User Guide

Hexagon SN-Clock

REVISION HISTORY

Issue Number	Date	Reason for Issue
1	4 September 2021	New document

1.1 About the SN-Class Nixie Clock Kits

How can the clock display the time with only a single digit? The clock flashes up the time in the sequence HHMM, with appropriate pauses between each digit, and a longer pause between each time cycle ie. H.H...M.M ...H.H...M.M.... and so on. It is really very intuitive, and once you 'get it', it is really obvious and simple to read the time!

1.2 Features

The SN-Class Nixie Clock Kit has the following features:
- Hours and Minutes display
- 12 or 24 hour modes
- Uses 5V USB Power
- Uses a Quartz Crystal Oscillator as the timebase
- Optional GPS or WiFi synchronisation with status indicator LED
- Dedicated DST button to switch between DST and standard time
- Supercapacitor backup. Keeps time during short power outages
- Simple time setting using two buttons
- Seconds can be reset to zero to precisely the set time
- Programmable night mode - blanked or dimmed display to save tubes or prevent sleep disturbance
- RGB tube lighting – select your favourite colour from 21 options
- Not AC frequency dependent – works in all countries
- All user preferences stored to non-volatile memory

1.3 Compatible Tubes:

IN-18 (40mm / 1.6" digit height)
R|568M (50mm / 2" digit height)
Z568M (50mm / 2" digit height)

1.4 SAFETY

DANGER: The clock pcb includes a switched-mode voltage booster circuit. This generates nominally 170 Volts DC. Assembly may only be undertaken by individuals who are suitably qualified and experienced in electronics assembly, and are familiar with safe procedures for working with high voltages. If in doubt, refer to a suitably qualified engineer before proceeding.

The voltages generated by this circuit can give a potentially LETHAL ELECTRIC SHOCK.

DISCLAIMER: This product is supplied as a kit of parts, intended only for suitably qualified electronic engineers, who are suitably qualified and experienced in electronics assembly, and are familiar with safe procedures for working with high voltages. The supplier, his agents or associates accept no liability for any damage, injury or death arising from the use of this kit of parts.

This is not a finished product, and the person assembling the kit is responsible for ensuring that the finished product complies with any applicable local regulations governing electrical equipment, eg. UL, CE, VDE.

2.   Other items you will need.

The clock includes a EU Plug 5V 1A and a USB Power Cable Power. The following type of adapter should be obtained and used with the kit:

EU Plug USB 5V 1A

USB A to Mini B.

A suitable plug and cable is shown below:

3.   HOW TO OPERATE THE CLOCK

The three buttons have the following functions:
SET: Enter Config Menu if held on power-up; Set time.
ADJ: Adjust time, config parameters; Enter colours menu.
DST: Toggle between DST and Standard Time (+/- 1 Hour)

Entering configuration mode:
The principal settings of the clock are stored in flash memory – your preferred configuration is stored even after powering off the clock for extended periods. To access the configuration mode press and hold the 'SET' button whilst the clock is power off and then connect power.

In configuration mode the clock will initially display the number '1' to indicate that parameter 1 is being viewed / edited. Pressing SET will scroll through each parameter 1 to 11 in turn.
Press ADJ will enter that parameter and first show the current parameter, and pressing ADJ further will adjust the parameter. When completed each parameter, press SET again to move to the next parameter. After parameter 11, you will exit to time display.

Refer to the table on the next page. It may help to make a pencil note of your intended setting before starting.

The time offsets are applicable if you are using a WiFi or GPS time receiver, as you need to use the settings to tell the clock your time zone.

Most time zones are whole hours only from GMT, so parameter 7 will rarely need to be changed from the default 0.

Parameter	Description	Values	-7-
1	12 / 24 Hr mode	0 – 12 Hr (default) 1 – 24 Hr	
2	Night Mode start hour	0 - 23	
3	Night Mode end hour	0 - 23	
4	Time display mode	0 – Standard display 1 – Crossfade display (default)	
5	RGB Display Mode	0 – RGB Disabled 1 – On, and follows night blanking (default) 2 – Always on	
6	Radio time offset hours	0-13 (default 0)	
7	Radio time offset mins	0-45 (default 0)	
8	Radio time offset polarity	0 - Minus time (default) 1 – Plus time	
9	Time Calibration Factor	0 - 99 (each unit adjusts by 0.2s per day)	
10	Time Calibration Polarity	0 - Make clock slower 1 - Make clock faster	
11	Night Mode Override minutes	0 – 50 (default 0 gives 15 seconds override)	

Setting the Time:
Before setting the time, press 'DST' briefly to toggle between DST and standard time as indicated by the yellow LED. Set according to whether you are currently in DST time or not.

From time display mode, press and hold 'SET' button for 2 seconds then release. The seconds will be displayed.
Press the 'ADJ' button to reset seconds to zero.

Briefly Press 'SET' again and the hours will be displayed.
Press the 'ADJ' button to set the hours. The hours are always set in 24 hour (military time) format, to ensure correct AM or PM time is set.

Briefly Press 'SET' again and the minutes will be displayed. Press the 'ADJ' button to set the minutes.

Finally, briefly Press 'SET' again to revert to normal clock operation.

Night Blanking Override:
During programmed night blanking, the blanking may be overridden to see the time by briefly pressing the 'SET' button. Tubes will remain lit for the period defined in parameter 11.

Rapid DST Adjustment
Press 'DST' briefly to toggle between DST and standard time. The yellow LED shows whether DST mode is active or not.

Note, that GPS or WiFi time data does not contain DST information, so the DST status will need to be set manually in GPS/ WiFi mode as well as manual time-set mode.

Calibration of Timekeeping Accuracy
Over time you may observe the clock runs faster or slower than an accurate time standard. You can finely adjust the timekeeping by setting configuration parameters 8 and 9. We recommend to precisely set the clock against a known accurate clock, and then record the time drift in seconds after 5 full days (120 hours). Program this value into parameter 9.
Set parameter 8 to 0 to slow down the clock and to 1 to speed up the clock.
This adjustment is not relevant if you are using GPS or WiFi time synchronisation.

4.   CONFIGURING THE RGB BASE LIGHTING
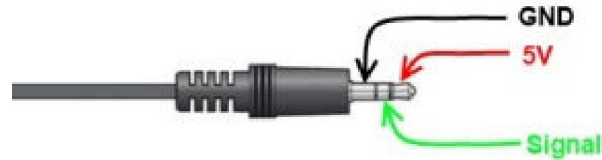
4.1 Entering RGB LED menu

From time display, press and hold the 'ADJ button for 2 seconds then release. The clock will then display the current setting (0 to 20) and show this colour on the RGB LED. Note that value 0 is for autocycling.

Press ADJ to scroll through all the colours until you find your chosen colour. Exit the menu and save your setting by simply leaving it for 30 seconds to auto exit.

5. CONNECTING A GPS OR WIFI TIME SYNC DEVICE

5.1 Principle of operation

The clock has a dedicated jack socket, connections as per the diagram below. It will respond to a standard GPS $GPRMC sentence, and set the time accordingly, allowing for time zone offsets as per the configuration settings.

The signal requirements are as follows:
9,600 bps
Valid $GPRMC sentence with correct checksum
Signal level: TTL UART

Our GPS and WiFi time sync devices can be used to synchronise the clock. Please consult the relevant pages on our website.

5.2 Function of the GPS indicator LED (D6):

The LED will be ON if the clock has synchronised in the last two hours; slowly flashing if the last synchronisation was between 1 hour and 24 hours ago; and off if the last synchronisation is older than 24 hours.