These sensors are intended for general-purpose application in control and regulation systems for the temperature and humidity measurement in interior. The output is the voltage or current signal fully adjustable in the range 0÷10V or 0÷20mA.

Alternatively is possible a combination of active voltage or current output for humidity measurement and passive resistance output for temperature measurement (Pt100, Pt1000, Ni1000, NTC ...).

The electronic system of the sensor consists of two parts. The T+RH sensor and LCD (if possible) are located in the front panel and the main part with terminal boards is located in the box that is inserted in the installation box.

Device configuration is performed by connecting a standard USB mini B cable to PC using Windows free USB_SET application.

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
	HTV-N	**HTV-D**	**HTV-N-x**	**HTV-D-x**

List of type of resistance sensors....x

| Type of resistance sensor	Placement after x (eg HTV-N-P)
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 20kΩ	**H**

Basic technical parameters:

Supply voltage (Ucc)	15 ÷ 30 VDC [*1]
Max. consumption (without load outputs)	15mA
Max. consumption (with load outputs)	55mA (OUT_1 = 20mA, OUT_2 = 20mA)
Temperature/humidity resolution	0,1°C / 0,1%RH
Accuracy - temperature	± 0,5°C (20 ÷ 40°C), ± 1°C (0 ÷ 60°C)
Accuracy - humidity	± 3% (20 ÷ 80 %RH)
Type of sensor	SHT40
Load impedance of voltage outputs	> 50kΩ
Load impedance of current outputs	< (Ucc - 13) x 50 [Ω]
Range of working temperature and humidity	max. 80°C
Range of recommended working temp.	- 30 ÷ 60 °C
Range of recommended storage temp. / RH	10 ÷ 50 °C / 20 ÷ 60 %RH
Protection type	IP40
Terminal board	CPP (max. 1mm^2)
Configuration program	USB_SET ; freeware; www.regmet.cz
FW upgrade program	USB_BOOT ; freeware; www.regmet.cz
Settling time	min. 2 h [*2]

[*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:!!!

Connection plan (fig.1):
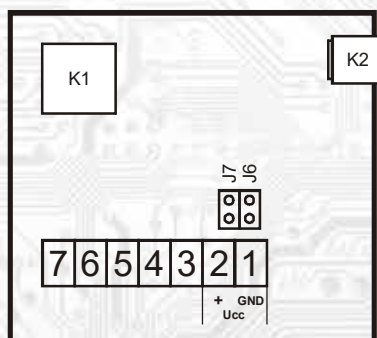
K1....connection sensor T+RH
K2...connector USb mini B
J6…device configuration
J7... reset

Terminal 1.......GND, negative pole
Terminal 2.......+Ucc, positive pole
Terminal 3.......common pole GND
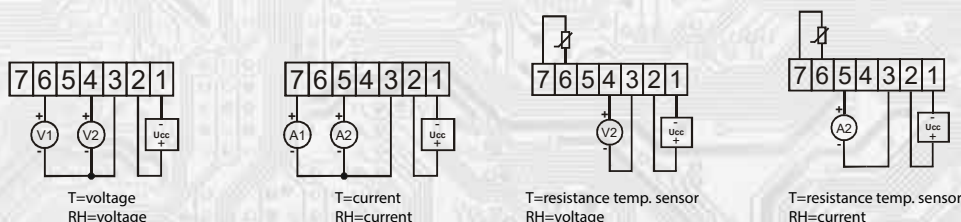Terminal 4.......OUT_U2 (RH) - voltage
Terminal 5.......OUT_I2 (RH) - current
Terminal 6.......OUT_U1 (T) - voltage
Terminal 7.......OUT_I1 (T) - current

Terminal 1 and terminal 3 are galvanically connected

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

T=voltage
RH=voltage

T=current
RH=current

T=resistance temp. sensor
RH=voltage

T=resistance temp. sensor
RH=current

Assembly and connection:

The sensors are designed to be installed into the standard installation boxes (KU68). The electrical connection of the conductors is done on the terminal, which is on the main part of the instrument by a conductor with a maximum cross section of 1mm² according to Fig. 1 and 2. Once the terminal box is connected, the box with the main part of the instrument is inserted into the installation box, where it is advisable to fasten it somehow. Then, screw the frame of the instrument onto the installation box and connect both parts of the electronics by a flat conductor. Insert the front cover into the frame of the instrument. This completes the mechanical installation. For disassembly, proceed in the reverse order.

Operating conditions of the SHT40 sensor:

The sensor operates steadily in the recommended measuring range, which is 5 ÷ 60 °C and 20 ÷ 80% RH. Long-term exposure to high humidity, especially> 80% RH, resulting in gradually increasing deviation reading RH (+ 3% RH after 60 hours> 80% RH). After returning to the normal range, the RH will slowly return to the calibrated values.
Long-term exposure to extreme conditions can accelerate the aging of the sensor.

To remove condensed / splashed water or during prolonged exposure of the sensor rel. humidity >80%, the sensor can be dried with a simple command. By writing 0xCBAC (52140 dek) to register 40029 – Status register, the heating of the sensor with a power of approx. 200mW for 1s is started. For approx. 1 min after starting the command, the sensor does not measure, the last measured values are on the line and the red heating symbol is displayed in the upper left corner of the LCD. To remove water from the sensor, it is recommended to run the command immediately after exceeding 99.9%RH. If it is not removed, the command can be repeated several times, but the delay between individual commands must be longer than that of approx. 1 min.
If the sensor is exposed for a long time >80%, it is advisable to dry the sensor periodically, e.g. once an hour.

Detailed information on conditions of long-term use of the sensor SHT40 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

SW configuration of sensor using the USBset program:

The configuration application USBset is freely available at producer´s web pages. The controlled 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 and the connected sensor is automatically connected with the hosting PC.
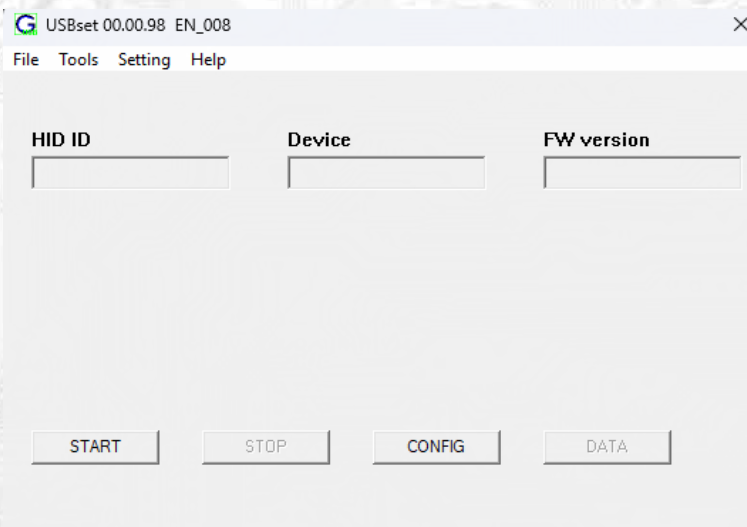
With clicking on the button "CONFIG" the configuration window gets opened.
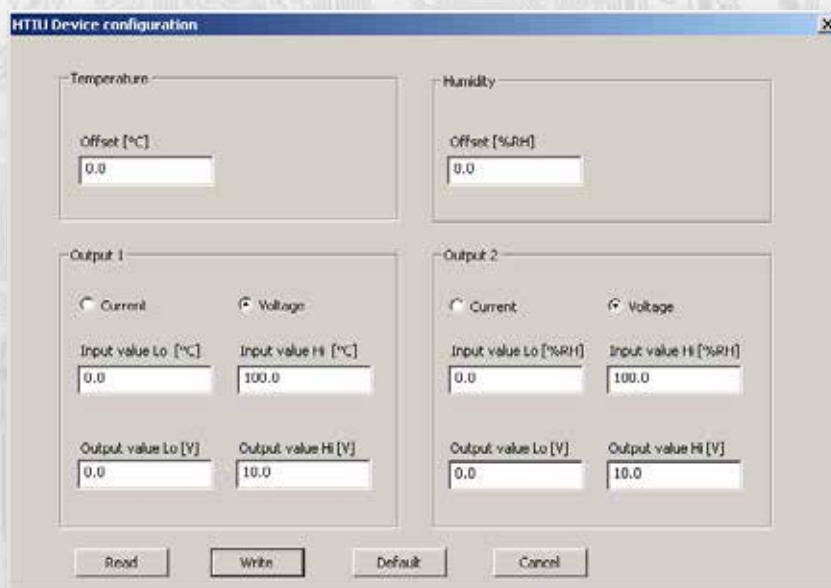
By clicking on the "Read" button, the configuration values are read from the flash memory of the sensor.
After setting the required values and quantities, to clicking on the "Write" button, the new configuration values will be saved to flash memory sensor.
The condition for writing to the flash memory is to insert jumper J6 (enable writing of configuration values) before clicking the button "Write".
Click on the "Cancel" button to close the configuration window.
After disconnecting the USB cable, pull jumper J6 and reset the device by briefly shorting the RST jumper (J7).

Variation of the application part FW:

After the USBset program launching click on the Tools – BootLoader and the windows gets opened:
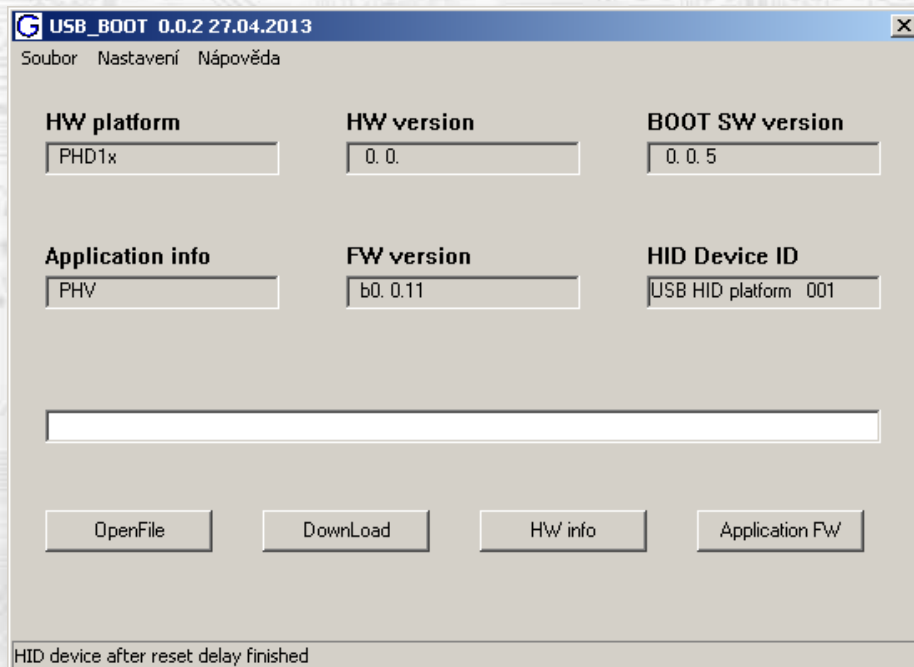
The work with application is conditioned by insertion of the jumper J6 (authorisation for configuration values recording).
Using the button "OpenFile" the new application FW is chosen and using the button "DownLoad" the FW variation gets started, being automatically controlled by PC and the device.
 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 memory:
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.

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 contrast: used to change the contrast of the LCD display in the range of 0 ÷ 45, if the device is equipped with an LCD display.

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

Output 1 (temperature):
The output signal type (voltage/current) is selected.
The input signal range is entered in the max. range -50 ÷ +200°C, 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 2 (relative humidity):
The output signal type (voltage/current) is selected.
The input signal range is entered in the max. range 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.

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 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 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

The sensor is therefore set to the values shown in the configuration window. These values can be recalled by clicking the "Presets" button.

Using the sensors 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

Terminals 1, 2 :
input voltage 24VAC

-24VDC

+24VDC

1
2

21

14

100   51