



NIXIE SIX ZIN70

Manual

Main System Parameters

1. Supply voltage, V	24($\pm 2.5\%$)
2. Highest consumption of current, A	2.5
3. Average consumption of current, A, not more than	0.95
4. Accuracy, %, not more than*	0.5
5. Power battery	CR1220

* Adjustable. If the Clock has GPS or WiFi time comparison modules, the accuracy of the Clock equals the accuracy of the reference clock of the exact time

WARNING!

The Clock is under High Voltage of at least 210V. To stay safe from the electric current, it is highly recommended to NOT TURN ON the Clock, if it is NOT ASSEMBLED! Many parts of the PCB are under voltage and will cause painful and unpleasant electric shock when you touch them.

The vacuum tubes (lamps) of the Clock are sensitive to hits, drops and other impacts. The glass of the tubes is thin and sharp enough to cause injuries. Such use of the Clock is not allowed.

In case the power is off, the Clock uses power battery CR1220 to keep on time counting. Please note, when the power is off and the battery is missing or uncharged, the Clock does not count time and sadly all the custom and default settings will be lost. The service life of the battery is 1 year in the average. The Clock stores its parameters and settings with the help of the battery. If upon power failure, your settings and the time and date on your Clock do not correspond to the ones you have set before, you should change the battery.



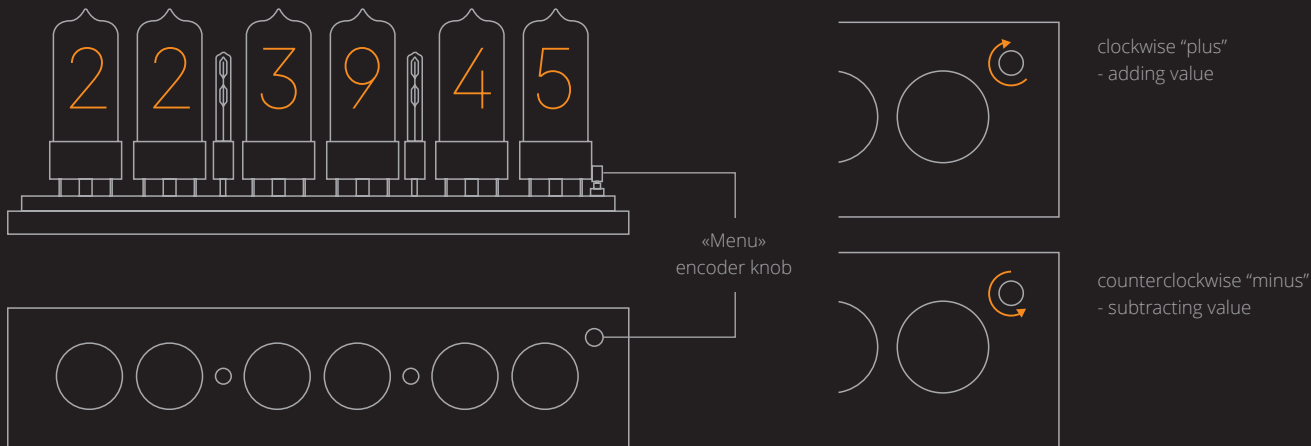
Case options for Zin-70 Clocks

Getting Started. Main Settings

To enter the Main settings, push the encoder knob in the Time/Date display mode. You will immediately go to the First page of the Main settings menu that is designed to set the time. The active parameter will be selected from the rest, for example it will be back lighted with a different color, or glow brighter, or the other parameters will be not back lighted at all.

Further on, you can set the parameters by turning the knob of the encoder: clockwise “plus” - adding value, counterclockwise “minus” - subtracting value. Pushing the “Menu” encoder knob switches the parameters and Sheets of settings. In the Setting mode, the Clock follows the Table of settings (please see below). Also, you can set your Clock via Android, ios or Windows.

