

**CZAKI THERMO-PRODUCT**

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# Electronic humidity and temperature meter

## EMW-200

### User manual

Version 21.04



## 1. Safety regulations

- read these instructions before use
- before turning on the power, make sure that the wires are connected correctly
- ensure operating conditions (power supply, humidity, temperature) according to specifications

## 2. Device characteristics

EMW-200 is a microprocessor-based humidity and temperature meter adapted for use with semiconductor sensors of "HT" type (e.g. HT-951, HT-952) offered by Czaki Thermo-Product. Depending on your needs, the meter displays the humidity value in relative units (%Rh), or absolute units: ( $^{\circ}\text{Cdp}$ ), ( $\text{gm}^{-3}$ ) or ( $\text{ppm}(\text{v})$ ). The meter is equipped with two relay alarm outputs.

## 3. Technical data

### LED digital temperature readout (4 digits):

- temperature measurement range.....  $-40^{\circ}\text{C} \dots 120^{\circ}\text{C}$
- temperature measurement error.....  $\pm 0,4^{\circ}\text{C}$  ( $5^{\circ}\text{C} \dots 40^{\circ}\text{C}$ );  
 $\pm 1,5^{\circ}\text{C}$  ( $-40^{\circ}\text{C} \dots 5^{\circ}\text{C}$ ) i ( $40^{\circ}\text{C} \dots 85^{\circ}\text{C}$ );  
 $\pm 2^{\circ}\text{C}$  ( $85^{\circ}\text{C} \dots 120^{\circ}\text{C}$ )
- temperature measurement resolution.....  $0,1^{\circ}\text{C}$
- height of digits ..... 13 mm
- LED color ..... red

### LED humidity digital readout (4 digits):

- humidity measurement range..... 0...100 %RH
- humidity measurement error.....  $\pm 2\% \text{RH}$  ( $10 \dots 90\%$ );  
 $\pm 4\% \text{RH}$  ( $0 \dots 10\%$ ) i ( $90 \dots 100\%$ )
- rozdzielczość pomiaru wilgotności.....  $0,1\% \text{RH}$ ;  $0,1^{\circ}\text{Cdp}$ ;  $0,1/1/10 \text{gm}^{-3}$ ;  
 $1/10/100/1000 \text{ppm}^*$
- height of digits ..... 13 mm
- LED color ..... Green or blue (option)

- Housing diameter** ..... 96 x 48 x 80 mm (260g)
- build in front ..... 92 x 45,2 mm
  - mounting..... brackets on the side of the case
  - front material ..... polycarbonate
  - body material ..... self-extinguishing Noryl

**Protection rating of the housing:**

- front side ..... IP61
- connector's side ..... IP20

**Power supply:**

- main..... 230V AC (+10% - 15%), 50Hz, 3VA
- LV low-voltage (option) ..... 10-30V DC, 2W

**Sensor connection:**

- max. wire length ..... aprox. 20 m

**Alarm output:**

- type ..... normally opened relay contacts
- max, continuous relay contact current ..... 5A
- max. contact voltage..... 250V AC, 30V DC
- max. switching power ..... 1250 W
- max. number of connections at rated load..... 600 cycles/h
- max. number of connections without load..... 7200 cycles/h

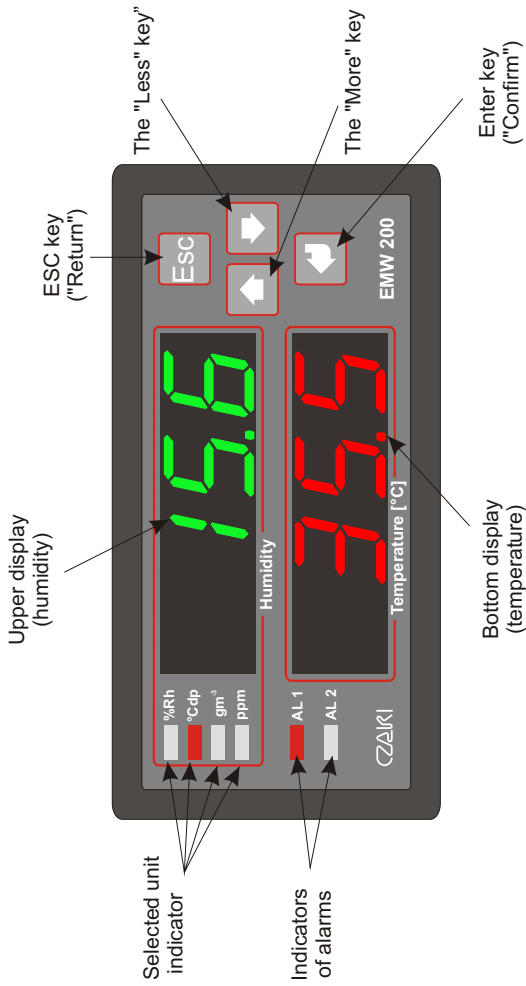
**Operating temperature:** ..... -25°C...+50°C

**Relative humidity:** ..... 0 - 90% RH non-condensing

**EMC Compatibility:** ..... Industrial environment

- resistance ..... wg PN-EN 61000-6-2:2002(U)
- emissions..... wg PN-EN 61000-6-4:2002(U)

\* Due to the very high dynamics of readings above 10000 ppmV, the displays will show a "t" symbol indicating readings in thousands of ppmV, i.e. de facto in per mille.



Front panel of the EMW-200 meter

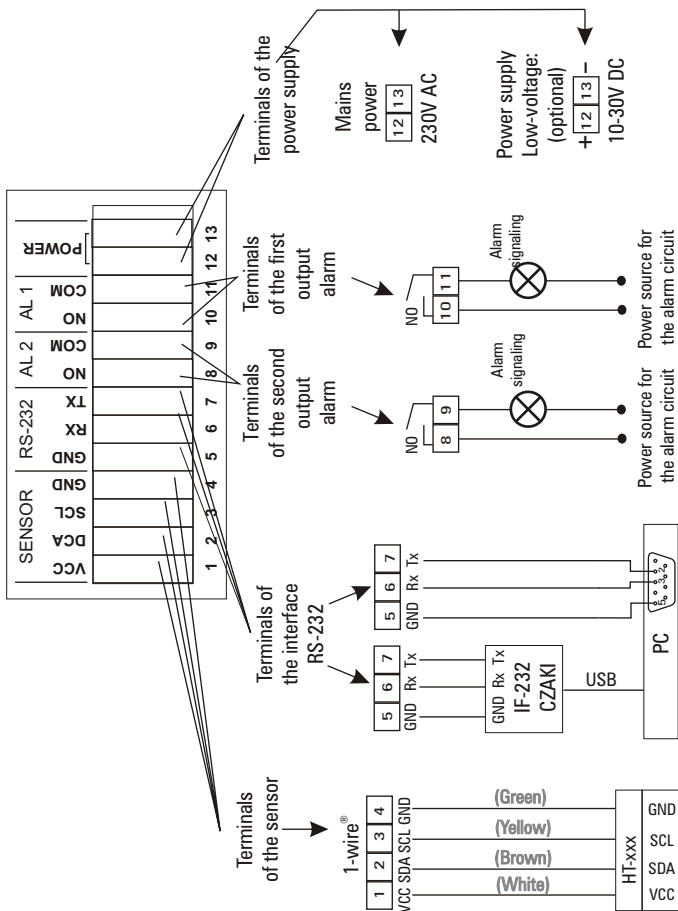
## **4. Installation recommendations**

### **General Notes::**

- mount in the board with mounting brackets- do not supply the device from the same lines as high
- power devices without appropriate filters
- avoid running sensor cables in the close vicinity or parallel to power lines
- avoid proximity to devices generating high impulse interference
- in the power supply circuit include a delay-free fuse 1A

### **Sensor connection:**

- the sensor should be connected using a 4-wire cable with the lowest possible capacity between conductors
- if possible, order the connecting wire of the required length
- avoid connecting different wires of different types and with different colors of conductors (signal, power, etc.)
- connect the sensor according to the drawing on the next page
- incorrect connection may damage the sensor



Connection of power supply and of sensor to the EMW-200 meter.

## **5. Handling of the meter**

- after proper installation the meter is ready to work
- the meter does not require periodic maintenance

### **Selection of the displayed humidity unit:**

The meter allows you to display humidity in the following units:

- relative humidity, expressed in percent [%Rh].
- absolute humidity, expressed in degrees Celcius dew point [ $^{\circ}\text{Cdp}$ ]
- absolute humidity, expressed in grams per cubic meter of gas [ $\text{gm-3}$ ]
- absolute humidity, expressed in particles per million gas particles [ppmV].

Whereby only relative humidity and temperature are measured. Absolute humidity is calculated from the measured values. The maximum error of the absolute value display is therefore the resultant of the maximum errors of the measured values.

To change the displayed unit, press and hold the "Enter" key for about 3 seconds until the upper display shows: "SEt" (setup). Use the "Up" / "Down" keys to select "Unit" on the lower display and confirm the selection with the "Enter" key, which will take you to the units submenu ("Unit" on the upper display). Then use the "Up" key, each time pressing of which changes the unit to the next, to select the desired unit.

