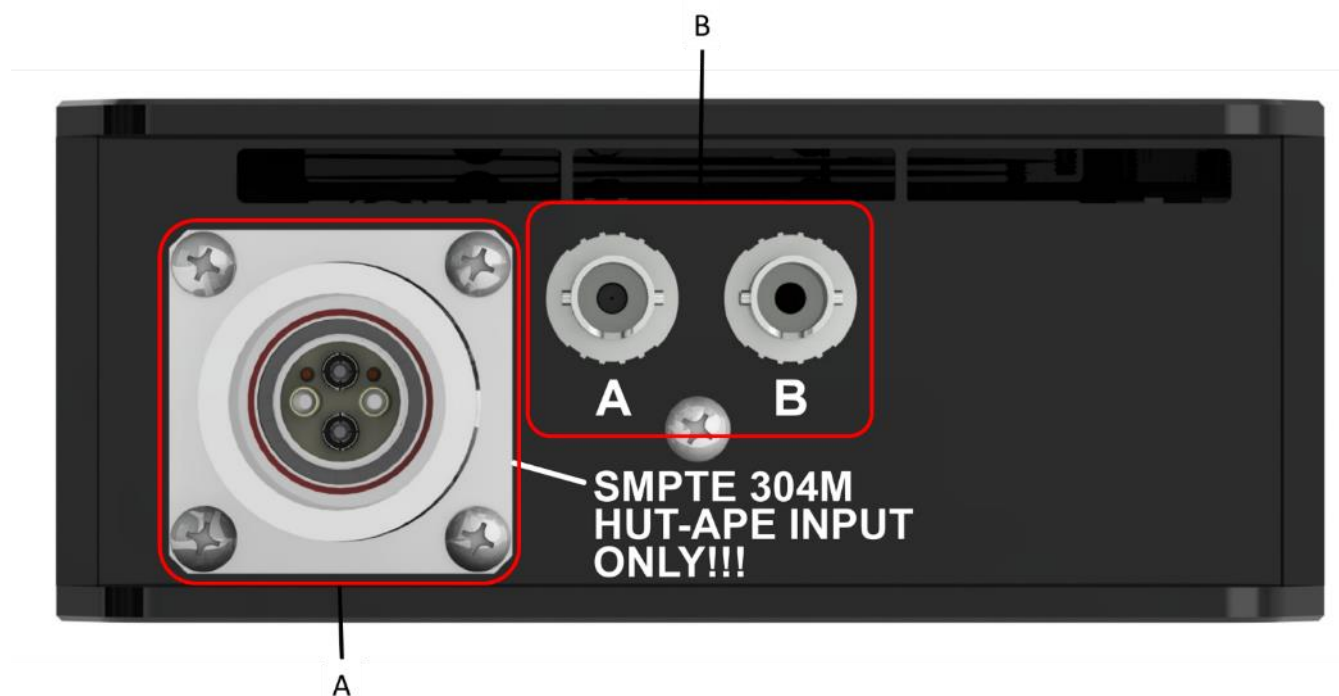
Two Fischer DBP 102 A052-139 3-pin connectors provide 24 VDC at up to 8 ADC in either a single connector, or the shared total between them, to power remote accessories.

#### E. USB-C Port

Provided to charge or power devices like cell phones, tablets, headphones etc., compliant to USB Power Delivery Specification 2.0/3.0, USB Type C-1.2 (5 VDC @ 0.1–3.0ADC, 15W total).

[Section 3.5.8](#) details LED functionality.

### 3.2 QS4-APE Rear Panel



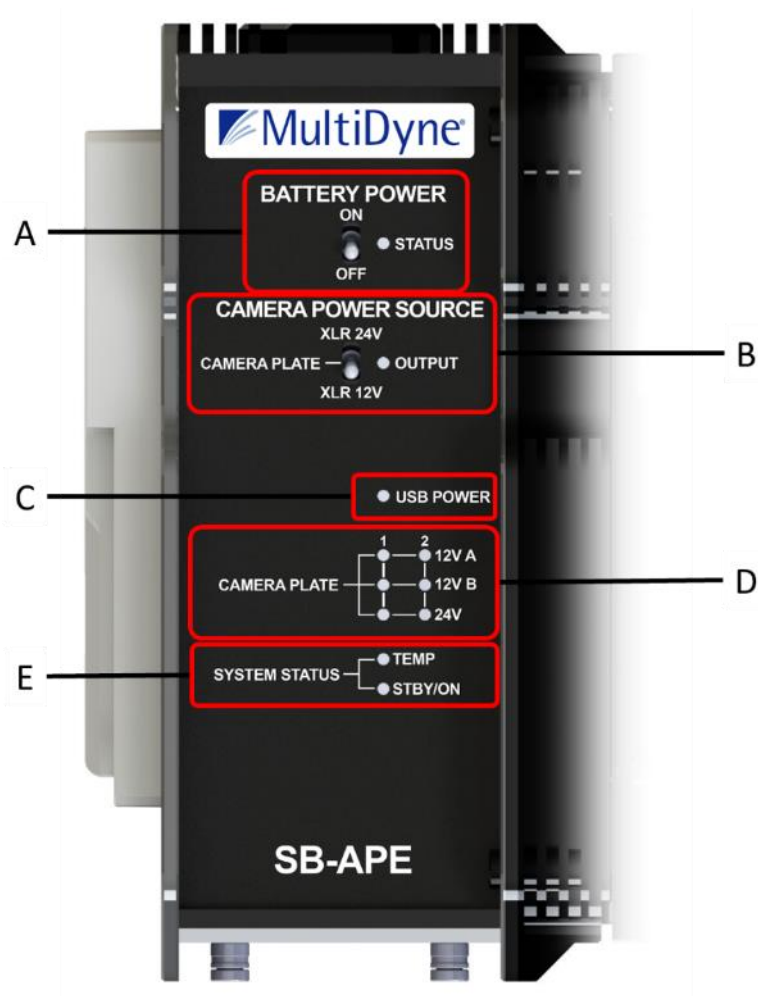
**A. Lemo EDW.3K.93C**

SMPTE (ST 304) hybrid cable connection to **HUT-APE** only, as noted on rear label.

**B. ST/UPC I/O**

Dry Fiber breakout from SMPTE hybrid cable, interface with camera optics.

### 3.3 SB-APE Front Panel



#### A. BATTERY POWER

See [Section 3.5.5](#) [switch] and [3.5.8](#) [LED]

#### B. CAMERA POWER SOURCE

This switch controls both the voltage on the main output(s), as well as which connector the output power will be sourced from: XLR-3, a fixed 24 VDC output; XLR-4, a fixed 12 VDC output or the battery emulation plate (B-Mount, G-Mount, V-Mount etc.) where the output voltage is automatically set to 12 VDC or 24 VDC by the APE main board, determined by configuration data sensed from the camera battery plate. See [Section 3.5.6](#)

#### C. USB POWER

Status LED: Green for power good

#### D. CAMERA PLATE

See [Section 3.5.8](#) for detailed LED functions.

#### E. SYSTEM STATUS

See [Section 3.5.8](#) for detailed LED functions.

### 3.4 SB-APE Rear Panel



#### A. USB POWER

Provided to charge or power devices like cell phones, tablets, headphones etc., compliant to USB Power Delivery Specification 2.0/3.0, USB Type C-1.2 (5 VDC @ 0.1–3.0ADC, 15W total).

#### B. 12V “A” PORT — DTAP

Two industry standard D-TAP/P-TAP connectors provide 12 VDC at up to 10 ADC from either a single connector, or the shared total between them, to power remote accessories.

#### C. 12V “B” PORT

Two LEMO EEG.0B.302.CLL 2-pin connectors provide 12 VDC at up to 10 ADC in either a single connector, or the shared total between them, to power remote accessories.

#### D. 24 VDC PORTS

Two Fischer DBP 102 A052-139 3-pin connectors provide 24 VDC at up to 8 ADC in either a single connector, or the shared total between them, to power remote accessories.

#### E. and F. XLR POWER OUTPUTS

The SB-APE model routes the main output to one of 3 selectable output ports: An XLR-3 @ 24 VDC output; XLR-4 @ 12 VDC output or the battery emulation plate (B-Mount, G-Mount, V-Mount etc.) where the output voltage is automatically set to 12 VDC or 24 VDC by the APE main board, determined by configuration data sensed from the camera battery plate. Further details on the use and capabilities of this port are provided below in the [“Toggle Switch Selection”](#) section.

