

Instructions Manual



ecom-J2K

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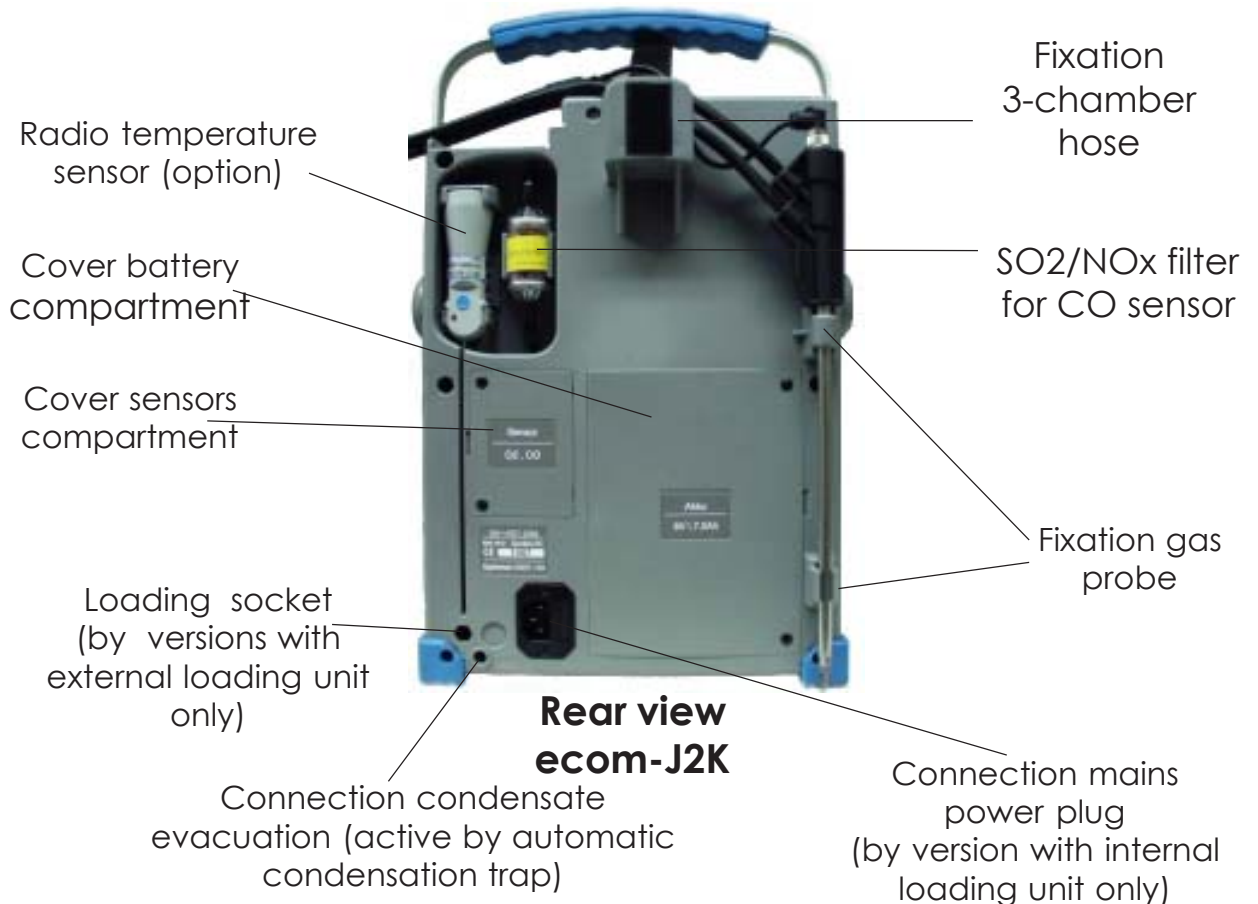
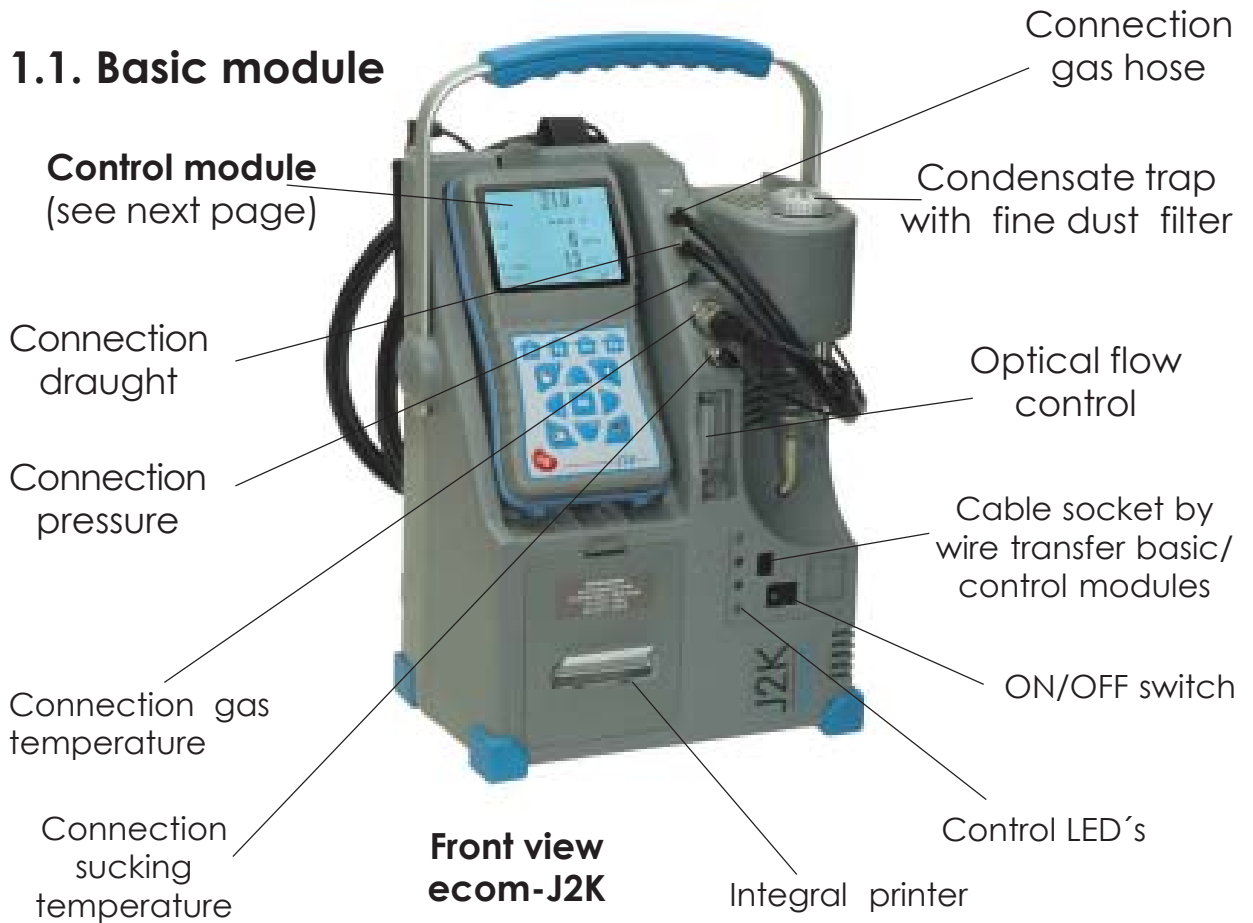
Internet: <http://www.rbr.de>

