

AUTOMOTIVE EMISSION ANALYZER
QRO – 201/2
OPERATING MANUAL



QROTECH

Notes for User

To use this analyzer with safety and effectiveness,
please read this manual before usage.

This manual applies to the product model QRO-201/2.

1. This manual should be referred with regard to the product design and safety assurance of the configuration.
2. For the purpose of safety confirmity, this manual should be provided to the end user at the same time with the supply of the product.
3. Please use only in well-ventilated place.
4. This product should not be washed/polished by volatile or toxic chemical materials like thinner.
5. Please don't use the printer until the printing paper is prepared.

- The contents of this manual may be changed without notice for the purpose of functional improvement.

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Contents

Notes for user	3
Contents	4
Chapter 1. Quality Guarantee Provision	
1-1 Guarantee provision	5
1-2 Guarantee claim procedure	5
Chapter 2. Safety Instruction	
2-1 Usage purpose	6
2-2 Usage condition	6
2-3 Caution and warning	6
Chapter 3. Introduction of QRO-201	
3-1 Specification	7
3-2/3 Front view and description	8
3-4 Rear view and description	9
3-5 Basic accessory and option	10
Chapter 4. Installation Method and Notes	
5-1 Installation	11
5-2 Notes	12
Chapter 5. Fault diagnosis and troubleshooting	13
Chapter 6. Measurement Mode	
6-1. Measurement	14
6-2. Key functions	15
6-3. Leak test	16
6-4. Standard gas calibration.....	17

Chapter 2. Safety Instructions

2-1. Purpose of usage

This analyzer is a equipment to measure the gas emission density of an automobile enabling to diagnose the automobile status and its preventive maintenance so that it can provide a function to prevent the air pollution in advance.

2-2. Usage condition

- (1) No emitted/polluted environment.
- (2) Less than 1000m in height and less than 85% in relative humidity.
- (3) No direct ray of sunlight, vibration and abrupt temperature change.
- (4) Well-ventilated place.
- (5) It should be setup at least 25cm from the ground surface.

2-3. Caution and warning

(1) General safety requirement

 Warning	This item includes some critical contents to prevent safety accident and product damage so that it needs to be read through and properly understood for correct usage.
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- ① This analyzer should be manipulated only by the trained personnel who well understood the usage.
- ② A spot check or periodical check should be executed in accordance with this manual prior to a measurement.
- ③ The probe should be installed in a place where not affected by a wind.
- ④ If there occurs a unusual case during operation, please stop the operation and contact us for its inspection and verification.

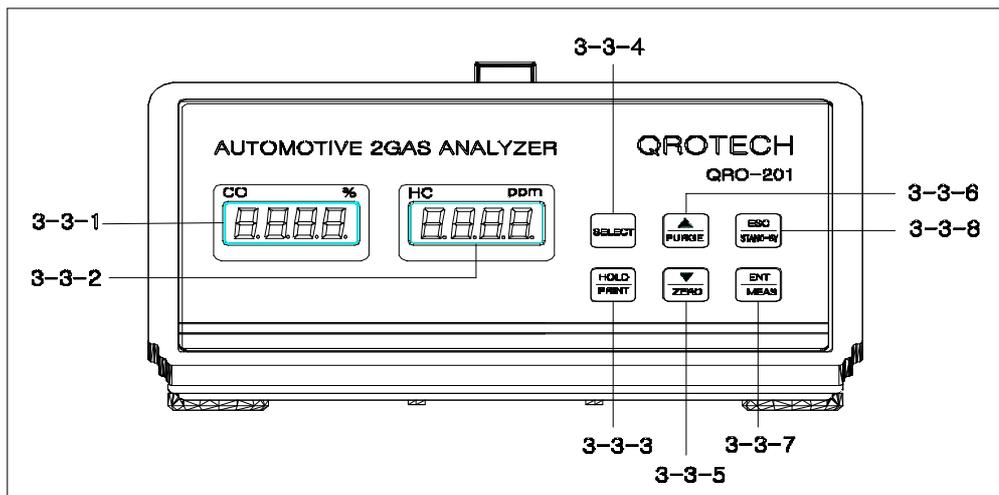
(2) Warning

- ① This analyzer is designed for the use of AC110V only or AC220V only. Please verify the power sources prior to the usage.
- ② The probe is so hot by emitted gas. Therefore, you need to pay high attention not to be burned during when you insert or remove.
- ③ During the analysis, please do not stay long in the place to which the gas is being emitted.
- ④ The emitted gas normally includes the CO, which may induce a fatal damage to a human body, so that it must be used only in well-ventilated place .

Chapter 3. Introduction of QRO-201

3-1 Specification

		QRO-201/2(2GAS)			
Measuring item	CO, HC				
Measuring method	CO, HC : NDIR Method				
Measuring range	CO	0.00 ~ 9.99%	HC	0 ~ 9999 ppm(201)	
Resolution		0.01%		0 ~ 15,000 ppm (202)	
Display		4 digit 7segment LED		1 ppm	
Repeatability	Less than $\pm 2\%$ FS				
Response time	Within 10 seconds (more than 90%)				
Warming up time	About 2 ~ 8 minutes				
Sample collecting quantity	4 ~ 6 L/min				
Power	AC110V only or AC220V only $\pm 10\%$, 50/60Hz				
Power consumption	About 50 W				
Operation temperature	0°C ~ 40°C				
Dimensions	285 (W) × 410 (D) × 155 (H) mm				
Weight	About 4.5 kg				
Basic accessories	Probe, Probe hose, Spare fuse, Leak test cap, Spare filter, Operation manual, Power cord,				
Options					



3-3-1 CO display window
This displays the CO density and program proceeding status.

3-3-2 HC display window
This displays the HC density and program proceeding status.

3-3-3

HOLD
PRINT

 KEY
(※ It's possible to be used in 4Gas Analyzer)

3-3-4

SELECT

 KEY
Used in choosing a supplementary function.

3-3-5

▼
ZERO

 KEY
Used in time of correcting the datum point or moving a figure or digit.

3-3-6

▲
PURGE

 KEY
Used in time of doing a purge or executing a value increase.

3-3-7

ENT
MEAS

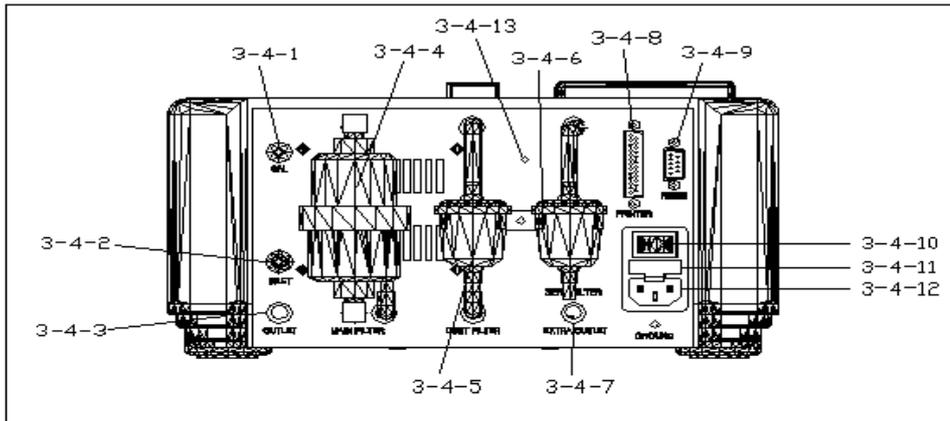
 KEY
Used in time of measuring or approving a supplementary function.

3-3-8

ESC
STAND-BY

 KEY
Used in time of returning to ready mode.

3-4 Rear view and description



3-4-1 CAL(Calibration)

This is a gas inflow gate used in time of standard gas adjustment.

3-4-2 INLET

This is a measuring inlet where one end of the probe mounted into this inlet in time of gas emission measurement.

3-4-3 OUTLET

This is an emitting outlet where the gas produced in the time of measuring the emitted gas (4GAS Analyzer) and water to correct the gas is outcome.

3-4-4 MAIN FILTER

This condenses the vapor contained in the automobile emitting gas so that it prevents other materials from incoming to inside the analyzer at the same time with the water and measuring gas.

3-4-5 DUST FILTER

This prevents fine dusts and materials from incoming inside the analyzer in the time of measuring.

3-4-6 ZERO FILTER

This is a activate charcoal filter to purify the analyzer cell in the time of correcting the zero point.

3-4-7 EXTRA OUTLET

This is a emitting outlet where the emitting gas and standard gas is outcome in the time of adding the NOx.

3-4-8 25 PIN PRINTER PORT (※ It' s possible to be used in 4Gas Analyzer)

This is a terminal to be directly connected with a normal PC printer.

3-4-9 RS232 PORT (※ It' s possible to be used in 4Gas Analyzer)

This is a communication terminal through which PC can operate the program.

3-4-10 POWER SWITCH

A power on/off terminal of this analyzer.

3-4-11 FUSE BOX

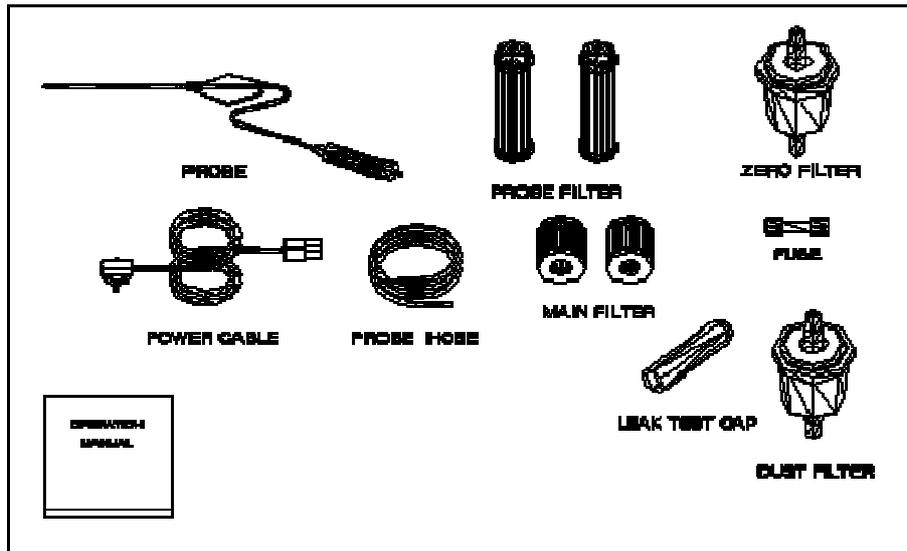
A fuse terminal which will prevent a damage from external voltage overflow.

3-4-12 POWER SOCKET

3-4-13 An assembling bolt for upper cover case and rear panel case.

3-5 Basic accessory and option

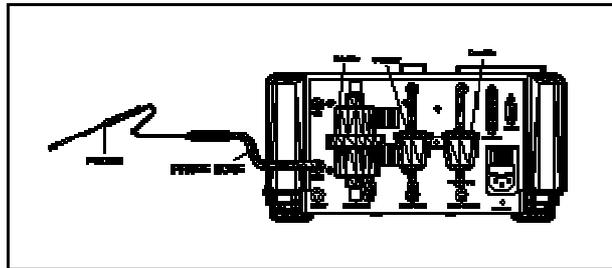
3-5-1 Basic accessory



Chapter 4. Installation Methods and Notes

4-1 Installation

4-1-1 Fit end of the probe hose into the measuring probe and the other end of the hose into the gas inlet in the rear of the analyzer. If the fitting condition is not good and the air comes into flow from outside, it may yield an incorrect measured value. Therefore, please carefully verify the fitting condition before use.

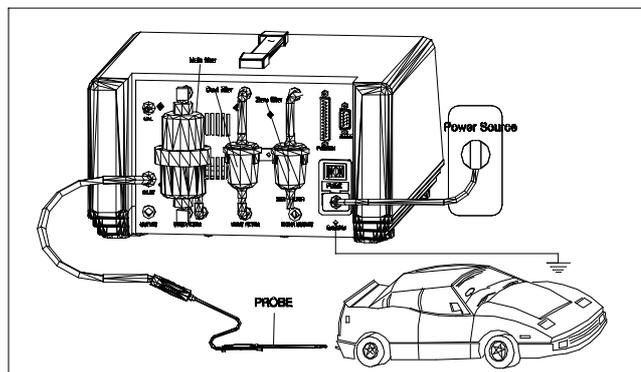


4-1-2 Turn off the power switch and then connect the power cable to the power socket located in the rear of the analyzer

4-1-3 Verify the fitting conditions of measuring probe filter and various filters located in the rear of the analyzer.

4-1-4 Verify again the connection status of the analyzer and then turn on the power switch.

<p>◆ Warning</p>	<p>This analyzer supports AC110V only or AC220V only. (Please confirm the power source to use.)</p>
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4-2 Notes

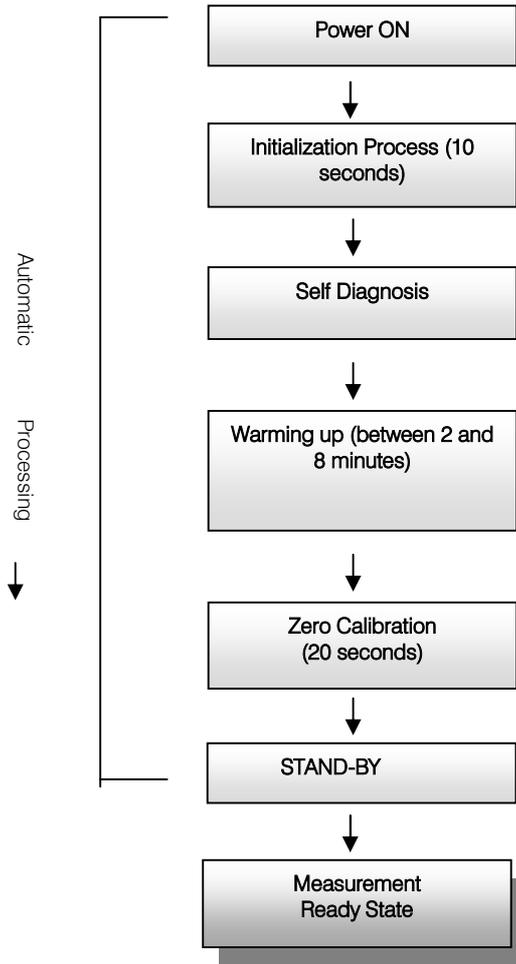
- ▶ This analyzer is operated with AC110V only or AC220V only. Please verify the power source before use. (Note that you can not change power source which is fixed upon supplying this analyzer.)
- ▶ The following factors should be considered to properly locate the analyzer body :
 - ▣ To be setup in a place of no direct light rays, humidity, vibration and abrupt temperature change.
 - ▣ To be setup in a indoor place where no emitted gas inflows.
 - ▣ To be setup in a height higher than 25cm from the ground.
- ▶ The analyzer should not be moved during the operation. It may cause an incorrectness in the measured value.
- ▶ The probe should be located in a place where not affected by the wind.
- ▶ The probe may be so hot during the operation so that it should be carefully handled not to be burned in insertion or removal.
- ▶ It needs to be noted that you should not stay in the gas emitting place during the operation.
- ▶ The analyzer should be used in a well-ventilated place only because the emitting gas contains the CO and it can cause a fatal damage to a human body.
- ▶ This analyzer is Type-approved in accordance with the related government laws so that it is extremely prohibited to disassemble, change, or rebuild the analyzer and also if you disassemble the NDIR Module, you may not be guaranteed for the repair.

*** Standard gas calibration's cycle : every about 6 ~ 12 months.**

Chapter 5. Fault diagnosis and troubleshooting

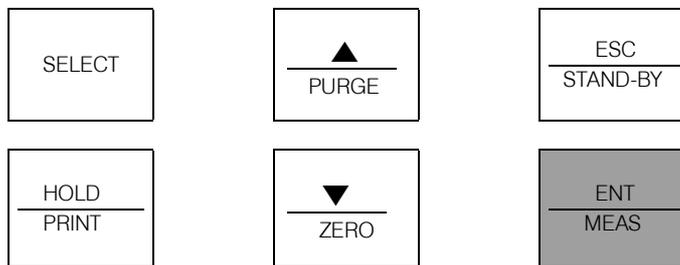
Fault	Verification	Troubleshooting
Unable to power switch ON	Is the power cord properly connected?	Connect the power cord.
	Is the fuse cut?	Replace the fuse and check the cause of power overflow.
Unable to measure (Measuring value stays in "0" and does not move)	Do you press the measurement key?	Press the measurement key in the rdy mode.
	Do you properly connect the probe to the analyzer?	Verify the connection status between the probe and hose (gas inlet).
	Is any of probe, hose or filter blocked? Please check the main filter housing's O ring.	Especially this could openly happen in the winter due to water-icing. Verify the probe filter, hoses, and filters.
Flow ERR (Flow error)	Is any of probe, hose or filter blocked? Please check the main filter housing's nipple is blocked.	Verify the probes, hoses, and filters.
Zero ERR (Zero Calibration error)	Is remaining gas in the analyzer?	Press the Purge key to clean the inside of QRO-201 with a clean air for about 2-3minute.
Leak Fail (Gas leakage fault)	Are the probe and hose properly connected?	Verify again the connection status of probes, hoses, and filters.
Screen stop (unable to press Key)	Has the analyzer seriously impacted?	Turn off the power and reboot.

Chapter 6. Measurement Mode



6-1. Measurement

- ① Place the probe in the clean air to perform the [Zero calibration].
- ② Push the probe deep into the exhaust outlet of the vehicle and measure exhaust gas by pressing measurement key.



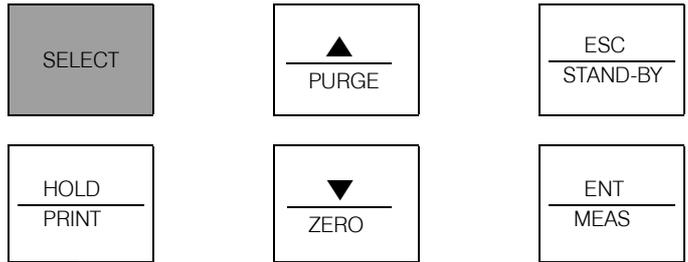
- ※ The measurement operates for 30 minutes and the pump is automatically stopped by the activation of the power-saving mode. Press **MEAS** key again to measure the exhaust gas for more than 30 minutes.
- ③ Pull the probe out of the exhaust outlet of the vehicle. Then clean the inside of QRO-201 with the clean air by pressing the **PURGE** key until the measurement values drop to 0.
- ④ If all the measurements fall close to 0, press **STAND-BY** key to maintain QRO-201 in a standby mode.
- ⑤ Press the **ZERO** key for a series of measurement. Then, repeat ②, ③, and ④.

6-2. Key functions

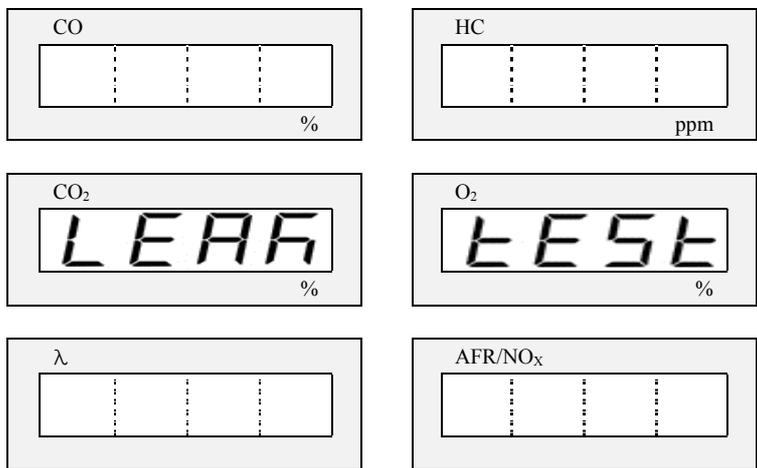
Key	Contents
SELECT	<p>Use the key to perform the leak test, the PEF value indication, the program version indication, and the standard gas calibration. Press the [Select] key and QRO-201 will operate as shown below.</p> <p>Leak Test ⇒ PEF value indication ⇒ Version Display ⇒ Standard Gas ⇒ Leak Test</p> <p>Press the [Select] key. QRO-201 will operate according to the contents</p> <p>▼ , ▲ , ESC , ENT printed on the upper side of each key.</p>
▼	Use this key to change the setup positions.
▲	Use this key to increase the setup values.
ESC	Use this key to end the selection mode and change into a measurement mode.
ENT	Use this key to select the present mode indicated, or to execute the number substituted.

6-3. Leak test

A function that looks for any possible air leakage from the sample-cell in order to indicate the exact result.

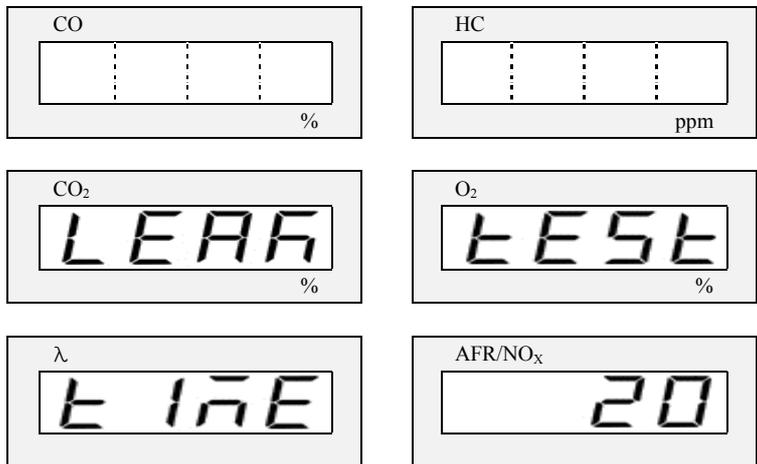


- ① Press the **SELECT** key once in the stand-by mode to select the Leak Test mode.



- ② If the message 'Leak test' is indicated on the indication window as shown above, mount the leak test cap on the front side of the probe.

- ③ Press **ENT** key. The pump operates and the count values decrease by 1 from 20 during the 20-second leak test.



- ④ If the test turns out normal without any leak after 20 seconds, a message is indicated as 'PASS'. If the leak is identified, the message is indicated as 'FAIL'.

6-4. Standard gas calibration

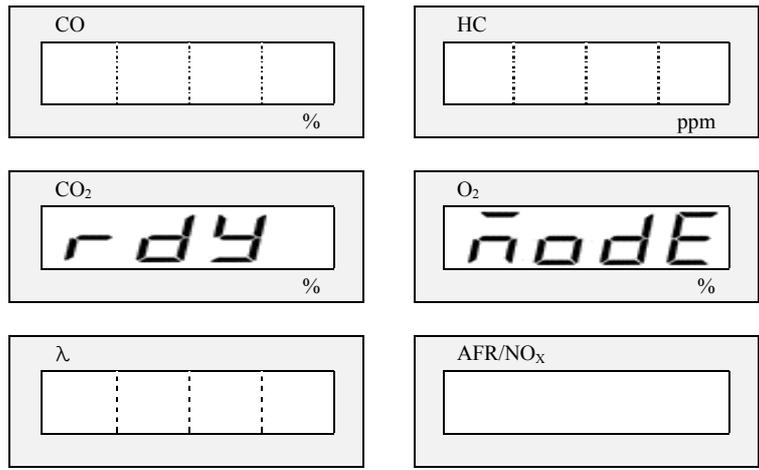
Precautions

- Read the manual and adjust the standard gas in the following order.
- Check if all the preparatory materials are ready.
- Check if the gas pressure is controlled to the requirements.
- This analyzer is designed to prevent QRO-201 from being wrongly controlled due to poor manipulation of unskilled person. However, since the standard gas calibration severely affects the accuracy of analyzer, the operator must fully understand the contents of this operation manual and observe the specified procedures.

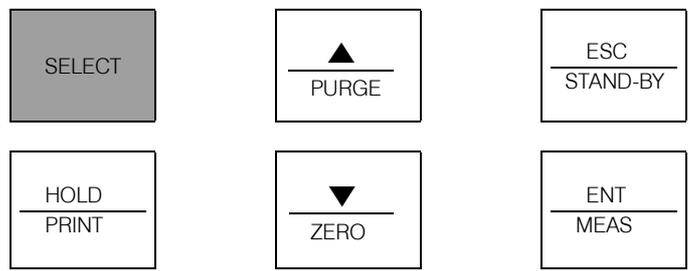
Note

- QRO-201 is converted into the standby mode unless you convert into other modes within 30 seconds during the standard gas calibration.
- If you decide that the standard gas calibration is in the wrong process, press [ESC] key to restart the process.

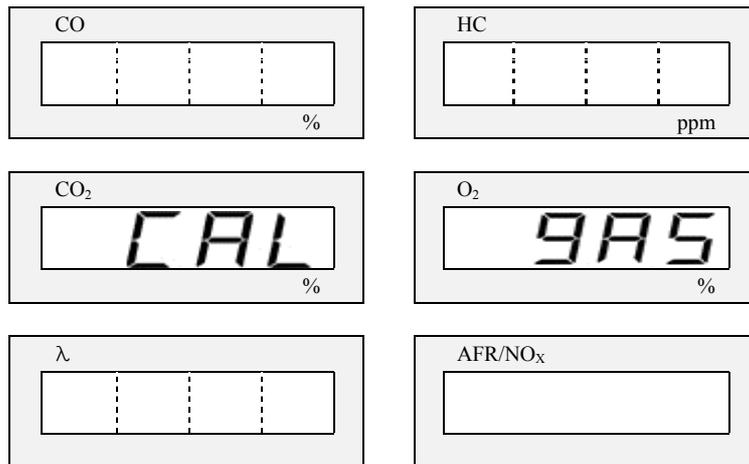
① Set this analyzer in [STAND-BY] mode.



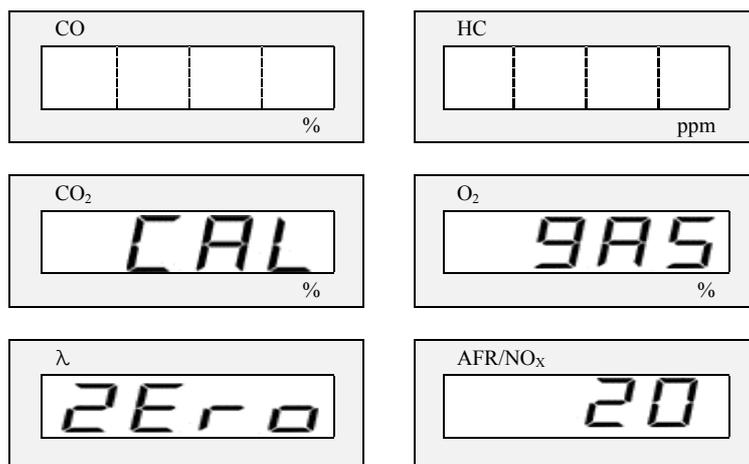
② Press **SELECT** key nine times.



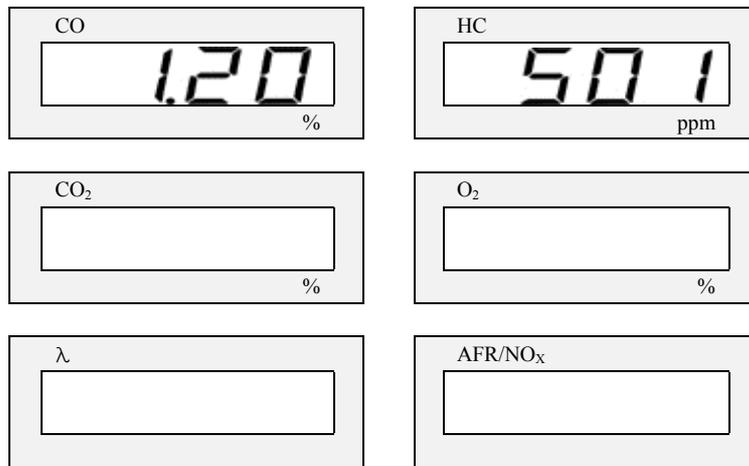
- ③ The following message is indicated. QRO-201 operates according to the , , , printed on the upper part of each key.



- ④ Press key in the above state. The [Zero calibration] starts automatically for once.

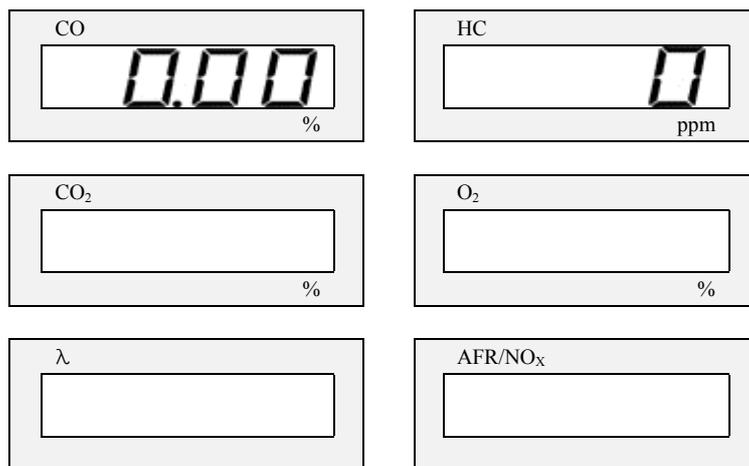


- ⑤ When the [Zero calibration] is completed, the values will be indicated on the indication window as shown and the value in the first digit will blink.

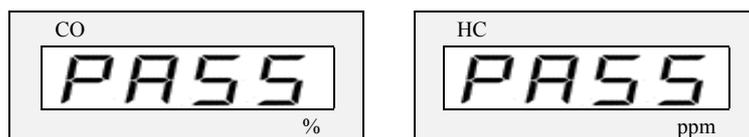


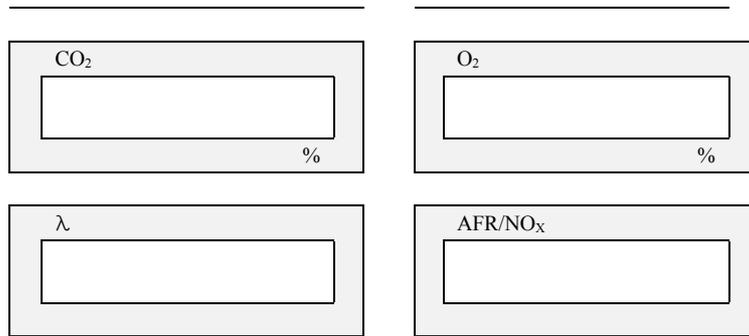
- ⑥ The  key makes the blinking number increased. After the setup of the required number, press  key to move the blinking part to the next field. Use ,  keys to setup to standard gas value of gas cylinder, then press  key. The each value of CO is entered the one displayed on the gas cylinder, but the HC value is entered the N-Hexane value. For example, HC value = the value is displayed on the gas cylinder (propane HC value) x PEF value.

If the HC value of the gas cylinder is 1002 ppm, multiply it by 0.5 of PEF value and the outcome value of 501 ppm is gas calibration.

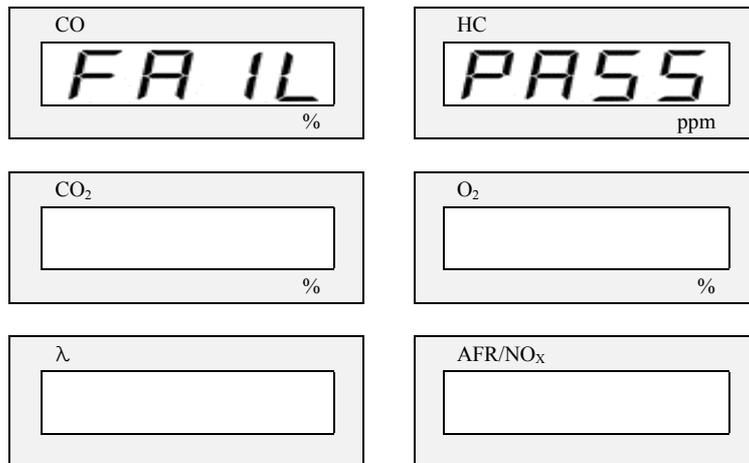


- ⑥ Open the valve of the standard gas cylinder to spill the standard gas in a constant pressure. If the measurement values are in a stable state, press both the  key and  key at the same time to start the gas calibration.





- ⑧ If the gas calibration is successfully completed, the message [PASS] will be indicated on each concerned window. If the gas calibration is successfully completed, the message [PASS] will be indicated on each concerned window. When key is pressed, the calibrated values indicate on each concerned window. When key is pressed one more time, this analyzer cleans the calibration line for about 120 seconds and performs the [Zero calibration] and returns to the standby mode.
- ⑨ If the gas calibration fails, the message [FAIL] is indicated on each concerned window. Press the key. QRO-201 will perform the [Zero calibration] and will return to the standby mode.



(It is succeeded in HC but failed in CO calibration.)

- * If the [FAIL] is displayed, return to the standby mode and press the key to clean the sample-cell with a clean air for two or three minutes. Then perform the gas calibration again.

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