TAKEX FLAME SENSOR

FS-2000E

Instruction Manual

We appreciate your purchase of a TAKEX flame sensor.
Please read this instruction manual carefully for correct and effective use.

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.
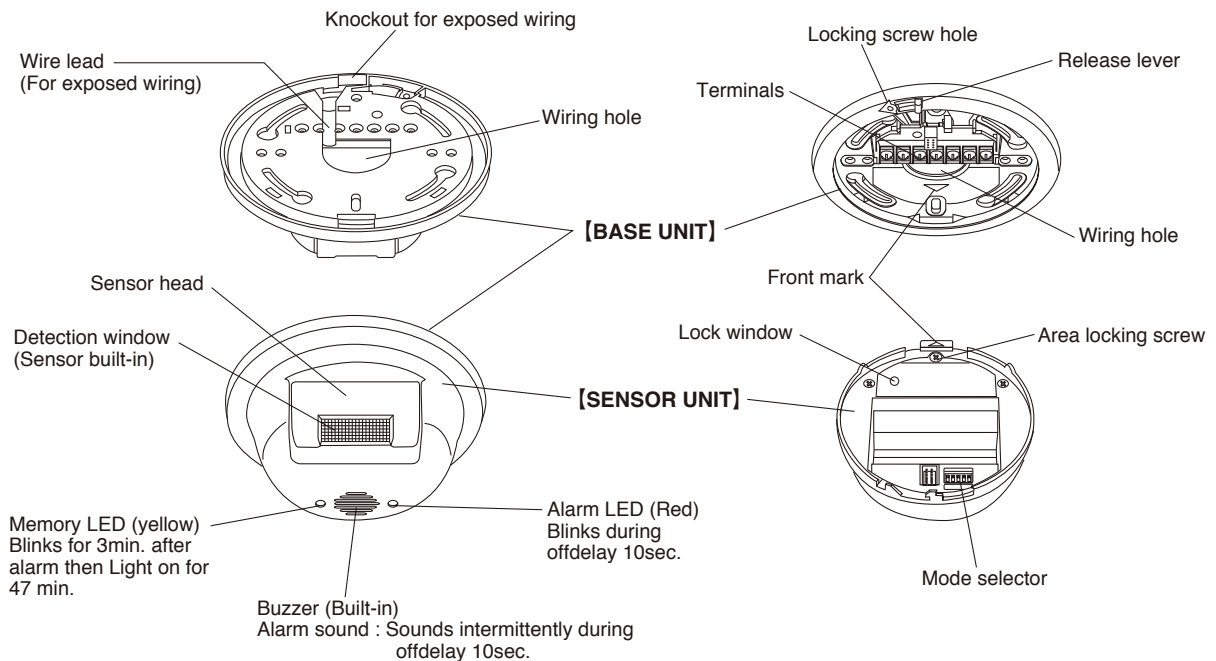
> This sensor detects Ultraviolet rays in the flames and initiates an alarm.
> It does not detect smoke, heat.
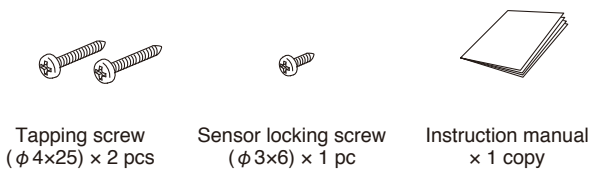
PRODUCT DESCRIPTION

Flame sensor FS-2000E is designed to detect ultraviolet rays contained in flames, and to initiate an alarm.

In addition to alarm sound, FS-2000E is equipped with form C (N/C, N/O.) output, to meet professional application.

Also, memory LED enables you to find out the initiated sensor out of a series of sensors.

Area adjustment mechanism brings wide selection of protection angle.

Quick separation of sensor and base eases installation and maintenance.
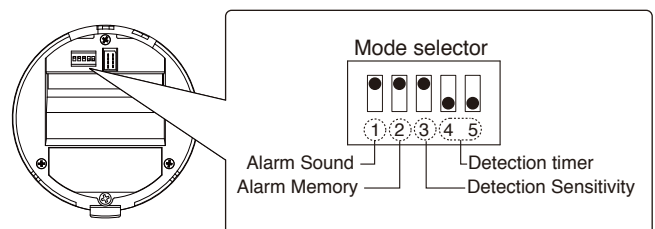
1 PARTS DESCRIPTION

1-1 Description

Knockout for exposed wiring
Wire lead (For exposed wiring)
Wiring hole
【BASE UNIT】

Locking screw hole
Release lever
Terminals
Wiring hole
Front mark

Sensor head
Detection window (Sensor built-in)
【SENSOR UNIT】

Lock window
Area locking screw

Memory LED (yellow)
Blinks for 3min. after alarm then Light on for 47 min.

Alarm LED (Red)
Blinks during offdelay 10sec.

Mode selector

Buzzer (Built-in)
Alarm sound : Sounds intermittently during offdelay 10sec.

1-2 Accessory

Tapping screw
(φ4×25) × 2 pcs

Sensor locking screw
(φ3×6) × 1 pc

Instruction manual
× 1 copy

1-3 Mode setting

Mode selector
1 2 3 4 5
Alarm Sound
Alarm Memory
Detection timer
Detection Sensitivity

2 ATTENTION

Product classification

This sensor is designed to detect ultraviolet rays contained in flames, and to issue a signal.
This unit is neither fire detector nor heat detector nor smoke detector.
TAKEX is not responsible for damage, injury or losses by fire, accident, calamity, Acts of God (including inductive surge by lightning), abuse, misuse, abnormal usage, faulty installation or improper maintenance.

Others

● When an strong impact is given to the sensor, it may cause damage, malfunction or less performance.
  Do not handle in a rough manner.

● Intense flames such like gas explosion's may damage the sensor, instead of the detection.

Objects to be detected

This sensor detects ultraviolet rays contained in flames.
Therefore, this sensor may detect something including ultraviolet rays but not in flame.
Besides, this sensor does not detect the burning object which is not flaming.

| Possible cause of false alarm Do not install the sensor nearby the followings.	Flames which can not be detected.
● Halogen lamp ● Electric discharging lamp such like mercury lamp ● Electric sterilizer lamp ● Spark of welding ● Electric spark (caused by motor, pantograph) ● Sunlight ● Electric discharge of thunderbolt ● High electric field ● All the objects which emanates ultraviolet rays	● Flames through the glass or transparent resin ● Lighting portion of cigarette ● Burning charcoal or briquet ● Electric stove ● Burnig object without flames

3 DO'S AND DON'T'S

◎ According to the detection area chart and operation check, decide installtion place not to form the death angle.
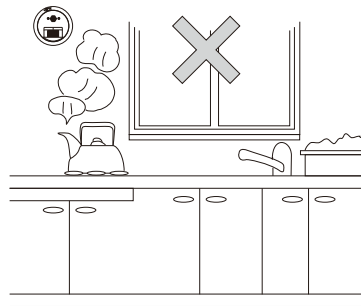◎ Do not install in the following places.

● Do not install in a site which is subject to direct or reflecting sunlight and rain. (This sensor is for indoor use only)
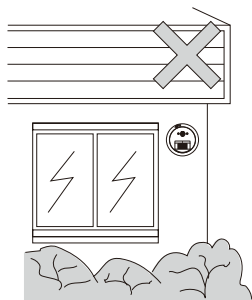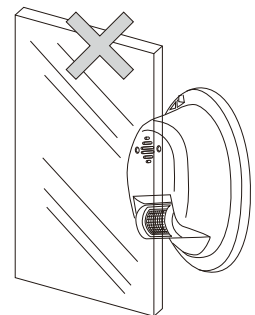
● Do not install in high humid place such like bathroom.
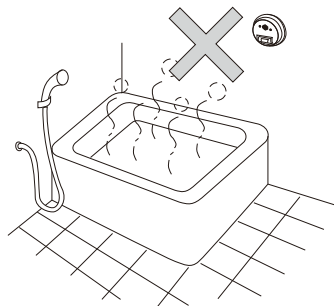
● Do not install in a site where fire (flame) is usually used such like kitchen.

● Do not install in front of the object to intercept light. (including glass and transparent resin etc.)

● Do not install in a site where the temperature falls less than +14°F (-10°C) or rises more than +140°F (+60°C).

● Do not give an impact to sensor. it may cause damage, malfunction and less performance to the sensor.

● Do not put water to the sensor, or leave the sensor in humid place. It may cause malfunction.

● This sensor's alarm output is 2 sec. offdelay, and alarm sound / LED is 10 sec. offdelay action.
  By detecting a flame, the alarm will be initiated after the set time of timer passed.
  The alarm action continues during the fire, and stops 2 sec. and 10 sec. later each after the extinction.

  (Alarm sound : intermittently   LED : continous)

∗ when alarm sound is "OFF", it does not sound.

4 WIRING

Terminal arrangement
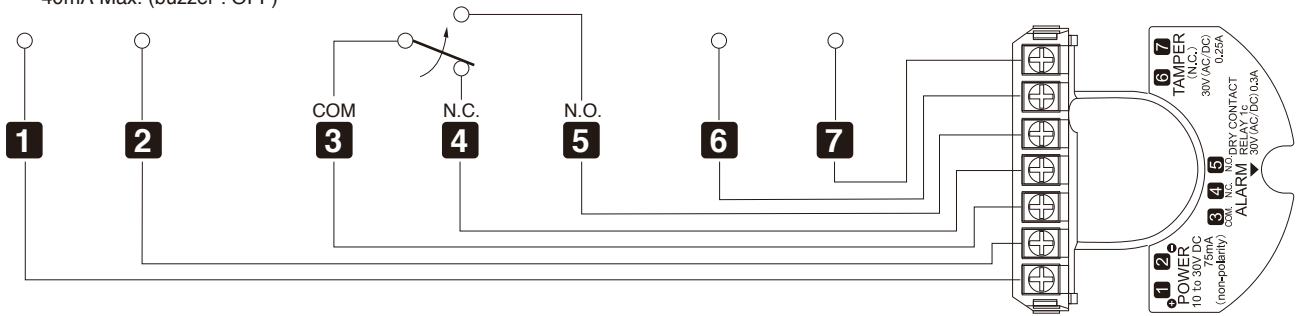
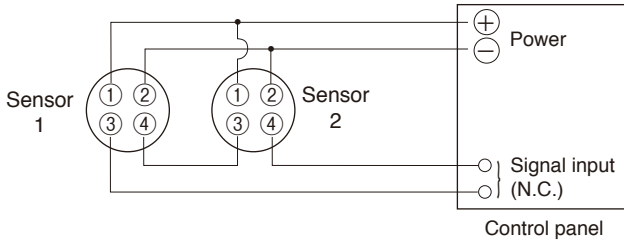| Power	Alarm output	Tamper
10 to 30VDC (non-polarity) Stand-by : 25mA Alarm : 75mA Max. (buzzer : ON) 40mA Max. (buzzer : OFF)	Dry contact relay output Form C Action : Offdelay (detection time + 2 sec.) Capacity : 30V (AC/DC) 0.3A or less (protective resistance 3.3 ohms)	Dry contact output Form B (N.C.) Action : Open when sensor unit is detached Capacity : 30V (AC/DC) 0.25A or less

1　**2**　**3** COM　**4** N.C.　**5** N.O.　**6**　**7**

Basic connection

[2 units connection in series (N.C.)]

Sensor 1　① ② ③ ④　① ② ③ ④　Sensor 2

Power ⊕ ⊖

Signal input (N.C.)

Control panel

【Allowable wiring distance between sensor and power source】

| Size of wire used	Distance at 12VDC
AWG 22 (Dia. 0.65mm)	490 ft. (150m)
AWG 20 (Dia. 0.80mm)	820 ft. (250m)
AWG 18 (Dia. 1.00mm)	1,230 ft. (375m)

Note 1) The maximum wire length, when two or more units are connected, is the above distance divided by the number of units.
　　2) The protection circuit can be wired to a distance of 3,280 ft (1,000m) with AWG 22 (0.65mm dia.) wire.
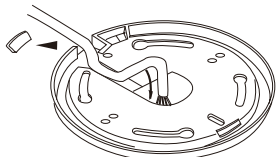
5 INSTALLATION

① Locate the installation site.
　(Ref : 3, DO'S AND DON'T'S and 7, DETECTION AREA)

② Slide the release lever to detach the sensor unit.
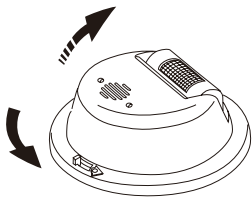
③ Fix the base with the screws included.
　(Ref : Base installation described later)
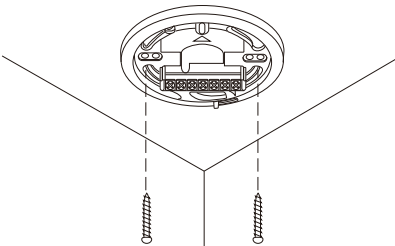
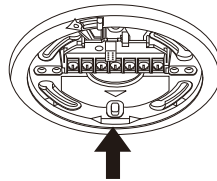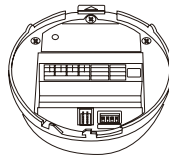※To make the exposed wiring, break the knockout and insert wires into the wire lead.

④ Connect wire to terminals of the base.
　(Ref : 4, WIRING)

⑤ Make the set-up of detection timer, alarm sound and alarm memory.
　(Ref : 6-(2) Function setting)

⑥ Attach the sensor unit to base unit.

(1) Turn front marks of base unit and sensor unit point same directions.
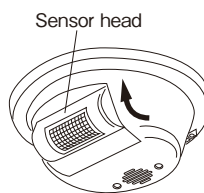
(2) Insert sensor unit into base unit.
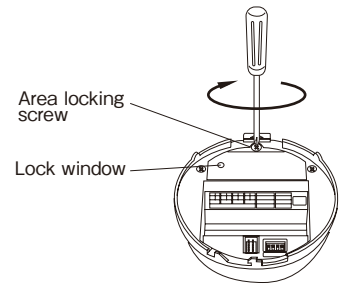
(3) Push sensor unit until release lever is locked.

⑦ Check operation and area.

Sensor head

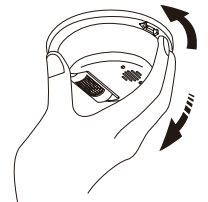※Sensor head can be adjusted ahead with 4 steps. (Ref : 7, Detection area)

⑧ Detach sensor unit, and turn Area locking screw to right and fix sensor head tightly.

(All the inside of lock window have to be turned into black.)

Area locking screw

Lock window

⑨ Attach sensor unit on base unit.

●When sensor unit is detached, wrap it in palm and slide release lever.

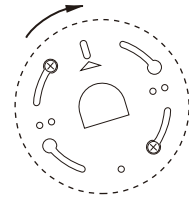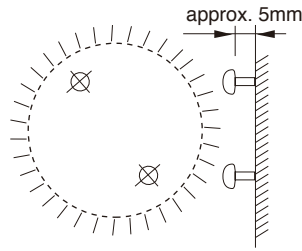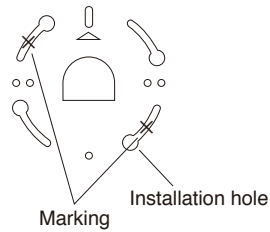●To lock sensor unit, insert sensor locking screw into locking screw hole and tighten it.

Sensor locking screw

[Installation of base]

● Installation hole   This product is equipped with installation holes (pitch 3.29" or 83.5mm) to make installation easy and the sensor's direction adjustable.

Installation hole

approx. 5mm

Marking   Installation hole

(1) Place the base on the site and mark ✕ on 2 points 180° apart.

(2) Thrust the 2 pcs. of tapping screws (accessory) leaving 5mm exposed from the surface.

(3) Adjust the sensor's direction by turning the base. (adjustment range 25°)

(4) Tighten the screws.

6 OPERATION AND FUNCTION

(1) Operation

Alarm (Basic action)

This product alarms only by detecting the flame continuing for the set time of detection timer.
(0.2sec., 1sec., 6sec., 30sec.)

Buzzer : Sounds intermittently every 0.2sec.
LED : Lights on
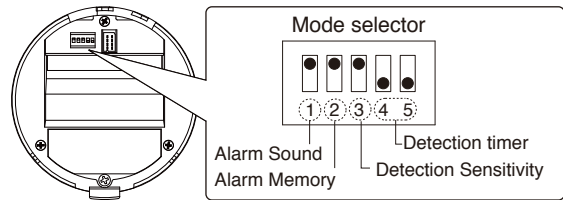Alarm output : Continuous

When the flame continues further, the above alarm actions are also continued for the meantime. 2sec. after the flame goes out, alarm output stops, and 10sec. after, alarm sound and LED stop (off delay).
Then sensor goes back to armed mode.

Alarm sound (buzzer)

Buzzer can be off by mode selector No.1, when external output is used.

SET	
●	ON
●	OFF

(Factory set : ON)
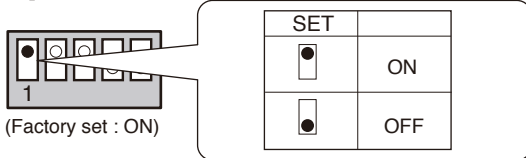
Alarm memory

When 2 or more sensor are connected on 1 loop, which sensor is initiated can be monitored by Memory LED (yellow) for 50 min. after alarm output. Memory LED will be off automatically after 3 min. of blinking and 47 min. of lighting on.
In case that the sensor initiates alarm again while its memory LED is lighting, LED continues to light on for further 47 min. after that. (re-trigger action)

SET	
●	AUTO (ON)
●	OFF

(Factory set : AUTO)
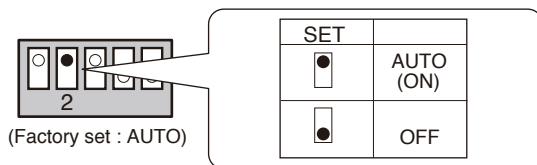
To reset the sensor LED which is blinking or lighting on, Detach sensor unit from base unit and attach it again, or put off power and on again. (Power on reset)

⚠ The following setting is about detection performance.

This unit detects ultraviolet rays in a flame and issues a signal.
In the semi-outdoors, there are many objects which generate ultraviolet rays and because there are no walls or windows in open area, there is a much higher possibility for the unit to detect those objects, in comparison with indoor installations.
The detection performance should be set using the dip switches according to the circumstances of the installation site.
When the performance of the installed sensor is unstable and the cause cannotbe indentified, select Sensitivity "L" and detection time one step longer than current setting.

(2) Mode setting

FS-2000E is equipped with 4 functions which can be used according to the application or environment.
Mode setting will be done by mode selector (dip switch) in accordance with mode setting chart on the back side of sensor unit.
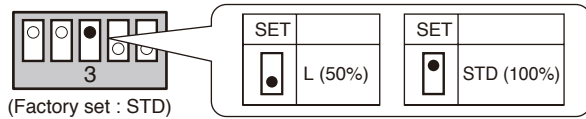
Mode selector

① ② ③ ④ ⑤

Alarm Sound
Alarm Memory

Detection timer
Detection Sensitivity

Detection Sensitivity

Detection sensitivity is selectable STD or L.
(STD: Standard setting: Same sensitivity as previous model)

SET		SET	
●	L (50%)	●	STD (100%)

(Factory set : STD)

＊Detection distance on "L" setting is 50% shorter than that on "STD" setting.
＊If the operation is unstable on "STD", switch to "L".
＊When installed semi-outdoor, "L" setting is recommended.

Detection timer

An alarm output occurs when the flame continues for set time of detection timer or longer.

SET	Timer	Application and installation
●●	0.2 sec	●For the quick detection of the flame of lighter / match at no smoking zone.
●●	1sec	●When above setting is not stable.
●●	6 sec	●For the detection of the fire at smoking zone
●●	30 sec	●At the window etc. which is subject to reflection of sunlights.

(Factory set : 0.2 sec)

※ When the ultraviolet rays of a flame is weak (it is related to size of flame and distance to sensor), alarm initiation may be delayed beyond the set time.

※ The ultraviolet rays are not visible, and may be detected from unexpected object.
When the sensor's operation is not stable (it detects something but not a flame) and its cause can not be identified, set detection time longer by one step and see the course.

7 DETECTION AREA

1. DETECTION AREA

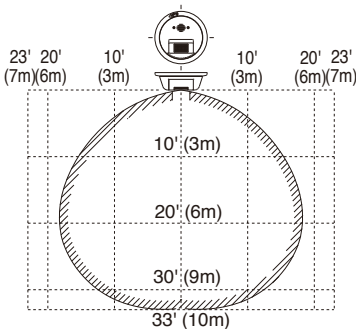● Detection area spreads out in front of the sensor at approx. 120° conically.

● The size of detection area is in proportion to the size of flame and the time of flaming.
The bigger flame becomes or the longer flame continues, the bigger detection area becomes.
When small flame such like lighter's is the object to be detected, confirm detection area.
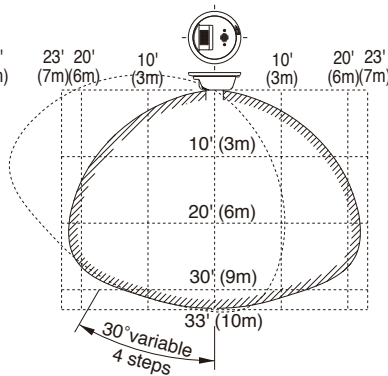
Approx. 120°
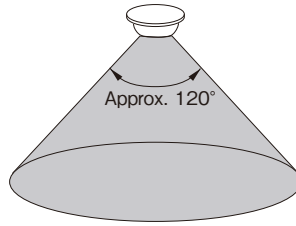
Detection area

● Condition of detection area
Detection timer : 0.2sec.
Origin of flame : Gas lighter
Size of flame : Approx. 2.75" (7cm)

Front view : Ceiling mount
Top view : Wall mount

Side view : Ceiling / wall mount

23' 20' 10' 10' 20' 23'
(7m)(6m) (3m) (3m) (6m)(7m)

10' (3m)
20' (6m)
30' (9m)
33' (10m)

23' 20' 10' 10' 20' 23'
(7m)(6m) (3m) (3m) (6m)(7m)

10' (3m)
20' (6m)
30' (9m)
33' (10m)

30° variable
4 steps

2. AREA ADJUSTMENT

● When improper area setting is found out by operation check, adjust area setting.

〈Adjustment range〉
Horizontal 25° ·············By base unit
Vertical 30° (4 steps) ·········By sensor head

sensor head

30° variable
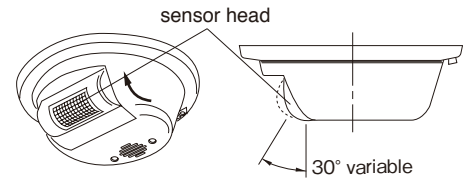
＊ Sensor installation surface can be covered by the most forward area setting.
After the adjustment, detach the sensor unit.
Fix the sensor head by turning Area locking screw to right, and attach it again.

LOOSENED		FIXED
Lock window ○	Lock window ◑	Lock window ●
⊗	⊕	⊗
To be fixed		To be loosened
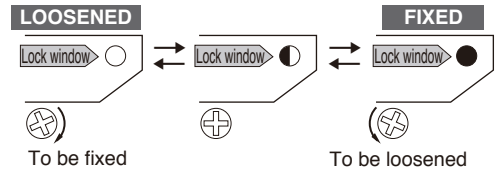
Area locking screw have to be turned with a big cross driver until the inside of Lock window changes to complete black (FIXED : turn to right) or white (LOOSENED : turn to left).

Lock window
Area locking screw
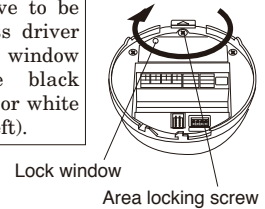
8 OPERATION CHECK

1. Turn power on.

2. Ignite a lighter etc. within detection area for more than the set time.

3. After the set time, an alarm output is issued, buzzer sounds intermittently and LED blinks. (Alarm action)

4. 2 sec. after the flame goes off, alarm output ends. 10sec. after the flame goes off, other alarm actions ends. (Check the alarm output by connecting a device such like bell / siren.)

⚠ Do not use a lighter in no fire zone because it is dangerous.
In such case, operation test have to be done in other place with sensor only.
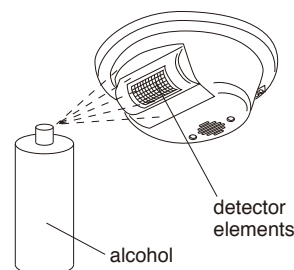
9 TROUBLESHOOTING

Solve possible problems according to the following table .
If normal operations can not be restored by these corrective actios, contact either the dealer from whom you bought the unit or TAKEX.

Trouble	Check	Corrective action
Completely inactive	● No power supply (Broken wire or improper wire) ● Low voltage (When power supply wired)	● Correct power supply or replace broken wire
	● Interrupting rays objects in front of detection area (Glass, transparent resin are interrupting rays objects)	● Remove the interrupting rays object
	● Sensor inside is wet by condensation etc.	● Dry out sensor inside, and remove the cause of the wet
Sometimes inactive	● Improper area setting	● Relocate the sensor to appropriate position
	● Detection window is soiled with dust	● Remove the dust and soil
	● Low voltage	● Correct power supply
Activated without flame	● Large electrical noise source such as a redio station or high-voltage wire nearby	● Relocate the sensor
	● Unexpected ultraviolet rays nearby (Ref : 2, ATTENTION)	● Remove the origin of the ultraviolet rays, interrupt ultraviolet rays, or relocate the sensor
	● Sensor inside is wet by condensation etc.	● Dry out sensor inside, and remove the cause of wet
The alarm LED and buzzer works but the connected devices are inactive	● Poor contact output connection or broken wire	● Check the wiring or connection
	● The connected unit's trouble	● Check the connected unit

Maintenance

● Check the operation once a week.

● Do'not fail to check operation whenever a funiture in the place is moved.

When detector elements are stained, spray alcohol to the elements and remove the stain.
Do not use such chemicals as mild detergent, thinner or benzine to clean the detector elements.
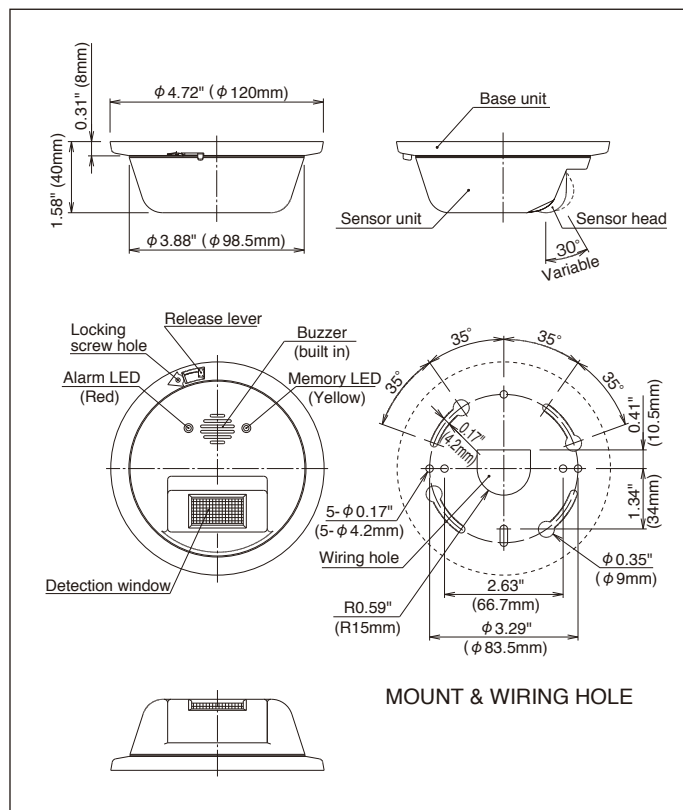When housing is stained, clean it with a soft cloth.

detector elements

alcohol

10 SPECIFICATIONS

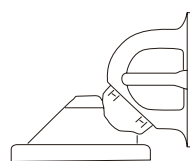| Product name	FLAME SENSOR	
Model No.	FS-2000E	
Detection system	Ultraviolet rays detection (Detected wave length 185 to 260nm)	
Detection area	Distance	33ft.(10m) [2.75"(7cm)lighter flame, in front]
	Angle	Approx. 120° conically
	Adjustment range	Horizontal 25° by base unit Vertical 30° (4 steps) by sensor head
Sensitivity adjustment	Detection Sensitivity (STD[100%] ,L[50%]) Detection timer 4 steps (0,2 sec., 1 sec., 6sec., and 30 sec.)	
Power supply	10 to 30VDC (non-polarity)	
Power consumption	Stand by : 25mA or less Alarm : 75mA or less (alarm sound ON) 40mA or less (alarm sound OFF)	
Alarm output	Dry contact relay Form C (alarm : open/close) Contact action : Off delay (approx. 2sec.) Contact capacity : 30V・0.3A, protective resistance 3.3 ohms	
Alarm memory	Auto-reset operation (on/off setting available) Memory LED blinks for 3 min. then light on for 47 min.	
LED	Alarm LED (red) : light on for off delay 10sec. Memory LED (yellow) : light on when memory indicated, blink when power turned on	
Alarm sound (buzzer)	Alarm : Sounds intermittently every 0.2sec. during off delay 10sec. Volume : 80dB or more at 3.3ft. (1m) ahead (Silent setting is available)	
Tamper output	Dry contact Form B (N/C) Action : open when sensor unit is detached Capacity : 30V・0.25A	
Wiring	Terminals	
Ambient temp. renge	+14°F to +140°F (-10°C to +60°C) without condensation	
Installation	Indoor (ceiling or wall mount)	
Weight	Approx. 150g (5.25oz)	
External dimensions	φ4.72" (120mm)×H 1.58" (40mm)	
Appearance	ABS resin (white)	
Accessories	● Tapping screw φ4×25, 2 pcs. ● Sensor locking screw φ3×6, 1 pce.	
Option	Ceiling mount attachment (BCW-401)	

11 EXTERNAL DIMENSIONS

Unit: inch (mm)

0.31" (8mm)
φ4.72" (φ120mm)
1.58" (40mm)
φ3.88" (φ98.5mm)

Base unit

Sensor unit
Sensor head
30° Variable

Locking screw hole
Release lever
Buzzer (built in)
Alarm LED (Red)
Memory LED (Yellow)
Detection window
Wiring hole

35° 35° 35° 35°
0.41" (10.5mm)
0.17" (4.2mm)
5-φ0.17" (5-φ4.2mm)
1.34" (34mm)
φ0.35" (φ9mm)
2.63" (66.7mm)
R0.59" (R15mm)
φ3.29" (φ83.5mm)

MOUNT & WIRING HOLE

■**OPTION**

◎Ceiling/wall mount attachment (variable attachment)

For angle adjustment more than horizontal 25° or vertical 30°.

〔BCW-401〕

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.