

ASTRONOMICAL ONE-CHANNEL TIME PROGRAMMER ZCM-31, ZCM-31P/U

INSTRUCTION MANUAL



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DESCRIPTION

Digital steering clocks ZCM-31 are intended for realization of time functions in the systems of automatics and steering. Switching on/off the appliance is connected with sunrise and sunset (dawn and dusk). The information about geographic coordinates, the place of the clock's installation, current date and a shift in relation to the universal time - all these factors are used in order to calculate the time of sunrise and sunset. The system calculates the end of civil dusk, that is the phase, during which the centre of the Sun's face is located on the 6 degrees angular below the horizon - the Sun's face is not noticeable but sky is lit with dispersed sunlight. The system additionally has a function of a programmed night break and an ability of shifting the calculated time of sunrise and sunset within a range of +/- 120 min. The construction of a casing makes it possible to install the system on a rail TH 35 and possible sealing the appliance with lead. **The construction of the system guarantees supporting of all the settings with battery energy when the electric power supply is off.**

In order to protect the battery during storage, the ZCM series programmers have a default setting, the so-called storage mode in which the battery power consumption is limited to a minimum.

FEATURES

- Steering dependant on a current hour in an astronomical cycle,
- two-module casing with a protective flap valve,
- steering input IN,
- lighting the LCD display.

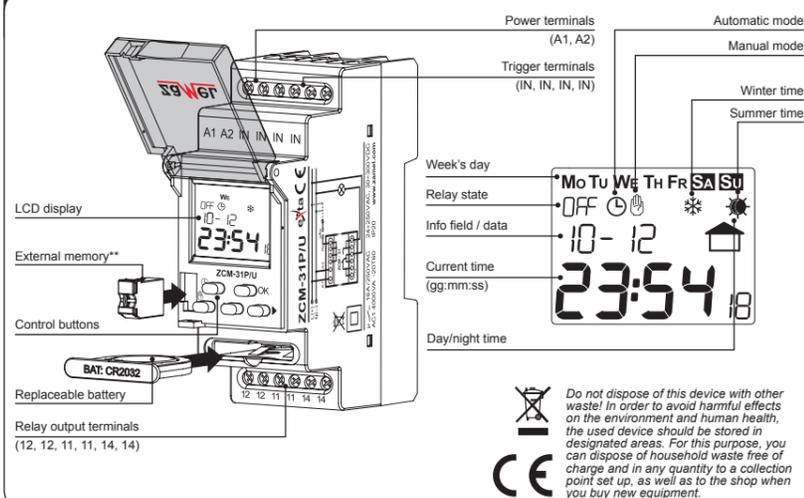


The device should be connected to a singlephase system according to current standards. The device connections will be described in this manual. Only qualified electricians are allowed to mount, connect and adjust the device. It is necessary to read this manual and know the unit functions before the device mounting. Do not disassemble the device casing or you will lose any warranty rights and expose yourself to the electric shock hazard. Before mounting operation make sure of disconnecting the connection wires from the electric network. Use a cross-head screwdriver of 3.5 mm diameter to mount the device. The relay should be carried, stored and used in an appropriate way. Do not mount the device in case of any device parts lack, damage or deformation. In case of malfunction please notify the manufacturer.

