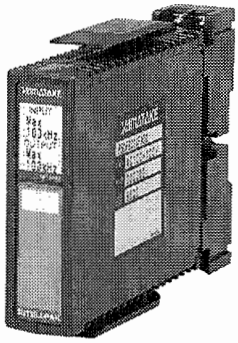
azbil

No. CP-UM-1336E

IP51FZC
INTELLPAK Pulse Isolator
User's Manual



Yamatake Corporation

RESTRICTIONS ON USE

This product has been designed, developed and manufactured for general-purpose application in machinery and equipment.

Accordingly, when used in applications outlined below, special care should be taken to implement a fail-safe and/or redundant design concept as well as a periodic maintenance program.

- Safety devices for plant worker protection
- Start/stop control devices for transportation and material handling machines
- Aeronautical/aerospace machines
- Control devices for nuclear reactors

Never use this product in applications where human safety may be put at risk.

REQUEST

Ensure that this User's Manual is handed over to the user before the product is used.

Copying or duplicating this User's Manual in part or in whole is forbidden. The information and specifications in this User's Manual are subject to change without notice.

Considerable effort has been made to ensure that this User's Manual is free from inaccuracies and omissions.
If you should find any inaccuracies or omissions, please contact Yamatake Corporation.

In no event is Yamatake Corporation liable to anyone for any indirect, special or consequential damages as a result of using this product.

SAFETY PRECAUTIONS

⚠WARNING Warnings are indicated when mishandling this product might result in death or serious injury.

⚠CAUTION Cautions are indicated when mishandling this product might result in minor injury to the user, or only physical damage to the product.

⚠WARNING

- Before wiring, or removing/mounting the IP51, be sure to turn the power OFF. Failure to do so might cause electric shock.

⚠CAUTION

- Before removing or mounting the IP51, be sure to turn the power OFF. Failure to do so might cause electric shock.
- Use the IP51 within the operating ranges recommended in the specifications (temperature, humidity, voltage, vibration, shock, mounting direction, atmosphere, etc.).
- Do not block ventilation holes. Doing so might cause fire or faulty operation.
- Do not disassemble the IP51. Doing so might cause electric shock or faulty
- Before wiring the IP51, be sure to turn the power OFF. Failure to do so might cause electric shock.
- Do not touch electrically charged parts such as the power terminals. Doing so might cause electric shock.
- Do not allow lead clippings, chips or water to enter the controller case. Doing so might cause fire or faulty operation.
- Firmly tighten the terminal screws at the torque listed in the specifications. Insufficient tightening of terminal screws might cause electric shock or fire.
- Do not use unused terminals on the IP51 as relay terminals. Doing so might cause electric shock, fire, or faulty operation.

CONTENTS

1. Introduction and Specifications

1. INTRODUCTION

The INTELLPAK IP51FZC is a plug-in pulse-isolator system, which conceives pulse signals transmitted from sensors or controllers and outputs pulse signals more suitable for measurement-control systems. This is accomplished by applying waveform processing, isolation and level convention to the received pulse signals.

2. SPECIFICATIONS

<table>
<tr><td rowspan="6">Input part</td><td rowspan="4">Input description</td><td>AC voltage pulse</td><td colspan="2">Peak-to-peak voltage detection model for small-signal input.
1: 200mV$_{p-p}$ to 50V$_{p-p}$ 0: 0 to 20mV$_{p-p}$
Input impedance: 100kΩ or greater</td></tr>
<tr><td>DC voltage pulse</td><td>Model for proximity or photoelectric sensors with large signal level input
1: 5 to 50V 0: –30 to +1.5V
Input impedance: 20kΩ or greater</td><td rowspan="2">Selected by DIP switch</td></tr>
<tr><td>ON/OFF pulse</td><td>Model for non-voltage contact and open collector.
OFF position: 5V
ON position: 1mA (voltage or current applied to contact.)
Input impedance: 20kΩ or greater</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td>Input frequency</td><td colspan="3">AC voltage pulse: 10Hz to 100kHz FS
DC voltage pulse (without one shot output F): DC to 100kHz FS
Other than one shot of output F: DC to 5 Hz</td></tr>
<tr><td>Input waveform</td><td colspan="3">Sine or square wave Duty: 25 to 75%</td></tr>
<tr><td>Chattering rejection</td><td colspan="3">When input frequency exceeds approx. 30Hz, output is forcefully stopped.
(Selectable by DIP switch for input type 14 only)</td></tr>
<tr><td rowspan="5">Output part</td><td rowspan="3">Output description</td><td>One shot non-contact output</td><td colspan="2">For driving AC/DC electromagnetic counter
ON time: 100ms ± 10%
Rating: ON voltage: 2V or less ON current: 500mA or less
OFF current: 2mA or less
Operating circuit voltage: 200Vdc, 130Vac or less</td></tr>
<tr><td>Open collector output</td><td>Rating: 30Vdc, 30mA or less
ON voltage: 0.4V or less
One shot output: ON time 100ms ± 10% (selected by switch)</td><td rowspan="2">Selected by DIP switch</td></tr>
<tr><td>Pulse voltage output</td><td>Rating: 1: 5V or 12V selected by DIP switch
0: 0.4V or less
Internal resistance: 620Ω
With one shot output: ON time 100ms ± 10% (selected by switch)</td></tr>
<tr><td>Output frequency</td><td colspan="3">Same as input frequency. With one shot output ON time is held.</td></tr>
<tr><td>Auxiliary output</td><td colspan="3">12V voltage output, Internal resistance: 1kΩ</td></tr>
<tr><td rowspan="6">General specifi-cation</td><td>Power supply description</td><td colspan="2">AC</td><td>DC</td></tr>
<tr><td>Rated power voltage</td><td>100/110/120Vac 50/60Hz</td><td>200/220/240Vac 50/60Hz</td><td>24Vdc</td></tr>
<tr><td>Operating power voltage</td><td>80 to 132Vac 45 to 65Hz</td><td>170 to 264Vac 45 to 60Hz</td><td>24Vdc ± 10%</td></tr>
<tr><td>Power consumption</td><td colspan="2">Approx. 5.5VA</td><td>Approx. 2.7VA</td></tr>
<tr><td>Starting current</td><td colspan="2">—</td><td>0.11A or less</td></tr>
<tr><td>Peak value and current width at power ON</td><td colspan="2">10A or less, 1ms</td><td>5A or less, 1ms</td></tr>
</table>

General specifi-cations	Insulation resistance	100MΩ or greater between I/O and power terminals, and between I and O terminals when measured by 500Vdc megger.	
	Dielectric strength	2000Vac, 1 minute between I/O and power terminals, and between I and O terminals	
	Operating ambient temperature	–5 to +55°C, non-freezing	
	Ambient storage temperature	–20 to +70°C, non-freezing	
	Operating ambient humidity	90% RH or less, no condensation	
	Ambient storage humidity	90% RH or less, no condensation	
	Vibration resistance	4.9m/s^2 or less, 10 to 60Hz, for 2 hour in X, Y and Z directions when equipped with vibration-absorbing bracket	Non applicable when mounted on DIN rail.
	Shock resistance	490m/s^2 or less, three times in either up or down movement	
	Case material	Heat resistance ABS resin	
	Case color	Gray, Munsell 2.5PB3.5/1	
	Wiring terminal screw	M3.5	
	Terminal screw tightening torque	0.78 to 0.98N • m	
	Installation	Mounted on wall or DIN rail	
	Mass	Approx. 200g including the base socket	

Standard accessory	Base socket Part No. QN719A
Auxiliary part (sold separately)	Vibration-absorbing bracket Part No. QN 718A

2. Model Selection

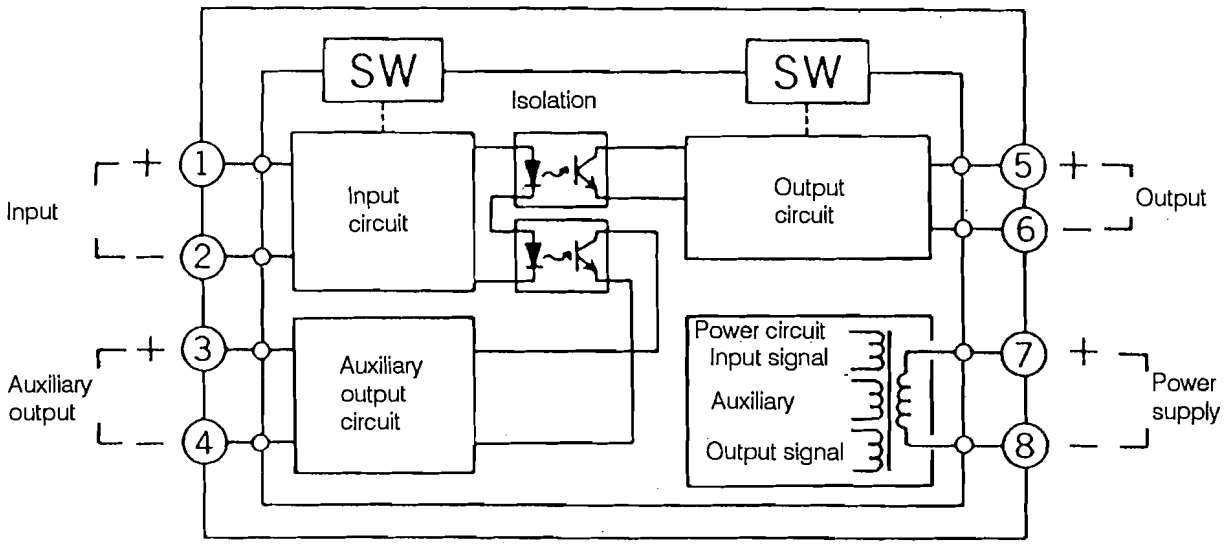
Model Configuration

I	II	III	IV	V	0

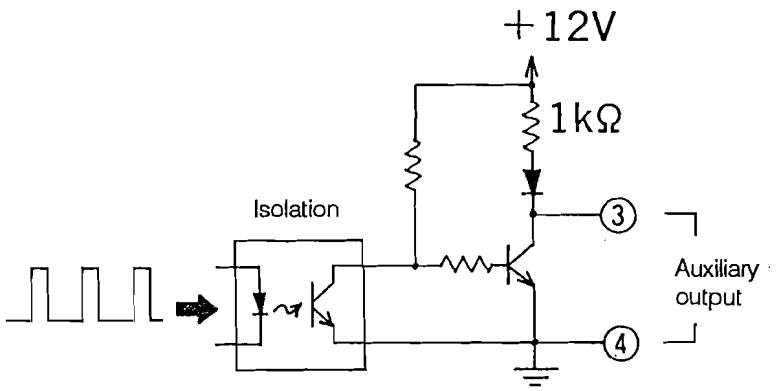
Example: IP51FZC12EA00

I Basic model No.	II Input	III Output	IV Power voltage	V Additional processing	Specifications	
IP51FZC					Pulse isolator	
	12				AC voltage pulse input: small-signal input Peak-to-peak voltage detection type	
	14				DC voltage pulse input: large-signal input. Model for proximity and photoelectric sensors	Selected by DIP switch
					ON/OFF pulse input: Model for non-voltage contact and open collector	
		E			One-shot non-contact output	
		F			Open collector output	Selected by
					Voltage pulse output	DIP switch
			A		100/110/120Vac 50/60Hz	
			B		200/220/240Vac 50/60Hz	
			C		24Vdc	
				0	None	
				T	Tropicalization	
				D	Inspection certificate provided	
				B	Tropicalization and test data	
				Y	Complying with the traceability certification	

3. Circuit Block Diagram

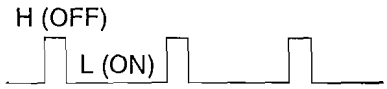


Each input signal applied to terminals ① and ② in the figure above first is isolated by photocoupler, then, wave-shaped by the input circuit, converted into desired output signal set by DIP switch, and output to the terminals ⑤ and ⑥.

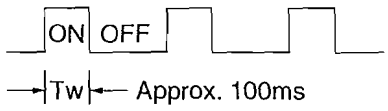


Input and Output Waveforms

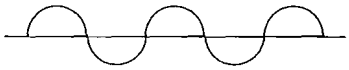
Between input terminals ① and ② (for input type 14)



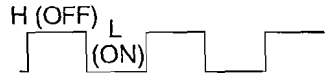
Between output terminals ⑤ and ⑥ (for output type E)



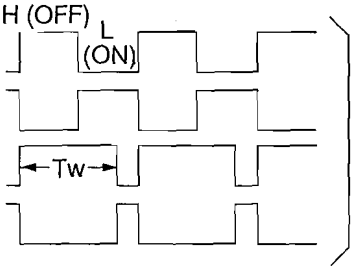
Between input terminals ① and ② (for input type 12)



Between input terminals ① and ② (for input type 14)



SW-2	
1	2
OFF	ON
OFF	OFF
ON	OFF
ON	ON



Between output terminals ⑤ and ⑥ (for output type F)

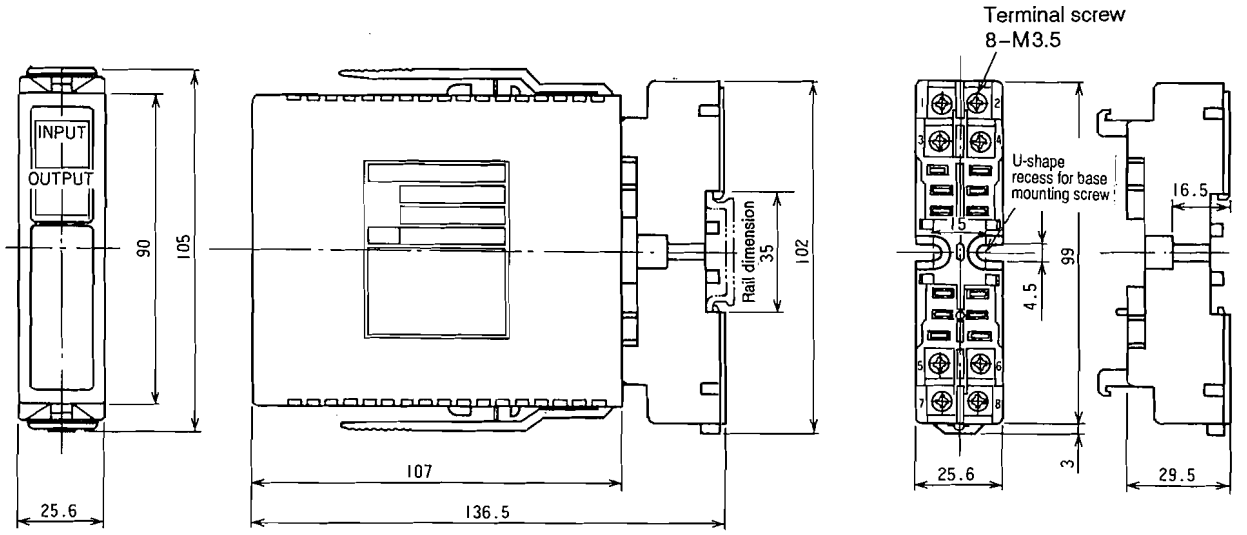
Tw : Approx. 100ms
Delay between input and output: 2 to 5 μs
One-shot output (SW-2-1: ON) cannot be used when output frequency is more than approx. 10 Hz.

4. External Dimensions

External Dimension Drawing

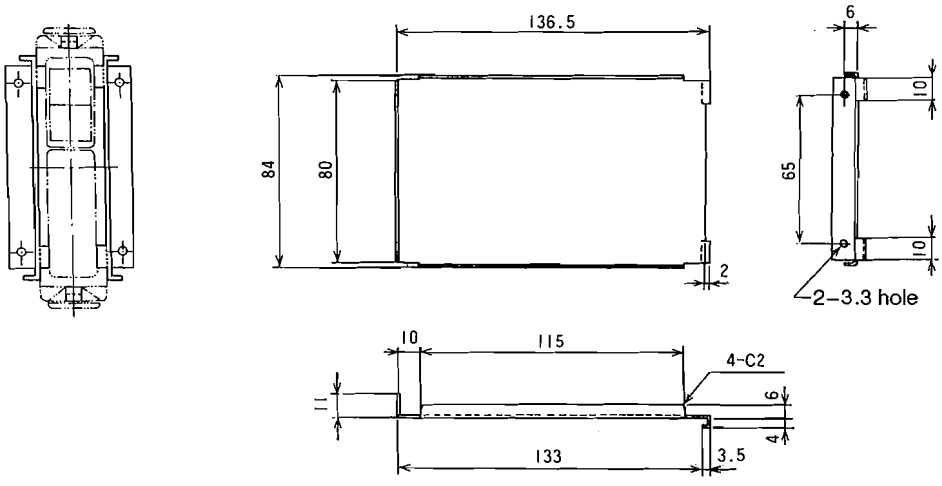
(Unit: mm)

Base socket Part No. QN719A



Equipped with Vibration-Absorbing Bracket

Vibration-absorbing bracket Part No. QN718A



Material: Galvanized, cold rolled plate steel
SPCC t1 with chromate processing

5. Installation

1. INSTALLATION PRECAUTIONS

(1) Handling

For personal safety when removing or mounting the main unit, always turn OFF both the power supply and the input signal.

(2) Installation

(a) When equipment is installed in a dusty environment, house it in a dust-proof cabinet with heat radiation protection.

(b) Avoid excessive vibration and shocks.

(3) Wiring

(a) Do not mount power, input signal, or output signal lines near either noise generators, or relay drive lines.

(b) Avoid clamping lines together or putting them in the same duct.

(c) While the equipment can be operated as soon as the power supply is turned ON, however 30 minutes are required to fully energize all circuits.

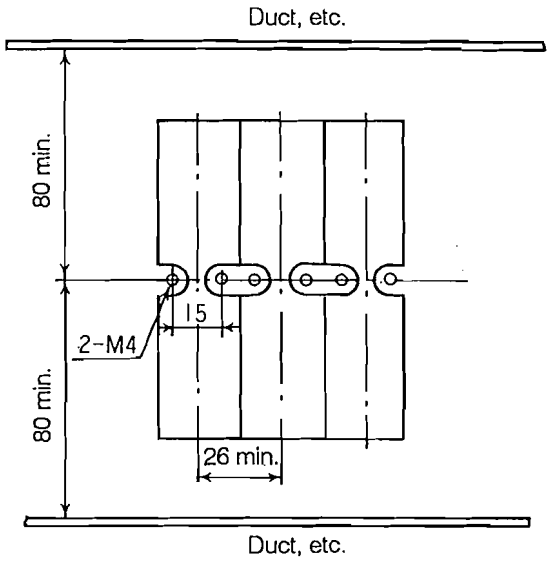
(4) Output terminal short circuit

Avoid shorting the output terminals for any length of time.

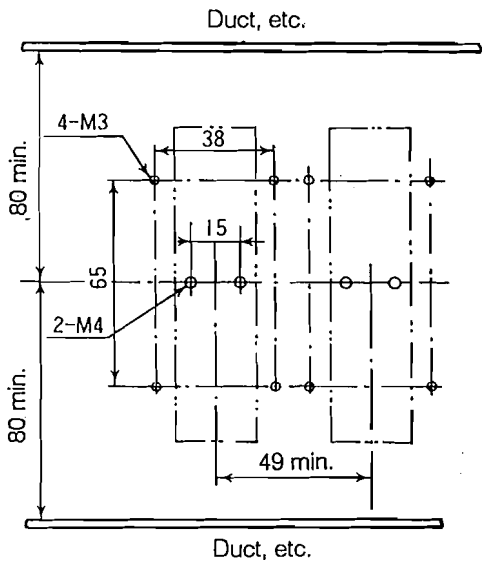
2. INSTALLATION PROCEDURE

(Unit: mm)

Lateral and vertical spacing



Installation on vibration-absorbing bracket with lateral and vertical spacing



Caution:

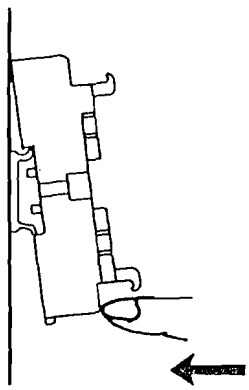
① When installing equipment on a wall with vibration, always use vibration-absorbing bracket (option QN718A). Where there is vibration present, the equipment cannot be installed on the DIN rail.

② When the main unit output is A/D converted, use the integral A/D converter. When the high speed A/D converter for sequential comparison is used, check the operation in advance by using the combination test.

3. MOUNTING AND REMOVING UNIT (DIN RAIL)

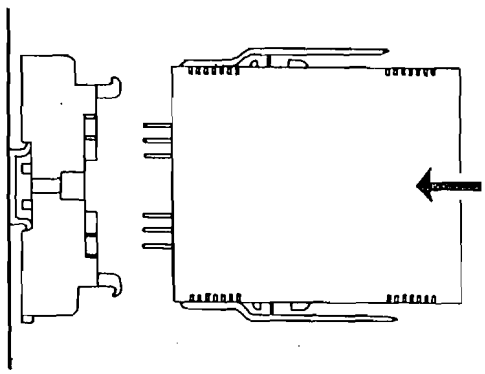
(1) Socket – DIN Rail Attachment

Hook one edge of the socket to the rail as shown in the figure, then push the socket in the direction of the arrow until it clicks in place.



(2) Main Unit – Socket Attachment

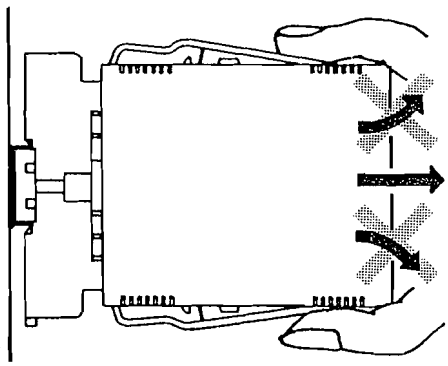
Hold the main unit with labels facing installer and insert unit straight into socket. Insert the unit until the side hooks return to their normal position parallel to the case. The unit should be tightly connected to the socket at this point.



(3) Main unit removal

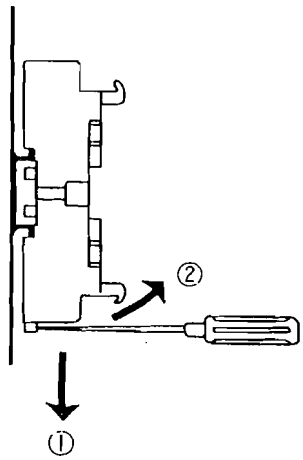
Push the main unit forward the socket while clasping side hooks, then slide unit straight out away from socket.

Note: Socket may be damaged if it is removed without clasping both side hooks equally.

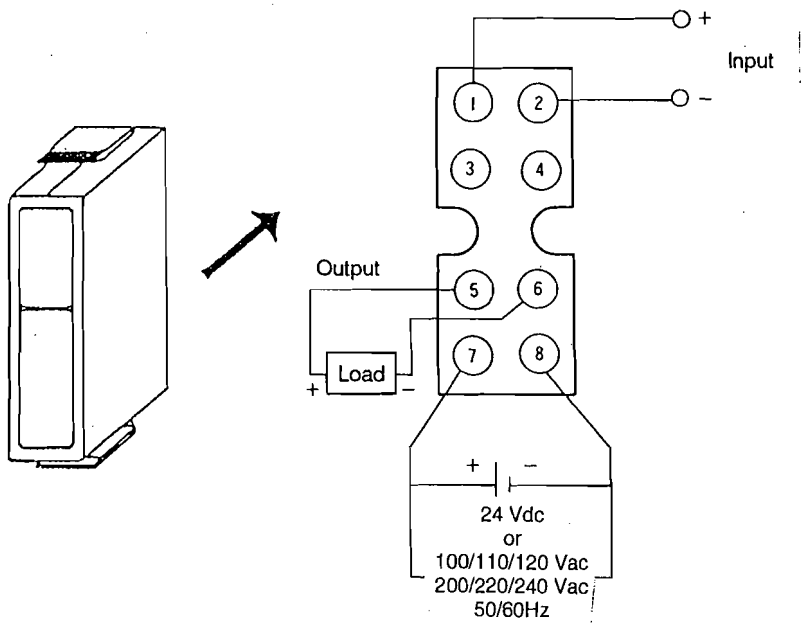


(4) Socket removal

Insert a screwdriver in the slider groove of the socket as shown in the figure. While moving screwdriver in arrow direction (1) swing the socket away from rail in arrow direction (2) until it is fully removed.



6. Wiring



1. ELECTRICAL PROCEDURE

1 – 1 Power Supply

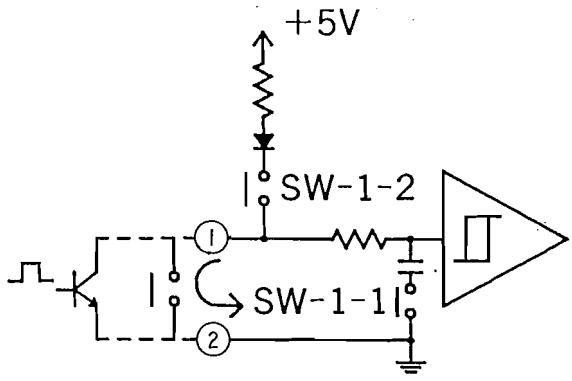
Connect rated power supply to terminals ⑦ and ⑧.

1 – 2 Input

Connect ⊕ input signal indicated on label to terminal ① , and ⊖ to terminal ② . The maximum input frequency is 100kHz. With square wave input set the duty to 25 to 76%.

Correspondence between ON/OFF and large input signals

Input code 14



a) ON/OFF input

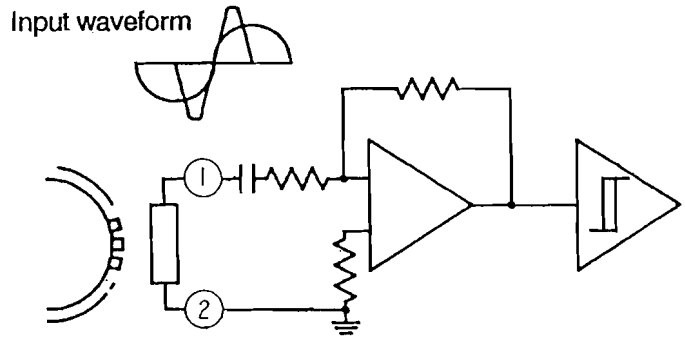
The input circuit where sensor output is adaptable to an open collector or reed relay (contact). When ON the closed current (Is) is approx. 1mA; when OFF the pull-up voltage is +5V.

As shown in Fig. 2, turn DIP switch 1-2 ON (SW-2). To eliminate chatter from contact input, turn ON SW1-1. When this is done the maximum input frequency is 30Hz.

b) Large input

Suitable for output circuit of +5 to +30V when the sensor output is high, or –30 to –1.5V when it is low. The input impedance is 20kΩ or greater. Turn OFF SW1-1 and SW1-2. When SW1-1 is turned ON, 30Hz or more can be cut from a 12V pulse (duty 50%).

