

INTRODUCTION

Thank you for choosing an HK Instruments CDT-MOD-2000 series carbon dioxide transmitter. The CDT-MOD-2000 series is intended for use in commercial environments in HVAC/R applications. The CDT-MOD-2000 series measures carbon dioxide (CO₂), utilizing the industry standard NDIR measurement principle, and temperature (T). Optional relative humidity (rH) measurement is also available in the same device. The CDT-MOD-2000 series devices are available with large touchscreen display making the configuration of the device quick and easy. Configuration is also possible via Modbus network.

The CDT-MOD-2000 series transmitters calibrate themselves automatically using ABC™ logic. The ABC™ logic requires that the space in which the transmitter is used needs to be unoccupied for four hours per day so that the indoor CO₂ concentration drops to the outside level. CDT-MOD-2000-DC is a dual channel model with a measuring channel and a reference channel that makes a continuous comparison and the necessary adjustment accordingly. CDT-MOD-2000-DC is also suitable for buildings that are continuously occupied.

APPLICATIONS

CDT-MOD-2000 series devices are commonly used to monitor:

- CO₂ and humidity levels in offices, public spaces, meeting rooms and classrooms
- CO₂ levels of return air in ventilation systems
- incoming air and return air humidity levels in ventilation system

⚠ WARNING

- READ THESE INSTRUCTIONS CAREFULLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THIS DEVICE.
- Failure to observe safety information and comply with instructions can result in PERSONAL INJURY, DEATH AND/OR PROPERTY DAMAGE.
- To avoid electrical shock or damage to equipment, disconnect power before installing or servicing and use only wiring with insulation rated for full device operating voltage.
- To avoid potential fire and/or explosion do not use in potentially flammable or explosive atmospheres.
- Retain these instructions for future reference.
- This product, when installed, will be part of an engineered system whose specifications and performance characteristics are not designed or controlled by HK Instruments. Review applications and national and local codes to assure that the installation will be functional and safe. Use only experienced and knowledgeable technicians to install this device.

SPECIFICATIONS

Performance

Measurement ranges:

CO₂: 400–2000 ppm
Temperature: 0...50 °C
Relative humidity: 0–100 %

Accuracy:

CO₂: ±40 ppm + 2 % of reading, DC model: 75 ppm or 10 % of reading (whichever is greater)
Temperature: <0.5 °C
Relative humidity: ±2...3 % at 0...50 °C and 10–90 % rH
Total error band includes accuracy, hysteresis and temperature effect over 5...50 °C and 10–90% rH.

Technical Specifications

Media compatibility:

Dry air or non-aggressive gases

Measuring units:

ppm, °C and % rH

Measuring element:

CO₂: Non-dispersive infrared (NDIR)
Temperature: Pt1000

Relative humidity: Thermoset polymer capacitive sensing element

Calibration:

Automatic self-calibration ABC Logic™ or continuous comparison (DC)

Environment:

Operating temperature: 0...50 °C
Storage temperature: -20...70 °C
Humidity: 0 to 95 % rH, non condensing

Physical

Dimensions:

Case: 99 x 90 x 32 mm

Weight:

150 g

Mounting:

3 screw holes slotted, 3.8 mm

Materials:

Case: ABS

Protection standard:

IP20

Display (Optional)

Touchscreen

Size: 77.4 x 52.4 mm

Electrical connections:

Power supply:

5-screw terminal block
(24 V, GND)
0.2–1.5 mm² (12–24 AWG)

Relay out:

3-screw terminal block
(NC, COM, NO)
0.2–1.5 mm² (12–24 AWG)

Electrical

Input:

24 VAC or VDC, ±10 %
Current consumption: max 90 mA (at 24 V) +
10 mA for each voltage output or 20 mA for
each current output

Relay out:

SPDT Relay, 250 VAC / 30 VDC / 6 A
Adjustable switching point and hysteresis

- humidity in various industrial applications
- temperatures in HVAC/R environment
- CDT-MOD-2000-DC series devices can also be used in applications where there is a constant source of carbon dioxide present (for example hospitals and greenhouses)

One analog output for selected media:

0/2–10 VDC, Load R minimum 1 kohm or
4–20 mA, maximum load 500 ohm

Communication

Protocol: MODBUS over Serial Line

Transmission Mode: RTU

Interface: RS485

Byte format (11 bits) in RTU mode:

Coding System: 8-bit binary

Bits per Byte:

1 start bit
8 data bits, least significant bit sent
first
1 bit for parity
1 stop bit

