

INSTRUCTION MANUAL

SEW 30 / SAW 30

WiFi Clock



Regulations and Certification

This product was developed and produced in accordance with the following EU directives:

EMC	Electromagnetic compatibility directive 2014/30/EU
LVD	Low voltage directive 2014/35/EU
RED	Radio equipment directive 2014/53/EU
RoHS	Restriction of the use of certain hazardous substances directive 2011/65/EU
REACH	Chemical substances directive 1907/2006/EC
WEEE	Waste electrical and electronic equipment directive 2012/19/EU
Railway Interop.	Interoperability of the rail system within the European Union directive 2016/797/EU
Railway Safety	Railway safety directive 2016/798/EU

See Conformity for the declaration of conformity of this specific product. This product may offer a CB test certificate for download at MOBATIME.COM/support/resources.



Important Notes

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1. Please read and follow the safety information in this document before operating the product. We cannot guarantee that no accidents or damage will occur due to improper use of this product. Please use this product with care and operate at your own risk.
2. We are not liable for any direct or indirect damage caused by the use of this document or the said product.
3. This product must be connected and installed by a qualified electrician who is familiar with the relevant regulations (e.g. VDE).
4. The information in this document is subject to change without notice. The latest version of this document is available for download at MOBATIME.COM/support/resources.
5. The product software is continuously being optimized and supplemented with new options. The latest firmware is available for download at MOBATIME.COM/support/resources.
6. This Instruction Manual has been composed with the utmost care to explain all the details to ensure a safe and stable operation of this product. Nevertheless, if questions arise or any errors appear, feel free to contact support.
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1 Safety



Read the safety sections carefully and follow all the instructions. This ensures safe and reliable operation of this device.

1.1 Instructions and Symbols

Symbols used throughout this document and their meaning are as follows:



A note or important information.



Answer to a possible question. Contact information.



Keep away from children and people with limited physical, sensory, or mental capacities



Action needs to be taken.



Connect device to earth ground.



More information included in the manual.



Disconnect mains power before doing anything.



Attention of electrical shocks.



Surface may be hot.



Item is flammable.



A warning, be cautious.



Recyclable materials.



Do not put in trash.

1.2 General



For safety and licensing reasons, unauthorized modifications and/or changes to the product is prohibited. Maintenance, adjustments or repairs may only be carried out by the factory (copyright holder).



The product is not a toy; it does not belong in the hands of children. Mount or place the product so that it cannot be reached by children. Children may try to insert objects into the product. The product will not only be damaged, but there is also a risk of injury, as well as danger to life through electric shock.



Never open the housing of this product, for it poses mortal danger from electric shock or may even cause a fire.

- Keep packaging such as plastic films away from children. There is the risk of suffocation if misused.



Use caution with the product, knocks, blows, or even falls from a low height can damage it.



In industrial facilities, the accident prevention regulations of the trade associations for electrical systems and equipment must be observed.

- Do not use the product if it is damaged. It can be assumed that safe operation is no longer possible if:
 - the product has visible damage
 - the product is not working properly (thick smoke or a burning smell, audible crackling noise, discoloration of the product or surrounding areas)
 - the product was stored under adverse conditions
 - tough conditions during transport



Improper handling of this product operated on the mains voltage can cause mortal danger from electric shock!



Interconnecting or combining equipment bearing a CE label does not inevitably result in a system that conforms with the safety regulations. Integrators will have to reassess the new product's compliance according to the locally valid directives. See section Conformity for more information on certification of this product.

1.3 Installation

- This product must be connected and installed by a qualified electrician who is familiar with the relevant regulations (e.g. VDE).



Never plug the product into voltage/power supply immediately after it has been moved from cold into warm environment (e.g. during/after transport/unboxing). The resultant condensed water may damage the product or may cause electric shock.



Allow the product to reach the ambient temperature. Wait until the condensation has evaporated, this can take a few hours. Only then can the product be connected to the voltage/current supply and put into operation.



This product may have screw terminal with open electrical contacts. It is essential to ensure that the connection is made only when no voltage/current is applied. Secure the power supply to prevent accidental reconnection. Verify the absence of voltage using an appropriate meter.



The power supply line must be protected with a residual current circuit breaker (RCCB) with a trip current ≤ 30 mA.



Always connect earth ground to the device at the indicated protective earth terminal (PE or earth symbol indication).



Always unplug a power plug from the socket only at the intended gripping surface, pull the power plug not the cord from a power outlet. Wires may rip out and pose danger to life through electric shock.



Maintain sufficient cooling of the product according to its specifications.

1.4 Operation

- Use the product in the specified environment. Use outside of the specifications can damage the product and/or stop any operation.
- The product may not be exposed to extreme temperatures, direct sunlight or strong vibrations. Protect the product from moisture, dust and dirt.



Operation in environments with excessive dust, flammable gases, vapours or solvents is not permitted. It may cause explosion or fire.



Depending on the cooling type, the product housing may reach temperatures above 60°C which can burn the skin.

- Do not overload the product. Note the input/output voltages and currents as well as output powers indicated on the product.
- Depending on the input currents and input voltages, suitable connecting cables with appropriate cable diameter must be used. Only use the plugs and connectors supplied in the original packaging with the product.

1.5 Maintenance and Cleaning

- If the product and/or the connecting cable is damaged, do not touch it: there is mortal danger from electric shock! First, turn off the power supply to all poles of the product (turn off associated circuit breaker or remove the fuse, then turn off GFCI). Verify the absence of voltage using an appropriate meter.
- For the end consumer, the product is maintenance free. Leave any maintenance to an expert. Repairs may only be done by the factory itself (copyright holder).
- Unplug all poles of the product from the operating voltage before cleaning.

- For external cleaning one can use a clean, soft, dry cloth. Dust can be easily removed with a clean, soft brush and a vacuum cleaner.
- Do not use aggressive chemicals or abrasive cleaners, as this may cause discoloration or even material changes.
- This product is equipped with fuses for protection against high voltage and high currents. Burned fuses may only be replaced by the factory itself (copyright owner).



Never bridge a fuse, it is a fire hazard and can cause a fatal electric shock.



Read the [Troubleshooting](#) section to find help to common mistakes, misbehavior and known issues.

1.6 Disposing



At the end of its lifecycle, do not dispose of this device in the regular household rubbish. Return it to the supplier who will dispose of it correctly.



This product was packed and stuffed with proper materials to protect it during transportation. Packaging materials can be recycled and should be disposed environmentally friendly.