You can exit from the menu by pushing the encoder knob and flipping to the end of the Table, or, if none of the push buttons was pushed, the Clock will go by default into the standby mode in 35-50 seconds.



The Table of the Main Settings

Sheet of Settings	Pair of Lamps 1 (Left)		Pair of Lamps 2 (Centre)		Pair of Lamps 3 (Right)	
1 [red]	Set hours		Set minutes		Reset seconds	
2 [green]	Set date		Set month		Set year	
3 [blue]	UTC Time Zone		American Date Display Standard	Night mode	Smooth switch of filaments	Separating colons
4 [yellow]	Turn on WiFi	Time format 12/24	Turn on GPS	Summer time	Show date	Color picker
5 [cyan]	Set Red color to manual setting of colors		Set Green color to manual setting of colors		Set Blue color to manual setting of colors	
6 [magenta]	Set hours of alarm		Set minutes of alarm		0 – Alarm off 1 – Alarm on	1 – Hour chimes on 0 – Hour chimes off



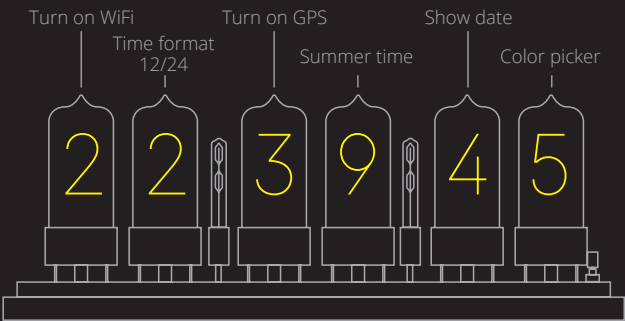
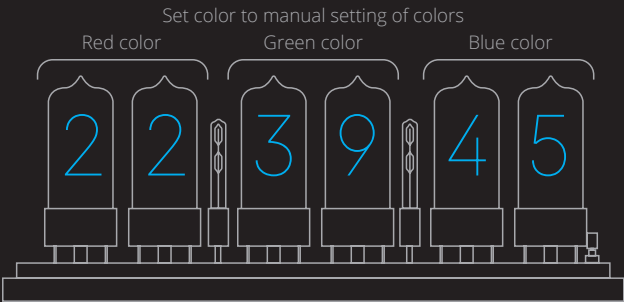
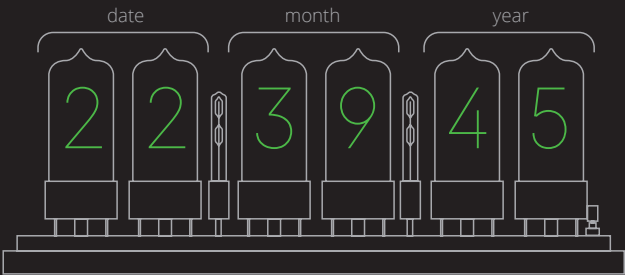
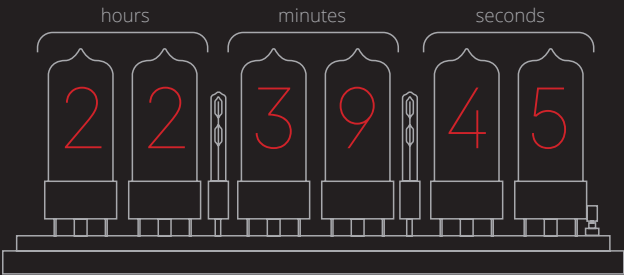
Video Manual
here



Setting hours and setting minutes, resetting seconds, setting date, month and year

manual setting of these parameters. The seconds will be reset to zero in the following order. If the current value of seconds is more than 30 seconds, than 1 minute will be added to the value of minutes; if – less, than the value will remain the same.

