

**PICOVEND EZ ESP 8X
(MDB slave/USB
8 relay module)
v2020-12-31**

Table of Contents

- I. Introduction.....3
- II. Hardware.....4
 - A. Board overview.....4
 - B. Connectors description.....4
 - C. Communication interfaces.....5
- III. Communication protocol.....6
 - A. When connected over USB interface.....6
 - 1. Individual relay control.....6
 - 2. Batch relay control.....6
 - 3. Check relay status.....7
 - 4. Relay reset.....7
 - 5. Set the relay board address.....7
 - 6. Save settings.....7
 - 7. Show settings.....8
 - B. When connected over MDB with PICOVEND EZ MASTER module.....9
 - 1. Individual relay control.....9
 - 2. Batch relay control.....9
 - 3. Check relay status.....10
 - 4. Relay reset.....10
 - C. When connected over MDB with third party modules.....11
 - 1. Individual relay control.....11
 - 2. Batch relay control.....11
 - 3. Check relay status.....12
 - 4. Relay reset.....12
- NOTE:.....13

I. Introduction

This device is an optional MDB slave module with 8 relays, that can be used attached directly to a computer, a Raspberry Pi or compatible SBC, via USB or to an MDB master module (for example PICOVEND EZ MASTER or PICOVEND EZ SELF LITE) in order to control up to 8 electrical circuits (for example a self service car wash system).

There are few control modes:

- with simple command – when attached to USB interface;
- with simple commands – when attached to PICOVEND EZ MASTER;
- internally handled by PICOVEND EZ SELF LITE (with the proper firmware);
- directly with specific device MDB commands from any MDB master device.

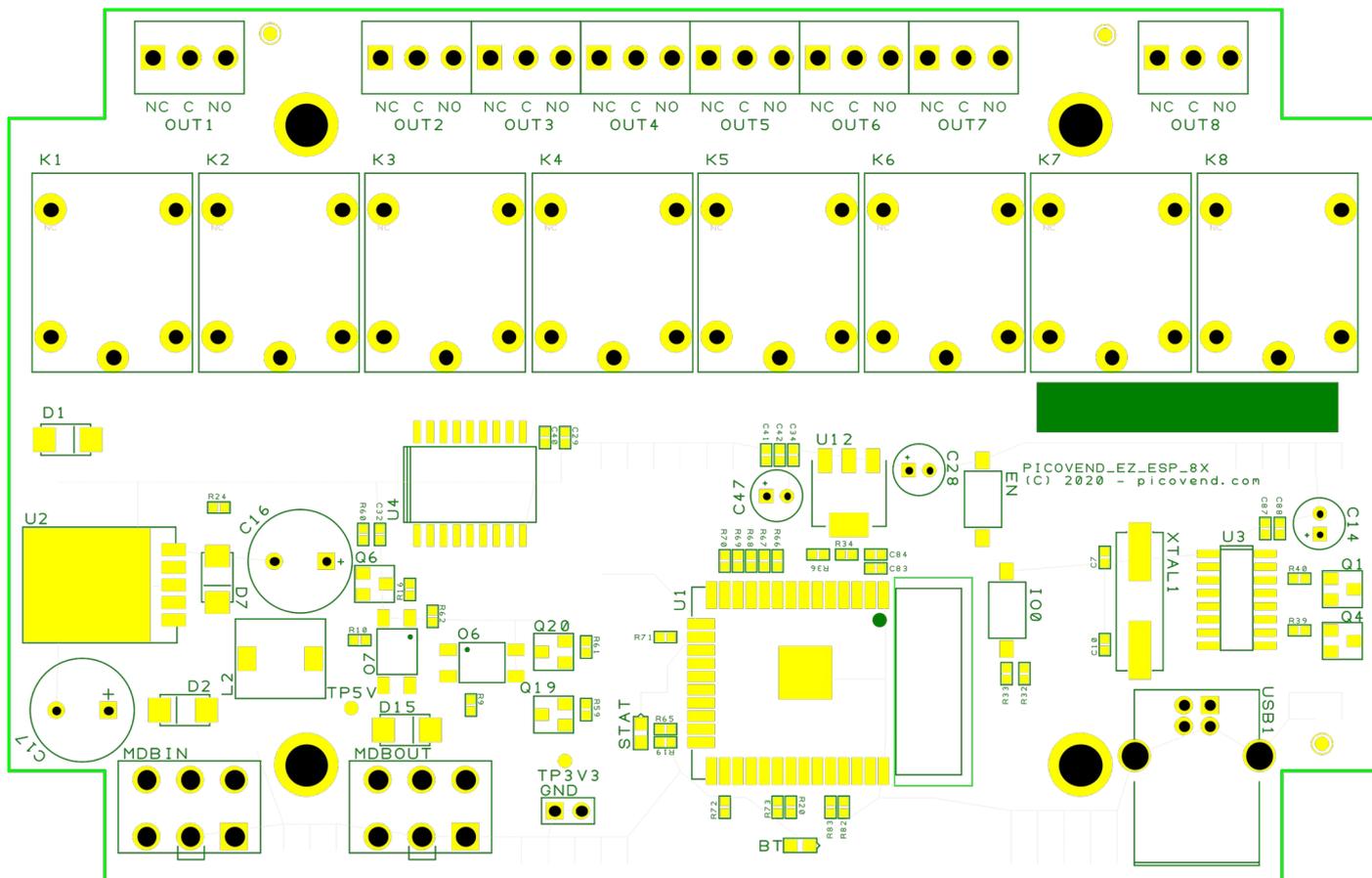
The device is using a simple ASCII protocol over USB/PICOVEND EZ MASTER interface. There is no need for you to have deep MDB knowledge, however, some knowledge about MDB will help you faster and better understand the interface functionality.

Standard package content:

- PICOVEND EZ ESP 8X relay board board;
- MDB cable.

II. Hardware

A. Board overview



B. Connectors description

1. **MDBIN**– connect the provided MDB cable between the board and the master. You need to use this connector to power the device if it is not connected to MDB and you want to use with commands sent over USB. Maximum voltage accepted for input is 25VDC.
2. **MDBOUT** – connect other needed payment systems.
3. **USB1** – to connect the board to a computer/Raspberry Pi. Default configuration is 115200/8/N/1.
4. **OUT1-OUT8**– the relay C/NO/NC contacts.

C. Communication interfaces

Using USB interface:

- baudrate – 115200bps;
- data bits – 8;
- stop bits – 1;
- parity – none;
- flow control – no flow control (either hardware or software).

USB interface is using a driver for Windows OS. For Raspberry Pi (or compatible) and most of the Linux distributions with new kernels, the OS will automatically load the correct kernel modules.

All commands must end with <CR> and <LF> (0x13, 0x10)

Also, all answers have <CR> and <LF> at the end. If you are using non-buffered serial interface reading, make sure your application reads until <LF>.

Sometimes, more than one message will be received (for example, a response to your command and an unsolicited message or an answer with the reason of the command fail). You need to receive the entire message and parse it by checking against all command answers related to your last command and also against all available unsolicited message (see unsolicited messages description below).

III. Communication protocol

A. When connected over USB interface

Commands are case-sensitive and you must use all upper case or all lower case for a command. No mixed characters accepted.

For simplicity, we will only use upper case in our documentation.

Answers are always upper case.

1. Individual relay control

Command	
- RELAY(A,B)	This command will energize one relay for a specified amount of time. - A – is the relay number (1-8) - B – is the time (seconds) for the relay to be energized, in seconds (1-65535). The board will automatically de-energize the relay after the specified time passed. To force the relay de-energize at any moment, you need to specify 0 for this parameter Example: RELAY(3,45) – will energize the relay number 3 (OUT3 on the board) for a specified time of 45 seconds
Possible answers	
- RELAYOK - RELAYFAIL	- If the command was successfully received and executed. - If the command was not successfully received and executed.

