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KEYENCE

Portable Monitor Microscope

VH-6100

INSTRUCTION MANUAL

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Thank you for purchasing the KEYENCE Portable Monitor Microscope VH-6100. As a leading manufacturer of high-tech sensors and measuring instruments for INDUSTRIAL APPLICATIONS, we use our unique technical experience to develop revolutionary products that meet the needs of our customers. We have obtained a high reputation for our thorough and coherent quality control and after-sales service. Please read this manual carefully to get the best from the VH-6100.

Check to make sure that all accessories listed below have been included with your VH-6100.

Camera probe	1
Lens	(1)*
Illumination head	(2)*
Power supply cable (cable length : 2m)	1
Carrying case	1
Carrying strap	1
Lens case	(2)*
Connector for remote recording	1
Still video floppy disk	1
Instruction manual (this manual)	1

*Insure the number of lens, illumination head, and lens case are as purchased.

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Chapter 1. OUTLINE OF VH-6100

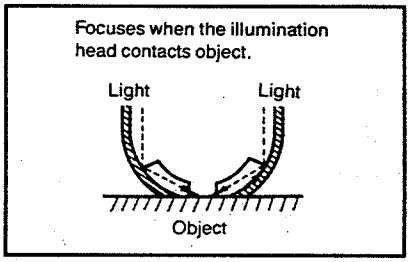
[1] Features

1. **Compact, and lightweight and self-contained**
   The VH-6100 controller hauses the color LCD monitor, still video recording system, camera controller and light source. Because of its compact size and lightweight, the VH-6100 can be conveniently carried to any job spot.

2. **Extra-wide depth-of-field produces extra-sharp 3-D pictures.**
   KEYENCE's unique optical technology has greatly improved the depth-of-field.

3. **Surprisingly clear picture**
   Employment of coaxial optical fiber illumination enables the brightness of the light source to be uniformly transmitted, thus consistently producing a clear picture.

4. **Clear distinction of flaws on metal surface by means of lateral illumination.**
   The minute flaws on a metal surface, which cannot be detected by conventional microscopes, can be easily distinguished.



5. **Automatic adjustment of light intensity**
   Regardless of reflected light intensity which fluctuates according to the color and material of objects, the screen brightness is kept constant.

6. **File name, date and time displayed on screen**
   An arbitrary file name consisting of alphanumerical characters, date and time can be displayed on the screen.

7. **Scaler function**
   Using scale marks superimposed on the screen, the dimension of an object can be directly measured.

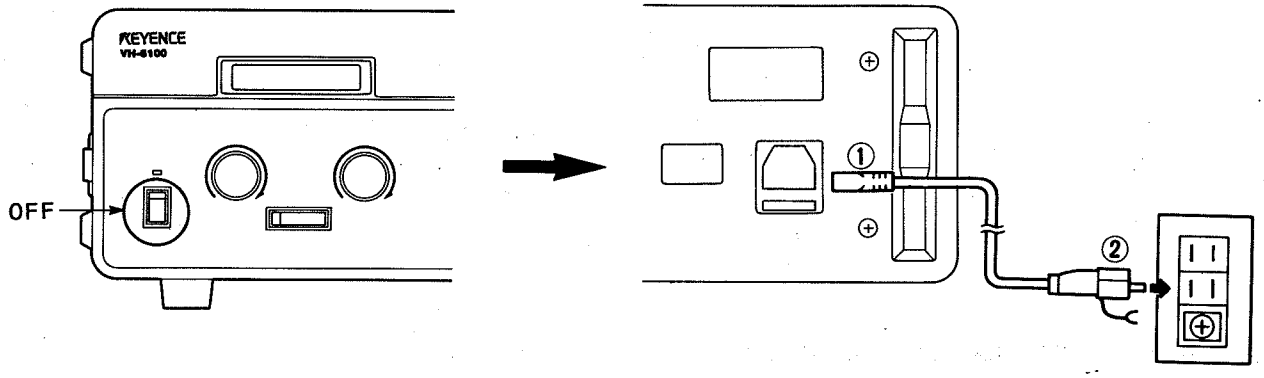
8. **Coloring function**
   By coloring brighter or darker portions than the set values alone on the screen, any flow or concave on the metal surface can be emphasized.

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[2] Preparation

1. Connection to power

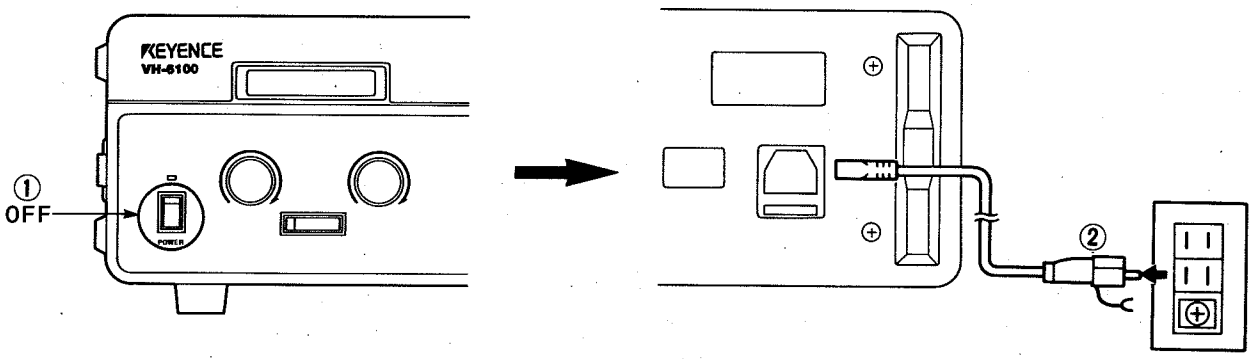
After confirming that the POWER switch of the controller is off, connect one end ① of the power supply cable to the power supply connector on the rear panel of the controller, and then connect the other end ② of the cable to an AC outlet.



2. Disconnection from power supply

To turn off the power supply, turn the POWER switch ① off. When power is turned off, the cooling fan continues to operate for a further five minutes. After the five minutes have elapsed, the buzzer sounds to inform the operator that the cooling fan has stopped. Then, disconnect the power supply cable ② from the AC outlet.

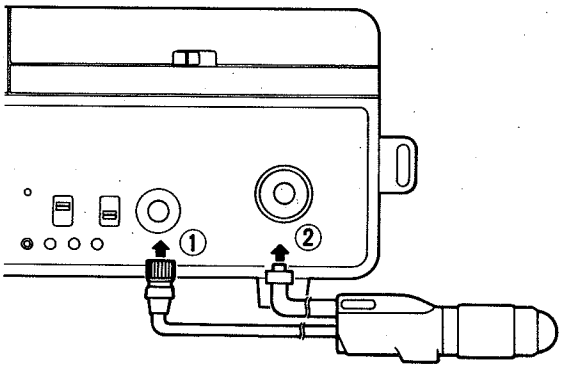
CAUTION: If these procedures are not observed, the service life of the illumination lamp may be shortened.



3. Connection of camera probe

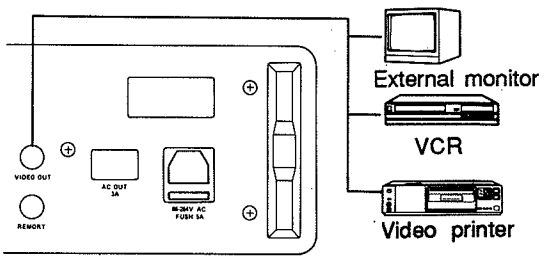
Keep the power off, and connect the camera cable ① to the CAMERA cable connector. Then, connect the optical fiber cable ② to the optical fiber (LIGHT) connector.

CAUTION: Never connect or disconnect the camera cable when the power is on. Connecting or disconnecting it when the power is on may result in damage to the camera.



4. Connection to external device

When connecting the external device, such as an external monitor, VCR, video printer, and so on, connect them to the external VIDEO OUTPUT on the rear panel of the controller.



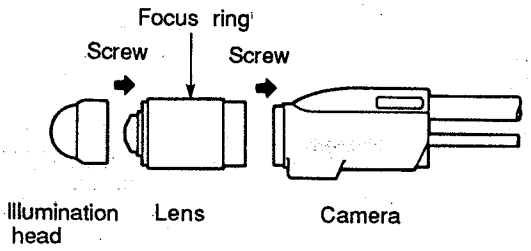
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[3] Hints on correct use

1. Mounting (interchanging) lens and illumination head

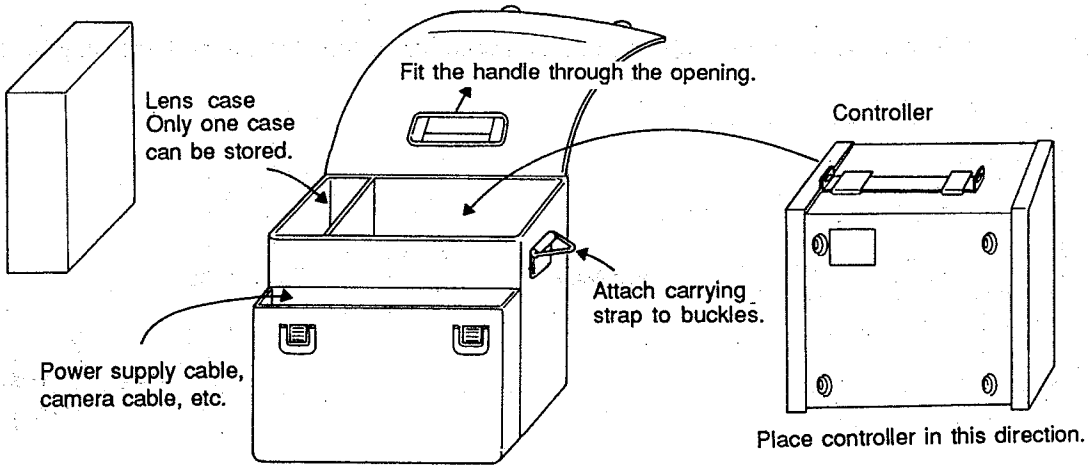
The lens screws on and off easily. Make sure it is firmly attached after interchanging the lens.

CAUTION: Tightening the lens excessively may damage the thread. The illumination head is also screw-mounted. Use a head appropriate for the magnification required.



2. Carrying case and carrying strap

Use the carrying case and carrying strap to carry the VH-6100.



Note: Vibration and shock

The VH-6100 features precision mechanical equipment. Be careful not to subject the VH-6100 to excessive vibration or shocks when transporting it.

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3. Lamp

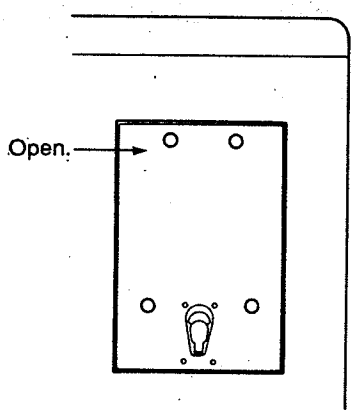
The service life of the illumination lamp is approx. 1,000 hours (at room temperature). When the lamp has burned out, follow the procedures below to replace the lamp.

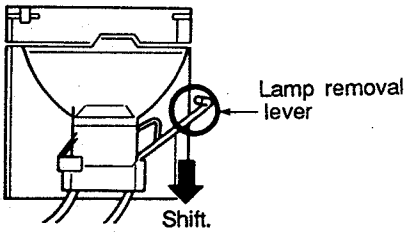
3-1. Open the lid at the bottom of the controller.

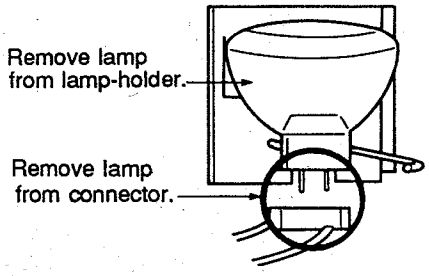
3-2. Remove the lamp from the lamp-holder using the lamp removal lever.

3-3. Remove the lamp (together with the reflector) from the connector.

3-4. Insert a new lamp into the lamp-holder and close the lid.







4. Lens (1000 X)

When the 1000-magnification lens (VH-1000) is used, the screen darkens. In this case, set the automatic sensitivity adjuster switch to ON or the SENS UP position (HIGH SENSITIVITY MODE).

5. Vents

Never block the vents on the controller panels. Blocking them will cause malfunction due to overheating.

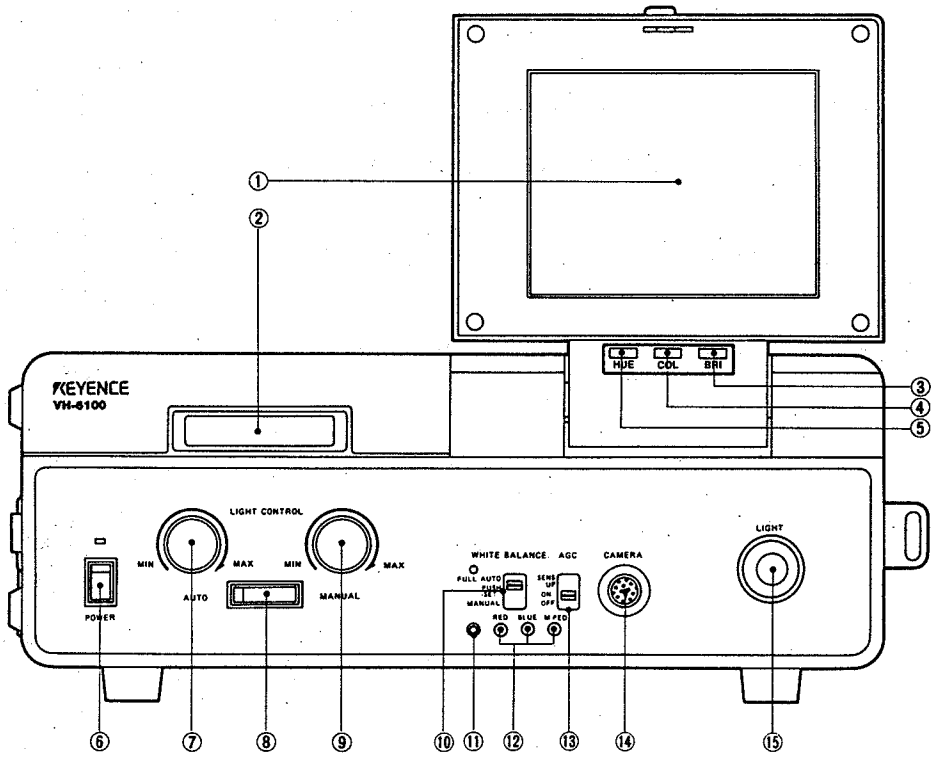
6. Operating environment

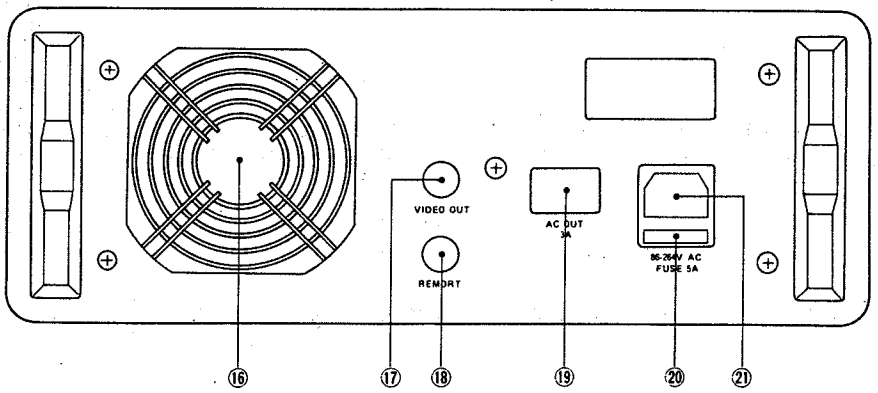
- Keep the operating temperature within a range of between 5 and 40°C. The operating humidity should be maintained within a range of between 35 and 80%. The VH-6100 should be used within these ranges only.
- Be careful not to allow any dust or other foreign matter to enter the camera probe. Remove any dust or foreign matter using a blower or wipe the inside clean using a soft cloth.
- Always be careful not to get water or any other liquid on the VH-6100.
- Exposing the LCD monitor to ultraviolet rays will deteriorate it. Do not use it under direct sunlight or intense ultraviolet rays for a long time.

