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USER GUIDE

HDK

Produal

Distributed by AKRIBIS



HDK - Duct CO_2 transmitter / controller

User Guide

This user guide is for devices with the software version 1.0.10 or newer.

PRODUAL
measure-be sure.

Contents

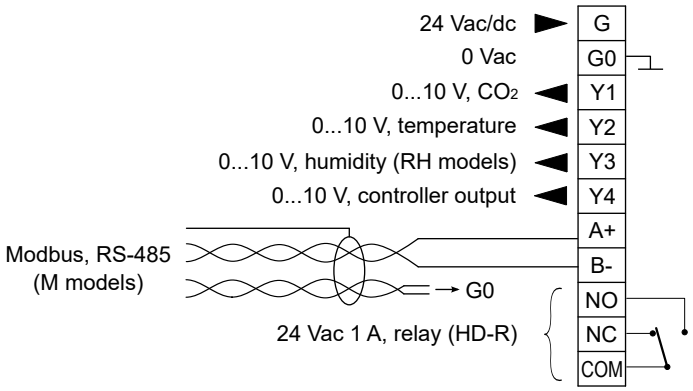
1 Commissioning.....3
1.1 Wiring.....3
1.2 Selecting information to be viewed on the display.....3
1.3 Calibration.....3
1.4 ML-SER tool.....4
1.4.1 Connecting ML-SER tool to the device.....4
1.4.2 ML-SER menu.....4

2 Modbus.....12
2.1 Modbus properties.....12
2.2 Terminating Modbus.....12
2.3 Modbus function codes.....12
2.4 Modbus registers.....13
2.4.1 Coils.....13
2.4.2 Discrete inputs.....13
2.4.3 Input registers.....13
2.4.4 Holding registers.....14

1 Commissioning

1.1 Wiring

CAUTION **CAUTION:** Device wiring and commissioning can only be carried out by qualified professionals. Always make the wirings while the power is switched off.

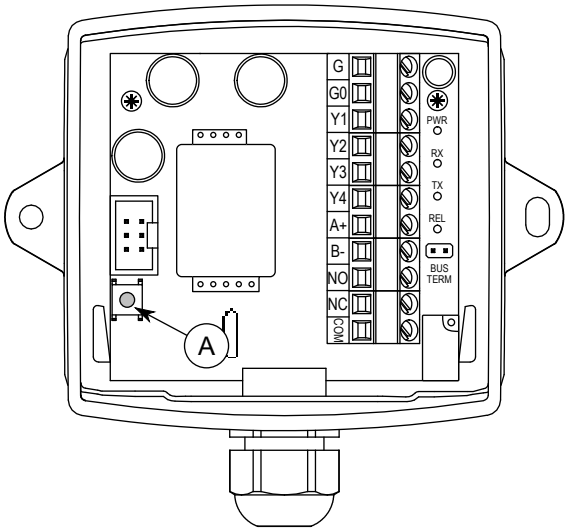


1.2 Selecting information to be viewed on the display

The measurement values scroll on the N model display by default.

NOTE **Note:** In M models, the shown measurement information can be selected also via Modbus.

- Press the S1 button to stop the scrolling to the currently displayed value.



A. S1 button

- Press the S1 button again to start the scrolling.

1.3 Calibration

The device uses automatic CO_2 measurement calibration function (ABC algorithm). The function eliminates the possible long term drift. The automatic calibration function can be used when the CO_2 concentration drops at least two times within a week to the level of approximately 400 ppm. Therefore the automatic calibration is effective in spaces that are not continuously occupied.

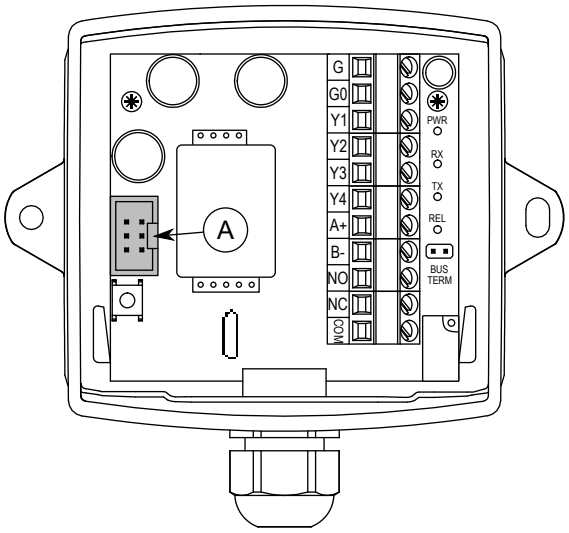
The automatic calibration function can be deactivated in continuously occupied spaces by using ML-SER tool.

