Spectroscopic detection of LED light source

Compact RGB Color Sensor

Suitable for lighting from various light sources

Lighting Check Sensor

Spectroscopic sensing realizes automated sensory inspections

Compositely discriminates the lighting status from DC to pulse lighting via hue and brightness

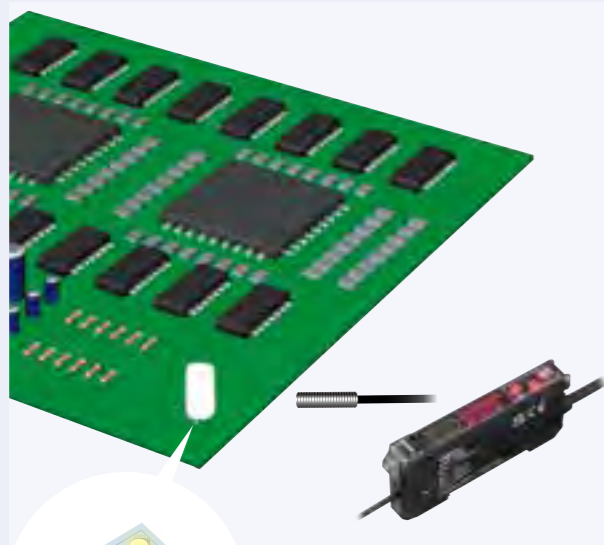# Alternative use as an image sensor for simple applications

Automated Visual Inspections

Stably discriminates LED hue,
a visual inspection challenge

Prevention of human-oriented errors

Discriminates LED hue differences

Simple introduction

Visualizes Operability through Retrofitting

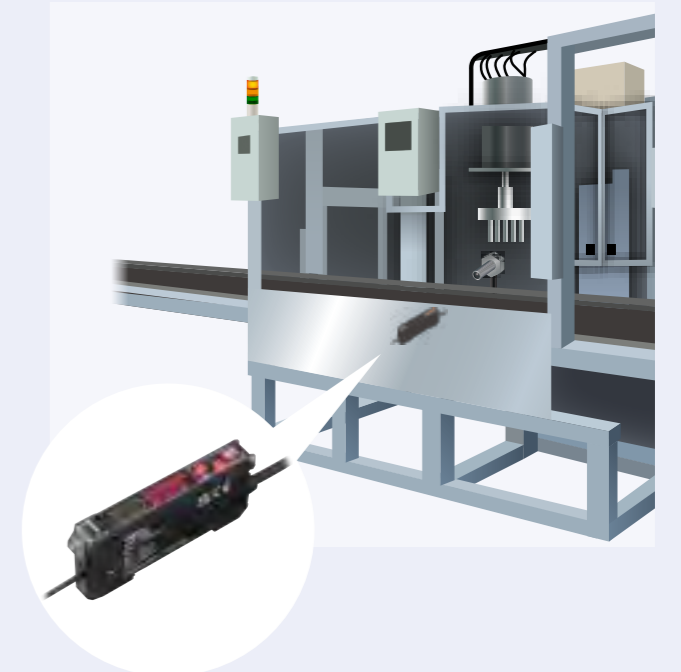Easy introduction not only to new,
but also to existing facilities

No large-scale modification is required

Supports Embedded Integration

Fiber-type allows
installation in confined spaces

Space-saving

NG
NG OK

Supports pulse lighting LED light sources

Detects various lighting types from high-frequency pulse to DC LED light sources.
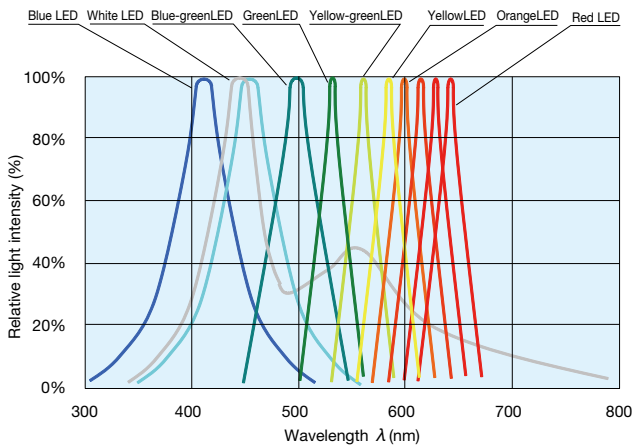Lighting is automatically identified by the sensor while teaching, requiring no setting by the user.

CS-R85

CE

R/G/B Spectroscopy for Color Ratio Discrimination

■ Ideal for LED color discrimination

Discriminates LED color ratio difference
Up to 3 colors of reference light can be registered with mode selection

LED wavelength characteristics that CS-R85 can discriminate (Typical example)

Blue LED White LED Blue-greenLED GreenLED Yellow-greenLED YellowLED OrangeLED Red LED

Relative light intensity (%)
100%
80%
60%
40%
20%
0%
300   400   500   600   700   800
Wavelength λ (nm)

■ Applications

Color check of lighting LEDs
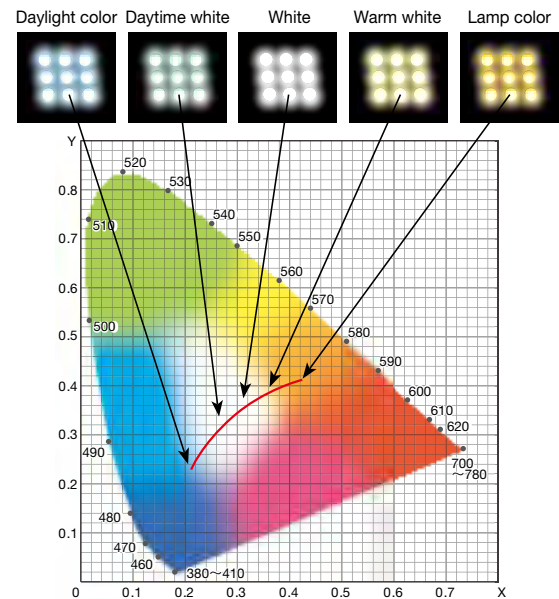Discriminates lighting LED colors in the production processes for LED blinkers, tail lamps, and stop lamps.

CST-R85

CE
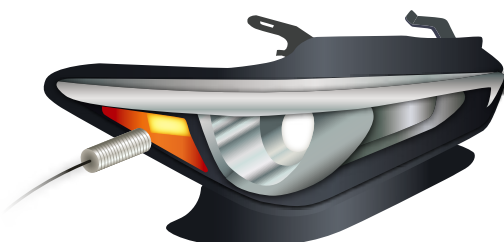
Precisely Discriminates Fine Color Tones or Light Intensities

■ Discriminates visually-hard-to-identify differences in LED color ratio down to 0.01%

High resolution discrimination of differences in color ratio and brightness of LEDs that have the same color
Integrable into LED inspection equipment

White LEDs that CST-R85 can discriminate (Typical example)

Daylight color   Daytime white   White   Warm white   Lamp color

Y
0.8   520
0.7   530   540   550
510
0.6   560
0.5   570
500   580   590
0.4   600
0.3   610 620
490   700
0.2   ~780
480
0.1   470
460   380~410
0   0.1   0.2   0.3   0.4   0.5   0.6   0.7   X

■ Applications
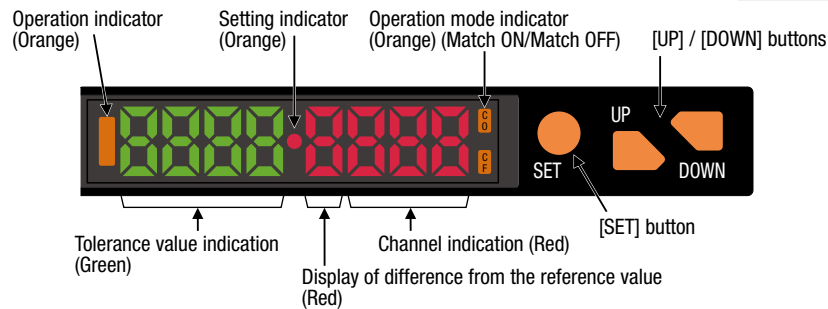
Mixing different lighting types, lighting check
Example of using both CS-R85 and CST-R85 for lighting check in the mixtures of different product types, as well as for lighting characteristics assessment.

CS-R85
NG：Different colors are mixed
NG：Not lit

CST-R85
NG：Color ratio is out of tolerance
NG：Brightness is out of tolerance

■ Improved visibility, size, and operability

Extended display from single to dual screens,
increasing visible information
Improved operability with larger setting buttons

Conventional model

Operation indicator (Orange)
Setting indicator (Orange)
Operation mode indicator (Orange) (Match ON/Match OFF)
[UP] / [DOWN] buttons

UP
DOWN
SET

[SET] button

Tolerance value indication (Green)
Channel indication (Red)
Display of difference from the reference value (Red)

■ External teaching input

Input devices such as PLCs allow teaching,
without operation from sensors
*For CS-R85, this is available only when set to Mode1

Teaching via remote operation is available

Input device
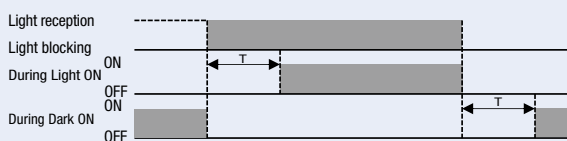
■ Timer function

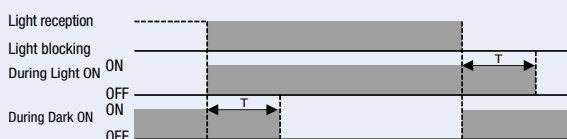Select from:

| On Delay | Off Delay |
| One Shot | No Timer |

Output signal through timer operation is available.
This is useful when a suitable output signal cannot
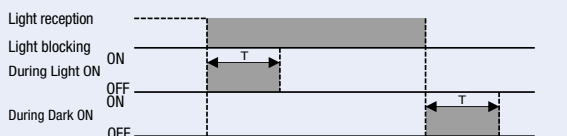be obtained in normal operation without timer.

On Delay: disables detection for a short time

Light reception
Light blocking
During Light ON   ON
                  OFF
During Dark ON   ON
                  OFF

Off Delay: extends the output signal for a specified time

Light reception
Light blocking
During Light ON   ON
                  OFF
During Dark ON   ON
                  OFF

One Shot: triggers signals from the detection timing
for a specified time span

Light reception
Light blocking
During Light ON   ON
                  OFF
During Dark ON   ON
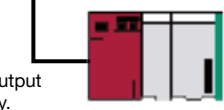   OFF

■ Reduction of maintenance inventory models

Output is changeable between NPN/PNP
Single model can be commonly used even when the
PLC or network of the existing facilities is changed

Supports both NPN input / PNP input
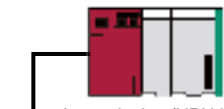
Input device (NPN input)

Use only one output at a time,
as the NPN output and PNP output
cannot be used simultaneously.

Input device (PNP input)

■ Option

CS-ND

Light Reception Adjustment Unit,
CS-ND
Ideal for adjusting the intensity of
receiving light,
such as when the reference light
is too bright

■ Dedicated fiber unit
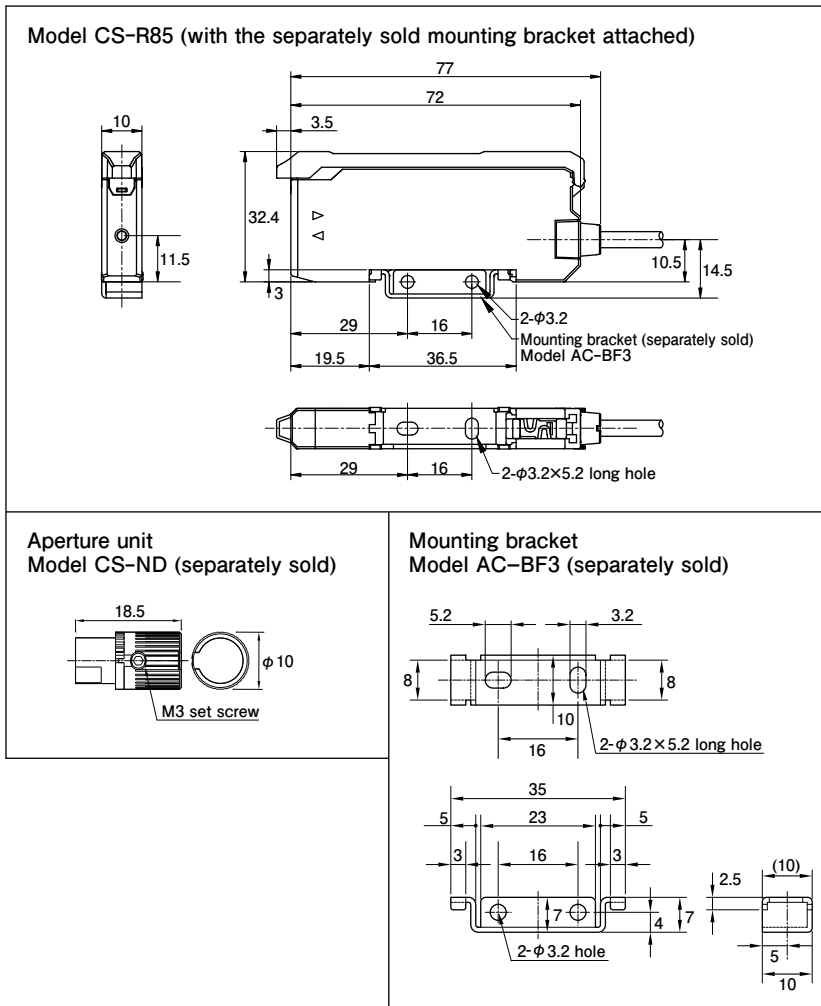
FT105BC-CS (Separately available)

■ SPECIFICATION

Model	CS-R85	CST-R85
Detection method	Identification of color ratios through R/G/B light receptive elements	Identification of color ratios and brightness through R/G/B light receptive elements
Detection distance	Depends on the use environment	
Standard detection target	Light source emitting visible lights	
Power Supply	12 to 24 V DC ±10%, Ripple 10% or less	
Current consumption	1000mW or less (40mA or less) at 24V DC	
Reference color registration	Via teaching: 1 color (for Mode 1) Via teaching: 3 colors (for Mode 3)	Via teaching: 1 color
Reference color setting	1-point teaching / 2-point teaching	
External input/output	1 input, 1 output (for Mode 1), 3 outputs (for Mode 3)	1 input, 2 outputs (Output 1: color ratio identification output, Output 2: brightness identification output)
External teaching input	No-voltage input (With or without contact point) (only for Mode 1)	No-voltage input (With or without contact point)
Output mode	NPN/PNP open collector output (operation switch) Load current: 50mA (30V DC) or less, Residual voltage: 2V or less	
Operation mode	Switch "Match ON"/"Match OFF" with the reference color	
Timer	ON Delay / OFF Delay / One Shot / No timer	
	Delay time: 1 to 999 ms (setting available in an interval of 1ms)	
Response time	Auto (10 ms or less at maximum, depending on the illumination conditions of the workpiece) / 50 ms or less / 100 ms or less / 250 ms or less / 500 ms or less (selectable)	
Indicators	Operation indicator, Setting indicator, Match ON (NO) and Match OFF (NC) Indicator: Orange LED	
Display	Tolerance value display: Green LED, 4-digit/ Maximum difference display of color ratios: Red LED, 4-digit	
Protection circuit	Protection against power reversed connection and output short-circuit	
Material	Polycarbonate	
Connection method	Attached cable type (φ4.2㎜ o.d.) 0.2㎟ x 5-core, 2m	
Accessories	Instruction manual	

■ ENVIRONMENTAL SPECIFICATION

Ambient temperature	−25 to +55℃ at storage (no freezing)
Ambient humidity	30 to 85 % RH (no condensation)
Protection structure	IP40
Anti-vibration	10 to 55 Hz, double amplitude 1.5 ㎜, X, Y, Z directions, 2 hour each
Shock	500m/s2, 3 times each in X, Y and Z directions
Dielectric withstand voltage	1000V AC for 1 minute
Insulation resistance	20MΩ or more with 500V DC Megger

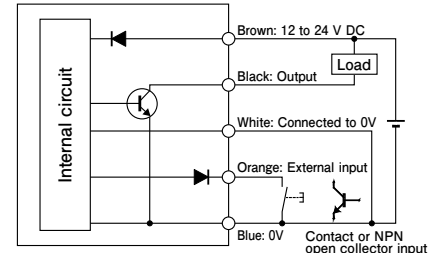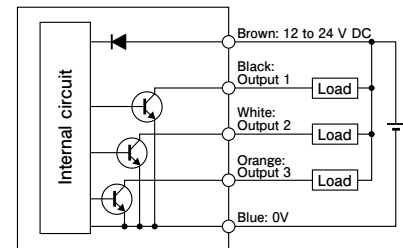## ■ DIMENSIONS (in mm)

Model CS-R85 (with the separately sold mounting bracket attached)

10
77
72
3.5
32.4
11.5
10.5
14.5
3
29
16
2-φ3.2
Mounting bracket (separately sold)
Model AC-BF3
19.5
36.5
29
16
2-φ3.2×5.2 long hole

Aperture unit
Model CS-ND (separately sold)

18.5
φ10
M3 set screw

Mounting bracket
Model AC−BF3 (separately sold)

5.2
3.2
8
8
10
16
2-φ3.2×5.2 long hole
35
5
23
5
3
16
3
7
2.5
(10)
7
4
2-φ3.2 hole
5
10

■ CONNECTION

CS-R85

● NPN Output
· Mode 1 (1 output/1 external input)

Brown: 12 to 24 V DC
Black: Output / Load
White: Connected to 0V
Orange: External input
Blue: 0V
Contact or NPN open collector input

*Connect the white wire to 0V.

· Mode 3 (3 outputs)

Brown: 12 to 24 V DC
Black: Output 1 / Load
White: Output 2 / Load
Orange: Output 3 / Load
Blue: 0V

● PNP Output
· Mode 1 (1 output / 1 external input)

Brown: 12 to 24 V DC
Black: Output
Contact or PNP open collector input
White: Connect to +power
Orange: External input
Load
Blue: 0V
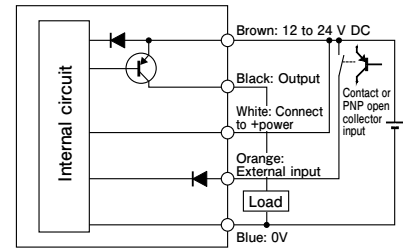
*Connect the white wire to the brown power line (12 to 24V DC).

· Mode 3 (3 outputs)

Brown: 12 to 24 V DC
Black: Output 1 / Load
White: Output 2 / Load
Orange: Output 3 / Load
Blue: 0V

CST-R85

● NPN Output

Brown: 12 to 24 V DC
Load   Load
Black: Output for color ratio discrimination
White: Output for brightness discrimination
Orange: External input
Blue: 0V
Contact or NPN open collector input

● PNP Output

Brown: 12 to 24 V DC
Black: Output for color ratio discrimination
Contact or PNP open collector input
White: Output for brightness discrimination
Orange: External input
Load   Load
Blue: 0V

Lighting Check Sensor
BS-R80

Stable Detection of Lighting from Various Light Sources

CE

■ Compatible with pulse lighting LEDs

In addition to DC lighting,
pulse LED light sources are covered

■ Visualizes the lighting status

Digital display enables threshold setting,
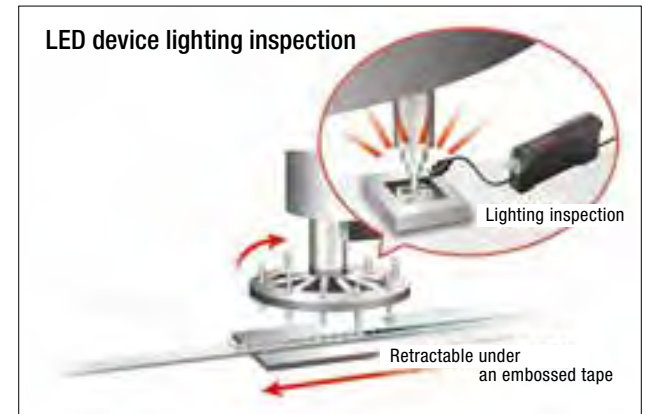fine setting, and other settings

■ Realized high-speed responses

Response time is selectable from 1ms, 10ms, 100ms, and 1000ms
In addition to the final inspection process,
introduction into in-line inspection is now possible.

LED wavelength characteristics that BS-R80 can discriminate (Typical example)

Compatible with various LED light sources such as blue, white, green, orange, red, and infrared,
so realizing a wide detection range
(standard wavelengths of 400 to 900 nm)

Blue LED   White LED   Blue green LED   Green LED   Yellow green LED   Yellow LED   Orange LED   Red LED   Infrared LED

Relative light intensity (%)

100%
80%
60%
40%
20%
0%

300   400   500   600   700   900   1200

Wavelength λ (nm)

■ Applications

LED device lighting inspection

Lighting inspection

Retractable under an embossed tape

■ Optimum teaching mode

Optimum setting can be selected from three teaching modes:
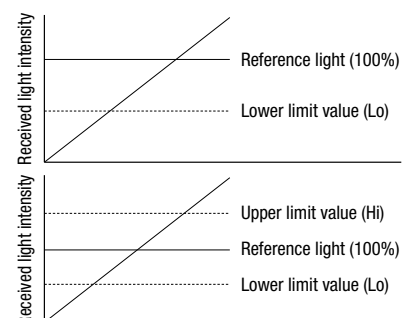
| Target value setting mode | With the reference light received, automatically set to optimum sensitivity for threshold value setting |

| Lower limit value setting mode | Performs teaching from reference light, and then the lower limit value for the threshold value setting |

| Upper/Lower limit values setting mode | Performs teaching from reference light, the lower limit value, and then the upper limit value for the threshold value setting |

Received light intensity

Reference light (100%)
Lower limit value (Lo)

Received light intensity

Upper limit value (Hi)
Reference light (100%)
Lower limit value (Lo)

■ SPECIFICATION

Model	BS-R80
Detection method	Identifying brightness
Light sensitivity	DC lighting 10 to 10000lx (white LED) / pulse lighting depends on conditions
Standard detection target	Light source that emits visible light and near-infrared light / DC lighting / pulse lighting
Power supply	12 to 24 VDC, Ripple 10% or less
Current consumption	500mW or less (20mA or less at 24V)
Standard light wavelength	400 to 900nm
External teaching input	No-voltage input (contact / no-contact) (During target value setting mode teaching only)
Output — NPN mode	NPN open collector output Rating:Sink current 50mA (30 VDC) or less / Residual voltage 2V or less
Output — PNP mode	PNP open collector output Rating:Source current 50mA (30 VDC) or less / Residual voltage 2V or less
Operation mode	Light ON / Dark ON (operation mode selectable)
Timer	ON delay / OFF delay Delay timer : 0ms to 999ms (set in millsecond)
Response time	0: 1ms / 1: 10ms / 2: 100ms / 3: 1000ms ※1
Indicator	Operation indicator: "OP"LED (orange) lights when output is issued Basic operation setting mode indicator:"SP"LED (red) lights up during basic operation setting
Display	Function display (orange) / Numeric display 3-digits (0 to 999, red)
Operation switch	[+] and [-] push button switches:setting selection / reference light level teaching / parameter change Selector switches: RUN / SELECT / SET selection
Protection circuit	Power reverse connection / Output short-circuit protection / Output reverse connection
Material	Polycarbonate
Wiring	Attached cable (o.d.φ3.7), 0.2㎟x4-cores, 2m
Weight	Approx. 60g (Cable 2m, including mounting bracket)
Accessory	Mounting bracket / Instruction manual

※ 1 Detection is enabled 2 seconds after power is applied.
※ 2 Fiber optic cable is optionally available.
         Recommended fiber optic cable: FT-105BC-CS(core diameter φ1.5)

■ ENVIRONMENTAL SPECIFICATION

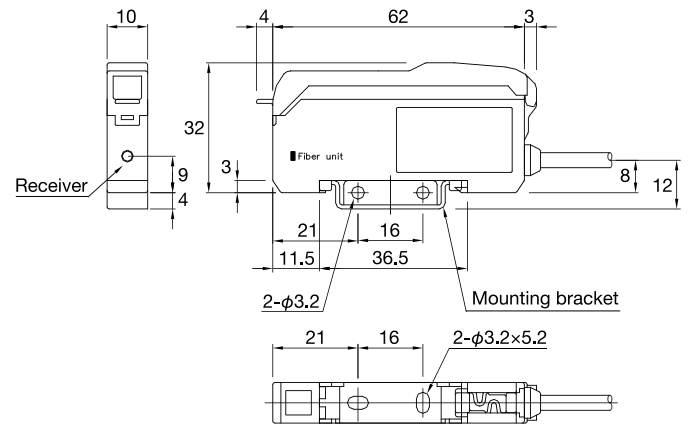| Ambient temperature	-25 to +55℃ (no freezing)
Ambient humidity	35 to 85%RH (no condensation)
Protective structure	IP 40
Vibration	10 to 55Hz / 1.5㎜ double amplitude / 2 hours each in X, Y and Z directions
Shock	500 m/s² / 3 times each in X, Y, Z directions
Dielectric withstanding	1000 VAC for 1 minute
Insulation resistance	20MΩ or more with 500 VDC Megger

■ DIMENSIONS (in mm)

■ CONNECTION

● NPN output mode
  Control output（NPN）
  External input（teaching）
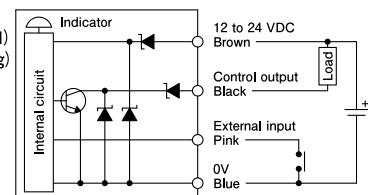
● PNP output mode
  Control output（PNP）
  External input（teaching）

※ When not using the external input, connect the external input cable (pink) to 12 to 24 VDC in NPN mode and to 0V in PNP mode.

Dedicated fiber optic cable
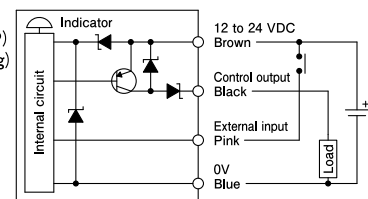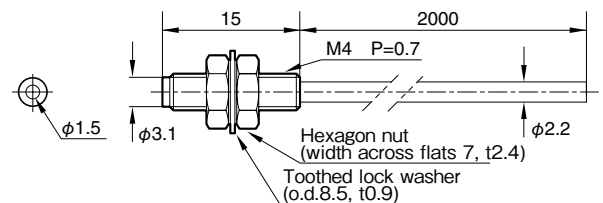FT105BC-CS

■ SPECIFICATION

Model	FT105BC-CS
Length	2m
Ambient temperature	-30 to +70 ℃
Materials	Sheath : Polyethylene Core : Plastic
Diameter	Cable : 2.2㎜ Core : 1.5㎜
Bending radius	45R

■ DIMENSIONS (in mm)

DUE TO CONTINUOUS PRODUCT IMPROVEMENT, THE DESIGN AND TECHNICAL SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE