ESPWRC2 Programming on PWRC2 v10a using ESP-Conv1

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1. INTRODUCCION

This document describes the PWRC2 connection (from Firmware v10a) with ESP-Converter (ESP-Conv1) for Web access, additionally to conventional cabled RS232 access. The software running on the ESP-Conv1 is known as ESPWRC2. Testing is base on various updates performed from November 2021 on PWRC2 unit INTI #233 according to Figure 1.

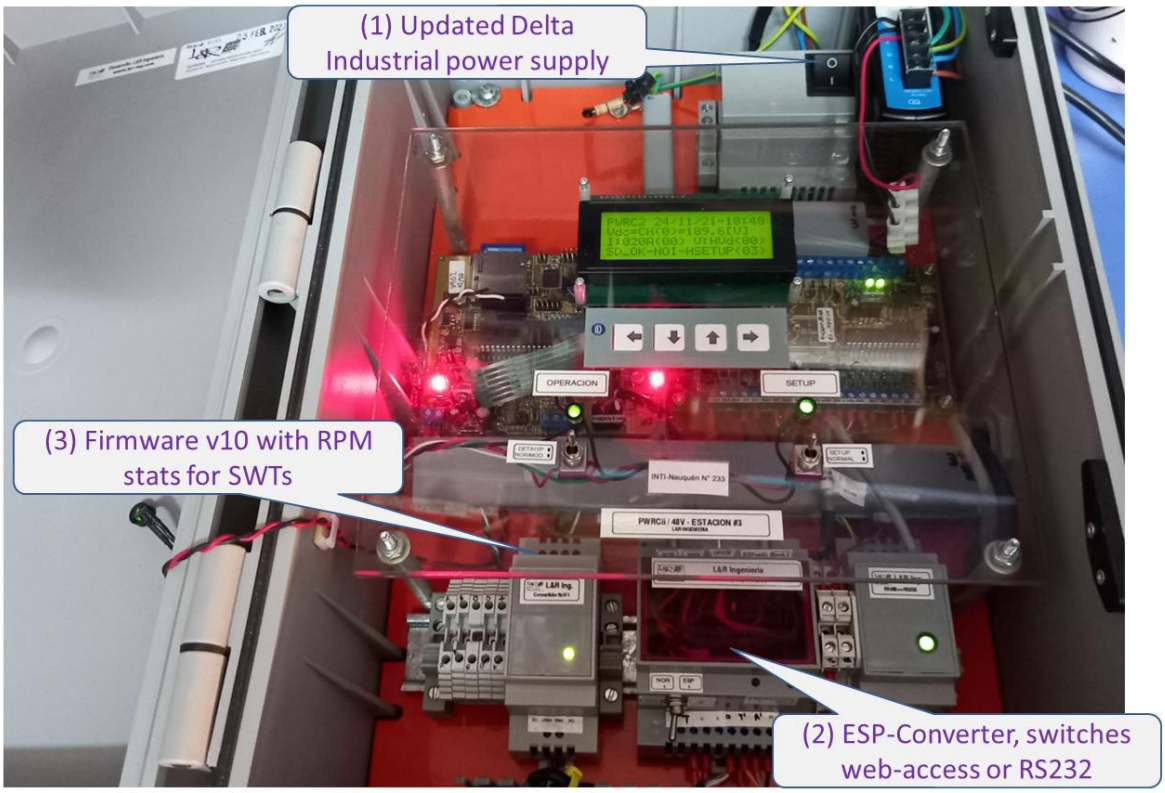

Figura 1 – PWRC2 #233 with updated (1) Delta power supply / Filters (2) ESP-Converter (3) RPM Stats on Firmware

2. ESP CONVERTER (ESP-Conv1) for Web interface

A web/Wi-Fi interface was added to the unit as an alternative to normal operation through RS232/ Ethernet converter. Using the manual switches on the ESP-Conv1 the prior normal mode can be easily restored.

