WÖHLER

Operating manual
CO_2 Logger

EN

Wº hler CDL 210

Best.-Nr. 22412ï 2016-10-26

Contents

EN

1 General Information

1.1 Operation Manual Information

This operation manual allows you to safely work with the Wöhler CDL 210 CO_2 Logger. Please keep this manual for your information.

The Wöhler CDL 210 should be used by trained professionals for its intended use only.

Liability is void for any damages caused by not following this manual.

1.2 Notes

WARINING!
Not following this warning can cause injury or death.

ATTENTION!
Not following this note can cause permanent damage to the analyzer.

NOTE!
Useful information

1.3 Intended use

The Wöhler CO_2-logger measures the CO_2 level, the air temperature and the humidity and logs the measured data. It is therefore ideal for the monitoring and the evaluation of the interior climate in living spaces and in commercial premises.

1.4 Components

Model	Parts
Wöhler CDL 210	CO_2-Logger
	Power supply
	USB cable
	Software

EN

1.5 Information on disposal

Electronic equipment does not belong into domestic waste, but must be disposed in accordance with the applicable statutory provisions.

You may hand in any defective batteries taken out of the unit to our company as well as to recycling places of public disposal systems or to selling points of new batteries or storage batteries.

1.6 Adresse

Wöhler Technik GmbH
Schützenstr. 41
33181 Bad Wünnenberg
Tel.: +49 2953 73-100
Fax: +49 2953 73-250
E-Mail: info@woehler.de

2 Specifications

CO_2-Measurement

Description	Data
Range	0 – 2.000 ppm (2001 - 9.999 ppm out of scale range)
Resolution	1 ppm
Accuracy	± 50 ppm ± 5 % of reading (0-2000 ppm)
Pressure dependence	± 1,6 % of reading per kPa deviation from normal pressure, 100 kPa
Sensor	Stable NDIR sensor

Temperature

Description	Data
Range	-10 °C to +60 °C
Resolution	0,1 °C (0,1 °F)
Accuracy	± 0,6 °C (± 0,9 °F)

Relative Humidity

Description	Data
Range	5 – 95 %
Resolution	0,1 %
Accuracy	± 3 % (10 – 90 %, 25 °C), 5 % (other values, 25 °C)

Data Logging

Description	Data
Number of measurement series	5.333 per reading (°C, %rF, CO_2)
Data logging	15.999
Sampling rate	from 1 second to 4:59:59 hours

General technical data

Description	Data
Display	Simultaneous indication of CO_2 level, temperature and relative humidity
Indoor air quality indication	Good Normal Poor
Power Supply	AC Adapter 5 V, 0,5 A output
Connection to PC	USB-interface
Dimensions (L x B X D)	120 mm x 100 mm x 110 mm
Visible and audible CO_2 warning alarm.	

3 Recommendations

The „Technischen Regeln für Arbeitsstätten ASR A 3.6" (Technical Rules for Workplaces) provide the following recommendations:

3.1 CO_2-Concentration

CO_2-concentration in the air	Recomendations
< 700 ppm	Good optimal (Display Wöhler CDL 210) No further ventilation is needed.
< 1000 ppm	Normal (Display Wöhler CDL 210) No further ventilation is needed.
> 1000 ppm	Poor (Display Wöhler CDL 210) Ventilation is required Improve ventilation behaviour
> 2000 ppm	Ventilation is absolutely necessary! Further ventilation measures are needed (more ventilation, reduction of the number of persons in the room)

3.2 Relative Humidity

The relative humidity in the room depends on the temperature. The following humidity values should not be exceeded.

