KEYENCE

RGB Digital Fiberoptic Sensor
CZ-V21A(P)/V22A(P)
Instruction Manual

BE SURE TO READ THESE MESSAGES CAREFULLY

⚠ Warning	• The CZ-V21(P)/V22(P) is just intended for the detection of target objects. Do not use the CZ-V21(P)/V22(P) in a safety circuit to protect the human body. • The CZ-V21(P)/V22(P) does not have an explosion-proof structure. Do not use it in a location where any flammable gases, liquid or powder exist. • The CZ-V21(P)/22(P) is a direct current type sensor. Application of the AC power may lead to burst or fire. • Do not directly look at the emitted LED beam. • The CZ-H32/H35S/H37S/H72 are the Class 1 LED product in which the light source LED is located in the amplifier unit. • The CZ-H52 is the Class 1M LED product. * When using the CZ-H52, be sure to read Precaution on Using CZ-H52 on page 8.

ACCESSORIES

■ Amplifier unit

• Mounting bracket: 1
Supplied with the CZ-V21A(P)

• End unit: 2
Supplied with the CZ-V22A(P)

• Instruction manual: 1

■ Sensor head

Common:	• Mounting bracket: 1 (two types, one of each for the CZ-H72) • Board nut: 1
CZ-H32/H35S/H37 only :	• M3 x 20 screw: 2
CZ-H52 only :	• M3 x 22 screw: 2 • Fiber insertion port cover seal: 1 • Ultraviolet ray spot check sheet : 1
CZ-H72 only :	• M3 x 30 screw: 2 • M3 x 6 screw: 2

PART NAMES

■ Amplifier unit

CZ-V22A(P)

Fixing lever / Output indicator / Receiver connector port / Display / Manual adjustment button / MODE button / Connection protection cover / Connection connector / SET button / Dust cover

CZ-V21A(P)

Display

Color indicator*
(Lights at C/C+I mode)
Bank indicator
(At C/C+I mode)
Channel indicator

BANK
A B
1 2 3 4

Current value monitor (red): 995
Setting value monitor (green): 950

* Film calibration indicator when using the CZ-H72

■ Sensor head

CZ-H32

Spot selection switch / Light emission fiber cable / Detection indicator / Emitter / Light reception cable / Receiver

CZ-H35S/H37S

Light emission fiber cable / Detection indicator / Emitter / Light reception cable / Receiver

CZ-H52

Receiver / Emitter

UV irradiation indicator (green) / Detection indicator (red)

CZ-H72

Detection indicator / Spot selection switch / Emitter / Receiver / Light emission fiber cable / Light reception cable

■ Installing the supplied brackets on the CZ-H72

Install the two supplied brackets by combining them as shown below.

The sensor angle can be adjusted within 90° (± 45°).
(Refer to the lower right of page 9.)
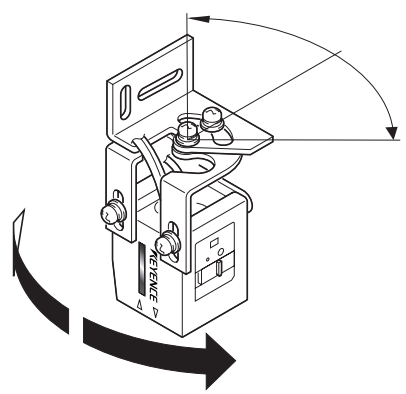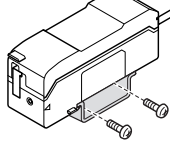
MOUNTING THE AMPLIFIER UNIT

■ Mounting on a DIN rail

Hook the claw located on the bottom of the amplifier unit to the DIN rail. While pushing the amplifier unit in the direction of the arrow 1, push it down in the direction of the arrow 2. To dismount the amplifier unit, while pushing the main body in the direction of the arrow 1, raise the body in the direction of the arrow 3.
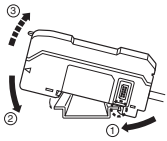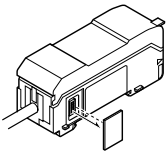
■ Mounting on a bracket

Mount the amplifier unit using the supplied mounting bracket as shown in the figure.
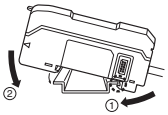
CONNECTING SEVERAL AMPLIFIER UNITS

Up to three sub-units CZ-V22A(P) can be mounted adjacent to the main unit CZ-V21A(P). By connecting several units, the number of power cables can be reduced.
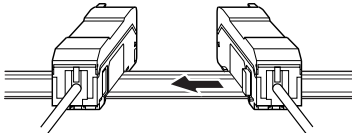
**1** Remove the protection cover on the side of the amplifier.
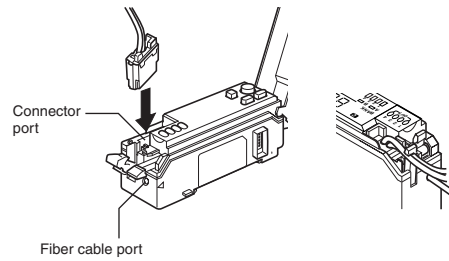
2 Mount the sub-unit on the DIN rail.

3 Connect the sub unit to the connector on the main unit by sliding the sub unit toward the main unit until a clicking sound is heard.

4 Mount the end units on both sides.
Fasten the screws on the top of the end units (at two positions on both end units) with the Philips screwdriver.

MOUNTING THE SENSOR HEAD
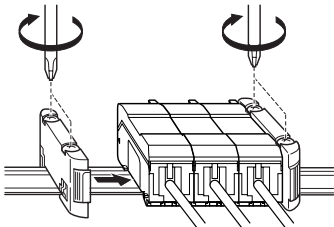
Connector port

Fiber cable port

1 Open the dust cover.

2 Tilt the fixing levers.

3 Insert the fiber cable and the connector of the sensor head into the corresponding ports.
Be sure to insert the fiber cable until it reaches the deepest end (the inserted length: about 20 mm).
* The CZ-H52 is not supplied with the fiber cable.
Attach the supplied cover seal on the fiber cable insertion slot when using the CZ-H52.

