G-Finder Multi Instruction Manual

G-Finder Multi is a personal safety device designed to detect the presence of Oxygen (O_2), Carbon Monoxide (CO), Hydrogen Sulfide (H_2S), combustible gases (default target combustible gas is methane, CH_4). Power is provided by one, non-user replaceable, lithium-thionyl chloride primary 2-cell. The unit includes LCD display to show readings, as well as audible, visual, and vibrating alarms are supported when user-configurable values are exceeded. It is your responsibility to respond appropriately to the alarms. G-Finder Multi has no facilities for connection of external electrical circuits. G-Finder Multi has IR communications for changing the alarm set point, calibration range and etc. The IR communications shall only be used in safe area.

WARNING

1) G-Finder Multi is designed for single use. Non-field replaceable lithium-ion battery, filter and sensor are already installed and ready for use.
2) Do not attempt replacement or substitution of components. Replacement or Substitution of components may IMPAIR Intrinsic Safety and will void the warranty of the product.
3) The electrical, electronic and battery elements of this product must not be disposed of via municipal waste streams; they should be disposed of by a qualified recycler or hazardous materials handler. Correct disposal will contribute to recycling of materials and prevent negative consequences for the environment.
4) It is recommended performing a bump test prior to use G-Finder Multi every day to confirm sensor response and alarm activation by exposing the detector to a concentration of target gas that exceeds the low alarm set point.
5) For optimal performance, please proceed zero calibration periodically.
6) G-Finder Multi is provided with anti-static coating over the LCD window to minimize risk of ignition due to electro-static discharge. Periodic inspection of this coating is required to ensuring prevention of degradation, delamination, abrasions or other deformities to the surface. Please make sure to clean only with a damp cloth.
7) For all gas types of G-Finder Multi, always proceed bump test and calibration at room temperature and in a fresh air environment (20.9% v/v O_2) that is free of hazardous gas.

CAUTION

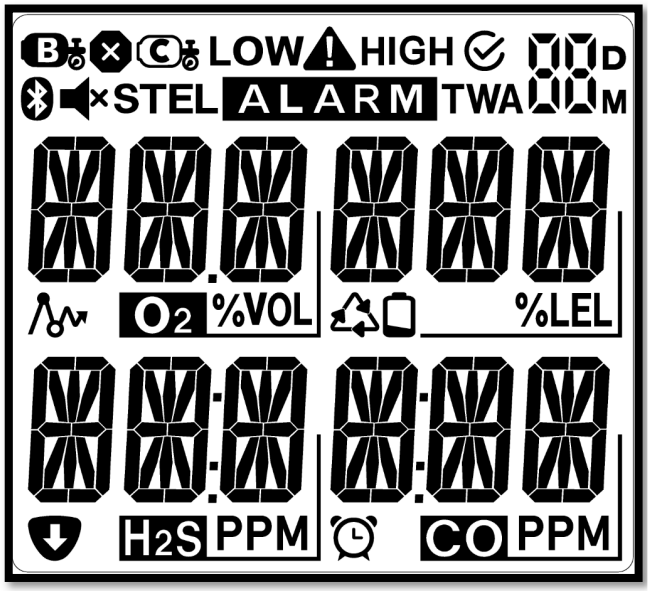
1) Activate G-Finder Multi before the activation date on the package.
2) In order to maintain normal operation of G-Finder Multi, keep the gas sensor grill from clogging and keep the gas sensor, LED and buzzer hole surfaces free from dust and dirt. Clean the exterior with a soft and damp cloth.
3) When using G-Finder Multi, sudden change in the temperature may cause change in the detected gas concentration value suddenly. Using in a stable temperature environment is recommended for more accurate detection.
4) The combustible gas sensor is initially calibrated to 50%LEL methane. Only methane gas should be used to calibrate or bump test the combustible gas sensor.
5) G-Finder Multi is a gas detector, not a measurement device.
6) Portable safety gas detectors are life safety devices. Accuracy of ambient gas reading is dependent upon factors such as accuracy of the calibration gas standard used for calibration and frequency of calibration.

1. Specification

Item	Description
Ex marking	Ⓔx II 1 G Ex ia IIC T4 Ga
Approvals	IECEx : IECEx KTL 19.0028X KCs : 19-KA2BO-0915X ATEX : DEKRA 19ATEX0132X NEPSI : GYJ20.1019X KC : R-C-G99-GFM-400
Dimensions	120x68x41 mm (Alligator clip included)
Weight	221 g (Alligator clip included)
Temperature	-20˚C ~ 50 ˚C
Humidity	5 ~ 95 % RH
IP	IP 68
Sensor type	O_2 - electrochemical cell CO- electrochemical cell H_2S - electrochemical cell CH_4 or C_3H_8 – Non-Dispersive Infrared Sensor * C_3H_8 is an option in the future.
Alarms	Visual, vibrating, audible (min. 95dB)
Display	Liquid Crystal Display (LCD)
Operating frequency	2402 MHz ~ 2480 MHz
RF output power	-11.08 dBm
Max. RF Distance	≤ 7m (at the non-interference environment)
Battery	Primary lithium-thionyl chloride (Li-SOCl2)
Event Log	Last 128 events. Newer events replace older events.
Battery Life	24 months of operation when 2 minutes of alarm occurs per day
Warranty	Full 2 years