Baud rate: selectable in configuration

Modbus address: 1–247 addresses selectable in
configuration menu

Conformance

Meets requirements for CE marking:

EMC Directive 2014/35/EU

RoHS Directive 2011/65/EU

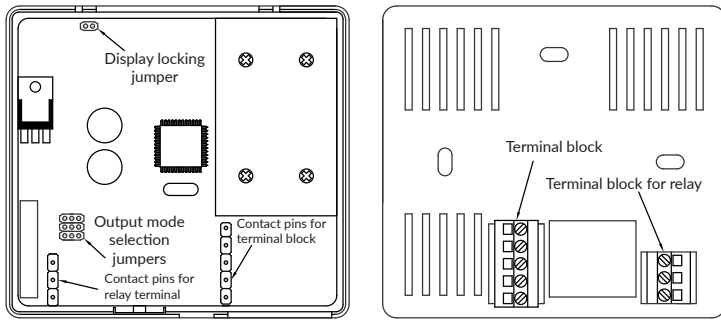
LVD Directive 2014/35/EU

WEEE Directive 2012/19/EU

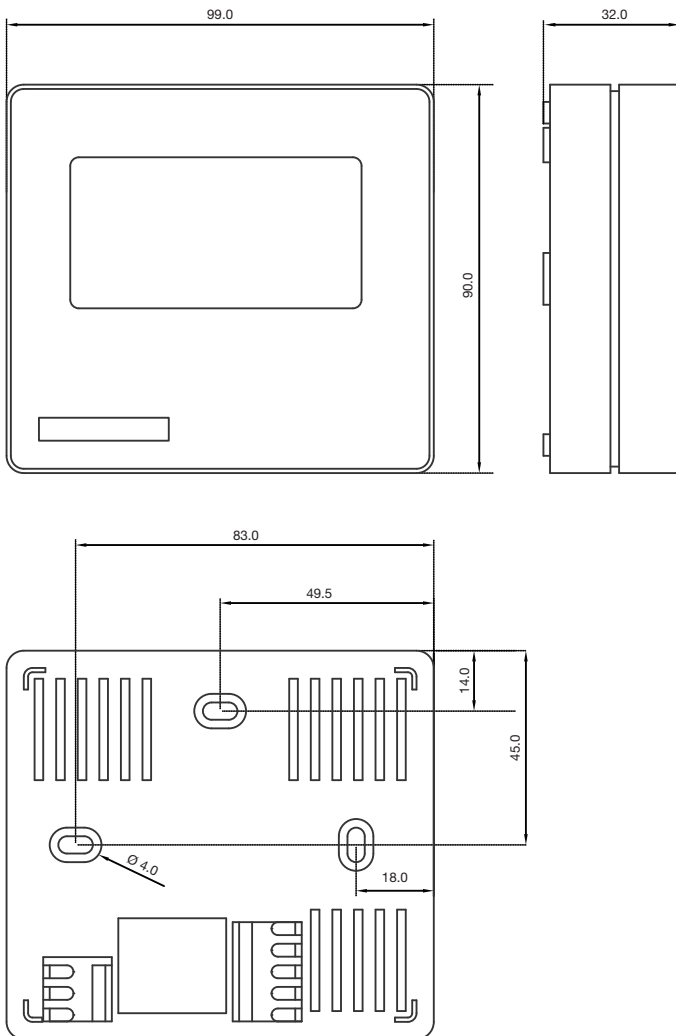
**COMPANY WITH
MANAGEMENT SYSTEM
CERTIFIED BY DNV GL
= ISO 9001 = ISO 14001 =**



SCHEMATICS



DIMENSIONAL DRAWINGS



INSTALLATION

- 1) Mount the device in the desired location (see step 1).
- 2) Route the cables and connect the wires (see step 2).
- 3) The device is now ready for configuration.

⚠ WARNING! Apply power only after the device is properly wired.

STEP 1: MOUNTING THE DEVICE

- 1) Select a mounting location on the wall at 1.2–1.8 m (4–6 ft) above the floor and at least 50 cm (20 in) from the adjacent wall. Locate the unit in an area with good ventilation and an average temperature, where it will be responsive to changes to the room conditions. The CDT-MOD may be mounted on a flat surface.

