

TAKEX

FLAME SENSOR

FS-5000E

Instruction Manual

We appreciate your purchase of a TAKEX flame sensor. This sensor will provide long and dependable service when properly installed. Please read this Instruction Manual carefully for correct and effective use.

Please note : This sensor is designed to detect flames and to initiate an alarm ; it is not a fire-preventing device.

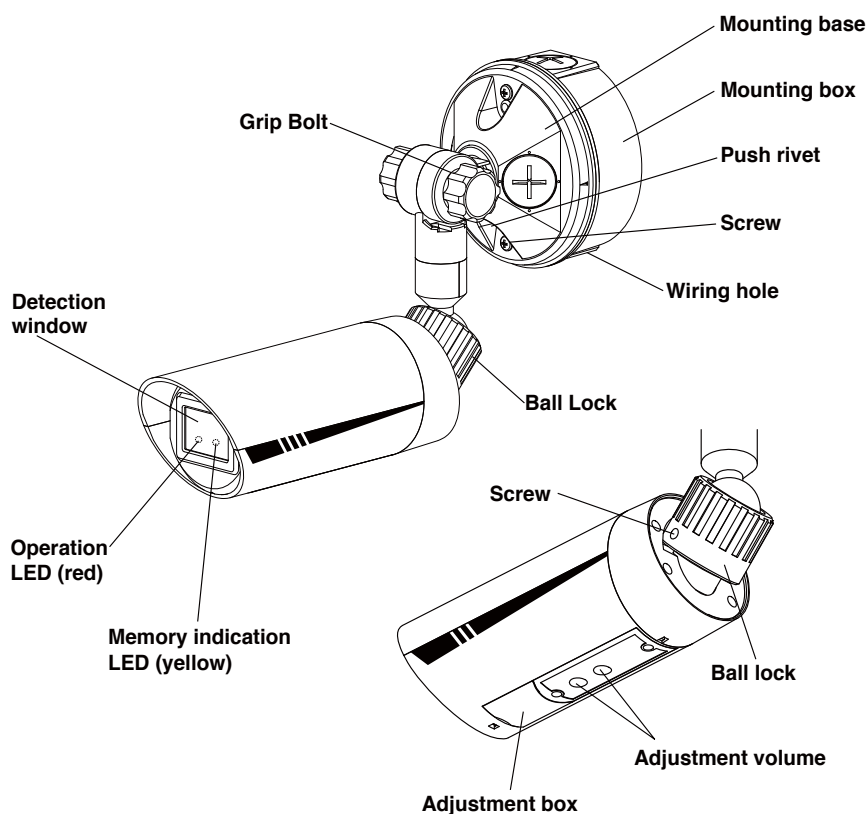
TAKEX is not responsible for damage, injury or losses caused by accident, theft, Acts of God (including inductive surge by lightning), abuse, misuse, abnormal usage, faulty installation or improper maintenance.

1 PRODUCT DESCRIPTION

Flame sensor FS-5000E immediately detects ultraviolet rays contained in flames and activates the external output. It can be installed either indoors or outdoors. By selecting the set up from the 8 levels that is suitable to the environment where the sensor is installed, it will reduce the possibility of false detections of other kinds of ultraviolet rays. Also there are many convenient functions such as Output Time Set Up, Day/Night Time Discernment Function, and Alarm Memory Function. It can be used widely as early detector of incendiary fire, smoking in prohibited areas etc.

! This sensor is not fire-alarm device.

2 PARTS DESCRIPTION



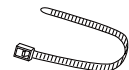
Accessories



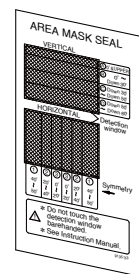
Tapping screw
φ 6×30 (4 pcs.)



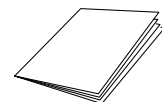
Tapping screw
φ 4×8 (1 pc.)



Binding band
(1 pc.)



Area mask seal (1 pc.)



Instruction manual



CAUTION

- * Follow the voltage of the indicated power supply. Incorrect voltage may cause fire, electric shock, etc.
- * Do not connect equipment that exceeds the indicated output capacity. It may cause fire.



CAUTION

- * Do not install in locations that cannot withstand the weight of this product. It may fall and cause an accident.
- * Do not disassemble or modify this product. It may cause fire, electric shock, etc.

3 PRECAUTIONS

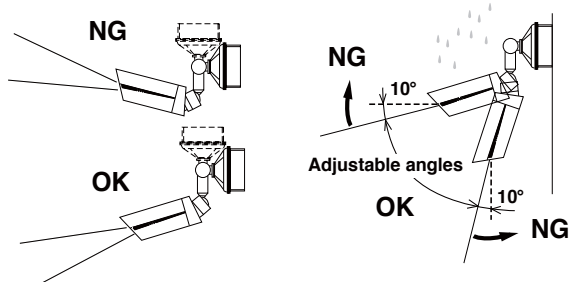
PRODUCT CLASSIFICATION

This sensor is designed detect ultraviolet rays contained in flames and to output a signal. This unit is not a fire-preventing device. It will not detect smoke or heat.

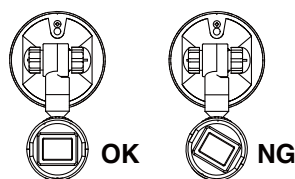
TAKEX is not responsible for damage, injury or losses caused by fire, accident, calamity, natural disasters (including inductive surge by lightning), abuse, misuse, abnormal usage, faulty installation or improper maintenance.

INSTALLATION

- The unit is designed for ceiling and wall mounting. Please make sure that the base surface is protected with reinforcements. In case of installation on concrete or gypsum board, please use anchors and screws suitable for the material.
- Keep the sensor angle somewhere between completely horizontal and vertical when installed outdoors.



- Keep the detection window straight and the adjusting part at the bottom.



- Do not pour water directly on the sensor, as it is rain proof, not water tight.
- Do not install the unit in locations where high amounts of steam stagnate (bathrooms etc.).
- Do not install the unit in areas where the temperature is under -20°C (-4°F) or over +50°C (+122°F).
- Do not install the unit in an environment subject to electrical noise or intense vibration.
- After adjusting the angle, tighten the screws and bolts to prevent the unit from falling and to maintain resistance to rain.
- A high installation location is recommended to prevent vandalism. (over 2.5m)
- This product is for installation on walls, ceilings, and under eaves. Use the optional attachment for installation at uneven places.

OTHERS

- The detection window is made of specialized glass and it is fragile.
- Do not touch the detection window barehanded. Oil from hands may cause low sensitivity. Wipe the detection window with a soft cloth with alcohol if it is dirty. After installation, wipe again when necessary.

OBJECTS TO BE DETECTED

- This sensor detects ultraviolet rays at a very sensitive level, so it will possibly detect objects other than flames. In addition, this sensor does not detect burning objects that are not producing flames.

- Ultraviolet rays are invisible. They may be emitted by unexpected objects. Set the sensitivity to "L" and the detection timer to the next longer time when the sensor does not operate properly, in case of generating an alarm when there is no flame or when none of the "possible causes of false alarm" listed below are present, etc.

- In the case of an explosion, the sensor may be damaged before detecting flames.

| Possible cause of false alarm. Do not install the sensor near the followings: | Flames which can not be detected: |
|--|---|
| <ul style="list-style-type: none"> * Halogen lamp * Electric discharge lamp such as a mercury lamp * Electric sterilizer lamp * Welding sparks * Electric sparks (caused by motor, pantograph) * Sunlight * Electric discharge from lightning * Radiation * High electrical field | <ul style="list-style-type: none"> * Flames through glass or transparent resin * Lit portion of cigarette * Burning charcoal or briquet * Electric stove * Burning object without flames |

- Sparks from neighboring areas where welding is being performed may cause false detection.

- If a person who is undergoing isotope therapy (radioiodine therapy) comes near the unit, he/she may emit radiation sufficient to trigger the sensor. Set the sensitivity to "L" in such a case.

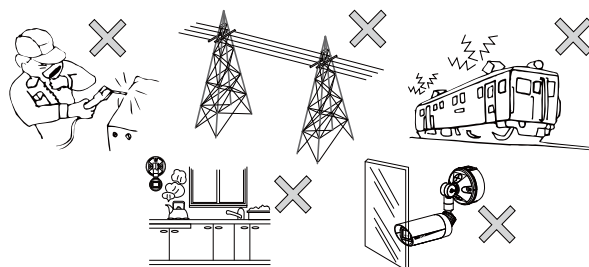
- Do not install the unit in locations where sparks or flames are usually used (kitchen, incinerator, etc.).

- Do not install the unit in locations subject to severe shock or electric noise.

- Do not install the unit in locations where a shield object (glass, transparent resin, etc.) is in front of the sensor.

- Do not install the unit near high voltage power lines. Sparks from pylons may cause false detection.

- Do not install the unit near railways. Sparks from pantographs may cause false detection.



- * There are many other ultraviolet rays outdoors that may cause unexpected detection. Therefore, it is recommended that the detection timer is set to longer than 6 secs. when the unit is installed outdoors.

| | | |
|------------------------|-----------------|--|
| INSTALLED OUTDOORS | DETECTION TIMER | 1 sec.: Not recommended 6 secs. or more: OK |
| | SENSITIVITY | H: Not recommended L: OK |

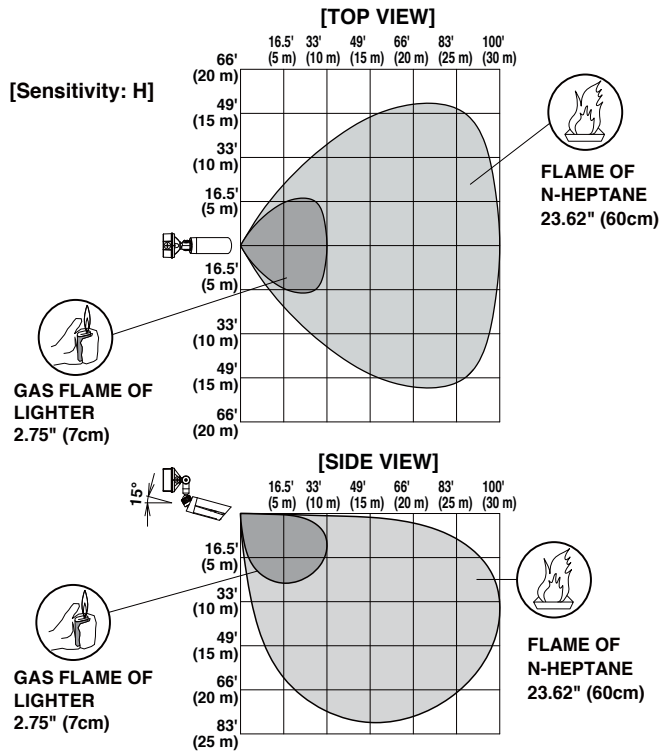
(The factory set is 1 sec.)

- The sensitivity will decrease in case of rain or snow in the detection area.
- In cases where the detection window is covered with frost, ice, etc., the sensitivity will become very low and the sensor may not detect properly.

4 DETECTION AREA

1. Detection Area

- * The upper detection area is limited to avoid sun ray influence and other unexpected detectable objects remotely located.
- * The detection distance depends on the size and time of flaming.
The bigger and longer continuous flame is more apt to be detected.
The smaller and shorter the flame continues, the narrower the detection area gets.

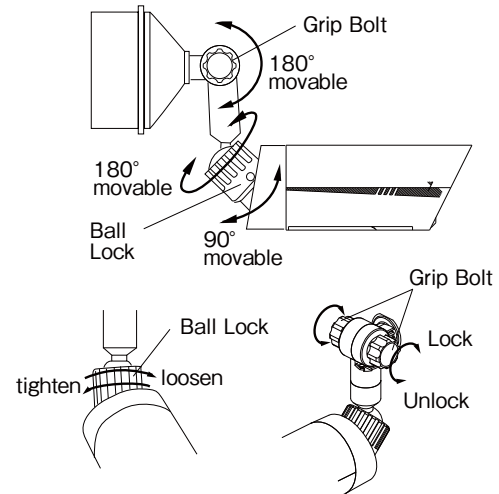


- * [N-HEPTANE FLAME] : Flame that burns the flammable liquid "n-heptane" that is a component of gasoline. Takenaka uses this flame as the standard for measurement.
Flame size is variable, so the above detection areas are average.

- * SENSITIVITY "L" : The detection area becomes approx 50% of above area.

2. Area adjustment

- The area adjustment in wide angle allows the sensor to be installed in various locations.
- Loosen the grip bolt and ball lock and refer to "3. PRECAUTIONS" when installing.
Do not forget to tighten it when finished.



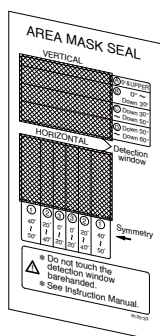
- * Keep the detection area downwards to avoid sun ray influence and other unexpected detectable objects remotely located when installing outdoors.

- ! The direction of rotation of the left and right grip bolts is the same.
Please do not rotate each in the opposite direction.
Please refer to the direction of rotation described on the body sticker.

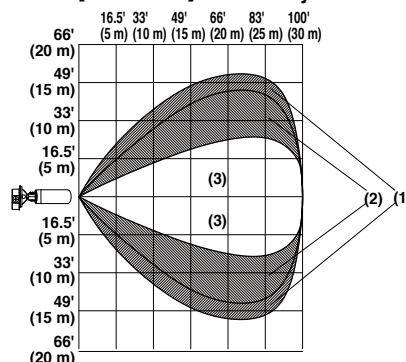
AREA MASKING

- There are many ultraviolet rays outdoors that may cause unexpected detection. In case there are objects in the area that cause unexpected detection and that cannot be avoided by adjustment, use the accessory "area masks" to cover the area.
- There are 6 horizontal and 4 vertical masks. These 2 types can also be used in combination.
- Affix the area mask on the edge of the detection window while holding the tab, and tear off the tab after affixing the area mask.
- After affixing the area mask, check operation of the sensor.
- Wear gloves and do not touch the detection window barehanded.

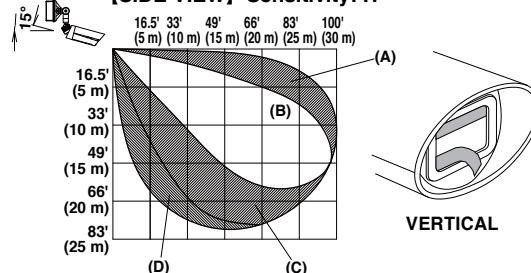
AREA MASK SEAL



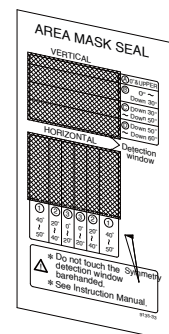
[TOP VIEW] Sensitivity: H



[SIDE VIEW] Sensitivity: H



AREA MASK SEAL

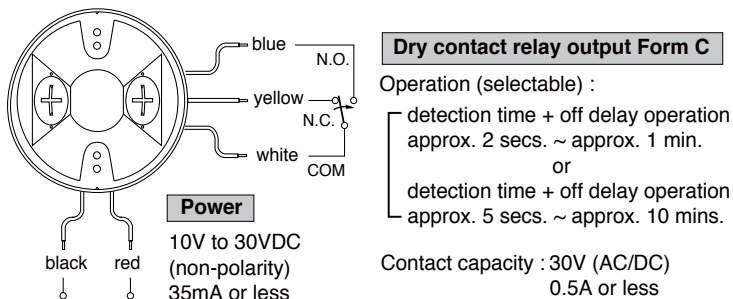


5 WIRING

(1) Attention

- * Turn off power when installing. Hot line work will cause electric shock and damage.
- * Lead wiring is required. Follow the proper way.
- * The wiring lead is contained in the mounting base. Take off the screw, mounting base, and mounting box when installing.

(2) Wiring Connection



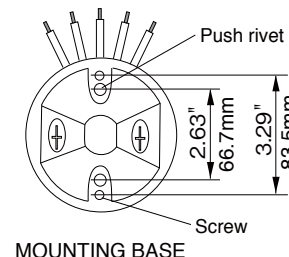
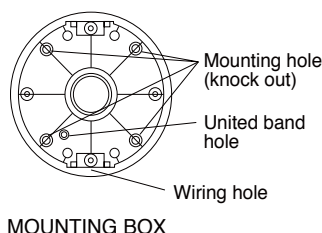
[Wiring distance]

| Size of wire used | Power supply | |
|-------------------------------|---------------|-----------------|
| | DC12V | DC24V |
| 0.3 mm ² (φ0.65mm) | 1310' (400m) | 9800' (3000m) |
| 0.75mm ² (φ0.93mm) | 3120' (950m) | 22600' (6900m) |
| 1.25mm ² (φ1.3 mm) | 5250' (1600m) | 38000' (11600m) |

- NOTE : 1) Maximum wiring distance, when two or more sets are connected, is calculated by dividing the above value by number of sets.
- 2) The signal line can be wired in the distance of up to 3,000ft. (1,000m) with (dia. 0.65mm) telephone wire.

6 INSTALLATION

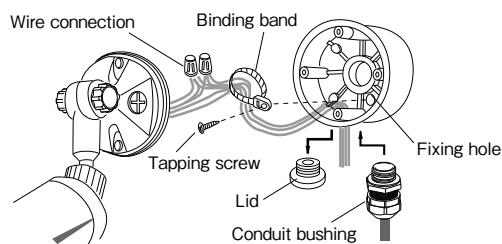
- [1] Select the most suitable installation place and way according to the purpose. (Refer to "3. PRECAUTIONS" and the following)
- [2] Take off the 2 screws, mounting base, mounting box. (Wiring leads are contained in the mounting base.)
- [3] Wire and instal the sensor. (Refer to "5. WIRING" and the following)
- [4] Set up temporary and confirm the area and operation.



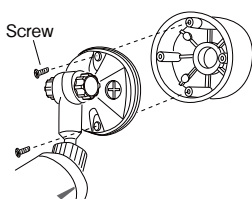
The following wiring and installation can be done. Follow the procedures.

EXPOSED WIRING

- (1) Fix to the surface
 - ① Make a hole through the 4 mounting holes (knock outs) by a driver etc.
 - ② Fix the mounting box by the 4 φ6×30 tapping screws to the surface.
- (2) Take off the lid of the wiring hole on the bottom of the mounting box and pass the wiring through. (Conduit tube wiring is possible for the wiring hole is conduit tube screw G16.)
- (3) Follow the "5. (2) Wiring connection" for wiring. To avoid direct pressure to the knot, combine the wiring by the accessory Binding Band and fix it to the inside of the box by φ4×8 tapping screw.



- (4) Fix the mounting base tightly to the mounting box by the 2 screws.



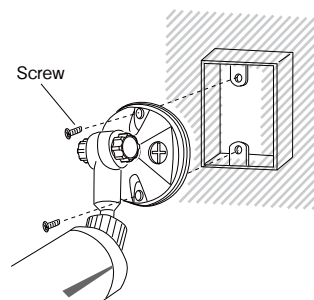
BUILT IN WIRING

- (1) Preparation (not necessary for following case)

[The mounting base fits 83.5mm and 66.7mm type built in switch box. However, it needs adjustment for the following case.]

○ 66.7mm type (beginning set up : 83.5mm)

 - Push out the 2 push rivets from the back side of the mounting base and put them into the 2 holes on the outside.
- (2) Follow the "5. (2) Wiring connection" for wiring.
- (3) Fix the mounting base tightly to the attachment box by the 2 screws.
- (4) Give rain proof treatment such as calking to the top and side of the mounting base. (It may not stick according to the surface condition.)
 - * Use optional equipments for other installation.



7 OPERATION AND FUNCTION

(1) Operation

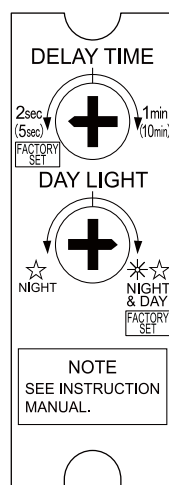
The operation LED (red) will light and start output when the sensor detects flame (ultraviolet ray) for the set up time (1 sec., 6 secs., 15 secs., 30 secs.,) and moreover when the environment is darker than the [operation mode] set up.
In case it still keeps flaming, it will continue the above operation LED (red) lighting and output. After the flame goes out, the operation LED (red) lighting and output (off delay) will stop according to the [delay time range] (2 secs. ~10mins.).

(2) Mode Setting

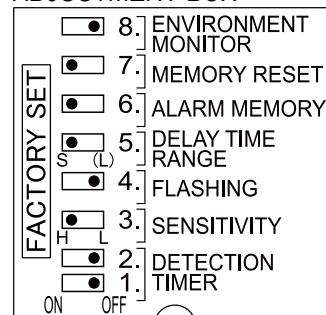
The following settings and functions are selectable for detection and output.
Use the dip switch in the adjustment box and adjustment volume which is on the bottom of the sensor.

- The adjustment volume can be turned by coins.
- Do not turn strongly, it may cause damage.

ADJUSTMENT VOLUME



ADJUSTMENT BOX



① Detection Function

This product detects ultraviolet ray included in flames and outputs an alarm. Outdoor installation would cause much more false detection than indoor installation, as there are many other ultraviolet ray factors and few shielding objects.
The 8 selectable sensitivity levels combined by 2 sensitivity selections and 4 detection timer selections are made to prevent false detection in such uncertain conditions outdoors. Select the set up that suits most the environment and purpose.
When the sensor does not operate properly, set the sensitivity to "L" and detection timer to the next longer time.

Detection timer

This function sets up the minimal flaming time to detect. It outputs an alarm when the flaming continues more than the set up time. It will not output an alarm when the flame goes out before the set time.

The following 4 levels are selectable.

| ADJUSTING BOX DETECTION TIMER | DETECTION TIME (outputs when flames for more than the below time) | PURPOSE/EXAMPLE |
|----------------------------------|--|--|
| OFF ● OFF 1 2 | 1 sec. | Flame of lighter/match detection at non-smoking areas. [Factory set] |
| OFF ● ON 1 2 | 6 secs. | Fire detection |
| ON ● OFF 1 2 | 15 secs. | In case of uncertain operation on the above two. |
| ON ● ON 1 2 | 30 secs. | Fire detection in uncertain environment. |

- * The alarm may delay when the strength of ultraviolet ray is low.
- * Intermittent ultraviolet ray will not be detected.
- * Timer set up with 6 secs. or more is recommended for outdoor installation.

Sensitivity

This function set up the size of flame (the strength of ultraviolet ray) to detect.

| ADJUSTING BOX SENSITIVITY | SENSITIVITY |
|------------------------------|---------------------------|
| H ● 3 | H : 100% [Factory set] |
| L ● 3 | L : 50% |

- * The detection distance for "L" is half of that for "H", when detecting same flame.
- * When there is uncertain operation at "H", change the sensitivity to "L".
- * For outdoor use, "L" is recommended.

② Output function

Delay time (Operation time adjustment)

The output time for day time is off delay of detection time + set time. There are following selections.

| ADJUSTING BOX DELAY TIME RANGE | ADJUSTING VOLUME DELAY TIME | OPERATION TIME (adjustment limit) |
|-----------------------------------|--------------------------------|---|
| (S) ● (short) 5 | (2 sec.) + (1 min.) | approx. 2 secs. ~approx. 1 min. [Factory set : approx. 2 secs.] |
| (L) ● (long) 5 | (5 sec.) + (10 min.) | approx. 5 secs. ~approx. 10 mins. |

Day light (Operation mode)

The following output will be produced only when the circumference is darker than the setting. (day / night time discernment function) Set up according to purpose.

| ADJUSTING VOLUME DAY LIGHT | OUTPUT CONDITIONS (circumference brightness) |
|-------------------------------|---|
| NIGHT | Output only night time |
| NIGHT & DAY | Output both day/night time [Factory set] |

- * For subtle setting, adjust the volume when the circumference is at the requested light level.
- * Even setting for night time mode, it may not output a signal when the circumference is bright with lightings etc. In that case, turn the volume to right until it outputs a signal.
- * The "output only night time" function is convenient to detect only at night time in the locations that have other ultraviolet ray factors at day time.
- * Please set "off" in "Alarm memory function" when setting up this function.

Flashing

The following two output types are selectable.

| ADJUSTING BOX FLASHING | OUTPUT TYPE |
|---------------------------|--|
| ON ● 4 | Repetition of flashing (0.5 sec. output, 0.3 sec. stop) |
| OFF ● 4 | Continuous output [Factory set] |

Flashing is useful to threaten and notice incendiarism.

Alarm Memory Function

This function enables identification of individual sensors in multiple sensor configuration.

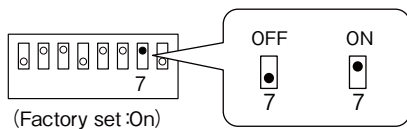
After raising an alarm, the memory indication LED (yellow) blinks for 3 minutes and then lights for 47 minutes.

When an alarm is caused again during the lighting, it will light for another 47 minutes. <re-trigger operation>

| ADJUSTING BOX ALARM MEMORY | MEMORY |
|---|-------------------------|
| ON <input checked="" type="checkbox"/> 6 | Indicates [Factory set] |
| OFF <input type="checkbox"/> 6 | Does not indicate |

* In case of resetting this function during blinking and lighting, turn the power off and on again.
(power on reset operation)

Memory auto reset



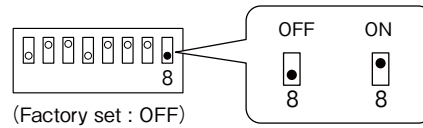
| Setting | Memory LED (yellow) |
|---------|--|
| ON | Blinking (3 minutes) Light on (Auto reset after 47 minutes later) |
| OFF | Blinking (3 minutes) Light on (Until resetting by manual) |

※ Manual reset : Power supply off and on again or "Alarm memory function" off.

Environment monitoring function

This function monitors the strength of nuisance by ultraviolet in installed environment to check whether there is a cause of false alarm.

When the performance of this sensor becomes unstable, please use this function to check the strength of ultraviolet.



| | | |
|--|--|--|
| No ultraviolet source for false alarm. | A little ultraviolet source for false alarm. | Much ultraviolet source for false alarm. |
| LED OFF | Blinking (slow) | Blinking (fast) LED lights ON |

The strength is showed by operation LED (red).

- 1: The operation LED (red) may be "light on" 2~3 times per 1 minute in even normal environment. In case of more frequent lighting, there may be a nuisance ultraviolet source in the site. Therefore, please set sensitivity "L" and detection timer more than "6 secs".
- 2: In case operation LED (red) lights on or blinking continue more than set detection timer, Please adjust sensitivity "L" and detection timer more than above operation LED (red) duration time.

* The environment of ultraviolet is not always equable.
It may fluctuate by varied factors.

When the performance of this flame sensor becomes unstable after installation, please adjust sensitivity to downward and detection timer to the next longer time.

* The alarm signal outputs at setting level (sensitivity, detection timer) even environment monitoring function is "ON".

8 OPERATION CHECK

Check operation after wiring and installation.

(1) Detection area

* Set up for area check. (Factory set)

| | |
|-----------------|-------------|
| Detection timer | 1 sec. |
| Sensitivity | H |
| Delay time | 2 secs. |
| Day light | Night & Day |

| | |
|-----------------------|-----|
| Alarm memory function | ON |
| Memory auto reset | ON |
| Environment monitor | OFF |

* Set up the area angle referring to the "4. 1. Detection area" picture. * Put power on.

* Turn on a lighter more than 1 sec. within the detection area. Check the angle and size of area by operation LED (red) and connected machines and tools.

* In case it includes unnecessary areas, adjust it by changing angle or masking the area.

(2) Operation

* Choose the set up according to the purpose and environment.

* Activate the sensor again and check the operation LED (red), and connected machines and tools.

9 TROUBLE SHOOTING

| TROUBLE | CHECK | CORRECTIVE ACTION |
|---|---|---|
| Completely inactive | <ul style="list-style-type: none"> No power supply (Broken or improper wiring) Low voltage Interrupting object in front of detection area (Including glass) Improper detection area setting (Including detection distance) Improper operation mode setting Improper detection timer setting | <ul style="list-style-type: none"> Correct supply or replace broken wiring Correct supply or replace broken wiring Remove the interrupting object Re-adjust the detection area set up (Refer to "4. DETECTION AREA") Re-adjust the operation mode (Refer to "7. OPERATION AND FUNCTION") Re-adjust the detection timer |
| Sometimes inactive | <ul style="list-style-type: none"> Improper detection area setting (Including detection distance) Improper operation mode setting Detection window soiled Improper detection timer, sensitivity setting | <ul style="list-style-type: none"> Re-adjust the detection area (Refer to "4. DETECTION AREA") Re-adjust the operation mode (Refer to "7. OPERATION AND FUNCTION") Wipe with soft dry cloth Re-adjust the detection timer, sensitivity |
| Activate without flame | <ul style="list-style-type: none"> Unstable power supply Large electrical noise source such as radio station or wireless station nearby Unexpected ultraviolet ray nearby (Refer to "3. PRECAUTIONS") Sparking object such as welding construction site, railway pantograph nearby | <ul style="list-style-type: none"> Correct power supply Relocate the sensor Remove the object / Relocate the sensor / Adjust the angle / Mask the area by seal / Set sensitivity to "L" / Set detection timer to the next longer time. (Refer to "4. DETECTION AREA") Relocate the sensor / Adjust the angle / Mask the area by seal / Set sensitivity to "L" / Set detection timer to the next longer time. (Refer to "4. DETECTION AREA") |
| The LED lights but the connected device inactivates | <ul style="list-style-type: none"> Poor contact output connection or broken wire Improper output connection Improper connected units | <ul style="list-style-type: none"> Check the wiring or connection Check the output terminal by tester etc. Check the connected units |

Maintenance

When the sensor is dirty, clean the cover with a soft cloth moistened with a small amount of cleaning solution.

Do not use chemicals such as thinner or alcohol. Check operation once a week.

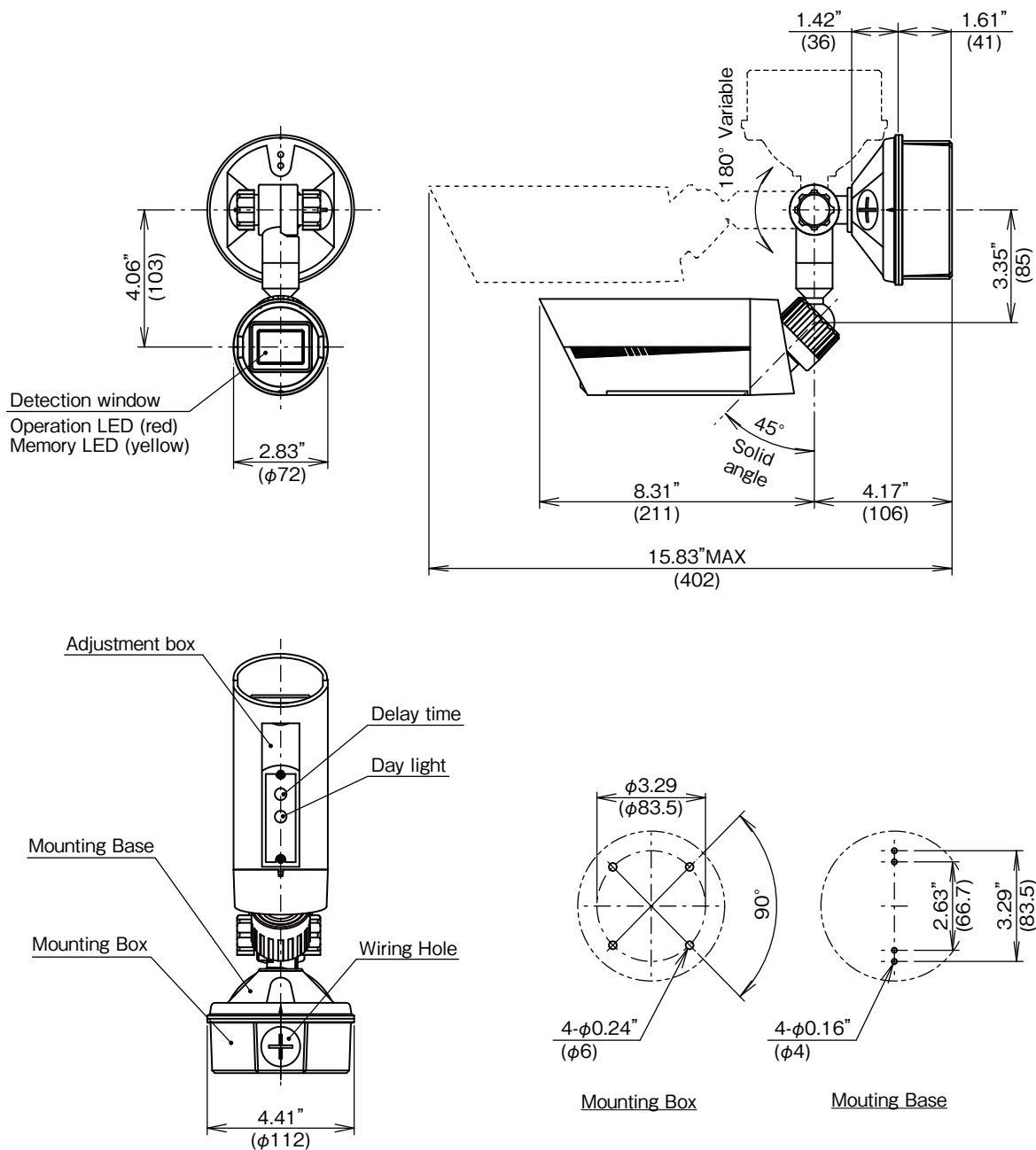
Do not fail to check operation whenever furniture in the vicinity is moved. When the battery is low, change it for a new one immediately.

If the battery is not changed, the sensor may not operate.

10 SPECIFICATIONS

| | | |
|------------------------|--|---|
| PRODUCT NAME | FLAME SENSOR | |
| MODEL NO. | FS-5000E | |
| DETECTION SYSTEM | Ultraviolet rays detection (Detected wave length <185 to 260nm>) | |
| DETECTION AREA | Distance | 33ft. (10m) [Gas Flame of Lighter in front of sensor : approx. : 2.75"(7cm)] 100ft. (30m) [Flame of N-heptane on fire plate 15cm□15cm : approx. : 23.62"(60cm)] *The flame size is rough. |
| | Angle | Vertical : approx. 75° (upward :15°) Horizontal : approx. 100° (downward :60°) |
| | Adjustment range | Vertical : downward 90° (horizontal-vertical) Horizontal : 180° |
| SENSITIVITY ADJUSTMENT | Sensitivity | H (100%), L (50%) [selectable by switch] |
| | Detection timer | 1sec., 6secs., 15secs., 30secs. [selectable by switch] |
| POWER SUPPLY | 10V to 30VDC (non-polarity) | |
| POWER CONSUMPTION | 35mA or less | |
| ALARM OUTPUT | Dry contact relay Form C (alarm : open/close) Contact capacity : 30V (AC/DC) 0.5A or less (resistance load) Operation time : The following are selectable * Detection time + off delay operation approx. 2 secs. - 1 min. * Detection time + off delay operation approx. 5 secs. - 10 mins. Output operation : The following are selectable * Same time as above continuous output * Same time as above intermittent output (Flashing) Operation mode (day/night time discernment function) : 5 lux (night time operation) - ∞ lux (day time operation) adjustment volume | |
| ALARM MEMORY | LED(yellow) blinking and lights on /or LED disable. [selectable by switch] | |
| LED | Operation LED (red) : synchronous dry contact relay Memory indication LED (yellow) : After blinking for 3 minutes and auto reset after 47 minutes or reset by manual | |
| WIRING | Lead wiring, power supply : 2 / dry contact : 3 | |
| AMBIENT TEMP. RANGE | -4°F to +122°F (-20°C to +50°C) | |
| INSTALLATION | Indoor, Outdoor | |
| WEIGHT | approx. 19.3 oz (550g) | |
| APPEARANCE | resin (white) | |
| OPTIONAL | Pole attachment (for the end) : BP-01, Pole attachment (for the middle) : BP-02, Vise : BV-03 | |

11 EXTERNAL DIMENSIONS



Limited Warranty :

TAKEX products are warranted to be free from defects in material and workmanship for 12 months from original date of shipment. Our warranty does not cover damage or failure caused by natural disasters, abuse, misuse, abnormal usage, faulty installation, improper maintenance or any repairs other than those provided by TAKEX. All implied warranties with respect to TAKEX, including implied warranties for merchantability and implied warranties for fitness, are limited in duration to 12 months from original date of shipment. During the Warranty Period, TAKEX will repair or replace, at its sole option, free of charge, any defective parts returned prepaid. Please provide the model number of the products, original date of shipment and nature of difficulty being experienced. There will be charges rendered for product repairs made after our Warranty Period has expired.



TAKENAKA ENGINEERING CO., LTD.

In Japan

Takenaka Engineering Co., Ltd.
83-1, Gojo-Dori, Sotokan Nishi-iru, Higashino,
Yamashina-ku, Kyoto 607-8156, Japan
Tel : 81-75-501-6651
Fax : 81-75-593-3816
<https://www.takex-eng.co.jp/>

In the U.S.

Take America Inc.
151, San Zeno WAY
Sunnyvale, CA 94086, USA
Tel : 408-747-0100
Fax : 408-734-1100
<https://www.takex.com>

In Australia

Take America Inc.
4/15 Howleys Road, Notting Hill,
VIC, 3168
Tel : +61 (03) 9544-2477
Fax : +61 (03) 9543-2342
<https://www.takex.com>

In the U.K.

Take Europe Ltd.
Aviary Court, Wade Road,
Basingstoke, Hampshire. RG24 8PE, U.K.
Tel : (+44) 01256-475555
Fax : (+44) 01256-466268
<https://www.takex.com>