

T.I. POWERBOX **PRO** V2

User Manual

Beta



Version

| Version Number | Release Date |
|----------------|--------------|
| Beta | 2024/4/20 |

Catalogue

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Product Overview

Introduction

Terrans PowerBoxPro V2 is a **comprehensive power and USB data management device used for remote astronomical photography**. Equipped with four USB 3.1 ports (backward compatible with USB 2.0), two USB 2.0 ports, six 12VDC output ports, one 3V-12V DC adjustable port, one 19V NUC power supply port, and an external temperature and humidity sensor port. Supports a maximum power output of 180W, meeting the power supply needs of most users.

Terrans PowerBoxPro V2 will help you clarify device wiring, bid farewell to complex wiring, and simply connect one power cord and one USB from the outside to your entire device. You can easily manage the power supply and USB communication of all devices through software.

Terrans PowerBoxPro V2 uses a **total of 22 imported chips from global leading semiconductor companies such as Texas Instruments (TI), STMicroelectronics (ST), and Monolithic Power Systems (MPS)**. Its excellent performance and protection capabilities ensure the safety and user experience of your device.

Support



ASCOM



INDI



TerransManageDesk



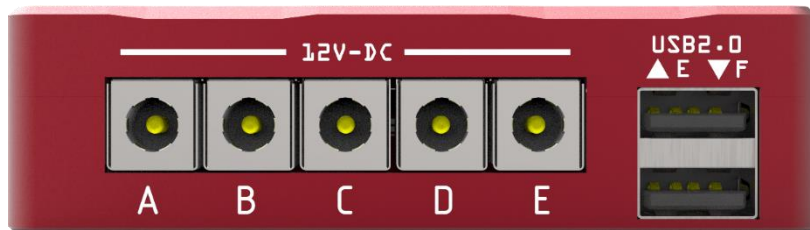
- Do not expose this device to excessively humid environments for a long time, as it may cause damage to the device itself and the connected devices. Direct intrusion of any liquid may cause damage to this device and the connected devices.
- Using low-quality power supplies without a brand may cause damage to this device and the connected devices.

Specifications

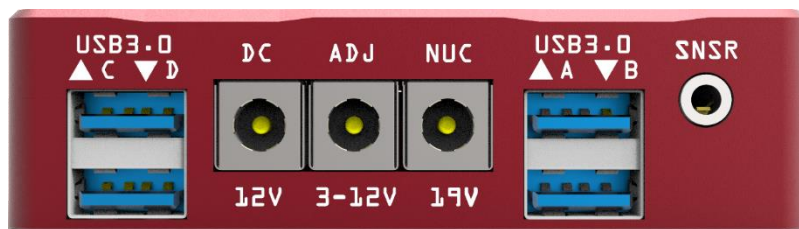
Product Function List

- Maximum output power 180W 12V/15A
- Input voltage overvoltage/undervoltage protection
- Six 12V DC power output ports with protection and support for independent switches
- Four USB3.1 SuperSpeed ports with protection and support for independent switches and independent plug and drop controls
- Two USB 2.0 ports with protection and support for independent switches and independent plug and drop controls
- One 3V-12V DC adjustable port
- One 19V NUC power supply port
- Real time monitoring of three channels voltage/current/power
- External temperature and humidity sensors can be connected to achieve automatic heating switch control
- Switch state power-off saved, automatically restored upon repowering on
- Internal temperature sensor, real-time acquisition of device internal temperature situation
- Hardware watchdog, automatic restart in case of crash in special circumstances
- Equipped with 4 M4 screw fixing holes and 1/4 inch screw hole on the back
- The motherboard is sprayed with three anti spray coatings to protect equipment safety in high humidity environments and situations where condensation may occur
- Supports ASCOM, INDI platforms, supports commonly used astronomical software such as NINA, KStars, etc
- Support TerransManageDesk independent control software

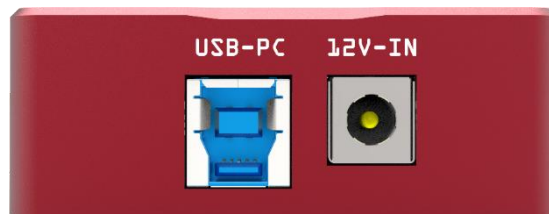
Ports Description



- 12V DC output ports [Five]
- USB 2.0 ports [Two]



- 12V DC output port [One]
- 3V-12V DC adjustable port [One]
- 19V NUC power supply port [One]
- USB 3.1 SuperSpeed ports [Four]
- Environmental sensor port [One]



- USB3.1 Type B PC port [One]
- 12V Power Input port [One]

Electrical characteristics

- Input voltage
 - Rated input voltage 12V
 - When the input voltage is greater than 14V or less than 10V, the device will disable all power outputs and pop up an alarm

- Input current
 - Maximum input current 15A
 - When the input voltage is 12V, the maximum output power is 180W

- 12V DC output
 - Each 12V output port supports independent switches
 - Single 12V output port can support a maximum output current of 8A
 - Power supply output slow start, limiting large currents or voltage surges
 - Short circuit protection. When a 12V port experiences a short circuit, the power management chip of that port will immediately cut off the power output without affecting the normal power supply of other ports.