## 3.5 Theory of Operation

In “standby” operation, a  $\approx 45\text{ V}_{\text{DC}}$ , SELV (safety extra-low voltage) pilot voltage is used to energize the control logic and safety circuits to determine whether the interconnection with the HUT-APE power supply through the SMPTE cable is free of fault conditions, such as shorts between conductors, open conductors, or excessive current leakage between the shield to other conductors i.e., a ‘ground fault’.

When a reliable connection has been established, the SB- / QS4-APE main board will send a proprietary signal to the HUT-APE through one of the sense wires in the SMPTE cable to communicate to the HUT-APE what type of device it is connected to, the SilverBack, QS4, or other APE Series. Once that determination has been established, the HUT-APE enables the  $\approx 325\text{ V}_{\text{DC}}$  high voltage output required for “standard” operation of the system.

### 3.5.1 Port Prioritization and Total Power Output Capabilities

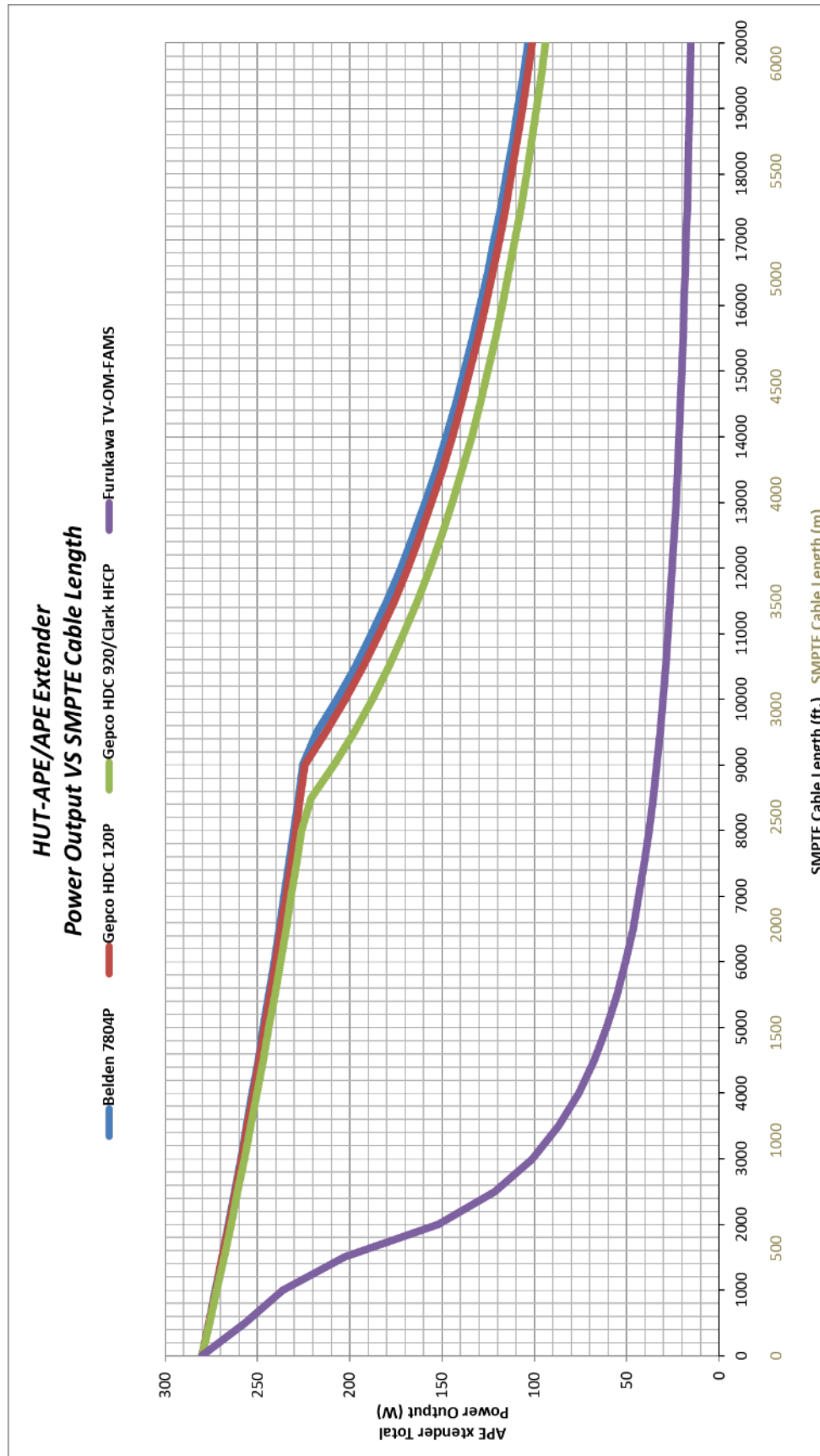
APE units prioritize the Main Output over the other outputs in the system as it is generally used for the most “essential” load in a particular use case, i.e., camera power etc. If the main output port load exceeds 225 W, the other outputs (excluding the USB port) will be shut down to ensure the main output receives the power it needs to remain active.

To provide the greatest user flexibility, each of the regulated output ports has a current limit determined by safe operating limits of the electronic components and output connector ratings specified by their respective manufacturers. However, the **outputs cannot all be loaded to their limits simultaneously as this would far exceed the total power available from the HUT-APE combined with the additive resistance impact of the SMPTE cable with increasing length.**

The actual, total available power output from the APE needs to be calculated, based on the combined total power drawn from each port and compared to the data on the graph on the next page.

If the combined load of all outputs on the APE exceeds the total power rating for any given cable length, as shown in the chart, system instability can occur. If there is a backup battery being used with the system, it will help eliminate the instability, but at the expense of battery life, i.e., the APE will intermittently be operating between SMPTE power and battery power which is not a preferred mode of operation.

In cases where the APE average output power may be limited by cable length resistance effects, battery backup can seamlessly provide temporary surge currents if required by load switching, startup etc., on the APE outputs.



### 3.5.1.1 Example QS4 Power Budget Calculation

Named equipment/specs for illustration purposes only. See [Specifications](#) for each port's MAX power rating. Consult Manufacturer for exact power requirement.

1) Available Power	<u>SMPTE Cable Length</u>	<u>Cable Type</u>	<u>Rating From Graph</u>
	2,000 ft	7804P	265W

2) Required Power	<u>Outputs</u>	<u>Description</u>	<u>Power</u>
	Main	Red V-RAPTOR XL Camera	50W
	12V "A" D-TAP 1	Tally light	5W
	12V "A" D-TAP 2	Camera light	17W
	12V "B" Lemo EEG 1	Shogun 7 Cinema Monitor	33W
	12V "B" Lemo EEG 2	Tilta Handgrips	1W
	24V Fischer DBP 1	Teradek Cube 605 Encoder	7W
	24V Fischer DBP 2		
	USB-C	Smartphone	15W
Total			128W

Available Power Remaining	137W
---------------------------	------

#### Template

1) Available Power	<u>SMPTE Cable Length</u>	<u>Cable Type</u>	<u>Rating From Graph</u>

2) Required Power	<u>Outputs</u>	<u>Description</u>	<u>Power</u>
	Main		
	12V "A" D-TAP 1		
	12V "A" D-TAP 2		
	12V "B" Lemo EEG 1		
	12V "B" Lemo EEG 2		
	24V Fischer DBP 1		
	24V Fischer DBP 2		
	USB-C		
Total			

Available Power Remaining
---------------------------

### 3.5.2 Independent Connector Current Monitoring

Current monitoring is provided on each output connector for controlling shutdown of individual ports in case of output overload, allowing the other ports to remain active.