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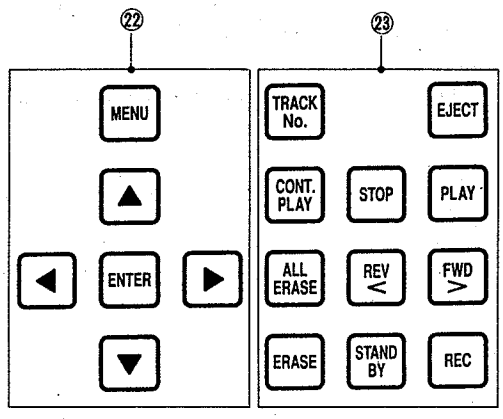
[4] Part names and functions

Controller

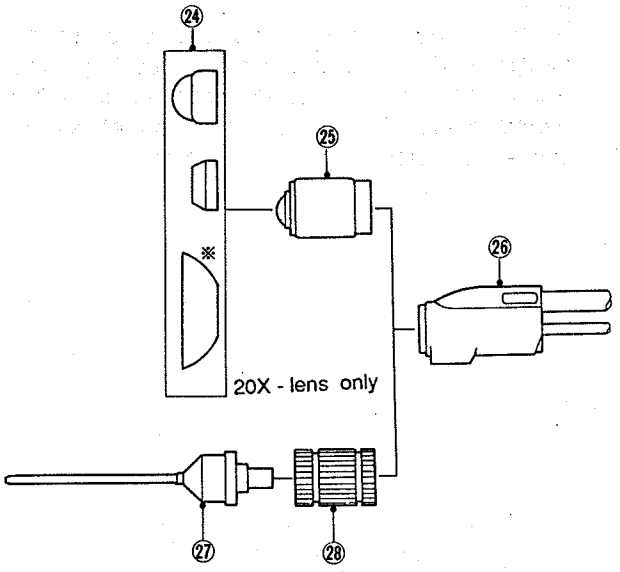




Operation panel



Camera probe



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Controller

(1) Color LCD monitor
Screen size is 5.6-inch.

(2) Disk insertion slot with shutter
Insert a video floppy disk after or before turning on the power, and unit automatically loads the disk. When the disk is in the slot, "Disk is inside" appears on the shutter.

(3) BRIGHTNESS adjustment dial
Adjusts screen brightness.

(4) COLOR CONTRAST adjustment dial
Adjusts screen contrast.

(5) HUE (tone) adjustment dial
Adjusts screen tone.

(6) POWER switch
Turn on this switch, after connecting camera cable. And disconnect camera cable, after turning off this switch.

(7) Light intensity adjuster (automatic)
Automatically adjusts light intensity in accordance with screen brightness.

(8) LIGHT CONTROL selector switch
Selects light intensity adjustment method between automatic and manual.

(9) Light intensity adjuster (manual).
Adjusts intensity of illumination.

(10) WHITE BALANCE selector switch
Switches over method of taking white balance.

(11) SET key
Press this key while taking white balance.

(12) White balance adjusters (RED,BLUE)
Turn this adjuster to set white balance manually.

(13) Black level adjuster (M. PED)
Adjusts black level of brightness signal. (Do not turn this adjuster during normal operation.)

(14) Automatic sensitivity adjuster switch
Normally set this switch to OFF. When sensitivity of camera is slightly low, set it to ON. When sensitivity of camera is extremely low, set it to SENS UP (high).

(15) Camera cable connector
Connects camera cable. (Turn off the power, when connecting and disconnecting camera cable).

(16) Optical fiber connector
Connects optical fiber for illumination.

(17) Cooling fan

(18) VIDEO OUTput connector

(19) Recording signal REMOTE input connector

(20) AC OUTlet
Outputs 100VAC (3A max., not coupled to power switch)

(21) FUSE holder (5A)

(22) Power supply connector
Connects attached AC power cable during power switch is off. (supply voltage : 85 to 264VAC, 50/60 Hz)

Operation panel

(23) MENU setting keys
Sets main MENU.

(24) Still video recorder operation keys

Camera prob

(25) Illumination head
Contact and non-contact type are available. Use a proper head in accordance with magnification.

(26) Lens
Different magnification is available by changing lens.

(27) Camera

(28) Borescope lens

(29) Lens attachment

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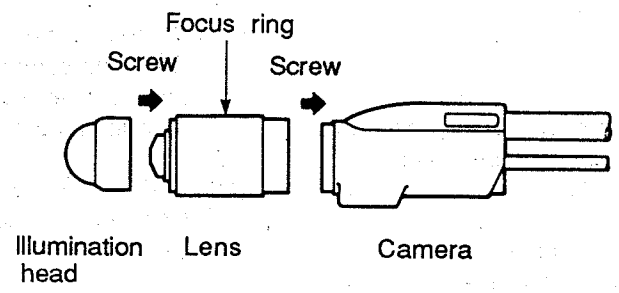
Chapter 2 LENS AND ILLUMINATION HEAD

[1] Mounting and focusing

1. Mounting (interchanging) lens and illumination head

The lens screws on and off easily. Make sure it is firmly attached after interchanging the lens.

CAUTION: Tightening the lens excessively may damage the thread. The illumination head is also screw-mounted. Use a head appropriate for the magnification required.



2. Focusing

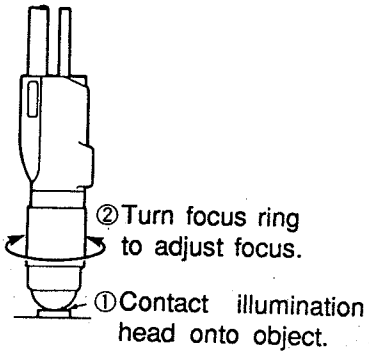
Adjust the focus of the lens by turning the focus ring.

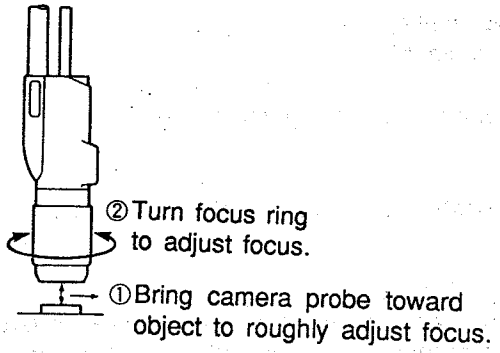
2-1. Contact type

Contact the illumination head onto an object. Then, adjust the focus with the focus ring, while checking the screen.

2-2. Non-contact type

While checking the screen, bring the camera probe toward an object to a position where the lens is roughly focused. Then, adjust the focus by turning the focus ring.

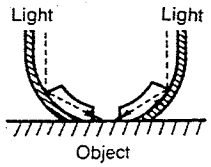




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[2] Illumination head

Two types of illumination heads are available: a contact type and a non-contact type.
Use either type according to the application.

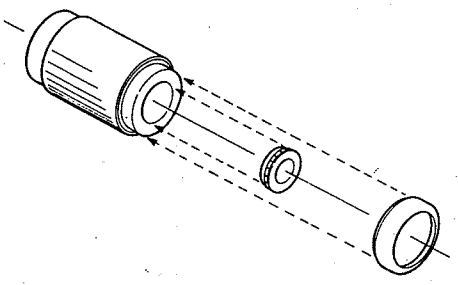


1. Contact type

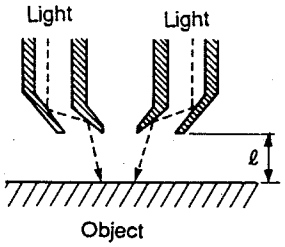
With the contact type illumination head, the lens is focused at the tip of the head. Contact the tip of the head onto an object to observe it, since it is illuminated by lateral illumination.

2. Non-contact type

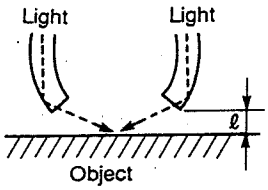
With the non-contact type illumination head, the lens is focused at a position slightly away from the tip of the head. Keep the tip of the head away from the object to observe it, since the light is projected downward from the tip. For mounting the non-contact type, 20-magnification lens, refer to the figure below.



20X-lens



50, 100X - lens



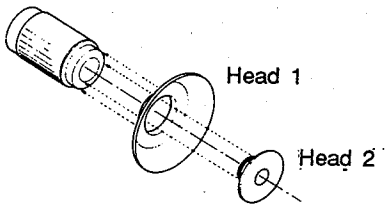
200,500,1000X - lens

The focus lens on object, set distance "l" to length specified in table below.

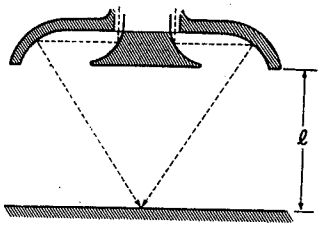
Model \ Distance	(mm)
VH-20	70
VH-50K	12.8
VH-100K	11.0
VH-200K	3.5
VH-500K	3.5
VH-1000K	3.5

3. Non-reflective lens

The 20-magnification lens can be used as a non-reflective lens by attaching the special illumination heads. The non-reflective lens eliminates glare, ensuring bright pictures.
Both heads 1 and 2 can be screw-mounted. Mount them by referring to the figure below.



Mount head 1 and then head 2.



The focus lens on object, set distance "l" to length specified in table below.

Model \ Distance	(mm)
VH-20	62

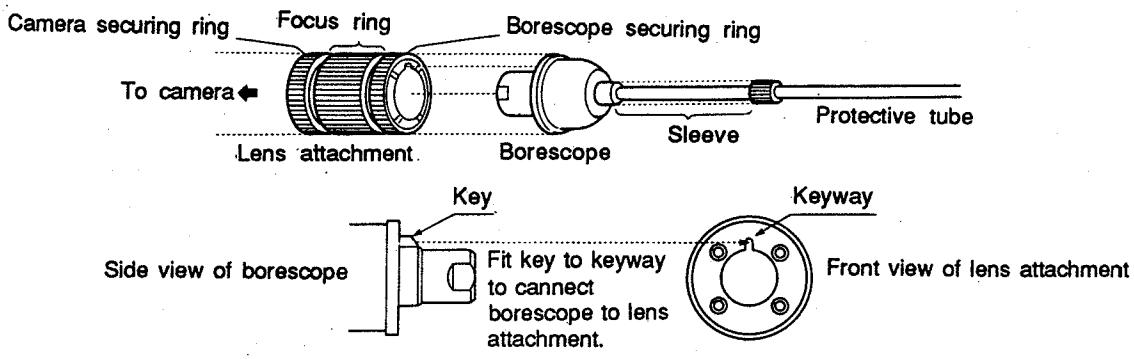
The surface image of an object can be altered by using different illumination heads. Use an appropriate head to obtain the desired picture.
When glare on the surface of the object is strong, it is recommended that the contact type be used.
In addition, be sure to use a matched pair of illumination head and lens according to the magnification required.

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[3] Borescope lens

1. Parts names and assembly drawing

To use the borescope lens, assemble the parts as follows.



1-1. Mounting of lens attachment

First, mount the lens attachment to the camera.

Be sure to turn the camera securing ring when mounting/removing the lens attachment.

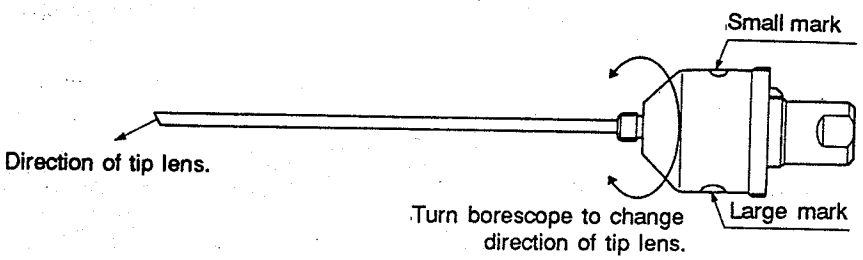
1-2. Mounting of borescope

Fit the key of the borescope to the keyway of the lens attachment. When the borescope is fully inserted into the lens attachment, fasten them using the borescope securing ring of the lens attachment.

Be sure to turn the borescope securing ring when mounting/removing the borescope.
If the borescope is not fitted all the way into the lens attachment, the screen darkens, and clear pictures cannot be obtained.

When the borescope is properly secured, bring the sleeve close to the observation point, and turn the focus ring of the lens attachment to adjust the focus.

With the VH-B32(for oblique type), there are marks on the root of the borescope. These marks help you to confirm the direction to which the tip lens is directed.
To change the observation point (side face or upper face) after inserting the sleeve, turn the borescope referring to these marks.



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2. Precautions on use

2-1. When using the borescope lens, mount the protective tube whenever possible.

2-2. The sleeve contains a precision optical component. Be careful not to subject the sleeve to any shock or excessive force. If the optical component is damaged, it may not be possible to repair it.

2-3. The sleeve is waterproof. Use of the sleeve in any liquid other than water, however, may damage it. For such application, contact KEYENCE.

2-4. The joint between the borescope lens and lens attachment, and the tip of the sleeve where the lens is exposed must be kept extremely clean. The lens should always be kept free of dirt and dust or other contaminants.

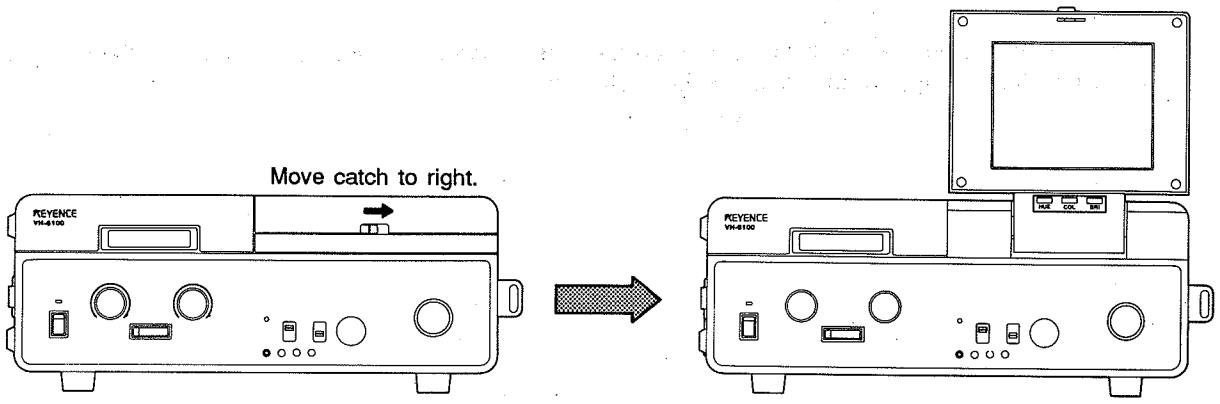
If there is some problem with the picture on the screen, check the joint and tip of the sleeve for dirt or dust, and then, if any, wipe it clean with a soft cloth.

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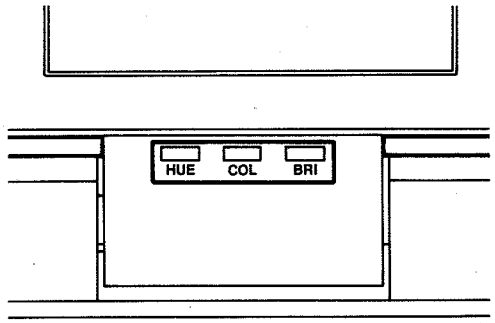
Chapter 3 ADJUSTMENT

[1] Built-in color LCD monitor

The 5.6-inch color LCD monitor is incorporated into the controller.

