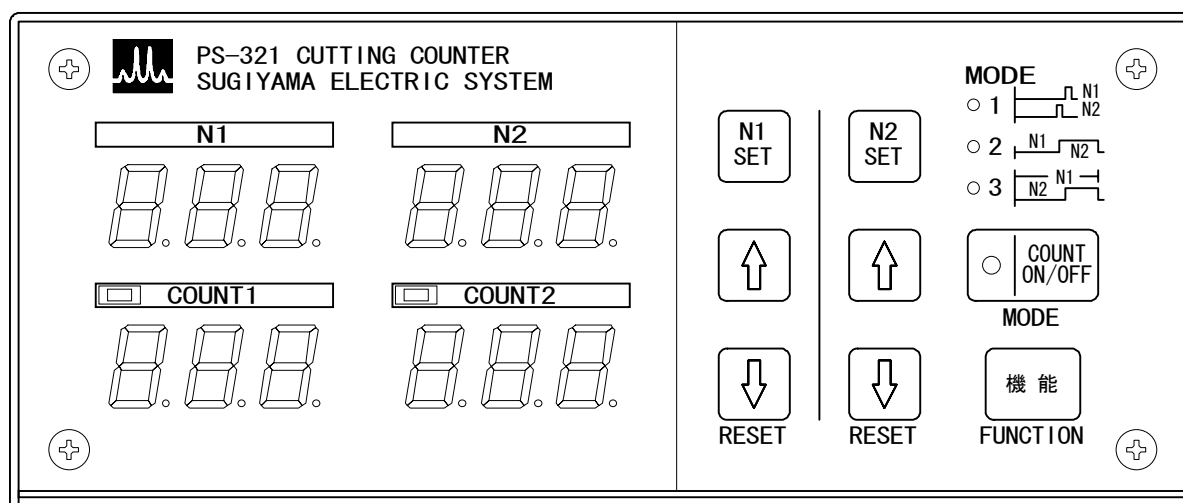


Cutting counter

# PS-321

## Instruction manual

Program version 1.1x



Thank you very much because PS-321 is had to be purchased this time indeed.

PS-321 is a cutting counter which was designed by making good use of know how and the computer technology which 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

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

When the power that exceeds a specified voltage is applied, PS-321 causes a fire.

Do not touch the terminal block.

Touching the metal part of the terminal block causes the electric shock.

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

When break down, remove the power source immediately and do not use.

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



## Attention

Fix this device surely.

Do not use the detector under the splashed water and other liquids to cause 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

PS-321 is a cutting counter device which makes and outputs the control signal by which the count cycle is assumed to be a unit from the count input signal.

### 1-1. Features

- PS321 was prepared the three counting modes.

Three kinds of count modes can be selected by the operation from the panel.

The count mode 1 operates the two independent channels.

The count mode 2, and 3 control the output for one counter by setting 2 position.

- The count value can be changed by the operation from the panel.

Even if the count signal is not given, the adjustment of the count value can be done by the operation from the panel.

- The unnecessary operation can be inhibit.

There is an operation inhibition to prevent unauthorized operation.

- The SSR output and the open collector output are independent.

PS321 provide the open collector and SSR output of each channel, that can be 4 outputs (maximum).

- Output format can be changed.

PS321 can be selected 4 output formations in mode 1 and further 15 formations in mode 2/3.

The format of the output changes by the function setting.

Output format sets the open collector and SSR output separately.

- PS321 also provides the function of the counting interruption and the counting reset, etc..

In the counting Mode 2/3, count input 2 can be used as a counting control input.

- The internal SSR can be use for the output.

AC-SSR or DC-SSR for the output can be use. Moreover, SSR can be exchanged by detaching the back plate.

PS321 must use the specified SSR by our company.

- Remote control can be done by the option.

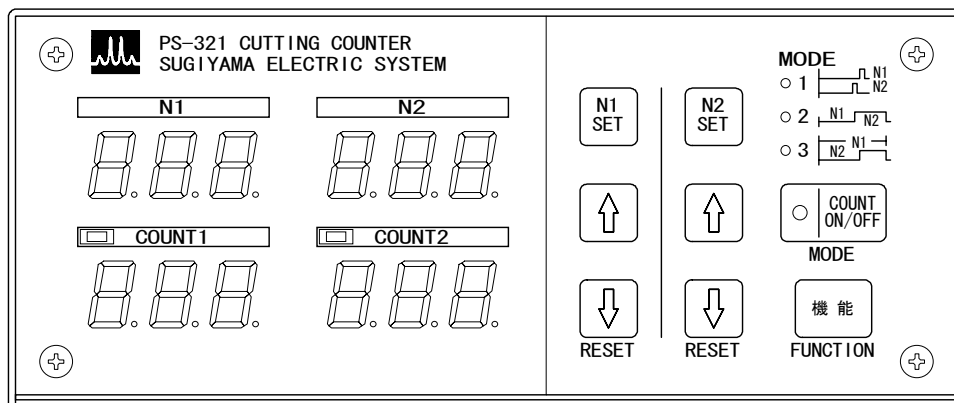
In the instruction such as sequencers, most operations consist of remoteness.

However, the option setting is needed.

## 2. Explanation of panel

### 2-1. Front panel

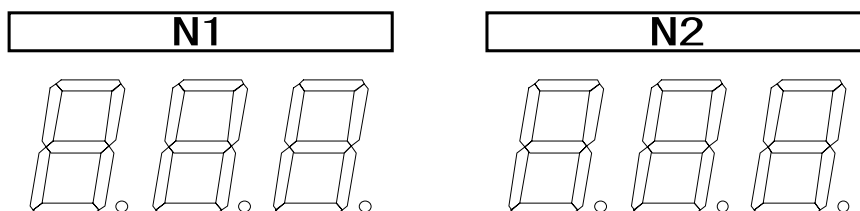
A front panel includes the digital display and the operation button, etc.



Front panel

#### 2-1-1. Setting value display

The setting value display is two 3-digit displays of N1 and N2. The figure blinks while changing setting.

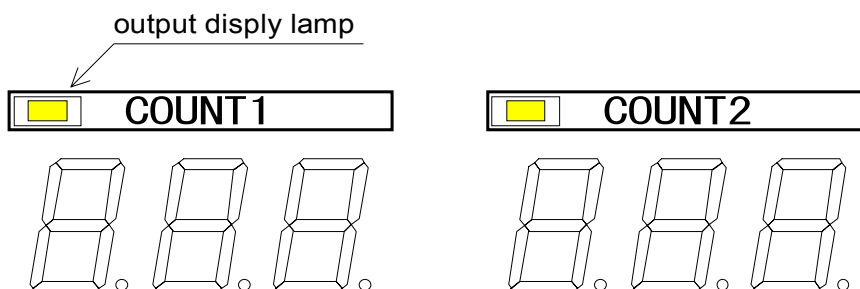


Setting value display

#### 2-1-2. Count display and output display

The count display is two 3-digit displays of COUNT1 and COUNT2.

The output lamp displays the state of the corresponding SSR output. COUNT1 corresponds in output 1 and COUNT2 corresponds to output 2. When the output is turning on, the lamp is lighted.



Count display and output display

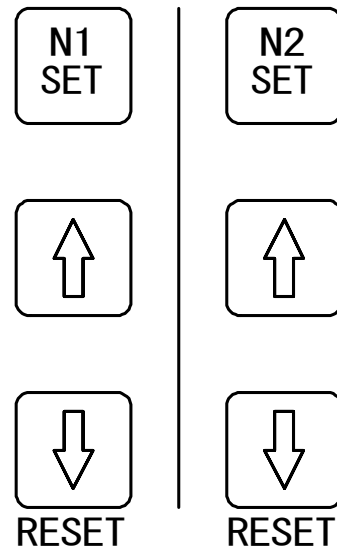
### 2-1-3. Set button and upper and lower arrow button

A set button and the upper and lower arrow button have two pairs (the N1 and the N2). Each pair corresponds to digital display N1 and COUNT1 or N2 and COUNT2.

A set button orders a set beginning and the end of the setting value change. The setting value changes with the upper and lower arrow button corresponding to time when the setting value display blinks.

The count value is changed when the upper or lower arrow button is pushed while the setting value display does not blink.

When the lower arrow button is pushed while pushing the function button, the corresponding count value is reset.



### 2-1-4. Count ON/OFF button and count state lamp

The count ON/OFF button switches the count-enable or disable. The count state lamp is lighted green when the count is enabled, the lamp blinks red during the disabled.

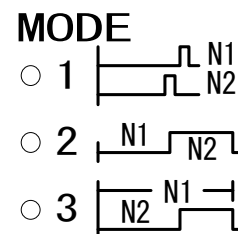
The count mode can be changed by pushing count ON/OFF button during pushing the function button.



### 2-1-5. Count mode display lamp

Count mode display lamp displays a present count mode.

One piece of three lamps is lighted.



### 2-1-6. Function button

The function button works as a function change button of other buttons.

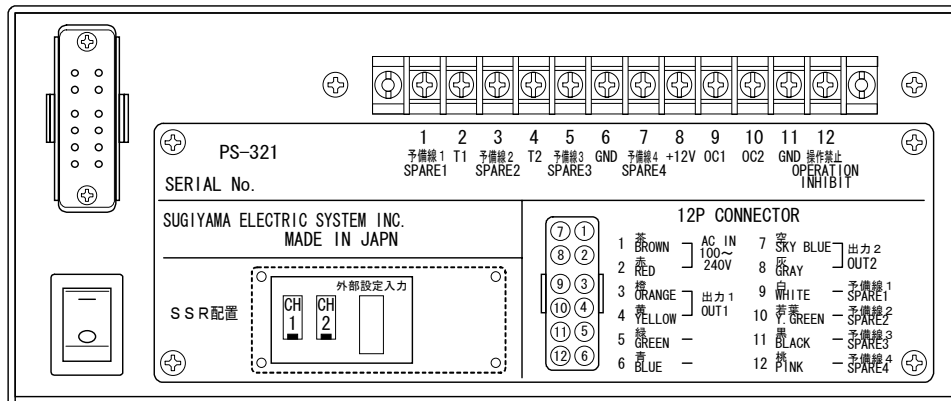
If the lower arrow button is pushed during pushing this button, the lower arrow button becomes reset of the count value. Moreover, count ON/OFF button similarly becomes a count mode change.

When the function button is pushed while settings, setting is interrupted.



## 2-2. The back panel

The back panel equipped the terminal block and the output connector, etc..



The back panel

### 2-2-1. Terminal block

The terminal block includes the count input, the spare wire, the opening collector output, and the operation inhibition input, etc.

T1 and T2 are the count input.

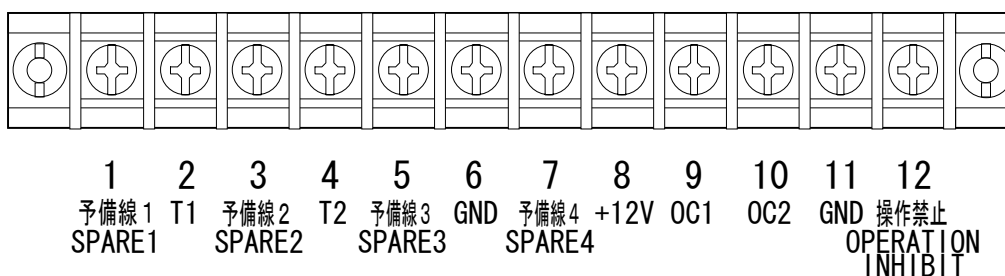
The spare wire 1 to 4 are connecting to the output connector inside.

+12V is the DC power sources for the proximity switch. Please use +12V by 100mA or less.

OC1 and OC2 are the open collector outputs.

PS321 enters the operation inhibition when the operation inhibition input connects to GND terminal.

GND is connecting to the chassis of this equipment for the common GND signal of the I/O signal on the terminal block.

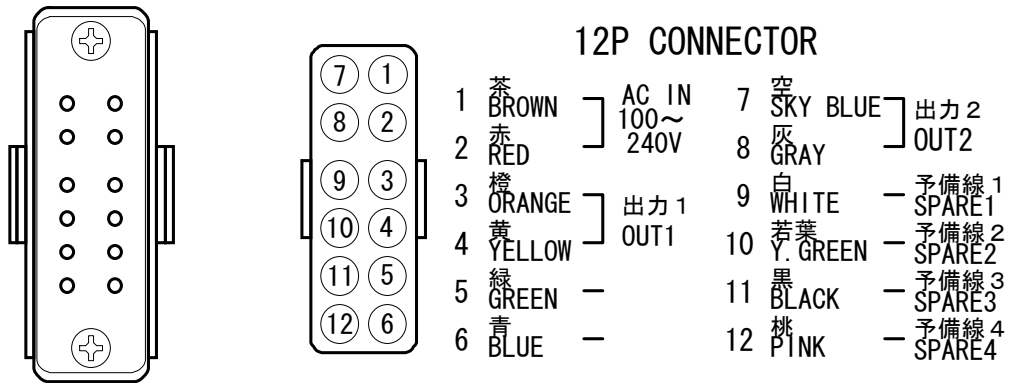


The terminal block.