The indicator of the currently displayed unit is located on the left side of the upper display (see figure on the previous page)

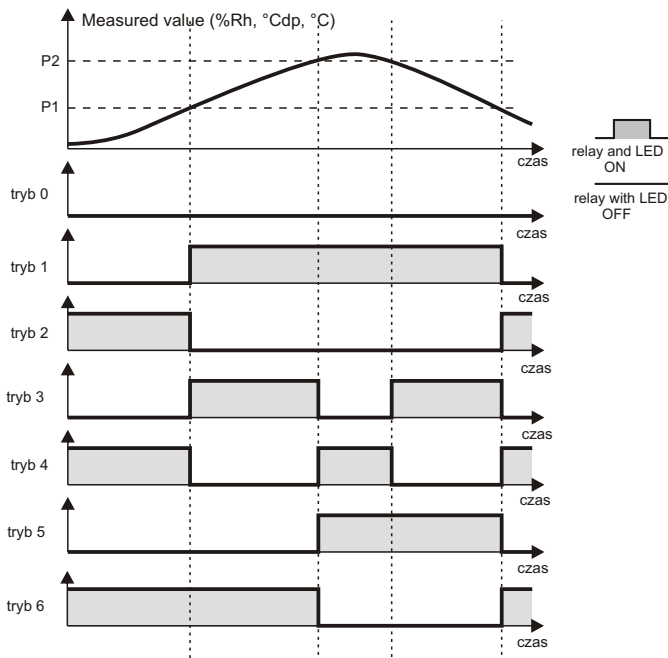
### **Alarms:**

The EMW-200 meter is equipped with two relay outputs with closed contacts (alarm outputs). These outputs, can be used by the user to monitor humidity and/or temperature, to inform about the current status of the process or to protect the object from moisture or overheating or overcooling.

Available to the user are normally open (NO) contacts (NO)

Each alarm can be associated with one of three values (units):

- relative humidity, expressed in [%Rh]
- absolute humidity, expressed in [°Cdp]
- temperature, expressed in [°C]



### Alarm modes

mode 0 - inactive alarm

mode 1 - above

mode 2 - below

mode 3 - between

mode 4 - extreme

mode 5 - simple ON/OFF controller with hysteresis for cooling (drying)

mode 6 - simple ON/OFF controller with hysteresis for heating (humidifying)



The alarm output, depending on your needs, can be configured for six different modes of operation:

- **mode 0** alarm is disabled
- **mode 1** "above", the relay turns on when the temperature rises above the indicated value (threshold P1)
- **mode 2** "below", the relay turns on when the temperature falls below the indicated value (threshold P1)
- **mode 3** "between", allows to signal that the measured temperature is between two indicated values (P1 threshold and P2 threshold)
- **mode 4** "beyond", the alarm signals that the measured value fell below the set value (threshold P1), or increased above the set value (threshold P2) (for example, the temperature is not within the required range)
- **mode 5**, a simple two-valve regulator with hysteresis, is suitable for connecting a refrigerator, the relay turns on when the temperature exceeds the preset value (threshold P2) and turns off when the temperature drops below the preset value (threshold P1)
- **mode 6**, a simple two-valve controller with hysteresis, is suitable for connecting a heater, the relay is on until the temperature exceeds the set value (threshold P2) and turns on again after the temperature drops below the set value (threshold P1).

The width of the hysteresis zone (i.e., the difference between the comparative threshold P1 and the comparative threshold P2) should be selected experimentally, starting with a large width, then reducing it to such a level that no undesirable oscillations occur. The optimal width of the hysteresis zone will depend on the dynamics of the object being stabilized.

**Default settings:**

Mode	0
unit	%Rh and °C
P1	0.0
P2	0.0

## **Konfiguracja wyjścia alarmowego:**

The alarm output is configured using three or four parameters: mode, unit, P1 threshold and possibly P2 threshold.

To change the settings of the alarm output, press and hold the "Enter" key for about 3 seconds until the upper display shows: "SEt" (setup). Use the "Up" / "Down" keys to select "AL 1" (Alarm 1) or "AL 2" (Alarm 2) on the lower display and confirm the selection with the "Enter" key, which will take you to the menu of the corresponding alarm ("AL 1" or "AL 2" on the upper display). Then use the "Up" / "Down" keys to select the parameter to be edited on the lower display: alarm mode ("nodE" - mode), unit ("Unit" display), threshold value P1 ("P1" display) or threshold value P2 ("P2" display). Confirm the selection with the "Enter" key.