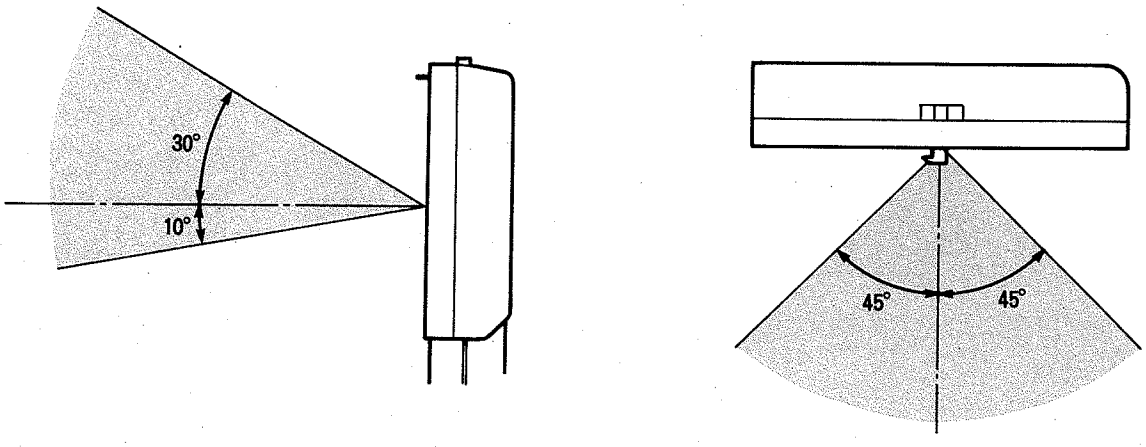


To use the monitor, open the monitor as shown in the figure below.
Then, adjust the picture on the screen using the dials located below the monitor.



HUE: Adjusts hue.
COL: Adjusts color contrast.
BRI: Adjusts brightness.

View the screen within the range shown below.



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[2] Light control

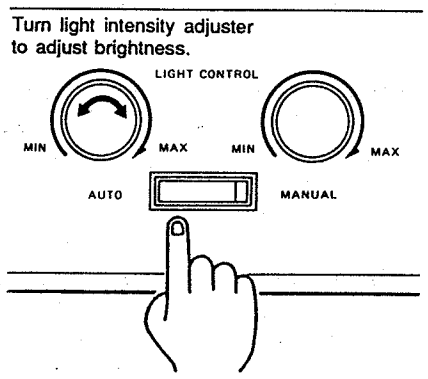
To adjust light intensity for illumination, the automatic mode or manual mode can be selected.

1. AUTO

In this mode, the brightness of the screen is automatically adjusted to a constant level, even if an object is changed.

1-1. Set the LIGHT CONTROL selector switch to AUTO (automatic mode).

1-2. While checking the screen, adjust brightness by turning the light intensity adjuster (AUTO). The brightness is automatically adjusted to this level.



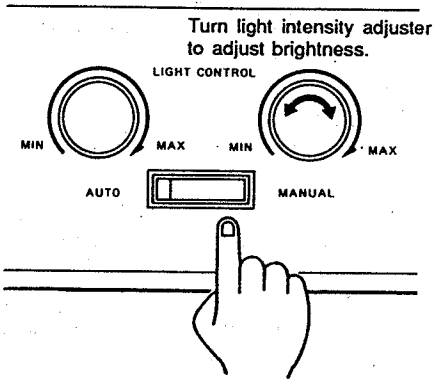
Set LIGHT CONTROL selector switch to AUTO.

2. MANUAL

Usually, optimal brightness is achieved in the automatic mode. However, use the manual mode to observe both black and white areas which are blended in the object.

2-1. Set the LIGHT CONTROL selector switch to MANUAL (manual mode).

2-2. While checking the screen, turn the light intensity adjuster (MANUAL) to obtain the appropriate brightness of the observation point.

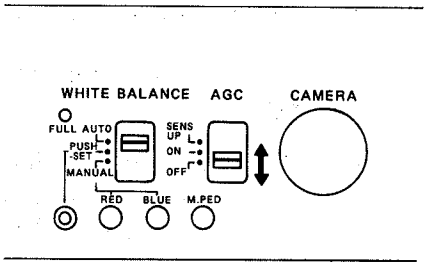


Set LIGHT CONTROL selector switch to MANUAL.

[3] Sensitivity adjustment

With the VH-6100 series, sufficient light provides clear pictures. Accordingly, normally set the automatic sensitivity adjuster switch (AGC) to OFF. If the desired brightness cannot be obtained, set this switch to ON or the SENS UP position.

When using the 1000-magnification lens, set this switch to the SENS UP position to obtain bright pictures.



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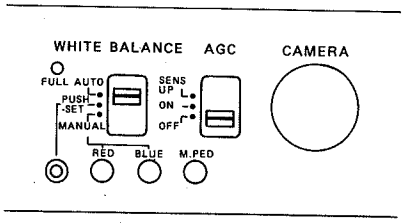
[4] White balance

In order to obtain clear pictures with proper color balance, adjust the white balance.

With the camera of the VH-6100, three modes are available to adjust the white balance: FULL AUTO/PUSH SET/MANUAL.

1. FULL AUTO (Automatic mode)

The camera can automatically measure color temperature to adjust the white balance. Almost all observations can be performed in the FULL AUTO mode.



2. PUSH SET (Semi-automatic mode)

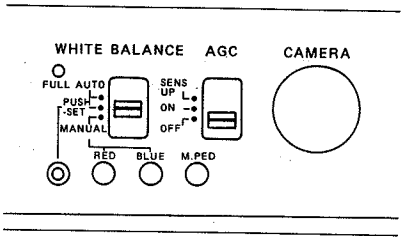
While projecting the picture of a white object on the screen, take the following procedures to adjust the white balance.

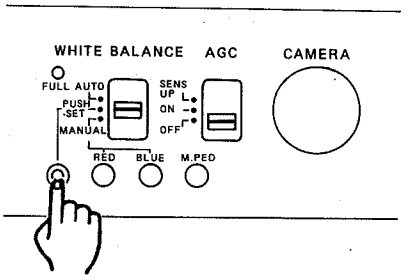
2-1. Set the WHITE BALANCE selector switch on the controller to PUSH SET.

2-2. The WHITE BALANCE indicator flashes.

2-3. Project the white object picture over the entire screen, and press the SET key.

2-4. When white balance is properly adjusted, the WHITE BALANCE indicator stops flashing and stably lights.
When the indicator continues flashing, the white balance is not properly adjusted. Check the screen to determine whether the monitor is being used under this condition or select the MANUAL mode.





Note: When turning on/off the power supply, re-adjust the white balance.

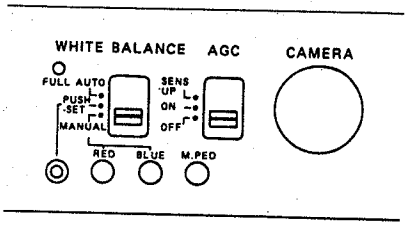
When light intensity for illuminating an object is insufficient, the white balance may not be properly adjusted. In this case, increase the light intensity or select the MANUAL mode.

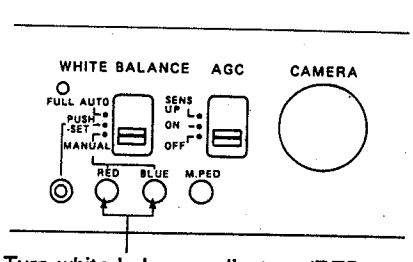
3. MANUAL (Manual mode)

While projecting the picture of a white object on the screen, adjust the red and blue level to properly adjust the white balance.

3-1. Set the WHITE BALANCE selector switch on the controller to MANUAL.

3-2. While projecting and checking a picture of a white object on the screen, adjust the white balance by turning the white balance adjusters (RED and BLUE).





Turn white balance adjusters (RED and BLUE) to adjust white balance.

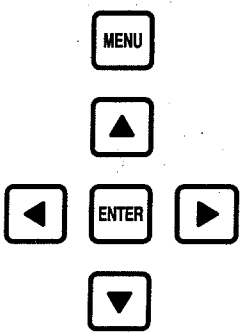
* When adjusting the white balance in the PUSH SET or MANUAL mode, set the LIGHT CONTROL selector switch to MANUAL to keep the light intensity constant.

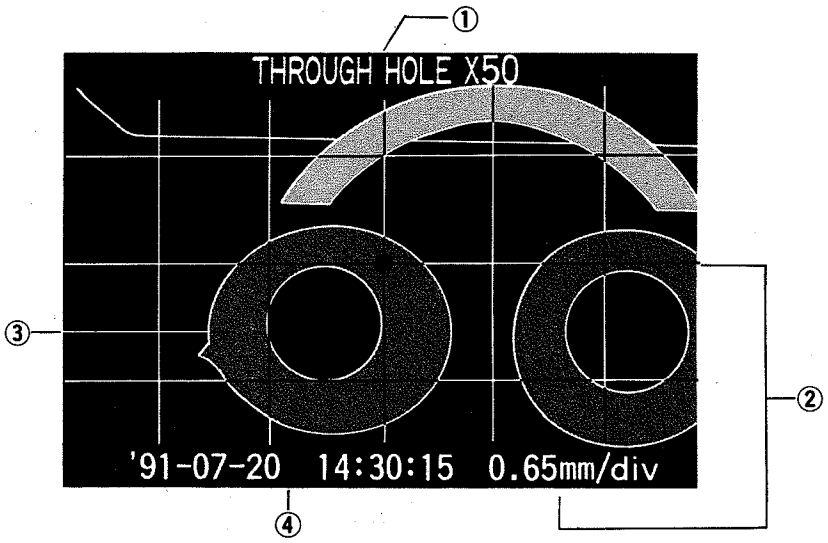
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Chapter 4 FUNCTIONS OF DISPLAY SCREEN

[1] Explanation of functions

To access each function, use the keys shown on the right.





① FILE NAME
A file name can be displayed on the screen using alphanumerical characters, units and symbols. (30 characters maximum)

② SCALE function
Scale mark and measurement per division can be displayed on the screen. Cross-hairs type or grid scale type can be selected.

③ COLORING function
Brighter or darker portions than the set values appearing on the screen can be colored for emphasis. This function is used to facilitate observation of any flaw or concave on the metal surface.

④ CLOCK
Date and time can be displayed on the screen.

⑤ LANGUAGE
All indications can be displayed in English or Japanese.

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[2] <MENU> screen

1. Press the MENU key to display the <MENU> screen.



Refer to page 18
Refer to page 19
Refer to page 21
Refer to page 25
Refer to page 28
Refer to page 30

2. Press the ▲ or ▼ key to shift the cursor (black/white reversal) on the desired menu.



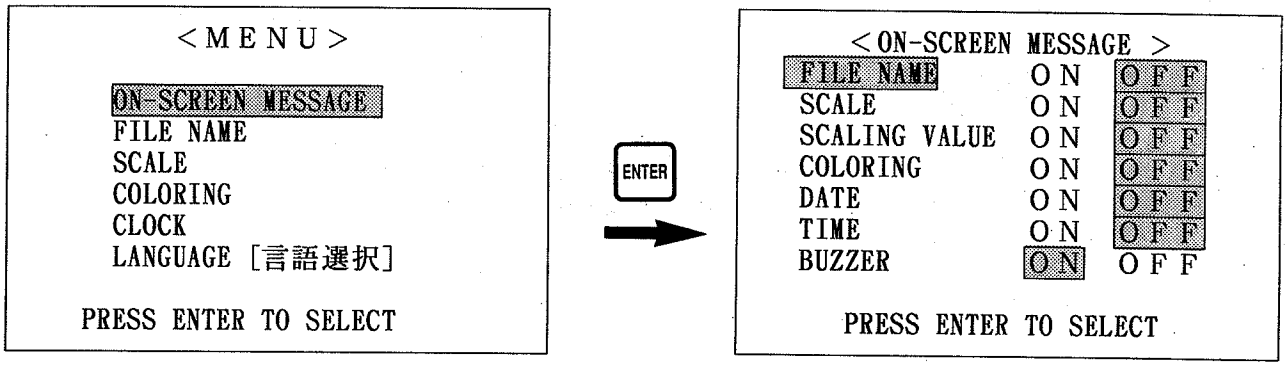
3. Press the ENTER key to execute the menu.

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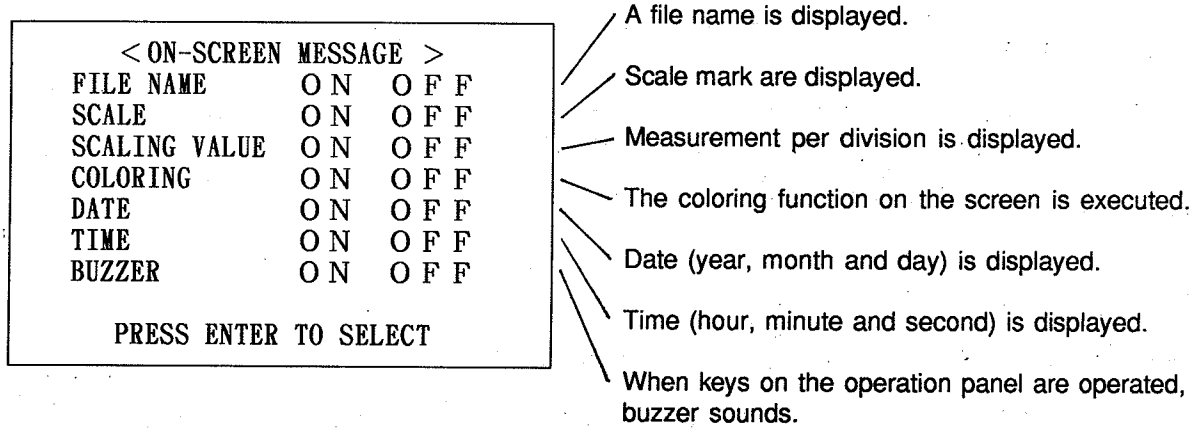
[3] <ON-SCREEN MESSAGE> screen

Used to determine whether or not each item on the <ON-SCREEN MESSAGE> screen is to be displayed on the screen.

1. Select ON-SCREEN MESSAGE on the <MENU> screen.



2. Use the ▲ or ▼ key to select an item, and use the ◀ or ▶ key to select ON (displayed) or OFF (not displayed).



3. When the setting is completed, press the ENTER key. Then, the monitor returns to the normal screen*, and the items selected on the [ON-SCREEN MESSAGE] screen are displayed and/or executed.

* The normal screen denotes the screen where the picture taken by the camera is projected.

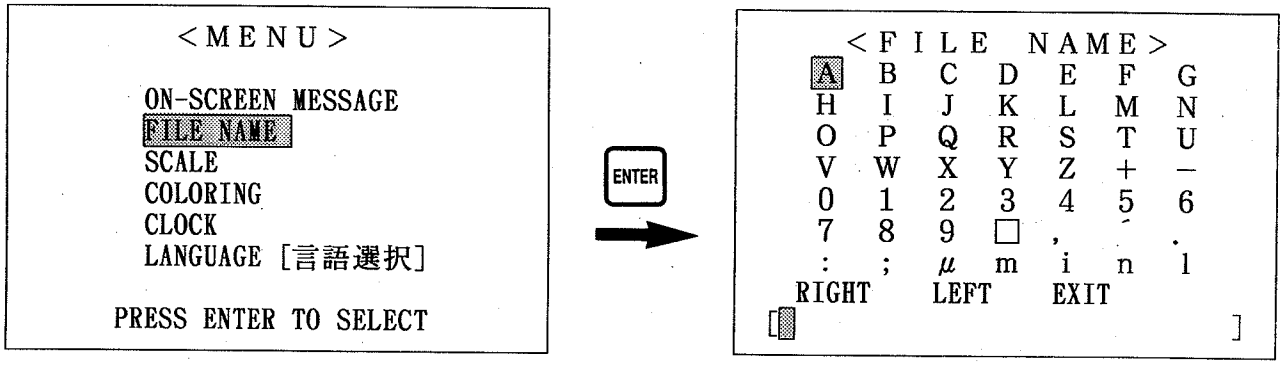
Note: Even when an item is set to OFF on the [ON-SCREEN MESSAGE] screen, the item is automatically set to ON by performing the setting of the item mentioned in the following pages.