### 2-2-2. Output connector

The output connector is 12 pins. The output connector is connected with the power source, the SSR output, and the spare wire.

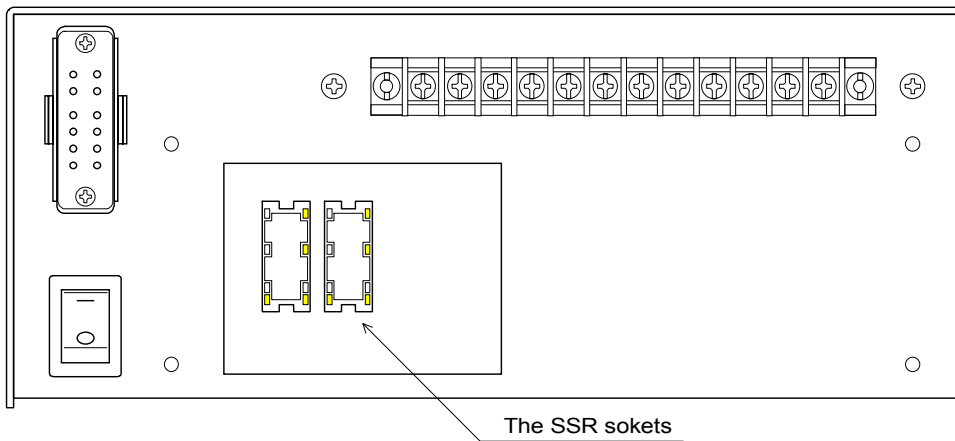


Output connector

### 2-2-3. SSR socket

The SSR socket is seen when the back plate is removed.

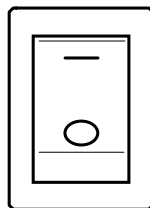
PS321 must install the specified SSR by our company.



SSR socket

### 2-2-4. Power switch

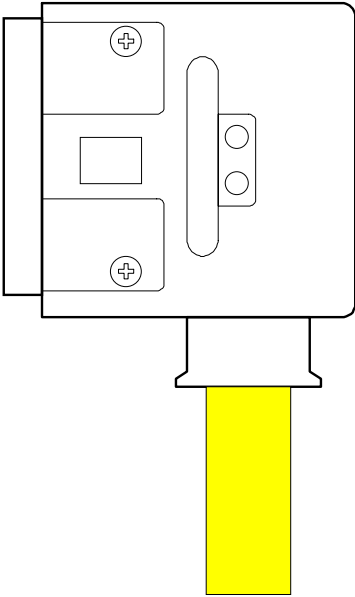
This equipment's power source turns ON or OFF by the power switch. Power switch has to avoid a frequent operation.



Power switch

2-2-5. Output cable

The output cable is connected with the output connector in the back of PS-321.



Output cable with connector

### 3. Function and operation

#### 3-1. Outline of operation

PS-321 has count mode 1 of two independent channels and count mode 2/3 to which two set values can be set.

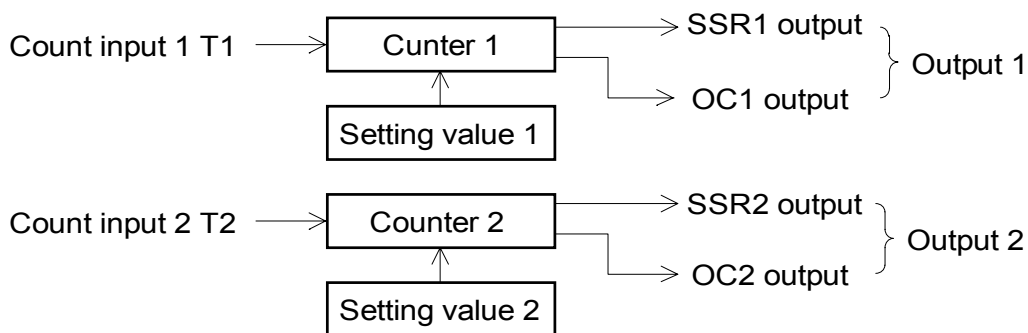
The count Mode 1 operates PS-321 as an independent counting counter of 2 channels. Counted input signals are compared with one set value and the result is output.

PS-321 operates as a counter with two set values in count Mode 2 and 3. A basic operation is the same though count Mode 2 and 3 are different the definition of the set value. The signal from counted count input T1 outputs the result to output 1 and output 2 compared with two set values.

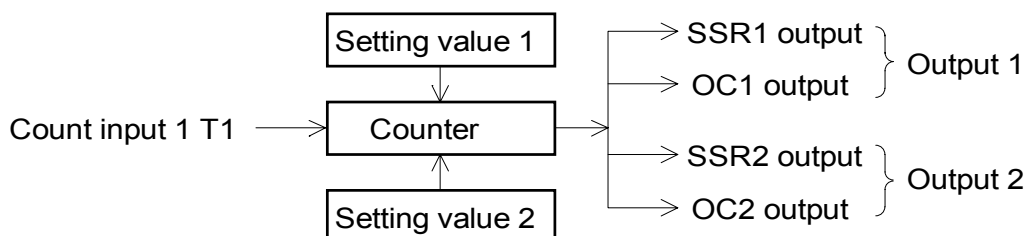
The output is made in each mode as a unit with the cycle of the input and the input level. Specify how to make the output by output format of the function setting.

There are two kinds of outputs (the open collector and the SSR output) and are four outputs in total. Output format can be specified for each output. Output format selects one from four forms in count Mode 1 and select one from 15 forms in Mode 2/3.

In count Mode 2/3, do not use the T2 input to input the count. The T2 input can be used to control the counter such as clear counter and the count on and off. Set the T2 mode by the function setting to use the T2 input by the count and Mode 2/3.



Count mode 1

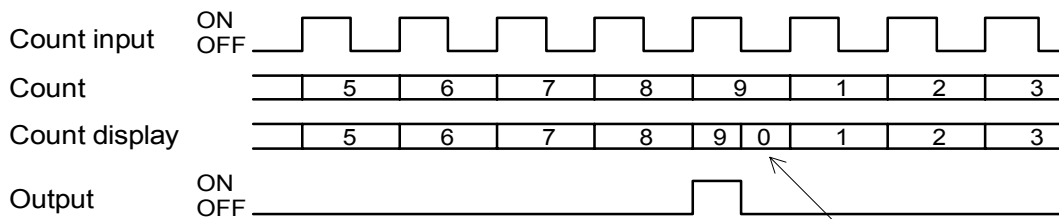


Count mode 2 and 3

### 3-2. Count mode 1

The count Mode 1 operate PS-321 as a independent cutting counter of 2 channels.

As for the counter, increment is done in each signal of the count input. The count value becomes one because of the following count input that the count value is corresponding to the set value. The N1 side counter is output in output 1 and the N2 side counter outputs the result to output 2. The count display displays the numerical value of the counter. hen the output is turned off when the count value is corresponding to the set value, the count display becomes 0.



When the set value is corresponding to the count and output is turned off, the display becomes 0.

Operation in initial state (example of set value=9)

The operation of the above figure is set in count Mode 1 while shipped. When the count value is corresponding to the set value and the input is turned on, the output is turned on.

Output format can be changed by changing setting output format. Please refer to the count and Mode 1 output format for details.

The counter can be adjusted to 0 only by the reset operation. When the count value is 0, the output is not turned on.

The count value is not changed even if the setting value is changed under than the counted value when the setting value is changed.

Attention: If the count is equal to the set value and the count input turns on the power supply of PS-321 while turned on, the output is turned on.

### 3-3. Count mode 2

The count Mode 2 controls the output with two setting values for one counter.

The set value is N1 and N2. N1 is the first half set value and N2 is a set value in the latter half. N1+N2 is the maximum value of the count.

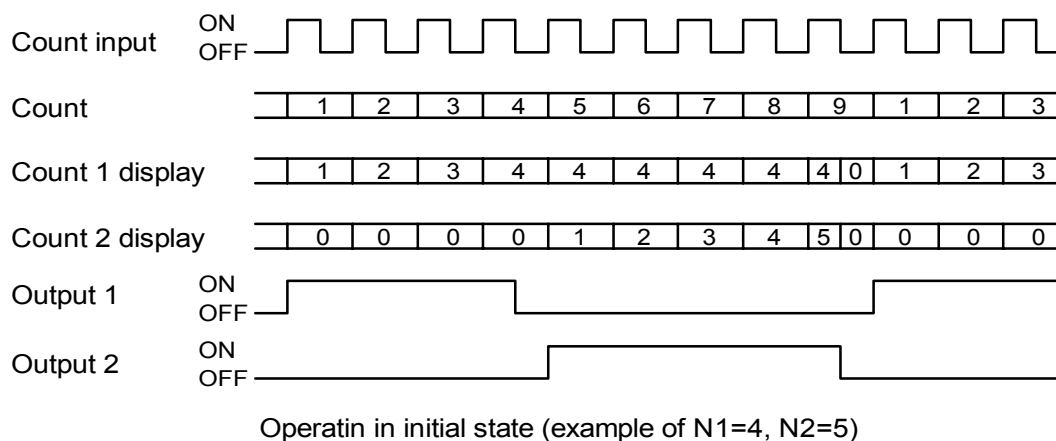
As for the counter, increment is done in each signal of the count input. The counter becomes one because of the following count input that the count is corresponding to N1+N2.

The count 1 display displays the count value until the count value becomes N1. Even if the count value becomes N1 or more, the display is a value of N1.

When the count value is N1 or less, the count 2 displays display 0. The count two displays display the value of count value- N1 until the count value becomes N1+N2.

When the count value becomes N1+N2 and output 1 and 2 is turned off, the count 1 and 2 displays become 0.

Figure shows the example of the operation of count Mode 2. Moreover, the operation of figure is in the state of a standard setting.



In a standard setting, output 1 is turned on while display 1 display form 1 to N1, and output 2 is turned on while display 2 displays from 1 to N2.

Output format can be changed by changing setting output format. Please refer to the count and Mode 2/3 output format for details.

The counter can be adjusted to 0 only by the reset operation. When the count value is 0, the output is not turned on.

The count value is not changed even if N1+N2 is changed under than the counted value when the setting value is changed.

### 3-4. Count mode 3

The count 3 controls the output with two setting values for one counter.

The set value is N1 and N2. N1 is the maximum value of the count. N2 is the first half set value.

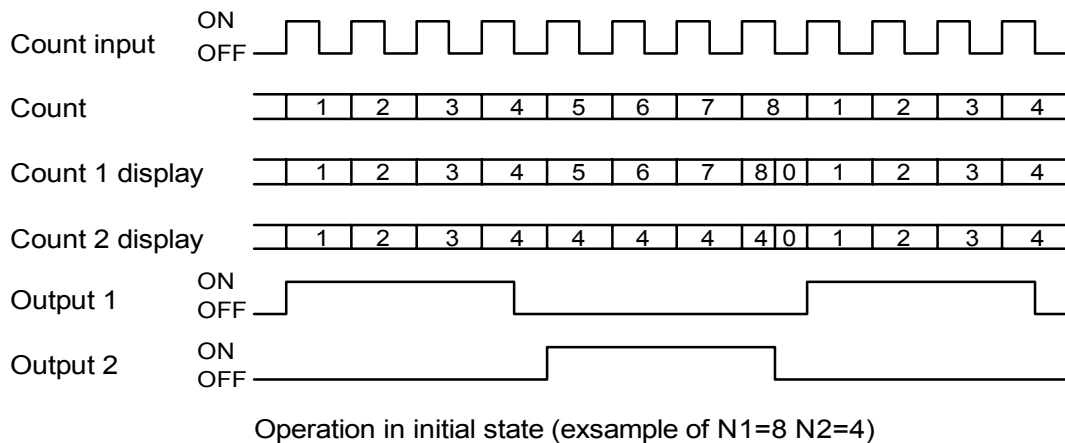
As for the counter, increment is done in each signal of the count input. The counter becomes 1 because of the following count input that the count is corresponding to N1.

Count 1 display displays the count value.

The count 2 display displays the count value until the count value becomes N2. Even if the count value becomes N2 or more, the display is a value of N2.

When the count value becomes N1 and output 1 and 2 is turned off, the count 1 and 2 displays become 0.

