



INSTRUCTION MANUAL

OZONE MONITOR MODEL EG-3000F

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Introduction

This time, we are pleased that you have purchased our ozone monitor, Model EG-3000F made by Ebara Jitsugyo Co., Ltd. This instruction manual is made out in order to install the system-in type ozone monitor correctly and to use the monitor sufficiently, so that the important message upon the application is described in this manual. Users are required to read this manual carefully before using the UV ozone monitor with related instruments and devices.




This ozone monitor is the advanced instrument which is designed by microprocessor based techniques, and it can automatically measure ozone concentration in air. And this monitor has two functions to make self-diagnosis on their operation and to supply output signals for processor control.

Since the setting and compensated information are stored in the non-volatile memory when shipping, it is not necessary to compensate it again by user side.

And then, regarding precautions in the matter of safety, refer to the following marks and their descriptions, and also see giving attention to "Dangerous Characteristics for Ozone Treatment", "Biological influences caused by ozone" and "Caution items when put the monitor (densitometer) in use".

Important Safety Message

The following safety messages and marks are the most important information for human bodies. Please ensure the safety of all users for our products by reviewing this information.

Mark	Description
 DANGER	DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING	WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION	CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



DANGER

Dangerous Characteristics for Ozone Treatment

- Ozone has powerful oxidation effect, and it is used for many kinds of substance by the reaction, such as Oxidation/Dissolution, Sterilization and etc, but it is also informed that Ozone has 'Toxicity' for human bodies.

Therefore, regarding using the ozone related equipment, give attention to exposure by ozone leakage from the surrounding parts.

The following table shows the effects, for Ozone concentration to human bodies.

Biological influences caused by ozone

Ozone concentration [ppm]	Influences
0.01 ~ 0.02	Sensible odor (with the sense of smell becoming gradually accustomed to the smell)
0.1	Strong odor stimulant to the nose and throat.
0.2 ~ 0.5	Eyesight weakens by 3 to 6 hour's exposure.
0.5	Apparently stimulant to the upper respiratory tract.
1 ~ 2	Exposure for 2 hours presents a headache, a pain in the chest, and thirsty at the upper respiratory tract and coughing. Repeatable exposures will lead to chronic toxicities.
5 ~ 10	Increase of pulses and pulmonary edema will be caused.
15 ~ 20	Small animals will die within 2 hours.
50	Life of man will be jeopardized in one hour.

'Report on Ozone Processing' by Japan Water Works Association, August 1984, P. 40

Threshold limit value:

Japan : 0.1 [ppm] (recommendation by Japan Association of Industrial Hygienists)(2006)

USA : 0.1 [ppm] TLV of TWA by ACGIH (1993 -- 1994) *

* TLV : Threshold limit value

TWA : Time Weighted Average Concentration

ACGIH : American Conference of Governmental Industrial Hygienists



DANGER

- Construction of this instrument is not one of flame proof type. If this monitor is used in the place where there is explosive gas, it may cause in trouble of explosion. Never use this monitor in such place.



WARNINGS

- If there is ozone smell, turn off the power source, and confirm whether the ozone monitor has an enclosure crack, piping damage and slackness on joints or not.
- A high voltage power supply (Steady state: about 200 V AC and Starting state: about 1000 V AC in a moment) for the low-pressure mercury lamp is built-in this monitor, so that you may have an electrical shock when perform adjustment and repairing inside of the monitor. Do perform it with a specialist.
- If you opened the front panel under when an electric power is supplied, you may have a chance which can receive UV ray from the low-pressure mercury lamp with burning light inside. Do wear glasses for protecting your eyes when you work on it.



CAUTIONS

Caution items when put the monitor (densitometer) in use

- Do not affect a shock and/or vibration to this monitor, this monitor is a precise equipment.
- Regarding the failure and/or accident broken out from the remodeling and wrong use, we can not have these obligations under the warranty.
- Sealing materials such as joint, piping and packing etc. which are used in the monitor, are not intended to be effective permanently. These materials are deteriorated by ozone gas and other materials and this may cause in ozone gas leakage. And the parts used in the monitor have a life. If they are used in over than their exchanging term, this may have a chance which will give a failure to other part. Make sure to have Perform the increased tightening of the joints and check and replace these materials regularly (every 1~2 years) by our service man.
- Never introduce into the monitor a sample of which pressure is higher than the limit. Otherwise, it would cause a leak or trouble. Don't forget to check the pressure specifications of the monitor and to perform periodical inspections.

- When confirmed ozone leakage or if smelling the ozone, please check the related equipments contained with the monitor at once.
- In case of removing the monitor from the device when maintenance and etc, confirm whether there is not residual ozone in the monitor (the indicating value of the ozone concentration is 0) and do work after when the electric power turned off. You may have an electrical shock.
- A high voltage power supply for the low-pressure mercury lamp is built in the UV ozone monitor. For functional adjustment or repair of some components, please call for specialist. UV rays emitted from the low-pressure mercury lamp may sometimes do harmful effect to eyes and skin. Do not take out a lighted low-pressure mercury lamp from the holder and also do not gaze at a lighted low-pressure mercury lamp when the circuit is alive.
- The low-pressure mercury lamp included Metal Mercury, so that it will harm human body. To scrap the used lamp needs to take the manner in accordance with your local regulation.
- If another material excepting ozone, such as hydrofluoric acid and etc, is contained in the sample gas, it may sometimes have corrosion, corruption, white spot on the inside of wetted parts. In this case, when the monitor has a failure trouble and also becomes to be unable to measure the concentration, we can not have a duty to pay the warranty.
- Be sure to take a caution when working with the monitor under power supplying or soon after when power turned off, because surface of the part in the inside (including parts installed on PCB) is in high temperature.

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1 General description

The ozone monitor, EG-3000F (hereafter referred as the monitor), is a densitometer with UV absorption method, which will measure Ozone concentration from absorption quantity of UV ray by ozone reaction.

This monitor can measure ozone concentration correctly by one-touch operation. And this monitor equipped with micro-computer which has a high performance, high reliability and maintainability, and also has expansibility taken up various functions. Moreover, as the non-volatile memory is installed inside of the monitor, it can store the newest measured data and an event detection data, and then the analysis in the accident can also be performed smoothly. And then, by its optional specification, this can be furnished with pressure compensation function for indicated value of the concentration, and USB and Ethernet interface can be equipped, so that you can construct a high degree control system.

2 Measuring principle

This product is an UV absorption type ozone monitor which detects and measures quantity of absorption of UV rays by ozone in the sample gas introduced into the detector. A low-pressure mercury lamp (emission wavelength 253.7 nm) is used for the light source. As the quantum of light absorbed by ozone existing within the optical path 'T' obeys the Lambert-Beer's Law, concentration of ozone can be measured as follows.

$$C = \frac{A}{\alpha T} \times \log \left[\frac{I_o}{I_x} \right]$$

where : **C** = Ozone concentration
 α = Specific absorption coefficient
 T = Path length of cell
I o = Light intensity through the sample free of Ozone
I x = Light intensity passed through sample Ozone
A = Constant

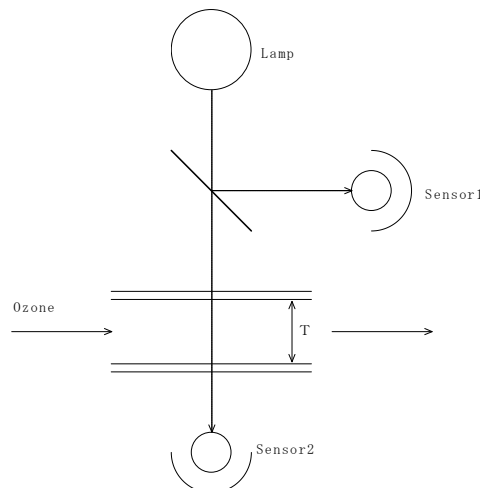


Figure- 1 Logic diagram

3 Specifications

Model & Product name	Model EG-3000F, Ozone Monitor
Measuring principle	UV absorption method
Service Note:	Ozone gas without sample pressure such as atmosphere measuring When changed the pressure of sample gas, it will affect to the indicated concentration value.
Measuring range Note:	0 to 1ppm (with temperature compensation function) If you use multi-ranges, please refer to the latter mentioned item of optional functions.
Function of Temperature compensation	Temperature compensation range 0 to 45°C corrected temperature..... 0 or 20°C (setting changeable) *Note: Generally, it is set to 20°C when shipped from the factory. And user can perform ON/OFF operation of compensation with using this function in Setting mode.
Sampling method	by the internal suction pump
Sample gas pressure	within ± 1.47 kPa (G)
Outlet gas pressure Note:	atmospheric pressure Please refer to Figure-33 Standard Flow diagram for ozone monitor, Model EG-3000F
Measurement interval Note:	Normal mode 15, 20, 30, 60 seconds Continuous mode measurement by every 1 second When in continuous mode, an interval of zero point correction should be set to 1 minute.
Flow rate of sample	1.5L/min
Linearity	within ± 0.005ppm
Zero drift Note:	within ± 0.005ppm/month When in continuous mode, an interval of zero point correction should be set to 1 minute.
Span drift	within ± 0.005ppm/month
Repeatability	0.005ppm or below
Indication Note:	digital display with 6 digits (max) as follows: 0.000 to 1.000 The maximum indication is shown in 6 figures, but the indicated value may not guarantee all of the figures. Accuracy etc. are as shown in the above mentioned specifications.
Analog output Note:	▪ Voltage output: 0 - 0.1, 0 - 1, 0 - 10V DC (non-insulation) Select one from the above ranges when you order. But you can change its setting after delivery. Allowable load resistance is more than 10 kΩ, and it is output from signal terminal block [VO1] on the rear panel. ▪ Current output: 4-20 mA, DC (insulated output) Note: Allowable load resistance is less than 750Ω, and it is output from signal terminal block [IO1] on the rear panel.

Control input	<p>Waiting input: When "EXC" is effectively set from the surface panel, the monitor will stop the measurement temporarily while this signal is being input.</p>
	<p>Note: This is a photo coupler LED input via signal terminal block [EXC].</p>
Control output	<p>No voltage is applied to the relay contact (form a or b) If it is not specified when shipping, it is set to a-form contact. The main operation mode is shown in Table 1.</p> <p>① Signal under measurement: This contact output becomes open when the monitor is under measurement.</p> <p>Note: output from signal terminal block, [MES] contact rating: 100V AC, 1A</p> <p>② Alarm 1: This contact output becomes open when measured value has exceeded from the setting value.</p> <p>Note: output from signal terminal block, [AL1] contact rating: 100V AC, 1A</p> <p>③ Alarm 2: This contact output becomes open when measured value has exceeded from the setting value.</p> <p>Note: output from signal terminal block, [AL2] contact rating: 100V AC, 1A</p> <p>④ Error signal: This contact output becomes open when the monitor has an error.</p> <p>Note: output from signal terminal block, [ERR] contact rating: 100V AC, 1A</p> <p>⑤ A contact working with the power switch: When a power source was supplied to the monitor, it will generate its output.</p> <p>Note: output from signal terminal block, [PWC] contact rating: 100V AC, 1A</p> <p>⑥ Synchronized signal for solenoid valve: This is a semiconductor relay contact output to switch ON/OFF in synchronizing with the operation of solenoid valve.</p> <p>Note: output from signal terminal block [OPT] contact rating: 100V AC, 0.1A and rush current of less than 1.5A/100msec)</p> <p>⑦ End signal for one measurement cycle: This is output as a pulse with band of 100msec after one measurement cycle.</p> <p>Note: output from signal terminal block, [EOM] as an open collector output. The voltage which can be connected is max. 35V DC.</p>

Table 1 Table of output signal operation mode for control

State of the monitor	AL1	AL2	MES	ERR	PWC
under power interruption					
under warming-up operation					●
under measurement			●		●
under measurement (more than the setting values of AL1)	●		●		●
under measurement (more than the setting values of AL2)		●	●		●
under measurement (more than the setting values of AL1&2)	●	●	●		●
Checking mode					●
Testing mode					●
Waiting mode					●
under indicating error				●	●

Communication interface	<p>Serial port: data transfer by RS232C</p> <p>Communication speed: Select from the following speed, 4.8 / 9.6 / 14.4 / 19.2 / 28.8 / 38.4 / 57.6 / 76.8 / 115.2 / 230.4 kbps</p> <p>When shipped from the factory, it is set to 19.2 kbps.</p> <p>Communication method: full duplex</p>
Power supply	<p>100 - 220V AC \pm10%, 50/60 Hz</p> <p>D class grounding is necessary</p>
*Note:	<p>The specifications of power supply of the main body are shown above, but the cable as a standard accessory is 100V AC for domestic use. Please consult us regarding the use except the area of 100V AC.</p>
Power consumption	45 VA
Outside dimension	<p>482 W \times 345 D \times 132.5 H (mm)</p> <p>The protruding portions are not included.</p> <p>Refer to Figure-32: Outline drawing.</p>
Panel cut-out	EIA standard 3U (As for the rack mount metal fittings, a disassembly is possible.)
Mass	Approx. 12 kg
Connecting mouth of piping	OD 6 mm \times ID 4 mm PFA (PTFE) tube connecting fitting (30 series made by FLOWELL)
Environment	<p>Temperature: 0-45°C (recommended temperature: 5-40°C)</p> <p>If the temperature rises higher, the life of parts will become short. We recommend that the monitor is used within the above recommended range.</p> <p>Relative humidity: 10~85 % (no condensation)</p>

Standard function	<p>(1) Self test mode: Abnormality condition inside of the monitor is monitored and displayed by the self-diagnosis function.</p> <p>(2) Self-adjustment of the light intensity for the low-pressure mercury lamp (AGC): The light intensity of the low-pressure mercury lamp will be optimized by this function.</p> <p>(3) Detection and control for the abnormal emission of light of the low-pressure mercury lamp: This is used to detect abnormal emission of the low-pressure mercury lamp and avoid this control system failure under the continuous operation by holding the normal data which was measured just before. Furthermore, when had its failure, the function will control this lamp so as to make the abnormal emission to normal condition.</p> <p>(4) Background calibration (BGCAL): When some background components exist in a sample gas, the value can be compensated as offset by pushing ENTER button at least 3 seconds during measurement.</p> <p>(5) Adding the offset: The voluntary offset value can be added to the measuring data. This function can be done besides the background correction.</p> <p>(6) Logging function: This is used to record the measured data for a few days inside memory of the main body (about 3 days measurement at interval of 10 seconds), but for its reading out, needs to use the exclusive software. These data is always overwritten, and only its latest one can be stored. By analyzing this data always when the monitor became abnormal condition, this can early make the measuring line to be restored.</p> <p>(7) Sub-display: This is used to display the current time, unit and error item etc. When setting operation, various setting items can be set by confirming its indication, so the efficiency of tasks will be improved and also avoided the setting failure.</p> <p>(8) Temperature compensation: compensation range: 0 to 45°C compensation temperature: 0°C or 20°C (setting changeable) Generally when shipping from the factory, this is set to 20°C. Moreover, in setting mode, you can perform ON/OFF setting of this function.</p> <p>(9) Built-in lamp heater: A low-pressure mercury lamp may sometimes become unstable in the UV rays emission when it is in low temperature. To avoid unstable condition, this series has a built-in heater, and ON/OFF operation of this heater is possible. Generally, the Heater is set to ON when shipped from the factory.</p>
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<p>Optional function</p>	<p>The following functions are optional, and these are not added in standard specification.</p> <p>(1) Pressure compensation: compensation range : 800 to 1300hPa (ABS) compensation pressure: 1013 hPa (ABS) (Atmospheric pressure)</p> <p>You can perform ON/OFF setting of the compensation in Setting mode.</p> <p>(2) Output of hour average value: Integrated output per one hour of analog voltage or current</p> <ul style="list-style-type: none"> • Voltage output: When ordering, select one from the following voltage ranges, 0-0.1V DC, 0-1V DC or 0-10 V DC (non isolation). But you can change its setting after delivery. Allowable load resistance is more than 10kΩ, and it is output from the signal terminal block [VO2] on the rear panel. • Current output: 4 - 20 mA, DC (isolated output) Allowable load resistance is less than 750Ω, and it is output from the signal terminal block [IO2] on the rear panel. • Pulse output: The pulse output of 1 hour average value (cumulative value) is output as a pulse width of 50 [msec.] from signal terminal [PLS] on the rear panel. The weight of pulse is 1/1000 of full scale. The fraction that doesn't reach this weight will be added next time. • Reset input: This is LED input of photo-coupler from signal terminal RES on the rear panel. When it is set to external reset mode, hour average value will be reset synchronizing with this signal. <p>(3) Corresponding to the multi-range: This series allows you to set multiple analog full scale ranges. When shipping, it has been calibrated by each range. When using the monitor, you can set to the most suitable range and measure ozone concentration. Maximum 3 range can be set.</p> <p>Model EG-3000F is possible to set additional 2 ranges among the following measuring ranges: 0 - 5, 0 - 10, 0 - 20, 0 - 50 ppm</p> <p>Note 1 In case of corresponding to the multi-range, the indications are as follows. 0.000 - 5.000, 0.00 - 10.00, 0.00 - 20.00, 0.00 - 50.00</p> <p>Note 2 In case of corresponding to the multi-range, each accuracy are as follows. Linearity: within $\pm 0.5\%$ FS Zero drift: within $\pm 0.5\%$ FS/month Span drift: within $\pm 0.5\%$ FS/month Repeatability: 0.5 % FS or below</p>
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<p>Note 3</p>	<p>For multi range specification, it is necessary to change the flow-line according to its concentration. Perform piping referring Figure-34: Multi-range Flow diagram for ozone monitor, Model EG-3000F</p> <p>(4) Communication interface (optional): The following functions can be added by equipping an optional network/USB function on this monitor. (When adding this board, RS232C connector on the rear panel is not equipped.)</p> <p>①USB memory Interface:</p> <ul style="list-style-type: none"> • When inserted USB memory to the USB port, concentration history and event history saved in this monitor inside will convert into a CSV format and store it automatically in USB memory. • The measured concentration data can be store additionally in USB memory into a CSV format. <p>② Network (Ethernet): This is an interface according to 10Base-T or 100Base-Tx and able to control the monitor by operating the outside computer. This has the following functions.</p> <ul style="list-style-type: none"> • UDP communication function: The measured parameter of the monitor can be set and display (monitor) from other remote PC or your controller via Ethernet port. As same as RS232C communication port, the latest concentration value can be obtained and set. • HTTP server function: An optional board works as function of HTTP (Web) server. The measured parameter of the monitor can be set by using web browser such as Internet Explorer via Ethernet. • FTP server function: An optional board works as function of FTP server. Via Ethernet, you can log in using FTP client software from other remote PC, and obtain the file of the concentration history and event history stored inside of the monitor which was converted into a CSV format.
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Standard accessories	<ul style="list-style-type: none"> • Fuse with rating of 250V AC, 1.25A (rush current type approved by UL standard) 2pcs • Teflon filter holder: NF000A 1 pc • Filter element (1 μ m) NF009A 10 sheets
Note	<p>This Filter element is included if you select Filter holder (NF000A).</p> <ul style="list-style-type: none"> • Filter unit: BZ175A 1 pc
Note	<p>You can select either NF000A or BZ175A. Normally, we recommend using NF000A. When maintenance cannot be performed for a long term, select BZ175A.</p> <ul style="list-style-type: none"> • PFA tube (OD 6mm, ID 4mm): NK030A 5 m • Power cable for the monitor 100V AC for domestic use(1.5m): EK110A 1 pc
Note	<p>Please contact us when using in the outside area of 100V AC.</p> <p>When measuring atmosphere as zero gas with multi-range specification, we provide the following three kinds of accessories.</p> <ul style="list-style-type: none"> • switching valve: NV011B 1 pc (delivered with Teflon connector (3 pcs) equipped) • Teflon connector (T type connector for OD 6mm piping): NJ023A 1 pc • Filter for zero gas (transparent): NF008A 1 pc
Note	<p>This filter is necessary when measuring 1 ppm or more of full-scale, using an atmosphere as zero gas.</p>

4 Each name of the position and object to use

4.1 Front panel

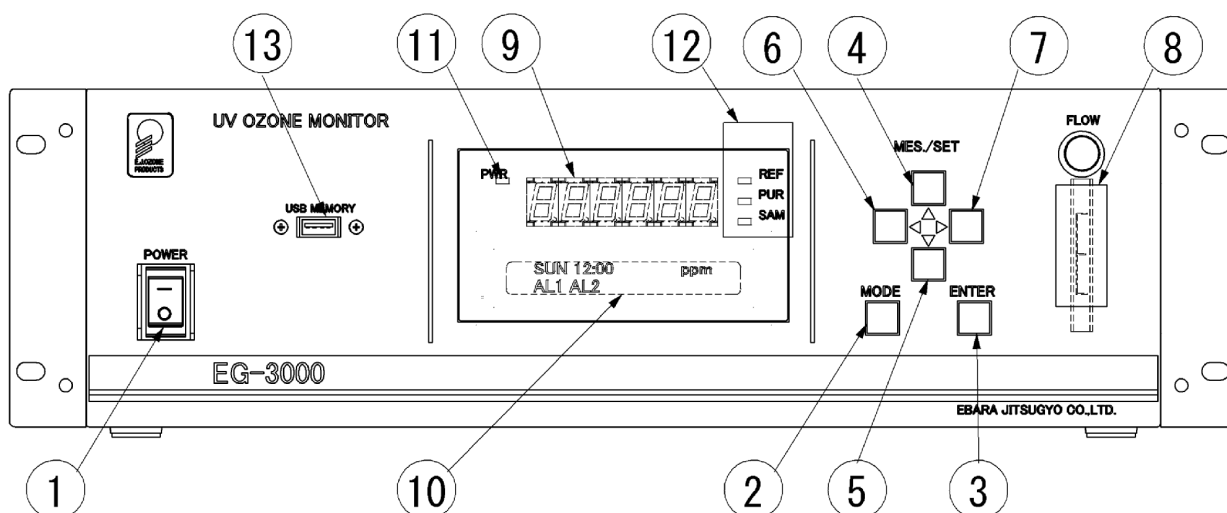


Figure- 2 Front panel

① Power source switch (POWER):

When this switch is pushed, the power will turn on and then the power lamp and the low-pressure mercury lamp (light source) will light. Further, the micro-computer starts the operation, and the indication of the ozone monitor starts the countdown from [UP20.00], and it is automatically entered in warming-up operation.

The warning-up time is for 20 minutes. To indicate that the monitor is under the warming-up operation, the character of [Warming-up] will be indicated in the second line of the sub-indication.

② Mode button (MODE):

This button is used for changing the mode as follows.

- enables to cancel the warming-up operation by pushing this button at least 3 seconds during the warming-up operation, and then shift to the Measuring mode.
- enables to shift to the Middle mode by pushing this button at least 3 seconds in the Measuring mode.
- enables to shift from the lower layer to upper layer.

③ Enter button (ENTER):

This button is used for changing the value of each parameter which was preset in the Setting mode. During the ozone concentration measurement, if some background component exists in atmosphere, pushing this button for at least 3 seconds enables to display the value which subtracted the background components.

***Note:** Do not push [ENTER] button during the measurement of ozone concentration.

When the background function is active, the character of [B] is displayed on the sub-indication.

④ Up button (UP):

This button is used for changing the item in each mode.

- When in the Checking , Setting and Testing mode, this shifts to the previous item.
- In the Setting and Testing mode, this is used for changing the value.
- In case of optional multi-range specification, you can switch its range by pushing this button at least 3 seconds during a measurement.

⑤ Down button (DOWN):

This button is used for changing the items in each mode.

- enables you to shift to the Checking mode during the Middle mode.
- enables you to shift to the Common parameter setting (CPS) during the Setting mode.
- As for the optional Multi-range specification, this enables you to shift to the Range 2 (R2) setting in the Range parameter setting (RPS).
- enables you to shift to the next item in the Checking, Setting and Testing mode.
- is used for changing the value in the Setting and Testing mode.
- By pushing this button at least 3 seconds in the Measuring mode, key is locked and other button's input is ignored.

⑥ Left shift button (LEFT):

- enables you to shift to the Setting mode in the Middle mode.
- enables you to shift to the Range parameter setting (RPS) in the Setting mode.
- enables you to shift to the Range 1 (R1) in the Range parameter setting.
- is used for shifting the figures to the left in the Setting mode.
- By pushing the RIGHT button simultaneously in the Measuring mode, the sequence of the concentration measurement will be reset, and then restart the sequence from the data sampling when zero gas sucked.

⑦ Right shift button (RIGHT):

- enables you to shift to the Testing mode in the Middle mode.
- enables you to shift to the Lamp parameter setting (LPS) in the Setting mode.
- As for the optional 3-ranges specification, it enables you to shift to the Range 3 (R3) setting in the Range parameter setting (RPS).
- is used for shifting the figures to the right in the Setting mode.
- By pushing the LEFT button simultaneously in the Measuring mode, the sequence of the concentration measurement will be reset, and then restart the sequence from the data sampling when zero gas sucked.

⑧ Flowmeter (FLOW):

This is used to adjust and indicate the flow-rate of sample gas.
Normally, adjust it to 1.5L/min.

⑨ Main-indication:

This shows the numbers with 6 figures. This indicates ozone concentration in the Measurement mode, but also indicates the various conditions of the monitor as follows.

- under warming-up operation count down from [UP20.00]
- under measurement ozone concentration value
- Checking mode Values of each checking item are indicated one by one.
- Testing mode The testing items are indicated one by one.
- Error This indicates error code.
- Setting mode The setting values are indicated one by one.

⑩ Sub-indication:

It is two lines of indication in 20 characters. Under measurement, this indicates the current time, measuring unit, temperature/pressure values (optional) etc.

When showing an error, the content of the error is displayed. Moreover, the detailed contents are displayed in Checking, Setting and Testing mode.

⑪ Power indication lamp (PWR):

When the power switch ① (POWER) was pushed, this lamp will light up.

⑫ Cycle indicator (REF, PUR, SAM):

This indicator displays each condition in the following measuring cycle. Moreover, if all cycle indicators (three) are lit in the Checking mode or Setting mode, it shows that the output is in the Holding mode.

- REF (REFERENCE) : under measuring the zero gas (reference gas)
- PUR (PURGE) : under replacing the gas
- SAM (SAMPLE) : under measuring the sample gas

***Note:** Regarding the indication and each button, refer to section 6 “Each operation mode and button operation.”

⑬ USB memory insertion inlet (Optional):

If optional Network/USB function is equipped, USB memory can be connected to it.

This is not equipped as standard equipment. Regarding the details of this option, refer to Optional board Instruction Manual of EG-3000 series.

4.2 Rear panel

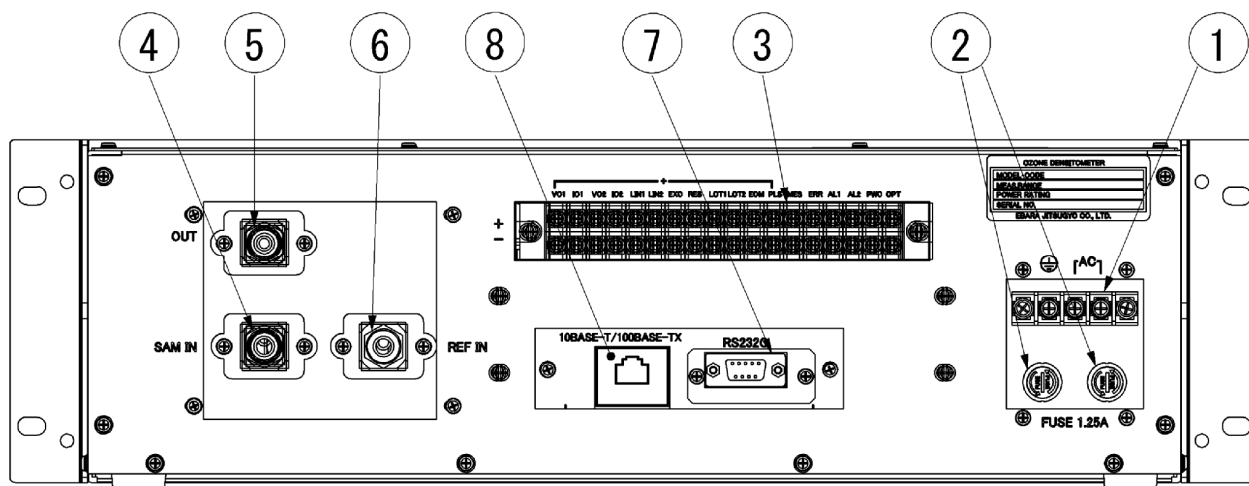


Figure- 3 Rear panel

***Note:** Regarding standard type (1ppm FS or below) of this model, it has no inlet for reference gas (REF IN) at above ⑥.

① Terminal block for power wiring (AC IN):

Connect these terminals to AC power source with the exclusive power cable. For safety, make sure to connect FG terminal to the ground.

② Fuse holder:

Two cylinder type fuses are equipped here. They have rating of 250 V AC, 1.25 A, having withstand rush current type approved by UL standard, and their sizes are the same as dia. 6.35×31.8 (mm). When replacing the fuse, replace 2 pieces at the same time.

③ Terminal block for signals (I/O):

Connection of each input/output signals are performed there. The each signal is as follows. When you connecting the wiring of each signal, make sure with polarity so that the plus (+) signal is located on upper row of the terminal block except the relay contact output.

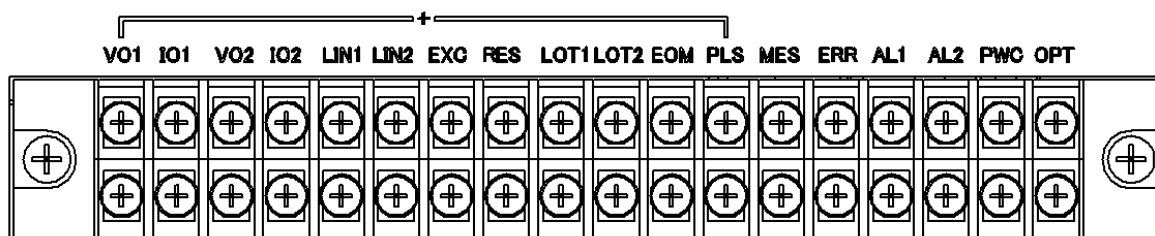


Figure- 4 Signal Terminal block

OPT : This is optional. Signal for changing the port of solenoid valve is supplied here. And then, this is one of 'a' type contact made from Semiconductor relay.

PWC : This is relay contacts worked by synchronizing with power switch of the monitor

- AL2** : Relay contacts signal for Alarm 2
When exceeded the setting value of concentration for Alarm 2, this becomes condition of a make contact or one of break.
- AL1** : Relay contacts signal for Alarm 1
When exceeded the setting value of concentration for Alarm 1, this becomes condition of a make contact or one of break.
- ERR** : This is a relay contact signal which is in condition of the make contact or one of break when the self-diagnosis function has found any obstacle in the monitor.
- MES** : Relay contact signal which is in condition of the make contact or one of break.
- PLS** : Integrated pulse output in case of adding the output of time average value which is optional and it is made from an open-collector of photo-coupler.
- EOM** : This is the signal for end of 1 measurement cycle and it is made from an open-collector of photo-coupler.
- LOT2** : Range ID signal in case of corresponding the multi-range which is optional and it is made from an open-collector of photo-coupler. This will supply output, when Range 3 is selected.
- LOT1** : Range ID signal in case of corresponding the multi-range which is optional and it is made from an open-collector of photo-coupler. This will supply output, when Range 2 is selected.

***Note:** If Range 1 is selected, both LOT1 and LOT2 do not output.

- RES** : This is used as an input resetting signal from outside for adding the output of hour average value which is optional and it is LED input.
- EXC** : Control signal in order to synchronize the monitor from outside. Then, when this signal is active, the monitor becomes measuring wait condition, and it is LED input.
- LIN2** : This is a signal used for changing the range corresponding to optional multi-range, and is LED input. It is effective only when set to Range 1 in the Setting mode. It changes to the measuring Range 3 when this signal applies.
The measurement returns to Range 1 again when the signal does not apply.
This monitor becomes a reset state immediately after the range changes, and the display and the analog output become 0. Then the port of the solenoid valve will be switched and it will starts from the zero calibrations.
- LIN1** : This is a signal used for changing the range corresponding to optional multi-range, and is LED input. It is effective only when set to Range 1 in the Setting mode. It changes to the measuring Range 2 when this signal applies.
The measurement returns to Range 1 again when the signal does not apply.
This monitor becomes a reset state immediately after the range changes, and the display and the analog output become 0. Then the port of the solenoid valve will be switched and it will starts from the zero calibration.
- IO2** : Analog current (4-20 mA) output when adding output of hour average value which is optional.
- VO2** : Analog voltage output when adding output of hour average value which is optional.

IO1 : This is analog current (4-20 mA) output.

VO1 : This is analog voltage output.

***Note: Regarding one of optional order among signals of each input and output, they have not the function when you have not specified. In addition, other signals can not be connected to their terminals as one of spare. For detail of each signal, refer to the following Figure-5.**

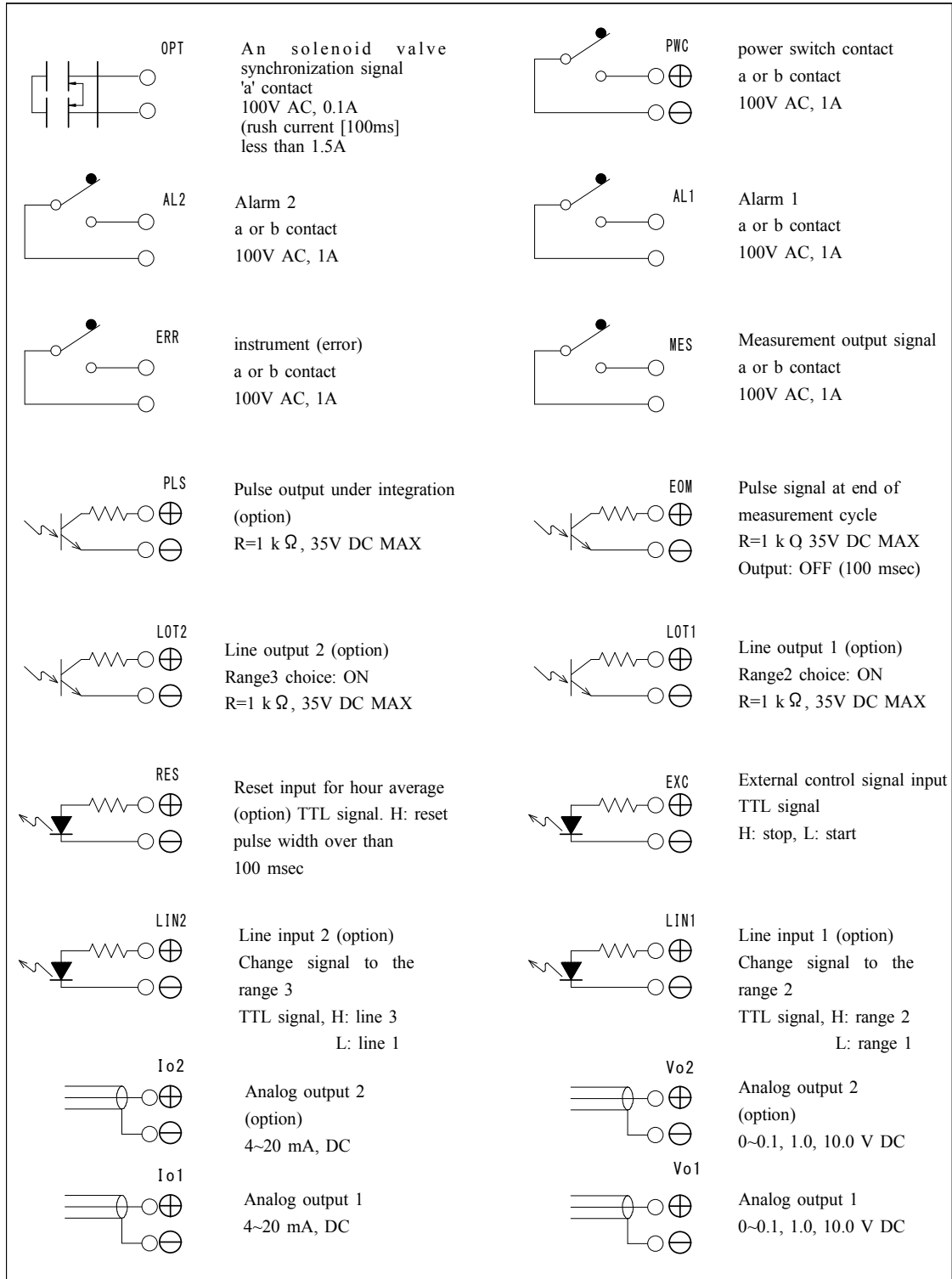


Figure- 5 Connection diagram for I/O terminal block

***Note: If you do not specify, each relay contact output for PWC, AL2, AL1, ERR and MES are formed as 'a' type contact when shipping from the factory.**

④ Inlet for sample gas (SAM):

This is a suction port for measuring the sample gas, and the PFA or PTFE tube is connected and use for introducing the sample gas.

⑤ Outlet for exhaust gas (OUT):

This is an exhaust port of sample gas/ reference gas which had used in a measurement.

Connect PFA or PTFE tube here.

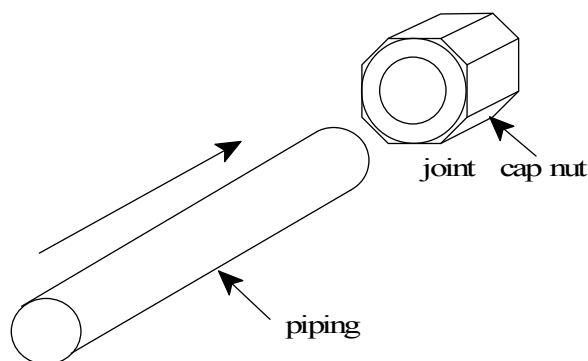


Figure- 6 Piping and joint

⑥ Inlet for standard/zero gas (REF):

This is a suction port for standard gas required to measure. The standard gas is introduced here by connecting PFA or PTFE tube. This model (regarding 1ppm or more of full-scale) is necessary to introduce a reference gas.

***Note1:** Regarding the piping to be connected to these ports, use PFA or PTFE tube with the size of OD 6 mm / ID 4 mm or 1/4 inch.

***Note2:** The standard accessory of this monitor is a PFA tube with OD 6 mm and ID 4 mm.

***Note3:** For piping connections, refer to section 5.5 "pipings".

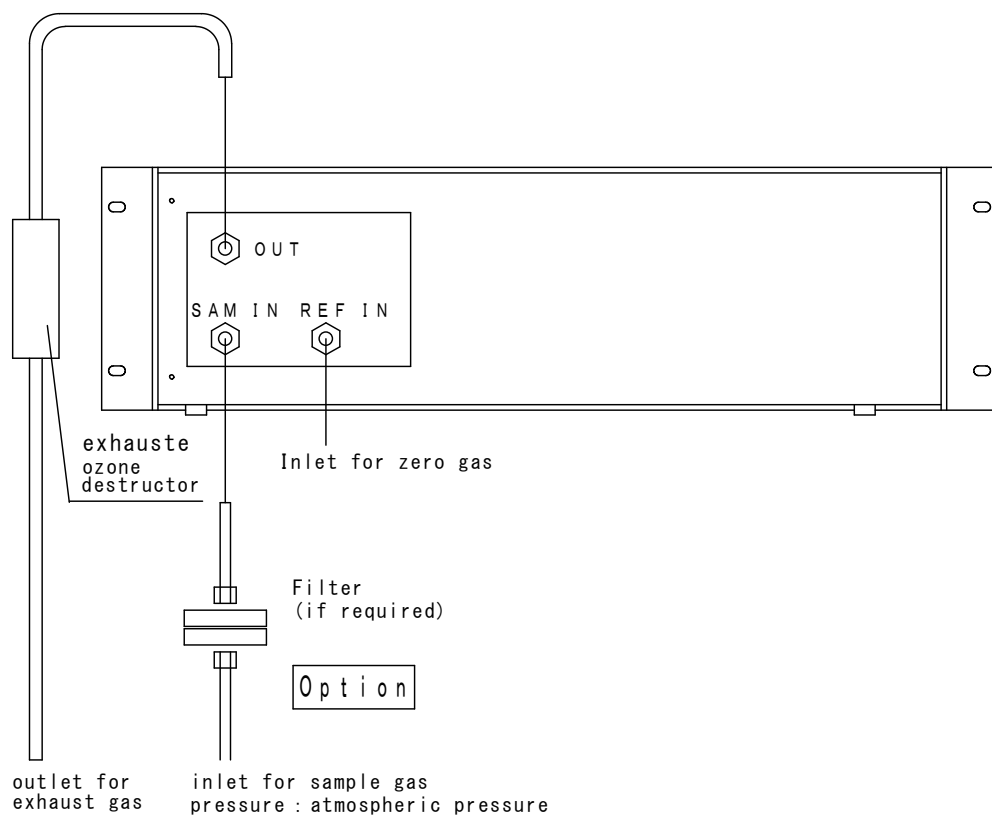


Figure- 7 Piping connection

***Note:** Regarding of standard type (1ppm FS or below) of this model, it have no inlet for zero gas above.

⑦ Serial port:

This is used for RS232C communication, and the female connector has 9 pin D-Sub for general purpose. When using the communication function, connect this port to a host computer with a straight cable of general purpose. But this port cannot be used if a communication option board (network / USB) was added.

⑧ Connector for network use (option):

This is a RJ45 connector for Ethernet. You can control the monitor with an outside computer via interface by 10Base-T or 100Base-Tx. With regard to the further details of this function, refer to Instruction Manuals of optional board for EG-3000 series. It is not included as a standard specification.

5 Before using the Monitor

5.1 Inspections

Though this monitor is checked completely when shipping, make sure to confirm the following matters before using the monitor.

(1) Damages and failures during transporting:

After connecting the power cable, supply the power source, and then the main-indication starts to count down from [UP20.00]. Please confirm whether the display of "warming up" appears in the second line of the sub-indication.

It is not necessary to connect a pipe in particular here. If the above-indication is not displayed, there is a possibility with some accidents. Please contact us.

(2) Checking of Accessories:

Check this with referring to section 3 "Specifications-standard accessories". Please contact us when there is any damage or shortage.

5.2 Requirements of installation

In order to protect the monitor from any damage and to ensure stable operation, installation at places as shown below should be avoided.

- (1) Dusty place or any place where such corrosive gas as hydrogen sulfide gas, sulfurous gas or halogen gas is floating in the atmosphere.**
- (2) The place of high temperature, high humidity such as the vapor close to saturation, and/or close to the faucet.**
- (3) The place with characteristic of strong vibrations or intermittent vibrations.**
- (4) The places under direct sunshine.**
- (5) The place close to the source of generation of a strong electromagnetic field, electric field or a high frequency.**
- (6) Process plant where explosive gas may be generated in the environment.**
- (7) The place lacking a sufficient space for maintenance and/or inspection of the monitor.**



DANGER

- Construction of this instrument is not one of flame proof type. If this monitor is used in the place where there is explosive gas, it may cause in trouble of explosion. Never use this monitor in such place.

***Note:** This device is a precision instrument. Please give neither impact nor the vibration.

5.3 How to install the monitor

- (1) Install the monitor on a strong and stable place where can be withstood for load with over 12 kgf.
- (2) Maintenance space is required for removing the cover as it is able to maintain the monitor easily.

5.4 Wiring connections

- (1) Connect a wire between earth terminal and ground in order to get safety condition of the monitor.
- (2) Use surely the power source recommended to instrumentation. If an inductive load and/or a large capacities load are connect to the line, it can sometimes cause a surge problem for disturbing the measurement.
- (3) Regarding wiring of analog signals, use the shielded cable to avoid the noise effect.

5.5 Pipings

- (1) When connecting the piping between inlet of sample gas and the inlet of the monitor should desirably be as short as possible within a necessary length and with minimum bending.
- (2) If the sample gas has high humidity, an electric humidifier should be equipped.
- (3) Consider to avoid containing moisture and dust etc in a sample gas.
- (4) The ozone gas after measurement should be open to atmosphere using off-gas treatment device at the outlet piping of the monitor.
- (5) When generated ozone gas and reference gas are clean enough, filter is not necessary. Still more, when dust, mist and etc. exist, use the supplied filter referring "Figure-7 Piping connection".

5.6 Required conditions for sample gas

Sample gas:

- ① Flow rate1.5 L/min
- ② Sample gas pressure.....within ± 1.47 kPa (G)
- ③ Pressure of outlet of the monitoratmosphere(pressure release)

***Note 1:** The concentration value measured by the UV ozone monitor, which method is UV absorption, is affected by the temperature and pressure of the sample gas. If the sampling-gas pressure is in low level as EG-3000F, and it should be sucked by pump, the indicating value of monitor may be affected by the sampling-gas pressure and/or pressure loss due to its distance for sampling. The indication value for concentration will be automatically compensated, if the optional pressure sensor is equipped. Regarding the formula of pressure compensation, refer to section 7.6 "Optional functions"

***Note 2:** Treat the sample gas so as not to have too much pressure fluctuation. If the pressure fluctuation has occurred in the sample, the specified flow rate (1.5 L/min) will not be obtained because of the fluctuation, and the indication may fluctuate.

***Note 3:** Sample gas after measurement should be open to atmosphere by ozone destructor.



WARNING

- Regarding accident or failure which had happened under modifying the monitor or using it without specified condition described in the instruction manual, even if the warrant is in the limit, we have not its obligation.

6 Each operation mode and button operation

Transition of the operation and button operation are shown in the chart below.

For details of each item, please refer to Figure-35 "Details of mode transition of EG-3000F".

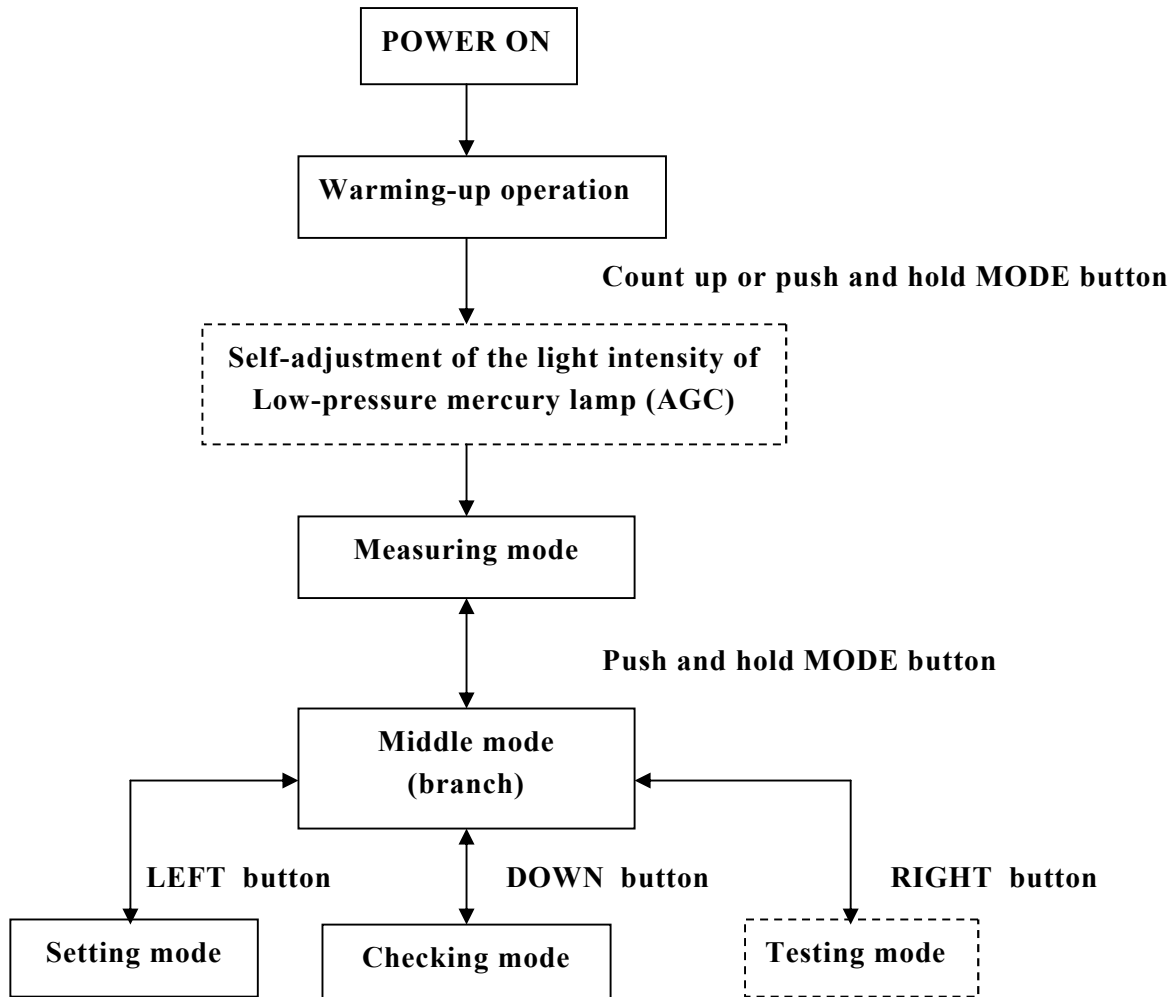


Figure- 8 Transition chart to each mode

***Note 1:** When AGC setting is OFF, self-adjustment of the light intensity after warming-up operation is not performed.

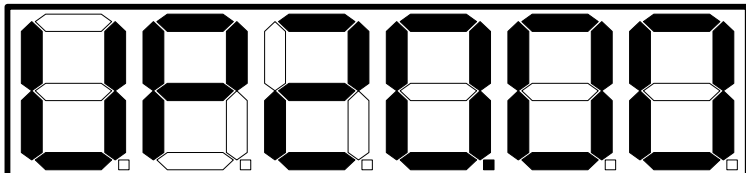
***Note 2:** Pushing MODE button in the Middle mode enables to return to the Measuring mode.

***Note 3:** Pushing MODE button enables to return to the Middle mode from the Setting mode, the Checking mode and the Testing mode.

***Note 4:** It is not possible to shift to the Testing mode when set to the holding mode.

6.1 Warming-up operation mode

This monitor automatically shifts to the warming-up operation after turning on the power supply. After the indicator showed Error 3 during measurement, it will return to the warming-up operation if the light intensity recovered. The warming-up operation is for 20 minutes. If the short interruption of the power occurred, you can skip a warming-up operation by pushing MODE button at least 3 seconds in the warming-up operation. But generally, make sure to perform a specified warming-up operation. The following indication appears during the warming-up operation. In addition, this main-indication counts down by every 1 second.

																		
1	3		1	7	:	0	5			w	a	r	m	i	n	g	u	p

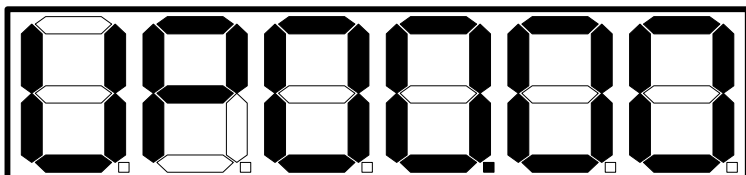
During the warming-up operation, when its maintenance time had been over than 8000 hours in total from the past, the indicator may show the message that maintenance is necessary. At this time, the sub-indication is as below.

1	3		1	7	:	0	5			w	a	r	m	i	n	g		u	p
P	l	e	a	s	e			m	a	i	n	t	a	i	n		i	t	.

The consumable parts are in this monitor. Even if this indication is appeared, it does not affect measuring the ozone concentration immediately, but perform maintenance as soon as possible. And then, regarding accumulated running time from the previous maintenance, it can be displayed in the Checking mode (CHK 07).

6.2 Self-adjustment of the light intensity (AGC)

After performing the specified warming-up operation in normal setting, this monitor automatically adjusts the light intensity of the low-pressure mercury lamp within the appropriate range. If the Lamp parameter setting "LPS01 Self-adjustment of the light intensity" is set to OFF, the automatic adjustment is not performed here, and the previous adjustment value is applied.

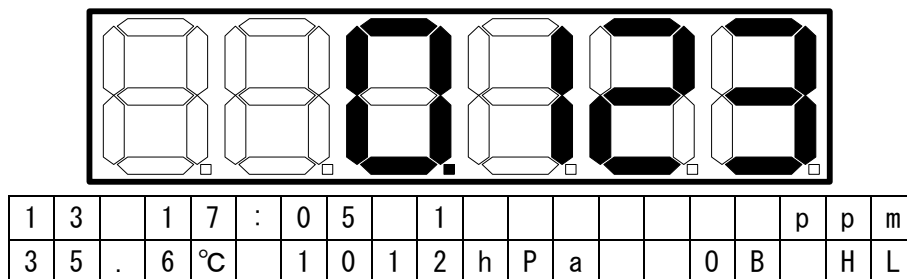
																		
1	3		1	7	:	0	5			w	a	r	m	i	n	g	u	p
A	G	C				o	p	e	r	a	t	i	n	g				

***Note:** For the stability of light intensity of lamp, refrain from skipping the warming-up operation by pushing MODE button at least 3 seconds during a warming-up operation except a short interruption of the power supply etc.

6.3 Measurement mode

(1) Normal Measurement mode:

The indication in the Measuring mode is shown below. The main-indication shows a concentration value, and the sub-indication shows following items.



The first line of the sub-indication:

From the left, Current date (time), Number of the measuring range (in case of optional multi-range specification) and concentration Unit.

The second line of the sub-indication:

From the left: Temperature value, Pressure value (in case of adding optional function for pressure compensation), having or not having the following functions: Offset, background calibration, holding mode, key lock.

- In the Setting mode, if the offset value has been set to any numerical value except 0, an offset compensation function works, and the display shows the concentration value which added the setting value. When the compensation is performed, the character of "O" will appear in the second line of the sub-indication. If this offset value is set to 0 in the Setting mode, the compensation is reset and the character of "O" will not display after this.
- If pushing the ENTER button at least 3 seconds in the Measuring mode, the function of background calibration works, and the concentration value will be calculated with the subtracts the latest measured value as an offset. When background calibration is working, the character of "B" appears in the second line of the sub-indication. During this status, the background calibration can be reset by pushing ENTER button at least 3 seconds again, and the character "B" will disappear.
- "H" on the lower right of the second line of sub-indication means that the Output holding mode is setting. For details, refer to section 6.8 "Common parameter setting (CPS 06 Holding mode)".
- Pushing DOWN button at least 3 seconds in the Measuring mode allows you to lock the key. After this, the key button input will be rejected and mode change cannot perform in the Measuring mode. The incorrect operation by touching a button can be avoided. At this time, the character of "L" is displayed on the lower right of the second line of the sub-indication. By pushing DOWN button at least 3 seconds again, the key lock will be released and the character of "L" disappears.
- When the monitor is in the Middle mode (branch), it will return to the Measuring mode by pushing MODE button.
- By pushing LEFT and RIGHT buttons simultaneously enables to reset a measurement cycle.
- If the self-diagnosis function performed, and any obstruction had occurred regarding the monitor measurement, the content of the error will be displayed. As for error, refer to "10.1 Error indications and solutions".

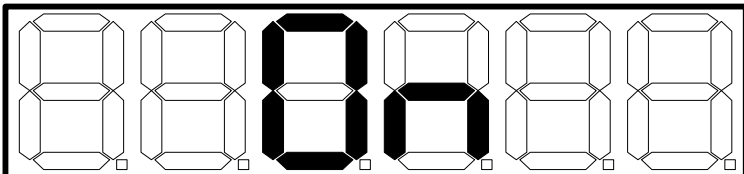
- If the monitor detects the exceeded value than the preset concentration alarm value (AL1, AL2) during the measurement, relay output signal will be make or break, and AL1 or AL2 will be appeared instead of the latest time in the first line of the sub-indication.
- In case of the optional multi-range specification, pushing UP button at least 3 seconds during measurement enables to switch the range.
- As for the optional multi-range specification, please set to Range 1 in case of switching the measuring range by using external signal LIN1 and LIN2.
External signal is valid only if it is set to Range1 from the front panel.

***Note 1:** The ozone concentration value is possible to indicate in maximum 6 digits. However, if the numbers of digit is exceeded than the preset value shipped from the factory, this accuracy cannot be guaranteed.

***Note 2:** Do not use ENTER button in normal ozone concentration measurement. When background calibration function is enabled, the character of "B" is shown on the sub-indication.

(2) The case beyond the full scale value:

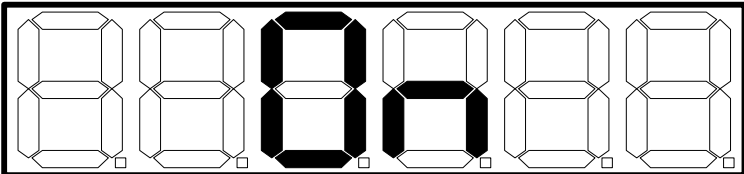
If the measured concentration value is between the range from over 100% to under 120% of preset analog full scale value, it will display the character in the second line of the sub-indication to pay attention instead of the temperature value etc. In this case, the concentration value will be displayed as a reference, but the analog output value will be full scale (the setting voltage 0-1V: 1 V, current 20mA).

																			
1	3		1	7	:	0	5		1								p	p	m
F	.	S	.	r	a	n	g	e		o	v	e	r						

***Note:** If the measured value exceeds 120% of the setting full scale value, it will be Error 0.

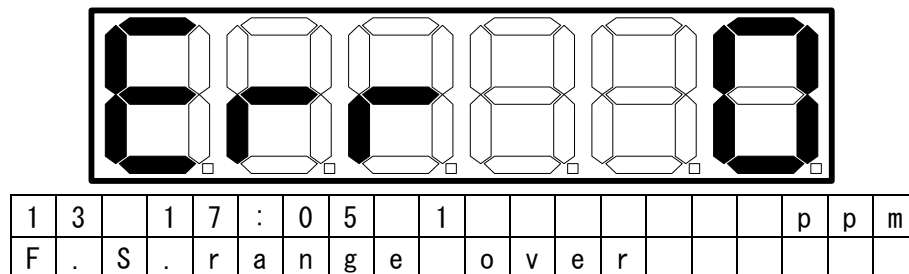
(3) The case of external control signal input (EXC):

If external control signal had been set to valid (ENABLE), and EXC signal had been inputs normally, the monitor becomes a waiting status and then stops the measurement. At this time, the measurement signal (MES) will be break in case of a-contact. If EXC signal is OFF, the monitor will restart the measurement from that point.

																		
1	3		1	7	:	0	5		1							p	p	m
E	X	C		o	n		m	o	n	i	t	o	r		w	a	i	t

(4) Detecting an error by self-diagnosis function:

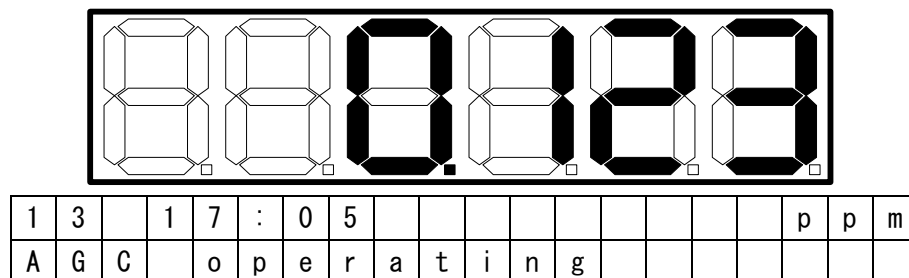
The monitor of this series has a self-diagnosis function. After changing any parameter setting or detecting abnormality under measurement, the monitor will stop measurement and display Error indication. The case of over range error is shown below as an example. Further information about error except this, refer to the section 10.1 "Error indications and solutions".



***Note:** If an error occurred in case of a-contact specification, the measurement signal (MES) will be break and the error signal (ERR) will be make.

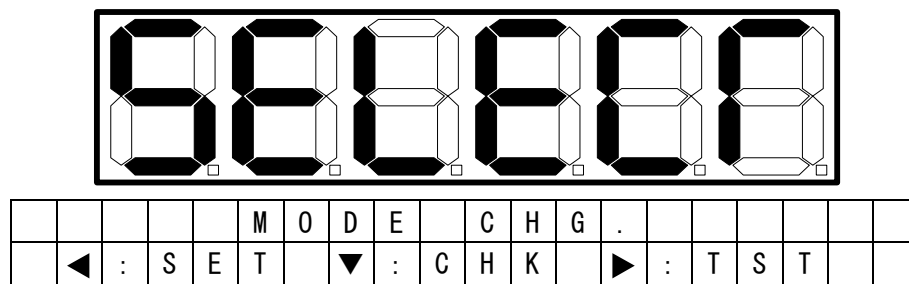
(5) The case working a self-adjustment function (AGC) of light intensity under measurement:

When the self-adjustment of the light intensity in normal setting is ON, this function will work if the light intensity of Sensor 1 or Sensor 2 is out of their appropriate range (50-90%). At this time, the sub-indication will show AGC is active. In addition, the measurement cycle becomes longer than usual at this time, but the external output signals such as measurement signal do not change.

**6.4 Middle mode**

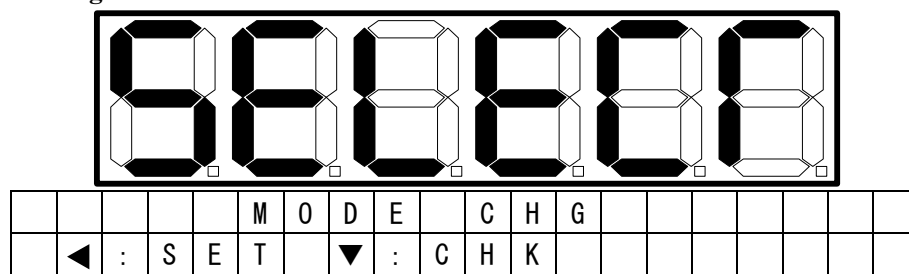
By pushing MODE button at least 3 seconds during measurement, the monitor will stop the measurement and shift to the Middle mode. In this state, you can shift to the each mode by pushing each button as follows: LEFT button → Setting mode, DOWN button → Checking mode, RIGHT button → Testing mode.

In addition, pushing MODE button in the Middle mode enables to return to the Measuring mode. If key is locked during the Measuring mode, change the mode after you release the key locked by pushing DOWN button for at least 3 seconds once.



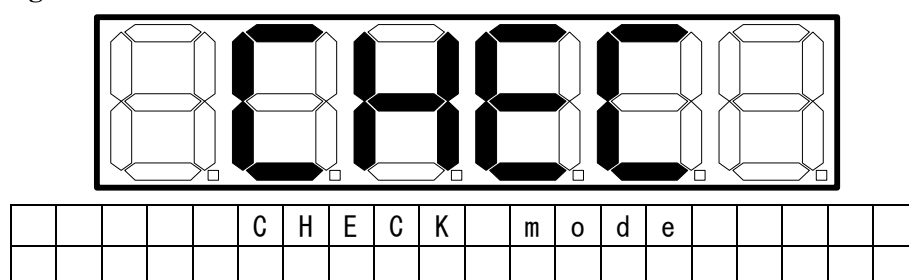
In the Middle mode, only the measurement signal (MES) is OFF, but the other output signals such as analog (VO1,IO1,VO2, IO2), error (ERR), alarm (AL1, AL2) remain unchanged, and the measurement result are the previous results.

If it is set to the Holding mode, all the cycle pilot lamp will light when shifting to the Middle mode. The right arrow mark and the character of TST on the sub-indication will not appear, and the transition to the Testing mode cannot be available. Moreover, the measurement signal (MES) does not change at this time, and maintain the same status as the Measuring mode.



6.5 Checking mode

This mode checks the inside condition of the monitor. In the Middle mode, it will shift to the Checking mode by pushing DOWN button. When changing to the Checking mode, the following display will be lit for about 2 seconds. The status of the output signal from the signal terminal doesn't change even if it shifts from the Middle mode to the Checking mode.



When displaying each checking items in the Checking mode, pushing the MODE button allows you to return to the Middle mode. Every time of pushing DOWN button, it shifts to the next item. Pushing UP button enables to return to the previous item. The possible displayed items are as follows. The figure on the left of each item shows the guide number, and the related page is on the right side.

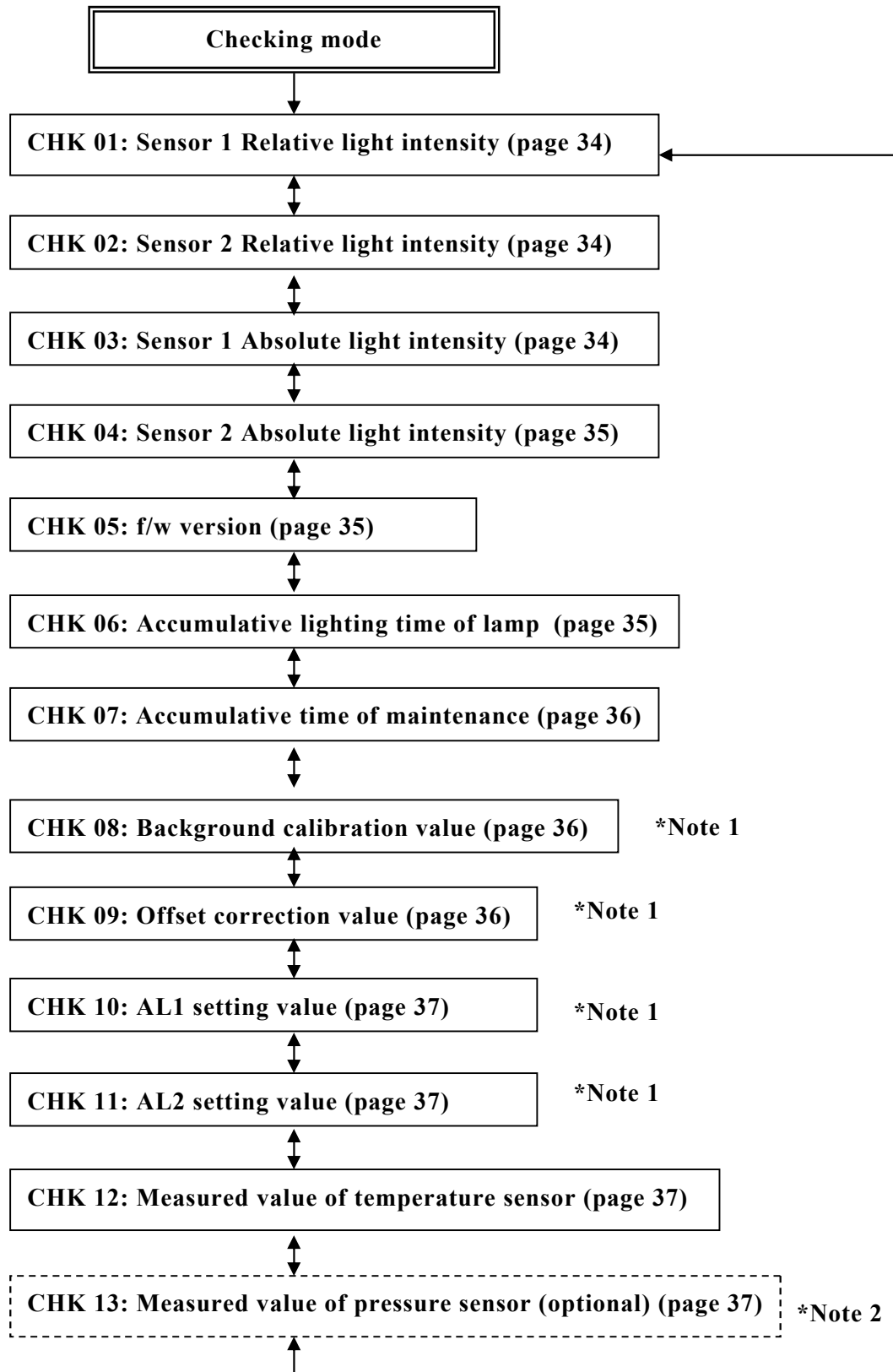


Figure- 9 Transition chart of the Checking mode

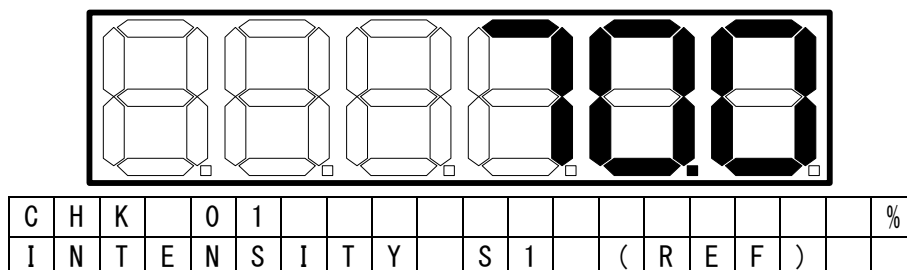
*Note 1: As for the multi-range specification, it corresponds to the value that is measured now.

*Note 2: This is only available when the monitor has an optional built-in pressure compensation function. This is not a standard specification.

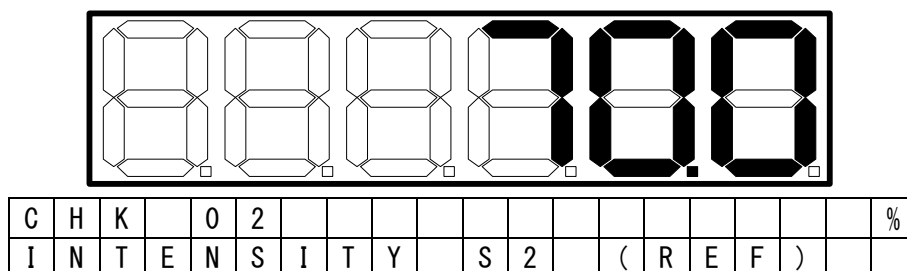
Details are shown below.

(1) Sensor 1 Relative light intensity:

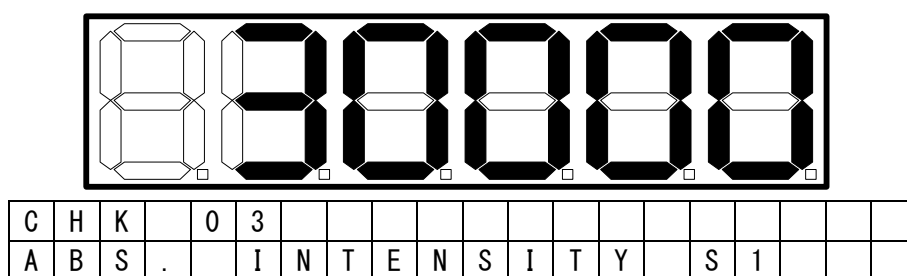
This is the light intensity of Sensor 1 side when the zero gas is supplying. It is shown in a ratio of the input value for the input range of the built-in A/D converter. The unit is % and an appropriate range is 50.0-90.0%. The Self-adjustment function of the light intensity (AGC) adjusts it within this range. If it is out of this range, adjust it according to section 6.9 "Lamp parameter setting (LPS 02 Manual AGC of light intensity)". The display is as follows.

**(2) Sensor 2 Relative light intensity:**

This is the light intensity of Sensor 2 side when the zero gas is supplying. It is shown in a ratio of the input value for the input range of the built-in A/D converter. The unit is % and an appropriate range is 50.0-90.0%. The Self-adjustment function of the light intensity (AGC) adjusts it within this range as same as Sensor 1. If it is out of this range, adjust it according to each items described in section 6.9 "Lamp parameter setting (LPS 02 Manual AGC of light intensity)". The main-indication shows the light intensity of Sensor 2 side as same as (1), and the sub-indication is as follows.

**(3) Sensor 1 Absolute light intensity:**

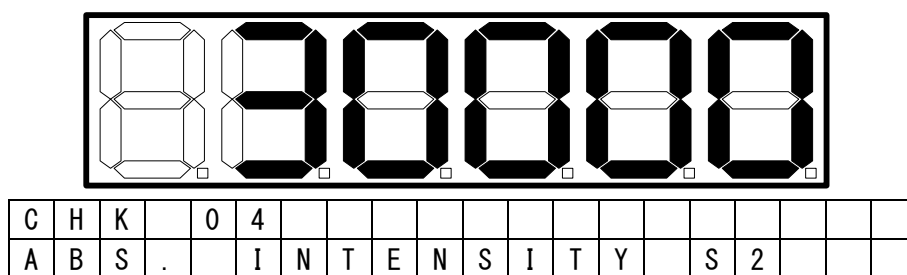
This series monitor automatically compensates the light intensity by internal Self-adjustment function of the light intensity of lamp (AGC). Therefore, confirm absolute light intensity of Sensor 1 to judge the deterioration of the low-pressure mercury lamp. The absolute light intensity is calculated from the conversion value of the A/D converter by the internal arithmetic and it has no unit. The appropriate range of absolute light intensity is 9000 and above. If the value becomes smaller than this, the low-pressure mercury lamp replacement is necessary. The main-indication shows the light intensity and the sub-indication is as follows.



***Note :** The relative light intensity is the conversion value of the internal A/D converter, but absolute light intensity is calculated by adding the gain of self-adjustment circuit of the light intensity in the former steps. Therefore, even if the relative light intensity value is the same, the light intensity of low-pressure mercury lamp itself might be different. To judge the absolute light intensity (life etc.) of low-pressure mercury lamp itself, refer to the absolute light intensity.

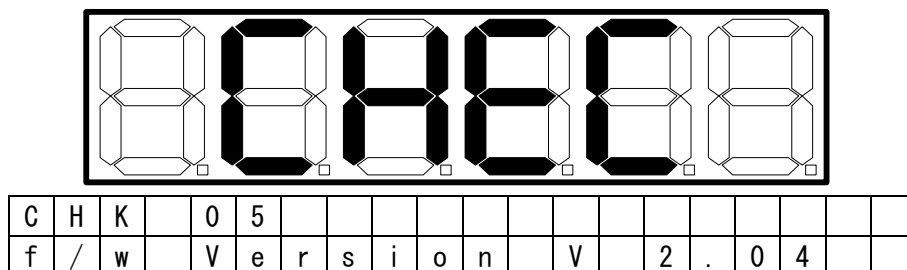
(4) Sensor 2 Absolute light intensity:

This is the absolute light intensity for Sensor 2 side as same as above (3). The appropriate range is 9000 and above. It has no unit. If the value becomes smaller than this, the low-pressure mercury lamp replacement is necessary. The main-indication shows the light intensity and the sub-indication is as follows.



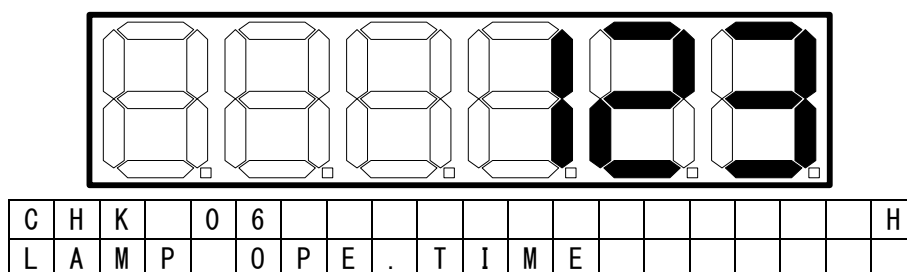
(5) f/w version:

This is a current version of the software installed in this monitor.
The main-indication shows CHEC, and the sub-indication shows its version.



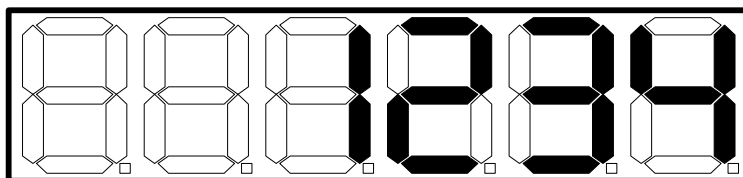
(6) Accumulative lighting time of lamp:

This is the accumulative lighting time of the built-in low-pressure mercury lamp. We guarantee 9000 hours. The low-pressure mercury lamp should be replaced with new one if it exceeds this value. As to time reset, perform it according to each item described in section 6.9 "Lamp parameter setting (LPS 03 Lamp lighting timer / Reset lighting time).



(7) Accumulative time of maintenance:

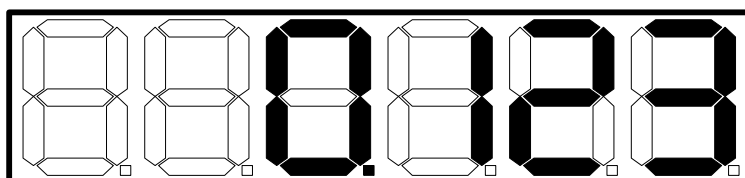
This indicates accumulative time from the last maintenance. Even if the monitor is not operated, this time increases. If the time has passed approximately 8000 hours, the sub-indication will display an attention during warming-up operation so as to perform maintenance. The monitor is not affected immediately even if it is operated without maintenance, but be sure to perform maintenance as soon as possible.



C	H	K		0	7													H
M	O	N	I	T	O	R		T	o	t	a	l		T	i	m	e	s

(8) Background calibration value (BG CAL):

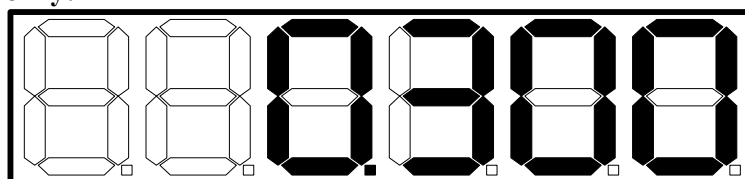
The background calibration value currently set is displayed. This value is added to the measured value in the actual measurement. In addition, in the case of multi-range specifications, the most recent range number which had been set will be displayed. Possible setting range is $\pm 20\%$ of full scale value.



C	H	K		0	8												p	p	m
B	G	.	C	A	L	.	V	a	l	u	e		(R	1)			

(9) Offset correction value:

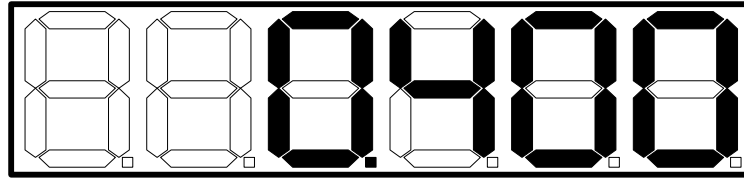
The Offset correction value currently set is displayed. This value is added to the measured value in the actual measurement. In addition, in the case of multi-range specifications, the most recent range number which had been set will be displayed. Possible setting range is -10% to $+50\%$ of full scale value, and it should be performed referring to section 6.7 "Range parameter setting RPS □3". Here is the display only.



C	H	K		0	9												p	p	m
O	F	F	S	E	T		V	a	l	u	e		(R	1)			

(10) AL1 setting value:

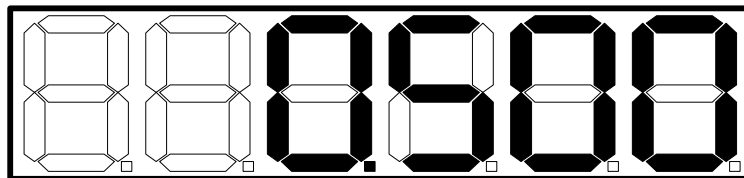
The alarm 1 (AL1) setting value currently set is displayed. In addition, in the case of multi-range specifications, the most recent range number which had been set will be displayed. Possible setting range is 0 to 100% of full scale and it should be performed in the Setting mode (Range parameter setting RPS □4). Here is the display only.



C	H	K		1	0												p	p	m
A	L	A	R	M	1		V	a	l	u	e		(R	1)			

(11) AL2 setting value:

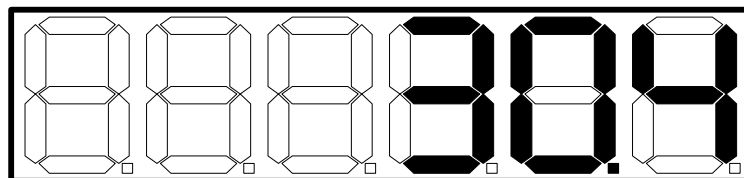
The alarm 2 (AL2) setting value currently set is displayed. In addition, in the case of multi-range specifications, the most recent range number which had been set will be displayed. Possible setting range is 0 to 100% of full scale and it should be performed in the Setting mode (Range parameter setting RPS □5). Here is the display only.



C	H	K		1	1												p	p	m
A	L	A	R	M	2		V	a	l	u	e		(R	1)			

(12) Measured value of temperature sensor:

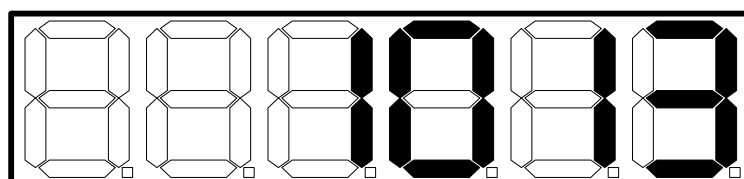
This indicates the measured value of built-in temperature sensor, and its unit is °C.



C	H	K		1	2														°C
T	E	M	P	.	S	e	n	s	o	r									

(13) Measured value of pressure sensor (option):

If the monitor has an optional built-in pressure compensation function, the measured pressure value of the sensor will be displayed. And if the monitor does not have this optional function when shipped from the factory, it will not be displayed. The port of solenoid valve is set to the sample gas side. Since a built-in pressure sensor is an absolute one, the unit is hPa.



C	H	K		1	3													h	P	a
P	R	E	S	S	.	S	e	n	s	o	r									

6.6 Setting mode

This mode is used to set an internal condition of the monitor. To push LEFT button in the Middle mode, which is described in section 6.4, enables to transfer to this mode.

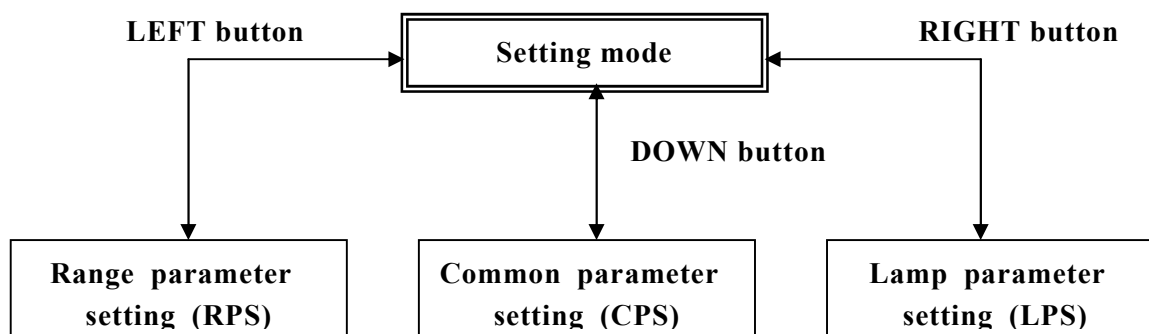
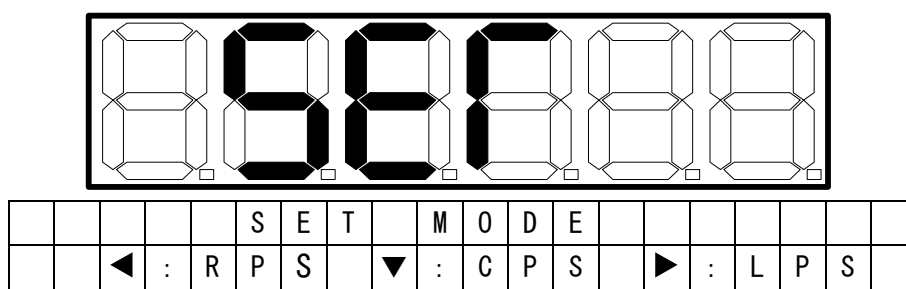


Figure- 10 Branch of the Setting mode

The main-indication and the sub-indication display the following characters. In the Setting mode, it will branch to the following three items by pushing each button. By pushing MODE button in each, parameter setting mode, it will return to the beginning of the Setting mode.



① Range parameter setting (RPS):

It branches by pushing LEFT button, and then sets the related items of the measuring range.

② Common parameter setting (CPS):

It branches by pushing DOWN button, and then sets the related items of the Measurement mode, Temperature and pressure compensation and communication functions etc.

③ Lamp parameter setting (LPS):

It branches by pushing RIGHT button, and then sets the related items of the built-in low-pressure mercury lamp.

Pushing MODE button in this status enables to return to the previous Middle mode.

In case of changing the setting value after shifting to each parameter setting mode, push ENTER button once, and then changeable numerical values or status indication will blink. The main-indication blinks in case of the numerical value, the sub-indication blinks in case of the status indication. Then set the value to be changed by pushing UP or DOWN button. Push ENTER button again to finalize the value. The value set here is stored internally and will be retained even after power supply is OFF.

6.7 Range parameter setting (RPS)

By pushing LEFT button in the setting mode mentioned above, it will branch, and set the related items of the measuring range. To return back to the branch point of upper layer from each range parameter setting, push MODE button.

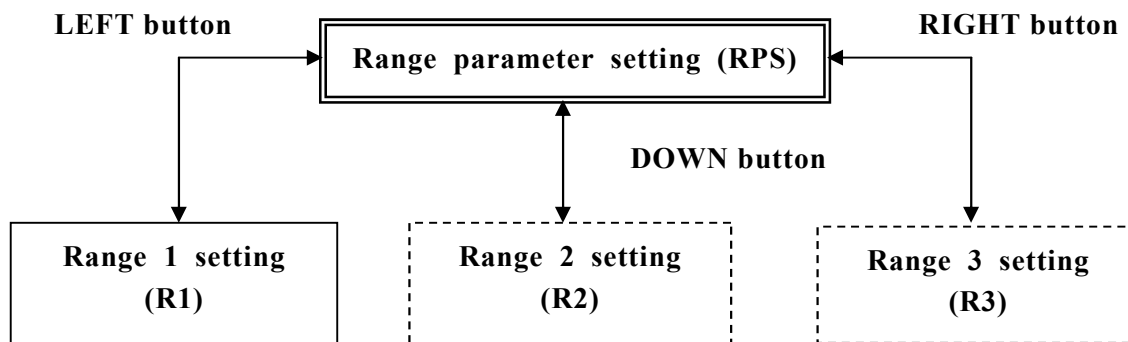
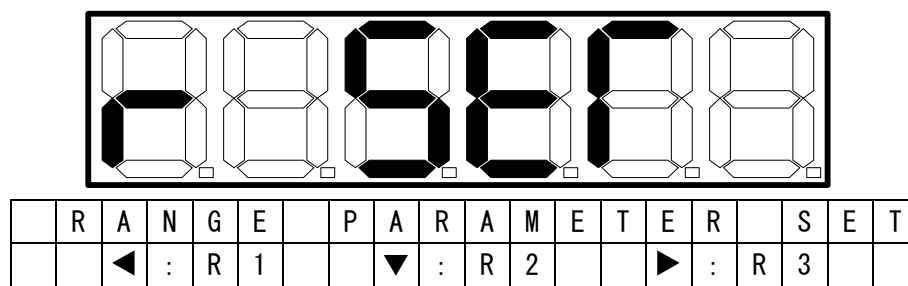


Figure- 11 Branch of the Range parameter setting

The range parameter can be corresponding to maximum 3 ranges (option). The following display is in case of the multi-range specification. In case of a single standard range specification, the indications, ▼: R2 or ►: R3, will not be displayed, and there is no response even if you push DOWN/RIGHT button. To push LEFT button in standard range enables to set each item of Range 1.



To push DOWN button enables you to shift to the next setting item, and by pushing UP button, it returns to the previous setting item. The available setting items are as follows. The figure on the left of each item shows the guide number, and the related page is on the right side. If it is the multi-range specification, and Range 2 or Range 3 is available, the guide number will be RPS 2□ or RPS 3□. The available contents of setting are the same as Range 1.

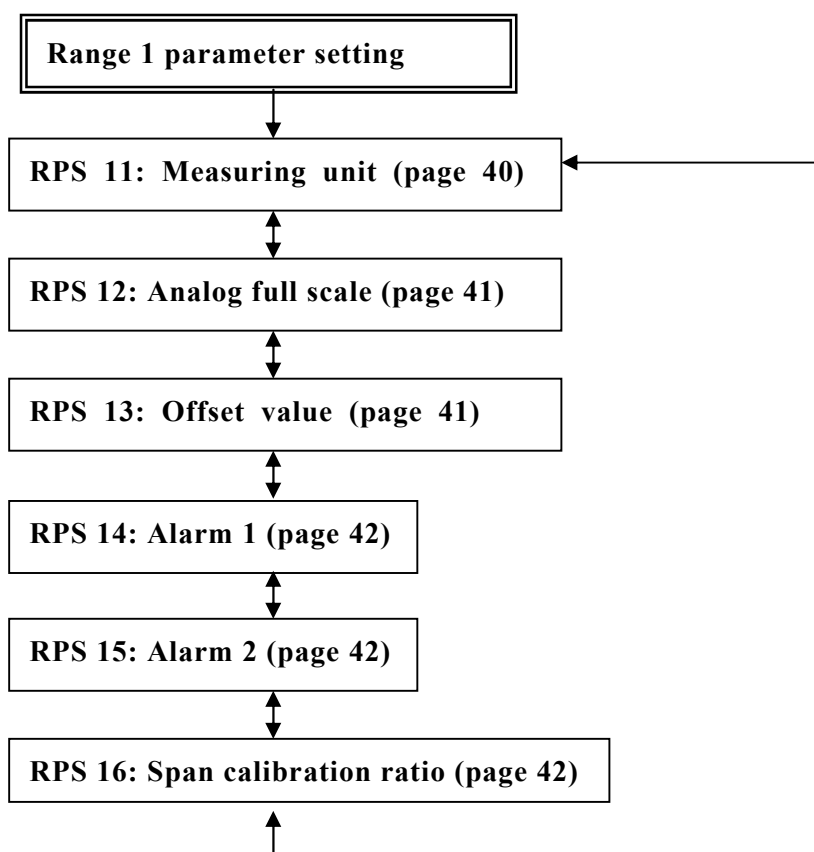


Figure- 12 Transition chart of Range 1 parameter setting

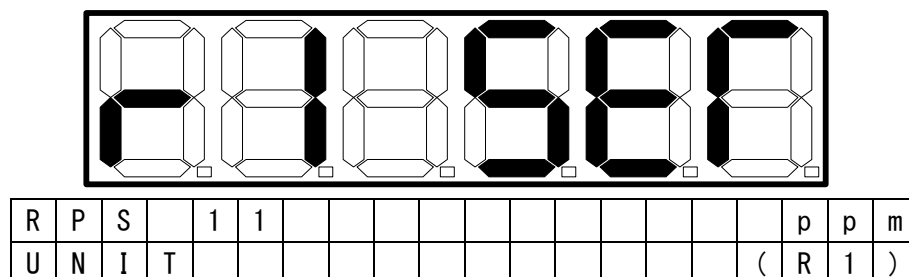
***Note:** Basically, when displaying each item setting in Range 1 parameter setting, pushing MODE button enables to return to the upper layer branch point of the range parameter. But only if you changed the analog full scale, it is not possible to return to the upper layer, unless each item such as Offset, Alarm1 and Alarm2 is reset or display.

In case of changing the setting value after shifting to each parameter setting mode, push ENTER button once, and then changeable numerical values or status indication will blink. The main-indication blinks in case of numerical value, the sub-indication blinks in case of status indication. Set the value to be changed by pushing UP/DOWN button. Push the ENTER button again to finalize the value.

The details of each item are shown below.

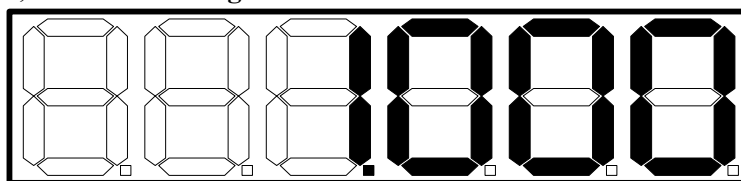
(1) Measuring unit:

Regarding EG-3000F, you can select one from any measuring unit of ppb, pphm and ppm, but g/m^3 and wt% cannot be applicable. Even if the unit of the measurement is changed, the accuracy according to it is not guaranteed. The accuracy of this monitor is only guaranteed against the state when shipped from the factory.



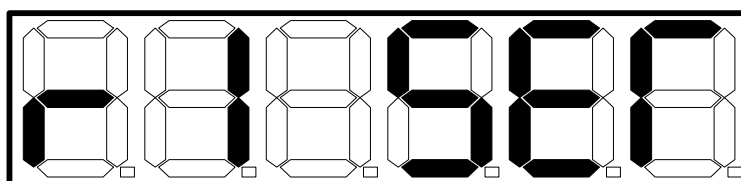
(2) Analog full scale:

The full scale value for analog output can be set here. First, decide the position for a decimal point, and then change the full scale value.



R	P	S		1	2											p	p	m	
A	N	A	L	0	G		F	.	S	.						(R	1)

If you have changed this setting successfully, offset value and alarm setting value which are set before become 0. **If you changed the full scale value, it is not possible to return to the upper layer unless each item such as Offset, Alarm1 and Alarm2 is reset or display.** When the following indication is displayed, please reset or display again for each item (Offset, Alarm1 and Alarm2).



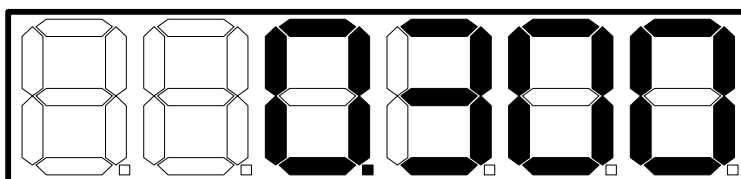
P	I	e	a	s	e		C	h	e	c	k		o	r		S	e	t	
0	F	F	S	E	T	,	A	L	M	1	,	A	L	M	2				

***Note:** You can change the analog full-scale value at this item, **but the accuracy of changed full-scale value is not guaranteed.** We only guarantee the accuracy of factory defaults (setting).

(3) Offset value:

An offset value can be added evenly to the concentration value currently measured. The possible adding offset value is within -10% to +50% of analog full scale value. It is not possible to set the offset value beyond this range.

Once the offset value was set, the character of "O" will appear on the second line of the sub-indication during the measurement of concentration value.



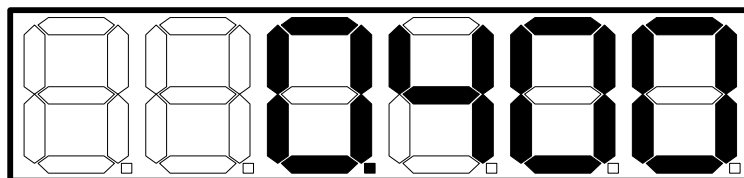
R	P	S		1	3												p	p	m
0	F	F	S	E	T											(R	1)

When adding a negative offset value, input the numeric value first, shift to the head of the numeric value, and then push DOWN button to display "-".

(4) Alarm 1:

Alarm 1 can be set as a warning of the concentration value. If the measured value exceeds the setting concentration value, the alarm contact output will be one of make or break contact. The possible setting range is in the limit of the full scale value.

If Alarm 1 becomes active, "AL1" will be appeared in the first line of the sub-indication. Once 0 is set here, an alarm output will not be supplied. It is set to 0 when shipped from the factory.

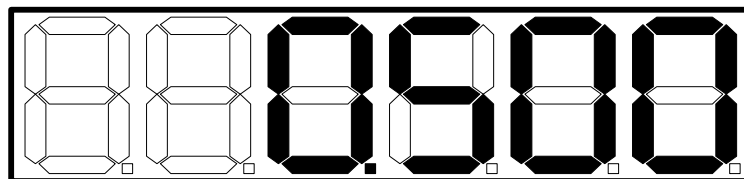


R	P	S		1	4												p	p	m
A	L	A	R	M		1										(R	1)

(5) Alarm 2:

Alarm 2 can be set as a warning of concentration value. If the measured value exceeds the setting concentration value here, the alarm contact output will be one of make or break contact. The possible setting range is in the limit of full scale value.

If Alarm 2 becomes active, "AL2" will be appeared in the first line of the sub-indication. Once 0 is set here, an alarm output will not be supplied. It is set to 0 when shipped from the factory.

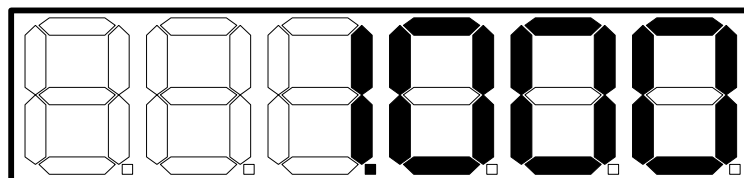


R	P	S		1	5												p	p	m
A	L	A	R	M		2										(R	1)

***Note:** Refer to the page of section 7.4 "How to use the function - 8) When using the alarm signal" for procedures of the use of alarm.

(6) Span calibration ratio:

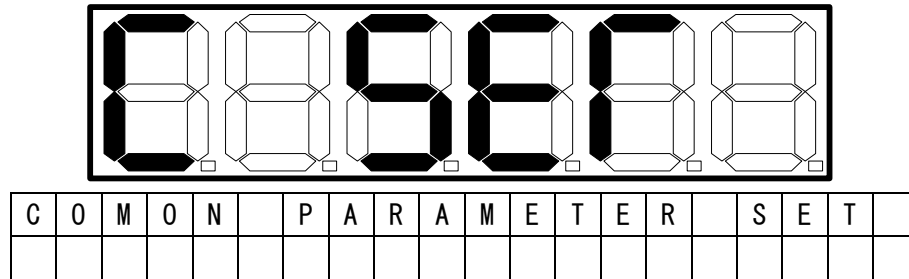
Set the span calibration ratio here, if you will change preset one in the monitor.



R	P	S		1	6															
S	P	A	N		C	A	L	.	R	a	t	i	o				(R	1)

6.8 Common parameter setting (CPS)

It branches from the state of the above-mentioned Setting mode by pushing DOWN button. The related items of the Measurement mode, Temperature and pressure compensation and communication functions etc. can be set here. The following indication will be lit for about 2 seconds when changing to the Common parameter setting.



Push DOWN button to shift to the next setting item. Moreover, pushing UP button enables to return to the previous setting item.

The items surrounded in a dotted line cannot be displayed according to its optional specification or the setting procedures. While each item is displayed in the Common parameter setting, it will return to the branch point in the setting mode by pushing MODE button.

The items that can be set are shown in “Figure-13”. The figure on the left hand of each item shows the guide number, and the description page is in the right hand.

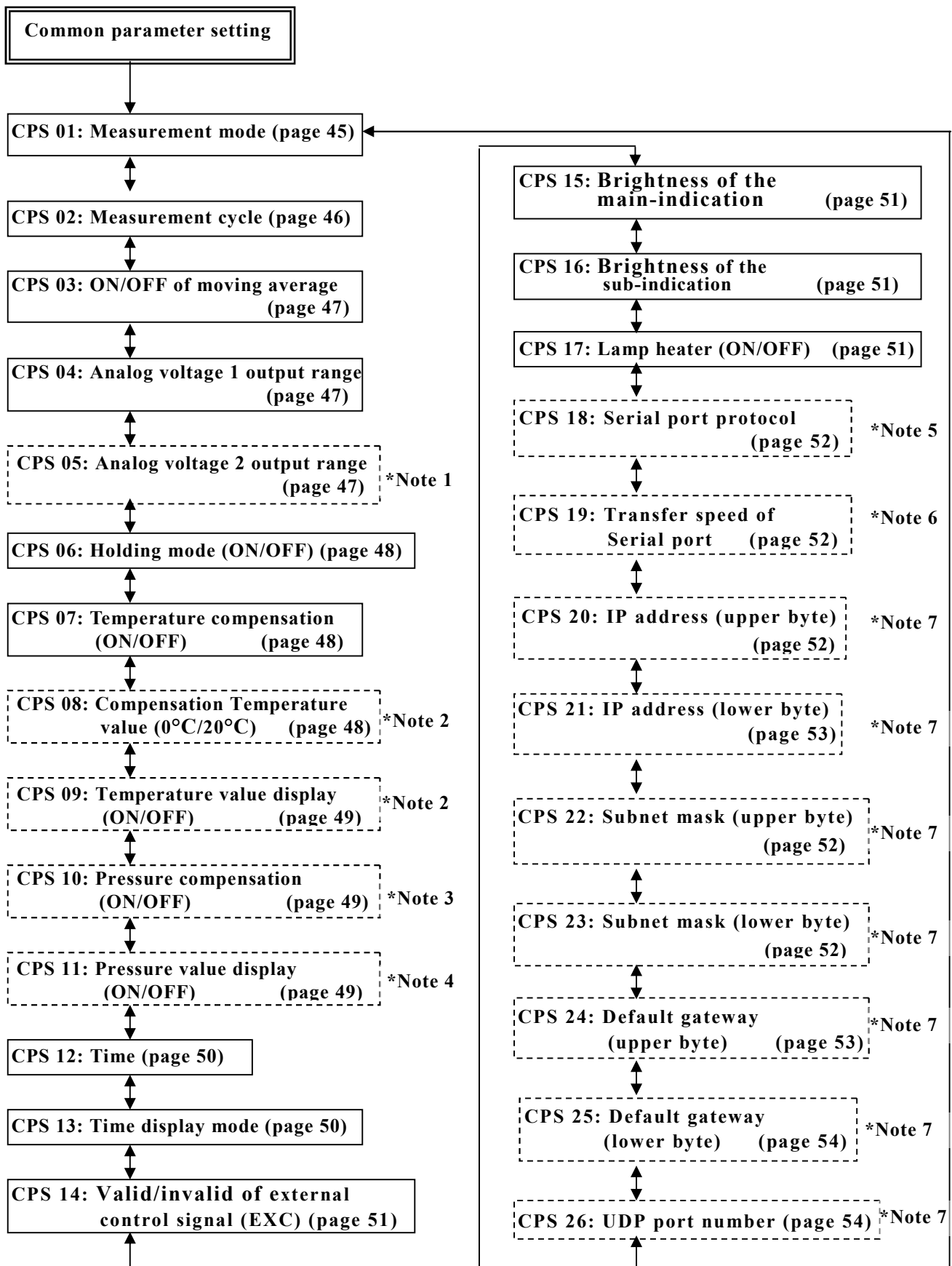


Figure- 13 Transition chart of Common parameter setting

***Note 1: This is only for having the optional hour average output function.
The standard specification is not available.**

***Note 2: This cannot be set when the temperature compensation of the previous section becomes invalid.**

***Note 3: This is only for having the optional pressure compensation function.
The standard specification is not available.**

***Note 4: This cannot be set when the pressure compensation of the previous section becomes invalid.**

***Note 5: If the monitor has an optional built-in communication board, this cannot be set.**

***Note 6: When the serial port protocol is set to 2001 mode, or having the optional built-in communication board, this cannot be set.**

***Note 7: This is only for having the optional built-in communication board.
The standard specification is not available.**

In case of changing the setting value after shifting to each parameter setting mode, push ENTER button once, and then changeable numerical values or status indication will blink. The main-indication blinks in case of the numerical value, the sub-indication blinks in case of the status indication. Then set the value to be changed by pushing UP or DOWN button. Push the ENTER button again to finalize the value.

Details of each item are shown below.

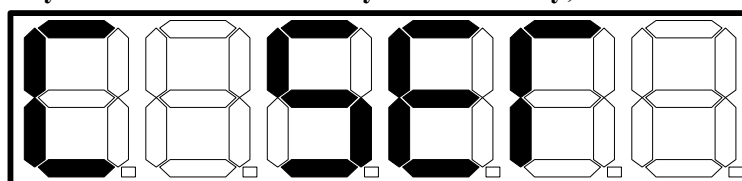
(1) Measurement mode:

This is a selection of normal mode or continuous mode. The Measurement mode is roughly divided into two modes (normal mode / continuous mode). It is set to a normal mode when shipped from the factory.

① Normal mode (NORMAL MODE):

- Sequential comparative auto-zero method:

This is a method to calculate the ozone concentration with sucking zero gas and sample gas alternatively in one measurement cycle. Generally, normal mode is recommended.

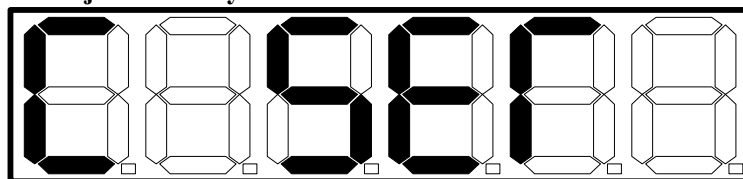


C	P	S		0	1													
M	E	S		M	o	d	e							N	O	M	A	L

② Continuous mode (CONTINUOUS MODE)

- Intermittent auto-zero method:

An interval of 1 second measurement is possible. Use this method to measure such ozone reaction which changes every moment. In case of Model EG-3000F, use this mode after setting the zero adjustment cycle to 1 minute.



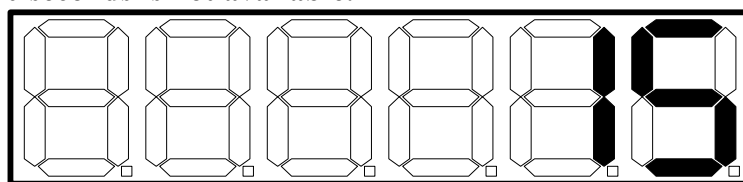
C	P	S		0	1														
M	E	S		M	o	d	e			C	O	N	T	I	N	U	O	U	S

***Note: The difference between the measurement of normal mode and continuous mode, refer to 7.4 "How to use the functions - (4) When changing Measurement mode".**

(2) Measurement cycle:

① In case of normal mode setting:

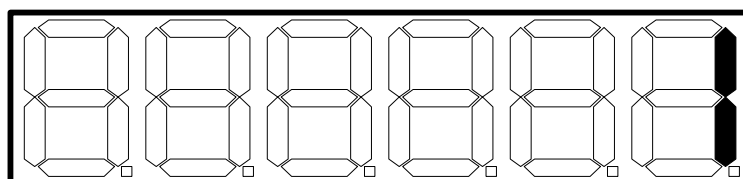
If the measurement mode mentioned above is set to normal mode, you can select one from any measurement cycle of 15, 20, 30 and 60 seconds. But regarding model EG-3000F, 10 seconds is not available.



C	P	S		0	2											s	e	c
N	O	R	.	M	o	d	e		I	n	t	e	r	v	a	l		

② In case of continuous mode setting:

In continuous mode setting, set the zero adjustment cycle (1 to 1440 minutes) with supplying zero gas. However, the drift might increase if zero adjustment is not performed for a long term. As for model EG-3000F, use it with setting this cycle to 1 minute in the continuous mode.

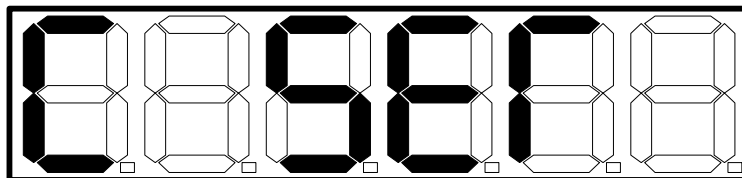


C	P	S		0	2											m	i	n
C	O	N	.	M	o	d	e		I	n	t	e	r	v	a	l		

(3) ON/OFF of moving average:

The ozone monitor measures discontinuous gas concentration value.

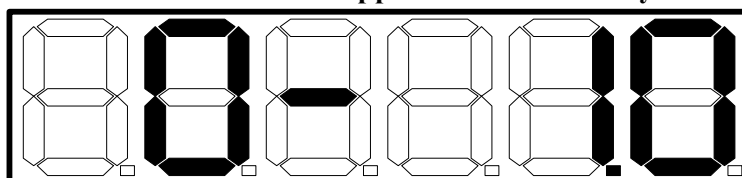
Therefore, you can apply three times moving average for the measured value to raise its accuracy. If you set this to OFF state, the responsiveness will be increased, but the measurement accuracy will be decreased. This is set to ON state when shipped from the factory.



C	P	S		0	3														
M	O	V	I	N	G		A	V	E	.								O	N

(4) Analog Voltage 1 output range:

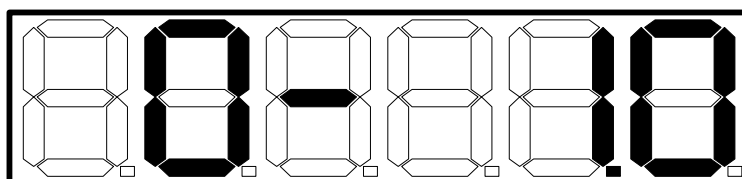
Analog Voltage 1 output range (VO1) in proportion to the concentration value can be set. You can select one range from three kinds of full scale for 0-0.1V, 1.0V and 10.0V DC, but it is set to 0-1.0V DC when shipped from the factory.



C	P	S		0	4												V
A	N	A	L	0	G	1		R	a	n	g	e					

(5) Analog Voltage 2 output range (option):

If the monitor has an optional built-in hour-averaged output function, the analog voltage output range (VO2) in proportion to the cumulative time average concentration value can be set. If the monitor does not have this function, there is neither display nor setting. You can select one range from three kinds of full scale for 0-0.1V, 1.0V and 10.0V DC, but it is set to 0-1.0V DC when shipped from the factory.



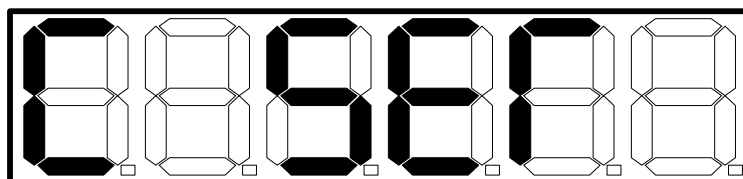
C	P	S		0	5												V
A	N	A	L	0	G	2		R	a	n	g	e					

(6) Holding mode (ON/OFF):

In the Checking / Setting mode, Model EG-3000 can maintain the most recent value of the following external output signal as same condition as when they were measured.

[MES, ERR, AL1, AL2, VO1, IO1, VO2, IO2]

Once it is set to HOLD here, the output signal is fixed even if it deviates from the Measuring mode. When it returns to the Measuring mode again, the contents will be reflected at the point that the new value is measured. When it is set to the output holding mode, all three cycle pilot lamps light if it gets out from the Measuring mode. If you shift to the Measuring mode after setting to the Holding mode, the character “H” will appear on the lower right of the second line of the sub-indication. Nothing has been displayed here (clear) when shipped from the factory.



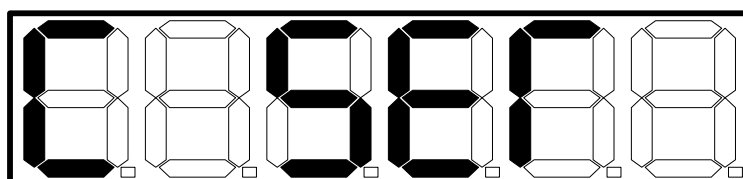
C	P	S		0	6														
0	U	T	P	U	T		S	i	g	n	a	l			C	L	E	A	R

If it is set to **Output Holding** mode, shifting to the **Testing** mode is not available.

(7) Temperature compensation (ON/OFF):

This is the valid/invalid setting for the built-in temperature compensation function.

If it is set to invalid (OFF), the temperature value is not displayed in the Measuring mode. Generally, it is set to valid (ON), when the monitor is shipped from the factory.

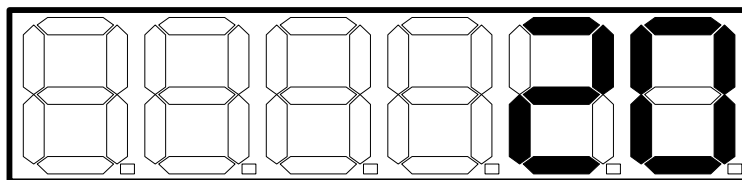


C	P	S		0	7												
T	e	m	p	.	C	o	m	p	.							0	N

(8) Compensation temperature value:

The gas monitor is sometimes affected by the temperature of the measured gas.

Since the measured gas concentration value is inversely proportional to temperature, and therefore to avoid measurement errors, it automatically converts using the signal from the temperature sensor. Set the temperature compensation value at this time. Generally, it is compensated to 0°C for high concentration ozone measuring such as generated ozone concentration, and 20°C for low concentration ozone measurement such as leakage detection etc. This monitor is set to 20°C when shipped from the factory. When measuring the gas concentration in normal condition, set the compensation temperature to 0°C. If the temperature compensation is set to invalid (OFF) in previous item (CPS 07), this item is not displayed.

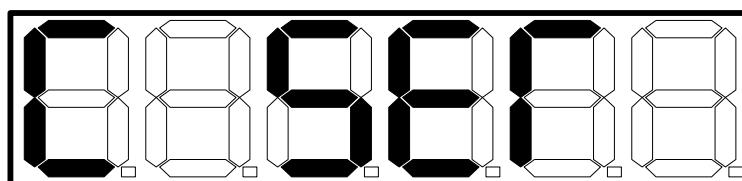


C	P	S		0	8												°C
C	o	r	r	e	c	t	e	d		T	e	m	p	.			

(9) Temperature value display (ON/OFF):

If temperature compensation is set to ON, the current temperature value will be displayed on the sub-indication during the measurement of concentration.

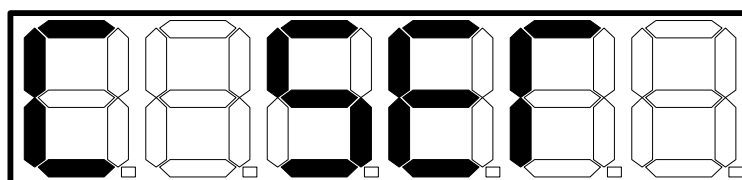
If it is set to OFF here, the indication will not be displayed. On the other hand “Te. C” is appeared during the measurement. If the temperature compensation is set to invalid (OFF) in previous item (CPS 07), this item is not appeared.



C	P	S		0	9												
T	E	M	P	.	V	a	l	u	e		D	i	s	p	.		0 N

(10) Pressure compensation (ON/OFF) (option):

This is the valid/invalid setting for the optional built-in pressure compensation function. If the monitor has this function, it has set to valid (ON) when shipped from the factory. If this is set to invalid (OFF), the pressure value is not displayed in Measuring mode. In addition, this function is not equipped in the standard specification, so there is neither display nor setting.

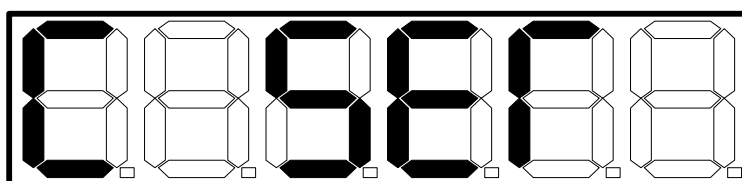


C	P	S		1	0												
P	R	E	S	S	.	C	o	m	p	.							0 N

(11) Pressure value display (ON/OFF) (Option):

If pressure compensation is set to ON, the current pressure value will be displayed on the sub-indication during the measurement of concentration.

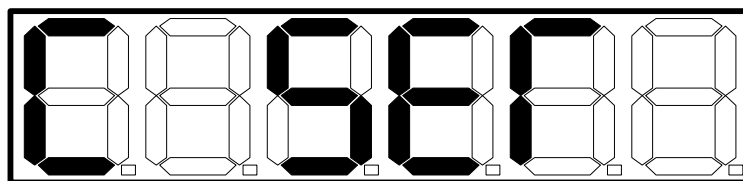
But if it is set to OFF here, the indication will not be displayed. On the other hand, “Pr.C” is appeared during the measuring. If the temperature compensation value is set to invalid (OFF) in previous item (CPS 10), this item is not appeared.



C	P	S		1	1												
P	R	E	S	S	.	V	a	l	u	e		D	i	s	p	.	0 N

(12) Time

This is the setting of built-in timer of this monitor. Every time of pushing RIGHT button enables you to change items in the following order : year → month → day → hour → minute → second. LEFT button works in the opposite. The changeable point blinks. Change the value with UP/DOWN button, and push the ENTER button to finalize the value. When the built-in battery is replaced, or also when power supply have been turned off for long term, reset is necessary.

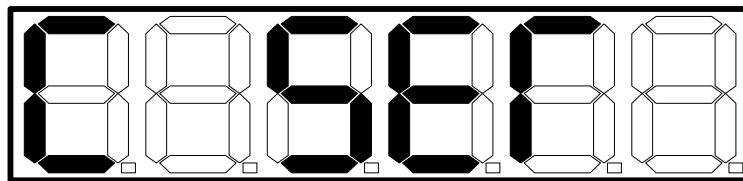


C	P	S		1	2					T	I	M	E						
2	0	0	9		0	4	/	1	6			1	8	:	0	9	:	2	4

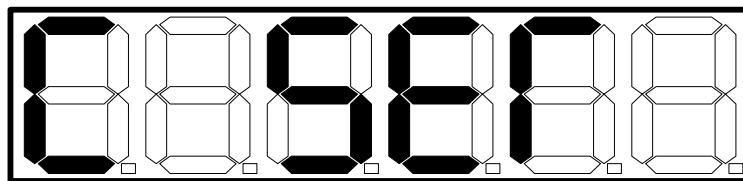
(13) Time display mode

This is the setting for how to display the time during the measurement. You can select one among the following three selections: display mode of year/month/day, day/hour/minute and non-indication.

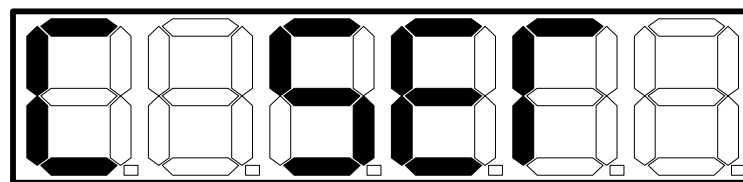
It is set to the display mode of day/hour/minute when shipped from the factory.

① Display mode of year/month/day:

C	P	S		1	3														
T	I	M	E		M	o	d	e				0	4	/	1	6	'	0	9

② Display mode of day/hour/minute:

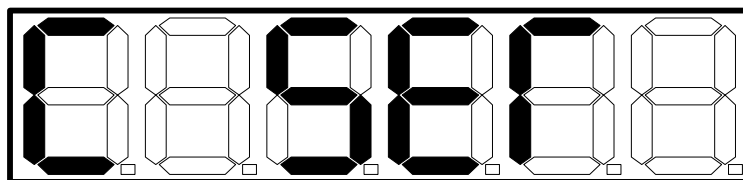
C	P	S		1	3														
T	I	M	E		M	o	d	e			1	6		1	8	:	0	9	

③ Non-indication mode:

C	P	S		1	3														
T	I	M	E		M	o	d	e				N	o	n	e				

(14) Valid/invalid of external control signal (EXC):

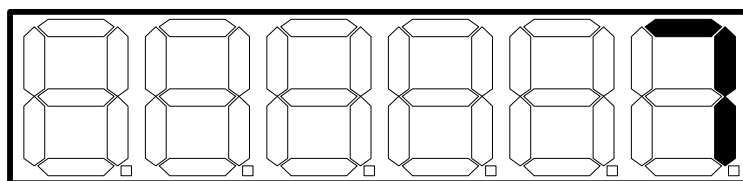
This is a setting for EXC signal from outside. Once it becomes invalid (ENABLE) state by pushing UP/DOWN buttons, the monitor will be in waiting state when EXC signal had been input. Set it to valid, when the monitor is controlled via external signal. It is set to invalid (DISABLE) when shipped from the factory. Regarding how to use this signal, refer to the page of “7.3 How to use the functions-- (12) When starting the measurement with external signal”.



C	P	S		1	4														
E	X	C		s	i	g	n	a	l				D	I	S	A	B	L	E

(15) Brightness of the main-indication:

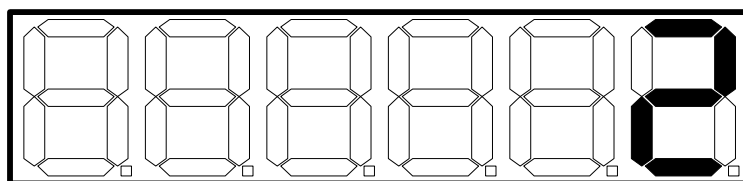
This adjusts the brightness of 6 digits numeric indication in the main-indication. The value of 1 to 15 can be set as an adjusted value. The maximum brightness is 15. It is set to 7 when shipped from the factory.



C	P	S		1	5														
M	A	I	N		D	I	S	P		B	r	i	g	h	t	n	e	s	s

(16) Brightness of the sub-indication:

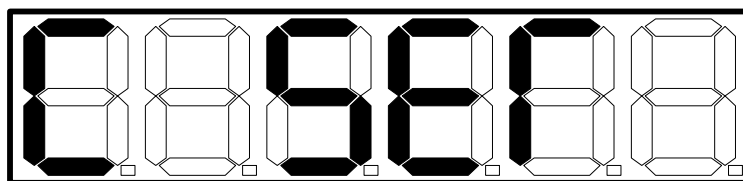
This adjusts the brightness of the sub-indication. The value of 1 to 4 can be set as an adjusted value. The maximum brightness is 4. It is set to 2 when shipped from the factory.



C	P	S		1	6														
S	U	B		D	I	S	P		B	r	i	g	h	t	n	e	s	s	

(17) Lamp heater (ON/OFF):

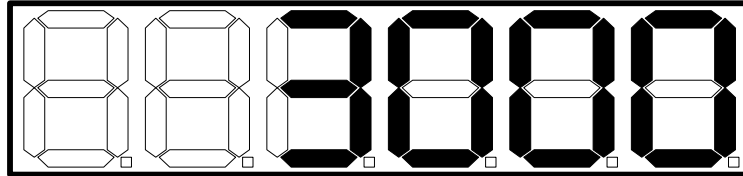
This is ON/OFF setting of the heater for the built-in low-pressure mercury lamp. Set it to ON, except when the ambient temperature is extremely high. It is set to ON when shipped from the factory.

[illegible]

(18) Serial port protocol:

This is a setting for the protocol of serial port (RS232C) on the rear panel.

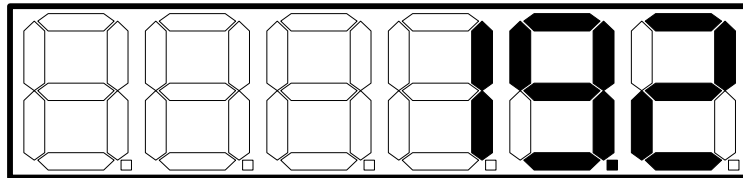
You can select EG-2001 compatible mode or EG-3000 mode. If you are using external communication software of conventional model EG-2001, set it to EG-2001 compatible mode. This monitor is set to EG-3000 mode when shipped from the factory. And if the monitor has a built-in optional board of Network/USB memory interface when shipped from the factory, it is not appeared.



C	P	S		1	8														
S	E	R	.	P	O	R	T		P	r	o	t	o	c	o	l			

(19) Transfer speed of serial port:

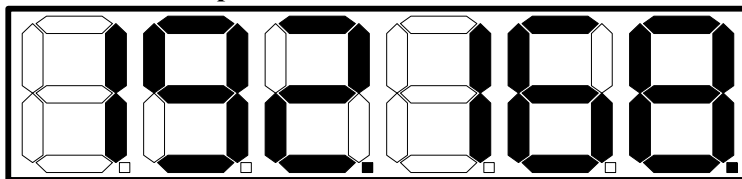
This is a setting for transfer speed of RS232C. The setting value can be selected among 4.8, 9.6, 14.4, 19.2, 28.8, 38.4, 57.6, 76.8, 115.2 and 230.4 kbps. However, these speeds are not guaranteed for the operation of every installed environment. Please select the suitable one according to the environmental conditions of the monitor installation. It is set to 19.2 kbps when shipped from the factory. In addition, when the above protocol was set to EG-2001 compatible mode, this transfer rate is automatically set to 4.8 kbps and is not appeared. Moreover, it is also not appeared when an optional network and USB memory interface function are equipped.



C	P	S		1	9										k	b	p	s	
S	E	R	.		P	O	R	T		C	o	m	m	.	S	p	e	e	d

(20) IP address (upper byte) (option):

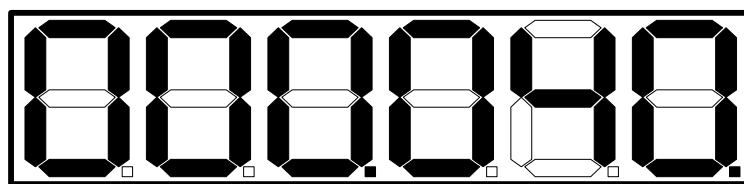
When the monitor has optional network and built-in USB memory interface, it is necessary to set Ethernet IP address. The upper byte is set here. The IP address when shipped is “192.168.0.40”. This function is not equipped in the standard specification, so there is neither display nor setting. For details of this function, please refer to the instruction manual of the optional board of EG-3000 series.



C	P	S		2	0														
I	P		A	D	D	R	E	S	S		U	P	P	.	b	y	t	e	

(21) IP address (lower byte) (option):

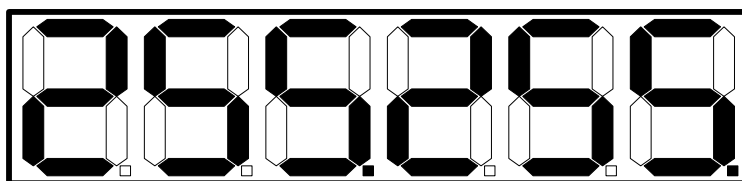
This is a setting of the lower byte continued from the previous item.



C	P	S		2	1														
I	P		A	D	D	R	E	S	S		L	O	W	.	b	y	t	e	

(22) Subnet mask (upper byte) (Option):

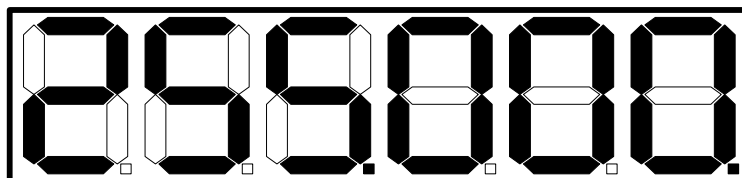
When the monitor has network and built-in USB memory interface, it is necessary to set subnet mask of Ethernet. The upper byte is set here. The subnet mask is "255.255.255.0" when shipped from the factory. This function is not equipped in the standard specification, so there is neither display nor setting. For details of this function, please refer to the instruction manual of the optional board of EG-3000 series.



C	P	S		2	2														
S	U	B	N	E	T		M	A	S	K		U	P	P	.	b	y	t	e

(23) Subnet mask (lower byte) (option):

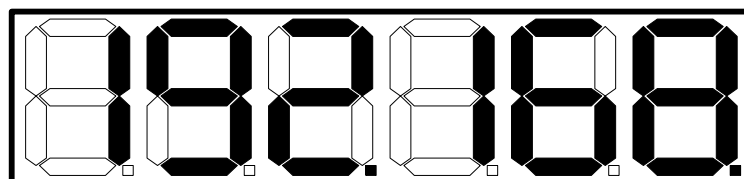
This is a setting of the lower byte continued from the previous item.



C	P	S		2	3														
S	U	B	N	E	T		M	A	S	K		L	O	W	.	b	y	t	e

(24) Default gateway (upper byte) (Option):

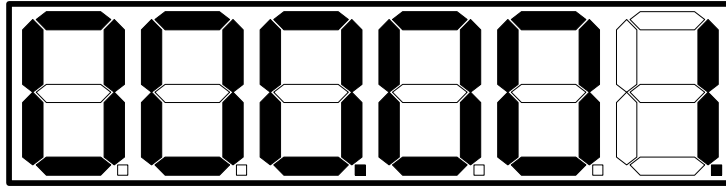
When the monitor has optional network and built-in USB memory interface, it is necessary to set default gateway of Ethernet. The upper byte is set here. The default gateway is "192.168.0.1" when shipped from the factory. This function is not equipped in the standard specification, so there is neither display nor setting. For details of this function, please refer to the instruction manual of the optional board of EG-3000 series.



C	P	S		2	4														
D	E	F	.	G	A	T	E	W	A	Y		U	P	P	.	b	y	t	e

(25) Default gateway (lower byte) (Option):

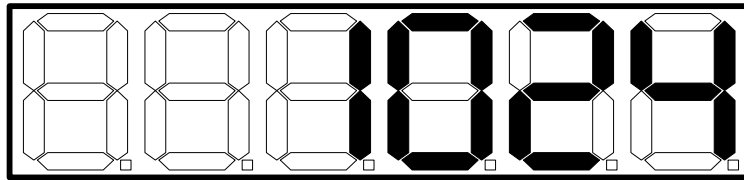
This is a setting of the lower byte continued from the previous item.



C	P	S		2	5														
D	E	F	.	G	A	T	E	W	A	Y		L	O	W	.	b	y	t	e

(26) UDP port number (Option):

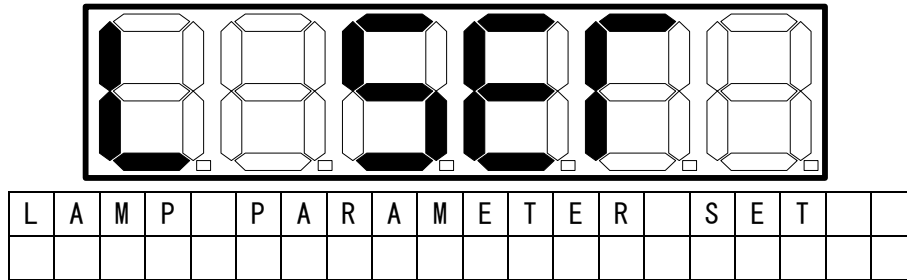
When the monitor has optional network and built-in USB memory interface, it is necessary to set UDP port number of Ethernet here. The default gateway when shipped from the factory is “1024”. This function is not equipped in the standard specification, so there is neither display nor setting. For details of this function, please refer to the instruction manual of the optional board of EG-3000 series.



C	P	S		2	6														
U	D	P		P	o	r	t		N	o	.								

6.9 Lamp parameter setting (LPS)

By pushing **RIGHT** button, it branches from the Setting mode. The related items of the built-in low-pressure mercury lamp can be set here. The following indication will be lit for about 2 seconds when switching to the lamp parameter setting.



Push **DOWN** button to shift to the next setting item. Moreover, pushing **UP** button enables you to return to the previous setting items. Pushing **MODE** button during displaying each setting item in the lamp parameter setting enables you to return to the branch point of the Setting mode.

The items that can be set are shown in “Figure-14”. The figure on the left hand of each item shows the guide number, and the related page is on the right hand.

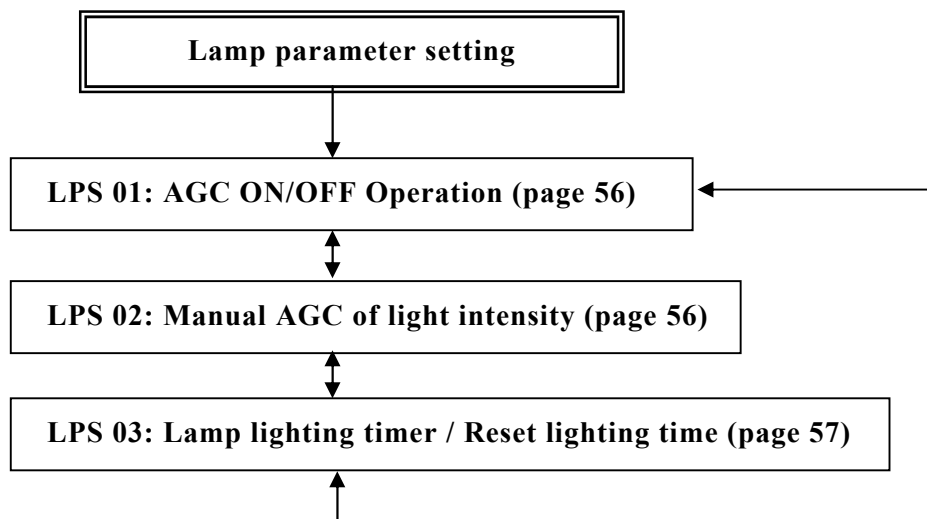


Figure- 14 Transition chart of Lamp parameter setting

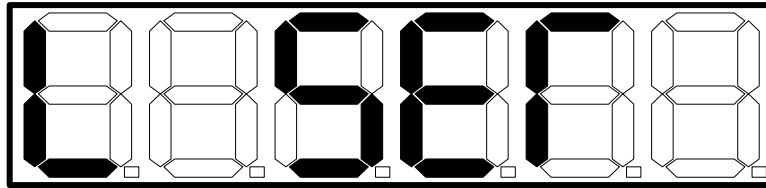
In case changing the setting value after shifting to each parameter setting mode, push **ENTER** button once, and then changeable numerical values or status indication will blink. The main-indication blinks in case of the numerical value, the sub-indication blinks in case of the status indication. Then set the value to be changed by pushing **UP/DOWN** button. Push the **ENTER** button again to finalize the value.

For details of each item are shown below.

(1) AGC ON/OFF Operation (Self-adjustment of the light intensity):

This series monitor has a self-adjustment function of light intensity.

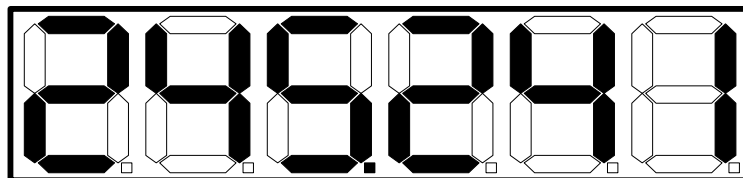
This is the setting to perform self-adjustment of the light intensity or not to perform, after the warming-up operation (just before starting the measurement) or during the measurement. When selected ON, relative light intensity will be automatically adjusted within the appropriate range (50-90%) during the measurement. If it is ON state, the measurement cycle may become longer since the adjustment is performed during the measurement. If this indication is OFF state, the adjustment value just before the power supply interruption is applied without performing gain-control after a warming-up operation. And after this, the measurement will be continued with the value as it is. It is set to ON (self-adjustment mode) when shipped from the factory.

[illegible]

(2) Manual AGC of light intensity:

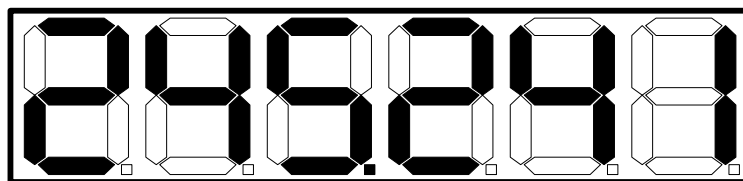
This function automatically compensates the output Sensor1 and Sensor2 within the appropriate range of the light intensity.

- The currently setting gain value is appeared on the main-indication: Sensor 1 on the left, Sensor 2 on the right.



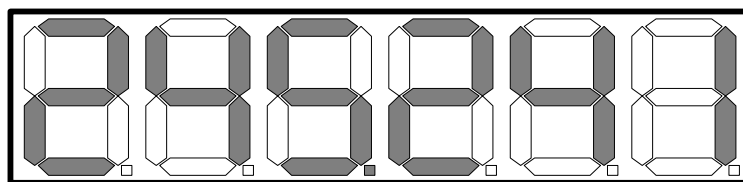
L	P	S		O	2													
M	A	N	U	A	L		A	G	C									

- If ENTER button is pushed, it becomes the screen to ask whether to perform the adjustment or not.



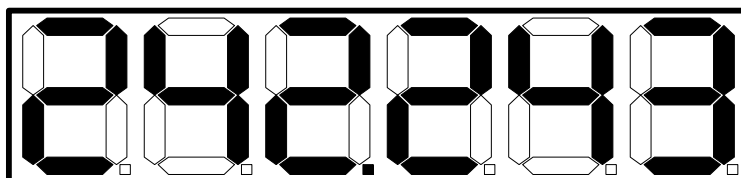
L	P	S		0	2														
M	A	N	U	A	L		A	G	C		R	e	a	d	y		?		

- Push ENTER button again to perform the adjustment. The main-indication blinks during the measurement.



L	P	S		0	2														
M	A	N	U	A	L		A	G	C		0	p	e	r	a	t	i	n	g

- The main-indication will display a new gain value after adjustment was finished. The character of "S1: OK /S2: OK" will be appeared on the sub-indication when it performed successfully.
- If the light intensity is not within the proper range (S1: LO / S2: LO) after the adjustment, replace the low-pressure mercury lamp with a new one.



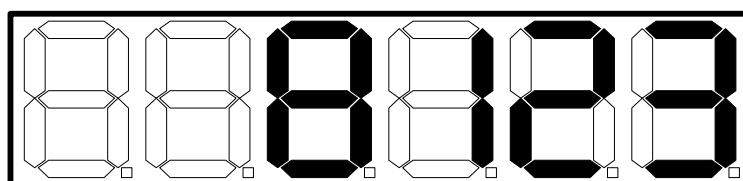
L	P	S		0	2											S	1	:	0	K
M	A	N	U	A	L			A	G	C						S	2	:	0	K

***Note:** If you replace the low-pressure mercury lamp with new one, perform this manual AGC of light intensity. In addition, perform this after sufficient warming-up operation (with stable condition of lamp emission).

(3) Lamp lighting timer / Reset lighting time:

Reset the cumulative lighting time for the built-in low-pressure mercury lamp.

The displayed indication shows the total lighting time up to the present. Push ENTER button one time, then the value on the main-indication blinks. "0" indication blinks by pushing UP/DOWN button. In this state, pushing ENTER button resets to "0" hour. When replacing the low-pressure mercury lamp, please reset this.

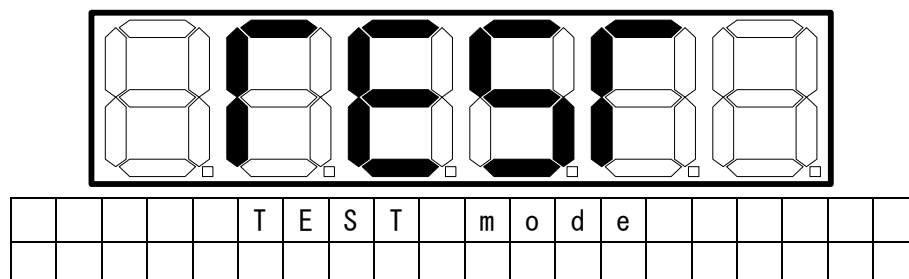


L	P	S		0	3																H
L	A	M	P		0	P	E	.	R	S	T										

6.10 Testing mode

This mode mainly tests input/output signal of the ozone monitor. When in the Middle mode, it will shift to the Testing mode by pushing RIGHT button.

However, in the Holding mode, transition to the Testing mode is not available. When switching to the Testing mode, the following display will be lit for about 2 seconds.



While displaying each item test in the Testing mode, the MODE button enables you to return to the Middle mode. Every time of pushing of DOWN button, it shifts to the next item. It returns to the previous item by pushing UP button. The possible testing items are as follows. The figure on the left of each item shows the guide number, and the related page is on the right side.

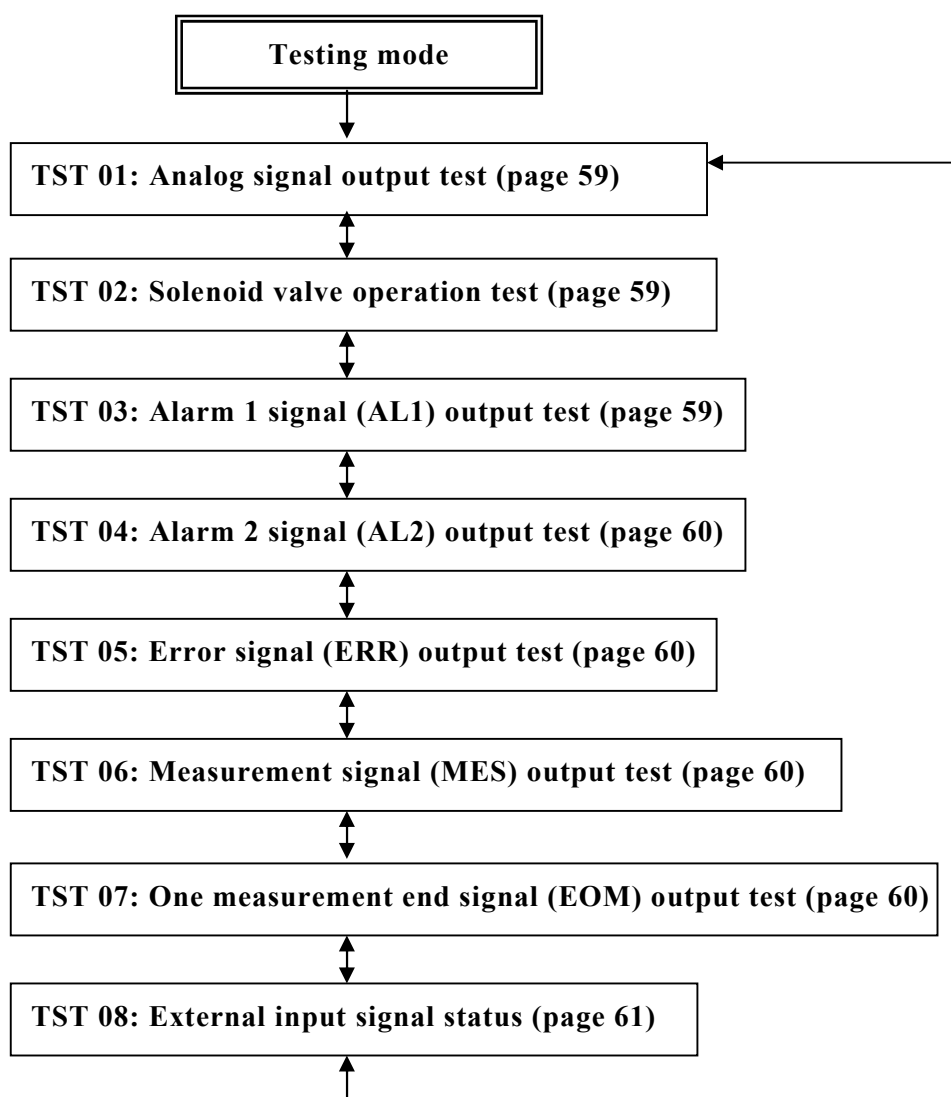


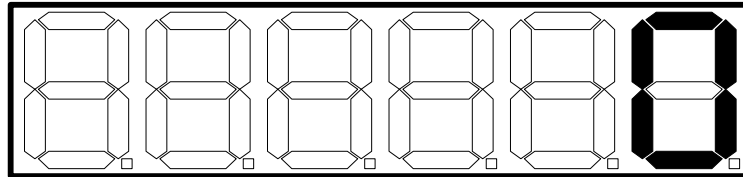
Figure- 15 Transition chart of the Testing mode

After shifting to the corresponding test item, output signal test will start by pushing ENTER button one time. If UP/DOWN button is pushed in this state, the output will change synchronized with the display. Then push ENTER button again, it becomes possible to shift to the next testing item.

Details of each item are shown below.

(1) Analog signal output test:

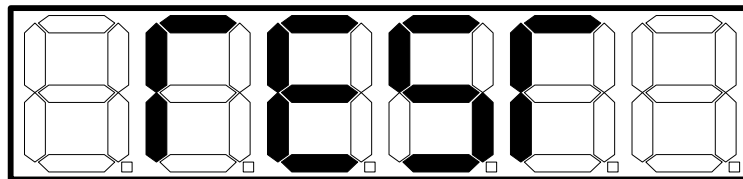
Every time of pushing UP/DOWN button, the indication changes, analog output (voltage/current) will change as following orders: 0, 25, 50, 75 and 100% of full scale. Operation check of the external equipment connected is available.



T	S	T		0	1												%
A	N	A	L	O	G		0	u	t	p	u	t					

(2) Solenoid valve operation test:

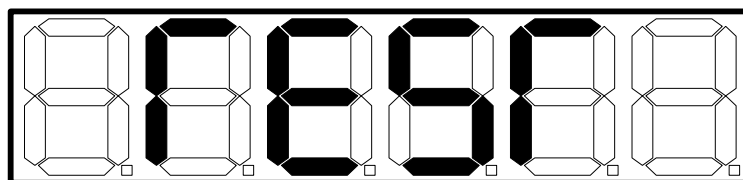
This is the test for built-in solenoid valve of this monitor. Every time of pushing UP/DOWN button, the port of solenoid valve will be ON/OFF state



T	S	T		0	2												
S	O	L	E	N	O	I	D		V	a	I	v	e				O N

(3) Alarm 1 signal (AL1) output test:

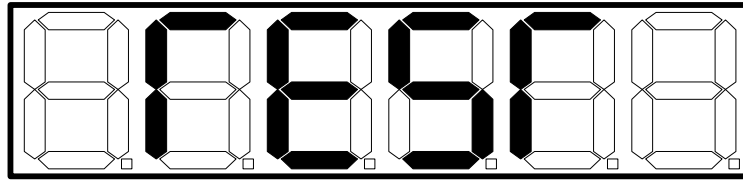
This generates Alarm 1 signal output. The relay contact signal will be ON/OFF state, every time you push UP/DOWN button. When specified to a-contact, the output becomes make-contact when it is ON state, and break-contact when it is OFF state.



T	S	T		0	3												
A	L	1		S	I	G	.	0	u	t	p	u	t				O N

(4) Alarm 2 signal (AL2) output test:

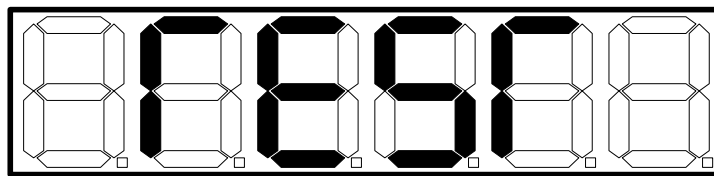
This generates Alarm 2 signal. The relay contact signal will be ON/OFF state whenever you push UP/DOWN button. When specified to a-contact, the output becomes make-contact when it is ON, and break-contact when it is OFF.



T	S	T		0	4														
A	L	2		S	I	G	.	0	u	t	p	u	t					0	N

(5) Error signal (ERR) output test:

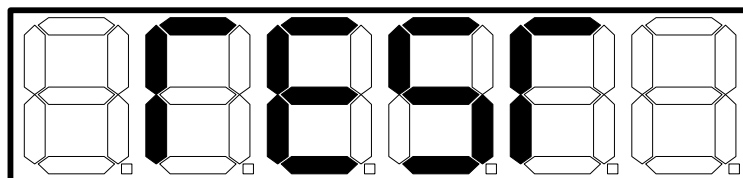
This generates Error signal. The relay contact signal will be ON/OFF state whenever you push UP/DOWN button. When specified to a-contact, the output becomes make-contact when it is ON, and break-contact when it is OFF.



T	S	T		0	5														
E	R	R		S	I	G	.	0	u	t	p	u	t					0	N

(6) Measurement signal (MES) output test:

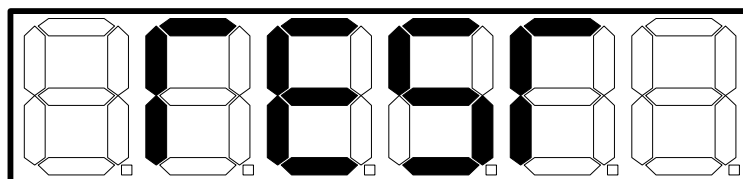
This generates Measurement signal. The relay contact signal will be ON/OFF state whenever you push UP/DOWN button. When specified to a-contact, the output becomes make-contact when it is ON, and break-contact when it is OFF.



T	S	T		0	6														
M	E	S		S	I	G	.	0	u	t	p	u	t					0	N

(7) One Measurement end signal (EOM) output test:

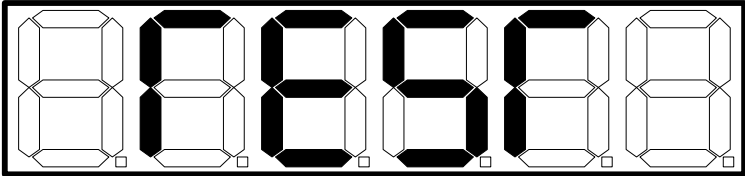
This generates one Measurement end signal. The transistor of the open collector will be ON/OFF whenever you push the UP/DOWN button.



T	S	T		0	7														
E	0	M		S	I	G	.	0	u	t	p	u	t					0	N

(8) External input signal status:

The current state of input signal connected to the terminal block of rear panel is shown. The state of each signal is shown in the sub-indication. "1" means a signal is ON, and "0" means it is OFF. Please refer to section 4.2 "Rear panel ③ Terminal block for signals" for the meaning of each signal.

															
T	S	T		0	8			R	E	S	:	0			
E	X	C	:	0				L	I	2	:	0			

7 Operation procedures and function utilization

7.1 Measuring flow-line

(*When using the monitor with multi-range specification and introducing atmosphere as zero gas)

In case of Model EG-3000F, if you use both internal zero gas generator and atmosphere as zero gas, make pipings to the monitor and another sampling part referring the following, "Measuring flow-line diagram, Figure-16".

When selected range 2 (high concentration (more than FS 10ppm)), supply the atmosphere to REF port as reference gas and when range 1 (low concentration (FS 1ppm)) is used, sample gas (ozone gas) should supply to REF separately.

* Note: Do not supply the ozone gas which has value over than 1ppm to REF of Model EG-3000F.

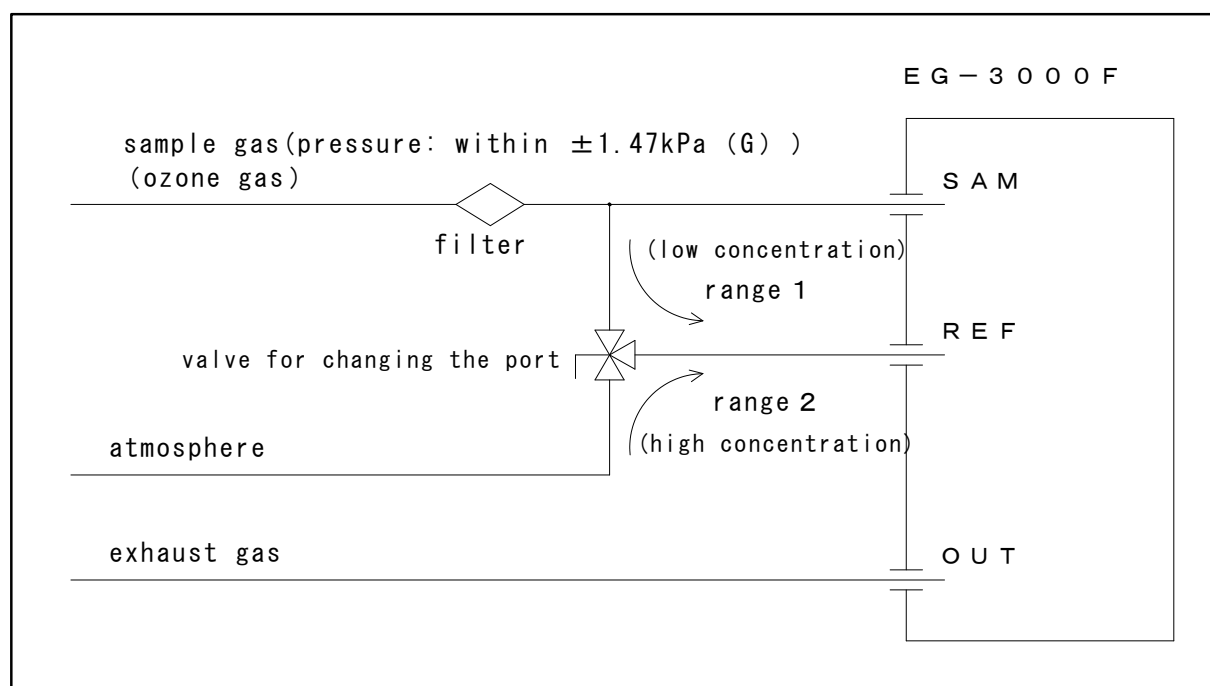


Figure- 16 Measuring flow-line diagram (in case of multi-range)



WARNING

- When smelled ozone, check whether there are crack on the enclosure, damage or fall out of the tube and loosening the joint or not, after stopping operation of the device.



CAUTIONS

- Do not attempt to remove the parts for maintenance before disconnecting power supply. It may cause in trouble of electric shock.
- Do routine maintenance and inspection for the device by specialist, because connecting points of pipings and enclosures may loosen as time goes on.
- Do not introduce sample gas having excessive pressure than the specification, this may cause a break or burst of the enclosure and parts, and may result in ozone gas leakage. Make sure to check the pressure specifications of the monitor and to perform periodical inspections.
- Sealing materials such as joint, piping and packing etc. which are used in the monitor, are not intended to be effective permanently. These materials are deteriorated by ozone gas and other materials and this may cause in ozone gas leakage. Perform the increased tightening of the joints and check and replace these materials regularly (every 1~2 years) by our service man.
- If another material excepting ozone, such as Hydrogen fluoride, is contained in the sample gas, it may sometimes have corrosion, corruption and white spot on the inside of wetted parts. In this case, when the monitor has a failure trouble and also becomes to be unable to measure the concentration, we can not have a duty to pay the warranty.
- Make sample gas to exhausted on condition that is dissolved after measuring the ozone concentration.
- Do not affect a shock and/or vibration to this monitor, this monitor is a precise equipment.

7.2 Operation procedures

Refer to Figure-2 "Front panel" and operate the monitor in accordance with the following items.

- (1) Confirm that the inlet and outlet for gas which are installed on the rear panel have their pipings correctly.
- (2) Operate the power switch ① to supply the power source. Power indication lamp ⑪ lights up and [UP × × . × ×] is displayed in the main-indication ⑨, and the current time and the character of [warming-up] are displayed in the sub-indication ⑩. And then, the monitor starts the specified warming-up operation.

- * **Note:** During warming-up operation, if the accumulated running time after the last maintenance is over 8000 hours, the message “Please maintain it.” may be displayed. Even if this message will be displayed, it does not mean that any trouble of measuring ozone will happen right now, but we recommend to perform a maintenance as soon as possible. Moreover, the accumulated running time from the last maintenance can be displayed in Checking mode (CHK 07).

(3) Flow adjustment

After warming-up operation, adjust the flow rate to 1.5 liter per minute, using a knob of the flowmeter ⑧ when [SAM] on the indicator lighted up, and also adjust it when [REF] indication. Read and confirm the indication of the flow rate at the center point of a floating ball.

- (4) After operating the monitor for specified warming-up operation, it will automatically become in measuring mode and measure ozone concentration.

(*In case of this operation, set the remote control signal effectively, and also outside control input signal is not applied to the monitor.)

- (5) In case of using the multi-range specification, set the range of the monitor itself and switch the corresponding zero gas flow-line by switching valve simultaneously, and then measure each ozone concentration. Please refer to “Figure-16: Measuring flow-line diagram (in case of multi-range)”. Incorrect switching makes not only measurement error but also earlier deterioration of zero gas generator inside of the monitor.

7.3 Switching the measuring range (*only available to multi-range specification)

When changing the measuring range, push UP button at least 3 seconds during the measurement (in the Measuring mode) to change it. If the button operation was accepted, the next range number in reverse will be displayed on the right side of currently measured range number on the sub-indication. Actually, the range will be changed after the current measurement cycle.

Once the power source turned off, it will start a measurement with the measuring range just before the power interruption when the power source turned on again.

- ***Note 1:** When performing low concentration measurement after the high concentration measurement, indication of ozone concentration value may sometimes become unstable for several minutes because of purging for gas in the piping.

- ***Note 2:** This function is an optional specification. It is not available for standard specification.

7.4 How to use the functions

(1) When skipping warming-up operation:

When the power supply is turned on soon after it is stopped for a short time, the warming-up operation can be skipped. Push the mode button ② at least 3 seconds during the warming-up operation. However, after the long interruption, do not omit the warming-up operation, otherwise the warming-up operation becomes insufficient by canceling this operation immediately after the power source turned on, and the concentration value displayed may become unstable.

(2) When existing the background components:

When the background components exist in the sample gas, push ENTER button at least 3 seconds during the measurement. The compensated value will be displayed from the next measurement cycle and the character of [B] will indicate on the sub-indication.

***Note:** Do not push the ENTER button while measuring the ozone gas.

(3) When releasing the background calibration:

The background calibration will be released by pushing ENTER button again at least 3 seconds, at when the character [B] is displaying on the sub-indication during the measurement. Then the character [B] on the sub-indication will disappear.

(4) When changing measurement mode:

Shift to the Setting mode (Common parameter setting) according to the purpose in the following, and then set the Measuring mode.

① Normal mode:

The normal mode measures the ozone concentration with sucking zero gas and the sample gas alternately in the 1 measurement cycle (T second). When ozone concentration at measuring point fluctuates slowly, or when the averaged value for a fixed time is required, normal-mode measurement is recommended.

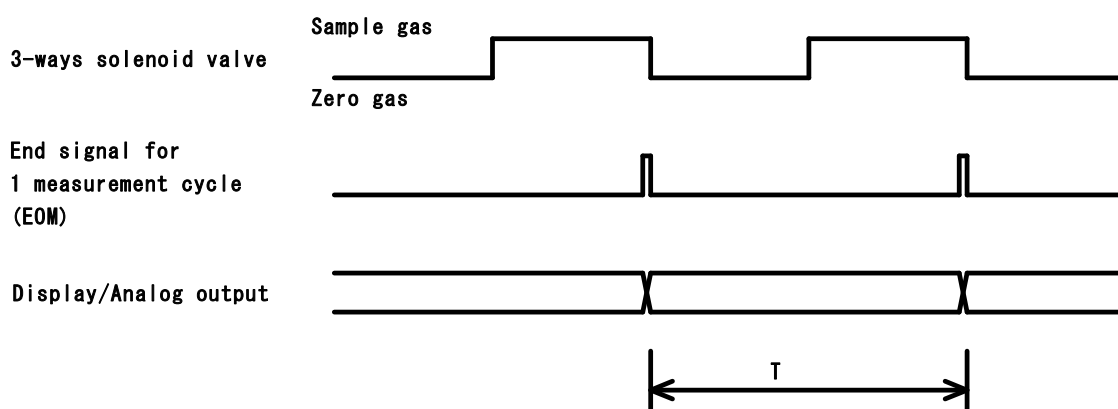


Figure- 17 Operation of Normal mode

② Continuous Mode

If the ozone concentration of measurement point changes every moment, the continuous mode with fast response speed is recommended. This continuous mode enables you to set the time interval for the zero calibration by notch of 1 minute.

Please pay attention that the drift might increase if zero calibration is not performed for a long term.

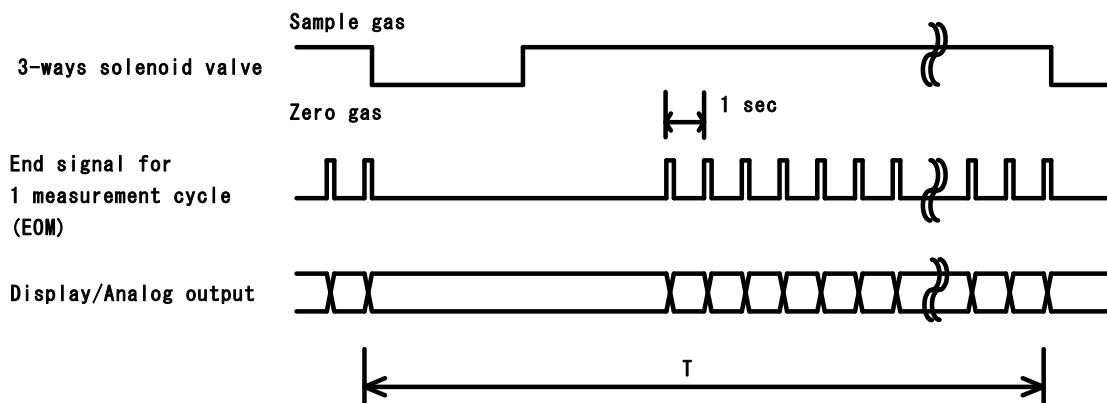


Figure- 18 Operation of continuous mode

***Note1:** When abnormality was seen in lamp lighting during the continuous measurement mode, there is the case that above cycle T might become shorter than the setting value to reset a lamp lighting circuit.

***Note2:** It is set to a normal mode when shipped from the factory.

Table 2 Measurement modes

Setting mode	Normal mode					Continuous mode
One mea. cycle	10 s	15 s	20 s	30 s	60 s	1 minutes only

***Note:** EG-3000F is not applicable to [10 seconds of normal mode].

Although accuracy is inferior, it can be used by continuous mode till 1 minute.

Regarding changing of the Measurement mode, refer to section 6.8 "Common parameter setting mode (CPS 01)".

(5) Setting the measuring unit:

The unit of measurement can be set according to item of the unit setting in Setting mode. Please be aware of the unit which can be set is different by its type of the monitor.

Table 3 Possible setting of measuring unit

Type of monitor	ppb	pphm	ppm	g/m ³	wt%
EG-3000F	○	○	○	×	×

(6) When span adjustment is performed:

If you perform a calibration to adjust span value, please reset the calibrated setting value to one multiplied by coefficient which you want to calibrate. Refer to section 6.7 "Range parameter setting (RPS □6 Span calibration ratio" and set the new values.

***Note:** Do not perform this operation except during calibration.

(7) When using contact interlocked with power switch PWC:

This contact output is interlocked when the power switch turned on, and it is available at PWC terminals on I/O terminal block. Use these terminals when you must use and operate external equipment with the ozone monitor at the same time (Synchronizing it with power switch). The contact capacity is 100V AC, 1A.

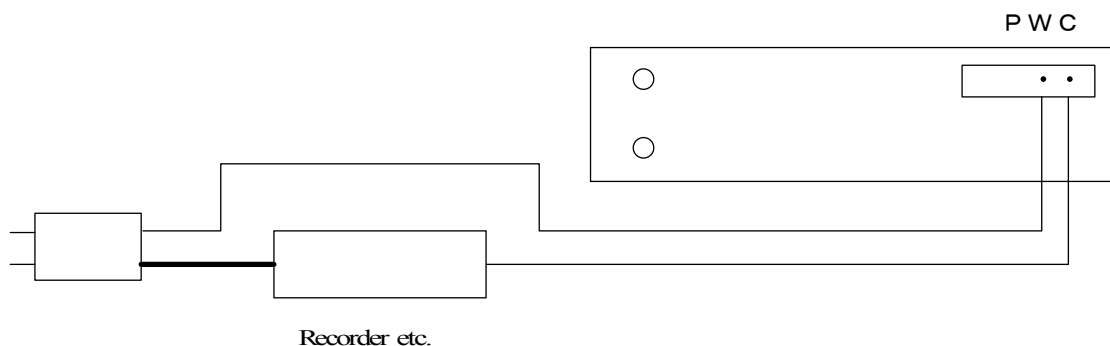


Figure- 19 Example application for contact linked with the power switch

(8) When using the alarm signal:

When the measured value exceeds the preset alarm value, the contact signals are transmitted from I/O terminal block. [AL1] terminal is used for Alarm 1, and [AL2] terminal is used for Alarm 2. It can be used as an abnormal warning by interlocking with an electronic-buzzer. Refer to section 6.7 "Range parameter setting (RPS □4 Alarm 1, RPS □5 Alarm 2)". The alarm value which can be set is up to analog full scale value. Alarm setting value will be 0 if you change the analog full scale value once. When given the alarm (exceeded the setting value), AL1 or AL2 will be shown in the first line of the sub-indication, instead of the current time.

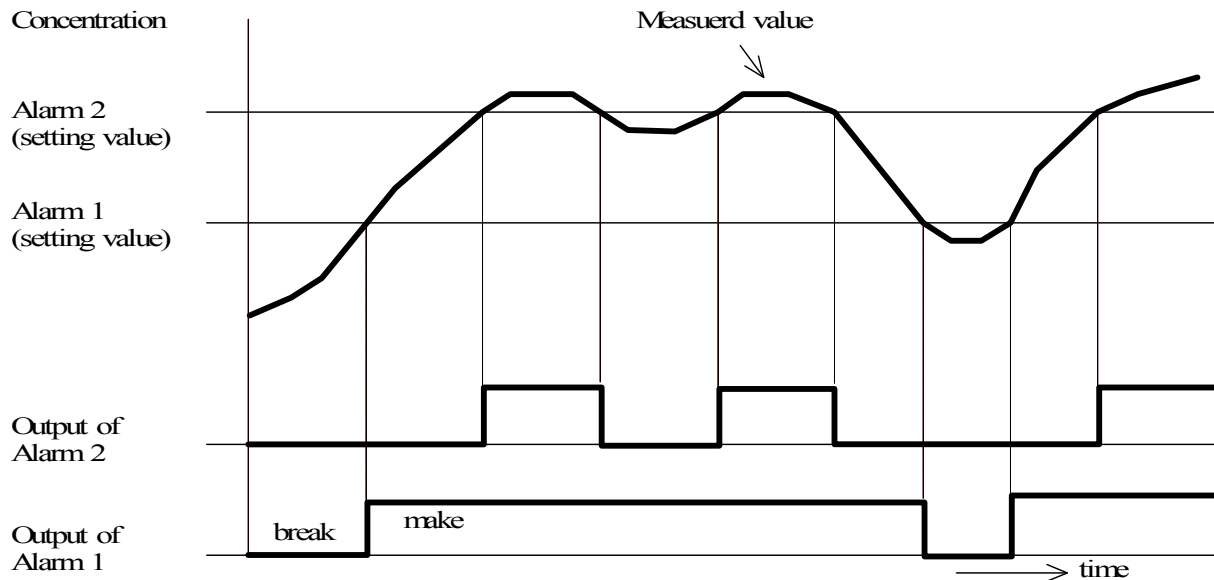


Figure- 20 Alarm output of concentration (in case of 'a' type contact)

(*in case of the multi-range specification)

Alarm 1 (AL1) and Alarm 2 (AL2) can individually set to Range 1, Range 2 or Range 3, but the alarm setting value of the range currently measured will be valid.

(9) When using signal under measurement:

Contact signal (100 V AC, 1 A) under measurement [MES] is located on the I/O signal terminal, and if it is set to a-contact, its contact condition are shown as below.

- under measurement.....make (active)
- powered off.....break (inactive)
- Checking modebreak (inactive)
- Setting modebreak (inactive)
- Testing modebreak (inactive)

But when the monitor is set to Output holding mode, even if it was set to Checking mode or Setting mode, this contact is in make state as it is.

(10) When using end signal for 1 measurement cycle:

Whenever 1 measurement cycle ends, the pulse signal (time width of 100 ms.) is output from the signal terminal block [EOM] terminal.

This signal is available to synchronize to external electric equipments. As for an output timing, refer to "Figure-17" and "Figure-18".

*Note: When Open-Collector's outputs are active ([ON] state), the output-impedance is 1 k Ω , so that over voltage than 35 V DC can not be applied to the circuit used with this collector.

(11) When using the analog output signal:

① Voltage output:

Set the range of voltage output, fitting it according to the input range of controller or recorder and etc. which are connected to the monitor. Regarding Setting method, refer to section 6.8 "Common parameter setting (CPS 04 Analog voltage 1 output range).

The value which can be set, is any one of 0.1 V, 1.0 V and 10.0 V.

When concentration value had become the full scale value, this voltage will be supplied as output. Furthermore, in case of the value less than one of full scale, the voltage which is in proportion to the concentration value at that time, will be supplied as output. The signal output will supply from VO1 on the signal terminal block installed on the rear panel. Regarding this connection, connect the wire so as not to have a mistake of polarity. Upper side of the signal terminal block is polarity of plus (+) and the load resistance which can be connected to its outside is over than 10 k Ω .

When the indication had already exceeded from full scale value, output is kept at the full scale value.

In Testing mode (TST 01 Analog signal output test), you can confirm an analog output. At this time, this indicator is displayed as follows (refer to Table 4), and the voltage corresponding to the indication is output to [VO1] terminal of the signal terminal block of the rear panel, and the current is output to [IO1].

Table 4 Indication and Check of analog output

State	output range Main- indication	0~0.1 V range [mV]	0~1.0 V range [V]	0~10 V range [V]	4~20 mA range [mA]
1	0	0	0.00	0.0	4
2	25	25	0.25	2.5	8
3	50	50	0.50	5.0	12
4	75	75	0.75	7.5	16
5	100	100	1.00	10.0	20

Regarding the above state 1~5, they can be change to push the UP or DOWN button. If connected a recorder, to adjust zero and span are available.

② Current output:

The current output is supplied at 4-20mA DC. The load resistance which can be connected to outside is less than 750 Ω . The setting of full-scale value, the checking of analog output, and the value when Err (error) and etc, these are as same as the case of voltage output.

(12) When starting measurement via external signal:

By using outside signal, you can start or stop the measurement. Make [EXC] signal to be valid in Setting mode (CPS 14 Valid/invalid of External control signal "EXC"), and connect TTL signal wire to the [EXC] terminal on the rear panel.

[H] (2.4 - 5.5 V DC) Voltage level to stop measurement

[L] (0 - 0.8 V DC)..... Voltage level to start measurement

If you want to let no relation with an external signal, make it to be invalid in the setting mode (Common parameter setting CPS 14). It is set to be invalid (DISABLE) when shipped from the factory.

(13) When using the serial port (RS232C):

In case of EG-3000, a personal computer and etc. should be connected to D-sub connector installed on the rear panel and this can automatically store measuring data and etc. as a data and also can control the monitor. These communication protocols have 2 kinds and regarding its setting, refer to section 6.8 "Common parameter setting (CPS 18 Serial port protocol)".

① EG-2001 compatible mode:

This is the same one of the communication protocol for EG-2001 series of conventional type. When using the outside communication soft of EG-2001, set it to this mode. In this mode, it will transmit only concentration value in the one way from monitor and computer for outside control will only receive the data. It can not control the setting and etc. to the monitor. And then, this transmission speed becomes 4800 bps. Regarding another protocols are as follows.

- Communication method : full double asynchronous method
(start and stop system)
- Data bit length : 8 bits
- Stop bit length : 2 bits
- Parity : non
- X parameter : valid
- S parameter : invalid
- DEL code : valid

② EG-3000 mode:

This is the polling method that uses an outside control master computer. To set and control the monitor is possible. And then, the transmission speed also can select from 4800 to 230.4 kbps. It is set to 19.2 kbps when shipped from the factory. Set the most suitable speed with consideration for installation environment. Main protocols are as follows.

- Communication method : full double asynchronous method
- Data bit length : 8 bits
- Start bit length : 1 bit
- Stop bit length : 1 bit
- Parity : non
- Communication speed : 4.8k / 9.6k / 14.4k / 19.2k / 28.8k / 38.4k / 57.6k /
76.8k / 115.2k / 230.4kbps

***Note 1:** All communication speeds in the above are not warranted in any installation environment. Set the suitable speed with consideration for installation environment.

***Note 2:** Regarding detail specifications about EG-3000 mode, refer to another Instruction manual of EG-3000 communication protocol.

7.5 Other functions

(1) Function of temperature compensation:

Conditions after compensation (rough estimated value) which is performed generally

- Low concentration measurement at environmental measuring etc:
20°C, one atm (1013 hPa (abs))
- High concentration measurement at generated ozone etc:
0°C, one atm (1013 hPa (abs))

Formula of temperature compensation

If the compensation is necessary, compensate the measured value according to the following formula.

$$C' = C \times \frac{273.15+t}{273.15+t_0}$$

Where,

- C' g/m³ (N) : concentration value of after temperature is compensated
(indication value of the monitor)
- C g/m³ : concentration value at t °C PhPa (Abs) (not compensated)
- t °C : temperature of sample gas
- t₀ °C : standard temperature (0°C or 20°C)

The setting of the compensated temperature can be changed in the Setting mode. In addition, valid/invalid of temperature compensation can be set too. The temperature compensation as standard specification has set to be valid when shipped from the factory. The compensated temperature of EG-3000F is set to 20°C.

(2) Heater for lamp:

The low-pressure mercury lamp in low temperature may sometimes make the UV rays emission unstable because of its structure. For this prevention, this series monitor has a built-in heater, so that ON / OFF operation setting of the heater can perform on the front panel. This heater is set to ON state when shipped from the factory. If the ambient condition used is high temperature, set it to OFF state

(3) History of the measurement:

Regarding this series, histories of measured concentration and event are stored in the internal non-volatile memory except each setting value. These data are always revised to the latest values, and they are maintained even if electric power is turned off. Therefore, if the monitor has an accident, you can make the cause clear quickly by analyzing these data. Generally, to take out the data is performed via Ethernet or USB.

① **History of the measured concentration value:**

This records the concentration value and the value of each sensor etc. along with their time, fitting to the revised timing of data measured. In the normal mode, they are recorded each time, and in the continuous mode, two kinds of data are recorded: the first data after zero gas measurement and the data before measuring the next zero gas. Numbers of these data are 29081 points. Therefore, data can be maintained for about five days at 15 seconds cycle in normal mode measurement.

② **History of event detection:**

If the monitor has any events, such as mode change, each kind of setting and alarm/error etc. from when the electric power had turned on, they are recorded with the time. The history of event is 112 points.

7.6 Optional functions

The following functions are optional, so they are not available as a standard specification.

(1) **Function of pressure compensation:**

Basically, the pipings of ozone monitor are arranged so as to exhaust the sample gas (generated ozone) to atmospheric pressure, or to suck it (exhaust ozone or ambient ozone) from atmospheric pressure. In this case, ozone concentration is affected by the environmental pressure. Generally, if the environmental pressure is 1000~1020 hPa (Abs), this error range may be in $\pm 1\%$. So it is not necessary to compensate it because it can be considered that it is within the error range as an ozone level. But you can compensate it by optional built-in pressure sensor.

Normally, an absolute pressure sensor is used and this pressure compensation value should be calculated according to the following formula.

Formula of pressure compensation

$$C'' = C' \times (P_0/P)$$

Where,

P hPa (Abs) : sample gas pressure..... hPa (Abs)

P₀ hPa (Abs) : standard atmospheric pressure..... 1013 hPa (Abs)

C'' : pressure compensation value indicated on the monitor

C' : ozone concentration value not compensated

(2) **Function for generating the output of hour average value:**

This will supply an analog output by adding the average output of indication data for 60 minutes in order. Therefore, if measuring the fixed concentration, the indicated concentration value and the analog output become the same after 60 minutes.

This output waveform is triangle because it is added sequentially. This output will be supplied from the signal terminal block (VO2 or IO2) installed on the rear panel.

You can specify the factory setting whether reset is based on the time of the outside equipment or it is based on the internal time of the monitor.

When you had specified the outside resetting, input the reset signal to the signal terminal block (RST) installed on the rear panel.

(3) Output interface of USB and Ethernet:

Since EG-3000 series ozone monitors are equipped with the internal memory, the latest measuring data and each event's information are recorded here. The above USB or Ethernet interface becomes necessary in order to read out this data. In addition, to control setting etc. of the monitor and also to collect information of the ozone concentration in real time can be performed via Ethernet interface.

USB interface corresponds to USB memory and transfers the above recorded file to it, and can record the measured concentration data.

8 Inspection item**WARNING**

- When smelled ozone, check whether there are crack on the enclosure, damage or fall out of the tube and loosing the joint or not after stopping operation of the device.

**CAUTIONS**

- Never introduce into the monitor a sample of which pressure is higher than the limit. Otherwise, it would cause a leak or trouble. Don't forget to check the pressure specifications of the monitor and to perform periodical inspections.
- Make to exhaust the sample gas on condition that it is dissolved, after when sampling.
- Do not affect a shock and/or vibration to this monitor, this instrument is a precise equipment.

8.1 Daily inspection

- (1) Prior to measure, confirm whether the connections of piping and wiring on the rear panel have slackness or not.
- (2) Confirm that the flow rate is suitable value (1.5 L/min) when measuring.

8.2 Regular inspection

- (1) Remove an upper cover of the monitor, and inspect whether the fixed screws on each portion (solenoid valve, sample cell etc.) have slackness (once a year).
- (2) Inspect whether light intensity of the low-pressure mercury lamp is suitable, according to the following procedure.
 - ① Wait until the display counts down from "UPXX.XX" after turning on the power supply and the measurement starts.

- ② Once the Measuring mode begins, push the MODE button for at least 3 seconds to shift to the Middle mode. Then confirm the following each values after shifting to the Checking mode by pushing the DOWN button.

- Relative light intensity of Sensor 1 (CHK 01)

This is the ratio of input value to the input range of the A/D converter of Sensor 1.
The unit is %, and an appropriate range is 50.0-90.0%.

- Relative light intensity of Sensor 2 (CHK 02)

This is the ratio of input value to the input range of the A/D converter of Sensor 2.
The unit is %, and an appropriate range is 50.0-90.0%.

*Note: If either of each sensor is beyond the appropriate range, adjust it referring to section 6.9 "Lamp parameter setting (LPS 02 Manual AGC of light intensity)".

- Absolute light intensity of Sensor 1 (CHK 03):

This is the value that considered the deterioration of the low-pressure mercury lamp which is different from Relative light intensity mentioned above.
The appropriate range is 9000 and above. When the value is smaller than this, replacement of the low-pressure mercury lamp is necessary.

- Absolute light intensity of Sensor 2 (CHK 04):

This is the value that considered the deterioration of the low-pressure mercury lamp which is different from Relative light intensity mentioned above.
The appropriate range is 9000 and above. When the value is smaller than this, replacement of the low-pressure mercury lamp is necessary..

*Note 1: If the displayed value of Sensor 2 is smaller than one of Sensor 1 on the absolute light intensity, it might be the dirt of the cell, so the cell disassembly and cleaning is required.

*Note 2: If both of the light intensity are within the appropriate range, return to the measurement of ozone concentration by operating MODE button.

9 Maintenance



CAUTION

- If another material such as hydrogen fluoride is contained in the sample gas or using wetted gas, and also if high concentration ozone gas is used in the PTFE piping, it may sometimes have corrosion, corruption, white spot on the inside of wetted parts. In this case, when the monitor has a failure trouble and also becomes to be unable to measure the concentration, we can not have a duty to pay the warranty.



WARNINGS

- A high voltage power supply (Steady state: about 200 V AC and Starting state: about 1000 V AC in a moment) for the low-pressure mercury lamp is built-in this monitor, so that you may have an electrical shock when perform adjustment and repairing inside of the monitor. Do perform it with a specialist.
- If you opened the front panel under when an electric power is supplied, you may have a chance which can receive UV ray from the low-pressure mercury lamp with burning light inside. Do wear glasses for protecting your eyes when you work on it.

9.1 Cleaning

To avoid the dust, clean the monitor with a dry and soft cloth periodically, but do not use solvent such as a thinner.



CAUTIONS

- To avoid Electrical Shock, surely disconnect power to the monitor before replacing the consumable parts.
- Connecting points of pipings and enclosures may be loosen as time goes on. And sealing materials such as packing and O-ring used to the parts can cause in leakage in their deterioration. Do routine maintenance and inspection for the monitor and its related device by manufacturer,
- Do not supply sample gas with over pressure than rated value, otherwise, this can result in damage of failure for each vessel and parts, and also it may cause ozone leakage.
- Do not affect a shock and/or vibration to this monitor, this monitor is a precise equipment.
- When the monitor is poured with a water, turn off the power and remove its cable immediately, so as to check this insulation resistance after drying it. Please advise this information to manufacturer if the value is too low.

9.2 Adjustment of light intensity for low-pressure mercury lamp

If the light intensity of the low-pressure mercury lamp is not within the appropriate range, or after replacement of the lamp, adjust the light intensity in accordance with the following procedures.

- Appropriate range of relative light intensity of Sensor 1 and Sensor 2:
50.0-90.0%

- (1) Adjust the light intensity after sufficient warming-up operation.
If the adjustment performed automatically in condition that luminescence of low-pressure mercury lamp is not in steady state, they may have a shift from the appropriate range after then.
- (2) Select "the Lamp parameter setting" in the Setting mode by operating the button on the front panel.
- (3) Select the item of manual AGC (LPS 02).
- (4) When the ENTER button is pushed, self-adjustment of the light intensity will start.
- (5) This adjustment completes if the character of OK will appear after a few seconds at both of the S1/S2 in the sub-indication. At this time, the main-indication displays the gain value for Sensor 1 on the left side, and for Sensor 2 on the right side.
- (6) If the character of LO is appeared at both of S1/S2 in the sub-indication, and a gain value of the main-indication is 255, there is the possibility of the life of low-pressure mercury lamp. Please replace it for a new one according to the procedures.
- (7) Enter into the Checking mode by operating the button, and confirm the light intensity is within the appropriate range.

9.3 Replacement of consumable parts

Each part used in the monitor has a life. And then, regarding deterioration and stains of material by ozone reaction, this warranty is out of our duty. Replacing term of main parts are as follows. Guarantee terms of all parts are one year after delivery.

Table 5 List of consumable parts

Consumable parts of the main body

Name	Goods code	Quantity	Replacing term	Remarks
Low-pressure mercury lamp	BZ103A	1 pc	every 1year	The low-pressure mercury lamp has a life, and the light intensity will decrease.
3-ways solenoid valve	BZ140A	1 unit	every 1year	To switch the sample becomes harder by abrasion.
Packing of flowmeter	NO016A	1 set	every 1year	The packing is used as a sealing material. Sealing characteristics will decrease by deterioration.
Cartridge for zero gas	BZ005A	1pc	every 1year	This will deteriorates with use and cannot generate zero gas.
O-ring for zero gas cartridge	NO005A	1pc	every 1year	Necessary for the replacement of zero gas cartridge.
Pump	BZ401A	1set	every 1year	The expected time required for replacement is every 1 year. (Warranty: 1year)
PFA tube(OD6mm/ID4mm)	NK030A	5m	—	Exchange if a dirt or damage etc occurred.
PCB, Sensor, Sample cell etc.	—	—	—	Expected time required for replacement is 5-7years. (Warranty: 1year) Depends on the dirt level of the sample cell.
O-ring set for EG-3000F	BZ613A	1set	—	Necessary for disassembly and cleaning of the cell .
Button battery	—	—	—	Commercial CR2032 type battery. Exchange it every five years.

Consumable parts of accessories (Option included)

Name	Goods code	Quantity	Replacing term	Remarks
PTFE (Teflon) Filter element 1μm	NF009A	10 Sheets/set	—	The filter will clog with contamination depend on its using environment, and cannot get sufficient flow rate. If NF000A was selected when delivered.
Filter	NF012A	1pc	—	If BZ175A was selected when delivered.
Filter	NF008A	1pc	—	In case of the multi-range specifications
PFA tube (OD6mm/ID4mm)	NK030A	5m	—	Please exchange it when dirt and damage, etc. are occurred.

9.4 Replacement of low-pressure mercury lamp

When an appropriate value is not indicated after the adjustment, or when a low-pressure mercury lamp will not light up, replace the low-pressure mercury lamp referring to the following “Figure-21” and “Figure-22”. Guarantee term of the low-pressure mercury lamp is 9000 hours (approx. 1 year) from the product delivery, so please replace the lamp in the approximate time to 9000 hours. Refer to section 6.5 "Checking mode (CHK 06)" Accumulative lighting time of lamp.



CAUTIONS

- Do not touch a low-pressure mercury lamp directly with fingers, because it has a very high temperature.
- Since the power source of a low-pressure mercury lamp has high voltage, you have to pay attention about it.

- (1) Turn off the power switch and disconnect power cable for safety.
- (2) Remove the upper cover from the ozone monitor.
- (3) After confirming that the temperature of the lamp itself in the monitor fell enough, disconnect a lamp connector from PCB of power source for lamp.
- (4) Loosen the mounting screw① and take out the used low-pressure mercury lamp unit②.
- (5) And then install a new low-pressure mercury lamp unit and tighten the mounting screw ①.

- (6) Connect the lamp connector to one to the power PCB.
- (7) Put back the upper cover of the ozone monitor.
- (8) Connect the power source plug and set the power source switch to [ON].
- (9) After 20 minutes (after the warming-up operation have done), shift to the Setting mode (Lamp parameter setting LPS 02) by pushing MODE button as shown in section 9.2 “Adjustment of light intensity for low-pressure mercury lamp” and perform automatic gain adjustment of the light intensity.
- (10) Shift to the Setting mode (LPS 03), and reset the cumulative lighting time of lamp.
- (11) Shift to the Checking mode (CHK 01, CHK 02) by operating MODE button, and then confirm the light intensity of Sensor 1 and Sensor 2. It is normal if both are within 50.0-90.0%.

***Note:** The equipped low-pressure mercury lamp of model EG-3000F is BZ103A.
Be sure to confirm model of the monitor, and then replace a corresponding lamp.

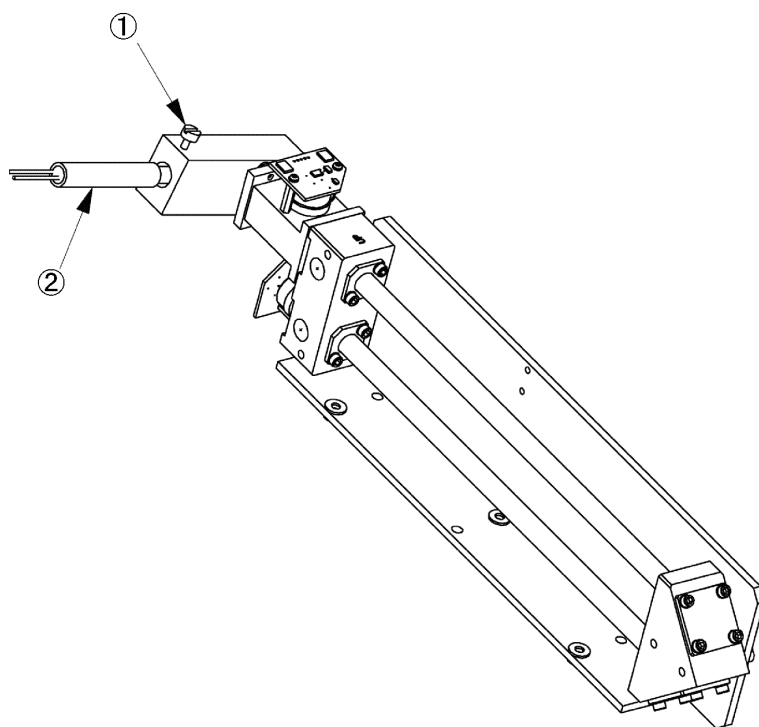


Figure- 21 Optical portion of Model EG-3000F

***Note:** ① is a mounting screw, and ② is a low-pressure mercury lamp.

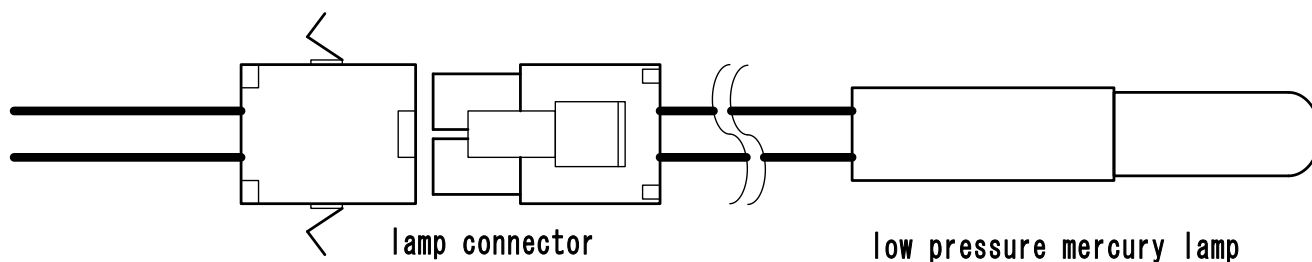


Figure- 22 Lamp connector and low-pressure mercury lamp of Model EG-3000F

9.5 Replacement of the cartridge for zero gas generator

- (1) Loosen two mounting screws ① of the zero gas generator holder, and remove the upper cover of zero gas generator ②.
- (2) Take out the used zero gas cartridge ③ (cylindrical shape in inside) of the zero gas generator from the lower cover of zero gas generator ④, and replace it with new one. Apply silicon grease very little on the side of the cartridge so as to put into the lower cover easily.
- (3) Put the upper cover over the new cartridge, and then tighten it with two mounting screws.

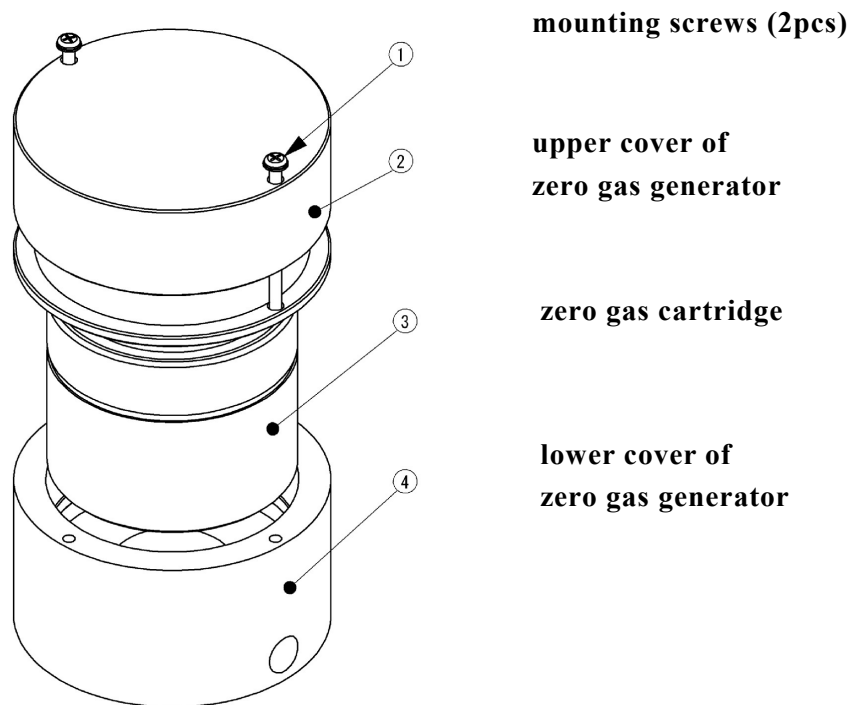


Figure- 23 Replacement of the cartridge for zero gas generators (EG-3000F)

9.6 Maintenance of the suction pump

(* Regarding Model EG-3000F, a suction pump is equipped in the monitor.)

The diaphragm type air pump is used in order to get sample gas. The pump cannot obtain its suitable flow-rate if its valve and diaphragm become to be deteriorated. Replace this pump with new one every one year (about 9000 hrs).

9.7 Replacement of filter element

***Note:** It is necessary to replace this filter element only when using model EG-3000F.
Replace it according to the following procedures.

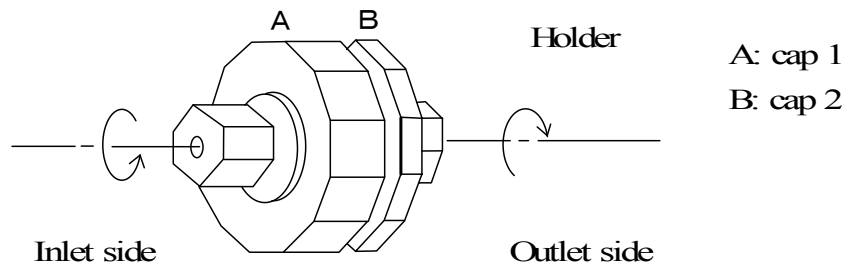


Figure- 24 Filter element (EG-3000F)

1) Replacement procedure for filter element

- (1) If remove cap A and cap B by rotating it toward direction (CCW) of arrows each other, they can be removed.
- (2) Replace the used filter element with new one after the light blue protection sheet will be peeled off, referring the following Figure-25 below. As the protection sheet is only used for protecting this filter, throw it away.
- (3) Mount the seal ring so that the shorter radius side should be touched the surface of filter element. Then tighten Cap 1 to Cap 2 by rotating to clockwise in reverse direction in the above (1) (refer above Figure 25) .

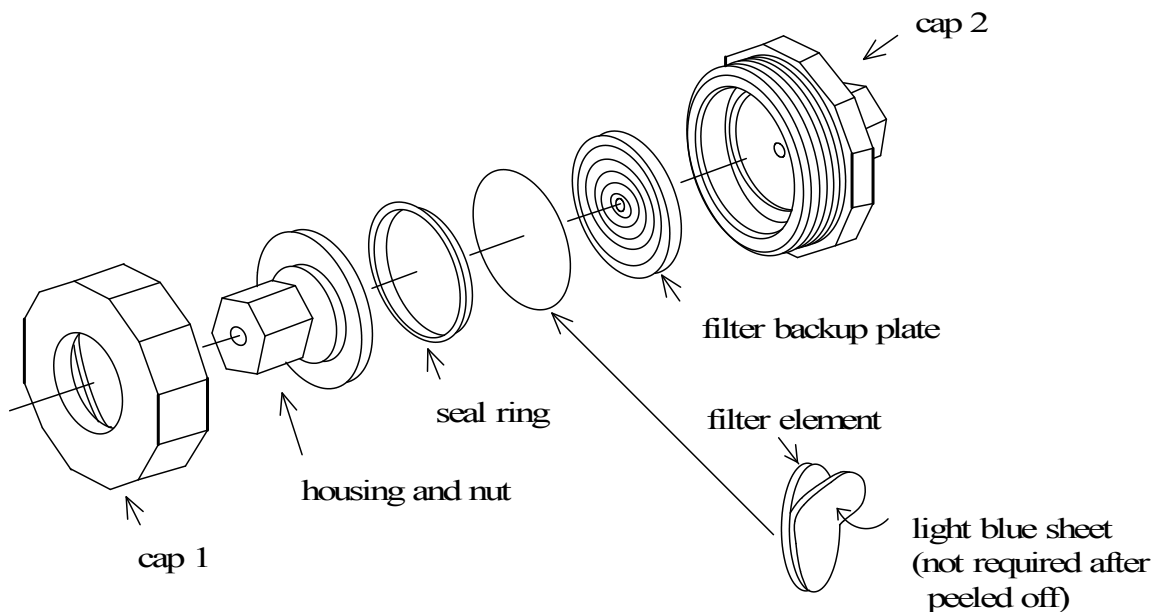


Figure- 25 Replacing of filter element (EG-3000F)

2) How to perform the piping for Teflon filter

When connecting PFA (Teflon) tube to the Teflon filter, perform the piping in accordance with following procedure.

- (1) After removing the nut, insert a PFA (Teflon) tube into it (refer to Figure-26 (a)).
- (2) Insert the tube into the flare of sleeve installed on the body by pushing it till the stopper.
- (3) Remove the PFA (Teflon) tube with the sleeve and confirm that the tip of tube exceeds from 6 to 10 mm at the sleeve end (refer to Fig.-26 (a)) .
- (4) Put back the tube attached to the sleeve to the joint installed on the monitor.
- (5) Lightly Tighten the nut with fingers.
- (6) Tighten 2 or 2 1/4 turns of the nut with using a wrench so that a thread can not be seen. Refer to Figure-26 (b).
- (7) At this time, between the nut and joint can be a gap of approximately 3 mm.

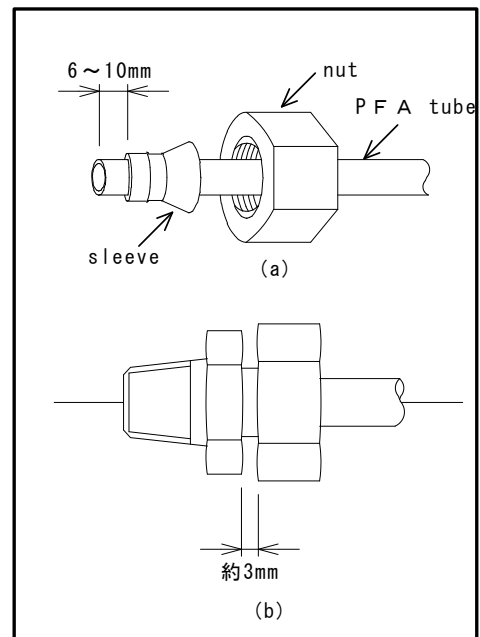


Figure- 26 Piping of filter (EG-3000F)

9.8 Replacement of a battery

To record the absolute time, this monitor has a built-in backup button battery inside. If the monitor had been powered down for more than a few months, it will not be able to record the correct time because of the battery's heavy consumption. The voltage drop of the battery cannot affect the concentration measurement, but please replace it in the approximate time to five years. The button battery used is CR2032 for commercial use.

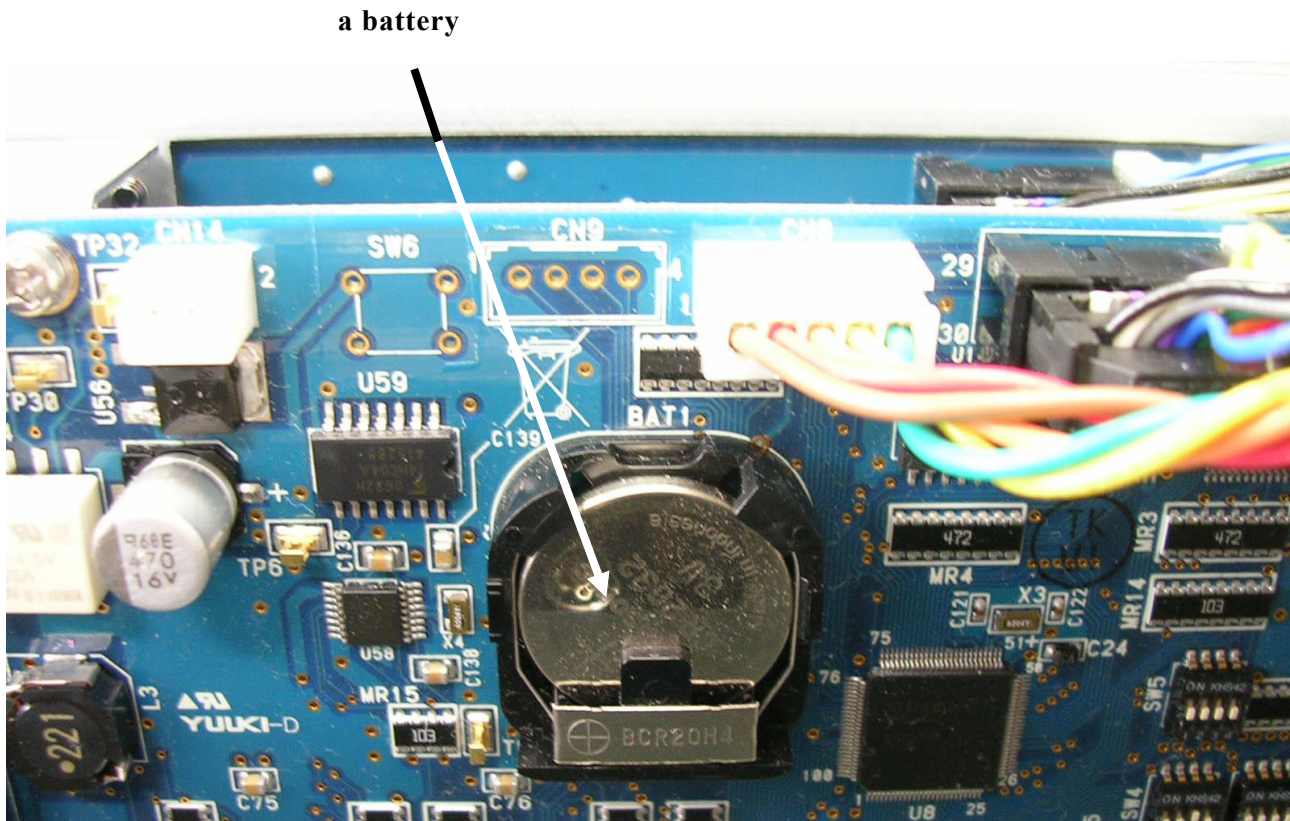


Figure- 27 Replacement of a battery

Procedure of replacing a battery

- (1) Shutdown the monitor, and remove the power supply cable for safety.
- (2) Remove the upper cover.
- (3) Remove the used old button battery from the holder shown in Figure-27, and replace a new one to the holder.
- (4) Put the upper cover back.
- (5) After turn on the power supply, reset the time of display of the monitor. Refer to section 6.8 "Common parameter setting (CPS 12 Time)".

***Note:** Please dispose the used old battery according to your local regulations.

10 Error indications and countermeasure

10.1 Error indications and solutions

This monitor has a self-diagnosis function besides ordinary measurement functions. If the self-diagnosis function detects an abnormal condition in the monitor, it will display the error indication and stop the measurement. In this case, refer to the solutions in the following table.

Table 6 Error Indication

Indications	Causes	Solutions
Err 0	Range over	As ozone concentration is too high, the monitor cannot measure.
Err 1	Failure for Sensor 1 circuit	Check the light intensity of Sensor 1. Please refer to CHK 01 / CHK 03 in Section 6.5 "Checking mode".
Err 2	Failure for Sensor 2 circuit	Check the light intensity of Sensor 2. Please refer to CHK 02 / CHK 04 in Section 6.5 "Checking mode".
Err 3	Failure of low-pressure mercury lamp	Replace the lamp with new one according to section 9.4 "Replacement of low-pressure mercury lamp".
Err 4	Failure of inside memory	An internal PCB board may have a failure. Please inform this trouble to our company or dealer.
Err 5	Range over by adding offset	Reset the offset value of concentration in specified range.
Err 6	False setting for measurement unit · Measuring unit of EG-3000F was set to one of g/m ³ or wt%.	Reset the measuring unit correctly as below. *Note: Regarding EG-3000F, any units are applicable except g/m ³ or wt %.
Err 7	False setting for measurement cycle · For EG-3000E and F; The measurement cycle was set to 10 seconds in normal mode.	Reset this measurement cycle over than 15 seconds.
Err 8	Internal setting switch was changed.	Return it back to the same state of which it is shipped from the factory.
Err 9	Temperature and pressure values of sample gas were in over scale, or internal sensor has an abnormal phenomenon.	Confirm whether the gas temperature, ambient temperature and sample pressure values are too high, or their sensor connectors are disconnected.
Err 10	Range over of light intensity value of the sensor	Adjust light intensity of the low-pressure mercury lamp, referring to Manual AGC.

10.2 Other symptom, causes and countermeasures

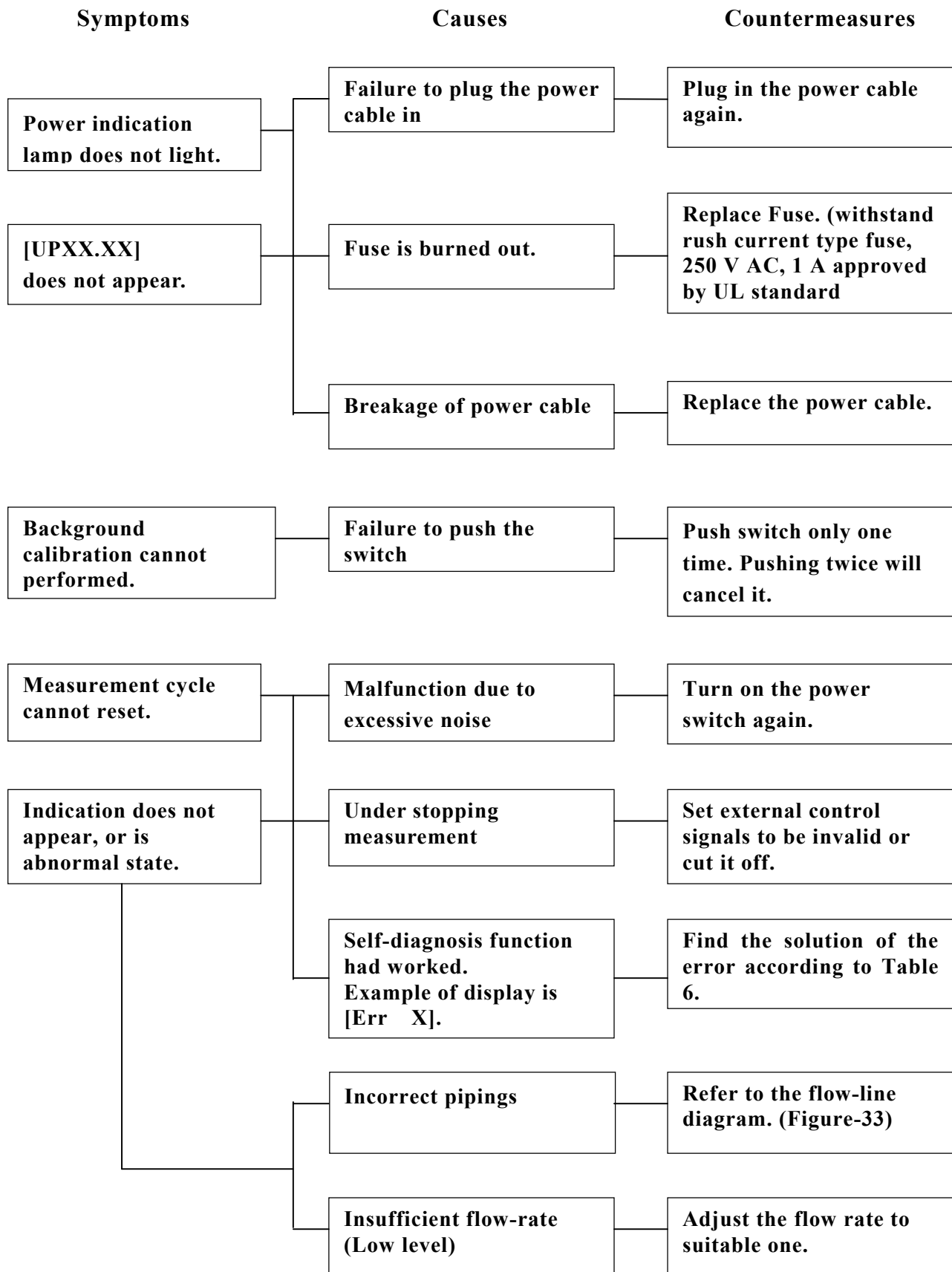


Figure- 28 Flow diagram 1 for trouble analysis

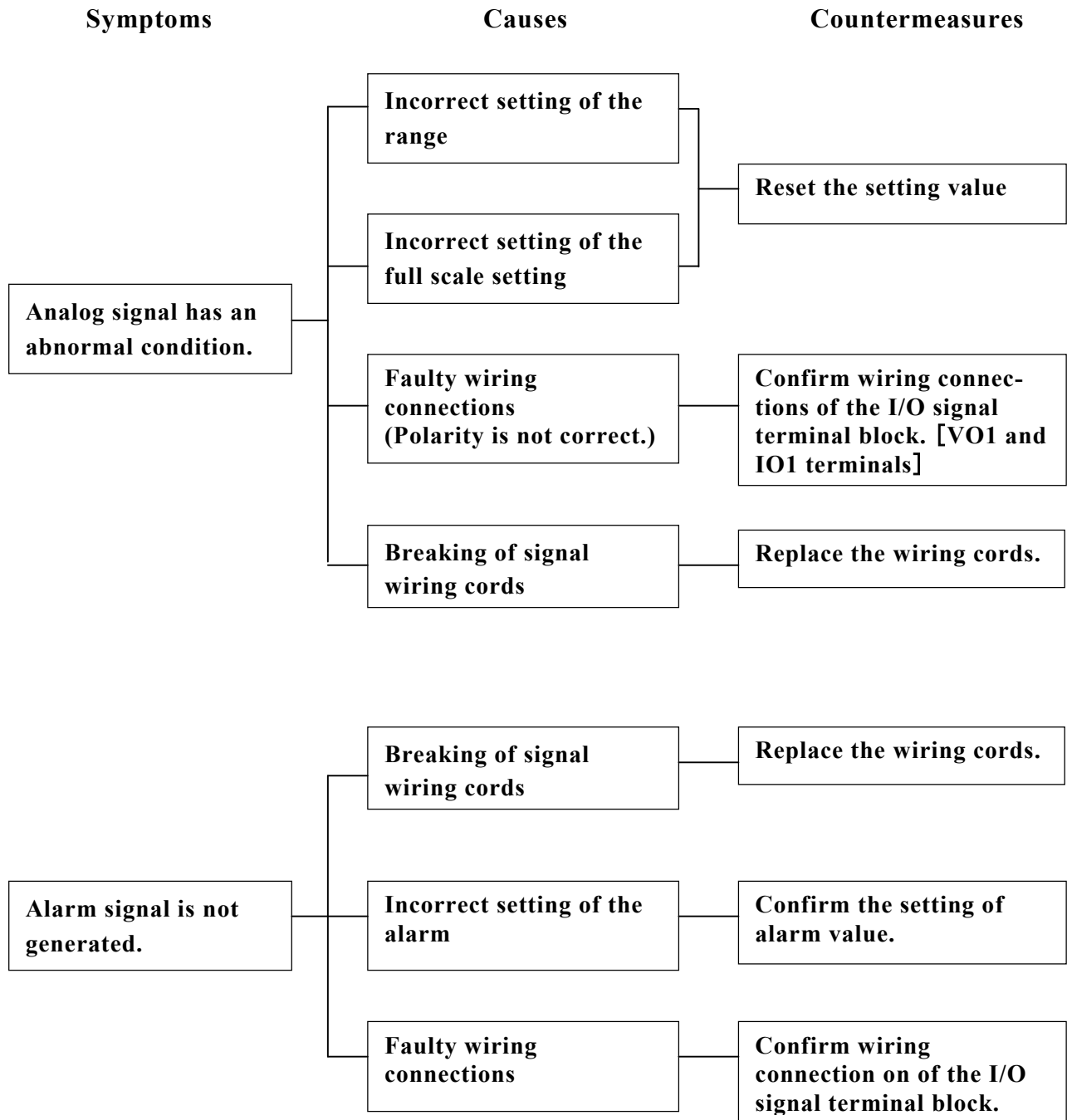


Figure- 29 Flow diagram 2 for trouble analysis

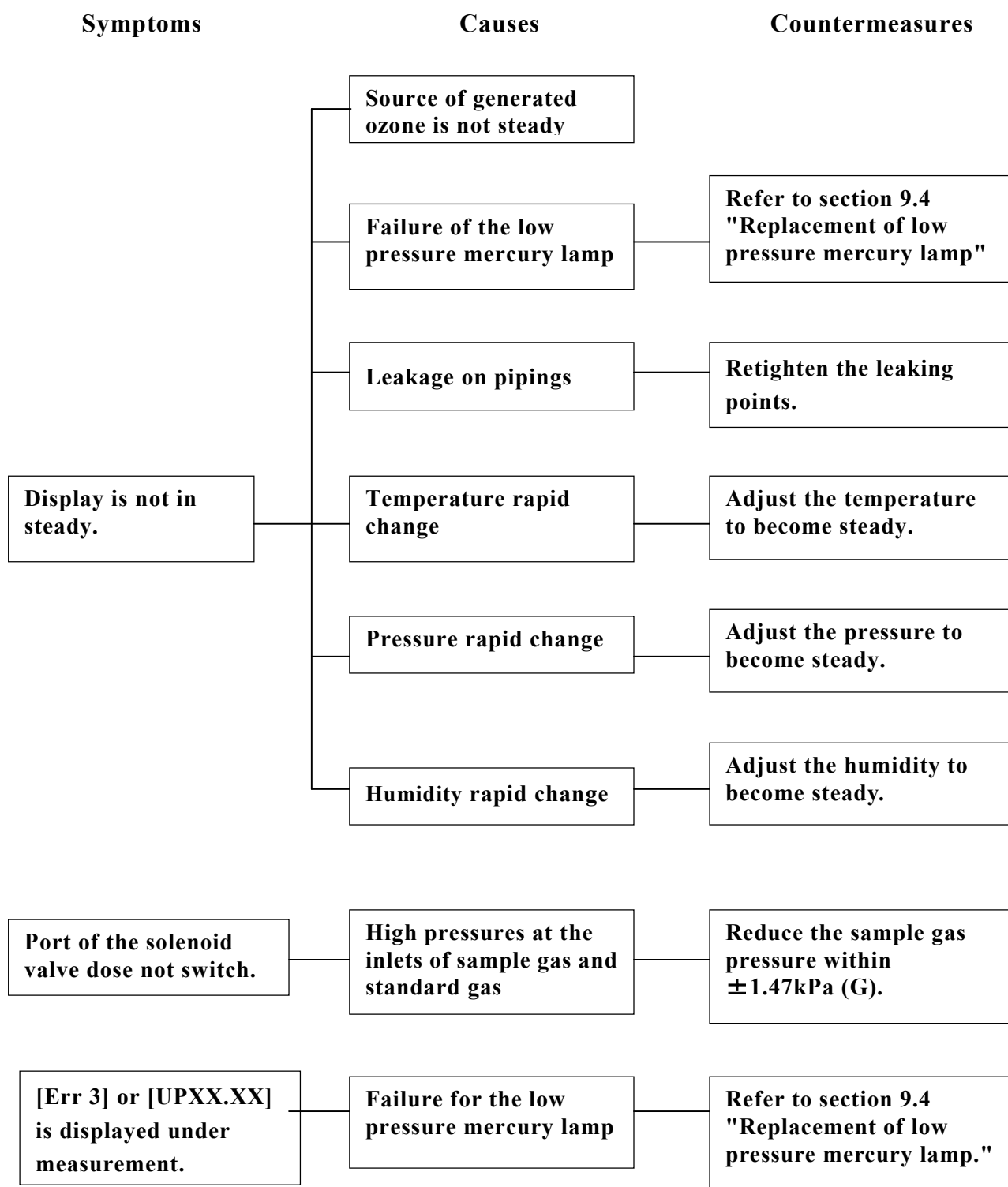


Figure- 30 Flow diagram 3 for trouble analysis

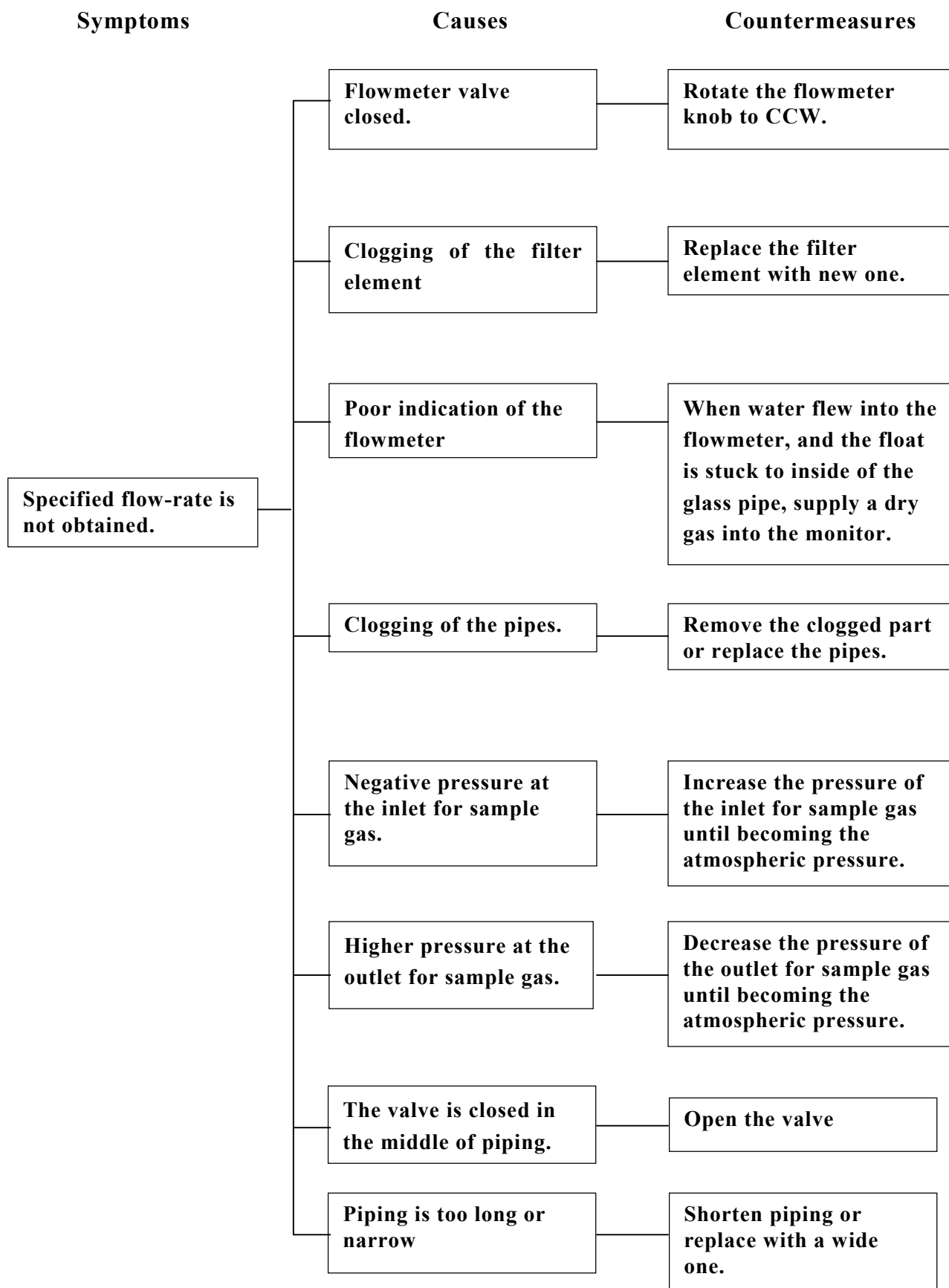


Figure- 31 Flow diagram 4 for trouble analysis

11 Warranty

Our products are warranted for 12 months from the date of delivery.

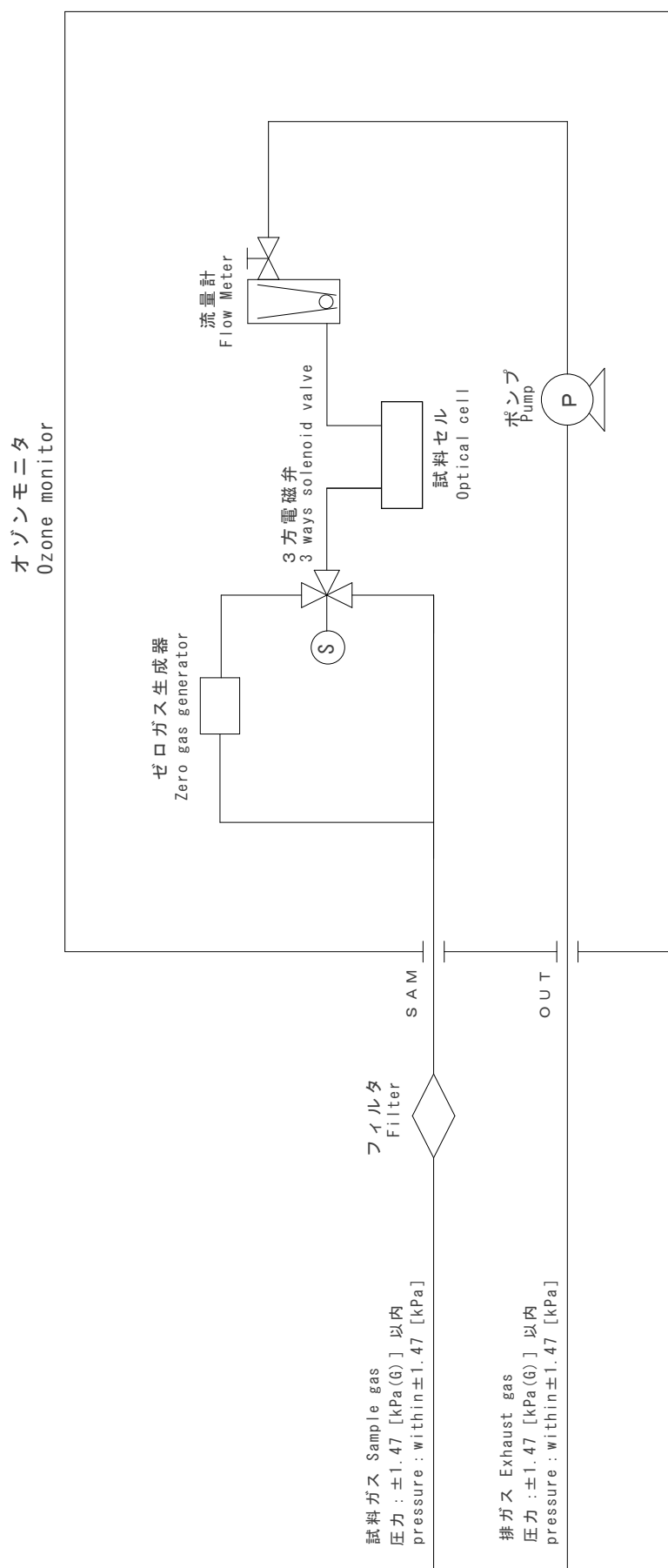
However, note that the following cases are not covered by this warranty.

Following failures or damages occurred within the warranty period.

- ① Failure caused by misuse.**
- ② Failure caused by inappropriate repair or modification using non-genuine parts.**
- ③ Failure or damage occurred during transportation or by drop after delivery.**
- ④ Failure or damage resulting from fire, brine, gas, earthquake, wind, flood, lightning, abnormal voltage or other natural disasters.**

Well, we can not warrant you for defects of the related devices, injury of human body and your any loosed profits even if when their in and out of guarantee terms.

The specification may have to change without its announcement for improving and remodeling the equipment.



注 1) 高湿度の試料ガスを測定する場合は除湿してください。

注 2) 試料ガスの圧力は ± 1.47 [kPa] 以内にしてください。

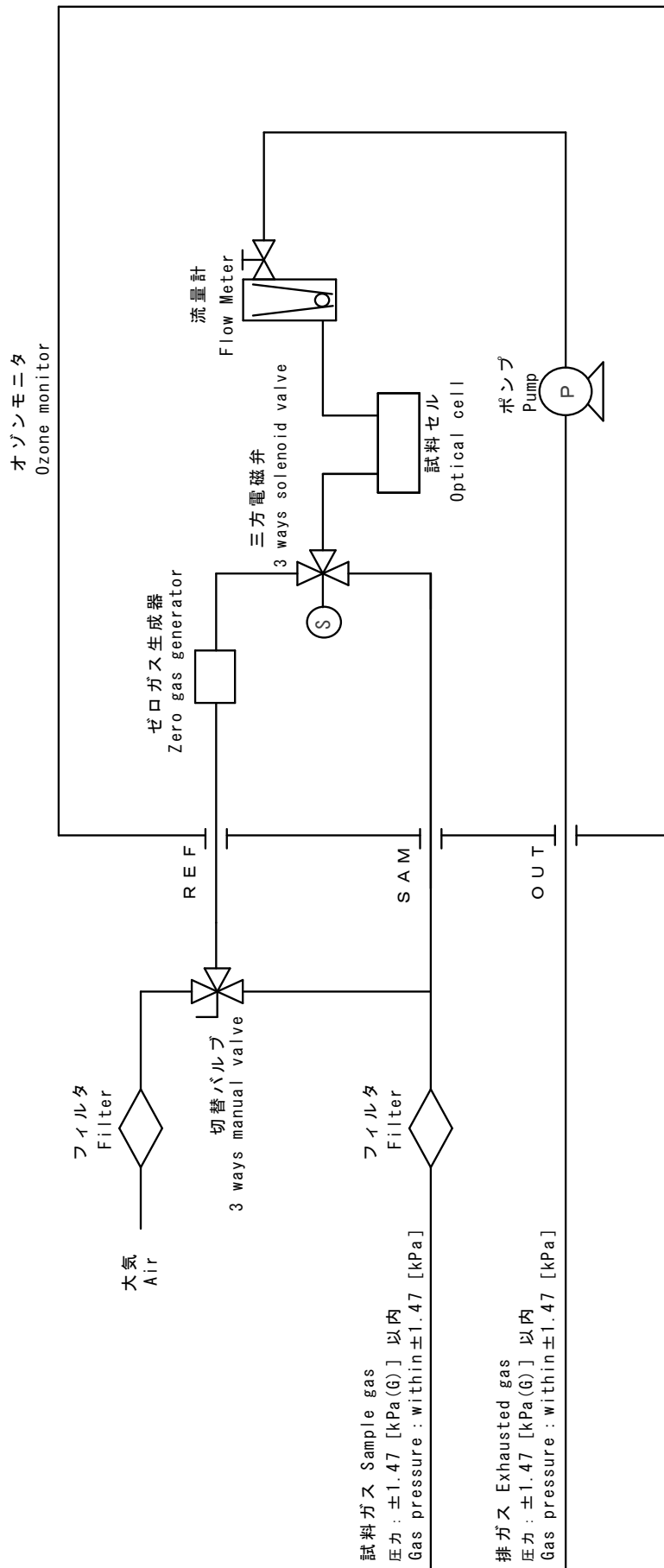
注 3) 試料ガス測定後の排ガスはオゾン分解処理をおこなってください。

Note1: If the sample gas has high humidity, it should be reduced by using the dehumidifier.

Note2: Sample gas pressure should be controlled within ± 1.47 [kPa(G)] .

Note3: Exhaust ozone gas after sampling must be destroyed by using the zero gas generator.

Figure- 33 Standard Flow diagram for ozone monitor, Model EG-3000F



- 注 1) 高湿度の試料ガスを測定する場合は除湿してください。
 注 2) 試料ガスの圧力は ± 1.47 [kPa (G)] 以内にしてください。
 注 3) 試料ガス測定後の排ガスはオゾン分解処理をおこなってください。
 注 4) 測定する試料ガス濃度に応じて切替バルブを切り替えてください。
 F 型 : 高濃度 (1 [ppm] 以上) : 大気から導入
 低濃度 (1 [ppm] 未満) : 試料ガスから導入

Note1: If the sample gas has high humidity, it should be reduced by using the dehumiditor.

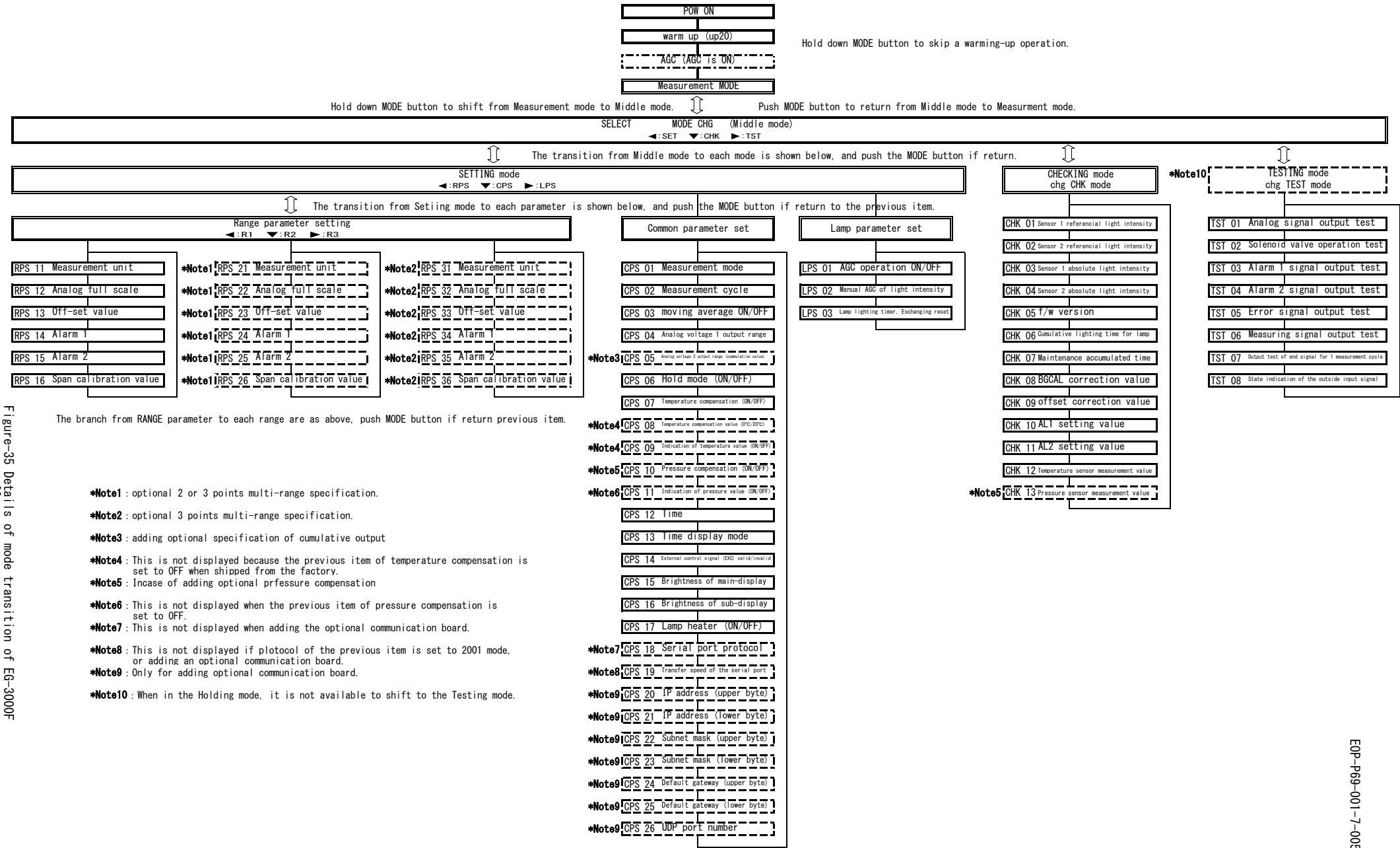
Note2: Sample gas pressure should be controlled within ± 1.47 [kPa (G)] .

Note3: Exhaust ozone gas after sampling must be destructured by OFF-GAS treatment device.

Note4: 3 ways manual valve should be changed in proportion to concentration which is measured as follows.
 Type F: High concentration more than 1 [ppm]: sucking in air

Low concentration less than 1 [ppm]: introducing from sample gas

Figure- 34 Multi-range Flow diagram for ozone monitor, Model EG-3000F



MEMO

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