Do not locate the CDT-MOD where it can be affected by:

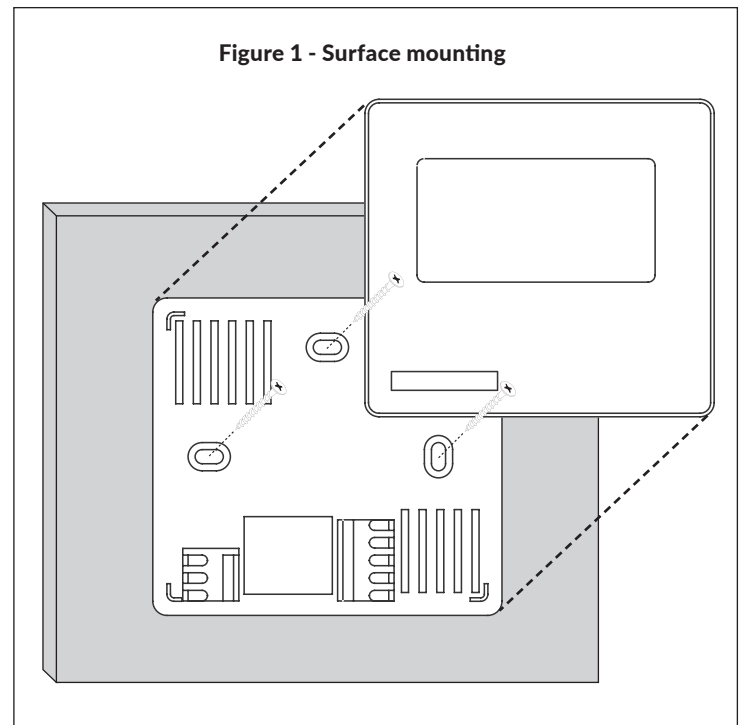
- Direct sunlight
- Drafts or dead areas behind doors
- Radiant heat from appliances
- Concealed pipes or chimneys
- Outside walls or unheated / uncooled areas

- 2) Use the device as a template and mark the screw holes.

- 3) Mount the wall plate with screws.

- Incorrect installation may cause a shift in temperature output

Figure 1 - Surface mounting



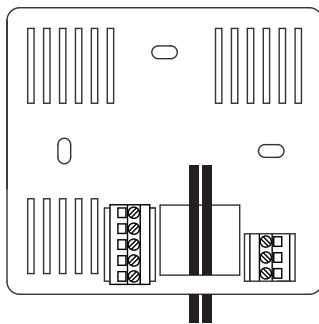
STEP 2: WIRING DIAGRAMS

CAUTION!

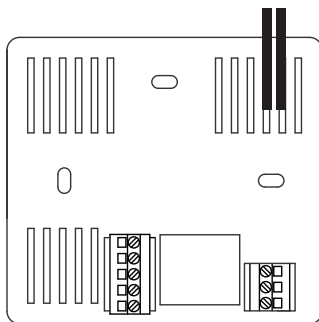
- For CE compliance, a properly grounded shielding cable is required.
- Use copper wire only. Insulate or wire nut all unused leads.
- Supply a separate cable for relay and signal out when using line voltage to power the relay.
- Any wiring may carry the full operating line voltage current based on field installation. The cover locking screw must be installed if the line voltage is supplied to the relay.
- Care should be used to avoid electrostatic discharge to the device.
- This unit has configuration jumpers. You may need to reconfigure this device for your application.

- 1) Route the cables through the square opening in the back plate or for surface wiring select a knockout on the top or bottom of the wall plate, as shown in Figure 2a.
- 2) Connect the wires as shown in Figure 2b and 2c.

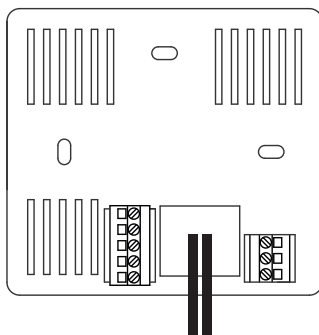
Figure 2a - Routing the cables



Wires can be routed through the square opening in the back plate



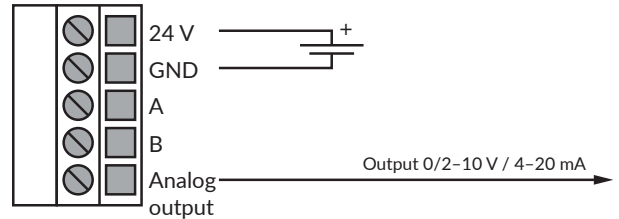
Wires can be routed through the top knockouts



Wires can be routed through the bottom knockouts

WIRING DIAGRAMS CONTINUED

Figure 2b - Wiring diagram: Power input & signal output



NOTE! When using long connection wires it may be necessary to use a separate GND wire for voltage output current to prevent measurement distortion. The need for an extra GND wire depends on the cross section and length of the used connection wires. If long and/or small cross section wires are used, supply current and wire resistance may generate a voltage drop in the common GND wire resulting in a distorted output measurement.

Figure 2c - Wiring diagram: Extra GND wire

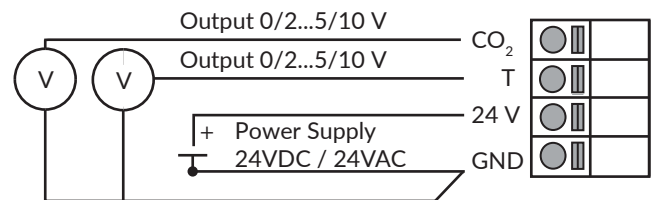
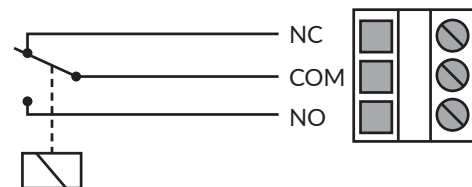


Figure 2d - Wiring diagram: Relay



STEP 3: CONFIGURATION

Configuration of the CDT-MOD-2000 series device is done in the configuration menu. See the user manual for further details.

STEP 4: MODBUS REGISTERS

Functions for Modbus communication:

Function Code	Description
01	Read coil status
02	Read input status
03	Read holding registers
04	Read input registers
05	Force single coil
06	Preset single register
07	Read exception status
15	Force multiple coils
16	Preset multiple registers
17	Report slave ID

MODBUS REGISTERS CONTINUED

Function code 02 - Read input status

Register	Parameter description	Data Type	Value	Range
1x0001	Relay status	Bit 0	0...1	On - Off
1x0002	Relay trend	Bit 0	0...1	0=Increasing, 1=Decreasing

Function code 03 - Read input holding register

Register	Parameter description	Data Type	Value	Range
4x0001	Parameter for P-controller	16 bit	0...3	0=CO2, 1=rH, 2=TE, 3=MAX, 4=Off
4x0002	CO2 high limit	16 bit	500...2000	500...2000 ppm
4x0003	CO2 low limit	16 bit	0...1900	0...1900 ppm
4x0004	rH high limit	16 bit	100...1000	10.0...100.0 %
4x0005	rH low limit	16 bit	0...900	0.0...90.0 %
4x0006	TE high limit	16 bit	50...500	5.0...50.0 °C
4x0007	TE low limit	16 bit	0...450	0...45.0 °C
4x0008	Parameter for relay	16 bit	0...3	0=CO2, 1=rH, 2=TE, (3=Off)
4x0009	CO2 relay on	16 bit	500...1950	500...1950 ppm
4x0010	CO2 relay off	16 bit	450...1900	450...1900 ppm
4x0011	rH relay on	16 bit	15...990	1.5...99.0 %
4x0012	rH relay off	16 bit	10...985	1.0...98.5 %
4x0013	TE relay on	16 bit	15...490	1.5...49.0 °C
4x0014	TE relay off	16 bit	10...485	1.0...48.5 °C

Function code 04 - Read input register

Register	Parameter description	Data Type	Value	Range
3x0001	Parameter for P-controller	16 bit	0...3	0=CO2, 1=rH, 2=TE, 3=MAX, 4=Off
3x0002	CO2 reading	16 bit	0...2000	0...2000 ppm
3x0003	rH reading	16 bit	0...1000	0.0...100.0 %
3x0004	Temp. reading	16 bit	0...500	0.0...50.0 °C
3x0005	CO2 high limit	16 bit	500...2000	500...2000 ppm
3x0006	CO2 low limit	16 bit	0...1900	0...1900 ppm
3x0007	rH high limit	16 bit	100...1000	10.0...100.0 %
3x0008	rH low limit	16 bit	0...900	0.0...90.0 %
3x0009	TE high limit	16 bit	50...500	5.0...50.0 °C
3x0010	TE low limit	16 bit	0...450	0...45.0 °C
3x0011	Parameter for relay	16 bit	0...3	0=CO2, 1=rH, 2=TE, (3=Off)
3x0012	CO2 relay on	16 bit	500...1950	500...1950 ppm
3x0013	CO2 relay off	16 bit	450...1900	450...1900 ppm
3x0014	rH relay on	16 bit	15...990	1.5...99.0 %
3x0015	rH relay off	16 bit	10...985	1.0...98.5 %
3x0016	TE relay on	16 bit	15...490	1.5...49.0 °C
3x0017	TE relay off	16 bit	10...485	1.0...48.5 °C
3x0018	Program version	16 bit	10...9999	1.0...999.9