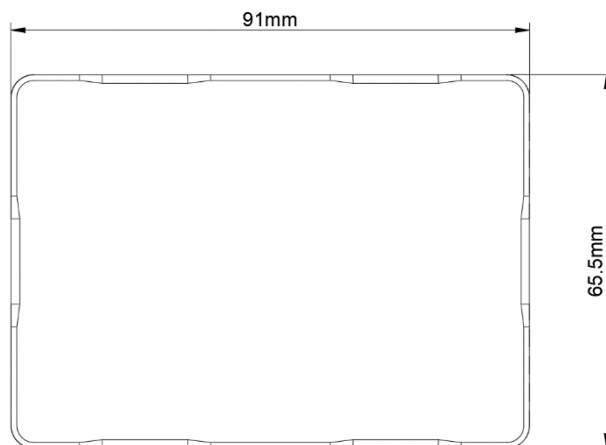
- USB 2.0 and USB 3.1 SuperSpeed ports
 - Each USB port supports independent power switch
 - Each USB port supports independent control and plugging, and USB3.1 can be downgraded to USB2.0
 - Single USB port supports a maximum output current of 2A, with overcurrent protection and short circuit protection
 - Power supply output slow start, limiting large currents or voltage surges
 - Under voltage protection, power supply is prohibited when the voltage is below 4V
 - Reverse current blocking, USB management chip supports blocking reverse current from abnormal electrical devices
 - Overheat protection, cutting off power supply when the temperature of the power supply chip exceeds 135 °C

- 3V-12V DC adjustable output
 - Supports adjustable DC voltage output from 3V to 12V, with an adjustable step size of 0.2V
 - Supports up to 4A output current and overcurrent protection
 - Overheat protection, cutting off power supply when the temperature of the power supply chip exceeds 125 °C

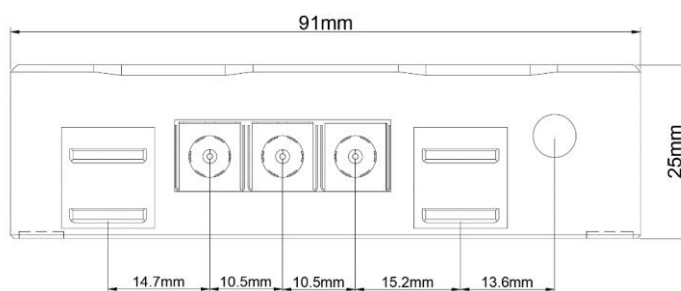
- 19V NUC power output
 - Support independent power switch
 - The output voltage is 19V, the maximum output current is 5A, and it supports overcurrent protection and short circuit protection
 - Power supply output slow start, limiting large currents or voltage surges
 - Overheat protection, cutting off power supply when the temperature of the power supply chip exceeds 150 °C

- Voltage/Current/Power detection
 - USB power/12V power/19V power three channels for real-time monitoring and display through software

