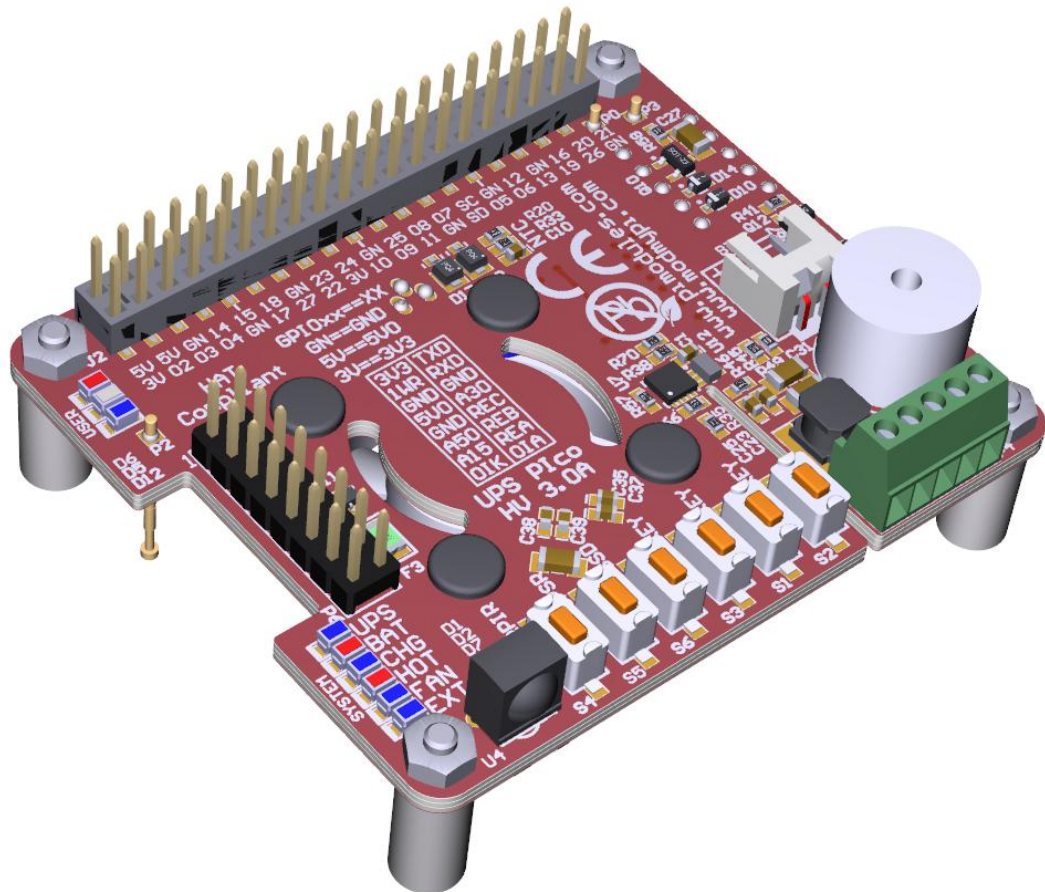


UPS Pico HV3.0A

Uninterruptible **P**ower **S**upply with **P**eripherals
and **I**²**C** **c**ontrol Interface



