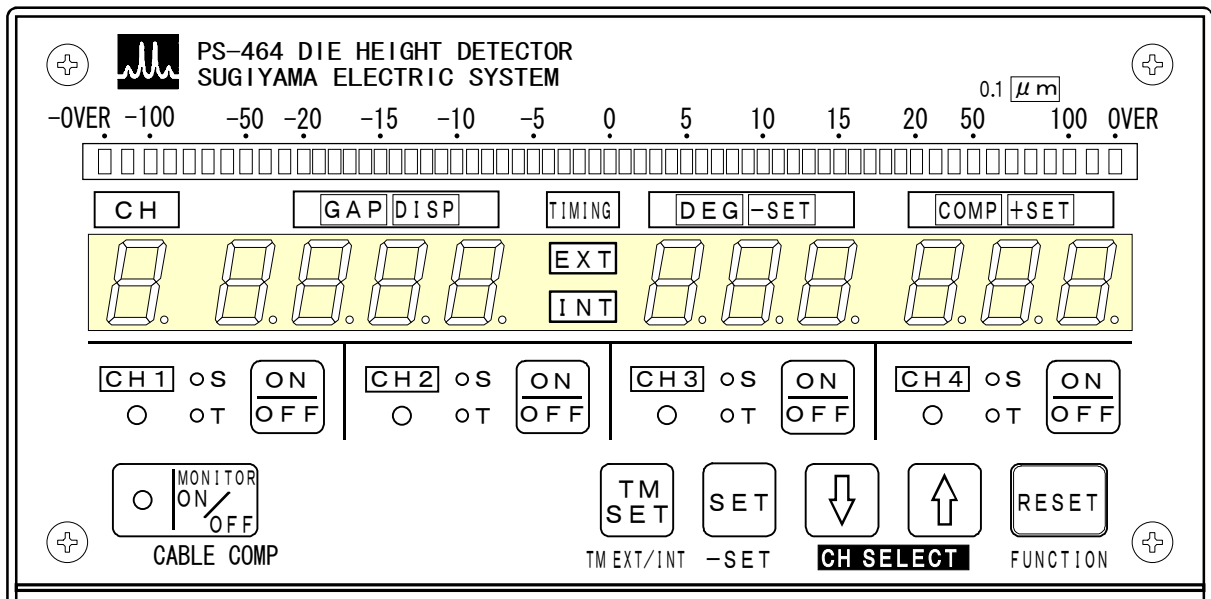


High resolution die-height detector

PS-464/462

Instruction manual

Program version 2.4x



Thank you very much because PS-464 /462 is had to be purchased this time indeed.

PS-464/462 is a die-height detector that was designed by making good use of know how and the computer technology that accumulated for many years.

Please read well this instruction manual in before use to understanding the performance of this detector's useful function.

SUGIYAMA ELECTRIC SYSTEM INC.



Warning

This device is used to decrease the damage of the die and to decrease generation of the defective products.

It is not guaranteed that the die does not break and defective products are not generated.

Use the voltage of the power source with AC100-240V.

When the voltage that exceeds a specified voltage is impressed, PS464 causes a fire.

Touch the terminal block.

It is likely to get an electric shock to be touching the metal part of the terminal block.

Do not decompose, repair nor remodel the device by the customer because of danger.

When breaking down, cut the power source immediately and please do not use.

IF there are smoke, heat and smells strange, remove the power source immediately and discontinue using under the abnormal situation.



Attention

Fix this device surely.

Do not use the detector under the splash water and other liquids to causes the breakdown, a fire, and the electric shock.

Check before use.

After power ON, confirm each function operates normally.

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1. Description

Die height detector PS-464/462 is a device to detect the floating slugs and the double stamping, etc. in the press stamping.

The bottom dead center position signal of the eddy current proximity sensor set up in the die is sample into the device in each stroke. The microcomputer calculates displacement of the bottom dead center position from sampled signal. The bottom dead-center position displacement is compared with the setting value and when displacement that exceeds the set point is detected, outputs stop signal.

1-1. Features

- The sensitivity has been improved.

The accuracy of the sensor signal processing circuit was improved and the maximum processing resolution was adjusted to $0.1 \mu\text{m}$.

Minute displacement of the bottom dead center can be detected.

- Displacement can be confirmed with the digital display and the micron-indicator.

Displacement is displayed in the micron-indicator that does the digital display and the state confirmation with high reading accuracy easily at the same time.

The working condition of device can be easily confirmed.

- The gap display for the sensor installation can be done.

The distance of the sensor head and the proximity block is displayed at the installation of the sensor. Even if the gap gauge is not used, the installation can be accurately done.

- The length of the connection cable can be freely selected.

The adjustment to the change of the length of the cable can be done by the cable compensation function in the scene.

The length of the cable of each channel can be freely set.

- The detection timing was reinforced.

The external timing makes 2 input and internal timings from each channel.

The internal angle timing makes the same detection without external cam.

- The timing test was enabled.

The state which cannot be controlled can be detected in defective performance of an abnormal installation of the sensor and an external cam in the timing test.

- The sensor wire broken can be detected.

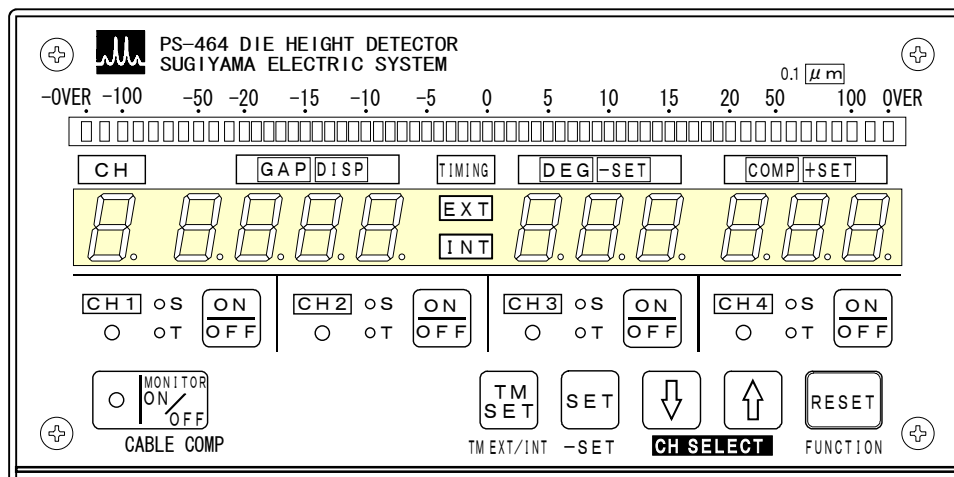
In the sensor wire broken function, stop signal is output by a sensor disconnection, a defective sensor, and a connection cable broken etc.

2. Explanation of panel

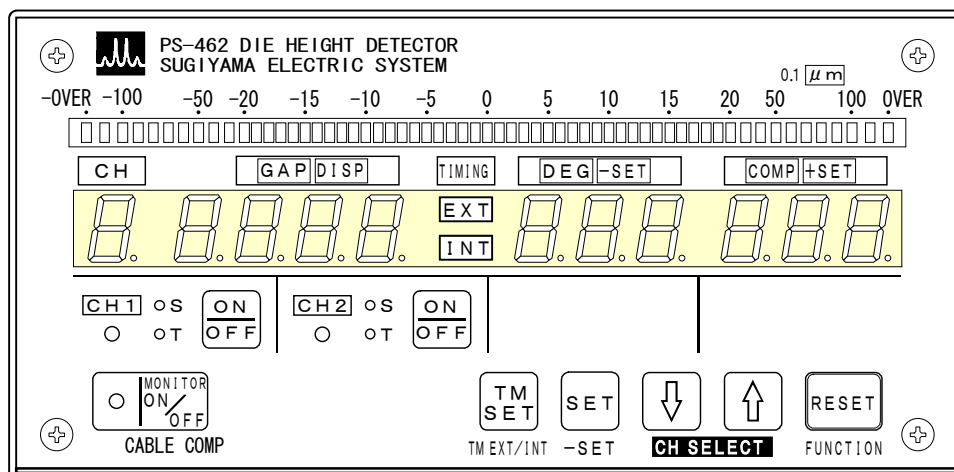
2-1. Front panel

The independent part is in the part and each channel which is operated/displayed specifying the detection channel for a front panel. As for the micron-indicator and digital display unit, the content of the channel which the channel number display shows is displayed.

PS-462 cannot operate channel 3 and 4.



Front panel of PS-464



Front panel of PS-462

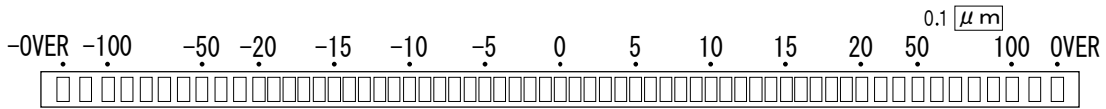
2-1-1. Micron-indicator

The distance of the sensor head and the proximity block is displayed at the detection monitor OFF. 0 at the center is a distance 1.0mm.

The setting value and displacement are displayed at the same time at the detection monitor ON.

The setting value is displayed in the \pm two places of the micron-indicator.

Displacement lights when the detection operation begins and there is a displayed content.

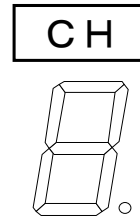


Micron-indicator

2-1-2. Channel number display

Which channel in the channel number display the content displayed in the bar graph and digital display unit is displayed. 1 to 4 is displayed in PS-464 and 1 and 2 are displayed in PS-462.

Channel number can be changed by pushing the channel selection button.



Channel number display

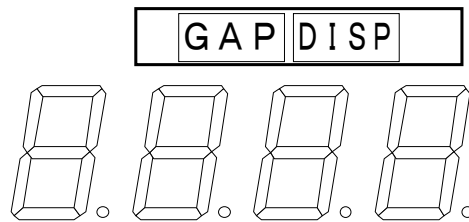
2-1-3. Gap and displacement digital display

The gap and the displacement digital display are digital displays of the sign and the three digit. The sign is not displayed at the positive though displays '-' when the value is negative. When displacement exceeds 200 or 20.0, 'EEE' is displayed.

The lamp displays the gap display or the displacement display.

The distance of the sensor head and the proximity block is absolutely displayed at the detection monitor OFF by a value as positive as X.XX. The unit is [mm].

Displacement is displayed at the detection monitor ON. The unit of the displacement display is [μ m].



Gap and displacement digital display

2-1-4. Timing mode display

The timing mode display displays the detection timing setting of the displayed channel. 'the external' or 'the internal' is displayed with the lamp.

The timing mode changes by pushing timing (angle) button during pushing function (reset) button.



Timing mode display

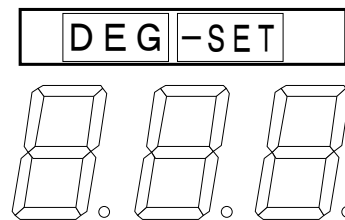
2-1-5. Angle, -set digital display

Angle, -set digital display displays the angle or the -set value.

The lamp on the digital display displays whether the display is an angle or it is a -set value.

The angle is changed by pushing the TM button, or the numerical value is changed by pushing the -set value button (The setting value button is pushed during pushing the function button).

The value is changed with the upper and lower arrow button.



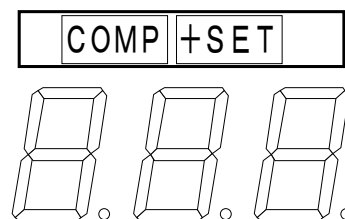
Angle, -set digital display

2-1-6. Compensation value, +set digital display

Compensation value, +set digital display is a compensation value or a +setting value is displayed.

The lamp on the digital display displays whether the display is a compensation value or it is +setting value.

After the setting value button is pushed, the numerical value is changed with the upper and lower arrow button when +setting value is changed.



Compensation value, +set digital display

2-1-7. Channel state lamps and channel ON/OFF button

The channel state lamps and channel ON/OFF button are independent in each channel.

The channel state lamps includes stop display lamp, the sensor lamp, and the timing lamp.

When the channel is off, these lamps are off.

Stop display lamp lights green at detection ON.

The stop lamp turns to red when the channel detects malfunction.

The channel is turned off in detection OFF. However, the lamp does not turn off the channel of turning off with red lights. The lamp turns off with the output circuits resets by the reset button.

The sensor lamp (S lamp) lights green when the gap between sensor head and proximity-block is inductive distance, and S lamp is turned off outside of the inductive gap. Moreover, red lights if the sensor head is not connected.

The timing lamp (T lamp) displays the state of the timing decided in the timing mode. Green lights when the detection timing is turned on.

Red lights when malfunction is detected in the detection timing.

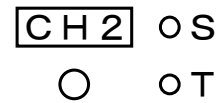
Channel ON/OFF button is a button to switch ON/OFF of each detection channel.

2-1-8. Monitor ON/OFF (cable compensation) button

The monitor ON/OFF button switches ON/OFF which this device detects.

The lamp which is located beside the monitor button is a red blinking in the monitor OFF, and green lights in the monitor ON.

When the monitor ON/OFF button is pushed during pushing function (reset) button, the cable compensation is done.



Channel state lamp



Channel ON/OFF button



CABLE COMP

Monitor ON/OFF
(cable compensation)
button

2-1-9. TM (timing) button

The TM button is a button to set both a detecting angle and the internal angle-timing mode.

Pushing the TM button during pushing function (reset) button can change the timing mode.



TM EXT/INT

Angle (timing) button

2-1-10. Setting value (-set value) button

The setting value button is a button for setting the comparison value with displacement to begin.

When this button is pushed, the setting value of the positive and negative can change at the same time with the upper and lower arrow button.

Only the -set value comes to be able to change by pushing the setting value button during pushing function (reset) button.



-SET

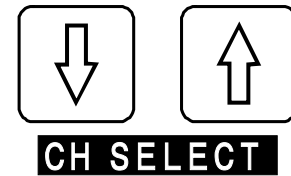
Setting value (-set value) button

2-1-11. Upper and lower arrow button

The upper and lower arrow button changes the display channel at the time of things except a numeric setting.

A numeric change setting the numerical value uses the arrow button.

The numerical value can be changed continuously by keeping pushing these buttons.



Upper and lower arrow button

2-1-12. Reset (function) button

The reset button is a button for the release under setting and the release of the output circuits, etc.

Stop signal is released by pushing the reset button when the stop signal outputs by malfunction detection.

If the reset button is pushed while setting the values, the return setting is ended the numerical value under setting is not changed.

The reset button can be use to key shift (function). Other buttons are pushed during pushing the reset button.

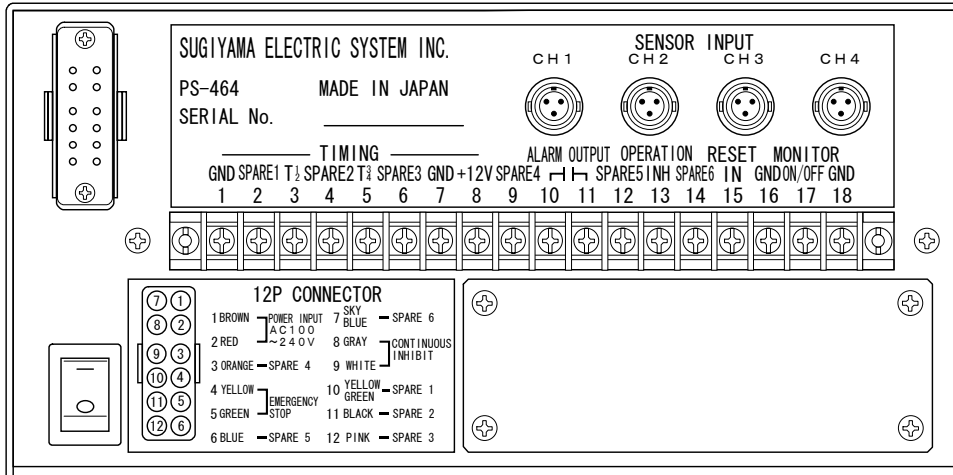


FUNCTION

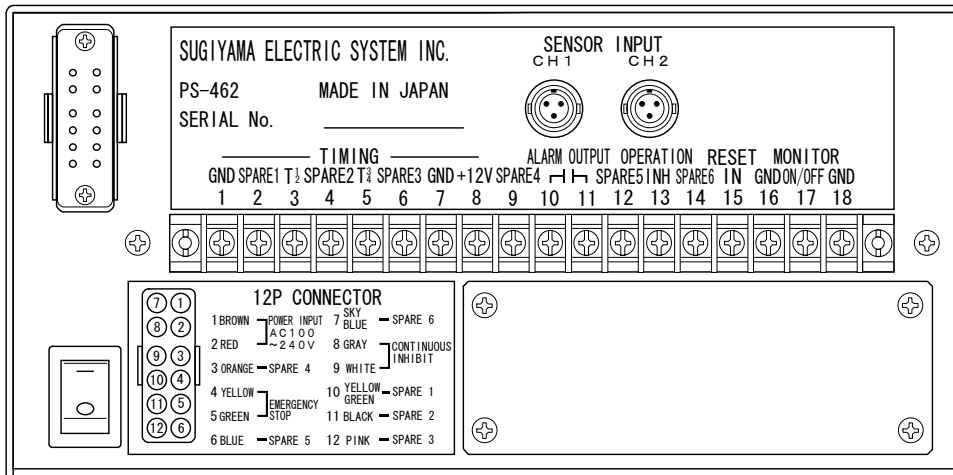
Reset (function) button

2-2. The back panel

The back panel includes the sensor connector, the output connector, power supply switch, and the terminal block, etc.



Back panel of PS-464



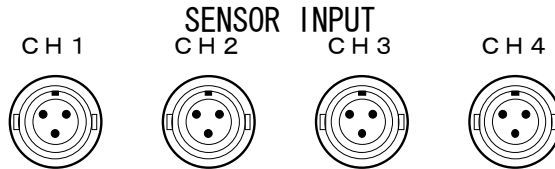
Back panel of PS-462

2-2-1. Connector for sensor

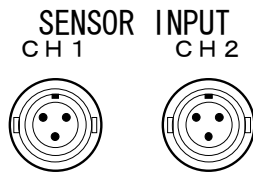
The connector for sensor is used to connect the proximity sensor head.

The connector and the sensor head are connected with the connection cable of the our company specification.

Sensors can be connected with PS-464 up to four and PS-462 up to tow.



Connector for sensor of PS-464

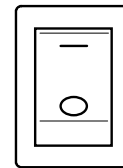


Connector for sensor of PS-462

2-2-2. Power supply switch

Power supply switch is turned on when knob is up.

Please avoid a frequent operation about this power supply switch.



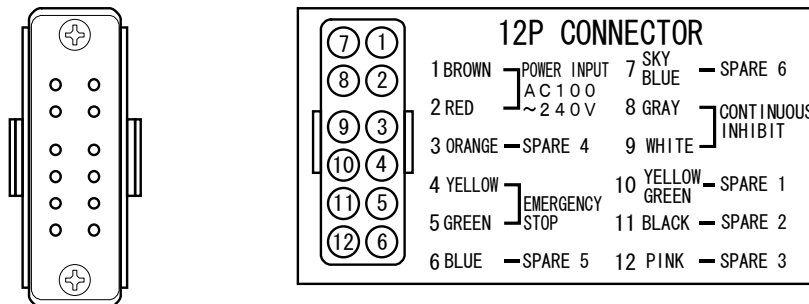
Power supply switch

2-2-3. Output connector

In the output connector, there are a power source, an output circuits of this detector, a continuous running inhibition output, and a spare wire.

The spare wire is connected with the terminal block in the control box.

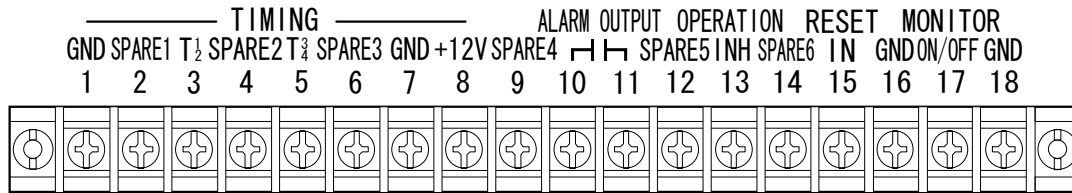
Please connect the cable with the connector of the our company specification with the output connector.



Output connector

2-2-4. Terminal block

There are an external timing input, an operation inhibition input, an external reset input, an external monitor ON/OFF input, an alarm output, and a spare wire in the terminal block.



Terminal block

T12(3) is an external timing input terminal of channel 1 and 2. It is an external timing input terminal of T34(5) channel 3 and 4. The external timing is turned on with the terminal opened to the external timing input.

+12V terminal (8) can supply the 12V of 50mA DC or less for the proximity switch.

Reset input (15) and monitor ON/OFF input (17) are the input by which the same function as reset, the monitor ON/OFF buttons of a front panel is done. It is possible to operate switching remotely by connecting the push-button and the switch.

Operation inhibition input (13) is a input terminal to do various set changes of a front panel without it is possible to do. The key switch etc. are connected. If the switch is turned on, the detector becomes an operation inhibition.

Terminal GND (1,7,16,18) is connected with the chassis of the detector control box in a common line of the input signal in the terminal block.

The input other than the external timing input are turned on with the short-circuit between the input terminal and GND. The signal of the no-voltage is connected with the signal input of the terminal block.

When an external empty voltage is input, an internal circuit is destroyed.

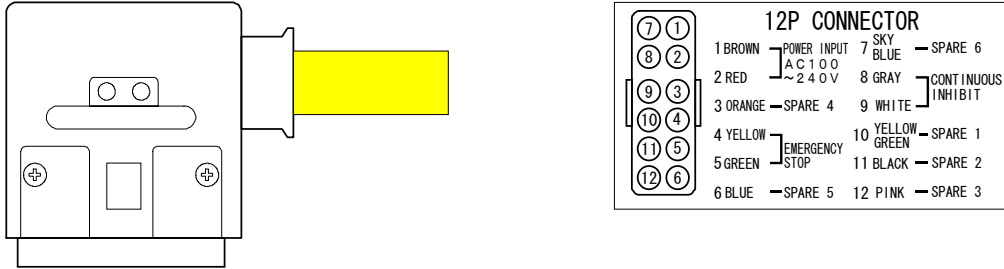
Alarm output (10,11) is connected with an internal relay contact. The alarm output is output at the same time as outputting stop signal.

Spare wire (2,4,6,9,12,14) is connected with the output connector. When the I/O signal of the terminal block is connected through the output cable, spare wire is used.

2-3. Output cable

Output cable is addition as connection can be done to output connector.

The length of the cable appends the one of 5m by the standard.



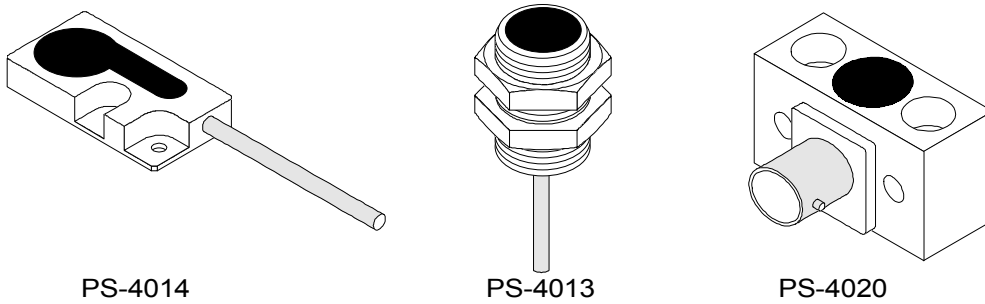
Output cable with connector

2-4. Sensor head and connection cable

The sensor head and the connection cable should have purchase besides the detector control box.

2-4-1. Sensor head

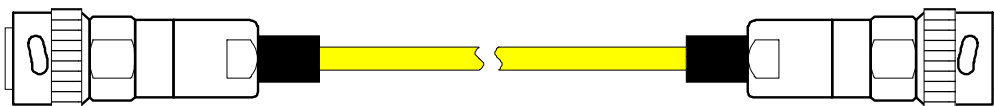
Please select the best one by the state of the installation about the sensor head.



Typical sensor head

2-4-2. Sensor connection cable

In the length of the cable, 3m and 5m are the standard. The color of the cable has blue, red, yellow, and white. Please select the cable length as short as possible.



Connection cable

3. Function and operation

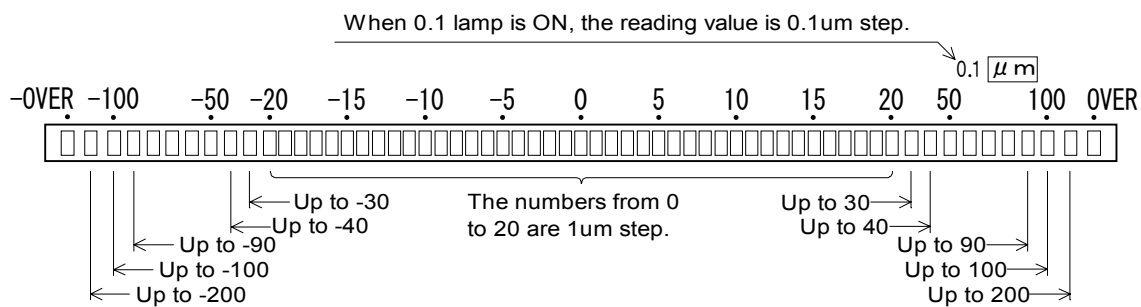
3-1. Display of micron-indicator

The micron-indicator displays relative values up to ± 200 by centering on 0. It displays points by lamp, 0 to 20 are $\times 1$ step, 30 to 100 are $\times 10$ step and 101 to 200 shows only one lamp. The value of the lamp with the width as a numerical value is below the numerical value of the lamp.

For instance, when the lamp at the position of 90 lights, it is meant that it is up to 90 from 81. The position of OVER lights to the numerical value which exceeds 200.

Display and the unit of the micron-indicator are different while used.

The setting value and the displacement are displayed while the detection monitor is ON. It is 1 or a unit of $0.1 \mu\text{m}$. The unit is displayed with the unit lamp in the upper right of the micron-indicator. When 0.1 is displayed, the unit of $0.1 \mu\text{m}$ and 0.1 display off is unit of $1 \mu\text{m}$.



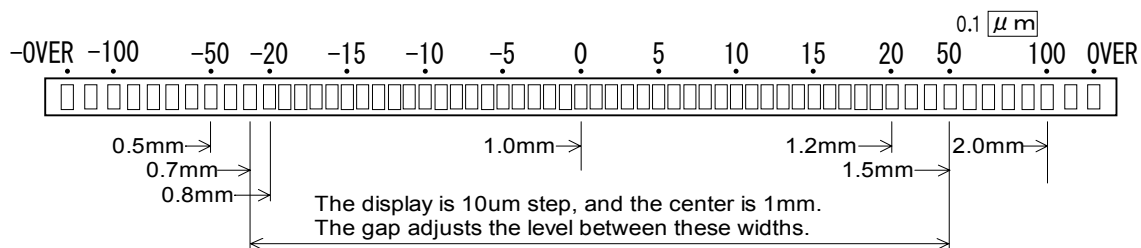
Display in state of detection monitor ON

The micron-indicator display at the detection monitor OFF displays the distance of the sensor head and the proximity block by displacement which centers on 1mm.

When the detection monitor is OFF, the unit is fixed in $10 \mu\text{m}$.

It is possible to use the gap display for the distance adjustment at the sensor head installation.

The unit lamp at the detection monitor OFF is not related to the display of the micron-indicator.



Display in state of detection monitor OFF

3-2. Cable compensation

The cable compensation memorizes the voltage characteristic in the combination of connected sensor and sensor connection cable internally. Moreover, the presence of the connection of the sensor is memorized.

It is possible to change freely in the length of the connection cable in the function of the cable compensation.

The cable compensation is done in the state of the detection monitor OFF with the monitor ON/OFF button. The distance of the sensor head and the proximity block is separated in the maximum (15mm or more) and the monitor ON/OFF button is pushed during pushing the reset button. When the compensation ends, the compensation value is displayed in the COMP digital display.

The compensation value changes by combining an internal circuit, the sensor, and the sensor connection cable when the length of the sensor cable is long, the value grows though it is not a value with regulations especially, too. If a standard 3m cable is used, the value becomes about 90. As for the channel with which the sensor is not connected, the compensation becomes 0.

When the cable is long, it is not possible to finish correcting the cable compensation. If it is not possible to correct the compensation, the compensation value becomes the same handling as becoming to 0 and no connection of the sensor.

Moreover, when the compensation value rises above 200, the detection operation becomes unstable and the compensation value is maximum 255. The sensor connection cable must use the one as short as possible.

The compensation value 0 channel should be detection OFF with channel ON/OFF button. Moreover, stop signal is output under such a condition by the sensor error in detection ON.

When the sensor connects to the compensation value 0 channel, stop signal is output by the sensor error. Please do the cable compensation when the connection is changed.

Without relation with the sensor connection, four channels are adjusted for cable compensation simultaneously. Please check the compensation's normally ending while the upper and lower arrow button changes the channel.

The compensation value is set in the setting of the product shipment and 0 is set in all channels. Please set the cable compensation after the installation.

3-3. Sensor error detection

The sensor error is detected only with the channel of detection ON. S(sensor) lamp of the corresponding channel lights red when there is a sensor error and stop signal is output.

The sensor error detects the sensor of the channel of detection ON being disconnected. It is judged to have disconnected when the sensor is not connected.

Moreover, if the cable compensation is not normally done, the detector detects error as a sensor error occasionally.

When the cause is removed, the sensor error is automatically released. Moreover, the output circuits whose sensor error is a cause is released.

Sensor error stop signal is output regardless of the detection monitor ON or OFF.

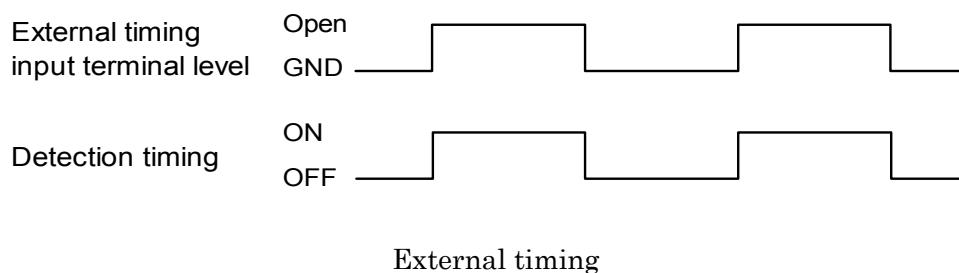
3-4. Detection timing

There are three kinds of detection timings about an external timing, an internal timing, and the internal angle timing.

The external timing assumes the external timing input in the terminal block to be an inspection timing. As for channel 1 and 2, T12, channel 3, and 4 correspond to the signal of T34. The external timing uses carefully because it is ON at open that is unlike other external input.