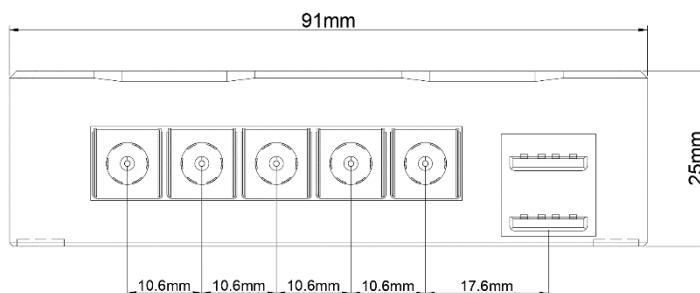
Product size



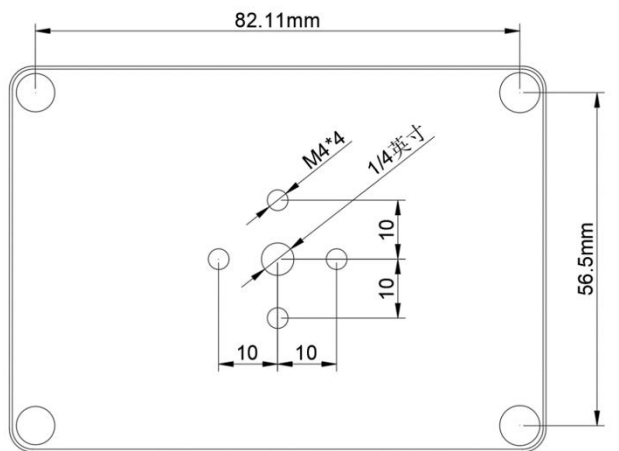
TOP



LEFT



RIGHT



BUTTON

Function introduction

Power input

This device is powered by a 12V power adapter, with a voltage input range of **10V to 14V**. When the voltage is below 10V or above 14V, **the power output will be completely disabled**. To ensure sufficient output power, please use a power adapter with a power of 120W (12V10A) or above. It is recommended to use a branded adapter with a power of 120W (12V10A) or 180W (12V15A). **Do not use a low-quality power adapter without a brand**, as it may cause device damage and USB communication interruption. The power input uses a 5.5-2.1 gold-plated interface. When using a 5.5-2.5 compatible 5.5-2.1 connector, ensure that the positive spring in the center of the connector can tightly contact the input interface terminal, otherwise it may cause poor contact.

When connecting power to the device, please first plug the adapter into the Terrans PowerBoxPro V2 host, and then plug the adapter into an AC socket.



- The power input range from 10V to 14V is only to accommodate potential voltage errors in the adapter, and the use of any power adapter with an output rated voltage other than 12V is prohibited.



Brand
Power Adapter



Unbranded
Power Adapter

USB PC port

This device uses a USB3 Type B port to connect to a PC, and the standard package includes a 1.5 meter long USB3 Type B cable for quick installation. If you need to replace the USB cable by yourself, **do not use an excessively long USB cable**. An excessively long USB cable may cause signal attenuation, interference, and interruption of USB communication. It is not recommended to connect a third-party USB HUB device to this device as it may affect USB communication or cause the device to malfunction.

When connecting this device to a PC, **please use the USB3 port soldered onto the motherboard on the PC**, and do not use a USB port led out from the motherboard through an extension cable or a USB HUB already connected to the PC.

The USB HUB of this device can work on Windows, MacOS, and various Linux kernels without the need for additional drivers.

USB Input ports

This device has 4 USB 3.1 SuperSpeed port and 2 USB 2.0 High Speed port, both of which are backward compatible and can even be physically downgraded to USB 2.0 High Speed port. All USB port can independently control the power switch. We have equipped each USB port with an imported power management chip from **Texas Instruments**, which comes with **power soft start, reverse current blocking, short circuit protection, overcurrent protection, and overheating protection**, fully protecting the safety of your device. The maximum output current of each USB port reaches 2A, which almost meets the power supply needs of all USB devices.

This device supports any combination of SuperSpeed (5Gbps), High Speed (480Mbps), Full Speed (12Mbps), and Low Speed (1.5Mbps) devices, and the MTT function of the integrated USB 2.0 hub provides higher performance.

This device supports **USB remote plugging and unplugging**, and each USB port supports independent remote plugging and unplugging to quickly reset faulty devices without affecting other devices. We have equipped each USB port with an imported data management chip from **Texas Instruments**, which enables complete physical disconnection of USB 3.1 and USB 2.0 data lines, enabling the actual insertion and removal of USB devices. At the same time, we provide a whole machine reset function. When the PC still cannot recognize a certain device, this device supports a complete reset of all USB devices, allowing the PC to enumerate all USB devices again. During the reset period, it will not affect the power supply of the device. **However, it should be noted that during the reset period, this device will also disconnect and needs to be reconnected to other devices after about 30 seconds.**

All USB ports are equipped with switch state memory function. When the device is powered on the next time, the power switch of the USB will automatically return to the previous usage state. The memory function can be set to off. When the switch memory function is turned off, all USB interface power supply defaults to off.



- Poor quality or excessively long USB cables will cause interference or interruption in USB communication
 - When plugging and unplugging devices, it takes about 30 seconds for the PC to recognize the device again. This process can be accelerated by scanning for new devices in the Device Manager
-

12V DC Output Ports

This device is equipped with six 12V DC power output ports that can independently control switches, and the maximum output current of each port can reach 8A. We are equipped with **imported power management chips** for each DC output, equipped with **power soft start/short circuit protection/overcurrent protection/spark protection, fully protecting the safety of your equipment. When one or more DC output suddenly experience a short circuit, the power management chip of that interface will immediately cut off power, while other normal working devices will not be affected.** Thanks to its ultra-low internal resistance of 12.8mΩ, even under high current conditions, **the power management chip hardly generates heat.**

The DC output of this device uses 5.5-2.1 **gold-plated connectors**, which are firmly connected and have excellent high current carrying capacity. The output voltage of all DC interfaces is consistent with the input voltage.

