Programmable interior temperature and humidity sensors, analog output - types RK-HTV-N, RK-HTV-D

The sensors are designed to measure relative air humidity and possibly air temperature without aggressive additives in interiors with increased aesthetic demands. They are adapted for direct mounting on an interior wall or on a standard installation box with a spacing of 60mm.
The output is a linear voltage or current signal fully configurable in the range 0 ÷ 10V or 0 ÷ 20mA.
The RK-HTV-D type also allows local display of the measured temperature and humidity using a backlit color 2.3" TFT display with touch panel.
Device configuration is performed by connecting a standard USB mini B cable to PC using Windows free USB_SET application.
The device is available in Czech or English version. Unless otherwise ordered, the Czech version is considered standard.

Basic technical parameters:

Supply voltage (Ucc)	15 ÷ 30 VDC *1
Max. consumption (without load outputs)	30 mA
Max. consumption (with load outputs)	70mA (OUT_I1 = 20mA, OUT_I2 = 20mA)
Type of sensor T+RH	SHT31
Temperature/humidity resolution	0,1°C / 0,1 %RH
Accuracy - temperature	± 0,5°C (20 ÷ 40°C), ± 1°C (0 ÷ 50°C)
Accuracy - humidity	± 3 % (20 ÷ 80 %RH)
Range of recommended working temp.	-10 ÷ 50°C / 10 ÷ 95 %RH
Recommende calibration interval	2 years
Settling time	min. 2 h *2
Range of recommended storage temp. / RH	10 ÷ 50 °C / 20 ÷ 60 %RH
Load impedance of voltage outputs (Rz)	> 50kΩ
Load impedance of current outputs (Rz)	< (Ucc - 13) x 50 [Ω]
Galvanic separation of outputs	no
Configuration program	USB_SET; freeware; www.regmet.cz
Protectionlevel	IP30 (EN 60529)
Terminal board	CPP (vodiče max. 1 mm^2)
Dimensions (L x V x H)	103 x 100 x 25 mm

*1 If 24VAC supply voltage is required, an MN24 voltage converter can be ordered for the device (for placement in the KU68 installation box

*2 Read: Sensor configuration using the USBset program: Measured value offset - temperature:!!!

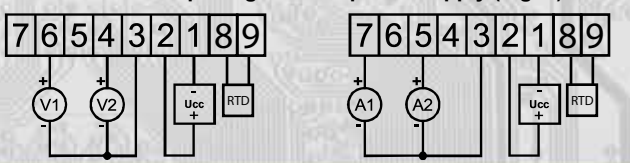
List of available types

Type of outputs	Humidity = I/U, Temperature = I/U		Humidity = I/U, Temperature = resistance sensor	
View option	without LCD	with LCD	without LCD	with LCD
	RK-HTV-N	**RK-HTV-D**	**RK-HTV-N-x**	**RK-HTV-D-x**

List of type of resistance sensors....x

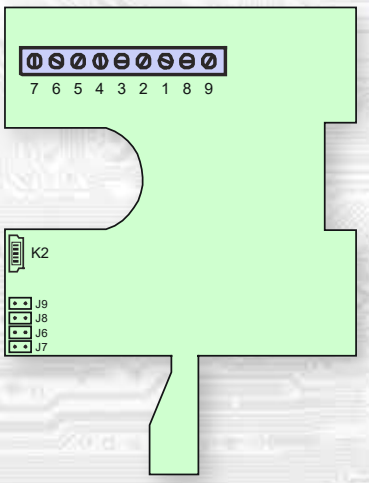
Type of resistance sensor	Placement after x (eg. RK-HTV-N-x)
Pt 100 / 3850 ppm	**P**
Pt 1000 / 3850 ppm	**PA**
Ni 1000 / 6180 ppm	**S**
Ni 1000 / 5000 ppm	**L**
Ni 891 / 6371 ppm	**J**
NTC 20kOhm	**H**

Connection of output signals and power supply (Fig. 2):



Connection plan (fig.1):