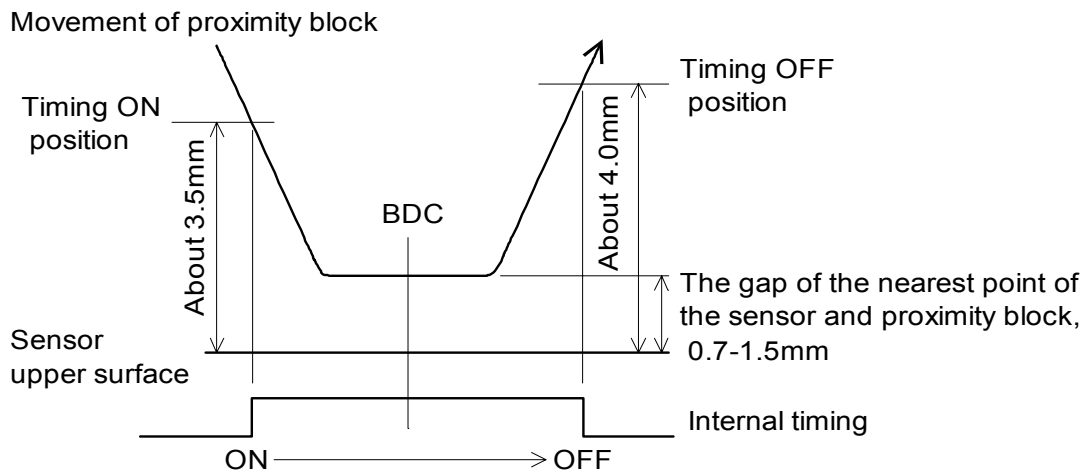
When the external timing is used for the detection timing, 'EXT' is selected in the timing mode.

Detection timing from the external timing input can be confirmed with T lamp. When the detection timing is turned on, T lamp lights green.



An internal timing is made from the sensor signal. The timing signal is made for each individual channel. ON/OFF of an internal timing is the same as the state of lighting of S lamp. If it is timing ON and turning off if S lamp lights, it is turning off. An internal timing is turned off when turning on and becoming about 4.0mm in a direction away when the distance of the sensor head and the proximity block becomes about 3.5mm in the direction approached.

When an internal timing is used, 'INT' is selected in the timing mode.



Internal timing

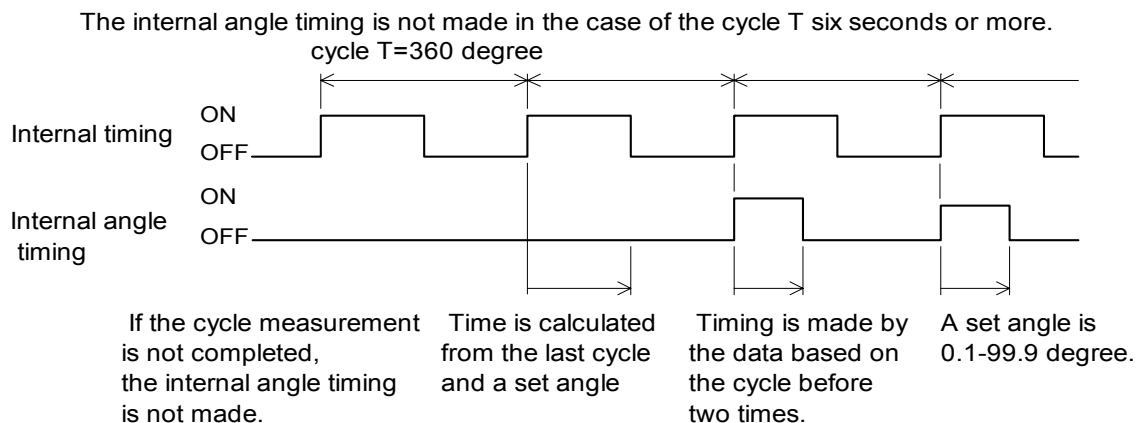
The internal angle timing is made from an internal timing. The detection timing is ON during setting angle by internal angle timing setting, that is started from ON point of the internal timing of each channel. The point of setting angle is calculated by measuring the interval of the internal timing.

The internal angle timing cannot be used for 6 seconds or more the interval of the sensor head.

When the internal angle timing is used, 'INT' is selected in the timing mode and the value is set in 'DEG'. Whether it is an internal timing or an internal angle timing is decided by the presence of the angle setting.

The timing method becomes an internal angle timing at numbers except an internal timing and 0 when the angle setting is 0.

99.9 degrees can be angling of setting for the internal angle timing set from 0.



Internal angle timing

3-5. Detection timing and sensor level sampling

The bottom dead center detection is basically calculated based on the distance of the most much approach of the sensor head and the proximity block in each stroke.

To detect the floating slugs however, the displacement by the floating slugs is sampling at the most changeable position (angle) occasionally.

The detection timing is a timing by which the position where the sensor signal is sampled is limited.

The sensor signal is done and the detection timing does the sample only during turning on in PS-464/462.

And, the value of the most much approach in the signal by which the sample is done is assumed to be a processing data.

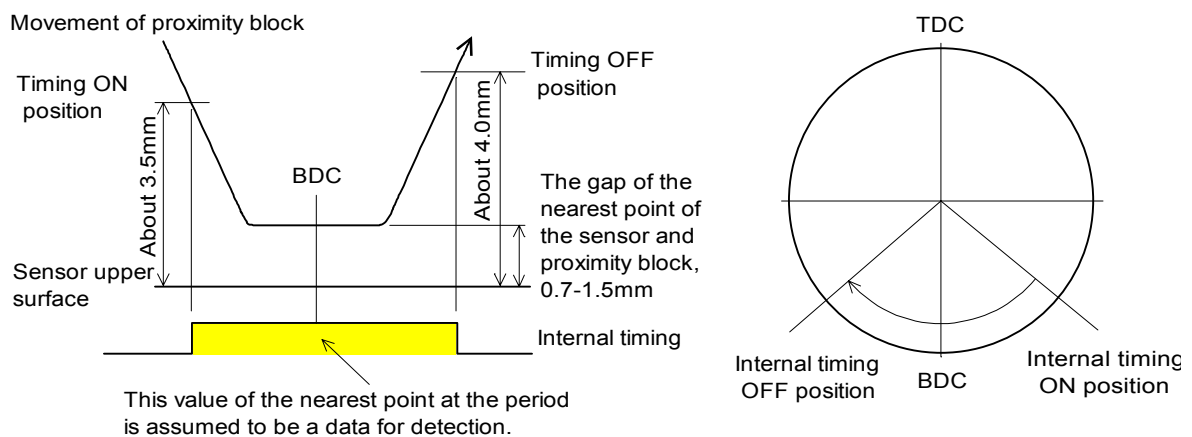
The processing of the data begins when timing signal is turned off.

It is after the timing is turned off that the stop output circuits is done by the slug detecting processing.

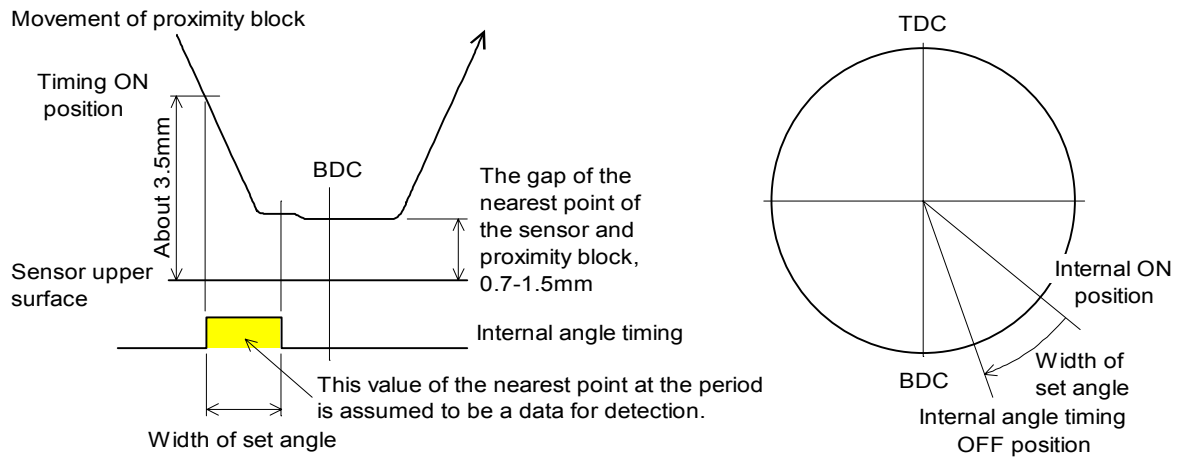
When an internal timing is used for the detection timing, the sample does the signal which contains the bottom dead center.

Moreover, if the external timing and the internal angle timing are used, setting which does not include the bottom dead center becomes possible.

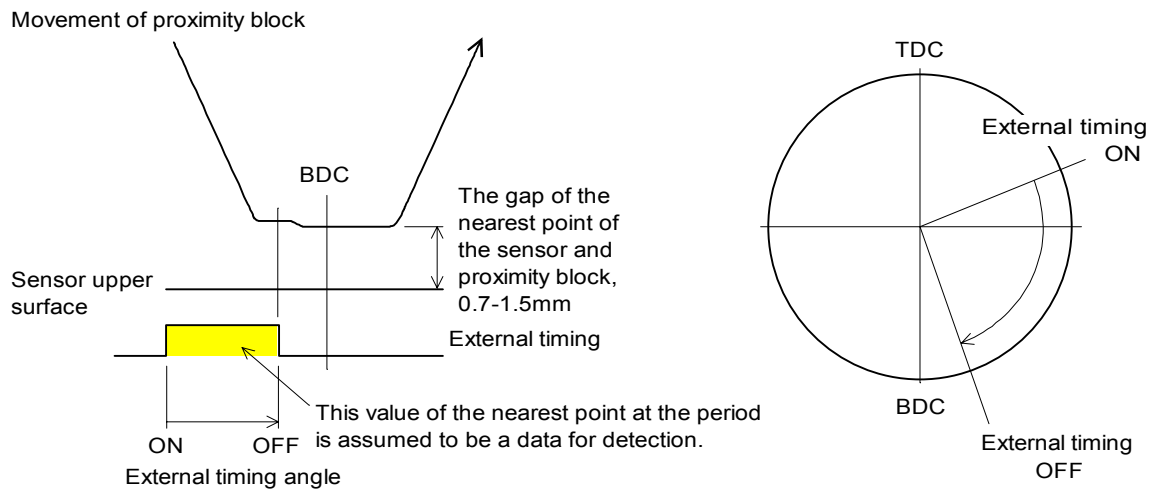
When the timing is made set which does not include the bottom dead center with the die of the press stamping when the detection of the floating slugs is difficult at the timing which contains the bottom dead center on the structure, it is likely to be able to detect the slugs.



Internal timing



Internal angle timing



External timing

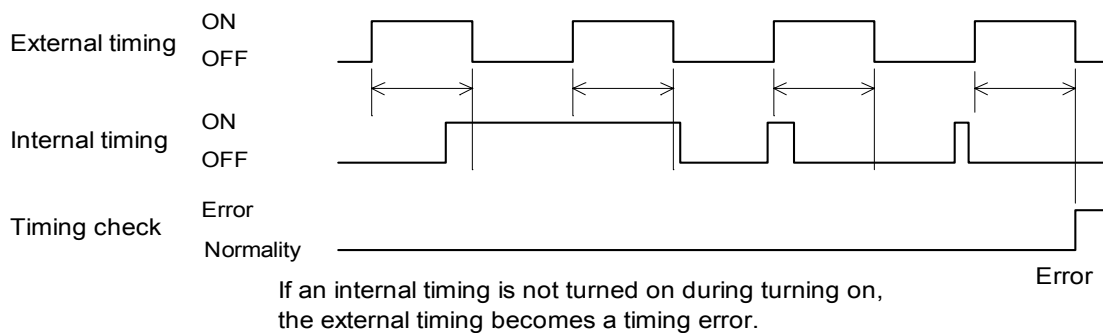
3-6. Timing check

The timing check detects the external timing circuit disconnection and the miss setting of the sensor position etc. and is a function to evade the state which cannot be detected.

When the error is detected by the timing check, stop signal is output. The T(timing) lamp lights red as a display of the timing error.

When the external timing is turned off in the external timing mode, the external timing confirms whether to have turned on an internal timing during turning on.

When an internal timing is not turned on, stop signal is output. This inspection is inspected regardless of the function setting.



Timing check always (external timing mode)

The function that the external timing for one cycle of an internal timing observes turning on and off is provided and turning an internal timing for one cycle of the external timing on and off, too.

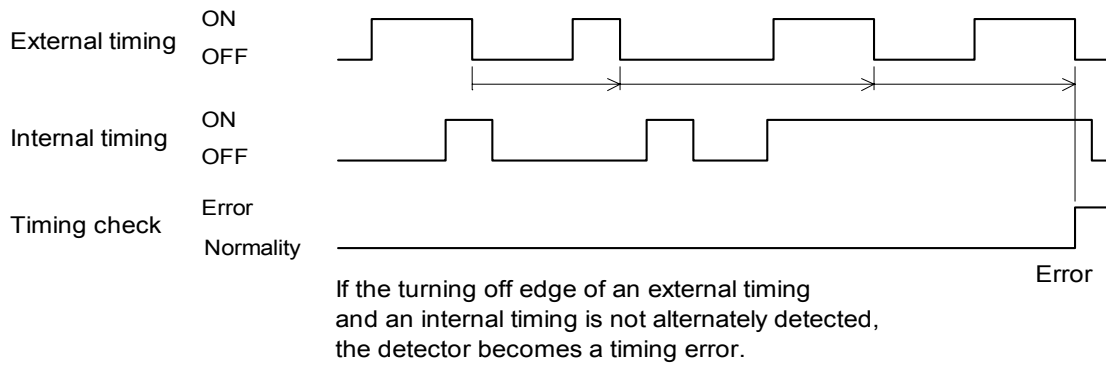
Mutual inspection of this timing is enabled or disabled by the function setting.

The delivery settings are “inspection” in the external timing mode and “no inspection” in the internal timing mode.

In a standard state of the timing check, when only an internal timing is turned on and off when using detector in the external timing and the mode, the detector becomes a timing error. Moreover, if the external timing repeats ON/OFF with the sensor head approaching the proximity block (S lamp is not turned off), the detector becomes a timing error.

Please change the timing check to “NO” in the external timing to setting' by the function setting when similarly becoming by the structural problem of the die.

Please connect a suitable signal (It is a signal of once in each stroke of the press) with the external timing input terminal, when the internal timing is not ON at the bottom dead center of the press in the internal timing mode. Then please set the timing check to “inspect” by the function setting.



Timing check by setting

3-7. Slug detecting

The slug detecting compares differences between the sensor signal and the previous average standard which does the sample with the setting value and judges the floating slugs.

The previous average standard is an average of the sample values of two times of the continuous taken just before the sample value for detection.

The previous average and displacement are displayed in the bar graph and the digital display machine. Displacement is a difference between the previous average and the sample value for detection. Output stop signal when displacement exceeds the set value. Update the previous average standard when displacement is a set value or less. When stop signal is output, the previous average standard is not updated.

Make the previous average standard from the two samples values by the standard. 1 to 64 can be selected by the function setting.

Detection is begun from the following timing completing the previous average standard making. The non-detection stroke when beginning to detect increases, when the number of samples to make standard is increased.

SAMPLE TIMES	1	2	3	4	5	6	7
SAMPLE VALUE	490	490	500	510	480	500	560
STANDARD	-	-	490	495	505	495	490
DISPLACEMENT	-	-	+10	+15	-25	+5	+70

The setting value is ± 30 , The stop signal is output with sample 7.

(The sample value is different from an actual value)

Slug detecting operation

3-8. Detection initialization, clear of previous average standard

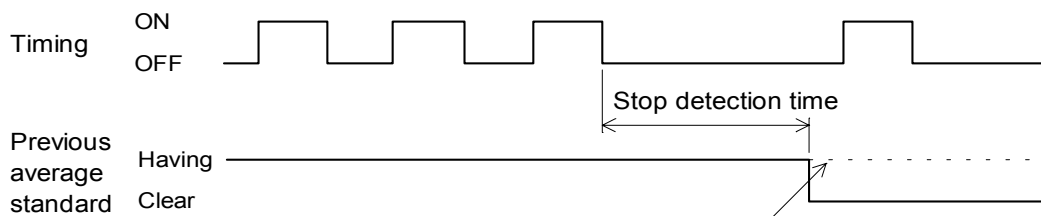
The standard is cleared by the detection initialization. All channels are initialized of detection with the power supply is turned on or non-detected by monitor ON/OFF button operation.

