# User Manual UNIV-6-Vx Nixie Clock
# 6TMV4.xx software

## Power for your Nixie Clock

The clock does not include a wall adapter. You should get a universal adapter yourself, these are not very expensive. The preferred voltage is 12VDC, but often 10VDC – 14VDC will do nicely too. The middle pin of the plug is the positive. Universal adapters often come with a set of various plugs, choose one that fits. If none them fits, you can use the dc-plug is included with the clock. If the clock does not work, you may have gotten the polarity wrong. Change the polarity and try again.

## Setting the Nixie Clock

Only one set button…. yes, setting this clock takes a bit of practice. If you already own one of my other clocks, this will be somewhat easier, but it still takes a bit of getting used to.

The LED's under the tube (if you have them) help you to set the clock. The little colons behave in the same way, so you can watch those if you don't have any LED's fitted. If the LED's or little neons aren't turned on already, tap the button once to turn them on. For the sake of this explanation, I assume you have the LED's fitted, but as I said, the neons behave in exactly the same way.

Press and hold the button. The LED's go off. While keeping the button pressed, after 5 seconds they will flash briefly. Now release the button. You are now in the 'SET TIME' mode. Tapping the button advanced the first digit. Each time you tap it, it will advance the digit. Of course you need to pause and wait to see that it actually has. When the first digit has been set correctly, you can move to the next digit. This is done by pressing and holding the button, until the LED's flash again, which takes about a full second. Release the button. Now you can set the second digit, again by tapping the button and watching the result being displayed. Once you have set all the digits, press and hold the button for 5 seconds, disregarding the brief flash of the LED's and wait until it turns on permanent. Release the button and the clock will resume normal operation.

At first, this may seem a bit of a hassle, but after a while you will hopefully notice that it is not extremely difficult to set the clock.

## Calibrating the Nixie Clock

Without calibration, the clock may gain or loose a number of seconds per day. For the best results, you need to calibrate it, using this procedure. Press and hold the set button, for about 7-8 seconds and release it after the second(!) brief flash of the LED's. There should be 4 digits being displayed now, showing the actual calibration value. Here you can set a new calibration value for the timing of the clock. First set this value at 5000. After setting this value, press and hold the button for 5-6 seconds, to return to normal mode. This value will be stored inside the microcontroller. Turn off the clock, and turn it on again.

Now set the clock, using a reliable time reference. If you use a radio clock for this, like a DCF77 or WWVB travel clock, make sure that your travel clock has a fresh synchronization.

You can force a fresh synchronization by removing and reinserting the batteries. If you don't do that, your DCF77/WWVB clock may be a few seconds off, and as such a rather poor 'reference' clock. I have also noticed that TV/Radio clocks and time information can be a few seconds too late. Make sure your reference is good.

Okay, let's assume your reference is perfect. Set the clock as described earlier, and wait until your time reference reaches the time you have set. Now press and hold the set button for 5-6 seconds, release when the LED's turns on permanently, and notice that the clock now runs synchronous with your reference, both displaying exactly the same time. Do it again if need be.

Using the standard calibration value of 5000, the clock should run with a better accuracy than +/- 10 seconds per day. Let the clock run for a couple of days. Make a note of the time difference between the nixieclock and the reference clock you have used. Calculate the number of milliseconds per hour the clock runs too fast or too slow.

Example: after 2 days, the nixieclock seems 7 seconds too fast. Divide by 48 hours,
And multiply by 1000. That's 145 millisecond per hour. The clock needs to run 145 milliseconds per hour slower, so the new calibration value will be 5000 - 145 = 4855.

Enter the new calibration value, in the same manner as you would set the time. Once you have entered the new calibration value, press and hold the button for 5-6 seconds, disregarding the brief flash of the LED's and wait until it turns on permanent. Release the button and the clock will resume normal operation. Now you can set the time again, using a reliable reference, and the clock will run much more accurate now. Repeat the procedure if need be.

## Setting Display Off Time

Nixie tubes last very long, but certainly not forever. You may want to use this option, to turn the tubes off during the night. Press and hold the set button, for about 9 seconds. You will first see that the first tube turns on its decimal point, and then the second tube will turn on its decimal point, and then the third tube turns on its decimal point. Now release the button. There should be 2 values displayed now, the two middle tubes are off. These values tell you at what hour the display goes off, and at what hour it turns on again. Adjust the values to your preferences. To save the values, hold the button for 5-6 seconds, to return to normal mode. The value will be stored automatically inside the clock. If you don't want to use this option, put both hours at 00. (or set them at equal values). For your information, rumours tell that most tubes last for 50.000 hours. I have reasons to believe it will be actually longer than that, as the current at which the tubes are driven can be set very low and is well regulated in this design. 50.000 hours equals to more than 5 years. Lifetime is defined as the time it takes for the nixies to fade to 50% of their initial brightness. The little neons will also turn off during the programmed 'display off' time. However, the LED's will stay on regardless the setting of this option. I made that choice deliberately, because LED's tend to last forever and it gives you some feedback that your clock is still functioning.

## Setting General Options

In this option setup you can set the modes for the LED's, choose 12hr or 24h r mode, and set the timezone if you are using the optional DCF77 or WWVB receiver that synchronizes the

clock to atomic time. And last but not least, you can set the 'fading' on or off, and the behaviour of the little neons.

Press and hold the set button, for about 11 seconds. Notice the neons light briefly, and release the button after the 4th flash. There should be 6 values displayed now.

The 1st digit defines the behaviour of the LED's in normal running mode. It can have a value of 0-5. A '0' means the LED's will be off. A '1' means the LED's will be always on. A '2' means they will both flash every second. A '3' means they will work as an indicator for the atomic time receiver. A '4' means it will be on if a succesful synchronisation has occurred in the last 24 hours. A '5' means that it will work as a AM/PM indicator, and the LED's will be on when it is PM.

The 2nd digit defines the 12hr or 24 hour mode. A '0' selects 24 hour mode, a '1' selects the 12 hour mode.

The 3rd digit sets the number of hours to be added to the Atomic time that was received. The 4th digit sets the number of hours to be subtracted to the Atomic time that was received. Depending on your location and receiver used, you can thus add or subtract 9 hours. You can set both if you like, but that doesn't make much sense. Normally, you set one of them to 0 and the other one to correct the number of hours. If you don't have a receiver attached, it will make no difference at all.

The 5th digit sets the 'fading' on or off. A '0' means 'fading off' and a '1' means 'fading on'. Once you have set all the options and values, press and hold the button for 5-6 seconds, ignoring the brief flash of the neons and wait until they turns on permanent. Release the button and the clock will resume normal operation.

The 6th digit defines the behaviour of the little neons in normal running mode. It can have a value of 0-5. A '0' means the neons will be off. A '1' means the neons will be always on. A '2' means they will both flash every second. A '3' means they will work as an indicator for the atomic time receiver. A '4' means it will be on if a succesful synchronisation has occurred in the last 24 hours. A '5' means that it will work as a AM/PM indicator, and the neons will be on when it is PM.

If you have any further questions, please contact me at
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or look for additional information at
www.franktechniek.nl

Have fun with your new nixieclock!

Thanks,
Frank Bemelman.