TECHNICAL DATA

| ZCM-31 | |
|---|--|
| Power supply clamps: | A1, A2 |
| Rated voltage: | ZCM-31: 230 V AC (-15 + +10 %) ZCM-31P/U: 24 + 250 VAC, 30 + 300 V DC |
| Rated frequency: | 50 / 60 Hz |
| Rated power consumption: | 2 W / 14 VA |
| Number of channels: | 1 |
| Programme: | astronomical |
| Mode of work: | manual, automatic |
| Change of season summer/ winter: | automatic, manual |
| Colour of LCD panel lighting: | amber |
| Input: | yes |
| Accuracy of time measurement: | max. ±1 s / 24 h at temp. 25 °C |
| Time of clock maintenance: | 3 years |
| Time of programme maintenance: | 5 years |
| Clamps of release system: | IN, IN, IN, IN |
| Clamps of receiver power supply: | 11, 12, 14 |
| Parameters of transmitter contacts: | 1NO/NC-16 A/250 V AC1 4000 VA |
| Number of terminating clamps: | 12 |
| Intersection of terminating conductors: | 0,2 + 2,50 mm ² |
| Temperature of work: | -20 + +60 °C |
| Position of work: | any |
| Fixing of casing: | TH 35 rail (PN-EN 60715) |
| Level of protection of casing: | IP20 (PN-EN 60529) |
| Protectivity class: | II |
| Overvoltage category: | II |
| Level of pollution: | 2 |
| Measurements: | two-module (35 mm) 90x35x66 mm |
| Weight: | 0,17 kg |
| Compatibility with norms: | PN-EN 60730-1; PN-EN 60730-2-7 PN-EN 61000-4-2,3,4,5,6,11 |

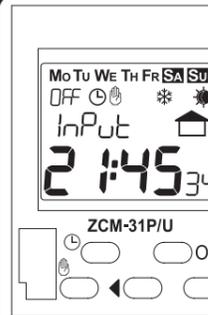
APPEARANCE**



Do not dispose of this device with other waste! In order to avoid harmful effects on the environment and human health, the used device should be stored in designated areas. For this purpose, you can dispose of household waste free of charge and in any quantity to a collection point set up, as well as to the shop when you buy new equipment.

* does not apply to the product ZCM-31
** apply to the product ZCM-31P/U

DESCRIPTION



Description of elements and messages displayed

Mo Tu We Th Fr SA SU - days of week

On OFF - relay status

☉ - automatic mode

☾ - manual mode

* / * - winter time / summer time

▶ - external input

☀ / ☀ - day / night

dAY - day

YEAR - year

PAUSE - night break setting

dELAY - time correction setting

t_m E - current time setting and summer/winter time shift

dAtE - current date setting

Coor-d - geographical position setting

InPUt - external input setting

PEn - external memory operation**

SrVE - external memory record**

rERd - external memory reading**

bUSy - external memory busy**

Err - reading / record error**

Sr ISE / S SEt - sunrise time / sunset time

Lat It / LonG - latitude/ longitude

Auto - automatic, USEr - user's

On OFF - switched on / switched off

Buttons descriptions

- ☉ • In the main window - entry to automatic mode or change of the transmitter status, if the clock is already in the automatic mode;
- ☾ • In other windows - one level up exit without saving the introduced data;

- ☀ • In the main window - entry to manual mode or change of transmitter status if the clock is already in the manual mode;
- ☀ • In other windows - one level up exit without saving the introduced data;

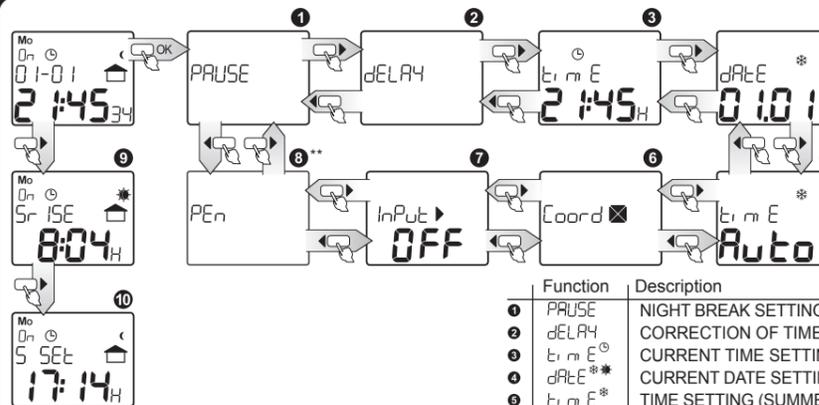
- OK • In the main window - entry to main menu;
- In other windows - entry to sub-menu or confirmation of the parameter being set;

- ◀ ▶ • Shifting windows /menu options or increasing/ decreasing of the parameter being set;
- ▶ (right cursor) in the main window - displaying a time of sunrise and sunset.

STORAGE MODE / BATTERY REPLACEMENT

- ZCM series programmers have a default setting, the so called storage mode in order to protect the battery during storage.
- In case of battery backup operation the storage mode is switched off during the first use of the programmer. It is done by means of a short pressing of the ☉ push-button and subsequent date and time adjustment.
- In case of a nominal power supply the storage mode is switched off during the first use of the programmer by means of date and time adjustment.
- Adjusting the programmer into the storage mode is realised by means of a reset - in order to carry it out press at the same time the ☉ and ☾ push-buttons in the main window.
- ZCM series programmers have the option to replace the clock maintenance battery. Before replacing the battery, disconnect the programmer from the external power supply. Please pay the attention to correct battery polarity when replacing.

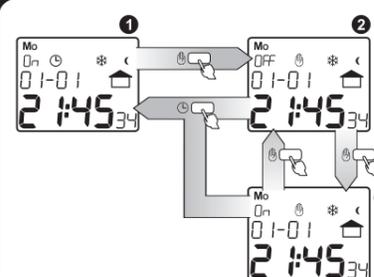
MAIN MENU



We enter menu from the main window by choosing OK; we move inside menu using cursors ◀ ▶. Return to the main window is possible after pressing button ☉ or ☾. You can enter the windows of displaying calculated sunrise/sunset time from the main window by using cursor ▶. Return is automatic after 10 s.

| Function | Description |
|----------------------|---|
| 1 PAUSE | NIGHT BREAK SETTING |
| 2 dELAY | CORRECTION OF TIME SETTING (SUNRISE/ SUNSET TIME) |
| 3 t _m E ☉ | CURRENT TIME SETTING |
| 4 dAtE ** | CURRENT DATE SETTING |
| 5 t _m E * | TIME SETTING (SUMMER/WINTER SEASON) |
| 6 Coor-d | GEOGRAPHICAL POSITION AND TIME ZONE SETTING |
| 7 InPUt ▶ | EXTERNAL INPUT SETTING |
| 8 PEn | EXTERNAL MEMORY ADJUSTMENT** |
| 9 Sr ISE | CALCULATED SUNRISE TIME |
| 10 S SEt | CALCULATED SUNSET TIME |

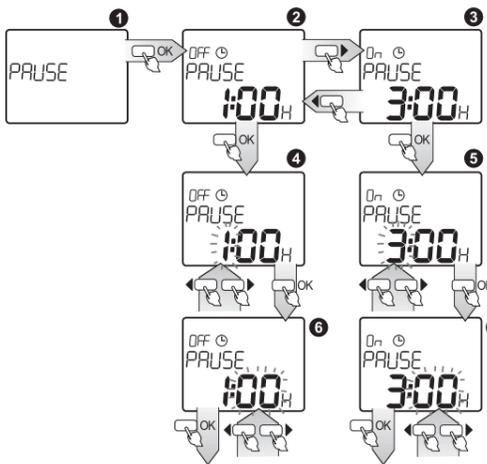
CHANGE OF MODE OF WORK (AUTOMATIC, MANUAL)



- CHANGE OF MODE INTO MANUAL - if the system is situated in the main window and it is in the automatic mode, pressing the button ☉ will cause a shift of the system from the manual mode with simultaneous change of transmitter status;
- Subsequent pressing of button ☀ will cause switching transmitter to the opposite status without change of work mode;
- CHANGE OF MODE INTO AUTOMATIC - if the system is placed in the main menu and it is in the manual mode, pressing button ☉ will cause automatic shift to the automatic mode, with simultaneous updating transmitter status.

