CK-02X / CP-02X

CO2, TEMPERATURE AND HUMIDITY SENSORS

Characteristics:
The transmitters are designed to measure carbon dioxide concentration, temperature and, optionally, humidity in rooms and comfort ventilation ducts. They also enable direct and indirect analog control of executive ventilation devices.

version: 26/03/25

Intended Use

The transmitters measure air parameters and have direct analog control of comfort ventilation actuators (e.g. VAV controllers). The data from them can be also used for indirect control through another system. The sensors come in two versions:

1. CK-02X - for installation in the ventilation duct of comfort ventilation.
2. CP-02X - for indoors wall mounting indoors.

Both versions of sensors can optionally be equipped with:

- Humidity measurement.
- Built-in display.
- Modbus RTU communication (the transmitter is configured as SLAVE).

Properties

Parameter	Value
Power supply	24 V AC/DC (22… 28 V) < 2 VA
CO_2 measurement range	0… 2000 ppm
CO_2 measurement accuracy	Standard. ±40 ppm +3% of the reading
Long-term stability	year 2% FS (automatic calibration)
Temperature measuring range	0… 50°C
Temperature measurement accuracy	±0,5°C
Humidity measurement range*	0… 100%rH
Humidity measurement accuracy	±2%rH
Probe	Ø10 mm x 110 mm; insulaton < 75 mm
Cable gland	M16
Control voltage	0… 10 V / 2… 10 V
Control current	2 mA
Communication	Modbus RTU
Working conditions – temperature	0… 50°C
Working conditions – humidity	0… 85%rH (non-condensing)
Storage temperature	-20… 70°C
Wire clamps	1,5mm2, screw clamps
Housing	IP54, cable inlet directed downwards
Dimensions (width x height x depth)	105 x 104 x 155 mm

Dimensions

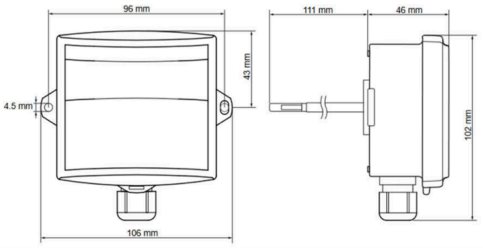


Figure 1. Device dimensions

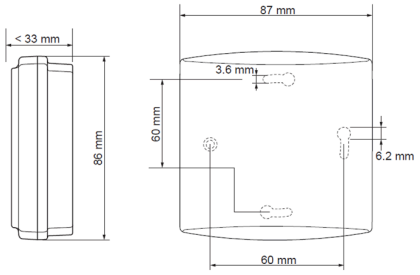


Figure 2. Device dimensions.

Operating Principle

Sensors are equipped with voltage analog outputs (0-10VDC) corresponding to the number of measured parameters. A big advantage of this devices is that each transmitter has an active ABCLogic™ self-calibration method, which eliminates the possibility of zero point drift. The ABCLogic™ function can be disabled using the configuration tool. The current voltage level of the analog output associated with a given parameter informs about it's current value within the assigned measurement range scaled to the voltage output range. In practice, scaling looks like this:

- Measurement range for CO_2 concentration is 0ppm to 2000ppm.
- Range of the voltage output associated with the CO_2 concentration measurement is 0V to 10V.
- In the room, CO_2 concentration changed from 600ppm to 1000ppm.
- Value of the voltage output associated with the CO_2 measurement changed from 3V to 5V at the same time.

