

ecom[®] • J2KN^{pro} •



Operations Manual

version 3.3.3

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1. Important Things to Remember



The J2KN Pro meets the requirements of EPA CTM-030 and CTM-034 and ASTM D-6522 testing protocols for portable emission analyzers.



In order to receive accurate measurements, please allow reading to stabilize for at least 2 minutes.



The J2KN Pro is not suitable for continuous emission testing. Please allow at least 10 minutes of fresh air purge for each hour of testing.



The following substances may cause damage to the electrochemical sensors:

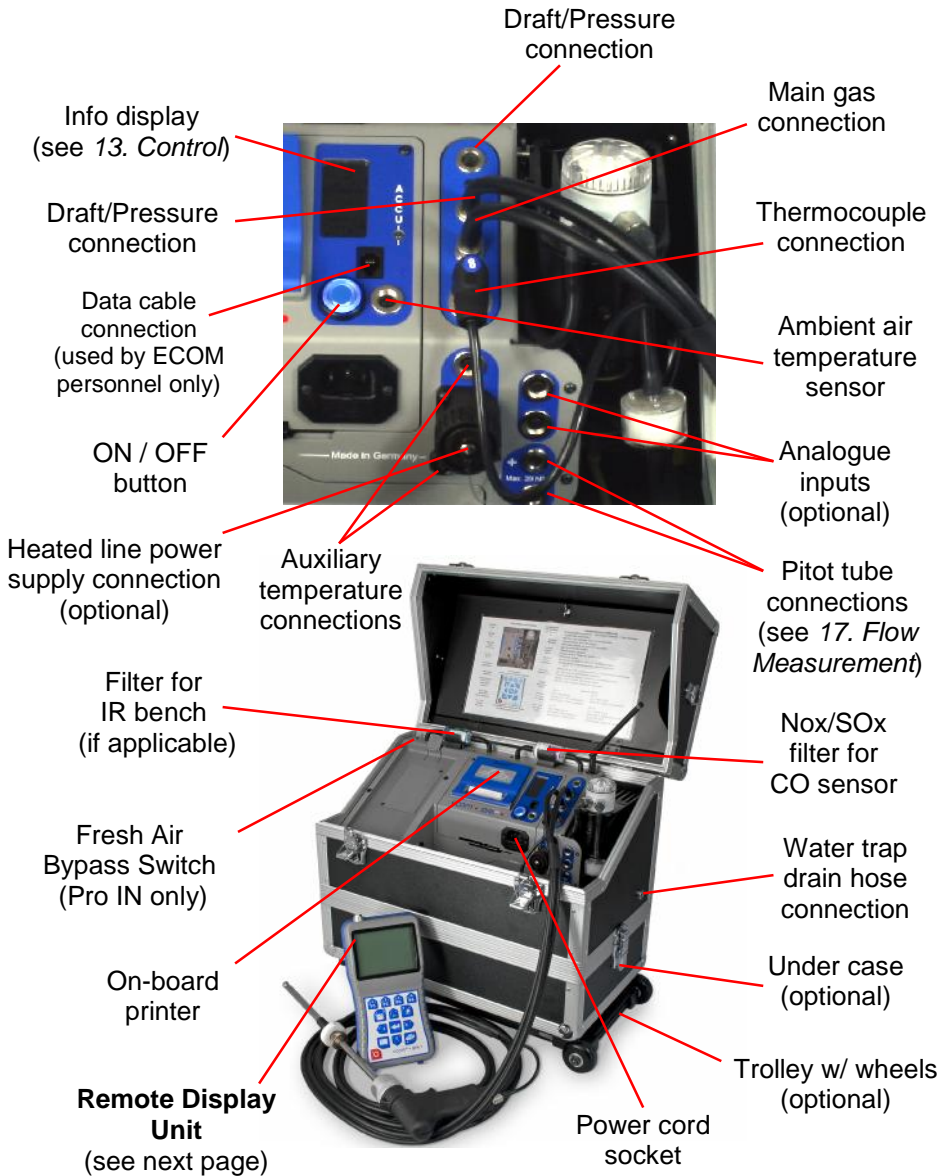
- Cleaning agents
- Degreasers
- Wax polishes
- Adhesives
- Formaldehyde



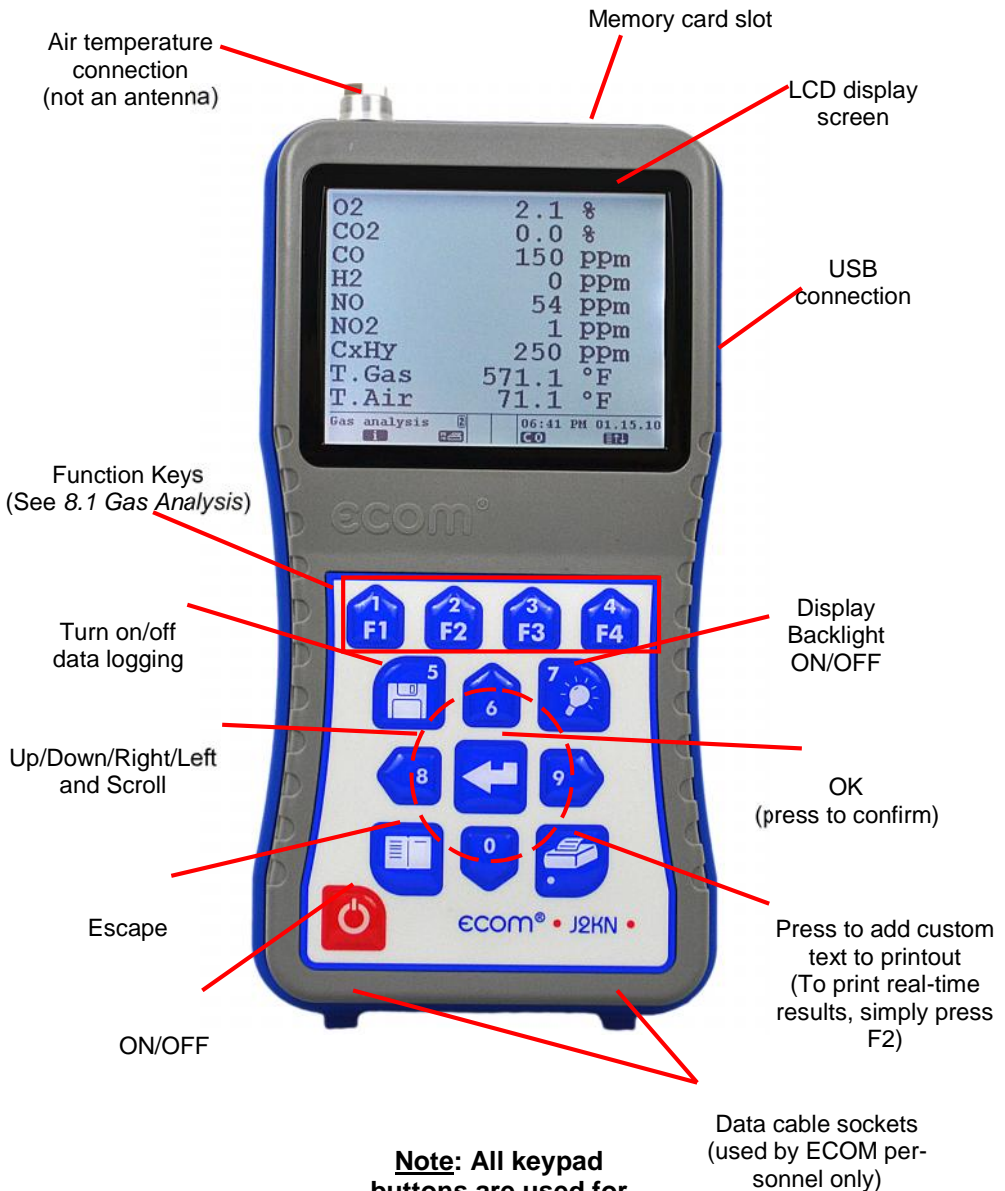
1. Charge the battery after each use
2. Always store unit with fully charged battery
3. Charge the battery at least once a month if not in frequent use