* does not apply to the product ZCM-31
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NIGHT BREAK SETTING

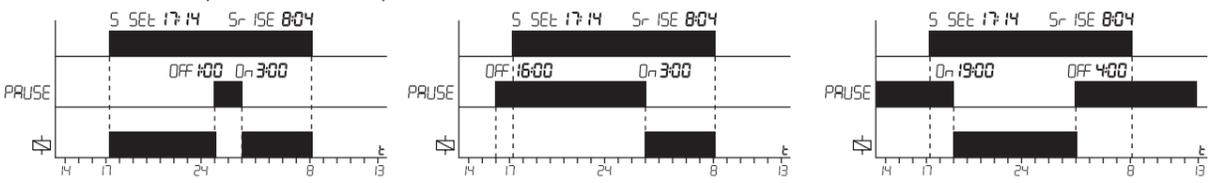


- 1 PAUSE - setting the duration time of a night break; entry to reviewing the settings after pressing OK; Choose time which you should change with cursors $\leftarrow \rightarrow$, remember at the same time that:
 - 2 Time of commencement of a night break; press OK in order to move to edition;
 - 3 Time of ending of a night break; press OK in order to move to edition;
 - 4 Choose adequate hour with cursors $\leftarrow \rightarrow$, confirm the choice with OK;
 - 5 Choose adequate minute with cursors $\leftarrow \rightarrow$, confirm the choice with OK;

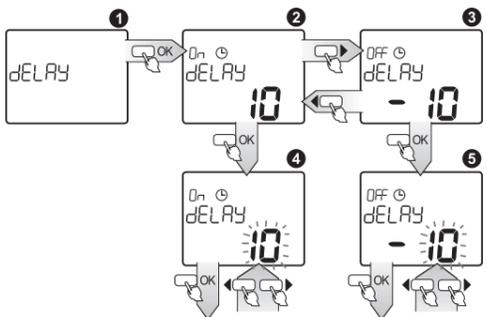
ATTENTION!!!

The clock will work without a night break, if the times of night break beginning and ending are the same.

It is possible to exit every sub-menu window in any moment without saving settings by pressing the button \odot or \ominus .



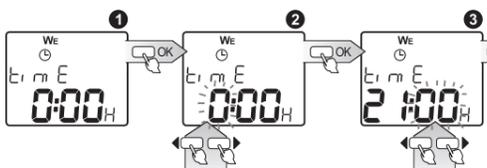
TIME CORRECTION SETTING



- 1 dELAY - setting the time correction; entry to review of settings after pressing OK; Choose time which you should change with cursors $\leftarrow \rightarrow$, remember at the same time that:
 - 2 Correction of dusk time; press OK, in order to move to edition;
 - 3 Correction of dawn time; press OK, in order to move to edition;
 - 4 Correct the time within a range of -120 + 120 min., choose an adequate parameter with cursors $\leftarrow \rightarrow$, confirm the choice with OK.

It is possible to exit every sub-menu window in any moment without saving settings by pressing the button \odot or \ominus .

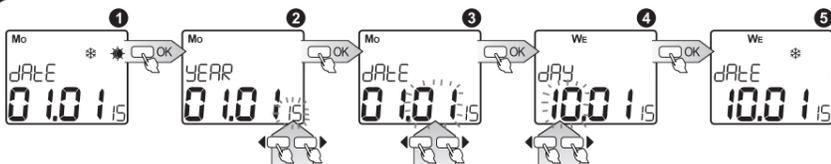
TIME SETTING



- 1 TIME - setting the current clock time; entry after pressing OK;
- 2 HOUR - choose adequate hour with cursor $\leftarrow \rightarrow$ which you can set in 1-24 H or 1-12 P (AM) and 1-12 P (PM) format; confirm with OK;
- 3 MINUTES - choose adequate parameter of minutes with cursors $\leftarrow \rightarrow$ confirm with OK;
- 4 Confirmation of the parameter of minutes causes simultaneous nullification of the parameter of seconds and movement to the window of time setting.

It is possible to exit every sub-menu window in any moment without saving settings by pressing the button \odot or \ominus .