If the automatic calibration function is not in use, the device should be calibrated every 6-12 months. The recommended calibration interval is 5 years even if the automatic calibration is in use.

1.4 ML-SER tool

1.4.1 Connecting ML-SER tool to the device

1. Open the cover.
2. Disconnect the display cable.
3. Connect the ML-SER cable to the display connector.



A. Display connector

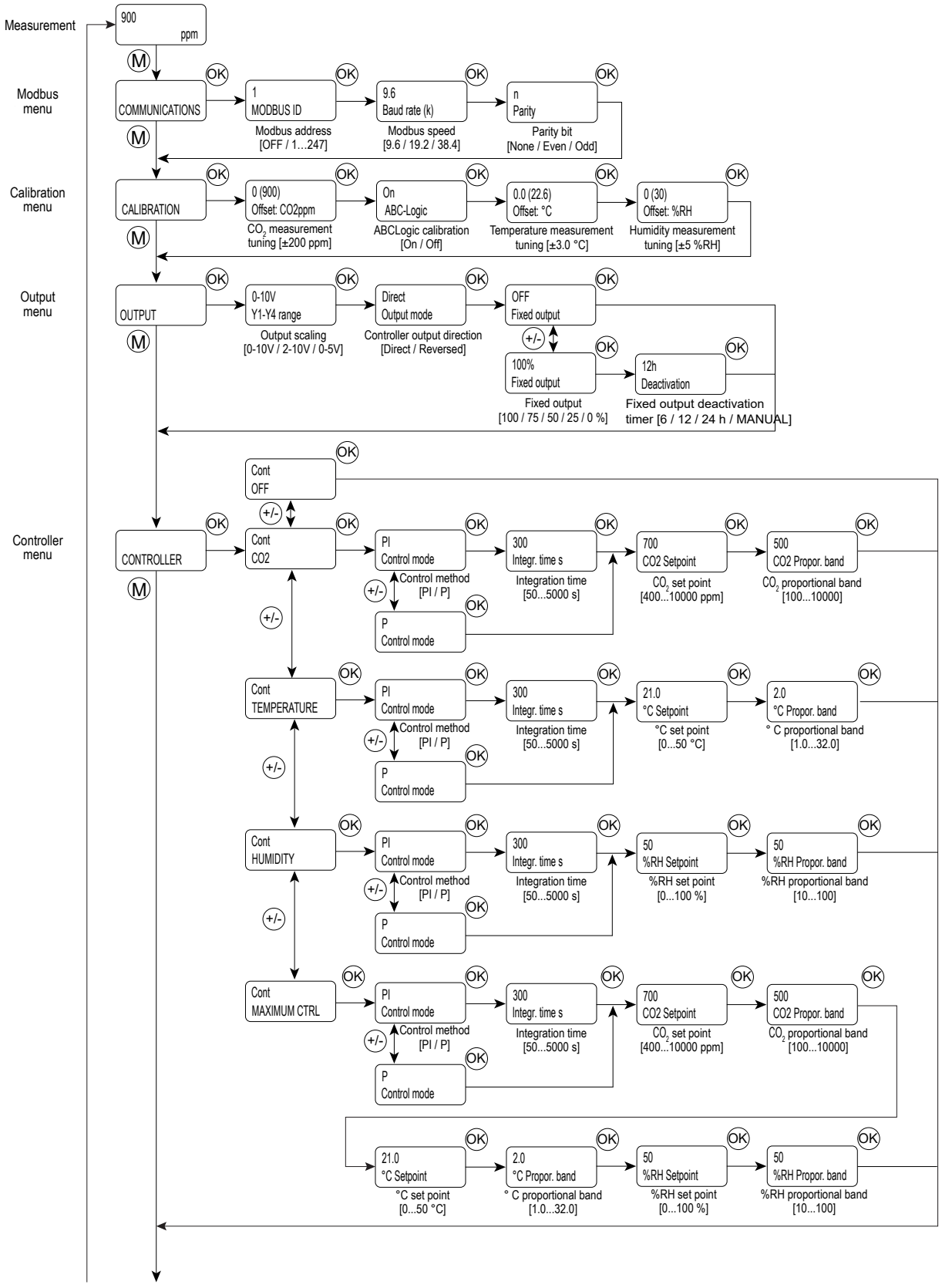
1.4.2 ML-SER menu

ML-SER menu opens by pressing the M button. The values can be changed with the ”+” and ”-” buttons. The menu is device-specific and the content depends on the device and installed options.

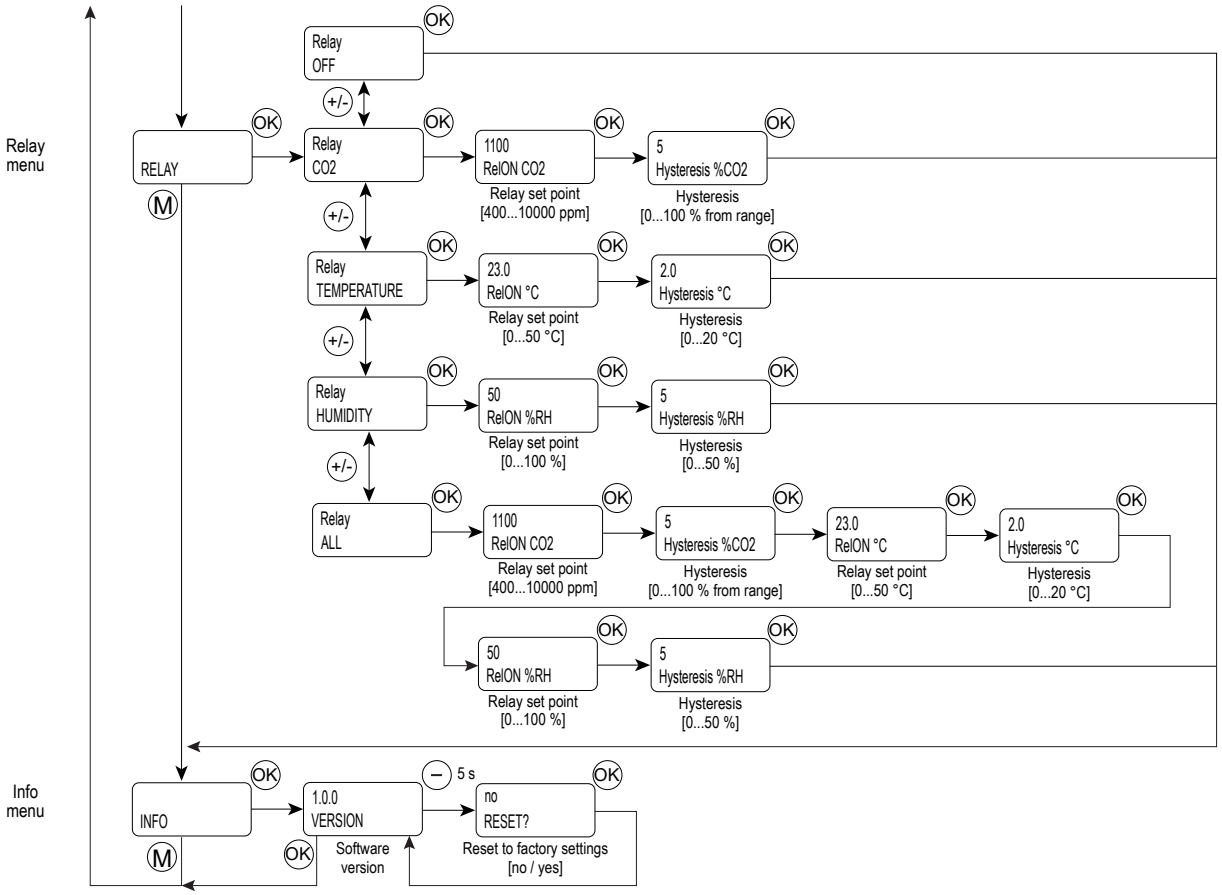
The following menu structure contains the factory settings.

NOTE **Note:** The default relay CO_2 set point is 2500 ppm in 10K models.

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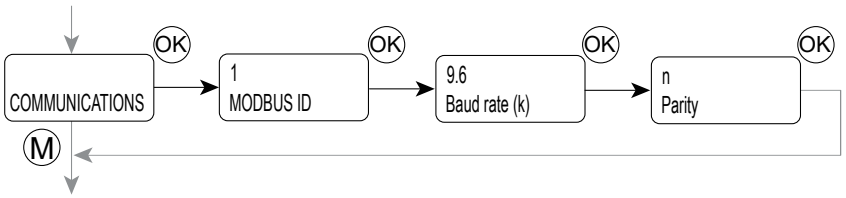


The diagram continues on the next page.



1.4.2.1 Communication menu

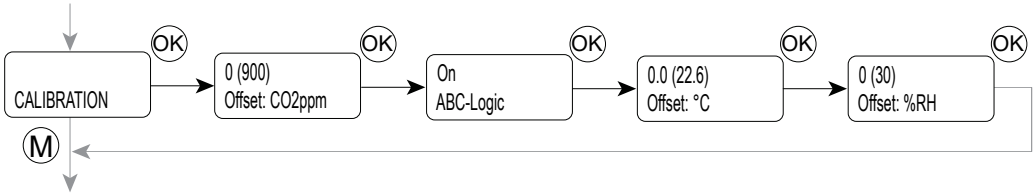
Modbus menu is available in M models.



Parameter	Available values	Description
MODBUS ID	*OFF / 1...247*	Modbus address.
Baud rate (k)	*9.6 / 19.2 / 34.8*	Modbus speed (kbit/s).
Parity	*n / E / O*	Parity bit. *n* None *E* Even *O* Odd

1.4.2.2 Calibration menu

All the measurements can be tuned through the calibration menu.

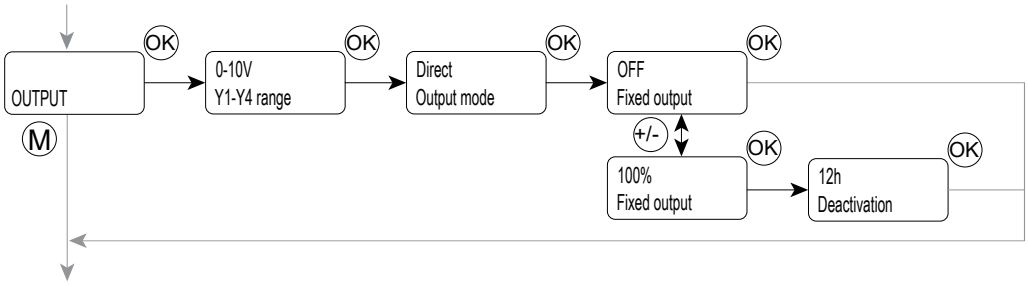


Parameter	Available values	Description
Offset CO2ppm	*-200...200*	CO_2 measurement tuning. The value can be adjusted by 10 ppm steps.
ABC-Logic	*On / Off*	Automatic calibration function (On/Off).
Offset °C	*-3,0...3,0*	Temperature measurement tuning. The value can be adjusted by 0,1 °C steps.
Offset %RH	*-5...5*	Humidity measurement tuning, RH models. The value can be adjusted by 1 % steps.

ML-SER tool display shows how much the current value is tuned. The measured value is shown in brackets after the tuning value.

1.4.2.3 Output menu

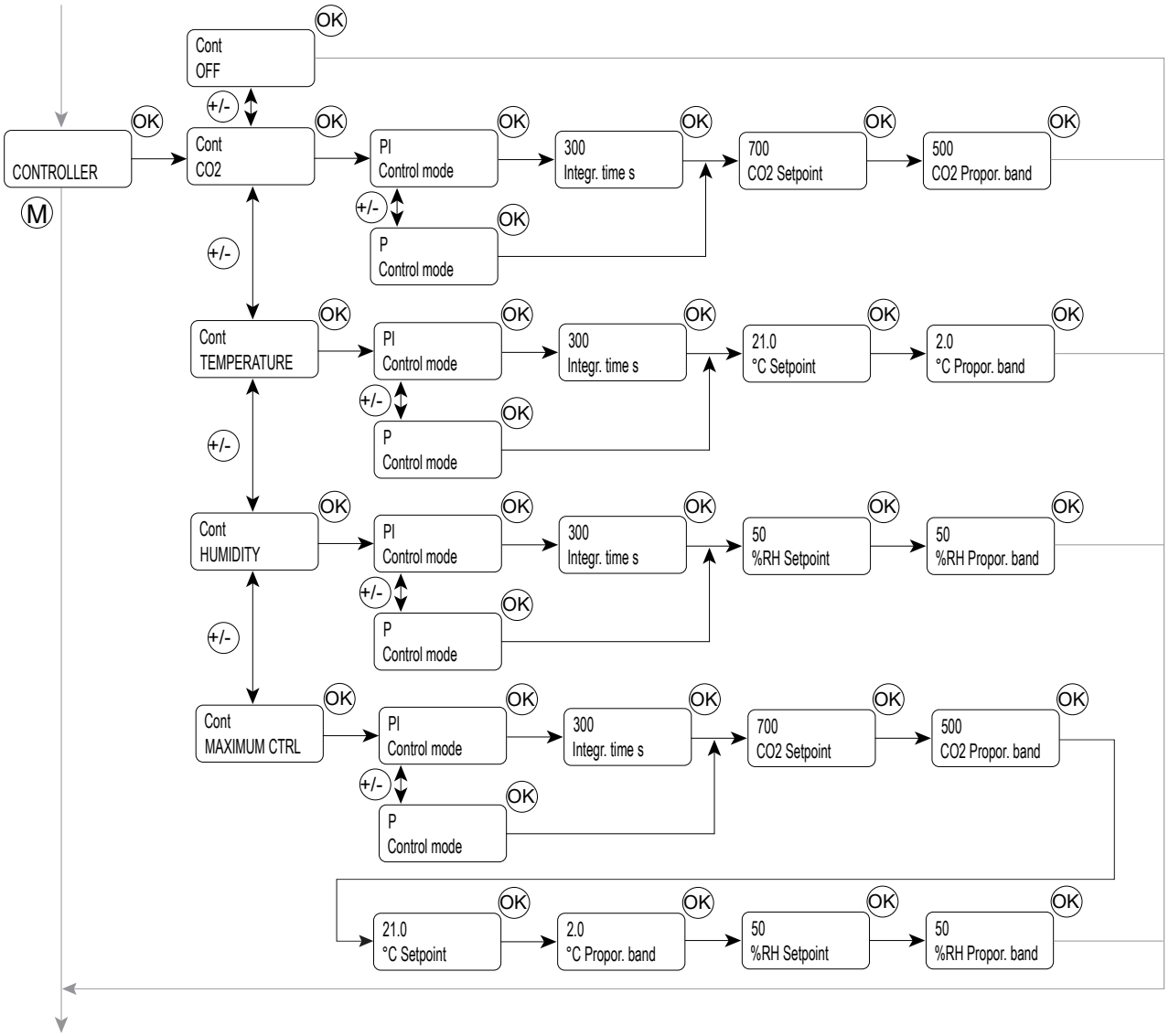
You can change the output scaling of all outputs and the controller output direction through the output menu. Also, the fixed controller output value and duration can be selected through the menu.



Parameter	Available values	Description
Y1-Y4 range	*0-10V / 2-10V / 0-5V*	Output scaling.
Output mode	*Direct / Reversed*	Controller output direction.
Fixed output	*OFF / 100% / 75% / 50% / 25% / 0%*	Fixed output.
Deactivation	*6h / 12h / 24h / MANUAL*	Fixed output deactivation timer.

1.4.2.4 Controller menu

The control output can be controlled either according to a one measurement value or according to the maximum selection of all values.

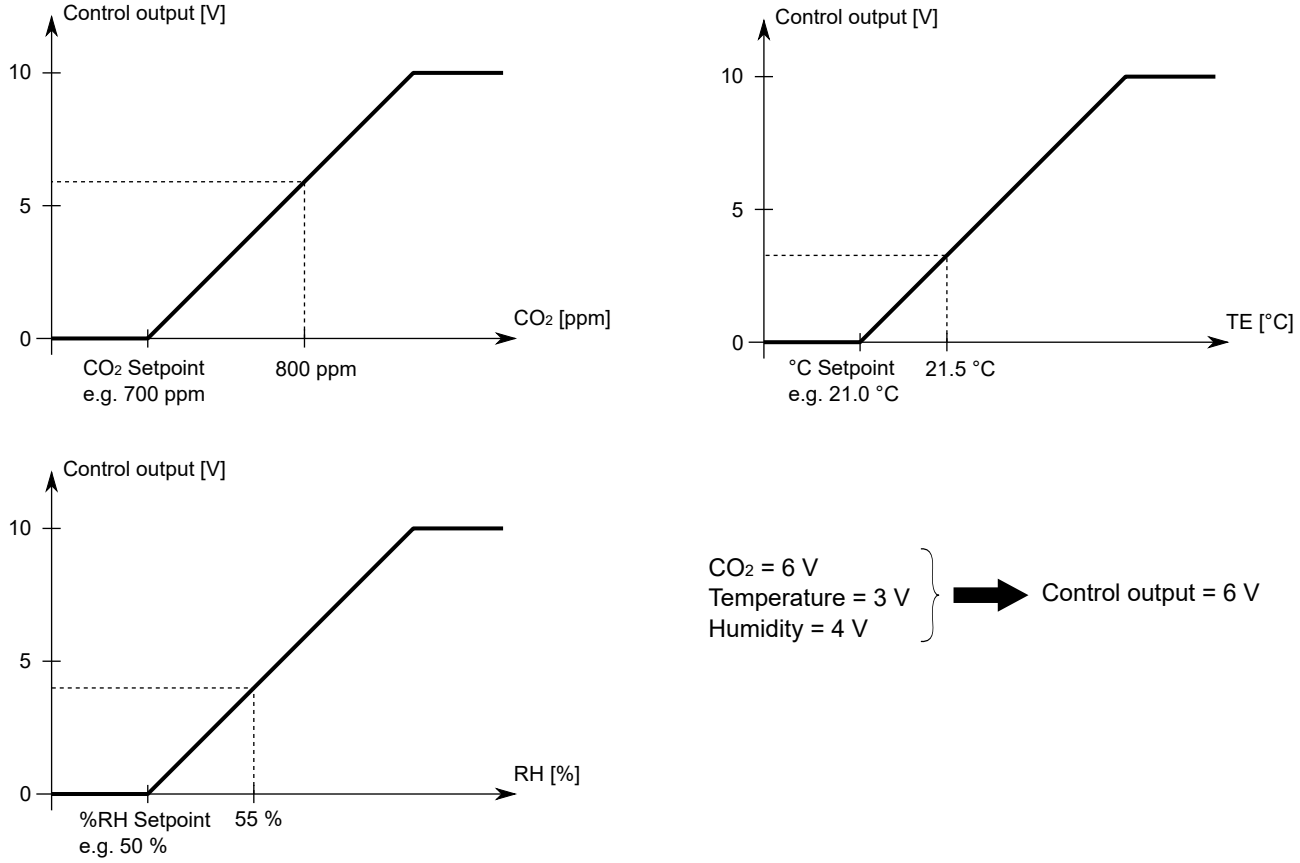


Parameter	Available values	Description
Cont	*OFF / CO2 / TEMPERATURE / HUMIDITY / MAXIMUM CTRL*	Controlled value. *OFF* — Controller off *CO2* — CO_2 *TEMPERATURE* — Temperature *HUMIDITY* — Relative humidity, RH models *MAXIMUM CTRL* — Maximum selection control. See more details after the table.
Control mode	*P / PI*	Control method.
Integr. time s	*50...5000*	Integration time (s).