1. For any given port, the current measurement from each of the 2 connectors are added together and used by the control circuits to limit the total output from the port.
2. Current limit Settings per Port (These are maximum ratings assuming a single port output load with a short SMPTE input cable. Total aggregate power from multiple port loads can't exceed limits shown on the graph on [p. 20](#)).
  - a. Main, Variable Output
    - i. QS4-APE w/ LEMO EEG.2B.302.CLL output connector.
      1. 5 V<sub>DC</sub>, 25 A<sub>DC</sub>
      2. 9 V<sub>DC</sub>, 25 A<sub>DC</sub>
      3. 12 V<sub>DC</sub>, 23.3 A<sub>DC</sub>
      4. 14.4 V<sub>DC</sub>, 19.4 A<sub>DC</sub>
      5. 18 V<sub>DC</sub>, 15.5 A<sub>DC</sub>
      6. 20 V<sub>DC</sub>, 14 A<sub>DC</sub>
      7. 22 V<sub>DC</sub>, 12.7 A<sub>DC</sub>
      8. 24 V<sub>DC</sub>, 11.6 A<sub>DC</sub>
    - ii. SB-APE w/ XLR-4 (12 V<sub>DC</sub>), XLR-3 (24 V<sub>DC</sub>) or battery emulation plate (12 V<sub>DC</sub>/24 V<sub>DC</sub>).
      1. XLR-3, 24 V<sub>DC</sub>, 10 A<sub>DC</sub> (connector limited)
      2. XLR-4, 12 V<sub>DC</sub>, 10 A<sub>DC</sub> (connector limited)
      3. Battery Plate Emulator, 12 V<sub>DC</sub>/24 V<sub>DC</sub>, 10 A<sub>DC</sub> (plate connector limited)

### 3.5.3 Port Overload Functionality

If current demand from one of the outputs exceeds specified limits, the port will be temporarily disabled and then attempt to restart every few seconds to determine whether the load has been modified to operate within allowable limits. If the load is acceptable, the output will remain energized.

### 3.5.4 Multi-point Thermal Measurement

The devices used for current monitoring on the individual output connectors also provide thermal data from multiple locations on the circuit board to the processing circuits. The thermal data is compared, and the highest temperature point is used as the feedback source for controlling the cooling fan. This prioritizes cooling for sections of the board with the greatest demand while also optimizing the fan speed for minimum noise with any given load condition.

Thermal overload limits are detectable from each monitoring device. If a limit is exceeded, the output related to that specific monitor is disabled. If internal heat continues to rise, each output will be shut down relative to its associated monitoring device until all outputs are disabled (except the USB port).

### 3.5.5 Auto-selection of power input source (SB-APE Only)

The primary power source for the APE power supply is from the HUT-APE AC Line powered power supply, through SMPTE hybrid cable. However, 24 VDC battery backup support is also provided to allow cameras or other APE powered equipment to be removed from the HUT-APE/SMPTE power source and re-located, if desired, without having to power down the attached device. This saves boot-up time and prevents configuration data loss. In the event SMPTE power is lost, either by a system fault or deliberate disconnection to re-locate the equipment, the transition of input power between the SMPTE power and battery backup, and vice versa, occurs seamlessly causing no disruption in the operation of the load device attached.

### 3.5.6 Battery Plate Operation and Configuration (SB-APE model only).

Depending on the battery plate type the camera or other load is supplied with; G-Mount, V-Mount etc., the APE will monitor this sense line to determine the operating voltage required by the load device, then output that result to the battery plate power pins.

Factory preset configuration options for this pin are:

- No connection
- [V-] connection
- Series resistor to [V-]

One of these options is selected to determine whether the power output to the load device is set to 12 VDC or 24 VDC, accordingly:

#### **G-Mount and V-Mount Battery Plates**

(Separate pins are provided on these plates for the 2 power options: A [V+] terminal for 12 VDC operation and a [VH+] terminal for 24 VDC operation).

- Sense pin [SW] connected to [V-] terminal - APE main output is set to 24 VDC.
- No connection on the sense pin [SW] - APE main output is set to 12 VDC.

#### **B-Mount Battery Plate**

- Sense pin ("ID") connected through a 22k ohm resistor to ground for 12 VDC operation.
- Sense pin ("ID") connected through a 47k ohm resistor to ground for 24 VDC operation.

### 3.5.7 Toggle Switch Selection (SB-APE model only)

The main output voltage is controlled by a 3-way toggle switch mounted on the SB-APE control/display panel. This switch controls both the voltage on the main output(s), as well as which connector the output power will be sourced from: XLR-3, a fixed 24 VDC output; XLR-4, a fixed 12 VDC output or the battery emulation plate (B-Mount, G-Mount, V-Mount etc.) where the output voltage is automatically set to 12 VDC or 24 VDC by the APE main board, determined by configuration data sensed from the camera battery plate.

### 3.5.8 LED Display Functionality

When the QS4-APE or SB-APE starts, i.e., transitions from standby to standard operation, the output ports are energized in a staggered time sequence to spread out the initial turn-on surges from multiple loaded ports, greatly reducing the initial input surge current required from the HUT-APE power supply.

#### **STBY/ON** (QS4-APE only, see below for SB-APE operation)

Solid Orange – HUT-APE is in standby mode performing initial load identification test and SMPTE cable safety check.

Solid Green – Standard Operation; High Voltage is being supplied from the HUT-APE power supply.

#### **STBY(R)/ON(G)** and **Battery Power STATUS** (SB-APE Model Only)

Below is a table listing various operational conditions and the resultant displays provided by these two indicators:

CONDITION	POWER SOURCE	BATTERY SWITCH	SMPTE POWER	“STBY / ON” LED	“BATTERY POWER STATUS” LED
Battery Present, Good SoC*	Battery	ON	STBY/LOW, OFF	ORANGE/SOLID RED	FLASHING GREEN
Battery Present, Weak SoC*	Battery	ON	STBY/LOW, OFF	ORANGE/SOLID RED	SOLID RED
Critical Battery	Battery Remnants	ON	OFF	FLASHING RED (UNTIL DEPLETED)	FLASHING RED (UNTIL DEPLETED)
No Batt or Dead Batt	HUT-APE	OFF or ON	STBY/ON	ORANGE/SOLID GREEN	OFF
Battery Present, Good SoC*	HUT-APE	OFF	STBY/ON	ORANGE/SOLID GREEN	FLASHING GREEN
Battery Present, Good SoC*	HUT-APE	ON	STBY/ON	ORANGE/SOLID GREEN	SOLID GREEN
Battery Present, Weak SoC*	HUT-APE	ON	STBY/ON	ORANGE/SOLID GREEN	SOLID RED/FLASH BETWEEN RED AND GREEN

\*SOC – BATTERY “STATE OF CHARGE”

**12V-A Port, 12V-B Port, 24V Port and the Main Output**

("V OUT" on QS4-APE, "CAMERA POWER SOURCE – OUTPUT" on SB-APE)

Off – No power is present at the output connectors.

Solid Green – Power is present at the output connectors.

Red with Green flicker every few seconds – The power is temporarily disabled to the output connectors if the current demand was higher than the specified maximum current rating for the port. A restart is attempted every few seconds (green flicker) to determine if the load has been reduced enough to operate within allowable limits.

Constant Red (simultaneously on all but Main Output and USB port) - The dominant, Main Output load requirement has exceeded 225W, so the other ports (excluding USB port) have been disabled.

**TEMP**

Lights solid Green when the internal operating temperature inside the APE power supply remains within acceptable limits.

Flashes between Green and Orange if the blower fails or the rotor gets stalled/locked.

*NOTE: The APE will remain functional up to the point where one or more of the internal over-temperature monitors triggers a thermal fault condition, resulting in the output ports being successively shut down to lower the internal temperature, protecting electronic components from catastrophic failure.*

Lights solid Red when one or more of the internal over-temperature monitors triggers a fault condition.

## 4. VB-APE Remote PTZ/POV Power Extension (VBA-FR7)

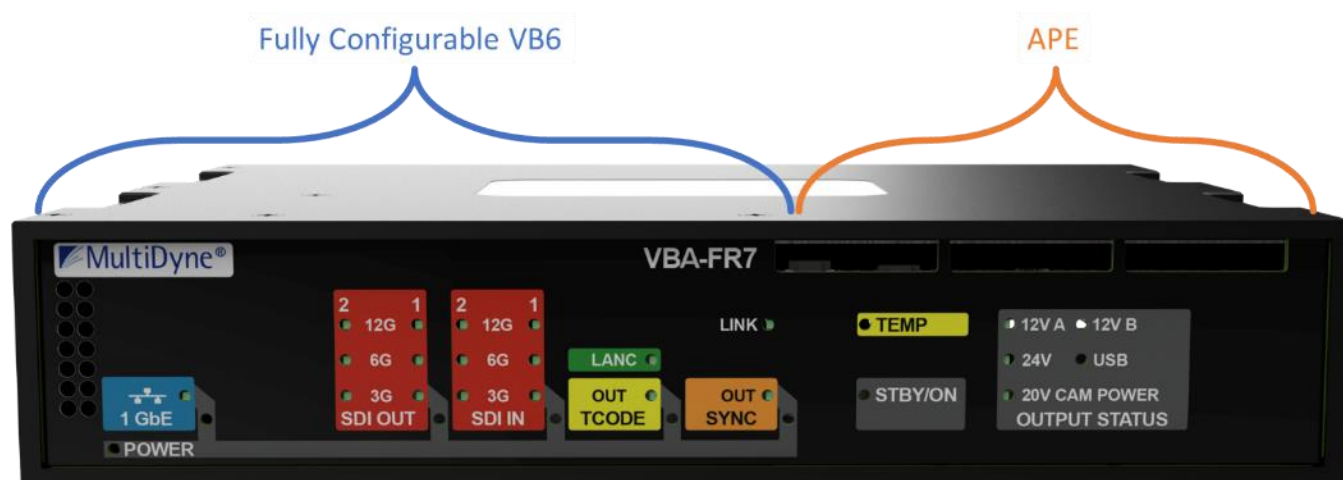
### Overview

The VB-APE combined with MultiDyne's HUT-APE provides a remote power extension and distribution solution for various PTZ/POV camera rigs through SMPTE Hybrid Video Cable. This VBA unit can be thought of as the integration of the flexible VB6 (select up to 6 VB cards) with the powerful APE power supply. The final unit is equivalent to a VB10. The scope of this manual is limited to the APE section, and a brief review of the Versatile Brix is provided for clarity:

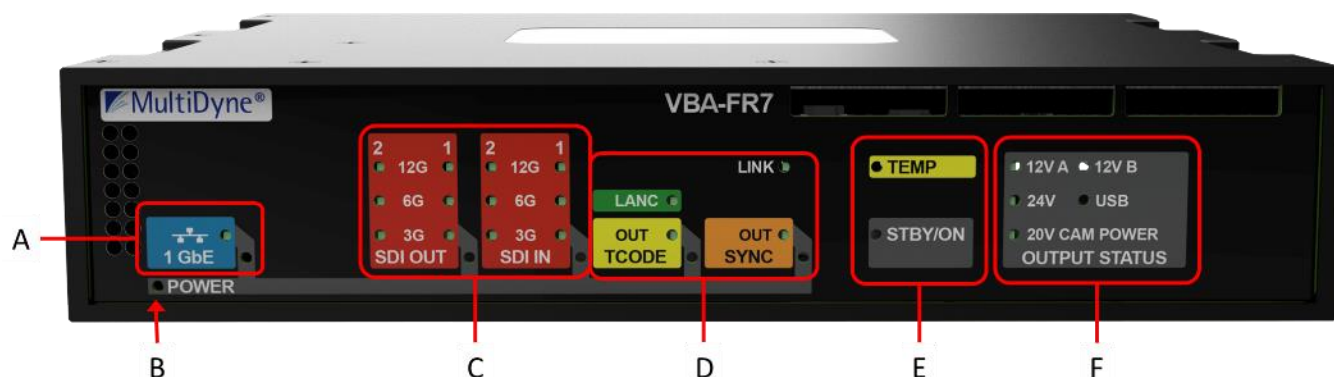
The Versatile Brix (VB) Series Box is a rack mounted stand-alone Video Serial Digital Interface (UHD-SDI) with audio, Ethernet, and data transport sub-system that extend the range limits for interfaces over fiber.

The VB Series are customized to specific customer needs and will combine, convert, receive, and transmit all video, audio, and data signals over a single optical fiber link. The system will transport digital signals for video, analog audio, Audio Engineering Society (AES) digital audio, serial data, tally, General Purpose I/O (GPIO), and Ethernet signals.

For our interactive online configuration tool, visit <https://configurator.multidyne.com/vb2/>



#### 4.1 Front Panel (Example Only, signal cards are configurable)



### VB6 (Configurable)

#### A. 1 GBE

Indicates link is established. Blinks to indicate Ethernet traffic is present.

#### B. POWER LEDs

The “POWER” bar stretches across the unit highlighting individual VB cards in the unit are properly powered as well as indicating the main power distribution bus is up.

#### C. SDI I/O

Video rates for SDI are indicated for each channel for this 2-input, 2-output config.

“SDI OUT” indicates the signals going into the BNC of the unit and being sent to the other end over fiber. “SDI IN” is the video coming into the unit from the remote end and being output on the BNC.

#### D. STATUS LEDs

Timecode, LANC, and SYNC all indicated signal is detected on their respective BNCs.

### APE

#### E. TEMP and STBY/ON

**Temperature** Lights solid Green when the internal operating temperature inside the APE power supply remains within acceptable limits.

Flashes between Green and Orange if the blower fails or the rotor gets stalled/locked. NOTE: The APE will remain functional up to the point where one or more of the internal over-temperature monitors triggers a thermal fault condition, resulting in the output ports being successively shut down to lower the internal temperature, protecting electronic components from catastrophic failure.

Lights solid Red when one or more of the internal over-temperature monitors triggers a fault condition.

### **Standby/ON**

Solid Orange – HUT-APE is in standby mode performing initial load identification test and SMPTE cable safety check.

Solid Green – Standard Operation; High Voltage is being supplied from the HUT-APE power supply.

## **F. OUTPUT VOLTAGE STATS**

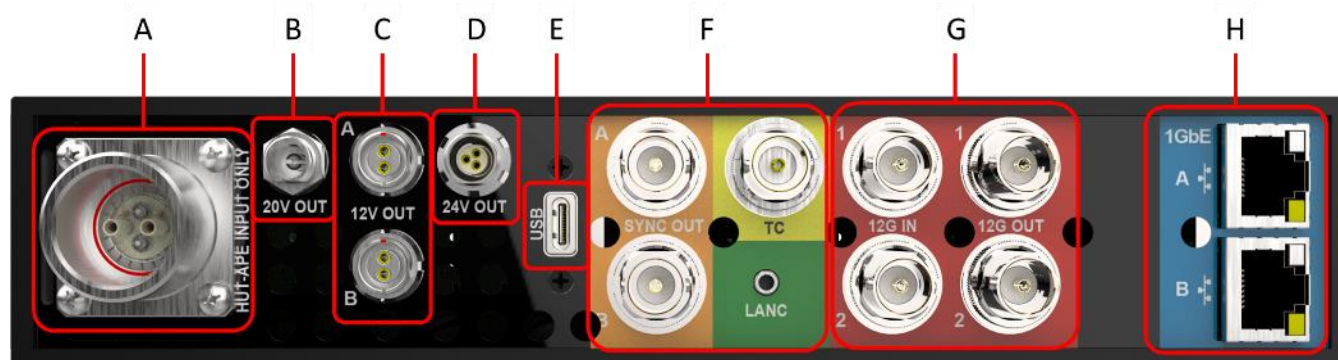
Off – No power is present at the output connectors.

Solid Green – Power is present at the output connectors.

Red with Green flicker every few seconds – The power is temporarily disabled to the output connectors if the current demand was higher than the specified maximum current rating for the port. A restart is attempted every few seconds (green flicker) to determine if the load has been reduced enough to operate within allowable limits.

Constant Red (simultaneously on all but Main Output and USB port) - The dominant, Main Output load requirement has exceeded 225W, so the other ports (excluding USB port) have been disabled.

## 4.2 Rear Panel (Example Only, signal cards are configurable)



### APE

#### **A. Lemo EDW.3K.93C**

SMPTE (ST 304) hybrid cable connection to HUT-APE only, as noted on rear label.

#### **B. Switchcraft PCL712A 2.5mm Locking Barrel Connector**

20VDC output. Center-positive

#### **C. Two LEMO EEG.0B.302.CLL 2-pin connectors**

Provide 12 VDC at up to 10 ADC in either a single connector, or the shared total between them, to power remote accessories.

#### **D. Fischer DBP 102 A052-139 3-pin connectors**

Provide 24 VDC at up to 8 ADC in either a single connector, or the shared total between them, to power remote accessories.

#### **E. USB-C Port**

Provided to charge or power devices like cell phones, tablets, headphones etc., compliant to USB Power Delivery Specification 2.0/3.0, USB Type C-1.2 (5 VDC @ 0.1–3.0ADC, 15W total).