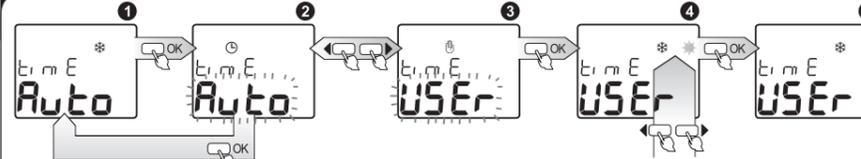
DATE SETTING



- 1 dATE - Current date setting; entry after pressing OK;
- 2 YEAR - choose adequate year with cursors $\leftarrow \rightarrow$ confirm with OK, range of years: 2000+2099;
- 3 MONTH - choose month with cursors $\leftarrow \rightarrow$ confirm with OK;
- 4 DAY - choose day with cursors $\leftarrow \rightarrow$ confirm with OK; the system has a protection against introducing incorrect parameter of a day for a given month (it takes into account leap years and it automatically calculates the day of the week on the basis of an arranged date);
- 5 Confirmation causes movement to a date setting window and set-up of current summer/ winter time - if the option Auto is arranged.

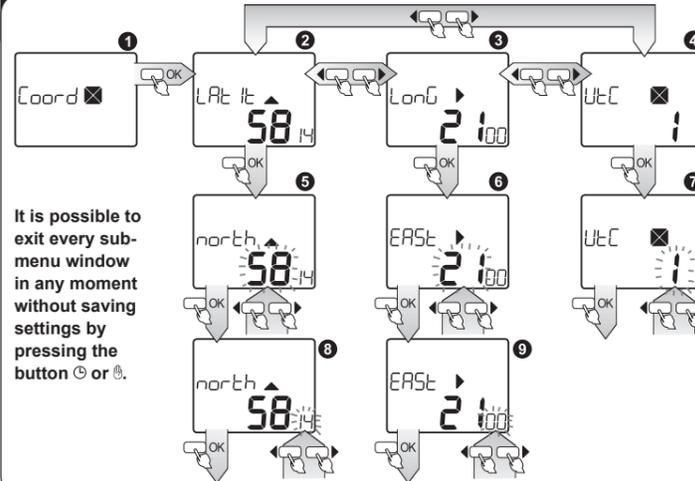
It is possible to exit every sub-menu window in any moment without saving settings by pressing the button \odot or \ominus .

WINTER / SUMMER TIME SETTING



- 1 TIME* - choice of one of the two modes in which switching between winter and summer season time will occur. Auto - switching will take place in an automatic way, on the last Sunday of March, at 2.00 (for summer time) and on the last Sunday of October, at 3.00 (for winter time), USER - a user chooses between winter/ summer time, entry after pressing OK;
- 2 setting the mode - choose mode Auto or USER with cursors $\leftarrow \rightarrow$, confirm with OK; after choosing the mode Auto, the clock automatically sets the time as winter or summer one, depending on the arranged date; after choosing the mode USER you go to another window;
- 3 Choose time for winter/ summer one with cursors $\leftarrow \rightarrow$ where * is winter time and * is summer time, if change of marker has happened the system will change the current time by adding or subtracting 1 hour, confirm the operation with OK;
- 4 After choosing the system moves to winter/ summer time shift window.

GEOGRAPHICAL POSITION SETTING



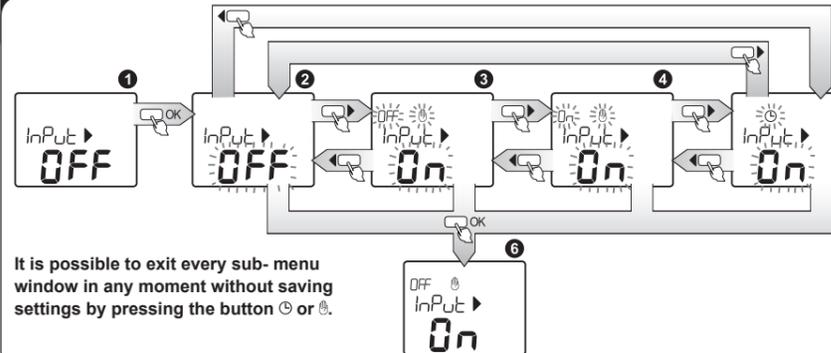
- 1 Coord - setting longitude, latitude and a time zone; entry to reviewing and edition of settings after pressing OK, choose parameters which should be changed with cursors $\leftarrow \rightarrow$ remember at the same time that:
 - 2 LAT - latitude;
 - 3 LONG - longitude;
 - 4 UTC - time zone in relation to UTC time;

For window 2 (latitude); press OK, so as to move to edition:
5 Choose latitude parameters (degrees) with cursors $\leftarrow \rightarrow$ (within range 90 South + 90 North); confirm with OK;
6 Choose latitude minutes with cursors $\leftarrow \rightarrow$ (if in the step 5 90 latitude was chosen, this step is omitted).

For window 3 (longitude); press OK, in order to move to edition:
7 Choose longitude degrees with cursors $\leftarrow \rightarrow$ (within range 180 West + 180 East); confirm the choice with OK.
8 Choose longitude minutes with cursors $\leftarrow \rightarrow$ (if in the step 7 longitude was chosen, this step is omitted).

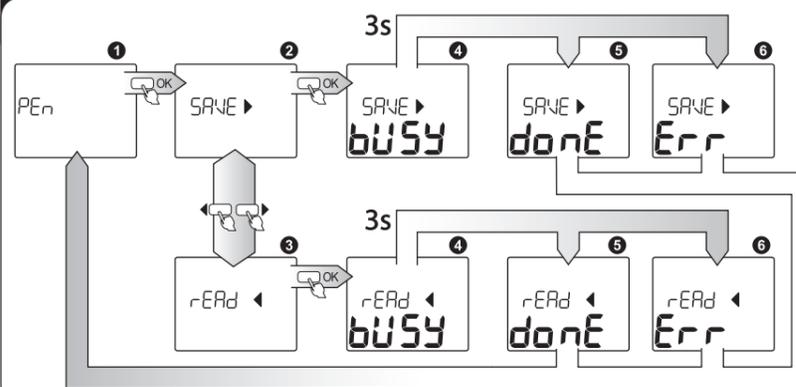
For window 4 (time zone); press OK, so as to move to edition:
9 Choose hour shift of time zone with cursors $\leftarrow \rightarrow$ (within a range -12 + 12); confirm your choice with OK.

EXTERNAL INPUT SETTING



- 1 InPut - setting the mode in which the system should operate after releasing the external input IN; entry to edition after pressing OK, choose adequate mode for external input with cursors $\leftarrow \rightarrow$, remember at the same time that:
 - 2 OFF - the function of external input is switched off;
 - 3 On - manual mode with permanent switching the transmitter off;
 - 4 On - manual mode with permanent switching the transmitter on;
 - 5 - automatic mode, the system switches the transmitter on/ off according to the arranged programmes;
 - 6 Confirm with OK the choice of a given mode; confirmation will cause a movement to the settings window of the external input.

EXTERNAL MEMORY OPERATION**



External memory allows for an easy record / reading of the adjusted programs into the external memory, so they can be easily copied to other programmers. It is very convenient in case if we want to program more ZCM programmers or archive the adjusted programs.

- 1 PE - sub menu to the external memory operation
- 2 SAVE - programs recording
- 3 r-ERd - programs reading from the external memory and storage in the programmer's memory
- 4 BUSY - the state of memory, "busy" during a record / reading
- 5 done - correct record / reading
- 6 Err - record / reading error

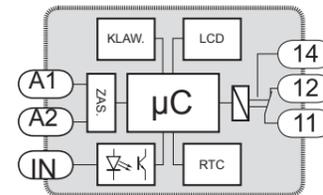
GEOGRAPHICAL POSITION OF GREATER TOWNS AND CITIES IN EUROPE

| | | |
|------------|-----------|-----------|
| Amsterdam | 52° 21' N | 4° 52' E |
| Andorra | 42° 03' N | 1° 31' E |
| Athens | 38° 02' N | 23° 44' E |
| Belgrade | 44° 49' N | 20° 28' E |
| Berlin | 52° 31' N | 13° 02' E |
| Bern | 46° 57' N | 7° 26' E |
| Bratislava | 48° 09' N | 17° 07' E |
| Brussels | 50° 51' N | 4° 21' E |
| Budapest | 47° 26' N | 19° 15' E |
| Bucharest | 44° 23' N | 26° 01' E |
| Dublin | 53° 26' N | 6° 15' E |
| Helsinki | 60° 01' N | 24° 53' E |
| Kiev | 50° 28' N | 30° 29' E |
| Chisinau | 47° 00' N | 28° 05' E |
| Copenhagen | 55° 43' N | 12° 34' E |
| Lisbon | 38° 42' N | 9° 05' E |
| London | 51° 03' N | 0° 01' E |
| Ljubljana | 46° 03' N | 14° 31' E |
| Luxembourg | 49° 37' N | 6° 08' E |
| Madrid | 40° 26' N | 3° 42' E |
| Minsk | 53° 51' N | 27° 03' E |
| Monaco | 43° 04' N | 7° 25' E |
| Moscow | 55° 45' N | 37° 37' E |
| Oslo | 59° 56' N | 10° 41' E |
| Paris | 48° 51' N | 2° 02' E |
| Podgorica | 42° 25' N | 19° 02' E |
| Prague | 50° 05' N | 14° 25' E |
| Pristina | 42° 39' N | 21° 01' E |
| Reykjavik | 64° 09' N | 21° 58' E |
| Riga | 56° 53' N | 24° 05' E |
| Rome | 41° 52' N | 12° 37' E |
| San Marino | 43° 55' N | 12° 28' E |
| Sarajevo | 43° 52' N | 18° 26' E |
| Skopje | 41° 35' N | 21° 03' E |
| Sofia | 42° 43' N | 23° 02' E |
| Stockholm | 59° 23' N | 18° 00' E |
| Tallinn | 59° 22' N | 24° 48' E |
| Tirana | 41° 02' N | 19° 48' E |
| Vaduz | 47° 09' N | 9° 31' E |
| Valletta | 35° 53' N | 14° 31' E |
| Warsaw | 52° 35' N | 21° 05' E |
| Vatican | 41° 54' N | 12° 27' E |
| Vienna | 48° 13' N | 16° 22' E |
| Vilnius | 54° 04' N | 25° 19' E |
| Zagreb | 45° 49' N | 15° 58' E |

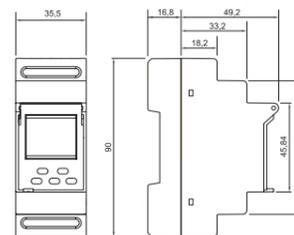
MOUNTING

1. Disconnect power supply circuit with a fuse, electrical energy redundant switch or insulation switch (all of them connected to adequate circuit)
2. **Check non- voltage status on power supply conductors, with an appropriate tool**
3. Assemble the appliance ZCM in the switching station on the TH 35 rail.
4. Connect conductors under clamps according to the connection scheme

INNER DIAGRAM



DIMENSIONS



PRODUCT FAMILY

ZCM-31 Programmer belongs to ZCM family of products.