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[4] <FILE NAME> screen

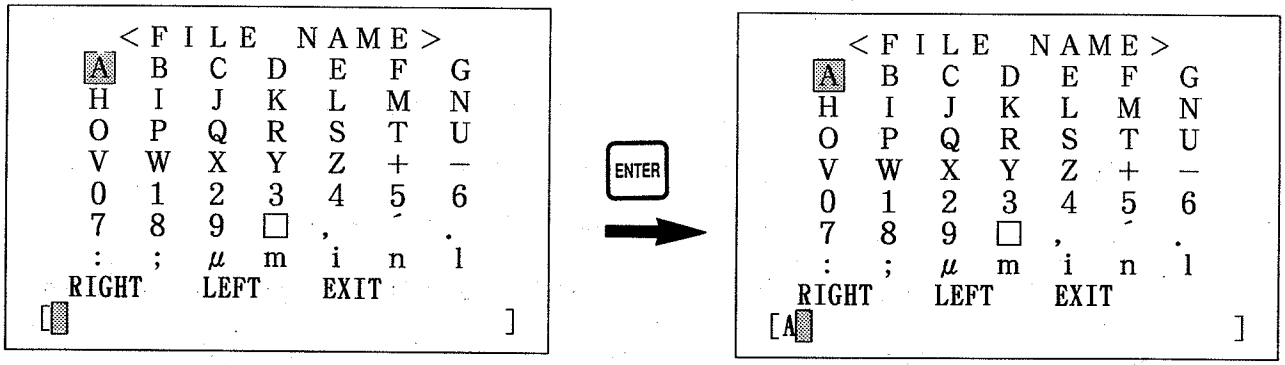
A file name consisting of 30 characters maximum can be displayed on the screen.

1. Select FILE NAME on the <MENU> screen.



2. Use the ▲ , ▼ , ◀ , or ▶ key to select a character or numeral, and press the ENTER key.

The characters or numerals entered are displayed in [ ] located at the lower part of the screen.

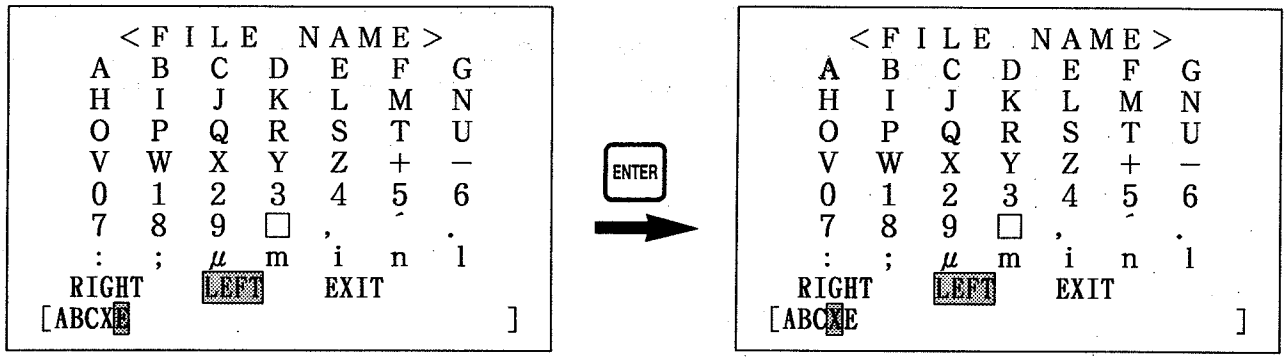


3. Follow the procedures below to change an entered character.

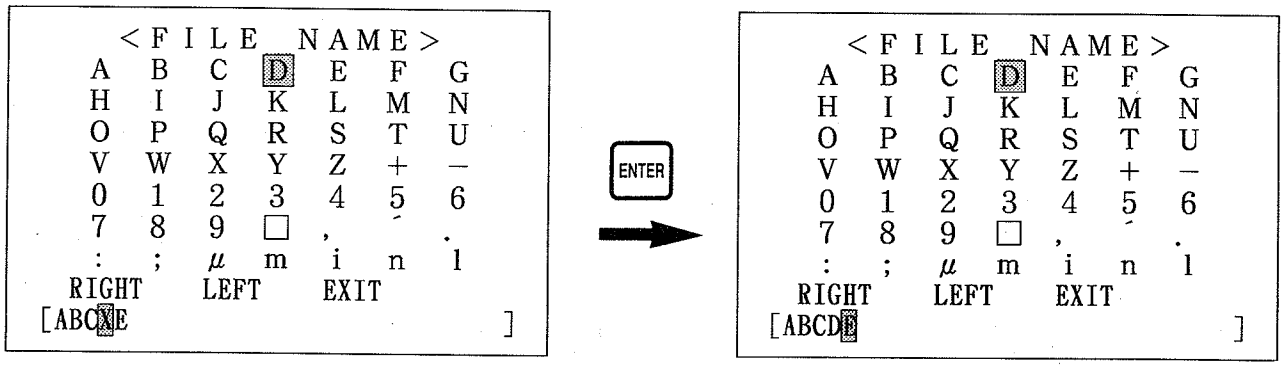
3-1. Select RIGHT or LEFT on the screen, and then pressing the ENTER key shifts the cursor in [ ]. Shift the cursor on the character required to be changed.

3-2. Use the ◀ , ▶ , ▲ , or ▼ key to select an intended character, and press the ENTER key it.

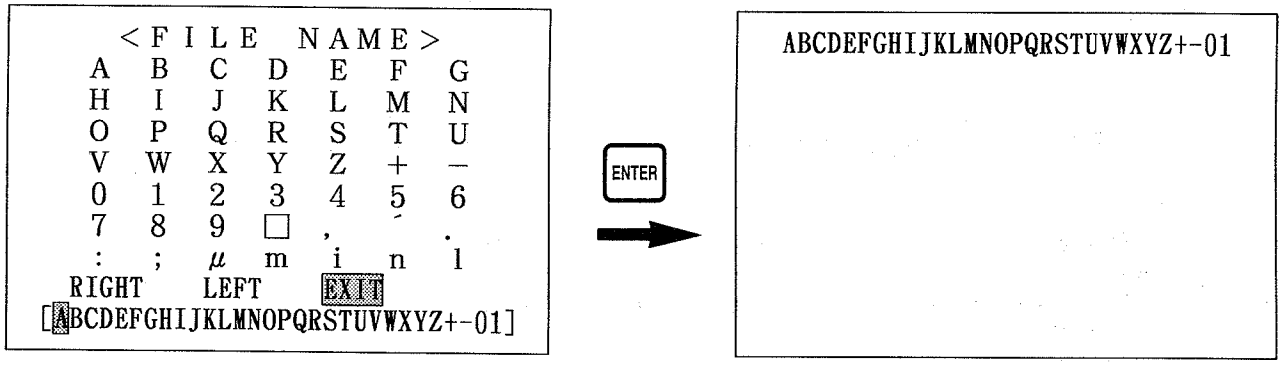
Example: Changing "X" into "D"



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4. When the setting is completed, select EXIT and press the ENTER key. The monitor then returns to the normal screen*, and the file name is displayed on the screen.



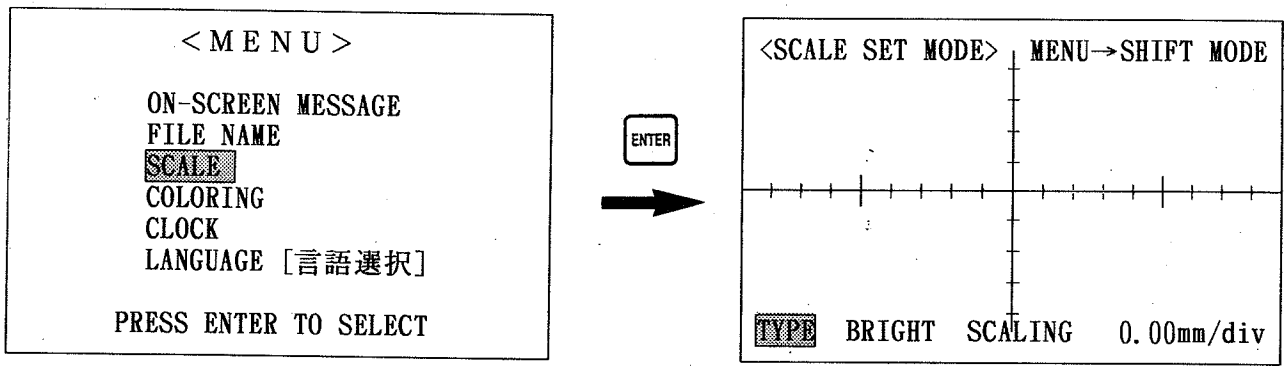
* The normal screen denotes the screen where the picture taken by the camera is projected.

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[5] <SCALE> screen (SCALER function setting screen)

Scale mark and measurement per division are displayed on the screen. Use this function to measure the length of an object.

1. Select SCALE on the [MENU] screen. The [SCALE] screen, however, is superimposed over the normal screen. (The normal screen denotes the screen where the picture taken by the camera is projected.)

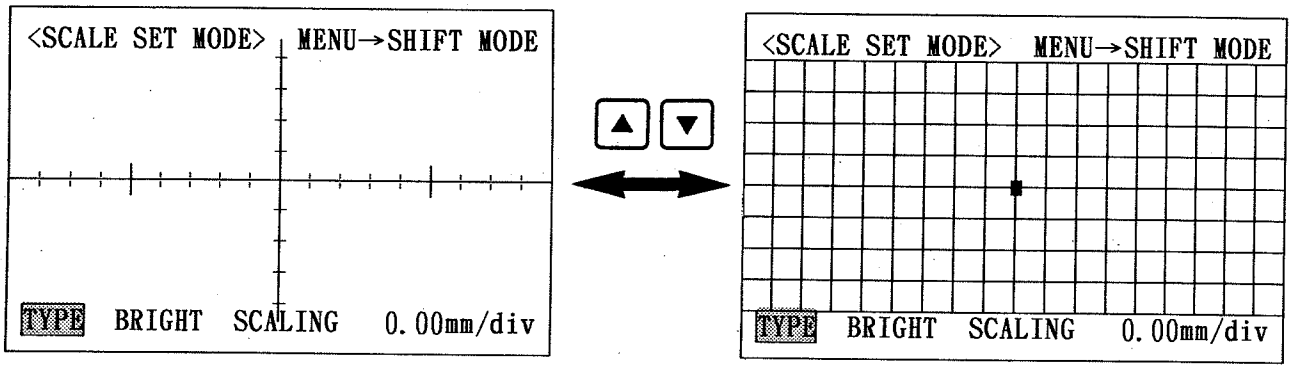


* The [SHIFT] screen may appear when the procedure above is taken. (Refer to section 7 on page 29.)

TYPE:
Selects cross-hairs type or grid scale type of scale marks.
BRIGHT:
Changes brightness of scale marks or characters (file name, date, and value).
SCALING:
Changes intervals between divisions.
/div:
Displays measurement of one division.
SHIFT:
The function which can shift position of scale marks. Press [MENU] key to enter SHIFT screen.

2. To select the TYPE of scale marks

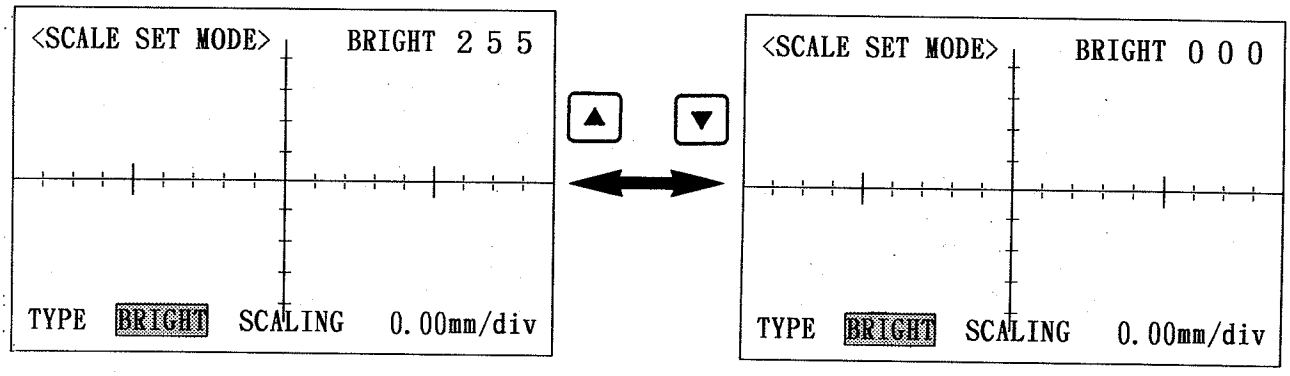
Select TYPE using the [◀] or [▶] key. Then select cross-hairs type or grid scale type using the [▲] or [▼] key.



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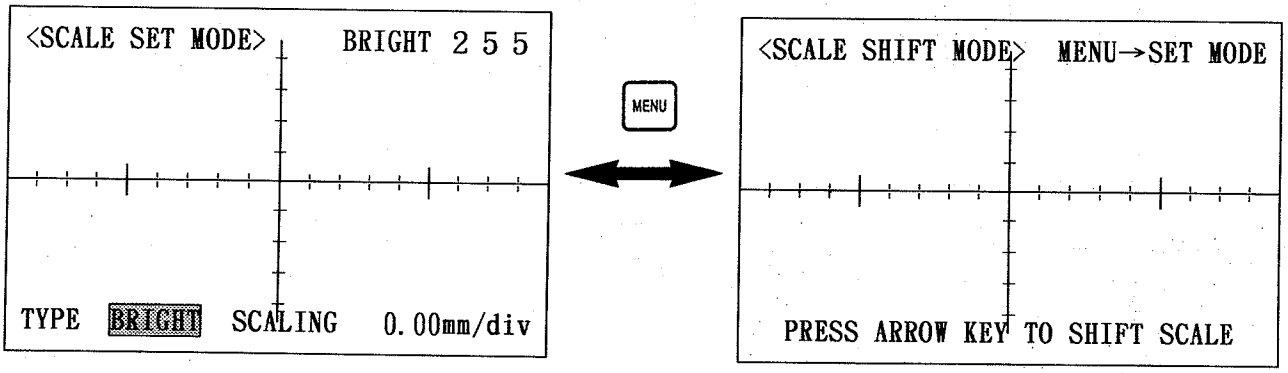
3 To adjust the BRIGHTNESS of the scale marks or characters

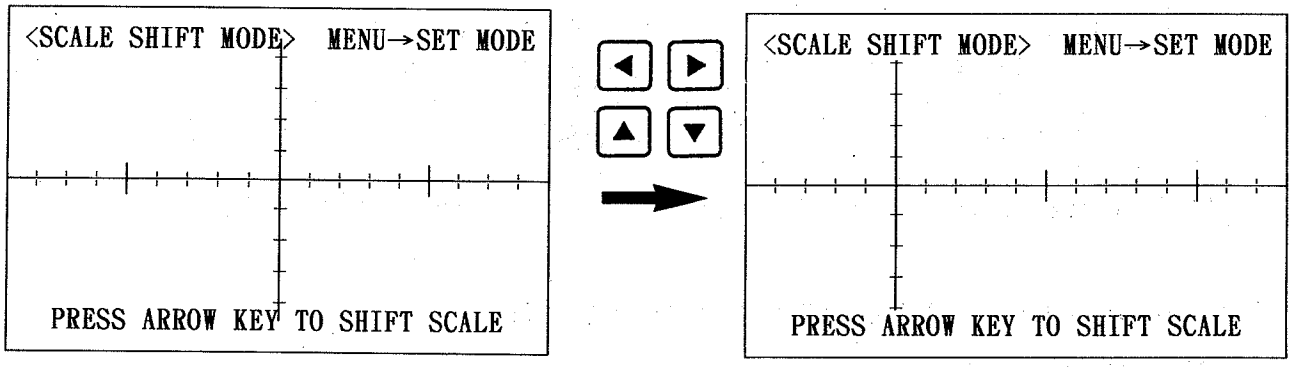
Select BRIGHT using the ◀ or ▶ key. Then adjust the brightness of the scale marks or characters using the ▲ or ▼ key. Set values, which range from between 0 and 255, are displayed at the upper right of the screen. Adjust brightness so that scale marks or characters are easily read out.