All DC interfaces are equipped with switch state memory function. When the next power is applied to this device, the DC power supply switch will automatically return to the previous usage state. The memory function can be set to off. When the switch memory function is turned off, all DC interface power supply defaults to off.



- Do not insert devices that require power supply when DC power is turned on. Otherwise, spark protection will be triggered and the power supply will be immediately cut off. Please insert the device that needs power while turning off the DC power supply, and then turn on the DC power switch. When unplugging the powered equipment, it is also necessary to first turn off the DC power switch.
-

3V-12V DC adjustable output

This device provides a 3V-12V adjustable output port that can be adjusted in 0.2V steps and supports an output current of up to 4A. This port can provide power to devices that require adjustable voltage, such as flat field boards and heating belts. In the case of high current, the output voltage of this interface may experience voltage drop, and it is not recommended to use this interface for devices that require precise voltage supply. This port uses a 5.5-2.1 gold-plated connector.

This port does not have the function of power-off state memory. When the device is powered on again, the port defaults to the off state and needs to be reset to the required voltage.

19V NUC power supply port

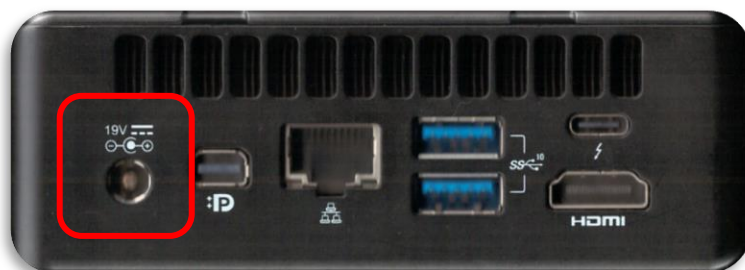
This device provides a 19V output port for supplying power to a 19V NUC, which can independently control the switch. The port can provide a maximum output current of 5A. We have equipped this port with an imported DCDC boost chip from Texas Instruments, equipped with power supply soft start/short circuit protection/overcurrent protection/overheating protection, fully protecting the safety of your equipment. This port uses a 5.5-2.1 gold-plated connector. When NUC uses this port for power supply, do not run post-processing software on the computer. Running post-processing will significantly increase computer power consumption and may exceed the maximum output power supplied by this interface. This port only supports computers running shooting software such as NINA PHD2.

This port is equipped with a switch state memory function, and the next time the device is powered on, the 19V power supply switch will automatically return to its previous usage state. The memory function can be set to off. When the switch memory function is turned off, the default power supply state of the 19V interface is on to avoid misoperation that may cause the NUC to fail to start. When not using 19V power supply, it is recommended to set the port to off to avoid accidental insertion and damage to other devices.

It should be noted that the power input of NUC is usually a 5.5-2.5 port, which requires the use of a 5.5-2.1 to 5.5-2.5 DC power supply line.



- Before using this port, please confirm that your NUC supports 19V power input

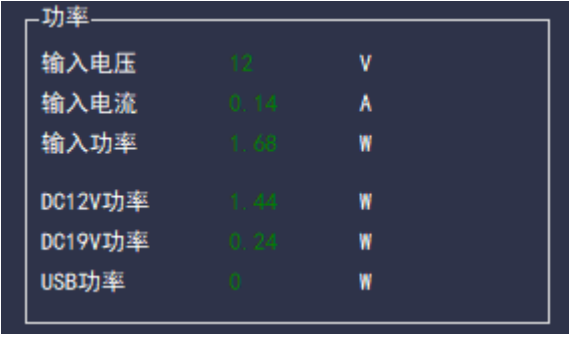


Built in three channels voltage/current/power meters

This device is equipped with a three channel power meter, which can detect input voltage/total input current and total input power in real time. In addition, it can display 12V power output, 19V power output, and USB output power separately.

| | |
|-----------------------|-----------------------|
| 输入电压 12 单位: V | 输入电流 0.14 单位: A |
| 总功率 1.68 单位: W | DC12V功率 1.44 单位: W |
| DC19V功率 0.24 单位: W | USB功率 0 单位: W |

(From NINA)



| 功率 | | |
|---------|------|---|
| 输入电压 | 12 | V |
| 输入电流 | 0.14 | A |
| 输入功率 | 1.68 | W |
| DC12V功率 | 1.44 | W |
| DC19V功率 | 0.24 | W |
| USB功率 | 0 | W |

(From TerransManageDesk)

The three channel power meter facilitates you to check the power consumption of the device at any time.