### VB6 (Configurable)

#### **F. Genlock, Timecode, and LANC outputs**

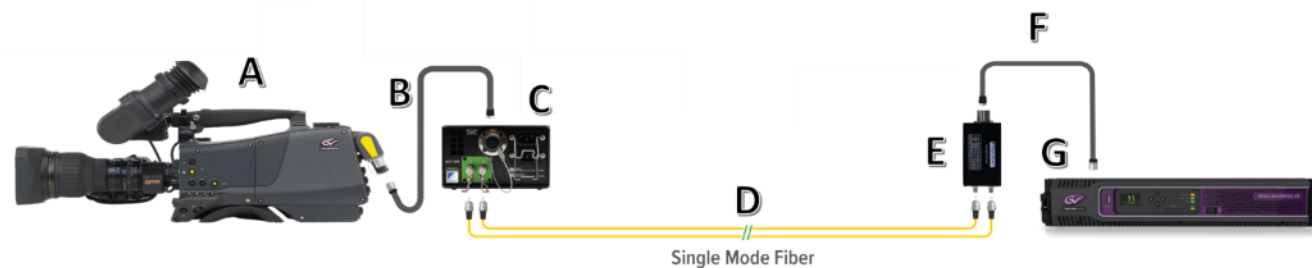
#### **G. SD/HD/3G/6G/12G-SDI I/O BNCs**

#### **H. 1GbE hub.**

1G Ethernet bandwidth is shared between both ports.

## 5. Applications

### 5.1 HUT-APE SMPTE Hybrid Fiber Elimination & Remote Studio Camera Power



- A. HDTV SMPTE Camera
- B. SMPTE Hybrid Cable. Up to 3km
- C. HUT-APE
- D. Singlemode fiber
- E. HUT-BS
- F. SMPTE Hybrid Cable
- G. Camera Controller Unit (CCU)

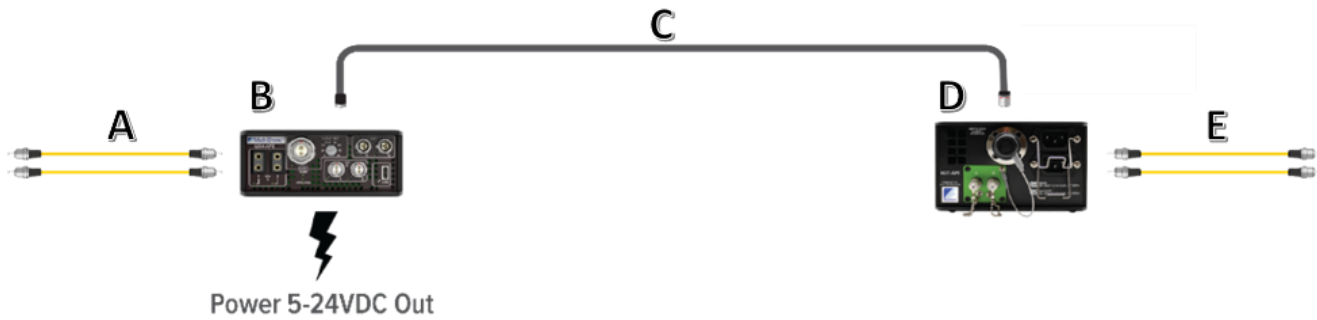
### 5.2 SB-APE + HUT-APE SMPTE Hybrid Fiber Elimination & Remote SilverBack + Camera Power

See [Appendix A](#) for a more detailed sample setup.



- A. Cine Camera
- B. SilverBack-APE
- C. SMPTE Hybrid Cable. Up to 3km
- D. HUT-APE
- E. Singlemode fiber
- F. HUT-BS
- G. SMPTE Hybrid Cable
- H. Camera Controller Unit (CCU)

### 5.3 QS4-APE + HUT-APE SMPTE Hybrid Fiber Remote Power Extension w/Dual Fiber Optical Passthrough



- A. Singlemode fiber
- B. QS4-APE
- C. SMPTE Hybrid Cable. Up to 3km
- D. HUT-APE
- E. Singlemode fiber

### 5.4 VB-APE + HUT-APE SMPTE Hybrid Fiber Remote Power Extension for PTZ/POV Cameras



- A. VBA-FR7
- B. SMPTE Hybrid Cable. Up to 3km
- C. HUT-APE
- D. Singlemode fiber
- E. VB10 Base Unit

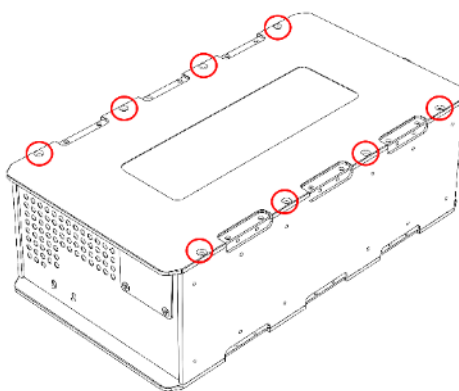
## 6. Moving the Fiber Plate

The HUT-APE allows you to have the fiber patched to the front or rear panel to handle different installation requirements. Review the following steps to relocate the fiber plate (ST/UPC shown). All work should be performed in an ESD-safe environment. Use caution not to touch any internal components. Do not contact any fiber-optic connector end faces. See [Section 6.1](#) for cleaning fibers.

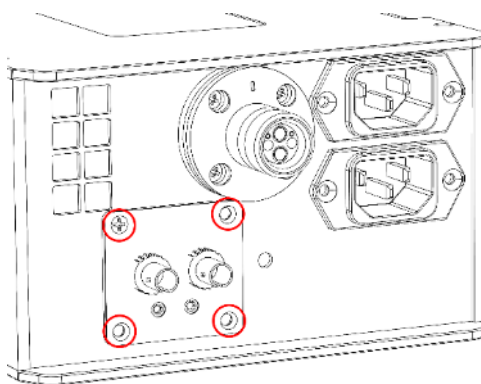
*Note: Apply medium strength thread locker on screws before closing the enclosure.*

Recommended product: Permatex 24010 Medium Strength Thread Locker Blue Gel

1. Unplug the HUT-APE power cable(s) and all connected fibers. Let the unit sit for 20 minutes for internal components to discharge.
2. Remove the eight (8) screws holding the top cover.

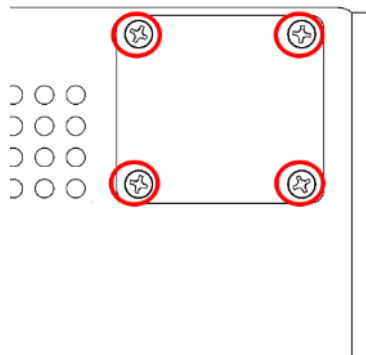


3. Remove the four (4) screws from the UFP plate and gently pull the assembly out only an inch or two. Watch for any fiber tension and do not pull hard if felt. Look inside the unit in the event a fiber is caught on any components.

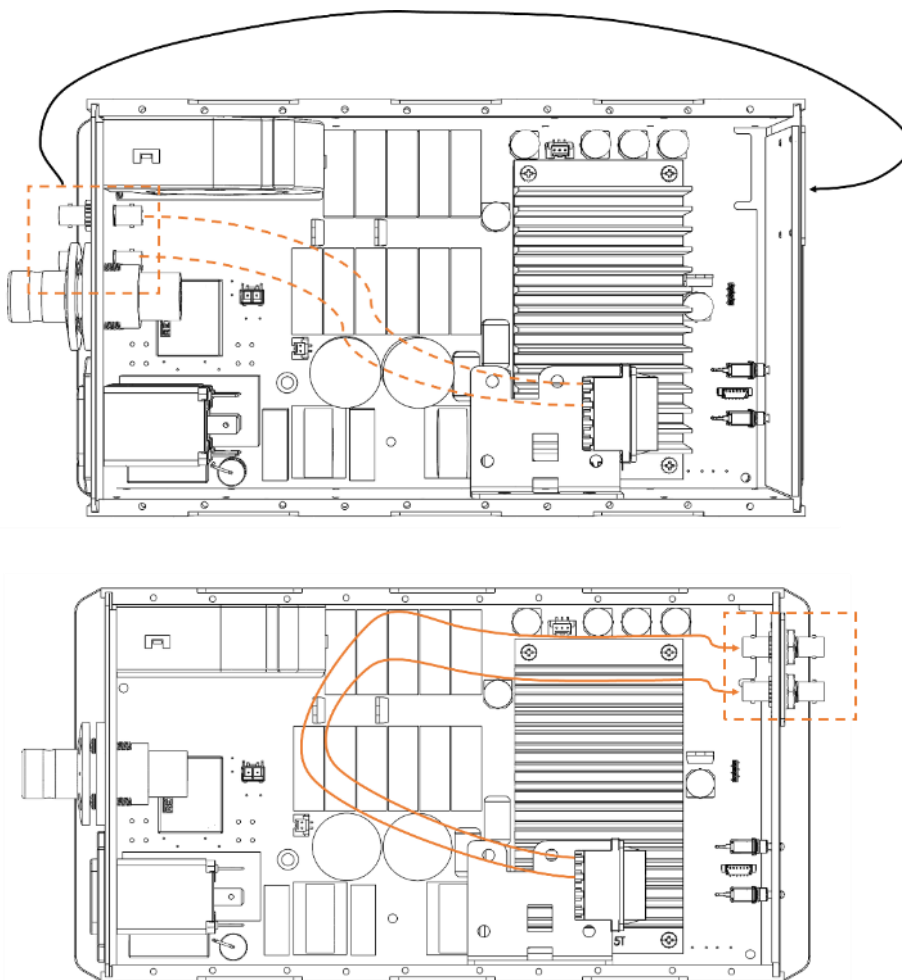


4. Note the positions of each fiber connector relative to marking on fiber plate. Unplug fiber connectors from panel.

5. Remove the four (4) screws holding the blank plate on the other side of the unit.



6. Re-route the internal fibers from their original position to the new fiber plate location.



7. Connect the fibers to the same corresponding ports noted in Step 4.
8. Attach fiber plate and blank plates in the reverse order they were removed using the same hardware found with each plate.
9. Reinstall top cover.

## 5.1 Clean Fiber

Cleaning an ST/UPC fiber connector properly is crucial to maintain optimal performance and prevent signal loss. Cleaning is recommended if the fiber plate is moved. Here's a step-by-step procedure to clean an ST/UPC fiber connector:

1. Gather the necessary tools and materials:
  - Lint-free wipes, cleaning cassette, or fiber optic cleaning pen
  - Fiber optic cleaning solution or isopropyl alcohol (99% purity)
  - Compressed air or a blower bulb
2. Prepare a clean and controlled environment:
  - Work in a clean and well-lit area to avoid contamination.
  - Ensure there is no dust or debris around the work area.
3. Blow away loose debris:
  - Use compressed air or a blower bulb to blow away any loose dust or debris from the connector end face.
  - Ensure the airflow is gentle and directed away from yourself and any nearby sensitive equipment.
4. Apply cleaning solution:
  - Apply a small amount of fiber optic cleaning solution or isopropyl alcohol (99% purity) to a lint-free wipe.
  - Be cautious not to touch the wipe or the connector end face with your fingers.
5. Clean the connector end face:
  - Gently wipe the connector end face using the wipe with cleaning solution.
  - Use a circular motion while applying slight pressure to remove any contaminants.
  - Avoid excessive pressure or aggressive scrubbing to prevent damage.
7. Dry the connector:
  - If you used a cleaning solution, allow the connector to air dry for a few seconds.
  - Alternatively, use a dry section of the lint-free wipe to gently dry the connector end face.
8. Reassemble and protect the connector:
  - Once the connector end face is clean, reassemble it into the ST coupler and install protective dust cap.
  - Avoid touching the end face or exposing it to any potential contaminants.

By following these steps, you can effectively clean an ST/UPC fiber connector and ensure optimal performance and reliability. Remember to always handle fiber connectors with care and maintain a clean environment throughout the cleaning process.

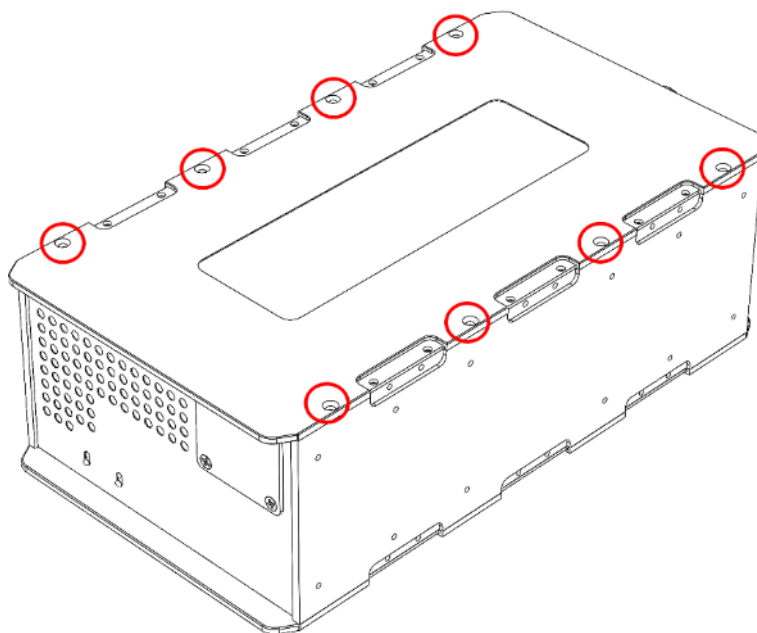
## 7. Panasonic Fiber I/O

Panasonic AK-HC3900 cameras have fiber paths that are reversed from other camera models supported but the HUT-APE. For correct optical power metering and patching, the fiber connectors must be moved as shown below. All work should be performed in an ESD-safe environment. Use caution not to touch any internal components. Do not contact any fiber-optic connector end faces.

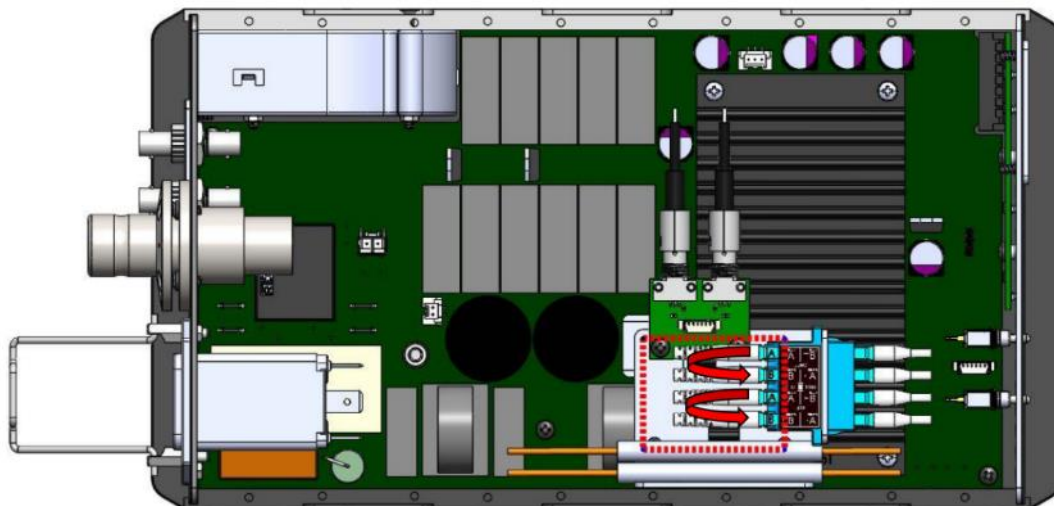
Note: Apply medium strength thread locker on screws before closing the enclosure.

Recommended product: Permatex 24010 Medium Strength Thread Locker Blue Gel

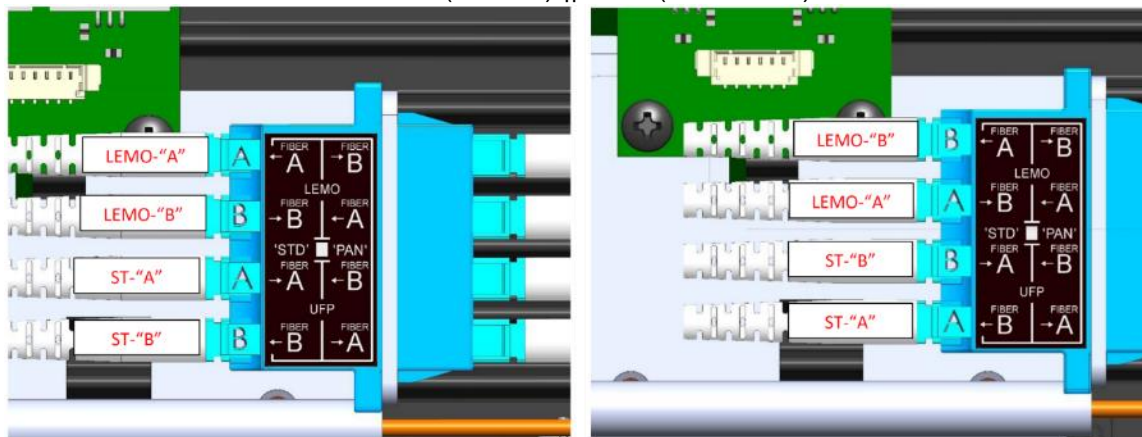
1. Unplug the HUT-APE power cable(s) and all connected fibers. Let the unit sit for 20 minutes for internal components to discharge.
2. Remove the eight (8) screws holding the top cover.



3. Swap both fiber pairs connected in the quad LC coupler.



Before (Default) || After (Panasonic)



4. Reinstall top cover.

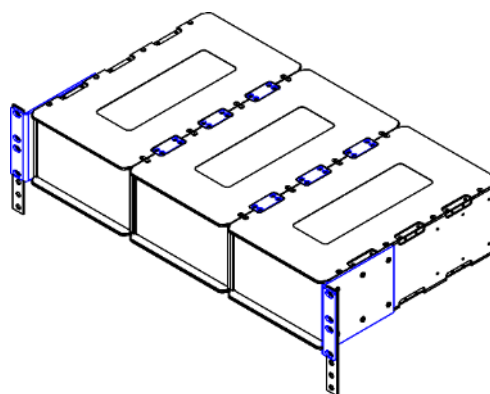
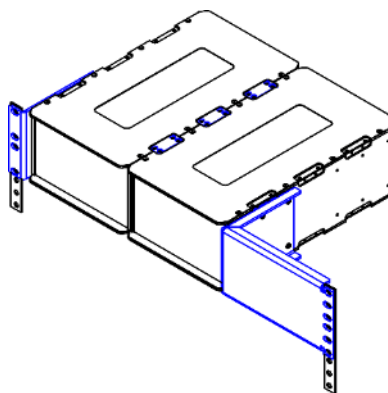
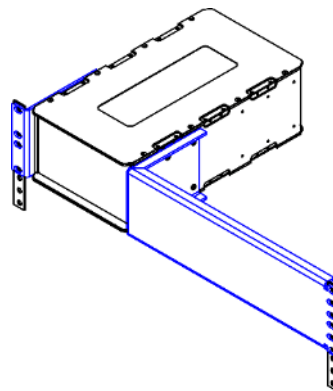
## 8. Accessories

### HUT Rackmount Kit

#### **RM-HUTCP-J48-KIT** HUT-APE Rackmount Kit.

The optionally available HUT Ears allow up to three (3) HUT-APE units to be mounted into a standard 19" rack. Each HUT-APE takes 2RU height and 1/3rd RU width.

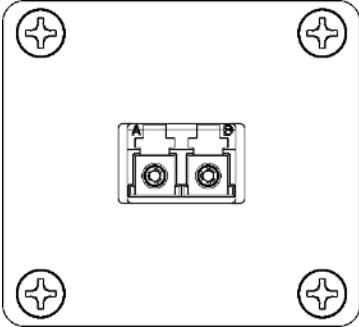
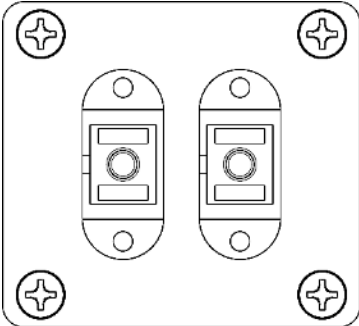
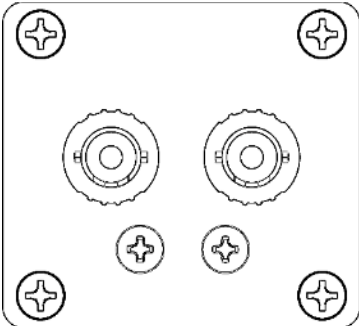
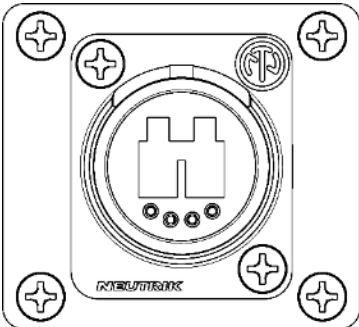
(Includes all parts for any of 3 configs shown)



### Mounting Kits

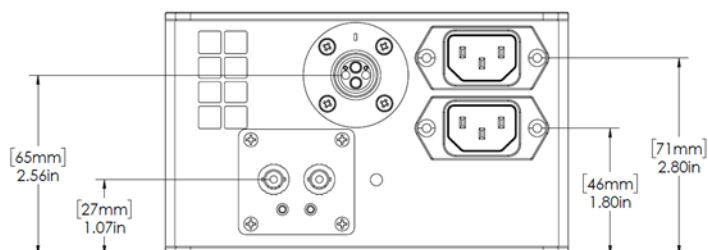
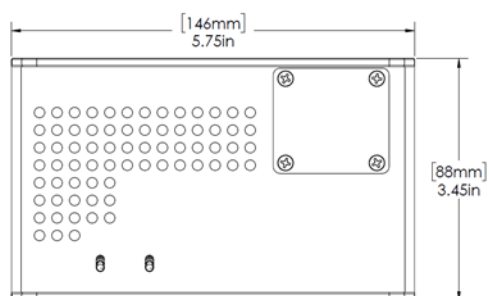
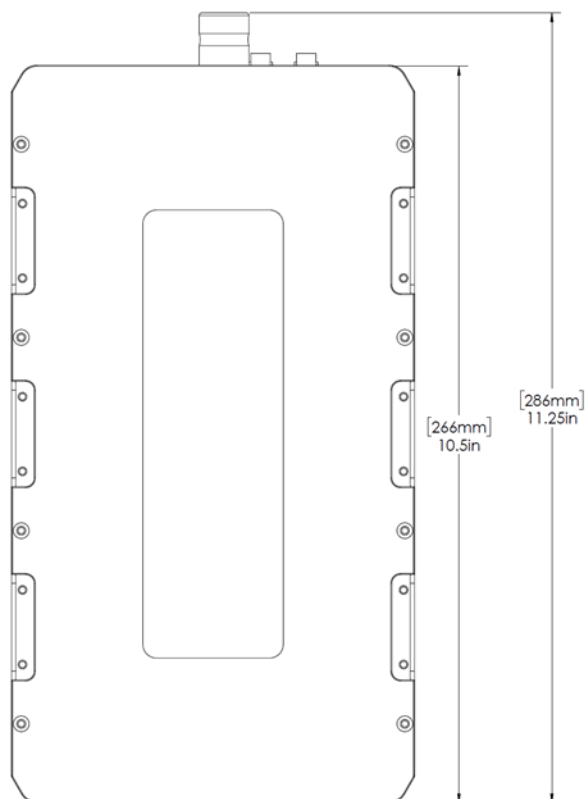
Part Number	Description
<b>WMK-VB SERIES</b>	Wall mount kit for VB Series units
<b>RM-1RU-V4</b>	RU Rack mount kit for VB4
<b>PTZK-VB10</b>	PTZ kit for VB10

## Fiber Plate Options

<p>HUT-APE-U2-SPPL<b>C2</b>XXF</p> <p>LC/UPC</p>	
<p>HUT-APE-U2-SPP<b>SC</b>2XXF</p> <p>SC/UPC</p>	
<p>HUT-APE-U2-SPP<b>ST</b>2XXF</p> <p>ST/UPC</p>	
<p>HUT-APE-U2-SPP<b>D2R</b>XXF</p> <p>Neutrik® opticalCON® Duo</p>	

## 9. HUT-APE Specifications

### 9.1. HUT-APE Dimensions & Weight



**HUT-APE** (W x H x D) 146mm x 88mm x 266mm (5.75 x 3.45 x 10.5 in.), 7.5 lbs.

**HUT-BS** (W x H x D) 178mm x 64mm x 51mm (7 x 2.5 x 2 in.), 0.7 lbs.

**QS4-APE** (W x H x D) 107mm x 44mm x 184mm (4.22 x 1.75 x 7.25 in.)

## 9.2. Electro-Optical

<b>Fiber Type</b>	Singlemode
<b>Fiber Polish</b>	Ultra-physical contact [UPC]
<b>Fiber Connectors</b>	LC, ST, SC, or Neutrik® opticalCon® DUO
<b>Optical Power Meter Accuracy</b>	+/- 2dB

## 9.3. Power

<b>HUT-APE Input</b>	95–250 VAC, 5–2A, 47–63Hz
<b>HUT-APE Power Consumption (MAX.)</b>	Remote APE models <b>325W</b> Grass Valley Camera <b>300W</b> Sony 180V Cameras <b>270W</b> Sony 240V Cameras <b>325W</b> Panasonic Camera <b>285W</b>
<b>HUT-BS (CCU Only)</b>	240 VAC or 375 VDC, 5W max.

