WÖHLER

Operating manual
Van Air Flow Meter

EN

Wº hler FA 410
Wº hler FA 430

Contents

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1 General Information

1.1 Operation Manual Information

This operation manual allows you to safely work with the Wöhler FA 410 / 430. Please keep this manual for your information.

The Wöhler FA 410 / FA 430 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

WARNING!
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

Use the meter to measure the air velocity, temperature and humidity (only Wöhler FA 430) and the CO_2 concentration (only Wöhler FA 430) and to calculate the flow, dew point (only Wöhler FA 430) and wet-bulb temperature (only Wöhler FA 430). Together with a cone it is used to measure the air flow at vents.

1.4 Scope of supply for standard configuration

Fan anemometer	Components
Wöhler FA 410 or Wöhler FA 430	Fan anemometer
	4 x AAA batteries
	Plastic case

1.5 Transport

CAUTION!
Improper transportation can lead to damage occurring to the fan anemometer!

To avoid damage occurring during transport it is imperative to transport the fan anemometer in the

original case designed for the purpose.

1.6 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.

1.7 Adress

2 Fan anemometer specifications

This operating manual has been written for the Wöhler FA 410 and Wöhler FA 430 fan anemometers. That means it may contain descriptions that do not apply to the Wöhler FA 410. This is indicated in such instances. The differences between both fan anemometers are listed in the table below:

	Wöhler FA 410	Wöhler FA 430
Flow velocity	✓	✓
Volume flow	✓	✓
Temperature	✓	✓
Relative humidity		✓
Dew point		✓
Wet-bulb temperature		✓
CO_2		✓

3 Technical Data

Range

Description	Wöhler FA 410	Wöhler FA 430
Flow velocity	0.5 – 30 m/s	
Volume flow (operating volume flow)	up to 99.999 m^3/h	
Temperature	-20.0 °C – 60 °C (-4 °F – 140 °F)	
Relative humidity		0.1% – 99.9%
Dew point		-20.0 °C – 59.9 °C (-4 °F – 139.82 °F)
Wet-bulb temperature		-20.0 °C – 59.9 °C (-4 °F – 139.82 °F)
CO_2		0 – 9999 ppm

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Resolution

Description	Wöhler FA 410	Wöhler FA 430
Flow velocity	0.1 m/s	
Volume flow	0.1 (0 – 9999.9) or 1 (10,000 – 99,999)	
Temperature	0.1 °C/F	
Relative humidity (RH)		0.1%
Dew point		0.1 °C/F
Wet-bulb temperature		0.1 °C/F
CO_2		1 ppm

Accuracy

Description	Wöhler FA 410	Wöhler FA 430
Flow velocity	±(1,5% of reading + 0,3 m/s) for under 20m/s	
	±(3% of reading + 0,3 m/s) for above 20 m/s	
Volume flow	0.2% of measurement reading	
Temperature	0.6 °C / 33.08 °F	
Relative humidity		±3% (at 25 °C / 77 °F) otherwise ±5%
CO_2		± 30 ppm ±5% of reading (0 – 5000 ppm)

Miscellaneous

Description	Wöhler FA 410	Wöhler FA 430
CO_2 warm-up time		30 seconds
Operating conditions (to avoid condensation)	0 – 50 °C (32 – 122 °F), < 80% RH	
Storage conditions	-10 – 50 °C (14 – 122 °F), < 90% RH	
Power supply	4 micro batteries AAA	
Battery life	> 40 hours	> 24 hours
Fan anemometer dimensions	269 x 106 x 51 mm	
Fan diameter	Ø 10 cm	
Weight (without funnel)	270 g	

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4 Design and function

4.1 Fan anemometer components

Fig. 1: Fan anemometer components

Front view

6 Handle
7 Keypad
8 IR interface
9 Display
10 Fan

Rear view

Battery compartment

4.2 Keypad

Fig. 2: Keypad

The fan anemometer is operated using four keys. The keys have the following functions

ON/OFF key

- Press briefly: Power on/off
- Press and hold: Access and exit Setup mode

HOLD/MIN/MAX key

- Press briefly: Freeze current reading; continue to press the key after freezing to begin printing.
- Press and hold: Display the lowest and highest measured value (MIN, Max)
- In the Average value mode (AVG): Save data or begin calculating averages over a specified time.
- In the Setup mode: Make settings

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Up key

- Toggle between readings displayed in the top part of the display (Wöhler FA 430 only)
- Press and hold: Access the Average value mode (AVG)
- In the Average value mode (AVG): Display average value and return to normal Measuring mode
- In the Setup mode: Select a parameter and increase a value

Down key

- Toggle between readings displayed in the lower part of the display
- In the Average value mode (AVG): Display the average values of all measured quantities
- In the Setup mode: Select a parameter and lower a value

Deactivate Auto-Off function.

Access Calibration mode

4.3 Display

After the fan anemometer is powered on, the whole of the display is briefly filled with all possible values.

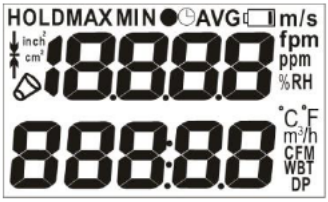

Fig. 3: Fully display

The display is structured as follows:

Top part of display

Displays flow velocity, relative humidity, CO^2 value (Wöhler FA 430 only), measurement duration in Average value mode.

Lower part of display	Displays temperature, volume flow, wet-bulb temperature and dew point

The abbreviations and symbols have the following meaning:

HOLD	Freeze the current display
MAX MIN	Highest and lowest values
AVG	Averaging
	Low battery warning
m/s; fpm	Flow velocity display units
ppm	CO_2 display unit
RH	Relative humidity
°C and °F	Temperature display units
m^3/h, CFM	Volume flow display units
WBT	Wet-bulb temperature
DP	Dew point temperature
$Inch^2$; cm^2	Area display units
	Funnel symbol

5 Operating the fan anemometer

5.1 Powering on/off.

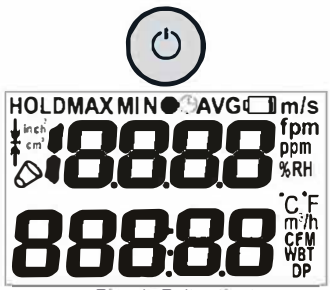

Fig. 4: Fully display

- To power on the fan anemometer, briefly press the On/Off key.

All possible symbols and units are displayed for about 1 second.

The Wöhler FA 410 switches immediately to the normal Measuring mode.

The Wöhler FA 430 switches to the normal Measuring mode after a warm-up time of approx. 30 seconds.

- To power off the fan anemometer in any mode, briefly press the On/Off key.

Auto-Off function

The fan anemometer automatically powers off if no keys are operated for 20 minutes.

Fig. 21: Deactivate the Auto-Off function

To deactivate the Auto-Off function, proceed as follows:

- With the fan anemometer powered off, press and hold the On/Off and AVG keys simultaneously for 2 seconds.

"n" is shown on the display before the fan anemometer switches to the normal Measuring mode (Wöhler FA 410) or the warm-up phase begins (Wöhler FA 430).

The Auto-Off function is deactivated, the fan anemometer will now not power off automatically.

To re-activate the Auto-Off function power the fan anemometer off and on again.

5.2 Selecting the measurement channel

Fig. 5: Flow velocity and air temperature display

After the fan anemometer is powered on, the flow velocity is displayed in the top part of the display and the air temperature is displayed in the lower part of the display.

Wöhler FA 430

- To toggle between displayed readings in the top part of the display, briefly press the Up key.

The flow velocity, relative humidity and the CO_2 readings are displayed in succession.

Wöhler FA 410

It is not possible to toggle between readings in the top part of the display.

Wöhler FA 430

- To toggle between displayed readings in the lower part of the display, briefly press the Down key.

The air temperature, volume flow, wet-bulb temperature and dew point readings are displayed in succession.

Wöhler FA 410

- To toggle between displayed readings in the lower part of the display, briefly press the Down key.

The air temperature and volume flow are displayed in succession.

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5.3 Measuring volume flow

5.3.1 Measuring avec funnel

Important Notes:

- When measuring the volume flow of a ceiling diffusor or of an axial valve, use the Wöhler funnel with the twist adjusting device (artikel 4164 or 23501), see accessories.

Before measuring the outlets of a push-pull-device, check if it works with an axial valve. In this case use the twist adjusting device.

Fig. 6: Wöhler FA 410/430 with round funnel attached

It is recommended to use a measurement funnel when taking measurements at air passages.

A 346 x 346 mm square funnel and a Ø 210 mm round funnel are available to attach to the fan anemometer, please refer to the Chapter Accessories.

- Insert the fan anemometer into the funnel clamp.
- To secure, slide the lever next to the fan anemometer upwards (indicated by an arrow in the image opposite).

When the fan anemometer is securely seated in the clamp it automatically recognizes that a funnel has been attached. The funnel symbol is shown in the display.

NOTE!
The readings now automatically take the installed funnel into consideration for the calculation of the volume flow.

Fig. 7: Funnel symbol

CAUTION!
When taking measurements, make sure the fan anemometer is securely seated in the clamp of the funnel. Only then is the funnel symbol shown in the display. Measurements undertaken using the funnel when the funnel symbol is not shown in the display do not return correct results.

5.3.2 Measuring without

- Before beginning air flow measurements, enter the area of the air outlet in the Setup

measurement funnel

mode, please refer to the Chapter 6.2.

☞ *NOTE!*
For the measurement of the volume flow at air passages without funnel we recommend the measurement mode "Average value determined over time".(chapter 5.8.1)

- When starting the measurement mode , direct the fan anemometer slowly and steady over the entire area of the air passage.

☞ *HINWEIS!*
Make sure to stop the measurement by pressing the button immediately after the data record has been finished, because the calculation of the average will not be correct, if the average measurement mode is stopped after the device has been removed from the air passage.

5.4 Determinating the air quality (only Wöhler FA 430)

A good air quality is decisive for the comfort of persons. Therefore many new guidelines , e.g. VDI 6022-3 and DIN EN 15251, are based on the determination of the air quality. The Wöhler FA 430 does not only determine the amount of circulating air but it also determines the quality of this air. According to VDI 6022-3 and DIN EN 15251 the humidity and the CO_2 are the most important parameters. The Wöhler FA 430 measures these values and the volume flow at the same time.

5.4.1 Measuring relative humidity (Wöhler FA 430 only)

- Press the Up key until the relative humidity is displayed in the top part of the display.

NOTE!
It is possible to set an offset value for the relative humidity in the Setup menu, please refer to Chapter 6.3.

5.4.2 Measuring the CO_2 concentration (Wöhler FA 430 only)

- Press the Up key until the CO_2 reading is displayed.

NOTE!
When measuring at high altitudes, take the pressure into consideration to obtain a precise CO_2 reading. Before beginning to take measurements at high altitudes, enter the absolute pressure of your location under position 4.0 in the Setup mode; please refer to Chapter 6.4.

5.5 Freezing readings

- Press the HOLD/MIN/MAX key.

The readings in the top and lower parts of the display are frozen.

- To return to the normal Measuring mode, press the HOLD key again.

5.6 Printing out data on the thermal printer

You can print out readings by transmitting them to a thermal printer via the infrared interface.

- In the normal Measuring mode, briefly press the HOLD/MIN/MAX key to freeze the current reading.
- In the Hold mode, press and hold the HOLD/MIN/MAX key for 2 seconds to begin transmitting the data to the thermal printer.

NOTE!
Make sure the infrared interfaces of the fan anemometer and the thermal printer are directly facing one another.

Data transmission and printout on the thermal printer will begin. "Print" flashes in the display of the fan anemometer as long as data is being transmitted.

The values of all measurement channels are printed out, not just those readings visible on the display. Furthermore, the area of the air outlet entered in the Setup menu will be printed, if there is no funnel installed while printing. If the funnel is installed while printing, the area cross section of the funnel, on which the volume flow calculation has been based, will appear on the printout.

Note!
After measuring with a funnel, printing should be done while the funnel is still mounted.

The Date, Signature and Remarks fields are also printed out for the operator to complete.

5.7 Displaying the lowest and highest measured values

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Fig. 8: Maximum value

- When in the normal Measuring mode, press and hold the HOLD/MIN/MAX key for 3 seconds.

The lowest measured values are displayed. MIN is shown in the display.

- Press and hold the HOLD/MIN/MAX key again for 3 seconds.

The highest measured values are displayed. MAX is shown in the display.

- To return to the normal Measuring mode, press and hold the HOLD/MIN/MAX key again for 3 seconds.
- To toggle between the individual readings on the display when in the MIN or MAX mode, press the Up key (top part of the display) or the Down key (lower part of the display).

5.8 Displaying the average value

The fan anemometer calculates the time-averaged and multi-point average of all measured quantities.

5.8.1 Average value determined over time

Fig. 9: Time-averaged value display

- In the normal Measuring mode, press and hold the Up key for 2 seconds to access the **Multi-point average** mode.
- Press the key again briefly to access the **Time-averaged reading mode**.

A clock and AVG are shown in the display.

Fig. 10: Average value determined over time

- Press the HOLD/MIN/MAX key to start the measurement.
- Direct the fan anemometer slowly and steady over the entire area of the air passage.
- Press the Up key to end measurements.

NOTE!
Make sure to stop the measurement by pressing the button immediately after the data record has been finished, because the calculation of the average will not be correct, if the average measurement mode is stopped after the device has been removed from the air passage.

The duration of the measurement is displayed in the top part of the display; the average value is displayed in the lower part of the display. AVG flashes.

- Press the Down key to toggle between the average values of the different measured quantities.

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- To obtain a printout, press and hold the HOLD/MIN/MAX key.

"Print" is shown in the display.

! CAUTION!
After returning to the normal measuring mode, the average values will no longer be shown. Therefore we recommend to print them out for documentation.

- To return to the normal Measuring mode, press the Up key.

5.8.2 Multi-point average

- In the normal Measuring mode, press and hold the Up key for 2 seconds to access the Multi-point average mode.

Fig. 11: Average value mode, multi-point

A dot and AVG are displayed in the top part of the display.

The number of stored measurement readings is displayed in the top part of the display; the current reading is displayed in the lower part of the display.

- To save a measurement reading, press the HOLD/MIN/MAX key.
- Repeat this process at various points.

Fig. 12: Average value display, multi-point

- When a sufficient number of measurement readings have been saved, press the Up key to display the average value.

AVG flashes.

- Press the Down key to toggle between the average values of the different measured quantities.

- To obtain a printout, press and hold the HOLD/MIN/MAX key.

"Print" is shown in the display.

! CAUTION!
After returning to the normal measuring mode, the average values will no longer be shown. Therefore we recommend to print them out for documentation.

- To return to the normal Measuring mode, press the Up key.

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6 Settings

In the Setup mode, the user is able to configure settings to achieve measurement results of the utmost accuracy. The following settings are possible:

P1.0: Select unit

P2.0: Entering the area of the air outlet

P3.0: RH offset

P4.0: Enter the air pressure (Wöhler FA 430 only).

- In the normal Measuring mode, press and hold the On/Off key for 2 seconds to access the Setup mode.

The P1.0 mode is displayed.

Fig. 13: Setting mode

- Press the Up or Down key to access the modes P1.0 to P4.0.
- To do settings, go immediatelyto chapter 6.1.

- To return to the normal Measuring mode, press and hold the On/Off key again for 2 seconds.

6.1 P1.0: Select unit

- In the P1.0 mode, press the HOLD/MIN/MAX key to access the Unit of measurement mode.
- Using the Up and Down keys, toggle between the screen displaying metric (European) units of measurement (m/s, °C, m^3/h, cm^2) and the screen displaying theimperial (US) units of measurement (fpm; °F, CFM and $inch^2$).

Fig. 14: Setting mode – selecting the unit of measurement

It is possible to choose between the following units:

Flow velocity: m/s and fpm

Temperature: °C and °F

Volume flow: m^3/h and CFM

Area: cm^2 and $inch^2$

- To return to the P1.0 mode, press the HOLD/MIN/MAX key.

6.2 P2.0: Entering the area of the air outlet in cm² or inch²

- In the P2.0 mode, press the HOLD/MIN/MAX key to access the Area entry mode.

A five-digit figure is displayed. The first digit flashes.

Fig. 15: Entering the area

- Set the first digit using the Up key.
- Move to the next digit using the Down key. Set this digit as described above.

- When you have finished setting the figure, press the HOLD/MIN/MAX key to save the entry and return to the P2.0 mode.

6.3 P3.0: RH offset (Wöhler FA 430 only)

If an offset value is entered, the fan anemometer fundamentally adds the entered offset value to the measured value.

- In the P3.0 mode, press the HOLD/MIN/MAX key to access the Offset setting mode.

The offset value will now flash in the display

Fig. 16: Setting the offset value

- Using the Up and Down keys, set an offset value between 0 and 12% RH.
- Move to the next digit using the Down key. Set this digit as described above.

- To return to the P3.0 mode after completing the setting, press the HOLD/MIN/MAX key.

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6.4 P4.0: Entering the absolute pressure (Wöhler FA 430 only).

When measuring at high altitudes, take the pressure into consideration to obtain a precise CO_2 reading. Before beginning to take measurements at high altitudes, enter the absolute pressure of your location .

- In the P4.0 mode, press the HOLD/MIN/MAX key to access the Absolute pressure setting mode.

The preset absolute pressure is displayed in hectopascal (1013 hPa).

Fig. 17: Entering the absolute pressure

- Using the Up and Down keys, set the absolute pressure of the location where you are taking measurements.

- To return to the P4.0 mode after completing the setting, press the HOLD/MIN/MAX key.

7 Calibration (Wöhler FA 430 only)

7.1 Calibrating the relative humidity

The user is not authorized to calibrate the relative humidity. If it becomes necessary to calibrate the relative humidity, return the fan anemometer to the factory or send it to an approved service center.

7.2 Calibrating the CO_2 sensor

The fan anemometer is calibrated ex-works to a CO_2 concentration of 400 ppm. However, it should be manually calibrated regularly outside in the fresh air to guarantee accurate measurements.

Return the fan anemometer to the factory if it has been used for a long time without being calibrated.

! CAUTION!
Never calibrate the fan anemometer when the CO_2 concentration is unknown. Otherwise, the fan anemometer sets the calibrated value equal to 400 ppm which in turn will lead to incorrect measurement results.

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Carry out manual calibration on a sunny day outside in the fresh air, for example on the outside windowsill, when the CO_2 concentration is approx. 400 ppm.

NOTE!
A rainy day is not suitable due to the high air humidity, and because it can affect the CO_2 concentration in the air.

Locations with high levels of CO_2 concentration are not suitable places to calibrate the fan anemometer, e.g. locations where a lot of people congregate or near exhaust air openings or fireplaces.

CAUTION!
Before calibrating the fan anemometer, make sure the battery warning symbol is not shown on the display. Empty batteries can lead to the calibration process being aborted.

- Power off the fan anemometer.
- To access the CO_2 calibration mode, simultaneously press and hold the On/Off key, the HOLD/MIN/MAX key and the Down key for 2 seconds.

Fig. 18: Calibrating the CO_2 sensor

CAL is shown in the display and the fan anemometer counts down 30 seconds. Then the calibration process begins.

During the calibration process a value ranging between 380 and 420 ppm flashes in the top part of the display.

The value stops flashing after approx. 10 minutes. The 400 ppm calibration is finished and the fan anemometer returns to the normal Measuring mode.

NOTE!
To interrupt the calibration process at any time, simply power off the fan anemometer.

8 Replacing batteries

The battery symbol is shown in the display when the battery voltage is low.

- In the event the battery symbol is displayed, replace the batteries as follows:
- Open the battery compartment on the rear of the fan anemometer by simultaneously pressing down on the small tab above the lid and sliding off the lid at the same time.
- Replace the batteries with four new AAA batteries. Insert the batteries according to the polarity markings inside the compartment.

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9 Faults

Fault	Possible cause	Remedy
It is not possible to power on the fan anemometer	On/Off key pressed too fleetingly	Press the On/Off key slightly longer
	Batteries not inserted correctly	Check correct polarity
	Battery voltage insufficient	Replace batteries

10 Error codes

10.1 Air temperature

Error code	Error	Remedial action
E02	Temperature is below measuring range	Acclimatize the fan anemometer at room temperature for 30 minutes. If E02 is still displayed, return the fan anemometer for repair.
E03	Temperature is above measuring range	Acclimatize the fan anemometer at room temperature for 30 minutes. If E02 is still displayed, return the fan anemometer for repair.
E31	Temperature sensor defective	Return the fan anemometer for repair.

10.2 Relative humidity

Error code	Error	Remedial action
E04	Caused by temperature error	Please refer to paragraph 10.1
E11	Calibration error	Return the fan anemometer for relative humidity calibration
E31	Moisture sensor defective	Return the fan anemometer for repair.

10.3 Dew point and wet-bulb temperature

Error code	Error	Remedial action
E04	Caused by temperature or humidity error	Please refer to paragraphs 10.1 and 10.2.

10.4 Flow velocity

Error code	Error	Remedial action
E03	Flow velocity is above range	Take measurements within range If E03 is still displayed, return the fan anemometer for repair.

10.5 Volume flow

Error code	Error	Remedial action
E03	Value is above display range.	Check entered tube area.
E04	Error with flow velocity	Return the fan anemometer for repair.

10.6 CO_2

Error code	Error	Remedial action
E03	Temperature is above measuring range	Acclimatize the fan anemometer at room temperature for 10 minutes. If E03 is still displayed, return the fan anemometer for repair.
E01/E33	Low battery voltage or CO_2 sensor error	If the battery symbol is displayed, replace batteries. Manually calibrate the CO_2 sensor

11 Service

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12 Declaration of Conformity

The product:

Name: Van Air Flow Meter
Modell: Wöhler FA 410 and FA 430

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.

13 Accessories

Printer

Wöhler TD 100 Thermoprinter	Art. n° 4160

Measurement funnel

Wöhler FA 4xx Measurement funnel kit with a rectangular and a circular measurement funnel that can be plugged on the fan anemometer	Art. n° 4148
Rectangular funnel 346 x 346 mm	
Circular funnel Ø 210 mm	

Twist adjusting device

Funnel with twist adjusting device	Art. n° 4164
Twist adjusting device	Art. n° 23501

Telescope bar

Telescope bar for the measurement funnel Wöhler FA 4xx	Best.-Nr. 4684

14 Short guide

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