Correspondence to small input | Input code 12

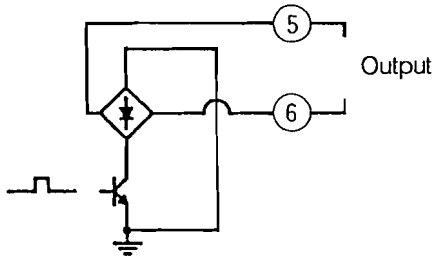


The input circuit suitable for such a signal source is one that is smaller at low-speed rotation and increases with speed, such as happens with an electromagnetic pickup sensor. The input impedance is 100kΩ or greater, with an allowable signal range from 200mV$_{p-p}$ to 50V$_{p-p}$ using a 0 -V center. This type of input is not provided with DIP switch SW-1.

1 – 3 Output

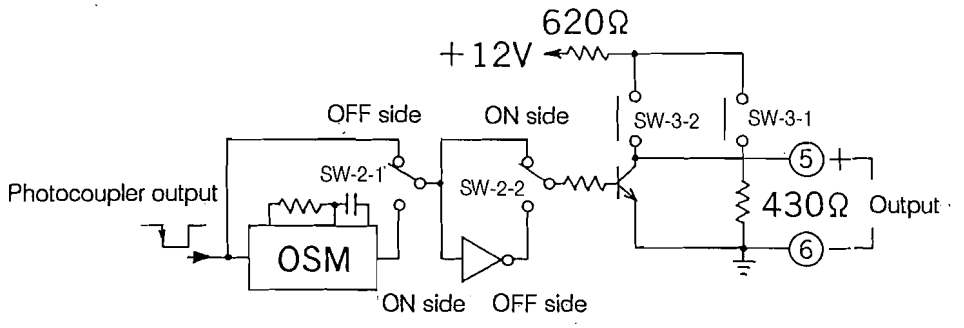
a) E-type output

This is used to drive an AC or DC electromagnetic counter. Set the maximum applied voltage to 200 Vdc or 130 Vac and the maximum drive current IL to 500mA. The conduction time is 100ms and remains constant. Keep the output frequency always at 5Hz or less.



b) F-type output

Output circuit suitable for open collector or pulse voltage output of 5V/12V. The equipment can accommodate various outputs by setting DIP switches SW-2 and SW-3.



i) SW-2

When DIP switch SW-2-1 is turned OFF, the input waveform is transmitted unchanged to the next stage when turned ON, the output waveform is transmitted. This permits the time width of the one-shot multivibrator output pulse to be increased. Since the time is 100ms, this cannot be used if the output frequency exceeds 10Hz. SW-2-2 is used for inversion/non-inversion of output pulse waveform.

ii) SW-3

DIPS switch SW-3 is used to select either open collector output or pulse voltage output, which can be switched to 5V or 12V. When SW-3-2 is turned OFF, output corresponding to the open collector is obtained.

The ON current shall be set to 30mA or less and the circuit voltage to 30V or less. The maximum voltage at ON time is 0.4V.

Whe SW-3-2 is turned ON, pulse voltage output is obtained. When SW-3-1 is turned ON, output voltage of 5V is obtained; when turned OFF, 12V is obtained. Since the voltage is output through a 620Ω resistor as shown in the figure, if the load resistance is smaller the output level will be reduced due to a voltage division.

1 – 4 DIP Switch Settings

Table below shows a matrix of DIP switch settings.

Not provided for input type 12.

Not provided for output type E.

SW-1	1	ON	Chatter rejection input
		OFF	Normal input
	2	ON	Open collector input (contact)
		OFF	Pulse voltage input
SW-2	1	ON	One-shot output
		OFF	Normal output
	2	ON	Inversion/non-inversion output
		OFF	
SW-3	1	ON	5V output
		OFF	12V output
	2	ON	Voltage output
		OFF	Open collector output

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Specifications are subject to change without notice.

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