2.1 Block Diagram and Operational Modes of ESP-Conv1: The new addition to CL2-based PWRC2 Small Wind Turbine (SWT) measurement units is called ESP-Conv1. A block diagram and connection can be seen in Figure 2. It allows operators tu use the existing RS232 interface on PWRC2 units in the conventional cabled terminal/ RS232 (bypass) directed to the CL2 board on the PWRC2 **(Mode1)**, to the WiFi / ESP12 module vía its internal serial port (for ESPWRC2 Webserver software update) **(Mode2),** or redirecting this ESP internal serial port to the serial port on the CL2 board **(Mode3**). In this last mode the PWRC2 can be accessed via WiFi using the integrated ESP12. Table 1 shows a listing of these operational modes.

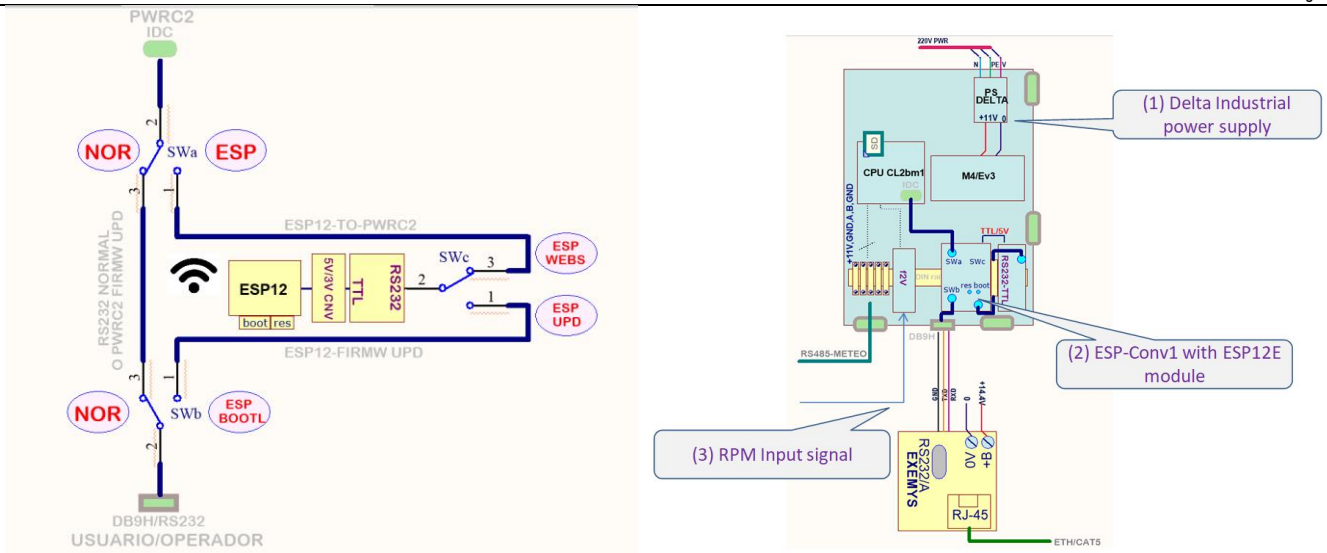

Figura 2 –ESP-Conv1 block diagram and connection to PWRC2

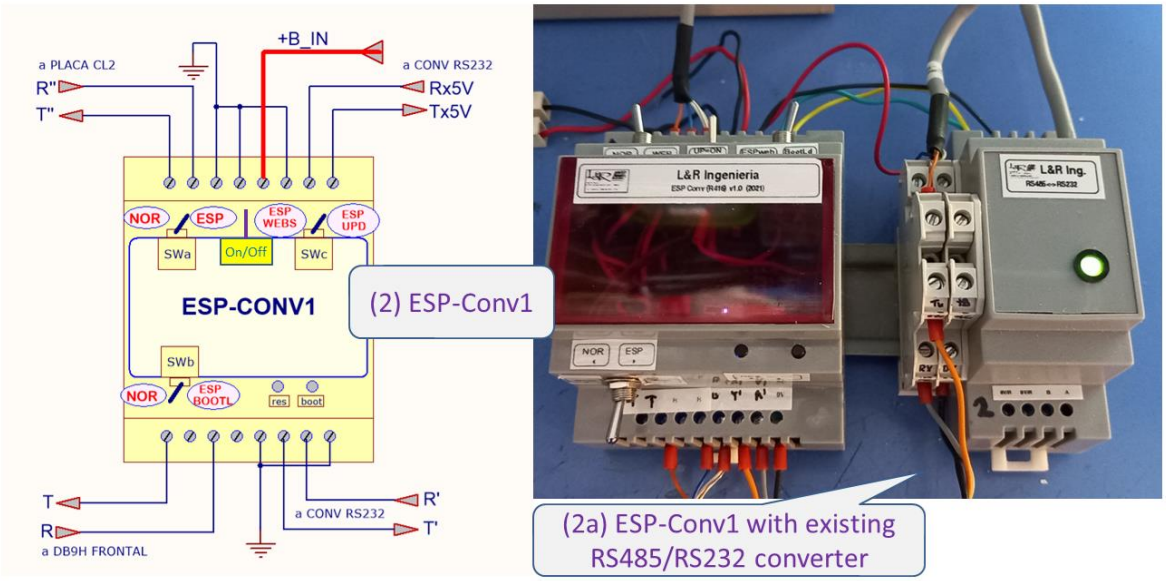

Figura 3 – Detailes ESP-Conv1 switch position and testing for PWRC2 connection

TABLE 1 – ESP-CONV1 OPERATION MODES

MODE	SWa	SWb	SWc	OBS
1	NOR	NOR	X	NORMAL/CABLED OR PWRC2 FIRMWARE UPDATE
2	X	ESP/BOOTL	ESP/UPD	UPD ESP12 FIRMW
3	ESP	X	ESP/WEBS	USER CONNECT to PWRC2 VIA WIFI

2.2 Mode 3 WiFi – user Access to PWRC2 via ESP-Conv1: This mode allows emulation of a cabled connection through WiFi . Figure 3 shows switch positions for SWa / SWc for this case, SWb is not used.

Mode 3 connection of PWRC2 to user vía WiFi - ESP-Conv1

MODE	SWa	SWb	SWc	OBS
3	ESP	X	ESP/WEBS	USER CONNECT to PWRC2 VIA WIFI

Figure 3 – Mode 3 Switches on ESP-Conv1

In mode 3 permite the operator can access PWRC2 vía WiFi, once the Access credentials are set using a conventional browser (e.g.Chrome) through the `espwrc2.local` page as shown in Figure 4.

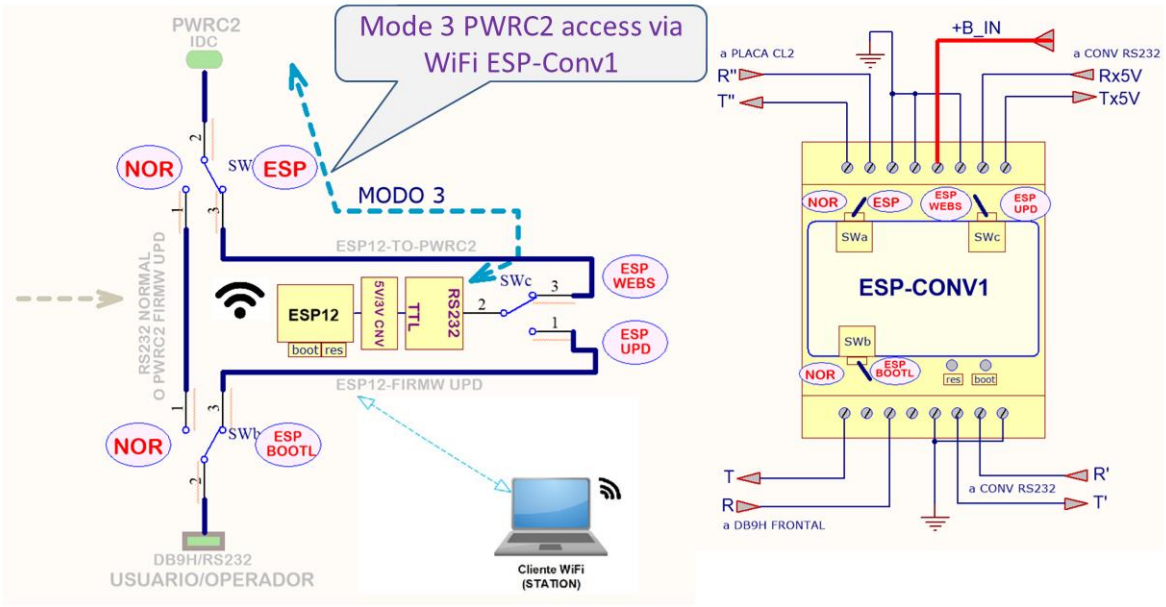

Figura 4 – Mode 3 – WiFi access to PWRC2 vía ESP-Conv1

Figura 5 – Modo 3 – Acceso WiFi al PWRC2 vía el ESP-Conv1 en este caso ya configurado el acceso vía web (preliminar)

2.3 Description of the terminal Function using ESP-Conv1: The terminal can be accessed from the following address: http://espwrc2.local/term.html. If the Mode3 access is set and the PWRC2 in Setup/Terminal mode (both switches up) the PWRC2 main menú can be accessed.

Figura 6 – Mode 3 in terminal access

3. Mode2 – Firmware Update of ESP: In Mode 2 (Figures 7, 8) the PC can be connected to modify the internal firmware and web-access data (HTML, CSS, Javascript files) on the ESP-12, via RS232 and a USB to serial converter. The example code can be downloaded from [ref2] repository. Once initialized from Visual Studio Code, with the PlatformIO plug-in installed, the Build File system (stored in /data directory) and Upload FileSystem commands in the PIO menu must be executed. The upload requires the RES and BOOT button to be pressed and released in sequence, a screen similar to Figure 7 should appear.

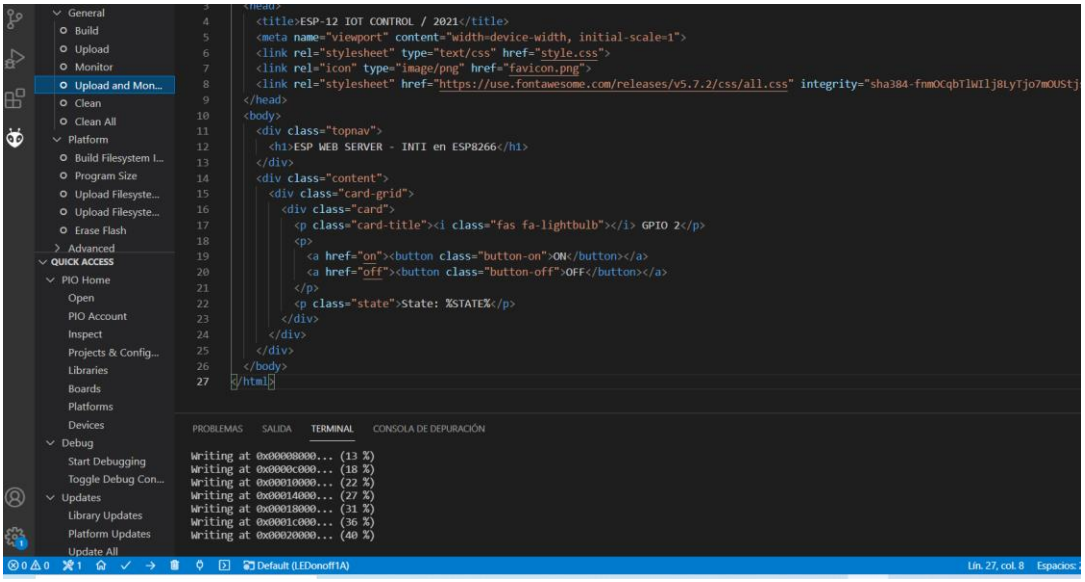

Figura 7 – Updating firmware from VSC/PIO in Mode 2 to ESP-Conv1

After the Filesystem image is uploaded, Upload and monitor executes the firmware build (in C++) and updates the ESP12 internal program memory, using similar front-button sequence as before, as shown in Figure 8. The ESP then starts the internal web server assigning an IP address and the naming via DHCP.

Figura 8 – Updating program and starting terminal. The File system is mounted and WiFi connection established. DHCP assigns the naming of the ESPWRC2 server.

5. References

[Ref1] CL2b board and interfaces: https://www.lyr-ing.com/Embedded/LyRAVR_CyEn.htm
[Ref2] ESPWRC2 internal firmware: https://github.com/LyRIng/ESPWRC2v2
[Ref3] UNPA-AEA Site: https://www.energiasalternativas-unpa.net/

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NOTES: