

Interior sensor T+RH+CO2 with analog outputs

RK-CHV...



RK-CHV-D - sensor with color TFT touch screen RK-CHV-L - sensor with LED indicator RK-CHV-N - sensor without indication and display

These devices are designed for measurement CO2 concentration, relative humidity and temperature in interior. They are intended for the direct mounting on the wall or on a standard installation box with a pitch of 60 mm.

The output is the voltage or current signal fully adjustable in the range 0+10V or 0+20mA.

The RK-CHM-L sensor has three indicator LEDs (green, yellow, red) at the front of the box to indicate the level of CO2 concentration in the air. The RK-CHM-D sensor is also equipped with a backlit color 2.3" TFT display with a touch panel.

Electronics with terminal blocks are located in the basic part of the box and are accessible after removing the lid.

The device configuration is made with sensor connection, using the standard USB cable, to PC with Windows system using the freeware application USB_SET.

The common chemically non-aggressive environment suits working conditions under which the sensors require no maintenance or service. The controller is available in Czech or English version. Unless otherwise ordered, the Czech version is considered the standard.

Basic technical parameters

Supply voltage (Ucc)	15 ÷ 30 VDC		
Power consumption/ peak < 200ms	1VA / 2,5VA (without charged output OUT)		
CO2/temperature/humidity resolution	1ppm / 0,1°C / 0,1%RH		
Range of CO2 concentration	400 ÷ 10 000ppm		
Accuracy - CO2 (range 0 ÷ 2000ppm) (range 400 ÷ 10 000ppm)	±30ppm ±3% of the range		
Sampling interval of CO2 concentration 2	2s		
Recommended calibration interval CO2	It is not necessary to calibrate in AC mode ⁽¹⁾		
CO2 sensor life	15 years		
Type of sensor T+RH	SHT31		
Accuracy - temperature	± 0,5°C (20 ÷ 40°C), ± 1°C (0 ÷ 50°C)		
Settling time (2)	min. 2 h		
Accuracy - humidity (+25°C)	± 3 % (20 ÷ 80 %RH)		
Recommended calibration interval RH	2 years		
Range of working temperature and humidity ⁽³⁾	-10 ÷ 50°C / 10 ÷ 95 %RH without condensation		
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 RS485	no a qa		
Configuration and FW upgrade	USB_SET; freeware; www.regmet.cz		
Protection type	IP30 (EN 60529)		
Terminal board	CPP (wires max. 1 mm ²)		
Dimensions (H x W x L)	103 x 100 x 25 mm		

(1) he regular exposure of the CO2 sensor to a concentration of 400ppm is the condition for the correct function of the AC mode is (regular room ventilation).

More detailed information about the used CO2 sensor, type SCD30, can be found directly on the manufacturer's website http://www.sensirion.com.

(2) Because the device has some own power consumption (especially the CO2 measurement module) and the temperature sensor is part of it, the measured temperature is affected by the energy emitted by the device.

After installation of the sensor and tempering for min. 2h, the measured and actual temperature difference stabilizes at a constant value. For types with temperature measurement, the offset is preset to -2.0 $^{\circ}$ C. (this means that at the moment of connecting the supply voltage, the value on the line will be 2 $^{\circ}$ C lower than the actual value).

(3) The devices are intended for use in living room interiors.

The sensor SHT31 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.

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K2 co	onnecto	r USB n	nini B			
J6 de	evice co	onfigurat	ion			
J8 m J9a	anual r utomatio	ecalibra c calibra	tion CO tion CC	2 (MC) 2 (AC)		
Term.	1	supply	- (GNE))		
Term.	2	supply -	t alli			
Term.	3	commo	n pole (GND		
Term.	4	concent (OUT_U	tration (U2)	CO ₂	voltage	
Term.	5	concent	tration (CO ₂	current	
		(OUT_I	2)			
Term.	6	output	Γ or RH		voltage	
		(OUT_I	J1)			
Term.	7	output	f or RH		current	
		(OUT_I	1)			

Terminal 1 and terminal 3 are galvanically connected.

SW configuration:

Configuration of the sensor using the USBset program:

The function of the automatic calibration (ACDL) and the manual recalibration (MCDL):

The CO2 sensor contains optical elements, which "age" during operations and the sensor losses its accuracy. In normal living rooms, where occasional complete air exchange of the room is assumed, ageing is compensated by setting the ACDL mode, which is the automatic calibration function. This function is activated by a permanent short-circuit of the J9 connector, when the first automatic calibration takes place after 3 days and then after every week.

VIn areas, where it is not possible to use the automatic calibration function, it is advisable to occasionally use the manual recalibration function. This is done by placing sensors with a connected voltage supply into the ventilated area, preferably into an outdoor environment (CO2 content = approx. 400ppm) for at least 30 minutes. Then, the J8 connector is short-circuited and the LED flashes red.

For the type with display, M.CAL. 300 is displayed and the countdown begins. After the countdown is complete (approx. 11 minutes), M.CAL. is displayed in the top line and the red LED is permanently lit. The jumper J8 is pulled out, the red LED goes out and the sensor operates with the adjusted values.

For types without a display, after approximately 11 minutes the red LED lights up permanently, jumper J8 is removed, the red LED goes out and the sensor operates with the adjusted values.

he senor must be placed in a ventilated area for the duration of the recalibration.

The instrument is supplied calibrated from the manufacturer without any set mode. It is up to the user to choose how the calibration will take place. The majority of the users use the optimal automatic calibration function (ACDL), thereby connected to J9.

Layout of the default sensor display: (only for model with LCD)

After switching on the controller, the manufacturer's logo appears on the display for approx. 1s, then basic information about the device. Temperature



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Touch panel control:

By pressing the button \square , the drop-down menu of the device is displayed, which can be scrolled through with the \blacktriangle and $\boxed{\mathbf{v}}$ buttons. Writing to FLASH is done by pressing \square . After inactivity of the buttons for longer than 10s or by pressing $\boxed{\mathbf{e}}$ them gradually will return the display to the previous level until finally exiting the menu.

Menu - IN/OUT info Information on current setting of inputs and outputs of device

device info , information on HW and SW of the device

VAC.

LCD settings ,

With clic

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 timesetting of the active display time, after which the LCD backlight without activity on the touch panel switches 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.

Configuration of the 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 and the connected sensor is automatically connected.

	Soubor Nástroje Nastavo	ení Nápověda			
	HID ID USB HID platform 002	Device RKCHV_CZ	FW version t0.00.04	-	
	START	STOP KONFIC	SURACE READ	1	
tton "CONFIG	URATION" the o	configuration	window gets	s opened.	
RK-CHV					
Pos	uv měřené hodnoty		LCD	-Nastavaní četřiče LCD	
	plota [°C] Vlhkost [%RH]	Konc. CO2	Měřená Teplota	Podsvícení neaktivní [%] Ve dne	
602				25	
			Měřená Vlhkost	V noci	
xaT	tové pole		Měřená Vlhkost Měřená konc. CO2	V noci 10 Čas aktivního displeje [s] 5s	
Tex F	tové pole K-CHV Regmet		Měřená vlinkost Měřená konc. CO2	V noci 10 Čas aktivního displeje [5] 55	
Tex F Výs	tové pole	ud © Napětí	Měřená Vihkost Měřená konc. CO2	V noci 10 Čas aktivního displeje [s] 5s V noci 10 Čas aktivního displeje [s] 5s V noci 10 Čas aktivního displeje [s]	
Tex Fex Výs G	trové pole K-CHV Regmet tup 1 Teplota C Vinkost C Pro	ud ເ Napětí s [°C]	Výstup 2	2.5 Y nod 10 Cas aktivniho displeje [s] Čas aktivniho displeje [s] Ss Ss •	
معالی است	ttové pole tK-CHV Regmet tup 1 Teplota C VInkost C Proi stup Lo [°C] V Stup F 0 jstup Lo [°C] Výstup 0 0 10.0	ud (° Napětí i [°C] Hi [V]	Výstup Lo [V] 0.0	2.5 Y nod 10 Los aktivního displeje [s] Čas aktivního displeje [s] Ss Ss V Vistup H [spm] Sso Vistup H [spm] Sso Vistup H [v] 10.0 Lo.0	
۲۰ ۲۰۰۳ ۱۹۹۳ ۱۹۹۳ ۱۹۹۳ ۱۹۹۳ ۱۹۹۳ ۱۹۹۳ ۱۹۹۳ ۱	ttové pole tk-CHV Regmet tup 1 5 Teplota C Vlhkost C Prov stup Lo [°C] Vstup F 0 [50.0 ystup Lo [V] Vystup 0 [10.0 afety hod. [V] 0	ид (^{с.} Napětí 6 [°C] Н [<u>М</u>]	Výstup Lo [ppm] 0 Výstup Lo [ppm] 0 Výstup Lo [y] 0.0 Safety hod. [V] 0.0	2.5 Y nod 10 Cas aktivního displeje [s] Čas aktivního displeje [s] Sa Ša • V rodu • Napětí • Vstup H [ppm] 500 Výstup H [V] 10.0	

With clicking on the button "Load " the configuration values from the flash memory of sensor are read.

Načíst RK-CHV

Zapsat RK-CHV

Cancel



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- 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.

- concentration of CO2: Setting of measured CO2 offset.

LCD: (only for LCD type)

Colour setting: The required colour is separately chosen for every position in LCD.

Setting of LCD saver:

Inactive 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% **.

Inactive 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 or relative humidity):

It is selected whether this output should be for temperature or humidity.

The output signal type (voltage/current) is selected.

The input signal range is entered in the max. range $-50 \div +200^{\circ}$ C or $0 \div 100\%$, 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/humidity sensor failure.

Output 2 (concentration of CO2):

The output signal type (voltage/current) is selected.

The input signal range is entered in the max. range 0 ÷ 9999ppm, it is also possible inversely.

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 CO2 sensor failure.

Enable Menu (only for LCD type):

Menu inaccessible: Checking this will make the menu inaccessible, e.g. for hotels, schools...

CO2 indication limits (only for LCD type):

Lower limit (40065): Up to this value, the "CO2 Level Indication" on the LCD will light green. **Upper limit** (40066): From this value, the "CO2 level indication" on the LCD will light up red. For measured CO2 concentration values between these limits, the "CO2 level indication" on the LCD will light up yellow.

For the type with LED indication, the following applies:

CO2 indication limits:

Lower limit : Up to this CO2 value, the LED will light green.

Upper limit : From this CO2 value, the LED will light up red.

When the measured CO2 concentration values are between these limits, the LED will light yellow.

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-CHV**"

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-CHV".

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: $0 + 50^{\circ}C = 0 + 10V$ CO2: 0 + 5000ppm = 0 + 10V

Variation of the application part FW:

After the USBset program launching click on the Tools – BootLoader and the windows gets opened:

BootLoader			2
HW Platform	HW Version	Boot	SW Version
C:\Reg_RKCHV_L15	1_t004_CZ.rgm		
OpenFile Boot Status Soubor pro download je	DownLoad	HW Info	Cancel

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.