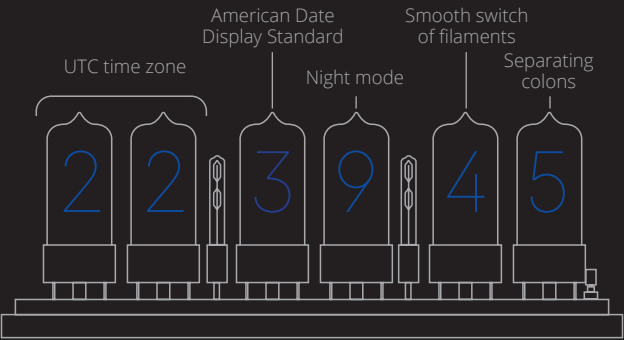
Attention! In case the GPS is turned on and is operating successfully, you cannot configure these parameters.



UTC Time Zone

The time zone as related to the UTC. From 1 to 14 – hours increase as related to zero, and from 15 to 26 – hours decrease as related to zero.

The Table below shows the values of this parameter for the most countries of the world.



The Table of UTC Time Zones

Value	Correction	Capitals, States, Territories
00	0	Dublin, Edinburgh, Lisbon, London, Casablanca, Monrovia
01	+1	Amsterdam, Berlin, Bern, Brussels, Vienna, Copenhagen, Madrid, Paris, Rome, Stockholm, Belgrade, Bratislava, Budapest, Warsaw, Ljubljana, Prague, Sarajevo, Skopje, Zagreb
02	+2	Athens, Bucharest, Vilnius, Kiev, Chisinau, Riga, Sofia, Tallinn, Helsinki, Egypt, Israel, Lebanon, Libya, Turkey, South Africa

Value	Correction	Capitals, States, Territories
03	+3	Minsk, East African Time (Kenya, Ethiopia, Eritrea, Tanzania, Somalia, Uganda, Sudan, Madagascar), Iraq, Yemen, Kuwait, Saudi Arabia, Qatar
04	+4	countries of the Caucasus, United Arab Emirates, Oman
05	+5	West Kazakhstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan
06	+6	central and eastern parts of Kazakhstan, Kyrgyzstan, Bangladesh, Bhutan time (Bhutan)
07	+7	Southeast Asia (Bangkok, Jakarta, Hanoi)
08	+8	Ulaanbaatar, Kuala Lumpur, Hong Kong, China, Singapore, Taiwan, Western Australian Time
09	+9	Republic of Korea, Japan
10	+10	Eastern Australian Time (Brisbane, Canberra, Melbourne, Sydney), Tasmania, Western Pacific Time (Guam, Port Moresby)
11	+11	Central Pacific Time (Solomon Islands, New Caledonia)
12	+12	Marshall Islands, Fiji, New Zealand
13	+13	Samoa, Tonga
14	+14	Line Islands (Kiribati)
15	-1	Azores, Cape Verde
16	-2	Mid Atlantic time
17	-3	South American Eastern Time (Brasilia, Buenos Aires, Georgetown), Greenland
18	-4	Atlantic Time (Canada), La Paz, Santiago

Value	Correction	Capitals, States, Territories
19	-5	North American Eastern Time (US & Canada), South American Pacific Time (Bogota, Lima, Quito)
20	-6	Central Time (US & Canada), Central American Time, Mexico (Guadalajara, Mexico City, Monterrey)
21	-7	Mountain Time (USA and Canada), Mexico (Chihuahua, La Paz, Mazatlan)
22	-8	North American Pacific Time (US & Canada)
23	-9	Alaska
24	-10	Hawaii
25	-11	American Samoa
26	-12	Date line
Added Time Zones*		
01	+3:30	Tehran time
02	+4:30	Afghanistan
03	+5:30	India, Sri Lanka
04	+5:45	Nepal
05	+6:30	Myanmar
06	+8:30	DPRK
07	+8:45	5 cities in Australia
08	+9:30	Australian Central Time (Adelaide, Darwin)

Value	Correction	Capitals, States, Territories
09	+10:30	part of Australia
10	+11:30	Norfolk Island (Australia)
11	+12:45	Chatham Archipelago (New Zealand)
12	+13:45	Daylight Saving Time in the Chatham Archipelago (New Zealand)
13	-4:30	Caracas
14	-3:30	Newfoundland

** - you can set these values in the in the corresponding part of the Extended settings.*

UTC time has no winter or summer versions and is always constant. To transfer to the Summer time by default, you need to turn on the corresponding function in the menu.