Figure shows the example of the operation of count Mode 3. Moreover, the operation of figure is in the state of a standard setting.



In a standard setting, output 1 is turned on while display 2 display form 1 to N2, and output 2 is turned on while display 1 displays from 1 to N2+1.

Output format can be changed by changing setting output format. Please refer to the count and Mode 2/3 output format for details.

The counter can be adjusted to 0 only by the reset operation. When the count value is 0, the output is not turned on.

The count value is not changed even if N1 is changed under than the counted value when the setting value is changed. Count value is becomes to 1 of the following count input.

Be careful please not to do a normal operation when you set bigger value than N1 in N2.

### 3-5. Count input, Counter

The count input has T1 and T2.

The Mode 1 uses T1 and T2 for each count input, the Mode 2 and 3 uses T1 for count.

The count input is turned on with the input terminal connected to GND. When the input terminal is open, the count input becomes off. Moreover, this polarity can be reversed by the function setting.

When the counter input is turned ON, the counter does +1 of the count value at the turn ON edge.

The counter does following operations regardless of the count mode.

- ① One increases to the count value by each count input.
- ② The count value becomes “1” when there is a count input when the count value is more than the setting value.
- ③ The count value becomes 0 by reset operation.
- ④ When the count mode is changed, all counters are reset and become 0.

The counter does not become 0 without reset.

### 3-6. Count with arrow button

The counter can increase and decrease the count value by operating the upper and lower arrow button. The count value can be done +1 with upper arrow button and -1 be done with the lower arrow button.

However, the count with the arrow button might not become an anticipated output.

### 3-7. Output display

The output display displays the state of the SSR output.

Because the SSR output and the open-collector output was set same output format in the state of the shipment, the open-collector output is corresponding to the output display.

When the SSR output and the open-collector output are different setting in the output-format, the open-collector output is not corresponding to the output display.

### 3-8. Count ON/OFF

The count can be interrupted with count ON/OFF button. Moreover, the output is turned off when the count is OFF.

### 3-9. Output format of count mode 1

Output format of count mode 1 specifies the form of the output signal in count mode 1.

The output format of the count mode 1 is selected from 4 type of the following.

① Output format 0 (Input synchronous 1 pulse)

When the setting value is equal to the count value, turns ON to the output while the count-input is turned ON.

② Output format 1 (Input synchronized n pulse)

When the setting value is not equal to the count value, turns ON to the output while the count-input is turned ON.

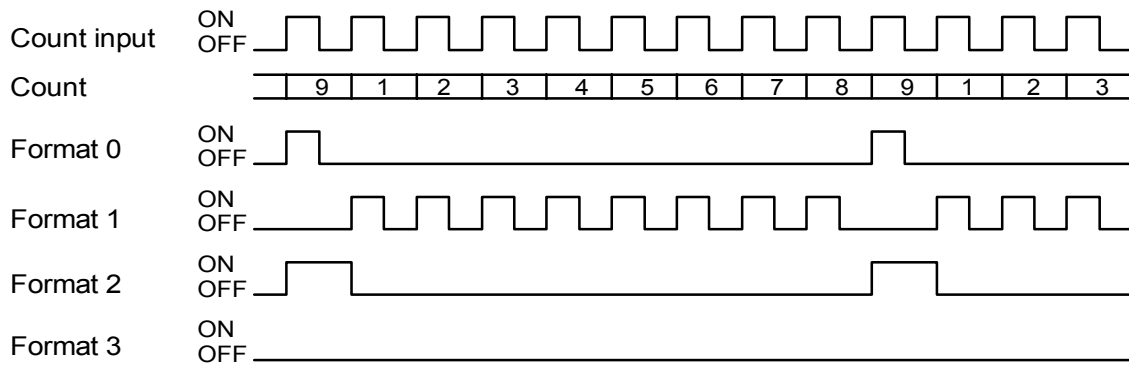
However, the output is not turned ON at count value 0 by reset.

③ Output format 2 (Cycle 1 pulse)

The output format 2 turns on the output when the count value is equal to the setting value.

④ Output format 3 (no output)

The output is not turned ON as for the output format 3.



Example of setting value=9

The output format is specified for each output of the open collector and SSR.

Output format changes by the function setting. Change from the item number 1 by 4 in order of OC1, OC2, and SSR1 and SSR2. The set value is 0-3.

The shipment sets 0 in all output formats.



### 3-10. Output format of Count mode 2 and 3

Count mode 2 and count mode 3 are different style of the setting value but a basic operation is same. The setting value is converted as follows and explains.

Count mode 2	N1	→	former setting value
Count mode 2	N2	→	post setting value
Count mode 2	N1+N2	→	total setting value
Count mode 3	N1	→	total setting value
Count mode 3	N2	→	former setting value
Count mode3	N1-N2	→	post setting value

The output of the counter is specified by output format of the function setting (item number 8-11). Set output format in (OC1,OC2,SSR1,SSR2) at each output.

Separate output format in count Mode 2 and count mode 3 cannot be set.

Output format of the count Mode 2 and Mode 3 is selected from 16 kinds of the following.

① Output format 0 (Former setting value input synchronous leading edge 1 pulse)

Output turns on when the count input is turned on at the count value = 1.

② Output format 1 (Former setting value input synchronous back edge 1 pulse)

Output turns on when the count input is turned on at the count value = the former setting value.

③ Output format 2 (former setting value input synchronous count width)

Output turns on when the count input is turned on at the count value  $\leq$  former setting value. However, the output is not turned on at count value 0 by reset.

④ Output format 3 (former setting value input synchronization n pulse)

Output turns on when the count input is turned on at the count value < former setting value. However, the output is not turned on at count value 0 by reset.

⑤ Output format 4 (former setting value cycle leading-edge 1 pulse)

Output turns on when the count value is 1. However, the output is not turned on at count value 0 by reset.

⑥ Output format 5 (former setting value cycle back-edge 1 pulse)

Output on when the count value = former setting value.

⑦ Output format 6 (former setting value cycle count width)

Output turns on when the count value < former setting value . However, the output is not turned on at count value 0 by reset.

⑧ Output format 7 (no output).

The output is not turned on in the output format 7.

⑨ Output format 8 (post-setting value input-synchronous leading-edge 1 pulse )

Output turns on when the count input is turned on at the count value = ( the former setting value +1 ).

⑩ Output format 9 (post-setting value input-synchronous back-edge 1 pulse )

Output turns on when the count input is turned on at the count value = the cycle setting

value.

⑪ Output format 10 (post-setting value input-synchronous count width)

Output turns on when the count input is turns on at the count value = ( the former setting value + 1 ≤ the count value < the cycle-setting value ).

⑫ Output format 11 (post-setting value input-synchronization n pulse)

Output turns on when the count input is turned on at the count value = ( former setting value + 1 ).

⑬ Output format 12 (leading edge 1 pulse of the post-setting value cycle)

Output turns on when the count value = ( former setting value + 1 ).

⑭ Output format 13 (leading edge 1 pulse of the post-setting value cycle)

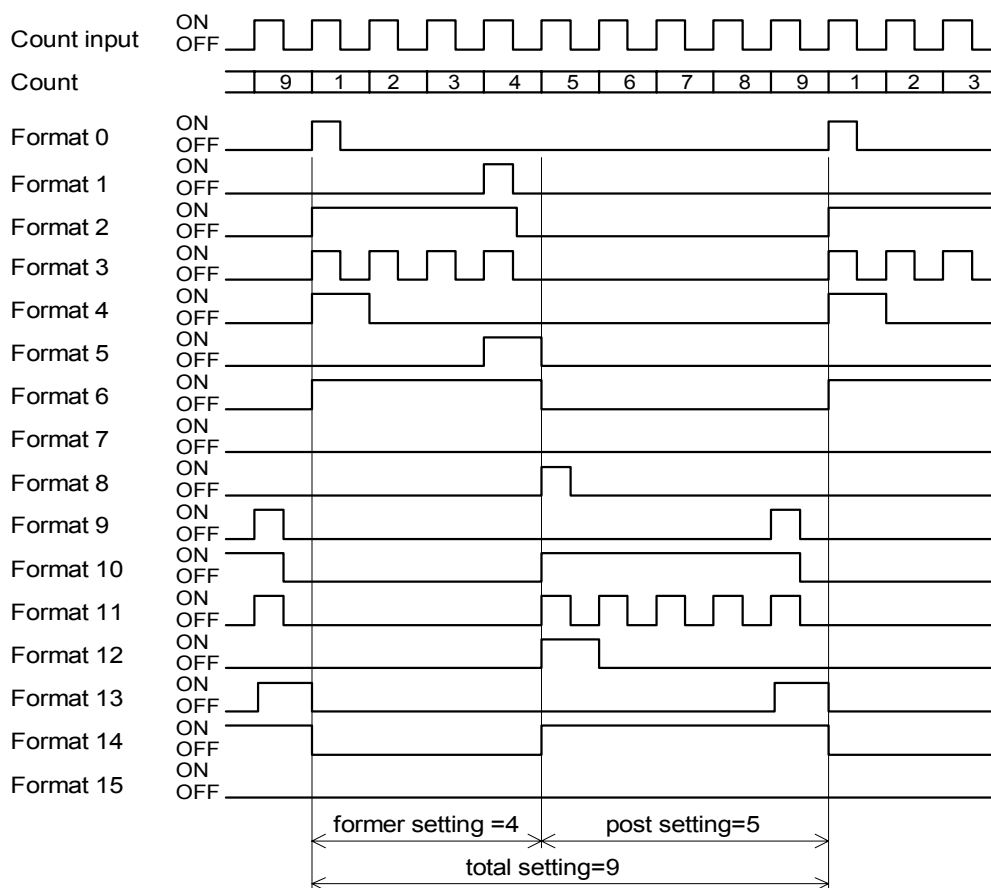
Output turns on when the count value is equal to cycle setting values.

⑮ Output format 14 (count width with post-setting value cycle)

Output turns on while the count value ≥ ( former setting value + 1 ).

⑯ Output format 15 (no output).

The output is not turned on in the output format 15.



The above figure shows the operation example. Setting by count Mode 2 is N1=4 and N2=5. Setting count mode 3 is N1=9 and N2=4.

Output format in the state of the shipment is output 2=10 of output 1=2.

### 3-11. Timer output mode

The level output can be changed to the timer output by specifying the timer output mode.

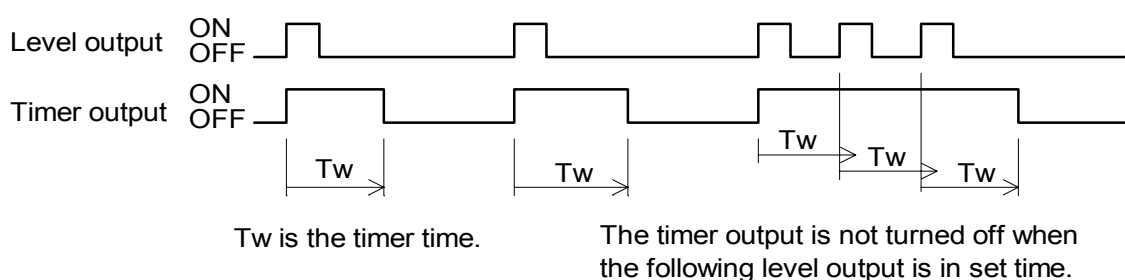
The level output is an output set by output format. The timer output turns on the output between the timer time from ON edge that the level output is turned on.

When setting the time of the timer is 0, the output is not turned on.

The timer output mode is set by the function setting. The timer output mode is set at each count mode and each output.

The timer output time can be set to output 1 and output 2. O/C of the same channel and the SSR output become set of the same time.

The change of the time of the timer starts by pushing a up-arrow button while pushing the function button.



### 3-12. T2 mode

In count Mode 2, and count mode 3, the functions can be allocated in count input (T2) not used usually. The T2 mode is disregarded in the count Mode 1.

The function of the T2 input is allocated by the T2 mode of the function setting (item number 15).

Setting which uses the T2 input is 1-5 though 0-15 can be set in the T2 mode. The T2 mode is '0' and is not used in the state of the factory shipment.

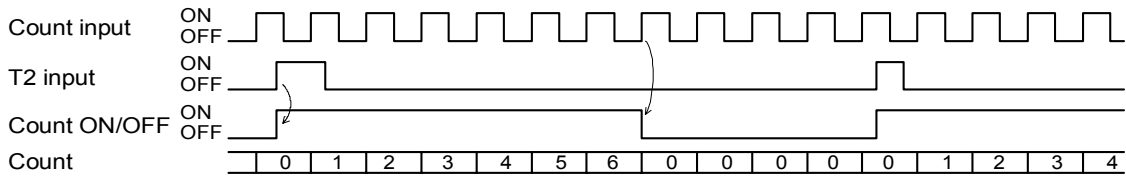
#### 3-12-1. T2 Mode 1 (cycle start)

T2 Mode 1 is a mode to count the counter only by one cycle by the input signal of the T2 input.

The counter is waited for until the turning on edge of the T2 input is detected by the waiting state (state of count OFF). When the turning on edge is detected, the counter has been turned ON and begins counting.

When the counting value becomes the setting value, the PS321 changes into a waiting state by the following count input (state of count OFF).

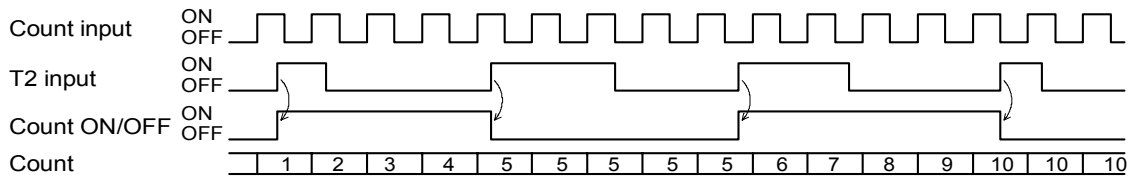
Moreover, the count can begin also with count ON/OFF button.



### 3-12-2. T2 Mode 2 (edge start/stop)

T2 Mode 2 controls count ON/OFF by the turning on edge of the T2 input.

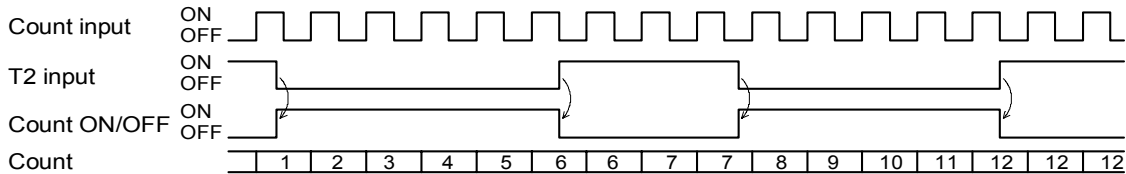
The count ON and OFF are changed by the turning on edge of the T2 input. Moreover, the count ON/OFF button can be change the count ON and OFF.



### 3-12-3. T2 mode 3 (level start/stop)

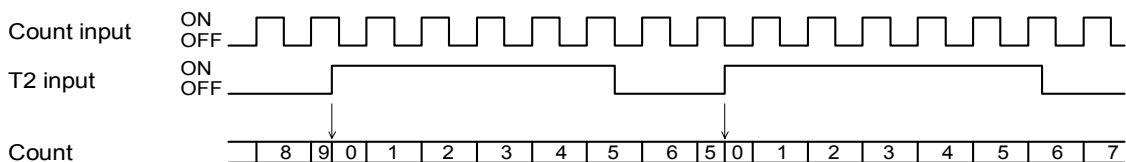
In the T2 mode 3, the count is ON when the T2 input is ON, and the count is OFF during OFF period of the T2 input.

The operation of count ON/OFF button becomes invalidity.



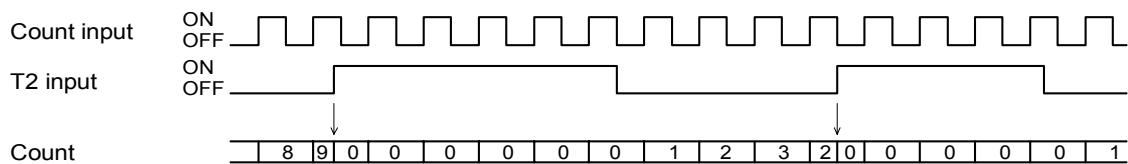
### 3-12-4. T2 mode 4 (edge reset)

T2 mode 4 resets the counter by the ON edge of the T2 input.



### 3-12-5. T2 mode 5 (level reset)

When the T2 input is turned ON, T2 mode 5 resets the counter.



### 3-13. Operation inhibition

The operation inhibition prohibits the button operation of the panel.

The PS464 is changed to the operation inhibition when the operation inhibition input connects to the GND in the terminal block located in the back panel.

### 3-14. Backup

The content changed by an operation usual like the count value of the counter and the setting value, etc. is backed up with the memory battery. In the backup, possible time is about two weeks.

Backup error 'Err-90' is displayed at power ON by the backup battery voltage reduction. When the function button is pushed, error indication is reset.

The count value and the time of the timer are initialized in 0 when the backup error occurs and the setting value is initialized by one.

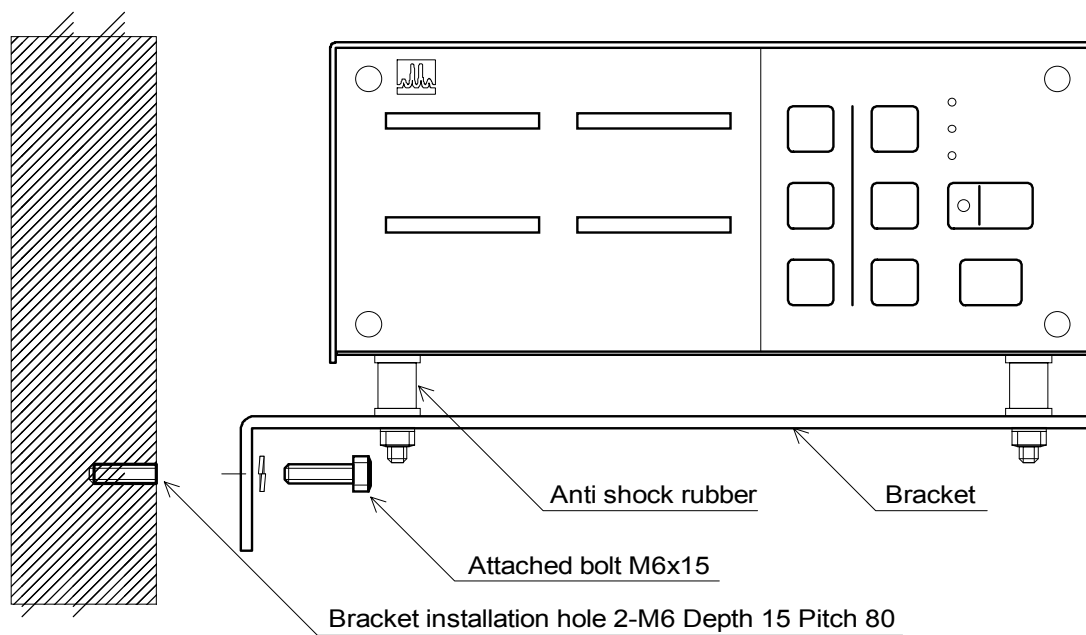
It is no erased if the PS321 occurs in the backup error, because the setting value in a set mode is memorized into EEPROM.

## 4. Installation

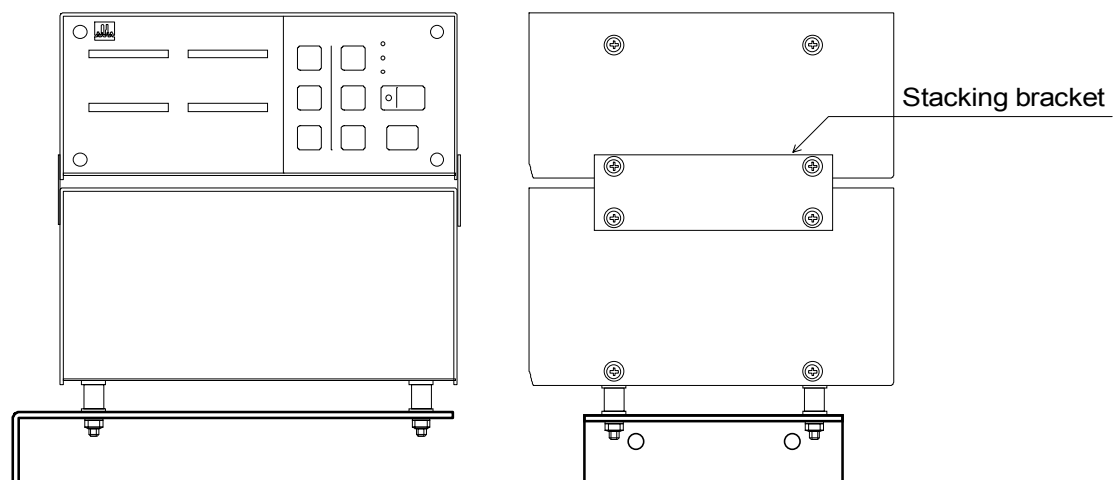
### 4-1. Installation of control box

Please install the control box by the standard bracket or use the stacking bracket for stacking installation on the other products.

Please choose to the place of installation except vibration and dust. Especially, please note that the PS321 causes possibly the malfunction and the breakdown if stamping oil and a metallic powder are splashed.



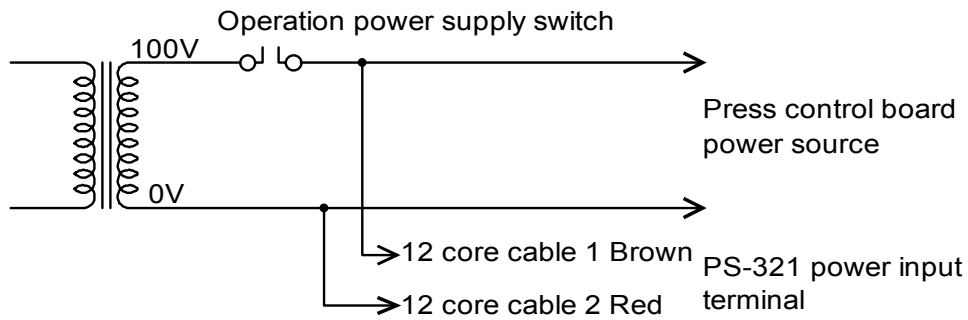
Install with standard bracket



Installation of control box with stacking bracket

#### 4-2. Wiring for power source

Connects the red and the brown wires of the output cable to the press operation power source.

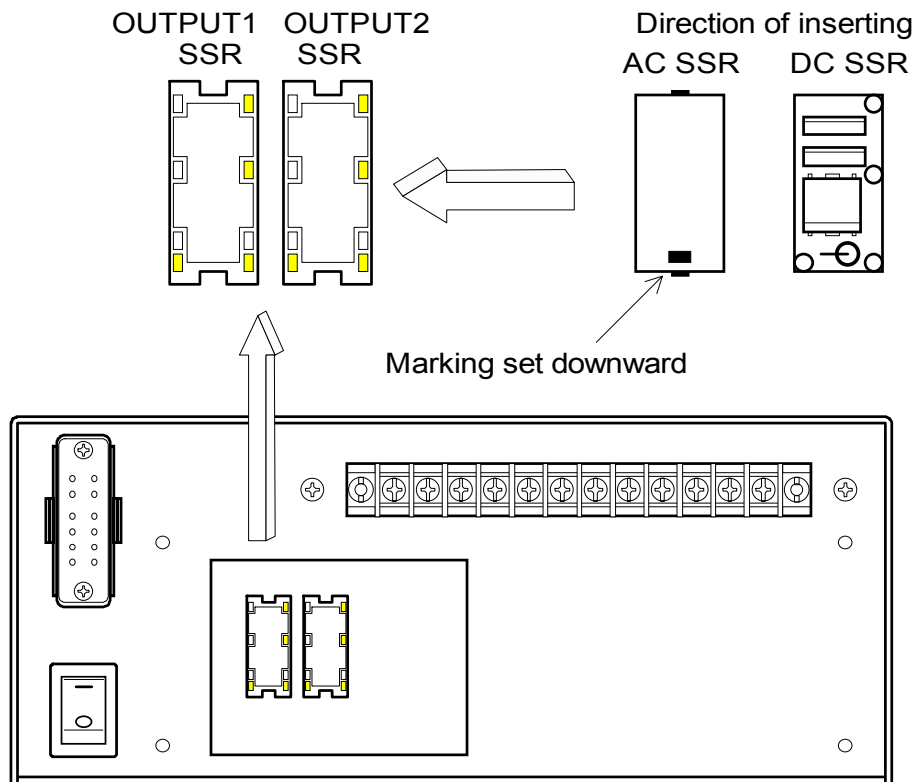


#### 4-3. Insert of SSR

Please open the back panel then insert the SSR to the socket.

Select the AC-SSR for AC load circuit, and select the DC-SSR for DC load circuit. When the selection is mistaken, the PS321 causes the breakdown and the malfunction.

Check the alignment of the pin for the SSR installation.



