ECOM®

Creative technology made by rbr

Operating Instructions

ECOM® · J2K ·

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Important hints

⚠️ **The ecom-J2K meets the requirements of DIN EN 50379 part of 2.**

⚠️ **The ecom-J2K may not be used for continuous emission control!**

⚠️ **Following minimum times must be kept, in order to receive correct measured values:**
-1 min. to calibrate the sensors at fresh air
-2 min. for stable measured values

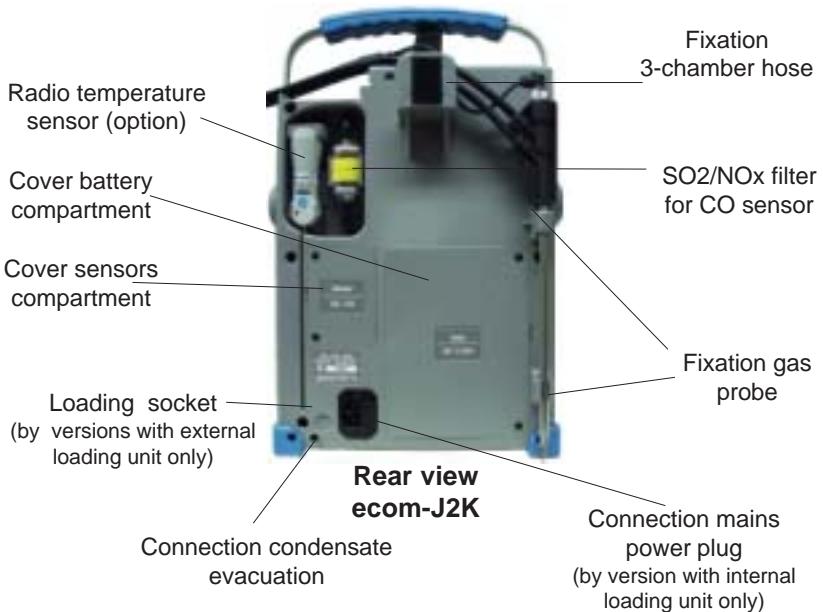⚠️ **The following substances impair the working of the instrument:**
-Cleaning agents
-Degreasers
-Wax polishes
-Adhesives
-Formaldehyde

⚠️ **Adjustments at burners and boilers should be made only by specialists, who are familiar with those installations!**

1. Instrument design

1.1. Basic module

Connection gas hose

Control module
(see next page)

Condensate trap with fine dust filter

Optical flow control

Connection draught

Connection pressure

Cable socket by wire transfer basic/ control modules

ON/OFF switch

Connection gas temperature

Control LED´s
(see chapter 10.)

Connection sucking temperature

Front view ecom-J2K

Integral printer

Fixation 3-chamber hose

Radio temperature sensor (option)

SO2/NOx filter for CO sensor

Cover battery compartment

Cover sensors compartment

Fixation gas probe

Loading socket
(by versions with external loading unit only)

Rear view ecom-J2K

Connection mains power plug
(by version with internal loading unit only)

Connection condensate evacuation

1.2. Control module

Slot for Multi
Media Card

Graphics display

Connection
keyboard

Connection
sucking
temperature

Socket for connection
cable by wire transfer
basic/control modules or
for RS 232 cable

Keyboard control module

Function keys
(function shown on display)

Measurement
values
recording

Display
backlit ON/
OFF

Cursor keys
(Up/Down/Right/
Left/Scroll)

OK key
(confirm
selection)

ESC key
(quit/
escape menu)

Print key
(access to printing
menu)

**In the input mode, the
keys are used for
numerical inputs.**

Switch ON/OFF
control module

1.3. Zubehör ecom-J2K

Transport case Item nr.: 60012	**Transport case (smal)** Item nr.: 60127
Carrying bag „Rucksack version" Item nr.: 30002117	**Carrying bag** Item nr.: 30002113
Add. keyboard Item nr.: 1050011	**Magnet fixation for control unit** Item nr.: 51149
Multi-Media-Card 128 MB Item nr.: 53656	**Data interface DAS-Software** Item nr.: 32000024
Data interface giant display Item nr.: 1040030	**Data cable** Item nr.: 52182 1050012 (with amplifier) *without illustration*
NOx hose (soot probe) Item nr.: 10176 (3,5 m) 30001187 (5 m)	**NOx hose (probe without soot measurement)** Item nr.: 10178 (3,5 m) 10185 (5 m)

Filtering case (solid combustibles) Item nr.: 55810	**Gas washing bottle (only with peltier cooler)** Item nr.: 5044041 (Tasche) 5044042 (Koffer)
Soot pump kit Item nr.: 50538	**T-room stick** Item nr.: 51446
Cable control - basic module 1,5 m lang Item nr.: 1040021 3,0 m lang Item nr.: 1040022 5,0 m lang Item nr.: 1040023 10,0 m lang Item nr.: 1040024 20,0 m lang Item nr.: 1040025 *without illustration*	

2. Gas cooler (option) / Version ecom-J2K-P

Gas-
Outlet

Peltier-
element

warm

cold

Fan

Level control

Gas-
Inlet

Condensate
evacuation
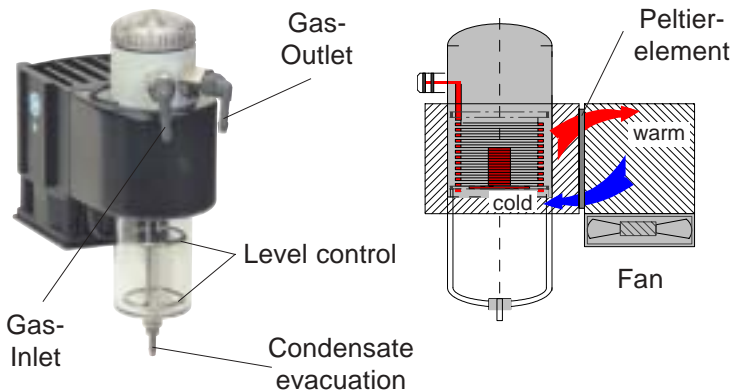
> ⚠ **Due to the power supply need of the gas cooler, it is only available with mains power!**

Exhaust gas with a temperature over the steam dew point (35 to 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 (semiconductor cooling element) flown by a continuous current is thermically 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 (either by the user or due to the level monitoring) by a periodically working hose pump.

The sucking capacity of the gas conveying pump avoids a sufficient dwell time of the gas with the condensate, so that wash out reactions ($NO_2+H_2O > H_2NO_3$) do not take place.

At the cooler outlet the gas has a temperature of ca. 5 °C with a relative saturation of nearly 100 % relative humidity (corresponds to a water vapour content < 7 g/m^3).

3. 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 accumulators should be recharged when the instrument shows a corresponding message (acoustical warning and display information). The accumulators 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 accus is no more possible. The instrument must be further powered via external or internal charging unit.

 Never use batteries to operate the control module of the ecom-J2K!

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):**
> > - accus slowly and carefully recharged
> > - recommended adjustment by frequent use
> **2. Recharging function OFF (<F4> = NO):**
> > - accus quickly recharged
> > - recommended adjustment by occasional use

4. Radio communication basic / control module

Thanks to the detachable control module the basic module can be monitored wireless. The basic module can be unlocked as follows:

1. Press to unlock.
2. Tip control module forwards
3. Release control module from basic module

Unlocking

The information exchange between control and basic module is performed via radio transmission (868 MHz) with a coverage of approx. 50 m (by free sight). The quality of the radio transmission is documented by a bar indication in the main menu of the instrument (long bar = good radio communication).

```
Gas analysis
Draught meas.
Soot..Oil trace
Data processing
Adjustments
 ⊖  ⊖     ⊙▬▬▬
Control  _ _ _ _ _
```

Bar indication radio quality

By interruption of the radio communication, an error message is displayed. By persisting disturbances of the radio communication, a cable (option) can take over the transfer (connection betwen socket DATA on control unit and socket DATA on basic module).

```
-- ECOM-J2K --

Radio connection
interrupted!
Use cable or
switch on basic
module!

Quit with:    ▐▌▐
```

If the basic module is switched off and the control module not, so the display will show an error message inviting to fix the control module in its docking station (helps also not to forget the control module). Observe this order, quit with **<ESC>** and finally switch off the control module.

```
-- ECOM-J2K --

Place J2K in
basic mod.!


Quit with:    ▐▌▐
```
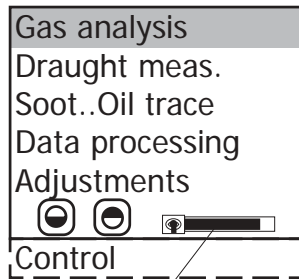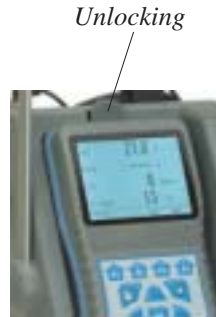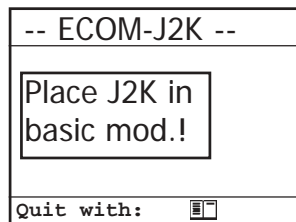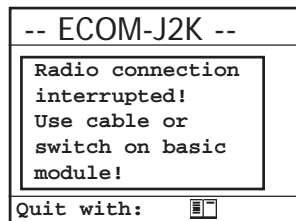
5. Data record

Data can be recorded either on the internal memory or on a multi media card. If no multi media card is inserted in the control module, so the internal memory will be activated.

5.1. Internal memory

Up to 1500 measurement results can be memorised in the internal memory. The values of these punctual measurements can be loaded later on via RS 232 (use data cable item number 1040019) on the PC. A gratis rbr-software (available on website „www.rbr.de") enables the filing of the recorded data. See chapter „Technical Data" for data format information.

5.2. Multi Media Card

The multi media card enables the storage of both punctual measurements and data logger records.
The values of punctual measurements are written in a text file (J2KDV.txt). Those of data logger records in a csv file (J2KDL-xx.csv / xx = records numbered consecutively).
Both file types have the same structure and can be imported respectively opened in Excel. See chapter „Technical Data" for data format information. The files can be transferred on the PC using a card reader. The following conditions must be fulfilled for using a multi media card:

- ecom-J2K from version 1.4 on
- minimal card volume 32 MB
- card formatted on 16 bit FAT
- SD cards or MM cards from rbr
- PC with card reader from rbr
         - or from the manufacturers Belkin and SanDisk

Insert the multi media card as shown. Take care that the card does not stand out and hooks on.

⚠	**Never pull out cards during data record - data loss and damaging of the data carrier possible!**

6. Instrument switch on

⚠	**1. Always position the probe in the exhaust pipe once the calibration phase is over!** **2. Never operate the instrument in the transport case or bag (recommended for transport)!**

Once the control module has been switched on (key **<I/ 0>**), 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):

Display contrast adjustable with F1 and F2

Gas analysis
Draught meas.
Soot..Oil trace
Data processing
Adjustments
◉ ◉
Control

Bar indication radio quality

- 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

- 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-minute calibration phase and the fuel types selection is displayed.

The following fuel types are available*:

Fuel types acc. to 1.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.
- Confirm with **<OK>**.
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>   !      │
│  ┌──────┐      ┌──────┐ │
│  │ YES  │      │ NO   │ │
│ ↓└──────┘      └──────┘↓│
└─────────────────────────┘
```

Country specific fuel types programmable on demand.

7. 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:

Selection upon:
Search word
Record number
`Quit with:` 🔳

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

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

  Example: "1" for record number 1

Record number
1
Please use the numerical keys!

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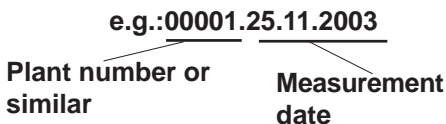
- Activate the storage number with **<OK>** once the input is completed.
- Press again **<OK>** to enter the gas analysis menu.

Input number
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
- 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.

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

Search word
25.11
Please use the numerical keys!

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

Measurement available

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: <↑↓> Record 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

Record number 1
00001.25.11.2003
Data record   12:15:53 25.11.03 Further pages: <↑↓> Record number 1

O2   **17.5** %
CO 0%   **738** ppm
CO   **123** ppm
Excess air   **7.00**
CO measurement   12:15:53 25.11.03 Further pages: <↑↓> Record number 1

Oxygen test
O2   **19.5** %
Oxygen check   12:15:53 25.11.03 Further pages: <↑↓> Record number 1

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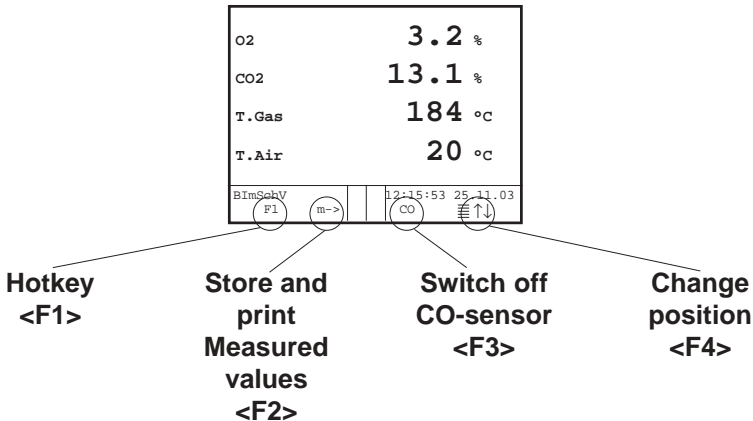 The recording of the current measurement values can begin.

8. Gas measurement

8.1. Gas analysis

> ⚠️ **Re-calibrate the instrument after each measurement (after one hour at the latest) to get correct results!**

After the 1-minute 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 check). Use the cursor keys to scroll the pages.

```
O2          3.2 %
CO2        13.1 %
T.Gas       184 °C
T.Air        20 °C
BImSchV          12:15:53 25.11.03
  (F1)  (m->)    (CO)    ↕↑↓
```

Hotkey <F1>   **Store and print Measured values <F2>**   **Switch off CO-sensor <F3>**   **Change position <F4>**

With **<F1>** you can switch from the measured value display to a menu or to „Standby" selected before (see chapter attitudes). Possible menu options are: Soot... Oil trace, Data processing, Adjustments, Control, Fuel type, Pressure. Further you can switch from any menu also to the measured value display.

With **<F2>** you can print and store the measured values into the intermediate memory at the same time.

With **<F3>** you can switched off the CO sensor, in order to protect the sensor against to high concentrations. The automatic disconnection will switch off the CO sensor at approx. 4000 ppm.

The position of the measured and calculated values (gas analysis) on the display pages is free selectable. For alteration of the exisiting 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.

```
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
   F1     m->  +     CO      ≡↑↓
```

**Core stream
search**

Position the sampling probe in the exhaust channel so that the thermocouple is fully surrounded with the gas (see picture).

Gas stream

Probe tip

**Protection
bow**
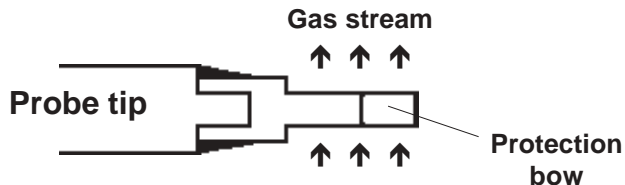
Perform the measurement in the core stream of the exhaust gas channel (probe placed in the highest gas temperature area). A trend indication for T. Gas easies the core stream search. As long as the display shows a + symbol, the measured temperature increases, it means the probe tip moves towards the core stream. If a - symbol is displayed, pull the probe out of the core stream and the temperature sinks. If no temperature change is shown for at least 3 seconds, so the trend indication will be deleted.

CO_2, efficiency, losses, excess air and dew point are calculated values. They can only be calculated if realistic values for the basic parameters O_2 and temperatures are available. It must be ascertained that:

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

are given. The dew point can only be calculated accurately if, in the menu **"Adjustments"**, the current barometric air pressure value has been inputed. This value cannot be determined by the **ecom-J2K**. If the gas temperature falls below the dewpoint (between 25 and 65 °C), ETA will be calculated with condensation. In the display (C) appears behind ETA.

Correct measurement values 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.

```
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
stored!             CO       ☰↑↓
```

**Measurement stored
in intermediate
memory**

If a printout of the values should be made simultaneously to the intermediate recording, so press **<F2>** (the complete content of the intermediate memory will be printed).

8.2. 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 homegeneous because of the flow in of secundary air and consequently the core stream 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. If a printout of the values should occur simulateneously to the recording in the intermediate memory, press **<F2>** (the complete content of the intermediate memory will be printed out).

```
O2                 17.5 %

CO 0%               738 ppm

CO                  123 ppm

Excess air         7.00

CO measurement    | 12:15:53 25.11.03
recorded!         |      CO
```

**Measurement stored
in intermediate
memory**

8.3. Oxygen check

This measurement is performed by room-independant plants like gross calorific value plants. It is determined if exhaust gas flows into the combustion air (O_2 content drops down / CO content may be rise) 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. If a printout of the values should occur simulateneously to the recording in the intermediate memory, press **<F2>** (the complete content of the intermediate memory will be printed out).

```
┌──────────────────────────────┐
│      Oxygen test             │
│                              │
│ O2            19.5 %         │
│                              │
│ CO               3 ppm       │
│                              │
│ Draught       0.01 hPa       │
│                              │
│ Oxygen check │ │12:15:53 25.11.03│
│ stored!      │ │      CO       │
└──────────────────────────────┘
```

**Measurement stored
in intermediate
memory**

8.4. 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 submenu **"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      ↓        │
└──────────────────────────────┘
```

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.

```
Draught measure.

        0.12 hPa

Recorded value:
        0.12 hPa
Zero point new      ↓
```

**Measurement stored
in intermediate
memory**

8.5. 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 meas.:  -.-
2nd soot meas.:  -.-
3rd soot meas.:  -.-
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. Switch hereto the probe heating of the pistol grip probe while selecting „**Adjustments / Internal / Probe heating / <F1>**".

> ⚠ **Due to the power supply need of the probe heating,
> it is only available with mains power!**

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 meas.:	1.0
2nd soot meas.:	0.5
3rd soot meas.:	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.

⚠ **Get the probe cooled down before putting it back in its fixation!**

8.6. 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 be checked one more time („**View memory**", **<OK>** and scroll with the cursor keys).

```
-- ECOM-J2K --
Start printout
View memory
Memory -> M
Input text
Quit with:      ▣▯
```

The optional external alphanumerical keyboard (item nr. 1050011) enables the input of a 4 x 20-character text (e.g. for remarks concerning the plant). Select hereto „**Input text**", press **<OK>** and input text. With **<F4>** you can delete the text.
Without external keyboard the control module keyboard enables the input of numbers („**Input text**", **<OK>**, activate number input with **<OK>**, input numbers).

```
-- ECOM-J2K --
Start printout
View memory
Memory -> M
Input text
Quit with:      ▣▯
```

Press „**Memory -> M**" and **<OK>** to store the all data -if correct- in the internal memory or on the multi media card. Once the transfer is completed, a "**Disk symbol**" appears on the bottom right of the display. The inputed text will only be recorded in the data record by use of the multi media card.

```
-- ECOM-J2K --
Start printout
View memory
Memory -> M
Input text            💾
Quit with:      ▣▯
```

Disk symbol

Select „**Start printout**" and press **<OK>**) to start a printout.

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

```
-- ECOM-J2K --
Start printout
View memory
Memory -> M
Input text
Quit with:      ▣▯
```
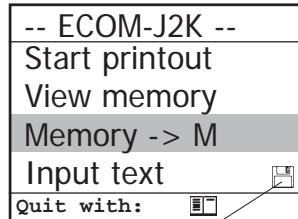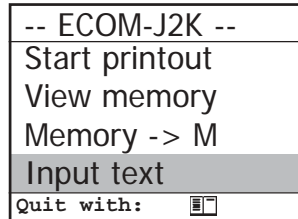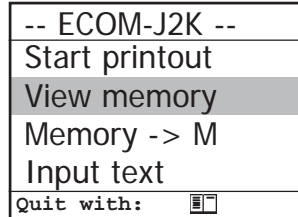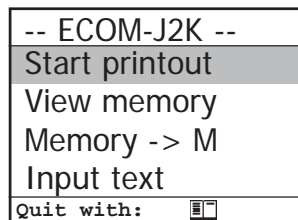
8.7. Printed protocole ecom-J2K

Free text input (4 x 20 characters for comments, remarks, information, ...)

For example name

Date and time of recording

Results of CO check

Results of O2 check

Gas analysis results

Results of differential pressure measurement
Results of soot measurement

Free text programming of 8 lines 20 characters each for customer´s company address

```
***************************
*  E C O M  -  J 2 K   *
***************************
TextTextTextTextText
TextTextTextTextText
TextTextTextTextText
TextTextTextTextText
----------------------
Mister Musterman
----------------------
Date      Time
21.09.04  13:42:02
----------------------
CO measurement
----------------------
O2           19.5 %
CO  0%O2     6370 ppm
CO            455 ppm
Exc. air    14.00
----------------------
O2 value in air
----------------------
O2           19.9 %
----------------------
Gas analysis
----------------------
Fuel type
Fuel oil
----------------------
T.Air          22 °C
T.Gas         122 °C
T.Boiler       66 °C
O2           19.6 %
CO            170 ppm
CO2           1.0 %
Eff.         50.6 %
Losses       49.4 %
Exc. air    15.00
Dew poi.      105 °C
Draught     -0.02 hPa
Soot      1.5 1.0 0.5
Oil trace   NO
----------------------
-rbr- Computertechnik
Am grossen Teich 2
58640 Iserlohn
----------------------
Tel. 02371-945-5
Fax. 02371-40305
EMail : info@rbr.de
http://www.rbr.de
```
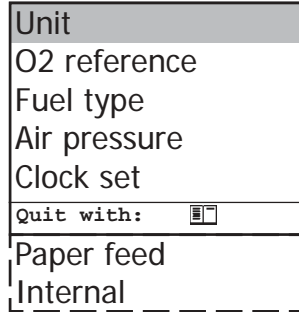
9. Adjustments

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.

The modifiable parameters are:

```
Unit
O2 reference
Fuel type
Air pressure
Clock set
Quit with:      ▣▯
Paper feed
Internal
```

Unit (adjustment with **cursor keys**):
-Calculation of gas concentrations in:

    -ppm   = volume concentration (parts per million)
    -mg/m^3 = 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/m^3 (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:

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

O2 reference
(for ppm and mg/m^3 units - Input after **<OK>** pressing):
    - Input of 02 reference value O_{2ref}

Fuel type (press **<OK>** to access selection list):
-Modification of adjusted fuel type (e.g. by measurements at combi-plants)

ecom-J2K   *Page 25*

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 setttings:

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

```
Printout contraste
Recharging function
Key beep
Probe heating
Language: English
Quit with:    ▣▢
F1 Hotkey
Data logger
```

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)

F1 Hotkey (Choose after pressing **<OK>**):
-Change the menu you get to after pressing F1 in measured value
 display

Datenlogger (Insert with number keys / 1 - 255 seconds)
-Adjustment of interval time for the data logger recording
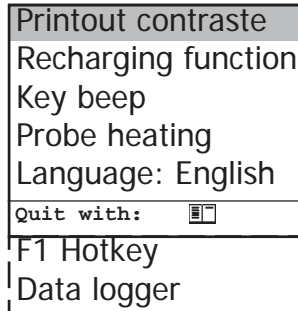
10. Control

The electrochemical sensors alter their output values along the operation period. 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:

Next service centre

Serial number

Software version

```
Control
-rbr- Computertechnik    O2  19744 mV
Am Großen Teich 2        CO      7 mV
58640 Iserlohn           Accu  4.50 V
---------------------    Acc.B 6.09 V
Tel.: 02371-945-5
Fax : 02371-40305
eMail : info@rbr.de

Operation hours  :     8.45 hrs
Serial number    :  J2K 12345
Service telephone:  02371-945-5
Programme version:  V1.6 / 20.04.06
Next maintenance :  20.04.07
```

Accu voltage control module
basic module

Operation hours

Recommended maintenance date

Control-LED´s:

LED 1
OFF = accu operation
lights red = accu in recharge
lights green = accu is recharged

LED 2
OFF = no error
blinks red = error has occurred

LED 3
OFF = basic module OFF
blinks green = basic module is switching off
lights green = basic module is ON

LED 4
OFF = basic module is OFF
blinks yellow = calibration phase in process / purging phase in process
lights yellow = basic module is calibrated

11. Data Processing

11.1. Internal memory

As mentionned earlier, the internal memory will be activated for data record if **no** multi media card is inserted in the control module. The menu **„Data Processing"** offers following functions:

```
Select
View
Memory (M)
RDT <-> PC !
Format
Quit with:    ▣▯
```

Select:
For search or creation of plants files for measurement values assignment (compare chapter 7.).

View:
Recorded values to a selected plant can be viewed
(compare chapter 7.).

Memory (M):
Here all stored measurements (sortiet by record number) can be seen. Individual measurement values can be called as follows:
-Choose record number with the cursor
 keys and confirm with <OK>
-Scroll with the cursor keys
-Leave record number with **<ESC>**

```
   Date      Time     Fuel type
 1 01.09.06  11:01:24  Fuel Oil
 2 01.09.06  11:02:34  Fuel Oil
 3 01.09.06  11:04:20  Fuel Oil
 4 01.09.06  11:07:44  Fuel Oil
 5 01.09.06  11:11:25  Fuel Oil
 6 01.09.06  11:23:02  Fuel Oil
 7 01.09.06  11:44:09  Fuel Oil
 8 01.09.06  11:53:13  Fuel Oil
 9 01.09.06  11:59:59  Fuel Oil
10 01.09.06  11:59:59  Fuel Oil

Select : (↑↓)      (← →)
```

RDT <-> PC !:

Load data:
Enables the data import from e.g. rbr software (available on our website „www.rbr.de"). See chapter „Technical Data" for data format information (please observe the transfer options of your software!).

```
RDT <-> PC !
Send data
Load data


Quit with:    ▣▢
```

Proceed as follows:
-Connect ecom-J2KN and PC via RS232 cable.
-Select **"Load data"** and confirm with **<OK>**.
-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.

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!

11.2. Multi Media Card

This data recording method will be used if a multi media card is inserted in the control module. The menu **„Data Processing"** offers the following functions:

```
Select
View
Memory (M)
Format
Data logger
Quit with:   ▣▯
```

Select:
For search or creation of plants files for measurement values assignment (compare chapter 7.).

View:
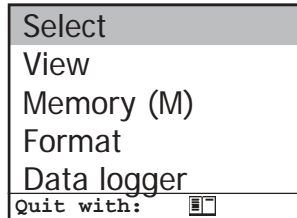Recorded values to a selected plant can be viewed (compare chapter 7.).

Format:
This function is usually needed by the initial adjustment of the instrument at our factory (preparation of internal memory for data record).
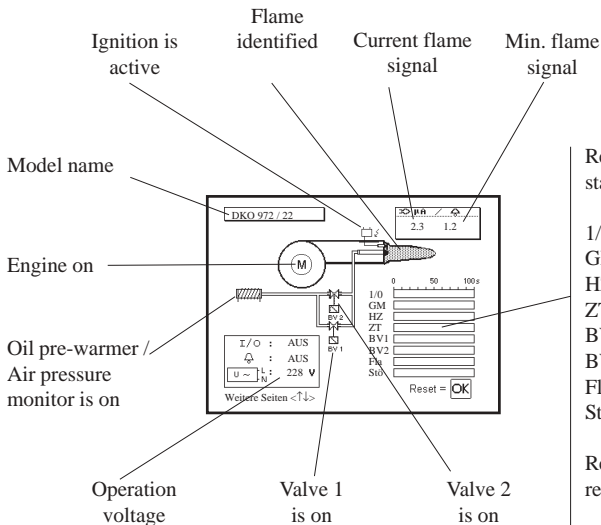**Caution: All stored values will be cancelled!**

Data logger:
To start and end a data logger recording (available only by use of a multi media card). Each recording creates a file on the card. The data are numbered consecutively (J2KDL-00.csv, J2KDL-01.csv, etc.) and can be transferred to a PC using a card reader.

12. Fault diagnosis

ecom-AK

The ecom-J2K is able to receive and to process information sent via radio by the ecom-AK (read-out head for digital firing automats). The distance between ecom-J2K and ecom-AK should hereby amount 5 m at a maximum (free sight).

In the main menu select the sub-menu **"Fault diagnosis"** and confirm with **<OK>**. The ecom-J2K tries to get into contact with the ecom-AK (message: „Searching") Once the connection is realized, the current operation stand of the burner is shown graphically on the display. The operation stand can be recorded (max. 100 sec).

Press **<OK>** to start a new recording phase (reset).

Flame identified

Ignition is active

Current flame signal

Min. flame signal

Model name

Recording of operation stand (max. 100 sec):

1/0 = Continuous phase
GM = Fan motor
HZ = Oil preheater
ZT = Ignition
BV1 = Valve 1st stage
BV2 = Valve 2nd stage
Fla = Flame identified
Stö = Disturbance

Engine on

DKO 972 / 22

I/O : AUS
🔔 : AUS
U ~ 228 **V**
Weitere Seiten <↑↓>

Oil pre-warmer / Air pressure monitor is on

Reset = Start a new recording (press **<OK>**)

Operation voltage

Valve 1 is on

Valve 2 is on

Use the <Up/Dn> keys to call up further data of the firing automat.
The 2nd display page lists information about the disturbance history
(type and volume of information depending on firing automat).

Number of burner starts
at a total resp. since reset
of firing automat

Current error

Störungshistorie		
Inbetriebsetzungszähler	677	
Servicezähler Ist	142	
Kein Fehler !		
Keine Flamme	004	9:23 min
Ende TSA	0.0 µA	227 V
Fremdlicht in der	001	12 sek
Vorspülphase	2.2 µA	225 V
Total	: 46	
Fremdlicht	: 22	
Sicherheitszeit	: 9	
Flammenabriss	: 17	
FT/LW	: 0	

Last 2 errors (Satronic)
Last 5 errors (Siemens)

Error statistics
(errors number)

The 3rd display page lists information about the monitoring times (type
and volume of information depending on firing automat).

Zeiten		
Sicherheitszeit (TSA)		4.9 sek
Verzögerungszeit BV2		40.0 sek
Vorzündzeit		17.0 sek
Nachzündzeit		20.0 sek
Verz. Fremdlicht Überw.		11.5 sek
Fremdlicht Überwachung	5.0 sek	
Reserve TSA (Ist)		4.1 sek
Weitere Seiten <↑↓>		

Monitoring times of
firing automat

13. Maintenance advices

> ⚠️ **Do not use other sensors or feelers from other manufacturers otherwise the TÜV approval will not be valid anymore!**

We recommend to send your instrument for maintenance one time a year, however after max. 400 operation hours, to the next authorised service centre and let the sensors checked and the internal tubing cleaned.

> ⚠️ **Service made by service centres not authorised by rbr-Computertechnik GmbH will result in a complete and immediate 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 (= ± 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"**):

O2	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.

14. 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 ... 120 %	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 230 V / 50 Hz~; accu 6 V / 7,2 Ah

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

Indication   graphic display; backlit

Dimensions (LxHxD)   250mm x 430mm x 200mm

Weight   approx. 5.5 kg with standard sampling probe

Subject to technical changes
V2.1 / 09.2007

Description of data record ecom-J2K with Multi Media Card
Format data logger recordings: J2KDL-xx.csv (separation mark between values = comma)
Format punctual measurements: J2KDV.txt (separation mark between values = comma)

Column	Description	Position	Remark/Example
A	Datum	1-10	DD.MM.YYYY (also by US version)
B	Time	12-19	HH:MM:SS (also by US version)
C	O2 in vol.%	21-26	0,0 - 21,0
D	CO in ppm	28-33	0 - 4000
E	NO in ppm	35-40	0 - 4000
F	NO2 in ppm	42-47	0 - 200
G	SO2 in ppm	49-54	0 - 2000
H	CO converted	56-61	*
I	NO converted	63-68	*
J	NO2 converted	70-75	*
K	NOX converted	77-82	*
L	SO2 converted	84-89	*
M	T.Gas in °C or °F	91-96	0 - 500 (US version with other range in °F)
N	T.Air in °C or °F	98-103	0 - 99 (US version with other range in °F)
O	Draught in hPa	105-110	0,00 - 20,00
P	CO2 in vol.%	112-117	0,0 - 25,0
Q	Eff. in %	119-124	0,0 - 100,0
R	Losses in %	126-131	0,0 - 100,0
S	Excess air	133-138	> 1,00
T	Dew point in °C or °F	140-145	0 - 500 (US version with other range in °F)
U	Poisoning index	147-152	> 0,0
V	O2 (gas channel check) in vol.%	154-159	0,0 - 21,0
W	CO (gas channel check) in ppm	161-166	related to 0,0 vol.% O2
X	CO (gas channel check) in ppm	168-173	Measured value
Y	O2 (check if O2 mixed) in vol.%	175-180	0,0 - 21,0
Z	T. Boiler	182-187	0 - 999
AA	T. Sensor	189-194	0 - 99
AB	O2 ref.	196-201	0,0 - 21,0
AC	Unit	203	0=ppm; 1=mg/m3; 2=mg/kWh; 3=mg/MJ
AD	Norm	205	N= converted to O2 ref.
AE	Fuel type number	207-208	Index acc. to instrument table
AF	Fuel type text	210-222	Text acc. to instrument table
AG	Soot1	224-226	0,0 - 9,9
AH	Soot2	228-230	0,0 - 9,9
AI	Soot3	232-234	0,0 - 9,9
AJ	Oil trace	236	0=no; 1=yes;
AK	20 characters text	238-257	
AL	20 characters text	259-278	
AM	16 characters text	280-295	
AN	Serial number	297-301	
AO	CO (check if O2 mixed) in ppm	303-308	
AP	Draught (check if O2 mixed) in hPa	310-315	
AQ-AW	Comma	316-323	Reserve field
AX	Comment text	324-343	editable only with additional keyboard
AY	Comment text	345-364	editable only with additional keyboard
AZ	Comment text	366-385	editable only with additional keyboard
BA	Comment text	387-406	editable only with additional keyboard
BB	Oil consumption	408-413	CH only
BC	Firing thermal output	415-420	CH only
BD	Operation hours counter	422-427	CH only
BE	Code	429-434	CH only
BF	free (column 510 always 0)	436-510	CH only otherwise BB = last column (position 391-510)
	CR-LF	511-512	#13#10

* converted on unit (column AC) and converted on O2 ref. (column AB) when column AD = N

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Data record description ecom-J2K / Internal memory
The transfer occurs with 14400 BAUD; 1 stop bit; no parity (ANSI character set)
CR / LF is sent after each data record.

Column	Description	Length	Example (unit)
1-5	Storage number	5	1
6-7	Hour	2	9
8-9	Minute	2	7
10-11	Day	2	4
12-13	Month	2	3
14	Fuel type (*)	1	0
15-19	Room temperature	5	21 (°C)
20-24	Gas temperature	5	484 (°C)
25-29	Oxygen (BImSchV)	5	209 (%; without comma)
30-34	CO (BImSchV)	5	889 (ppm)
35	Draught	1	- = minus; blank character = plus
36-39	Draught	4	value in Pascal
40	Oil trace	1	0 = no; 1 = yes
41	Soot dot 3	1	1
42	Soot dot 2	1	1
43	Soot dot 1	1	1
44-48	Free	5	
49-53	NO (BImSchV)	5	45 (ppm)
54-58	Boiler temperature	5	55 (°C)
59-78	20 characters text (1st display line)	20	e.g.: Name
79-98	20 characters text (2nd display line)	20	e.g.: Street
99-114	16 characters text (3rd display line)	16	e.g.: ZIP/City
115-116	2 special signs (HEX $80, $00)	2	
117-121	Oxygen (CO measurement)	5	209 (%, without comma)
122-126	CO (CO measurement)	5	540 (ppm)
127-131	Free	5	
132-136	Free	5	
137-141	Free	5	
142-146	Free	5	
147-151	Free	5	
152-156	Oxygen check	5	209 (%, without comma)
157-161	CO (Oxygen check)	5	45 (ppm)
162	Draught	1	- = minus; blank character = plus
163-166	Draught (Oxygen check)	4	value in Pascal
167-168	CR-LF	2	#13#10

Date transfer PC to ecom-J2K (ANSI charecter set)

First send:	$00 $01
Then send:	56 characters text
Then send:	$80 $00

Once the ecom-J2K has processed the data, it sends $FF back. If the data volume is too large, it sends an other Byte back. If the data transfer should be terminated, so just 60 Byte $00 need to be sent to the instrument.

DECLARATION OF CONFORMITY

I hereby delcare that the product:

ecom-J2K

(Name of product, type or model, batch or serial number)

satisfies all the technical regulations applicable to the product within the scope of Council Directives 73/23/EEC, 89/336/EEC and 99/5/EC:

EN 300 220

EN 301 489-1,-3

EN 61010

(Titles of regulations, standards, etc.)

All essential radio test suites have been carried out.

MANUFACTURER or AUTHORISED REPRESENTATIVE:
- Address:

Rbr Computertechnik GmbH

Am Großen Teich 2

58640 Iserlohn (Sümmern)

Germany

This declaration is issued under the sole responsibility of the manufacturer and, if applicable, his authorised representative:

- Point of contact:
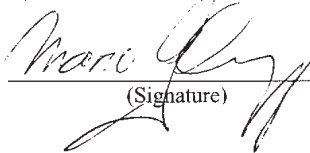
Mr   **Tel.: +49(0)2371 945 5**   **Fax: +49(0)2371 40305**

Name, telephone and fax number

Iserlohn, 2003-11-25

(Place, date of issue)

(Signature)

Mario Glasenapp /Technical Director

(Name and title in block letters)

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