ZCM-xx/U

Power supply:
ZCM-xx - 230 V AC
ZCM-xx/U - 24 ÷ 250 V AC
30 ÷ 300 V DC

Programmer type:
11 - week (1 channel)
12 - week (2 channel)
22 - weekly - year
31 - astronomical

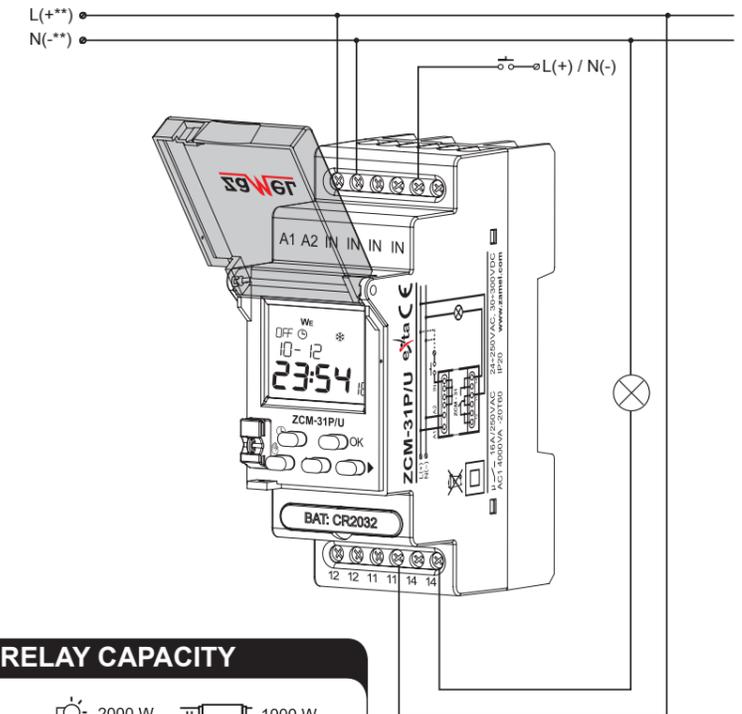
Device type

WARRANTY CARD

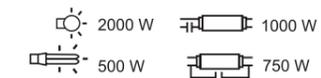
There is 24 months guarantee on the product

Salesman stamp and signature, date of sale

CONNECTION



RELAY CAPACITY



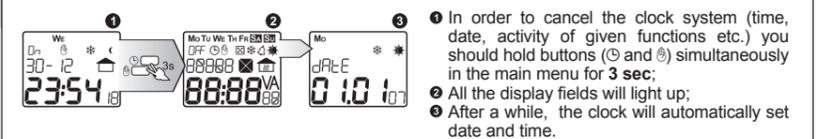
ADVANTAGES

Intelligent calendar - the system has an in-built calendar, which automatically takes into account leap years, it makes introducing non-existent date impossible, and also calculates a day of a week on the grounds of a date and it takes into account the change of time into winter/ summer one.

Universal external input - the system has an external input, with the help of which a user can enforce change of clock work mode without the necessity of interfering in a switchboard but using e. g. remote controller button.

Cooperation with the external memory** - the user has a possibility of a quick record / reading of the adjusted programs into the external memory in order to copy them in other programmers quickly.

MAIN RESET



Attention: In order to restore factory settings, you should additionally hold button OK

1. ZAMEL provides a two-year warranty for its products.
2. The ZAMEL warranty does not cover:
 - a) mechanical defects resulting from transport, loading / unloading or other circumstances
 - b) defects resulting from incorrect installation or operation of ZAMEL products;
 - c) defects resulting from any changes made by CUSTOMERS or third parties, to products sold or equipment necessary for the correct operation of products sold;
 - d) defects resulting from force majeure or other aleatory events for which ZAMEL is not liable;
 - e) power supply (batteries) to be equipped with a device in the moment of sale (if they appear);
3. All complaints in relation to the warranty must be provided by the CUSTOMER in writing to the retailer after discovering a defect.;
4. ZAMEL will review complaints in accordance with existing regulations.;
5. The way a complaint is settled, e.g. replacement of the product, repair or refund, is left to the discretion of ZAMEL.
6. Guarantee does not exclude, does not limit, nor does it suspend the rights of the PURCHASER resulting from the discrepancy between the goods and the contract.

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