KEYENCE

RGB Digital Fibreoptic Sensors
CZ-V20 Series

Luster-cancel,
small beam spot sensor head
CZ-H37S

Adjustable spot,
colour detection sensor head
CZ-H32

Lustre-cancel,
colour detection sensor head
CZ-H35S

Fluorescence
detection UV sensor head
CZ-H52

The Smartest RGB Sensor in the Industry

Two new sensor head models have been added to the product line

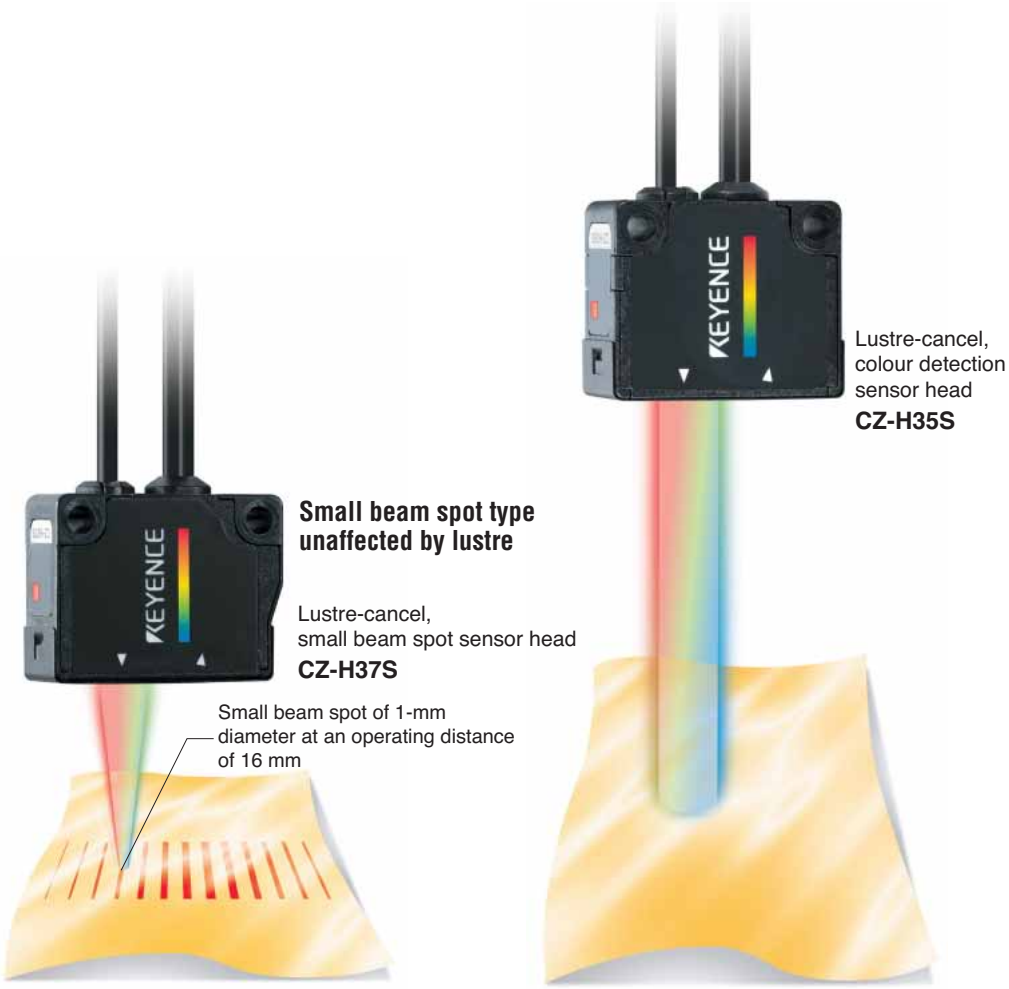
CE

The two new sensor heads will further

expand the range of applications for the SUPER RGB sensor.

Four types of sensor heads selectable according to target conditions and size.

The **lustre-cancel type** cancels the influence of the lustre of a target. The **adjustable spot type** allows adjustment of the beam spot size according to the target. The **fluorescence detection type** can detect fluorescent materials. These sensor heads offer highly stable detection while solving conventional problems.



Shape, position, inclination, and surface lustre

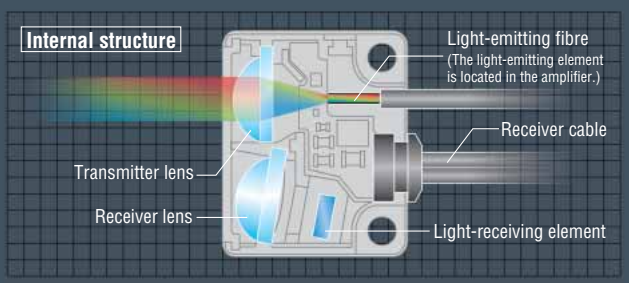
Less affected by changes in target condition

World's first

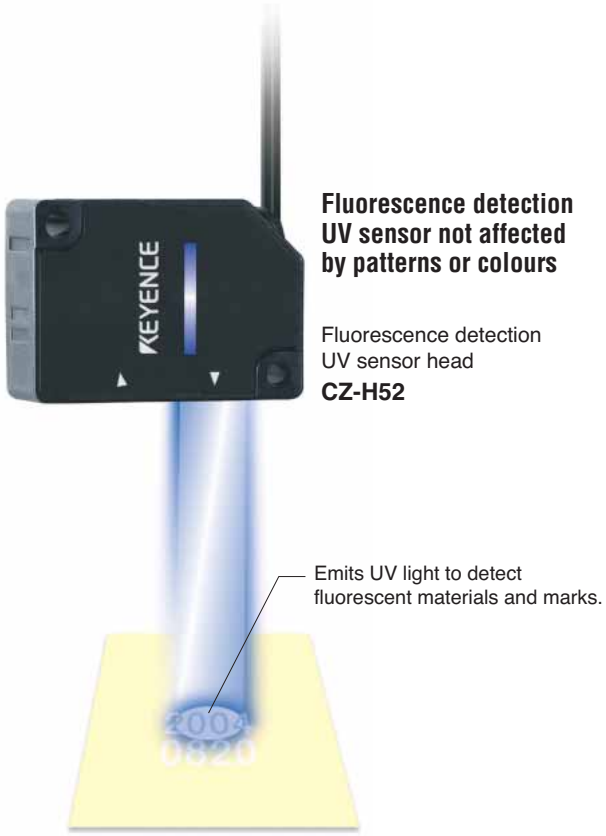
Extremely high power

Utilises the world's first hybrid structure

The SUPER RGB sensor was developed by a dramatic redesign of the sensor head structure to improve overall performance. The transmitter uses an optical fibre, which creates an incredibly uniform beam spot and helps reduce the size of the sensor head. The light-receiving circuit is built into the sensor head, enhancing its detection ability and improving stability.



Adjustable spot, colour detection sensor head
CZ-H32



Fluorescence detection UV sensor not affected by patterns or colours

Fluorescence detection UV sensor head
CZ-H52

Beam spot adjustable in 3 sizes

Versatile detection from a long distance

UV light application

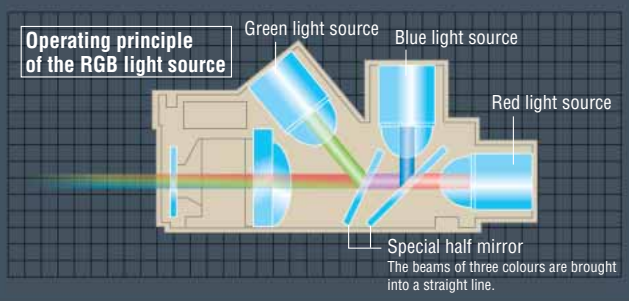
Detecting fluorescent materials and marks

First-in-its-class

RGB light source for triple 16-bit calculation

Three-colour light source for accurate target recognition

The SUPER RGB sensor incorporates three separate colour LED's. The signal from each colour is converted into 16-bit data in the receiver to enable colour recognition. This ensures accurate detection regardless of target vibration.



Simple sensitivity adjustment

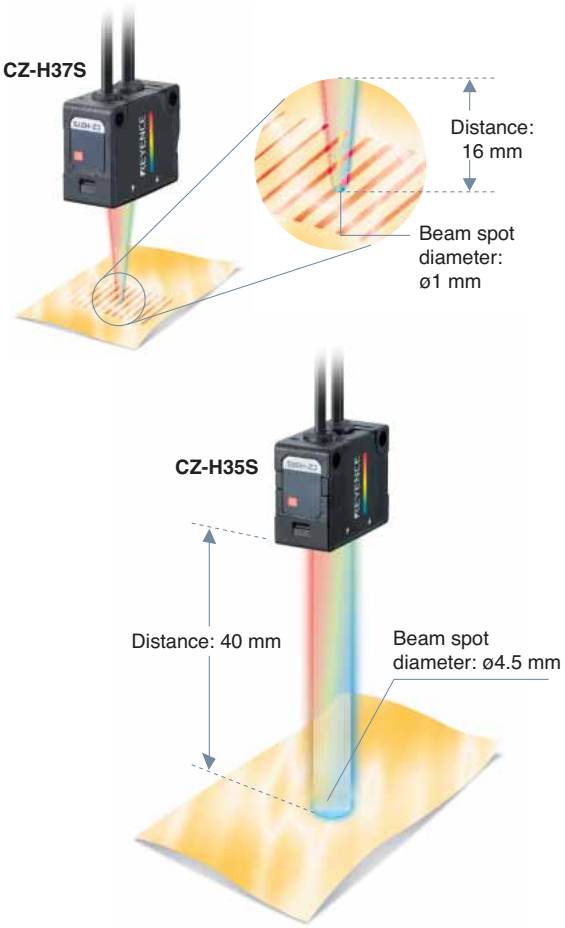
One-touch calibration

The SUPER RGB sensor can be calibrated with the push of a button. This simple approach eliminates variation between operators and ensures continuous, stable detection.

Dual Digital display, amplifier
CZ-V21A(P)/V22A(P)

Choose the sensor head that is right for your application

CZ-H35S Lustre-cancel, reflective type



CZ-H37S Small beam spot type

The beam spot is as small as 1 mm in diameter at an operating distance of 16 mm. This ensures reliable detection of objects and components smaller than those detectable with conventional models.

Distance vs. beam spot diameter (Typical)

Units: mm

Distance	12	14	16	18	20
Beam spot diameter	2.9	1.9	1	1.3	2

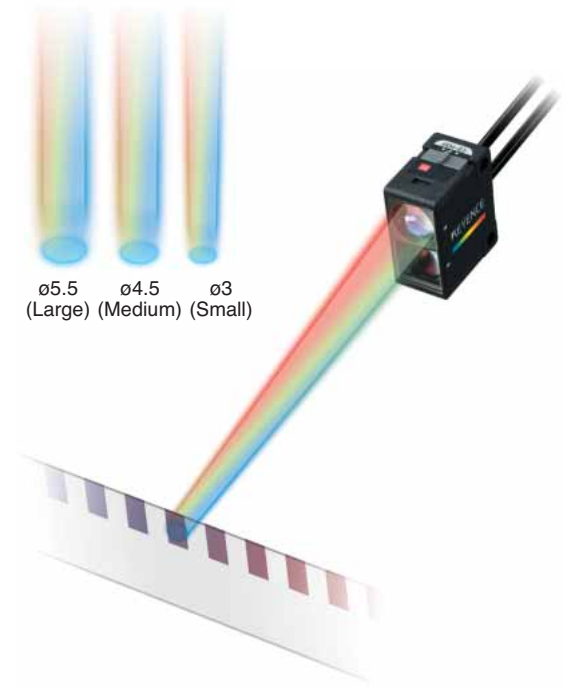
Less affected by shape, position, inclination, and surface lustre (Patent-pending)

The CZ-H35S/CZ-H37S incorporates a polarizing filter which cancels the reflection from the glossy section and only recognises targets by their colour components. The CZ-H35S/CZ-H37S maintains accurate detection despite changing target conditions.

What is “lustre”?

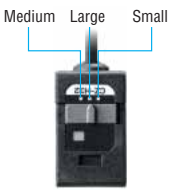
As the picture on the right shows, depending on the illumination some sections on a pepper’s surface can appear white. Like human eyes, conventional sensors can not recognise the correct colours of such a target.

CZ-H32 Adjustable spot, reflective type



Adjustable beam spot

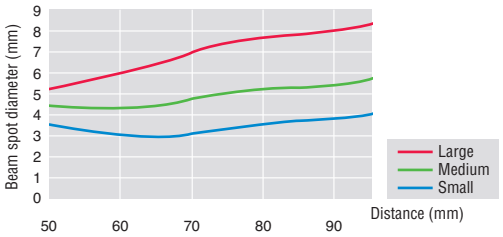
Three beam spot sizes can be easily selected by adjusting the slide switch, allowing a wide range of targets to be inspected.



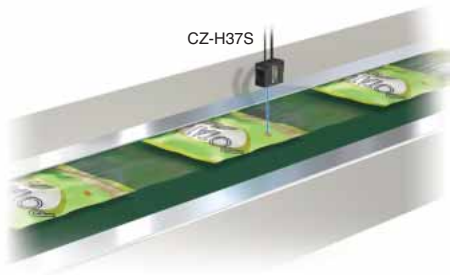
Long detecting range of 50 to 95 mm

Detection is available within a range of 50 to 95 mm. The sensor can be mounted at a long distance and is less affected by changes in target position.

Distance vs. beam spot diameter (Typical)



A wide variety of detection applications from every industry

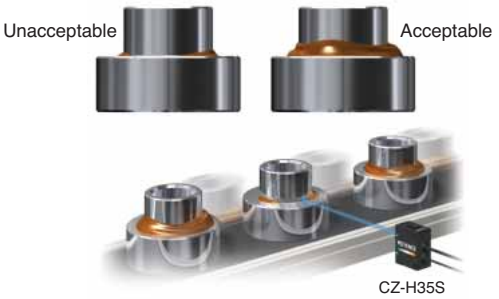


Detecting marks on bags printed with multiple colours

The lustre-cancel type stably detects marks on bags even when the background of the mark vibrates or has lustre. The small beam spot ensures reliable detection of even small marks.

Differentiation between the front and back sides of chips after being sealed in embossed tape

The lustre-cancel type, which cancels the influence of specular reflection, stably differentiates between the front and back sides of chips even through a transparent film.

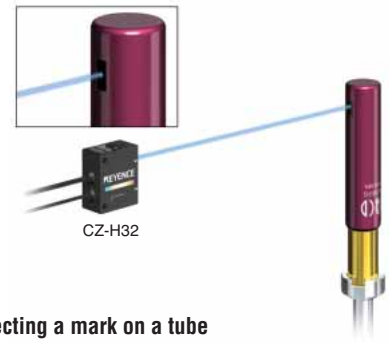


Detecting the presence/absence of grease

By canceling the influence of surface lustre and target position, the CZ-V20 reliably detects grease, despite its non-uniform shape and position.

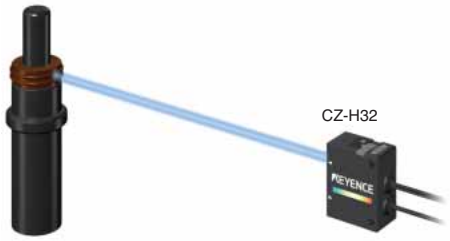
Detecting the seam on a spray can

Even when patterns are printed on spray cans, the sensor detects only the seam.



Detecting a mark on a tube

Selecting the small beam spot allows stable detection of small marks even from a long distance.

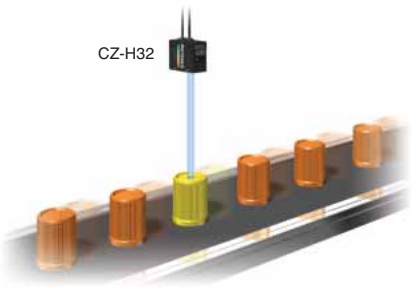


Checking parts assembly

The enhanced detection ability ensures stable detection of dark-coloured targets.

Detecting improperly positioned labels

Detection is stable because the colour recognition is not affected by the change in bottle colours. The interference prevention function assures successful detection when two sensor heads are mounted in close proximity.



Detecting caps of different colours

The CZ-V20 Series stably detects subtle colour differences that are difficult to detect with conventional sensors. Since detection is based on RGB components, it is less affected by target position or vibration.

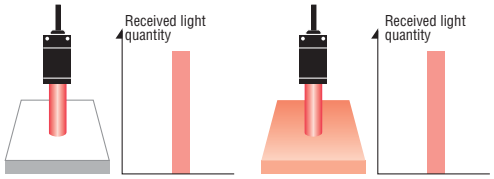
High resolution amplifier for triple 16-bit calculation

RGB light source for diversified target recognition

The SUPER RGB sensor enables stable detection by using a three-colour light source.

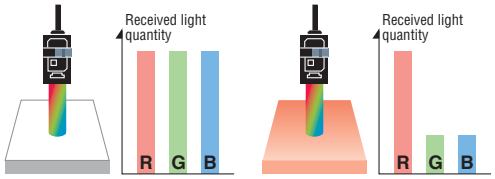
Advantage of the RGB light source 1 Accurate target recognition

Single-colour light source



Almost no difference is recognized between certain colours, resulting in unstable detection.

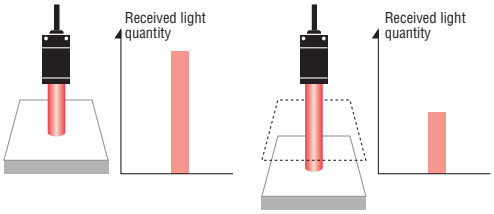
Three-colour light source



The received light quantity is converted into a ratio of three colours, and the target is recognized by its colour. This ensures accurate detection.

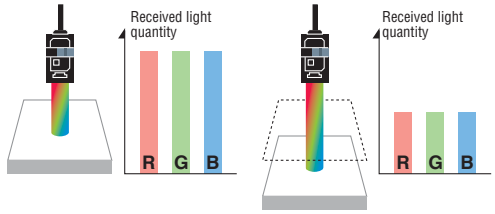
Advantage of the RGB light source 2 Less affected by changes in target position

Single-colour light source



When the target position changes, the received light quantity changes according to the distance between the target and the sensor head, resulting in unstable detection.

Three-colour light source

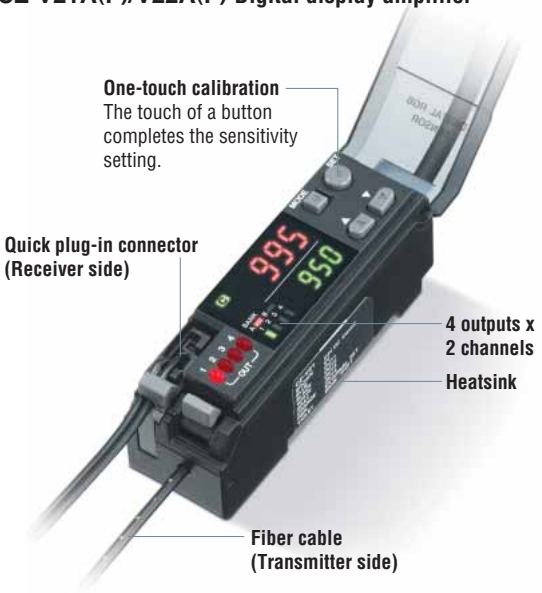


Even when the target position changes and the received light quantity changes, the ratio of the three colours does not change. Stable detection is ensured.

Dual digital display & Direct access

Both the current value and set value are displayed simultaneously.
Sensitivity and fine adjustment can also be done manually.

CZ-V21A(P)/V22A(P) Digital display amplifier



1-line connection supported. Interference prevention for up to 2 amplifiers

Power is supplied through the connector on the side, saving connection cables.

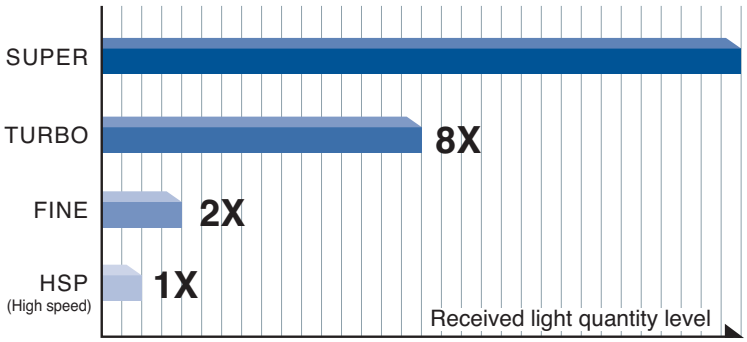
Detections that were once difficult can easily and reliably be achieved. (Super I Mode)

World's First Automatic selection of 7 different light combinations (Patent pending)

In the Super I mode, the sensor detects the received light quantity and automatically selects the most stable light from seven patterns. (There is no need for complicated settings because the light source is automatically selected during the sensitivity setting.)*

* In reality, the colour of the emitted light does not change because the light combination is selected by the receiver.

SUPER mode + 3 LEDs for exceptionally powerful detection



3 LEDs
Red, green, blue

The combination of the SUPER mode + 3 high-intensity LEDs has achieved unrivaled detection power. Even dark-coloured targets can be reliably inspected.

Three detection modes for every target

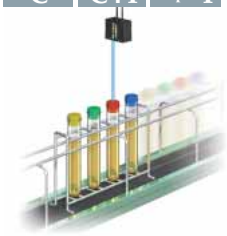
Super I	C	C+I
Detects the received light quantity	Detects the colour components	Detects the colour components and received light quantity

Advanced features that provide 100% reliability

Four independent outputs

C C+I Super I

This function is useful for target differentiation. The sensor stores data of four types of targets simultaneously and allows the setting and output for each target independently. When the C or C+I mode is used, the bank function enables differentiation of up to eight different types of targets.



Shift function

Super I

This function is useful for detecting subtle colour difference. When there is a change in the surrounding environment over time, the displayed value can be compensated with the external shift input.
(Patent pending)

When the difference in sensitivity between the target and the background is small, providing shift inputs periodically will compensate for data variations.

External calibration function

C C+I Super I

The sensitivity can be adjusted by using an external device such as a PLC.

Automatic calibration adjustment

C C+I

After the sensitivity setting is complete, the set value can be finely adjusted by detecting actual acceptable or unacceptable targets and adding (increasing) or excluding (decreasing) the set value.
(Patent pending)

Attenuation function

C C+I Super I

When the reflection from a target is too strong, the attenuation function can be used to decrease the sensitivity.

Three types of timer functions

C C+I Super I

Three types of timers are available: ON-delay, OFF-delay, and One-shot. The timer value can be set between 1 ms and 1,000 ms.

Specifications

Sensor head

Type		Adjustable spot	Lustre cancel	Lustre-cancel, small beam spot	Fluorescence detection UV
Model		**CZ-H32**	**CZ-H35S**	**CZ-H37S**	**CZ-H52**
Detection range		50 to 95 mm (Recommended: 70 mm)	28 to 52 mm (Recommended: 40 mm)	11 to 20 mm (Recommended: 15 mm)	25 to 55 mm (Recommended: 35 mm)
Smallest spot diameter		Small: 3 mm dia. Medium: 4.5 mm dia. Large: 5.5 mm dia. at respective reference distance [1]	4.5 mm dia. at reference distance of 40 mm	1 mm dia. at reference distance of 16 mm	10 mm dia. at reference distance of 25 mm
Light source		Red LED (665 nm)/Green LED (520 nm)/Blue LED (465 nm)			UV (ultraviolet) LED (375 nm) [2]
Receivable wavelength (Receiver)		—			425 to 550 nm
Minimum bend radius of fibre		25 mm		15 mm	—
Ambient light		Incandescent lamp: 10,000 lux max., Sunlight: 20,000 lux max.			
Ambient temperature		-10 to +55°C, No condensation			
Vibration		10 to 55 Hz, 0.06" (1.5 mm) double amplitude in X, Y, and Z directions, 2 hours respectively			
Enclosure rating		IP-40			
Material	**Housing**	Fibreglass reinforced plastic			
	Lens cover	Polyarylate	Triacetate, Polyarylate (Metal section: TYPE 304 stainless steel)		Glass
Weight (with 2-m cable)		Approx. 40 g		Approx. 45 g	Approx. 40 g

1. Reference distance: 65 mm for Small, 60 mm for Medium, and 50 mm for Large
2. The CZ-H52 emits ultraviolet light from the transmitter. Do not directly look at the light source while in operation.

Amplifier

Model			
	NPN	**CZ-V21A**	**CZ-V22A**
	PNP	**CZ-V21AP**	**CZ-V22AP**
Unit type (Main/expansion)		Main unit	Expansion unit
Response time		200 μs (HIGH SPEED)/1 ms (FINE)/4 ms (TURBO)/8 ms (SUPER)	
Control output [1]		NPN (PNP) open-collector x 4 channels, 40 VDC (30 VDC) max., Up to 100 mA for one output, Up to 200 mA in total of 4 outputs, Residual voltage: 1.0 V max.	
Protection circuit		Reverse-polarity protection, overcurrent protection, surge absorber	
External calibration input		Input time: 20 ms min.	
External bank switch input (C/C+I mode), External shift input (Super I mode)		Input time: 20 ms min.	
Timer function		Timer OFF/OFF-delay/ON-delay/One-shot, Timer time: 1 to 1,000 ms adjustable (for each bank respectively)	
Power supply		24 VDC, Ripple (P-P): 10% max.	
Current consumption		Normal mode: 1.5 W (62.5 mA max.), Eco-mode: 1 W (42.0 mA max.)	
Ambient temperature [2]		-10 to +55°C, No condensation	
Vibration		10 to 55 Hz, 1.5 mm double-amplitude in X, Y, and Z directions, 2 hours respectively	
Material		Housing, cover: Polycarbonate	
Weight (with 2-m cable)		Approx. 110 g	Approx. 100 g

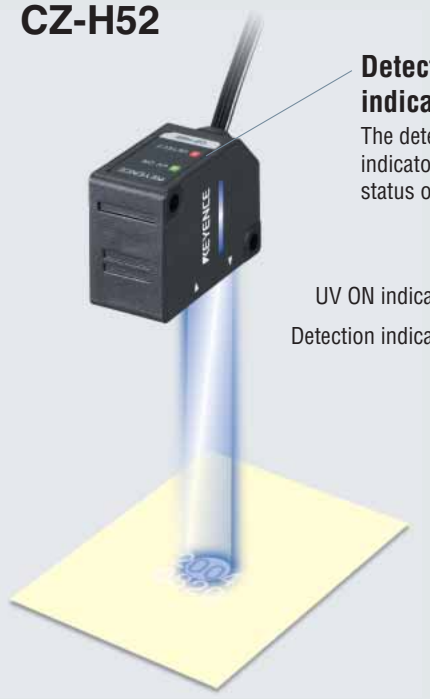
1. 20 mA max. when several units are connected.
2. When several units are connected, the acceptable ambient temperature varies depending on the conditions given below. To connect several units, be sure to mount them to a DIN rail and to limit the output current to a maximum of 20 mA.
   When 1 or 2 units are connected: -10 to +50°C
   When 3 units are connected: -10 to +45°C

Note: The expansion unit of the FS-V20 Series cannot be connected to the main unit of the CZ-V20 Series. To connect the FS and CZ Series units, connect the expansion unit of the CZ-V20 Series to the main unit of the FS-V20 Series. To connect two or more expansion units, connect the CZ-V20 Series units on the right of the FS-V20 Series units.

Fluorescence detection UV sensor suitable for the detection of fluorescent materials and paints

UV

CZ-H52



Detection/operation indicators

The detection and operation indicators show the current status of the detection.

UV ON indicator

Detection indicator

Detecting fluorescent marks without being affected by patterns or colours

The CZ-H52 emits UV light from the transmitter and detects the reflected light which was converted into visible light by the fluorescent material. Fluorescent materials and paints are normally invisible, however, they reflect visible light when UV light is applied.

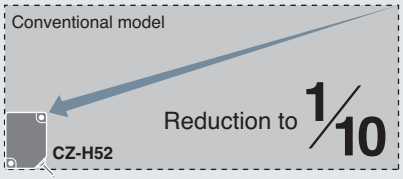
Targets which may contain fluorescent materials/paints

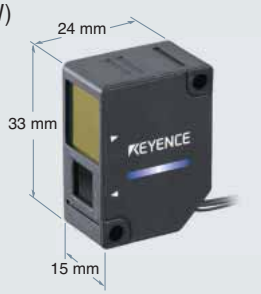
■ Fluorescent label ■ Fluorescent chalk ■ Fluorescent lubricant
■ Fluorescent dye ■ Paper ■ Adhesive ■ Marking tool/ink-jet printer
■ Fluorescent colour ■ Label ■ Sticker ■ Optically bright materials
■ Transparent film ■ Marking ink ■ Grease ■ Ink and varnish/lacquer
■ Felt-tip pen ■ Printing ink And so on

The CZ-H52 may be effective for detecting the above targets.

Super-small head for space saving

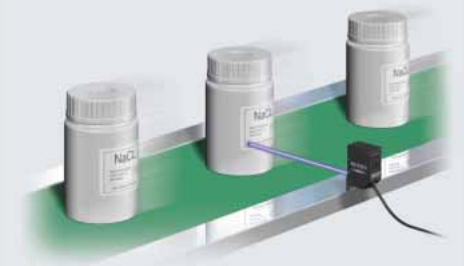
The small sensor head measures only (15 (W) x 33 (H) x 24 (D) mm). It can be easily mounted in tight spaces.





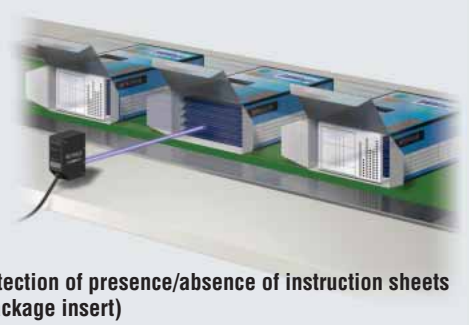
Applications

Many targets contain fluorescent materials or paints. The fluorescence detection UV sensor may be able to detect targets which cannot be detected with photoelectric sensors. Try your target in an actual situation.



Detecting labels on white containers

The fluorescent component contained in a label is detected to check for the presence/absence of the label. Since the detection uses the fluorescent components, it can stably detect even white labels on white containers.

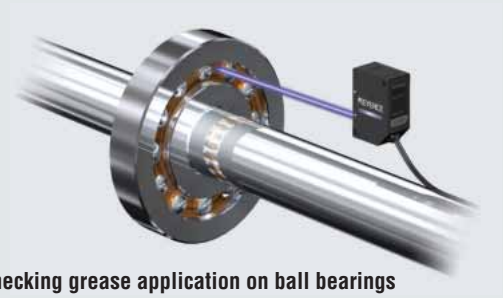


Detection of presence/absence of instruction sheets (package insert)

The CZ-H52 detects the fluorescent component contained in paper to check whether the instruction sheet (package insert) is properly inserted into each medicine package.

Detection of presence/absence of invisible print

The CZ-H52 detects the presence or absence of the print in invisible ink which contains a fluorescent component. The fluorescence detection UV sensor can stably detect print which cannot be detected with reflective type photoelectric sensors.



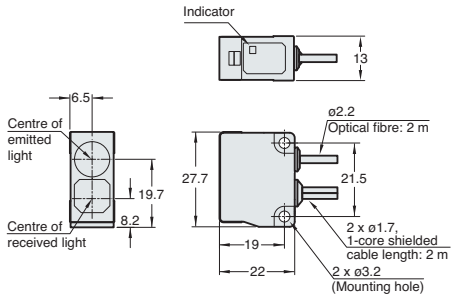
Checking grease application on ball bearings

The grease application is checked by detecting the presence/absence of the fluorescent component contained in it. Even glossy metal targets can be stably detected by ignoring the influence of specular reflection.

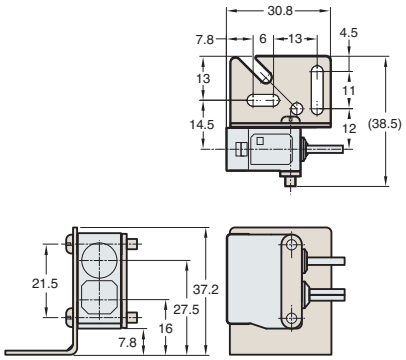
Dimensions

Unit: mm

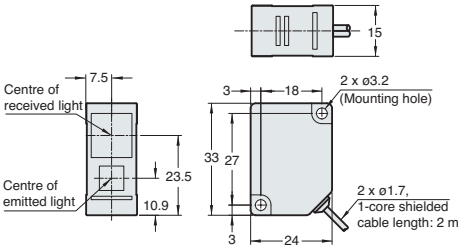
CZ-H37S



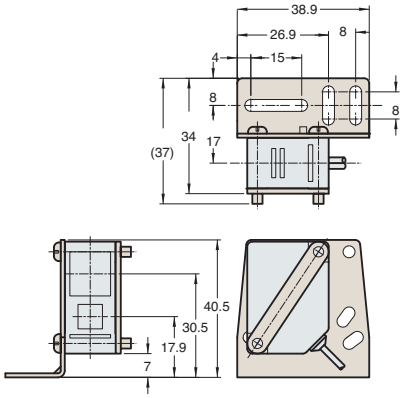
When a mounting bracket is attached



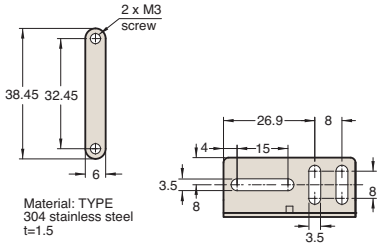
CZ-H52



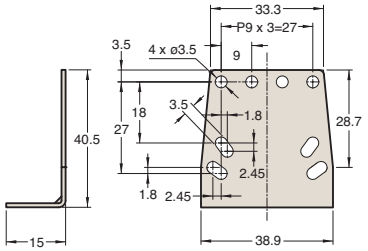
When a mounting bracket is attached



Mounting bracket (Supplied with the CZ-H52)



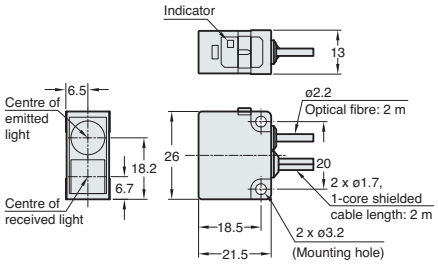
Material: TYPE 304 stainless steel t=1.5



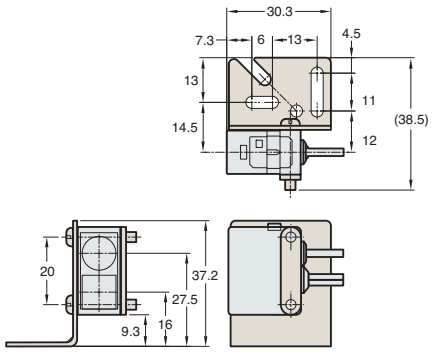
Material: TYPE 304 stainless steel t=1.2

Supplied screw: 22 x M3 screws (2)

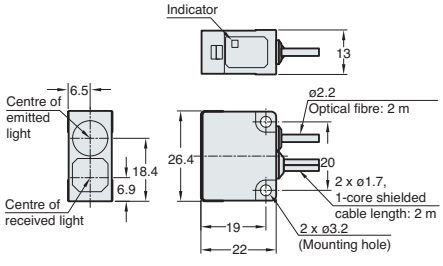
CZ-H32



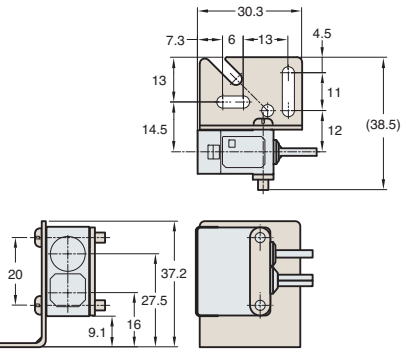
When a mounting bracket is attached



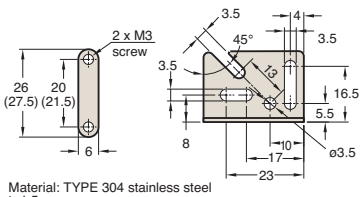
CZ-H35S



When a mounting bracket is attached

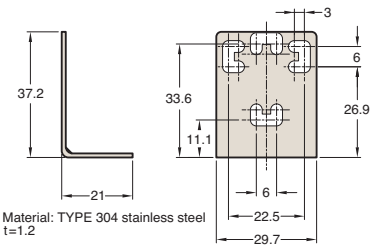


Mounting bracket (Supplied with the CZ-H32, H35S, and H37S)



Material: TYPE 304 stainless steel t=1.5

The figures in parentheses apply to CZ-H37S only.

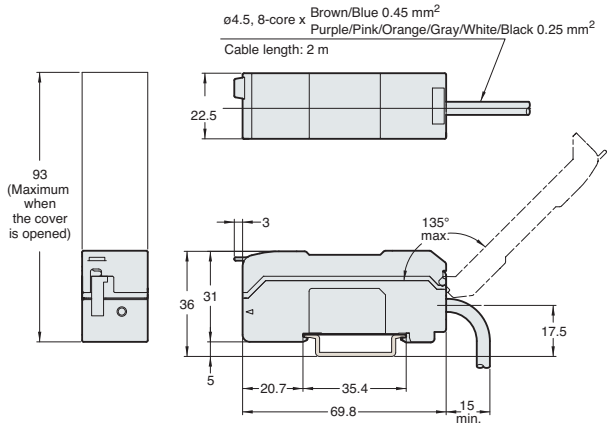


Material: TYPE 304 stainless steel t=1.2

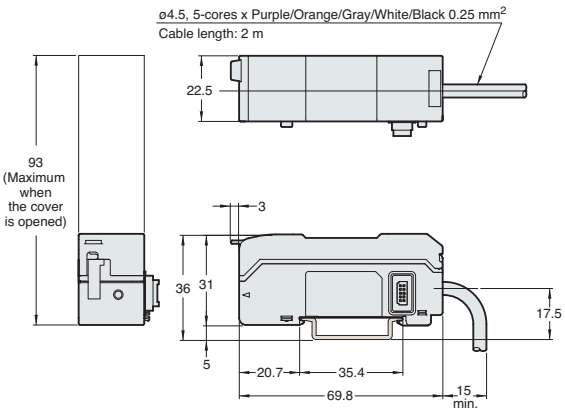
Supplied screw: 20 x M3 screws (2)

Unit: mm

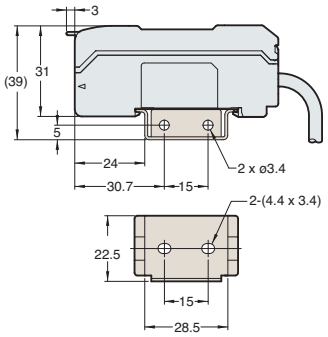
CZ-V21A/CZ-V21AP



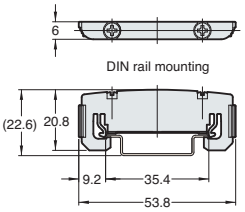
CZ-V22A/CZ-V22AP



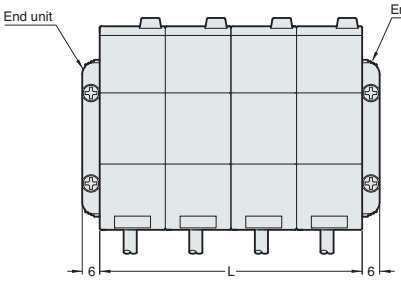
When a mounting bracket is attached (supplied with the CZ-V21A/V21AP)



End unit (supplied with the CZ-V22A/V22AP)



When several units are connected

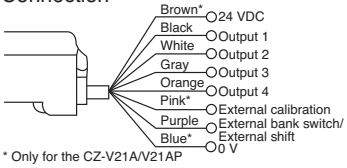


No. of expansion units	L
1	45
2	67.5
3	90

Note: When connecting expansion units, be sure to use the end units.

Input/output circuit diagram

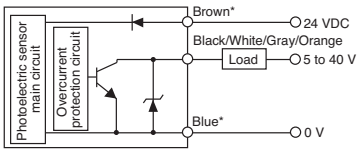
Connection



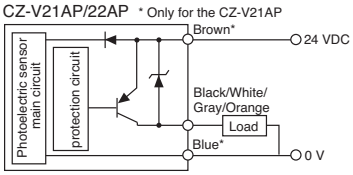
* Only for the CZ-V21A/V21AP

Output circuit

CZ-V21A/22A * Only for the CZ-V21A

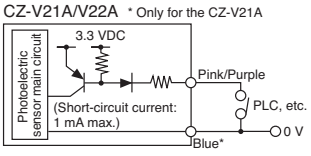


CZ-V21AP/22AP * Only for the CZ-V21AP

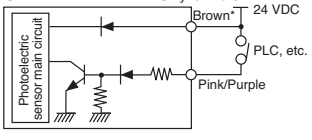


Input circuit •External calibration (Pink) •External bank switch/External shift (Purple)

CZ-V21A/V22A * Only for the CZ-V21A



CZ-V21AP/V22AP * Only for the CZ-V21AP



SUPER RGB SENSOR

Specifications are subject to change without notice.

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AUSTRIA
Phone: +43 22 36-3782 66-0 Fax: +43 22 36-3782 66-30

BELGIUM
Phone: +32 27 16 40 63 Fax: +32 27 16 47 27

CANADA
Phone: +1-905-696-9970 Fax: +1-905-696-8340

CHINA
Phone: +86-21-68757500 Fax: +86-21-68757550

CZECH REPUBLIC
Phone: +420 222 191 483 Fax: +420 222 191 505

FRANCE
Phone: +33 1 56 37 78 00 Fax: +33 1 56 37 78 01

GERMANY
Phone: +49 61 02 36 89-0 Fax: +49 61 02 36 89-100

HONG KONG
Phone: +852-3104-1010 Fax: +852-3104-1080

HUNGARY
Phone: +36 1 802 73 60 Fax: +36 1 802 73 61

ITALY
Phone: +39-02-6688220 Fax: +39-02-66825099

JAPAN
Phone: +81-6-6379-2211 Fax: +81-6-6379-2131

KOREA
Phone: +82-31-642-1270 Fax: +82-31-642-1271

MALAYSIA
Phone: +60-3-2092-2211 Fax: +60-3-2092-2131

MEXICO
Phone: +52-81-8220-7900 Fax: +52-81-8220-9097

NETHERLANDS
Phone: +31 40 20 66 100 Fax: +31 40 20 66 112

POLAND
Phone: +48 71 36861 60 Fax: +48 71 36861 62

SINGAPORE
Phone: +65-6392-1011 Fax: +65-6392-5055

SLOVAKIA
Phone: +421 2 5939 6461 Fax: +421 2 5939 6200

SWITZERLAND
Phone: +41 43-45577 30 Fax: +41 43-45577 40

TAIWAN
Phone: +886-2-2718-8700 Fax: +886-2-2718-8711

THAILAND
Phone: +66-2-369-2777 Fax: +66-2-369-2775

UK & IRELAND
Phone: +44-1908-696900 Fax: +44-1908-696777

USA
Phone: +1-201-930-0100 Fax: +1-201-930-0099

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