User manual
Universal timer control

CRONOS

Dear Customer!

Thank you very much for choosing our product. Before its use, please read these instructions carefully. There are given here the most appropriate ways of dealing with this device, the basic principles of safety and maintenance. Please also keep the user manual so that you can read it during later use.

Remember!

The manufacturer is not liable for any damage caused by improper use of the device for its intended purpose or improper handling, as well as fault driver resulting from improper use.

Table of contents:

1   Preliminary informations

Before starting work with the controller, read The User manual and follow the instructions contained therein!

Describtion of visual symboles used in this user manual:

This symbol is responsible for reviewing the appropriate place in the user instructions, warnings and important information. Failure to follow warnings could cause injury or damage to the module.

Important informations and guidelines

Following this guidelines makes the use of the module easier

Attention: The appearance of the screen shots shown in this manual may differ slightly from the actual work with the module. The differences may relate to the size and font type and size of symbols. There are no differences in the content of the information.

2   Purpose of the device

Digital timer control is used to support control systems time functions. Cronos specifically can be used to time control electric circuits in programmed by user way.

3 Warranty and liability of the manufacturer

The manufacturer provides a 2-year warranty on the module. The manufacturer also provides post-warranty service for 10 years from the date of the introducing the module on the market. The warranty covers all defects in material and workmanship

The manufacturer undertakes to comply with the contract of guarantee, if the following conditions are met::
- all repairs, alterations, extensions and device calibrations are performed by the manufacturer or authorized service,
- supply network installation meets applicable standards in this regard,
- the device is operated in accordance with the recommendations outlined in this manual
- the device is used as intended.

The manufacturer assumes no responsibility for consequences resulting from improper installation, improper use of the module, not following this manual and the repairs of the module by individuals without permission.

This device doesn't contain serviceable parts. The repairs can be done only by manufacturers approved repair service.

4 Safety guidelines

The module has been constructed using modern electronic components, according to the latest trends in the global electronics. In particular, much emphasis was placed on ensuring optimum safety and reliability of control. The device has a housing with high quality plastic.

4.1   Power supply
The module power supply must be in range of 12-24VDC or 230VAC 50kHz.

4.2   Storage, working environment and transportation
The module has to be used in closed environments free from fumes and corrosive atmosphere. Environmental conditions for storage:

- Temperature: -40°C – +85°C,
- Relative humidity: 5 – 95%,
- Atmospheric pressure: 700 – 1060hPa

Environmental conditions for use:
- Temperature: -10°C – +60°C,
- Relative humidity: 5% – 95%,
- Atmospheric pressure: 700 – 1060hPa.

Recommended conditions for transportation:
- Temperature: -40°C – +85°C,
- Relative humidity: 5 – 95%,
- Atmospheric pressure: 700 – 1060hPa.

4.3 Installation and use of the module

The module should be used following the guidelines shown in next part of the user manual.

4.4 Utilisation of the module

When it becomes necessary to liquidate the device (e.g., after the time of use), please contact the manufacturer or its representative, who are obliged to respond appropriately, i.e., collecting the module from the user. You can also ask the companies involved in utilization and / or liquidation of electrical or computer equipment. Under no circumstances should you place the device along with other garbage

5 Device description

5.1   Construction

Overall view of the module is shown on the picture below.

General features:
- 8 relay outputs 250VAC 8A
- RJ-45 Ethernet socket
- LCD display
- **astronomical timer**
- make settings by WEB interface or integrated display with keypad
- the ability to control the outputs via LAN
- Pprecision clock RTC with battery backup and synchronization NTP
- housing for DIN rail

The device supports the following network protocols:
- SNMP protocol
- MODBUS TCP protocol
- HTTP/HTTPS protocol
- KNX IP in routing mode

5.2   Specifications

Supply voltage: 230 VAC or 12-24VDC (depending on the version)
Power consumption: 5W max (it depends on the amount activated outputs)

Outputs:

Output Type: Relay
Maximum working voltage: 250VAC,
The maximum load current relay 8A
Output NO (normally open)
ON time: 1ms.
Off Time: 5ms,
Mode of operation: bistable, astable, monostable

LAN:

1x Ethernet 100 Mbps, RJ45

6   Device Configuration

When you first start, you need to configure the device.