2. Each part for G-Finder Multi

3. LCD Icons Description



Icon	Description
LOW ALARM / HIGH ALARM	LOW alarm and HIGH alarm. These signs are displayed when gas concentration exceeds alarm setpoints.
STEL ALARM	STEL (Short Term Exposure Limit) alarm. Displays when gas concentration exceeds alarm setpoints
ALARM TWA	TWA (Time Weighted Average) alarm. Displays when gas concentration exceeds alarm setpoints
	Calibration reminder. This icon is displayed when a sensor calibration is due. / indicates a failed calibration.
	Bump test reminder. If the detector is configured to display a bump test reminder, this icon is displayed when a bump test is due. / indicates a failed bump test.
	This icon is displayed when a functional error occurs.
	This icon is displayed when the Bluetooth is connected.
	This icon is displayed when all alarm signal is off.
	This icon blinks when the detector works normally without any functional errors.
D M	Displays for remaining product life time.
%VOL	Oxygen concentration is measured as percent by volume.
%LEL	Combustible gas concentration is measured as lower explosive limit.
PPM	Toxic gas concentration is measured as parts per million.
	Alarm event indicator. This icon is displayed when an alarm event has occurred within the past 8 hours.
	End of operating life warning indicator.
	Low battery warning indicator.
	When this symbol is displayed, press the button once or hold until the symbol disappears
	Time Indicator. (Remaining product life with 00M / 00d / 00h display, 00 means remaining months / days / hours)

4. Activating the New Detector

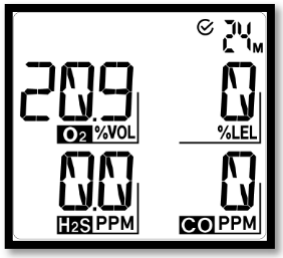
1) Move to normal atmosphere (20.9% v/v O2) free of hazardous gas.
2) Press and hold the button until 5 second countdown is displayed, then keep holding until the countdown is completed to activate G-Finder Multi.
3) When the countdown is completed, the LCD, LEDs, vibration, and beep will be on and off. Then, the alarm setpoints are displayed and the sensor stabilization countdown is displayed.

4) When the countdown is completed, the activation is completed.
   ※ When the countdown reaches 0, the zero calibration is performed automatically and after the zero calibration, the activation is completed.

5) The detector is in normal operating mode when the gas type and concentration are displayed.

5. Normal Operating Mode

1) When the detector is in normal operating mode, the type of gas detected is permanently displayed. The detected concentration of the gas is displayed until it is disrupted by a button action, gas alarm, or error event.
If you want to see the status information about the detector, please press the button once.

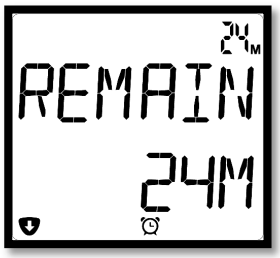


Normal

2) By pressing the button once, it will display current firmware version of the detector. The number before the underscore '_' indicates major number of the firmware version, and the number after the underscore indicates minor number. In other word, "1_00" indicates the firmware number '1.00'.

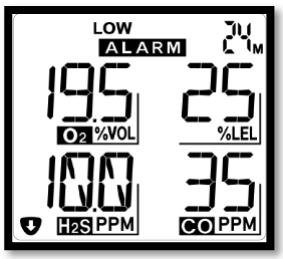
Firmware Version

3) By pressing the button once from the above phase, it will display the remaining product life. The remaining life will be counted automatically refer to the remaining life scale; "24M" ~ "1M", "30D" ~ "1D", "24H" ~ "1H". (M: Months, D: Days, H: Hours)



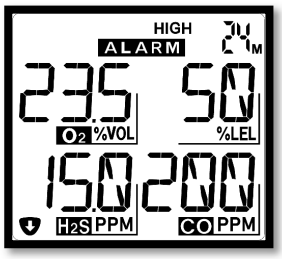
Remaining Product Life

4) Pressing the button once again from the above phase, it will display low alarm set value.



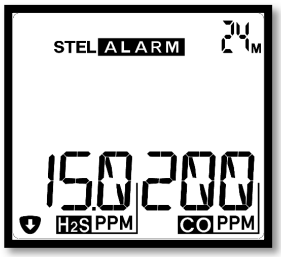
Low Alarm Set Value

5) Pressing the button once again from the above phase, it will display high alarm set value.



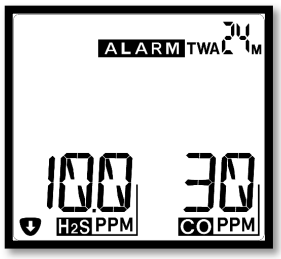
High Alarm Set Value

6) Pressing the button once again from the above phase, it will display Short Term Exposure Limit (STEL).



STEL Alarm Set Value

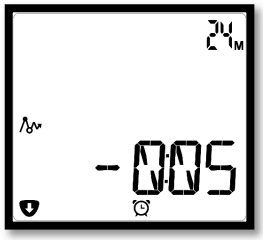
7) Pressing the button once again from the above phase, it will display Time Weighted Average (TWA) alarm set value.