2 Introduction

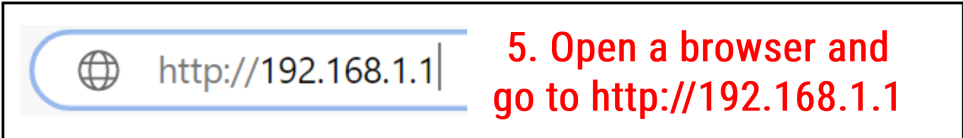
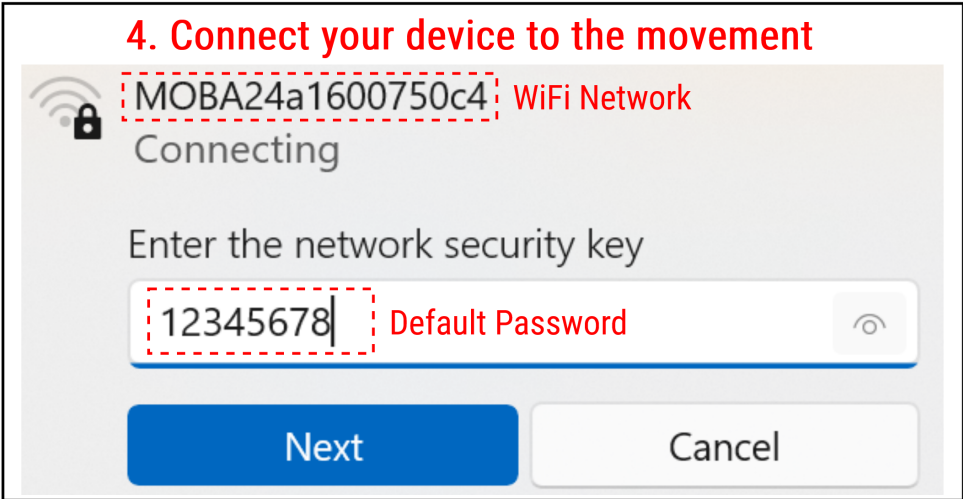
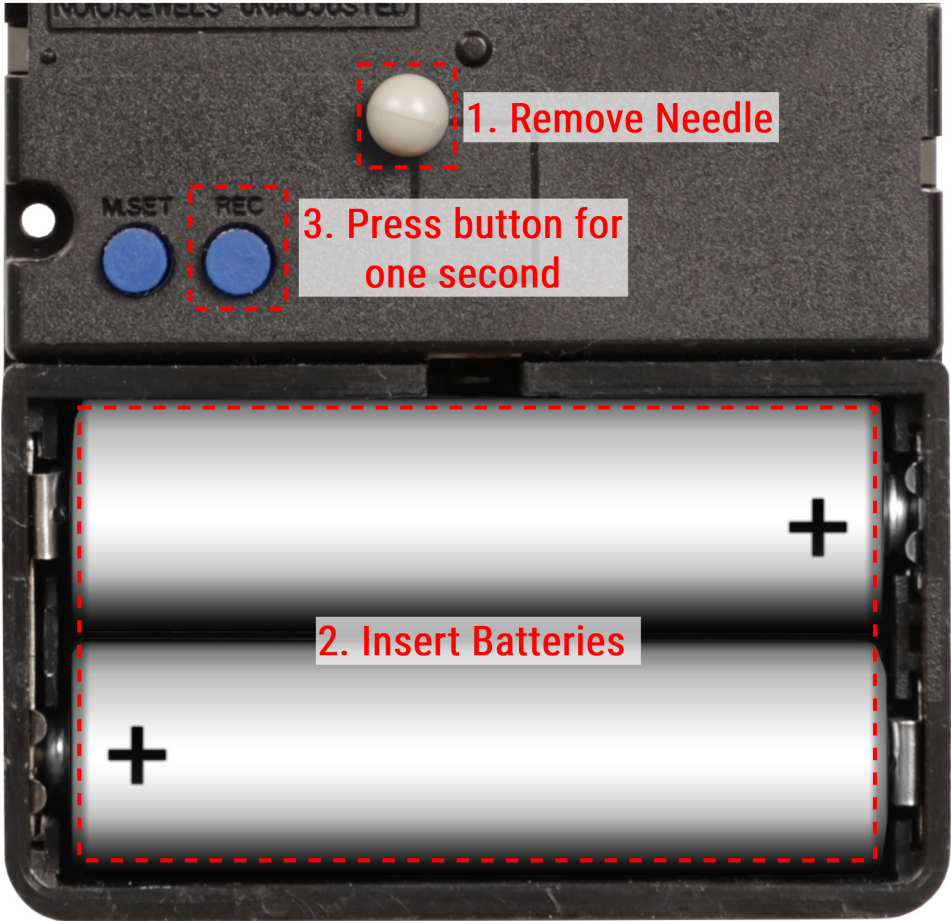
The 'SEW 30' is a battery-operated, self-setting movement that can be synchronized and configured using a WiFi connection. There also exist the product versions 'SAW 30' and 'SEW 30 Powered', see the table below for differences.

Features of the 'SEW 30':

- Uses two AA batteries (1.5V Alkaline or Lithium)
- Simply start the SEW 30's web interface and instantly access all configuration parameters.
- Synchronized using the 'Network Time Protocol' (NTP). Supports manual selection of up to five time servers.
- The movement periodically transmits a message that contains detailed status information and can be used to monitor the device. This includes values such as the battery voltage or the detection of mechanical anomalies.
- 91 Timezones are available for selection. Handling of summer/winter time takes place without user intervention.
- Initial configuration is possible using any WiFi-compatible device that has a browser installed.
- The current operating mode is indicated on two LEDs and can be controlled using two push-buttons.
- The second hand moves continuously. Minute / hour hands move by one step every ten seconds.
- Supports WiFi networks that use OPEN, WEP, WPA, WPA2 or WPA3 authentication modes. 'Protected Management Frames' (PMF) are supported.
- Time can be set manually. This is useful if a network connection is temporarily unavailable.

Product Number	Name	Description
134425	SEW 30	Battery-operated WiFi movement with second hand.
134609	SAW 30	Battery-operated WiFi movement without second hand.
133515	SEW 30 Powered	Mains-powered WiFi movement with second hand. No battery operation possible.
139408	SAW 30 Powered	Mains-powered WiFi movement without second hand. No battery operation possible.

3 Quick Start Guide



If there are any problems when accessing the web interface, try disconnecting your device from any other networks. Activating 'airplane mode' and only enabling WiFi is a reliable way to achieve this.

Configuration

General

Timezone: Berlin **6. Select Timezone**

Hostname:

Pause Second Hand at Night:

Ignore Low Battery:

Network Connection

Authentication:

SSID:

PSK: ●●●●●●●●●●●●●●●● **9. Enter Password**

WiFi Scanner

Select Network: example-network-2 **7. Select Network**
8. Click 'Use'

Network Time Protocol

Enable NTP:

Interval:

NTP Server 1:

NTP Server 2:

NTP Server 3:

NTP Server 4:

NTP Server 5:

Monitoring

Enable Syslog:

Interval:

Syslog Server:

Static IP Address

Use Static IP:

IPv4 Address:

IPv4 Mask:

IPv4 Gateway:

IPv4 DNS:

Config Management

AP PSK:

10. Click 'Save'
11. Click 'Apply / Quit'

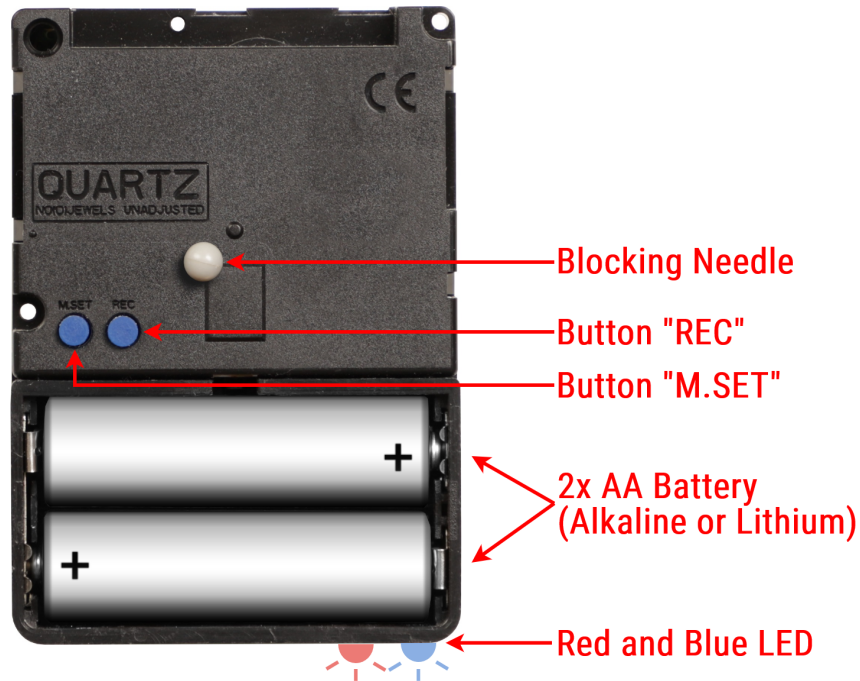


Make sure to complete the setup within 10 minutes, as the web interface will close automatically and any unsaved changes are lost.

The movement now is configured and should start displaying the current time after at most 10 minutes.

4 Operation

4.1 Modes of Operation



Mode	Button Press	Blue LED	Description
Initial Configuration	'REC' for 2 seconds (fast red flashing)	Flashes once	The movement generates a WiFi access point and enables the configuration interface. See Quick Start Guide and Web Interface for more details.
Configuration	'REC' for 5 seconds (slow red flashing)	Flashes 2 times	Connection to the configured network is established and the configuration interface is enabled. The movement's ip address must be known to use this mode (either use a static ip or check the router's dhcp mapping).
Show Device Status	'M.SET' for 2 seconds (fast red flashing)	Flashes 3 times	A short configuration check is performed. Any detected errors are shown on the red LED. See section Device Status below.
12h Position	'M.SET' for 5 seconds (slow red flashing)	Flashes 4 times	All hands move to the 12:00 position. After 2 minutes, normal operation will resume.
Factory Reset	'REC' for 20 seconds (permanent red light)	Flashes 5 times	The movement will automatically restart and reset any stored configuration parameters. All settings will need to be entered again.