6.1   Changing the computer's subnet

After connecting to the network, you must change your computer subnet
To do this, go to the Network Configuration: Start->Settings->Control Panel ->Network connections.
Then select the Network connection with right-click and clik „Properties". After selecting shows the configuration screen (see figure at left).
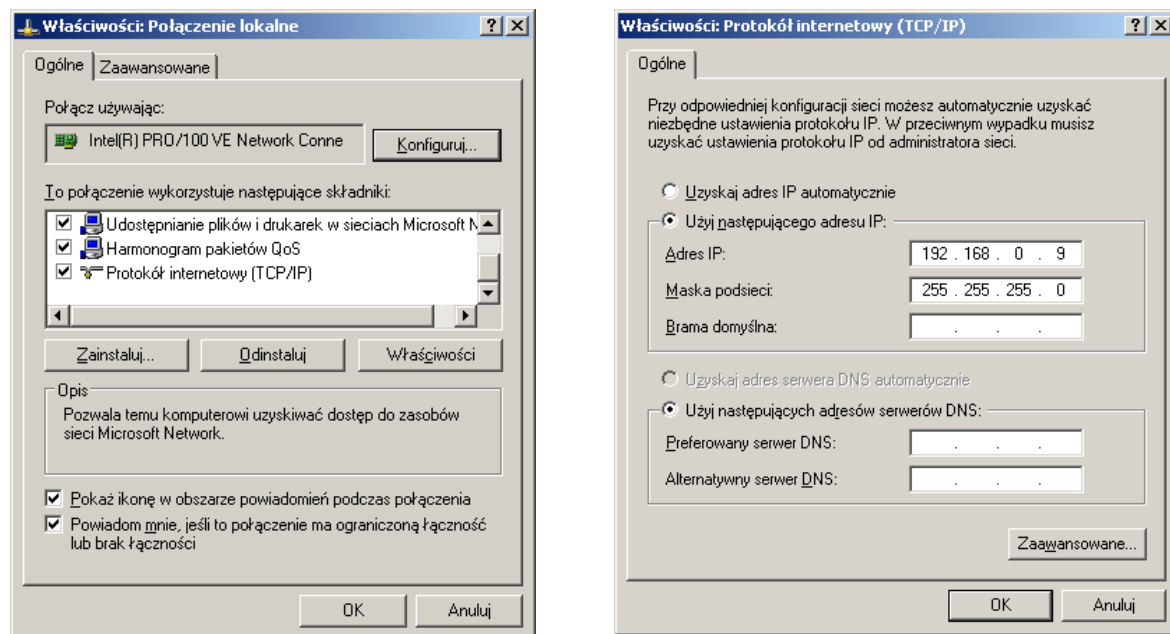
Then select "Internet Protocol (TCP / IP)" and enter the following settings:
– IP address: 192.168.0.9

> – Subnet mask: 255.255.255.0

The other fields are unimportant.

After accepting the settings, click OK, open a Web browser and enter the address: **192.168.0.10** .

6.2   Configuring the network through a web browser

Network configuration is performed on the page Administration →   *Network*.

The default username and password are:admin/admin

Fields to configure the network interface module:
- *MAC Address –*
- *Host Name –* NETBIOS name,
- *Enable DHCP –* checking this box forces use the address assigned by the DHCP server,
- *IP Address –* the module IP address
- *Gateway*
- *Subnet Mask*
- *Primary DNS, Secondary DNS*

- Destination IP, Destination Port – with software version <1.0 – not supported

After making changes, click **Save Config**.

7   Home tab

After logging into the device, user can check the current status of the outputs and the status of the device.

The table **OUTPUTS** column **OUT** contains the names of output channels that user can change in the tab **Out config**.
Column **On / Off** shows the current state of the output (on / off).
- output active green

- output inactive red.

Curent time – the current date and time set in the controller
Sunrise – calculated time of sunrise for a fixed geographical position
Sunset – calculated time of sunset for a fixed geographical position
Uptime – the time elapsed since the start of the controller

8   The output channels configuration

After selecting the menu **Out config** screen is displayed output configuration site.
Each output can operate in different modes:
 • Disable
 • Bistabile
 • Astabile - time of switching on and off is determined by parameters **Time On** and **Time Off**

- Monostabile – monostable mode (activation time is determined by parameter of **On Time**

Selecting **On** in the tab *Power On State* forces the switching on of the output after running the driver.

In the tab **Power-on out control**, user can define how he wants to set the output after power outages and restoration.

      Off – after power restoration all outputs are disabled

      Last state -after power restoration outputs are set to the states that were before the power outages.

      User defined – the output is dependent on the settings in the dialog **Power On State**

      Cron simulate – after power restoration outputs are set to a state which they might-have-been if controller would worked without break.

9 Menu Administration

After selecting the **Administration** menu, you can modify the following settings:
Admin – user and administrator passwords settings
Network
SNMP
Time – real-time clock and time zone settings
Clock – geographic coordinates and the operation of the astronomical clock settings
Manage – software update and device reset

9.1   Admin

User Password – user password with limited rights to change settings
Admin Password -password of the user with administrator rights
Session Timeout (1-30min) – automatic logout if it has no activity.

When the option **USB keylock** is set and **USB keycode** is typed controller has keyboard locked (no ability to make changes by unauthorized persons) The display will be displayed **LCK**. To unlock the keybord user need to create file on pendrive, named **cronos.key** with identical content as in **USB keycode** field and put it into the USB input.

9.2 Network

To configurate module nettwork interface are fields:
- *MAC Address*
- *Host Name*
- *Enable DHCP* – Checking this box forces use the address assigned by the DHCP server
- *IP Address*
- *Gateway*
- *Subnet Mask*
- *Primary DNS, Secondary DNS*

*After making changes, click **Save Config**.*

9.3 SNMP

The module is equipped with SNMP v2c agent.
After typing configuration data save the settings pressing **Save Config**
SNMP allows to retrieve and set the outputs status
MIB file describing the structure is available for download in the tab **Administration SNMP.**
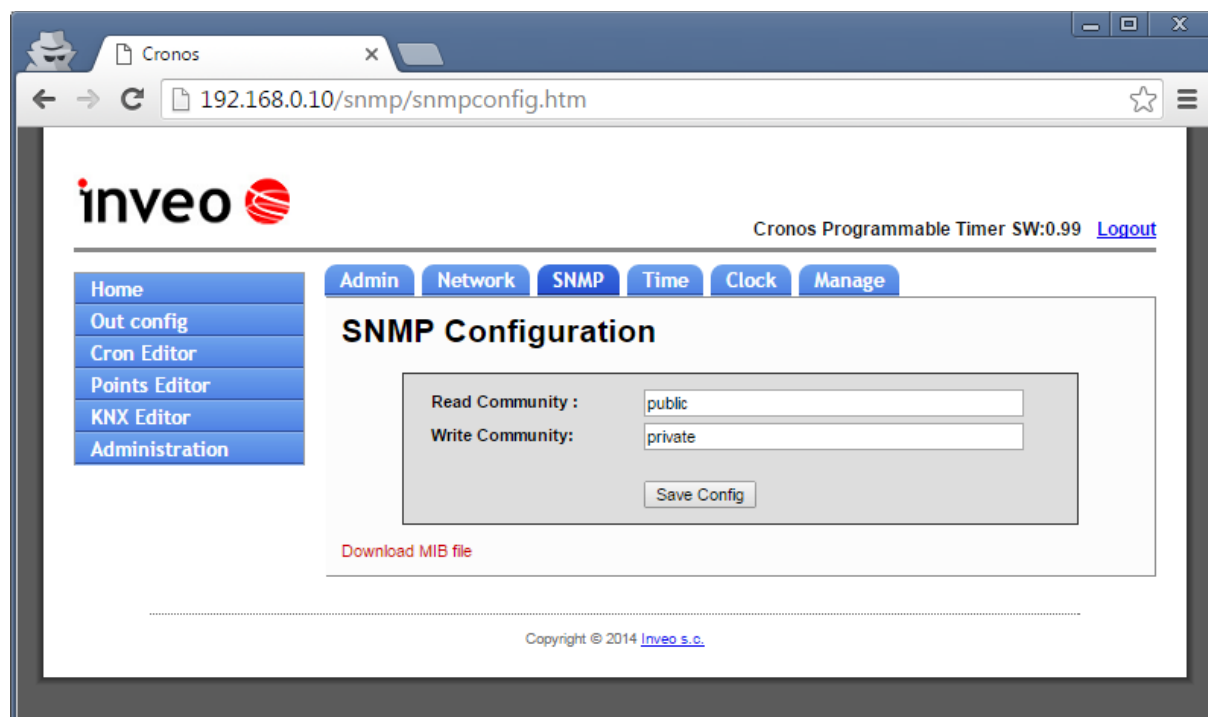
9.4　Time

CRONOS module is equipped with an internal real time clock (RTC).
The module has also the ability to synchronize the internal clock with the SNTP time server
The settings configuration can be made in the tab **Administration Time** .

