

Wohler E 335 / E 380

TÜV By RgG 195 approved



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The Measure of Technology

1. Description

The E 335 / E 380 Econometer is a hand held flue gas analyzer for efficiency measurement of residential and light commercial heating appliances. The Wohler E 3 Series is available in both traditional probe/hose style (E 335) and the compact "gunstyle" with integrated probe (E 380).

1.1. Specifications

Oxygen concentration (O₂) in the flue gas:

Reading: % Volume in relation to flue gas
 Measuring principle: electrochemical sensor
 Measuring range: 0 to 20.9 %
 Accuracy: 0.3 Vol. %

Carbon monoxide concentration (CO_v) in the flue gas:

E 380:

Reading: ppm Volume in relation to diluted flue gas
 Measuring principle: CO indicator semi-conductor, not H₂ compensated
 Measuring range: 0 to 350 ppm
 Accuracy: approx. ± 50 ppm

E 335:

Reading: ppm Volume in relation to diluted flue gas
 Measuring principle: electrochemical sensor, not H₂ compensated
 Measuring range: 0 to 3000 ppm
 Accuracy: 0 ... 400 ppm, ± 20 ppm
 401 ... 3000 ppm, 5 % from reading

Chimney draught or flow and jet pressure at the burner (PD):

Reading: inchH₂O or Pascal
 Measuring principle: semi-conductor membrane
 Measuring range: -0.4 ... 16 inWC or -100 ... +4000 Pa
 Accuracy: 0.1 ... 0.4 inWC, 0.01 inWC or 20 ... -100 Pa, 3 Pa
 0.08 ... 16.06 inWC, 3 % of reading or 21 ... 4000 Pa, 3 % from reading
 range limit value at -0.4 ... 16.06 inWC or -100 Pa to 40 hPa

Flue gas temperature (TS):

Reading: °F or °C
 Measuring principle: thermoelectric element (NiCr-Ni)
 Measuring range: 32 ... 1472 °F or 0 ... 800 °C
 Accuracy: 32 ... 257 °F, 4°F or 0...125 °C, 2 °C
 258 ... 482 °F, 5°F or 126...250 °C, 3 °C
 483 ... 752 °F, 7°F or 251...400 °C, 4 °C

Ambient air temperature (TA):

Via TS flue gas temperature when device is switched on.

Reading only if no specific ambient air temperature probe has been connected

Reading: °F or °C

Measuring principle: semi-conductor resistor (Si+PTC)

Measuring range: -3.8 ... 211.8 °F or -19.9 ... 99.9 °C

Accuracy: 32 ... 122 °F, 2°F or 0 ... 50 °C, 1°C

1.2. Calculated values:

- ETA: efficiency from 0 ... 100 %
- CO₂: carbon dioxide - content in %
- excess air number Lamda (e.g. 1.25 for 25 % of excess air)

1.3. Extra functions in the basic version:

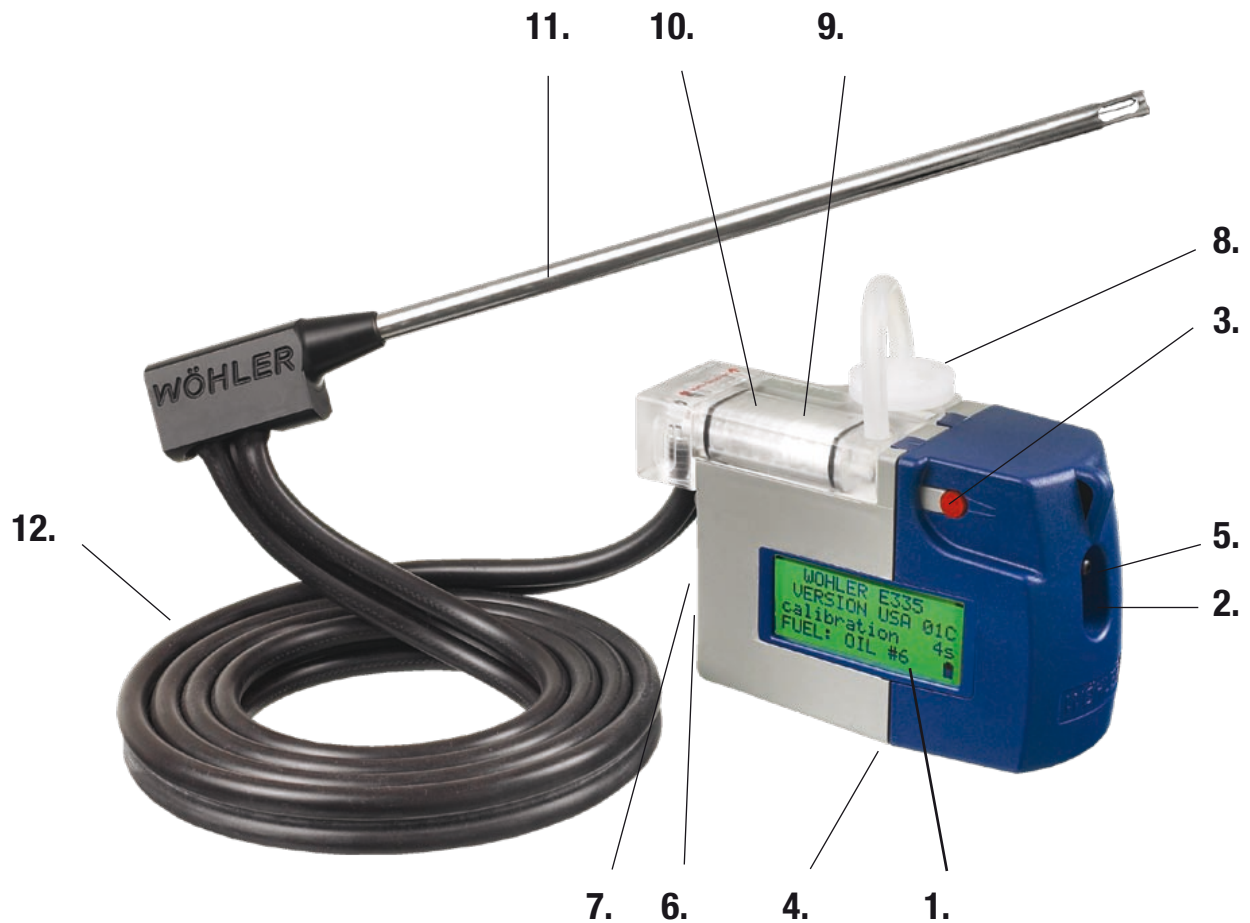
- differential pressure recording possible via external pressure connection (above of the charging terminal) for adjusting the flow or jet pressure
- display of battery status
- data transfer to a thermal printer via infrared interface
- data memory for last 10 customer records

1.4. Technical Data:

- Power supply: 4 alkaline or 4 rechargeable batteries
- Current input: approx. 60 mA (w/ pump running)
- Voltage: 4.4 ... 6.0 V
- Storage temp.: -4 ... 122 °F (-20 ... 50 °C)
- Operating temp.: 50 ... 104 °F (10 ... 40 °C) if accuracy levels indicated are to be observed
- Dimensions: 4.5 x 3.3 x 2.2 inch (115 x 84 x 55 mm), w/o probe

1.5. Gas intake and preparation:

The flue gas is pumped in via the probe by means of a membrane pump and carried to the condensate trap. That is where a heat exchanger will cool the flue gas. A cotton filter will retain the dust particles. Lastly, a water stop filter (PTFE membrane) will keep the membrane pump and the measuring cells free from any water and dust.



2. Operating elements:

1. Display
2. Charging terminal
3. on/off and control key
4. Connection for ambient air temperature sensor (bottom)
5. Pressure connection for burner adjusting operations
6. Battery case
7. Infrared interface
8. Water stop filter
9. Cotton wool filter
10. Heat exchanger
11. Flue gas probe w/ thermocouple
12. Silicone hose

3. Using the analyzer

The E 3 series utilizes multiple display screens to guide you through the performance of a complete combustion test, draft and differential pressure test or ambient carbon monoxide test.

3.1. Turning the analyzer ON

Press the button on the front of the analyzer once. The analyzer will begin a sixty second self-check procedure.

```

W O H L E R   E 3 3 5
V E R S I O N   U S A   0 1 C
c a l i b r a t i o n       4 s
F U E L :   O I L   # 6   •

```

In this screen the analyzer will display the type of fuel it is set to measure and the battery charge status.

3.2. Performing a combustion efficiency test

Upon conclusion of the self-check procedure the analyzer will display the main combustion efficiency test screen.

```

T S      7 1 °F   T a   7 3 . 4 °F
O 2 2 0 . 8 %   C O 2   0 . 1 %
E F - - . - %   C O           0 p
E A > 9 9 9 %   R U N N I N G •

```

You are ready to insert the probe into the stack and begin your test.

Note: Do NOT put the probe in an elbow. Place the probe in the center of a straight piece of smoke pipe as close to the heating appliance as possible. Never take a test between the draft regulator and the chimney.

When you have adjusted the burner to achieve the desired combustion test results, press the button on the analyzer ONCE. In the lower right hand corner you will see the display change from “RUNNING” to “IN HOLD”. This indicates that the analyzer has now captured these test results for printing or storing. You are ready to go to the next step and perform a draft test.

3.3. Performing a draft test

With the analyzer in the “IN HOLD” mode, double click the button on the front of the analyzer.

```

S E L E C T   O P T I O N :
• P R I & S A V   F U E L S
P D - M E A S   C O - M E A S
S E T U P       E S C

```

(Note: a single click at this point will allow you to navigate the “SELECT OPTION” screen. The black square cursor will be located next to the “PD-MEAS” option. To perform a draft test double click the button.

When you double click on the “PD MEAS” option the analyzer will display the following screen directing you through the draft test.

```

T O   Z E R O   R E M O V E
P R O B E   F R O M   S T A C K
      T H E N   P R E S S
      B U T T O N   O N C E !

```

The analyzer will direct you to press the button once. Be sure the probe is NOT in the stack because the analyzer is zeroing out the draft channel. Insert the probe into the stack and take your draft reading. When your draft adjustments are complete and you are satisfied with the reading, press the button once as directed by the analyzer. The analyzer display will return to the “SELECT OPTION” screen.

```

D R A F T   /   P R E S S U R E
P D :           0 . 0 0   i n W C
w h e n   f i n i s h e d . . .
h i t   B U T T O N   o n c e !

```

3.4. Printing and Saving Test Results

3.4.1. Printing Test Results

Once you have completed your draft test and single clicked to return to the “SELECT OPTION” screen the black square cursor will be located next to the “PRI&SAV” option. Point the electronic eye of the analyzer, located to the left of the display screen, at the electronic eye of the printer and double click the button. The test results will print out. When the print out is complete the analyzer will return to the “SELECT OPTION” screen with the black square cursor located next to the “PRI&SAV” option. If you desire multiple copies of the test results double click the button as above for an additional copy.

```

S E L E C T   O P T I O N :
• P R I & S A V   F U E L S
  P D - M E A S   C O - M E A S
  S E T U P       E S C

```

3.4.2. Saving Test Results

When you print a test result the analyzer will automatically save that information into memory. To reprint all the ten tests saved in memory, when you turn on the analyzer hold the button for three seconds with the electronic eye of the printer pointed at the electronic eye of the analyzer

and the printer will print out all stored tests prior to beginning the self-check.

p l e a s e w a i t . . .

3.5 Performing an Ambient Carbon Monoxide Test

When the analyzer has completed its self-check it will display the combustion readings screen. Double click the button to get to the “SELECT OPTION” screen. The square black cursor will be next to the “PD-MEAS” option. Single click once to move the cursor next to the “CO-AMB” option.

S E L E C T O P T I O N :
P R I & S A V F U E L S
P D - M E A S • C O - A M B
S E T U P E S C

Double click on the “CO-AMB” option. The analyzer will now display the “CO-AMBIENT” screen.

C O - A M B I E N T
C O a : - 3 p p m
0 3 0 1 0 0

Single click the button now to display you “CO” options. The analyzer will display three options for you.

“COa=OK” means you have completed your test and have the desired results. Double click here to return to the “SELECT OPTION” screen.

“COa=0” means that you wish to ZERO the CO sensor. (This should be done in a fresh air environment prior to starting your test). Double click here to ZERO the CO sensor.

“COa continue” means you wish to continue testing for CO. Double click here to return to the “CO AMBIENT” graph mode and continue testing.

C O - A M B I E N T
C O a : - 3 p p m
• C O a = 0 K C O a = 0
C O a c o n t i n u e

3.6 Fuel Selection

To change the fuel that you are testing you must get to the “FUELS” menu. From the combustion readings screen double click the button to get to the “SELECT OPTION” screen. From here single click the button to move the square black cursor until it is next to the “FUELS” screen. Double click the button and the analyzer will display the “FUELS” menu.

```

F U E L S :      E S C
  O I L # 2      K E R O
• N G A S        L P G
  C O A L        W O O D
  
```

Single click the button to navigate through the “FUELS” menu until the cursor is next to the desired fuel. Double click on the desired fuel and the analyzer will return to the combustion readings screen. If you decide not to change the fuel selection just navigate the cursor to the “ESC” option and double click. The analyzer will return to the combustion readings screen.

3.7 “SETUP” Menu Option.

The last item in the “SELECT OPTION” screen is “SETUP”. Double click the button to access the “SETUP MENU” screen. This allows you to change probe specification, units of measure specifications, printer specifications, monitor specifications AND this is where you can check to life of the oxygen sensor. In the lower right hand corner of the display is a constant readout of the oxygen sensor strength. Double click on the “ESC” option to return to the “SELECT OPTION” screen.

```

S E T U P   M E N U :
• P R O B E S       M O N I T O R
  U N I T S         P R I N T E R
  E S C             O 2 : 1 0 0 %
  
```

3.7 Turning OFF analyzer

To turn off the analyzer depress and hold the button. The analyzer will begin a three second countdown to shutdown. Note: releasing the button at any time during the three second countdown to shutdown will result in the analyzer staying on and returning to the combustion readings screen.

4. Maintenance

4.1. Cleaning the gas way of the E 380

The heat exchanger houses a cotton wool filter that needs to be changed as soon as it has become moist. For optimum protection, the outside of the device is fitted with a water stop filter that seals off as soon as condensate or water or dust penetrates into the gas way behind the cotton wool filter. The pump operation will become heavier if the filter begins to seal off. For changing the water stop filter, the hose connectors on both sides must be released. The filter can be exchanged without any problem and it will be necessary to fit the hose connectors again securely.

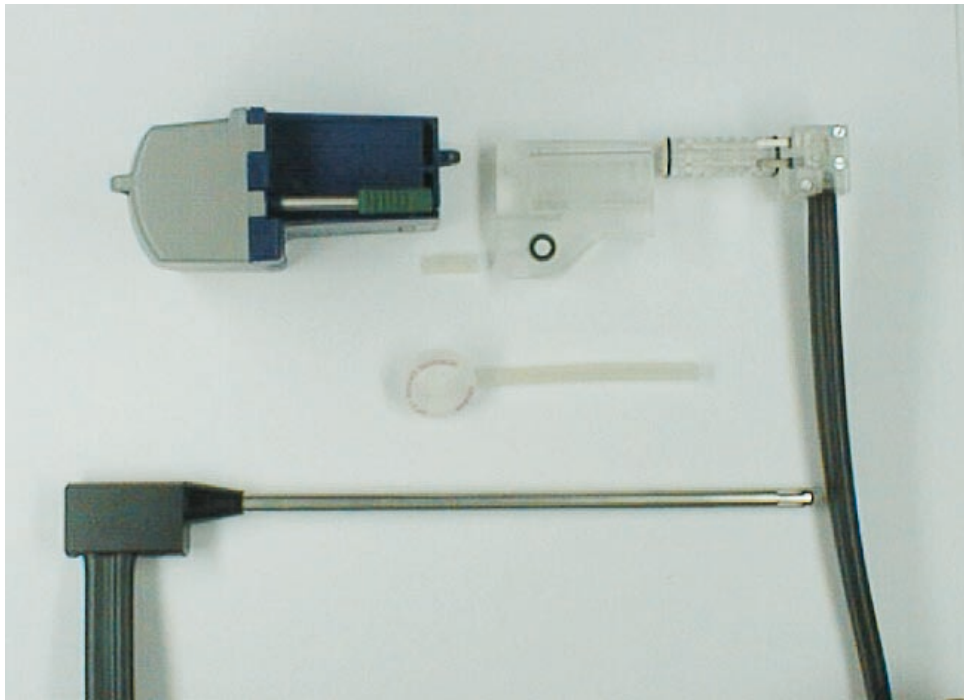
The heat exchanger can be cleaned under running water.

The O-rings 14 x 1.78 (joints) of the heat exchanger (condensate spiral) must be treated with a special lube at regular intervals so as to continue to work properly.

4.2. Cleaning the gas way of The E 335

The heat exchanger houses a cotton wool filter that needs to be changed as soon as it has become moist. Simply pull the condensate spiral out off the condensate casing (or move it with a piece of money). For optimum protection, the outside of the device is fitted with a water stop filter that seals off as soon as condensate or water or dust penetrates into the gas way behind the cotton wool filter. The pump operation will become heavier if the filter begins to seal off. For changing the water stop filter, the hose connectors on both sides must be released. The filter can be exchanged without any problem and it will be necessary to fit the hose connectors again securely.

The O-rings 14 x 1.78 (joints) of the heat exchanger (condensate spiral) must be treated with a special lube at regular intervals so as to continue to work properly.



4.3. Service

The E 3 series requires annual calibration at our Wohler USA Service Center. The following functions of the E 3 series are checked:

- The oxygen sensor is calibrated
- The draft channel is calibrated
- Stack temperature and ambient temperature are calibrated
- The carbon monoxide sensor is calibrated
- The pump is checked complete
- Filters are replaced if necessary
- General overall evaluation of unit

4.4. Sensors

The E 380 utilizes an electrochemical measuring oxygen sensor and a semiconductor type CO indicator with (PD) semiconductor membrane.

The E 335 utilizes an electrochemical measuring oxygen sensor and an electrochemical measuring carbon monoxide sensor.

The life of the measuring sensor will be determined by numerous outside parameters such as the care provided for the device (removal of condensate), the frequency of use and regular maintenance. This explains why the average life of measuring sensors will be determined by specific experience.

Average sensor life expectancy:

- O₂ Sensor 1.5 - 2 years
- CO Sensor 2 - 3 years
- CO Indicator up to 5 years

5. Accessories

- | | |
|--|----------|
| • USB IR Interface, with cable and drivers | p/n 9318 |
| • Wöhler TD 600, thermo fast printer | p/n 4130 |
| • Printer Paper (10 roles) | p/n 4145 |
| • Combustion air temperature plug | p/n 9605 |
| • Combustion air temperature probe | p/n 9611 |
| • probe holder, stainless steel | p/n 2494 |
| • short cotton filters (qty. 150) | p/n 620 |
| • water stop filter (qty. 3) | p/n 9621 |
| • condensate wiper | p/n 621 |

6. Warranty and Service

6.1. Warranty

Each E 3 series econometer analyzer will be tested in all functions and will leave our factory only after extensive quality control testing. The final control will be recorded in detail in a test report and preserved in our archives.

If used properly, the warranty period for the measuring device and the probe will be 12 months from the date of sale. Not covered by the warrant are components subject to wear (e.g. batteries, accus, filters, etc.).

6.2. Service

Service is our major concern and that is why we remain at your disposal during the warranty period, too.

- You send us your measuring device and it will be repaired within 3 days of the date it is received
- Our technicians will provide you gladly with information by phone.

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