K2...connector USB mini B
J6…device configuration
J7... reset

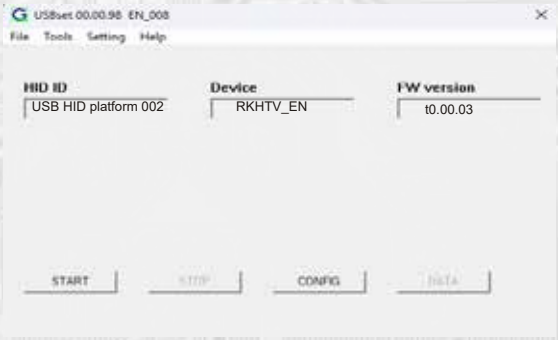


Terminal 1.....GND, negative pole
Terminal 2.....+Ucc, positive pole
Terminal 3.....common pole GND
Terminal 4.....OUT_2 (RH) - _voltage
Terminal 5.....OUT_2 (RH) - current
Terminal 6.....OUT_1 (T) - _voltage
Terminal 7.....OUT_1 (T) - current
Terminals 8,9.....RTD (semsor)

Terminal 1 and terminal 3 are galvanically connected

SW configuration of sensor using the USBset program:

The configuration application USBset is freely available at producer´s web pages. The sensor can be configured only when the jumper J6 is inserted before the connection of supply voltage (reset). The sensor is connected with PC using the cable of USB mini B type. With connected cable the USB communication has the priority over the line RS485.
After the launching of USBset program, the basic window is opened, by clicking the "START" button, the sensor will connect to the host PC.



With clicking on the button “CONFIG” the configuration window gets opened.

By clicking on the "Read RKHTV" button, the configuration values are read from the flash memory of the sensor.

Correction of the measured value:
- temperature: Setting of measured temperature offset
Since the device has its own energy consumption and the temperature sensor is part of it, the measured energy temperature is affected radiated from the device. After installation of the device and tempering for min. 2h, the difference between the measured and the actual temperature stabilizes at a constant value and it is possible to compensate for this difference by setting the measured temperature shift. The factory default offset is -1.0 ° C, but it depends on the specific design, wall material, location, line load ...
For example, if after tempering the device (min. 2h) it seems that the device is measuring by 0.5 ° C, the value is set to -1.5 (from the factory it is already preset -1.0) and the device will display and transmit the actual room temperature.

- humidity: Setting of measured humidity offset

LCD: (only for LCD type)
Colour setting: The required colour is separately chosen for every position in LCD.
Setting of LCD saver:
I**nactive LCD backlight during the day**: used to set the LCD backlight when the display is inactive during the day (saving mode) in the range 0 ÷ 100% **.
I**nactive LCD backlight during the night**: used to set the LCD backlight when the display is inactive during the day (saving mode) in the range 0 ÷ 100% **.
Time of active display: The setting of active display time, after which the LCD without activity on the touch panel switches to power saving mode.

Text field: intended for the client´s identification of the controller (title, location...).

Output 1 (temperature):
It is selected whether the output should be voltage or current.
The input signal range is entered in the max. range -50 ÷ +200°C or 0 ÷ 100%, and the inverse is also possible.
The specified input signal range is assigned to the output signal range in the max. range of 0 ÷ 10V or 0 ÷ 20mA, and the inverse is also possible. The safety value is used to enter a safe value to which the output is set after switching on or resetting the device before it starts working correctly or in the event of a temperature sensor failure.

Output 1 (relative humidity):
It is selected whether the output should be voltage or current.
The input signal range is entered in the max. range -50 ÷ +200°C or 0 ÷ 100%, and the inverse is also possible.
The specified input signal range is assigned to the output signal range in the max. range of 0 ÷ 10V or 0 ÷ 20mA, and the inverse is also possible. The safety value is used to enter a safe value to which the output is set after switching on or resetting the device before it starts working correctly or in the event of a humidity sensor failure..

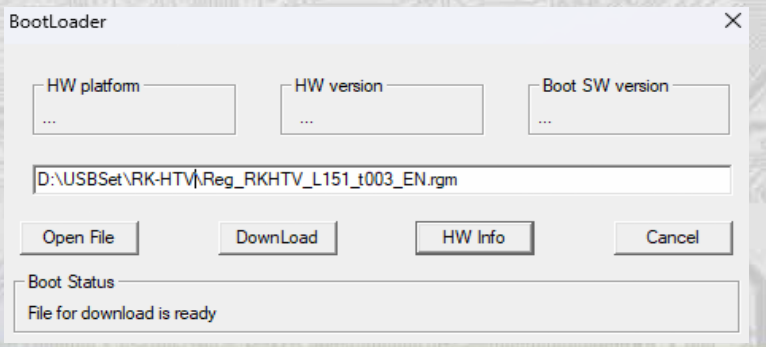
Enable Menu:
Menu inaccessible: Check to make the menu inaccessible, eg for hotels, schools ...

After setting of required values and quantities the new configuration values are saved in the flash memory of the device by clicking on the button „ **Write RK-HTV**“
The writing into the flash memory is conditioned by insertion of jumper J6 (authorisation for configuration values recording) before the clicking on the button “**Write RK-HTV**”.
By clicking on the button "**Cancel**" the configuration windows gets closed.
After USB cable disconnection the jumper J6 is pulled out and the device is ready for operation.
Jumper J6 is used only for configuration, do not operate the device with J6 inserted, there is a risk of damaging the device data!

Factory default settings:
Temperature: 0 ÷ 50°C = 0 ÷ 10V
Relative humidity: 0 ÷ 100% = 0 ÷ 10V

** Reducing the energy consumption of the device and thus negatively affecting the measured quantities.

Variation of the application part FW:
After the USBset program launching click on the Tools – BootLoader and the windows gets opened:



The work with application is conditioned by insertion of the jumper J6 (authorisation for configuration values recording). Using the button “OpenFile“ the new application FW is chosen and using the button “Download“ the FW variation gets started, being automatically controlled by PC and the device.
For the maximum simplicity and safety every device has unambiguous identification of HW platform. This designation describes HW topology and also defines what application FW can be sued for the specific type of HW. This information can be read through the button “HW info“.
The application FW are distributed in data format “.reg “. In case of application variation the information on HW platform and HW version are always read after the connection of PC with the device. At the same time, the HW platforms descriptors and HW versions from the file “.reg “ are read. Provided HW platform and HW version are not compatible, the FW variation cannot be done.

Provided the communication failure occurs during the application FW variation, for example due to the supply voltage drop, the application SW will not be functional. In such case the automatic launching of “bootload” process as well as the automatic reading of HW info will not work. The Bootloader in the device gets always activated after the reset, thus it is necessary to reset manually. Using the RESET jumper or the simple disconnection and subsequent connection of supply voltage.
Provided the automatic sequence of FW variation launching is damaged:

- switch off the device or connect the jumper at RESET pins
- launch the bootload process using the button “DownLoad“
- switch on the supply voltage or release the RESET jumper
- delay between the activation of button “DownLoad“ and the switching on or by the RESET shall be shorter than 2s.

After the USB cable disconnection the jumper J6 is pulled out and the device reset is performed using the short shorting of RST jumper (J7).

The integrity check of content of memories:
The bootloader as well as the application are protected by control total sums. Provided the data integrity is broken, the content of FLASH memory MCU is damaged and the damaged program will not be launched.

Layout of initial display:
Following the controller switching on the display shows, for approx. 1s, the producer´s logo, and later basic information on the device and finally the initial display:

Temperature: currently measured temperature
Relative humidity: currently measured relative humidity.
Menu: enter to the device menu.

Touch panel control of the device:

Pressing the button ☰ displays the drop-down menu of the device, which is scrolled through with the buttons ▼ ▲
Writing to FLASH is done by pressing ↵ After inactivity of the buttons for more than 10 s or by pressing Esc, the display will gradually return to the previous level until the final exit of the menu.

Menu – IN/OUT info ↵ Information on current setting of inputs and outputs
▼ ▲
device info ↵ Information on HW and SW of the device
▼ ▲
LCD Settings ↵ Color... color settings for each LCD field
Brightness during the day.... LCD backlight setting when the display is inactive (power save mode) during the day **
Brightness during the night.... LCD backlight setting when the display is inactive (power save mode) during the night **
100% brightness time ....setting of the active display time, after which the LCD backlight without activity on the touch panel s witches to power saving mode ***

** To reduce the energy consumption of the device and thus to negatively affect the measured quantities by heating the device, it is recommended to set the LCD backlight to the lowest possible value when the display is inactive.