Function code 05 - Write single coil

Register	Parameter description	Data Type	Value	Range
0x0001	Relay trend	Bit 0	0...1	0=Increasing, 1=Decreasing

Function code 06 - Write single register

Register	Parameter description	Data Type	Value	Range
4x0001	Parameter for P-controller	16 bit	0...3	0=CO2, 1=rH, 2=TE, 3=MAX, 4=Off
4x0002	CO2 high limit	16 bit	500...2000	500...2000 ppm
4x0003	CO2 low limit	16 bit	0...1900	0...1900 ppm
4x0004	rH high limit	16 bit	100...1000	10.0...100.0 %
4x0005	rH low limit	16 bit	0...900	0.0...90.0 %
4x0006	TE high limit	16 bit	50...500	5.0...50.0 °C
4x0007	TE low limit	16 bit	0...450	0...45.0 °C
4x0008	Parameter for relay	16 bit	0...3	0=CO2, 1=rH, 2=TE, (3=Off)
4x0009	CO2 relay on	16 bit	500...1950	500...1950 ppm
4x0010	CO2 relay off	16 bit	450...1900	450...1900 ppm
4x0011	rH relay on	16 bit	15...990	1.5...99.0 %
4x0012	rH relay off	16 bit	10...985	1.0...98.5 %
4x0013	TE relay on	16 bit	15...490	1.5...49.0 °C
4x0014	TE relay off	16 bit	10...485	1.0...48.5 °C

MODBUS REGISTERS CONTINUED

Function code 16 - Write multiple registers

Register	Parameter description	Data Type	Value	Range
4x0001	Parameter for P-controller	16 bit	0...3	0=CO2, 1=rH, 2=TE, 3=MAX, 4=Off
4x0002	CO2 high limit	16 bit	500...2000	500...2000 ppm
4x0003	CO2 low limit	16 bit	0...1900	0...1900 ppm
4x0004	rH high limit	16 bit	100...1000	10.0...100.0 %
4x0005	rH low limit	16 bit	0...900	0.0...90.0 %
4x0006	TE high limit	16 bit	50...500	5.0...50.0 °C
4x0007	TE low limit	16 bit	0...450	0...45.0 °C
4x0008	Parameter for relay	16 bit	0...3	0=CO2, 1=rH, 2=TE, (3=Off)
4x0009	CO2 relay on	16 bit	500...1950	500...1950 ppm
4x0010	CO2 relay off	16 bit	450...1900	450...1900 ppm
4x0011	rH relay on	16 bit	15...990	1.5...99.0 %
4x0012	rH relay off	16 bit	10...985	1.0...98.5 %
4x0013	TE relay on	16 bit	15...490	1.5...49.0 °C
4x0014	TE relay off	16 bit	10...485	1.0...48.5 °C

RECYCLING/DISPOSAL

The parts left over from installation should be recycled according to your local instructions. Decommissioned devices should be taken to a recycling site that specializes in electronic waste.



WARRANTY POLICY

The seller is obligated to provide a warranty of five years for the delivered goods regarding material and manufacturing. The warranty period is considered to start on the delivery date of the product. If a defect in raw materials or a production flaw is found, the seller is obligated, when the product is sent to the seller without delay or before expiration of the warranty, to amend the mistake at his/her discretion either by repairing the defective product or by delivering free of charge to the buyer a new flawless product and sending it to the buyer. Delivery costs for the repair under warranty will be paid by the buyer and the return costs by the seller. The warranty does not comprise damages caused by accident, lightning, flood or other natural phenomenon, normal wear and tear, improper or careless handling, abnormal use, overloading, improper storage, incorrect care or reconstruction, or changes and installation work not done by the seller or his/her authorized representative. The selection of materials for devices prone to corrosion is the buyer's responsibility, unless otherwise is legally agreed upon. Should the manufacturer alter the structure of the device, the seller is not obligated to make comparable changes to devices already purchased. Appealing for warranty requires that the buyer has correctly fulfilled his/her duties arisen from the delivery and stated in the contract. The seller will give a new warranty for goods that have been replaced or repaired within the warranty, however only to the expiration of the original product's warranty time. The warranty includes the repair of a defective part or device, or if needed, a new part or device, but not installation or exchange costs. Under no circumstance is the seller liable for damages compensation for indirect damage.