INSTRUCTION MANUAL

LIVING SPACE CO_2 CONVERTER

HTC-V, HTC-VP, HTC-VV

view of HTC

Description

- Room sensor for measuring CO_2 concentration with optional temperature sensor or temparature converter.
- For the CO_2 measurement the „Non Dispersive InfraRed (NDIR) Technology“ with automatic self-calibration is used.
- Sensors HTC series are produced in three variants:

- **HTC-V**: CO_2 sensor with measuring range 0/400...2000 ppm and analog output 0/2...10V
- **HTC-VP:** CO_2 sensor with measuring range 0/400...2000 ppm and analog output 0/2...10V supplied with the passive temperature sensor PT100, PT1000, Ni100, Ni1000, LG-Ni1000, NTC 10K3A1 or other.
- **HTC-VV**: CO_2 sensor with measuring range 0/400...2000 ppm and analog output 0/2...10V supplied with temperature converter with measuring range 0/10...50° and analog output 0/2...10 V

*HOTCOLD **s.c.** ul. Reymonta 12/26, 05-120 Legionowo, Poland, tel/fax +48 22 784 11 47*

Technical data

CO_2 sensor:	CO_2 – NDIR (non dispersive infrared)
temperature sensor:	PT100, PT1000, Ni100, Ni1000, LG Ni1000, NTC 10K3A1 or other
CO_2 measuring range:	0/400...2000 ppm
CO_2 analog output:	0/2...10VDC, load max. 10 mA (1k ohm)
CO_2 Accuracy @21°C:	+/-40 ppm + 2% of reading
Warm up time:	< 2 min
Response time:	< 10 min
CO_2 stability:	< 2% of Full Scale over life of sensor (typ. lifetime 15 years)
CO_2 repeatability:	< 1% of Full Scale
Calibration interval:	not required - see ABCLogic™
Temperature output signal:	HTC-VP – signal proportional to build-in sensor HTC-VV – analog signal 0/2...10 VDC for range 0/10...50°C.
Temperature converter accuracy:	< 0,1 %
Power supply:	15...30 VDC (max. 3W) lub 24 VAC +/-10% (max. 6VA)
Current consumption:	**1**50mA (average)
Housing:	ABS
Clamps:	terminal screw, max 1,5 mm^2
Weight:	80g
Dimensions:	80 x 120 x 25 mm
Ambient temperature:	0...50°C (max 85% RH, no condensate)
Storage temperature:	-20...70°C (max 95% RH, no condensate)
EMC:	EN 60730-1:2002

ABCLogic - Self Calibration Feature

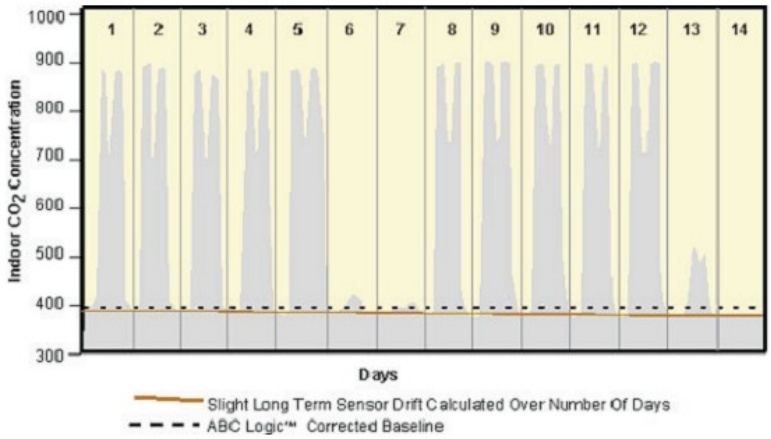
Introduction

Virtually all gas sensors are subject to some sort of drift. The degree of drift is partially dependent on the use of quality components and good design. But even with good components and excellent design a small amount of drift can still occur in the sensor that may ultimately result in the need for a sensor to be recalibrated. Generally, recalibration involves a maintenance person visiting each sensor in a building and performing a 5 minute to 20 minute recalibration routine using gas bottles and plastic tubing. The calibration process is simple but it can turn into a significant expense if recalibration is required frequently. If the wrong choice of sensors is made, the expense of sensor maintenance may wipe out any potential energy savings that couldcome from CO_2 based demand controlled ventilation.

What Causes Sensor Drift?
As discussed before, sensor design and components have a lot to do with drift. In the Thermokon sensor the natural drift of the sensor is very gradual at a few ppm per month with the greatest drift occurring in the first few months of operation. This drift can be up or down. The self-calibration feature called ABCLogic™ is designed to correct all sensor dirft including aging of the light source.

How It Works

Outside levels of CO_2 are generally very low at around 400 to 500 ppm. Inside buildings people are the major source of CO_2. When a building is unoccupied for 4 to 8 hours CO_2 levels will tend to drop to outside background levels. This is especially the case if the building operational schedule includes a pre-occupancy purge of fresh air into the building prior to the start of the day. ABCLogic™ which stands for "Automatic Background Calibration" utilizes the computing power in the sensor's on-board microprocessor to remember the lowest CO_2 concentration that takes place every 24 hours. The sensor assumes this low point is at outside levels. The sensor is also smart enough to discount periodic elevated readings that might occur if for example a space was used 24 hours per day over a few days. Once the sensor has collected 14 days worth of low concentration points it performs a statistical analysis to see if there has been any small changes in the sensor reading over background levels that could be attributable to sensor drift. If the analysis concludes there is drift, a small correction factor is made to the sensor calibration to adjust for this change.
The figure below shows CO_2 concentrations as they might occur over 14 days in an office space with peak concentrations occurring in the morning and afternoon of each day. The dotted line is drawn through all the low points for each day as compared to an assumed background of 400 ppm. If a statistically relevant change in the data shows a shift above or below background, a slight adjustment is made to sensor calibration as shown by the solid level line. Every day the sensor looks at the past 14 days worth of data and determines if a calibration adjustment is necessary.



Measuring Inside-Outside Differential

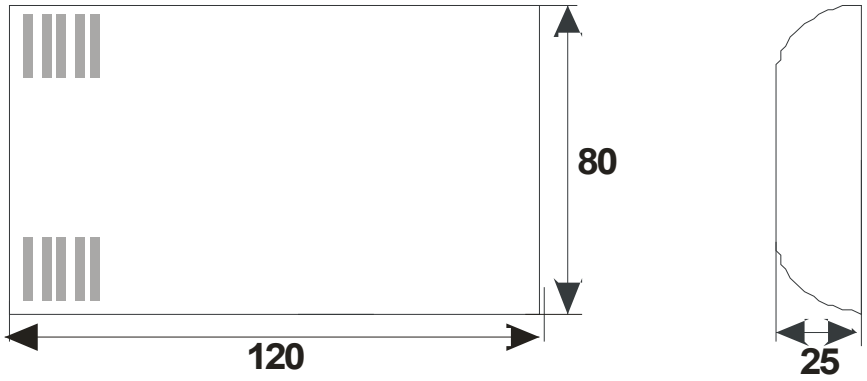
When using CO_2 to measure and control for ventilation it is most important to consider not the absolute ppm levels but the differential concentration between inside and outside concentrations. One of the additional benefits of ABCLogic™ is that the sensor is calibrated to outside levels without having the expense and trouble of placing a sensor in the outside air. The sensor assumes that the lowest level is 400 ppm. Any readings above this level are related to the differential.

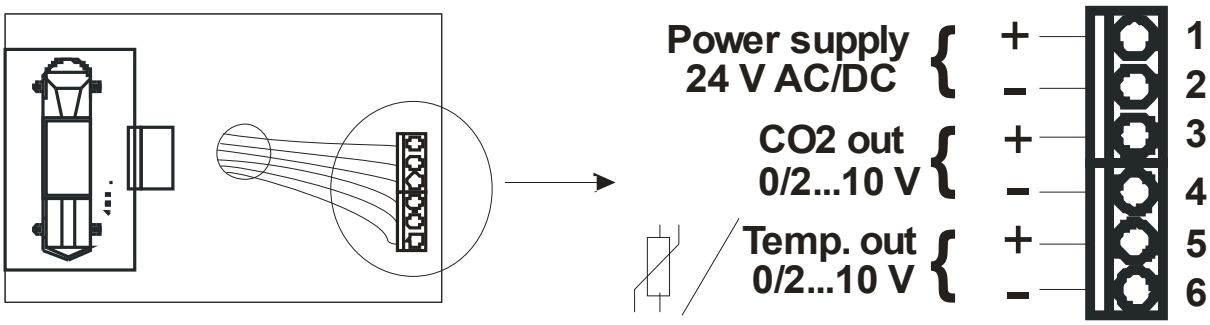
Applications for ABCLogic™

It is important to note that ABCLogic™ is designed for use in applications where spaces are periodically unoccupied for 4 hours per day or more so that indoor concentrations can drop down to typical outside levels. When first installed CO_2 sensors with ABCLogic™ , the sensors will use the first 14 days of operation to calibrate themselves to local background levels. Each sensor will calibrate itself to its environment over the first 14 days of operation.

Commissioning Sensors with ABCLogic™
NOTE! The is not suitable for environments where the co_2 concentrations are consistently elevated, because the unit automatically adjusts its calibration to daily low ambient CO_2 levels

Dimensions and electrical connections





PIN	HTC-V	HTC-VP	HTC-VV
1	+ power supply for 15...30 VDC and for 24 V AC	+ power supply for 15...30 VDC and for 24 V AC	+ power supply for 15...30 VDC and for 24 V AC
2	power GND	power GND	power GND
3	+ 0/2...10 V for CO_2	+ 0/2...10 V for CO2	+ 0/2...10 V for CO2
4	GND for CO_2	GND for CO_2	GND for CO_2
5		temperature sensor	+ 0/2...10 V for temp.
6		temperature sensor	GND for temp.