When detection is turned off with channel ON/OFF button, the channel is initialized.

The detection initialization can be done in the reset button operation without putting into the state of non-detection when the initialization setting is turned on by the function setting. Set the initialization setting of each channel.

Please avoid an unnecessary reset button operation when you turn on the initialization setting.

When stop detection time passes from the last detection timing, the detection initialization can be done by both turning on the initialization setting and the stop detection time. Setting the stop detection time is sharing with all channels. To do the detection initialization automatically, this sets the detector by stopping the press.



When the stop detection time and the detection initialization are set, the detection initialization is automatically done.
(When the detection initialization is set, the detection initialization is done even if the reset button is pushed.)

Automatic reset of previous average standard

3-9. Beginning of slug detecting

There are two methods of beginning the slug detecting. It is a method of beginning with the monitor ON/OFF button and a method of beginning with channel ON/OFF button.

A necessary channel is made from turning on to the state of the detection monitor ON with channel ON/OFF button in the state of the detection monitor OFF so that detection may begin with the monitor ON/OFF button. In this method, the channel which is turning on begins detecting at the same time.

The detection begins at the channel turned ON by channel ON/OFF button, after the monitor switch has been turned ON. In this method, the detection of each channel turned on begins.

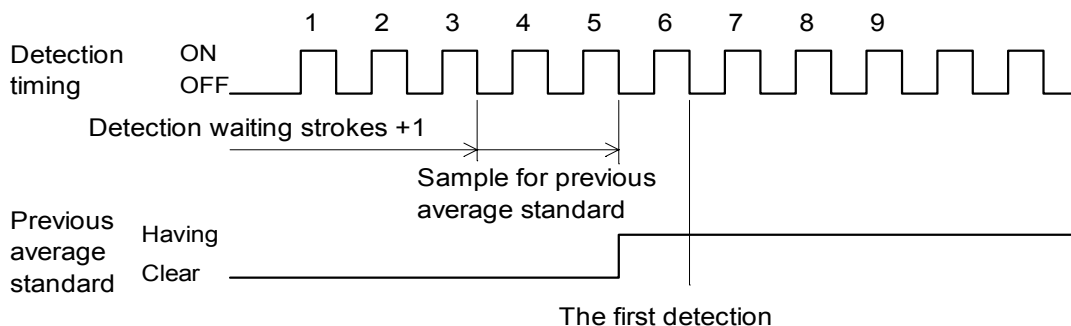
When beginning of detection is ordered with the button, detection is initialized. After initializing detection, the sample of the sensor signal is begun when the strokes of detection waiting and +1 was run. The previous average standard is made from the sample beginning and detection begins from the following stroke of the previous average standard making completion. Because the detection waiting strokes needs two times and the previous average standard is making by 2 strokes, actual detection is begun by the sixth stroke from the instruction of detection start. (Standard setting)

The detection waiting strokes can be changed by the function setting.

The detection waiting strokes sets the stroke number of times until press rotation is stabilized when the press is started.

Numbers of samples for the standard can be set up to 64. The non-detection stroke when beginning to detect increases, when the number of samples for the standard is increased.

When a big value is set in the number of samples for the standard, the tentative standard setting is effective. If the tentative standard setting is turned on, tentative standard detection becomes possible. In tentative standard detection, make the standard averaging the sample taken till then until the number of samples reaches the number of samples for the standard. Tentative standard detection can reduce non-detection.



A minimum value of detection waiting strokes +1 becomes two.

Previous average standard making when beginning to detect the slug.

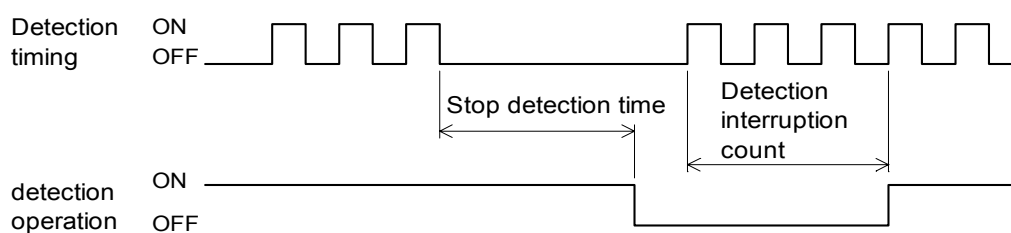
3-10. Detection interruption

Interrupt detection according to the detection timing for the predetermined number at time when the reset button was pushed when you set the number of detection interruptions by the function setting.

The number of detection interruptions is common to all channels. However, the initialization setting is given to priority more than setting the number of detection interruptions.

Please avoid an unnecessary reset operation when you set the number of detection interruptions.

Unstable detection at the press comeback movement can be avoided by using the number of detection interruptions together with setting the stop detection time.



It is able not to be detected to reactivate.

Detection interruption at press comeback movement

3-11. Sensitivity and setting value

As for the resolution, the value displayed to the setting value is used. When the integer is displayed in the indicated value, the resolution becomes $1 \mu\text{m}$ and $0.1 \mu\text{m}$ is displayed in the decimal point.

The setting value can change the setting value of the positive / negative simultaneously and a independently change of the negative setting value. The sensitivity of a positive setting value is adopted in the setting value change and a setting value positive as for the display of a negative setting value is followed. When a positive setting value is a display with the decimal point, a negative setting value becomes becoming only to the integer display when a positive setting value displays the integer also a negative setting value with the decimal point. The sensitivity becomes the same with the positive and negative.

The setting value is changed with the decimal point when operating detector as a positive setting value reaches smaller value than three while the setting value is changing because of the integer display. If the operation which grows more than 7.9 with the decimal point is done, detector becomes an integer display.

When setting ends, display lamp of $0.1 \mu\text{m}$ on the bar graph is changed.

The detection operation is initialized when there is a change in the setting value with a change in sensitivity in the detection operation.

3-12. Sensitivity and change in material thickness

When the difference between the first sample data after detection initializing and the sample data under detection is grown (absolute value change), the amplifier in the detector is saturated and detection is not normal operation.

Do the error indication of 'E-01' or 'E-02' in the displacement display if detection cannot be normalized and stop signal is output. The absolute value change is that the distance of the sensor head and the proximity block at the sample position gradually changes in the press stamping. 'E-01' is too much approaching, and the distance is a display of parting too much at 'E-02'.

Tolerance of the absolute value change is $\pm 20 \mu$ min in 0.1μ range, and $\pm 200 \mu$ min in 1μ m range.

In the absolute value change, the bottom dead center change by the cycle change of the press and the change in material thickness of the material etc. are main causes. Moreover, it is the one with the drift of an internal voltage by the temperature change of this device.

The voltage drift by the temperature change is reduced at 30 minutes after the power source is turned on.

Especially, please avoid using immediately after the power source on in a case of 0.1μ m range.

3-13. Operation inhibition

The operation inhibition is a function to limit the operation which relates to the detection function only to the monitor ON/OFF switch and error reset of detection.

To put the detector into the state of the operation inhibition, the operation inhibition input in the terminal block is connected with the terminal GND.

In the state of the operation inhibition, the operation which does not relate to the detection function is possible.

3-14. Backup data

Various setting for the detection thought to be changed frequently in use is backed up with the battery. The backup is possible for about two weeks.

The backup is checked at power source ON.

Backup error 'E-03' is displayed when the backup is not normal and setting is initialized.

Please the cable compensation, the timing mode, and set channel ON/OFF again when the backup error occurs.

Because EEPROM are used for the item set by the function setting, it is not initialized by the backup error.

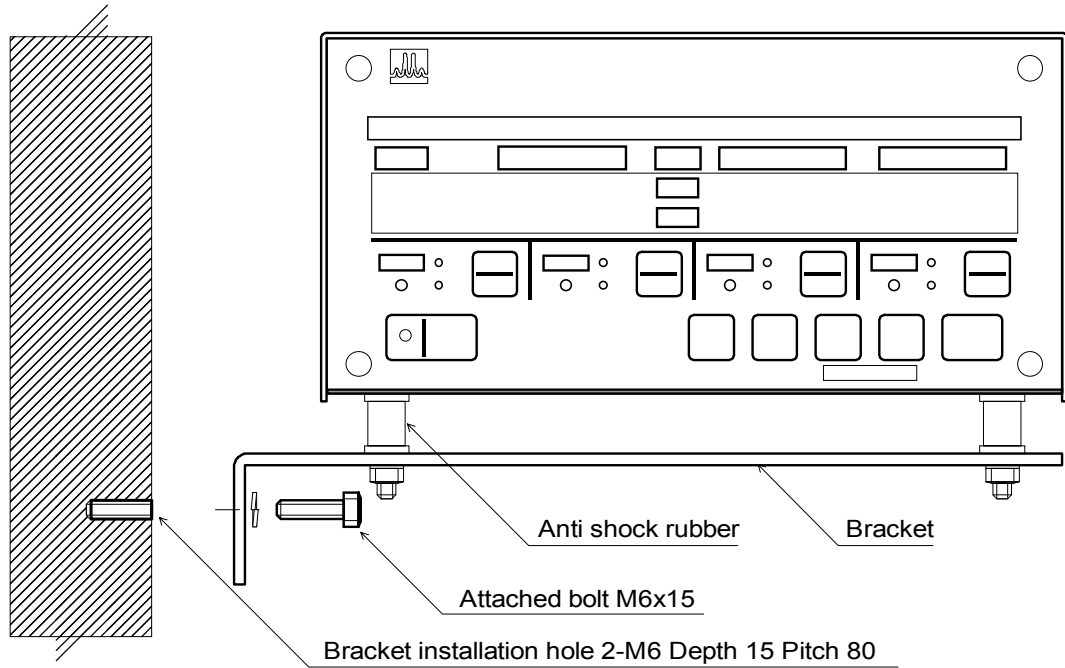
4. Installation

4-1. Installation of control box

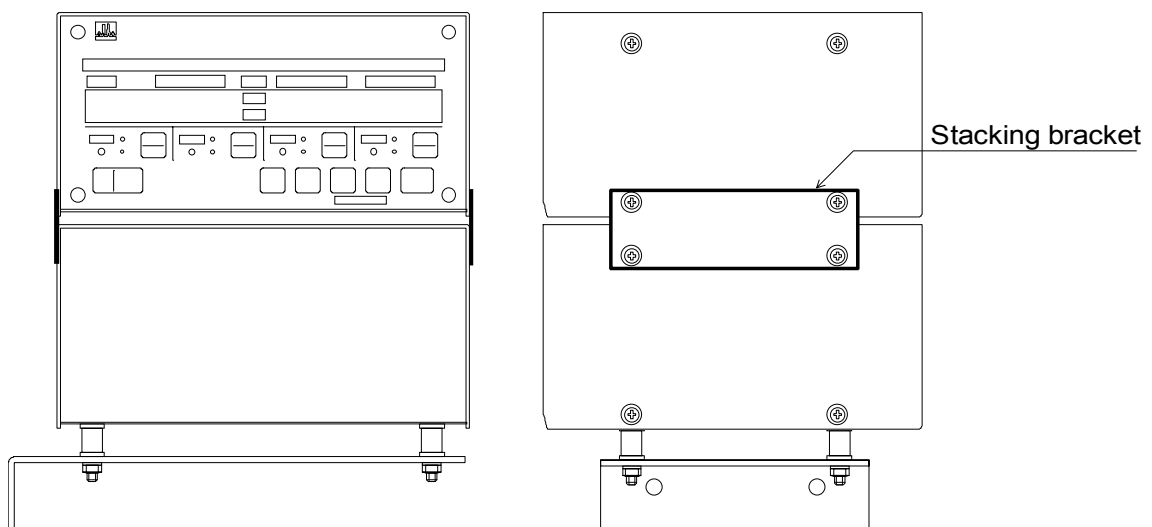
The installation of the control box uses a standard bracket, or the another detector and PS464/462 uses the stacking bracket to the stacking installation.

Please choose to the installation place vibrating and a little dust.

Especially, please note that PS464/462 causes the malfunction and the breakdown when processing oil and a metallic powder hang.



Installation with standard bracket



Installation of control box with stacking bracket

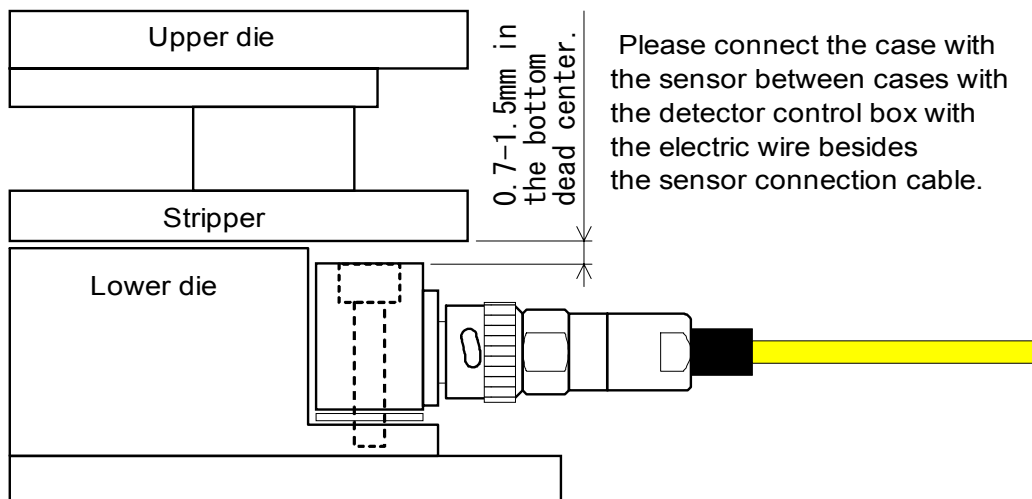
4-2. Installation of sensor head

Please install the sensor head so that the gap of the sensor head and the proximity block may become 1.5mm from 0.7 at the bottom dead center position of the press. Fix the connection connector by the screw surely in case of PS-4014 and PS-4013 sensor head.

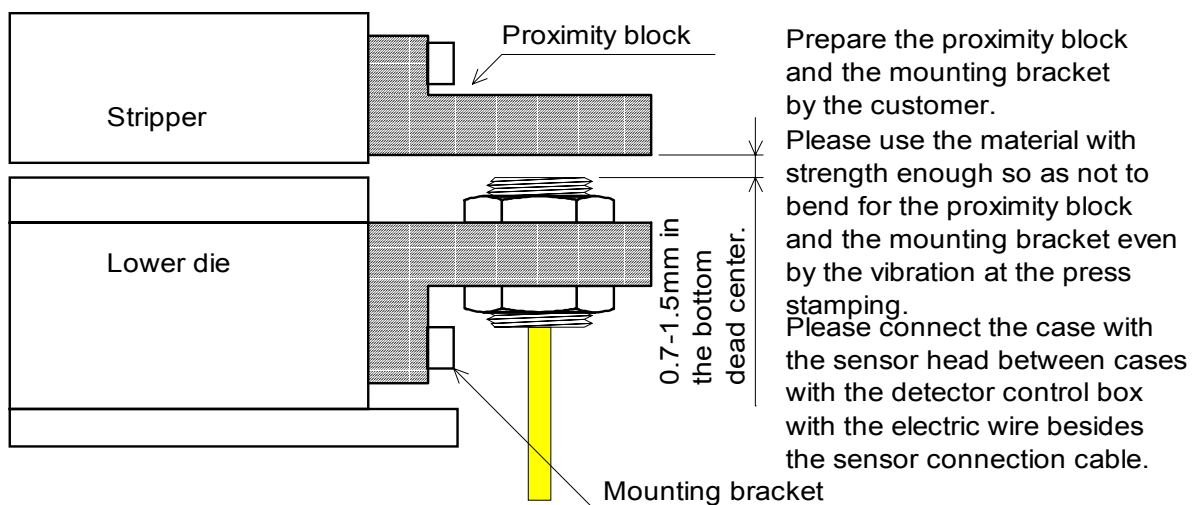
It is necessary to connect a metallic case and the control box chassis of the sensor head in electricity. Please connect the detector control box with the electric wire of 0.5mm² or more among the press bolsters.

Prepare the proximity block and the mounting bracket of the sensor by the customer. Please use the one which does not bend for the proximity block and the mounting bracket even by the vibration by the press stamping to raise the detection accuracy.

Please arrange the proximity block to cover the sensor induction center by 30mm or more in the diameter.



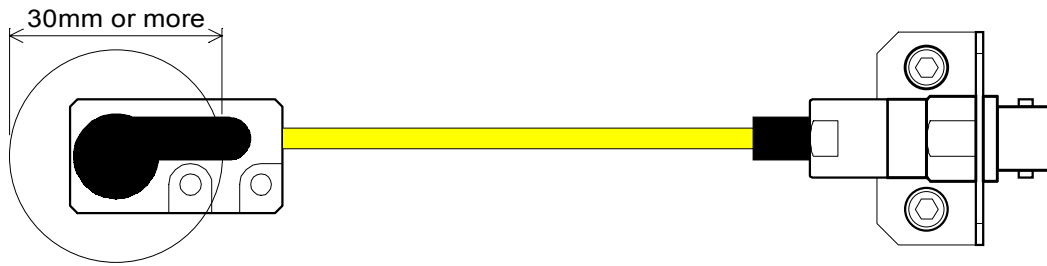
Example of installing sensor head (PS-4020)



Example of installing sensor head (PS-4013)

Prepare the proximity block the one of 30mm or more with the iron. Please arrange the proximity block at the induction center of the sensor.

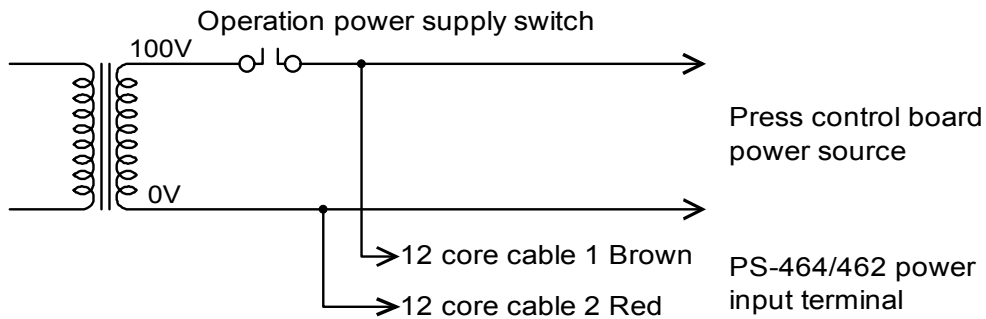
Please connect the case with the sensor head between cases with the detector control box with the electric wire besides the sensor connection cable.



Fixation of connection connector

4-3. Connection of power source

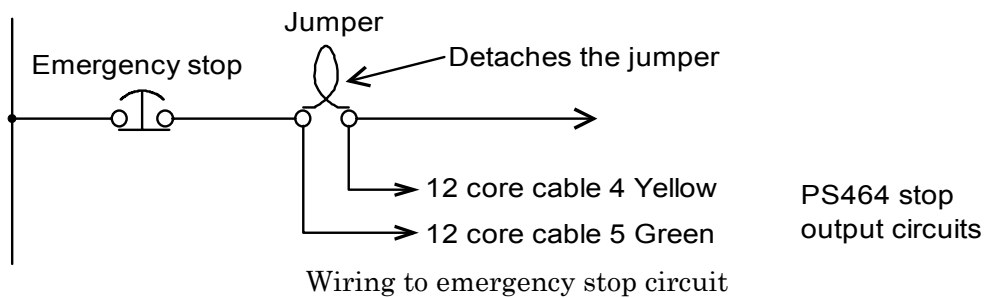
The press operation power source is connected with the brown and red of the output cable.



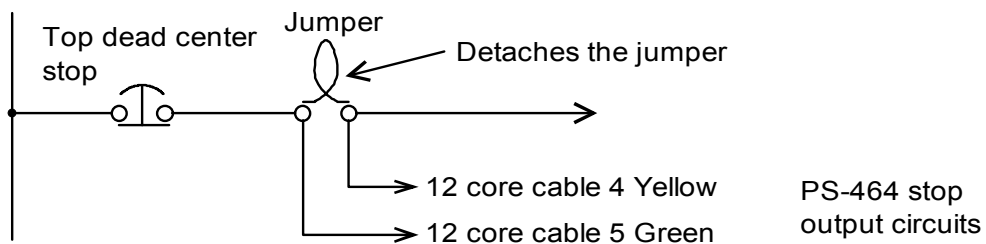
Wiring for power source

4-4. Connection of output circuits

Yellow and green are connected with emergency stop or top dead center (continuous) stop circuit of the press operation circuit.



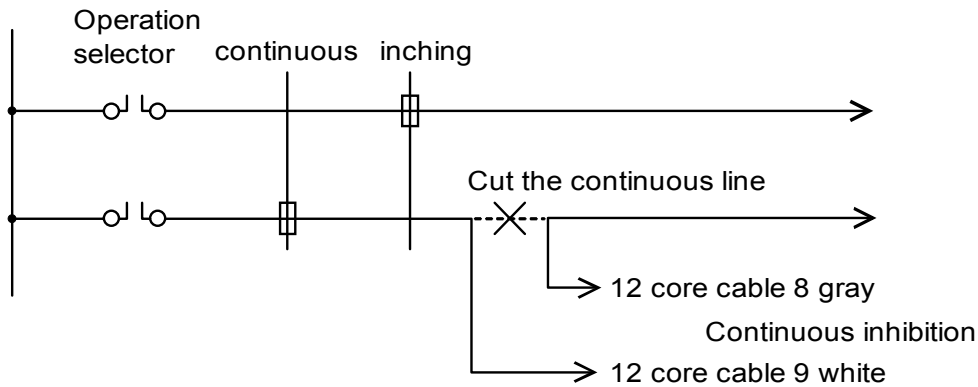
Wiring to emergency stop circuit



Wiring to continuous stop circuit

4-5. Connection of continuous inhibition

When the continuous inhibition output is connected with the circuit of the operation selector, continuous mode of the press cannot be operated by detection OFF.

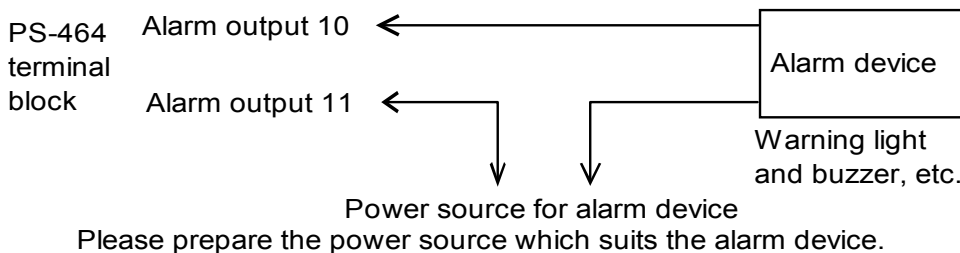


Wiring for continuous inhibition

4-6. Connection of alarm device

Alarm devices such as warning light and buzzers can be operated by using the contact of the alarm output.

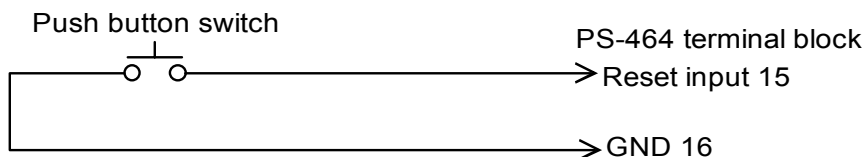
It is necessary to prepare the power source of the alarm device separately.



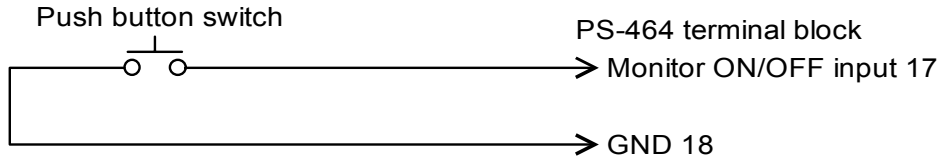
Wiring for alarm device

4-7. Connection of external reset, monitor ON/OFF switches

The operation becomes convenient, if the monitor ON/OFF switch (button) or reset switch is set up in system control panel when system control panel of the detector control box and the press is away. Especially, it is not necessary to wire.



Wiring for external reset switch

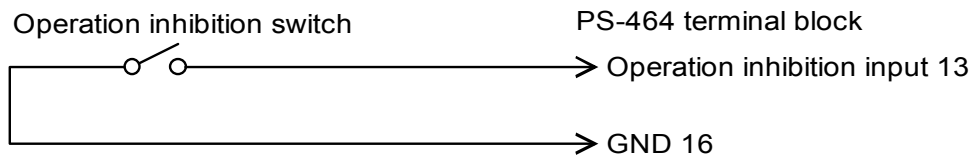


Wiring for external monitor ON/OFF switch

4-8. Connection of operation inhibition switch

The ON/OFF switch of the operation inhibition is connected. Especially, it is not necessary to wire.

The operation inhibition switch becomes an operation inhibition because of turning on.



Wiring for operation inhibition switch

4-9. Connection of external timing signal

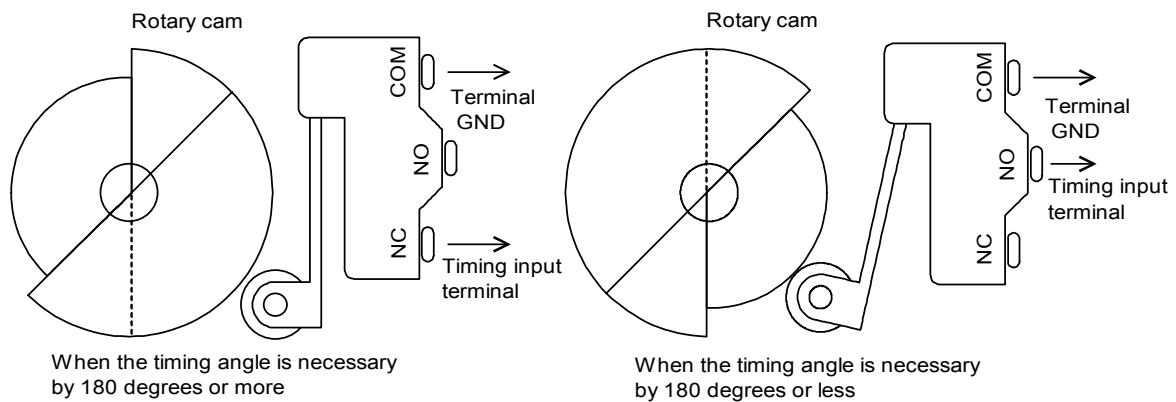
The contact or no-contact of the no-voltage signal inputs to external timing input (3,5) of the terminal block.

The common terminal is a terminal displayed as GND.

There is no necessity of the connection when using the detector in an internal timing mode.

The change in the wiring for the limit switch might become necessary by the width of the timing of a set angle.

Moreover, please note NO and NC of the output when using the proximity switch.



Example of external timing connection

4-10. Power ON/OFF

Power supply switch is in the back of this detector. The detector power ON/OFF by the control power source of the press usually.

4-11. Cable compensation

It is confirmed the sensor is connected and the sensor head is away enough from the proximity block.

The state of the detection monitor OFF (The lamp in the monitor ON/OFF button must blink red) is confirmed.

The monitor ON/OFF button pushes during pushing function (reset) button.

It is confirmed that the compensation value of the channel with which the sensor is connected by the upper and lower arrow button is not 0.

4-12. Confirmation of gap of sensor head and proximity block in bottom dead center

In the state of the detection monitor OFF, the sensor head at the bottom dead center position of the press and the gap of the proximity block are confirmed.

The gap is displayed in the gap digital display by the unit of mm.

Please adjust the gap so that the value may become 1.50 from 0.70.

4-13. Parameter setting

The setting value of each channel, the timing mode, and ON/OFF of the channel are set.

5. Operation

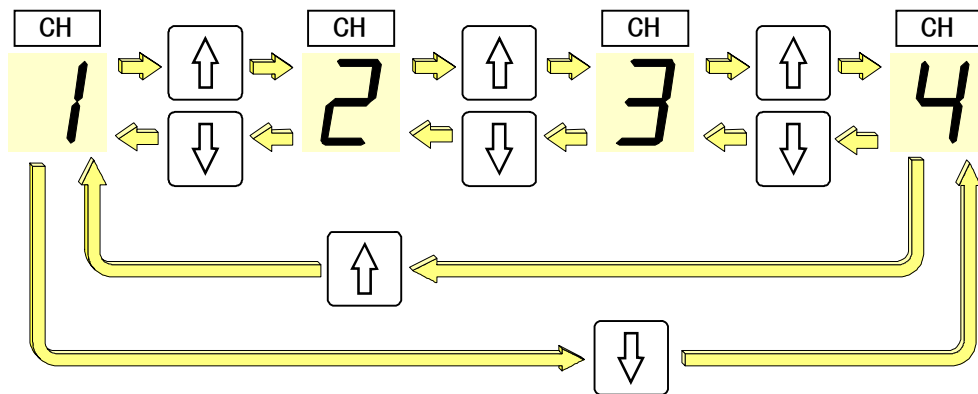
5-1. Selection of display channel

Select the channel which is displayed in the digital display and the micron-indicator.

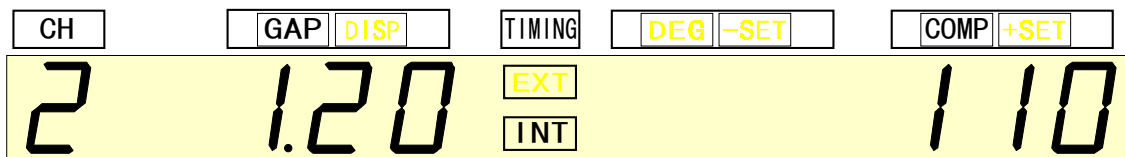
The channel which wants to confirm the digital display does not blink, push the upper and lower arrow button, and display channel is selected. The selected channel is displayed in the channel number display.

The content displayed in the display is different because of monitor ON or OFF. "The gap" and the "compensation value" are displayed in the state of the detection monitor OFF. Moreover, the gap of the sensor head and the proximity block is displayed in the micron-indicator.

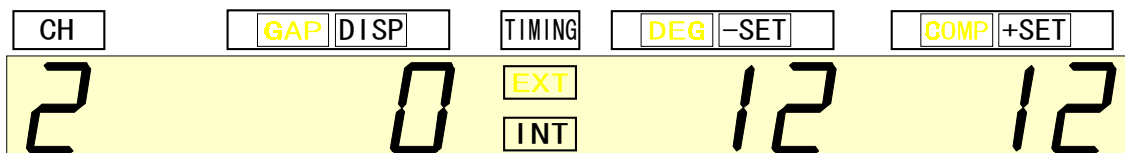
In the state of the detection monitor ON, \pm 'the setting value' and 'displacement' are displayed. The setting value and displacement are displayed in the micron-indicator. However, displacement is not displayed until actual detection is done.



Selection of display channel



Display in state of detection monitor OFF



Display in state of detection monitor ON

Difference of content of digital display

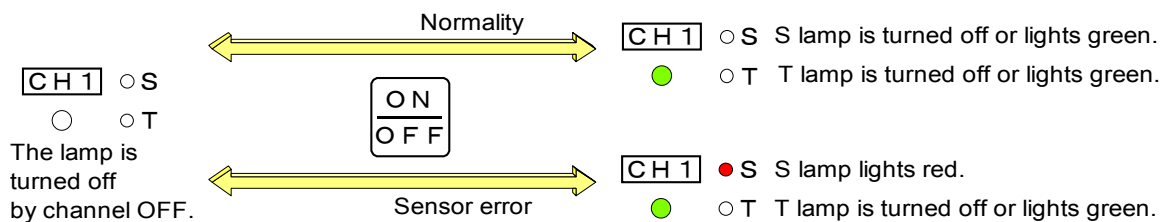
(Please refer to the function and the operation for the micron-indicator)

5-2. ON/OFF of detection of channel

To turn detection on and off, the corresponding channel ON/OFF button is pushed about the detection of the channel.

