PLC
HMI
SENSOR
ENCODER
COUNTER
INFORMATION

Electronic Counter
Tachometer
Digital Timer
Programmable Cam

KCV
KCX
KCM

KCX-□,□D/DM
Features

Green Counter Increment Type, Single Preset

- Maximum counting speed
  For 1 and 2 digits: for both 10 Hz and 200 Hz
  For 3 and 4 digits: for both 10 Hz and 1 kHz
  For 5 and 6 digits: for both 10 Hz and 5 kHz
- The 1 to 6-digit preset electronic counter uses an easy-to-see, bright green color for the numerical display and the input/output display. The electronic counter features various user-friendly functions including thorough dust prevention measures and power failure measures.

With input/output display   With numerical display

■Features

Easy-to-see Green Display
An easy-to-see green display is used for the numerical display and the input/output display (The numerical display is a green LED with a character height of 8 mm.)

Equipped with a Dust Cover as a Standard Feature
All models are equipped with a dust cover as a standard feature, and the setter can be operated from outside the dust cover.

Dust Cover
Digital Switch
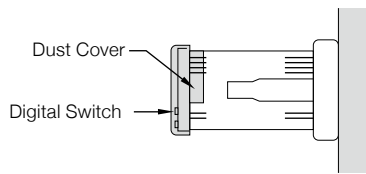
Improved Space Factor
All models for 1 digit to 6 digits have a small design with the front outer shape being DIN size (72 x 72 mm) and an overall depth of 103.5 mm.

Retentive Memory without Battery Backup
An EEPROM is used for memory storage and a battery that does not require maintenance is used.

Built-in Power Source for Sensors
All models for 1 digit to 6 digits have a built-in 12 V DC, 50 mA power source for sensors and, therefore, can be directly connected to sensors such as proximity sensors, photoelectronic sensors, and rotary encoders.

Wide Variable Range for Output Time
In the case of specific time output operation (A-type operation), the output time can be varied from 50 to 1,000 ms using the volume on the front part of the counter. Moreover, by installing a capacitor on the terminal, the output time can be increased to up to 10 s.

For Both A-type (Specific Time Output) and B-type (Self-holding Output)
The A-type operation and the B-type operation can be switched by changing the connection of the terminal.

Six Kinds of Operation Modes
The best operation mode can be selected.

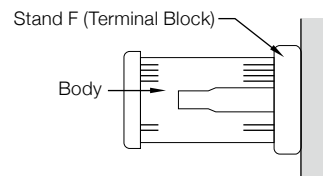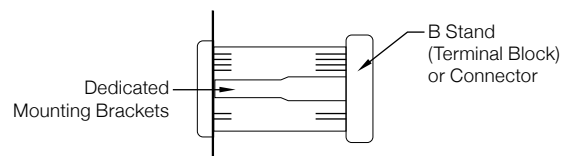### A Wide Range of Supply Voltage
The supply voltage covers 90 to 132 V AC and 180 to 264 V AC.

Counting Input can be Prohibited.
By applying input to the counting input inhibit terminal, counting input can be interrupted to stop counting.

For Both Embedded and Surface-Mount Installation
In the case of embedded installation, the counter can be attached to the panel simply by tightening the dedicated mounting bracket from the back side. In the case of surface-mount installation, the counter can be mounted to and removed from the F terminal (terminal block) by one-touch operation.