eMail: info@rbr.de

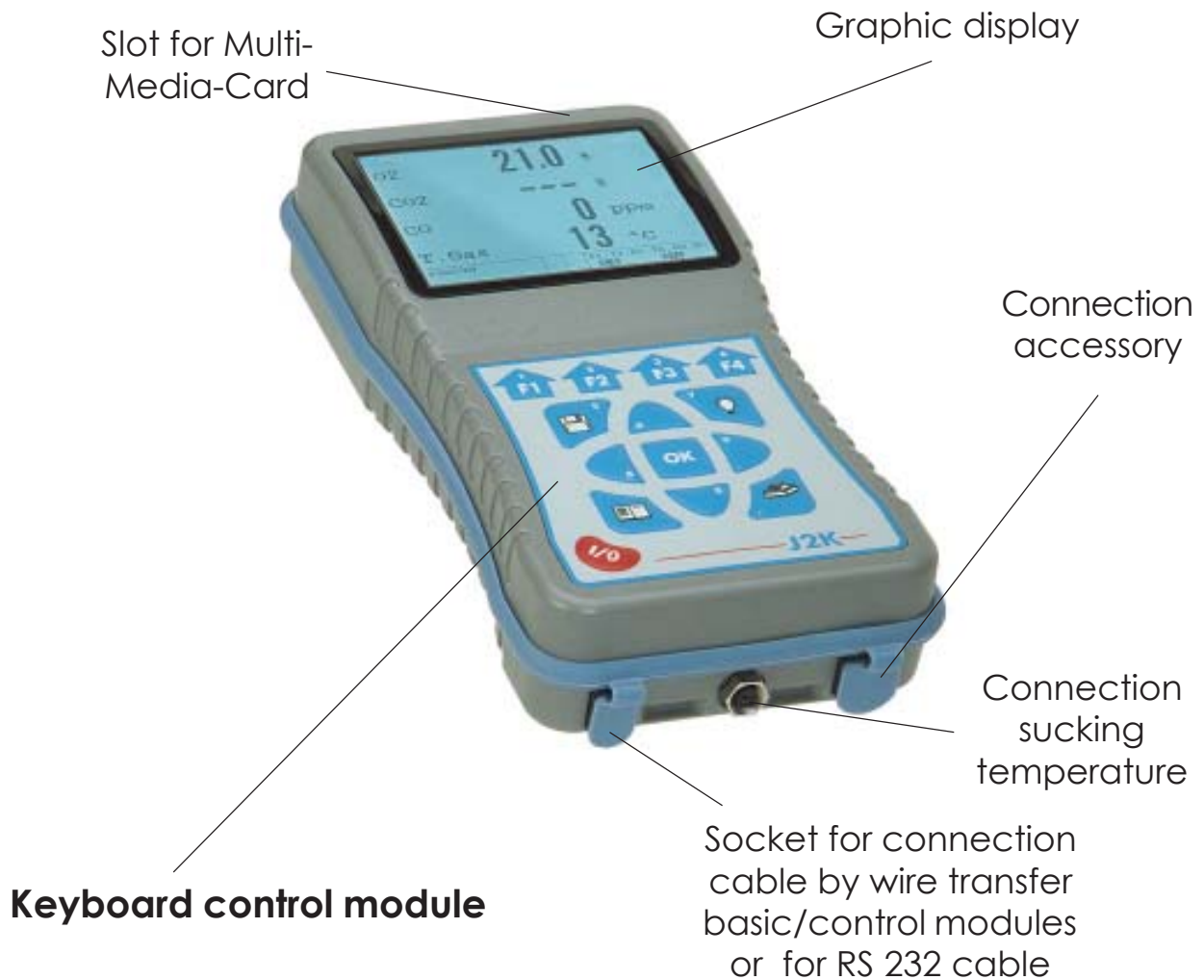
Index	Page
1. Instrument design	
1.1. Basic module	3
1.2. Control module	4
2. Power supply	5
3. Radio communication basic/control modules	6
4. Instrument switch on	7
5. Input or selection of combustion plants	8
6. Flue gas analysis	
6.1. Gas analysis	10
6.2. CO measurement (gas path check)	11
6.3. O2-Ringspaltmessung	12
6.4. Draught measurement	13
6.5. Soot dot...Oil trace	13
6.6. Measurement record and printout	15
7. Adjustments	16
8. Control	18
9. Data processing	18
10. Maintenance advices	20
11. Technical data	22

1. Instrument design

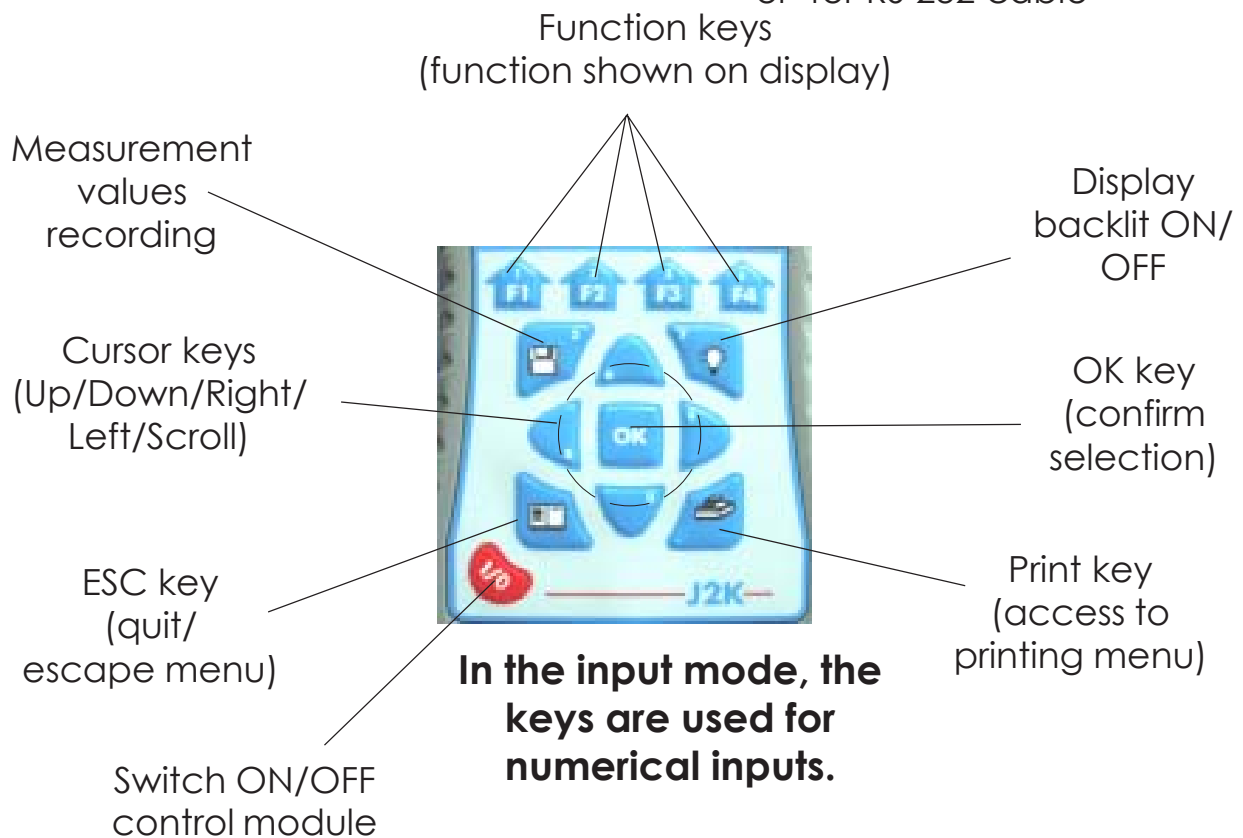
1.1. Basic module



1.2. Control module



Keyboard control module



2. Power supply



Used accumulators can be returned to us or brought to recycling stations of public waste disposal companies respectively accumulators selling stores!

The basic module of the ecom-J2K is delivered either with external or with internal loading unit (depending on features selected). In both cases the instrument can be operated upon a longer time period with the internal accumulator (6 V; 7,2 Ah). Connecting the external or the internal charging unit to mains power is only compulsory to recharge the accumulators and to operate the Peltier cooler and the heated pistol grip probe.

The accumulator should be recharged when the instrument shows a corresponding message (acoustical warning and display information). The accumulator loading stand can be checked, looking at the voltage information on the display (menu "**Control**"). The accu warning is activated when the value „ACC.B“ is smaller than 6 V.

By 5,8 V the power operation via accu is no more possible. The instrument must be further powered via external or internal charging unit.

The control module of the ecom-J2K is powered by 3 nickel-metal-hydride accumulators (type AA). In case of need, the accumulators can be recharged by docking the control module to the basic module.

Hereby 2 functions can be selected („**Adjustments**“ / „**Internal**“ / „**Reloading function**“ / <OK>):

1. Recharging function ON (<F1> = YES):

- accu slowly and carefully recharged
- recommended adjustment by frequent use

2. Recharging function OFF (<F4> = NO):

- accu quickly recharged
- recommended adjustment for occasional use

2. Power supply



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- recommended adjustment by frequent use

2. Recharging function OFF (<F4> = NO):

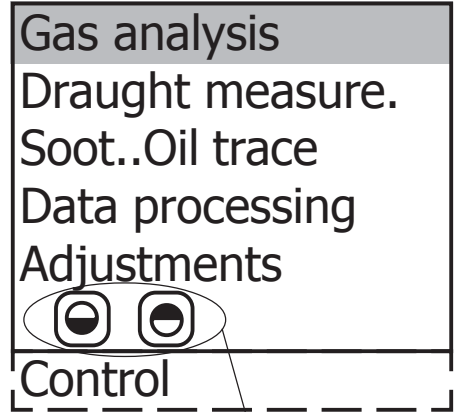
- accu quickly recharged
- recommended adjustment for occasional use

4. Instrument switch-on



1. Always position the probe in the exhaust pipe first after the calibration phase is over !
2. Never operate the instrument in the transport case or bag !

Once the control module has been switched on (key **<I/O>**), the main menu is displayed. 6 sub-menus with the following functions are displayed (non-visible sub-menus can be called up scrolling the arrow keys):



- Gas analysis : Perform gas analysis
- Draught measure. : Perform draught or pressure measurement
- Soot...Oil trace : Input of soot measurements results
- Data processing : Assign measurements/Load or send data
- Adjustments : Modify instrument adjustments
- Control : Check operation state of instrument

Display
contraste
adjustable
with F1 and F2

- . To perform concrete measurements, first switch on the basic module (switch located under the condensation trap).
- . Use the arrow keys to select the sub-menu "**Gas analysis**".
- . Confirm with **<OK>**. The instrument starts a 3-minutes calibration phase and the fuel types selection list is displayed.

The following fuel types are selectable*:

Fuel types acc. to 1st. BImSchV
 Fuel oil (B)
 Natural gas (B)
 City gas (B)
 Coke oven gas (B)
 Liquid gas (B)

Fuel type		
Fuel oil (B)		
CO2max	A1	B
15.4	0.50	0.007
Select: (↑↓) !		

Use the arrow keys to select the desired fuel type and confirm with **<OK>**.

*Country specific fuel types will obviously be programmed on demand.

The instrument will then enquire if you wish to use the data bank. If you want to assign the sampled data to a specific plant, so press **<F1>** (**<F4>** = no: -> the measurement will be performed without assignment).

Do you wish to use data processing ?	
Quit with <OK> !	
<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO

5. Input or select plant specific data

To call up plant data recorded in the J2K or to create a new file, the following possibilities are available:

Record number: To create a new file, a numerical number can be assigned.

- . Select „**Record no.**“ and confirm with **<OK>**.
- . Input a random record number (1 -1500):

Example: "1" for record number 1

- . Press **<OK>** after input in order to call up the record number.
- . Press **<F3>** to determinate the next free record number (calculated from record number 1).
- . Press **<F4>** to input a plant-related code.


Tip: As only figures (max. 16) can be entered, we suggest a date-related input to easily find the data record later on via the search function (search per date):

e.g.: 00001.25.11.2003

Plant number or similar

Measurement date

- . Activate the storage number with **<OK>** once the input is completed.
- . Press again **<OK>** to enter the gas analysis menu.

Selection upon:	
Search word	
Record number	
Quit with: 	

Storage number	
<input type="text" value="1"/>	
Please use the numerical keys !	

Input number	
<input type="text" value="00001.25.11.2003"/>	
Please use the numerical keys!	

Search word: If the plant code is known, it is possible to find the plant data stored with help of a search machine.


- . Select "**Search word**" and press **<OK>**.
- . Input 4 related figures of the plant code:

Example: "25.11"
for plant code 00001.25.11.2003

Search word
25.11
Please use the numerical keys!


- . Press **<OK>** after input to start the searching process. All possible correspondences with this figures sequence will be filtered. The selection can be stepped thru with the arrow keys (F1 for selection beginning, F2 for selection end).


- . Press **<OK>** to activate once the desired data block is found,
- . Press **<Print>** / „**View memory**“ / **<OK>** to view the previous analysis at this plant.

Record numb. 1
00001.25.11.2003 
F1: First record F3: Next free F2: Last record F4: Delete
End with : <OK>!


All measured and calculated values can be called up on 4 display pages using the arrow keys to step thru.


Measurement available

Storage number 1
00001.25.11.2003
Data record 12:15:53 25.11.03 Further pages:  Record number 1

O2	3.2 %
CO2	13.1 %
CO	0 ppm
Efficiency	92.5 %
Losses	7.5 %
Excess air	1.18
T.Gas	184 °C
T.Air	20 °C
Draught	-0.03 hPa
Gas analysis 12:15:53 25.11.03	
Further pages:  Storage number 1	

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


O2	17.5 %
CO 0%	738 ppm
CO	123 ppm
Excess air	7.00
CO measurement 12:15:53 25.11.03	
Further pages:  Storage number 1	

Oxygen test
O2 19.5 %
Oxygen test 12:15:53 25.11.03
Further pages:  Storage number 1

- . Press twice **<ESC>** to quit the previous measurement. The recording of the current measurement values can begin.

6. Gas measurement

6.1. Gas analysis



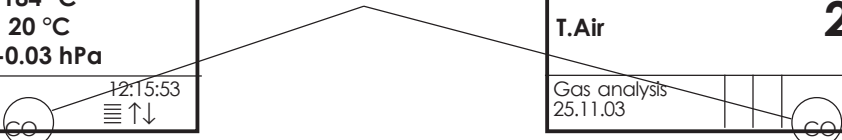
Important: re-calibrate the instrument after each measurement (after one hour at the latest) to get correct results !

After the 3-minutes calibration phase, the instrument switches over to the measurement mode. The gas measurement values can be viewed on 4 display pages (2 x gas analysis; 1 x CO measurement; 1 x oxygen test). Use the cursor keys to scroll the pages.

O2	3.2 %
CO2	13.1 %
CO	0 ppm
Efficiency	92.5 %
Losses	7.5 %
Excess air	1.18
T.Gas	184 °C
T.Air	20 °C
Draught	-0.03 hPa
Gas analysis 25.11.03	
12:15:53	

CO sensor can be switched-off manually (key <F3>)

O2	3.2 %
CO2	13.1 %
T.Gas	184 °C
T.Air	20 °C
Gas analysis 25.11.03	
12:15:53	



The position of the measured and calculated values (gas analysis) on the display pages is free selectable. For alteration of the existing succession respectively personal listing, proceed as follows:

- Press **<F4>** to activate the function.
 - select the line with the cursor keys (up/down),
 - select the measured or calculated value with the cursor keys (right/left),
 - repeat this procedure until all modifications are completed.
- Press **<F4>** to deactivate the function.

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

It must be ascertained that:

$$O_2 < 20,5 \% \quad \text{and} \\ T.Gas - T.Air > + 5 \text{ } ^\circ\text{C}$$

are given. The dew point can only be calculated accurately if in the menu "**Adjustments**" the current barometric air pressure value has been inputted. This value cannot be determined by the ecom-J2K.

Correct measurement are displayed first after a short delay, necessary for the gas transport and the build-up of a stable electrochemical reaction at the sensors.

This time period lasts approx. between 1 and 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.

If the measurement values are stable and the results can be printed out, press the key **<Record>** (disc symbol) to transfer the values in the intermediate memory (caution: store gas analysis and CO measurement values separately). The values are stored for a later printout and, if need be, for a final data record storage.

**Measurement
stored in
intermediate
memory**

O2	3.2 %
CO2	13.1 %
CO	0 ppm
Efficiency	92.5 %
Losses	7.5 %
Excess air	1.18
T.Gas	184 °C
T.Air	20 °C
Draught	-0.03 hPa
Gas analysis 25.11.03 stored!	12:15:53 CO

6.2. CO measurement (gas channel check)

For the technical check of gas-fired plants in regards of safety aspects the gas channel check called also CO measurement is used.

Hereby the CO concentration in the gas channel is measured after the flow safety device and calculated on an undiluted value (oxygen rest content in flue gas = 0 %).

As the gas conditions after the flow safety device are no more homogeneous because of the flow in of secondary air and consequently the stream core measurement can be erratic, the analysis of the exhaust gas is performed along the totality of the exhaust pipe diameter. A multi-hole probe (optional accessory) is hereby used as sampling probe.

The calculated value shown on the line CO 0 % corresponds to the measured CO concentration supposed the oxygen content would amount 0% by the same exhaust gas volume.

It is consequently the undiluted CO content in exhaust gas. If the value indication is stable, press the key **<Memory>** (disk symbol) to store the result in the intermediate memory.

Measurement stored in intermediate memory

O2	17.5 %
CO 0%	738 ppm
CO	123 ppm
Excess air	7.00
CO measurement stored!	12:15:53 25.11.03 CO

6.3. Oxygen test

This measurement is performed by room-independent plants like gross calorific value plants .

It is determined if exhaust gas flows into the combustion air (O2 content drops down) and herewith influence on the combustion quality.

For this analysis a special multi-hole probe (optional accessory) should be used. If the value indicated is stable, press the key **<Memory>** (disk symbol) to store the value in the intermediate memory.

Measurement stored in intermediate memory


O2 in air	
O2	19.5 %
Oxygen test stored!	12:15:53 25.11.03 CO


6.4. Draught measurement

A trend indication for the draught conditions in the exhaust channel can already be determined during the gas analysis. Nevertheless the value for the chimney draught will not be stored together with the gas values while pressing the key **<Memory>**.

Indeed the difference pressure sensor tends to drifts because of its sensibility and, for an exact measurement, it is consequently advised to re-calibrate the sensor immediately before sampling and documenting the value.

- . Access the menu while selecting the sub-menu "**Draught measurement**". The current value is displayed as well as the instruction to adjust the zero point of the sensor.
- . Release hereto the draught hose from the instrument for a short moment and press **<F4>**. The sensor is herewith re-calibrated.

Draught measure.
0.12 hPa
Recorded value: --.-- hPa
Zero point new 

Draught measure.
0.12 hPa
Recorded value: 0.12 hPa
Zero point new 

- . Fix the draught hose again. The display shows the exact measurement value which can be stored while pressing **<Memory>** and added to the previous results in the intermediate memory. The stored value is shown on the display.
- . Press **<ESC>** to quit the differential pressure measurement menu.

6.5. Soot...Oil trace

The sub-menu "**Soot...Oil trace**" enables the input of measured results for boiler temperature, soot dots and oil trace.

- . Select the line „**Boiler temp.**“ and press **<OK>** to activate the input. The input can be made using the numerical keys.
- . Press **<OK>** to store the value in the data record of the measurement.

Soot..Oil trace	
Boiler temp. :	66°C
1st. Soot dot :	.-
2nd Soot dot :	.-
3rd Soot dot :	.-
Oil trace :	----
Mean value :	.-

The soot dot measurement is to be performed with the optional heated pistol grip probe which heating function prevents the filter paper to become wet because of the humidity issued by the combustion condensate. The filter paper slot is hereby heated up to approx. 70 °C.

Proceed as follows:

- . Switch on the probe heating while selecting „**Adjustments / Probe heating / <F1>**“.
- . Insert a filter paper in the paper slot.
- . Select the line „**1st. soot dot**“.
- . Press **<OK>** to start the measurement. The display shows the volume to be sucked and the pump starts sampling.

If the soot dot analysis are made with a manual pump the sucking procedure can be interrupted while pressing **<F4>** (result value can immediately be entered).

Once 1,63 litre has been sucked in, the instrument will instruct to input the opacity degree. Proceed as follows:

- . Release the filter paper from the probe slot.
- . Compare the greyness with the opacity scale.
- . Input the result using the numerical keys and press **<OK>**.
- . Repeat this procedure until all 3 soot dot analysis are completed. The mean value will be calculated and automatically stored.

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

- . Set the cursor on the line "**Oil trace**".
- . Input the result with **<OK>**
("NO", "YES" or "- - -")

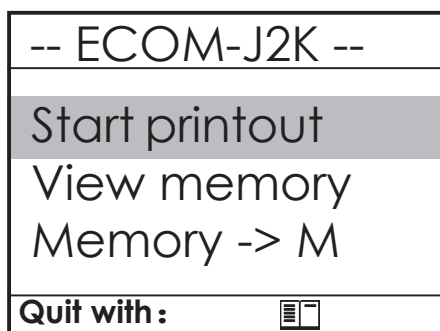
Soot...Oil trace	
Boiler temp. :	66°C
1st Soot dot :	1.0
2nd Soot dot :	0.5
3rd Soot dot :	1.5
Oil trace :	NO
Mean value :	1.0

- . Press **<ESC>** to quit the menu once all necessitated inputs have been entered. The measurement is now completed.

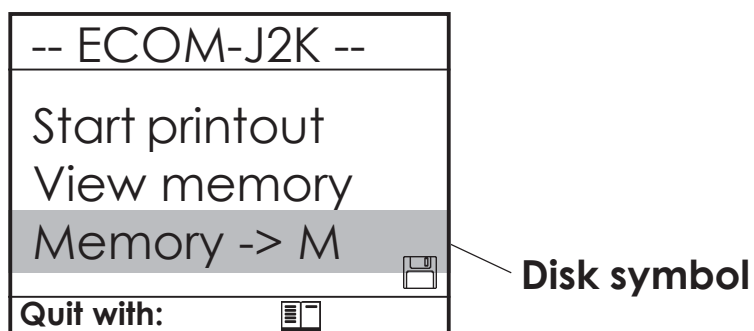
6.6. Measurement record and printout

Important: Once the gas analysis is completed, transfer the values recorded in the intermediate memory into the internal memory otherwise they could get lost by switch-off of the instrument!

- . Press **<Print>** (printer symbol) to enter the printing menu. The sampled data can be checked one more time („**View memory**“, **<OK>** and scroll with the cursor keys).



- . Press „**Memory -> M**“ and **<OK>** to transfer all data -if correct- in the internal memory. Once the transfer is completed, a "**Disk symbol**" appears on the bottom right of the display and a printout can be started („**Start printout**“ and **<OK>**).



- . Press **<ESC>** to turn back to the gas analysis menu.

7. Adjustments

Additionally to the **ecom-J2K** functions described previously, various adjustments can be made in the instrument.

- . From the main menu select the sub-menu "**Adjustments**" and confirm with **<OK>**.
A selection of modifiable parameters, adjustable according to the application, is displayed.
- . Place the cursor on the desired line and press **<OK>** to call up or modify the adjustment.

Unit
O2 reference
Fuel type
Air pressure
Clock set
Paper feed
Internal

The modifiable parameters are:

Unit (adjustment with **cursor keys**):

- Calculation of gas concentrations in:

- ppm = volume concentration (parts per million)
- mg/m³ = mass concentration per volume unit
- mg/kWh (undiluted) = mass concentration per power unit
- mg/MJ (undiluted) = mass concentration per power unit
- ppm (undiluted) = volume concentration (parts per million)
- mg/m³ (undiluted) = mass concentration per volume unit

Undiluted:

- Conversion of the gas concentration on selected reference oxygen:

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

- Conversion formula:

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

O₂ reference

(for ppm and mg/m³ units - Input after **<OK>** pressing):

- Input of O₂ reference value O_{2ref}

Fuel type (press <OK> to access selection list):

- Modification of adjusted fuel type (e.g. by measurements at combi-plants)

Air pressure (press <OK> to access menu):

- Input of barometric air pressure for dew point calculation

Clock set (press <OK> to access setting menu):

- Correction of internal clock with cursor keys

Paper feed (press <OK> to activate paper feeding):

- Paper feed line by line

Internal (press <OK> to open menu):

- Further instrument settings:

Printout contraste (0..9)

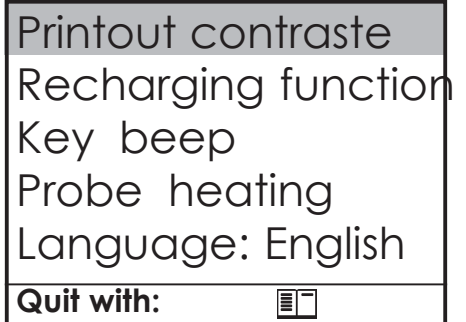
(press <OK> to access input menu):

- Printer contraste adjustment

Recharging function

(<F1> for YES / <F4> for NO):

- Careful (<F1>) or quick (<F4>) recharging of the control module accumulators



Key beep (<F1> for YES / <F4> for NO):

- Acoustical signal by key pressing

Probe heating (<F1> for YES / <F4> for NO):

- ON/OFF switch for probe heating for soot measurement (by use of the optional heated pistol grip probe)

Language: English

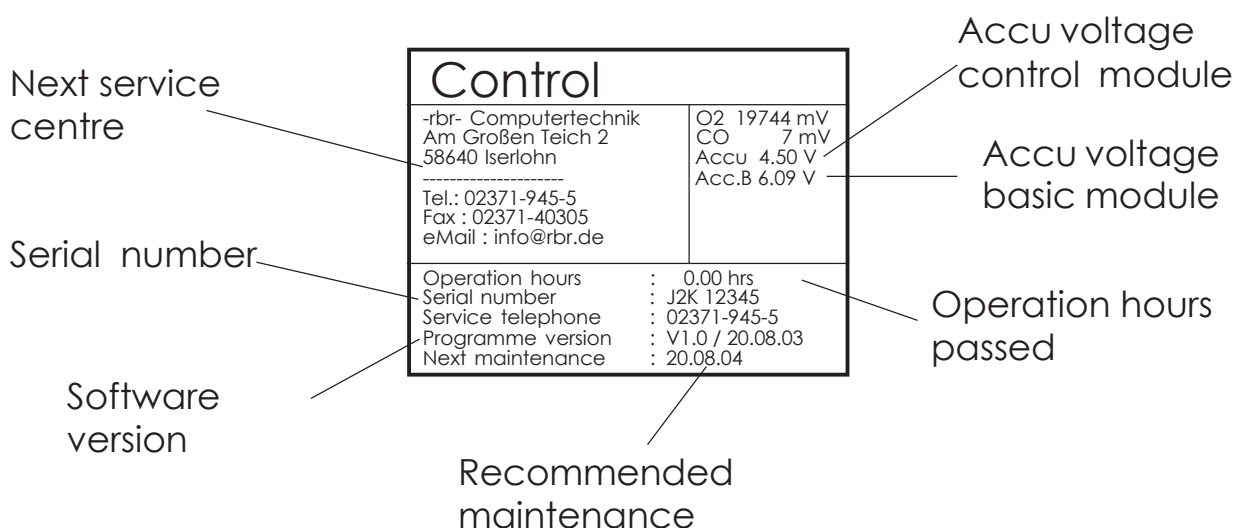
- Info about programmed language (modifiable only by authorized service centres)

8. Control

The electrochemical sensors used for the gas analysis are submitted to a wearing process and consequently age. Along the operation period, they alter their output values depending on gas concentration, flow duration and soiling degree of the measured gases.

The programme controls the sensors and corrects drifts. 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 authorised service centre.

The control menu informs about the current status values for the sensors as well as about:

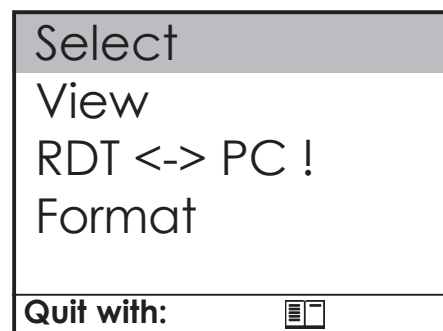


9. Data Processing

These functions can be selected in the menu „**Data Processing**“:

Select:


For search or creation of plants file for measurement values assignment (compare chapter 5.)



View:

Recorded values to a selected plant can be viewed (compare chapter 5.).

DFÜ <-> PC !:

DRDT <-> PC !	
Send data	
Load data	
Quit with:	

Load data:

Enables the data import from e.g. specific chimney sweepers software programmes. The transfer is made with ANSI font characters and 14400 Baud (please check the transfer options of your software !).

Proceed as follows:

1. Connect ecom-J2K and PC via RS232 cable.
2. Select "**Load data**" and confirm with **<OK>**.
3. Answer the displayed question with **YES (<F1>**).
4. Decide if the data recorded can be cancelled (**<F1>** for **YES** / **<F4>** for **NO**).
5. Start the data transfer on your PC.

Send data:

With this function the data records completed with measurement values can be transferred to the PC programme (procedure similar to chapter „**Load data**“).

Format:

This function is usually needed by the initial adjustment of the instrument at our factory (preparation of internal memory for data record).

Caution: All stored values will be cancelled!

10. Maintenance advices

We recommend to send your instrument for maintenance one time a year, however after max. 500 operation hours, to the next authorised service centre and let the sensors checked and the internal tubing cleaned.

Do not use any other sensors and feelers types than those installed, otherwise the TÜV approval will not be valid anymore!

Please also note that service made by non-authorised centres will result in a complete lost of any warranty.

The following advices will be of help for the daily check and maintenance of single parts or assemblies:

Fine dust filter (condensate trap/gas cooler)

Screw off the cover of the condensate trap/gas cooler and check the state of the particle filter. Change it once the filter has a grey colour (= \pm number 2-3 of the soot comparison scale).



Fine dust filter

Sensors

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

The output values of the sensors are (enter menu "**Control**"):

O ₂	approx. 18000 mV
Others	0 mV (+/- 150)

If an error message is displayed during calibration and cannot be eliminated despite several calibration phases, so the instrument must be checked by a qualified and authorised service centre. The oxygen sensor must show a value >7000 mV, otherwise it must be changed by an authorised service centre.

The CO sensor is protected against exceedings by the internal programme. If the limit value of 4000 ppm is exceeded, a second pump switches on and flows the sensor with fresh air.

Probe and hose

Depending on the frequency of use, probe and hose should be regularly cleaned in order to release particle deposits and to prevent early wearing due to corrosion.

- . Release the connections at the instrument and at the probe grip to free the hose.
- . Clean the hose (flow warm water in then dry respectively blow water drops out).

Change printer paper roll

- . Release the printer cover.
- . If necessary, extract the paper rest out of the printer ("**Adjustments**"/"**Paper feed**"/<OK>).
- . Remove the printer shaft and place the new paper roll on the printer shaft.
- . Insert the paper end in the slot (future printed side must be ahead).
- . Press ("**Adjustments**"/"**Paper feed**"/<OK>) to transport ± 10 cm paper thru the printer.
- . Place the printer shaft back in the fixation.
- . Insert the paper thru the cover of the printer compartment.
- . Close the printer compartment while fixing the cover.

11. Technical Data

Parameter	Range	Principle
O ₂	0 ... 21 vol-%	Electrochemistry
CO	0 ... 4.000 ppm	Electrochemistry
NO (Option)	0 ... 2.000 ppm	Electrochemistry
CO ₂	0 ... CO _{2max}	Calculation
T-G	0 ... 500 °C	NiCr/Ni
T-Air	0 ... 99 °C	Semi-conductor
Differential pressure	0 ... +/- 20 hPa	DMS bridge
Efficiency	0 ... 99,9 %	Calculation
Losses	0 ... 99,9 %	Calculation
Excess air	1 ... ∞	Calculation
CO undiluted (adjustable ref. O ₂)		Calculation
Flue gas dew point		Calculation

CO sensor purge thru separate fresh air pump

Electronic condensate monitoring

Power supply Mains power 220 V / 50 Hz~; accu 6 V / 3,2 Ah

Protocole printer integral; 58mm paper width;
printout end individually labellable

Indication graphic display; backlit

Dimensions (L x H x D) 250mm x 430mm x 200mm

Weight approx. 5.5 kg with standard sampling probe

rbr Computertechnik GmbH

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eMail: info@rbr.de

Stand: 10/03

PALGO

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