4 Lock them with the fixing levers.

5 Route the cable of the connector under the fixing lever.

■ When the cable of the sensor head is too long

1 Fabricate the cable end as shown in the figure.

10 mm or more   Shielded wire   Core   90°
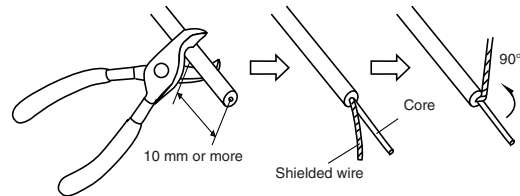
2 Tilt the lid of the connector in the direction of the arrow indicated on its left-hand side, and open the connector.
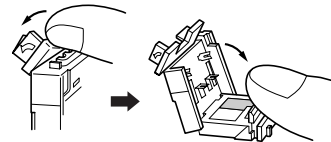
3 Insert the wires to the deepest end with the shielded wires bent upward.
Bend the shielded wires along the grooves in the direction of the arrows. Be sure to match the colors of the sticker on the connector with those of the shielded wires.

Red

White
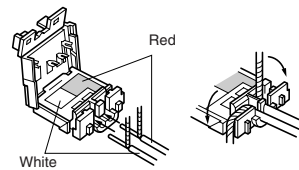
4 Close the connector to crimp down the wires, and tilt the top to lock.
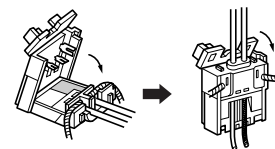
5 Trim off the wires sticking out of the connector by using a nipper or the like.
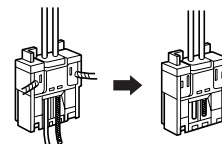
Note	Limit the reconnection to two times.

INPUT/OUTPUT CIRCUIT SCHIMATIC

■ Connection diagram

Brown* — 24 VDC
Black — Output 1
White — Output 2
Gray — Output 3
Orange — Output 4
Pink* — External calibration
Purple — External bank selection/external shift
Blue* — 0 V

*CZ-V21A and V21AP only

■ Output circuit

CZ-V21A • V22A *CZ-V21A only

Sensor main circuit | Overcurrent protection

Brown* — 24 VDC
Black/white/gray/orange
Load — 5 to 40 VDC
Blue* — 0 V

CZ-V21AP • V22AP *CZ-V21AP only

Sensor main circuit | Overcurrent protection

Brown* — 24 VDC
Black/white/gray/orange
Load
Blue* — 0 V
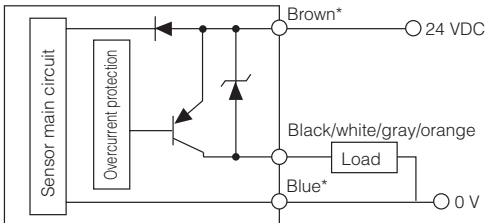
■ Input circuit

• External calibration (pink)
• External bank selection/external shift (purple)
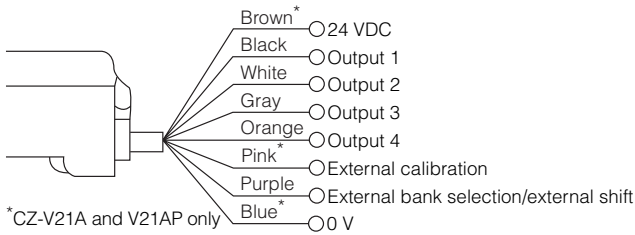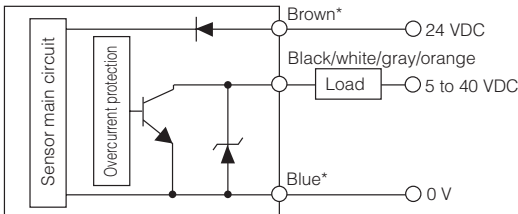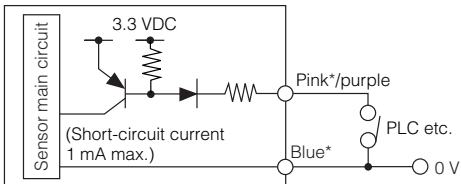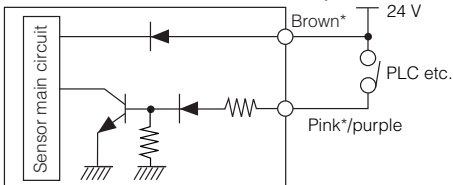
CZ-V21A • V22A *CZ-V21A only

Sensor main circuit

3.3 VDC
Pink*/purple
(Short-circuit current 1 mA max.)
PLC etc.
Blue* — 0 V

CZ-V21AP • V22AP *CZ-V21AP only

Sensor main circuit

24 V
Brown*
PLC etc.
Pink*/purple

DETECTION MODES

Mode	Description	Sensitivity setup method
C mode	Detects the target based on the color components (R,G,B).	Refer to page 3.
C+I mode	Detects the target based on the color components (R, G, B) and light intensity (amount of light received).	
Super I mode	Detects the target based on the lithgt intensity (amount of light received).	Refer to page 4.

* For the CZ-H52, the selectable detection mode is "Super I" mode only.

SENSOR HEAD MODES AND REFERENCE PAGES FOR SENSITIVITY SETUP METHOD

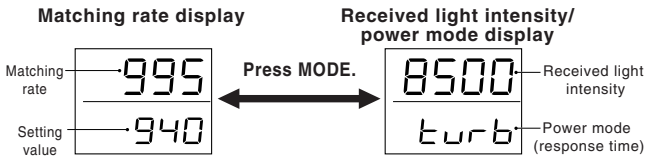| Model	Mode	Description	Sensitivity setup method
CZ- H32 /H35S /H37S	C mode	Detects the target based on the color components (R, G, B).	Refer to page 4.
	C+I mode	Detects the target based on the color components (R, G, B) and light intensity (amount of light received).	
CZ-H52	Super I mode	Detects the target based on the light intensity (amount of light received).	Refer to page 5.
CZ-H72	Luster detection mode	Detects the target based on the luster difference.	Refer to page 6.

OPERATION PROCEDURE FOR USING THE C/C+I MODE

■ Description of indication

Matching rate display **Received light intensity/ power mode display**

Matching rate → `995`   **Press MODE.** →   `8500` ← Received light intensity

Setting value → `940`   `turb` ← Power mode (response time)

Selecting the displaying channel: While holding down the MODE button, press the UP or DOWN button (refer to page 6).

Matching rate

Displays the degree of correspondence between the target color calibrated as a reference and the target color currently being detected.
Setting range: 0 to 999 (larger value for higher matching rate)

Setting value

Displays the threshold value that judges how much correspondence between the color of the current target and the color of the target calibrated as a reference is considered as an identical color.

Received light intensity

Displays the amount of light currently received.

Power mode (response time)

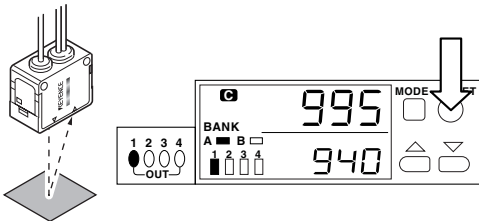Displays the power mode currently being selected.

Setting a sensitivity

For selecting a calibration mode, refer to page 5.

■ 1-point calibration (for detecting a single specified color)

Place a target of which color is to be used as a reference onto the focus position of the beam spot emitted from the sensor. Then press the SET button once.
• The set value appears in green.

■ 2-point calibration (for discriminating two colors)

1 Place a target of which color is to be used as a reference onto the focus position of the beam spot emitted from the sensor. Then press the SET button once.
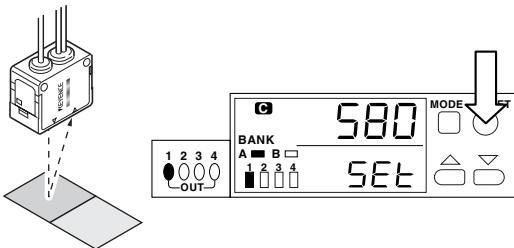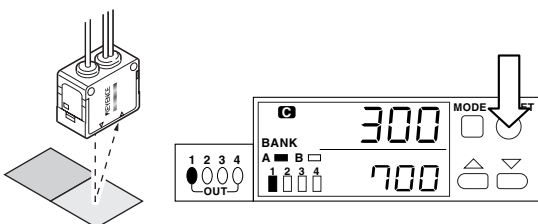"SET" appears in green on the setting value monitor.

2 Place a target of which color is to be discriminated. Then press the SET button once.
• The set value appears in green.

| Note | If the sensitivity difference is insufficient, the setting value monitor shows "- - - -" in green. |

■ Pinpoint calibration (1-point calibration with a stricter criterion)

Suitable for performing a stricter detection than 1-point calibration.
The setup method is the same as that for 1-point calibration.
• The setting value becomes larger than that of 1-point calibration even if the same target is used for calibration.

Fine-adjusting a sensitivity

■ Fine-adjusting a sensitivity by changing the setting value

The larger the setting value, the stricter the detection becomes, and the smaller the setting value, the rougher the detection becomes.
To change the setting value (displayed in green digits), press the UP or DOWN button.
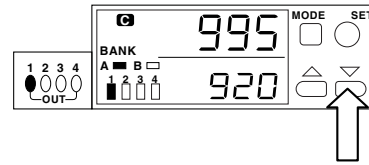
■ Fine-adjusting by using a target

Fine-adjust the setting value by performing an adding or eleminating calibration.

Adding calibration (setting-value decreasing calibration)

Set the target to be judged as an identical color. While holding down the SET button, press the DOWN button.
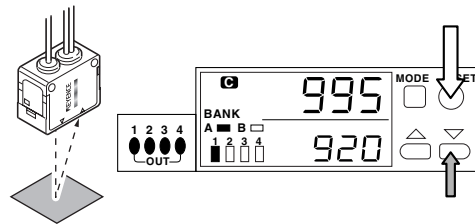
Eliminating calibration (setting-value increasing calibration)

Set the target not to be judged as an identical color. While holding down the SET button, press the UP button.
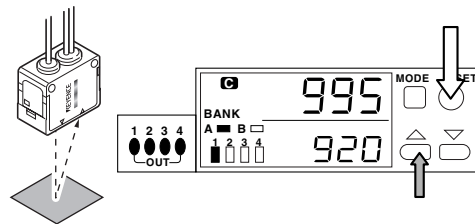
Permitting uneven color

At a 1-point calibration or a pinpoint calibration, the sensor continues sampling while the SET button is held down.
• The sampled colors are set to be judged as an identical color.
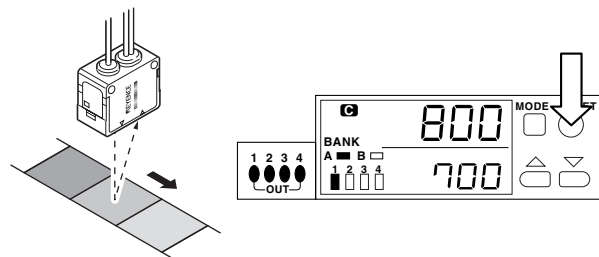
Setting value

At the sensitivity setting, the sensor automatically determines the setting value. The setting value can also be preset to a fixed value manually. In that case, perform the following operation.

Press the UP and DOWN buttons at the same time for three seconds or more.
• "F" appears in green on the left-hand side of the setting value monitor.
The cancellation method is the same as the method of fixing the setting value.
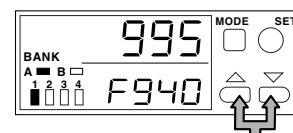
With the "F" being on display, the setting value does not change from the fixed value even if the sensitivity setting is performed.

OPERATION PROCEDURE FOR USING THE SUPER I MODE

■ Description of indication

(CZ-H32/H35S/H37S)

Received light intensity indication

Received light intensity — `8500`
Setting value — `5000`

Press MODE. →

When EASY is selected

When FULL is selected

Received light intensity/ lightsource indication

`8500` — Received light intensity
`rGb` — Selected light source
r: red
G: green
b: blue

Press MODE. ↖   **Press MODE.** ↘

Received light intensity hold indication

Peak intensity — `8700`
Bottom intensity — `5700`   ⟷   `HoLd`

Selecting the displaying channel: While holding down the MODE button, press the UP or DOWN button (refer to page 6).

(CZ-H52 only)

Received light intensity indication

Received light intensity — `8500`
Setting value — `5000`

Press MODE. →
← **Press MODE.**

Received light intensity hold indication

`HoLd`   ⟷   `8700` — Peak intensity
`5700` — Bottom intensity

Setting a sensitivity

■ 2-point calibration (basic)

1 Place a target onto the focus position of the beam spot emitted from the sensor. Then press the SET button once.
 • "SET" appears in green on the setting value monitor.
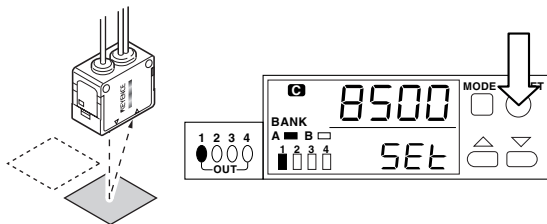
2 Press the SET button once without the target.
 • The set value appears in green.

Note If the sensitivity difference is insufficient, the setting value monitor shows "- - - -" in green.

■ Setting the maximum sensitivity (when maximizing the sensitivity)

1 Press the SET button and hold it for three seconds or more without the target.

2 Check that "SET" flashes, and release the SET button.

■ Full auto calibration (when a target is moving)

1 While holding down the SET button, pass the target through the optical axis.

2 Check that "SET" flashes, and release the SET button.

■ Positioning calibration (when positioning a target)

1 Press the SET button without a target.
 • "SET" appears in green on the setting value monitor.

2 Place a target on the desired position. Then press the SET button for three seconds or more.

3 Check that "SET" flashes, and release the SET button.

Fine-adjusting a sensitivity

■ Fine-adjusting a sensitivity by changing the setting value

To change the setting value (displayed in green digits), press the UP or DOWN button.

Shift function

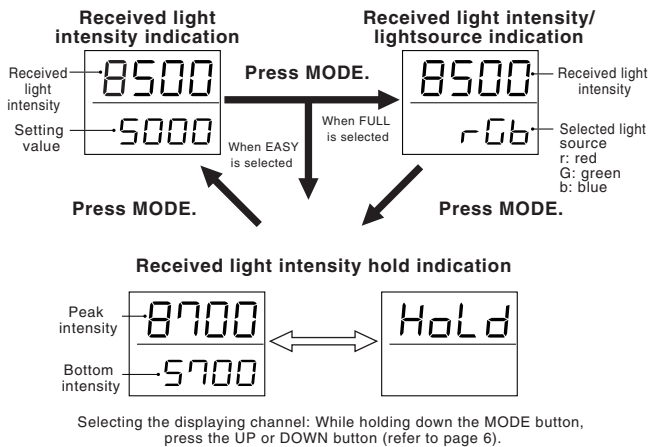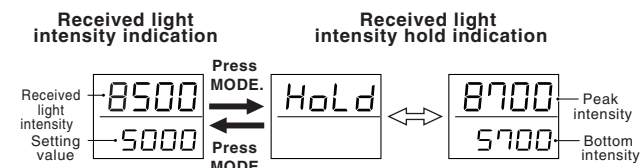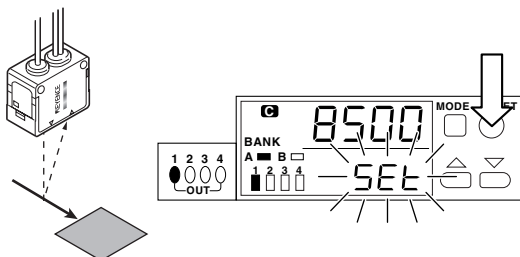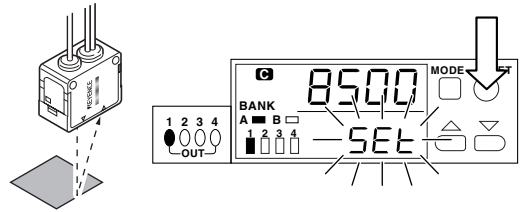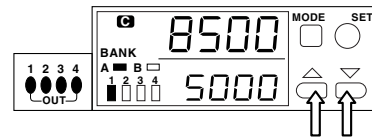Forcibly synchronizes the received light intensity with the preset value.
 • Regular shift inputs from a PLC or other device stabilizes the detection of the target that has a little light intensity difference. (For external inputs from a PLC or other devices, refer to page 6.)
 • The shift function can be used when the shift function selection is set to ON (refer to page 5).

Note The updated value after a zero shift input is cleared when the power is turned off.

Selecting a light source

The sensor selects the optimum source of the RGB lights used for detection automatically at sensitivity setting.
The light source can be selected for each channel.

Note The light actually emitted appears pale regardless of the selected light source.

■ Manually selecting the light source

To select the light source manually, perform the following operations.

1 At the display of the received light intensity/light source selection, press the UP and DOWN button at the same time for three seconds or more.
 "F" appears on the left-hand side of the setting value monitor.

2 Select a light source by pressing the UP or DOWN button.
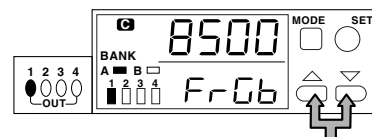
 • Once the light source is selected manually, the light source remains fixed even if the sensitivity value is changed.

To return to the automatic light source selection, press the UP and DOWN button at the same time for three seconds or more.
* The CZ-H52 does not have the light source selection function.

OPERATION PROCEDURE FOR USING THE LUSTER DETECTION MODE (CZ-H72)

■ Description of indication

Received light intensity indication
(The value is larger as the luster is stronger.)

Received light intensity → `8500`
Set value → `5000`
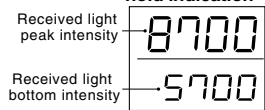
Received light intensity hold indication

Received light peak intensity → `8700`
Received light bottom intensity → `5700`

`HoLd`

Selecting the displaying channel: While holding down the MODE button, press the UP or DOWN button.

Setting a sensitivity

■ 2-point calibration (basic)

1 Place a lustrous portion of the target onto the focus position of the beam spot emitted from the sensor. Then press the SET button once.
  • "SET" appears in green on the setting value monitor.
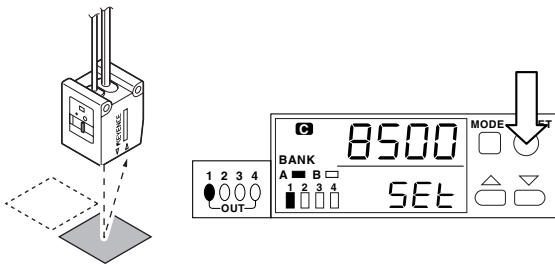
2 Place a matte portion of the target onto the focus position of the beam spot emitted from the sensor. Then press the SET button once.
  • The set value appears in green.
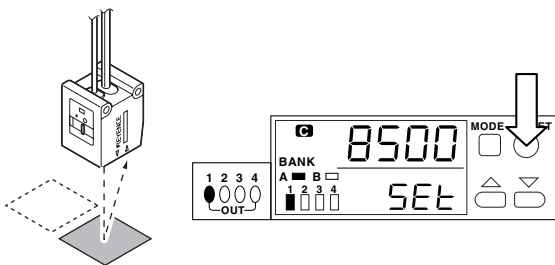
■ Base calibration
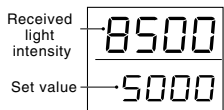### (maximum sensitivity that does not detect the matte portion)

Place a matte portion of the target onto the focus position of the beam spot emitted from the sensor. Then press the SET button once.
  • The set value appears in green.
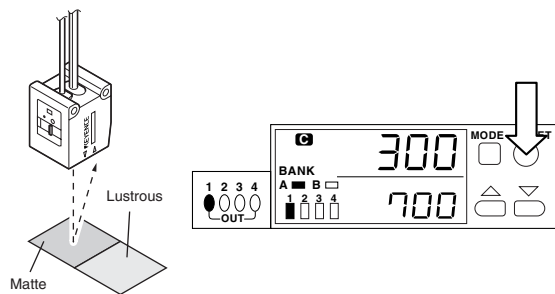
■ Film calibration (for detecting the presence or absence of a film)

1 Place a target with a film onto the focus position of the beam spot emitted from the sensor. Then press the SET button once.
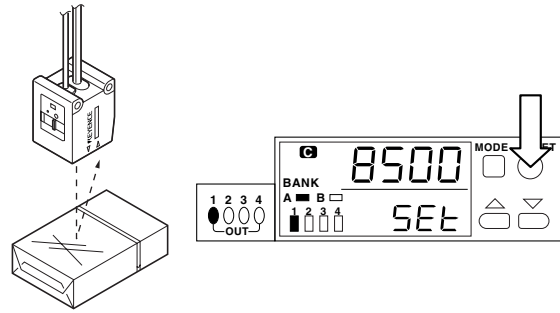
2 Place a target without a film onto the focus position of the beam spot emitted from the sensor. Then press the SET button once.

Fine-adjusting a sensitivity

■ Fine-adjusting a sensitivity by changing the setting value

To change the setting value (displayed in green digits), press the UP or DOWN button.

MENU SELECTION

Pressing the MODE button for three seconds or more displays the menu, from which each mode can be configured.
To exit the menu during setting, press the MODE button again for three seconds or more.

```
 C      934
BANK
A■ B□   900
1 2 3 4
```

Press MODE for three seconds or more

Menu display

```
 C      EASY
BANK
A■ B□
1 2 3 4
```

Selecting an access mode
Select by pressing UP or DOWN.
• EASY Displays the basic menu only.
• FuLL Displays all menus.

When using the CZ-H52/H72 — Press MODE

When using the CZ-H32/H35S/H37S

```
 C      Func
BANK
A■ B□   CoL
1 2 3 4
```

Selecting a function (detection mode)
Select by pressing UP or DOWN.
• CoL   C mode: Detects color based on color components
• C-i   C+I mode: Detects color based on color components and light intensity
• SP_i Super I mode: Detects color based on light intensity

Press MODE

```
 C      1200
BANK
A■ B□   hSP
1 2 3 4
```
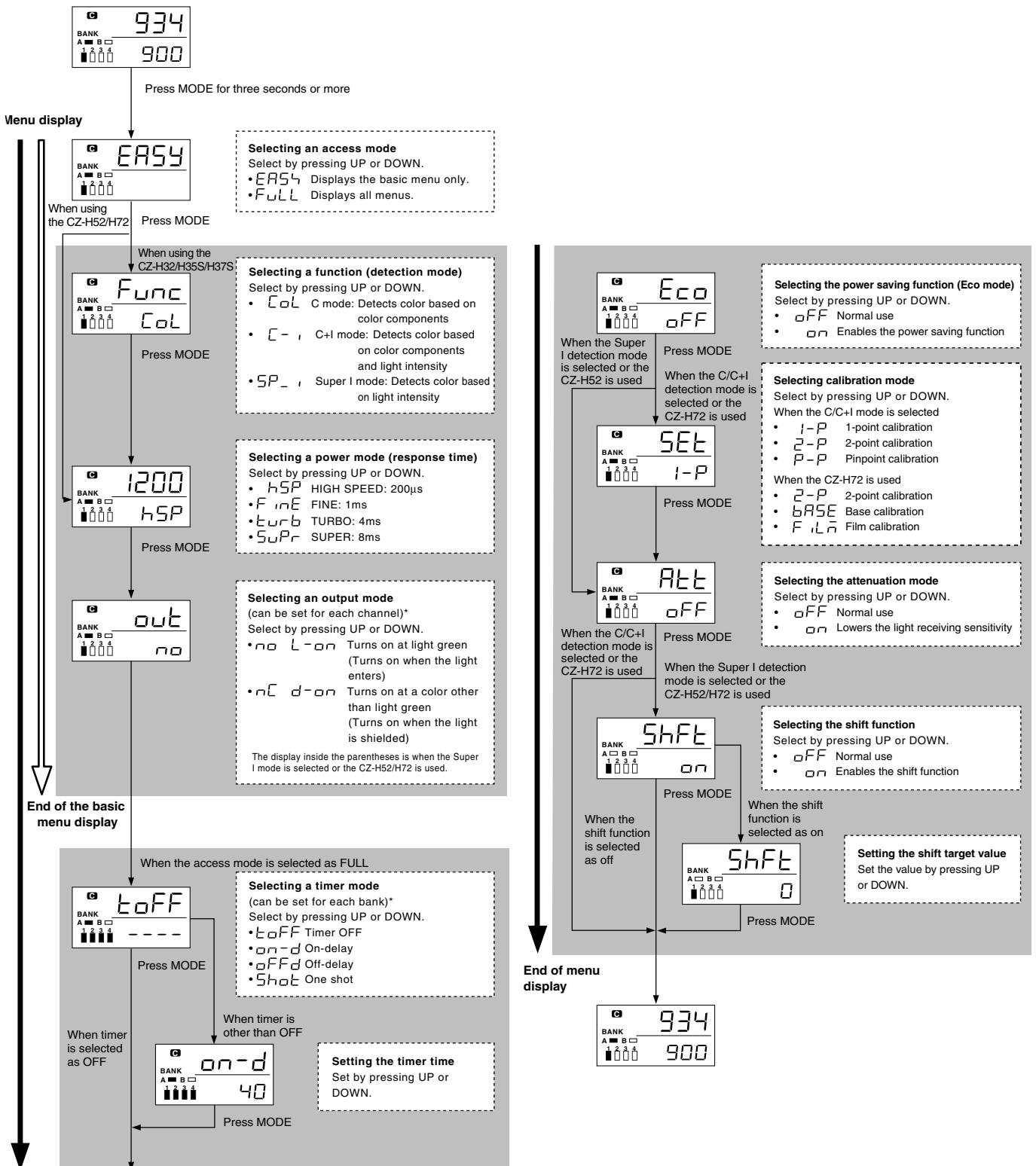
Selecting a power mode (response time)
Select by pressing UP or DOWN.
• hSP   HIGH SPEED: 200µs
• FinE FINE: 1ms
• turb TURBO: 4ms
• SuPr SUPER: 8ms

Press MODE

```
 C      out
BANK
A■ B□   no
1 2 3 4
```

Selecting an output mode
(can be set for each channel)*
Select by pressing UP or DOWN.
• no L-on Turns on at light green (Turns on when the light enters)
• nC d-on Turns on at a color other than light green (Turns on when the light is shielded)

The display inside the parentheses is when the Super I mode is selected or the CZ-H52/H72 is used.

End of the basic menu display

When the access mode is selected as FULL

```
 C      toFF
BANK
A■ B□   ----
1 2 3 4
```

Selecting a timer mode
(can be set for each bank)*
Select by pressing UP or DOWN.
• toFF Timer OFF
• on-d On-delay
• oFFd Off-delay
• Shot One shot

Press MODE

When timer is selected as OFF

When timer is other than OFF

```
 C      on-d
BANK
A■ B□   40
1 2 3 4
```

Setting the timer time
Set by pressing UP or DOWN.

Press MODE

* For the method of selection, refer to page 6.

```
 C      Eco
BANK
A■ B□   oFF
1 2 3 4
```

Selecting the power saving function (Eco mode)
Select by pressing UP or DOWN.
• oFF   Normal use
• on   Enables the power saving function

When the Super I detection mode is selected or the CZ-H52 is used — Press MODE

When the C/C+I detection mode is selected or the CZ-H72 is used

```
 C      SEt
BANK
A■ B□   1-P
1 2 3 4
```

Selecting calibration mode
Select by pressing UP or DOWN.
When the C/C+I mode is selected
• 1-P   1-point calibration
• 2-P   2-point calibration
• P-P   Pinpoint calibration

When the CZ-H72 is used
• 2-P   2-point calibration
• bASE Base calibration
• FiLm Film calibration

Press MODE

```
 C      Att
BANK
A■ B□   oFF
1 2 3 4
```

Selecting the attenuation mode
Select by pressing UP or DOWN.
• oFF   Normal use
• on   Lowers the light receiving sensitivity

When the C/C+I detection mode is selected or the CZ-H72 is used — Press MODE

When the Super I detection mode is selected or the CZ-H52/H72 is used

```
 C      ShFt
BANK
A■ B□   on
1 2 3 4
```

Selecting the shift function
Select by pressing UP or DOWN.
• oFF   Normal use
• on   Enables the shift function

Press MODE

When the shift function is selected as off

When the shift function is selected as on

```
 C      ShFt
BANK
A■ B□   0
1 2 3 4
```

Setting the shift target value
Set the value by pressing UP or DOWN.

Press MODE

End of menu display

```
 C      934
BANK
A■ B□   900
1 2 3 4
```

OTHER FUNCTIONS

■ Power saving function

If the Eco mode is turned on, three minutes' absence of operation brings the sensor to the power saving state. (For switching to the Eco mode, refer to page 5.)
To return the display to the normal state, press any one of the operation buttons.

■ Changing channels

The sensitivity can be set for each of the following number of channels depending on the detection mode.
• C/C+I mode: 8 channels (4 channels x 2 banks)
• Super I mode: 4 channels (no bank selection)
* When using the CZ-H52/72, the 4 channels can be used.

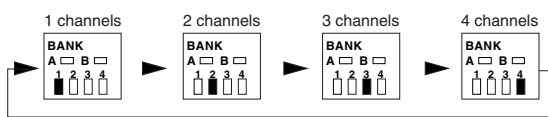To select the display channel, perform the following operation.
While holding down the MODE button, press the UP or DOWN button.
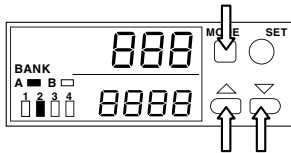
C/C+I mode
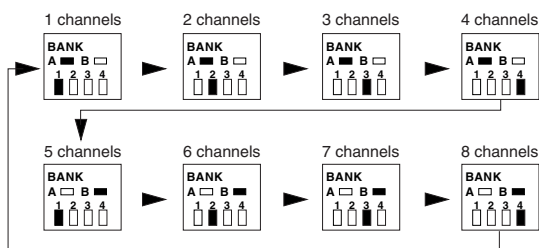
Super I mode

■ Keylock

Disables the key operation to change settings.
While holding down the MODE button, press the UP button for three seconds or more.
The cancellation method is the same as that of locking.

■ Interference protection function

The CZ-V20A series can prevent mutual interference by connecting several amplifier units.

Power mode	HIGH SPEED	FINE/TURBO/SUPER
Number of units required to prevent interference	Unavailable	2

* Total number of the main- and sub-units

EXTERNAL INPUT

■ Setting a sensitivity by the external input (external calibration)

1 Activate the keylock function.

2 Connect the pink wire to the external devices such as a switch and a PLC.

3 Short-circuiting the pink wire as shown below for each model equals the operation of pressing the SET button.


The minimum input time is 20 ms.
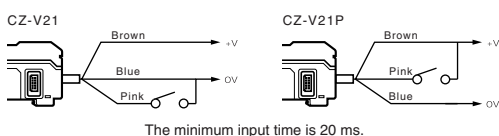
The external calibration to the connected sub-units (CZ-V22A(P), FS-T2(P), or PS-T2(P)) can be performed together with the main unit.
Lock only the sensor for which to perform external calibration. The setting content is the same as that of the main unit.

■ Externally inputting a shift input
(In the Super I mode setting/When using the CZ-H52/CZ-H72)

1 Connect the purple wire to the external devices such as a switch and a PLC.

2 Short-circuiting the purple wire as shown below for each model enables the shift input.
(The shift input is performed at the rising edge of the input signal.)

The minimum input time is 20 ms.
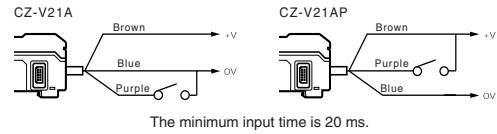
■ Selecting a bank by the external input (in C/C+I mode)

1 Activate the keylock function.

2 Connect the purple wire to the external devices such as a switch and a PLC.

3 Short-circuiting the purple wire as shown below for each model switches the bank from A to B.
(The bank is set to B while the input signal is ON.)

The minimum input time is 20 ms.
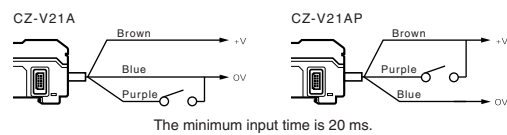
DEFAULT MODE SETTINGS (INITIALIZATION)

Access mode	EASY
Function (detection mode)	C mode
Calibration mode	1-point calibration
Power mode (response time)	TURBO
Output mode	no (L-on)
Timer mode	OFF (timer value 20 ms)
Power saving function (Eco mode)	OFF
Attenuation	OFF
Shift function	OFF (shift value 0)

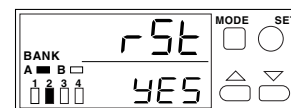* When using the CZ-H52, the function (detection) mode and the calibration mode are not displayed.
** When the CZ-H72 is used, the function (detection) mode is not displayed.

■ Resetting to the default settings

1 While holding down the MODE button, press the SET button five times.
• The monitor shows "rSt/no".
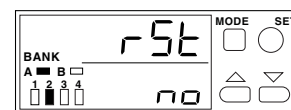
2 Press the UP button.
• The monitor shows "rSt/YES".

3 Press the MODE button.
• The sensor returns to the default state.

To cancel the reset operation, select "no" in step 2, and press the MODE button.

SPECIFICATIONS

■ Sensor head

Type	Spot selectable	Canceling glaze		Fluorescent object detection	Luster detection
Model	CZ-H32	CZ-H35S	CZ-H37S (small spot)	CZ-H52	CZ-H72
Detecting range (mm)	50 to 95	28 to 52	11 to 20	25 to 55	15-mm center[*2]
Recommended setting distance (mm)	70	40	15	35	15
Minimum spot diameter	Depending on the reference distance* Small: ø3/ medium: ø4.5/ large: ø5.5	Setting distance 40 mm ø4.5	Setting distance 16 mm ø1	At the setting distance of 25 mm: ø10	At the setting distance of 15 mm[*3]: Small: approx. ø3 large: approx. ø5
Light source	Red LED (665nm) Green LED (520nm) Bule LED (465nm)			UV (ultraviolet) LED (35 nm)	Red LED (665nm)
Received light wavelength (at receiver)	–			425 to 550 nm	–
Tolerated bending radius of fiber (mm)	R25	R15		–	R25
Operating ambient temperature:	−10 to +55°C (No freezing)				
Operating ambient illumination	Incandescent lamp: 10000 ℓ x or less Sunlight: 20000 ℓ x or less				
Protection structure	IP40				
Materials — Housing	Glass reinforced resin				
Materials — Lens cover	Polyarylate	Triacetate Polyarylate (Metal part: SUS304)		Glass	
Weight (including 2-m cable)	Approx. 40 g	Approx. 45 g		Approx. 40 g	Approx. 50 g

*1 Reference distance
  Small: 65 mm, medium: 60 mm, large: 50 mm
*2 Large spot: 15 ± 5 mm, small spot: 15 ± 3 mm
*3 The focus distance is about 10 mm, but stable detection can be achieved with 15 mm.

■ Amplifier unit

| Model — NPN output	CZ-V21A	CZ-V22A
Model — PNP output	CZ-V21AP	CZ-V22AP
Main/sub	Main unit	Sub-unit
Response speed	200 μ s (HIGH SPEED)/1 ms (FINE)/4 ms (TURBO) / 8 ms (SUPER)	
Control output[*1]	NPN (PNP) open collector x 4 CHs 40 VDC (30 VDC) max. 100 mA max. per output, 200 mA max. for the total of four outputs Residual voltage 1 V max.	
External calibration input	No voltage input Input response time 20 ms min.	
External bank selection input (C/C+I mode)		
External shift input (Super I mode)		
Protection circuit	Reverse-polarity protection, overcurrent protection, surge absorber	
Power supply voltage	24 VDC, Ripple (P-P): 10% max, Class 2 (the power-on reset time is 3 seconds.)	
Current consumption	Normal mode: 1.5 W (62.5 mA max.) Eco mode: 1 W (42 mA max.)	
IEC Class (IEC 60825-1)	Class 1 LED product	
Operating ambient temperature[*2]	−10 to +55°C (No freezing)	
Vibration	10 to 55 Hz, 1.5 mm double amplitude in the X, Y, and Z directions, 2 hours respectively	
Materials	Housing material: Plycarbonate	
Weight (including 2-m cable)	Approx. 110 g	Approx. 100 g

*1 20 mA maximum 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. Ensure that the output current is 20 mA max.
  When 1 to 2 units are connected: -10 to +50 °C
  When 3 units are connected: -10 to +45 °C

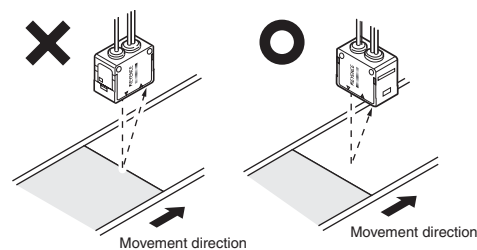## MOUNTING THE SENSOR HEAD

■ Extraneous light

A detection error may occur when the light from high-frequency lighting equipment such as an inverter fluorescent lamp directly enters or reflected on the target into the emitter. In such a case, apply a light shield plate or change the location of the sensor.
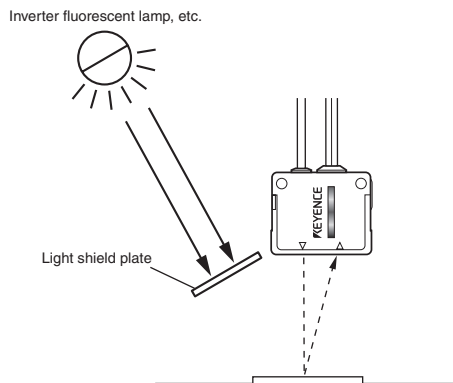

■ Target movement and sensor orientation

To stabilize the sensor output at a border, mount the sensor as shown in the following figure as much as possible.

### ■ When using the CZ-H32

When detecting a metal surface or glossy target

When a target has a metal or glossy surface, the calibration/differentiation may fail. To detect such a target, tilt the sensor head by approximately 10 to 15 degrees.
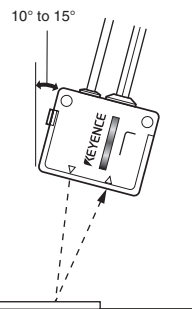
■ When using the CZ-H35S/CZ-H37S/H72

When a target has a glossy surface (a birefringence target such as an oriented film), the detection may fail depending on the mounting orientation. To detect such a target, displace the sensor head by approximately 45 degrees.
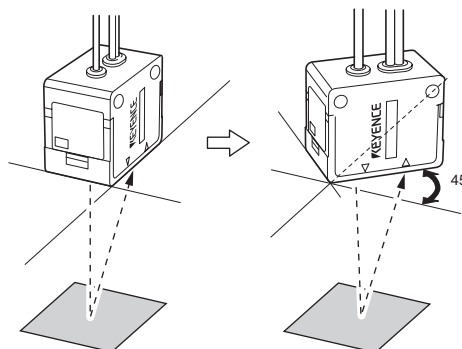
ERROR INDICATION

The following indications on the LCD display show the error events.
Correct the problem using the following countermeasures.

Error indication	Cause	Countermeasures
∩∩∩∩	Received light intensity is insufficient.	• Install the sensor within the specified detecting distance. • Check whether the fiber cable is inserted into the sensor to its deepest end. (approx. 20 mm) • Delay the response time.
⊔⊔⊔⊔	Received light intensity is excessive.	Turn on the attenuation mode. • Tilt the sensor head by approx. 10 to 15 degrees.
ErH	Sensor head is not connected. Head cable is broken.	• Check that the sensor head is connected. • Check that the head cable is not broken. • After checking these points, turn on the power again.
ErC	Overcurrent flows through the output wire.	• Check the load and reduce the current to be within the rated range. • Check that the output wire does not touch another wire or a frame.
Note	ON/OFF judgment is performed even with the "∩∩∩∩" of "⊔⊔⊔⊔" display.	

When an error indication not listed above is displayed, contact your nearest KEYENCE office.

RECEIVED LIGHT INTENSITY INDICATION

In the received light intensity indication, the number larger than 9 at the top digit is substituted with an alphabet.
Maximum value displayed: P599   Actual value: 25599

■ Denotation of indication

Indication	Alphabet	Number	Indication	Alphabet	Number
A	A	10	⌐	I	18
b	B	11	J	J	19
c	C	12	Ч	K	20
d	D	13	L	L	21
E	E	14	⊓	M	22
F	F	15	⊓	N	23
G	G	16	◻	O	24
h	H	17	P	P	25

Precaution on Using the CZ-H52

This sensor uses an ultraviolet LED as the light emitting source and a light receptor element that has the enhanced sensitivity in the visible region. The sensor is designed to reliably and easily detect fluorescent marks (such as hidden marks painted with fluorescent paint, or fluorescent marks painted with fluorescent paint).

■ Caution
⚠Class 1M LED

The LED emits powerful ultraviolet light while turned on, which can be very dangerous to the unprotected human eye. Do not view directly with optical instruments (such as a microscope or a telescope or a magnifiers).
Doing so may result in eye injury.
If there is a risk of reflected ultraviolet light entering the eye, wear protective goggles and avoid all risks of direct exposure to the eye.

■ Precaution on Detection

Some fluorescent objects cannot be detected by this sensor even though they may be visible to the human eye. Check the types of fluorescence before use. For your information, fluorescent materials include those which emit fluorescent light, phosphorescent light, and light accumulated from light-accumulative materials.

SAFTY PRECAUTIONS

• Isolate the sensor cable from the power line or the high voltage line. The use of these lines in the same pipe generates noise, which may cause malfunction.
• When a number of colors enter into the beam spot, they are averaged down in recognition, resulting in the output of the color that is different from the preset color.
• To extend the amplifier cable, use the cable with the nominal cross-sectional area no less than 0.3 mm^2, and with the length no more than 100 m.
• When using the commercially available switching regulator, be sure to earth the frame ground terminal and the ground terminal.
• Do not use the sensor outdoors.
• Even in the detection of the same color, the displayed value may vary due to the reason such as amplifier's individual characteristics, sensor head cable length, and different mounting conditions.

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E CZ-V21A(P)/V22A(P)-IM