If the detection of the channel is turned on, stop display lamp becomes a green lighting. At this time, S(sensor) lamp lights red and stop signal is output when the connection of the sensor is abnormal. T(timing) lamp enters the state decided in the timing mode.

When the detection of the channel is turned off, stop display lamp is turned off. However, stop display lamp of turning off becomes as a red lighting while outputting stop signal. At this time, if the reset button is pushed, the stop display lamp becomes turning off from a red lighting.



ON/OFF of detection of channel

5-3. Detection monitor ON/OFF switch of detection device

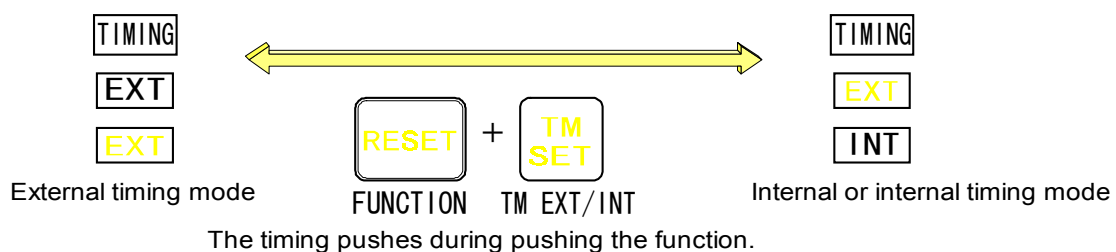
The state of the detection ON/OFF to the entire device can be switched by pushing the monitor ON/OFF button. Display lamp becomes in a green lighting in the state of the detection monitor ON and the lamp becomes a red blinking in the state of the detection monitor OFF.



Detection monitor ON/OFF switch of the detector

5-4. Setting of timing mode

The timing mode pushes timing (angle) button during pushing function (reset) button. The timing mode display lamp changes to INT/EXT by the internal/external timing selection. However, the ON channel cannot be changed during the monitor ON.



Setting of timing mode

5-5. Change in set value

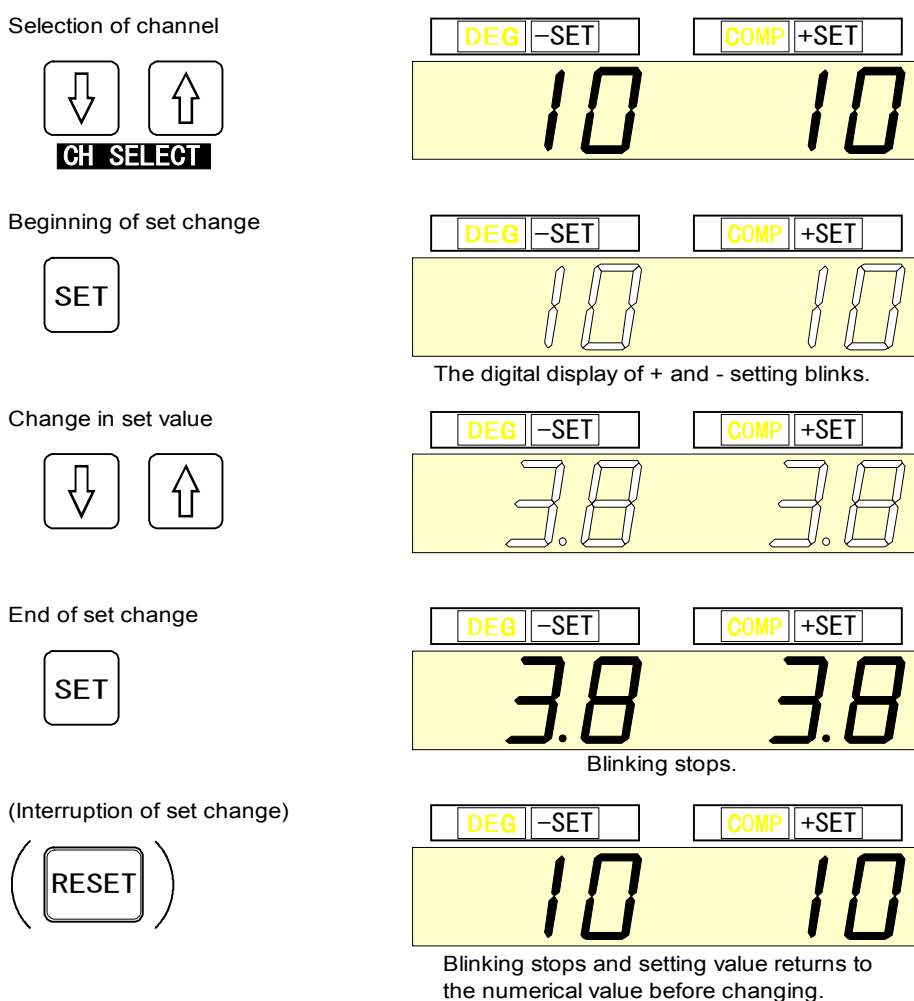
Select the channel which is changing the setting value with the arrow button. (The setting value is displayed in the state of the detection monitor ON. In the state of the detection monitor OFF, even if the channel is selected, the setting value is not displayed. It is displayed that the setting value button is pushed)

Two numerical values of + and - setting values blink when the setting value button is pushed. The numerical value blinking with the arrow button is changed.

If the operation by which the numerical value is reduced from the state being displayed for 3 without the decimal point while changing the numerical value is done, the value becomes a display with the decimal point. Moreover, if the operation to which the numerical value is raised from 7.9 by displaying the decimal point addition is done, the value becomes a display without the decimal point.

If the setting value button is pushed after setting value in a necessary value, a set change is ended. When the reset or the TM button is pushed while the numerical value is blinking, the setting interrupts and the value returns to previous value.

After setting is completed, the sensitivity is changed. If the setting value without the decimal point is set, the resolution becomes $0.1 \mu\text{m}$ range with $1 \mu\text{m}$ and the decimal point.



Change in set value



Operation of lower arrow button



Operation of upper arrow button

DEG	-SET	COMP	+SET
10		10	
9		9	
8		8	
⋮		⋮	
3		3	
19		19	
18		18	
⋮		⋮	
0.2		0.2	

Minimum setting value is 0.2um.

DEG	-SET	COMP	+SET
30		30	
31		31	
32		32	
⋮		⋮	
79		79	
8		8	
9		9	
⋮		⋮	
200		200	

Maximum setting value is 200um.

Select of sensitivity

5-6. Change in -set value

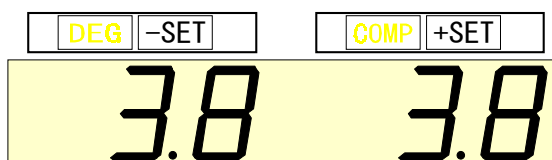
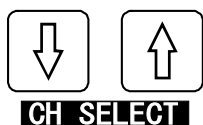
The channel which changes the -set value is selected with the upper and lower arrow button. The setting value is not displayed even if the channel is selected at the detection monitor OFF. It is displayed that the set change beginning is ordered.

When -set value (setting value) button is pushed during pushing function (reset) button, the -set value begins blinking. The -set value blinking with the arrow button is changed.

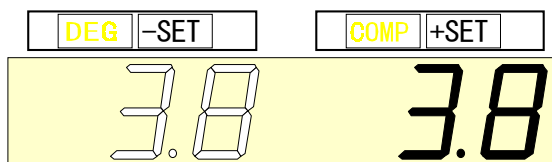
Blinking is stop when the setting value button is pushed after a necessary value is set and setting is completed. When the reset or the TM button is pushed while the -set value is blinking, the setting interrupts and the value returns to previous value.

The opposite cannot be done from the display to the display with the decimal point in the change in the -set value without the decimal point again.- that is Sensitivity cannot be changed by the change in setting.

Selection of channel

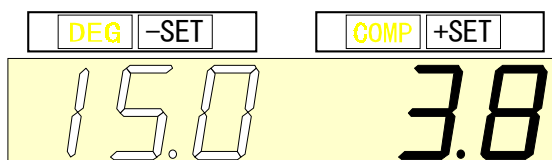


Beginning of set change

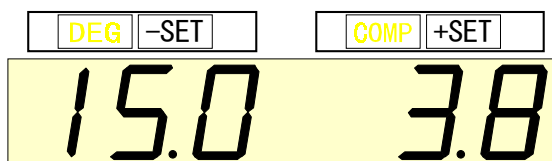


The digital display of - setting blinks.

Change in set value

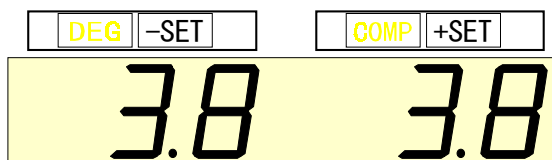


End of set change



Blinking stops.

(interruption of set change)



Blinking stops and setting value returns to the numerical value before changing.

Change in -set value

5-7. Setting of internal angle timing

It is necessary that the internal angle timing select setting and an internal timing mode of the angle.

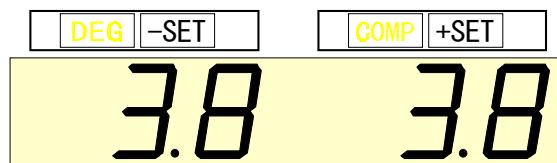
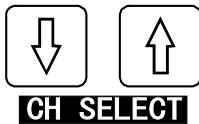
The INT is set in the timing mode (An internal timing is selected).

The angle digital display blinks when the TM button is pushed during two second and setting begins. The angle is set with the upper and lower arrow button. When the TM button is pushed, setting is completed.

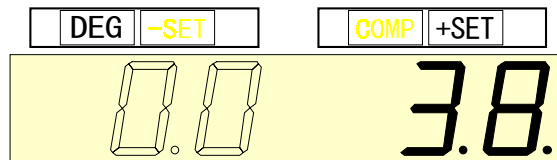
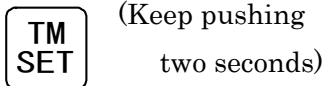
When the reset or the setting value button is pushed during the digital display blinks, setting is interrupted.

The internal angle timing becomes enabled, except 0 degree in the angle setting. Please adjust the angle setting to 0 to use the detector by an internal timing.

Selection of channel

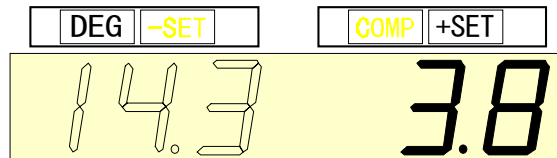


Beginning of set change

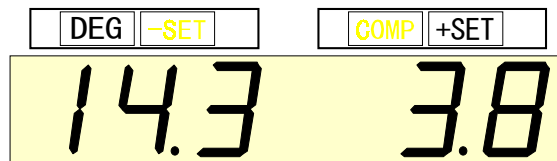


The digital display of the angle blinks.

Change in set value

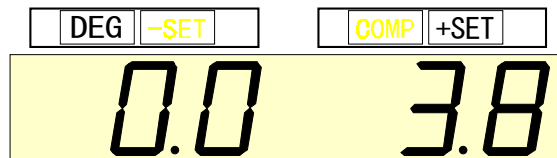


End of set change



Blinking stops.

(Interruption of set change)



Blinking stops and setting value returns to the numerical value before changing.

Confirmation of timing mode

TIMING

EXT

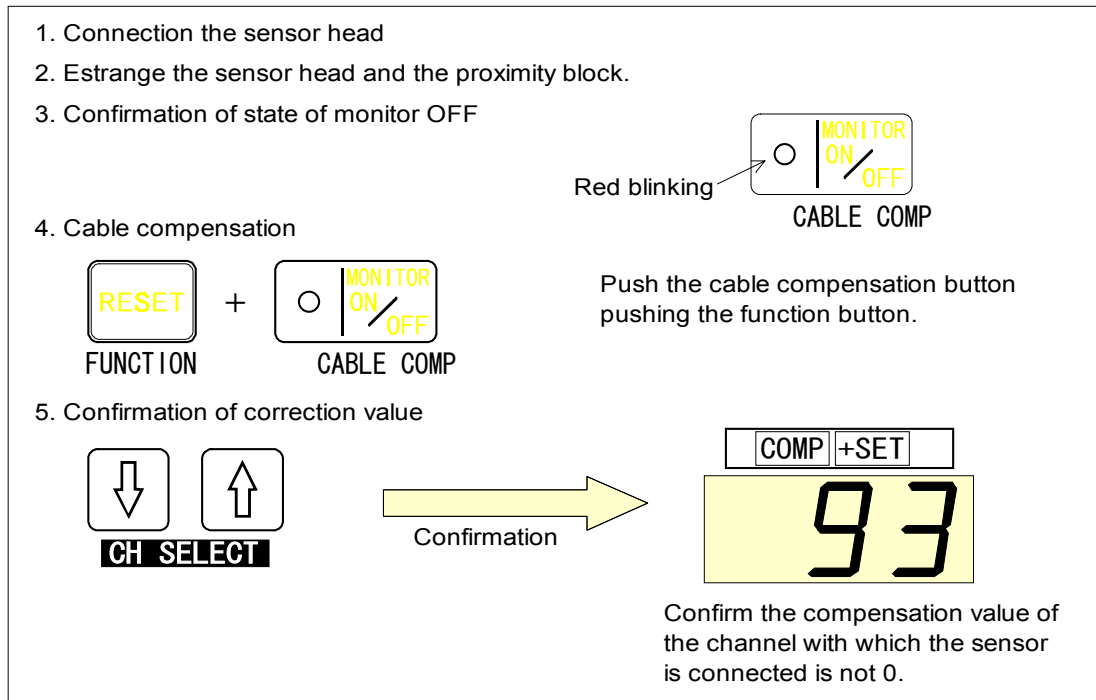
INT

Change the timing to the internal timing mode

Setting of internal angle timing

5-8. Cable compensation

The cable compensation pushes cable compensation (monitor ON/OFF) button during pushing function (reset) button. It is not necessary to select the channel. However, please confirm it is not 0 after the compensation value of the channel which connects the sensor heads.



Cable compensation

5-9. Error and reset of output circuits

To release the error and the output circuits, the reset button is pushed.

However, the sensor error cannot be released by reset.

Make turn OFF to the channel in S lamp lights red, or confirm whether the sensor and the connection cable work normally.

5-10. Function setting

After the operation mode is switched to the function set mode, the function setting is operated. Various functions are set.

Please refer to the item of the function setting.

6. Error

The error is displayed in the lamp or the numerical display.

6-1. Error displayed with lamp

6-1-1. Sensor error

S lamp lights red when becoming a sensor error.

The sensor error occurs when the sensor is not connected or the compensation value of the cable compensation turns on the channel of 0.

Please turn off the channel when you turn on the channel which does not connect the sensor.

Confirm the cable compensation value is not 0 when the sensor is connected. Compensate the cable again when the compensation value is 0

When the compensation value is not 0, it is thought the breakdown of the sensor head or connection cable.

When the cause is removed, the sensor error is automatically released.

6-1-2. Timing error

T lamp lights red when becoming a timing error.

The timing error occurs when the mistake is found in setting external timing when the timing mode is the external.

Release the timing error with the reset button.

6-2. Error displayed with numerical display

6-2-1. Reference value level error (E-01,E-02)

The reference value level error is an error by the saturation of an internal circuit.

Release the error with the reset button.

6-2-2. Reference making error (E-03)

The reference making error occurs when the sensor signal is unstable at the beginning of a reference making.

Release the error with the reset button.