Dedicated Mounting Brackets
B Stand (Terminal Block) or Connector

Stand F (Terminal Block)
Body

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KCX-☐,☐D/DM
Specifications

■Specifications

Model Number		With Input/ Output Display	Standard	KCX-1	KCX-2	KCX-3	KCX-4	—	—
		With Numerical Display	Standard	KCX-1D	KCX-2D	KCX-3D	KCX-4D	KCX-5D	KCX-6D
			Power Failure Memory Type	—	KCX-2DM	KCX-3DM	KCX-4DM	KCX-5DM	KCX-6DM
Digit			1 digit	2 digits	3 digits	4 digits	5 digits	6 digits	
Operation Format		For both A-type (Specific time output type, automatic reset) and B-type (Output holding type)							
Count Input			Contact input	Non-contact input	Contact input	Non-contact input	Contact input	Non-contact input
	Maximum counting speed	10 Hz	200 Hz	10 Hz	1 kHz	10 Hz	5 kHz		
	Minimum pulse width	50 ms	2.5 ms	50 ms	0.5 ms	50 ms	0.1 ms		
	Input resistance	6 kΩ	12 kΩ	6 kΩ	12 kΩ	6 kΩ	12 kΩ		
	Input voltage	"L" 0 to 2 V/"H" 6 to 30 V							
External Reset	Response time	Delay ON time: 20 ms Delay OFF time: 4 ms		Delay ON time: 10 ms Delay OFF time: 2 ms		Delay ON time: 5 ms Delay OFF time: 1 ms			
	Input resistance	6 kΩ							
	Input voltage	"L" 0 to 2 V/"H" 6 to 30 V							
Automatic Reset	Reset time	5 ms or less		1 ms or less		0.2 ms or less			
Power Source Reset*1	Power supply shutdown time	Minimum of 0.2 s is required.							
	Reset time	0.2 s or less							
Voltage Output*2	Output resistance	1.2 kΩ (No-load voltage 12 V)							
	Output current	Source: 2.5 mA Sink: 8.0 mA							
	Withstand voltage	45 V							
	Output time	A-type: (Variable), B-type: Self-holding							
Contact Output	Contact capacity	250 V AC 2 A							
	Number of circuits	Transfer 1 circuit (1c)							
	Output time	A-type: (Variable), B-type: Self-holding							
	Electrical life	1 million times or more (250 V AC resistance load)							
	Mechanical life	1 million times or more							
Input/Output Response Time*3		10 Hz	200 Hz	10 Hz	1 kHz	10 Hz	5kHz		
	Voltage Output	Approx. 10 ms	Approx. 4 ms	Approx. 10 ms	Approx. 0.8 ms	Approx. 10 ms	Approx. 0.15 ms		
	Contact output	Approx. 20 ms	Approx. 14 ms	Approx. 20 ms	Approx. 10 ms	Approx. 20 ms	Approx. 10 ms		
Power Failure Memory Function		EEPROM Number of overwrite cycles: 100,000 cycles or more							
	Storage time	10 years							
	Input gate response time when power failure occurs*4*5	Typ, 70 ms							
	Input gate response time when the power returns*6	Typ, 120 ms							
Power Source for Sensors		12 V ±2 V DC 50 mA Ripple 5% (rms) or lower							
Withstand Voltage		2kV AC 1 min (Between AC power supply terminal, E terminal, and relay contact terminal)							
Insulation Resistance		500 V DC 20 MΩ or higher							
Vibration Resistance		Compliant with JIS C 0911. Endurance vibration: Displacement amplitude 0.5 mm, 10 to 55 Hz, 3 axial directions Malfunction vibration: Displacement amplitude 0.35 mm, 10 to 55 Hz, 3 axial directions							
Supply Voltage		90 to 132 V AC/180 to 264 V 50/60 Hz							
Power Consumption		With numerical display: Approx. 5 VA With input/output display: Approx. 3 VA							
Use Ambient Temperature (When Operated)		Power-on: 0 to +40°C Memory storage: -10 to +50°C							
Storage Temperature		-20 to +55°C							
Use / Storage Ambient Humidity		35 to 85% RH (No condensation)							
Noise Resistance*7		1 µs width, square-wave pulse, 1 kV							
Weight		0.5 kg							

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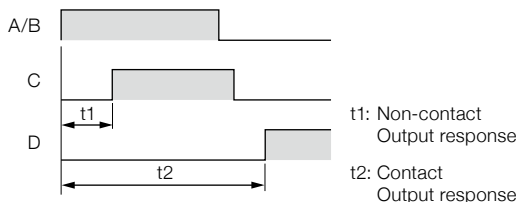GENERAL CATALOG 2018

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KCX-□,□D/DM
Specifications

Precautions (See the previous page.)