- The measurement results of the built-in power meter may have slight deviations due to environmental and temperature influences. Please do not use this function for precise measurement.

Built in temperature sensor

This device is equipped with a temperature sensor to detect the internal temperature of the device, which is the average temperature inside the device and is used to refer to whether the operating temperature of the device is normal. It should be noted that when the 19V power supply is turned on, the internal temperature will be slightly higher than the temperature when the 19V is turned off due to the heating generated by the 19V boost.

External temperature and humidity sensors

This device provides a 3.5mm port for external temperature and humidity sensors, and the sensor values are also used for automatic heating control. When connecting or unplugging sensors, please turn off the power to this device first.

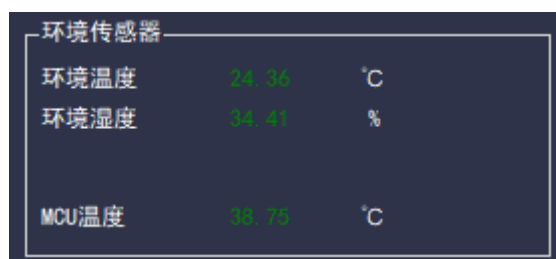


MCU温度 38.43
单位: °C

环境湿度 32.95
单位: %

环境温度 24.5
单位: °C

(From NINA)

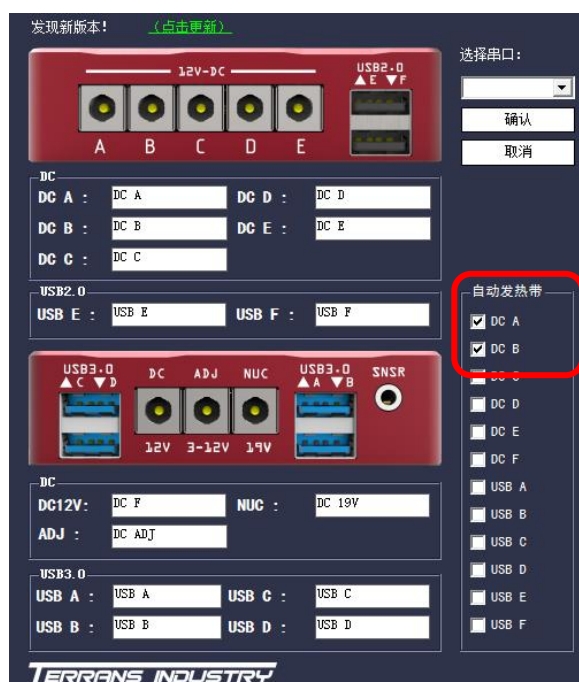


(From TerransManageDesk)

Automatic heating control

This device supports automatic heating control. To enable the automatic heating control function, an external temperature and humidity environmental sensor needs to be connected. This device will calculate the current dew point based on the collected environmental temperature and humidity values. When it is determined that condensation is about to occur in the environment, it will automatically turn on the corresponding channel's heating belt for power supply.

In each control software, automatic heating channels can be configured. As shown in the figure, DC A and DC B ports are configured as heating channels. This device will automatically control the power supply switch of these two ports to control the opening and closing of the heating channels.



Hardware Watchdog

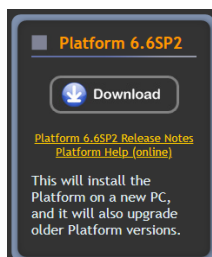
This device is equipped with an independent hardware watchdog, which may cause program operation failures in extreme environments and prevent the device from communicating properly. The watchdog function will detect whether the program is running normally every 1 second. If there is no response after 1 second, the device will be automatically restarted. In regular use, this feature is rarely used. But the existence of this feature will help you quickly restore the device to normal when problems arise.