2. Instrument Design

2.1 J2KN Pro Base Unit



2.2 Remote Display Unit



Note: All keypad buttons are used for input of numbers 0-9 and decimal point

2.3 Accessories

Advanced DAS Compliance Testing Software w/ Bluetooth

Part no. PRT90205



Calibration Gas Kit

Part no. CALGASKIT1



Under Case

Part no. RBR69825 (Pro Easy)
Part no. RBR69829 (Pro IN)

(Pictured on page 5)

15ft Heated Sample Line

Part no. PRT79525-15



T-Gas Dummy Plug

Part no. CONNECT70280



T-Air Sensor Stick

Part no. TROOMSTICK



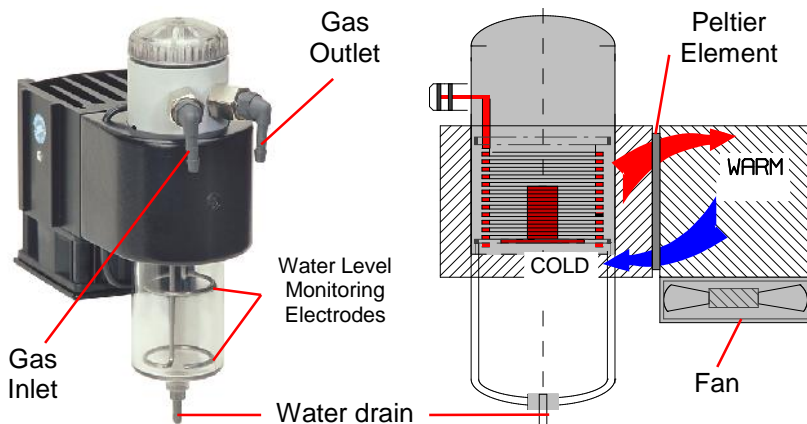
Extra Length Probes and Sample Lines

30-foot Standard Sample Line	Part no. RBR71278
30-foot Heated Sample Line	Part no. PRT79525-30
3-foot Probe Pipe w/ Thermocouple	Part no. RBR71267
5-foot Probe Pipe w/ Thermocouple	Part no. RBR71271

2.4 Consumables

	PART	PART #	DESCRIPTION
	Particulate Filter (10/PK)	FILTER 75316	10/PK - Particulate filter located on top of water trap assembly
	In-line Smoke Filter (1 EACH)	RBR 71185	1 EACH - Standard 3/4" in-line filter in clear plastic casing.
	Soot Test Paper (100/PK)	SOOT 71283	100/PK - Round smoke test filters for smoke dot test
	Soot Test Chart	SOOT CHART	Soot Test Chart with 0-9 Grayness Scale
	NOx/SOx Filter Media (1LB)	NOXSOX 79275	1LB - NOx/SOx filter media refill container (purple beads)
	NOx/SOx Media Tube	RBR 71286	NOx/SOx Media Tube
	Thermal On-board Printer Paper (5/PK)	PRT 79274	5/PK - Printer paper for on-board thermal printer
	J2KN-Pro Main Battery	PRT 79291	Main Battery
	J2KN-Pro Remote Display Batteries (3/PK)	PRT 79292	3/PK - Battery Pack for Remote Display

3. Peltier Cooler



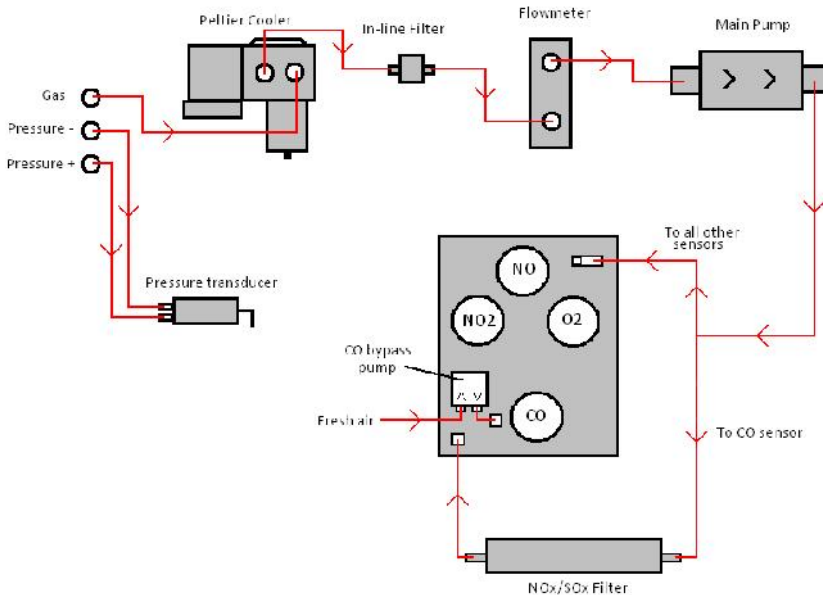
J2KN Pro must be plugged in for the Peltier cooler to operate.

Exhaust gas with a temperature above dew point is introduced into a spiralling gas path with a coated metal surface of good thermal conductivity. The hot gas radiates its heat to this metal coating, which is thermally connected to a Peltier element and a second metal body with cooling ribs and ventilation slots. The flow thru the Peltier element creates a heat transfer from WARM to COLD and this takes the heat from the metal coating and transfers it to the outer cooling body. The heat is then released to the surrounding air via a ventilation fan.

Condensation forms when the gas temperature drops below dew point. This moisture drains into the water trap bowl and is pumped out by a peristaltic pump when the water reaches a high enough level to link both monitoring electrodes.

The high speed pump allows for enough flow to avoid excess exposure time between the gas sample and water, so that drop-out reactions (for example, $\text{NO}_2 + \text{H}_2\text{O} > \text{H}_2\text{NO}_3$) do not occur, which is necessary for measurement accuracy.

4. Gas Path Diagram



Response Time

After inserting the probe into the sample gas, there is a short delay before correct measurement values are displayed. This is necessary for the gas to pass through the sampling system and build up a stable electrochemical reaction at the sensors. This is referred to as response time, and it usually lasts between 60 and 90 seconds. Before printing or recording emission results, wait approximately 2 minutes until the values have stabilized. Minor drifting of a few ppm can be due to unstable pressure conditions in the exhaust channel and may be negligible.

Since the CO sensor has an independent gas path with NOx/SOx filter (see diagram above), the response time will be slightly longer for CO measurement values.

5. Power Supply

The J2KN Pro base unit has an internal power supply, and it is recommended to always run the unit on AC power. For testing locations where an AC plug-in is not available, the instrument can be operated from 6-8 hours on battery power when fully charged. Connecting the J2KN-Pro to AC power charges the battery and is necessary to operate the Peltier cooler and heated probe.

When the battery level gets low, the analyzer will start to beep and display a low battery warning. The voltage reading on the battery is displayed in the Control screen. The warning is activated when the charge drops below 6 V. When it reaches 5.8V, the battery charge is not sufficient to power the unit.



Only use batteries supplied by ECOM.
Contact ECOM with any questions.

The J2KN remote control unit is powered by 3 nickel-metal-hydride batteries (type AA). These batteries are recharged by docking the remote control unit onto the J2KN base unit. To change the settings for recharging these batteries, go to:

Adjustments -> Internal -> Reload function -> OK

1. Recharging function ON (<F1> = YES)
 - Batteries slowly and carefully recharged
 - Recommended for frequent use
2. Recharging function OFF (<F4> = NO)
 - Batteries quickly recharged
 - Recommended for occasional use
 - Note: Battery run-time is reduced on quick charge!



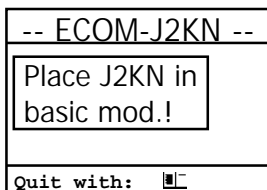
1. Charge the battery after each use
2. Always store unit with fully charged battery
3. Charge the battery at least once a month if not in use

6. Radio Communication

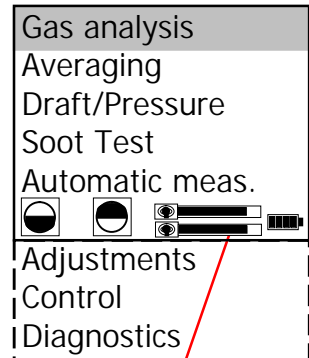
The J2KN Pro base unit communicates wirelessly to the remote display unit via radio transmission. To unlock the remote control unit, press on the tab to unlock and release from the cradle on the base unit.

The information exchange between the remote control and base unit is performed via radio transmission (915 MHz) with a coverage of approximately 100ft by free sight. The quality of the radio transmission is documented by a bar indication in the Main Menu.

If the J2KN base unit is switched off and the remote control unit is on, the display will show a message telling the user to place the remote control unit into the docking station (see below).



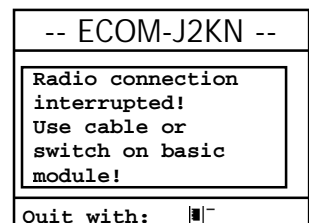
Unlock



Troubleshooting Communication Issues

If there is interruption of the radio communication, an error message is displayed (see below right). If this occurs frequently, it may be necessary to re-sync the remote to the base unit:

1. Place remote unit into cradle
2. Go to Adjustments-> Internal-> RF Connect-> Standard-> OK
3. The base and remote are now synced
4. Go to Adjustments-> Internal-> RF Connect-> Remote -> OK
5. The remote can now be used as normal

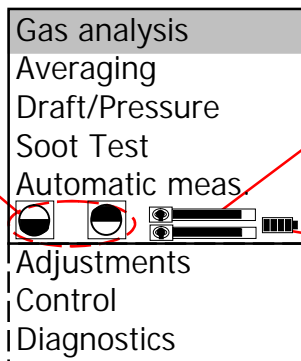


7. J2KN Pro Start-up



Make sure the probe is in fresh air when you turn on the J2KN Pro.

Display contrast:
Lighten F1
Darken F2



Radio Link
Quality Indicator

Battery Charging
Indicator

- Switch on the J2KN base unit and the remote control unit. The Main Menu is displayed with 8 sub-menus:
 - Gas analysis View gas readings & calculations
 - Averaging Perform averaging tests
 - Draft/Pressure Calibrate pressure sensor
 - Soot Test Perform soot/smoke density test
 - Automatic meas. Data logging onto memory card (Pro Easy & IN) and set up automatic test cycles (Pro IN only)
 - Adjustments Modify J2KN settings
 - Control Diagnostic info/Calibration mode
 - Diagnostics (Only used with ECOM AK tool)

2. Select Gas Analysis and press <OK>

3. Press Up/Down to select Fuel Type and press <OK>

4. Analyzer will complete auto-zeroing of all sensors, except the O2 sensor which is calibrated to 20.9%

Fuel type		
Gas-Natural		
CO2max	A1	B
11.7	0.35	0.006
Select: (ÇE:11		

8. Emissions Measurement

8.1 Gas Analysis



Calibrate the sensors before each emission test for best results.

After the 1-minute auto-zeroing phase, the instrument switches to Gas Analysis mode. The measurement values can be viewed on 3 display pages: a zoomed in 4-line display and 2 full 9-line displays. All line items are user-selectable (see Display Values below). Press Up/Down to scroll between the pages.

Tip: To apply O2 correction, go to Adjustments/Ref. O2 and input O2 correction %. Then go to Adjustments/ Unit and change unit to O2% undiluted.

O2	8.2 %
CO	431 ppm
NO	126 ppm
NO2	65 ppm
Gas Analysis	
25.11.07	

Bypass Switch (Pro IN)
Info Screen (Pro Easy)
<F1>

Quick
Print/Save to
memory
<F2>

CO Bypass
Pump ON/OFF
<F3>

Edit Display
Lines
<F4>

- F1: Bypass Switch (Pro IN)..Turn on/off fresh air bypass to purge
Info Screen (Pro Easy)....View diagnostic info on Control screen

To change F1 hotkey from default, go to Adjustments -> Internal -> F1 Hotkey

- F2: Quick Print.....Prints on-screen measurement values
F3: CO Bypass.....Manually turn on/off CO bypass pump

Turn on CO bypass pump to protect CO sensor from high concentrations
Pump automatically activates at 4000ppm!

- F4: Display Lines.....Choose measurement values to display by pressing F4 then Up/Down/Right/Left

To change F4 hotkey from default, go to Adjustments -> Internal -> F4 Hotkey

8.2 Printing



Wait for the measurement values to stabilize for at least 2 minutes before printing the results.

Quick Print

The easiest and quickest way to print is to press <F2> for quick print, which immediately prints the measurement values currently on the screen. This also saves a snapshot to memory.

Print in Timed Intervals or Print an Average Over Time

To print in timed intervals (for example, every 10 seconds or each minute) or to print an average over time, please refer to 10. Averaging Tests.


Print from Memory

1. Press 5/Save (disk icon)
2. Press Print key (printer icon)
3. Select Start printout
4. Press 5/Save to clear memory

O2	8.2 %
CO	431 ppm
NO	126 ppm
NO2	65 ppm
Gas Analysis Recorded!	
	[CO] [↑↓]

Measurement recorded

Print with Text (i.e. site and equipment)

1. Press Print key (printer icon) to display printing options
2. Select Insert Text and press OK to select first line of text (maximum 6 lines of text, 20 characters per line)
3. Using the directional keys and OK, select the alphanumeric characters to insert text. Press F3 to change grid to lower case, numbers, or other characters. To delete a character, press F4 to toggle up then F2 to delete. Press F1 to accept text. If you wish to insert more lines of text, select the next line and repeat.
4. Press  twice to return to Gas Analysis
5. When ready to print, press <F2> for quick print
6. To clear text from printout, press Print key, select Insert Text, select text line, press F4 to toggle up, move the cursor to the right of the text, and press F2 to delete each character.

8.3 Soot Test

The soot test is a measure of soot or smoke density in the exhaust sample.

Soot Test	
Boiler temp.:	---°F
1st Soot meas.:	-.-
2nd Soot meas.:	-.-
3rd Soot meas.:	-.-
Oil trace :	----
Average:	-.-

The soot test must be performed with the heated probe turned on in order to prevent the filter paper from becoming wet due to condensation. To turn probe heating on, go to

Adjustments -> Internal -> Probe heating -> F1



J2KN Pro must be plugged in for the probe heating function to activate. Allow 3 minutes for the probe to heat up before soot test.

Soot Test Procedure

1. Turn on probe heating: Adjustments->Internal->Probe heating->F1
2. Press the trigger on the probe handle to open the filter slot and insert a filter paper (will insert about half-way)
3. Select the line 1st. Soot meas
4. Press <OK> to start the measurement.
The display shows flow volume and the pump starts sampling
5. Once 1.63 liters have been sucked in, the J2KN-Pro will prompt to input the opacity number
6. Press the trigger on the probe handle to open filter slot and pull out the filter paper
7. Compare the greyness on the filter paper with the soot test chart 0-9 opacity scale
8. Input the number and press <OK>
9. Repeat steps 2-8 until all 3 soot tests are completed. The mean value will be calculated and automatically stored.
10. Turn off probe heating: Adjustments->Internal->Probe heating->F4

Soot Test	
Boiler temp.:	166°F
1st Soot meas.:	5.0
2nd Soot meas.:	4.5
3rd Soot meas.:	5.5
Oil trace :	NO
Mean value:	5.0

Select NO for Oil trace.



Remember to let the probe cool down before putting it back in the case.



9. Data Logging onto Memory Card (2GB max)

Initial Set-up

1. Insert memory card (32MB to 2GB) into the top-right of the handheld display
2. Go to Automatic Meas. -> Save to MM Card. This is the time interval that each data snapshot is recorded to the memory card (min. 1sec, max 255sec). Input desired amount in seconds and press OK.



Data Logging

1. Within Automatic Meas., select Datalogger -> "Start dl? Are you sure?" -> Press F1
2. Analyzer is now in Datalogging mode. The blinking disk in the top right corner indicates that the analyzer is currently logging data. Press  to return to the main menu and select Gas Analysis to view real-time measurements.
3. To start & stop data logging, press 5 (disk symbol) while in Gas Analysis.
4. To complete data logging and save the file to the SD card, press  to return to the main menu, go to Automatic Meas., select Datalogger -> "Finish dl? Are you sure?" -> Press F1.
5. Press down on the memory card to release, and insert the card into a card reader on a computer to view the files (.csv format). Each data logging term will be saved separately as J2KDL-00, J2KDL-01, J2KDL-02, etc. Open in Microsoft Excel.

10. Averaging Tests

The Averaging function allows you to take a sample of emissions data and compute an average over time.

1. Go to Averaging -> Select Meas. Time
2. Input total measuring time in minutes or seconds (for seconds, press decimal 1st)
3. Select Scanning and input interval time in minutes or seconds

Averaging	
Start measurement	
Meas. time	
Scanning	
Printer	
Store	
Quit with:	

For example: If the Meas. Time is 1 minute and the Scanning time is 10 seconds, the mean value will take into account 6 scans and find the average

4. Select Printer and choose from the following options:
No Value. This prints only the final averaged values.
Each Value. This prints a snapshot for every scan.
Each Value of 2, 3, etc. This prints a snapshot for every other scan, every third scan, etc.
5. Do not select Store. Please leave to default.
6. Select Start Measurement.

Mean value measurement has initiated.
Press up/down to toggle between mean value and real-time results. You will see the time counting down in the bottom left of the display screen.


O2	3.2 %
CO2	13.1 %
CO	0 ppm
Eta	92.5 %
Losses	7.5 %
Lambda	1.18
T.Gas	184 °C
T.Air	20 °C
Averaging	25.11.07
15:59 min	

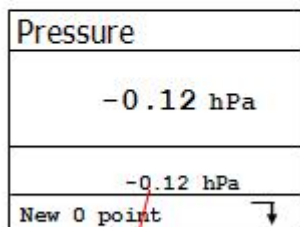
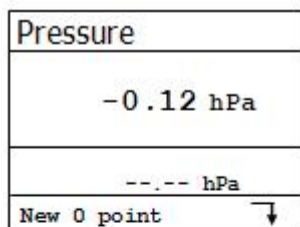
7. After the Meas. Time has elapsed, press Print key to print averaged results if it does not print automatically
8. Press , select Averaging, and press F1 to quit averaging calculation

11. Draft/Pressure

A trend indication for the draft conditions in the exhaust channel is displayed in the Gas Analysis screen. Note that the pressure sensor tends to drift because of its sensitivity, and it is necessary to calibrate the sensor immediately before sampling to get an accurate measurement.

To calibrate, go to Draft/Pressure. The current value is displayed. Disconnect the draft hose from the J2KN for a short moment and press <F4>. The pressure sensor is now calibrated.

Reconnect the draft hose. The display shows the current draft measurement value. This can be stored into intermediate memory by pressing 5/Save. The stored value is shown on the display. Press  to quit the differential pressure menu.



Measurement stored in intermediate memory

12. Adjustments

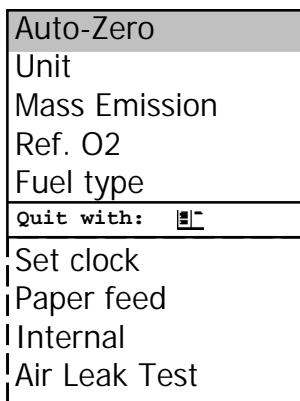
Most of the settings of the J2KN-Pro that are user-selectable can be changed in Adjustments in the Main Menu.

Auto-Zero (J2KN-Pro IN only)

Press <OK> to set new zero points for sensors. Before using this function, the sensors must be flushed with fresh air, and the J2KN-Pro IN must be in a fresh air environment during the auto-zero phase.

Unit

The default setting for gas concentration units is ppm (parts per million). The options for units include:



12. Adjustments (continued)

ppm	parts per million
mg/m ³	milligrams per cubic meter
mg/kWh (undiluted)	milligrams per kilowatt-hours corrected to O ₂ %
mg/MJ (undiluted)	milligrams per megajoules corrected to O ₂ %
ppm (undiluted)	parts per million corrected to O ₂ %
mg/m ³ (undiluted)	milligrams per cubic meter corrected to O ₂ %
lbs/mmBTU (undiluted)	pounds per million BTU corrected to O ₂ %

*Undiluted = concentration value corrected to reference O₂%

Mass Emissions

The J2KN-Pro calculates mass emissions in units of lbs/hour, tons/year, or gr/bhp. First, under Adjustments, set the Unit to ppm and choose the correct Fuel Type. Then select Mass Emission and press <OK>. Press up/down to select the correct unit.

For lbs/hour or tons/year:

- If fuel flow is known, press F2 to input Fuel consumption (scf/hr for gaseous fuel & gal/hr for liquid fuel)
- If fuel flow is not known, press F4 to input mmBTU/hr for a calculated fuel consumption
- No need to input Horsepower@test
- Press <OK> to accept

For gr/bhp:

- If fuel flow is known, press F2 to input Fuel consumption (scf/hr for gaseous fuel & gal/hr for liquid fuel)
- If fuel flow is not known, press F4 to input mmBTU/hr for a calculated fuel consumption
- Press F3 to input Horsepower@test
- Press <OK> to accept

Ref. O₂

Enter the reference O₂% value using the number keys and decimal point. The conversion equation is shown to the right. You must then change the Unit to O₂% undiluted.

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

Fuel type

Options for fuel type include natural gas, propane, butane, diesel, oil, coal, and wood. This is necessary for CO₂ and Mass Emissions calcs.

Set clock

Set time and date

Paper feed

Press <OK> to start paper feed and  to end paper feed

Air leak test

Cover the end of the probe with the yellow cap supplied with the unit and press <OK> to start checking the sampling system for air leaks.

12.1 Internal

(Go to Adjustments > Internal)

Print contrast

Choose print contrast from 0-9

Reload function

Choose remote unit battery recharging settings (see 5. Power Supply)

Key beep

Press F1/F4 to turn key beep on/off

Graphic menu

Press F1/F4 to turn graphic menu on/off

Probe heating

Press F1/F4 to turn probe heating on/off for soot measurement test (see 8.3 Soot Measurement Test)

Power saving mode

Press F1/F4 to turn on/off power saving mode, which turns off the Peltier cooler and the heated probe option

Language: English

Press OK to choose between French and English

F1 Hotkey

Press Up/Down to choose F1 shortcut (see 8.1 Gas Analysis)

F4 Hotkey

Press Up/Down to choose F4 shortcut (see 8.1 Gas Analysis)

Eff. (C)

Press F1/F4 to turn on/off the efficiency calculation with and without condensation

RF-connect

*Do not change from default setting unless you are troubleshooting communication issues! (See 6. Radio Communication)

-Standard: choose this option to sync the base and remote units if radio communication problems occur

-RF-connection: do not choose this option

-Remote: default setting

*Change RF-connect setting back to Remote after troubleshooting.


Printout contrast

Reload function

Key beep

Graphic menu

Probe heating

Quit with: 

Power saving mode

Language: English

F1 Hotkey

F4 Hotkey

Eff. (C)

°C/°F

RF-connect

USB

Bluetooth

Pitot Factor

Printout

12.1 Internal (continued)

USB

For DASNT 5: Set Baud rate to 1200
 Set Protocol to Enhanced

For Advanced DAS: Set Baud rate to 38400 and
 Set Protocol to Enhanced

Bluetooth

For DASNT 5: Set Baud rate to 9600
 Set Protocol to Enhanced

For Advanced DAS: Set Baud rate to 9600 and
 Set Protocol to Enhanced



The first time you connect to a computer via Bluetooth, use "1234" pairing PIN.

Pitot factor

Set the Pitot factor for flow rate calculation. If the flow rate calculation is not needed, set Pitot factor to 0. If you are using a standard ECOM probe, set this to 0.93. (For more information on the flow measurement option, see 17. Flow Measurement with Pitot Tube.)

Printout

This feature allows you to add 8 lines of text at the bottom of the printout (20 characters per line). Usually this is reserved for company information such as company name, address, phone number, and website. (To add a special note for a specific test, please see 8.2 Printing.)

To change printout text, press Up/Down to select the line you would like to edit. Press F4 to toggle up and down between the insert text box and the alphanumeric grid. Using the directional keys and OK, select the characters to insert text. Press F3 to change grid to lower case, numbers, or other characters. To delete a character, press F4 to toggle up, then F2 to delete. Press F1 to accept text and continue to the next line.

13. Control

The electrochemical sensors change their output values over time based on frequency of use. The J2KN-Pro is programmed to monitor the sensors and correct drifts. If the drifts and the correlated measurement errors increase, an error message is displayed and it is time to change the sensor. The control menu displays the status of the sensors, batteries, radio quality, error count, number of times the J2KN-Pro has started up, and other analyzer information.

Control	
-trc- Messtechnik Am Großen Teich 2 58640 Iserlohn	O2 10744 mV CO 7 mV Batt: 4.50 V Bat.B 6.09 V
----- Tel.: 02371-945-5 Fax : 02371-40305 eMail : info@trc.de	
Operation hours : 8.45 hrs Serial no. : J2KN 12345 Service tel. : 02371-945-5 Program version : V3.0 / 12.07.10 Next unit check : 20.04.11	

Control	
20 4.2 /s 4.2 /s 0.0 /s	1 X 22 ppm 4 X 11 X
	O2 10744 mV CO 7 mV Batt: 4.50 V Bat.B 6.09 V
Operation hours : 8.45 hrs Serial no. : J2KN 12345 Service tel. : 02371-945-5 Program version : V3.0 / 12.07.10 Next unit check : 20.04.11	

Info Display

ltr / min	2.24	Gas flow (liters per minute)
Main pump is running	2.6	
Fresh air valve is open	2.4	
CO purging is running	2.2	
Gas cooler ready for use	2.0	
Heated line ready for use	1.8	
Probe heating is switched on	1.6	
Heated head ready for use	1.4	
Calibration phase	1.2	
	1.0	Radio mode
	0.8	Battery operation

14. Maintenance Tips

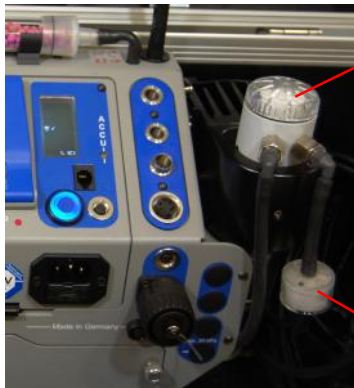


Only use sensors, filters, and filter media provided by ECOM. Do not use desiccant!

14.1 Filters

Particulate filter (water trap filter)

Unscrew the cover of the water trap and check the particulate filter for greyness. Change it once the filter has a darkness of 4-5 on the soot chart scale.



Particulate filter

In-line smoke filter

In-line smoke filter

The round in-line smoke filter should be checked periodically for greyness. Change it once the filter has a darkness of 4-5 on the soot chart scale.

NO_x/SO_x filter

The CO sensor has an independent gas path (see 4. Gas Path Diagram) which includes a potassium permanganate chemical filter for filtering SO₂ and NO_x from the gas sample.



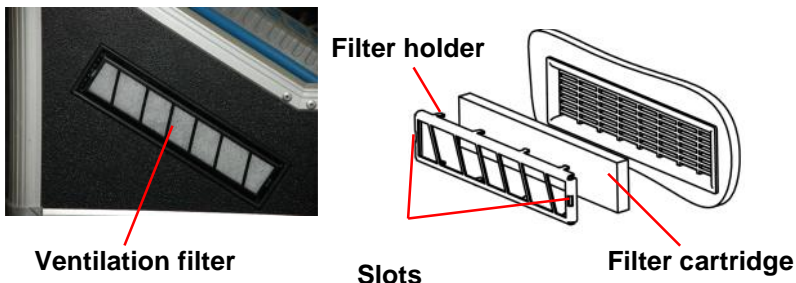
Color change: purple -> brown -> grey-> white

Filter media should be changed once it has turned grey!

14.1 Filters (continued)

Ventilation filter

The ventilation filter should be changed if the filter has a darkness of 2-3 on the soot chart scale. Use a screwdriver to pry open the filter holder from the slots on each side. Change the filter cartridge and refasten the filter holder.



14.2 Sample Line and Probe

The sample line and probe should be cleaned regularly to release particle deposits and to prevent early wearing due to corrosion.

To clean the hose, disconnect from the analyzer end and the probe end, blow out the line with short bursts of air from an air compressor, and hang up to dry overnight so that excess water may drain out.

14.3 Sensors

During the J2KN-Pro start-up procedure, each sensor is zeroed using fresh air as the reference point, except for the O₂ sensor which is calibrated to 20.9%. The status of each sensor is permanently monitored by the instrument. The sensor's life span is shortened by the exposure to high concentration gases above the measurement range. The output values of the sensors should be in the range of:

O ₂ OO/105 (white)	11000 mV to 13000 mV
O ₂ 5FO (black)	17000 mV to 24000 mV
All others	-100 mV to +100 mV

If an error message is displayed during the start-up phase and cannot be cleared despite several restart attempts, please call an authorized service center for troubleshooting advice.

14.3 Sensors (continued)

The CO sensor is protected from exposure to high concentrations by the automatic CO bypass pump. If the limit value of 4000 ppm is exceeded, a second pump switches on and purges the sensor with fresh air.

14.4 Printer Paper

To change the printer paper, please follow these steps:

1. Release the printer cover
2. Take out the used paper roll
3. Remove the used paper roll from the shaft and place the new paper roll onto the shaft
4. Insert the paper end into the black ribbon cartridge slot
5. Feed approximately 2 inches of paper by going to Adjustments -> Paper feed and pressing <OK>
6. Place new paper roll and shaft back into place
7. Insert the paper end into the blue printer cover slot
8. Close the printer cover

14.5 Changing the Fuse

A 1 amp fuse is located in a small drawer just below the power cord socket. If the J2KN-Pro is not powering up when plugged into AC power, this may be due to a blown fuse. To change the fuse, please follow these steps:

1. Use a small screwdriver to release the fuse drawer



Fuse drawer

2. Take out the spare fuse and insert into the active fuse spot



Active fuse (exposed)

Spare fuse (hidden)

3. Re-insert fuse drawer

15. How to Change Sensors



Improper installation voids warranty!

Please mark connector when removing old sensor and insert new sensor into correct connector to prevent destruction of the sensor and main board.

15.1 How to Change O2 Sensor



Step 1:

Use a T-10 torx wrench to remove screws from O2/CO cover plate



Step 2:

The O2 sensor is attached to 2 wires, located below the CO sensor



Step 3:

Disconnect the lead wires and unscrew counter clockwise until loose, then pull directly out



Step 4:

Install new O2 sensor by screwing clockwise until locked & reconnect wires

Step 5: Replace O2/CO cover plate and tighten screws with a T-10 torx wrench

Step 6: Turn on analyzer and select Gas Analysis to start self-calibration of O2 sensor to 20.9% in ambient air (must be in fresh air)

15.2 How to Change A5F CO Sensor



Improper installation voids warranty!

Please mark connector when removing old sensor and insert new sensor into correct connector to prevent destruction of the sensor and main board.



Step 1:

Use T-10 torx wrench to remove screws from O2/CO cover plate



Step 2:

The A5F CO sensor is in gray housing attached to a ribbon cable



Step 3:

Disconnect ribbon cable from CO sensor



Step 4:

Remove CO sensor using coin or fingers

Turn 45 degrees counter clockwise and pull directly out

(continued on next page)

15.2 How to Change A5F CO Sensor (continued)



Step 5:

Pop open the gray cap using a small screwdriver

Use the side of the housing as a leverage point



Step 6:

After the cap is removed, slide the sensor out of the housing as shown here



Step 7:

Remove the board from the sensor using a small screwdriver

Warning! PTC embedded in glue

Pry from beneath the dried glue so the PTC does not separate from the board

Failure to do so may destroy PTC

Step 8: Place board onto new sensor

Step 9: Insert new sensor into gray housing and replace cap by snapping into place

Step 10: Insert new sensor into analyzer, turn 45 degrees clockwise to lock into place and replace ribbon cable

Step 11: Replace O₂/CO cover plate and tighten screws with T-10 torx wrench

Step 12: Calibrate your new CO sensor using certified calibration gas

15.3 How to Change MEM CO Sensor



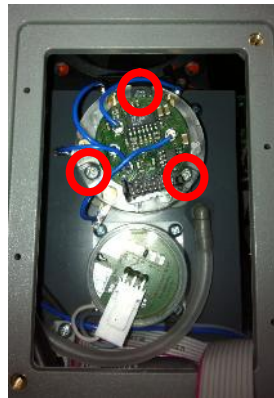
Step 1:
Use T-10 torx wrench to remove screws from O2/CO cover plate



Step 2:
The MEM CO sensor is shown here



Step 3:
Disconnect ribbon cable from CO sensor



Step 4:
Remove 3 screws shown here using a phillips head screwdriver

Pull sensor directly out

Step 5: Insert new CO sensor, replace 3 screws, and tighten until snug

Step 6: Replace ribbon cable

Step 7: Replace O2/CO cover plate & tighten screws with T-10 torx wrench

Step 8: Calibrate your new CO sensor using certified calibration gas

15.4 How to Change NO, NO2, SO2, and High CO Sensors



Improper installation voids warranty!

Please mark connector when removing old sensor and insert new sensor into correct connector to prevent destruction of the sensor and main board.



Step 1:

Disconnect power cord



Remove these screws

Step 2:

Set J2KN on its back side to expose the 3 screws that attach base unit to carrying case



Step 3:

Return J2KN to upright position and disconnect drain hose

Firmly grip base unit and pull up and out to remove from carrying case



Step 4:

Loosen both thumb screws located below power cord socket, pull out battery drawer, and disconnect battery leads

(continued on next page)

15.4 How to Change NO, NO2, SO2, and High CO Sensors (continued)



Step 5:

Use T-10 torx wrench to remove screws shown here

Remove O2/CO cover plate

Remove O2 sensor by disconnecting lead wires and unscrewing counter clockwise

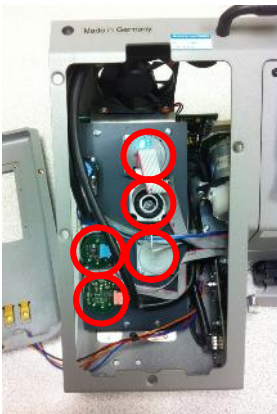


Step 6:

Remove cradle as shown here (notice O2 sensor removed)

Do not force cradle—it should swing out without too much force

If necessary, break wire tie mounted in upper left corner of base unit (see arrow)



Step 7:

View of the uncovered sensor manifold

To change the sensor, remove ribbon cable, turn 45 degrees counter clockwise, and pull directly out



Step 8:

Remove the board from the sensor using a small screwdriver

Pry from beneath the dried glue so the PTC does not separate from the board—failure to do so may destroy PTC

Warning:
PTC embedded in glue!

(continued on next page)

15.4 How to Change NO, NO2, SO2, and High CO Sensors (continued)

- Step 9: Place board onto new sensor
- Step 10: Insert new sensor, turn 45 degrees clockwise to lock into place, and replace ribbon cable
- Step 11: Repeat steps 7-10 for each sensor you would like to change
- Step 12: When done, replace cradle and reinstall O2 sensor by screwing clockwise until locked & reconnect wires
- Step 13: Replace O2/CO cover plate and tighten screws with T-10 torx wrench
- Step 14: Reconnect battery leads and close battery drawer
- Step 15: Place base unit into carrying case and reconnect drain hose
- Step 16: Align the analyzer all the way to the left, gently set analyzer on its back, & replace the 3 bottom screws



- Step 17: Calibrate your new sensor(s) using certified gas

If you have any questions, please call (770) 532-3280 and ask for the service department

16. How to Calibrate Sensors

For best results, the calibration gas concentration should be as close to the expected levels of emissions as possible. Because each sensor is linear through a nominal range, one calibration gas concentration can be used for a reasonably wide range of emission levels. For applications with extremely low or extremely high levels of emissions, the sensors should be calibrated as close as possible to expected concentration levels. It is also recommended that—for gas mixtures that support oxygen content—a small percentage of oxygen (i.e. 2% - 5%) be present in the calibration gas to aid in the system leak check.

Fully charge analyzer:

Place unit on charge the night before you plan to use analyzer to ensure full charge of battery.

Initiate analyzer:

1. Attach T-gas thermocouple, sample line, and power cord.
2. Switch on analyzer.
3. Select Gas Analysis on main menu.
4. Select Fuel Type, press OK.
5. Select No for Data Processing.
6. Allow instrument to complete self-calibration/auto-zero sequence.

Perform air leak test:

1. Apply nitrogen gas to analyzer through probe/sample line (you can use NO calibration gas that is balanced in nitrogen).
2. Allow gas to flow for 3 minutes.
3. After 3 minutes, check that O₂ reading is 0.0% (+/- 0.2%). If reading other than 0.0%, troubleshoot source of leak and correct. To troubleshoot, check tubing, connections, and o-rings.
4. Do not proceed to calibrate analyzer until air leak is corrected.

16. How to Calibrate Sensors (continued)

Put analyzer in calibration mode:

1. Select Control on main menu.
2. Swipe calibration magnet over the silver Cal Magnet sticker, located at bottom left of keypad.
3. The analyzer is now in calibration mode.

Calibrate your analyzer:

1. Connect calibration gas to analyzer using one of the following three set-ups:

(1st option) Measure flow of pump at point of cal gas input with flow meter. Connect calibration gas to analyzer through flow meter and adjust flow to match pump draw.

(2nd option) Vented flow meter configuration. Ensure sensors are not over or under pressurized by allowing small amount of gas out of flow meter. This prevents air from entering system and allows pump to control internal pressure within analyzer.

(3rd option) *Recommended method* Use on-demand regulator which uses pump draw to establish flow. No need to measure and match flow from the regulator, as pump is controlling the flow.

2. Flow calibration gas for 5 minutes.
3. After reading has stabilized for target sensor, press OK to display input mode. Input concentration of calibration gas using numbers on keypad. Press OK.
4. Disconnect calibration gas.
5. After calibrating target sensor, allow analyzer to flush with fresh air for 5 minutes or until readings are below 10 ppm.

17. Flow Velocity Measurement (Option)

Stack flow or exhaust gas flow can be measured by the J2KN-Pro using a special flow probe.

First, the Pitot factor must be entered in the Adjustments menu to get the correct flow rate calculation. Input 0.93 for the Pitot factor if you are using a standard ECOM probe. To do this, go to:

Adjustments -> Internal -> Pitot factor



Connections for pitot tube

After connecting the Pitot tube to the analyzer, go to Flow Measurement

Press <F4> to set the zero point of the flow sensor.

Press <F1> to input the cross section of the stack or exhaust stream, which is required for the flow rate calculation.

Flow measurement	
V. Gas	0.4 m/sek
M. Flow	44 Nm ³ /h
dP	0.1 Pa
Flow measurem. 25.11.07	[CO] [P, P]

Position the Pitot tube in the stack or exhaust stream.

The display will show the speed (m/s), flow rate (Nm³/h) and differential pressure (Pa). After the values have stabilized, press <F2> to print the results.

Measurement stored in intermediate memory

*Call ECOM at 877-326-6411 if you would like the flow measurement option added to your J2KN-Pro. You will have to get a return authorization number and send the analyzer to our service department in Gainesville, Georgia, USA.

18. Frequently Asked Questions

Where do I find important instrument information?

In the Control screen, all important instrument information is shown (e.g. battery voltage, sensor values, serial number, next service date, operation hours, etc.).

How long is the life span of the sensors?

The life span depends on the operating hours and the instrument equipment. The life span of the toxic sensors (CO, NO, SO₂, NO₂) is affected by high gas concentrations or insufficient purging. The life span for these sensors is on average 3 years. The life span of the O₂ sensor is independent of the operating hours and amounts to approximately 2 years.

Which sensors can I exchange?

The following sensors are exchangeable:

- O₂ sensor
- CO sensor (pre-calibrated available)
- NO sensor (pre-calibrated available)
- NO₂ sensor (pre-calibrated available)
- SO₂ sensor (pre-calibrated available)


The instrument shows the error message "O₂ sensor 0 mV"

The O₂ sensor must be changed.

The instrument shows the error message "T-Gas" or "T-Air"

Possible reasons could be:

- Cable is broken (at the plug)
- T-Air sensor error – check all connections
- T-Gas sensor error – check all connections
- Thermocouple is defective

Note: The error messages can be ignored by pressing . Calculations that rely on these temperatures will not display.

The instrument shows wrong or inaccurately CO₂ values

Possible reasons could be:

- O₂ is defective

(CO₂ values are calculated from O₂ value)

- Pump is not working correctly
- Air leakage in the gas path
- Peltier cooler is clogged

Can I change the printout?

Yes, go to Adjustments -> Internal -> Printout

18. Frequently Asked Questions (continued)

J2KN-Pro cannot be switched on	<ul style="list-style-type: none">- Check the main power cable- Check the fuse (located inside the power socket)- Recharge the batteries for a minimum of 8 hours (Battery could be completely discharged)
J2KN-Pro does not print	Check whether the printer paper is correctly inserted. Make sure that the printer is clean (no chads in the drive). Check if printer ribbon is locked into place. Replace if necessary.
Pump flow seems too low	Check all hose connections for tearing/cracking and check Peltier cooler for blockage
The water is not pumping out of the water trap bowl	Check the white peristaltic tubing
When trying to connect using DAS software, the analyzer is not connecting to my PC.	Check these 3 items: 1-Adjustments -> Internal -> RF Connect... Make sure it is in Remote setting 2-Adjustments -> Internal -> Bluetooth... Make sure Baud rate=9600 and Protocol=Enhanced 3-Adjustments -> Internal -> USB... Make sure Baud rate=38400 and Protocol=Enhanced
No flow is getting to the sensors	Check all connections and bypass the water trap to pinpoint if the lead is in the water trap
J2KN-Pro display is blank when I turn it on but the analyzer is clearly powered on	Display contrast may be set incorrectly – press F2 many times after you turn on the remote unit to see if screen comes back
My data logger is not working correctly with memory card	Verify that you have a memory card storage of between 32MB and 2GB

Hint: If you have several J2KN-Pro analyzers, you can find the source of an error by exchanging the accessories (probe, hose, temperature sensor, etc.)

If you have any further questions, do not hesitate to contact the ECOM America Service Department at 770-532-3280

19. Technical Data

Parameter	Range	Principle
O ₂	0 ... 21.0 vol-%	Electrochemistry
CO	0 ... 4000 ppm	Electrochemistry
CO% (Option)	4000 ... 63000 ppm	Electrochemistry
NO	0 ... 5000 ppm	Electrochemistry
NO ₂	0 ... 1000 ppm	Electrochemistry
SO ₂ (Option)	0 ... 5000 ppm	Electrochemistry
C _x H _y (Option)	0 ... 4.00 vol-% (CH ₄)	Catalytic
C _x H _y (Option)	0 ... 2000 ppm (C ₃ H ₈)	Infrared
C _x H _y (Option)	0 ... 30000 ppm (CH ₄)	Infrared
CO% (Option)	0 ... 63000 ppm	Infrared
CO ₂ (Option)	0 ... 20.0 vol-%	Infrared
Air pressure	300 ... 1100 hPa	DMS bridge
CO ₂	0 ... CO ₂ max	Calculation
T-Gas	0 ... 1000 °C	NiCr/Ni
T-Air	0 ... 99 °C	Semi-conductor
Differential pressure	0 ... +/- 100 hPa	DMS bridge
Efficiency	0 ... 120 %	Calculation
Losses	0 ... 99.9 %	Calculation
Excess air	1 ... ∞	Calculation

CO sensor purges thru separate fresh air pump

Electronic water trap monitoring with Peltier cooler

Power Supply	Main Power 110V...60 Hz / 220V...50 Hz
Base Unit Battery	6V/7.0 AH Lead Acid
Remote Unit Batteries	AA Nickel Metal Hydride (set of 3)
Pump	Flow rate of 2.0+ lpm
On-board Printer	Thermal printer / 58mm paper width
Display Screen	LCD Display with Backlight
Dimensions (LxWxH)	(Pro Easy) 17.5 x 9.75 x 12 inches (Pro IN) 20 x 9.75 x 12 inches
Weight	(Pro Easy) 28 lbs with sampling system (Pro IN) 29 lbs with sampling system

Subject to technical changes

V3.3 / 02.28.2011

20. Description of Data Fields using J2KN-Pro Data Logging onto Memory Card

File format: J2KDL-xx.csv (comma-separated-values)

Column	Description	Remark / Example
A	Date	DD.MM.YYYY
B	Time	HH:MM:SS
C	O2 in vol.%	0.0 – 21.0
D	CO in ppm	0 – 4000
E	NO in ppm	0 – 4000
F	NO2 in ppm	0 – 500
G	SO2 in ppm	0 – 5000
H	CO converted*	CO corrected to reference O2%
I	NO converted*	NO corrected to reference O2%
J	NO2 converted*	NO2 corrected to reference O2%
K	NOX converted*	NOx corrected to reference O2%
L	SO2 converted*	SO2 corrected to reference O2%
M	T. Gas in °C or °F	0 – max temp.
N	T. Air in °C or °F	0 – max temp.
O	Draft in hPa	0.00 – 20.00
P	CO2 in vol.%	0.0 – 25.0
Q	Efficiency in %	0.0 – 120.0
R	Losses in %	0.0 – 100.0
S	Excess air	> 1.00
T	Dew point in °C or °F	0 – max temp.
U	Poisoning index	> 0.0
V	O2 (gas channel check) in vol.%	0.0 – 21.0
W	CO (gas channel check) in ppm	Related to 0.0 vol.% O2
X	CO (gas channel check) in ppm	Measured value
Y	O2 (O2 check) in vol.%	0.0 – 21.0
Z	T. Boiler	0 - 999
AA	T. Sensor	0 - 99
AB	O2 reference %	0.0 – 21.0
AC	Unit	0=ppm 1=mg/m3 2=mg/kWh 3=mg/MJ
AD	Norm	N = corrected to reference O2%
AE	Fuel type number	Index acc. to instrument table
AF	Fuel type text	Text acc. to instrument table
AG	Soot 1	0.0 – 9.9
AH	Soot 1	0.0 – 9.9
AI	Soot 1	0.0 – 9.9
AJ	Oil trace	0=no 1=yes
AK	20 characters text	
AL	20 characters text	
AM	16 characters text	
AN	Serial number	
AO	CO (O2 check) in ppm	
AP	Zug (O2 check) in hPa	
AQ	CxHy	
AR	Number copy data	
AS	T1 (Δ T-measurement)	
AT	T2 (Δ T-measurement)	
AU	Velocity	m/s
AV-AW	Comma	Reserved
AX	Comment text	
AY	Comment text	
AZ	Comment text	
BA	Comment text	
BB	H2 in ppm	
BC	H2 converted*	H2 corrected to reference O2%
BD	Sensor # 6 in ppm	
BE	Sensor 6 converted *	Sensor 6 corrected to reference O2%
BF	dP (velocity) in Pa	0 – 1000.00
BG	Air pressure in hPa	300 – 1100
BI-BM	Mass emissions	lbs/hr, gr/bhp, tons/year
BQ	Internal flow in lpm	0.00-3.00

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

21. Calculations

Carbon Dioxide (CO₂) Range=0-CO₂max

$$\text{CO}_2 = \text{CO}_2 \text{ max} \times \frac{(21 - \text{O}_2 \text{ measured})}{21}$$

Combustion Efficiency (Eta) Range=0-99.9%

$$\text{Efficiency} = \text{Eta}_{\text{max}} - \left(\frac{\text{A1}}{\text{CO}_2} + \text{B} \right) \times (\text{T}_{\text{Gas}} - \text{T}_{\text{Air}})$$

Losses Range=0-99.9%

$$\text{Losses} = 100 - \text{Efficiency}$$

Excess Air (Lambda) Range=1-infinity

$$\text{Excess air} = \frac{21}{21 - \text{O}_2 \text{ measured}}$$

Note: A1, B, CO₂max & Eta_{max} are constants based on fuel type.

22. Software Help

If you need help with installation or operation of your Advanced DAS, Boiler Test Software, or VETS software, please consult the Operations Manual for your software product. If you still need assistance, please contact ECOM.

Tip: If you are having trouble communicating from the analyzer to a computer, please check these 3 items:

- 1- Adjustments -> Internal -> RF Connect... Make sure it is in Remote setting
- 2- Adjustments -> Internal -> Bluetooth... Make sure Baud rate=9600 and Protocol=Enhanced
- 3- Adjustments -> Internal -> USB... Make sure Baud rate=38400 and Protocol=Enhanced



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