Auto update (SNTP) – enable time synchronization with the time server via SNTP.
Daylight Savings – enable correction time Winter / Summer
Time Zone – select the time zone
Hours, Minutes, Seconds, Day, Month, Year - fields to set the date and time
Serwer IP – IP address of the time server from which the device is to synchronize.
Pooling Interval (16-65000 sec) – synchronization time interval

If the time server is not used, user can manually enter clock settings by typing in the appropriate fields time and date.
All settings will be saved by pressing the **Save Config.**
The **PC Time Synchro** tab programs the controller RTC with date and time from your computer.

9.5   Clock

A bite of theory

Civil twilight – the faze of sunset when the geometric center of the sun is 6° below the horizon. At this time brightest planets and stars appear in the sky (with good transparency in the air) Due to the scattering of light in the atmosphere there is still a lot of sunlight that is enough to normal activities in open space without artificial light sources.

Nautical twilight - (also called dark) – the faze after the sunset, when geometric center of the sun is between 6-12° below the horizon. At this time is possible to observe horizon line. During nautical twilight, sailors can take reliable star sightings of well-known stars, using a visible horizon for reference. Before nautical twilight there is a civil twilight and after it – astronomical twilight

Astronomical twilight – the period of sunset when geometric center of the sun is between 12-18° below the horizon. The end of astronomical twilight is the begening of astronomical night.

Astronomical dawn – the period before sunrise, when rays of sun (down) light up the sky so the dimmest stars are no longer visible. Sky is no longer black. Astronomical dawn takes place when geometric center of the sun is between 18-12° below the horizon. Astronomical dawn ends time of astronomical night, after it begens nautical dawn.

Nautical dawn – the time before sunrise when the horizon is visible and it is possible to navigate on the basis of dawn lit objects on land or sea, the brightest stars in the sky are still visible. The geometric center of the sun is between 12-6° below the horizon

Civil dawn – the faze berofe sunrise when the center of the sun is 6° below the horizon
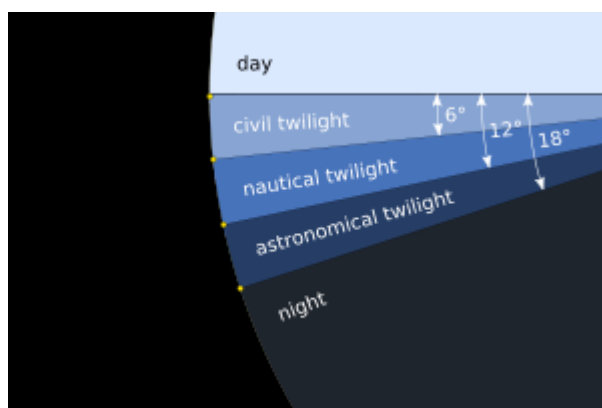
The controller calculates the times of sunrise and sunset. For this purpose it is necessary to fill in geographical coordinates (longitude and latitude in degree-minute format) and time offset.

Twilight – selection of astronomical clock work mode
- **Sunrise/set (-0,58°)**
- **Civil (-6°)** -
- **Nautical (-12°)**
- **Astronomical (-18°)**

Longitude

Latitude

Example settings for civil twilight (-6 °) for the village: Bielsko-Biała, Poland

Longitude 19°04'E

Latitude 49°50'N

After entering the longitude and latitude and approval settings by pressing the **Save Config** on the display will be shown the hour of sunrise and sunset

In this case, the sunrise at 6:01 and the sunset of 18:06

9.6   Manage
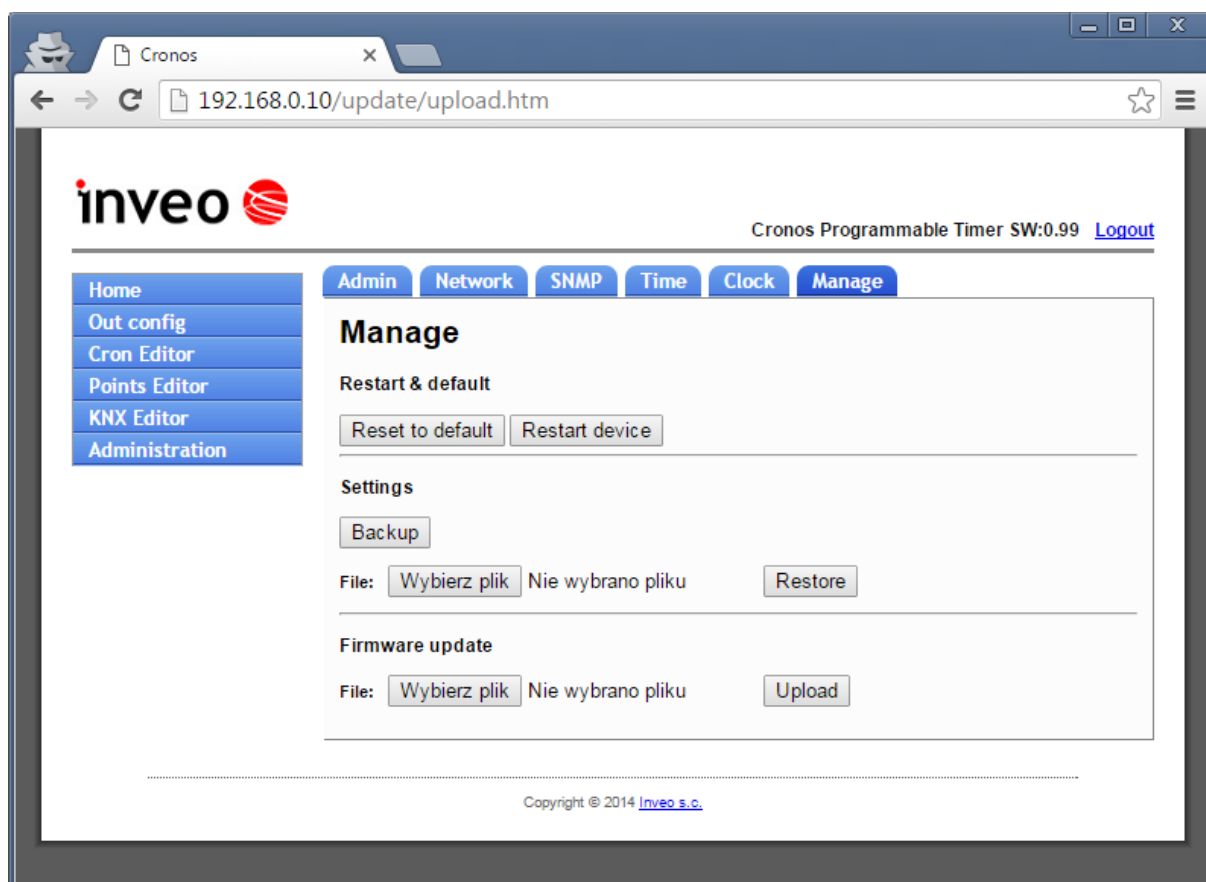
Reset to default

Restart device

Backup – save all the settings on computer

Restore – reset from the computer to the controller

Upload – upload new software version control

The program must be loaded in a tab **AdministrationManageFirmware**

After loading the program, the page displayed MD5 checksum and the length of the loaded file.

The sum must be the same as the total given in the file sum.md5 supplied with the program file.

If the sum is correct, click **Burn**.

10 Crontab Editor

Selecting **Cron Editor** from the menu dislays editor crontab entries.

After typing in the edit field the relevant data it must be saved to memory by clicking the floppy disk.

These 6 columns have to be apropriet filled

The following figure shows the importance of further columns.
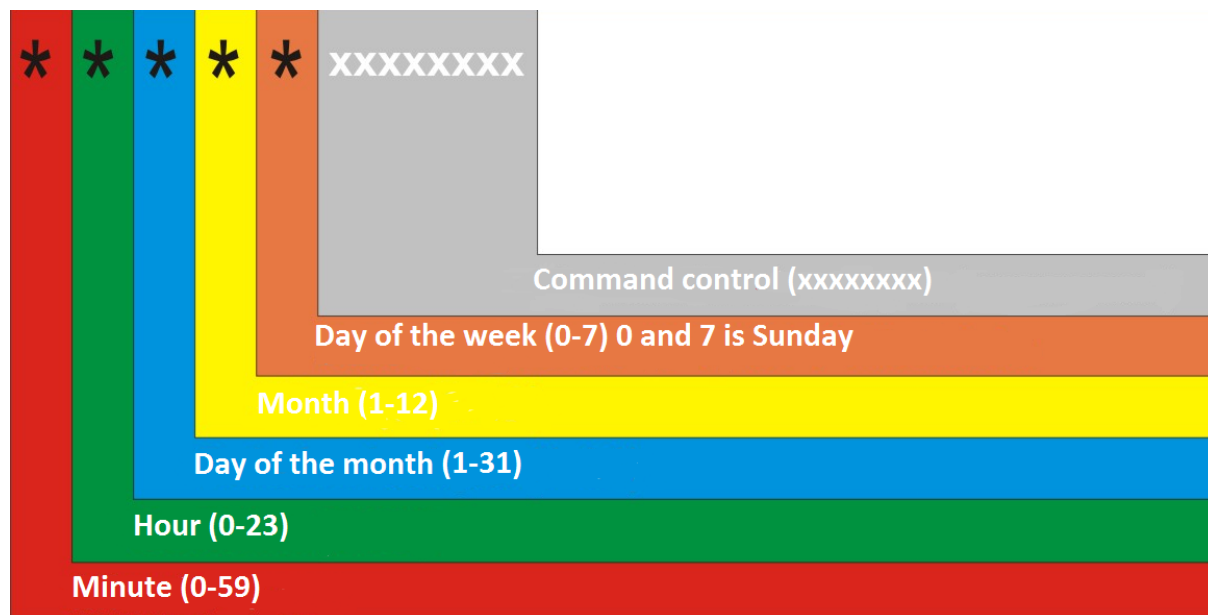
Control command consists of 8 fields showing the status of the relevant outputs.

Every field can have a value:

1 – output switching on
0 – output switching off
n – negation (if it was swithed on will be switched off and vice versa)
– – leave output unchanged

Example

Output	1	2	3	4	5	6	7	8
Mode	1	1	0	1	n	1	-	0

Switching on outputs: 1,2,4,6
Switching off 3,8
Negarion output 5
Output 7 leave without change

The driver recognized the following entries:
- Sunday can be marked as 0 or 7
- The day of execution of the command can be entered in two ways: giving day of the month or day of the week. If both fields are set, the command is executed in both the set day of the month and the set day of the week!
- Numerical values can be saved in various formats:
  ◦ 1-3 – meaning the value: 1,2,3

- - 0-10/2 – meaning the value: 0,2,4,6,8 i 10 (every second value from the set of 0 to 10)
  - 1,2,5 – meaning the value sequence 1,2,5
  - */2 – every second value (eg. in the first column it will be 0,2,4,6 ... 56,58)
  - 1-3,5,6 - meaning 1,2,3 and 5,6
- SR – referring to the hours of sunrise
- SS – referring to the hours of sunset

Because of the time change, avoid setting tasks that could be performed between 2:00 and 3:00 am on Sunday. This setting causes that during the summer time change the task would not be executed but it would be doubled because of winter time change (between 2:00 and 3:00 and between 2a:00 and 3a:00).

Examples:
switching on the third relay at 12:45
45 12 * * * --1-----

switching on the fifth relay at 17:30 on October 16
30 17 16 10 * ----1---

switching on the second relay from Monday to Friday at 8:00 am
00 8 * * 1-5 -1------

switching on the first and switches off the fifth relay from Monday to Friday at sunrise
SR SR * * 1-5 1---0---

switching on the first relay at twilight and switching off at dawn
SS SS * * * 1-------
SR SR * * * 0-------

switching on the third relay 10 minutes after dawn
SR+10 SR * * * --1-----

10.1 Show Wizard

On the Cron Editor you can run a simple guide for easy data input.

Cron Wizard

Cron Line
[Minute] [Hour] [Date] [Month] [DayOfWeek] [Command]: * * * * * *

Periodically Actions

- ● Every Minute
- ○ Odd Minutes
- ○ Even Minutes
- ○ Every 5 Minutes
- ○ Every 15 Minutes
- ○ Every 30 Minutes
- ○ Other: [   ]

- ● Every Hour
- ○ Odd Hour
- ○ Even Hour
- ○ Every 6 Hours
- ○ Every 12 Hours
- ○ Other: [   ]

- ● Every Day
- ○ Odd Days
- ○ Even Days
- ○ Every 5 Days
- ○ Every 10 Days
- ○ Every Half Month
- ○ Other: [   ]