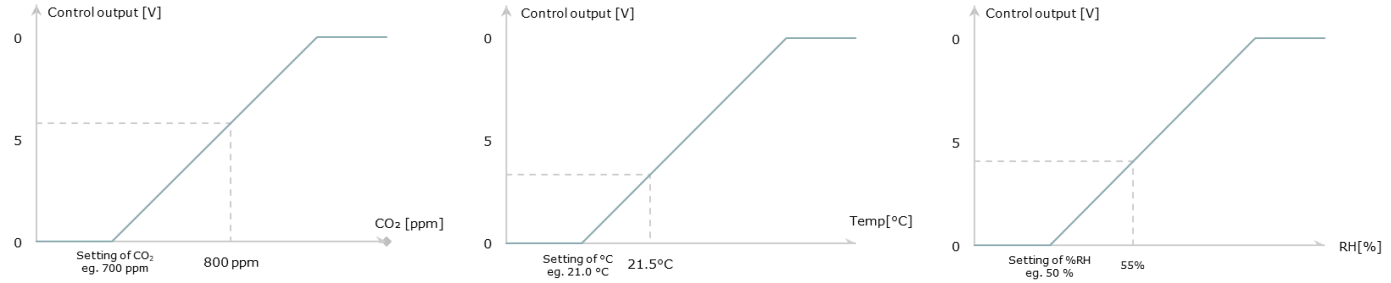
The transmitters also have a control output, default regulation by CO_2 concentration. The lower limit of the control output is set to 400ppm by default. In the case of the upper limit, you can choose one of three values: 1000ppm (default value), 1200ppm and 1400ppm.

It is possible to change the control parameter or use all three parameters for control simultaneously. In this case, the output signal is shaped according to the measurement that needs the highest control value.

Optionally, the transducer has additional settings:

- control signal range (0-10V, 2-10V or 0-5V),
- direction of the control output,
- control type (P or PI).
- setpoint value of the control parameter (CO_2 concentration, temperature, humidity).

User can change settings not included in the order code using the configuration tool and via MODBUS RTU communication if the sensor version supports this communication protocol.



CO_2 = 6V
Temperature = 3V
Humidity = 4V
} Control output = 6V

Installation

Only qualified specialists can connect and configure the device. All connections must only be made when the power supply is off.

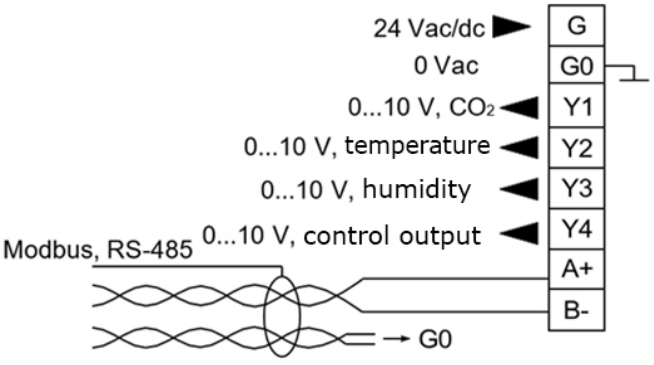


Figure 3. Wiring diagram

There must be the same supply voltage potential in the sensor and connected 24 V AC actuators.

