

WHEN LED Network Clock User Manual

Revision History

| Date | Version | Release Notes |
|---------|---------|---|
| 2024.02 | V1.0 | First release; Function and operation introduction. |
| 2024.09 | V1.1 | Document proofreading, change the way it is described, no functional changes. |
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1. Overview

Over four years of updates and iterations, the clock's functionality and performance have significantly improved. It features precise timekeeping accuracy. Testing shows that after successfully obtaining network time, multiple clocks can maintain synchronized display switching, colon flashing, and chime sounds.

The clock features a wide range of functions and flexible system settings, allowing for customizable display content to meet personalized usage needs.

The clock has a built-in web service, eliminating the need to download an app or use a mini-program, and there's no concern about the product becoming unusable due to manufacturer server issues. It can be used globally without regional restrictions.

The clock supports OTA remote online upgrades, facilitating feature enhancements and problem fixes.

2. Preparation Before Use

- (1) Ensure the supply voltage is between 4.2V and 5.2V, with a current capacity of at least 1A.
- (2) Prepare a 2.4G Wi-Fi network environment for the clock to connect.
- (3) Have a smartphone or laptop ready to configure the clock's network.
- (4) Please read this manual carefully for detailed information.

3. Clock Parameters

- (1) Clock dimensions: 178x49x24mm (length x height x width, excluding buttons and anti-slip pad height)
- (2) Power interface: TYPEC 5V=1A
- (3) Network connection: Wi-Fi (2.4G)
- (4) Time synchronization protocol: SNTP protocol
- (5) Clock model: CWT9S18/CWT9S19
- (6) Clock name: IOTTIMER WIFI CLOCK-WHEN

4. Clock Features

(1) Network & Time Calibration

- a. Wi-Fi automatic time synchronization, with selectable intervals of 1 minute/5 minutes/1 hour/1 day/off
- b. Includes a time synchronization status indicator (blue LED on the lower right front)
- c. Supports 2 customizable NTP server addresses
- d. Supports global time zones and configurable automatic Daylight-Saving Time
- e. Supports OTA remote online upgrade functionality
- f. Configuration interface uses built-in web service, accessible via the clock's internal network IP
- g. Supports DHCP and static IP configuration
- h. Supports modification of its own MAC address

(2) Display

- a. Supports alternating display of dual time zones (primary and secondary).
- b. Supports time display in tenths of a second (0.1S) or cent seconds (0.01 S).
- c. Display is divided into 3 areas; each can be set to show different content.
- d. Supports alternating display, with up to 3 pages switching, duration per page can be set from 1-60 seconds.
- e. When the first digit of time and date is '0', it can be set to retain or hide the '0'.
- f. Time display supports 12-hour/24-hour format.
- g. Time separator (:) can be set to blink or remain steady.
- h. Date format options: MMDD/MM-DD/DDMM/DD-MM.
- i. Day of the week format options: numbers 1-7/numbers 1-6,0/English abbreviations.
- j. Temperature unit options: Celsius (°C)/Fahrenheit (°F).

- k. Supports display of both countdown and count-up timers, with units: days/hours + minutes + seconds.
- l. Time offset can be set within the range of -30 minutes to 30 minutes.

(3) Brightness Adjustment

- a. Brightness levels can be selected from 1 to 11.
- b. Dimming modes can be selected from: automatic light sensing adjustment/timed adjustment/fixed brightness.
- c. Light sensing parameters are configurable, with a dedicated debugging interface to accommodate automatic light sensing in various environmental brightness conditions.

(4) Alarm

- a. Up to 10 alarm settings can be configured.
- b. Alarm sound and duration are selectable.
- c. Supports 4 alarm modes: Once only/Weekly schedule/Legal workdays/Legal holidays.
- d. Legal holiday list is automatically retrieved from the internet (currently supports Mainland China and Japan); users in other regions can customize their holiday list.
- e. Alarm can be turned off by button press/button + light sensing/end of alarm duration.
- f. The brightness threshold for light sensing to turn off the alarm can be configured; the alarm will automatically turn off when the ambient brightness difference exceeds the threshold.

(5) Timer

- a. Set the countdown using buttons.
- b. Countdown can be set from 1 minute to 5 hours.
- c. Alarm sound for countdown completion is selectable.
- d. Duration of the alarm for countdown completion can be set.