How To Use

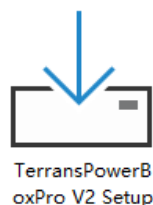
ASCOM

This device supports the ASCOM platform. Please connect in the following order:

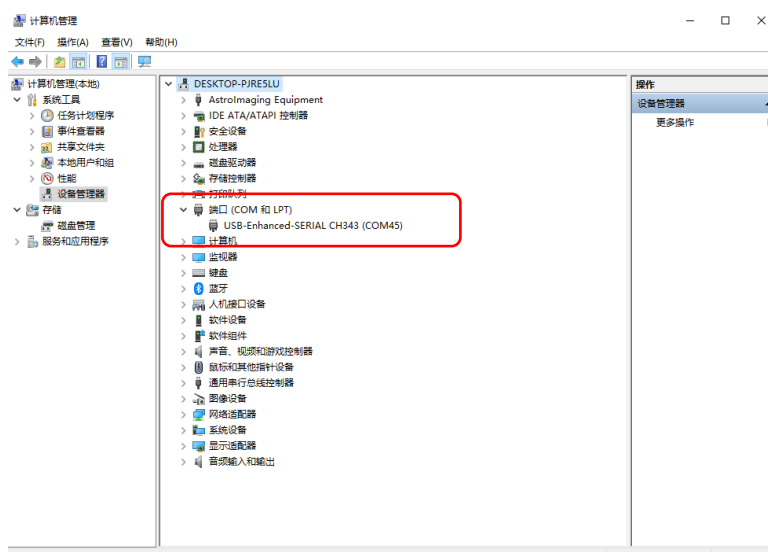
1. Install the latest version of ASCOM Platform



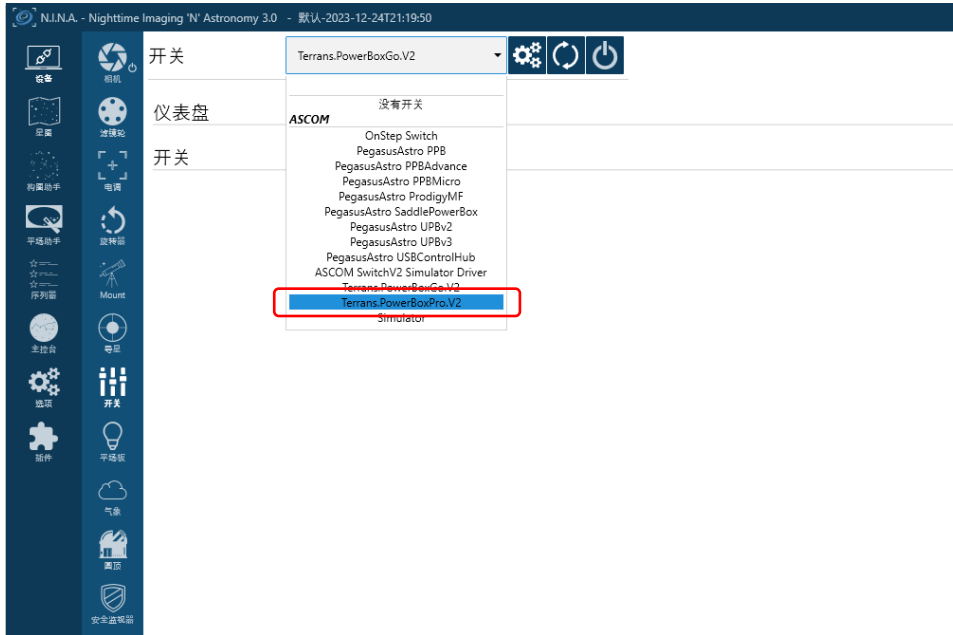
2. Visit our official website [TerransIndustry-DOWNLOAD \(terrans-industry.com\)](http://TerransIndustry-DOWNLOAD (terrans-industry.com))
Download the CH343 driver and the ASCOM driver for this device and complete the installation.



3. Connect the device to the computer and power it on, open the Device Manager, and check the corresponding COM port number of the device. When the device is inserted into different USB ports on the computer, the COM port number will change. Please pay attention to the record. If the CH343 device cannot be recognized, it indicates that the CH343 driver has not been installed or installation has failed. Please try reinstalling the CH343 driver.