2. Batch relay control

Command	
- RELAYALL(A,B,C,D,E,F,G,H)	This command will energize/de-energize all slave board relays with a single command - A-H – is the time (seconds) for relay 1-8 (OUT1-OUT8). The board will automatically de-energize the relays after the specified time passed. To force the relay de-energize at any moment, you need to specify 0 for the parameter on the desired relays. The maximum allowed value is 65535 Example: RELAYALL(,10,60,0,0,0,0,0) – will energize OUT1 relay for 10 seconds and OUT2 relay for 60 seconds, all the other relays will be de-energized.
Possible answers	
- RELAYALLOK - RELAYALLFAIL	- If the command was successfully received and executed. - If the command was not successfully received and executed.

3. Check relay status

Command	
- RELAYSTATUS	This command will check the relays status and will return the time that each relay will be still energized. You can use this command to check if some of the relays are energized and for how long.
Possible answers	
- RELAYSTATUS(A,B,C,D,E,F,G,H)	- If the command was successfully received and executed. - A-H – is the time in seconds that relays (OUT1-OUT8) will be still energized. If the returned value is 0, the corresponding relay is de-energized.
- RELAYSTATUSFAIL	- If the command was not successfully received and executed.

4. Relay reset

Command	
- RELAYRESET	This command will reset all relays time to 0 and de-energize them
Possible answers	
- RELAYRESETOK	- If the command was successfully received and executed.
- RELAYRESETFAIL	- If the command was not successfully received and executed.

5. Set the relay board address

Command	
- MYADDRESS(A)	This command will set the internal board address. Using the address allows you to connect up to 8 relay boards to an MDB master device (or PICOVEND EZ MASTER module). - A – is the relay board module address (accepted values between 1 and 8)
Possible answers	
- MYADDRESSOK	- If the command was successfully received and executed.
- MYADDRESSFAIL	- If the command was not successfully received and executed.

6. Save settings

Command	
- SAVESETTINGS	This command will save the previously MYADDRESS value in the non-volatile memory. It will be automatically loaded and used on the next board reboot. You must execute this command after changing MYADDRESS value, otherwise, the board will restart with the latest address on the next power-up
Possible answers	
- SAVESETTINGSOK	- If the command was successfully received and executed.
- SAVESETTINGSFAIL	- If the command was not successfully received and executed.

7. Show settings

Command	
- SHOWSETTINGS	This command will display the configured and saved MYADDRESS value
Possible answers	
- MYADDRESS(X)	- If the command was successfully received and executed, X is the current board address

B. When connected over MDB with PICOVEND EZ MASTER module

Commands are case-sensitive and you must use all upper case or all lower case for a command. No mixed characters accepted.

For simplicity, we will only use upper case in our documentation.

Answers are always upper case.

1. Individual relay control

Command	
- RELAY(A,B,C)	This command will energize one relay for a specified amount of time. - A – is the relay board module address, set by MYADDRESS command over USB and saved with SAVESETTINGS command after. - B – is the relay number (1-8) - C – is the time for the relay to be energized, in seconds (1-65535). The board will automatically de-energize the relay after the specified time passed. To force the relay de-energize at any moment, you need to specify 0 for this parameter Example: RELAY(1,3,45) – will energize the relay number 3 (OUT3 on the board) for a specified time of 45 seconds
Possible answers	
- RELAYOK - RELAYFAIL	- If the command was successfully received and executed. - If the command was not successfully received and executed.

2. Batch relay control

Command	
- RELAYALL(A,B,C,D,E,F,G,H,I)	This command will energize/de-energize all slave board relays with a single command - A – is the relay board module address, set by MYADDRESS command over USB and saved with SAVESETTINGS command after. - B-I – is the time for relay 1-8 (OUT1-OUT8). The board will automatically de-energize the relays after the specified time passed. To force the relay de-energize at any moment, you need to specify 0 for the parameter on the desired relays. Example: RELAYALL(1,10,60,0,0,0,0,0,0) – will energize OUT1 relay for 10 seconds and OUT2 relay for 60 seconds, all the other relays will be de-energized.
Possible answers	
- RELAYALLOK - RELAYALLFAIL	- If the command was successfully received and executed. - If the command was not successfully received and executed.

