

# **Practical guide**

“How to interconnect your Antrack-Pro MCU with the EncoderHub and feed DC to avoid ground loops, timing and booting problems”

(guide prepared based on MCU FW 1.46.6 and encoderhub FW 4.0)

# INTRODUCTION:

With 80 DIY kits sold and another 12 assembled and tested units I collect enough information regarding the best way to interconnect your Antrack-Pro MCU with the EncoderHub. The interconnection happens via a RS485 line, with a theoretical distance of 1.2Km, for sure we can reach that enormous distance, but some considerations must be in place.

I'm not so fun of producing and sale DIY project because soon or later you will be confronted with situations where the lack of ability to build kits becomes your most horrible nightmare. I decide to convert the Antrack-Pro in a DIY project to bring to our community an extraordinary piece of HW for an extremely low cost, something Ham Radio Amateurs love, even if later this is translated to a sort of pain for me

In those situations, I prefer to always lose money and send back new assembled units that simply cover myself in Article 9 of my Terms and Conditions, available to everybody, the link is in the last line of your invoice and is not in small letters, but nobody reads that.

This guide will help you to avoid problems when you boot for first time your Antrack-Pro. This controller is not one controller more, it has embedded a plethora of tools very useful for EME and Radio Astronomy, all confined in a small but powerful microprocessor with unprecedented resolution and accuracy in Math calculation and tracking capabilities.

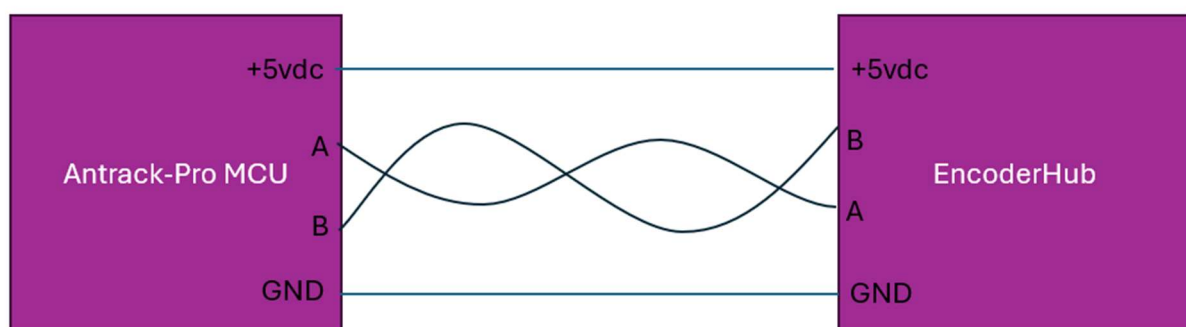
To exploit to the maximum all these characteristics I ask you to read carefully this guide, do not re-invent the wheel and follow my recommendations, then you will have a lot of fun

73 de Alex, HB9DRI

29.03.2025

## 1 to 1 Interconnection (common DC):

The graphic below simply shows how the MCU and the EncoderHub must be connected, you need a 4-wire cable, two of them must be twisted pair for the A and B RS 485 lines and the other two for DC (+5vdc) and GND



Advantages:

- Single power supply
- Just need one single cable with two twisted pairs
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Disadvantages:

Single power supply

Chances voltage drops below the working threshold are high

Most people don't use shielded twisted pair cables and that introduce Communication problems translated in constant or spontaneous MCU rebooting.

Chances of timing problems due to clock interactions between the ESP32 and the Arduino NANO

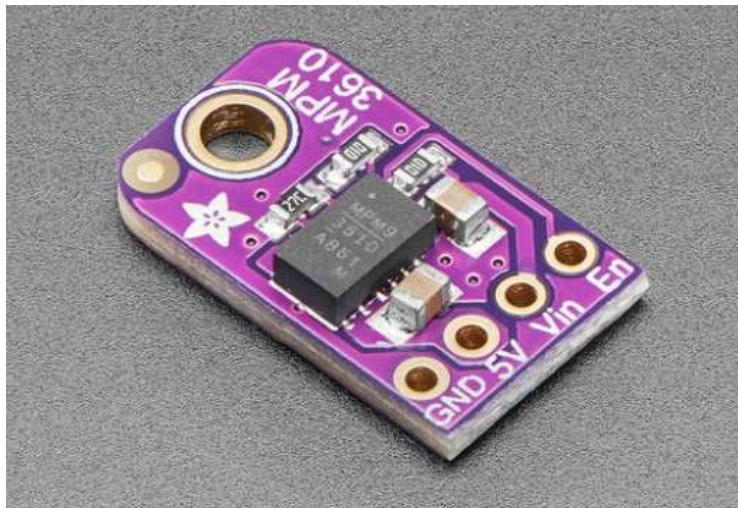
Conclusions: This works when distances are just few meters, for longer distances must be another approach.

## 1 to 1 Interconnection (splitted DC)

I found the best way is if we can provide split DC power supplies instead of linking both boards together. To do that I decide to avoid the use of the traditional linear regulators like the 7805, they are noisy, sometimes trend to oscillate and they never deliver 5.00VDC (only if you have the original IC but with Chinese copies no way)

A new regulator in the market keeps my attention and all tests confirm is reliability and perfect characteristics. Yes, it is a switching voltage regulator but a good one!!, don't be scared about switching regulator!!!

I'm talking about the MPM3610 with a cost of 6.00 USD.