The upper display will show the name of the parameter being edited, and the lower display will show its current value. Use the "Up" / "Down" keys to select the desired value, and then confirm with the "Enter" key. This will save the value and move to the level of selecting the parameter for editing and the possibility of editing the next parameter.

At any time you can abandon editing the value by pressing the "ESC" key.

Each time you press the "ESC" key, you will go to a higher level of the menu without saving any change.

After the configuration is complete, to return to the measured temperature display mode, press the "ESC" key while in the main menu ("SEt" on the upper display).

Alarm threshold limits are closely related to the type of unit selected.

To disable the alarm function, select the value "0" when editing the alarm mode value.

If the power supply to the meter fails, the relays always turn off (monostable relays).

### **Offset correction:**

Each sensor has a certain accuracy. Especially in very dry (less than 10%RH), as well as very humid atmosphere (above 90%RH), its accuracy is lower ( $\pm 4\%$ ).

In addition, over some time and, particularly, due to the conditions in which the sensor operates, its performance may deteriorate.

Having an device with much better accuracy, usually based on a cooled mirror, it is possible, to a limited extent, to correct the sensor bias. The parameter "Offset" is used for this purpose.

This parameter allows correcting the displayed humidity value and refers only to relative humidity, expressed in %. An offset different from zero introduces a constant difference between the humidity read from the sensor and the one indicated by the meter. Correction is possible in the range -10% ... +10% RH.

To enter the offset, press and hold the "Enter" key for about 3 seconds until the upper display shows: "SEt" (setup). Use the "Up" / "Down" keys to select "OFFS" (Offset) on the lower display and confirm the selection with the "Enter" key. The upper display will show the name of the parameter being edited ("OFFS"), and the lower display will show its current value. Use the "Up" / "Down" keys to set the desired value in the range from -10.0 to +10.0, and then confirm with the "Enter" key. This will save the value of the entered adjustment and move to the main menu level.

At any time you can abandon editing the value by pressing the "ESC" key.

To return to the mode of displaying the measured humidity and temperature, press the "ESC" key (while in the main menu, "SEt" on the upper display).

## **Computer cooperation and software:**

The EMW-200 meter, by using the RS-232 serial interface, can cooperate with a computer or other device in the transmission of measured values.

In case there is no RS-232 socket on the computer, an RS232<->USB converter of the IF232U type can be used. The connection diagram can be found on page 5.

To operate with the EMW-200 meter, there is a downloadable application on the [czaki.pl](http://czaki.pl) website, on the product specific sub-page. This application does not need to be installed, but only unzipped and saved to the computer's hard drive.

The application allows you to track the measured humidity and temperature directly on the computer screen. It consists of two tabs: "Chart" and "Hygrometer". Its main features are:

- simultaneous display of: absolute humidity ( $^{\circ}\text{Cdp}$ ) and relative humidity (%RH) and gas temperature
- graphical depiction of the course of these values
- connectivity to the EMW-200 via a serial port (or, after using the IF232U interface, USB)
- recording of measurement data on the computer disk
- reading of previously recorded measurements and its presentation on the chart
- ease of importing stored data by popular programs (e.g. Excel)

After starting application and having properly connected EMW-200 meter to the computer, click the "Connect" button

## **"Hygrometer" tab**

The tab consists of three windows: "Relative Humidity", "Absolute Humidity", "Temperature" and two buttons: "Connect" and "Load chart."

After pressing "Connect", the program performs a device search procedure, and it does not matter here whether the device is connected directly to the serial port or whether a USB converter has been used. The search procedure, if the device is missing or incorrectly connected, can take up to several seconds. On the other hand, when the device is found successfully, a message appears with information on what device has been found.

Using "Load Chart" you can read out the previously saved data, which will be presented in graphical form on a chart ("Chart" tab).

The values measured by the EMW-200 hygrometer are read from the device every second or so and so stored in a file. This file, jrtiw1.txt, is a text file, located in the directory where the application is located. In order to save the collected measurement data, it is necessary, after closing the application, to rename it, or move it to another directory.

## **"Chart" tab**

This tab allows you to graphically illustrate the course of relative humidity (%RH, green), absolute humidity ( $^{\circ}\text{Cdp}$ , blue) and temperature ( $^{\circ}\text{C}$ , red) over time. When connected to the EMW-200 meter, the graph is automatically scaled.

It is possible to zoom in on a section of the retained or read from the chart file. To do this, hover the mouse cursor over the area of interest, press and hold the left mouse button and with a right-down movement select the selected fragment. If you want to restore the entire area, you need to make a similar movement, but left-up, also holding the left mouse button. This is particularly useful for later analysis of previously saved measurements.

## **6. Package contents**

- meter with two mounting brackets
- instruction manual with warranty card