*1 The power source reset is applied to models except the power failure memory types (KCX-1 to 4, KCX-1D to 6D).
The "reset time" of the power source reset refers to the time when counting is disabled when the power is turned on.

*2 Voltage output (Non-contact output)
When connected to a 12 V system 《P load》

```
+12 V

Source        2.4 kΩ      6 V or higher
```

When connected to a 12 V system 《N load》

```
+12 V              +12 to +14 V
                   2kΩ
Sink               0.8 V or lower
```

When connected to a 24 V system

```
+12 V              +24 V
Sink               Vc
```

Vc≦3 V when the sink current is 20 mA

*3 The time from the generation of the final pulse of the input signal that reaches the set value in the counting input terminal to the output of the counter.

```
Contact Input — A      C — Voltage Output
                 KCX         (Non-contact Output)
Non-contact Input — B  D — Contact Output
```

```
A/B
C
   t1           t1: Non-contact
D                   Output response
   t2           t2: Contact
                    Output response
```

*4 The power failure detecting circuit starts operating simultaneously with a power failure, and stops the function of each input circuit (counting and reset input) after a certain period of time, and prevents the counting or reset operation even if an input signal is added.
The "input gate response time when power failure occurs" refers to the time until the functions of each input circuit stop. Each input circuit performs normal operation during this time.

*5 During a power failure, the functions of each input circuit are stopped. When the power returns, however, each input circuit resumes normal operation by the function of the detection circuit.
The "input gate response time when the power returns" refers to the time until each input circuit resumes normal operation and can start receiving the counting input and the reset input after the power is returned.

*6 Other than these tests, we confirm the functions by our original test methods including electrostatic discharge tests, inductive load switching tests, and electromagnetic switch oscillation tests in order to ensure safe operation.

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KCX-□,□D/DM
Operation

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Electronic Counter
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Digital Timer
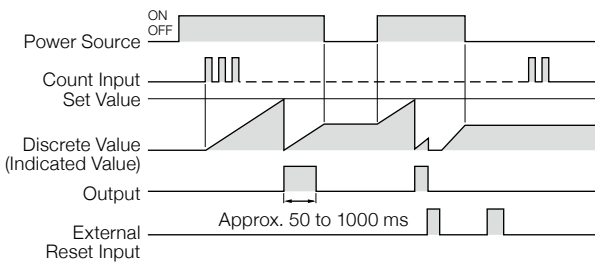Programmable Cam

KCV
KCX
KCM

■Operation

A-type Operation (Specific Time Output Operation)
- When the number of input pulse signals reaches the preset value (count-up), the output is produced.
- The output time is approx. 50 to 1,000 ms (volume variable).
- If the counter counts up, the counting circuit and the counting display (for the models equipped with a numerical display) are automatically reset, and the operation can be repeated.
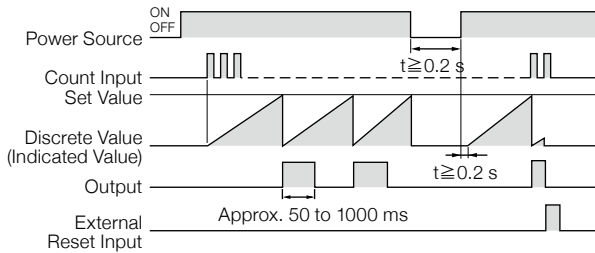- Output is also reset by external reset during output time.

《Retentive memory type》
When resetting the counting: Add the external reset signal.

Power Source
Count Input
Set Value
Discrete Value (Indicated Value)
Output
External Reset Input
Approx. 50 to 1000 ms

《Normal type》
When resetting the counting: ① add the external reset signal.
Or shut down the power source ② temporarily (0.2 s or longer).

Power Source
Count Input
Set Value
Discrete Value (Indicated Value)
Output
External Reset Input
t≧0.2 s
Approx. 50 to 1000 ms

B-type Operation (Self-holding Output Operation)
- If the number of input pulse signals reaches the preset value (count-up), the output is produced and held.
- In the case of the models equipped with a numerical display, if terminal ④ (E), terminal ⑤ (CH1) and terminal ⑥ (CH2) are connected, the counting display is not reset even if the counter counts up, and if the input signal is added, it is counted for the count-up display. However, when terminal ④ (E) and terminal ⑤ (CH1) are connected, if the counter counts up, the counting display is reset to 0. (See the "A-type /B-type operation switching connection method".)

《Retentive memory type》
When resetting the output signal and counting: Add the external reset signal.

Power Source
Count Input
Set Value
Discrete Value (Indicated Value)
Output
External Reset Input
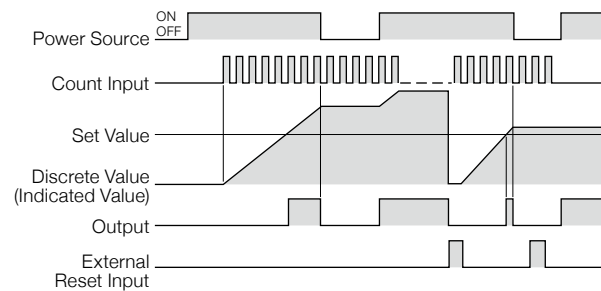
《Normal type》
When resetting the output signal and counting: ①Add the external reset signal.
Or shut down the power source ② temporarily (0.2 s or longer).

Power Source
Count Input
Set Value
Discrete Value (Indicated Value)
Output
External Reset Input
t≧0.2 s
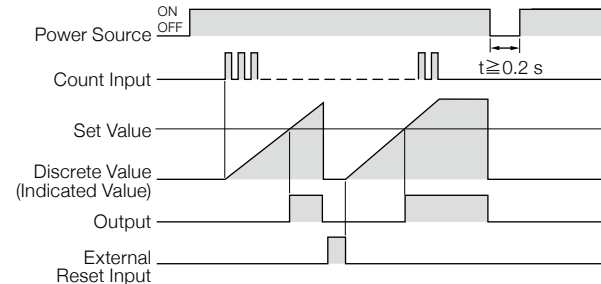
■A-Type/B-Type Operation Switching Connection Method

When terminal ④ (E) and terminal ⑤ (CH1) are connected, the counter performs the B-type operation, and if they are not connected, the counter performs the A-type operation. In the case of B-type operation (terminals ④ and ⑤ are connected), if the counter counts up, models equipped with a numerical display reset the counting display to 0. To prevent the counting display from being reset, connect terminals ④, ⑤ and ⑥. In this way, if the counter counts up, the counting display does not become 0, and if an input is added, it is counted for the count-up display.

① +12 V
② IN (10 cps)
③ IN (High Speed)
④ E   (Counter)
⑤ CH1
⑥ CH2
⑦ R
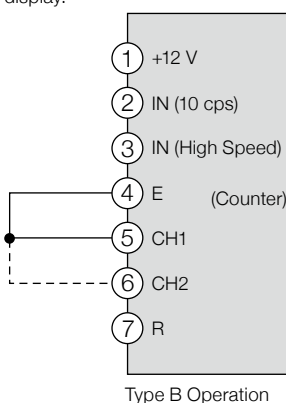
Type B Operation

KCX-□,□D/DM

Connection

■Terminal Assignment

With I/O Indicators

Terminal Number	Symbol	Description
1	+12 V	Power source for sensor
2	IN (10 Hz)	Counting input for low speed
3	IN	Counting input for high speed*1
4	E	Ground*2 (Capacitor ⊖)
5	CH	Switching specific time output/ Holding output (Capacitor ⊕)
6	—	Not connected
7	R	External reset input
8	OUT	Non-contact output
9	COM.	Relay contact output
10	N.O.	
11	N.C.	
12	180 to 264 V AC	AC power input
13	90 to 132 V AC	
14	0 V AC	