3. Check relay status

Command	
- RELAYSTATUS(A)	This command will check the relays status and will return the time that each relay will be still energized. You can use this command to check if some of the relays are energized and for how long.
Possible answers	
- RELAYSTATUS(A,B,C,D,E,F,G,H,I)	- If the command was successfully received and executed. - A is the relay board module address, set by MYADDRESS command over USB and saved with SAVESETTINGS command after.
- RELAYSTATUSFAIL	- B-I – is the time in seconds that relays (OUT1-OUT8) will be still energized. If the returned value is 0, the corresponding relay is de-energized. - If the command was not successfully received and executed.

4. Relay reset

Command	
- RELAYRESET(A)	This command will reset all relays time to 0 and de-energize them - A is the relay board module address, set by MYADDRESS command over USB and saved with SAVESETTINGS command after.
Possible answers	
- RELAYRESETOK	- If the command was successfully received and executed.
- RELAYRESETFAIL	- If the command was not successfully received and executed.

C. When connected over MDB with third party modules

Commands are binary and must respect all MDB protocol constraints and specifications.

1. Individual relay control

Command	
- 0x80 0x01 0x10 <Kn> <Kt> <CRC>	<p>This command will energize one relay for a specified amount of time.</p> <ul style="list-style-type: none"> - Kn – is the relay number (1-8) - Kt – is the time for the relay to be energized, 2 bytes with the most significant byte first, in seconds (1-65535). The board will automatically de-energize the relay after the specified time passed. To force the relay de-energize at any moment, you need to specify 0 for this parameter <p>Example: 0x80 0x01 0x10 0x03 0x2D 0xC1 – will energize the relay number 3 (OUT3 on the board) for a specified time of 45 seconds</p>
Possible answers	
- 0x00 (MDB ACK) - 0xFF (MDB NAK)	<ul style="list-style-type: none"> - If the command was successfully received and executed. - If the command was not successfully received and executed.

2. Batch relay control

Command	
- 0x80 0x01 0x11 <Kt1> <Kt2> <Kt3> <Kt4> <Kt5> <Kt6> <Kt7> <Kt8>	<p>This command will energize/de-energize all slave board relays with a single command</p> <ul style="list-style-type: none"> - Kt1-Kt8 – is the time for relay 1-8 (OUT1-OUT8). The board will automatically de-energize the relays after the specified time passed. To force the relay de-energize at any moment, you need to specify 0 for the parameter on the desired relays. <p>For each relay time, there should be 2 bytes, with the most significant byte sent first.</p> <p>Example: 0x80 0x01 0x11 0x00 0x0A 0x00 0x3C 0x00 0xD8– will energize OUT1 relay for 10 seconds and OUT2 relay for 60 seconds, all the other relays will be de-energized.</p>
Possible answers	
- 0x00 (MDB ACK) - 0xFF (MDB NAK)	<ul style="list-style-type: none"> - If the command was successfully received and executed. - If the command was not successfully received and executed.

3. Check relay status

Command	
- 0x80 0x01 0x12 0x93	This command will check the relays status and will return the time that each relay will be still energized. You can use this command to check if some of the relays are energized and for how long.
Possible answers	
- 0x80 0x01 0x11 0x00 0x0A 0x00 0x3C 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0xD8	- If the command was successfully received and executed. - Answer format is identical with the format needed for batch relay control.
-- 0xFF (MDB NAK)	- If the command was not successfully received and executed.

4. Relay reset

Command	
- 0x80 0x01 0x13 0x94	This command will reset all relays time to 0 and de-energize them
Possible answers	
- 0x00 (MDB ACK) - 0xFF (MDB NAK)	- If the command was successfully received and executed. - If the command was not successfully received and executed.

NOTE: