# TAKEX

**Color Sensor**

# CST-R80 Series Instruction Manual

**TAKENAKA ELECTRONIC INDUSTRIAL CO.,LTD.**

Head office, factory : 20-1 Shinomiya Narano-cho, Yamashina-ku,
: Kyoto 607-8032, Japan
Telephone : +81-75-581-7111
FAX : +81-75-581-7118

- The CST-R80 series sensors identify color and brightness of light sources like LED or color lamp and perform color matching.
- Easy teaching by setting buttons. External inputs can be used as an alternative.
- Equipped with two outputs ; Color (RGB) composition matching and brightness matching.
- The tolerance of color composition and brightness can be separately set.

## 1 SPECIFICATIONS

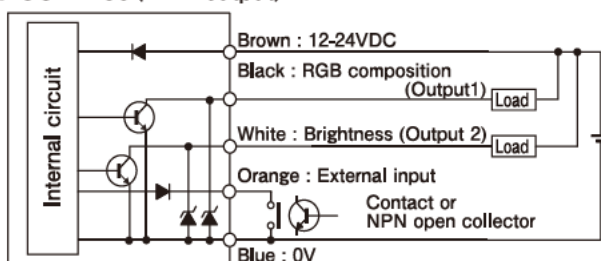| Output type | NPN | PNP |
|---|---|---|
| Model | CST-R80 | CST-R80PN |
| Detection method | RGB color composition / Brightness | |
| Detection distance | Variable according to the receiving light intensity (※1) | |
| Power supply | 12 to 24VDC ±10%, Ripple 10% Max. | |
| Current consumption | 50 mA (Max.) | |
| Standard color | Teaching, 1 color | |
| External input for teaching | Non voltage input (contact, non contact) | |
| Output mode — Output | RGB composition (Output1) / Brightness (Output 2) | |
| Output mode — Output 1 | NPN open collector output Sink current 50mA (30VDC) Max. | PNP open collector output Source current 50mA (30VDC) Max. |
| Output mode — Output 2 | Residual voltage : 2V | Residual voltage : 2V |
| Operation mode | Match On / Match Off, selectable | |
| Delay time | Selectable : On delay / Off delay / Timer disabled Delay time : 250ms fixed | |
| Response time | Lights up ; 50ms or less / Lights down ; 100ms or less (※2) | |
| Indicators | Operation indicator "OP" : When the output is activated Level indicator "H" : Excessive light intensity "L" : Insufficient light intensity | |
| Display | 1 orange digit indicator + 3 red digit indicators | |
| Mode Switch | RUN : RUN mode / Setting mode, switchover SELECT : SELECT mode / SET mode, switchover +/- : Change the tolerance value and setting item | |
| Protective feature | Short circuit protection | |
| Materials | Polycarbonate | |
| Cable | Flying lead 2m (outer dia φ3.7) | |
| Weight (Max.) | 60 g | |
| Attachments | Bracket, Instruction manual | |

※1  Use within the range so that level indicators H and L are both turned off.
※2  The sensor is activated 1 second after it is powered on.
Response time may change depending on the amount of ambient lights.
Recommended fiber : FT105BC-CS, detecting range : 5mm or less
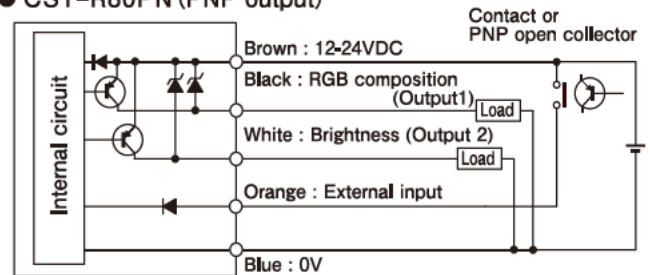
## 2 ENVIRONMENTAL CHARACTERISTICS

| | |
|---|---|
| Ambient light | 1,000 l x Max. |
| Temperature range | 10 to 40℃ |
| Humidity | 35 to 85%RH |
| IP rating | I P 40 |
| Vibration resistance | 10 to 55Hz, 1.5mm double amplitude, 2 hr. in X, Y and Z directions |
| Shock | 500 m/s² 3 times in X, Y and Z directions |

## 3 WIRING

● CST-R80 (NPN output)



Internal circuit
Brown : 12-24VDC
Black : RGB composition (Output1) — Load
White : Brightness (Output 2) — Load
Orange : External input
Contact or NPN open collector
Blue : 0V

● CST-R80PN (PNP output)



Contact or PNP open collector

Internal circuit
Brown : 12-24VDC
Black : RGB composition (Output1) — Load
White : Brightness (Output 2) — Load
Orange : External input
Blue : 0V

## ● Precautions when wiring

· Insulate unused input and output lines.
· For the extension cord, use a cord with diameter of more than 0.3mm² and length less than 100m.
· Set the force to be applied to the cords according to the following standard : Tension : 70N or less      Torque : 0.8N·m
                              Pressing force : 20N or less     Flexion : 3kg or less
· When the load and the sensor have the own power supply separately, be sure to power on the sensor first.
· When powering off, output pulses may be generated. Be sure to power off the load or the load line first.
· Before attaching or removing the amplifier, be sure to power off.
· Be sure to route the sensor lines separately from any power transmission or high-voltage line. Using the same conduit or duct for wiring may cause electric induction, which leads to faulty operation or damage.
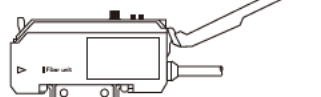
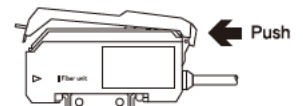## 4 AMPLIFIER UNIT INSTALLATION

### How to attach / remove case cover

1) How to open case cover
Pull up a case cover tab with holding the front part of the case cover.
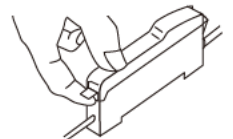
2) How to remove case cover
Push the cover end with full-opened condition and the cover.

3) How to attach case cover
Put the cover on an amplifier unit and push a hinge shown on the figure.



### How to install DIN rail / mounting bracket

1) How to attach
Engage a front hook of the amplifier unit onto a rail (or a mounting bracket) and press a rear part of the amplifier unit.

2) How to detach
Lift up the front with pushing the amplifier unit forward, and the hook will be released.
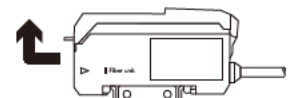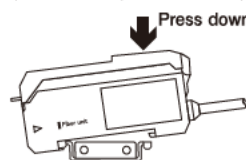


3) Side mounting of Amplifier unit
Fasten with screws by making use of the attached mounting bracket. The tightening torque should be 0.8N·m Max.
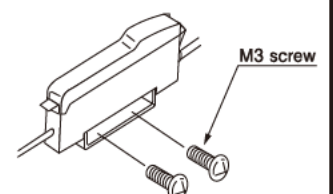
## 5 FIBER UNIT INSTALLATION

### How to insert Fiber unit to Amplifier unit

1) Make a one-touch locking lever go down.
2) Push a fiber unit all the way.
You can find some marks on the case side showing the insertion length. Please make use of them as a gauge to avoid a mistake when inserting the fiber unit.
3) After the fiber unit is inserted, raise the locking lever until you hear the locking click.



Fiber unit insertion length : approx. 13mm

**TAKEX**

ABH-HS-0122-1

## 6 OPERATION PANEL

Level indicator (H)　Operation indicator　　　　　　　SELECT switch



Level indicator (L)　Digital display　　+ and − buttons　RUN switch
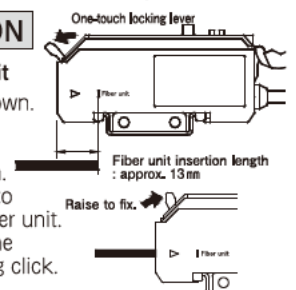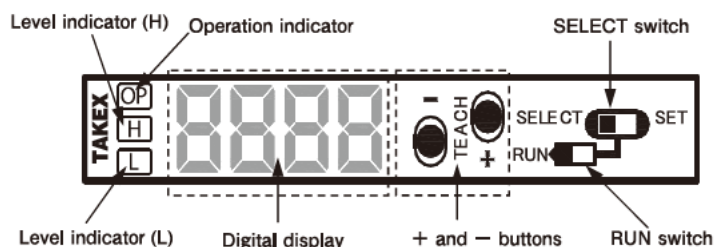
### Panel Parts Descriptions

● **Indicators**
**Operation indicator (OP)** : Lights when output turns ON.
**Level indicator (H)**
　: Lights when the received light amount becomes saturated.
**Level indicator (L)**
　: Lights when the received light amount becomes insufficient.
　※ When the level indicator (H) or (L) is lit, the light amount is beyond
　　or under the measurable range. Adjust the light amount or distance
　　so that the light amount stays within the measurable range.
● **Digital display** : 1 digit in orange + 3 digits in red.
　RUN mode : 1 digit in orange : No indication when color composition
　　　　　　　　　　　　　　　is indicated Indicates "U" or "d" for
　　　　　　　　　　　　　　　brightness.
　　　　　　3 digits in red : Indicates a numeric value.
　　　　　　　※ The value appears slowly to have better visibility.
● **RUN switch** 　　　　: Changes between the RUN mode and the setting mode.
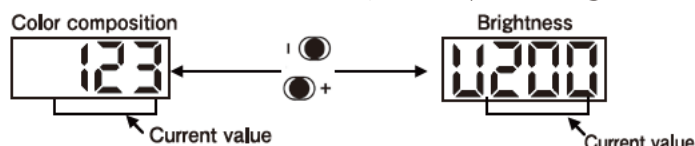● **SELECT switch** 　　 : Changes between the SELECT mode and the SET mode.
● **+ and − buttons** : Changes the tolerances and setting items.

## 7 INDICATIONS DURING RUN MODE

### 7.1　Digital display during RUN mode

"+ and −" button switch the indication ; Color composition / Brightness



Color composition　　　　　　　　　　　　Brightness

· When color composition is displayed ;
　The digital display shows the difference from the standard with
　the range from 0 to 999. The closer to the standard the sensed
　value is, the smaller the displayed value shows.

　　0 ◄―――――――――――► 999
standard (color value)　close　　　　　　far

· When brightness is displayed ;
　The digital display shows the difference from the standard with the
　range from −999 to +999. The closer to the standard the sensed
　brightness is, the closer to zero the displayed value becomes.

−999 ◄――――――► 0 ◄――――――► +999
far (too dark)　　standard (brightness)　　far (too bright)



↑"d" is indicated when the　　　↑"U" is indicated when the
current value is below standard.　current value exceeds standard.

### 7.2　Operation indicator during RUN

| Output OFF | Output ON |
|---|---|
| OP | OP |
| Unlit | Lit |

※ The indicator lights when both or either output is activated.

### 7.3　Received light amount indicators



These indicators show whether the received light amount is within the
measurable range or not. If H or L is lit, the light amount is beyond or
below the measurable range. Adjust the light amount or distance so
that these indicators turn off.

## 8 TEACHING

● Refer to 9. DETAIL SETTINGS for setting details.
● Make teaching for color composition and brightness at the same time.
● Factory set for tolerance is 100 for color composition and −100 to +100
　for brightness.

### 1) Registering the standard through the key operation on the sensor unit (Teaching)

| Status | Operation | Switch | Display | Work |
|---|---|---|---|---|
| RUN mode | | SELECT / SET, RUN | "999" lights. Note 1 | |
| Setting mode | Change the RUN switch to the setting mode. | SELECT / SET, RUN Change | 1ch The orange indicator blinks. Note 2 | A work should be placed |
| Teaching | Hold down the + or − button (until "End" appears) | Hold down TEACH − + | t - - - "t---" blinks. | |
| Teaching Completed | | TEACH − + | End "End" lights. | |
| Setting mode | Release the button. | TEACH − + | 1ch The indicator in orange blinks. | |
| RUN mode | Change the RUN switch to the RUN mode. | SELECT / SET, RUN Change | 0 The current value appears. The operation indicator (OP) lights. Output ON | A work should be placed |

Note 1 : Factory-set or after being initialized, the display shows "999".
Note 2 : Teaching can be done only when output 1 (1ch) is selected.

### 2) Registering the standard using the external output (Teaching)

| Status | Operation | Switch | Display | Work |
|---|---|---|---|---|
| RUN mode | | SELECT / SET, RUN | "999" lights. Note 1 | A work should be placed |
| Teaching | Enter external input signals for more than 7 seconds. | | t - - - "t---" blinks. | |
| Teaching Completed | After 7 seconds has passed | | End "End" lights. | |
| RUN mode | Release external input signals. | SELECT / SET, RUN | 0 The current value appears. The operation indicator (OP) lights. Output ON | A work should be placed |

Note 1 : Factory-set or after being initialized, the display shows "999".

### ※ Teaching errors

If the Err indication appears in the digital display after teaching,
an error has occurred.
If this happens, the basic colors do not change but hold the
previous values.
During the error is displayed, no output is performed. Press the
+ or − button to reset.



**Teaching error**
The input value of received light amount is out of
the range. Check the high (H) and low (L) received
light amount indicators. Adjust the settings so that
both indicators will go off.

## 9 DETAIL SETTINGS

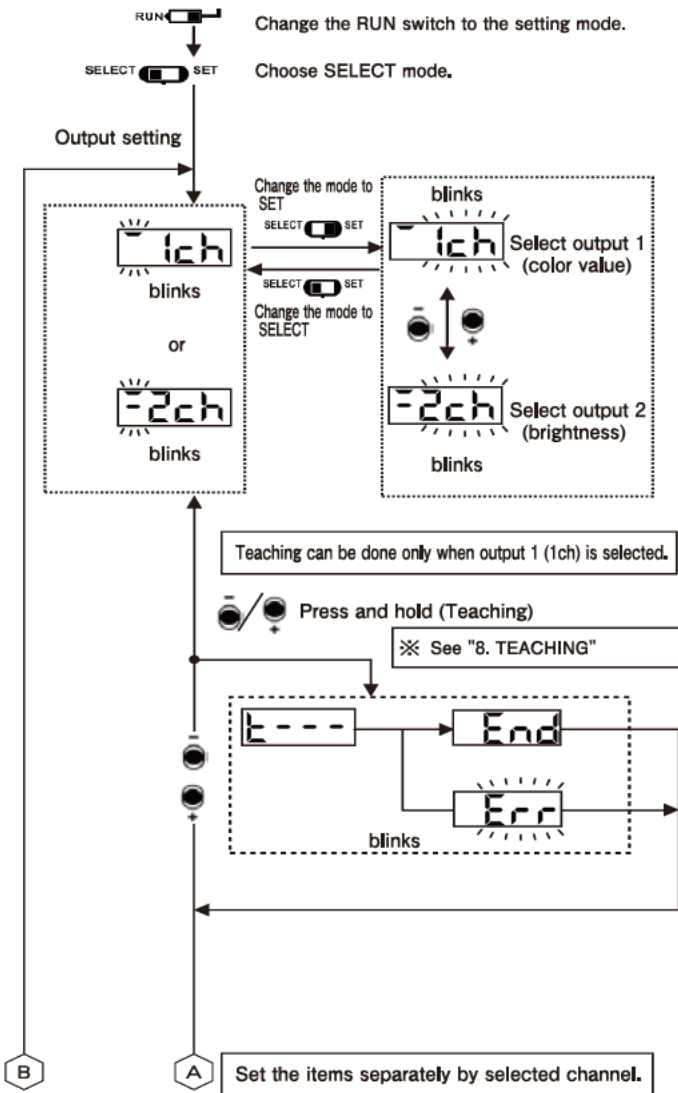In the setting mode following functional settings are available.
※ The indicated numeric value like tolerances and received light amounts are just samples and it may be different from real ones.
The indications are based on factory-set.

The color composition and brightness can be set seperately.
Output 1 : Color composition
Output 2 : Brightness

RUN — Change the RUN switch to the setting mode.

SELECT ■ SET — Choose SELECT mode.

Output setting

**1ch** blinks

or

**-2ch** blinks

Change the mode to SET
SELECT ■ SET

Change the mode to SELECT
SELECT ■ SET

blinks
**1ch** Select output 1 (color value)

**-2ch** Select output 2 (brightness)
blinks

Teaching can be done only when output 1 (1ch) is selected.

Press and hold (Teaching)

※ See "8. TEACHING"

**t---** → **End**

**Err** blinks

B / A Set the items separately by selected channel.

---

B / A

Change the mode to SET
SELECT ■ SET

Set the tolerance using the + or – button

Increases the tolerance

Decreases the tolerance

Holding down the button makes the change faster.

**Toleranse setting (tolerance)**
**t 100** blinks → **t 100** blinks

Change the mode to SELECT
SELECT ■ SET

**Operation mode setting (Conform)**
**C on** blinks
Change the mode to SET
SELECT ■ SET
→ **C on** blinks — Matching to the basic color ON

**CoFF** blinks — Matching to the basic color OFF

Change the mode to SELECT
SELECT ■ SET

**Off delay setting (oFF delay)**
**FoFF** blinks
Change the mode to SET
SELECT ■ SET
→ **FoFF** blinks — Off delay disabled

**F on** blinks — Off delay (250ms)

Change the mode to SELECT
SELECT ■ SET

**On delay setting (on delay)**
**NoFF** blinks
Change the mode to SET
SELECT ■ SET
→ **NoFF** blinks — On delay disabled

**N on** blinks — On delay (250ms)

Change the mode to SELECT
SELECT ■ SET

Red light received amount monitor
**r 13b**

Green light received amount monitor
**9421**

Blue light received amount monitor
**b2 10**

---

| | |
|---|---|
| Tolerance (txxx) xxx : value | Set the tolerance value from satndard color composition and brightness. 0 ← small big → 999 |
| Operation mode (C on) (CoFF) | Select "match ON" or "match OFF" for relay operation. |
| Off delay (FoFF) (F on) | Set OFF DELAY on or off for the output. |
| On delay (NoFF) (N on) | Set ON DELAY on or off for the output. |
| Receiving light amount monitor | Light amount is indicated for each RGB components. 0 ← dark bright → 999 |
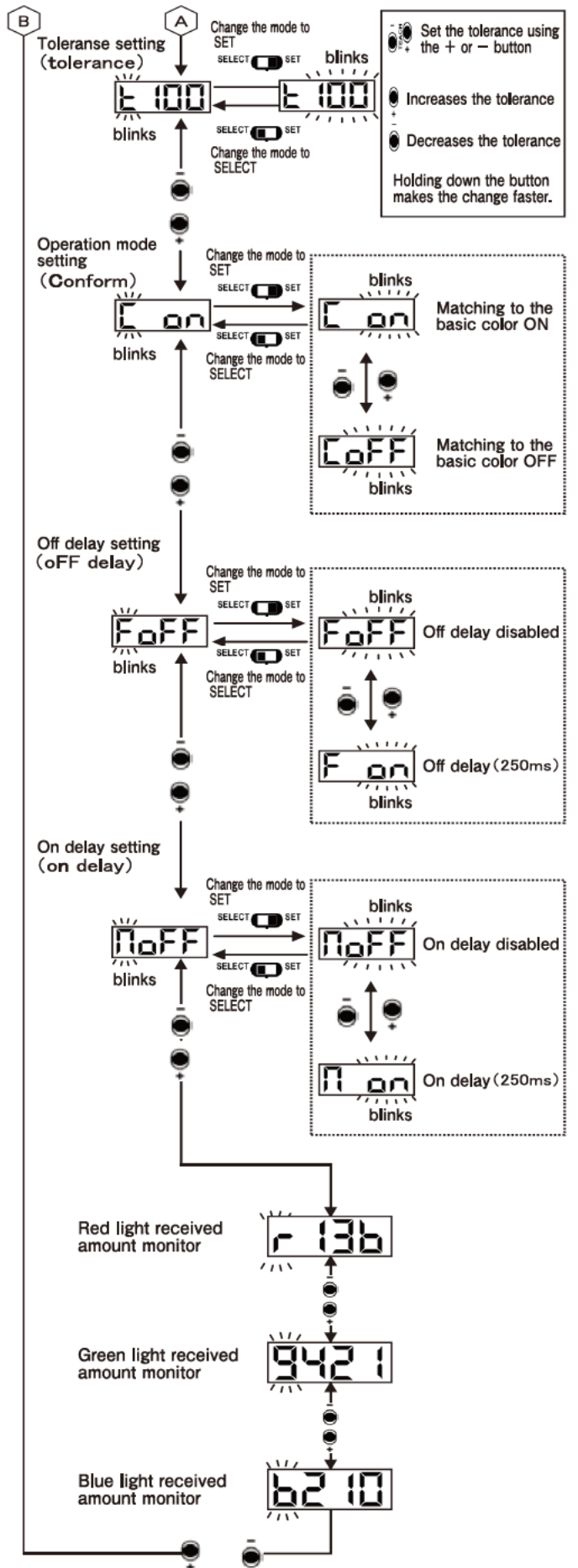
## 10 INITIALIZING THE MODE

Setting and standard color information are reset.

| Status | Operation | Switch | Diaplay |
|---|---|---|---|
| RUN mode | | SELECT □■ SET  RUN ■□ | **999** "999" lights. Note 1 |
| Initializing mode | Change the RUN switch to SET mode while holding down the − button. | TEACH ⊖⊕  SELECT ■□ SET  RUN □■ | **2out** "2out" blinks. |
| Initializing | Holding down the + or − button for more than 3 seconds. | TEACH ⊖⊕ | **rSt** "rst" blinks. |
| Initializing mode | Release the + or − button. | TEACH ⊖⊕ | **2out** "2out" blinks. |
| RUN status | Change the RUN switch to RUN. | SELECT □■ SET  RUN ■□ | **999** "999" lights. Note 1 |

Note 1 : Factory-set or after being initialized, the indicator shows "999"

Setting at factory : After being initialized ;

Tolerance : 100 (color composition) / −100 to +100 (brightness)
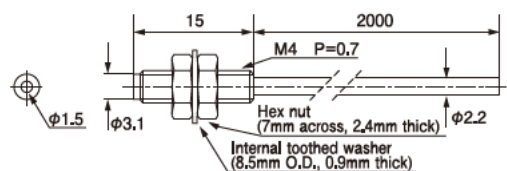Operation mode (Conform) : ON when matching
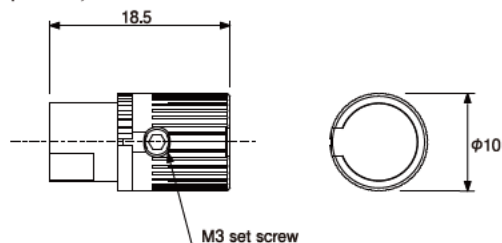Off delay : None
On delay : None

## 12 DIMENSIONS  (unit : mm)
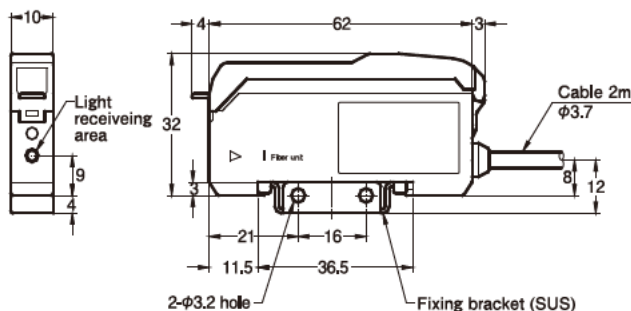


Model : FT105BC−CS (optional)



Model : CS−ND (optional)



## 11 PRECAUTIONS

● The CST−R80 series may be affected by the ambient light. Do not use the sensor in environments subject to fluctuation of brightness such as the vicinity of windows.
● If the ambient light is brighter than the light source of the work to be detected, the detecting ability may become unstable. Maximize the brightness of the light source of the work to be detected and place the fiber unit as close as possible to the light source.
● For high brightness light sources, use CS−ND light afternation unit.
● Use the fiber unit having a large core diameter for stable detection. Recommended fiber : FT105BC−CS (core diameter 1.5)
● Since the light of fluorescent lamps blink at high rate, the sensor detects the light unstably in environments where the light source of the work to be detected is illuminated with the fluorescent light. Keep the fluorescent light as far away as possible from the light source of the work. The conventional fluorescent lamps are more likely to be affected than the inverter fluorescent lamps.
● The sensor operation may become unstable and generate chattering depending on the installation enviironments and conditions. On-delay timer or off-delay timer, may reduce generation of chattering.
● The hysteresis level corresponds to the tolerance. The greater the tolerance becomes, the higher the hysteresis level and the less chattering.
● Increase or decrease the tolerance as required using the factory set as a reference.
● Do not use the sensor outdoor or at a site where its light receiving surface is directly exposed to ambient light.
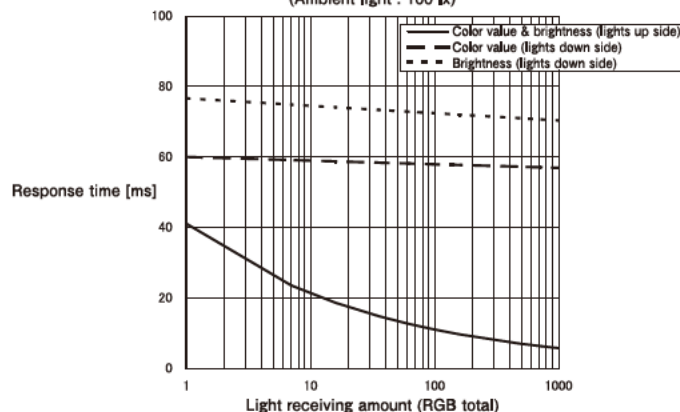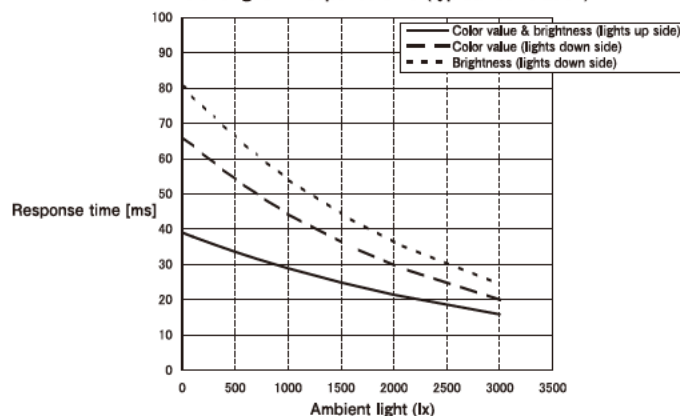




● The guarantee period of this product is one year after the delivery.
● If any defect is found during the guarantee period, Takenaka will repair or replace the defective product.
● This product is an industrial sensor which issues an output upon detecting an object. It does not have any function to prevent accidents, death or injuries.
● Takenaka will not held responsible for any damage or loss incurred due to accidents, faulty installation, abuse, misuse, improper maintenance or acts of God including lightning surge.

**TAKEX**