4.2 Device Status

When this mode is triggered, the movement will attempt to establish the WiFi connection, reach the NTP server(s) and transmit the status message. During this process, the blue LED will keep blinking. After it is done, the red LED will show one or multiple of the following error codes:

Error	Red LED	Description
None	Off	No error was detected.
Battery	Flashes once	The battery voltage is too low for normal operation.
WiFi	Flashes 2 times	Connection to the WiFi access point is not possible. There might be a problem with the ssid/password configuration.
NTP	Flashes 3 times	Time synchronization not possible. Check the movement's NTP server settings. There might be a problem resolving the hostnames using DNS (only if the NTP servers were not entered by ip).
Syslog	Flashes 4 times	The syslog server cannot be reached. If it is specified by hostname, it could likely not be resolved properly (DNS).
Mechanical	Flashes 5 times	Position of second/minute/hour hands cannot be detected.

Each pattern is repeated 3 times. If there are multiple problems, the corresponding error codes are shown sequentially.



If the battery voltage is very low, the blue LED's blinking might not be visible. The red LED is not affected by this and will still show any active errors at most 30 seconds after the mode is triggered.

5 Web Interface

The web interface can be used to view and modify the device configuration. The following chapters describe all of its elements. Similar texts can also be displayed in-browser by hovering the cursor over the setting in question (only on pc/laptop).

This interface can be accessed in two different ways. See [Modes of Operation](#) for more details:

- 'Initial Configuration' (press 'REC' for 2 seconds): The movement generates an access point that any WiFi device can join as a client. The interface is then reachable under the url 'http://192.168.1.1/' using any browser. This mode is used during the initial setup, but can also be activated at any other time.
- 'Configuration' (press 'REC' for 5 seconds): The movement connects to the access point specified in the device settings (i.e. the network also used for time synchronization). In order to access the interface, the device's ip address must be known. This is either achieved by setting up a static ip beforehand or checking the WiFi router's dhcp mappings. The interface can then be reached using the url 'http://.', where 'ip' is replaced with the movement's ip address (e.g. '192.168.1.1')

For the 'SEW 30' and 'SAW 30' product variants, the web interface automatically closes after 10 minutes and any unsaved modifications are lost. Configuration is permanently accessible for the 'SEW 30 Powered' variant.

5.1 State

Using the options listed under 'State', some aspects of the movement's operation can be temporarily modified. These settings take effect immediately and are lost after a restart of the movement.

5.1.1 12h Mode

When the 12h mode is enabled, all hands move to position 12:00. After disabling this checkmark, the movement will return to normal operation and show the current time (provided it is currently synchronized).

5.1.2 Manual Time

This field allows manual synchronization of the movement, which is useful for testing or when the network connection temporarily is unavailable. When a new time is received over NTP, any values entered manually are overridden. If NTP is disabled, the movement will stay synchronized indefinitely. In order to ensure correct handling of timezones and daylight saving time, 'Coordinated Universal Time' (UTC) should be used when entering time and date.

5.2 Configuration

The following sections describe all configuration items. Any modifications to these settings need to be confirmed using the 'Save' button. All values are permanently stored and thus preserved even when the batteries are removed. Use 'Factory Reset' in the chapter 'Modes of Operation' to restore the defaults.

5.2.1 General

Name	Default Value	Description
Timezone	Berlin	Timezone used by the movement. This parameter also sets up automatic handling of daylight saving time.
Hostname	sew30	The movement uses this hostname when connecting to a network. It is recommended to enter an easily identifiable name that does not contain special characters.
Pause Second Hand at Night	off	This option stops moving the second hand between 20:00 and 06:00, which significantly improves battery life.
Ignore Low Battery	off	By default, the second hand will permanently stop at 12:00 in case of the battery running low. If this behavior is not desired or not working properly due to a special type of battery being used, it can be disabled by activating the option 'Ignore Low Battery'.

5.2.2 Network Connection

Name	Default Value	Description
Authentication	WPA2	Authentication mode used when connecting to the WiFi network. When the WiFi scanner is used, this parameter set automatically.
SSID	defaultssid	Name of the WiFi network. The movement will connect to this network for time synchronization and transmission of the status message.
PSK	defaultpassword	Password needed to access the network.

When setting up the WiFi connection, the 'WiFi Scanner' can be used to quickly fill out the 'Authentication' and 'SSID' fields. Simply select the desired network from the drop-down menu and click on the 'Use' button. After this, only the 'PSK' needs to be entered manually.



The authentication modes WEP, OPEN and WPA are insecure and should be avoided. It is recommended to use WPA2. WPA3 is also supported, but leads to a shorter battery life.

5.2.3 Network Time Protocol

Name	Default Value	Description
Enable NTP	on	If disabled, no automatic synchronization takes place and time needs to be set manually.
Interval	1 day (SEW 30 / SAW 30) 5 minutes (SEW 30 Powered)	Time synchronization takes place this often. Lower values lead to more accurate time but shorter battery life. The default value of 1 day provides a good balance between battery life and accuracy.
NTP Servers	0.pool.ntp.org 1.pool.ntp.org 2.pool.ntp.org 3.pool.ntp.org pool.ntp.org	The first reachable server is used for time synchronization, starting from server 1. Each server can be specified either by ip address or hostname.

5.2.4 Monitoring

Name	Default Value	Description
Enable Syslog	on	Enable / disable the status message.
Interval	1 day (SEW 30 / SAW 30) 1 hour (SEW 30 Powered)	The status message is sent in this often. This value also impacts battery life and should typically be set either to the same as time synchronization or to a longer interval.
Syslog Server	192.168.46.49	This server can be specified either by ip address or by hostname. Status messages are sent to UDP port 514 of this device.

5.2.5 Static IP Address

Name	Default Value	Description
Use Static IP	off	If enabled, an ip address can be manually assigned to the movement. Otherwise, DHCP is used to obtain an ip address.
IPv4 Address	-	IPv4 address used by the movement. There must be no other device with the same address.
IPv4 Mask	-	IPv4 network mask
IPv4 Gateway	-	Gateway used for reaching any servers outside of this network (e.g. the time servers)
IPv4 DNS	-	DNS server needed to resolve domain names (e.g. ntp servers and/or the syslog server)

5.2.6 Config Management

Name	Default Value	Description
AP PSK	12345678	Password needed to access the 'Initial Configuration' mode.

Pressing the 'Save' button stores any modifications to the configuration but does not apply them until the web interface is quit. After 'Apply / Quit' is clicked, the new configuration is used and the web interface is stopped. The 'SEW 30 Powered' movement will always keep the web interface reachable from within the configured network. When the configuration was changed, the browser window might need to be reloaded and it can take a few seconds until the interface is shown again.

6 Status Message

The movement can be configured to periodically transmit its status to a server. In addition, any detected errors are reported immediately (e.g. in case of a mechanical problem). The contents of this message are structured according to the syslog protocol defined in RFC 5424.

'STRUCTURED-DATA-ELEMENTS' are used to encode the different parameters.

Data ID	Description
serial	Serial number of the movement
item	Item number that indicates the product type.
mac	MAC-Address of the movement.
ip	Current ip address of the movement (assigned statically or received using DHCP)
alarm	All active alarms encoded using bitwise 'OR': 0x01 = Not synchronized 0x02 = Battery voltage too low 0x04 = Mechanical error 0x08 = Device restart
versionclock	Firmware version (movement).
versionwlan	Firmware version (wifi).
lastsource	Time server that was used during the previous time synchronization (ip address or hostname).
lastsync	Timestamp received from this server.
lastdeviation	Offset corrected during the previous time synchronization.
uptime	Number of seconds since startup.
stepslostsec	Position error that was corrected, in number of second hand steps (16Hz)
stepslostmin	Position error that was corrected, in number of minute hand steps (0.1Hz)
oscaccuracy	Estimated frequency deviation of the internal oscillator.
timesource	Type of time source used. 0 = not synchronized 1 = NTP 2 = Manual (NTP enabled) 3 = Manual (NTP disabled)
voltagemean	Mean battery voltage during previous wifi connection.
voltagevar	Variance of battery voltage during previous wifi connection.
voltagemin	Minimum battery voltage during previous wifi connection.
chargeused	Approximate battery charge consumed since startup.
wifirssi	Received signal strength indicator (RSSI).
wifipower	Value of internal transmit power setting.

7 Tips and Troubleshooting

7.1 Recommended Setup

Configuration and environment significantly affect the movement's battery life. Because of the wireless network connection, there are also security aspects that need to be considered. The following section shows a possible setup and the tradeoffs involved. Any hints regarding battery life can be ignored for the 'SEW30 Powered' variant, because it includes an external power supply.

- Use 1.5V lithium AA batteries. This type of battery is more expensive but allows the movement to operate for a longer time.
- It is recommended to use a dedicated WiFi network for the movements. Access from within the network can be limited to the time servers, the syslog server (if required) and the DNS server (if required). This allows the movements to function while limiting the potential damage an attacker can cause. On many routers, it is also possible prevent any unauthorized devices from connecting at all (e.g. by using a mac address whitelist).
- The WiFi network uses WPA2 and has "Protected Management Frames" (PMF) disabled. WPA3 and PMF would provide increased security, but negatively affect the battery life. Networks that are open, use WEP or WPA1, are insecure and should not be used.
- Change the default password during initial configuration.
- If possible, enable the option 'Pause Second Hand at Night'. This will cause the second hand to be stopped between 20:00 and 06:00, significantly increasing the battery life. Make sure that this behavior is not confused with the low-battery warning, where the second hand is permanently stopped.
- For maximum battery life, intervals of time synchronization and status message should be set as large as possible and to the same value. Typically, the default interval of 1 day is a good tradeoff between accuracy and energy consumption. In cases where larger time errors are not noticeable, for example when using the SAW 30 (no second hand), it could make sense to increase the interval (e.g. 2 days or 1 week).
- Do not mix batteries of different types (e.g. lithium and alkaline) or different discharge states (e.g. full and empty). Not following this recommendation will result in reduced battery life.



When using lithium AA batteries, the manufacturer's safety recommendations must be observed. Recharging, short-circuiting or mechanically damaging such a battery may present a fire and/or explosion hazard.



Never use lithium batteries with a voltage of 4.2V! This might damage movement and batteries, posing a potential fire hazard.

7.2 Further Behaviors

The following information might be useful when troubleshooting:

- If time synchronization fails, a retry is started after a third of the configured interval. Using the default synchronization interval of 1 day, this corresponds to 8 hours.
- If NTP is enabled and no new time information is received for more than 7 days, the movement will stop all hands at 12:00. This behavior is deactivated when NTP is disabled and time is set manually.
- The low-battery alarm is based on periodic measurements of the battery voltage. When the movement is reset while the low-battery alarm is present, for example by removing and then re-inserting the batteries, information is lost and it might take a while before the alarm returns. This only temporarily removes the alarm and does not increase battery life!
- For security reasons, the configured wifi password cannot be accessed after it was set. The typical '****' is shown in the webinterface but the number of characters is not adjusted depending on the password length. For any change to the password, it must completely be re-entered.
- The UDP protocol used to transmit the status message does not ensure reliable message delivery. The log sometimes missing a single message does not necessarily indicate a problem.

7.3 Troubleshooting

During troubleshooting, it might be helpful to activate the 'Device Status' mode, as described in 'Modes of Operation'. The following sections show some common problems and solutions.

The configuration page cannot be reached.

The browser attempts to establish a connection using HTTPS. The movement only supports HTTP. Replace "https" with "http" in the browser's address bar.

The configuration page cannot be reached (Movement as access point).

The laptop or smartphone is successfully connected to the movement's access point, but attempts to reach the configuration page using the wrong network interface. Temporarily disconnect any other network connections (e.g. ethernet cable, 4G, ...) and try again. The browser and/or the computer might need to be restarted.

Second hand permanently stops at 12:00.

Low-battery warning is active. Replace the batteries. This low-battery warning can be disabled using the configuration option 'Ignore Low Battery'.

No hands are moving after insertion of the batteries.

The movement reports a mechanical error.

For shipping, the gearbox is blocked by a needle. This needle must be removed!

Second hand stops at 12:00, but only during the night.

The setting 'Pause Second Hand at Night' is enabled. Use the configuration interface to disable this behavior.

The movement is unable to synchronize and stops all hands at 12:00.

Batteries are empty and need to be replaced.