Insert of SSR

#### 4-4. Wiring for SSR output

The SSR output is output through the output cable. The SSR 1 output are connected into orange and yellow line, the SSR 2 output are connected into sky blue and gray line.

The SSR output does not operate if SSR is not installed in the back panel.

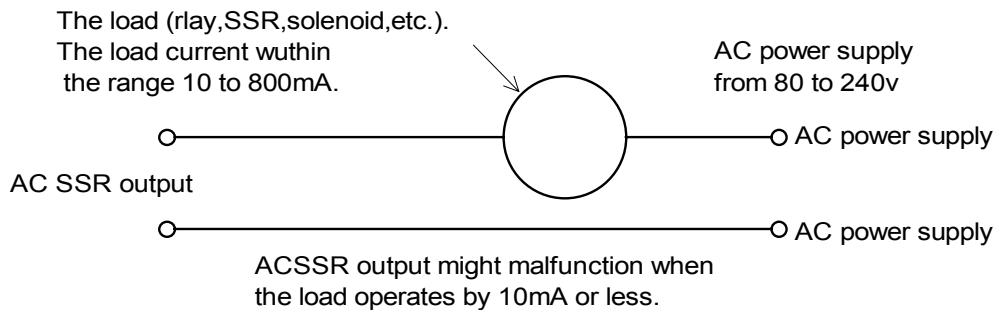
##### 4-4-1. Connection of AC load

The load (relay and solenoid, etc.) which operates by the AC connects into the output of ACSSR.

Please use the output of ACSSR within the range 80 ~ 240V and 10 ~ 800mA.

Please note the rush current when you make the solenoid a load. Please do not connect the load with built-in SSR directly when rush current exceeds 1A.

If ACSSR is used with the DC circuit, the output becomes ON always.



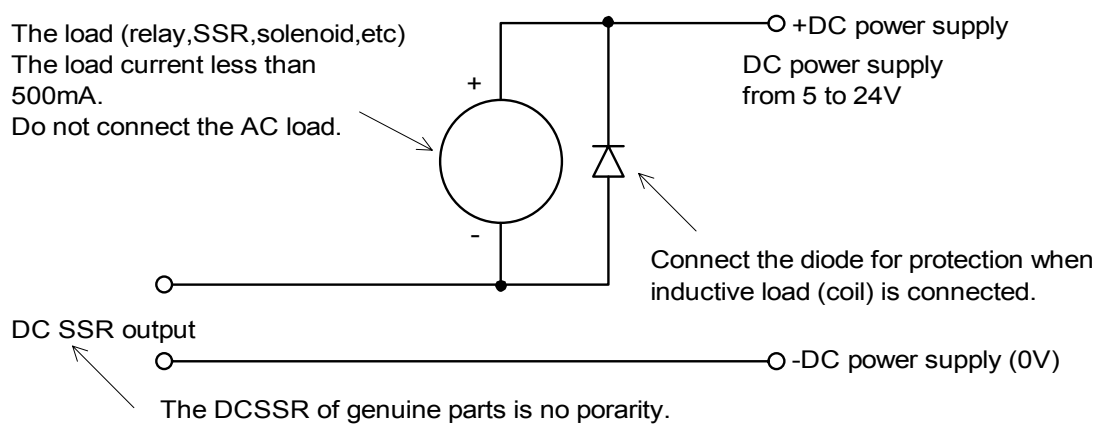
Connection of AC load

##### 4-4-2. Connection of DC load

The load (relay and solenoid, etc.) which operates in DC connects into the output of DCSSR.

Please use the output of DCSSR from 5 to 24V and 500mA or less. Please connect the diode for protection when inductive load ( coil ) is connected.

The DCSSR of genuine parts is no polarity.



Connection of DC load

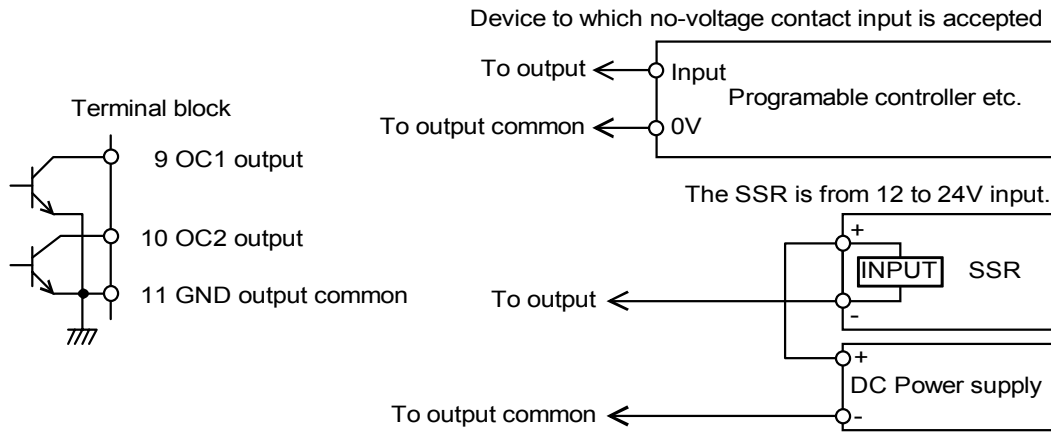


#### 4-5. Wiring for open collector output

The open collector output has the output terminal in the terminal block. The emitter of the output transistor is connected with the terminal GND of the terminal block.

Please use the open collector output from DC 5V to 24V and 100mA or less.

Please separate from the power line or shield the wiring connected with the open collector output.



Wiring for open collector output

#### 4-6. Wiring to count input

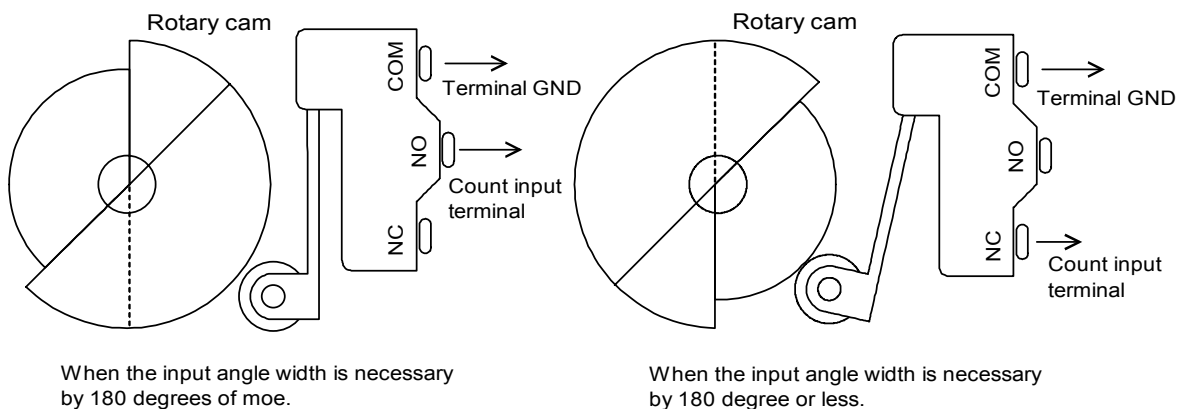
The count input are T1 and T2 in the terminal block. Connect the signal which were dry contact or the solid state output into T1 and T2.

When the proximity switch is used for the count signal, +12V terminal can supply the power source.

Please use the current from +12V terminal by 100mA or less.

+12V terminal is supplied from the power source used in the control box. The internal circuit becomes malfunction or break down, when the load current is 100mA or more.

When the rotary cam is used to input the count, the change in the wiring for the limit switch is occasionally needed by the set width of the angle.



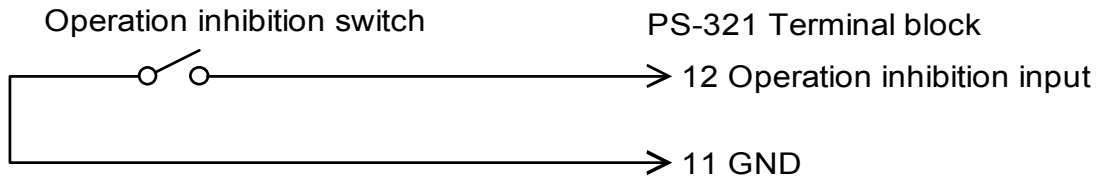
Wiring to count input

#### 4-7. Wiring for operation inhibition input

The switch to turn the operation inhibition on and off is connected with the operation inhibition terminal of the terminal block.

Especially, it is useful for prevention of miss-operation though unnecessary to the wiring.

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



Wiring for operation inhibition input

#### 4-8. Power ON/OFF

Power supply switch in the back of the control box is turned on.

Please do the power source operation after the installation with the switch on the control panel of the press side.

## 5. Operation

### 5-1. Handling of upper and lower arrow button

When the numerical value is changed, the upper and lower arrow button is used.

Only one increases and decreases pushing numerical value of the button once.

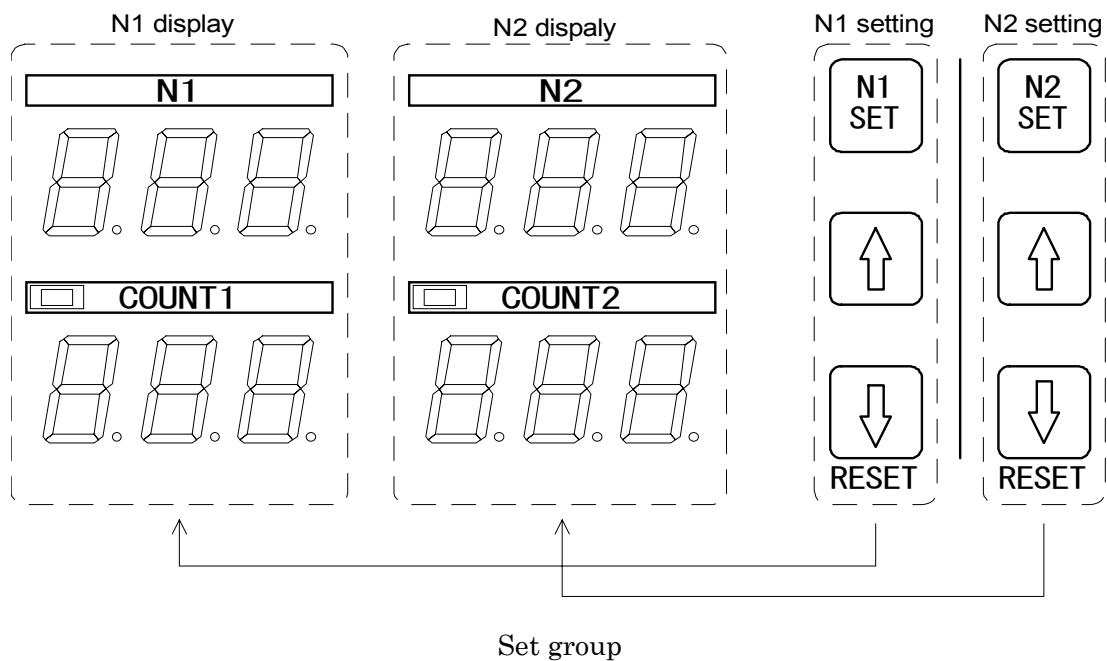
The numerical value is keeping to change into repeat by keeping the button pushing. The speed of repeat goes up in every two seconds.

Please use the repeat when a numeric change includes a great change.

### 5-2. Set group

Final controlling element of the display and setting is made in PS-321 separately for two groups.

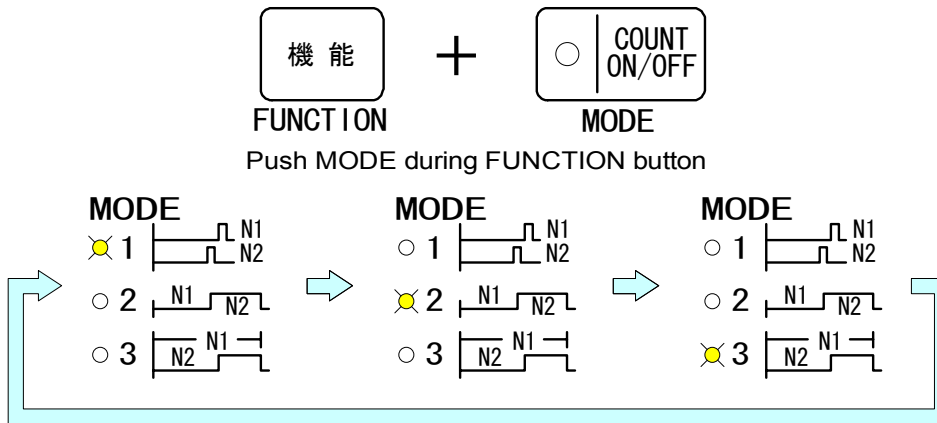
The operation of N1 and COUNT1 of display panel is N1SET, upper and lower arrow button, and the operation of N2 and COUNT2 are changed by N2SET and a upper and lower arrow button.



### 5-3. Change of count mode

The count mode can be changed by pushing count ON/OFF button during pushing the function button. The count mode being selected now is displayed with the LED lamp upper 'MODE'.

When the count mode is changed, the counter is reset.



Change of count mode

#### 5-4. Change in setting value

The setting value has N1 and N2. The setting change for N1 side by N1 operation button, use the operation button for N2 for a set change on the N2 side.

Beginning of a set change pushes the SET button. When the SET button is pushed, the setting value begins blinking.

When the setting value blinks, the setting value is changed with the upper and lower arrow button.

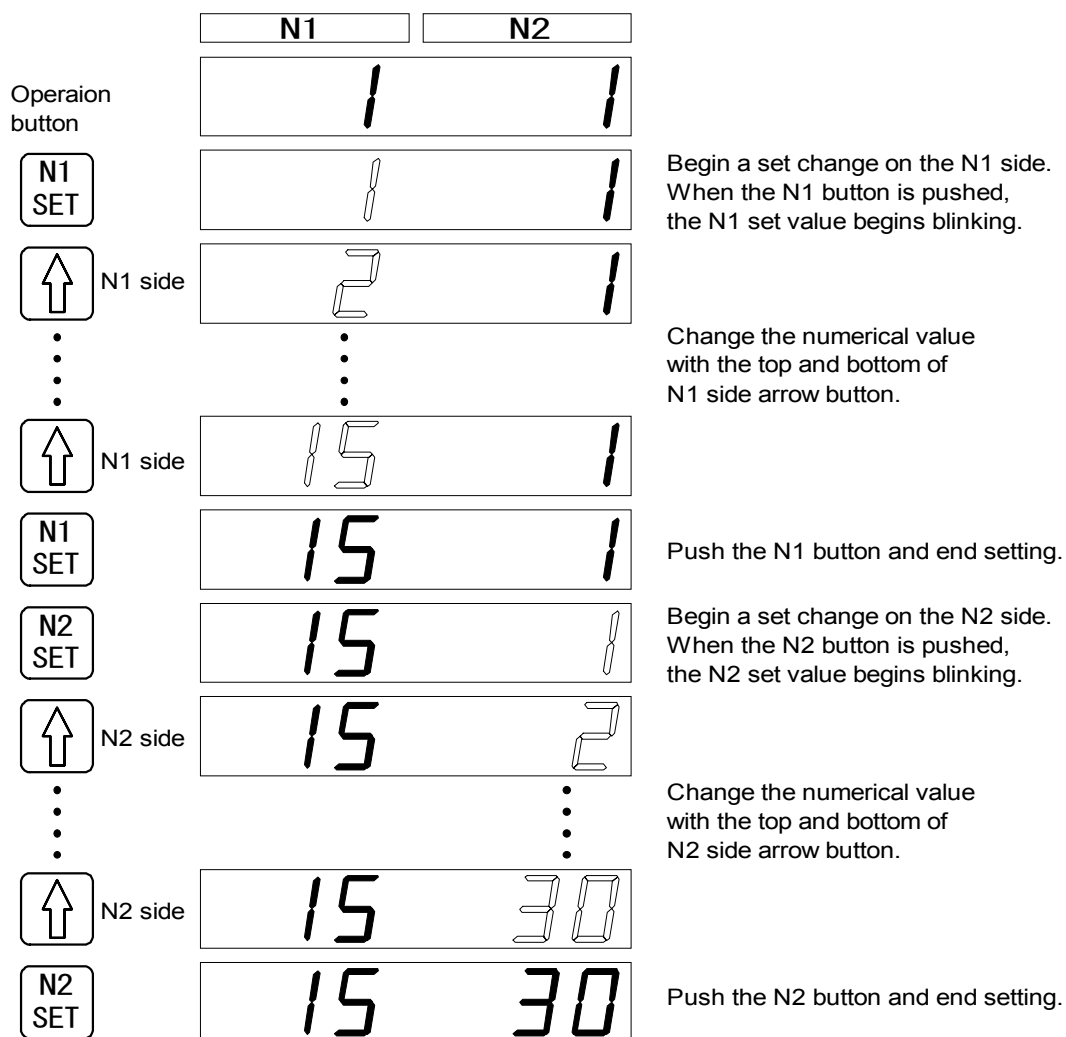
If the SET button is pushed again after changing to the value by which the setting value is scheduled, the setting value ends blinking and ends the change in setting.

When the function button is pushed when the setting value blinks, a set change is interrupted. Blinking ends and settings returns to the setting value of point by which the change begins.

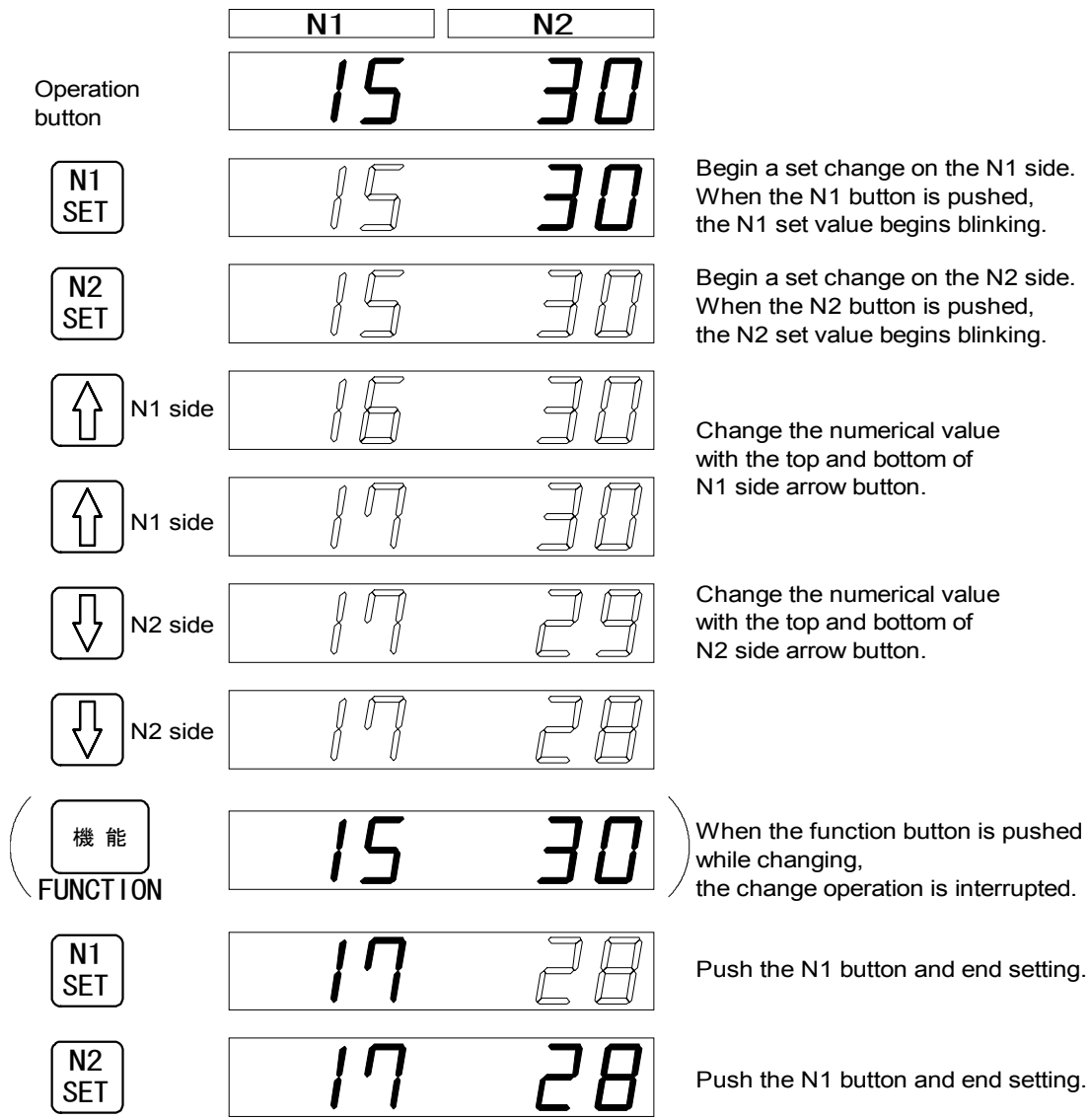
A set change of N1 and N2 can be done at the same time.

The minimum setting value is 1, the "0" is not available.

Please be careful that the up/down arrow button does up or down operation for the counter unless the N1/SET or N2/SET button is pushed.



Change in setting value 1



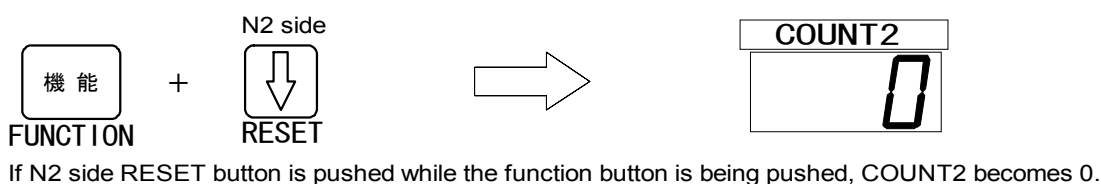
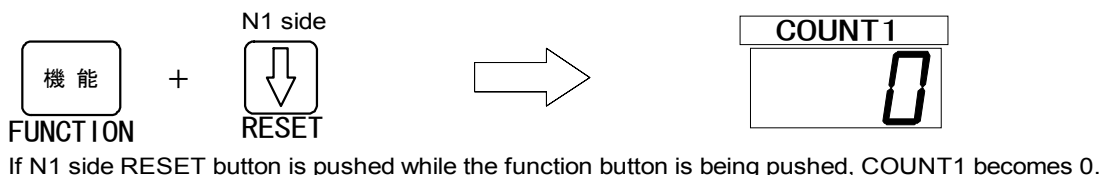
Change in setting value 2

### 5-5. Reset of counter

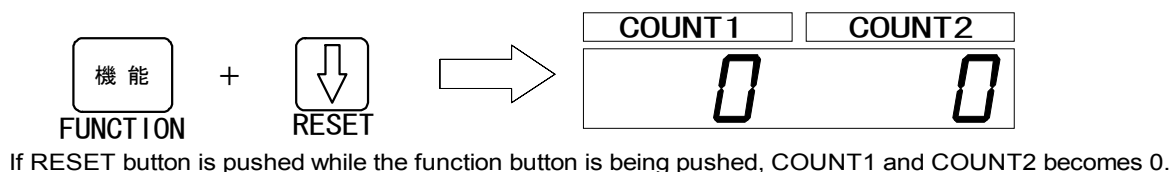
The counter can be reset by pushing the down arrow button while pushing the function button.

The counter 1 is reset by down-arrow button of N1 side, and the counter 2 is reset by the N2 side.

The counter becomes counter reset even if which arrow button is pushed because there is only one at count, in the Mode 2 or count mode 3.



Reset of counter in mode 1



Reset of counter in mode 2 and 3

### 5-6. Change of timer time

The change of the timer time begins when the up-arrow button is pushed during pushing the function button.

The display with the decimal point blinks when the change begins. The numerical value is changed by the up/down arrow button of blinking side.

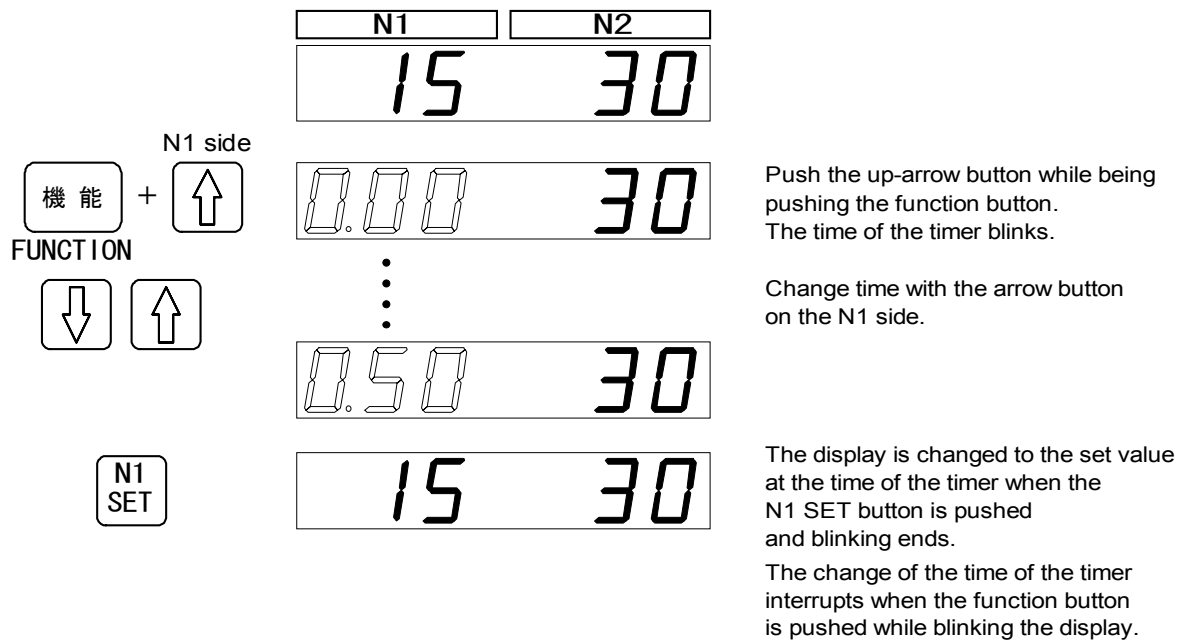
Time can be set until 0.00-9.99 seconds.

The change end pushes only the SET button on the side where setting began. When the function button is pushed, setting is interrupted.

The time of the timer of the N1 side is time of the output of the open-collector 1 output and the SSR1 output.

The time of the timer of the N2 side is time of the output of the opening collector 2 outputs and the SSR2 outputs.

The output does not become a timer output only by setting the time of the timer. Please set the timer output by the function setting (item number 5 or 12) to assume the output to be a timer output.



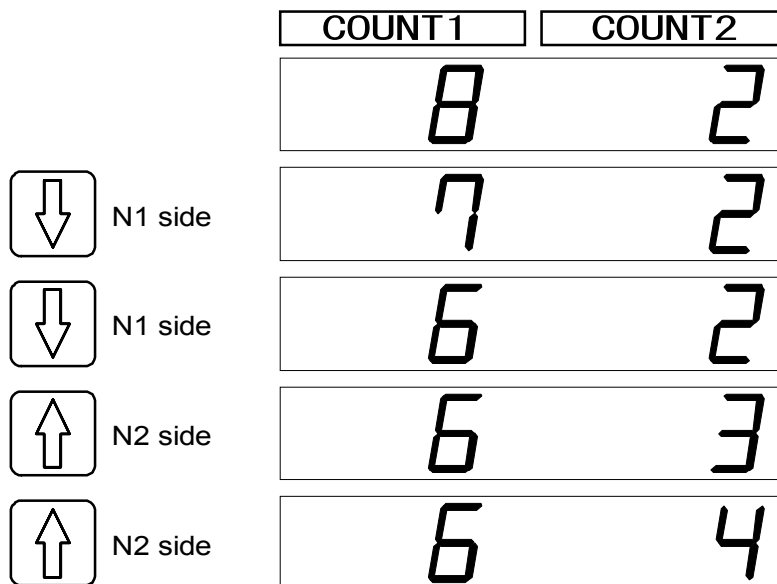
Example for N1 timer time setting

### 5-7. Change of count value

The counter increases and decreases when the button is pushed while counted ON.

In the count and Mode 1, count 1 is N1 side upper and lower arrow button and count 2 is changed with the N2 side upper and lower arrow button.

In the count MODE 2 and 3, the count value is changed by the up/down arrow-button of both side.



Change of count value (example of count mode 1)

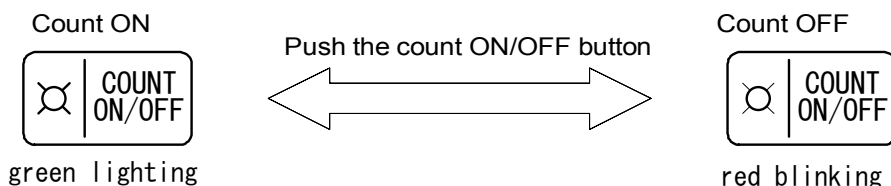


### 5-8. Count ON/OFF

The count ON and OFF can be switched by pushing count ON/OFF button.

In the count-ON, the lamp of the count ON/OFF button to green and the lamp blinks red in the count-OFF.

The output is turned off in the count-OFF.



Count ON/OFF

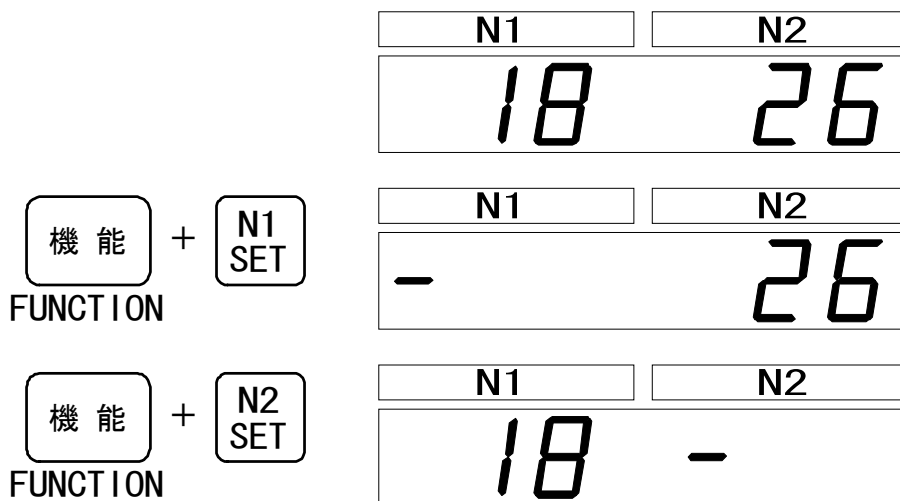
### 5-9. Count channel ON/OFF

In the Count mode 1, the counter channel can be turned on and off.

Pushing the set button with the function button pushed can change ON/OFF of the counter channel.

The counter channel turned off displays '-' in the display of the setting. And the display of the count is turned off.

Channel 1 and 2 cannot be turned off at the same time.



Count channel ON/OFF (Only in the count mode 1)

### 5-10. Function setting

After switching to a set mode, the function setting is operated. Please refer to the item of the function setting.

## 6. Function setting

The function of PS-321 can be changed by the change in the function setting. It is necessary to start a set mode to change the function setting.

### 6-1. Start of set mode

Change to count-OFF from the normal operation. A set mode starts when the function button is pushed during pushing the down-arrow button on the N2 side.

Item number 01' blinks to the USB two digits of the N1 setting value and it is displayed to become a set mode.

Moreover, the setting value of item number 01 is displayed in the N2 count display. Other digital displays and lamps are turned off.

### 6-2. End of set mode

The PS321 becomes the same as the reentry of the power source if count ON/OFF button is pushed with the item number blinks and it returns to the normal operation.

It is necessary to check the state of count is OFF after returning from a set mode to the normal operation.

### 6-3. Display and operation in set mode

In the set mode, the item number is displayed to the USB two digits of N1 setting value display panel and the set corresponding to item number content is displayed in count display panel of N1 and N2. The item number blinks when a set mode is started.

The item number to which a set content is not displayed does not have the set content.

The side (item number or set content) which blinks with the up/down arrow button of N1 side can be changed.

First of all, to change setting, the item number is selected with the up/down arrow button of N1 side.

Blinking moves to a set content when the N1 set button is pushed after a necessary item number is selected and a set content can be changed with the up/down arrow-button of N1 side. It is necessary to move blinking column number with the N2 side up/down-arrow button according to a set content.

When the N1 set button is pushed again, the change of a set content is completed when changing. Moreover, to interrupt the change, the function button is pushed.

Blinking moves to the item number to complete setting or to interrupt.

### 6-4. Initialization of set content

To return a set content to the state of the factory shipment, a set content is initialized.

The item number is adjusted to 99 in a set mode and the N1 set button is pushed during pushing the function button. When initialization is completed, the item number becomes 01.

## 6-5. Details of set item

### 6-5-1. Mode 1 OC1 output format (item number 01)

Output format of the count Mode 1 of the open-collector output is set. 0-3 can be set.

Initial value 0

### 6-5-2. Mode 1 OC2 output format (item number 02)

Output format of the count Mode 1 of the open-collector 2 outputs is set. 0-3 can be set.

Initial value 0

### 6-5-3. Mode 1 SSR1 output format (item number 03)

Output format of the SSR1 output of the count Mode 1 is set. 0-3 can be set.

Initial value 0

### 6-5-4. Mode 1 SSR2 output format (item number 04)

Output format of the SSR2 output of the count Mode 1 is set. 0-3 can be set.

Initial value 0

### 6-5-5. Mode 1 timer output mode (item number 05)

The timer output mode of the count Mode 1 is set. As for a set content, 0 or 1 is displayed by four digits. It corresponds from a right digit to OC1, OC2, SSR1, and SSR2 sequentially.

0 is a level output and one is setting of the timer output.

Column number where a set change is done is switched with the up/down arrow bottom of N2 side.

The initial value is 0000 (All outputs is level).

### 6-5-6. Output at mode 1 count OFF (item number 07)

The MODE 1 COUNT OFF OUTPUT sets the output enable and OFF when the count is OFF. '0' or '1' is set. If '0' is set, the output is turned off. The state set to set '1' by output format is output.

The initial value is '0' (The output turns off).

### 6-5-7. Mode 2/3 OC1 output format (item number 08)

Output format of the COUNT MODE 2/3 of the open collector 1 output is set. 0-15 can be set.

Initial value 2

#### 6-5-8. Mode 2/3 OC2 output format (item number 09)

Output format of the COUNT MODE 2/3 of the open collector 2 outputs is set. 0-15 can be set.

Initial value 10

#### 6-5-9. Mode 2/3 SSR1 output format (item number 10)

Output format of the SSR1 output of the COUNT MODE 2/3 is set. 0-15 can be set.

Initial value 2

#### 6-5-10. Mode 2/3 SSR2 output format (item number 11)

Output format of the SSR2 output of the COUNT MODE 2/3 is set. 0-15 can be set.

Initial value 10

#### 6-5-11. Mode 2/3 timer output mode (item number 12)

The timer output mode of the COUNT MODE 2/3 is set.

As for a set content, 0 or 1 is displayed by four digits. It sequentially corresponds from a right digit to OC1, OC2, SSR1, and SSR2.

0 is a level output and 1 is setting of the timer output.

Column number where a set change is done is switched with the up/down arrow button of N2 side.

The initial value 0000 (All outputs output the level).

#### 6-5-12. Output (item number 14) at Mode 2/3 counts OFF

The MODE 2/3 COUNT OFF OUTPUT sets the output enable and OFF when the count OFF.

'0' or '1' is set. If '0' is set, the output is off. The state set to set '1' by output format is output. The initial value 0 (The output turns off).

#### 6-5-13. T2 mode (item number 15)

The T2 mode sets the use purpose of Mode 2/3 T2 input in the terminal block. 0-15 can be set.

Initial value 0(The T2 input is not used)

#### 6-5-14. Output polarity (item number 16)

The output polarity sets whether to make the output NO or NC.

As for a set content, '0' or '1' is displayed by four digits. The outputs are correspond from a right digit to OC1, OC2, SSR1, and SSR2. '0' is NO and '1' is setting of NC.

Column number where a set change is done is switched with the UP/DOWN arrow button of

N2 side.

The initial value 0000 (All outputs are NO).

#### 6-5-15. Input polarity (item number 17)

The input polarity sets the state turning on the input signal.

'0' or '1' is set to each input. If '0' is set, the output becomes ON with the input terminal connected with GND. If '1' is set, the output becomes ON with the input terminal opened.

As for a set content, 0 or 1 is displayed by five digits. From right digit to T1, T2, operation inhibition, reserve, and PIFSTB in order it

Please do not change though the reserve is unused.

Column number where a set change is done is switched with the up/down arrow button of N2 side.

The initial value 0000 (All outputs are NO).

#### 6-5-16. Key repeat waiting time (item number 18)

The key repeat waiting time is time until key repeat is begun when key is kept pushing the up/down arrow button. 0-999mS can be set.

Initial value 400mS

#### 6-5-17. Initial key repeat time (item number 19)

Initial key repeat time is a cycle of key repeat when key repeat is begun pushing the up/down arrow button.

The key repeat cycle shortens every two seconds. 0-999mS can be set.

Initial value 200mS

#### 6-5-18. T1 input constant (item number 21)

T1 input constant is rejection time for input 1 chattering. 0-255mS can be set.

Initial value 10mS

#### 6-5-19. T2 input constant (item number 22)

T2 input constant is rejection time for count input 2 chattering. 0-255mS can be set.