Designed for the Raspberry Pi® 3

Compatible with

**Raspberry Pi® 2, Pi Zero, A+, B+,
HAT Compliant**

“Raspberry Pi” is a trademark of the Raspberry Pi® Foundation

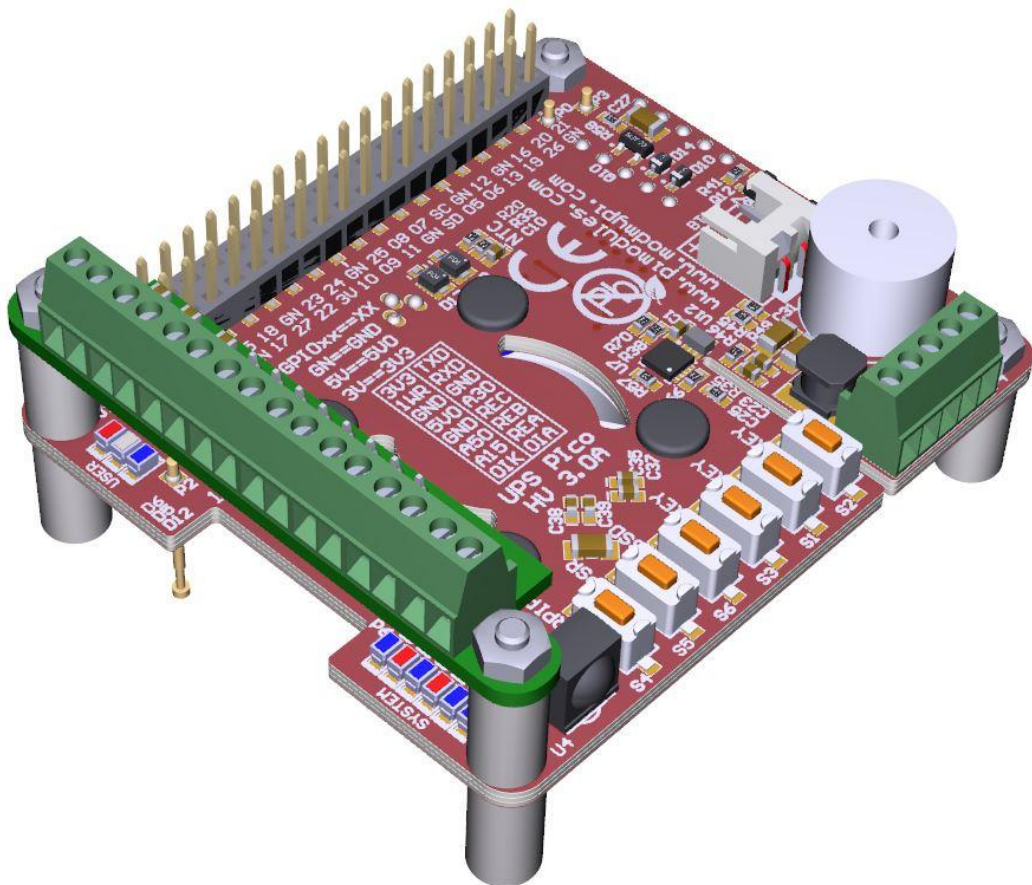
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The **UPS Pico HV3.0A** is an advanced uninterruptible power supply for the **Raspberry Pi® 3** that adds a wealth of innovative power back-up functionality and development features to the innovative micro-computer!

Especially designed for the **Raspberry Pi® 3** but also compatible with all other models; offers now **3A** current from the External Power Supply or battery backup, **3** User Keys, **3** User LEDs, **3** different types of high capacity batteries, **2 x 3** pins bi-stable relay (Zero Power), as also **3 x A/D 12 bit** converters pre-adjusted to 5V, 15V and 30V conversion. Now, with additional **External Supply Powering Input**; that have implemented **Dynamic Power Tracking**; automatically adjust battery charging current according to power availability from 50mA – 1000 mAh. This feature has been especially designed to support **Solar Panel Powering Raspberry Pi® Systems**, as it is adjusting the charging battery current to available Sunning conditions. The **External Supply Powering Input** is able to accept power from **7 V DC** up to **28 V DC !!** Thus make it ideal for Cars, Trucks, Buses and any industrial applications where voltage is usually higher than 24V DC. The **External Supply Powering Input** is equipped with Over Current protection, Over Voltage as also with **Zero Voltage Drop Inverse Polarity Protection** in order to use all available energy from the Solar Panel in case of use. The New **UPS Pico HV3.0A** is an all-in-one tool that allows implementing easy and fast simple applications as also complicated projects providing a set of pre installed peripherals.

The **UPS Pico HV3.0A** is standard equipped with a 450 mAh 15C LiPO battery specially designed to enable safe shutdown during cabled power cut and automatic system restart when cabled power comes back. The included battery provides enough energy to keep running system for 5-8 minutes. Additionally, this can be easily upgraded to the extended **4000mAh** version, **8000 mAh** as also **12000 mAh** batteries (optional on special request), which enables prolonged use of a Raspberry Pi for **more than 32 hours** without a power supply connected (with biggest battery installed) !

