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ecom®

English



OPERATION MANUAL

ecom® EN3 TECH

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Important Hints

SAFETY INSTRUCTIONS

Please observe all safety instructions in this manual carefully, in order to avoid danger and damage to people and property values.

REGULATIONS

Observe the relevant, valid standards, regulations and guidelines when working with the instrument!

TARGET GROUP

This manual is intended exclusively for authorized professionals.



WARNING

Risk of injury

Improper work on combustion engines or combustion controllers can lead to injuries.

Work on such systems may only be carried out by specialists.



WARNING

Risk of poisoning

Noxious gases are sucked in by the measuring device and released into the ambient air. Only use the measuring device in well ventilated spaces!

INTENDED USE

The ecom-EN3 TECH is designed for the following applications:

- Analysis of exhaust gases from combustion processes in combustion engines and combustion plants in the context of control measurements
- Analysis of pressure differences in combustion engines and combustion plants



WARNING

Risk of injury

Do not use the ecom-EN3 TECH as a safety device or safety alarm device in gaseous environments or processes



CAUTION

Damage to the sensors

Substances containing solvents damage the device's sensors.

Avoid contact with substances containing solvents.

The unauthorized use leads to the exclusion of any liability claims.

DISPOSAL

- **Dispose the packaging material of the instrument in an environmentally sound manner.**
- **Old electrical equipment must be disposed in an environmentally sound manner by an authorized body. On request, we take back your old instrument purchased from us and guarantee for an environmentally friendly disposal.**
- **Defective batteries can be dispensed both at the factory and at the collection points of public waste disposal companies or at points of sale for rechargeable batteries!**



WARNING

Risk of electric shock

Live components are exposed when the housing is open. Before opening the device, disconnect it from the power supply voltage.



WARNING

Li-Ion battery

The replacement of the battery must be carried out only by qualified personnel or by an ecom authorized service center.

NOTE

Charge the internal accumulator regularly (an unused analyser should be charged at least 1 x per month). Never store the unit with a discharged battery!



CAUTION

Damage to electronic components

Electrostatic discharge can damage electronic components.

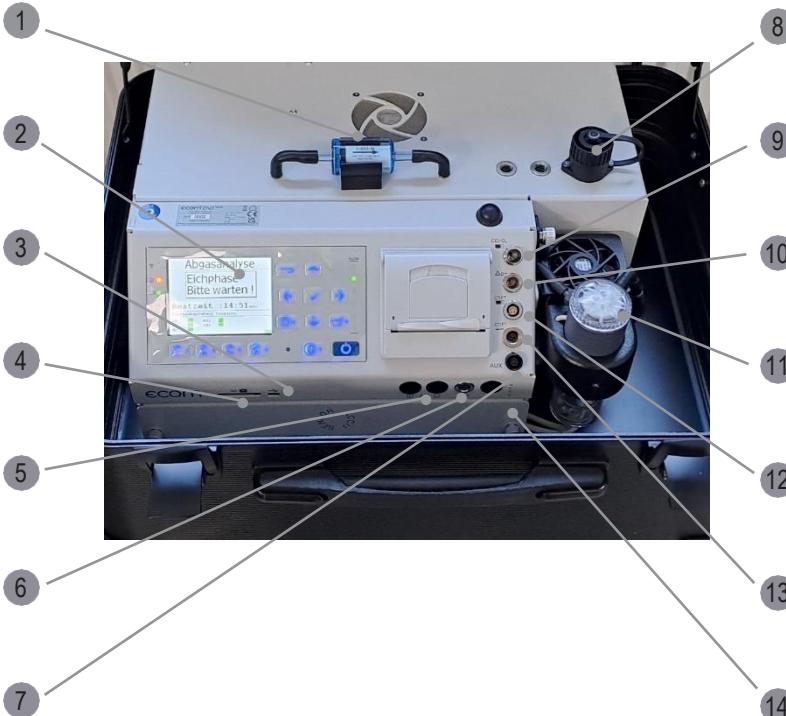
Before touching the inside of the housing, touch a grounded component.

NOTE

Strong electromagnetic fields can impair the function of the measuring instrument. Make sure that the measuring instrument is not exposed to strong electromagnetic radiation sources.

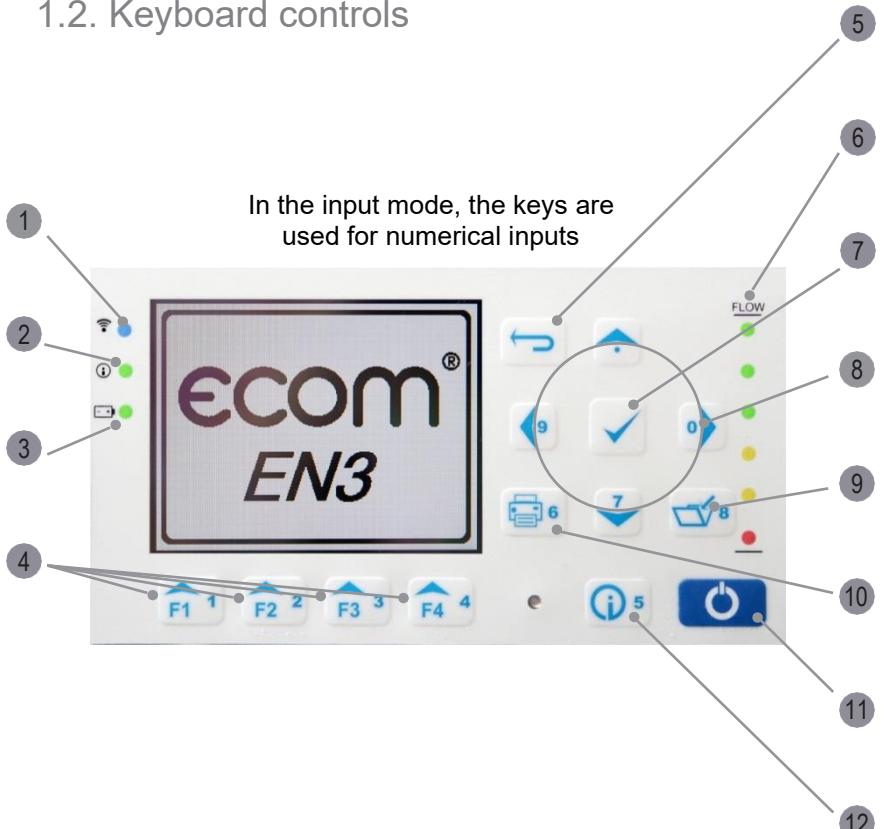
1. Instrument Design

1.1. ecom-EN3 TECH



1 PTFE filter for UV-Bench	2 Graphic display	3 Connection USB
4 Slot for multi-media card (SD)	5 Connections for Pa pressure sensor	6 Connection pressure
7 Connection AUX	8 Connection heated probe	9 Connection sampled gas
10 Connection draught	11 Peltier cooler with cooler with fine dust filter	12 Connection gas temperature
13 Connection air temperature	14 Battery and sensors compartment	

1.2. Keyboard controls



1	LED (active with existing BT or WiFi connection)	2	Info LED to display the device status	3	Battery LED to display the charge state
4	Function key (function shown on display)	5	ESC key (quit/exit menu)	6	Digital flowmeter
7	Enter key (confirm selection)	8	Cursor keys (Up/Down/Right/Left/Scroll)	9	Save key
10	Print key	11	Ein-/Ausschalter	12	Info-Taste (zum Kontrollmenü)

1.3. Connections at the instrument



1 Connection sampled gas	2 Connection draught	3 Connection gas temperature
4 Connection air temperature	5 Connection AUX	6 Connection Pa-Sensor
7 Connection pressure	8 Slot for multi-media card (SD)	9 Connection USB

1.4. Heated Sampling System



By using a heated sampling system is possible to measure water-soluble substances (NO_2 and SO_2) without washout. A built-in hot gas filter protects the instrument especially for long-term measurements from fouling. The maximum exhaust gas temperature when using the heated sampling system is 500 ° C.

1.4.1. Heated Hose



The heated hose is available in lengths of 3.4 m, 5 m, 7 m, 10 m and 15 m. The heated hose can be set to a maximum temperature of 180 °C.

NOTICE

Do not bend the heated hose!

Heated hose has to be cooled out after the measurement!

Heated hose may not be folded too tight - use the whole case!

Do not put the heated hose in water!