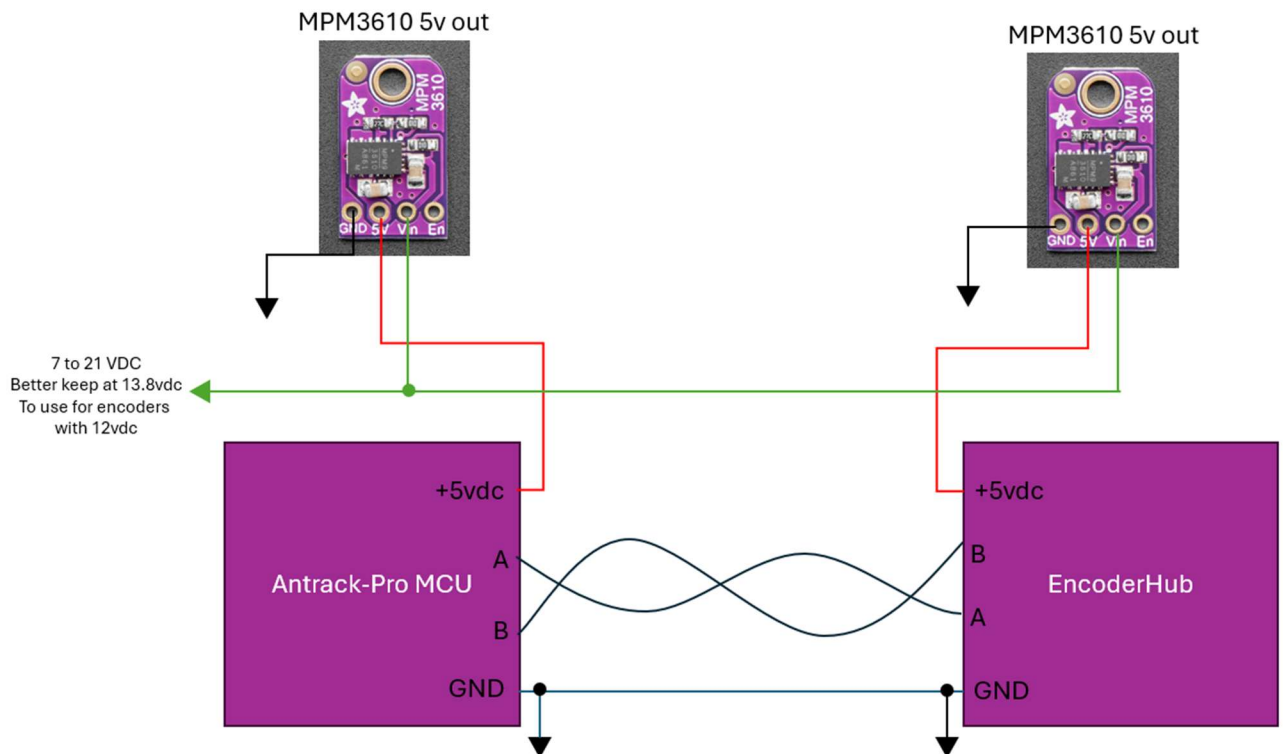
**This little buck converter based on the MPM3610 is a marvel, taking up to 21V input and providing a 5V output with up to 1.2A current.**

It's great for supplying power to popular 5V voltage circuits from a range of battery or power options. This chip provides up to 1.2 Amp load current across the entire input voltage range of 6V to 21V. The high voltage range is what sets this buck converter apart from most!

The Adafruit MPM3610 Breakout runs at 2-MHz fixed-frequency in PWM mode - the fully integrated inductor design is efficient and very small!

Comes with a fully assembled and tested breakout board. Also includes header to plug it into a breadboard but be careful with that, pin headers will not allow to reach the top current and even create a sort of voltage instability, for that reason the best way to work with this little beast is "SOLDERING CABLES", simple like that.

The next diagram shows how to interconnect the MCU with the EncoderHub but using two MPM3610 voltage regulators to provide separate 5VDC to both units.



#### Considerations:

- You will need a 4-wire cable, two of them must be twisted pair.
- The best is to use shielded CAT5 cable, you will use one twisted pair for A and B, one twisted pair for GND and one twisted pair for 13.8VDC
- It is extremely important that all grounds are connected, which means both boards have a share ground and each GND in each voltage regulator is connected to his respective board.
- In the EncoderHub you have plenty of space to install the regulator, use the 12VDC connector to receive the 13.8VDC coming from the MCU via the cable and re-route connections like 5VDC from the voltage regulator to the +5 input in the 4pin connector.
- The hole in the voltage regulator is M2 but you can drill an M3 without any problems.
- Thermal dissipation starts at 500ma and up at 700ma becomes really hot. Installing a screw M2 or M3 with nuts in both sides will help to act as a dissipator, nevertheless, the consumption in the MCU side will be no more than 400ma when in the EncoderHub with two HH12 and/or ETS25 the consumption will not be more than 180ma

#### Advantages:

- You avoid dropping voltages within long cables, even at 100 meter in a CAT5 cable the drop using 13.8VDC and 500ma will not be more than 0.7vdc, the regulator will continue to be delivering 5VDC and full current without any problems.
- You isolate two Microprocessors avoiding timing problems and false rebooting.
- You bring up already 12vdc if your encoder needs 12vdc and not 5, like the inclinometer SOLAR360

#### Disadvantages:

- A small additional work to host both regulators in the boards
- The additional cost, but each cost aprox. 6.00 USD, not expensive for what it is.

#### Final words:

Please, do not add any capacitor in the output lines of the regulators, people think adding a 1000uF capacitor will filter better the Dc output, well in Switching power supply NO.

Switching regulators don't like big capacities at the output, they prefer LC networks with a moderate inductance followed by a small capacitor, opposite Linear regulators love and need big capacities in the output, but this is not our case.

73 de Alex, HB9DRI

Switzerland, 29.03.25