4. To shift the scale marks

Pressing the MENU key causes the <SHIFT> screen to appear. Shift whole scale marks using the ◀, ▶, ▲, or ▼ key as required by the object. For grid scale type of scale marks, the center is indicated.



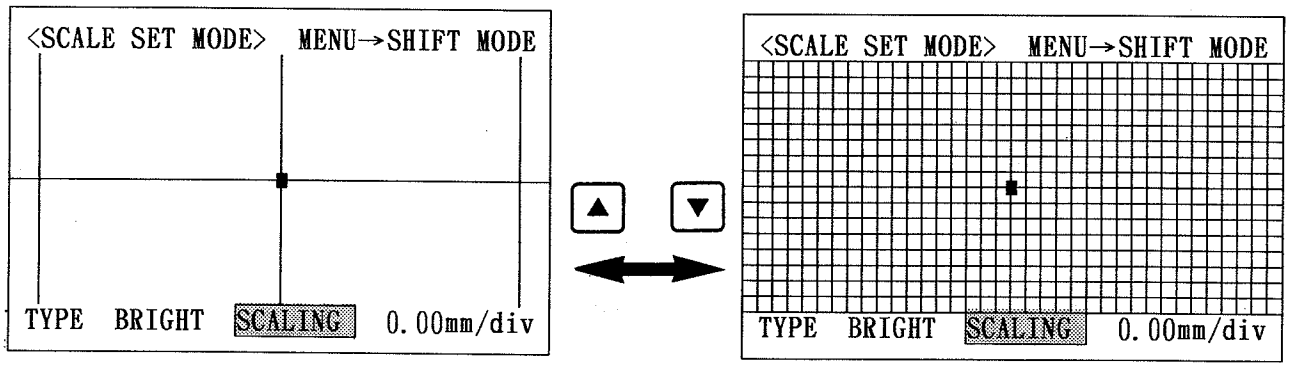


To return to the <SCALE> screen, press the MENU key again.

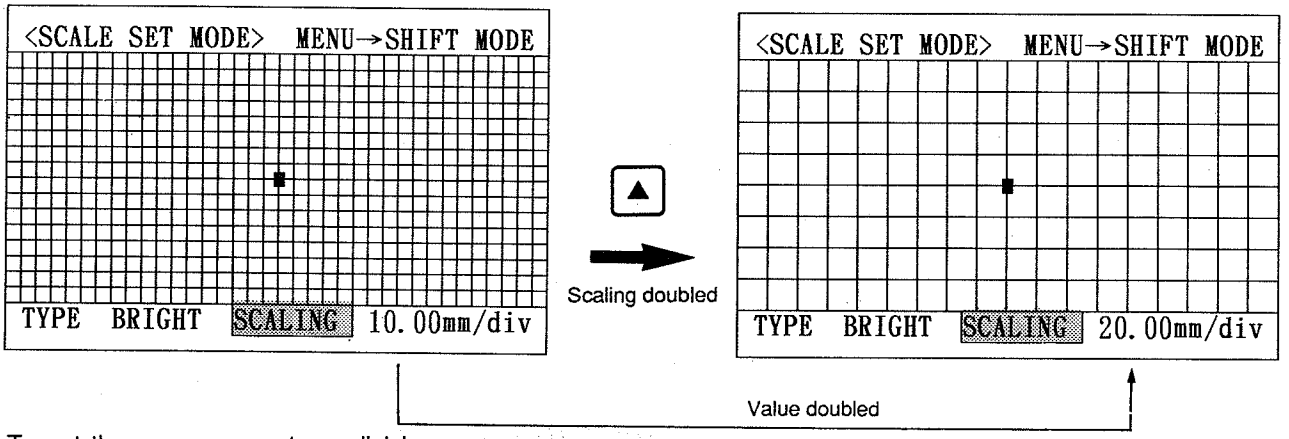
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5. To change intervals of the divisions

Select SCALING using the ◀ or ▶ key, and change the intervals of the divisions using the ▲ or ▼ key.

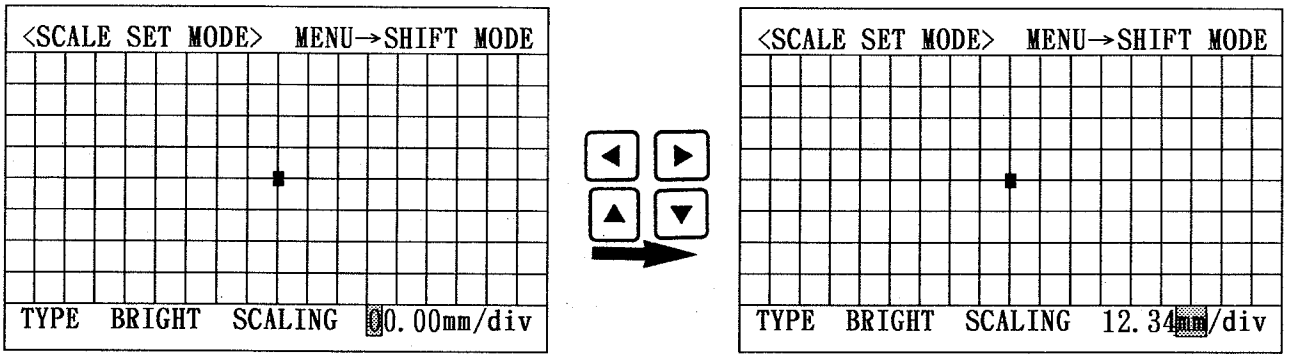


If the intervals of the divisions are changed after the measurement per division is set, the value indicating the measurement per division is also changed automatically. Accordingly, the length of an object can be read.

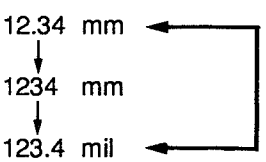


6. To set the measurement per division.

Select a digit and unit using the ◀ or ▶ key, and change the value and unit using the ▲ or ▼ key.



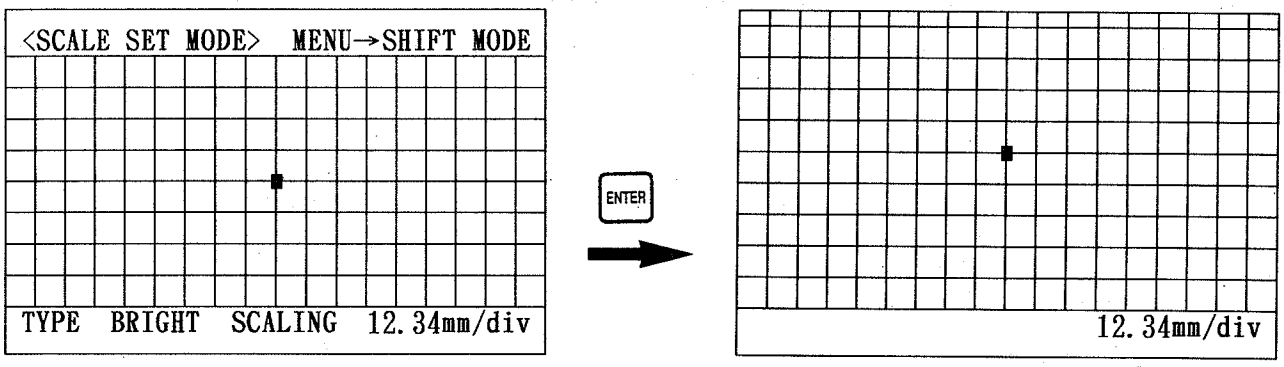
Changing a unit also changes the position of the decimal point.



The maximum value displayed is 9999. When this value is exceeded, "----" appears.

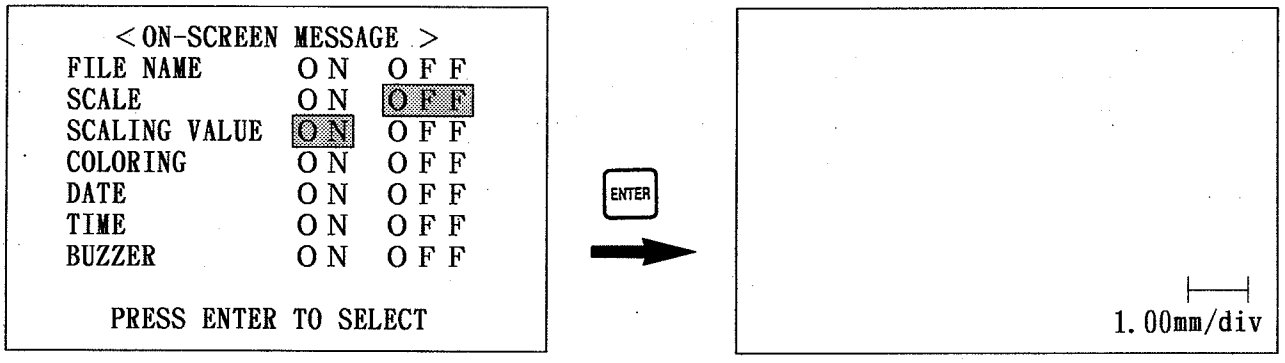
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7. To return to the normal screen
When the setting is completed, press the ENTER key. The monitor then returns to the normal screen and the scale marks are superimposed on the screen.



* Whichever screen of<SCALE>and<SHIFT>is accessed, pressing the ENTER key enables scale marks setting.
In addition, when the last setting is performed on the<SHIFT>screen, the<SHIFT>screen appears even if SCALE is selected on the<MENU>screen at the next setting. To access the<SCALE>screen, press the MENU key.

Note: By selecting OFF for SCALE, and selecting ON for SCALING VALUE on the<ON-SCREEN MESSAGE>screen (refer to page 18) after scale setting is completed, a line for one division is displayed at the lower right of the screen.



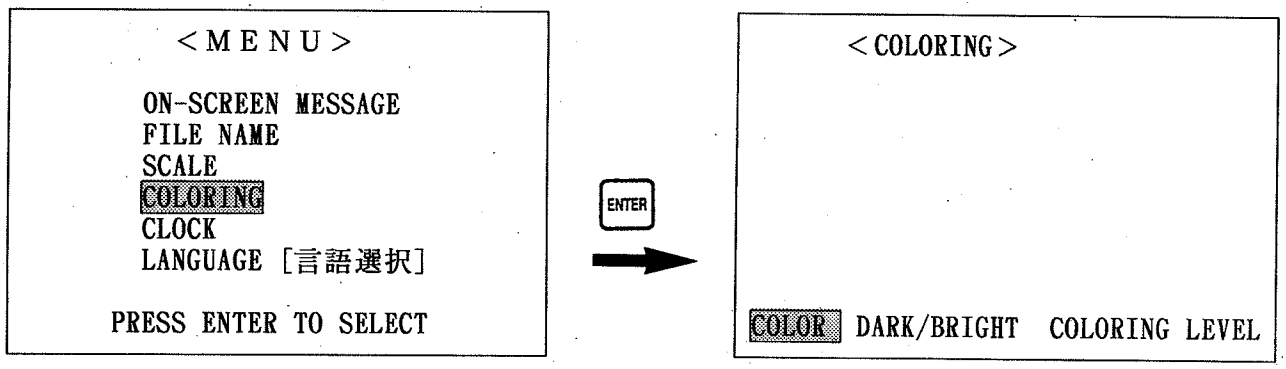
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[6] <COLORING> screen

Brighter or darker portions than the set value appearing on the screen can be colored (red, green, or blue) for emphasis.

This function is used to facilitate observation of any flaw or concave on the metal surface.

1. Select COLORING on the <MENU> screen. The <COLORING> screen is superimposed over the normal screen. (The normal screen denotes the screen where the picture taken by the camera is projected.)

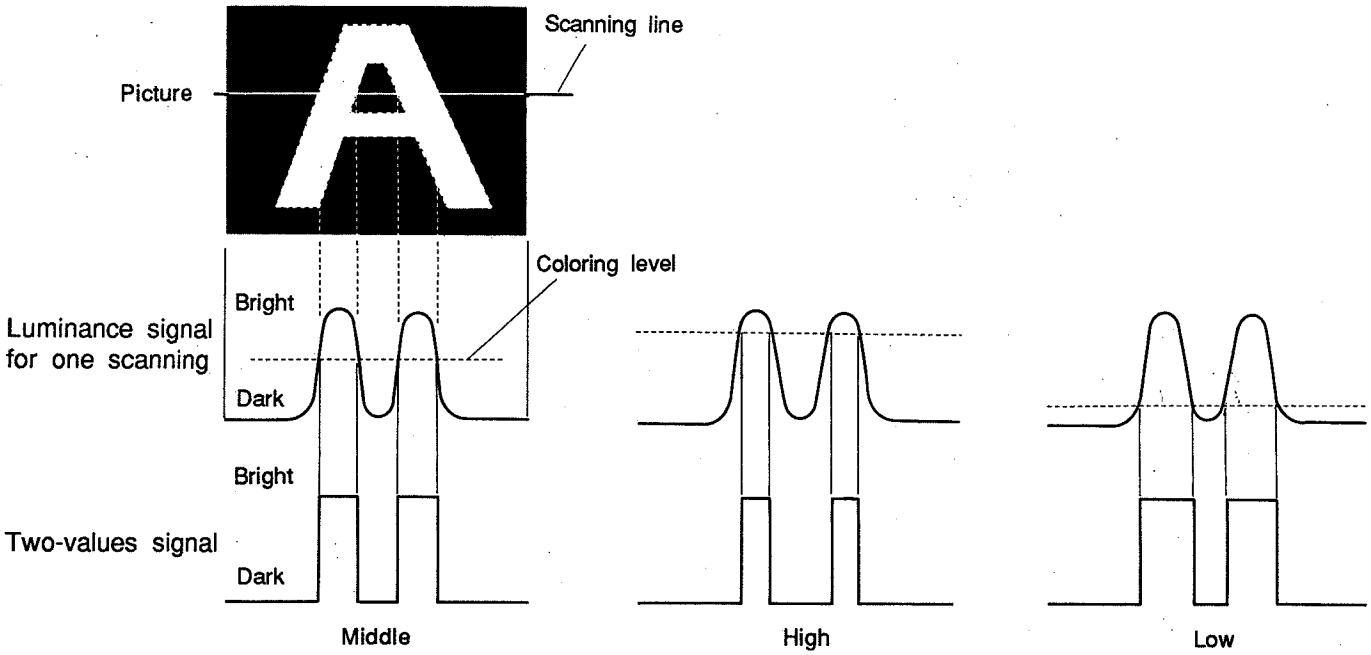


COLOR:
Selects the color to be used for emphasis. Red, green, or blue is available.

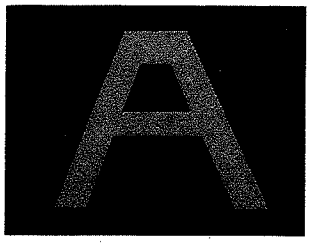
DARK/BRIGHT:
Selects whether bright portions or dark portions are to be colored.

COLORING LEVEL:
Video signals transmitted by the camera include luminance signals (which indicate luminance) and chrominance signals (which indicate hue).
The threshold value for the luminance signals is specified to color the portions whose luminance is higher or lower than the threshold value.
This threshold value is termed COLORING LEVEL.
To perform setting for COLORING, first set COLORING LEVEL.

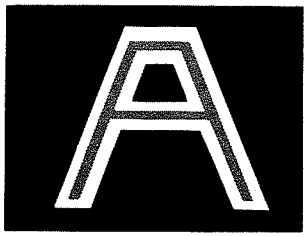
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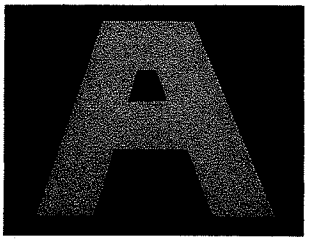
Coloring brighter portions.



Brighter portions than set value are colored.

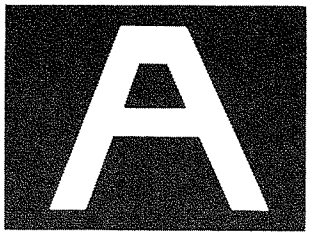


Becomes smaller.

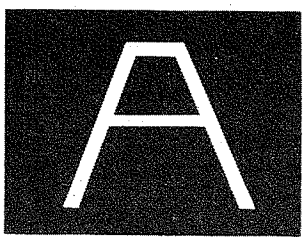


Becomes larger.

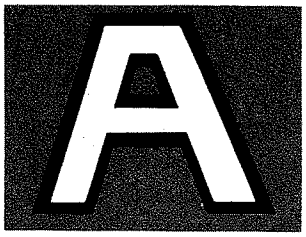
Coloring darker portions.



Darker portions than set value are colored.



Becomes larger.



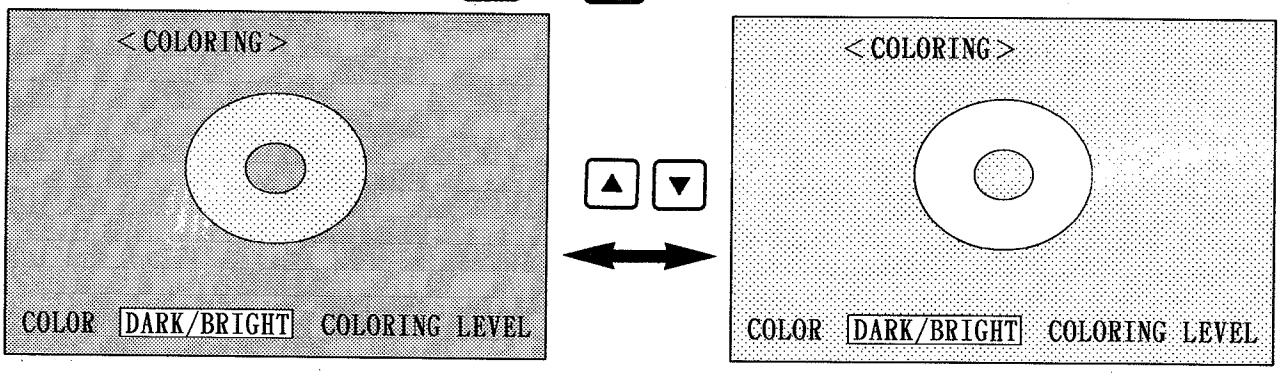
Becomes smaller.

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2. To select COLOR
Select COLOR using the ◀ or ▶ key, and then select RED, GREEN, or BLUE using the ▲ or ▼ key.

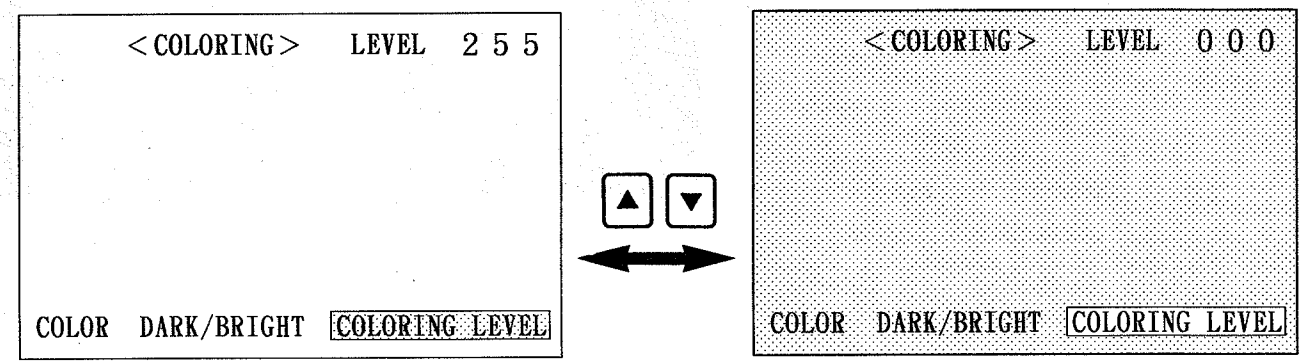
Red ⟷ Green ⟷ Blue

3. To select DARK/BRIGHT
Select DARK/BRIGHT using the ◀ or ▶ key, and then select whether bright portions or dark portions are to be colored by using the ▲ or ▼ key.



4. To set COLORING LEVEL
Select COLORING LEVEL using the ◀ or ▶ key, and then adjust the coloring level using the ▲ or ▼ key. The set values range from between 0 and 255, which are displayed on the upper right of the screen.

Set the level so that only the portions to be emphasized are colored.

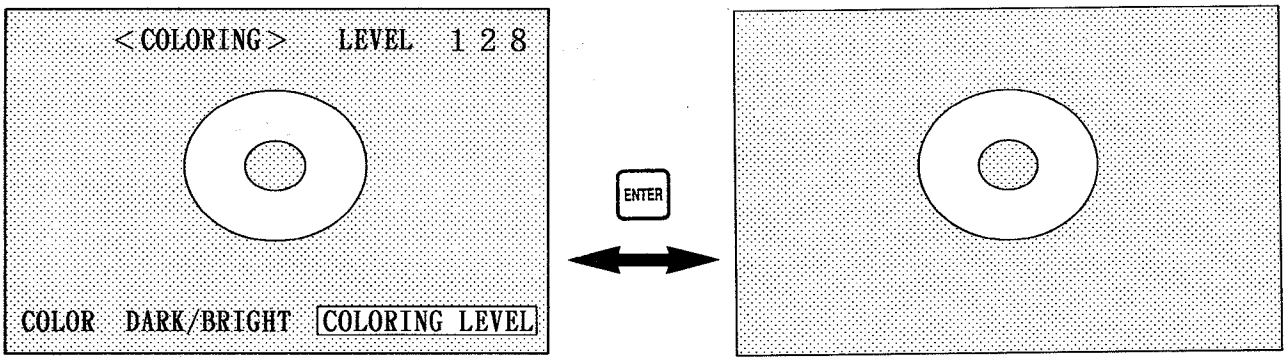


When the level is set to 255, no area is colored.

When the level is set to 0, the entire screen is colored.

* The figure above shows the case where BRIGHT is selected in setting for DARK/BRIGHT.

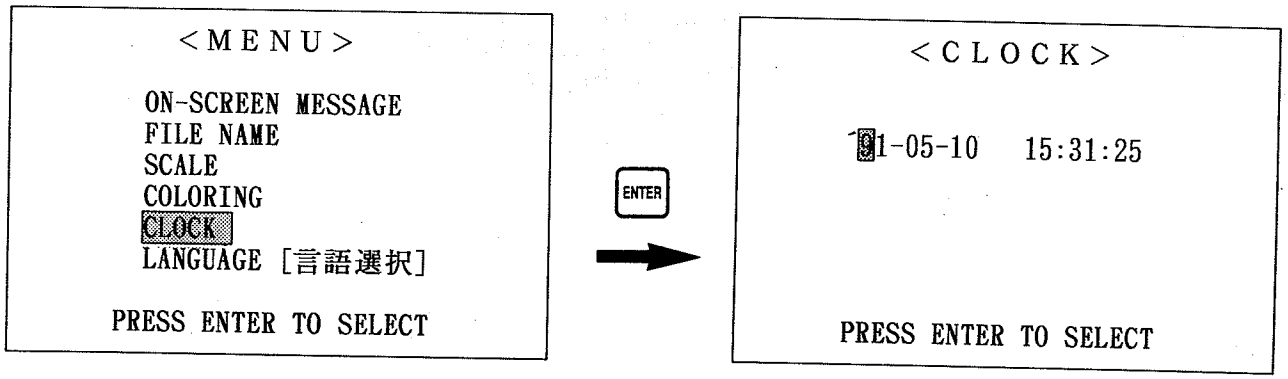
5. To return to the normal screen
When the setting is completed, press the ENTER key. Then, the monitor returns to the normal screen, and a picture in which bright portions or dark portions are emphasized is displayed.



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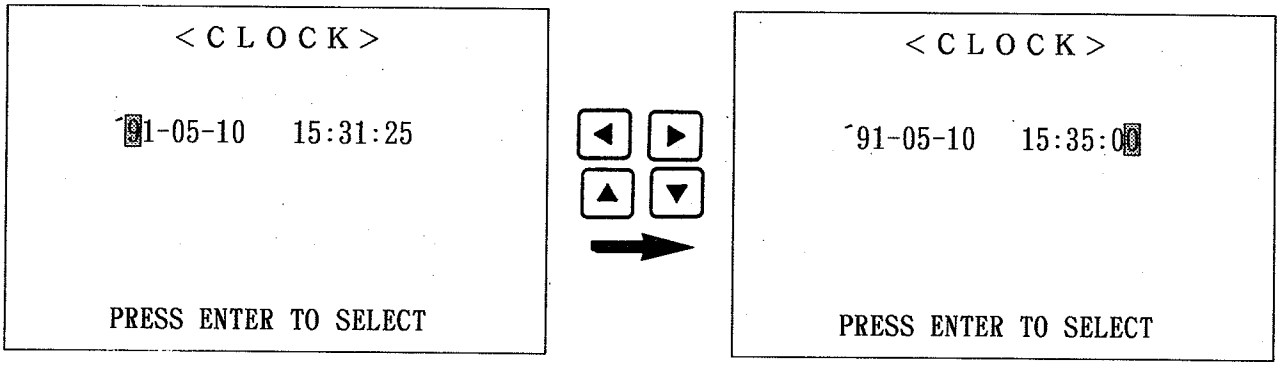
[7] <CLOCK> screen

1. Select CLOCK on the<MENU>screen.

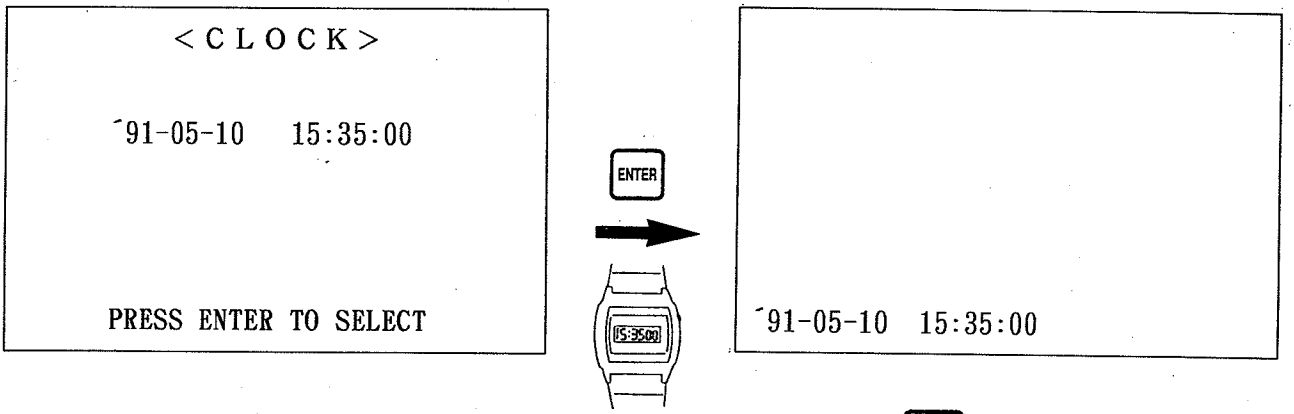


2. To change the data
Select date (year, month, and day) and time (hour, minute, and second) using the ◀ or ▶ key, and change values using the ▲ or ▼ key.

Example: Changing " '91-05-10(yy-mm-dd), 15:31:25(hh-mm-ss)" displayed on the screen into " '91-05-10, 15:35:00".



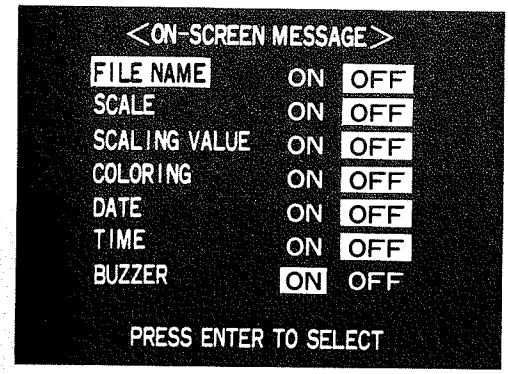
3. To start operating the CLOCK
Complete the setting, and wait until 15:35:00. At 15:35:00, press the ENTER key. Then, the monitor returns to the normal screen, while the timer (clock function) starts operating at the set time.



At 15:35:00, press the ENTER key.

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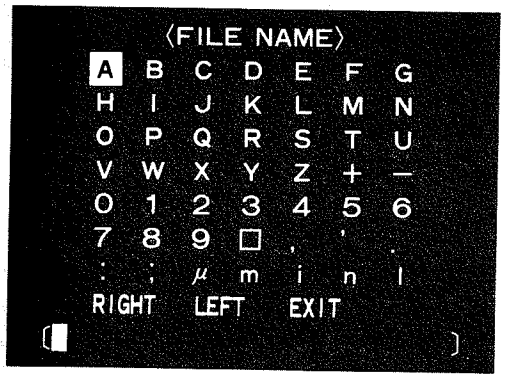
<ON-SCREEN MESSAGE> screen



<ON-SCREEN MESSAGE> screen



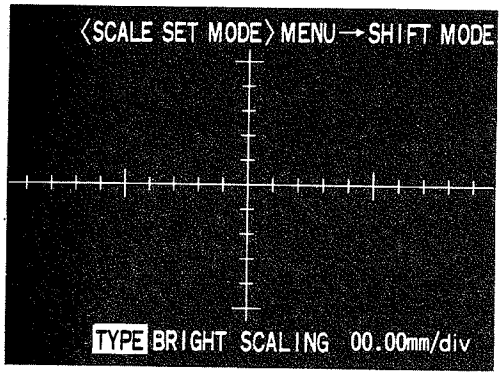
<FILE NAME> screen



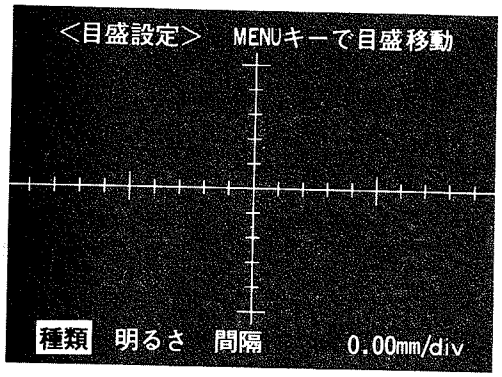
<FILE NAME> screen

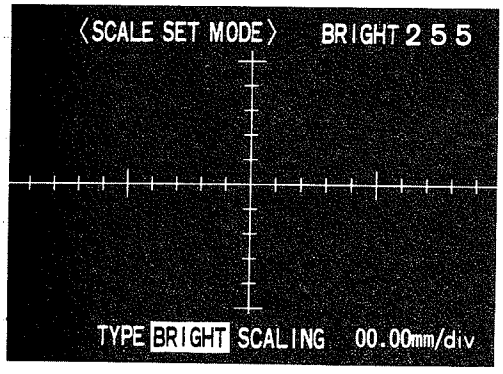


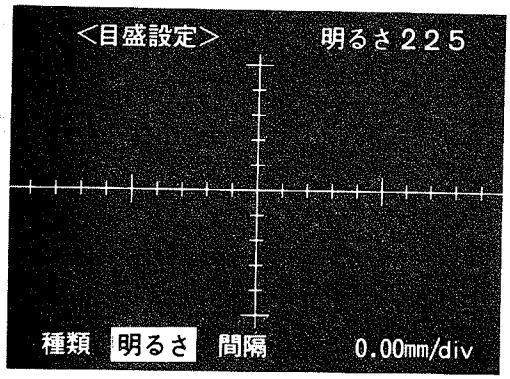
<SCALE> screen



<SCALE> screen

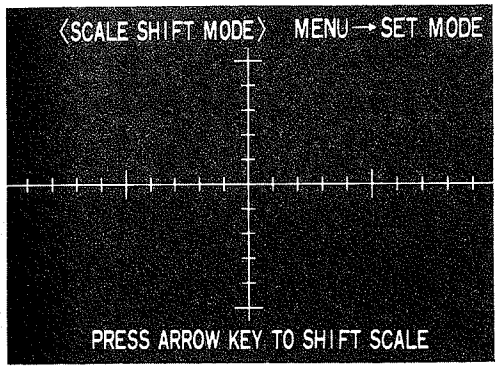






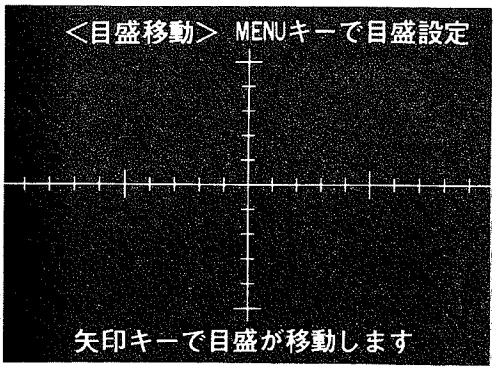
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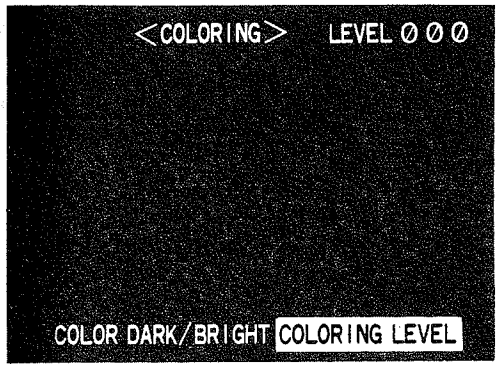
<SCALE SHIFT MODE> screen

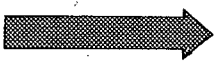


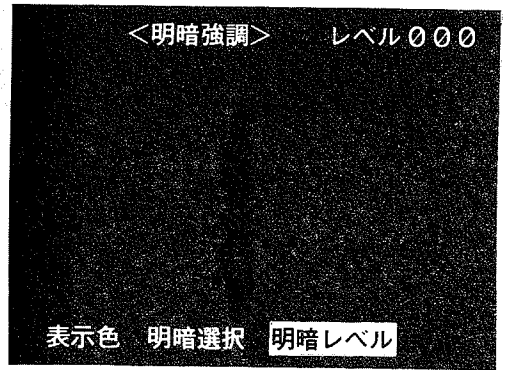


<SCALE SHIFT MODE> screen



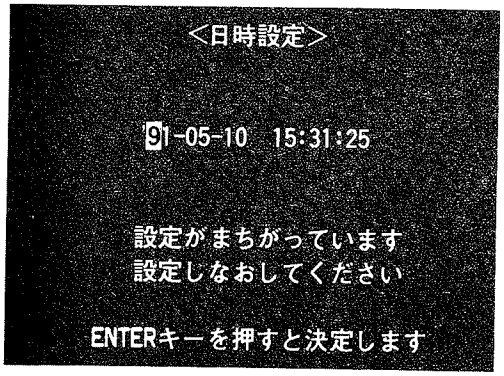












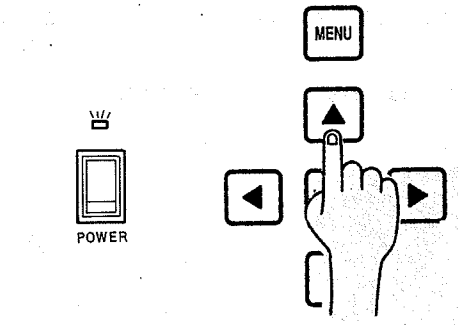






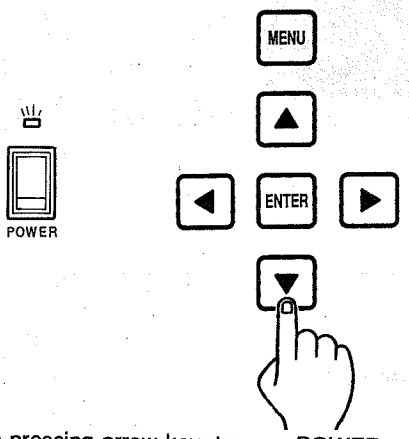
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After replacing the battery, perform either of the following operations.



While pressing arrow key, turn on POWER switch.

All indications are displayed in Japanese.



While pressing arrow key, turn on POWER switch.

All indications are displayed in English.

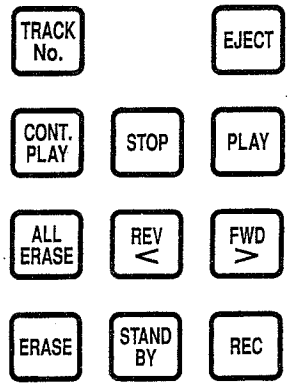
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Chapter 5 STILL VIDEO RECORDER

Pictures being observed can be recorded by the built-in still video recorder. In addition, recorded pictures can be played back.

[1] Operation keys

The still video recorder is operated using the keys shown on the right.



* When any of the setting screens (refer to "FUNCTION OF DISPLAY SCREEN" on page 16) is accessed, keys other than the [EJECT] key cannot be operated.

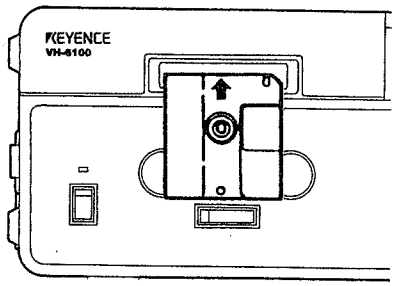
1. [STAND BY] : Stand by key
   Used to set the recorder to the record or erase status. Before recording or erasing a picture, be sure to press this key.
2. [REC] : Record key
   Used to record a picture.
3. [PLAY] : Playback key
   Used to play back a recorded picture.
4. [FWD >] : Forward key
   Used to increment the current address.
5. [REV <] : Reverse key
   Used to decrement the current address.
6. [STOP] : Stop key
   Used to stop all operations and return the monitor to the normal screen.
7. [ERASE] : One-picture erase key
   Used to erase the picture recorded in the specified address.
8. [ALL ERASE] : All-pictures erase key
   Used to erase all the pictures recorded. Erasing operation is completed in approx. 20 seconds. To stop the erasing halfway, press the [STOP] key.
9. [TRACK No.] : Address indication selection key
   Used to erase the address indication. To indicate the address, re-press this key.
10. [CONT. PLAY] : Continuous playback key
    Used to automatically feed the recorded pictures in order of sequence.
    Pressing the [STOP], [REV <], [FWD >], [PLAY], or [STAND BY] key stops the automatic feeding.
11. [EJECT] : Video floppy disk removal key
    Used to remove the video floppy disk.

* The normal screen denotes the screen where the picture taken by the camera is projected.

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[2] Recording pictures

1. Insert the video floppy disk into the disk insertion slot.
   When the disk is inserted, the message "SEARCH" is displayed for a few seconds.
   While this message is displayed, keys other than the [EJECT] key cannot be operated.



2. Select the address where a picture is to be recorded by pressing the [REV <] or [FWD >] key.

   The address No. is displayed on the upper right of the screen for 4 seconds.

   The address No. becomes smaller.

   0←1←2←– – –50

   The address No. becomes larger.

   0→1→2– – –→50

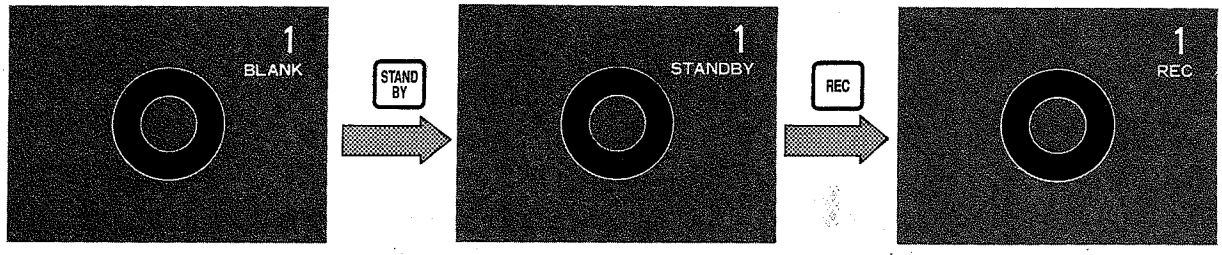


3. Press the [STAND BY] key to set the recorder in the record status.

   At this time, the message "STAND BY" is displayed. When an instruction is given to erase the address indication, however, the address is not displayed.

   Then, pressing the [REC] key executes recording, and the picture recorded is reproduced on the screen. (The message "REC" is displayed on the upper right of the screen for 4 seconds.)

- To continuously record pictures, repeat procedures 2 and 3 above.
- When the address where no picture has been recorded is selected, the message "BLANK" is displayed on the upper right of the screen. Recording is possible only at addresses for which the "BLANK" message is displayed.



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4. To view the normal screen again, perform either one of the following procedures.

   . Press the STOP key.

   . Press the EJECT key to remove the floppy disk.

   (The normal screen denotes the screen where the picture taken by the camera is projected.)

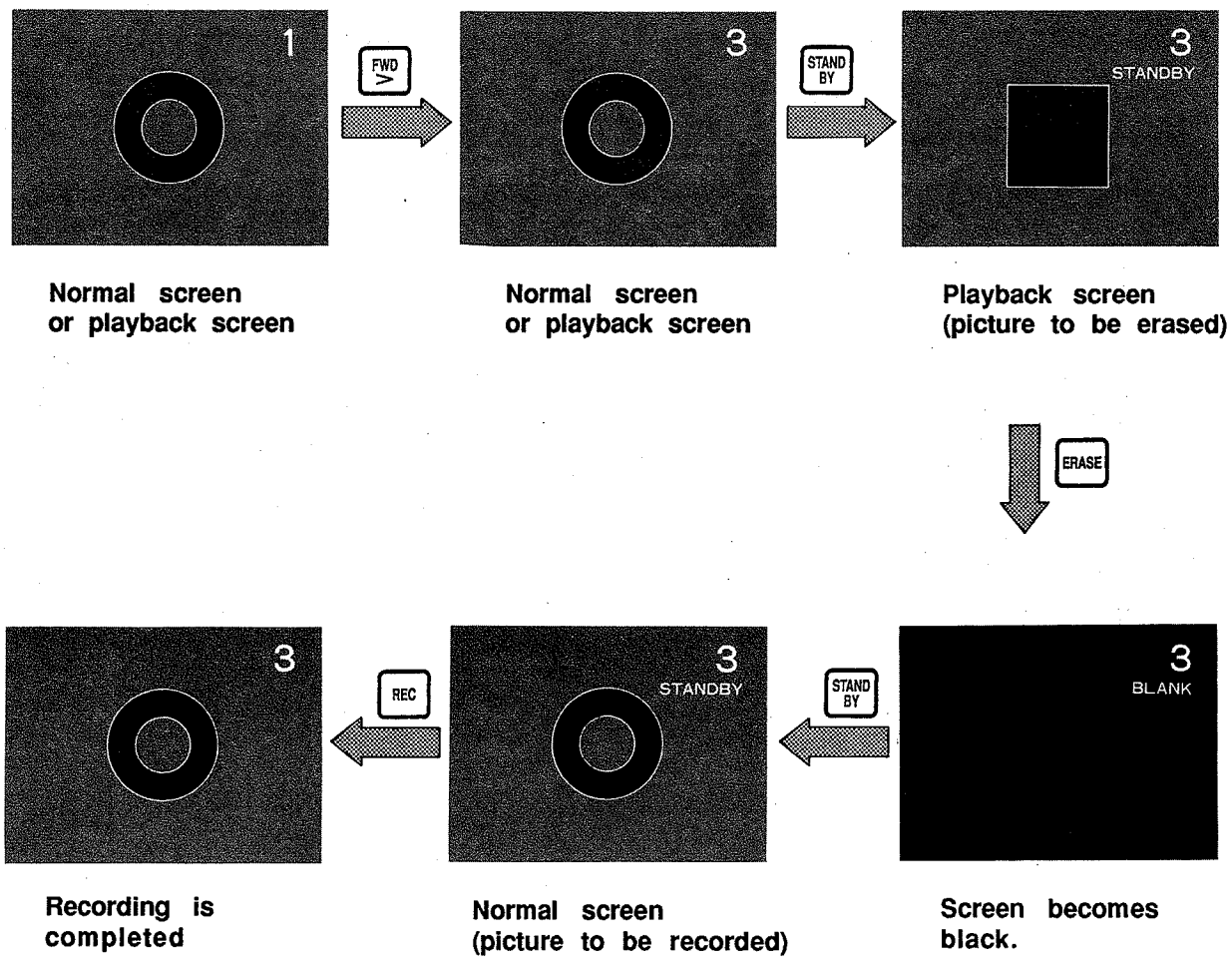
5. To record a new picture in an address where a picture has been recorded,

   5-1. Select an address where a new picture is to be recorded using the REV < or FWD > key.

   5-2. Press the STAND BY key and then press the ERASE key to erase the prerecorded picture. (The screen becomes black, and the message "ERASE" is displayed, followed by "BLANK". When an instruction is given to erase the address indication, however, the address is not displayed.)

   5-3. Press the STAND BY key and then press the REC key.

   Example: To erase the picture prerecorded in address No. 3 and record a new picture there.



Normal screen or playback screen

Normal screen or playback screen

Playback screen (picture to be erased)

Recording is completed

Normal screen (picture to be recorded)

Screen becomes black.

- A new picture cannot be recorded in the address where any picture has been recorded, unless the pre-recorded picture is erased.
- The setting screens (refer to "Functions of Display Screen" on page 16.) cannot be recorded.

Note: When standby status (when the STAND BY key is pressed) continues for 10 minutes, the monitor comes to stop status (where the STOP key is pressed, that is, the normal screen).

To return to the standby status, re-press the STAND BY key.

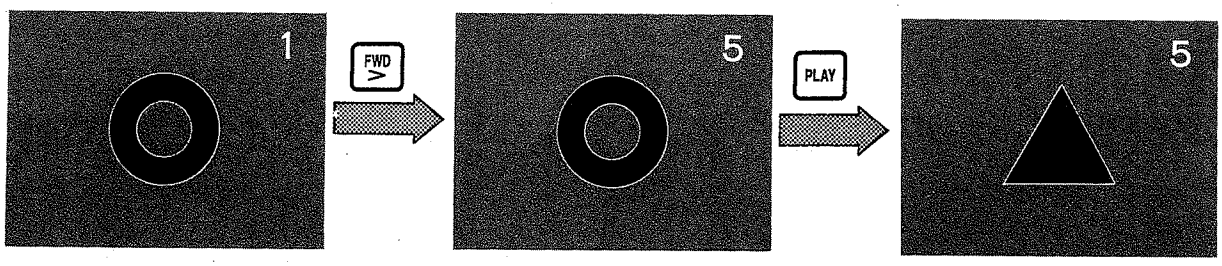
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[3] Playing back pictures

1. Insert the floppy disk on which pictures are recorded into the disk insertion slot. (The message "SEARCH" is displayed. When an instruction is given to erase the address indication, however, the address is not displayed.)

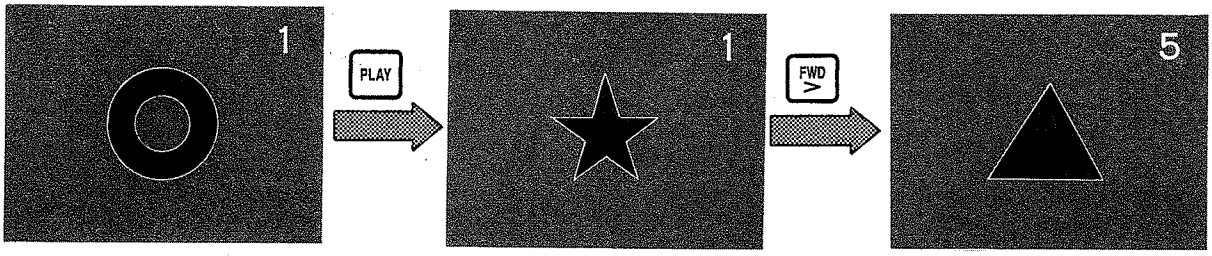
2. To access the playback screen, select an address where a picture to be played back has been recorded using the REV or FWD key and then press the PLAY key. It is also possible to first press the PLAY key to access the playback screen, and then press the REV or FWD key to select the desired address. Before the PLAY key is pressed, the monitor maintains the normal screen and it does not display the picture recorded in the floppy disk. If an address where no picture has been recorded is selected for playback, the screen becomes black, and the message "BLANK" is displayed on the upper right of the screen.

   Example: To view the picture recorded in address No. 5.



Normal screen **Normal screen** **Picture recorded in address No. 5**

or



Normal screen **Picture recorded in address No. 1** **Picture recorded in address No. 5**

3. To view the recorded pictures in order of sequence, press the CONT. PLAY key. The picture is changed to the next one at an interval of approx. 5 seconds.

4. To stop automatic feeding of the pictures, press any one of the STOP, REV, FWD, PLAY, or STAND BY key.

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Note: When playback status continues for 60 minutes, the monitor is switched to stop status (the status where the STOP key is pressed). To return to the playback status, press the PLAY key.

Failure?

If a picture recorded on the floppy disk is damaged by magnetism, the screen becomes black. And the message "NOT VIDEO" is displayed on the upper right of the screen. Since such a picture cannot be played back, erase it using the ERASE key.

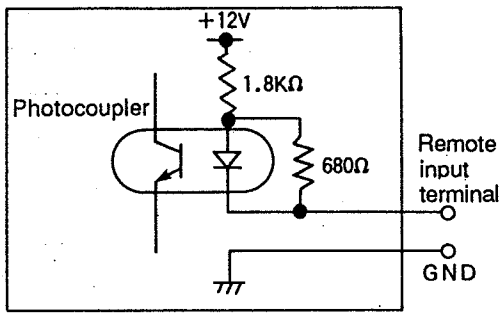
Service life of floppy disk

A floppy disk that has been played back or used in stand-by status for a total 80 hours will be badly worn. USE OF A DAMAGED OR WORN FLOPPY DISK MAY CAUSE DAMAGE TO THE STILL VIDEO RECORDER.

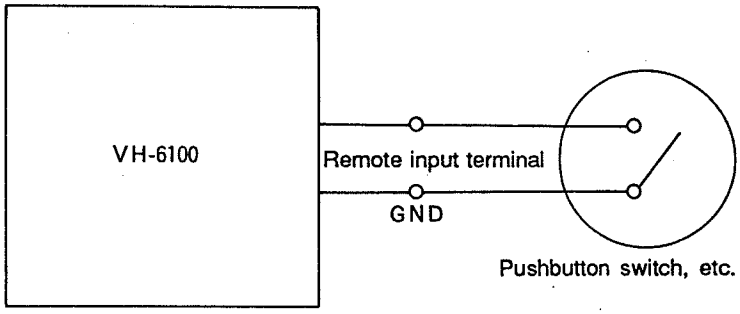
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[4] Recording signal remote input terminals

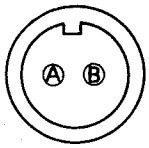
Circuit diagram



Example for connection



Pin layout



Fitting connector is PRC05-P5M manufactured by TAJIMI ELECTRONICS Co., Ltd. (Accessory)

Model PRC05-R2F manufactured by TAJIMI ELECTRONICS Co., Ltd.
(TAJIMI MUSEN DENKI Co., Ltd.)

- Short-circuiting between A and B terminals allows a picture to be recorded in the video floppy disk. (Equivalent to STAND BY to REC with key operation.)
- Even if short-circuiting between A and B terminals is performed for an address where a picture has been recorded, recording cannot be performed.
- The setting screens (refer to "FUNCTIONS OF DISPLAY SCREEN" on page 16.) cannot be recorded.

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Chapter 6 TROUBLESHOOTING

If a problem should occur, first try the troubleshooting procedures shown below.

If the problem is not eliminated despite having taken proper remedy, contact KEYENCE.

Symptom	Inspection	Remedy	Reference page
Power is not supplied.	· Fuse blown? · Power supply cable correctly connected?	· Replace fuse. · Contact power supply cable correctly.	7 4
Picture is not projected.	· Power switch turned on? · Address where no picture has been recorded selected?	· Turn on power switch. · Press STOP key.	4 39
Picture is not clear.	· Monitor properly adjusted? · White balance properly adjusted? · Camera properly focused on object? · Does illumination head match lens used?	· Adjust BRI, COL, or HUE dial of monitor. · Adjust white balance. · Adjust focus of camera. · Use illumination head that matches lens.	13 15 9 10
Picture cannot be recorded.	· STAND BY key pressed? · Address where picture has been recorded selected? · Slide of floppy disk broken to inhibit writing?	· Press STAND BY key and then press REC key. · Select address where no picture has been recorded or erase picture recorded in that address. · Use another floppy disk or place tape on claw.	37 38 —
Picture cannot be played back.	· Is PLAY key pressed?	· Press PLAY key.	39
Illumination is not provided.	· Light intensity adjuster turned to leftmost position? · Lamp burned out?	· Turn light intensity adjuster to right. · Replace lamp.	14 6

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Chapter 7 SPECIFICATIONS AND DIMENSIONS

[1] Specifications

Controller

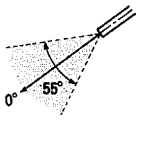
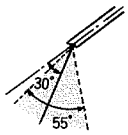
Model		VH-6100
Built-in monitor		5.6-inch color LCD
Still video recorder	Disk	Still video floppy disk (disk diameter: 47 mm)
	Recording capacity	50 field still pictures
	Recording format	Hi-band
Camera	Image pickup sensor	1/2-inch CCD
	Effective pixels	574 (H) x 489 (V)
	Scanning method	2:1, Interlaced scanning
	Scanning frequency	Horizontal (H): 15.734 kHz, Vertical (V): 59.94 Hz
	Resolution	Horizontal (H): 360 min., Vertical (V): 350 min.
	S/N	46 dB
	White balance	Automatic/Semi-automatic/Manual
Light source	Lamp	100 W halogen lamp
	Service life of lamp	1000 hours (average)
	Color temperature	3100°K (max.)
Video output		VBS 1.0 Vp-p, in accordance with NTSC
AC output		3 A max. (not coupled to power switch)
Recording signal remote input		No voltage input (contact/solid-state)
Power supply		86 to 264 VAC, 50/60 Hz
Power consumption		500 VA max.
Operating temperature		+5 to +40°C
Operating humidity		35 to 80% RH (No condensation)
Weight	Controller	Approx. 8.1 kg
	Camera probe	Approx. 0.6 kg

Standard lens

Model		VH-20	VH-50K	VH-100K	VH-200K	VH-500K	VH-1000K
Monitoring range (mm)	H (Horizontal)	15.25	6.10	3.05	1.53	0.61	0.31
	V (Vertical)	11.38	4.55	2.28	1.14	0.46	0.23
	Diagonal	19.05	7.62	3.81	1.90	0.76	0.38
Magnification[1]	15-inch monitor	20X	50X	100X	200X	500X	1000X
	5.6-inch monitor	7.5X	19X	37X	75X	187X	373X
Depth-of-field (mm)		12.0	6.5	1.0	0.4	0.1	0.05
Monitoring distance (mm) (Non-contact type head)		62(70)[2]	12.8	11.0	3.5	3.5	3.5

1. Magnification changes depending on the screen size of the monitor. Contact KEYENCE for details regarding the magnification.
2. Figure in parentheses is the value in the case where the non-reflective lens is not mounted.

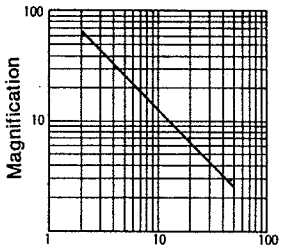
Borescope lens

		Direct view	Oblique view
Appearance			
Model	Borescope	VH-B31	VH-B32
	Lens attachment	VH-B	
View direction		0° (Direct view)	30° (Oblique view)
View angle		55°	
Observation depth		2 to 50 mm	
Magnification[1]		2.6 x to 65 x	
View range		2 mm dia. to 52 mm dia.	
Outer diameter		3 mm dia. (Protective tube: 4 mm dia.)	
Effective length		105 mm	
Protection		Sleeve: waterproof[2]	
Operating temperature		Sleeve: 0 to 80°C (in air)/0 to 40°C (in water) Parts other than sleeve: 0 to 40°C (in air)	

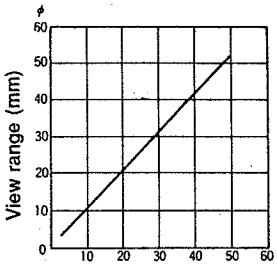
1. When using 15-inch monitor
2. When using in liquids other than water, contact KEYENCE.

Characteristics charts

Change of magnification (When using 15-inch monitor)



Change of view range



Distance between tip of borescope and object (mm)

On 15-inch monitor

Distance (mm)	2	5	10	20	30	40	50
Magnification	65	26	13	6.5	4.3	3.2	2.6

Distance (mm)	2	5	10	20	30	40	50
Magnification	2.1	5.2	10.4	20.8	31.2	41.6	52.1

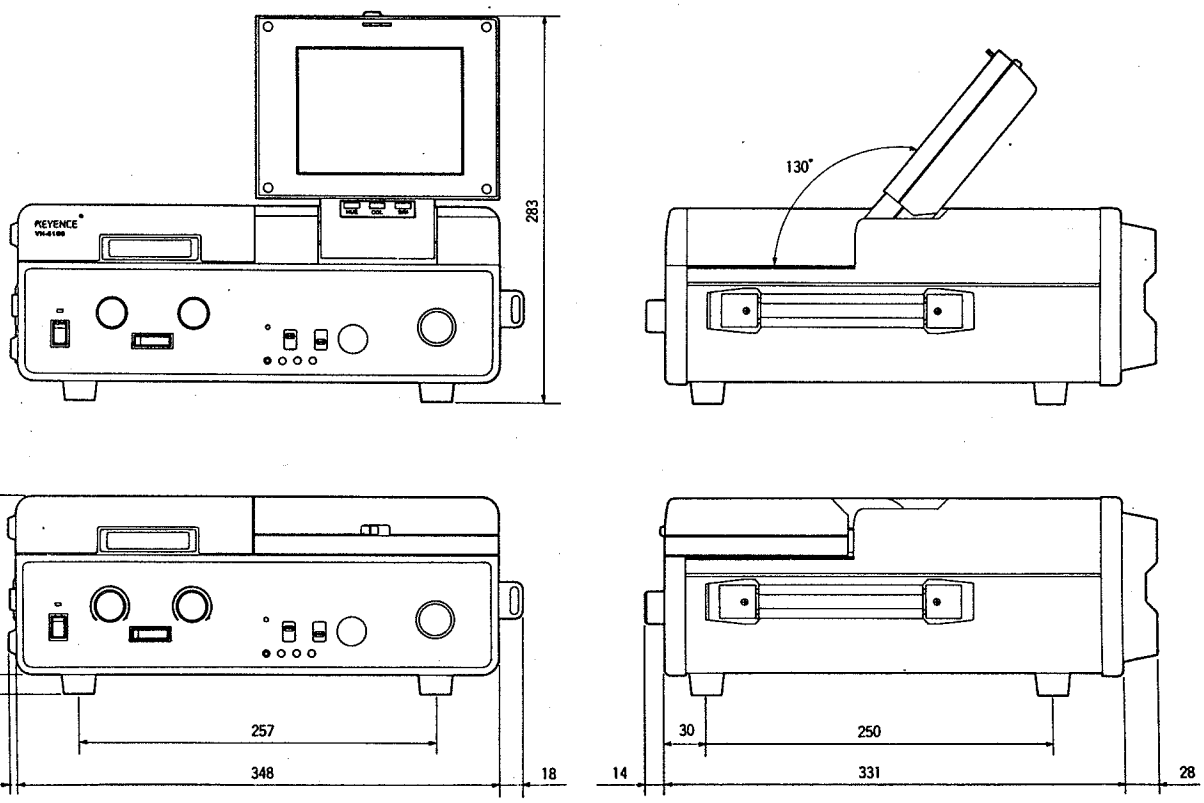
On 5.6-inch monitor (VH-6100)

Distance (mm)	2	5	10	20	30	40	50
Magnification	24.3	9.7	4.9	2.4	1.6	1.2	0.9

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[2] Dimensions

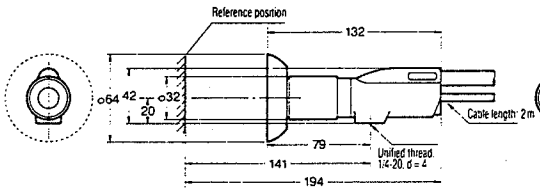
Controller



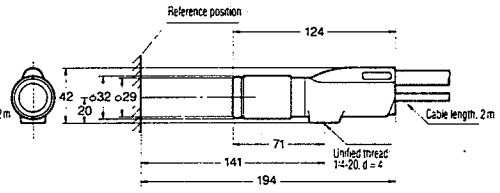
Standard lens

VH-20

With non-reflective lens

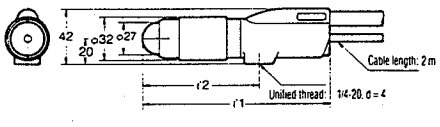


Without non-reflective lens

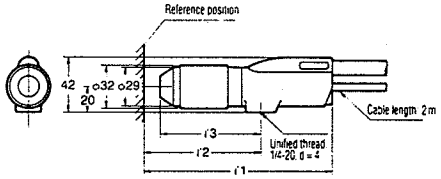


VH-50K/100K/200K/ 500K/1000K

Contact type

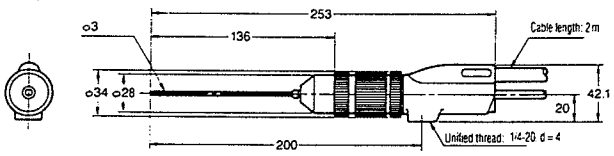


Non-contact type

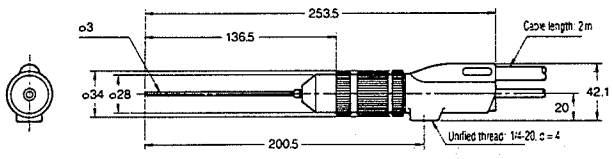


Dimensions \ Lens	VH-50K	VH-100K	VH-200K	VH-500K	VH-1000K
ℓ1 (mm)	145	143	138.5	166.5	187
ℓ2 (mm)	92	90	85.5	113.5	134
ℓ3 (mm)	79	79	82	110	130.5

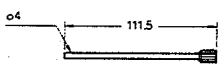
Borescope lens VH-B31



VH-B32



Protective tube



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Specifications and designs are subject to change without notice

KEYENCE

KEYENCE CORPORATION

Headquarters:
2-13, Aketa-cho, Takatsuki, Osaka 569, Japan
PHONE: 81-726-84-2233
FAX : 81-726-84-0444
TELEX : 5336530 KEYENC J

KEYENCE CORPORATION OF AMERICA
Head office:
17-17 Route 208 North, Fair Lawn, NJ07410 U.S.A.
PHONE: 201-791-8811 800-328-2238 (all states)
FAX : 201-791-5791

California Office:
3858 Carson St., Suite 203, Torrance, CA 90503 U.S.A.
PHONE: 213-540-2254 800-543-8690 (all states)
FAX : 213-316-1032

KEYENCE DEUTSCHLAND GmbH
Friedrich-List-Straße 44
7022 Leinfelden-Echterdingen,
F.R.G.
PHONE: 0711-796061
FAX : 0711-7977799

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