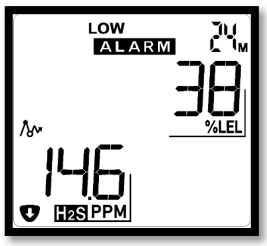
TWA Alarm Set Value

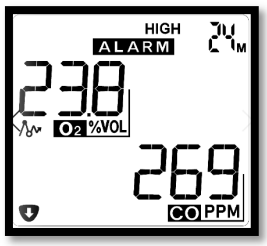
8) If there are not any alarm events occurred within the past 8 hours, the display information on the LCD is changed to the normal display from the TWA alarm set value by pressing the button once.

9) Or if there are any alarm events occurred within the past 8 hours, it will show elapsed time since the alarm occurred from the TWA alarm set value by pressing the button once, and then it is changed to the alarm value occurred by pressing the button once again, and it is changed to the normal display by pressing the button once again.



Elapsed Time





Alarm Value Occurred

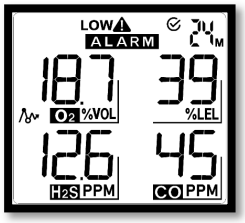
6. Alarms

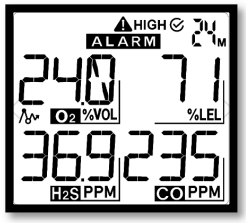
An alarm is initiated when the sensor is exposed to a gas concentration exceeding alarm setpoints. The alarm has four types, low alarm; high alarm; STEL alarm; TWA alarm.
The alarm persists until the gas concentration returns to an acceptable range. Battery life decreases rapidly when the detector is in alarm condition.

For the gas type O_2, a low alarm occurs when the measured concentration value is lower than the low alarm setting value, while a high alarm occurs when the measured concentration value is higher than the high alarm setting value.
The following alarm settings are default for each gas type.

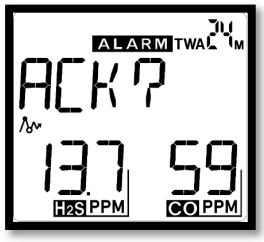
Gas Type	Low Alarm	High Alarm
O_2	19.5% v/v O_2	23.5% v/v O_2
CO	30 ppm	200 ppm
H_2S	10.0 ppm	15.0 ppm
CH_4	10% LEL	20% LEL

When the alarm occurs, LED lights flash, vibration and beep sounds occur, and display will be changed as below for example.

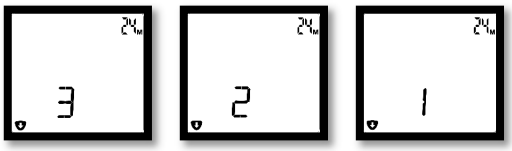




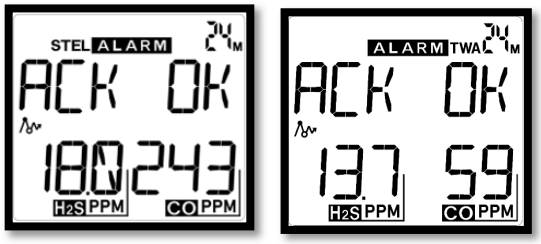
When the STEL alarm or/and the TWA alarm occurs, **STEL** or/and **TWA** icon is indicated and LED lights flash, vibration and beep sounds occur. The STEL alarm and the TWA alarm are latching alarms. These alarms will hold the detector with LED lights flash, vibration and beep sounds until the acknowledgement action is done. In order to acknowledge and release the alarm, press the button twice and the display on the LCD screen will be changed as below for example.



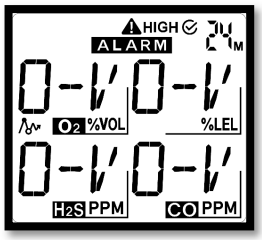
Press and hold the button until 3 seconds countdown is displayed, then keep holding until the countdown is completed for the acknowledgement action.



When the countdown is completed, “ACK?” will be changed to “ACK OK” on the LCD screen as below for example, and then the alarm will be released.

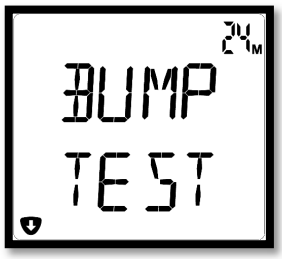


When G-Finder Multi detects gas concentration which is over the upper limit of the detection range, the concentration display part on the LCD screen will be changed to “O-V” as below for example.

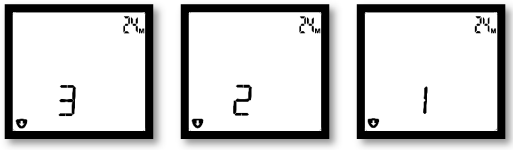


7. Bump Test

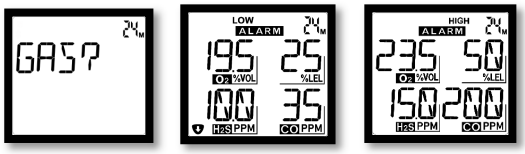
1) Press the button twice to get into the menu, it shows "BUMP TEST" on the screen.



2) Press and hold the button until 3 seconds countdown is displayed, then keep holding until the countdown is completed in order to perform the bump test.



3) Then the gas applying display, the low alarm setpoint display, and the high alarm setpoint display occur cross and the detector waits for applying gas which causes an alarm.



4) If the detector detects the gas concentration of all 4 types for the bump test in 60 seconds, the bump test process is performed automatically. The result will be displayed on the screen at the end of the test. If an alarm occurs during the bump test, the test is succeeded, otherwise the test is failed. If the test is failed, B icon ⊗ icons are appeared additionally with the bump test mode display on the screen.

8. Zeroing the Sensor

In case of O_2 sensor, over time and through use, the sensor baseline at zero exposure may drift from the manufacturer’s baseline.
For optimal performance of O_2 sensor, it is recommended to zero the O_2 sensor at least once in a month at the condition of room temperature and in a fresh air environment (20.9% v/v O_2) free of hazardous gas.

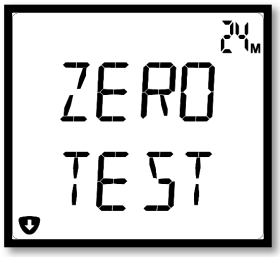
The user will be noted by the display of the calibration reminder icon when the sensor calibration is due. If the icon is showing please zero the sensor as instructed below:

※ For all gas types, we recommend zeroing for the sensors periodically.

1) Move to a normal atmosphere (20.9% v/v O_2) free of hazardous gas.

2) Press the button twice to get into the menu. Then, "BUMP TEST" will be displayed on the

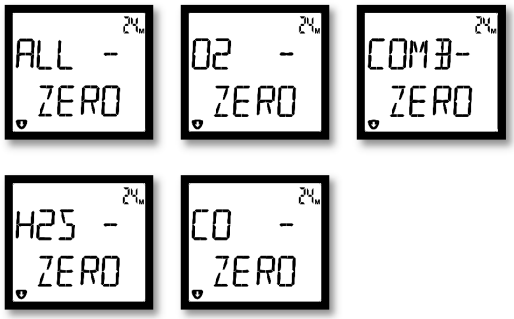
screen. And “ZERO TEST" is displayed on the screen by pressing the button once again.



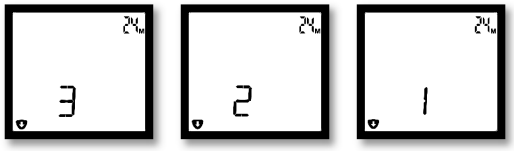
3) Zero can be performed one of two modes by selection. User can select to calibrate the entire gas type at once, or select to calibrate each gas types individually.

4) Press the button twice in order to enter selecting menu for the zeroing when the “ZERO TEST" is displayed on the screen. Otherwise, press the button once to the next menu, Gas Calibration Menu.

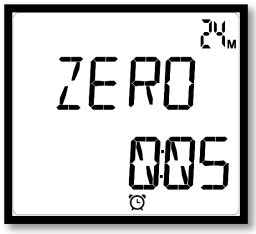
5) If you enter selecting menu for the zeroing by pressing the button twice when the “ZERO TEST" is displayed on the screen, “ALL - ZERO” is displayed first, and the display changes to “O2 - ZERO”, “COMB - ZERO”, “H2S - ZERO”, and “CO - ZERO” sequentially by pressing the button.



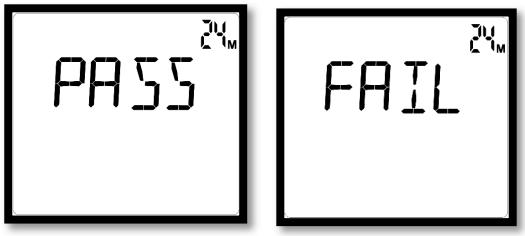
6) When the corresponding zero calibration menu is displayed, press and hold the button until 3 seconds countdown is displayed, then keep holding until the countdown is completed in order to perform the selected zero calibration.



7) Then, the zeroing process will be performed automatically. Wait until the zeroing process is completed.



8) When the zeroing process is completed, "PASS" or "FAIL" appears.



9) After displaying the result, "ZERO TEST" is displayed on the screen again automatically.

10) If "FAIL" appears, repeat the zeroing process according to the procedure above.

11) If the zeroing process fails again, please contact our service center.

12) In order to calibrate gas, press the button once, and "SPAN TEST" will be displayed on the screen. Continue calibrating according to the "Gas Calibration" section.

13) Or in order to exit the menu, press the button repeatedly to go back to normal operating mode.

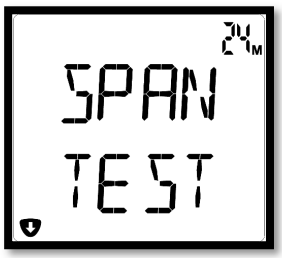
9. Gas Calibration

For more optimal performance of G-Finder Multi, gas calibration may be needed. In order to calibrate the detector, we recommend gas calibration after doing zero calibration at room temperature and in a fresh air environment (20.9% v/v O_2) that is free of hazardous gas.
By default, G-Finder Multi is configured to use the following calibration gas mixtures:

Gas Type	Standard Calibration Gas Concentration
O_2	18.0 % v/v O_2
CO	100 ppm (balance N_2)
H_2S	25 ppm (balance N_2)
CH_4	50 % LEL (balance N_2)

1) Move to a normal atmosphere (20.9% v/v O_2) free of hazardous gas.

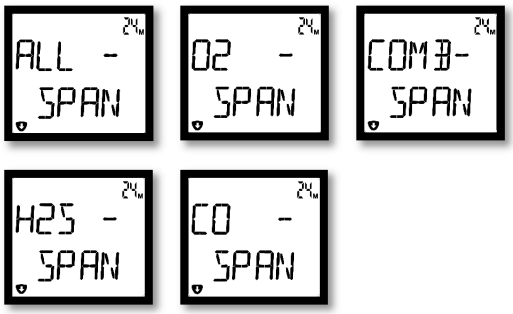
2) Press the button twice to get into the menu. Then, "BUMP TEST" will be displayed on the screen. "ZERO TEST" will be displayed on the screen by pressing the button once, and then, "SPAN TEST" will be displayed on the screen by pressing the button once again.



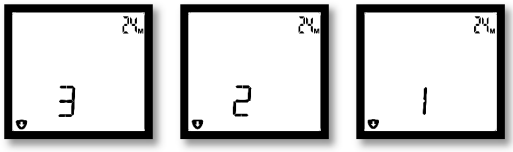
3) Same as the zeroing procedure, the gas calibration can be performed by two modes. User can select to calibrate the entire gas type at once, or select to calibrate each gas types individually.

4) Press the button twice to enter selecting menu for the gas calibration when the “SPAN TEST" is displayed on the screen. If the button is pressed only once, it will skip to the next menu.

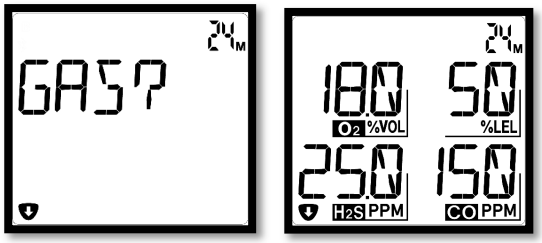
5) If you enter selecting menu for the gas calibration by pressing the button twice when the “SPAN TEST" is displayed on the screen, “ALL - SPAN” is displayed first, and the display changes to “O2 - SPAN”, “COMB - SPAN”, “H2S - SPAN”, and “CO - SPAN” sequentially by pressing the button.



6) When the corresponding gas calibration menu displays, press and hold the button until 3 seconds countdown is displayed, then keep holding until the countdown is completed.

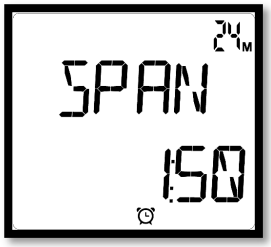


7) The gas applying display and the standard calibration gas concentration display occur cross and the detector waits for applying calibration gas.

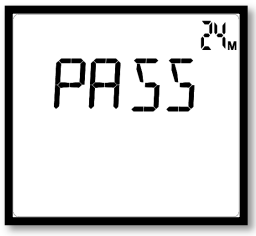


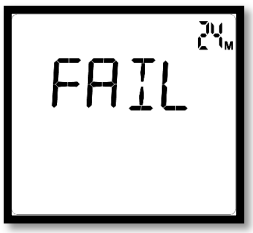
8) If G-Finder Multi detects the gas concentration for the gas calibration, the gas calibration process will be performed automatically. Wait until the gas calibration process is completed.

※ If you press the button during the gas calibration process, the gas calibration process will be cancelled.



9) When the gas calibration process is completed, "PASS" or "FAIL" appears.





10) After displaying the result, "SPAN TEST" will be displayed on the screen again automatically.

11) If "FAIL" appears, repeat the gas calibration process according to the procedure above.

12) If the gas calibration fails again, please contact our service center.

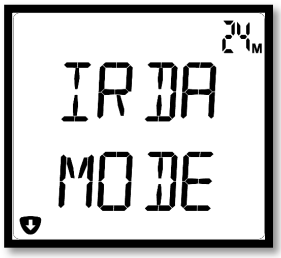
13) Press the button repeatedly to go back to normal operating mode.

10. IRDA Communication Mode

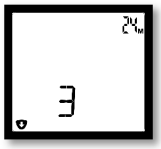
IRDA communication mode is provided basically. Separate PC software is required to use this mode. Through this mode, it allows to check the internal information of the G-Finder Multi and change alarm settings, etc.

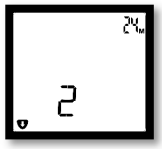
※ Battery life decreases faster while using IRDA communication mode. It is recommended to save battery by using IRDA communication mode only when absolutely necessary.

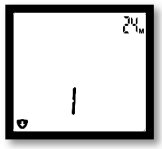
1) Press the button twice to get into the menu. Then, "BUMP TEST" will be displayed on the screen. And "IRDA MODE" will be displayed on the screen by pressing the button three times.



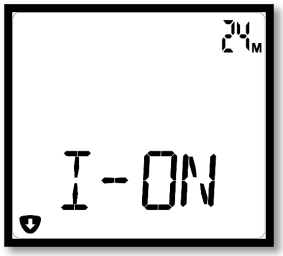
2) Press and hold the button until 3 seconds countdown is displayed, then keep holding until the countdown is completed in order to perform the IRDA communication mode.





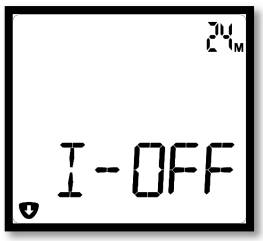


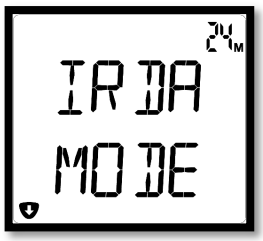
3) Then, the display on the screen is changed to “I-ON”, which indicates that the IRDA communication mode is ready for normal operation. While “I-ON” is displayed on the screen, perform the desired operations through the PC software.



4) In order to exit the communication mode, while “I-ON” is displayed on the screen, press and hold the button until 3 seconds countdown is displayed, then keep holding until the countdown is completed.

5) When the countdown is completed, “I-OFF” is displayed on the screen for a while, then return to the communication mode menu and “IRDA MODE” will be displayed.





6) For more information of PC software related to IRDA communication, please refer to the ‘G-Finder PC software user manual’.

11. Bluetooth Communication Mode

G-Finder Multi supports Bluetooth communication mode for user convenience, and the availability of Bluetooth communication mode is determined by option when ordering.

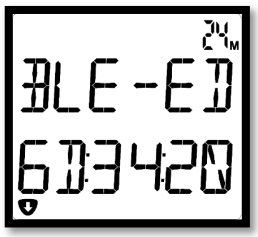
While using Bluetooth communication mode, blue LED flashes and the gas concentration measurement value is transmitted once every 10 seconds in normal condition (once every 2 seconds when an alarm occurs) to the connected Bluetooth device. It allows user to monitor remotely through the connected Bluetooth device.

※ Battery life decreases faster while using Bluetooth communication mode. It is recommended to save battery by disconnecting Bluetooth communication mode while not using Bluetooth communication mode.

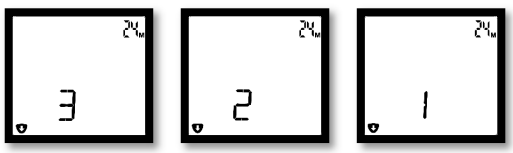
※ For G-Finder Multi, which does not support Bluetooth option, below figures of screen will not be displayed.

1) Press the button twice to get into the menu. Then, "BUMP TEST" will be displayed on the screen. "BLE-XX XX:XX:XX" will be displayed on the screen by pressing the button four times. (it will not be shown if G-Finder Multi is without Bluetooth option)

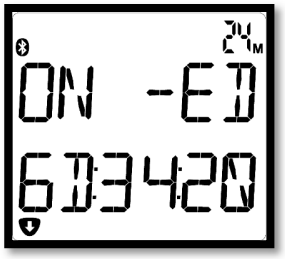
   "XX XX:XX:XX" is the last four groups of two hexadecimal digits of the Bluetooth MAC address of the G-Finder Multi. In the example below, G-Finder Multi with "ED:6D:34:20" as the last four groups of two hexadecimal digits of the Bluetooth MAC address is shown.



2) Press and hold the button until 3 seconds countdown is displayed, then keep holding until the countdown is completed in order to enable the connection of Bluetooth communication mode.



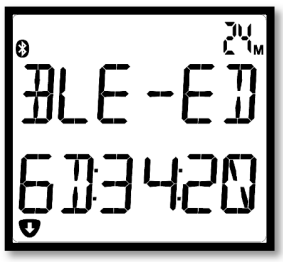
3) Then, "ON- XX XX:XX:XX" is displayed on the screen and the icon blinks to wait for a connection from the Bluetooth device.



4) Run the application on the Bluetooth device, search and select GFM-400 which has the same MAC address with the last four groups of two hexadecimal digits of the MAC address on the GFM-400 LCD screen.

5) When the Bluetooth communication between the Bluetooth device and GFM-400 is initially connected, various internal values of the corresponding G-Finder Multi are transmitted to the device. When transmission and connection are completed, the screen automatically switches to the Bluetooth mode screen and the icon lights up continuously.

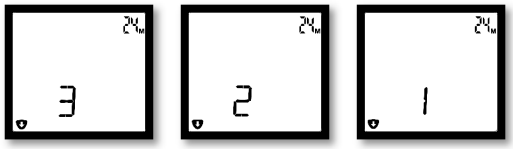
   After this moment, the Bluetooth communication connection will be completed successfully and the Bluetooth communication mode will be operated normally with transmitting the gas concentration measurement value periodically and the blue LED flashing.



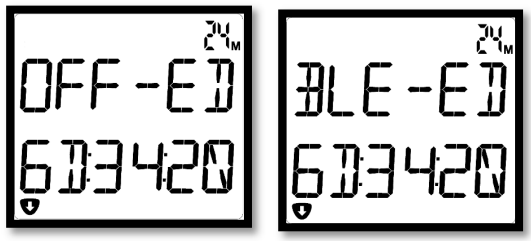
6) In order to disconnect and disable Bluetooth communication mode, proceed the above procedure '1)' until "BLE-XX XX:XX:XX" and the icon is displayed on the screen as shown at the above procedure '5)'.

7) Press and hold the button until 3 seconds countdown is displayed, then keep holding until the countdown is completed in order to

disable the connection of Bluetooth communication mode.



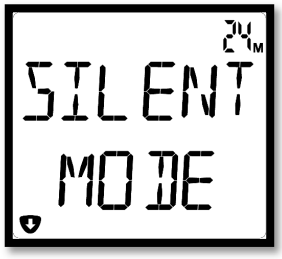
8) When the countdown is completed, “OFF-XX XX:XX:XX” is displayed on the screen for a while and then return to the communication mode menu. It will show MAC Address, “BLE-XX XX:XX:XX” without icon.



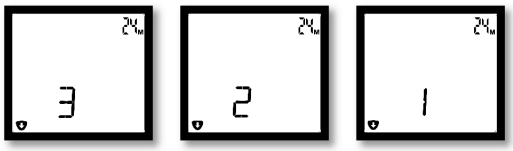
12. Silent Mode

G-Finder Multi supports Silent mode. When Silent mode is on, the alarm function does not work even when G-Finder Multi is exposed to gas concentrations exceeding the alarm set value.

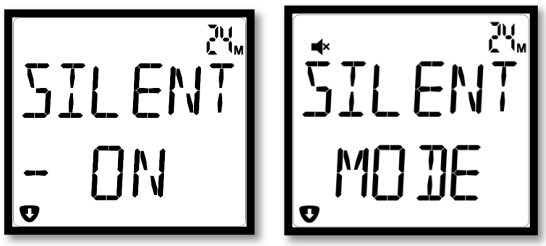
1) Press the button twice to get into the menu. Then, "BUMP TEST" will be displayed on the screen. "SILENT MODE" will be displayed on the screen by pressing the button five times. (or four times in case of G-Finder Multi without Bluetooth option)



2) Press and hold the button until 3 seconds countdown is displayed, then keep holding until the countdown is completed in order to perform the Silent mode.



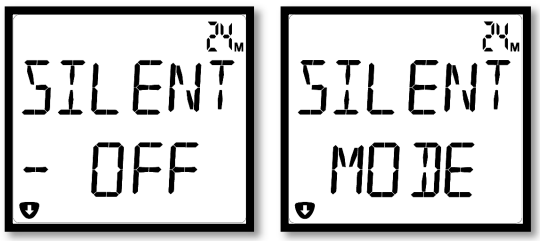
3) When countdown is completed, “SILENT-ON” is displayed on the screen for a while, then return to the Silent mode menu with icon. After this moment, this Silent mode is turned on with icon lights up continuously.



4) In order to turn off the Silent mode, proceed the above procedure ‘1)’ until “SILENT MODE” displays, and icon is displayed on the screen as shown at the above procedure ‘3)’.

5) Press and hold the button until 3 seconds countdown is displayed, then keep holding until the countdown is completed.

6) When countdown is completed, “SILENT-OFF” is displayed on the screen for a while and return to the Silent mode menu without the icon.

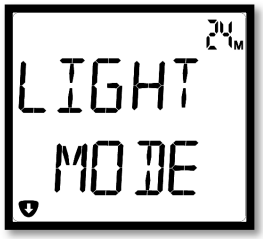


13. Light Mode

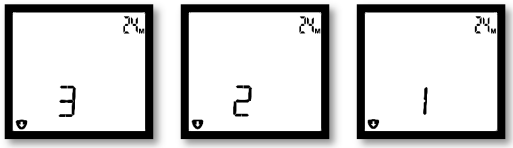
G-Finder Multi supports Light mode related to LCD back-light. When this Light mode is turned on, the LCD backlight flashes when an alarm occurs, and the LCD backlight lights up for 2 seconds each time the button is pressed, making it easy to check the LCD display screen in a dark environment.

※ Battery life decreases faster when the LCD back-light is turned on. If you do not need the LCD back-light, it is recommended to save battery by turning the LIGHT mode off.

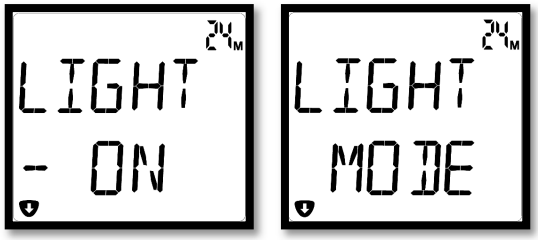
1) Press the button twice to get into the menu. Then, "BUMP TEST" will be displayed on the screen. "LIGHT MODE" will be displayed on the screen by pressing the button six times. (or five times in case of G-Finder Multi without Bluetooth option)



2) Press and hold the button until 3 seconds countdown is displayed, then keep holding until the countdown is completed in order to perform the Light mode.



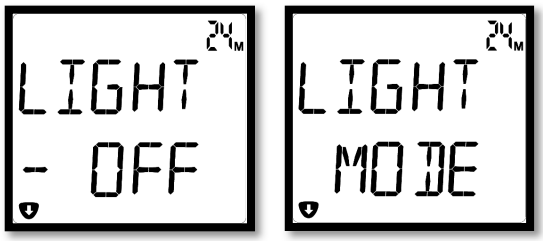
3) When the countdown is completed, “LIGHT-ON” is displayed on the screen for a while then return to the Light mode menu.



4) In order to turn off the Light mode, proceed the above procedure ‘1)’.

5) Press and hold the button until 3 seconds countdown is displayed, then keep holding until the countdown is completed in order to turn off the Light mode.

6) When the countdown is completed, “LIGHT - OFF” is displayed on the screen for a while then return to the Light mode menu.



14. Detection Range

Please refer to the below table for the Detection ranges.

Gas Type	Detection Range
O_2	0 to 25.0% Vol with 0.1 increments
CO	0 to 300 ppm with 1 increment
H_2S	0 to 100 ppm with 0.1 increments
CH_4	0 to 100% LEL with 1 increment

15. Detectable Combustible Gases

G-Finder Multi combustible gas sensor is optimized for methane detection. The sensor is able to detect and respond to the other combustible gases shown in the table below, but the accuracy of the measured gas concentration values may not be consistent.

Combustible Gas	Expected response at 20% LEL target gas
Methane(CH_4)	20 %LEL
Propane(C_3H_8)	15 ~ 45 %LEL
Butane(C_4H_{10})	15 ~ 35 %LEL
Pentane(C_5H_{12})	13 ~ 45 %LEL
Hexane(C_6H_{14})	7 ~ 28 %LEL
Ethane(C_2H_6)	42 ~ 50 %LEL
Ethylene(C_2H_4)	4 ~ 5 %LEL

16. Manufacturer Information

If there are any problems with our products, please contact us at the address below.

1) Address :
Gastron Co., Ltd. 23, Gunpocheomdansaneop 1-ro, Gunpo-si, Gyeonggi-do, Korea
2) Tel : 82-31-490-0800
3) Fax : 82-31-490-0801
4) URL : www.gastron.com
5) e-mail : gastron@gastron.com

17. Certifications and Approvals

1) The certification marking and certificate numbers are in the table below.

Product Name	Specific Low Power Radio Equipment for Wireless Data Communication Systems
Ex marking	ATEX : CE 0344 Ex II 1 G Ex ia IIC T4 Ga IECEx / KCs / NEPSI : Ex ia IIC T4 Ga
Approvals	IECEx : IECEx KTL 19.0028X KCs : 19-KA2BO-0915X ATEX : DEKRA 19ATE0132X NEPSI : GYJ19. XXXX KC : R-C-G99-GFM-400

2) The product is in conformity with the following standards:
IECEx : IEC 60079-0:2017, IEC 60079-11:2011
KCs : Announcement No. 2019-15 of Ministry of Employment and Labor
ATEX : EN IEC 60079-0:2018, EN 60079-11:2012
NEPSI : GB 3836.1-2010, GB 3836.4-2010, GB 3836.20-2010

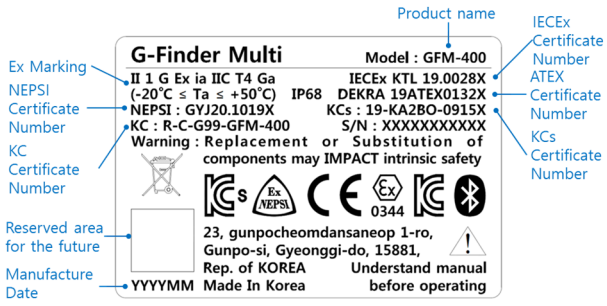
3) The product may be used in zones 0, 1 & 2 with flammable gases and vapors with apparatus groups IIC and with temperature classes T1, T2, T3, T4.

4) The product is only certified for use in ambient temperature in the range -20℃ ≤ Ta ≤ +50℃ and should not be used outside this range.

5) With regard to explosion safety, it is not necessary to check for correct operation.

6) The product contains non user-replaceable parts and is not intended to be repaired by the user. Repair of the equipment is to be carried out by the manufacturer, or their approved agents, in accordance with the applicable code of practice.

7) The certificate label is described as below.



18. Ordering Information

Please put an order according to the model code description below.

- **GFM-400-X-Y-Z**
  - **GFM-400 : standard model name**
  - ***X : Flammable gas type**
    - *X : Option code (default, MM2.5 ~ PP2.5) which can be selected when ordering by user demand which is not be a default for target gas, calibration gas, and measurement range about flammable gas. For the details about options, please refer to the table below. Other option codes except default are options in the future.

Option code	Target Gas	Calibration Gas	Measurement range, %vol
Default (blank)	**CH_4**	**CH_4**	**0 ~ 5**
MM2.5	CH_4	CH_4	0 ~ 2.5
MM100	CH_4	CH_4	0 ~ 100
MP1.5	CH_4	C_3H_8	0 ~ 1.5
MP2.5	CH_4	C_3H_8	0 ~ 2.5
PP1.5	C_3H_8	C_3H_8	0 ~ 1.5
PP2.5	C_3H_8	C_3H_8	0 ~ 2.5

  - ***Y : Housing body color (Blank : Orange(default), YE : yellow, GN : green, VT : violet, BK: black, etc.)**
    - *Y : Option which does not affect intrinsic safety. This option code is needed at the order phrase for different housing color. This option code will not be printed on the nameplate.
  - ***Z : Bluetooth Communication Availability Blank : With Bluetooth option(default), (Reserved option code for the future)**

19. Sales Information

This equipment may be operated in all EU members.

20. Revision History

REV.	CONTENTS	DATE
0.1	Initial Document	25 JUL 2019
0.2	Certificate Updated	17 DEC 2019
1.0	Released	18 MAY 2020