The blue LED is barely visible when it should be blinking.

Batteries are empty and need to be replaced.

In the 'Initial Configuration' mode, no connection to the access point is possible.

A different device might already be connected. The movement does not allow connections from more than one client at the same time. By removing the batteries for a few seconds and then starting the mode again, any ongoing connections to other devices can be terminated. Some devices, such as laptops, provide the option 'Connect Automatically' when logging into a WiFi network. This should be left disabled because it could prevent other users from connecting.

Batteries are full but all hands are stopped at 12:00.

There is no time synchronization possible. Make sure that the device configuration was set. It is also possible that the network is temporarily unavailable or the NTP server cannot be reached. If none of these errors are present, try restarting the movement by removing and re-inserting the batteries.

The movement does not show the correct time and pauses every few seconds.

The batteries are at a very low level and cause the movement to restart each time network communication is attempted. This can be confirmed by checking that the red LED blinks when the hands begin moving. The error can be resolved by inserting new batteries.

8 Technical Data

8.1 Overview

Parameter	Value
Supported Wifi Standards	802.11 b/g/n (2.4GHz)
Supported Authentication Modes	Open, WEP, WPA, WPA2, WPA3
Second hand operating mode	Continuous
Operating Temperature	0... 55 °C
Minute/Hour hand operating mode	Step every 10 s
Power Supply (SEW 30 / SAW 30)	2x AA Battery (Alkaline or Lithium)
Power Supply (SEW 30 Powered)	100... 240 VAC (50/60 Hz)
Internet Protocol	IPv4 only
Time Deviation	<100 ms directly after synchronization
Time Drift	Max. 10 s per week (if not synchronized by NTP)
Startup Time	Max. 10 minutes until hands are on time (If configured with valid time source)

8.2 Battery Operation

Current consumption was measured under the following circumstances:

- 24h Time synchronization and status message intervals
- Standard configuration for all other parameters
- NTP server nr. 1 is reachable
- 3V Battery voltage

Product Variant	Estimated Battery Life
SEW30	Alkaline: 10 months Lithium: 1 year
SAW30	Alkaline: 1.5 years Lithium: 2 years



Current consumption is influenced by a lot of factors, such as the room temperature and the type of batteries used. This table only shows typical values. It is possible that the actual runtime surpasses the given value or falls short of it.

8.3 Supported Timezones

Daylight saving time (DST) is automatically handled by the movement. The following timezones are supported:

Adelaide	Almaty	Amman	Amsterdam	Anchorage	Athens
Auckland	Azores	Baghdad	Baku	Bangkok	Barbados
Beirut	Belgrade	Berlin	Bogota	Brazzaville	Brisbane
Brussels	Buenos Aires	Cairo	Calcutta	Cape Verde	Caracas
Casablanca	Chicago	Chihuahua	Chongqing	Colombo	Costa Rica
Darwin	Denver	Dubai	Fiji	Godthab	Guam
Halifax	Harare	Helsinki	Hobart	Hong Kong	Honolulu
Irkutsk	Istanbul	Jakarta	Jerusalem	Kabul	Karachi
Katmandu Kolkata	Krasnoyarsk	Kuala Lumpur	Kuwait	London	Los Angeles
Madrid	Magadan	Majuro	Manaus	Mexico City	Midway
Minsk	Montevideo	Moscow	Nairobi	New York	Oral
Perth	Phoenix	Rangoon	Regina	Rome	Santiago
Sao Paulo	Sarajevo	Seoul	Shanghai	South Georgia	St Johns
Sydney	Taipei	Tbilisi	Tehran	Tijuana	Tokyo
Tongatapu	Vladivostok	Windhoek	Yakutsk	Yekaterinburg	Yerevan
GMT-12	GMT-11	GMT-10	GMT-9	GMT-8	GMT-7
GMT-6	GMT-5	GMT-4	GMT-3	GMT-2	GMT-1
GMT	GMT+1	GMT+2	GMT+3	GMT+4	GMT+5
GMT+6	GMT+7	GMT+8	GMT+9	GMT+10	GMT+11
GMT+12	GMT+13	GMT+14			

The constant GMT offsets (e.g. GMT+3) can be used in cases where no appropriate timezone can be found in the list. These do not automatically handle daylight saving time.

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