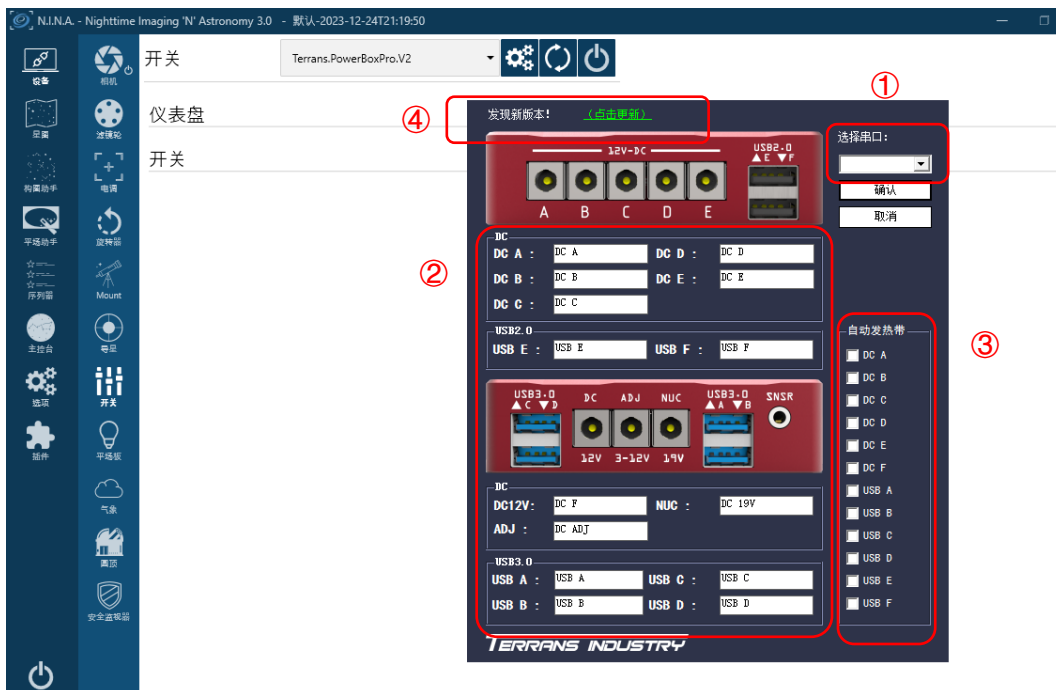
- Open NINA, select Device ->Switch, and select Terrans PowerBoxPro V2 from the dropdown menu, if this option is not available, please reinstall the ASCOM driver for this device and restart NINA.



- Click on the settings icon on the right side of the drop-down menu to pop up the Setup settings box.

- In region ①, please select the COM port number to be viewed in step three
- In region ②, you can customize the names of the devices connected to each port
- In region ③, You can set the channel for automatic tropical control
- In region ④, you can view the current version of the driver and obtain update push notifications

After setting up, click OK, then click Connect to connect to the device.



INDI (KStars)

This device supports the INDI platform. Please connect in the following order

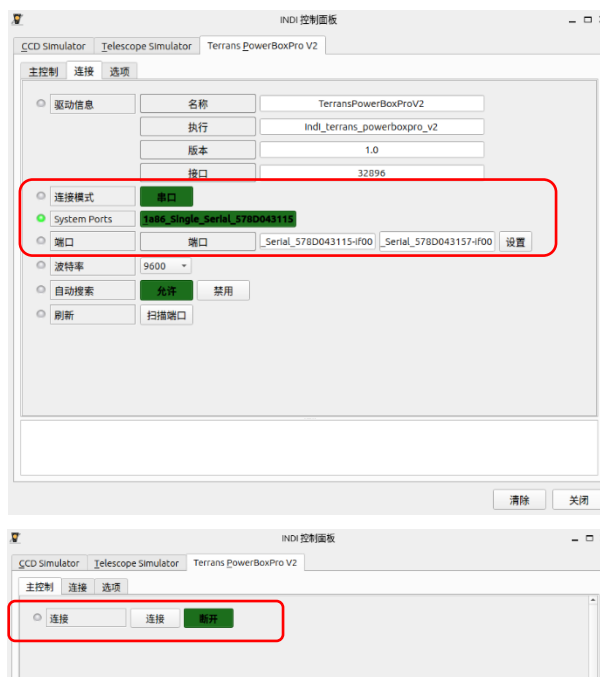
1. Install the latest version of INDI Library and KStars for Linux devices. For detailed steps, please refer to the INDI Library official website



2. Connect the power to this device and only connect it to your Linux device. Start KStars, select Terrans PowerBoxPro V2 from the auxiliary devices in the configuration file editor, click save, and then start Ekos.