CO2 Setpoint	*400...10000*	Set point for CO_2 (ppm). The value can be adjusted by 10 ppm steps.
CO2 Propor. band	*100...10000*	Proportional band for CO_2 (ppm). The value can be adjusted by 10 ppm steps.
°C Setpoint	*0...50.0*	Set point for temperature (°C). The value can be adjusted by 0,1 °C steps.
°C Propor. band	*1.0...32.0*	Proportional band for temperature (°C). The value can be adjusted by 0,1 °C steps.

Parameter	Available values	Description
%RH Setpoint	*0...100*	Set point for humidity (%rH), RH models. The value can be adjusted by 5 % steps.
%RH Propor. band	*10...100*	Proportional band for humidity (%rH), RH models. The value can be adjusted by 5 % steps.

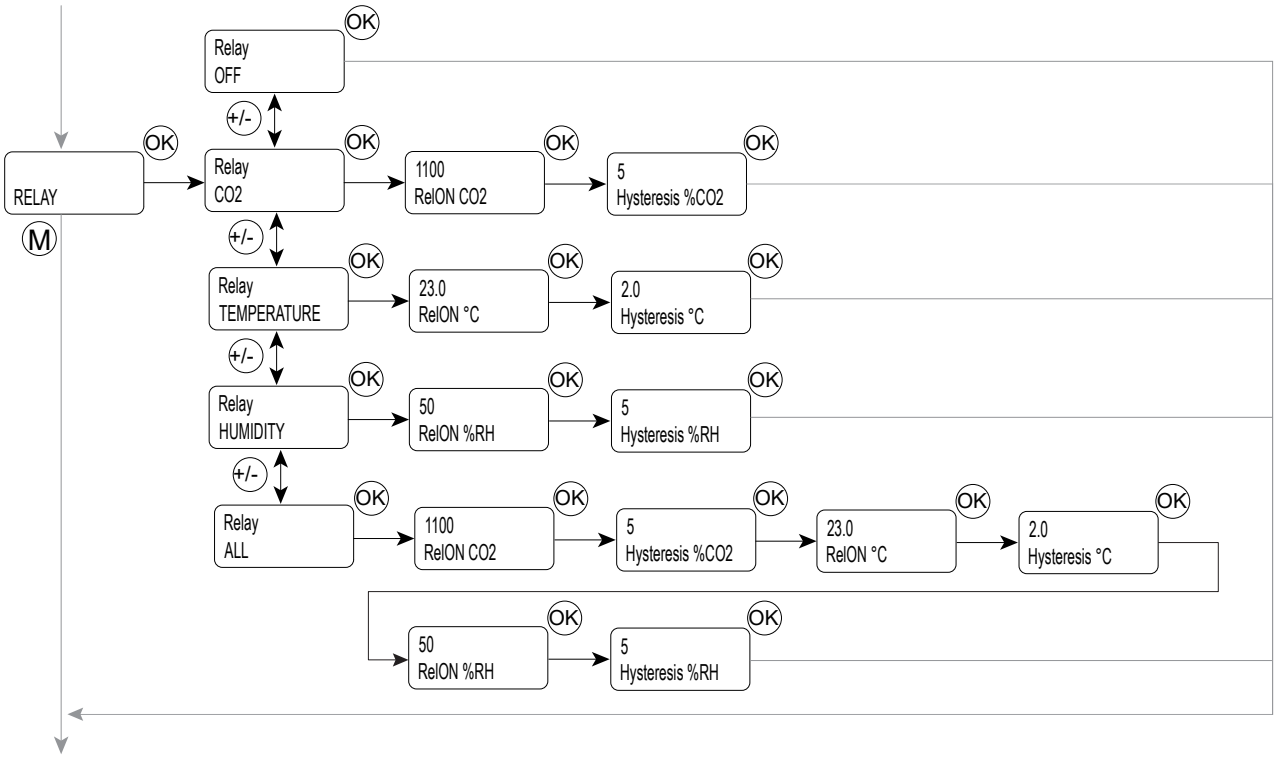
In the maximum selection control, the control output signal is formed according to the measurement that causes the largest control signal value. The following situation is described in the example figure:

- Carbon dioxide concentration is 800 ppm.
- Temperature is 21.5 °C.
- Relative humidity is 55 %.



1.4.2.5 Relay menu

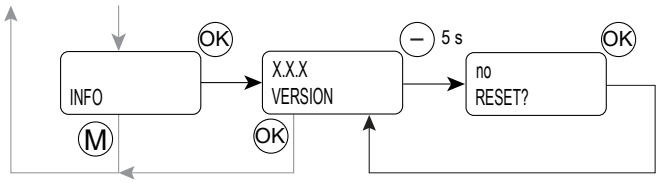
Relay menu is available if HD-R option is installed. The relay switching point and hysteresis can be changed through the menu.



Parameter	Available values	Description
Relay	*OFF / CO2 / TEMPERATURE / HUMIDITY / ALL*	Relay control value. *OFF* — Controller off *CO2* — CO_2 *TEMPERATURE* — Temperature *HUMIDITY* — Relative humidity *ALL* — All values. When the relay is controlled according to the all values, the relay activates when one measured value exceeds the set point.
RelON CO2	*400...10000*	Set point for CO_2 (ppm). The value can be adjusted by 10 ppm steps. NOTE **Note:** The default relay CO_2 set point is 2500 ppm in 10K models.
Hysteresis %CO2	*0...100*	Hysteresis for CO_2 (% from range). The value can be adjusted by 1 % steps.
RelON °C	*0...50.0*	Set point for temperature (°C). The value can be adjusted by 0,1 °C steps.
Hysteresis °C	*0.0...20.0*	Hysteresis for temperature (°C). The value can be adjusted by 0,1 °C steps.
RelON %RH	*0...100*	Set point for humidity (%rH). The value can be adjusted by 5 % steps.
Hysteresis %RH	*0...50*	Hysteresis for humidity (%rH). The value can be adjusted by 1 % steps.

1.4.2.6 Info menu

You can check the device software version and reset the device to factory settings through the menu.



Parameter	Available values	Description
VERSION	*X.X.X*	Device software version.
RESET?	*no / yes*	Reset to factory settings.

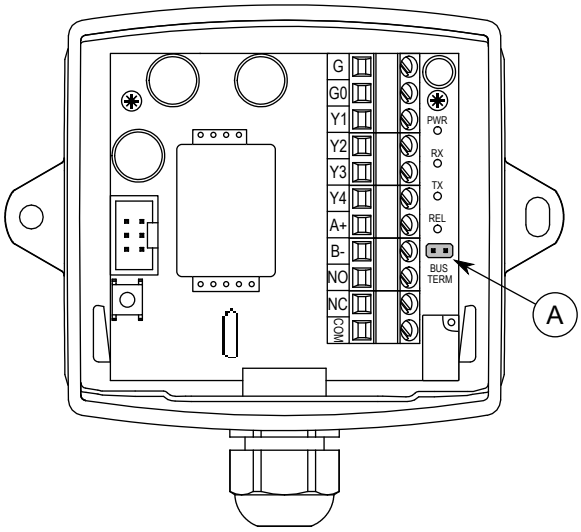
2 Modbus

2.1 Modbus properties

Protocol	RS-485 Modbus RTU
Bus speed	9600*/19200/38400 bit/s
Data bits	8
Parity	none*/odd/even
Stop bits	1
Network size	up to 128 devices per segment
	* factory setting

2.2 Terminating Modbus

1. Open the cover.
2. Place the termination jumper.



A. Termination jumper

2.3 Modbus function codes

The device supports the following Modbus function codes.

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

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2.4 Modbus registers

NOTE **Note:** If you try to write a parameter value that is beyond the parameter value range, the value will be replaced by the nearest acceptable value.

Example:

1. The register value range is -500…500.
2. You try to write the value 600 to the register.
3. The value 500 is written to the register.

2.4.1 Coils

Register	Parameter description	Data type	Values	Range	Default
1	Y1 output overdrive activation	Bit	0 - 1	0. Off 1. On	0
2	Y2 output overdrive activation	Bit	0 - 1	0. Off 1. On	0
3	Y3 output overdrive activation	Bit	0 - 1	0. Off 1. On	0
4	Y4 output overdrive activation	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. Reversed	0

2.4.2 Discrete inputs

Register	Parameter description	Data type	Values	Range
10001	Relay status	Bit	0 - 1	0. Off 1. On

2.4.3 Input registers

Register	Parameter description	Data type	Values	Range
30001	CO_2 measurement	Signed 16	400...10000	400...10000 ppm
30002	Temperature measurement	Signed 16	0...500	0,0...50,0 °C
30003	Humidity measurement	Signed 16	0...100	0...100 %rH
30004	Y1 output voltage	Unsigned 16	0...1000	0,00…10,00 V
30005	Y2 output voltage	Unsigned 16	0...1000	0,00…10,00 V
30006	Y3 output voltage	Unsigned 16	0...1000	0,00…10,00 V
30007	Y4 output voltage	Unsigned 16	0...1000	0,00…10,00 V

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2.4.4 Holding registers

Register	Parameter description	Data type	Values	Range	Default
40001	Y1 output overdrive	Signed 16	0...1000	0...10,00 V	0
40002	Y2 output overdrive	Signed 16	0...1000	0...10,00 V	0
40003	Y3 output overdrive	Signed 16	0...1000	0...10,00 V	0
40004	Y4 output overdrive	Signed 16	0...1000	0...10,00 V	0
40005	CO_2 measurement tuning (offset)	Signed 16	-200...200	-200...200 ppm	0
40006	Temperature measurement tuning (offset)	Signed 16	-30...30	-3,0...3,0 °C	0
40007	Humidity measurement tuning (offset)	Signed 16	-5...5	-5...5 %rH	0
40008	Control method	Signed 16	0 - 1	0. P 1. PI	1
40009	Controller output	Signed 16	0 - 1 - 2 - 3 - 4	0. Not in use 1. CO_2 2. Temperature 3. Humidity 4. Maximum selection	1
40010	Set point, CO_2	Signed 16	400...10000	400...10000 ppm	700
40011	Set point, temperature	Signed 16	0...500	0,0...50,0 °C	210
40012	Set point, humidity	Signed 16	0...100	0...100 %rH	50
40013	Proportional band, CO_2	Signed 16	100...10000	100...10000 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 set point, CO_2	Signed 16	400...10000	400...10000 ppm	1100 *)
40018	Relay hysteresis, CO_2	Signed 16	0...100	0...100 %	5
40019	Value shown on the display	Signed 16	0 - 1 - 2 - 3	0. CO_2 1. Temperature 2. Humidity 3. Scrolling	3
40020	Not in use	Signed 16	-	-	1
40021	Not in use	Signed 16	-	-	0
40022	Relay set point, 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 set point, 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. Not in use 1. CO_2 2. Temperature 3. Humidity 4. All	1
40027	Y1…Y4 output range	Signed 16	0 - 1 - 2	0. 0...10 V 1. 2...10 V 2. 0...5 V	0

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Regis-ter	Parameter description	Data type	Values	Range	Default
40028	Fixed control output	Signed 16	0 - 1 - 2 - 3 - 4 - 5	0. Off 1. 100 % 2. 75 % 3. 50 % 4. 25 % 5. 0 %	0
40029	Fixed control output timer	Signed 16	0 - 1 - 2 - 3	0. 6 h 1. 12 h 2. 24 h 3. Manual	1

*) The default relay CO_2 set point is 2500 ppm in 10K models.

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