6-2-3. Backup error (E-04)

The backup error is displayed for the voltage of the battery for the memory backup of building into to decrease and for a set content to be initialized.

Please the cable compensation, the timing mode, and set channel ON/OFF again when the backup error is displayed.

Release the error with the reset button.

7. Function setting

The operation can be customized by the function setting. The function setting is done in the function set mode.

Attention: Please confirm the program version displayed at environment operating is the same as version number in the cover of the manual. When version number is different, a set content is not corresponding.

7-1. Switch to function set mode

Set the detector into the detection monitor OFF in normal operation (slug detection) mode. '1' blinks to the digital display of compensation value /+ setting value when the reset button is pushed during pushing the lower arrow button and it is displayed.

Moreover, the figure is displayed in the gap and the displacement digital display.

7-2. Display of contents, setting change

In the function setting, display the item by the number and it is called the item number. The item number is displayed in compensation value /+ set display. The content set in the item number is displayed in the gap and the displacement display.

The item number can select from 0 to 99. The content is not displayed when there is no content setting to the item number.

When the item number blinks, the item number can be changed with the arrow button. Blinking moves to a content when the setting value button is pushed after the item number is selected. A content can be changed by an arrow button with a set content blinks.

Channel ON/OFF button is occasionally used according to a set content. Move the blinking digit with the arrow button when the content is displayed by four digits of 0/1 and it blinks by one digit. And, the content changes with either of channel ON/OFF button.

The setting value which changes is registered when a set button is made after a set content is changed and blinking moves to the item number. To interrupt setting, the reset button is pushed instead of a set button. The setting returns to the previous value before a set content changes when the reset button is pushed then blinking moves to the item number.

7-3. Initialization of setting

Setting can be initialized by pushing a set button during pushing the reset button in the function set mode after item number 0 is selected. The initialization of setting can return setting to the state of the factory shipment.

7-4. Switch to normal operation

Detector changes into the normal operation mode if the TM button is pushed during the function set mode.

7-5. Details of function setting

Please correspond with the latest manual about the mass production goods.

7-5-1. Stop detection time (item number 1)

Set time that it can be confirmed that the press stopped at the stop detection time. A set unit is a second. Time from 0.0 to 65.5 can be set. However, when 0.0 is set, the stop is not detected.

Do not do this setting at all if item number 2/3 or item number 10 is not set.

Initial value 0.0

7-5-2. 1 μ m Number of detection interruptions (item number 2)

1 μ m number of detection interruptions sets the number of detection interruptions when 1 μ m unit detection. Number from 0 to 9999 can be set.

As for the channel which is turning on the detection initialization of item number 10, this setting is disregarded.

Initial value 0

7-5-3. 0.1 μ m Number of detection interruptions (item number 3)

0.1 μ m number of detection interruptions sets the number of detection interruptions when 0.1 μ m unit detection. Number from 0 to 9999 can be set.

As for the channel which is turning on the detection initialization of item number 10, this setting is disregarded.

Initial value 0

7-5-4. Tentative standard detection (item number 4)

The tentative standard detection orders detection to begin before a standard making is completed. Set 0 or 1 of each channels. 0 is setting by which the tentative standard is not detected and 1 is setting by which it is done.

The display is from left digits in order to 1, 2, 3, and 4 channels.

When 1 is set in item number 7, this setting is disregarded.

Initial value 0000

7-5-5. 1 μ m Detection waiting stroke (item number 5)

The 1 μ m detection waiting stroke sets number-1 of strokes from the detection starting instruction by the monitor ON/OFF button / the channel ON/OFF button to beginning of making of the previous average standard.

9999 can be set from 0 in setting.

However, even the previous average standard making beginning needs two strokes or more.

Initial value 2

7-5-6. 0.1 μ mDetection waiting stroke (item number 6)

The 0.1 μ m detection waiting stroke sets number-1 of strokes from the detection starting instruction by the monitor ON/OFF button / the channel ON/OFF button to beginning of making of the previous average standard.

9999 can be set from 0 in setting.

However, even the previous average standard making beginning needs two strokes or more.
Initial value 2

7-5-7. The sample number of previous standard (item number 7)

How many sample values making the standard of average sets the sample number.

Please set setting within the range from 1 to 64.

Initial value 2

7-5-8. Reservation item (item number 8)

Do not change this reservation item.

Initial value 5

7-5-9. Automatic return count (item number 9)

The number of automatic return strokes sets the number of strokes for the return in the state of detection from the detection invalidity.

9999 can be set from 0 in the set value. The automatic return function does not operate if 0 is set in the set value.

Initial value 30.

7-5-10. Detection initialization (item number 10)

The detection initialization specifies the channel initialized by the stop detection or the reset operation. Set the stop detection by item number 1.

Setting is 0 or 1 in each channel. When 0 is set, it is 'Do not do the detection initialization'. When one is set, it is 'Do the detection initialization'. The content display is 4 digits. It is from the left in order to 1, 2, 3, and 4 channels.

Initial value 0000.

7-5-11. Key repeat waiting time (item number 11)

The key repeat waiting time is waiting time until key repeat is begun when the upper and lower arrow button has been kept pushing.

A set unit is [mS]. Please set key repeat waiting time within the range from 1 to 9999.

Initial value 400mS

7-5-12. Key repetition time (item number 12)

The repetition time of key repeat of the upper and lower arrow button is set at the key repeat time.

A set unit is [mS]. Please set key repeat time within the range from 1 to 9999.

Initial value 200mS

7-5-13. Sensor error output (item number 13)

The sensor error output sets whether turning on the error output at detection monitor OFF.

Set 0 or 1 in the sensor error output. 0 is setting of 'Do not output ' and 1 is setting of 'Do output '.

Initial value 1

7-5-14. Set-end time (item number 14)

When a set change is left in the normal operation mode without ending (A set content is in the state of blinking), a set change is automatically interrupted.

Time from the last operation of a set change to the automatic interruption of setting is set at the set-end time.

A set unit is a second. Please set set-end time within the range from 0.1 to 65.5 seconds.

Initial value 20.0 seconds

7-5-15. μ m set lower limit (item number 15)

1 μ m set lower limit sets lower limit of the interval which can be set in 1 μ m range.

In the normal operation mode, the change in the setting value which falls below this setting becomes range set of 0.1 μ m resolution.

A set unit is μ m. Give setting as smaller value than [(0.1 μ m set upper limit setting value) \div 10] within the range from 2 to 19.

Initial value 3

7-5-16. 0.1 μ m set upper limit (item number 16)

0.1 μ m set upper limit sets the upper limit which can be set in 0.1 μ m range.

This setting is assumed to be a unit of 0.1 μ m. 100 is set and display shows 10.0 μ m. In the normal operation mode, the change in the setting value more than this setting becomes range set of 1 μ m.

Adjust setting to value bigger than the value of [(value of 1 μ m set lower limit setting) \times 10] within the range from 10 to 200.

Initial value 80

7-5-17. Setting value brightness (item number 17)

The set value brightness specifies the brightness of the set value displayed to micron-indicator.

Set 0 or 1 in the set value. Brightness darkens when 0 is set and lightens if 1 is set.

Initial value 0

7-5-18. External input polarity (item number 18)

As for the external input polarity, the operation inhibition are decided.

The display changes setting with channel ON/OFF button in four digit display of 1 or 0.

Changing is only the rightmost digit. Please do not change other digits. Please do not change unused.

The inputs shuts between GND turning on "0", and opens turning on "1" set

Initial values 0000

7-5-19. External timing polarity (item number 19)

As for the external timing polarity, the input polarity of timing input T12 and T34 in the terminal block is decided.

The display is four digit display of 0 or 1, two digits in the left are T12, and two digits in the right are T34.

Setting is changed with the channel ON/OFF button. The MSB 2 digits or the LSB 2 digits are changed at the same time.

The inputs shuts between GND on to "0", and opens on to "1".

Initial values 1111

7-5-20. Sensor error level (item number 20)

The sensor error level is a numerical value for the disconnection detection of the sensor.

The value sets the sensor error within the range from 0 to 999. It is a numerical value for system construction. Please do not change.

Initial value 40

7-5-21. The timing test external (item number 21)

The timing test external sets enable or disable that the timing test of the channel in the internal timing between external timing.

From the left Display is 4 digit display of 1 or 0, and to CH1, CH2, CH3, and CH4 it

Setting is changed with the channel ON/OFF button. The setting are "0" to disable and "1" to enable.

Initial values 1111

7-5-22. Timing test internal (item number 22)

The timing test internal sets enable or disable that the timing test of the channel in the external timing between internal timing.

From the left Display is 4 digit display of 1 or 0, and to CH1, CH2, CH3, and CH4 it

Setting is changed with the channel ON/OFF button. The setting are "0" to disable and "1" to enable.

Initial values 0000.

7-5-23. Reset output time (item number 23)

Time to output the reset signal from the reset terminal of the terminal block when the reset button is pushed is set at the reset output time.

A set unit is [mS]. 9999 can be set from 0. When 0 is set, the reset signal is not output.

Initial value 200

7-5-24. Monitor ON/OFF output time (item number 24)

Time to output the monitor ON/OFF signal from the monitor ON/OFF terminal of the terminal block when the monitor ON/OFF button is pushed is set at the monitor ON/OFF output time.

A set unit is [ms]. 9999 can be set from 0. When 0 is set, the signal is not output.

Initial value 0

7-5-25. External timing time constant (item number 25)

The external timing time constant sets internal processing time of external timing.

Setting is a unit of 0.1mS. 255 can be set from 0.

When using the stroke which exceeds 2500 SPM, it is necessary to change the set value.

Initial value 100

7-5-26. External input "H" level response time (item number 26, 27, 28, and 29)

It is external input "H" level response time and the anti-chattering time of an external input signal is set at the delay time. The setting value can set 255 from 0.

Item number 26 is an operation inhibition, 27 is reset, 28 is a monitor, and 29 is unused.

Initial value 20

7-5-27. External input "L" level response time (item number 30, 31, 32, and 33)

It is external input "L" level response time and the anti-chattering time of an external input signal is set at the delay time. The setting value can set 255 from 0.

Item number 30 is an operation inhibition, 31 is reset, 32 is a monitor, and 33 is unused.

Initial value 20

7-5-28. Operation inhibition item 1 (item number 34)

Operation inhibition item 1 selects the item by which the panel operation is inhibited when the operation inhibition input is turned on. The operation inhibition of 'Set change', 'Cable compensation', 'Channel ON/OFF', and 'TM SET' can be set.

As for the content display, 0 or 1 is displayed by four digits. The figure corresponds from the left to 'Set change', 'Cable compensation', 'Channel ON/OFF', and 'TM SET'. In 0, 'Permission', 1 is 'Inhibition'.

Initial value 1111

7-5-29. Operation inhibition item 2 (item number 35)

Operation inhibition item 2 selects the item by which the reset and detection monitor ON/OFF operation is inhibited when the operation inhibition input is turned on.

As for the content display, 0 or 1 is displayed by four digits. The figure corresponds from the left to 'Detection monitor button on panel', 'Reset button on panel', 'External detection monitor ON/OFF input', and 'External reset input'. In 0, 'Permission', 1 is 'Inhibition'.

Initial value 0000

7-5-30. Output polarity (item number 36)

The output polarity, decide the polarity of the output relay.

Set 0 or 1. In 0, 'Standard', 1 is 'Reverse'. As for the content display, 0 or 1 is displayed by four digits. The figure corresponds from the left to 'Start', 'Alarm relay', 'Continuous inhibition relay', and 'Emergency relay'

After turning on the power supply, detection becomes invalid if 0 is set in 'Start'. If 1 is set in 'Start' detection becomes valid.

If the power supply is turned off regardless of this setting, the stop output is turned close, and other outputs are turn open.

Initial value 0000

7-5-31. Absolute mode (item number 37)

Absolute mode switches the operation mode from standard to absolutely.

Set 0 or 1 of each channels.

Do not set 1 in this setting.

Initial value 0000

7-5-32. Oscillation voltage error (item number 38)

The oscillation voltage error sets tolerance of the maximum oscillation voltage.

Do not change this setting.

Initial value 2

7-5-33. Operating mode (Item number 39)

Operating mode sets the internal-angle timing extension. When the internal-angle timing is selected, this setting becomes effective. '0' or '1' of four digits is displayed in the display.

The leftmost digit is set the timing mode. 0 selects internal-angle timing. 1 selects timer timing.

The next digit set the unit of timer time. 0 selects 1 second. 1 select 0.1 seconds.

Two digits of the remainder are the reserves. Do not change setting the reserve.

Initial value 0000

7-5-34. Holding mode (item number 40)

The holding mode decides the holding mode of the internal angle timing is 'Peak hold' or 'Sample hold'.

As for the content display, four digits display 0 or 1. The setting are "0" to Peak hold and "1" to Sample hold

Initial value 0000

7-5-35. Operation setting (item number 41)

The operation setting is setting of angle set operation.

When 1 is set in the leftmost digit, it is necessary to push the TM button for 2 seconds for beginning of the angle setting.

The angle is displayed immediately after the TM button was pushed when 1 is set the second digit from the left.

The next digits set external monitor input mode.

The digit of the remainder is a reserve. Do not change setting the reserve.

Initial value 1000

7-5-36. Sensor calibration value (item number 50-82)

The sensor calibration value is a value set in the calibration mode. Do not change the setting.

- CENTER (item number 50)
- LGAIN (item number 51, 52, 53, and 54)
- HGAIN (item number 55, 56, 57, and 58)
- LOFFSET (item number 59, 60, 61, and 62)
- HOFFSET (item number 63, 64, 65, and 66)
- SNGAIN (item number 67, 68, 69, and 70)
- CENTRV (item number 71, 72, 73, and 74)
- TMONV (item number 75, 76, 77, and 78)
- TMOFFV (item number 79, 80, 81, and 82)

7-6. Function set item list

Item number	Function	Setting value	Initial value/content
01	Stop detection time	0-65.5S	0.0mS
02	1 μ m Detection interruptions	0-9999	0
03	0.1 μ m Detection interruptions	0-9999	0
04	Tentative standard detection	0/1	0000 0=do not 1=do
05	1 μ m Detection waiting stroke	0-9999	2
06	0.1 μ m Detection waiting stroke	0-9999	2
07	Reference sample	0-9999	2 1 to 64
08	Reservation	5	
09	Auto-return stroke	0-9999	30
10	Detection Initialization	0/1	0000
11	Key repeat wait time	0-9999ms	400mS
12	Key repeat time	0-9999ms	200mS
13	Sensor error output	0/1	1
14	Set end time	0-65.5S	20.0S
15	1 μ m set lower bound	0-9999	3 1 μ m unit
16	0.1 μ m set upper bound	0-9999	80 0.1 μ m unit
17	Set value brightness	0/1	0
18	External input polarity	0/1	0000 0=close 1=open
19	External timing polarity	0/1	1111 0=close 1=open
20	Sensor error level	0-255	40
21	Timing test by external	0/1	1111 0=not test 1=test
22	Timing test by internal	0/1	0000 0=not test 1=test
23	Reset output time	0-9999mS	200mS
24	Monitor output time	0-9999mS	200mS
25	External timing constant	0-255	100 *0.1mS
26	Up delay time inhibit	0-255mS	20mS
27	Up delay time reset	0-255mS	20mS
28	Up delay time monitor	0-255mS	20mS
29	Up delay time reserve	0-255mS	20mS
30	Down delay time inhibit	0-255mS	20mS
31	Down delay time reset	0-255mS	20mS
32	Down delay time monitor	0-255mS	20mS
33	Down delay time reserve	0-255mS	20mS
34	Operation inhibition item 1	0/1	1110
35	Operation inhibition item 2	0/1	0000
36	Output polarity	0/1	0000

37	Absolute mode	0/1	0000	Do not change
38	Oscillation voltage error	0-255	2	Do not change
39	Operation mode	0/1	0000	
40	Holding mode	0/1	0000	0=peak 1=sample
41	Operation setting	0/1	1000	

50 to 82 Items set the proofreading value. Do not change.

8. Specification and performance

8-1. Detection

Sensor channels	4 (PS-464) 2 (PS-462)
Resolution	1 μ m or 0.1 μ m
Maximum setting value	200 μ m or 20.0 μ m
Nearest gap of sensor head and proximity block (BDC)	0.7-1.5 mm
Sensor environment temperature	0-55°C
Detection timing	external, internal, and internal angle timing
Sensor cable	3m or 5m (1m MIN, 15m MAX)
SPM	4000SPM (MAX)

8-2. Output (stop, alarm, and continuous inhibition)

Relay output	250VAC/30VDC 3.0A (MAX)
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8-3. External input (Reset, Monitor ON/OFF, Operation inhibition)

H level	Over 9V Under 1mA
L level	Under 3V Over 8mA (10mA MAX)

8-4. Display and setting

Micron-indicator	61 Point Bar Graph
Displacement display	3 Digit
\pm SET value	3 Digit

8-5. Power source

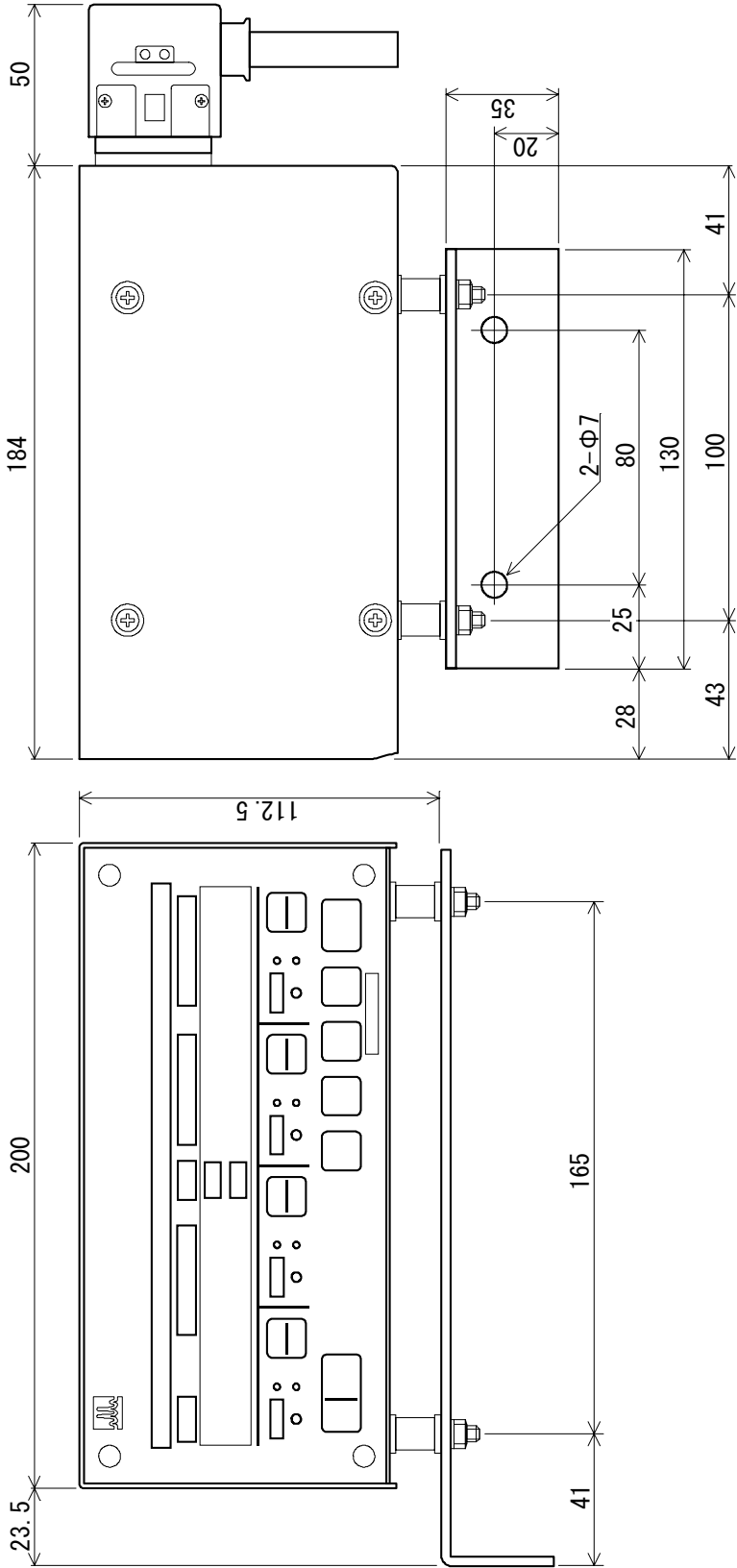
Voltage	AC100-240V \pm 10% 50/60Hz
Consumption	22VA (MAX)

8-6. Others

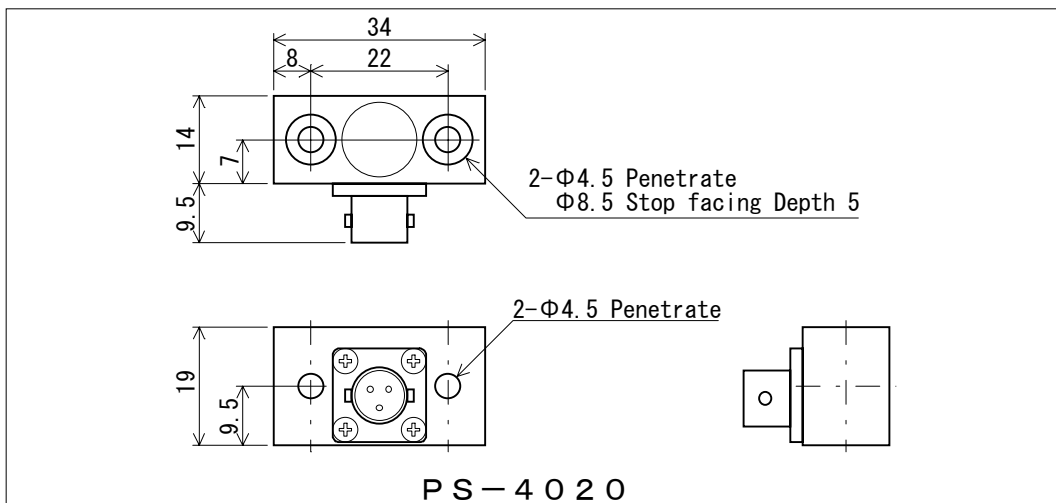
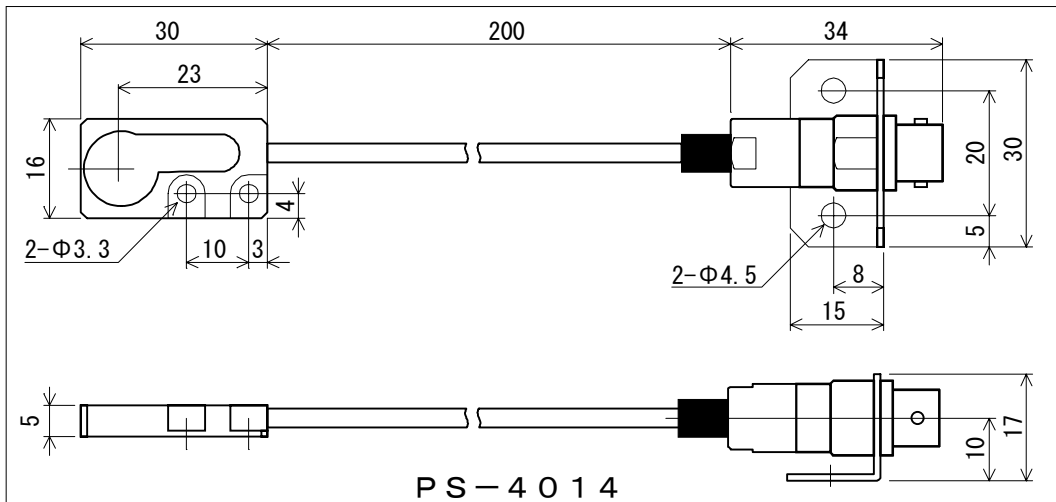
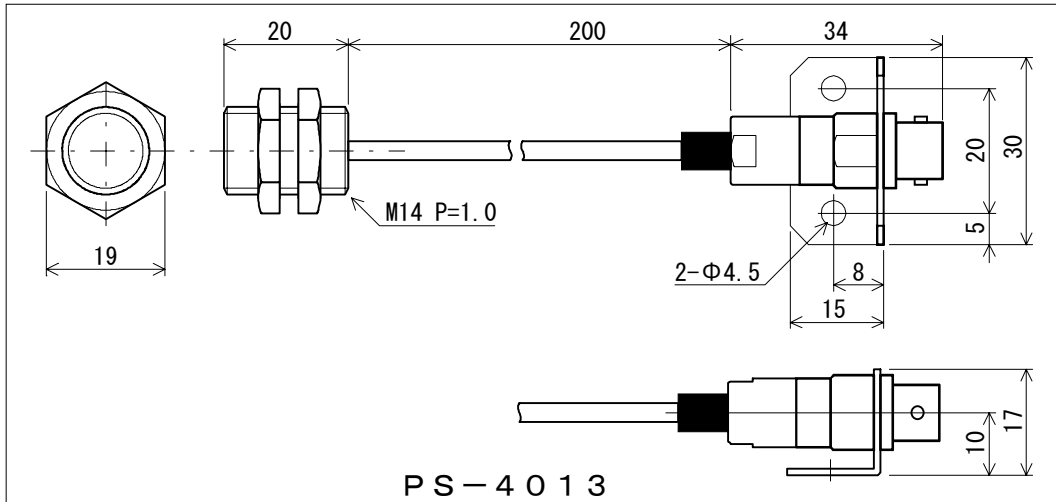
Weight	2.8kg
Environmental temperature	0-55°C
Environmental humidity	35-85%RH
Size	200W \times 98.5H \times 184D mm

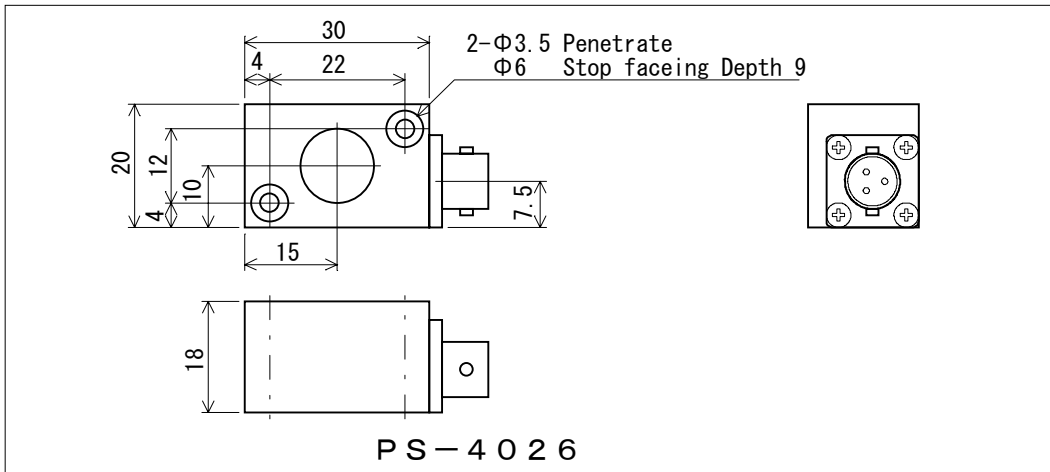
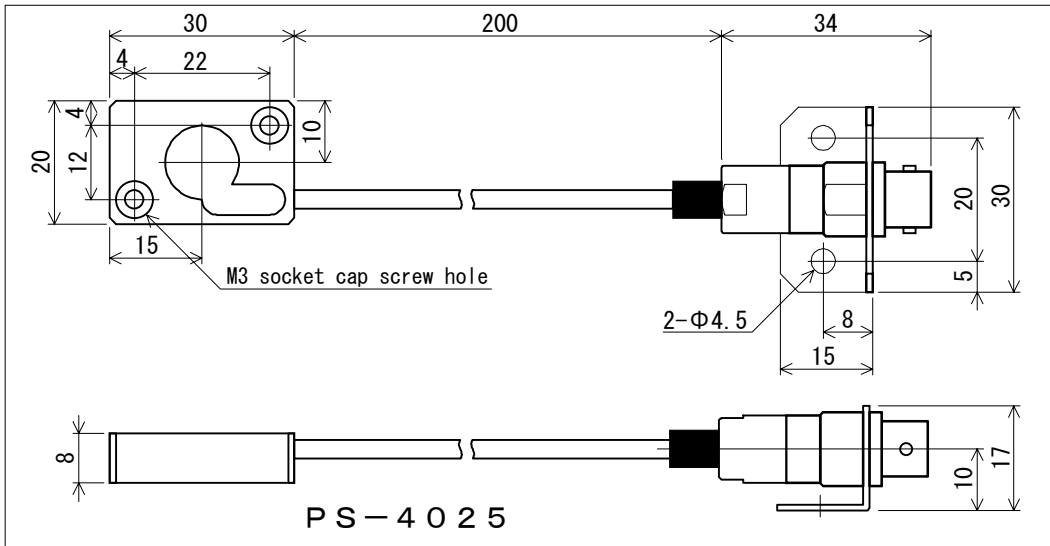
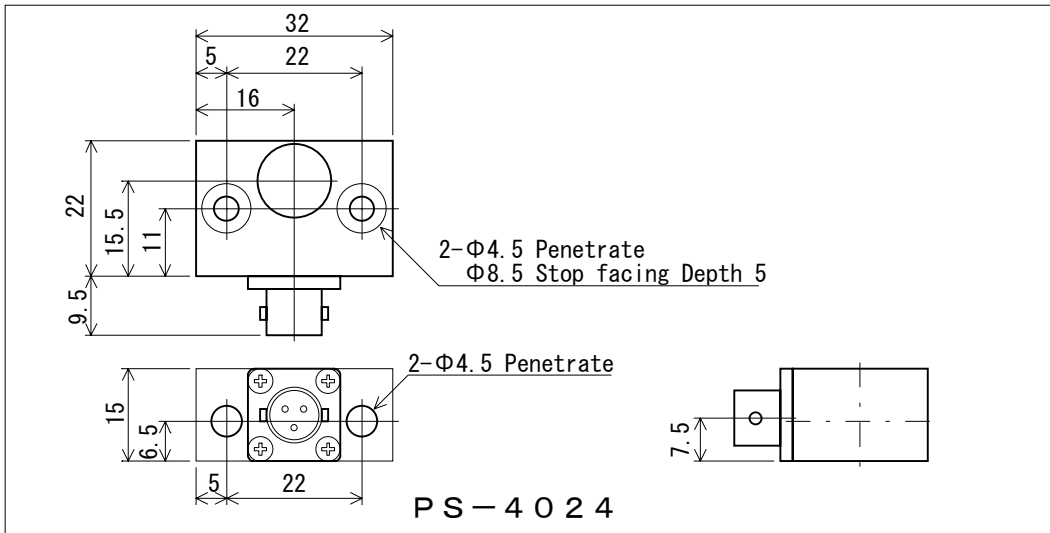
9. Reference size

9-1. Control box



9-2. Sensor head





WARRANTY

All Sugiyama Electric System products are warranted against defective materials and workmanship for one year from the date of delivery. Any questions with respect to the warranty should be taken up with your Sugiyama Electric System Field Engineer or agents.

All requests for repairs and replacement parts should be directed to the Sugiyama Electric System Office or agents in your area. This will assure you the fastest possible service. Please include the instrument Type Number or Part Number and Serial Number with all requests for parts or service.

Specifications and price change privileges reserved.

SUGIYAMA ELECTRIC SYSTEM INC.

1-30, KAMITAKABATA, NAKAGAWA-KU, NAGOYA 454 JAPAN

TEL 81-52-363-0501 FAX 81-52-351-7585