3. Select the automatically recognized serial device on the connection page, and then click on the connection on the main control page



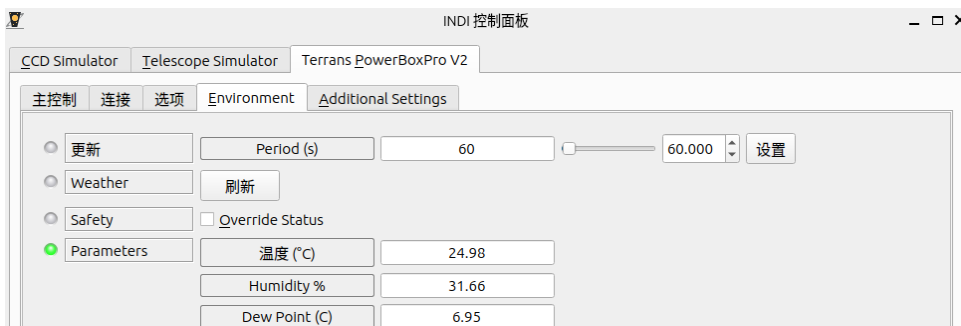
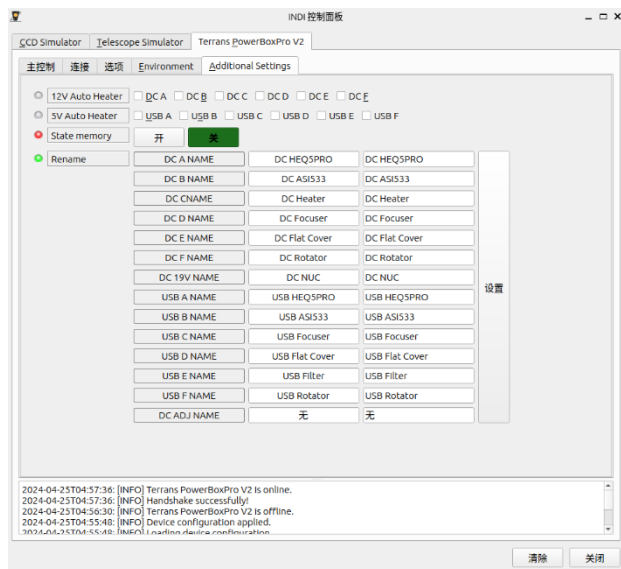
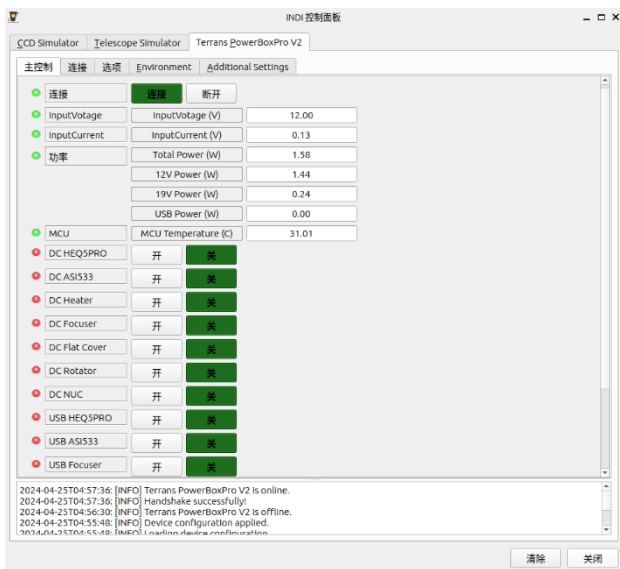
4. 设备连接成功后

5. After successful device connection

On the main control page, you can control the switches of each DC and USB interface to view device power and internal temperature

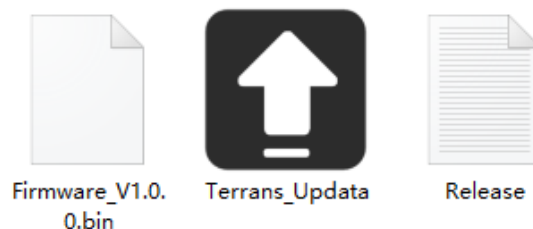
External environment sensor parameters can be viewed on the Environment page

In the Additional Setting page, you can set up automatic heating channel , rename the device and set the switch state memory.



Firmware update

1. Download the latest firmware package and unzip it. Pay attention to the Release document and use the corresponding versions of ASCOM and INDI driver files.



Open the Terrans_Updata upgrade tool

2. Connect the device to the computer and power it on. Follow step ① to select the corresponding COM port number, click connect, and the device model and serial number should be recognized in the upper right corner. If recognition fails, please close the software and try again.



3. As shown in the above figure, Step 2 opens the suffix The firmware package for BIN, click start, wait for the progress bar to complete and a pop-up window will display Upgrade Success.

The firmware upgrade has been completed at this time. Please restart the device.

Consultation and technical support

If you have any questions or suggestions, please contact us via the following email:

terransindustry@outlook.com

Or consult customer service to add WeChat groups and QQ groups (712675695)

This manual is subject to updates without prior notice.

You can visit the Terrans Industry official website to view the latest version

<https://www.terrans-industry.com/>