

Comfort Index Measurement



Operative range

It is possible with this measuring setup to measure all the physical parameters needed for assessing and evaluating thermal comfort simultaneously on three levels. It reliably evaluates the performance of heating and ventilating systems. The data acquired from the series of measuring operations for operative temperature (globe temperature), room temperature, and room air flow and humidity, and the necessary input parameters (e.g. clothing factor, activity level, mechanical output) is used together to calculate the PMV (predicted mean vote) and PPD (predicted percent dissatisfied) values (as per DIN ISO 7730) and the degree of turbulence (as per DIN EN 13779, formerly DIN 1946 Part 2); these values are calculated either online or offline using the AMR WinControl software in conjunction with the add-on module for comfort index measurement.

The software

The averaging number is preset at 200 measuring points but this is variable and can be modified. The PMV and PPD values and the degree of turbulence can be displayed and documented in y/t or x/y diagrams either each one separately or together with other measurable variables. A software wizard is available to guide the user step-by-step through the various settings. If measuring is started online, the first value is indicated after completion of the first 200 measuring operations (as per DIN ISO 7730). These values continue to be calculated, updated, and displayed, and - optionally - also saved and / or exported. (see Chapter 05)

Technical features

- Thermal comfort and air-conditioning calculations using WinControl software with add-on module for comfort index measurement as per DIN ISO 7730 and DIN EN 13779 (formerly DIN 1946)
- Independent measuring sequence in real-time mode
- Various display and output options Real-time mode, memory access to offline measuring operations
- Graphical presentation of measured data and calculated data in a format with data export options
- Comprehensive, clear, meaningful evaluation.

Types (sensor set for one level)

Globe thermometer

Digital sensors for humidity, temperature, atmospheric Pressure

Thermo-anemometer, omnidirectional up to 1 m/s

Stand for measuring operations at heights of 0.1 to 1.7 meters, including 1 set of instrument holders for 1 level (traverse including traverse holder and sensor fastening), including carry case

Set of instrument holders for extra levels (as above)

optional for assessing air quality Digital carbon dioxide sensor to 10.000 ppm, with handle

Device selection

ALMEMO® 2690-8A (new variant) hand-held data logger, 5 inputs, including mains unit and data cable, USB can be used for 1 measuring level (see page 01.22)

ALMEMO® 710 data logger, 10 inputs, including mains unit, USB data cable can be used for 3 measuring levels (see page 01.32)

PC link via Ethernet, RS232, or wireless with Bluetooth see Chapter 04, ALMEMO® networking technology.

Software:

WinControl for 20 measuring points / 1 device including additional module for comfort index measurement

Accessories:

Carry case, universal, spacious, robust, for globe thermometer, humidity sensor, and data logger

Exterior dimensions (WxHxD) approx. 51 x 35 x 30 cm

Order no.

FPA805GTS

FHAD46C41A

FVAD05TOK300

ZB1001PPD1

ZB1001MH1

FYAD00CO2B10

MA26908AKSU

MA710

SW5600WC1

SW5600WCZM1

ZB5600TK3

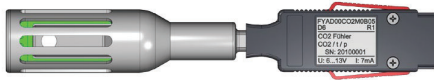
DAkKS or factory calibration temperature, humidity, air flow, carbon dioxide for sensor (see chapter Calibration certificates).
DAkKS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

Digital carbon dioxide sensor FYAD 00-CO2Mx for assessing the indoor air quality and for checking ventilation in line with requirements.

With built-in temperature sensor and air pressure sensor for automatic measured value compensation, with ALMEMO® D6 connector.



CO₂ sensor
FYAD 00-CO2M1B05



CO₂ sensor,
FYAD 00-CO2M0B05

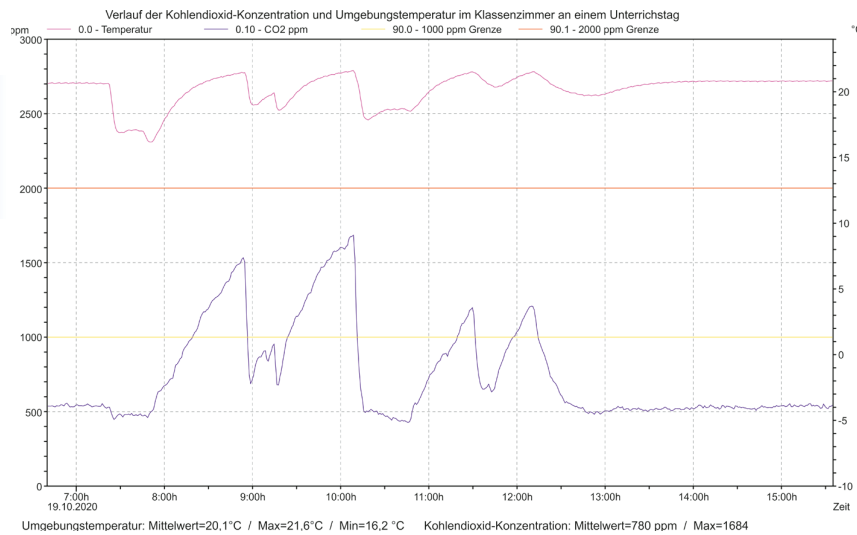
Technical data and functions

- Assessment of air quality for checking demand-oriented ventilation in recreation and work rooms, including classrooms, lecture halls, day care centers, meeting rooms, event rooms, production halls, health care facilities, public transportation.
- In combination with an ALMEMO® data logger, the measured values are continuously recorded with date, time. Based on the stored data, a differentiated analysis of the air quality during the room usage times is possible.
- Simultaneous measurement of air temperature as a criterion for assessing the quality of stay (comfort) in the rooms.
- Quantitative measurement of CO₂ concentration, measured value in ppm. Differentiated decision for concentrations near the quality levels 1000 ppm and 2000 ppm. On request: calibration of the sensor (traceable) by an accredited calibration laboratory.
- Calibrated reference system for CO₂ concentration for checking CO₂ sensors permanently installed in the building management system (BMS) / room ventilation system (AHU).
- Digital sensor with integrated signal processor. All calibration and sensor data are stored in the sensor.
- Unique auto-calibration procedure (without fresh air supply): aging effects are automatically compensated.
- Open protection cap for fast response time. Filter inside on the sensor carrier.
- Automatic compensation of carbon dioxide concentration with built-in digital temperature and barometric pressure sensor.
- Low power consumption. Long-term measurements with ALMEMO® data logger in sleep mode; only for current instrument types with sleep delay.
- 3 primary measurement channels (real measured variables): carbon dioxide concentration, air temperature, air pressure.

Technical Data

Sensor:	2-beam infrared sensing element. Non-dispersive infrared technology (NDIR).
Measuring range: 0...5 000 ppm.	Automatic compensation of pressure and temperature dependence of CO ₂ measurement with the built-in sensors.
Accuracy:	±(50 ppm +3 % of measured value)
Nominal conditions:	25°C, 1013 mbar
Switch-on time (initialization):	15 s
Response time t63:	140 s
Measuring interval:	fixed 15 s as exponential moving average over 60 s (= 4 instantaneous values 15 s).
Range of application:	FYAD 00-CO2M1B05: -40 ... 60 °C FYAD 00-CO2M0B05: -10 ... 60 °C 0...95 % r.h. (non-condensing), 700 ... 1100 mbar
Protection cap:	Material PA12, diameter approx. 20 mm, length approx. 51 mm
Sensor tube:	FYAD 00-CO2M1B05: stainless steel, diameter 12 mm, length approx. 130 mm,
Sensor supply:	via ALMEMO® D6 connector

Connection:	FYAD 00-CO2M1B05: permanently connected cable 2 m with ALMEMO® plug FYAD 00-CO2M0B05: sensor mounted directly on ALMEMO® connector
Digital air pressure sensor (built-in)	Measuring range: 700 ... 1100 mbar Accuracy: typ. ± 2 mbar (at 25 °C)
Digital air temperature sensor (built-in)	Measuring range: -40 ... +60 °C Accuracy: typ. ± 0.5 °C (at 25 °C)
ALMEMO® D6 connector:	Measuring channels: Carbon dioxide concentration, air temperature, air pressure Refresh rate: 15 sec. for all 3 channels
Supply voltage:	6 ... 13 V DC
Current consumption:	typ. approx. 7 mA (average current at measuring interval 15 s)



Measured Value Recordings of CO₂ Concentration and Room Temperature (Example)



ALMEMO® measuring system (example):
CO₂ sensor
with data logger ALMEMO® 202/204

Versions (incl. works test certificate)

Digital carbon dioxide sensor, measuring range 5 000 ppm, digital air temperature sensor and air pressure sensor built-in.
With handle, permanently connected cable with ALMEMO® D6 connector.

Sensor, directly mounted on ALMEMO® D6 connector

Order no.

FYAD00CO2M1B05

FYAD00CO2M0B05

ÖKD calibration KY96xx, carbon dioxide concentration, for digital probe, see chapter calibration certificates
The ÖKD calibration fulfills the requirements of DIN EN ISO/IEC 17025 for test equipment.

WBGT Measurement



Application Range

The wet bulb globe temperature (WBGT) is the decisive parameter for evaluating the work stress at heat-exposed working places and the operation and cool-off times involved. Temperature, radiation and relative humidity are determined by measuring the dry temperature, the natural humid temperature of a psychrometer and the globe temperature of a globe thermometer. These are all combined as WBGT.

Note:

For WBGT measurements the use of a psychrometer with a disengageable ventilator is compulsory

Technical Data

Accuracy:	Class B	Diameter:	approx. 150mm
Sensor:	Pt100 4-conductor, arranged in the center	Operating temperature:	-50 to 200°C
Globe thermometer:	matt black copper globe with suspension	Cable length	3 m

Types

Globe thermometer (Pt100 4L)

Psychrometer with disengageable ventilator

Order no.

FPA805GTS

FNA846WB

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates). DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.



On request:

Sound Level Meter MA 86193 with ALMEMO®- cable for measured value recording



NTC-sensor FNA 305



For Indoor air measurements

Accuracy: NTC, see page 07.04
 Measuring tip: Operative range -10 to +60 °C (non-condensing)
 Protective tube in stainless steel
 Diameter = 3.0mm, length = 50 mm
 mounted directly on ALMEMO® connector
 8 s

T_{90}

L = 50 mm **Order no. FNA305**
 (No variants available)