- ● Every Month
- ○ Odd Months
- ○ Even Months
- ○ Every 4 Months
- ○ Every Half Year
- ○ Other: [   ]

- ● Every Weekday
- ○ Monday-Friday
- ○ Weekend Days
- ○ Other: [   ]

Simple everyday action
- ● Time: [0   ] : [0   ]
- ○ Sunrise
- ○ Sunset

Command
- ● On Channel
- ○ Off Channel
- ○ Invert Channel
- [1 ▼]

- ○ Execute point [   ]
- ○ Other [   ]

[Add Line] or [Close]

11 Points Editor

Cronos has the ability to send control frames to the other devices using TCP or UDP.

Format of control frame				
Name	**Protocol**	**Address**	**Port**	**Data**

Name – Any user name
Protocol – the protocol used to send the frame (UDP, TCP, GET, KNX)
Address – destination address
Port – port to which frame will be send
Dane – data in format hex- \x00, ascii -abcd,

Examples of control frames:

Name	Protocol	Address	Port	Data	Description
pwron	*TCP*	*192.168.111.15*	*9761*	*\x00\x01\x02\x03*	
test1	*UDP*	*192.168.111.23*	*1000*	*\x12abcdefgh*	
zamek	*GET*	*192.168.111.24*	*80*	*/stat.php?inv=1 YWRtaW46YWRtaW4wM A==*	
lampa	*KNX*	*2/1/2*		*\x81*	

It is possible to define a macro sending multiple frames:
O1 CALL test1,pwron
call frame O1 sends the frames **test** and **pwron**

12 KNX Editor

13 Description of control keys located on the front of the controller

⬆	Increasing the value or change of position
✔	Approval of changes or enter submenu
✖	Omission of entered changes or exit to the upper menu
⬇	Decrease value or change of position

14 Control via HTTP

Cronos module has the ability to control via HTTP. To read the current status of the module open a Web browser side, for example: http://192.168.0.10/stat.php

The module in XML file contains all relevant information:
```
<response>
<prod_name>Cronos</prod_name>
<out>00001000</out>
<on>00001000</on>
</response>
```

Section	Description
<prod_name> Cronos </prod_name>	Module type In this case Cronos.
<out>00001000</out>	Outputs mode (On/Off) In this case, the output OUT4 is active.
<on>00001000</on>	State of outputs

The table below shows the available commands of the HTTP (GET) protocol

Polecenie	Opis
http://nr_ip/stat.php?on=x	Switching on the output x=number of relay output: Cronos x=1-8
http://nr_ip/stat.php?off=x	Switching off the output x=number of relay output: Cronos x=1-8
http://nr_ip/stat.php?inv=x	Changing the output mode to the opposite x=number of relay output: Cronos x=1-8
http://nr_ip/stat.php?set=87654321	All outputs setting Possible options 1-switching on 0-switching off n-changing the output mode to the opposite - -no mode changing
http://nr_ip/stat.php?exe=name	It sends a predefined frame TCP or UDP

Examples of the control module using the http protocol.
1.Switching on relay output OUT2:
http://192.168.0.10/stat.php?on=2

2.Changing the relay output OUT1:
http://192.168.0.10/stat.php?inv=1

3.Switching off relay output OUT2:
http://192.168.0.10/stat.php?off=2

4.Switching on output 1; negation of output 2.
http://192.168.0.10/stat.php?set=000000n1

15 The use of the twilight sensor

The latest version introduces a modification that allows to control the outputs depending on the illumination by the use of external sensors (e.g.: WZM-01/S1 by Zamel). The detector is connected to terminals 24 and 25 of the controller. An external sensor allows for example to turn of the night lighting according to the astronomical clock and to turn it on again when the light intensity is low, even during the day.

16 Restore the factory settings

To restore the device to factory settings, hold the reset button for 8 seconds.
After the above steps the unit will set the following parameters:
  – IP address: 192.168.0.10
  – IP mask: 255.255.255.0
  – User: admin
  – Password: admin

17 Software Update

The module is equipped with the ability to update the software. The software is delivered as a file with the extension .bin.

Warning! Improper use of the function software update may damage the module.

The program must be loaded in a tab Administration-> Manage-> Firmware
After loading the program, the side is displayed MD5 checksum and the length of the loaded file.
The sum must be the same as the total given in the file sum.md5 supplied with the program file.
If the sum is correct, click "Burn".

Notes

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