IN-14 2-Tube Digit NIXIE Clock Quick Setup Manual V1.0 Pro.

Version: 1.0. (05-05-2016).

Download product documentation and the related software at:

http://vfdclock.jimdo.com

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Contents

Notice:

In order to drive the NIXIE tube, some internal equipments are under the High Voltage(up to ~180V DC),please do not use this clock outside or in any wet conditions, please do not touch any part inside the clock when power supply is turned on. Always keep it away from kids.

Specifications:

Tube Name: IN-14(Made in the U.S.S.R.);
Tube Diameter: 18mm;
Tube Height: 55mm (approx including glass nipple);
Digit Height: 17mm;
Digit Width: 10mm;

Clock Supply: 5V DC via USB;
Max Current: ~200mA(~500mA when Li-poly battery in charging mode);
Clock Size: 68mm(L)*50mm(W)*70mm(H)(with IN-14 tube installed);
PCB Size: 58mm*41mm;
PCB Color: Black;
Weight: ~60g;
The clock works with any standard USB supply, please use high-quality adapter!

Features:

1).5V **USB** powered, easy to be used. Can connect to your computer's USB plugs directly;
2).High efficiency HV circuit, you get almost no heat in 24*7 working condition;
3).All **SMT** components, very **thin** PCB, Bottom component has only 6mm(max) high; **Static driving, No Blue Dot, No Flashing, High Brightness**;
4).Support **12H** or **24H** display modes, can show "." as "A/P" in 012H time format. **Leading zero** blanking is programmable;
5).Display date in **all format**: YY.MM.DD or DD.MM.YY or MM.DD.YY or even MM.YY.DD; Can display week info too;
6).Support **5** different Effects: **Normal/ Fading/ Cross Fading/Slow Fading /Loop/Flash** for displaying time. All the segments in the IN-14 tube can be lighted up, include the **Left & right dots**;
7).High accuracy RTC inside, factory calibrated to $\pm$ 5ppm,($\pm$**13 seconds (Max) per month**);
8).Simple setting by using **2 buttons** only and supports **IR remote control (optional)** ;
9).**Three alarms** with weekends ON/OFF support can be controlled individually;
10).**Three programmable Auto Power ON/OFF** mode, can turn ON/OFF NIXIE tubes in any time you want. This function can save tubes life;
11).**8-level adjustable NIXIE tube bright** with **Auto-brightness** feature (it is able to adjust the tube brightness depending on the current environment);
12).**Rechargeable Backup Battery** or **Farad capacitor** keeps RTC running during power

outages;

13).**Tri-colored RGB LED** mounted under the each NIXIE tube. These LEDs can display different colors with a lot of pre-defined auto color change effects.

14).Store user settings in **non-volatile memory**;

15). CAD designed **acrylic case** made using a laser cutter makes the clock look beautiful. You can assemble/disassemble the case by using only 4 screws on the bottom of the case. The case also has **4 bumpers** as feet on the bottom of the case in order to stop to prevent case's damage;

16).Can install **Temperature Sensor**(**optional**) ;Can install **Li-poly battery charging circuit**(**optional**),thus you can light the clock up with Li-poly battery only;

Turn Power ON/OFF

When you plug the Mini-USB/Micro-USB with power supply to the clock, the clock will turn on automatically, with NIXIE tube displays current time with the LED running in breathing mode.

In this mode ([**Time display mode**]), press and keep the **[+]** button down then single click the **[SET]** button, you can turn the clock **[soft power on/off]**. When you turn the clock power off, the HV supply will shutdown, and the LED will turn off, but all the Alarms and Auto Power ON/OFF and RTC functions will still be running;

*Let the clock face to you, the left button is **[SET]**, the right button is **[+]**.Or you can check the marks on the PCB.

Tips: Press any key down then plug the USB power in(With no Li-poly battery installed),the clock will do the self testing, it will show the different color s via LEDs then loop displaying the 0~9 segments inside the NIXIE tubes.

Note:
For the Li-poly battery driving version, if the Li-poly battery inside the clock is out of power, you need to do the [Soft power OFF/Power ON] by using the buttons or the IR to re-power on the clock, or the NIXIE tubes will not be lighted up even after re-plug the USB power in !!!
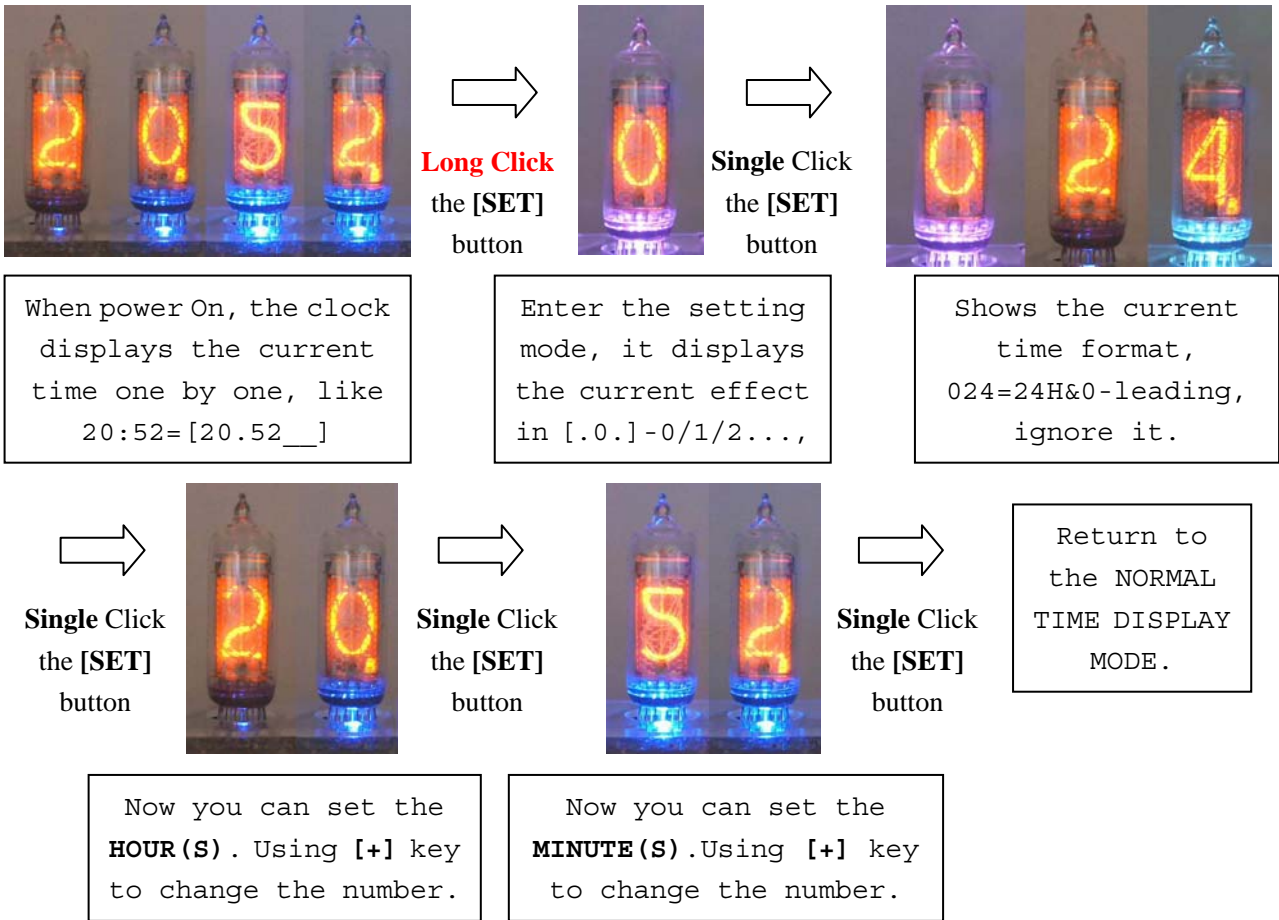
Turn LED ON/OFF

In **[Time display mode]**, single click **[SET]** button will switch the LED in **Play/Pause/OFF** modes.

Change the LED's Color Pattern

In **[Time display mode]**,press the **[+]** button down for about 2 seconds then release the button (Long click), the LEDs will switch to the next color pattern;

Quick Start Guide for setting up the current time

When the power On, the clock displays the current time. If the time is not correct, you need to set it by yourself. Here is the quick guide for setting the current time.

Long Click the **[SET]** button

Single Click the **[SET]** button

When power On, the clock displays the current time one by one, like 20:52=[20.52__]	Enter the setting mode, it displays the current effect in [.0.]-0/1/2...,	Shows the current time format, 024=24H&0-leading, ignore it.

Single Click the **[SET]** button

Single Click the **[SET]** button

Single Click the **[SET]** button

Return to the NORMAL TIME DISPLAY MODE.

Now you can set the **HOUR(S)**. Using **[+]** key to change the number.	Now you can set the **MINUTE(S)**.Using **[+]** key to change the number.

If feel hard to understand the instructions, check the [State Machine Table] in the last page will help.

Switch display mode and change settings

1. Time Display Mode

After power on initialization, the clock will display the current time in [HH.MM.] format, where [HH.] is the current Hours (in 00-23 or other range/style, depends on the time format you have set), [MM.] is current Minutes (in 0~59).
In this mode, after press the [SET] key down for at least 2-sec(Long Click),it will switch to the time related setting mode, and you can short or long click the [+] button to change the value, and single click the [set] button to switch to another settings.
In this setting mode you can set:
[Display Effect 0:x]:0 (normal effect)/1(Fade effect)/2(Cross Fade effect)/3(Slow Fading)/4(Loop)/5(Flash);

[Time Format]:024(24H with 0-leading)/12(12H)/012(12H with 0-leading)/[.12](12H with dot as PM);
[Set Hour]: set time hour in [0~23];
[Set Minute]:set time minute in [0~59];

*if you changed the time value(hour and(or) minute),the second will set to 00 automatically.
*When switching the display effect via remote control, may cause a little bit flashing delay. It's normal.

2. Date Display Mode

When in the **[Time Display Mode]**,if you click the **[+]** button you can switch to the **[Date Display Mode]**. In this mode the tube displays date in preset format, like DDMMYY/MMDDYY/YYMMDD/YYDDMM. The year displays with left and right dots all light up.
eg: In **[MMDDYY]** format, the date shows like **[02.28..1..6.]** which means Feb.28,2016; You can long click the **[SET]** button to switch to another settings,which you can set:
[DATA Format 1:x]:0(DDMMYY)/1(MMDDYY)/2(YYMMDD)/3(YYDDMM);
[Set Year]: set year in [2013.~2099];
[Set Month]: set month in [01~12];
[Set Day]: set day in [01~28,29,30,31],depends on the year&month that you have set.

*After you finished setting all the values in this mode, you will return back to the current display mode, then you can single click the **[+]** button to switch to other mode, or single click the **[SET]** button to return the **[Time Display Mode]** immediately.

3. Temperature Display Mode (Optional)

When in the **[Data Display Mode]**,if you click the **[+]** button you can switch to the **[Temperature Display Mode]**. In this mode the tube displays the temperature got from the temperature sensor.
E.g.: The temperature date shows like **[26.58]** which means 25.68° C or ° F, depending on the unit you have set; If the clock has no temperature sensor installed, it shows 00.00;
[Temperature Unit]: temperature display unit,[0] for ° C,[1] for ° F ;
[Temperature error adjustment]: adjustable temperature display error adjustment value, step+-0.1° C. The left dot light up when set a negative value;
Note: This Model may not exist or displays [0.00] if with no temperature sensor installed!

4. Alarm Display Mode

Same, click the **[+]** button, switch to the **[ALERT DISPLAY Mode 1/2/3]**;

The clock supports 3 individually alarms with weekends ON/OFF;

[.2.1 HH.MM.]: displays the first alarm information. The first[.2.] means "alarm", the next 1 means "alarm 1"(for alarm2/alarm3 shows [.2.2]&[.2.3]),the hh&mm shows the alarm time in hour:minute;

Long click the **[SET]** button for setting the alarm information:

[Set Hour]: set alarm hour in [00~23];

[Set Minute]: set alarm minute in [00~59];

[Set Alarm Option]: 0(Alarm OFF)/1(Alarm ON)/2(Alarm ON-except weekends).

5. Auto Power ON/OFF Display Mode

Same, click the **[+]** button, switch to the **[AUTO POWER ON/OFF DISPLAY Mode 1/2/3]**;
The clock supports 3 programmable Auto Power ON/OFF mode;

[.3.1]: displays the Auto ON/OFF mode and the index num. The first[.3.] means " Auto Power ON/OFF mode ",the next 1 means " Auto Power ON/OFF 1"(It shows auto2 and auto3 mode like [.3.2]&[.3.3]).

Long click the **[SET]** button for setting the Auto Power ON/OFF information:

[Set Enable]: set this Auto Power ON/OFF enable or disable, 0(Disable)/1(Enable);

[Set Turn On Hour]: set auto turn on hour in [00~23];

[Set Turn On Minute]: set auto turn on minute in [00~59];

[Set Turn Off Hour]: set auto turn off hour in [00~23];

[Set Turn Off Minute]: set auto turn off minute in [00~59];

[Nixie Brightness]: 0(Auto-Brightness)/[1~8]for brightness(8 is the brightest);

6. Misc Mode

For misc mode, it displays the **[.4.]** as index.
Long click the **[SET]** button you can enter the miscellanies setting mode.

[Set NIXIE Brightness]: 0(Auto-Brightness)/[1~8] for brightness(8 is the brightest);

[Click Beep Enable]: 0(Disable)/1(Enable);

[Set Beep Alert Style]:[0~3] for 4 different beep style;

[Set Alarm Beep Loop Times]: in [05~99] range;

7. Version Display Mode:

For this mode it displays the version num on NIXIE tube, like **[.5. 1.0.]** means current software version is 1.0;

Long click the **[SET]** button to enter the setting mode:

[IR Test Mode]:Shows the IR remoter code which you pressed. You can test your IR remote controller in this mode;

[Reset All]:set this number to **[1]**,then click the **[set]** button, all the settings will be reset to the default, and the clock will auto reboot itself when finished.

Infra Red (IR) Remote Controller functions:
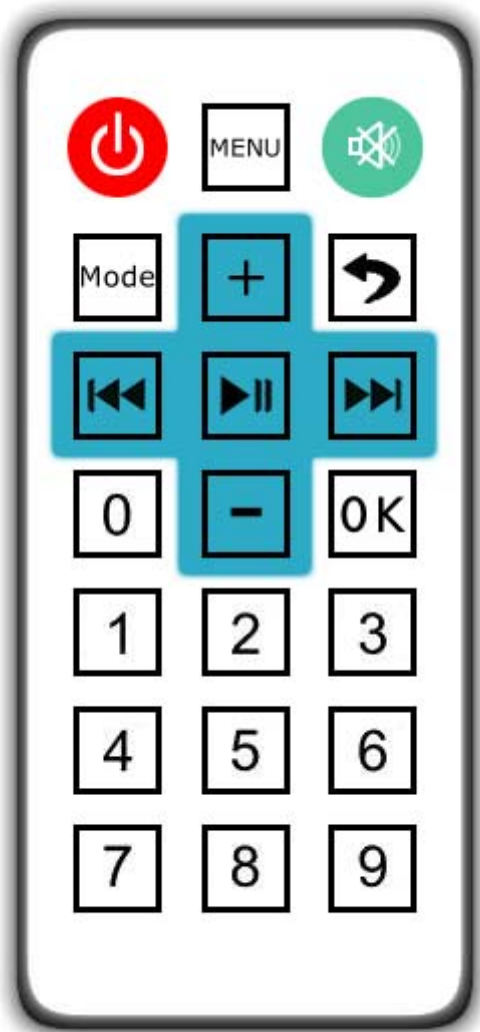
Power: Press the button to shut down/turn on the clock.

Menu: Press the button to enter the setting menu of the current display mode.

Mute: Press for mute the buzzer.

Mode: Press the button to switch the time display effects.

Return [<-']: Press the button to return the [Time display mode] directly.

[+]: Press to change values in ascending order.

[-]: Press to change values in descending order.

Previous [>>|]: Press the button to go back to the previous menu.

Next [|<<]: Press the button to go to the next menu.

PLAY [>||]: Press the button to switch the LED in Off/Pause/Off modes.

OK: Press the button to switch the LED color.

[0~9]: Press the buttons to change the values directly.

Tips:
Any IR keys can turn on the nixie clock for about 3 seconds when the clock is on the soft power off mode;

If you are trying to use the remote control for the first time, unplug the plastic film in the battery case.

If there is no battery included, place a CR2025 battery by yourself, and make sure the battery is placed at the right polarity according to the marking on the battery holder.

Make sure the batteries in the remote control are fresh.

*To insert the battery into the remote control, follow the instructions printed on the back side of the remote control.

Install the new IN-14 tube (For all the Pluggable NIXIE clocks)

If you want to change the tube or install the new tube by yourself. here is the step:

1. Cut the IN-14 NIXIE tube's legs into right length, usually 10mm length is recommended. Then use "needle-nose pliers" or other tools to make all the legs straight, make sure all the legs is clean, contain no soldering tin or other stuffs.

Tip 1: If possible, use scissors to cut the end of the legs in 45 degree sharp edge(make sure the edge is clean);
Tip 2: Cut some legs in a little bit long, and others in a little bit short, will be easier for installing.

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2. Plug all the legs into the socket pins on PCB. Please note that the anode pin(with white pipe inside the tube) need to connect to the middle socket pins(Check the picture) . After all the legs are all plugged into the socket pins, you can push the tube down genteelly.
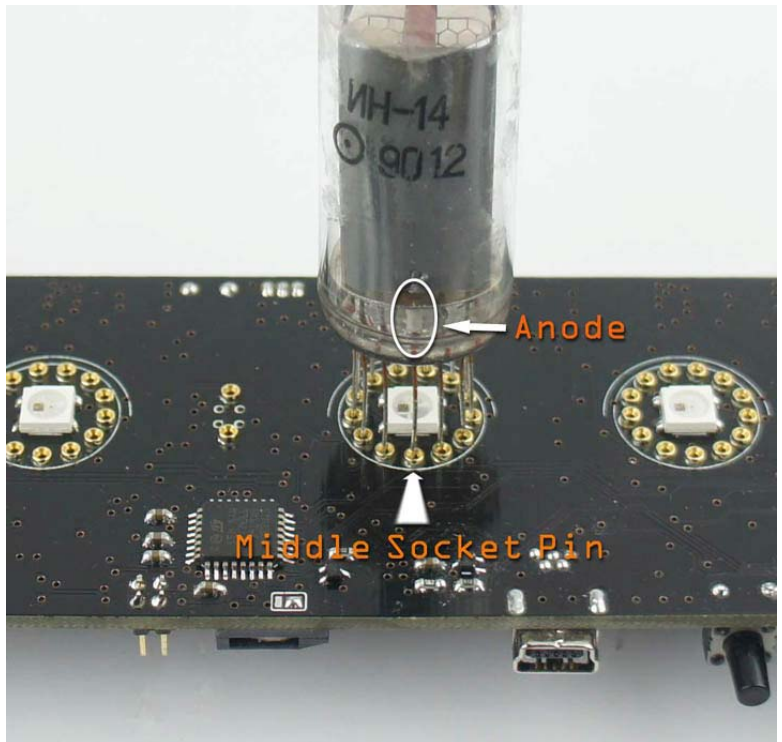
3. After pushed all the legs in the socket pins, if you find the legs are too long, you can cut it short, and you can adjust the height of the tube by yourself or twirl the tube a little bit to make the tube just faces the front.

4. Make sure all the tubes' legs have no short before power on!

Note: **In order to protect the socket pins, if not necessary, do not plug /unplug the tube frequently.**

The State Machine of 2-tube NIXIE Clock v1.0

[+]

Power ON

08.30

Display Time → LONG CLICK SET → Flip Effects → **SET** → Time Format → **SET** → Hours → **SET** → Minutes → **SET** → Save&Return

- Flip Effects: [+] 0:Normal; 1:Fade; 2:Cross Fade; 3.Slow Fade; 4.Loop; 5.Flash;
- Time Format: [+] 024/24/12/012/.12
- Hours: [+] +1 Hour
- Minutes: [+] +1 Minute

02.28..1..4.

Display Date → LONG CLICK SET → Data Formats → **SET** → Year → **SET** → Month → **SET** → Day → **SET** → Save&Return

- Data Formats: [+] 0:DDMMYY 1:MMDDYY 2:YYMMDD 3:YYDDMM
- Year: [+] +1 Year
- Month: [+] +1 Month
- Day: [+] +1 Day

28.00

Display Temperature → LONG CLICK SET → Unit → **SET** → Error adjustment → **SET** → Save&Return

- Unit: [+] 0:°C 1:°F
- Error adjustment: [+] +-0.1°C step

.2.1 08.30.
.2.2 08.30.
.2.3 08.30.

Display Alert1 / Display Alert2 / Display Alert3 → LONG CLICK SET → Alert Hour → **SET** → Alert Minute → **SET** → Alert Option → **SET** → Save&Return

- Alert Hour: [+] +1 Hour
- Alert Minute: [+] +1 Minute
- Alert Option: [+] 0:Alert OFF 1:Alert ON 2:ON-except weekends.

.3.1
.3.2
.3.3

Auto ON/OFF1 / Auto ON/OFF2 / Auto ON/OFF3 → LONG CLICK SET → Status → **SET** → Auto ON Hour → **SET** → ON Minute → **SET** → Auto OFF Hour → **SET** → OFF Minute

- Status: [+] 0:Disable 1:Enable
- Auto ON Hour: [+] +1 Hour
- ON Minute: [+] +1 Minute
- Auto OFF Hour: [+] +1 Hour
- OFF Minute: [+]

.4.

Misc Setting → LONG CLICK SET → Brightness → **SET** → Click BEEP → **SET** → Alert Beep Style → **SET** → Alert-Beep Loop → **SET** → Save&Return

- Brightness: [+] 0:Auto Bright 1~8:Brightness
- Click BEEP: [+] 0:OFF 1:ON
- Alert Beep Style: [+] 0~3; 4 types
- Alert-Beep Loop: [+] 05~99 times

.5.

Display Ver. → LONG CLICK SET → IR-TEST → **SET** → Reset ALL

- IR-TEST: Display the IR Code when received.
- Reset ALL: [+] 0:NO; 1:YES; → **SET** → IF (1) Reset ALL → Reboot