Setting summer time

0: disabled; 1: European summer time (transfer on the last Saturdays of October and March); 2: American summer time (transfer on the second Sunday of March and first Sunday of November). For more details on this function, please see the following links.

https://en.wikipedia.org/wiki/Daylight_saving_time

https://en.wikipedia.org/wiki/Daylight_saving_time_by_country

https://en.wikipedia.org/wiki/Summer_Time_in_Europe

https://en.wikipedia.org/wiki/Daylight_saving_time_in_the_Americas

https://en.wikipedia.org/wiki/Daylight_saving_time_in_Oceania

https://en.wikipedia.org/wiki/Daylight_saving_time_in_the_United_States

Smooth switch of filaments – gradual change of hours, minutes and seconds of the Clock. The new value gradually appears in place of the previous one.

Separating colons – modes of the neon separating filaments:

0 – colons blink with the frequency of 0.5 Hz (1 time per 2 sec);

1 – colons blink with the frequency of 1 Hz (1 time per 1 second);

the rest - various beautiful visual effects of colons.

Menu Sheet 5 is designed to manually set colors of back lights in mode 0, and is selected by the menu item “Color picker”.

Color picker - allows setting different colors of the backlights. The Clock has several modes of backlights. Mode 0 manually sets the color. In other modes, colors change according to the respective program.

Backlights - This menu item turns on and off the backlights in the Operating mode. In the Settings mode and in the Alarm mode, the backlights will be turned on always.

Show date - The date is displayed in certain intervals in DD: MM: YY (Day-Month-Year) format.

Turn on WiFi - This menu item switched on the WiFi module. You can also configure the Clock to send the requests to the servers of the exact time via application. If the GPS module is disabled, or the exact GPS time is not available (for example, the antenna is missing), the Clock will request the exact time via WiFi in the first place, as a priority module.

Turn on GPS - This menu item switches on GPS, if your Clock version has GPS module. Value “0” turns off the module, value “1” receives data in the GPS format, and value “2” receives data in the BDS format.

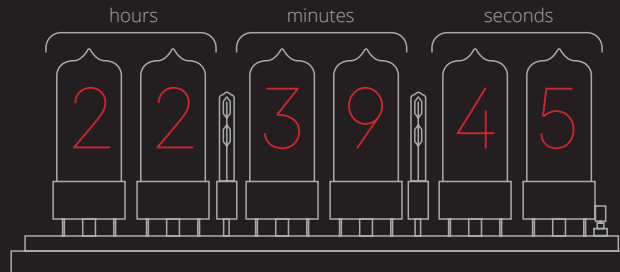
American Date Display Standard - In position “1”, the date is displayed in the MM.DD.YY format, otherwise - in the DD.MM.YY format.

Night mode - When this mode is turned on, the lamps and backlights dim for the period of time that is set in the Extended settings (and by default, it is from 23:00 to 06:00). In position “1” the lamps attenuate by 80%, and position “2” completely shuts down the lamps (this is a power saving mode, when all the high-voltage circuits are turned off that reduces energy consumption for more than 25%).

Note. When any of the Night modes is active, the cathode antipoisoning routing cannot operate. To activate this function, you need to change the time when it starts to a non-night time. You can set this parameter in the Extended settings (please, see below).

Setting up the Clock. Step-by-step instructions

1. Plug in the Clock and wait till the time starts. When first turned on, the Clock shows 00:00:00.
2. Short push the "Menu" button (far left) one time. The lamps will change their color, and the first pair of lamps will light up brighter. Use the "Minus" (middle) and "Plus" (far right) push buttons to set the current time - hours.
3. Short push the "Menu" button again. The second pair of lamps (centre) will light up brighter than the others. Set the minutes of the time with the "Plus" and "Minus" push buttons.
4. Short push the "Menu" button. The third pair of lamps (far right) will light up brighter. Use the "Plus" and "Minus" push buttons to set the seconds to zero.
5. Please repeat the operations described in ss. 2-4, while following the Table of Settings (see above,) to set the rest of the menu items. When you set up the last item of the Table, the Clock is considered completely configured.



Encoder

Encoder represents a control in the form of a regulator knob. If you use encoder to control the Clock, please follow these instructions.

1. In the time/date display mode.

Turning the Encoder knob (no pushing) counterclockwise (left) – switches the Clock to show the date and temperature (if the temperature sensor is installed).

Turning the Encoder knob (no pushing) clockwise (right) - turns on or off the backlights.

Push of the Encoder knob (no turning) - switches the Clock to the Menu mode, from the start and according to the Table of Settings with the following pushes.

Push and hold the Encoder knob in the Operating mode (for at least 5 seconds; no turning the knob) – switches the Clock to the Extended settings menu (please see the Extended settings section of this Manual).

2. Upon entering the Settings menu, turn the knob left or right to set the value that you need. With another push you will go to a new menu item according to the Table of Settings.

3. When using WiFi. If you push the Encoder knob and turn it clockwise, the Clock will turn on WiFi hotspot. It sets connection with your mobile and allows setting parameters via mobile application (if supported by your version of the device).

4. When the Alarm rings, the reaction of Encoder first stops the alarm (see the Alarm clock paragraph), and then fulfills its standard functions described in ss. 1-3.

The Special Functions

This paragraph describes the Clocks whose microcontroller supports special functions Temperature and Alarm clock.

The Temperature

The Clock can have a remote Temperature sensor. This sensor can measure room temperature in the range from 0 °C to 99.9°C.

The Temperature sensor is mounted in the back part of the Clock. It does not need any setting, and indicates the temperature by default, if it is connected and operates successfully. The order of indication is the following: Time - Date - Time - Temperature. This means as you first call the time, the Clock shows the time, and as you call again – the Clock shows the temperature.

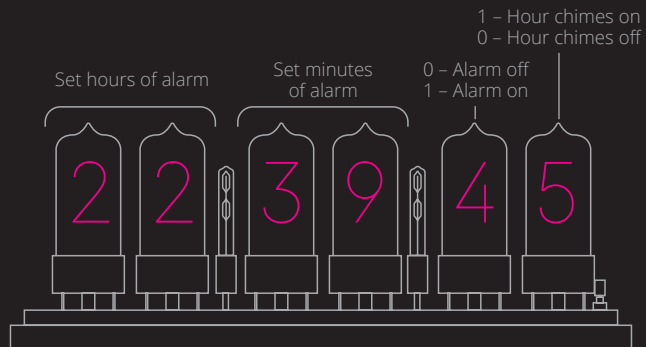
The Clock calls the Temperature sensor every 10-30 seconds, this means that you should not expect an instant response. This is not deemed a malfunction.

The Alarm clock

You can set and turn on and off the Alarm clock with menu item 6. When Alarm starts, you will see the bright white glow, blinking of the backlight LEDs and hear the alarm sounds (in the frequency of 1-3 kHz). The Alarm sounds for about 90 seconds (and you can set any duration from 30 to 129 seconds. Please see section Extended settings for details.) If you want to stop the Alarm, turn the Encoder knob clockwise. If you do not stop the Alarm in menu 6, it will repeat in 24 hours.

You can also repeat the Alarm after it has already rang. To do so, you need to turn the Encoder knob counterclockwise. Then, in 5 minutes the Alarm will ring again. You can repeat the Alarm 5-7 times (depending on the version), and stop it by turning the Encoder knob clockwise.