Models with a Numerical Display

| Terminal Number	Symbol	Description
1	+12 V	Power source for sensor
2	IN (10 Hz)	Counting input for low speed
3	IN	Counting input for high speed*1
4	E	Ground*2 (Capacitor ⊖)
5	CH1	Switching specific time output/ Holding output (Capacitor ⊕)
6	CH2	Switching automatic reset / Non-automatic reset
7	R	External reset input
8	OUT	Non-contact output
9	COM.	Relay contact output
10	N.O.	
11	N.C.	
12	180 to 264 V AC	AC power input
13	90 to 132 V AC	
14	0 V AC	

*1 See Specifications.
*2 Capacitor connection terminal for output time extension.
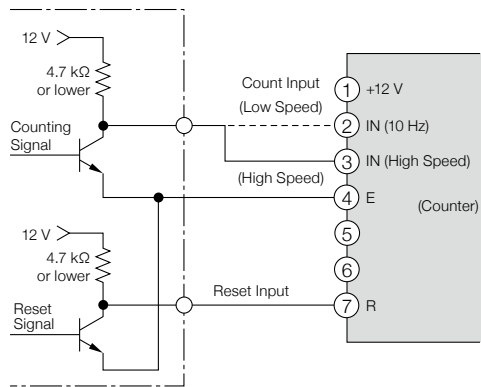
■Terminal Connections

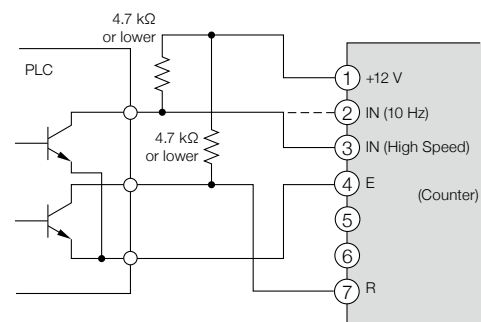### Connection of Counting Input

1. In the case of contact input signals

Count Input (ON: Count)
Reset Input (ON: Reset)

1 +12 V
2 IN (10 Hz)
3
4 (Counter)
5
6
7 R
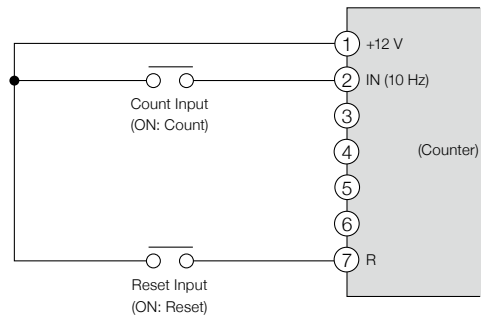
2. In the case of no-contact input signals

The counting input can be selected from low-speed input and high-speed input.

12 V
4.7 kΩ or lower
Counting Signal
12 V
4.7 kΩ or lower
Reset Signal

Count Input (Low Speed)
(High Speed)
Reset Input

1 +12 V
2 IN (10 Hz)
3 IN (High Speed)
4 E (Counter)
5
6
7 R

3. Connection to the open collector output

The counting becomes the reverse action. (Counting when the open collector output changes from ON to OFF)

4.7 kΩ or lower
PLC
4.7 kΩ or lower

1 +12 V
2 IN (10 Hz)
3 IN (High Speed)
4 E (Counter)
5
6
7 R

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Contact input

(1) When used as shown in the figure below, the voltage and current that flow through the contact point are around 2 mA. Therefore, the use of the contact point for minute electric current improves reliability. Since the contact point of the electromagnetic switch is designed for large current and high voltage, it is not suitable for use for contact input of the counter.
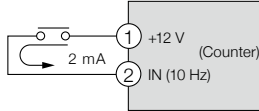
(2) The input response of the counting input terminal ② (10 Hz) has the following characteristics.
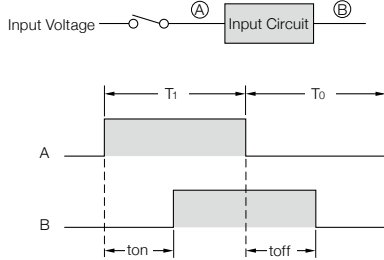
| Input Voltage	Delay ON Time (ton)	Delay OFF Time (toff)
6 V	16 ms	4 ms
12 V	8 ms	8 ms
30 V	3 ms	23 ms

Since the values above are standard values, T1 and T0 should have values more than 3 times the values above for actual input signals.
Example) Contact input using the power source for sensor (12 V DC)
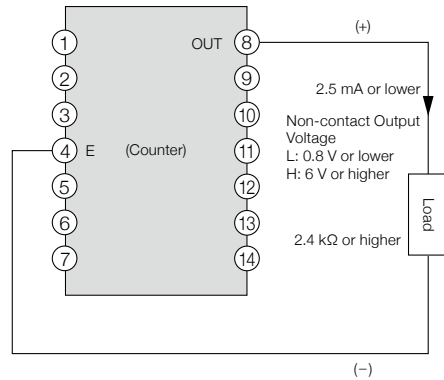   T1: 24 ms or more, T0: 24 ms or more are required.

Connection of the Output

1. Contact output

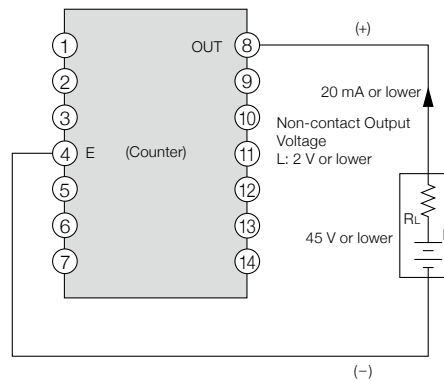Electric current is applied to load A and is not applied to load B when counting is completed.
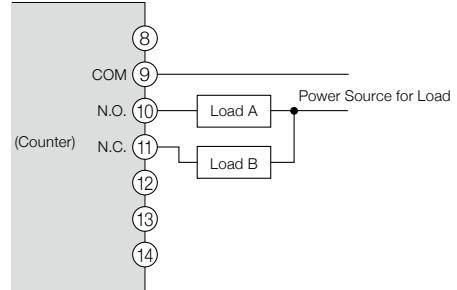
2. Non-contact output
《Source load》

《Sink load》
In this operation, the current flows in when the output is in the "L" state.
This operation is reversed from the normal open collector output, and the output becomes "H" when the counter counts up.

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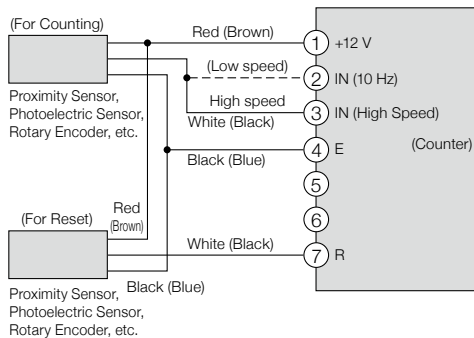GENERAL CATALOG 2018   471

KCX-□,□D/DM
Connection

■Example of Connection

When Directly Connected to the Sensors
A consumption current of +12 V should be 50 mA or less in total.

(For Counting)
Proximity Sensor, Photoelectric Sensor, Rotary Encoder, etc.

Red (Brown)
(Low speed)
High speed
White (Black)
Black (Blue)

Red (Brown)

(For Reset)
Proximity Sensor, Photoelectric Sensor, Rotary Encoder, etc.