Initial value 10mS

#### 6-5-20. Operation inhibition constant time (item number 23)

The operation inhibition input constant is rejection time for chattering of the operation inhibition input. 0-255mS can be set.

Initial value 20mS

#### 6-5-21. Spare input constant time (item number 24)

Please do not change setting to the constant of spare input.

#### 6-5-22. PIFSTB input constant (item number 25)

The PIFSTB input constant is rejection time for chattering of the PIF operation inhibition input. 0-255mS can be set.

Initial value 5mS

#### 6-6. Set item list

Item number	content set range	value/set content
01 Mode 1 OC1 output format	0 to 3	0
02 Mode 1 OC2 output format	0 to 3	0
03 Mode 1 SSR1 output format	0 to 3	0
04 Mode 1 SSR2 output format	0 to 3	0
05 Mode 1 timer output mode	0/1	0000 SSR2 SSR1 OC2 OC1
06		
07 Output at mode 1 count OFF	0/1	0
08 Mode 2/3 OC1 output format	0 to 15	2
09 Mode 2/3 OC2 output format	0 to 15	10
10 Mode 2/3 SSR1 output format	0 to 15	2
11 Mode 2/3 SSR1 output format	0 to 15	10
12 Mode 2/3 timer output mode	0/1	0000 SSR2 SSR1 OC2 OC1
13		
14 Output at mode 2/3 count OFF	0/1	0
15 T2 mode	0 to 15	0
16 Output polarity	0/1	0000 SSR2 SSR1 OC2 OC1
17 Input polarity	0/1	00000 PIFSTB spare INH T2 T1
18 Key repeat waiting time	0 to 999	400mS
19 Initial key repeat time	0 to 999	200mS
20		
21 T1 input constant	0 to 255	10mS
22 T2 input constant	0 to 255	10mS
23 Operation inhibition constant time	0 to 255	20mS
24 Spare input constant time	0 to 255	20mS
25 PIFSTB input constant	0 to 255	5mS

## 7. External set function

An external set function is an option function. If the specification of the option is not gotten when ordering, it is not equipped with this function.

### 7-1. External setting function

As for an external set function, the remotely control of PS-321 becomes possible from a high-ranking equipment such as sequencers.

As for an external set function, the data of 4Bit of each strobing signal is received from a high-ranking equipment.

PS-321 receives the one that two or more datas of 4Bit were brought together as a command.

PS-321 returns the busy signal during the setting and the command processing by panel operation.

A busy inside should prohibit output data from a high-ranking equipment.

The data of 4bit is assumed a general BCD and is expressed by the figure or the sign of one character. The value which exceeds nine by the BCD code is sequentially assumed to be a sign of a, b, c, d, e, and f.

The command is composed of separator d which shows the end of the figure and the command of two digits or more. The command shows the command name by the head two digits and the parameter continues follows. There is a command without the parameter either.

### 7-2. Command

#### Status change command

Counter 1 reset	01d
Counter 2 reset	02d
Counter ON	03d
Counter OFF	04d
Operation inhibit	05d
Operation enable	06d

#### Numeric setting command ( xxx is figure of the treble )

Set 1	10xxxd
Set 2	11xxxd
Timer 1	12xxxd
Timer 2	13xxxd
Count 1	14xxxd
Count 2	15xxxd

#### Counter mode setting command

Count mode 1 setting	20d
----------------------	-----

Count mode 2 setting	21d	
Count mode 3 setting	22d	
OC1 output format	23xxd	xx=0 to 3 / 0 to 15
OC2 output format	24xxd	xx=0 to 3 / 0 to 15
RL1 output format	25xxd	xx=0 to 3 / 0 to 15
RL2 output format	26xxd	xx=0 to 3 / 0 to 15
OC1 timer mode setting	27xd	x=0 or 1
OC2 timer mode setting	28xd	x=0 or 1
RL1 timer mode setting	29xd	x=0 or 1
RL2 timer mode setting	30xd	x=0 or 1
T2 mode	31xxd	xx=0 to 15
Output at count OFF	32xd	x=0 or 1

05 and 06 are released by the power source ON in the memory operation only for an external setting.

15 is disregarded in the count, Mode 2, and 3.

As for 26 from 23, 0-3 are the count Mode 1 accept 0-15 to the count Mode 2 and 3.

No.23-32 returns to the contents set by the function setting in the power source ON as same content as the item of the function setting.

The command where only 0 and 1 is received by the parameter becomes a set by 1 and reset by 0.

Sign a, c, e, and f are disregarded.

When sign d is received, the command is executed.

When sign b is received, the data received till then is released.

When the command is not approved, such as outside ranges of acceptance of the numerical value or the all characters number is not matched, PS321 does not do at all.

### 7-3. Connector and cable for external setting

Connectors for an external setting are 9 poles. The signal allocation is shown as follows.

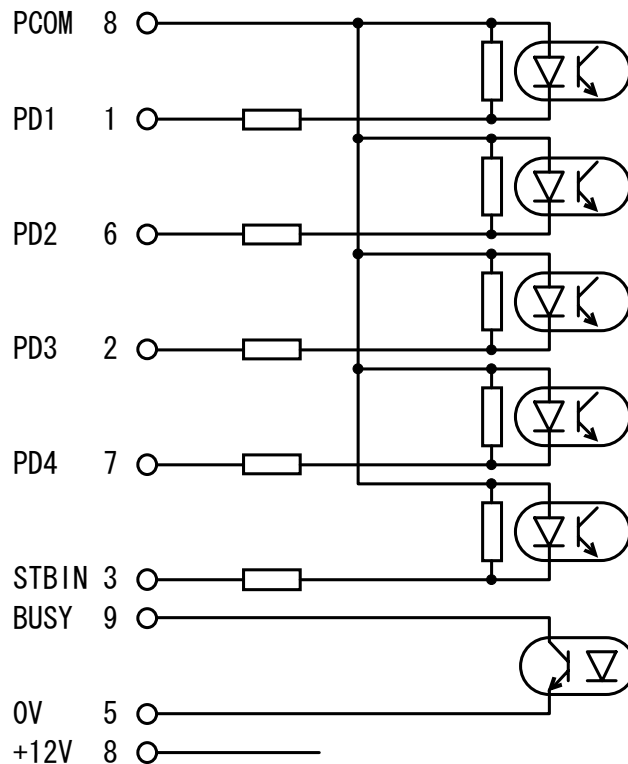
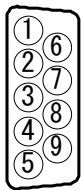
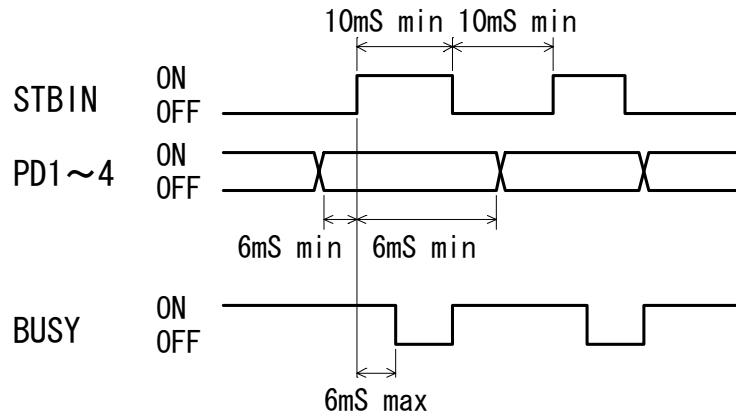
Signal	Pin number	content
PD1	(1)	data input 1
PD2	(6)	data input 2
PD3	(2)	data input 3
PD4	(7)	data input 4
STBIN	(3)	strobe input
+12V	(8)	do not use (+12V power supply)
PCOM	(4)	interface power supply + (from upper equipment)
BUSY	(9)	busy output (OFF at busy)
0V	(5)	interface power supply - (from upper equipment)



### 7-4. Interface and timing

Read the input data of PD1-4 by the turning on edge of STBIN.

When input data can be received, the BUSY signal is turned on. When the panel is being operated or internal processing the command, the BUSY signal is turned off. When the power supply is turned off, BUSY is turned off. Please do not turn on STBIN when BUSY is turning off.



## 8. Specification and performance

### 8-1. Count

Digit of count:	3 digit
Maximum count speed:	200CPS
Count channels:	2 (count mode 1) 1 (count mode 2, and 3)
output format:	4 (count mode 1) 15 (count mode 2, and 3)

### 8-2. External input (count input, operation inhibition input)

Input specification:	internal voltage (DC12V) type Connect the no-voltage contacts or the open collector.
H level:	over 9.0V under 1mA
L level:	under 3.0V over 8mA (10mA MAX)

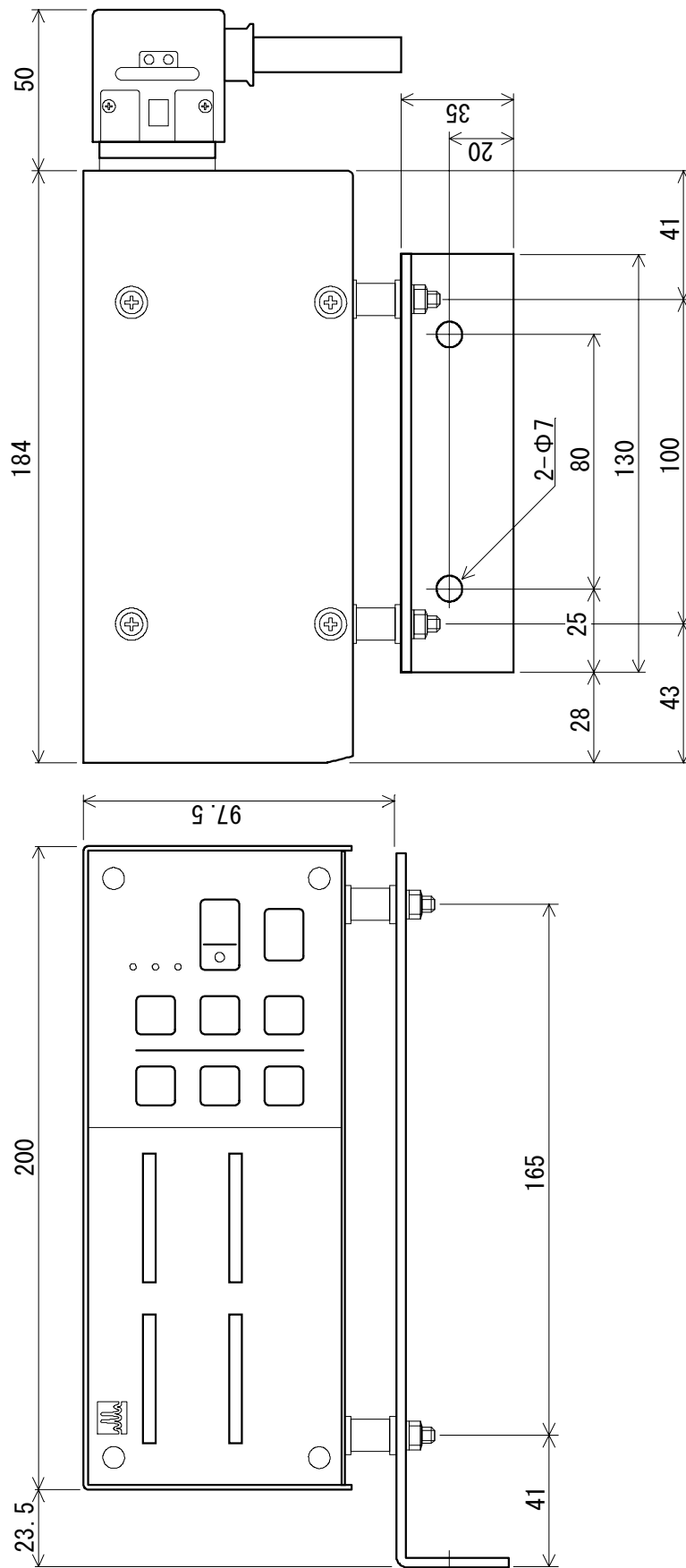
### 8-3. Output

DCSSR:	DC 30V 500mA MAX,
ACSSR:	AC 240V 1A MAX
Open collector:	DC 30V 100mA MAX.

### 8-4. Power source and others

Power source voltage:	AC 100-240V $\pm 10\%$ 50/60Hz
Power consumption:	15VA
MAX, Weight:	2.8kg
Size:	200 × 88.5 × 184mm(WHD) (Control box, the projection part does not include).
Environmental temperature:	0-55°C
Environmental humidity:	35-85% RH.

### 9. Reference size



## WARRANTY

All Sugiyama Electric System products are warranted against defective materials and workmanship for one year 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 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