You can also set the Hour chimes, when the Clock chimes every new hour. This function is active from 6 am to 11 pm by default. (You can change this period in the Extended settings).



The Extended Settings (for version 1.1+ only)

If you push and hold the “Menu” button in the Operating mode for more than 5 seconds, you will enter the Extended setting menu of the Clock. Here, you can make custom setting of the majority of the Clock’s parameters.

The Work Flow of the Extended Menu

- The first two lamps indicate the page number.
- Depending on the parameter that you are setting, either the second or the third pair of lamps will light up.
- The “Menu” push button flips though the parameters, and the rest of the push buttons set the values of the parameters.

The Table of Parameters of the Extended Menu

The default values are taken in square brackets [].

Line	The 2nd Pair of Lamps	The 3rd Pair of Lamps
00	Duration of Time display, (Wait to Show Date,) sec+15 [20]	Duration of Alarm, sec +30 [60]
01	Duration of Date display, sec [08]	Turn on Cathode anti-poisoning [01]
02	Time to Start Hour chimes [05]	Time to End Hour chimes [23]
03	Time to Turn on Cathode anti-poisoning [02]	Turn on Sound confirmation (for push buttons) [01]
04	Set Tone of Hour chimes [00]	Set Tone of Alarm [00]
05	Set Visual effect to Transfer from Time to Date [00]	Set Added Time Zones [00]
06	Turn off Testing LED (1-LED_OFF; 0-LED_ON)	Update data via WiFi, call the site (see paragraph WiFi)

Line	The 2nd Pair of Lamps	The 3rd Pair of Lamps
07	Set Brightness of Lamps [11]	Show Temperature [00]
08	Not used in this version [00]	Volume of Sound [07]
09	Time to Start Night mode [23]	Time to End Night mode [06]
10	Turn on Software Upgrade [00]	Set All values to DEFAULT [00]

The Description of the Parameters of the Extended Menu

Duration of Time Display, (Wait to Show Date,) sec– duration (in seconds) when the Clock shows the time before switching to show the date. This function works if the default Show Date menu item in the Main settings is turned on. The least possible value is 15 seconds that corresponds to the number “00” of the indicator, and the highest possible value is 114 seconds that corresponds to the number “99” of the indicator.

Duration of Alarm, sec

Duration of ringing of the Alarm clock. Number “00” of the indicator corresponds to 30 seconds, number “99” of the indicator - to 129 seconds.

Duration of Date Display, sec

The period of time when the Clock is being displaying the date. It is set by default in the Main menu and you can adjust it manually by pushing the centre push button on the Control panel.

Turn on Cathode Anti-poisoning

One of the technical drawbacks of the gas-discharge lamps is the filaments stacking inside the lamp one on another. Thus, when the lamp works, the particular cathode filaments are switched on more often than the other and the metal particles of the active cathodes settle on the passive cathodes while “poisoning” them. Unfortunately, at first, this causes dull glow of the most effected parts of the passive filaments, and further on – the complete failure of these parts to glow. All gas-discharge lamps that use active-passive

cathodes experience this effect, for example, in clocks, when the hours and tens of hours are switched on extremely rarely. One of the methods of cathode “anti-poisoning” is flipping though the filaments in the lamp (slot machine effect) that significantly reduces the “poisoning” and highly increases the service life of the lamps.

Therefore, it is strongly recommended to NOT disable the Turn on Cathode anti-poisoning function and protect the lamps!

Time to Start Hour chimes

Time in hours from 00:00 to 23:00, when the Hour chimes turn on. You can activate this function in the Main menu with the menu item “Hour chimes.”

Time to End Hour chimes

Time in hours from 00:00 to 23:00, when the Hour chimes turn off. You can activate this function in the Main menu with the menu item “Hour chimes.”