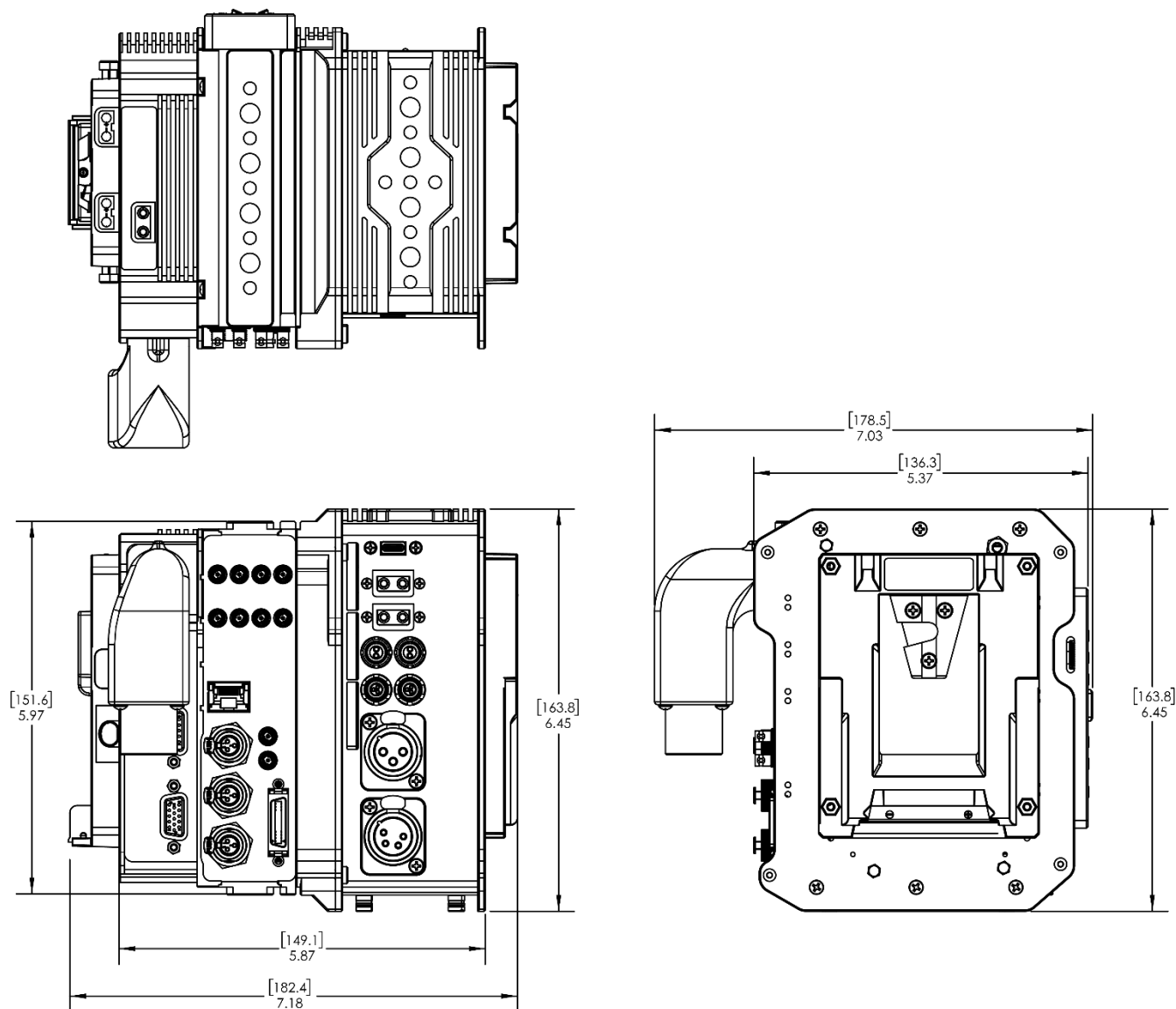
## 9.4. Supported Cameras &amp; Equipment

<b><u>Manufacturer</u></b>	<b><u>Models</u></b>
<b>MultiDyne®</b>	SB-APE
	QS4-APE
<b>Panasonic®</b>	AK-HC3900
	AK-PLV100
<b>Grass Valley®</b>	LDX 82
	LDX 85
	LDX 86

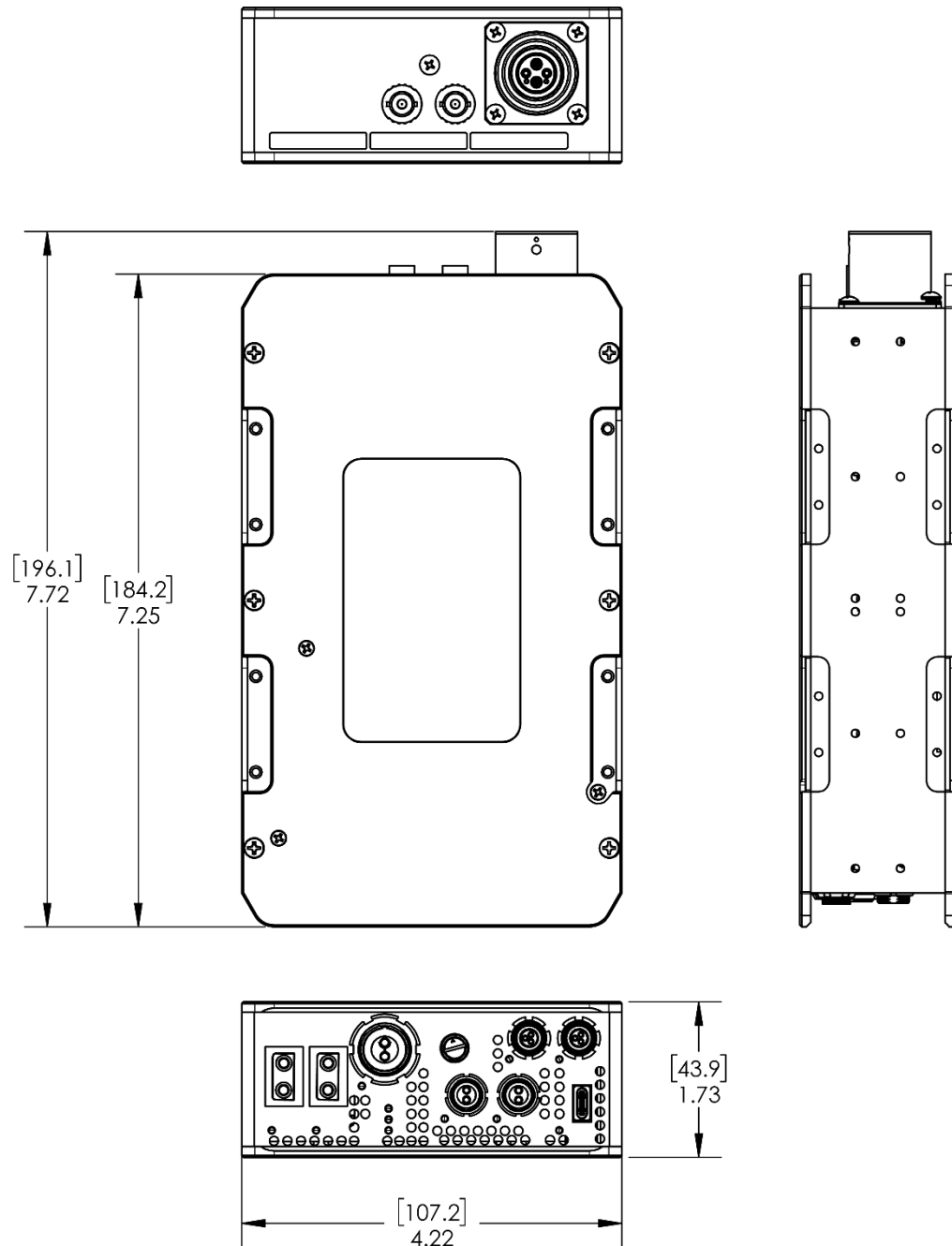
	LDX 100
	LDX 150
	HDC-1500
	HDC-1700
	HDC-2000
	HDC-2400
	HDC-2500
<b>SONY®</b>	HDC-2570
	HDC-3100
	HDC-3170
	HDC-3500
	HDC-4300
	HDC-4800
	HDC-5500

## 10. APE Series Specifications

### 10.1 SB-APE Dimensions



## 10.2 QS4-APE Dimensions



## Contact Info

Contact [support@multidyne.com](mailto:support@multidyne.com)

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Product specifications are subject to change without notice.

## Appendix A