(6) Auto Screen Off (Sleep Mode)

- a. Supports 3 sleep modes: Timer/Light Sensor/Timer + Light Sensor
- b. The light sensor threshold can be set. When the ambient brightness is lower than the set threshold, it will enter sleep (screen off) mode; when the ambient brightness is higher than the set threshold, the screen will light up.
- c. Sleep delay can be set, e.g., screen off 30 seconds after the lights are turned off.
- d. Sleep can be set with a weekly schedule.

- e. After entering sleep mode, any key will wake the screen for 30 seconds. If any key is pressed again during this 30-second wake period, the current sleep mode will end.

(7) Time Announcement

- a. The time announcement sound is similar to the hourly chime of a radio broadcast and can be set to chime on the hour/half-hour.
- b. The half-hour sound is a single "beep," and the hourly sound can be set to 3 different modes.
- c. The time announcement can be scheduled with a weekly and customized time plan.

(8) Others

- a. The settings interface supports Simplified Chinese, Traditional Chinese, English, and Japanese.
- b. Supports automatic restart, with configurable restart time.
- c. Allows synchronization of phone or computer time to the clock.
- d. You can set a specific date and time as a starting point for counting up or down.

5. Button Operations



In normal display mode (non-configuration mode):

- Long press the yellow button: Enter configuration mode
- Long press the red button: Enter timer mode
- Long press the green button: Reserved
- Short press the yellow button twice quickly: Display the clock's IP address in area 3 with rotation

6. Area Display Content



-
- Area 1:**
- Year
 - Month and day
 - Lunar day
 - Hour and minute
 - Count time value (days)
 - Count time value (hours and minutes)
 - Month and day (secondary time zone)
 - Hour and minute (secondary time zone)
 - No display

-
- Area 2:**
- Seconds
 - Count time value (seconds)
 - Day
 - Lunar day
 - Seconds (secondary time zone)
 - Day (secondary time zone)
 - No display

-
- Area 3:**
- Weekday
 - Temperature
 - Count time value (days)
 - Seconds + tenths of a seconds (unit 0.1 seconds)
 - Cent second (unit 0.01 seconds)
 - Day
 - Lunar day
 - Day (secondary time zone)
 - Weekday (secondary time zone)
 - No display

7. Network Configuration (Wi-Fi Binding)

The clock's network configuration is similar to router backend management. After entering configuration mode, the clock will create a Wi-Fi hotspot. Connect your phone or computer to this hotspot and access the webpage through a browser to configure the network and set parameters. Please follow the steps below.

(1) Enter configuration mode

Press and hold the yellow button to enter waiting connection mode.

The screen will display a '- -' looping animation, followed by a '□ □' looping animation, indicating that it has entered configuration mode. (It will exit this mode after 5 minutes without a connection or by short pressing the yellow button twice briefly.)

(2) Connect to the clock hotspot

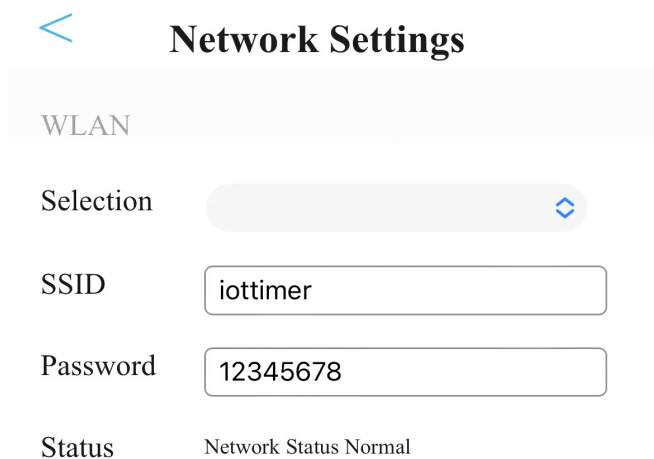
Use a phone or computer to scan for available networks and connect to the clock hotspot. Once connected successfully, the time will be displayed.

Hotspot Name: **IOTTIMER_xxxx** (where xxxx is variable)

Password: **12345678**

(3) Access the configuration page IP

Enter **192.147.10.1** in the browser's address bar to access the main menu. Click on **★ Wi-Fi Network** to enter the [Network Settings] interface, as shown below.



(4) Enter Wi-Fi name and password

In the [Selection] dropdown, choose the Wi-Fi you want to connect. The [SSID] field will auto-fill. Enter the Wi-Fi password, then click the [Save] button, and then click [Restart] button to wait for the clock to restart and connect to the network.

