



# Blub Nixie Clock

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# 1. How it works

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Blub Nixie Clock is a single nixie tube clock, it utilizes one nixie tube to display full time in HH:MM format by switching from one digit to another. The time is displayed as a sequence of digits, e.g. time 10:45 is shown as 1-pause-0-pause-4-pause-5-long-pause.



*Blub displaying time 02:26*

## Technical specification

Power input: 5V @ 250mA (mini USB connector)

Power consumption: 1.25W

The expected lifespan of the nixie tube: over 15 years

## Configuration

The clock contains two buttons on the back, the ADJ button, and the SET button. All configuration parameters are accessible over this interface. More information is available on the [Configuration page](#). Another option is using the USB interface for the configuration of the clock, more here: [USB interface](#).

## Timekeeping

The clock contains a high accuracy RTC module (DS3231) with accuracy  $\pm 2\text{ppm}$  (maximum  $\pm 1$  minute per year). The RTC module is battery-backed, the CR2032 battery will last more than 10 years. The battery doesn't discharge when the clock is powered but will lose some energy over time. Note: the

battery provides energy only for the RTC module, not for the clock itself (to display numbers).

## Package Contents

1x Blub Nixie Clock

1x Power adapter

1x USB cable

1x User guide



## 2. Configuration

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All settings are done using two buttons on the back of the clock.

**SET button** is used to enter the settings and confirm the parameters.

**ADJ button** is used to increment the current parameter value.



*Blub Clock – Button description*

The clock can be set in two modes: **Time mode** and **Configuration mode**.

### Time Mode

This is the mode in which the clock spends most of the time – displaying the current time. After power-up, the clock automatically starts in **Time mode**. To get the clock back to **Time mode** from **Configuration mode**, either select parameter **0** in the root menu, or just power cycle the clock.

### Configuration Mode

Whenever you need to change the parameters of the clock (time, display speed, etc..), the clock needs to be switched into **Configuration mode**.

✿ Hold the SET button for more than 3 seconds to enter the **Configuration mode**.

By pushing the ADJ button you will list through parameters 0-8 which represents the following configuration parameters. To enter a particular configuration parameter, push the SET button while on the corresponding number.

✿ When setting up a new clock, start with parameter 1 and then continue with the other parameters.

| Parameter | Name                  | Options                       |
|-----------|-----------------------|-------------------------------|
| 0         | Return to Time mode   | N/A                           |
| 1         | Time zone for DST*    | 0,1,2,3,4,5                   |
| 2         | Time and date         | yyMMddhhmm                    |
| 3         | Time format 12/24     | 1,2                           |
| 4         | Transition Effect     | 1,2,3                         |
| 5         | Display speed         | 1 (fastest) – 9 (slowest)     |
| 6         | Night Mode brightness | 0 (off) – 9 (full brightness) |
| 7         | Day Mode brightness   | 0 (off) – 9 (full brightness) |
| 8         | Night Mode timing     | HHhh                          |

**DST** stands for Daylight Savings Time.

## Parameter 1 – Time Zone for Daylight Savings Time compensation

This parameter tells your clock when to switch automatically between summer and wintertime. Set the parameter according to the location of your clock.

0 – No daylight savings compensation (e.g. Japan, China, India, Arizona)

1 – US style

2 – EU style

3 – Mexico

4 – Australia

5 – New Zealand

## Parameter 2 – time and date

Configuration of this parameter tells the clock the actual time and date. This configuration parameter expects the time and date input in format yyMMddhhmm, every single position is one digit, push SET to confirm every position.

Use current time at your time zone (what you see at the other clocks), the Blub clock will calculate the daylight savings automatically from the date.

Enter the time in 24h format.

yy – last two positions of the year (2021), MM – month number, dd – number of the day, hh – hour, mm – minute.

For example 6th of March 2021, 12:36 would be entered as: 2103061236.

2-set-1-set-0-set-3-set-0-set-6-set-1-set-2-set-3-set-6-set

### Parameter 3 – time format 12/24

Use this configuration parameter to switch between 12 and 24-hour time formats.

1 – 12h, 2 – 24h format

### Parameter 4 – Transition Effect

This parameter sets the transition between digits.

1 – no transition effect

2 – crossfading between digits

3 – slot machine effect

### Parameter 5 – Display Speed

Use this parameter to set how fast is the time displayed on the clock. Use value 9 for slowest mode, value 1 for fastest mode.

### Parameter 6 – Night Mode Brightness

Use this parameter if you want to adjust display brightness during the night (default from 21:00 to 7:00). Set 1 for minimal brightness, 9 for full brightness, 0 to turn off the display during the night.

### Parameter 7 – Day Mode Brightness

Use this parameter if you want to adjust display brightness during the day (default outside 21:00 to 7:00). Set 1 for minimal brightness, 9 for full brightness, 0 to turn off the display during the day.

### Parameter 8 – Night Mode time range

Adjust this parameter to modify the default time range for night mode (21:00 to 7:00). Enter the time in 24h format. The time is entered as individual digits **HHhh** where **HH** is starting time of the night mode and **hh** ending time of the night mode. Push the set button to confirm each digit.

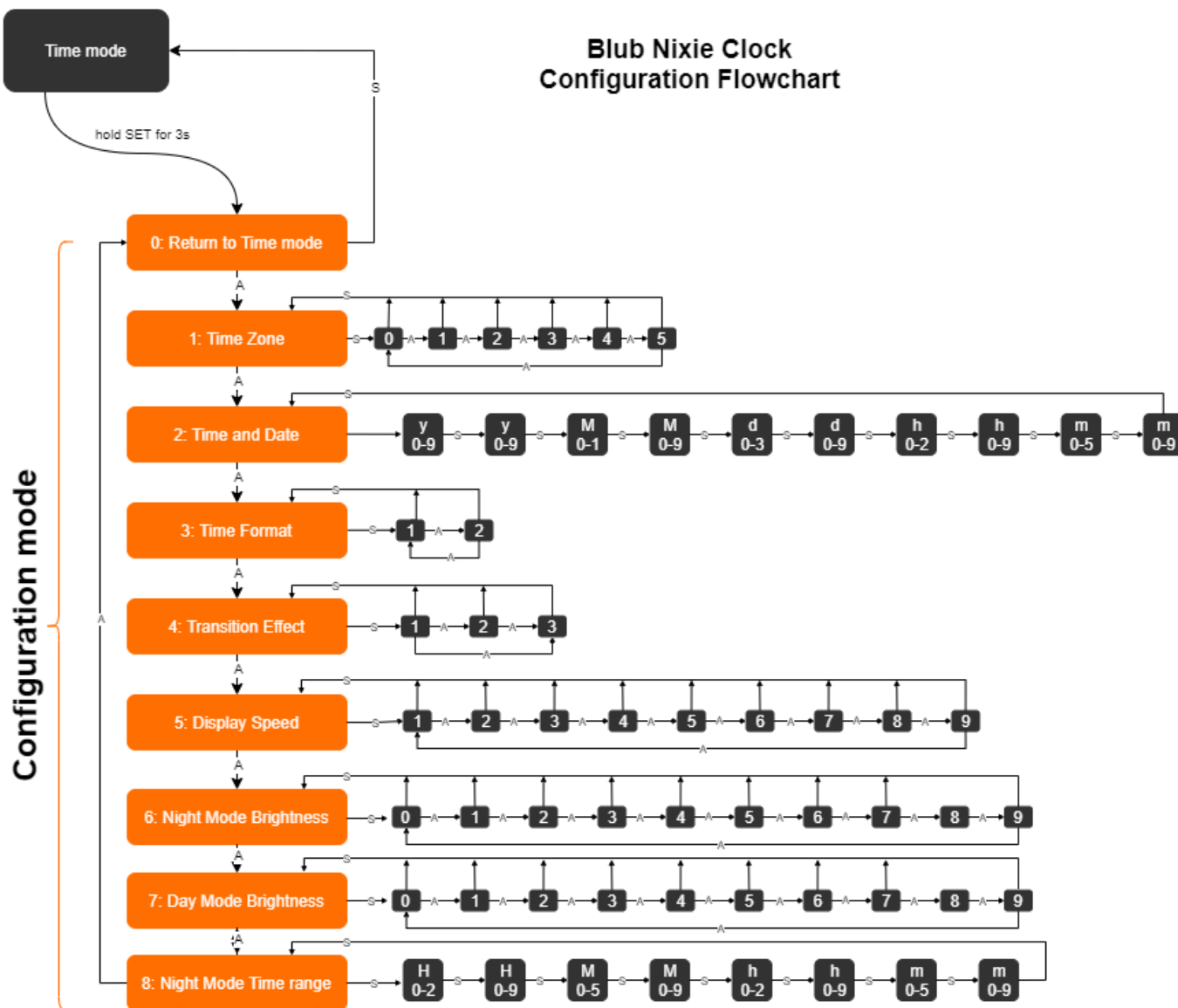
For instance, to set the time range from 21:00 to 07:00, you need to enter 2107.

2 – set – 1 – set – 0 – set – 7 set

### Configuration Flowchart

[zoomable PDF version of Blub Flowchart](#)





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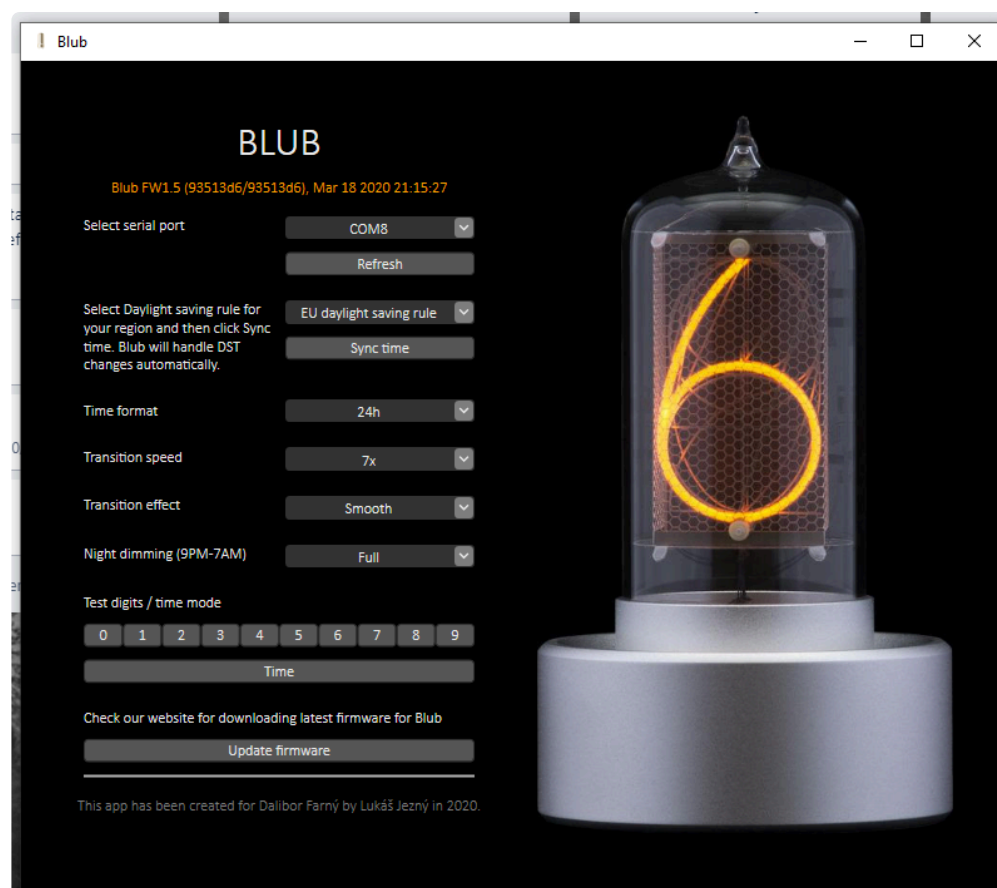
## 3. USB Interface

The USB interface on the Blub Nixie Clock provides additional functionality:

- Firmware update
- Faster/easier settings of the clock parameters
- Access to additional parameters of the clock

To control the clock over USB, you can use either a serial line (Putty, Hterm, etc..) or our [Windows app](#).

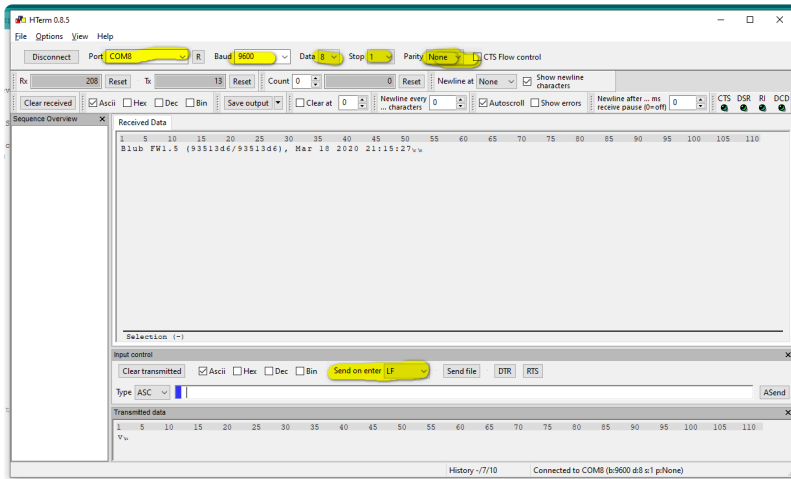
### Application for Windows



### Serial Communication

Configuration of the serial line connection:

- 8 data bits, no parity, one stop bit (default Arduino settings)
- 9600 bps



### Parameters for serial communication:

- **v**: print version of current firmware in the clock and its compilation date
- **e**: clear EEPROM and all settings in the clock
- **d**: display a custom number, e.g. d6 displays 6 on the tube, d10 returns the clock back to time mode
- **t**: set the time by giving a UNIX timestamp as an input, e.g. t1570323600
- **f**: set format: f1 for 12h, f2 for 24h
- **s**: set display speed (1-9), e.g. s1 to fastest, s9 slowest
- **m**: set transition of the display (values 1-3)
- **n**: set night mode brightness (1-9)
- **o**: set day mode brightness (1-9)
- **r**: set night mode time range (HHhh) in 24h time format, e.g. r2107 to set the range from 21:00 to 07:00
- **z**: set a time-zone (behavior of DST), values 1-6 (1: NO DST, 2:US-style DST, 3:EU-Style DST, 4:Mexico, 5:Australia, 6:New Zealand)

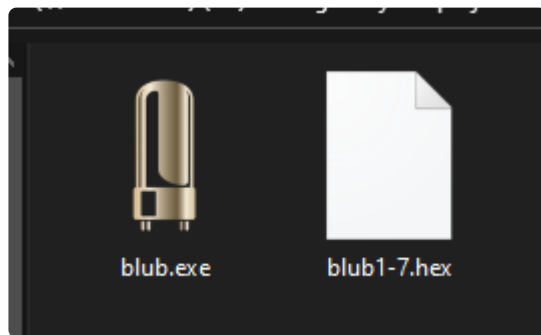
## 4. Windows application

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To make the settings easier, we made a simple Windows application that talks to the Blub clock over the [USB interface](#). It can set up the configuration parameters as well as update the firmware.

First, download the [ZIP archive](#), the ZIP archive contains the Blub.exe application and HEX file with current firmware.

ZIP file contents:

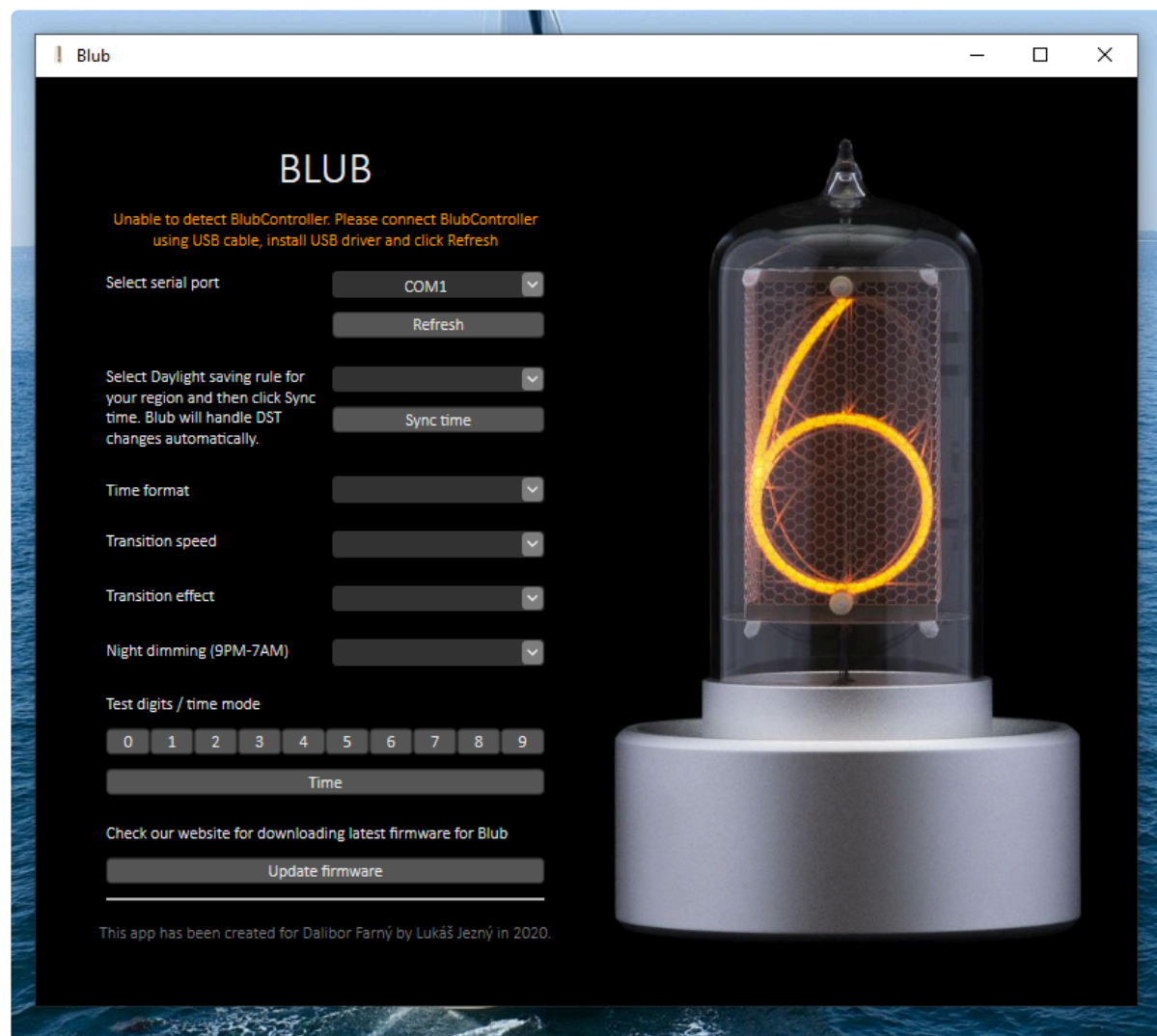


Unpack it and launch the Blub.exe application, no installation is necessary. Connect the clock to the computer via the provided USB cable.

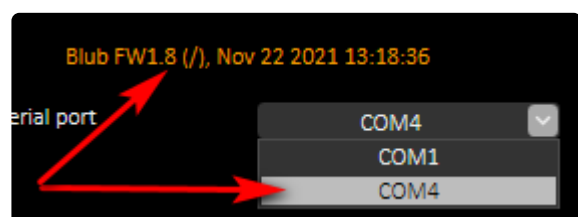
## Drivers

The hardware of the Blub clock is designed just like Arduino Nano (328p). Under Windows 10, the driver will be installed automatically after plugging in the clock. For manual installation or for other Windows versions please follow the instructions here:

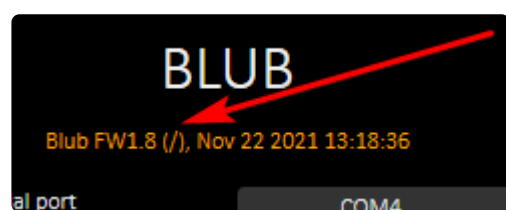
<https://www.arduino.cc/en/Guide/DriverInstallation>



Now we need to find the right COM port where is the clock connected. Click the *refresh* button and select one of the ports that are not COM1. In our case, it is COM4.



In case of a successful connection to the clock, the application will write the current clock firmware and the date when the firmware was compiled. We are connected to the clock!



## Configuration

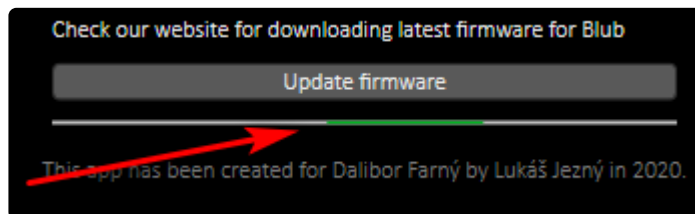
To configure the clock, pick the desired option from the drop-down menus, the option will be sent to the clock immediately.

## Time synchronization

Click the *Sync time* button to set the clock to the time from your computer.

## Firmware update

To update the clock firmware, click the *Update firmware* button and select the new firmware HEX file (provided in the [ZIP archive](#)). The file will be loaded into the clock in around 1 minute, you can see a green line on the progress bar. The clock will restart once the update is done.





## 5. Troubleshooting

### I can't connect the Blub clock to my Windows computer or the Blub Windows app is crashing.

Please make sure that the FTDI driver for the Blub clock interface is installed. This should be done automatically on Windows 10 computers, but we've seen cases where users had to install the drivers manually.

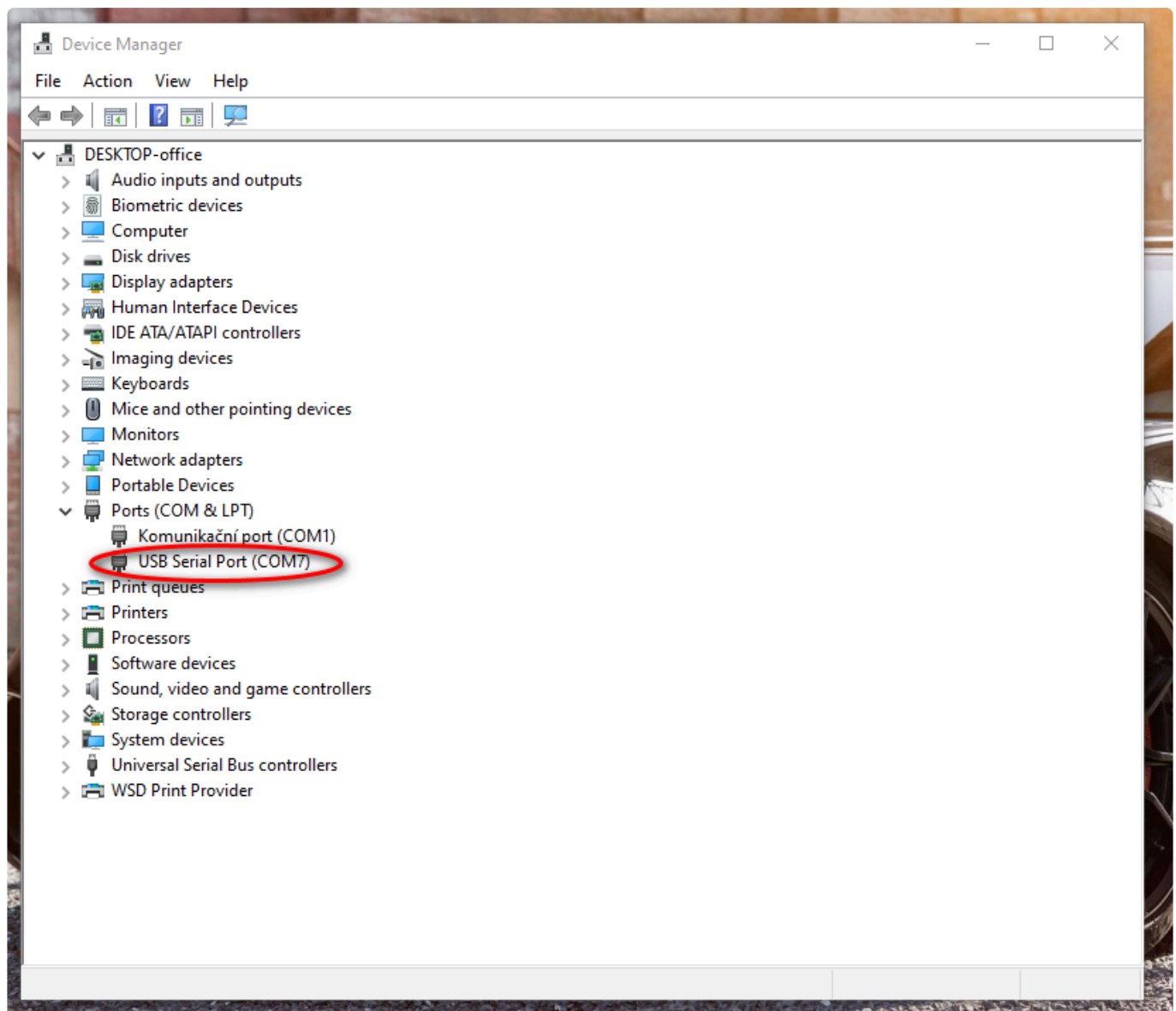
There is a PDF file with the instructions:

[FTDI driver installation guide](#)

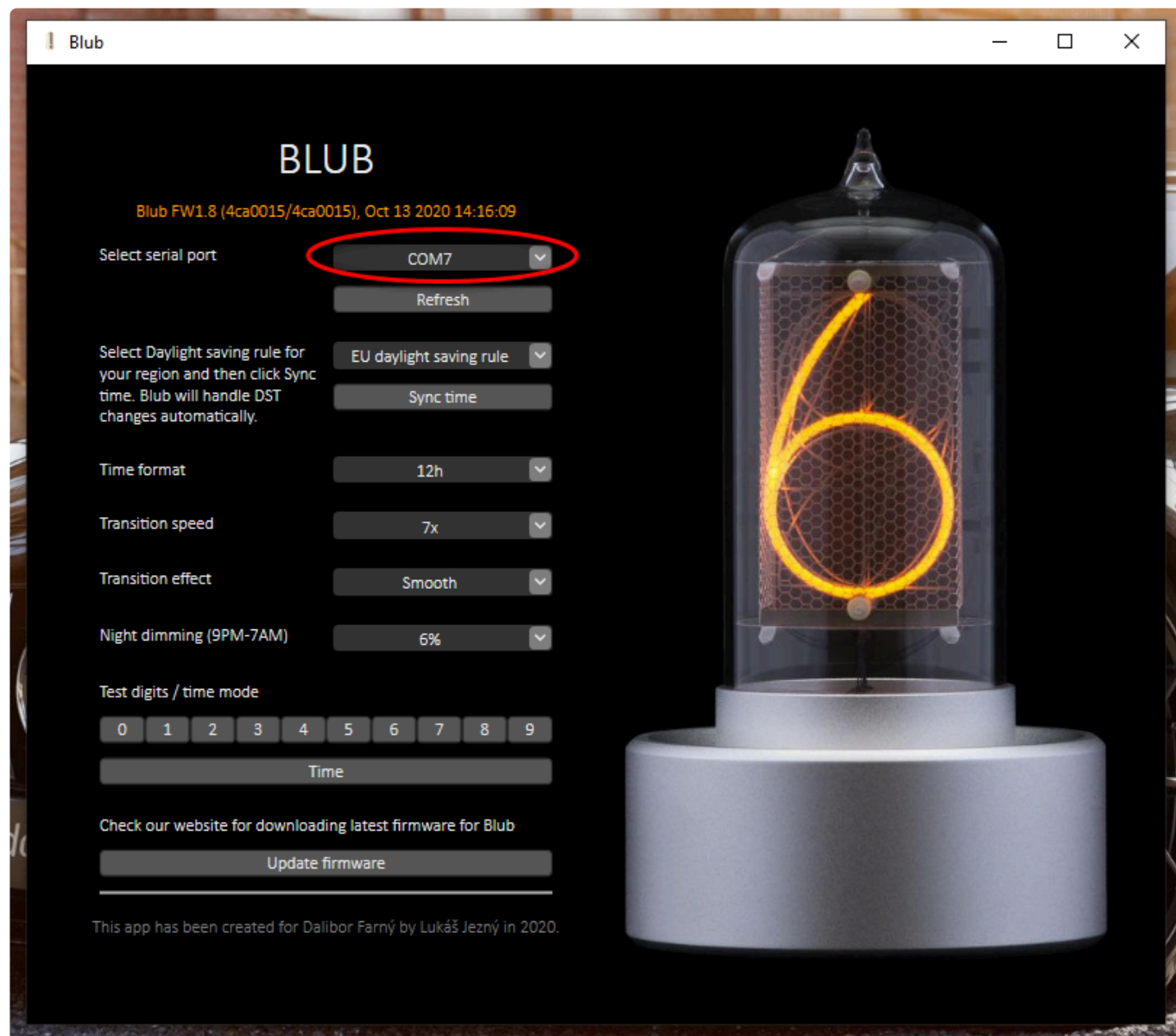
If you want to see it being done – here is a video on Youtube:

<https://www.youtube.com/watch?v=H0UA4xYDq6c>

Once the driver is installed successfully and the Blub clock is connected, there should be a new item in the Device Manager under “Ports (COM & LPT)” called USB Serial Port (COM\*xx\*) where **xx** is a number dependent on your system.



The same COM port is then available in the Windows app – notice the COM port has the same xx number as in the Device Manager above.



## 6. Download

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### PDF Manuals

The link to download PDF is under the menu on the left.

### Software

Windows application for controlling the Blub clock:



Download: [Blub v1-8](#)

### Code

Would you like to make your own code for the Blub Nixie Clock? A minimal code showing the hardware layout of the Blub clock is available on the link below.

<https://github.com/DaliborFarny/Blub-Nixie-Clock—sandbox>