*** When setting on the touch panel, the LCD backlight is set to 100%.

Working conditions of the sensor SHT31:

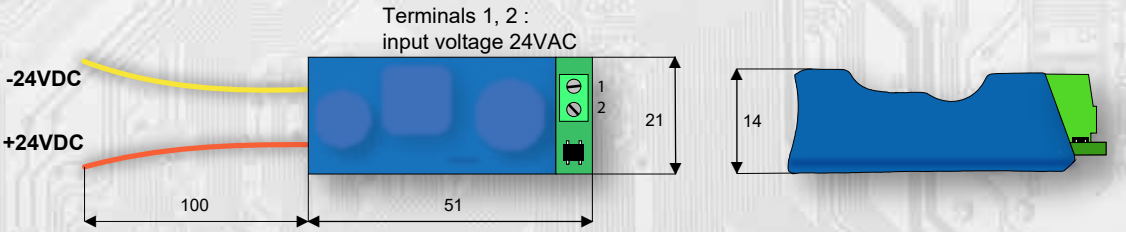
The sensor steadily works within the recommended measurement range that is 5 ÷ 60 °C and 20 ÷ 80 % RH. The long-term exposition to the high humidity, namely >80% RH causes the gradually increasing reading deviation of RH (+3% RH after 60 hours >80% RH). After returning back to normal range the RH measurement gets slowly back to calibrated values. Long-term exposure to extreme conditions can accelerate the aging of the sensor.
Detailed information on conditions of long-term use of the sensor SHT31 under conditions out of the standard range, especially at the relative humidity >80% RH, are shown directly at the producer´s website at:
http://www.sensirion.com

Assembly and connection:

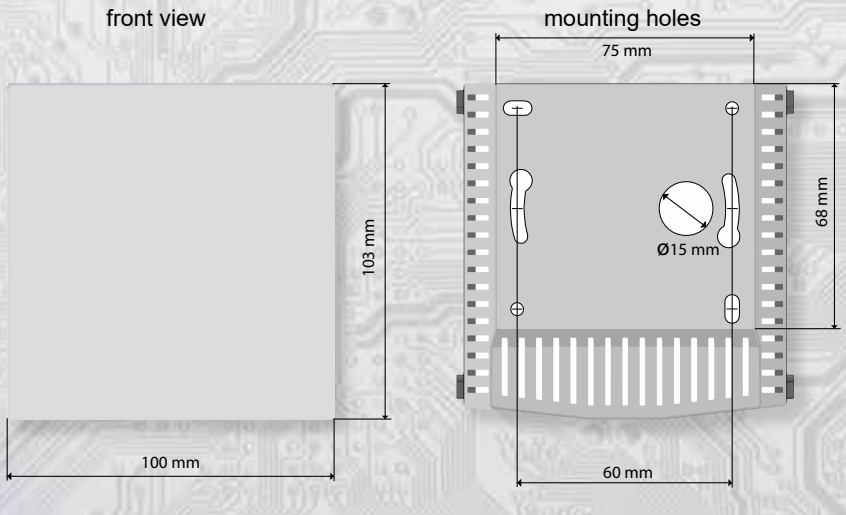
The devices are intended for direct mounting on the wall or on the KU68 installation box. First, the lid is removed, which makes the terminal block and mounting holes accessible. The base is screwed to the interior wall or to a standard installation box with a spacing of 60mm using two screws.
The electrical connection of the lead wire of the recommended cross-section and diameter is made on the terminal block (Fig. 1 and 2).
By attaching the perforated cover, the sensor is ready for operation.

Using the sensor in 24VAC systems

Using the MN24 converter, these devices can also be used in 24VAC measurement and control systems.
The converter can be placed in a deeper flush-mounted box, e.g. KU68.



Dimensions



Material	polyamid
Color	white
Dimensions	103x100 x 25 mm