(5) Confirm if the network connection is successful

After the clock restarts, observe the blue LED light on the lower right front of the clock. If the LED light turns off, it indicates a successful network connection.

(6) Troubleshoot connection failure

If the blue LED light remains on after the clock restarts, it indicates a network connection failure. Follow steps (1)-(3) again to enter the network settings interface and check the reason for the previous failure in the [Network Settings]- [Status] section.

Common Failures and Explanations:

If [Unable to connect to the router]: Please ensure the Wi-Fi name and password are correct, and check if the router has settings like a whitelist enabled.

If [Unable to get NTP]: NTP time cannot be retrieved, unable to connect to the NTP time server.

If [Failed to connect to the network]: Unable to connect to the upgrade server.

(7) Handle other situations

- After connecting to the clock's hotspot, some phones may prompt a warning like 'Cannot connect to the Internet, do you want to continue connecting?'. Please stay connected and do not disconnect.
- If you cannot access the configuration webpage, first check if you are connected to the hotspot 'IOTTIMER_xxxx', turn off mobile data, and do not use a VPN.
- If certain settings on the configuration webpage cannot be clicked, try switching browsers. The webpage is written in HTML5, and some older phones' default browsers may not be compatible. Newer devices' default browsers usually work fine. It is recommended to use a third-party browser based on the Chrome engine.

****Tip: In short, after connecting to the hotspot, ignore the no internet warning, stay connected, and disable any phone optimization features that might affect the connection.***

8. Timer Usage Instructions

(1) Normal Display Mode:

Long press the red button to enter Timer Setting Mode (2). The display will show 00:00:00.

(2) Timer Setting Mode:

a. Set Timer Duration:

- Short press the green button once -> Increase timer by 1 minute
- Short press the red button once -> Decrease timer by 1 minute
- Short press the green button twice -> Increase timer by 10 minutes
- Short press the red button twice -> Decrease timer by 10 minutes
- Short press the yellow button twice -> Reset timer

b. Start Timer:

Short press the yellow button once -> Start countdown and enter Countdown Mode (3)

c. Exit Timer Setting:

- Long press the yellow button -> Exit Timer Mode and return to Normal Display Mode (1)
- No operation for 5 minutes -> Automatically exit Timer Setting Mode (2)

(3) Countdown Mode (During Timing):

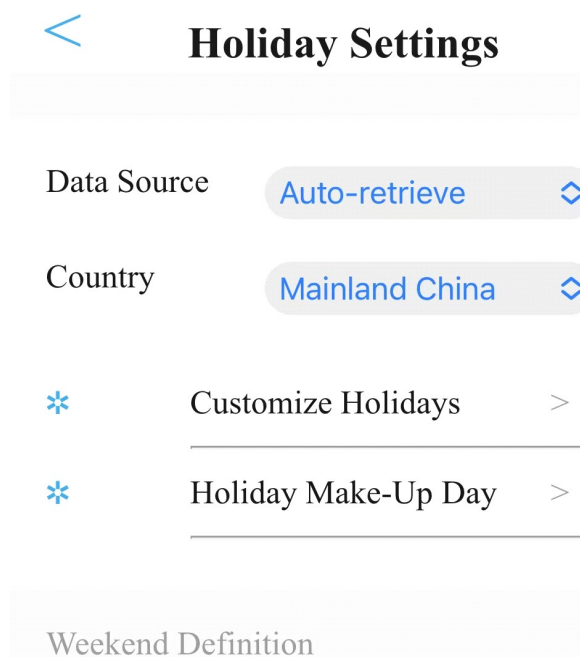
- Short press the yellow button once -> Stop countdown and return to Timer Setting Mode (2)
- Short press the red button once -> Switching display mode: Countdown Mode (3) / Normal Display Mode (1) + Countdown Mode (3)

When the timer ends, a buzzer will sound and the screen will flash. Press any button or wait for the buzzer to stop to silence it.

9. Special Setting Instructions

(1) Holiday Settings

- a. Access the configuration webpage: [Clock Settings] – [System Settings] – [Holiday Settings].
- b. Data Source: The alarm schedule includes statutory workdays and statutory holidays. To obtain the holiday list, there are two ways (data sources): Automatic Retrieval/Custom. Automatic retrieval currently only supports Mainland China and Japan. Users in other regions can customize holidays.
- c. Holidays: National statutory holidays
- d. Adjusted Workdays: Weekends that require work
- e. Weekend Definition: Considering that in some regions, weekends are not Saturday and Sunday, most areas can keep the default as Saturday and Sunday. Users in special regions can customize weekends.



Note:

The Legal Holiday mode of the alarm can only be used if the above parameters are set correctly.

The statutory holiday list server is in Shanghai, China. Due to geographical particularities, there is no guarantee that users abroad can connect successfully. If automatic retrieval fails, users can set it manually.

(2) Light Sensitivity Parameter Calibration

a. Function Overview:

To adapt to different ambient brightness levels and their variations, the clock supports light sensitivity parameter calibration. This allows you to set the sensitivity adjustment range according to the actual environment. The clock's brightness can be set from levels 1 to 11, with levels 1-8 being low brightness and levels 9-11 being high brightness.

It's recommended to use the low brightness range as much as possible to extend the LED lifespan.

b. Access Configuration Page:

[Clock Settings]- [Brightness] – [Sensitivity Calibration].

c. Current Environment Sensor Value:

The clock detects the current ambient brightness value, which should be referred to when setting the parameters described in d, e & f below.

d. Current Dimming Level:


Displays the current brightness level based on the dimming settings.

e. Low Brightness Sensitivity Range:

Comparison parameters for brightness levels 1-8.

f. High Brightness Sensitivity Range:

Comparison parameters for brightness levels 9-11.

 **Light Sensitive Settin**

Ambient Light Sensitive 463

Current Dimming Level 10

Low brightness range

-

(Min) (Max)

g. Automatic Sensitivity Logic:

Assuming the dimming level range is set from 1 to 11,
Min/T1 Brightness = 1, Max/T2 Brightness = 11:

- If [Low brightness range] Minimum Value > [Ambient Light Sensitive] Value:
[Current Dimming Level] = 1
- If [Low brightness range] Minimum Value < [Ambient Light Sensitive] Value < [Low brightness range] Maximum Value:
[Current Dimming Level] = Adjust proportionally between 1-8
- If [Low brightness range] Maximum Value < [Ambient Light Sensitive] Value < [High brightness range] Minimum Value:
[Current Dimming Level] = 8
- If [High brightness range] Minimum Value < [Ambient Light Sensitive] Value < [High brightness range] Maximum Value:
[Current Dimming Level] = Adjust proportionally between 9-11
- If [High brightness range] Maximum Value < [Ambient Light Sensitive] Value:
[Current Dimming Level] = 11

< **Brightness**

| | |
|--------------------|---------------|
| Dimming Mode | Auto Light S |
| Schedule Start(T1) | 07:00 |
| Schedule End(T2) | 19:00 |
| Min/T1 Brightness | Level 1 (Dim |
| Max/T2 Brightness | Level 11 (Bri |

10. Intranet Access

Once the clock successfully connects to the router, the router will assign it an IP address. You can access the configuration page by visiting this IP address within the same local network. You can find the clock's IP in the router's settings, and the clock's name is usually IOTTIMER-WHEN. Alternatively, press the yellow button twice to cycle the IP display in the upper right area of the clock screen.

Tips:

- Quickly press the yellow button twice to cycle the IP display in the top right area 3 of the clock screen.
- It's recommended to bind the clock's IP to its MAC address in the router.
- You can save the clock's configuration webpage as a desktop shortcut. Some browsers support shortcut access to this page.

Note: The above requires users to have relevant network knowledge and operational skills. For details, please refer to <Clock Intranet IP Access.pdf >

11. OTA Remote Upgrade

In the clock configuration webpage, when a new version is available, the number will be displayed in [Clock Settings] – [About & Upgrade] – [Device & Upgrade] section, you can click [Update Firmware] to proceed with the upgrade.

During the upgrade, the clock will sequentially display |--UP| |UP--| |Upgrade Progress Percentage| |UPSU/UPFA|.

If the upgrade is successful, it will display [UPSU] and automatically restart the clock.

If the upgrade fails, it will display [UPFA]. In this case, you need to power off the clock and then power it back on to re-enter configuration mode and trigger the upgrade again.

Note:

After normal power-up, an animation will be displayed.

But when there is a new version, the power-up will display the new version number instead of the start-up animation.

12. FAQ

(1) Clock timing accuracy

With network: The time tolerance is less than 1 second upon successful synchronization.

Without network: The clock uses the Epson RX8010SJ RTC model, with a built-in crystal oscillator, factory calibrated. The datasheet indicates a frequency stability of ± 1 minute per month at 25°C.