Air temperature	Relative Humidity
+20 °C	80 %
+22 °C	70 %
+24 °C	62 %
+26 °C	55 %

EN

4 Component explanation

4.1 Keys

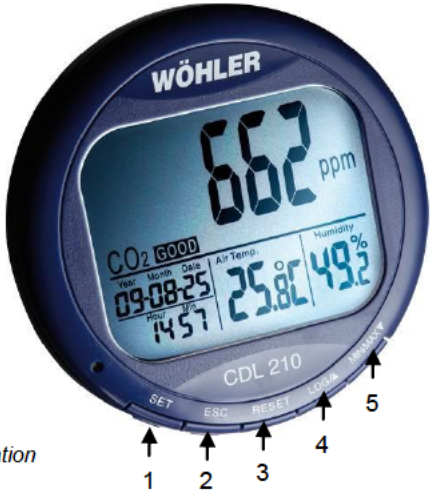

Fig. 1: Component explanation

Number	Key	Function
1	SET	Enter setup mode Save and finish settings
2	ESC	Exit setup mode Exit data logging mode Terminate datalogging Terminate calibration
3	RESET	Clear MAX/MIN records
4	LOG/▲	Start data logging Select mode Increase value in setup mode
5	MIN/MAX▼	Activate MIN/MAX function Select mode Decrease value in setup mode
1 + 4 + 5	Set + ▲ + ▼ (Press simultaneously)	CO_2 - calibration

4.2 Display

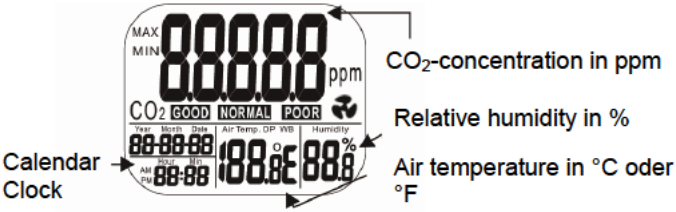

Fig. 2: Display details

Icon	Signification
MIN/MAX	Minimum/Maximum readings
GOOD	Good CO_2 level
NORMAL	Normal CO_2 level
POOR	Poor CO_2 level
Air Temp.	Air temperature
Humidity %	Unit of relative humidity (air)
	CO_2 alarm

5 Operation

EN

5.1 Power on/off

ATTENTION!
Calibrate the Wöhler CDL 210 at fresh air, before using it fort he first time (see chapter 8).

Plug in the power supply and the meter turns on automatically with a short beep. The readings will immediately appear in the display.

ATTENTION!
If the voltage is too high or low, "bAT" will flash in the display. (Please see chapter 9 "Trouble shooting").

WARNING!
Risk of electrical shock!

Never touch the jack with wet hands!

Protect the power supply against water and moisture!

Do not unplug the power supply by pulling the cable!

Do not use the power supply when the voltage requirements of the recharger and the supply do not match!

Fig. 3: Initial display

The display will show the current CO_2-value, the temperature, humidity, date and time.

The air quality level is indicated as good, normal or poor, see Fig. 3.

5.2 Taking Measurement (CO_2, temperature and humidity)

The Wöhler CDL 210 starts taking measurement after it has been turned on and updates readings every second.

If the operating environment changes (ex. from high to low temperature), it will take 2 minutes until the correct CO_2 and temperature readings are indicated and 10 minutes until the correct relative humidity is indicated.

NOTE!
Do not hold the meter close to faces, because the exhalation can affect the CO_2 level.

5.3 MAX, MIN

Fig. 4: Minimal value

- In normal operation mode, press MIN/MAX▼ to see the minimum or maximum of each parameter. With each press of the MIN/MAX▼-key in sequence, the display shows the MINIMUM, then the MAXIMUM and after that it returns to the normal mode.
- In MIN and MAX modes, it shows the minimum and maximum readings of CO_2 on the main display and the air temperature and the humidity on the lower display. (Fig. 4)

In MIN/MAX or normal operation modes, press and hold RESET for more than 1 second to clear the minimum and the maximum value and then restart. After that the device will calculate new minimal and maximal values.

NOTE!
You can carry out this step in MIN/MAX and normal operation mode.

EN

5.4 Data logging

The Wöhler CDL 210 can record readings of CO_2, temperature and humidity for long time environment monitoring. The memory capacity is 16 000 points.

The user can set up the sampling rate from 1 second to 4:59:59 hours. (The corresponding steps are explained in chapter 7.9 “Sampling rate”).

- After the sampling rate is selected, press LOG/▲ for 2 seconds in normal mode to start logging.

The green LED light blinks to indicate the logging status and the main display shows the current CO_2 value and “rEC” in turn. Lower displays are the current temperature, humidity and clock.

- To terminate the data logging, press ESC for 2 seconds.

The green LED light stops blinking and the main display shows “End” and the CO_2 reading in turn.

- Press and hold ESC for 2 seconds again, and it returns to normal measurement mode.

NOTE!
Minimum and Maximum recall is still working during logging.

NOTE!
The Wöhler CDL 210 will stop logging during a power breakdown. After the power breakdown it will continue logging because the internal battery has provided power to the clock during the breakdown (see note in fig. 7.7) The graph of the PC software will present a gap for the breakdown time.

ATTENTION!
When the user starts a new logging cycle, the stored data will be canceled. There is no other way to eliminate the data from the Wöhler CDL 210 memory.

The Wöhler CDL 210 will keep the stored data, even if the power supply is disconnected.

5.5 Data Transmission

Fig. 5: Rear side of the Wöhler CDL 210 with USB cable and power supply

After that, the logged data can be transferred to the computer via the USB-cable for detailed analysis with the PC Software Wöhler CDL 210.

- Insert the plug of the USB cable into the socket of the rear side of the Wöhler CDL 210.
- Insert the USB plug into the USB interface of your PC.

ATTENTION!
Take care that the Wöhler CDL 210 is connected to the power supply before you transfer the data to the PC.

NOTE!
For information about the transmission of the data to the computer and the application of the software, see Manual PC-Software Wöhler CDL 210 (art n° 22413) delivered with the software CD.

For information about the installation of the USB driver, see Manual USB transmission cable. (art. n° 22354)

All manuals are also provided as a download in internet (www.wohler-international.com).

EN

6 Alarm

6.1 Setting the alarm

The meter features audible alarm to give warnings when CO_2 concentration exceeds the limits. Users can set up 2 limits:

1. Limit for alarm threshold that requires ventilation.

2. Lower limit: The ventilation system has to be stopped, when this limit is reached.

- Set the limits according to chapter 6.4.

6.2 Alarm indicator

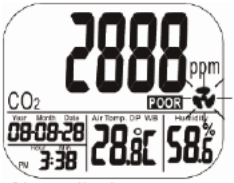

Fig. 6: Alarm display

The CDL 210 emits beeps (80 dB) and a fan icon will appear on the display, when the CO_2 level exceeds the upper limit.

- Beeps can be stopped by pressing any key or it automatically stops when the CO_2 reading falls under the lower limit. The icon keeps flashing after the beeps have been manually shut.
- Users can press RESET for more than 1 second to reactivate the alarm.

If the beep is temporarily shut, it will sound again, when the readings fall under the lower limit and then exceed the upper limit again.

7 Setup

In the different modes of the Wöhler CDL 210, different parameters can be set.

Mode	Parameter
P1.1	CO_2 limit for good interior air quality
P1.2	CO_2 limit for normal interior air quality
P1.3	CO_2 beep alarm
P1.4	CO_2 beep alarm on/off
P2.0	temperature scale
P3.1	year
P3.2	month
P3.3	day
P3.4	12 hour or 24 hour display
P3.5	hour
P3.6	minute
P4.0	reset
P5.1	lograte: hours
P5.2	lograte: minutes
P5.3	lograte: seconds

Press and hold SET for 3 seconds to enter the setup mode. Press LOG to change from P1.0 to P2.0 and the SET to change from P 1.1 to P1.2 etc. The following chapters 7.1 to 7.9 will describe the parameters in detail.

EN

7.1 Enter and exit setup mode

- Press and hold SET under normal mode for more than 3 seconds to enter the setup mode.
- To exit setup mode, press ESC.

7.2 Setting the CO_2 upper limit of good level

In the setup mode, CO_2 and P 1.0 are displayed. (see Abb. 7)

- Press SET again to enter the P1.1 mode for setting the CO_2 upper limit of GOOD level.

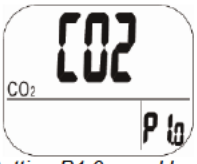

Fig. 7: Setting P1.0: good level

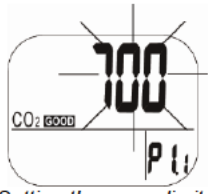

Fig. 8: Setting the upper limit of the good level.

The current set value is blinking now (see Abb. 8).

- Press LOG/▲ to increase or MIN/MAX▼ to decrease the value.

Each press tunes 100 ppm.

NOTE!
The alarm range is from 0 to 700 ppm.

- Press SET again to confirm the P 1.1 setting and to enter the P 1.2 mode for the upper limit of NORMAL level.

Press ESC (without pressing SET before) to return to P 1.0 without saving.

7.3 Setting the CO_2 upper limit of NORMAL level

- Press LOG/▲ to increase or MIN/MAX▼ to decrease the value.

Each press tunes 100 ppm.

NOTE!
The alarm range is from 700 ppm to 1000 ppm.

- Press SET again to confirm the P 1.2 setting and to enter the P 1.3 mode for setting the alarm level.

Press ESC (without pressing SET before) to return to P 1.0 without saving.

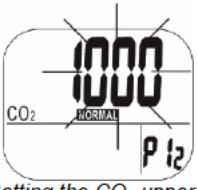

Fig. 9: Setting the CO_2 upper limit of NORMAL level

7.4 Setting the CO_2 alarm limit

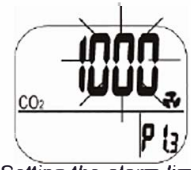

Fig. 10: Setting the alarm limit

In the P 1.3 mode the current set value will be blinking and the flat icon will appear (see Abb. 10).

- Press LOG/▲ to increase or MIN/MAX▼ to decrease the value.

Each press tunes 100 ppm.

NOTE!
The alarm range is from 1000 ppm to 5000 ppm.

Press SET to confirm.

NOTE!
Set up the alarm value within the specification range, so that accuracy is ensured. Readings that are out of specification are only for reference and not suitable to be used as alarm limits.

EN

7.5 Switching the alarm beep on and off

In the P 1.4 mode the alarm beep can be switched on and off.

- Select ON to activate the alarm beep.
- Select OFF to deactivate the alarm beep.
- Press SET to save the setting.

7.6 Temperature scale

Select the temperature unit in P2.0 mode. Go from normal mode to 2.0 mode by doing the following steps:

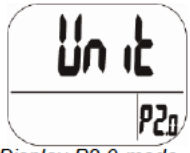

Fig. 11: Display P2.0-mode

- Press and hold SET in normal mode for three seconds to enter P1.0 mode.
- Press LOG/▲ in P1.0 mode to enter P2.0 mode (see Fig. 11).
- Press SET to enter P2.1 mode for setting the actual temperature unit with the actual unit °C or °F blinking (Fig. 12)
- Press LOG/▲ or MIN/MAX▼ key to change from °C to °F.
- Press SET to save the settings or press ESC to return to P2.0 mode without saving.

Fig. 12: Selecting the temperature

7.7 Clock and calendar

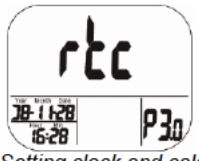

Fig. 13: Setting clock and calendar (rtc: real time clock)

Fig. 14: Setting the year

24 hour and 12 hour time displays are both available in this meter. Setting can be done in P3.0 mode.

Go from normal mode to P3.0 mode by doing the following steps:

- Press and hold SET in normal mode for three seconds to enter P1.0 mode.
- Press LOG/▲ in P1.0 mode twice to enter P3.0 mode for setting clock and calendar (Fig. 13).
- Press SET to enter P 3.1 mode. Current year will blink (Fig. 14). To change the month, press LOG/▲ or MIN/MAX▼.
- Press SET to save the settings and enter P3.2 mode or press ESC to return to P3.0 mode without saving.
- In P3.2 mode the current month will blink. To change the month press LOG/▲ or MIN/MAX▼.
- Press SET-key to save the settings and enter P3.3 mode or press ESC to return to P3.0 mode without saving.

EN

Fig. 15: 12 hour or 24 hour display

Fig. 16: Setting the hour (clock)

- Repeat the steps described above for setting the date (day) in P3.3 mode. Press SET-key to save the settings and enter P3.4 mode or press ESC to return to P3.0 mode without saving.
- In P3.4 mode the current time setting (12 hour or 24 hour) will blink (Fig. 15). To change the setting press LOG/▲ or MIN/MAX▼.
- Press SET to save the settings and enter P3.5 mode to set the hours, Fig. 16. Press Set to save and enter P 3.6 mode to set the minutes or press ESC to return to P3.0 mode without saving.
- Repeat the steps described above and save your settings with the SET-key.

NOTE!
The CDL 210 has an internal rechargeable battery that provides power to the clock. It takes at least 24 hours to charge this battery with the power supply. In case of a voltage interruption, that is when the power supply is unplugged, the internal battery will provide power to the clock during 10 hours.

7.8 Reset

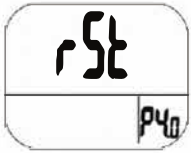

Fig. 17: Reset-mode

Fig. 18. no reset

- In normal mode press and hold the SET key for three seconds to enter P1.0 mode.
- Press LOG/▲ three times to enter P4.0 mode for reverting the meter to default status, see Fig. 17.
- Press SET to enter P4.1 mode with blinking "No" (default), see Fig. 18, so that no reset will be done.
- To switch the status (Display "YES") press LOG/▲ or MIN/MAX▼. When "Yes" is chosen, y reset to the parameters specified above will be done.
- Then press SET to save the setting or press ESC without saving and return to P4.0 mode.

If you choose "Yes" the meter is reset to the following defaults:

Parameter	Default
P 1.1	700 ppm
P 1.2	1000 ppm
P 1.3	5000 ppm
P 2.1	°C
P 4.1	No (no reset)

EN

7.9 Sampling Rate

Fig. 19: Setting the sampling rate (hours)

Fig.18

Fig. 20: Setting the sampling rate (seconds)

- In normal mode press and hold the SET key for three seconds to enter P1.0 mode.
- Press LOG/▲ four times to enter P 5.0 mode for setting the sampling rate of data logging, see Fig. 19.

NOTE!
The range is from 1 second to 4 hours 59 minutes and 59 seconds.

- Press SET to enter the 5.1 mode with the hour digits blinking. To change the setting press LOG/▲ or MIN/MAX▼.
- Press SET to enter P5.2 mode to set the minutes and after that enter the P5.3 mode to set the seconds, see Fig. 20. To change the setting press LOG/▲ or MIN/MAX▼.
- Then press SET to save the setting or press ESC without saving and return to P5.0 mode.

8 CO_2-Calibration

The meter is calibrated at standard 400 ppm CO_2 concentration in factory. It is suggested to do manual calibration regularly and especially before using it for the first time to maintain good accuracy. The calibration will last about 30 minutes.

When accuracy becomes a concern after a long time usage or other special conditions, return to dealers for standard calibration.

! WARNING!
Do not calibrate the meter in the air with unknown CO_2 level. Otherwise, it will be taken as 400 ppm and this fact leads to inaccurate measurements.

8.1 Automatic Baseline Calibration

The automatic baseline calibration (ABC) eliminates the zero drift of the infrared sensor. The ABC function is always ON when turning on the meter.

ABC is to calibrate the meter at the minimum CO_2 reading detected during 7.5 days continuous monitoring (power on). It is supposed that in the ventilating area there is fresh air with CO_2 level around 400 ppm during a period of time.

! WARNING!
For the described reasons, the automatic baseline calibration cannot be done in close area with higher CO_2 level such as places with windows shut.

8.2 Manual Calibration

The manual calibration is suggested to be done outdoor, e.g. on an exterior window ledge, on a sunny day where CO_2 level is around 400 ppm.

NOTE!
Do not calibrate on rainy days, because the high humidity will affect the CO_2 level in air.

Do not calibrate the meter in places crowded with people or close to where exist high CO_2 concentration such as ventilating outlets or fireplaces.

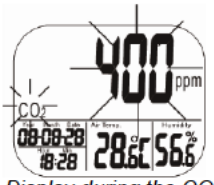

Fig. 21: Display during the CO_2 calibration

- Turn on the meter and hold down SET, LOG/▲ and MIN/MAX▼ simultaneously and more than 1 second to enter CO_2 calibration mode, Fig. 21.

400 ppm and CO_2 are blinking on the LCD while performing calibration, Fig. 21. Wait about 30 minutes until the blinking stops and the calibration is completed automatically. The meter will return to normal mode now.

To abort the calibration, press ESC for more than 1 second.

EN

9 Trouble shooting

Error message	Possible reason	Solution
The meter cannot be powered on.	The power supply is not well plugged.	Check if the power supply is well plugged.
	System crash	Use a needle or toothpick to stab the RESET hole at the meter bottom.
The readings in the display do not change.	The meter is in maximum or minimum mode.	Press and hold the RESET key for more than one second.
"Bat" and the green LED keep flashing.	The power supply output voltage is too high or too low.	Use the adaptor with 5 V (±10 %), > 0,5 A.
The data cannot be transfered from the Wöhler CDL 210 to the PC	Data transfer disturbed	Do a hardware reset:: Press a paper clip (or similar) into the small opening in the middle of the bottom of the device.

10 Error Code

10.1 CO_2-Werte

Error Code	Problem	Solution
E01	CO_2-sensor is damaged.	Send back for repair.
E02	CO_2 value is under the lower limit.	Recalibrate the CO_2. If the error code still appears, send it back for repair.
E03	The CO_2 reading exceeds the upper limit.	Put the meter in fresh air and wait for 5 minutes. If the error code still appears, recalibrate the meter.
E17	The ABC mode of the CO_2 sensor fails and might cause wrong CO_2 readings.	Send the meter back for repair.

10.2 Air Temperature Readings

Error Code	Problem	Solution
E02	The air temperature value is under the lower limit.	Put the meter in regular room temperature for 30 minutes, if the error message still appears, send the device for repair.
E03	The air temperature value exceeds the upper limit.	Put the meter in regular room temperature for 30 minutes, if the error message still appears, send the device for repair.
E31	The temperature sensor or measuring circuit is damaged.	Send the device for repair.

10.3 Air Humidity Reading

Error Code	Problem	Solution
E04	The air temperature measurement has an error code.	Refer to the above mentioned temperature error code.
E11	The RH calibration has failed.	Send the meter back for recalibration.
E34	The RH sensor or the measuring circuit is damaged.	Send the meter back for repair.

10.4 General

Error Code	Problem	Reason/Solution
E36	Supply voltage too low	- Controll contact to the power supply - Signal during Power breakdown. (No further action necessary. After the power breakdown the Wöhler CDL 210 will continue logging because the internal battery has provided power to the clock during the breakdown) - E 36 will appear if the Wöhler CDL 210 is disconnected from the mains before logging is finished.

11 Service

EN

Test Equipment Depot - 800.517.8431 - 99 Washington Street Melrose, MA 02176
TestEquipmentDepot.com

12 Declaration of Conformity

The product:

Name: CO_2-Logger
Model: CDL 210

has been tested in accordance to essential protection requirements of Council Directive 2014/30/EU and found the test results indeed meet the limitation of the relevant test standards listed below:

EN 61326-1:2006
(CISPR11, IEC/EN 61000-3-2 (2006), IEC/EN 61000-3-3 (2008)
(IEC/EN61000-4-2 (1995+A1:1998+A2:2001)/-3 (2006+A1:2008)
-4(2004)/-5(2006)//-6(2007)/-11(2004))