1.4.2. Heated Head

The heated head (BK2) is available with probe lengths of 300 mm, 500 mm, 700 mm, 1,000 mm and 1,500 mm including a thermocouple. The PTFE filter can be changed as follows:

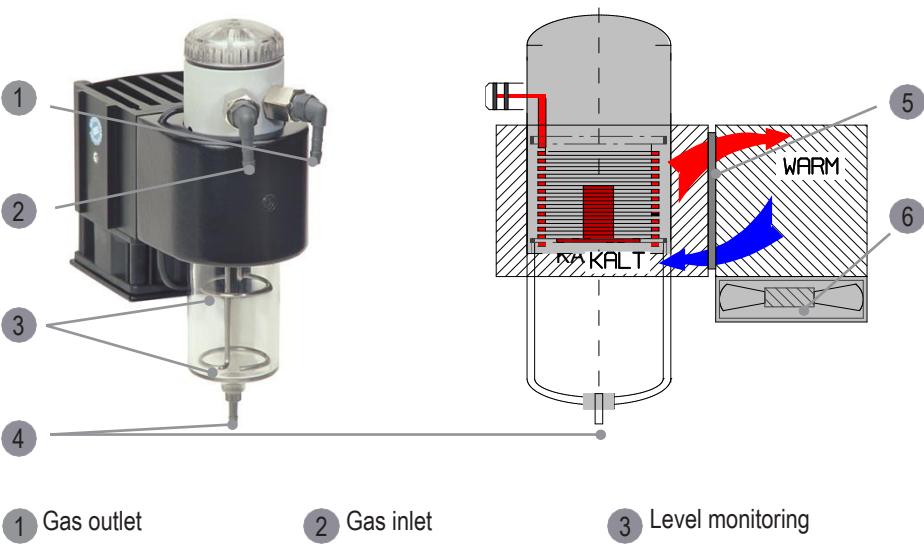


1. Disconnect connections to heated hose.
2. Loosen the bayonet lock on the back of the heated head.
3. Remove the filter carefully.
4. Insert new filter and fix with bayonet lock.
5. Make connections to heated hose.

NOTICE

Clean or change the PTFE filter regularly!

1.5. Option gas cooler



Exhaust gas with a temperature over the steam dew point (35 - 65 °C) is flown spiral via a long gas path thru a surface coated metal body with good thermal conductivity. The gas radiates its heat to this metal body. A Peltier element (semi-conductor cooling element) flown by a continuous current is thermal connected with this body and with a second metal body with cooling ribs and ventilation slots.

The flow thru the Peltier element creates a heat transfer from WARM to COLD, drains the heat of the metal body flown by gas and conveys it to the outer cooling body. This heat is conveyed thru a vertical forced ventilation to the surrounding air.

The condensation issued by the heat loss of the gas drops in a receptacle and is pumped out on request by a periodically working hose pump.

NOTE

When the gas cooler is active, the power requirement of the instrument increases considerably. Therefore the cooling capacity of the gas cooler in the battery operation is reduced.

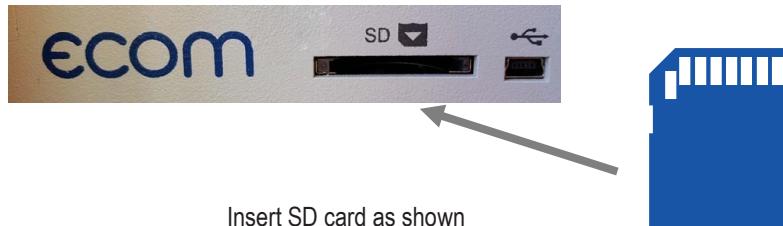
To deactivate the activated gas cooler in battery operation, proceed as follows:

- Press the <Enter> key when the measuring menu is active.
- Choose the menu point "Peltier I / 0".
- press the <Enter> key again.

To reactivate the deactivated gas cooler, repeat the above steps.

1.9. Data Memory

When a SD card is inserted into the device, point measurements and data logger records can be stored.



To start point measurements or data logger records, insert the SD card as shown in the SD card slot and let it fully engage.

NOTE

The SD card must have the following characteristics:

min. card volume 32 MB - max.32 GB (UHC)

card formatted on 16 bit FAT or FAT32



CAUTION

Data loss

Never pull out cards during data record - data loss and damaging of the multi-media-card are possible!

All values of a point measurement are stored in a text file with the name "J2KDV-xx.txt". The text file is stored automatically in the main directory of the SD card.

All values of a data logger record are stored in a csv file with the naming "J2KDL-xx.csv". Sequential files are automatically numbered from 0 ... 99.

The data in the text file and the csv file are stored in the same structure. You will find further information on the data format in the chapter "Technical data".

The files can be transferred to a PC using a card reader. Both file types can be imported or opened using MS Excel.

1.7. Option Interface Wi-Fi (WLAN)

If the instrument is equipped with the Wi-Fi option, this interface can be used to display the current measured values in the App "ecomMander" of ecom. The following functions can be used in the App:

- live display of current measured values
- export of stored measured values as *.pdf or *.csv
- activate the function "Print measured values" on the measuring instrument
- activate the function "fresh air purge CO sensor" on the measuring instrument

NOTE

For the start-up of the Wi-Fi interface and for further information on the corresponding settings, please refer to the chapter "Adjustments".

1.11. Interface BLE (Bluetooth Low Energy)

The device is equipped with BLE, so this interface can be used to display the current measured values in the App "ecomMander" of ecom. The following functions can be used in the App:

- Live display of current measured values
- Export of stored measured values as *.pdf or *.csv
- Activate the function "Print measured values" on the measuring instrument
- Activate the function "fresh air purge CO sensor" on the measuring instrument

NOTE

For the start-up of the BLE interface and for further information on the corresponding settings, please refer to the chapter "Adjustments".

2. Measurement Preparations

NOTE

Make sure that before each measurement:
the device has no visible defects
the measuring system is tight (see chapter leak test)

2.1. Turn on the instrument

The instrument is switched on with the <1 / 0> key.

NOTE

After switching on the instrument or before starting a measurement, check the charging status of the battery. Check the charging status of the battery in the status line and / or in the menu "Control".

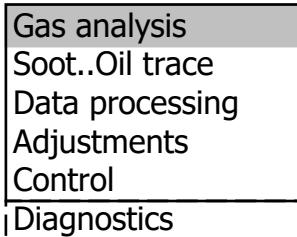
The instrument is supplied with charging power supply. The instrument can also be operated with the internal battery for an extended period of time. When recharging the battery is necessary, the instrument will emit a battery warning. This is done acoustically and via a message in the display.

NOTE

The battery warning is activated when the battery voltage is less than 6.5 V. Less than 6.0 V the operation with battery is no longer possible. The operation must continue via the charging power supply.

2.2. Main menu

When the instrument is switched on, the start screen is displayed, followed by the main menu. If the device is in the main menu, the UV bench is heated even in battery mode until it is released for measurement above 40 °C.



Up to 5 submenus are displayed simultaneously in the main menu. Hidden submenus can be displayed by scrolling with the arrow keys.

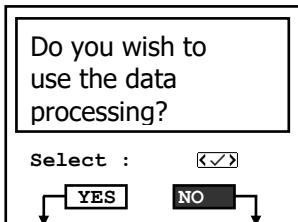
Menu	Meaning	Comment
Gas analysis	Perform gas analysis	
Mean value	Perform gas analysis with mean value calculation	
Soot...Oil trace	Input of soot measurement results	Start soot measurement (units with soot measurement)
Data processing	Assign measurements / Data transfer	only with inserted MM card
Adjustments	Modify instrument adjustments	
Control	Check operation state of instrument	
Diagnostics	<ul style="list-style-type: none"> - Read-out of firing automate - - delta-T measurement - - Heating check - - 4-Pa-Test 	only with ecom-xRE

2.3. Warm-up phase, calibration and fuel type

Before you can start the measurement procedures, the instrument performs the following steps:

1. Automatic adjustment of the sensors (calibration phase)
2. Query: Use of the database
3. Query: Selection of the fuel type

Select the sub-menu "Gas analysis" and confirm with <Enter>. The instrument starts the automatic calibration of the sensors (calibration phase). This calibration phase is completed after 60 s.



While the calibration phase is active, the query for using the database is displayed. If the measured values of the subsequent gas analysis are to be assigned to a plant or a customer, confirm the query with "Yes".
 → Press the <F1> key.

For the following steps see chapter "Data processing during the measurement"

If the measured values of the subsequent gas analysis are not to be assigned to a plant or to a customer, e.g., for a fast control measurement, confirm the query with "No".

→ Press the <F4> key.

Then select which fuel type is used in the combustion.

Fuel type		
Fuel oil		
CO2max	A1	B
15.4	0.50	0.007
Select :	<input checked="" type="checkbox"/> <input type="checkbox"/>	

→ To scroll through the list of fuel types stored in the instrument, scroll up or down with the arrow keys.

→ Select the appropriate fuel by confirming with the <Enter> key.

The following fuel types are stored in the instrument as standard:

Fuel type	CO2 max	Factor A2	Factor B
Fuel oil	15,4	0,68	0,007
Natural gas	11,8	0,66	0,009
City gas	11,7	0,63	0,011
Coke oven gas	10,2	0,60	0,011
Liquid gas	14,0	0,63	0,008

3. Carry out gas analysis

If the calibration has been successfully completed and all previous queries have been answered, the instrument is ready for operation.

NOTE

The following minimum times must be observed in order to obtain correct measured values:

- 1 minute for fresh air calibration of the sensors
- 2 minutes for stable measured values at the instrument

To obtain accurate measurement values it's important to re-calibrate the instrument after each measurement (at the latest after one hour). To calibrate the sensors, proceed as follows:

- switch off the instrument and wait for the switch off phase
- switch on the device and refer to chapter "Measurement Preparations"

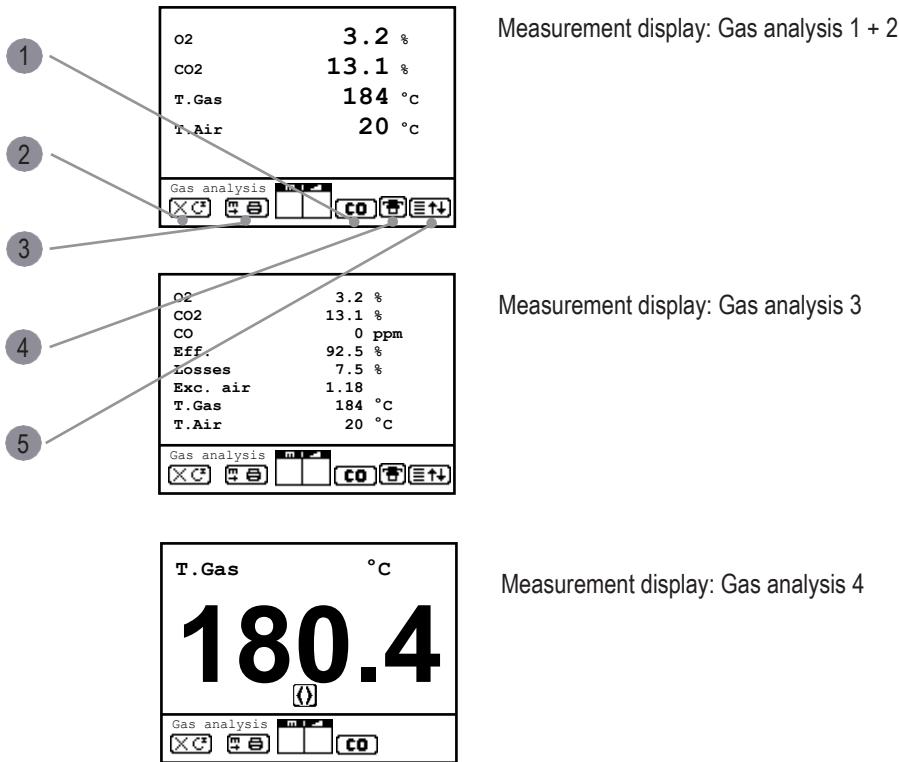
The current measured values of the active sensors are displayed in the measurement menu. In addition, various measuring procedures are available:

Display	Meaning	Comment
Gas analysis 1	Display of 4 definable measured values	Select the measured values with the <F4> key
Gas analysis 2	Display of 4 definable measured values	Select the measured values with the <F4> key
Gas analysis 3	Display of 8 definable measured values	Select the measured values with the <F4> key
Gas analysis 4	Display of 1 definable measured value	Select the measured value with the cursor keys <right / left>
Draught measurement	Display of the measured value Draught / Pressure and storing a reference value	While this measurement procedure is active, the gas pump remains inactive Set the zero point of the pressure sensor with the <F4> key Storing a reference value with <save>

4. Measurement procedures

4.1. Gas analysis

The measurement procedure for gas analysis can be used for most control measurements in order to determine the gas components, temperatures and ratios in the measured combustion process. The following measurement displays are available for the gas analysis procedure:



- 1 Switch-off CO-Sensor key <F3>
- 2 Hotkey key <F1>
- 3 Store and print values key <F2>
- 4 Symbol cooler ON /OFF
- 5 Hotkey key <F4>

The following functions are available in all 4 measurement displays:

Pressing <F1> enables to switch, from the values display, to a menu point selected before or on „Standby“ (see chapter Adjustments). Possible menu points are: Soot...Oil trace, Data processing, View memory, Display values, Fuel type, Efficiency (K), Internal, Adjustments. Furthermore you can switch back from any random menu point to the values display with <F1>.

Press <F2> to print out the values simultaneously to their recording in the intermediate memory.

Press <F3> to cut the CO sensor from the gas path so that it is protected against too high concentrations. The automatic switch-off takes place at 2500 ppm or 4000 ppm (depending on the model).

The following function is also available in the measurement screens 1..3:

Pressing <F4> also enables to switch, from the values display, to a menu point selected before or on „Standby“ (see chapter Adjustments).

4.1.1 Adaptation of the displays for gas analysis

NOTE

The position of the measured and calculated values (gas analysis sub-menu) on the display pages is free selectable

For alteration of the existing succession, proceed as follows:

- press <Enter> / „Display values“ / <Enter> to activate the function
- select line with cursor keys (Up/Down)
- select desired parameter with cursor keys (right / left)
- repeat procedure until desired layout is completed
- press <Enter> to deactivate the function

The measured value or the calculation value in measurement screen 4 can be set with the cursor keys (right / left).

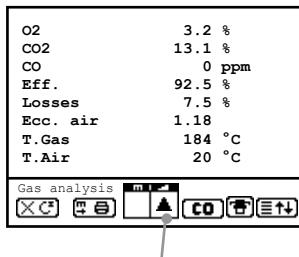
4.1.2 Positioning the probe, search the core stream

NOTE

The correct positioning of the probe in the gas stream is necessary in order to achieve an impressive measuring result.

To correctly position the probe in the gas stream, proceed as follows:

- Connect the probe hose to the device "connection gas temperature"
- Position the sampling probe in the exhaust channel, so that the thermo-couple is fully surrounded with the gas.
- Position the sampling probe in the exhaust channel (Position in the hottest gas temperature area).
- Observe trend for T.Gas in the measurement display.
- As long as the display shows an arrow in upwards direction, the measured temperature increases, it means the probe tip moves towards the core stream center.
- If an arrow in downwards direction is displayed, it means you move the probe away from the core stream and the temperature sinks.



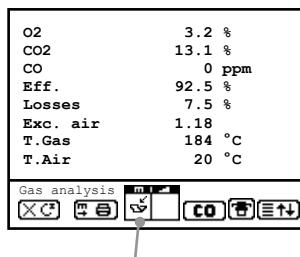
Core stream search

4.1.3 Determination of measured values

CO₂, efficiency, losses, excess air and dew point are calculated values. They can only be calculated if realistic values for the basic parameters like O₂ and the temperatures are available. It must be ascertained that:

$$\text{O}_2 < 20,7 \% \text{ und } \text{T.Gas} - \text{T.Air} > 0 ^\circ\text{C}$$

are given. If the gas temperature falls below the dew point (between 25 and 65 °C), so efficiency will be calculated with condensation gain. In this case a (K) is displayed after „Efficiency“. Correct measurement values are displayed first after a short delay, necessary for the gas transport and the build-up of a stable electrochemical reaction to the sensors. This time period lasts approx. 1 to 1.5 minute. For recording, printout and evaluation, wait until the values do not change anymore. If deviations higher than 2 ppm still occur by the gas values, they can be due to unstable pressure conditions in the exhaust channel.



Measurement stored in intermediate memory

If the measurement values are stable and the results can be printed out, press the key <Save> to transfer the values in the intermediate memory (caution: store separately gas analysis, CO, O₂ check and draught measurements). They will be kept there for a later printout and, if need be, for a final data record storage.

4.1.4 Printing measured values

There are two ways to print measurements:

1. Print of the measurements stored in intermediate memory.

To print the measured values stored in the previous step, press the **<Print>** key. The complete content of the intermediate memory will be printed.

2. Printing the currently displayed values, including storage in intermediate memory.

To print the measured values currently displayed, press the key **<F2>**. At the same time the measured values are stored and overwrite existing intermediate stored values.

NOTE

Use the option "Print the currently displayed values" to adjust the time of optimal measurement results and to print them immediately.

4.1.5 CO-Overload Protection

The CO sensor is protected against overload by the system. If the limit of 2500 ppm or 4000 ppm (depending on the model) at the CO sensor is exceeded, the internal additional fresh air purging pump is switched on, which supplies fresh air to the CO sensor.

When the CO overload protection is active, the CO indicator flashes in the status bar of the measurement screen, and the **<Info>** status LED changes from "green" to "red".



CAUTION

Damage to the CO sensor

If the opening for the supply of fresh air to the CO sensor is closed, the sensor can not be purged with fresh air and will be damaged or destroyed during overload.



Fresh air opening

If the CO sensor has been purged sufficiently with fresh air (X disappears behind CO) and the measured values are within the permissible range, the fresh air flushing pump is switched off.

The CO indicator in the status bar of the measurement screen no longer flashes and the status LED <Info> changes from "red" to "green".

The "CO automatic" option can be used to set how the fresh air flushing pump is switched off after sufficient purging of the CO sensor:

- automatically
- must be triggered manually

To deactivate the CO automatic option, deactivate the corresponding option in the menu **Adjustments \ Internal \ CO-Automatic** with "No".

To switch off the fresh air flushing pump with the CO automatic deactivated, press the <F3> key.

4.2 Draught measurement

A trend indication for the draught conditions in the exhaust channel can already be viewed during the gas analysis. Nevertheless the value for the chimney draught will not be stored together with the gas values while pressing **<Save>** because the differential pressure sensor tends to drifts because of its sensibility. For an exact measurement, it is consequently advised to re-calibrate this sensor just before sampling and documenting the value.

Pressure
Draught -0.12 hPa
Recorded value: -0.12 hPa
  

The display shows the current value as well as the recommendation to re-set the zero point of the sensor. Disconnect the draught hose from the instrument for a short moment and press **<F4>**. The sensor is herewith re-calibrated. Re-connect the draught tubing.

The display shows the exact measurement value which can be stored while pressing **<Save>** and added to those results previous stored in the intermediate memory. The stored value is shown on the display. Press **<ESC>** to exit the draught measurement menu.

4.3 Soot...Oil trace



Hand soot pump set

In order to perform a soot measurement in the flue gas from oil firing systems, a hand soot pump can be used.

By a prescribed number of suction strokes with the hand soot pump, a defined amount of flue gas is drawn through an inserted filter paper. On the basis of the deposited amount of soot on the filter paper (blackening), it is

possible to compare optically with a scale, which is the soot number. This makes it possible to evaluate the amount of soot in the flue gas.

The sub-menu "Soot...Oil trace" enables the input of measured results for boiler temperature, soot dots and oil trace. Select the desired line on the display and activate the input with <Enter>. The input for boiler temperature and soot measurement can be made one with help of the instrument keyboard. Press <Enter> to store the value in the data record of the measurement.

Soot..Oil trace	
Boiler temp.:	66°C
1st Soot meas.:	-.-
2nd Soot meas.:	-.-
3rd Soot meas.:	-.-
Oil trace	: -----
Auswählen: <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	

Soot..Oil trace	
Boiler temp.:	66°C
1st Soot meas.:	1.0
2nd Soot meas.:	0.5
3rd Soot meas.:	1.5
Oil trace	: NO
Auswählen: <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	

The result of the oil trace check will be documented as follows:

- Place cursor on line "Oil trace"
- Consign the result with <Enter> ("No", "Yes" or "----")

Once all inputs have been entered, press <ESC> to exit the menu. The measurement is now complete.

4.4 Customer data

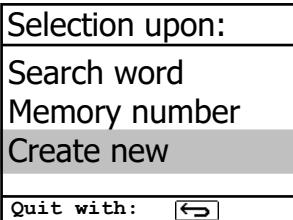
To call up plant data already recorded or to create a new file, the following possibilities are available:

4.4.1 Create new

(is automatically selected by first use of a MM card)

To create a new file, a numerical number should be assigned. Select „Create new“ and confirm with <Enter>. Input a random number (max. 16 figures) using the keyboard:

- use the cursor keys <Up/Down/Right/Left> to select the figure (selected figure outlined by a black background)
- press <Enter> to accept the figure (press <F2> to delete the last figure if needed)
- repeat this procedure until the desired number is complete



Example: „25.09.2017“

Tip: We suggest a date-related input to easily find the data record later on via the search function.

After confirming with **<F1>** it is possible to enter a text via the keyboard (max. 6 lines with 20 characters each) which is printed out and can be used for data processing purposes. Proceed as follows:

- select text line 1 using the cursor keys **<Up/Down>** and confirm with **<Enter>**
- select with **<F3>** the keyboard mode (4 keyboard modes are available)
- select with the cursor keys **<Up/Down/Right/Left>** the desired character (selected character outlined by a black background)
- press **<Enter>** to accept the character
- (press **<F2>** to delete the last character)
- repeat this procedure until the desired text is complete

Proceed as follows to correct a character:

- press **<F4>** to interrupt the character selection
- use the cursor keys **<Right/Left>** to select the character requiring correction
- activate with **<F4>** the character selection and correct character
- return with **<F1>** to character selection and call up next line for process

The input is closed with **<ESC>** and the next available data record is activated. Press **<ESC>** to return to the gas analysis menu.

4.4.2 Memory number

For check of the plant already stored in the instrument, the selection upon record number is most appropriate.

Select „Memory number“ and confirm with <Enter>. Input a random data memory number:

Selection upon:	Input number
Search word	
Memory number	3
Create new	
Quit with: 	Please use the numeral keys!

Example: "3" for data record number 3

Press <Enter> once the input is completed to call up said data memory number. The cursor keys <Up/Down> enable the check of the record numbers.

Press <F1> to select the first memory number.

Press <F2> to select the last memory number.

Press <F4> to delete the content of the selected memory number.

Press the <Enter> to select the currently displayed memory number and store the following measurements under this memory number.

Finally press <ESC> to start the gas analysis.

4.4.3 Search word

If the plant code is known, it is possible to find the plant data stored with help of a search machine. Select hereto "Search word" and confirm with <Enter>. Using the software keyboard, input at least 3 connected figures of the plant.

After input completion, press <F1> to start the search. All files matching this code will be filtered. The resulting selection can be scrolled using the cursor keys.

Memory number 1
25.09.2017 
  

Example: "25.09" for plant code 25.09.2017

<F1> for selection start
<F2> for selection end

Once found, activate the desired data record with <Enter>. The last measurement on this plant can be viewed pressing <Enter> / „View memory“ / <Enter>.

All measured and calculated values can be called up on 5 display pages, using the cursor keys to step thru.

Memory number 1
25.09.2017
12:15 25.09.17

o2	3.2 %
co2	13.1 %
co	0 ppm
Eff.	92.5 %
Losses	7.5 %
Exc.air	1.18
T.Gas	184 °C
T.Air	20 °C

Gas analysis 12:15 25.09.17
Memory number 1

o2	17.5 %
co	738 ppm
co	123 ppm
Exc.air	7.00
CO measurement	12:15 25.09.17
Memory number 1	

O2 value in air
25.09.2017
12:15 25.09.17
Memory number 1

Boiler temp.:	65 °C
1st Soot meas.:	0.5
2nd Soot meas.:	0.3
3rd Soot meas.:	0.7
Oil trace:	NO

Soot..Oiltrace 12:15 25.09.17
Memory number 1

t1	70.4 °C
t2	56.3 °C
dt	14.1 °C
dt-measurement	12:15 25.09.17
Memory number 1	

Press <ESC> to escape the previous measurement data and the recording of the current data can start.

5. Mean values

By mean value measurement function, measurements can be sampled within an adjustable time frame and mean values can be calculated. Should the several measurement values or the mean value result be stored a storage place has to be selected as described in chapter 7. If the function "Store" is activated, based on this storage place all measurements will be written consecutively on the next storage places. If the function "Store" is not activated, the mean value result can be stored on MMC with <Print> / „Memory -> M".

Once the fresh air calibration is completed, select the menu point „Mean values“. Before starting, the parameters „Measurement time“, „Scanning“, „Printer“ and „Record“ should be checked or modified if need be. The meaning is respectively:

- Measurement time = Time frame during which the mean values will be sampled
- Scanning = Time interval between the measurements considered for mean value calculation
- Printer = Documentation of measurements serving to the mean value calculation
- Store = All measurements for mean value calculation will be stored

Gas analysis	Mean value
Mean value	Start measurement
Soot..Oil trace	Meas. time
Data processing	Scanning
Adjustments	Printer
Control	Store
Diagnostics	Select: <input checked="" type="checkbox"/> <input type="checkbox"/>

„Measurement time“ and „Scanning“ can be adjusted as follows:

- select menu point and confirm with <Enter>
- set the desired time using the numerical keys:
 - 0.01 = 1 sec = minimal value
 - 59.59 = 59 min : 59 sec = maximal value
- confirm with <Enter>

The settings for „Printer“ can be changed as follows:

- select menu point and confirm with <Enter>
- select desired adjustment with cursor keys
- confirm with <Enter>.

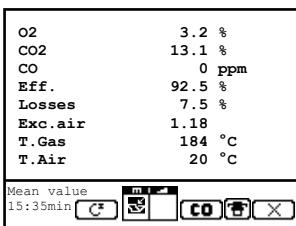
The setting for „Store“ can be changed as follows

- select menu point and confirm with <Enter>
- activate memory function with <F1> or
- deactivate it with <F4>

By “Start measurement” / <Enter> the evaluation of the measurement values will be started. On the display the actual mean values will be shown (will be updated with new measurement values / switch to the actual values with cursor keys <up/down>).

o2	3.2 %
CO2	13.1 %
CO	0 ppm
Eff.	92.5 %
Losses	7.5 %
Exc.air	1.18
T.Gas	184 °C
T.Air	20 °C

Mean value
15:35min



It is possible to scroll through the values with the cursor keys <right/left>. With <F2> you can interrupt and with <F4> stop the measurement.

After finishing the measurement time a protocol of the results with all mean values can be printed (key <Print>).

6. Measurement procedure Diagnostics

6.1 Fault diagnostic

The ecom-EN3 TECH is able to receive and to process information provided via cable transfer by the ecom-xRE (read-out head for digital firing automates).

→ Out of the main menu, select the sub-menu "Fault diagnostic" and confirm with <Enter>. The ecom-EN3 TECH tries to establish a connection with the ecom-xRE (display message: „Search in process“).

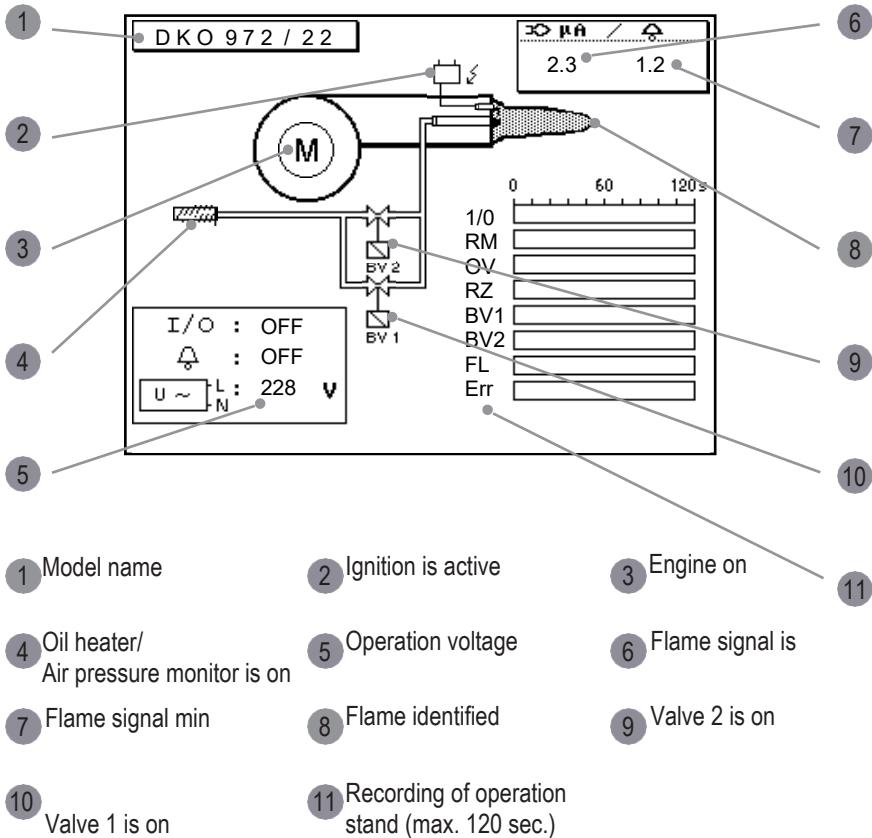
By successful attempt, the current burner operation stand is displayed as a graphic on the display. The operation stand can be recorded (max. 120 sec). Press <Enter> to initiate a new recording (reset).



ecom-xRE



ecom-EN3 TECH



Current error	
No error !	
Number of startups total 677 Service counter actual 142	
Further pages:	

Use the cursor keys (Up / Down) to call up further data of the firing automate. On the 2nd display page the current error and the number of burner starts are displayed.

Error history		
Flame signal during straylight check		
After:	001	12 sek
Stat :	2.2 μ A	225 V
Total	:	46
Straylight	:	22
Safty time	:	9
Loss of flame	:	17
FT/LW	:	0
Select:		

Timing values		
Safty time (TSA)	:	4.9 sek
Delay time valve 2	:	40.0 sek
Pre-ignition time	:	17.0 sek
Post-ignition time	:	20.0 sek
Delay straylight sup.	:	11.5 sek
Straylight supervision	:	5.0 sek
Rest time TSA (actual)	:	4.1 sek
Select:		

- 1 Current error
- 2 Number of burner starts at a total resp. since reset of firing automate
- 3 Last 2 errors (Satronic)
Last 5 errors (Siemens)
(Scroll errors using <Right/Left>)
- 4 Error statistics (number of errors)
- 5 Monitoring times of firing automate

6.2 delta-T Measurement

With the ecom-EN3 TECH a difference temperature measurement is possible. For measurements at pipes (e.g. water-in and water-out of heating systems), special temperature sensors are needed, available from your authorized ecom agency. Out of the main menu point "Diagnostics" select the sub-menu "dT measurement" and confirm with <Enter>.

dT measurement	
T1	70.4 °c
T2	56.3 °c
dT	14.1 °c

Measurement stored in intermediate memory

The instrument indicates the temperature T1 (sensor at connection „Gas temperature“), the temperature T2 (sensor at connection „Air temperature“) and the difference between both temperatures (T1 - T2). Press <Save> to store the result in the intermediate memory. A printout can be started with <Print>.

7. After measurement

After the measurements have been completed, the following things have to be observed BEFORE turning the instrument off.

7.1 Save measurement, print measurement

Once the gas analysis is completed and a memory place is chosen before, transfer the values recorded in the intermediate memory on the MM card, otherwise they would get lost by switch-off of the instrument. To store measured values permanently on the MM card, proceed as follows:

Press <Print> (printer symbol) to enter the printing menu.

--ECOM-EN3--	
Start printout	
View memory	
Memory -> M	
Input text	
Select:	AVV

The sampled data can be checked one more time („View memory“, <Enter> and scroll with the cursor keys). The cursor keys can be used to scroll through the measurement screens.

--ECOM-EN3--	
Start printout	
View memory	
Memory -> M	
Input text	
Select:	AVV

By selecting the "Insert text" menu item, the plant identifier can be entered or changed.

See chapter "Gas analysis: Data processing" for more information

--ECOM-EN3--	
Start printout	
View memory	
Memory -> M	
Input text	☒
Select:	AVV

All data correct? Then press „Memory -> M“ and <Enter> to transfer them in the internal memory or on the MM card ("Symbol memory" is shown in black in the measurement mode). The inputted text is taken over into the data record only by transfer on MM card.

--ECOM-EN3--
Start printout
View memory
Memory -> M
Input text
Select: <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

Select („Start printout“ and <Enter>) to print out the data.

Press <ESC> to turn back to the gas analysis mode.

NOTE

The functions „View memory“, „Memory -> M“ and „Input text“ can also be selected out of the measurement mode with <Enter>.

7.2 To-Dos before switching off

Before switching off the device, the following points must be observed:

- Correct stowage of the probe
- Checking the fine dust filters
- Emptying the water trap



CAUTION

Damage to the device

The hot probe can cause damage to the instrument or to the transport system. Let the probe cool down before stowing it.



CAUTION

Impairment of the measurement

Highly contaminated filters can affect the volumetric flow in the gas path and therefore the measurement. Check the condition of the particle filter. Replace the particle filter when the contamination of the filter is equivalent to a soot number of approx. 2 - 3.

8. Control

The electrochemical sensors for gas analysis are submitted to a wearing process and do age. They alter their output values along the time depending on the gas concentration, the exposure time and the soiling grade of the sampled gas.

The program monitors the sensors and corrects drifts. But if the drifts and the correlated measurement errors increase, an error message is displayed. In this case the corresponding sensor must be changed by an authorized service centre.

The control menu informs about the current status values for the sensors. Further information is also consigned on 4 display pages (use cursor keys to scroll)

The following status values are available:

- battery voltage (charging status); is displayed as a symbol in all menus



Full charge



Half charge



Empty

O2 19744 mV
CO 7 mV
Batt 6.09 V
Operating hours: 8.45 Std
Total : 18.75 Std
Next unit check: 01.07.10
Service tel. : 02371-945-303
Further pages:

Parameter	Meaning
Sensor ##### mV	Output voltage of the sensor
Batt #,## V	Output voltage of the battery
Operation hours:	Operation hours since last service
Total:	Total operation hours
Next unit check:	Date of the next recommended service
Service tel.:	Phone number of the next service center

Program version: v1.0 02.04.09
Serial no. : EN2-0001
CO purges : 15
Error counter : 21
Operating hours: 8.45 Std
Total : 18.75 Std
Next unit check: 01.07.10
Service tel. : 02371-945-303
Further pages: 

Parameter	Meaning
Program version:	Software version
Serial no.:	Serial number of the instrument
CO purges:	Amount of CO switch-offs
Error counter:	Amount of errors

Last service (history)
25.08.09 88 hrs
14.08.10 145 hrs
23.08.11 205 hrs
19.08.12 322 hrs
--.--
--.--
Further pages: 

Parameter	Meaning
Last service (history)	Collection of the last maintenance

UV-NO	0.4 ppm
UV-NO2	0.2 ppm
UV-SO2	0.3 ppm
Temp.	45.48 °C
UV Serv	12 hrs
Status	00/F4
T.Probe	139 °C
T.Tube	138 °C
Status	00/00

Weitere Seiten: 

Parameter	Meaning
UV-NO	Raw NO value from UV bench
UV-NO2	Raw NO2 value from UV bench
UV-SO2	Raw SO2 value from UV bench
Temp.	Temperature UV bench
UV Serv	Operation hours UV bench since service
Status	Status UV bench
T.Probe	Temperature heated head
T.Tube	Temperature heated tube
Status	Status heated head / tube

9. Adjustments

Adjustments	
Calibr. sensors	
Re-Calibration	
Unit	
Second unit	
Ref. O2	
Select:	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
Fuel type	
Set clock	
Paper feed	
Internal	
Air leak test	

Additionally to those ecom-EN3 TECH functions described previously, various adjustments can be made in the instrument, which have an effect on the measurement procedures, the functionality or the output and display of measured values. The following adjustments are available in the Adjustments menu:

Parameter	Meaning	Adjustment
Calibr. sensors	Calibration of the sensors with calibration gas	
Re-Calibration	Start of a calibration phase to set new zero-point for the sensors	
Unit	Calculation and display of gas concentrations	ppm mg/m ³ mg/kWh (undiluted) mg/MJ (undiluted) ppm (undiluted) mg/m ³ (undiluted)
Second unit	Second calculation and display of gas concentrations	ppm mg/m ³ mg/kWh (undiluted) mg/MJ (undiluted) ppm (undiluted) mg/m ³ (undiluted)
Ref. O2	Reference O2	0,0 ... 21,0 %
Fuel type	Modification of adjusted fuel type	Fuel oil Natural gas

		City gas Coke oven gas Liquid gas
Set clock	Correction of internal clock	
Paper feed	Paper feed line by line	
Internal	Further instrument settings -- see following table --	
Air leak test	Check the tightness of the instrument (see chapter "Air leak test")	

NOTE

The term "undiluted" refers to the conversion of the gas concentration to a definable reference oxygen content according to the following formula:

$$E_{\text{ref}} = E_{\text{meas}} * \frac{21 - O_{2\text{ref}}}{21 - O_{2\text{meas}}}$$

NOTE

mg/kWh and mg/MJ are always calculated on 0% O₂ basis.

The following adjustments are available in the Adjustments / Internal menu:

Parameter	Meaning	Adjustment
Print contrast	Print contrast adjustment with cursor keys	9 steps
Key beep	Acoustical signal by key pressing	Yes, No
Language: ###	Selected language	system dependent
Colour scheme	Sets the colours used	4 schemes to choose from
F1 Hotkey	Assign the link using the <F1> key	see Chapter Gas analysis
F4 Hotkey	Assign the link using the <F4> key	see Chapter Gas analysis
Values options	Adjustments for efficiency, excess air and temperature	All parameters in a table on the following pages
CO-Automatic	Enable / Disable CO sensor switches on after purging automatically	On, Off
USB	Settings for the USB interface	All parameters in a table on the following pages
Bluetooth	Settings for the Bluetooth interface	All parameters in a table on the following pages
WLAN	Settings for the WiFi interface	All parameters in a table on the following pages
Pitot factor	Input of Pitot factor for flow rate calculation	0,20 - 2,00
Printout	Settings for defining the printout	All parameters in a table on the following pages

The following adjustments are available in the Adjustments / Internal / Values options menu:

Parameter	Meaning	Adjustment
Temperature	Not available at all instruments	°C or °F
Excess air		Excess Air as proportionate number or in %
Eff.(C)	Efficiency calculation with or without condensation gain	On, Off
Draught	Unit of draught measurement	hPa, mmH2O, "H2O, PSI, mbar

The following adjustments are available in the Adjustments / Internal / USB menu:

Parameter	Meaning	Adjustment
Transfer speed		1200 ... 115200 Baud
Protocol		DAS = DAS NT 2 Enhanced = DAS 5 ---- = no protocol

The following settings are predefined in the Settings / Internal / Bluetooth (BLE) menu and can NOT be changed:

Parameter	Meaning	Adjustment
Transfer speed		115200 Baud
Protocol		Enhanced

The following adjustments are available in the Adjustments / Internal / Bluetooth menu:

Parameter	Meaning	Adjustment
Transfer speed (not changeable)		9600 Baud (not changeable)
Protocol		DAS = DAS NT 2 DAS (DELAY) = Giant display Enhanced = DAS 5 ---- = no protocol

The following adjustments are available in the Adjustments / Internal / WLAN menu:

Parameter	Meaning	Adjustment
Access Point OR Existing Network	Set whether the instrument is to be used as a WiFi access point OR to connect to an existing WiFi network	Access Point, Existing Network

NOTE

The Access Point setting is necessary to connect the ecom-EN3 TECH to mobile devices via the Wi-Fi interface.

The following settings are available in the Adjustments / Internal / WLAN menu if the instrument has been defined as an access point:

Parameter	Meaning	Adjustment
Start / Stop WLAN	Activate the WiFi interface (available only with deactivated Auto Connect)	Start WLAN, Stop WLAN
(Without) Auto Connect	Enable / Disable automatic connection	Yes, No
Channel Set	which radio channel is to be used for the communication	1 ... 13
Security	Assign a password to secure the WiFi connection	Yes, No; Password entry: 1234567890

The following settings are available in the Adjustments / Internal / WLAN menu if the instrument has been defined as an existing network:

Parameter	Meaning	Adjustment
Start / Stop WLAN	Activate the WiFi interface (available only with deactivated Auto Connect)	Start WLAN, Stop WLAN
(Without) Auto Connect	Enable / Disable automatic connection	Yes, No
Existing Network	Search for Existing Network	
WPA-Password	Assign a password to secure the WiFi connection	Password entry

The following adjustments are available in the Adjustments / Internal / Printout menu:

Parameter	Meaning	Adjustment
Footer for the Printout		8 x 24 signs
Selection of measurement and calculation values for printout		max. 64 measurement and calculation values

NOTE

The footer of the printout can be defined as desired, e.g. to print out the company address of the instrument user on every printout of the measured values.

To adjust the footer of the printout, proceed as follows:

- activate character selection list with <F4>
- select keyboard type with <F3> (4 different keyboards available)
- use the cursor keys to select the desired character (selected character is outlined by black background)
- confirm selection while pressing <Enter>
- repeat procedure until desired text is complete
- once input for line 1 is completed, deactivate the characters selection mode with <F4> and move to the second line with the cursor key <Down>
- once all lines have been processed as desired, exit the menu with <ESC>

NOTE

The number and order of the measured values on the printout can be defined as desired.

To adjust the number and order of the measured values on the printout, proceed as follows:

- use the <F1> key to activate the value selection
- navigate to the corresponding line <up / down>
- select the measured value by pressing the <Enter> key

The following measurement and calculation values can be selected for each line of the printout:

1	T.Air	26	CO mg/N	51	SO2 mg/kWh
2	T.Gas	27	CO mg/kWh	52	SO2 mg/MJ
3	T.Boiler	28	CO mg/MJ	53	H2
4	T.Sensor	29	NO ppm	54	H2S
5	O2	30	NO ppm/N	55	Gas speed
6	CO	31	NO mg	56	Mass flow
7	NO	32	NO mg /N	57	CO x% Italy
8	NO2	33	NO mg/kWh	58	Eff._Hs
9	NOx	34	NO mg/MJ	59	Difference Temperature
10	SO2	35	NO2 ppm	60	Not used
11	CxHy	36	NO2 ppm/N	61	H2 ppm
12	CO2	37	NO2 mg	62	H2 ppm/N
13	Efficiency	38	NO2 mg/N	63	H2 mg
14	Losses	39	NO2 mg/kWh	64	H2 mg/N
15	Excess Air	40	NO2 mg/MJ	65	H2S ppm
16	Dew point	41	NOx ppm	66	H2S ppm/N
17	Poison Index	42	NOx ppm/N	67	H2S mg
18	Draught	43	NOx mg	68	H2S mg/N
19	Soot	44	NOx mg/N	69	Air pressure
20	Oil trace	45	NOx mg/kWh	70	Not used
21	Blank Line	46	NOx mg/MJ	71	CO Einheit 2
22	Line	47	SO2 ppm	72	NO Einheit 2
23	CO ppm	48	SO2 ppm/N	73	NO2 Einheit 2
24	CO ppm/N	49	SO2 mg	74	NOx Einheit 2
25	CO mg	50	SO2 mg/N	75	SO2 Einheit 2

10. Data processing

10.1 Storage on MM card

NOTE

When an MM card is inserted into the instrument, it is used to store measured values and plant data. This storage must be triggered manually or can be automated (data logger).

Data processing	
Select	
View	
Memory (M)	
Format	
Quit with:	<input type="button" value=""/>
DRT <-> PC!	
Datalogger	

By selecting the menu item "Select", plants for the assignment of measured values can be searched for or set up (for further information see chapter "Gas analysis: Data processing").

Date	Fuel type
1 01.09.14	11:01 Fuel oil
2 01.09.14	11:02 Fuel oil
3 01.09.14	11:04 Fuel oil
4 01.09.14	11:07 Fuel oil
5 01.09.14	11:11 Fuel oil
6 01.09.14	11:23 Fuel oil
7 01.09.14	11:44 Fuel oil
8 01.09.14	11:53 Fuel oil

By selecting the menu item "View", stored measured values can be viewed (for further information see chapter "Gas analysis: Data processing").

Single measurement results can be called up as follows:

- select desired record number with the cursor keys and confirm with <Enter>
- confirm desired record number with <Enter>
- scroll with the cursor keys <up/down>
- press <ESC> to exit

By selecting the "Format" menu item, the entire MM card can be formatted. This function is usually needed by initial adjustment of the instrument at our factory (preparation of MM card for data recording).



CAUTION

Data loss

When the "Format" menu item is selected and confirmed, all stored data on the MM card inserted in the instrument will be irrevocably deleted.

10.2 Data logger

When a MM card is inserted into the instrument, a data logger recording can be performed. The measured values are stored one after the other on the MM card depending on the recording interval set and are merged into a file with the format *.csv.

The measured values can be evaluated using MS Excel or open office CALC.

NOTE

The data logger is ONLY available when a MM card is inserted into the instrument.

The following adjustments are available in the Data processing / Datalogger menu:

Parameter	Meaning	Adjustment
Datalogger	Start, Stop Data logger	Yes, No
Save to MMC	Adjustment of the interval time for data logger recordings	1 ... 999 s
CSV-Header	Adjustment of data logging with or without column headings	On, Off

If the data logger becomes active or becomes active again after an interruption, a new file is created on the MM card, in which all subsequent measured values of the recording are saved. The files have a predefined name and are numbered consecutively.

NOTE

Each measurement is assigned its own file with collected measured values. Each file is automatically named and numbered.

To select the correct data logger file use the date identification:

J2KDL-00.csv -- älteste Datei
J2KDL-01.csv
J2KDL-02.csv
J2KDL-XX.csv -- neueste Datei

10.3 Data connection to PC

If the device is connected to a PC, measured values and plant data can be synchronized with a PC software from ecom.

The following software solutions are available:

- ecom-DAS NT 2 (10.3.1)
- ecom-DAS 5 (10.3.2)
- PC-software (10.3.3)

10.3.1 Data recording with PC Software ecom-DAS NT 2

In addition to data logger recordings the data could also be transferred online via USB or AUX to the software "ecom-DAS NT 2".

The following interfaces can be used for communication with the software:

- USB
- AUX-Schnittstelle = RS232
- Bluetooth (option)

NOTE

A driver is required to communicate with the PC software DAS NT 2 via the USB interface. To download and install the necessary USB driver, see <https://www.ecom.de/en/downloads>.

To enable communication with the PC software DAS NT 2, the following settings must be made in the menu Adjustments / Internal / USB:

Parameter	Meaning	Adjustment
Transfer speed		1200 Baud
Protocol		DAS = DAS NT 2

NOTE

For further information on importing from the PC software and exporting to the PC software, please refer to the operating instructions of the corresponding PC software.

10.3.2 Data recording with PC Software ecom-DAS 5

The software "ecom-DAS 5" can be used to display and record measured values. Via the MM card, customer and measurement data can be exchanged between the software and the instrument. A recording of point and continuous measurements can be done via USB or WLAN.

NOTE

A driver is required to communicate with the PC software DAS 5 via the USB interface. To download and install the necessary USB driver, see <https://www.ecom.de/en/downloads>.

To enable communication with the PC software DAS 5, the following settings must be made in the menu Adjustments / Internal / USB:

Parameter	Meaning	Adjustment
Transfer speed		1200 ... 38400 Baud
Protocol		Enhanced = DAS 5

To enable communication with the PC software DAS 5, the following settings must be made in the menu Adjustments / Internal / WLAN:

Parameter	Meaning	Adjustment
Access Point		Access Point
Auto Connect		Yes

NOTE

For further information on importing from the PC software and exporting to the PC software, please refer to the operating instructions of the corresponding PC software.

10.3.3 Import and Export of Data

To import plant data from a PC software (e.g. ecom-MiniDV) into the instrument, proceed as follows:

- connect ecom-EN3 TECH and PC via USB cable (if the connection is correct, "USB" appears in the lower right corner of the display)
- select "Load data" and confirm with <Enter>
- answer the displayed question with YES (<F1>)
- decide if the data recorded can be cancelled (<F1> for YES / <F4> for NO)
- start the data transfer on your PC

NOTE

The instrument is used to add measured values to plant data, which were created before with a PC software. These complete data sets, consisting of plant data and measured values, can be exported from the instrument and managed in a PC software.

To export data from the instrument to a PC software, proceed as follows:

- connect ecom-EN3 TECH and PC via USB cable (if the connection is correct, "USB" appears in the lower right corner of the display)
- select "Send data" and confirm with <Enter>
- answer the displayed question with YES (<F1>)
- start the data transfer on your PC

10.4 Data recording with ecomMander App

To display and storage of measured values, the App "ecomMANDER" for smartphones is available. The following operating systems are supported by the App:

- iOS
- Android

If the instrument is connected to the App via WiFi or BLE, the current measured values of the instrument can be displayed directly in the App. The measured values can be saved and exported together with the customer information to be entered. These exported data can be sent for example by e-mail.

The following file formats can be exported:

- *.pdf
- *.csv

To enable communication via WiFi with the App "ecomMander", the following settings must be made in the Adjustments / Internal / WLAN menu:

Parameter	Meaning	Adjustment
Access Point		Access Point
Auto Connect		Yes

To enable communication with the App „ecomMander“, the following settings are fixed in the Adjustments / Internal / Bluetooth menu:

Parameter	Meaning	Adjustment
Transfer speed		115200 Baud
Protocol		Enhanced

11. Maintenance Tips

To secure the accuracy of your measuring instrument we recommend the annual check by an authorized ecom partner.



CAUTION

Loss of warranty

Service made by service centres non-authorised by ecom GmbH will result in a complete and immediate loss of any warranty.

NOTE

In the case of strong use (e.g. permanent several hours of measurement per day, rough conditions etc.) shorter intervals between checks should be selected. Please contact your ecom partner. All ecom partners are listed under www.ecom.de.

11.1 Fine dust filter

The fine dust filter should be checked every time the instrument is used.
Procedure for testing:



- unscrew the cap
- check the condition of the particle filter
- replace the cap

NOTE

Change the fine dust filter once the filter has a grey colour. Replace the fine dust filter if the filter has a gray colour of 2 ... 3 on the soot comparison scale.

11.2 Gas sensors

The sensors get calibrated with the reference gas fresh air by each switch-on. New sensors age along the operation time because of the wearing of the reagents (oxygen sensor) and due to soiling respectively exceeding concentrations beyond the nominal measurement range (toxic sensors).

Their state of the sensors is permanently checked by the instrument. The output values of the sensors are listed in the menu "Control".

If one of the sensors exceeds the monitored limit values, this is signaled by an error message.

NOTE

If an error message still occurs after repeating the calibration phase several times, the device must be checked at an ecom-authorized service center.

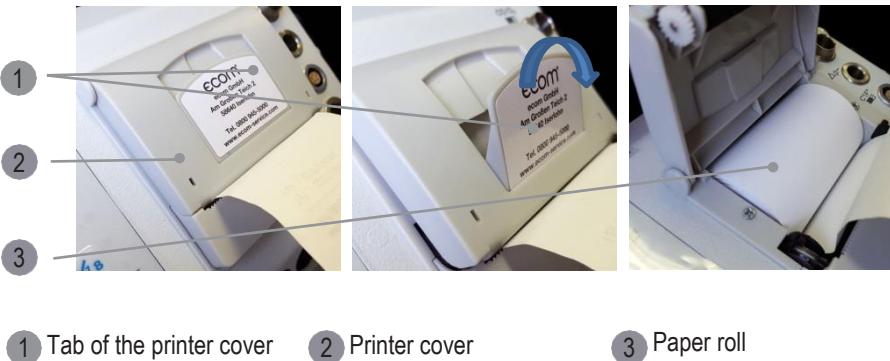
NOTE

The CO sensor is protected against overload by the internal programme. For further information on CO overload protection, please refer to the chapter "CO-Overload Protection"

11.3 Printer paper

Replace the printer paper as follows:

- unlock the printer by pulling on the tab of the printer cover
- if necessary, feed the rest of the paper out of the printer by using the paper feed of the printer
- to do this, navigate to the "Adjustments / Paper feed" function and press <Enter>
- remove the plastic sleeve from the old paper roll
- insert the beginning of the paper roll into the gap provided below the transport roll. The inside of the new roll must be at the front.
- feed the paper about 3 cm through the printer. To do this, navigate to the "Adjustments / Paper feed" function and press <Enter>
- place the paper roll in the recess provided for it
- feed the paper through the printer compartment cover
- close the printer compartment with the cover



1 Tab of the printer cover

2 Printer cover

3 Paper roll

11.4 Air leak test

An air leak test can be carried out in order to rule out the possibility of leaks, damage and leaks in the system.

The instrument performs the tightness test procedure to check for leaks in probe, probe tubing or gas path.

NOTE

Carry out the air leak test at regular intervals to ensure that there are no leaks in the instrument which could falsify the measured values.

To start the air leak test, navigate to the Adjustments menu and select the air leak test.



To perform the air leak test, follow the on-screen instructions on the instrument display and observe the following:

- the gas probe must be sealed with a suitable plug
- the flow indicator (FLOW) must drop during the air leak test to 0 (red) (see flow display)
- the test procedure air leak test must be carried out completely, all queries in the instrument display must be processed

If the air leak test is completed, remove the plug from the probe. The instrument is now ready to measure.

12. Technical Data

Parameter	Measurement range	Resolution	Accuracy
O ₂	0 ... 21 vol. %	0,01 vol. %	± 0,3 vol. %
CO	0 ... 10000 ppm	1 ppm	± 20 ppm or 5 % of reading
CO ₂	0 ... CO ₂ max	0,01 vol. %	calculated
T.Gas	0 ... 500 °C	0,1 °C	± 2 °C or 1,5 % of reading
T.Air	0 ... 99 °C	0,1 °C	± 1 °C
Pressure	0 ... +/- 100 hPa	0,01 hPa	± 0,5 hPa or 1 % of reading
Efficiency	0 ... 120 %	0,1 %	calculated
Losses	0 ... 99,9 %	0,1 %	calculated
Excess air	1 ... ∞	0,01	calculated
Flue gas dew point	x °C	0,1 °C	calculated

UV Bench ¹	NO	SO ₂	NO ₂
Measurement range	0 ... 500 ppm 500... 2000 ppm (F.S.)	0 ... 500 ppm 500... 2000 ppm (F.S.)	0 ... 500 ppm 500... 2000 ppm (F.S.)
Lifetime UV radiation source	> 8000 h (EDL) ²	> 20000 h	> 20000 h
Warm-up time	≤ 60 min (initial) ³	≤ 60 min (initial) ³	≤ 60 min (initial) ³
Response time (t ₉₀)	≤ 20 sec	≤ 20 sec	≤ 20 sec
Detection limit (3•σ) ⁴	≤ 0,5 ppm	≤ 0,5 ppm	≤ 0,5 ppm
Linearity error	0 ... 500 ppm: ≤ ± 0,15 % F.S. 500 ... 2000 ppm: ≤ ± 0,50 % F.S.	0 ... 500 ppm: ≤ ± 0,15 % F.S. 500 ... 2000 ppm: ≤ ± 0,50 % F.S.	0 ... 500 ppm: ≤ ± 0,15 % F.S. 500 ... 2000 ppm: ≤ ± 0,50 % F.S.
Repeatability	± 0,15 % F.S.	± 0,15 % F.S.	± 0,15 % F.S.
Long term stability (zero)	< 5 ppm / 6 h ⁷ < 0,2 % F.S. / 24 h ³	< 5 ppm / 6 h ⁷ < 0,2 % F.S. / 24 h ³	< 8 ppm / 6 h ⁷ < 0,2 % F.S. / 24 h ³
Long term stability (span)	< 0,2 % F.S. / month	< 0,2 % F.S. / month	< 0,2 % F.S. / month
Temp. influence zero	< 0,2 % F.S. / 10 K	< 0,2 % F.S. / 10 K	< 0,2 % F.S. / 10 K
Temp. influence span	< 0,2 % F.S. / 10 K	< 0,2 % F.S. / 10 K	< 0,2 % F.S. / 10 K
Cross sensitivity ⁵	@ 100 ppm SO ₂ : < 2 ppm @ 500 ppm NO ₂ : < 2 ppm @ 20 °C D.P. H ₂ O: < 5 ppm @ 100 ppm N ₂ O: < 10 ppm	@ 500 ppm NO ₂ : < 5 ppm @ 20 °C D.P. H ₂ O: < 5 ppm @ 100 ppm N ₂ O: < 10 ppm	@ 100 ppm SO ₂ : < 5 ppm @ 20 °C D.P. H ₂ O: < 5 ppm @ 100 ppm N ₂ O: < 10 ppm
Pressure influence	< 0,1 % / 10 hPa of reading ⁶	< 0,1 % / 10 hPa of reading ⁶	< 0,1 % / 10 hPa of reading ⁶

¹ related to Pa = 1020 hPa ; Ta= 25 °C ; flow = 1 l/min

² EDL: 50 % intensity drop

³ full specification after 6 h, demands to environmental conditions

⁴ at zero point

⁵ to each calibrated gas channel

⁶ with pressure compensation

⁷ first 6 h after Warm-up

Further Data	
Power supply	110.- 230 V / 50 – 60 Hz~; Battery: 7,20 V / 11,6 Ah
Bluetooth LE	Transmission Power: < 5,5 mW Frequency range: 2402 – 2480 MHz (CYBLE 202007-01)
WLAN (Option)	Transmission power: < 32 mW Frequency range: 2400 – 2495 MHz (GS2200MIZ)
Protocol printer	integral; 58 mm paper width; individual footer printout
Indication	Graphic display; backlit
Dimensions (W x H x D)	500 x 320 x 390 mm
Weight	approx. 13 kg
Application limits	+5 - +40 °C max. 90 % rF, not condensing
Protection	IP 40

Subject to technical changes
V1.15 / 01.2026



EG-Konformitätserklärung | EC Declaration of Conformity

Hiermit erklärt der Hersteller
The manufacturer

ecom GmbH
Am Großen Teich 2
D-58640 Iserlohn, Germany



in alleiniger Verantwortung für die Ausstellung dieser Erklärung, dass die nachfolgend aufgeführten Produkte:
hereby declares under its sole responsibility, that the products

Abgasanalysegeräte / flue gas analysis devices

Type: ecom-EN3 TECH

allen einschlägigen Bestimmungen der folgenden EU-Richtlinien entsprechen:
comply with the following European Directives:

2014/53/EU	Funkanlagenrichtlinie / Radio Equipment Directive
2011/65/EU	RoHS
2014/35/EU	Niederspannungsrichtlinie / Low Voltage Directive

Folgende Normen wurden angewendet:
The following standard/s were used:

EN 61010-1:2010/A1:2019	Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte <i>Safety requirements for electrical equipment for measurement, control, and laboratory use</i>
EN 300 328 V2.2.2	Breitband-Übertragungssysteme - Datenübertragungsgeräte zum Betrieb im 2,4-GHz-Band <i>Wideband transmission systems - Data transmission equipment operating in the 2,4 GHz band</i>
ETSI EN 301 489-1 V2.2.3	Elektromagnetische Verträglichkeit (EMV) - Standard für Funkeinrichtungen und -dienste – <i>ElectroMagnetic Compatibility (EMC) standard for radio equipment and services</i>
ETSI EN 301 489-17 V3.2.4	Elektromagnetische Verträglichkeit (EMV) für Funkeinrichtungen und -dienste - Teil 17: <i>ElectroMagnetic Compatibility (EMC) standard for radio equipment and services - Part 17:</i> <i>Specific conditions for Broadband Data Transmission Systems</i>
EN 61326-1:2013	Elektrische Mess-, Steuer-, Regel- und Laborgeräte - EMV-Anforderungen <i>Electrical equipment for measurement, control and laboratory use – EMC requirements</i>
EN IEC 63000:2018	Technische Dokumentation zur Beurteilung von Elektro- und Elektronikgeräten hinsichtlich der Beschränkung gefährlicher Stoffe <i>Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances</i>

Iserlohn, 18.06.2025


Matthias Platte (Geschäftsführer / Managing Director)

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ecom[®]

ecom GmbH
Am Großen Teich 2
D-58640 Iserlohn
Info@ecom.de
www.ecom.de

Phone: +49 2371 945-5
Fax: +49 2371 40305

UK importer:

DRM Technic Ltd.
Unit 25 Raleigh Hall Industrial Estate,
Stafford, Staffordshire, ST21 6JL, UK
sales@drmtechnic.com
www.drmtechnic.com

Phone: +44 (0) 1785 556 593