Note: The accuracy data above comes from our company's tests and the chip manufacturer's datasheet. There may be variations due to different testing conditions. This clock is not an instrument; the data is for user reference only and accuracy is not guaranteed.

Additionally: Some users compare the time with their mobile phones or computers. Generally, the time on these devices is not very accurate. For comparison, please use web-based time. Two recommended time websites:

<https://time.org.cn>

<https://time.is>

(2) How to confirm network configuration success?

The following conditions indicate that the network has been successfully configured:

- The blue LED on the lower right front is off.
- Enter configuration mode, [Network Settings]- [Status] section shows 'Normal'.

(3) Can a power bank be used for power supply?

It depends on the power bank. Since the clock has low power consumption, most power banks will automatically shut off. The power bank needs to support low-current output.

(4) How to check the current version number?

Enter configuration mode, Check [Clock Settings] – [About & Upgrade] – [Device & Upgrade] section.

(5) Time cost for each synchronization?

Under normal conditions, it usually takes 6-8 seconds to connect to the router and obtain the time. If synchronization fails, it will take longer, and the process will retry 6 times.

(6) Synchronization time points?

The synchronization interval can be set, and there is no fixed synchronization timing; The synchronization interval is always calculated from power-on. The interval can be set to 1 minute, 5 minutes, 1 hour, or 1 day.

Note: If milliseconds are displayed, the synchronization interval will automatically change to 1 minute.

(7) LED light degradation explanation

LEDs have a characteristic of light degradation. Over time, segments that are frequently lit may become dimmer than those that are not.

To extend the lifespan of the LEDs and meet display requirements, it is recommended not to set the brightness to the maximum. Brightness levels 1-8 are optimal.

(8) Function of the button battery?

The clock board has its own RTC circuit, allowing it to keep time even without a network. When the power is off, the RTC is powered by a button battery to prevent time loss.

Button battery model: CR1220.

(9) What does the clock display 'Err1' mean?

Displaying 'Err1' indicates that the RTC chip has reset and the time is lost, possibly because the battery was removed or is dead.

Note: If 'Err1' is displayed, the clock will automatically switch to normal display mode once it successfully connects to the network and synchronizes.

(10) Does a dead button battery affect normal functionality?

If the battery is dead, the clock will lose time when powered off. In a networked environment, it will retrieve the time upon powering on, so the impact is minimal with a good network connection. The button battery usually lasts over a year and usually doesn't need replacement.

(11)Unable to connect to the router

- In most cases, the issue is with the password. Please ensure the Wi-Fi name and password are correct.
- The clock only supports 2.4G and cannot connect to the 5G band.
- If it's a mixed network (2.4G and 5G with the same name), try separating them or enabling a guest network to see if it connects properly.
- Check if the router has enabled settings like a whitelist to prevent unauthorized access.
- Ensure the IP acquisition method matches the router's settings; usually, DHCP is used.
- Some company networks require MAC address authentication. The clock's MAC address can be modified—consult your company's IT department for details.
- There is an incompatibility with some routers, specifically with the TP WDR5620 series. You can enable the clock's strong connection mode with path: [System Settings] – [Router Conn.] – [Persistent Connection Mode].
- The router's password authentication mode should be set to WPA/WPA2, as the clock currently does not support WPA3.

(12)Flashing during video or photo capture

The clock display uses a scanning method, so it may appear to flicker under a camera, but it is not noticeable to the human eye and won't affect usage. If you need clock for filming, choose other clocks with static display mode.

(13)Explanation of temperature tolerance

To ensure display quality and aesthetic design, the clock does not use an external temperature probe, which may affect the accuracy of temperature readings.

The clock's built-in temperature measurement uses a digital sensor with an accuracy of $\pm 0.5^{\circ}\text{C}$. However, the LED display generates heat during operation, which can vary with room temperature, display brightness, and content. These factors can cause the clock's temperature reading to be higher than the actual ambient temperature.

To minimize this heat effect, the clock is added a compensation mode in the software to adjust the displayed temperature. However, due to varying environmental conditions, the software compensation may not fully adapt to all situations.

To ensure more accurate temperature readings, it is recommended to set the display brightness to a lower level (levels 1-8). Within this range, the temperature readings are typically closer to the actual temperature. If the brightness is set higher (levels 9-11), the increased heat from the LEDs may cause greater discrepancies in the readings.