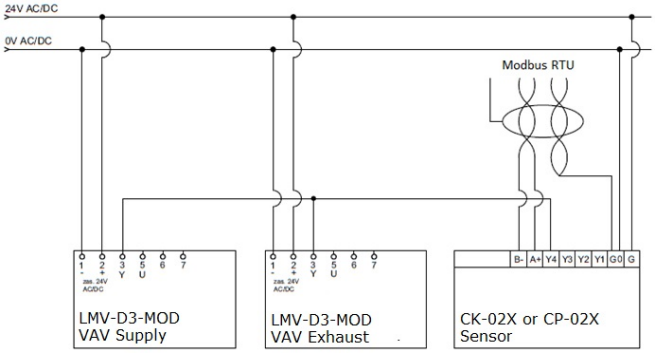


Figure 4. Connections for the CK-02X or CP-02X sensors without the iFlow system

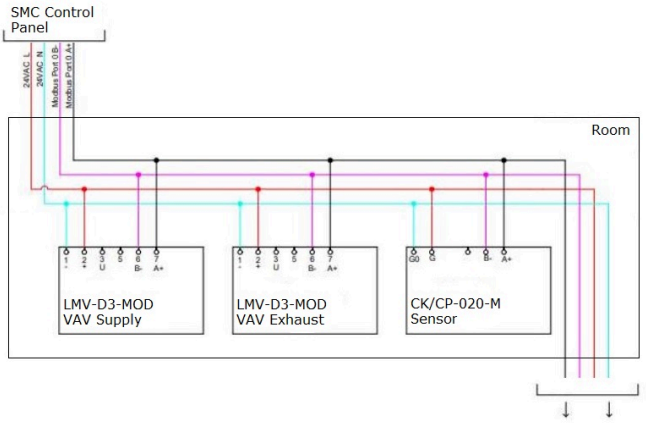


Figure 5. Connections for the CK-02X or CP-02X sensor with iFLOW system

Assembly

The CK-02X sensor is intended for installation on ventilation ducts (usually exhaust) with a measuring lance inside the duct. The CP-02X sensor is designed for wall mounting in a room. It is important that the CP-02X sensor must be placed in area with proper measurement of actual air parameters.

Communication

Sensors with MODBUS RTU communication support are characterized by the following transmission parameters and enable reading and writing described flags and registers.

Table 1. Communication paremeters

COMMUNICATION PROPERTIES			
Type	**Parameters(*factory settings)**		
Protocol	RS-485 Modbus RTU		
BaudRate	9600*	19200	38400
Data Bits	8		
Parity	None*	Odd	Even
Stop Bits	1		
Devices Quantity	Max 128 per segment		
SUPPORTED MODBUS RTU FUNCTION CODES			
Code	**Function**		
0x01	Read Coils		
0x02	Read Discrete Inputs		
0x03	Read Holding Registers		
0x04	Read Input Registers		
0x05	Write Single Coil		
0x06	Write Single Register		
0x0F	Write Multiple Coils		
0x10	Write Multiple Registers		
0x17	Read/Write Multiple Registers		

Table 2. Accessible read-only discrete inputs

DISCRETE INPUTS (READ-ONLY)					
Address	**Parameter description**	**Data type**	**Values**	**Range**	**Default**
10001	Relay state	Bit	0; 1	0. Off 1. On	-

Table 3. Accessible read-write coils

COILS (READ-WRITE)					
Address	**Parameter description**	**Data type**	**Values**	**Range**	**Default**
1	Output overdrive activation Y1	Bit	0; 1	0. Off 1. On	0
2	Output overdrive activation Y2	Bit	0; 1	0. Off 1. On	0
3	Output overdrive activation Y3	Bit	0; 1	0. Off 1. On	0
4	Output overdrive activation Y4	Bit	0; 1	0. Off 1. On	0
5	Relay overdrive activation	Bit	0; 1	0. Off 1. On	0
6	Relay overdrive	Bit	0; 1	0. Off 1. On	0
7	Controller output direction	Bit	0; 1	0. Direct 1. Reverse	0

Table 4. Accessible read-only input registers

INPUT REGISTERS (READ-ONLY)					
Address	**Parameter description**	**Data type**	**Values**	**Range**	**Default**
30001	CO2 measurement	Signed 16	400…2 000	400…2 000 ppm	-
30002	Temperature measurement	Signed 16	0…500	0,0…50,0°C	-
30003	Humidity measurement	Signed 16	0…100	0…100%rH	-
30004	Output voltage level Y1	Unsigned 16	0…1000	0,00…10,00 V	-
30005	Output voltage level Y2	Unsigned 16	0…1000	0,00…10,00 V	-
30006	Output voltage level Y3	Unsigned 16	0…1000	0,00…10,00 V	-
30007	Output voltage level Y4	Unsigned 16	0…1000	0,00…10,00 V	-

Table 5. Accessible read-write holding registers

HOLDING REGISTERS (READ-WRITE)					
Address	**Parameter description**	**Data type**	**Values**	**Range**	**Default**
40001	Output overdrive Y1	Signed 16	0…1000	0…10,00 V	0
40002	Output overdrive Y2	Signed 16	0…1000	0…10,00 V	0
40003	Output overdrive Y3	Signed 16	0…1000	0…10,00 V	0
40004	Output overdrive Y4	Signed 16	0…1000	0…10,00 V	0
40005	Tuning (correction) CO2 measurement	Signed 16	-200…200	-200…200 ppm	0
40006	Tuning (correction) temperature measurement	Signed 16	-30…30	-3,0…3,0°C	0
40007	Tuning (correction) humidity measurement	Signed 16	-5…5	-5…5%rH	0
40008	Control method	Signed 16	0; 1	0. P 1. PI	1
40009	Controller output type	Signed 16	0; 1; 2; 3; 4	0. Nieużywane 1. CO2 2. Temperatura 3. Wilgotność 4. Wszystkie	1
40010	Setpoint, CO2	Signed 16	400…2 000	400…2 000 ppm	700
40011	Setpoint, temperature	Signed 16	0…500	0,0…50,0°C	210
40012	Setpoint, humidity	Signed 16	0…100	0…100%rH	50
40013	Proportional band, CO2	Signed 16	100…2 000	100…2 000 ppm	500
40014	Proportional band, temperature	Signed 16	10…320	1,0…32,0°C	20
40015	Proportional band, humidity	Signed 16	10…100	10…100%rH	50
40016	Integration time	Signed 16	50…5000	50…5000 s	300
40017	Relay setpoint, CO2	Signed 16	400…2 000	400…2 000 ppm	1100
40018	Relay hysteresis, CO2	Signed 16	0…100	0…100 %	5
40020	Unused	Signed 16	-	-	1
40021	Unused	Signed 16	-	-	0
40022	Relay setpoint, temperature	Signed 16	0…500	0,0…50,0°C	230
40023	Relay hysteresis, temperature	Signed 16	0…200	0,0…20,0°C	20
40024	Relay setpoint, humidity	Signed 16	0…100	0…100%rH	50
40025	Relay hysteresis, humidity	Signed 16	0…50	0…50%rH	5
40026	Relay function	Signed 16	0; 1; 2; 3; 4	0. Nieużywane 1. CO2 2. Temperatura 3. Wilgotność 4. Wszystkie	1
40027	Controller output range Y1…Y4	Signed 16	0; 1; 2	0. 0…10 V 1. 2…10 V 2. 0…5 V	0
40028	Controller output constant level	Signed 16	0; 1; 2; 3; 4; 5	0. Wył. 1. 100 % 2. 75 % 3. 50 % 4. 25 % 5. 0%	0
40029	Control output constant level timer	Signed 16	0; 1; 2; 3	0. 6 h 1. 12 h 2. 24 h 3. Ręcznie	1

CP-02X – Room sensor

When ordering, please provide information as follows:

CP-02<X>-<W>-<M><F>-<V><K>

Where:

X	Humidity measurement	
	0	**- No humidity measurement**
	1	- Humidity measurement
W	Display*	
	none	**- No display**
	W	- With display
M	Modbus RTU communication*	
	none	**- No Modbus RTU communication**
	M	- Modbus RTU communication
F	Use regime*	
	none	**- Version intended for using outside the iFlow system (default setting)**
	adres (3,6,9… etc)	- The iFlow address number
V	Output signal*	
	none	**- 0–10 V (default setting)**
	V	- 2-10V
K	Upper ppm limit (for which the control output reaches its maximum)*	
	brak	**- 1000 ppm (default setting)**
	1	- 1200 ppm
	2	- 1400 ppm

* Optional values – if not specified, the default values will be used

Sample order: **CP-021-W-V2**

CK-02X – Duct sensor

When ordering, please provide information as follows:

CK-02 <X>-<M><F>-<V><K>

Where:

X	Humidity measurement	
	0	**- No humidity measurement**
	1	- Humidity measurement
M	Modbus RTU communication*	
	none	**- No Modbus RTU communication**
	M	- Modbus RTU communication
F	Use regime*	
	none	**- Version intended for using outside the iFlow system (default setting)**
	address (3,6,9..etc)	- The iFlow address number
V	Output signal*	
	none	**- 0-10 V (default setting)**
	V	- 2-10 V
K	Upper ppm limit (for which the control output reaches its maximum)*	
	none	**- 1000 ppm (default setting)**
	1	- 1200 ppm
	2	- 1400 ppm

* Optional values – if not specified, the default values will be used

Sample order: **CK-020-M3**