Attention! Be attentive while setting the Time to Start and the Time to End Hour chimes. Otherwise, you can have Hour chimes either completely disabled or enabled all the time.

Time to Turn on Cathode anti-poisoning

You can set the time to turn on the Cathode ant-poisoning to any time that is convenient to you from 00:00 to 23:00. The duration of the Cathode ant-poisoning routine is 1-2 hours.

It is strongly recommended to NOT completely disable the function Time to Turn on Cathode anti-poisoning!

Turn on Sound confirmation (of push buttons)

This function activates the sound effect when you push the controls.

Set Tone of Hour chimes

Here, you can select a melody of your Hour chimes. You can turn on this function in the Main settings.

Set Tone of Alarm

This function selects a melody of the Alarm clock.

Set Visual effect to Transfer from Time to Date

This function selects one of the three visual effects how the Clock should go from time display to date display.

Set Added Time Zones

This function sets the exact time in a given area. It can only operate under the software that supports it and with the connected GPS module. Please see details in the Main settings paragraph.

Turn off Testing LED

This option allows disabling the testing LED (if it is used in your model of the Clock). Value "1" corresponds to Disabled state. Depending on the configuration, this LED indicates response to pressing the keys of the Remote control and status of GPS or WiFi connection. Please see details in the corresponding sections of this Manual.

Set Brightness of Lamps

This menu item changes the brightness of the lamps. Some versions of the Clock do not save this parameter in order to avoid incorrect operation of the Clock that is why, when the power restarts, this parameter will be reset to its default value.

Show Temperature

Value "0" of this menu item indicates the temperature in Celsius, and value "1" – in Fahrenheit.

Volume of Sound

You can adjust the volume of the sounds of the Clock, such as the sound of the Alarm or of the push buttons from silent - "0" to loud - "9".

Time to Start Night mode

Time to End Night mode

The time from 00:00 to 23:00 that corresponds to turning on and turning off the Night mode of the Clock.

Attention! You should be attentive while setting Time to Start Night mode and Time to End Night mode. Otherwise, the Night mode on your Clock can never turn on or will be turned on all the time.

Turn on Software Upgrade (software of controller)

Attention! The function “Turn on Software Upgrade” can only be used by the Certified Users such as Official representatives of the Manufacturer and Repair shops. The Manufacturer bears no responsibility for any damage that may cause use of this function.

When you enable this menu item, the Clock turns on the bootloader to upgrade the software. If the value is set to “1”, and when the Clock restarts upon the power reset, the Clock will go to the bootloader mode by default. The Clock will not operate. For more details, please see the section Software Upgrade.

If this menu item is set to “2”, the Clock will immediately start upgrade and will download via the Internet the latest current firmware of the controller. This can take a few minutes. Among others, the binding prerequisite of the successful upgrade is the stable Wi-Fi Internet connection. The Clock checks up for a newer firmware version once a day, between 00:00 am and 03:00 am. Also, if the Clock receives the permission to upgrade, the upgrade will be performed immediately. During the upgrade, the Clock will not operate. Only the blue LED indicator inside the Clock will be blinking.

Note. If an option of the software upgrade function is not supported you cannot select it. For example, if value “2” is not supported you will see “0”.

Set All values to DEFAULT

When this function is set to 01, the next push on the “Menu” push button, will reset all custom settings to their DEFAULT values.

LCD - Liquid crystal display

Some models may have an LCD graphic display. It is intended to help the user set up the clock, and duplicates the settings menu items in this description.

The display turns on automatically when you press the encoder button when the clock is in basic or advanced settings mode. When you turn on the display, you can see the Millclock logo, after which the display turns off, and turns on when you call the settings menu.



*The team is responsible for the
quality of the products.*

CEO:

A white handwritten signature on a dark background, appearing to be "Chris".

Head engineer:

A white handwritten signature on a dark background, appearing to be "Miron".

Product assembler:

A white handwritten signature on a dark background, appearing to be "Allen".



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