The **UPS Pico HV3.0A 450 mAh Stack Plus** design support now batteries with different chemistry: **LiPO** as also **LiFePO4**. Especially the **LiFePO4** batteries are addressed to applications where temperatures environment is more restricted as can be used for supplying from **-10 degrees up to +60 degrees**. In addition the **LiFePO4** have a unique extremely long life of charging/discharging that can achieve up to **2000 cycles!!**

The implemented trimmed **Hardware Real Time Clock and Calendar**, guarantees time stamp when system is running without access to the Network. The **Hardware RTCC** is backed up and powered from the integrated system battery. The **RTCC** current consumption is **only 1 uA**.

The integrated **Hardware RTCC** enables a new extremely usefully feature – the **Events Triggered RTCC Based System Actions Scheduler**. The **Events Triggered RTCC Based System Actions Scheduler** allows to timely start up, or shutdown the **Raspberry Pi®** on various internal or external events that include, 1-wire, IR, A/D, RTCC, temperature, Opto Coupled Input or just on requested Time Stamp.

Professional developers often need to protect their application. In order to support them **UPS Pico HV3.0A** offers the **XTEA** dual path encryption (on read and write path) embedded engine that protect the developed software with the secure code.

The **UPS Pico HV3.0A 450 mAh Stack Plus** offers **2.6A** battery power backup for the **Raspberry Pi®** via GPIOs as also **3A** extended power supply, but not only. In addition is offered an independent from the **Raspberry Pi®** powering, battery backed output of **5V@750 mA** available for the user devices connected to the **Raspberry Pi®** that must be running even if the mother **Raspberry Pi®** is shut down and not powered (i.e. USB powered HUBs, WiFi Routers, Motion Detectors, HDDs etc). The total current can not exceed 3A. The current supply delivered via GPIOs to the **Raspberry Pi®** is **2.6A**

Many applications need to have **secondary RS232** in addition to the primary one offered by the **Raspberry Pi®**. Until today, it has been solved by users with add-on hardware put on the top. Not anymore !! With the **UPS Pico HV3.0A** user have access to integrated secondary serial port 3.3V level but save also to be used with 5V level. This makes the developed application cost effective and more robust. This software driver is under development and wil be delivered within 1 month after system delivery.

Now with **additional Terminals Blocks Add-on UPS Pico HV3.0A 450 mAh Stack Plus** offers a professional I/O connectivity for any industrial application including 12V level converter for both Serial Ports (one of them must be selected).

The **Zero Power Bi Stable Relay** offers two independent sets of NO terminals, offers up to 1A contacts able to switch ON/OFF various peripherals of the developed system. Due to unique design, no power is required when Bi Stable Relay is in Set/Reset state, making it ideal for battery powered applications. Two independent 3 pins sets offered (NC, NO, COM) are switched at the same time.

Now, the high voltage signal can be monitored safely with the **Opto Coupled interface**, which can be read as digital as also analogue input.

The **IoT** developers will find usefull the **3 ESD protected 12 bits buffered A/D converters** as also number of internal sensors and sensor interfaces that can be used for system monitoring such as Battery Voltage, External Powering Voltage, Raspberry Pi Voltage, **Current Consumption**, System Temperature and 1-wire interface.

The **UPS Pico HV3.0A** can also be equipped with an optional **Infra-Red Receiver** which is routed directly to GPIO18 via the PCB. This opens the door for remote operation of the Raspberry Pi® and **UPS Pico!**

The embedded **Electromagnetic Programmable Sounder** can be used as a **simple buzzer** but also as **music player** due to implemented sound generator and dedicated programmer interface.

Finally, the **UPS Pico HV3.0A** features an implemented Automatic Temperature Control **PWM FAN controller**, and can be equipped with a micro fan kit, which enables the use of the Raspberry Pi® in extreme conditions including very high temperature environments. The FAN speed is automatically adjusted according to system temperature conditions semi linearly (8 levels) from 0 % (FAN is OFF) up to

100% by increasing and decreasing rotation speed. Thus guarantees the possible lowest level of noise and always cool **Raspberry Pi® 3**.

Technical Specifications

Features	Model UPS Pico HV3.0 A		
	UPS Pico HV3.0 A Stack 450	UPS Pico HV3.0 A Stack 450 Plus	UPS Pico HV3.0 A Top End 450
Raspberry Pi®			
Raspberry Pi® System Compatibility			
	Designed for Raspberry Pi® 3 Compatible with Pi2, Pi3, Pi Zero, A+, B+	Designed for Raspberry Pi® 3 Compatible with Pi2, Pi3, Pi Zero, A+, B+	Designed for Raspberry Pi® 3 Compatible with Pi2, Pi3, Pi Zero, A+, B+
Cases Compatibility			
	Most of the cases ModMyPi cases PiModules Pico case	Most of the cases ModMyPi cases PiModules Pico case	Most of the cases Recommended Raspberry Pi Original Case adopted to Medial Player Applications
Raspberry Pi® GPIO Usage (occupation)			
Permanent use of I ² C (User selectable addresses)	GND, 5V, SDA0, SCL0 I ² C Addresses: 68 69 6a 6b 6c 6d 6e 6ff	GND, 5V, SDA0, SCL0 I ² C Addresses: 68 69 6a 6b 6c 6d 6e 6ff	GND, 5V, SDA0, SCL0 I ² C Addresses: 68 69 6a 6b 6c 6d 6e 6ff
Selectable use of Raspberry Pi® RS232	TXD0, RXD0	TXD0, RXD0	TXD0, RXD0
Selectable use of Raspberry Pi® GPIO	GPIO_GEN22 (pulse train generator) GPIO_GEN27 (System Shutdown initiator) GPIO_GEN18 (if IR receiver is used) GPIO_GEN4 (if 1-wire is used)	GPIO_GEN22 (pulse train generator) GPIO_GEN27 (System Shutdown initiator) GPIO_GEN18 (if IR receiver is used) GPIO_GEN4 (if 1-wire is used)	GPIO_GEN22 (pulse train generator) GPIO_GEN27 (System Shutdown initiator) GPIO_GEN18 (if IR receiver is used) GPIO_GEN4 (if 1-wire is used)
Battery and Charger			
Supported Batteries Types			
LiPO 3.7V with high current cable			
	Standard - LiPO 450 mAh	Standard - LiPO 450 mAh	Standard - LiPO 450 mAh (dedicated to be used with Raspberry Pi Original Case)
	Optional - LiPO 4000 mAh	Optional - LiPO 4000 mAh	
		Optional - LiPO 8000 mAh	
LiFePO4 3.2V with high current cable			
	Optional - LiFePO4 4000	Optional - LiFePO4 4000 mAh	
		Optional - LiFePO4 8000 mAh	
		Optional - LiFePO4 12000 mAh (due to big size of batter only on special order)	
Battery Life Charge/Discharge Cycles			
LiPO	450 cycles	450 cycles	450 cycles
LiFePO4	2000 cycles	2000 cycles	2000 cycles
Battery Charger			
	Standard - Continues fixed current 256 mAh	Automatic Dynamic Power Tracing Charger with charging current 50 mA – 1000 mA, triggered by voltage changes on the GPIO or External Power Source	Standard - Continues fixed current 256 mAh
Charging Modes			
LiPO	Automatic Selected : Full Charging Cycle Trickle Charging	Automatic Selected : Full Charging Cycle Trickle Charging	Automatic Selected : Full Charging Cycle Trickle Charging
LiFePO4	Automatic Selected : Full Charging Cycle Trickle Charging	Automatic Selected : Full Charging Cycle Trickle Charging	Automatic Selected : Full Charging Cycle Trickle Charging
Battery Protection			
450 mAh	On board cut-off protection system when thermal, overcharge or	On board cut-off protection system when thermal, overcharge or	On board cut-off protection system when thermal, overcharge or

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	over discharge	over discharge	over discharge
High Capacity LiPO and LiFePO4	On board cut-off protection system when thermal, overcharge or over discharge On battery additional PCM protection	On board cut-off protection system when thermal, overcharge or over discharge On battery PCM additional protection	On board cut-off protection system when thermal, overcharge or over discharge On battery PCMAadditional protection
Battery Electrical Isolation System	Battery is Electrically Isolated until system start up for the first time	Battery is Electrically Isolated until system start up for the first time	Battery is Electrically Isolated until system start up for the first time
Battery Back-Up			
System Battery Backup	Standard – 5V 2.6A current continuous supply to Raspberry Pi via GPIO Pins	Standard – 5V 2.6A current continuous supply to Raspberry Pi via GPIO Pins	Standard – 5V 2.6A current continuous supply to Raspberry Pi via GPIO Pins
Auxiliary 5V Battery Backed Supply on Plco I/O Pins	Standard – 5V 750 mA current continuous supplies on Plco I/O Pin battery backed, with possibility to continuous supply auxiliary devices with Raspberry Pi disconnected. Total system current should not exceed 3A.	Standard – 5V 750 mA current continuous supplies on Plco I/O Pin battery backed, with possibility to continuous supply auxiliary devices with Raspberry Pi disconnected. Total system current should not exceed 3A.	Standard – 5V 750 mA current continuous supplies on Plco I/O Pin battery backed, with possibility to continuous supply auxiliary devices with Raspberry Pi disconnected. Total system current should not exceed 3A.
Battery Back-up Type			
UPS	UPS Standby Type, with switchover time of 360 uS, during switching time the protected system is powered by auxiliary online power source for maximum 10mS, therefore no power gap on GPIO during switching time	UPS Standby Type, with switchover time of 360 uS, during switching time the protected system is powered by auxiliary online power source for maximum 10mS, therefore no power gap on GPIO during switching time	UPS Standby Type, with switchover time of 360 uS, during switching time the protected system is powered by auxiliary online power source for maximum 10mS, therefore no power gap on GPIO during switching time
Powering Monitoring Point	Raspberry Pi® GPIO 5V	Raspberry Pi® GPIO 5V	Raspberry Pi® GPIO 5V
UPS Activation Powering Triggers	GPIO 5V pins <=4.65V Proprietary Algorithm of Falling Power Peak Analysis	GPIO 5V pins <=4.65V Proprietary Algorithm of Falling Power Peak Analysis	GPIO 5V pins <=4.65V Proprietary Algorithm of Falling Power Peak Analysis
Cable Powering Reactivation	After 3s of continuously cable powering (without spikes)	After 3s of continuously cable powering (without spikes) on any cable power source (GPIO or External)	After 3s of continuously cable powering (without spikes)
Cable Powering Sources			
Cable Powering Sources			
Raspberry Pi ® GPIO 5V Pins	2.6 A	2.6 A	2.6 A
External Power Source 6 - 28 VDC		3A max (adjusted according dynamic power tracking)	
Additional Features - Peripherals			
HAT Compliant			
HAT EEPROM	Simulated HAT EEPROM on uC memory	Simulated HAT EEPROM on uC memory	Simulated HAT EEPROM on uC memory
HAT Dimensions	Compliant	Compliant	Compliant
Plco I/O Interface			
Independent from Raspberry Pi ® 3.3 V supply @200 mA	Yes	Yes	Yes
ESD Protected 1-wire interface	Yes	Yes	Yes
Independent from Raspberry Pi ® 5.0 V supply @750 mA With battery Back-up (raspberry Pi ® can be OFF when this power source is running)	Yes	Yes	Yes
12 Bit A/D converters ESD protected, pre-scaled to 5V, 15V and 30V with Sampling rate 100K SPS, buffered	Yes	Yes	Yes
3V3/5V0 RS232 Port that can			

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be programmed as: primary Raspberry Pi® Port Secondary (independent from the Raspberry Pi®)	Yes	Yes	Yes
Optical Isolated Interface (readable as digital or analog)	none	Yes	none
Primary 3 Pin Bi-stable (Zero Power) Relay Interface Rating (resistive) Maximum Switching Current Maximum Switching Voltage	Yes (Optional) 0.5A 125 VAC or 1A 30 VDC 2A 125VAC, 110VDC	Yes 0.5A 125 VAC or 1A 30 VDC 2A 125VAC, 110VDC	Yes (Optional) 0.5A 125 VAC or 1A 30 VDC 2A 125VAC, 110VDC
Pico Terminals Block Extension PCB (Supplied separately)			
12 V RS232 converter attached to primary or secondary Serial Port	Yes (Optional)	Yes (Optional)	Yes (Optional)
Terminal Block on Each Pico I/O Interface listed above	Valid only for existing Interfaces	Yes	Valid only for existing Interfaces
Pico Plus Terminal Block Standard Interface			
DC in 6 – 28 V with Power Tracking	none	Yes	none
Secondary 3 Pin Bi-stable (Zero Power) Relay Interface	Optional if Relay Installed	Yes	Optional if Relay Installed
Hardware User Interface			
System LEDs Indicators	UPS, BAT, CHG, HOT, FAN	UPS, BAT, CHG, HOT, FAN, EXT	UPS, BAT, CHG, HOT, FAN
User LEDs Indicators	Blue, White, Red	Blue, White, Red	Blue, White, Red
System Keys	RPIR, UPSR, FSSD	RPIR, UPSR, FSSD	RPIR, UPSR, FSSD
User programmable Keys	AKEY, BKEY, CKEY	AKEY, BKEY, CKEY	AKEY, BKEY, CKEY
Audio Interface	Electromagnetic Transducer, with programmable sound duration and frequency, able to play music	Electromagnetic Transducer, with programmable sound duration and frequency, able to play music	Electromagnetic Transducer, with programmable sound duration and frequency, able to play music
Other Features			
Battery Backed Hardware Real Time Clock and Calendar	Yes	Yes	Yes
Bi-Stable (Zero Power) Relay	Yes (optional)	Yes	Yes (optional)
Automatic Active Cooling System (FAN)	Yes (optional)	Yes (optional)	Yes (optional)
Automatic File Safe Shutdown Functionality	Yes	Yes	Yes
Raspberry Pi® Reset via POGO Pin	Yes	Yes	Yes
Automatic Restart on Power Return	Yes	Yes	Yes
Events Triggered RTCC Based System Actions Scheduler	Yes	Yes	Yes
Real Time Raspberry Pi® current measure	none	Yes	none
Real Time Battery Capacity Measure	none	Yes (based on System current consumption)	none
Secondary Serial Port (based on software driver)	Yes (future option)	Yes (future option)	Yes (future option)
IR interface	Yes	Yes	Yes
Optimized design for a very low noise A/D operation	Yes	Yes	Yes
Optimized Ultra Low Power design for a long time Battery System Operation	Yes	Yes	Yes
XTEA Encryption	Yes	Yes	Yes
Extended Raspberry Pi® Watch-Dog (Still Alive)	Yes	Yes	Yes
System Monitoring	Battery Voltage, Raspberry Pi® Voltage, Temperature	Battery Voltage, Raspberry Pi® Voltage, External Voltage, Current Consumption by Raspberry Pi®, Temperature	Battery Voltage, Raspberry Pi® Voltage, Temperature
I2C Pico Programmer Interface	Yes	Yes	Yes
RS232 @command Interface on Primary and Secondary Serial Port	Yes	Yes	Yes

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Bootloader for Live Firmware Update	Yes	Yes	Yes
PCB Construction			
PCB Manufacturing	4 Layers, 2 OZ Copper, 6mils/6mils Immersion Gold Plated PB Free Bismuth based alloy assembly	4 Layers, 2 OZ Copper, 6mils/6mils Immersion Gold Plated PB Free Bismuth based alloy assembly	4 Layers, 2 OZ Copper, 6mils/6mils Immersion Gold Plated PB Free Bismuth based alloy assembly