White (Black)
Black (Blue)

1 +12 V
2 IN (10 Hz)
3 IN (High Speed)
4 E   (Counter)
5
6
7 R

When Operating the Counters in Parallel
1. In the case of contact input signals

Count Input

1 +12 V
2 IN (10 Hz)   (Counter)
4 E

1 +12 V
2 IN (10 Hz)   (Counter)
4 E

2. In the case of no-contact input signals

12 V
R
Counting Signal

3 IN (High Speed)
4 E   (Counter)

3 IN (High Speed)
4 E   (Counter)

$R \leqq \dfrac{12}{N}$ (kΩ)
N: Numbers of counter that can be connected in parallel.

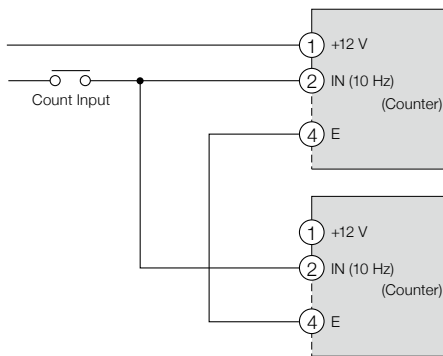### Simple Input Inhibit Method Using an Unused Input Terminal
If the contact point is closed and the input is forcibly applied to terminal ②, the sensor is prohibited from counting.
However, when the sensor output (terminal ③) is in the "L" state, if the contact point of input inhibit is closed, the count increases by 1 pulse.
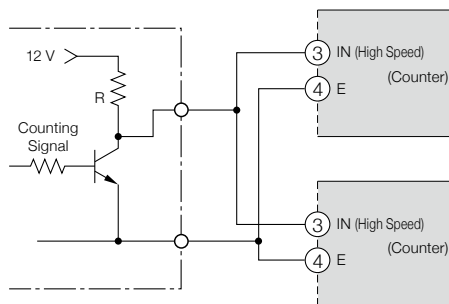

Input Inhibit
Sensor

1 +12 V
2 IN (10 Hz)
3 IN (High Speed)
4 E   (Counter)
5
6
7 R

How to Prohibit Counting when Output is Produced
When using the sensor at high speed, wire the cables as shown by the dotted lines.
(Diode: Equivalent to Hitachi 1S2076)
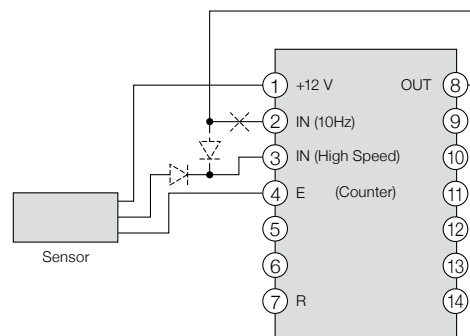
Sensor

1 +12 V   OUT 8
2 IN (10Hz)   9
3 IN (High Speed)   10
4 E   (Counter) 11
5   12
6   13
7 R   14

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■List of Operation Modes

In the case of models with a numerical display, six operation modes are enabled as shown below.

Output		Discrete Value When Counting Up		Prohibition of Counting Input During Output	Timing Chart	Terminal Connections
Holding Output	Switching Specific Time Output	Reset	No Reset			
	●	●			A-type Operation Input Counting Output — Specific Time	
●			●		B-type Operation Count Up Input Counting Output External Reset	④-⑤-⑥
●		●			Count Up Input Counting Output External Reset	④-⑤
●	●			●	Count Up Input Counting Output — Specific Time	②-⑧* or ③-⑧
●			●	●	Count Up Input Counting Output External Reset Set Value is Maintained.	②-⑧* or ③-⑧ ④-⑤-⑥
●	●			●	Input Counting Output External Reset	②-⑧* or ③-⑧ ④-⑤

* If the voltage terminal (terminal ⑧) is connected to the low speed input terminal (terminal ②), until the input is prohibited after counting up, the counter has the same responsivity as the low speed input terminal.