

# MITSUBISHI

PROGRAMMABLE CONTROLLER

# MELSEC-A

User's Manual

## High speed counter module type A1SD61 (Hardware)

### INTRODUCTION

Thank you for choosing the Mitsubishi MELSEC-A Series of General Purpose Programmable Controllers. Please read this manual carefully so that the equipment is used to its optimum. A copy of this manual should be forwarded to the end User.



IB (NA) 66486-A (9406) ROD

## 1. GENERAL DESCRIPTION

### 1 GENERAL DESCRIPTION

This manual describes specifications, handling and wiring of an A1SD61 high speed counter module (hereinafter referred to as the A1SD61).

#### 1.1 Related Manual

- A1SD61 user's manual (IB-66337)  
Describes details of specifications, functions and programming of an A1SD61.

## 2. SPECIFICATIONS

### 2 SPECIFICATIONS

#### 2.1 General Specifications

Item	Specifications				
Operating ambient temperature	0 to 55 °C (See the important notice described below)				
Storage ambient temperature	-20 to 75 °C				
Operating ambient humidity	10 to 90 %RH, non-condensing				
Storage ambient humidity	10 to 90 %RH, non-condensing				
Vibration resistance	Conforms to <sup>2</sup> JIS C 0911	Frequency	Acceleration	Amplitude	Sweep Count 10 times *1 (1 octave/minute)
		10 to 55 Hz	—	0.075 mm (0.003 inch)	
		55 to 150 Hz	9.8 m/s <sup>2</sup> (1 g)	—	
Shock resistance	Conforms to <sup>2</sup> JIS C 0912 (98 m/s <sup>2</sup> (10 g) x 3 times in 3 directions)				

Item	Specifications
Noise durability	By noise simulator of 1500 Vpp noise voltage, 1 µs noise width and 25 to 60 Hz noise frequency
Dielectric withstand voltage	1500 VAC for 1 minute across AC external terminals and ground 500 VAC for 1 minute across DC external terminals and ground
Insulation resistance	5 MΩ or larger by 500 VDC insulation resistance tester across AC external terminals and ground
Grounding	Class 3 grounding; ground to the panel if proper grounding is not available.
Operating ambience	Free of corrosive gases and oil mist. Dust should be minimal.
Cooling method	Self-cooling

### REMARKS

- One octave marked \*1 indicates a change from the initial frequency to double or half frequency. For example, any of the changes from 10 Hz to 20 Hz, from 20 Hz to 40 Hz, from 40 Hz to 20 Hz, and 20 Hz to 10 Hz are referred to as one octave.
- <sup>2</sup>JIS: Japanese Industrial Standard

### IMPORTANT

Restriction for UL standard approved products

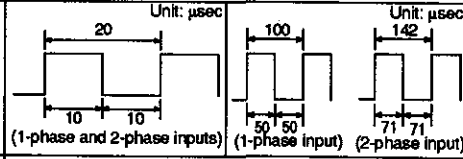
In order to be recognized as UL listed products, the following restrictions apply;

- Operating ambient temperature is limited from 0 to 50 °C
- A class 2 power supply recognized by the UL standard must be used

#### 2.2 Performance Specifications

Item	Specifications	
Counting speed selection pin	50K side	10K side
Number of occupied I/O points	32	
Number of channels	1	
Count input signal	Phase	1-phase and 2-phase inputs
	Signal levels (φA and φB)	5 VDC 12 VDC 24 VDC } 2 to 5 mA

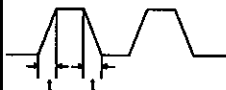
The United States	Mitsubishi Electronics America, Inc. (Industrial Automation Division) 800 Biermann Court, Mt Prospect IL 60056 Phone: (708)298-8223
Canada	Mitsubishi Electric Sales Canada, Inc. (Industrial Automation Division) 4299 14th Avenue, Markham Ontario L3R 0J2 Phone: (416)475-7728
United Kingdom	Mitsubishi Electric UK Ltd., (Industrial Automation Division) Travellers Lane, Hatfield, Herts., AL10 8XB Phone: (0707)276100
Germany	Mitsubishi Electric Europe GmbH, (Industrial Automation Division) Gothaer Strasse 8, Postfach 1548, D 4030 Ratingen 1 Phone: (02102)4860
Taiwan	Setuyo Enterprise Co., Ltd., (106) 11th Fl, Chung Ling Bldg., 363 Sec 2 Fu-Hsing S Rd., Taipei, Taiwan R.O.C. Phone: (02)732 0161
Hongkong (& China)	Ryoden International Ltd., (Industrial & Electrical Controls Division) 10/F, Manulife Tower 169 Electric Rd North Point, Hong Kong Phone: 8878870
Singapore (& Malaysia)	MELCO Sales Singapore Pte Ltd (Industrial Division) 307 Alexandra Rd #05 01/02, Mitsubishi Electric Bldg Singapore 0315 Phone: 4732308
Thailand	F.A. Tech Co. Ltd., 1138/33-34 Rama 3 Rd., Yannawa, Bangkok 10120 Phone: (02)295 2861-4
Australia	Mitsubishi Electric Australia Pty. Ltd., (Industrial Controls Division) 348 Victoria Rd., Rydalmere, N.S.W. 2116 Phone: (02)684 7200
Republic of South Africa	M.S.A. Manufacturing (Pty) Ltd., (Factory Automation Division) P.O. Box 39733, Brenley, Johannesburg 2018 Phone: (011)444 8080
<b>MITSUBISHI ELECTRIC CORPORATION</b> <small>HEAD OFFICE: MITSUBISHI SHIENKI BLDG MARUHOCHI TOKYO 100 TELEX: J26522 CABLE MELCO            TOKYO INAGAYA WORKS: 1-14, YADAI NAMIS HIGASHIKU INAGAYA, JAPAN</small>	
<small>When exported from Japan, this manual does not require application to the Ministry of International Trade and Industry for service transaction permission.            Printed in Japan Specifications subject to change without notice</small>	

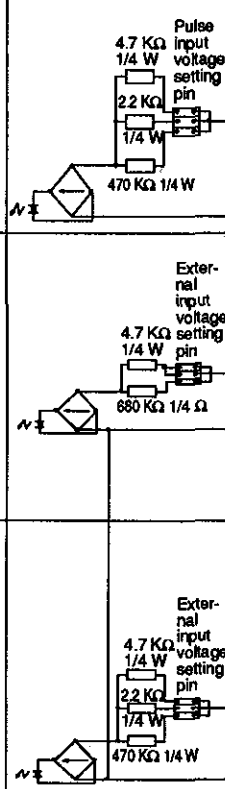
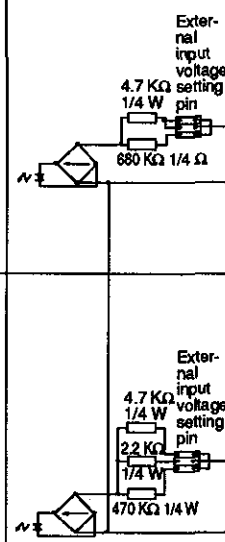
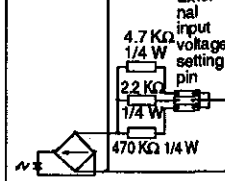
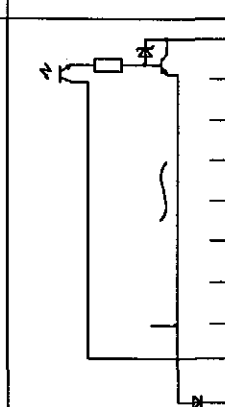
Item		Specifications		
Counter	Maximum counting speed *1	1-phase input	50K pps	10K pps
		2 phase input	50K pps	7K pps
	Counting range	32-bit signed binary -2147483648 to 2147483647		
	Type	Equipped with UP/DOWN preset counter and ring counter functions		
Minimum pulse width that can be counted *2		Unit: μsec		
		Unit: μsec		
		Unit: μsec		
Limit switch output	Comparison range	32-bit signed binary		
	Comparison result	N/O contact operation: dog ON address ≤ count value ≤ dog OFF address N/C contact operation: dog OFF address ≤ count value ≤ dog ON address		
External input	Preset	12/24 VDC 3/6 mA		
	Function start	5 VDC 5 mA		
External output	Comparison output	Transistor (open collector) output 12/24 VDC 0.1 A/point 0.8 A/common		
Power consumption		5 VDC 0.35 A		

\*1 The counting speed is influenced by the pulse leading edge/fall time. The following counting speeds are possible. If a pulse is counted with a leading edge/fall time that is too long, a counter error may be caused.

\*2 Adjust so that the leading edge/fall time of the input is 5 μsec or less, Duty ratio: 50 %

Counting Speed Setting Pin	50K		10K	
	1-phase input	2-phase input	1-phase input	2-phase input
Leading Edge/Fall Time				
t=5 μsec or less	50K pps	50K pps	10K pps	7K pps
t=50 μsec or less	5K pps	5K pps	1K pps	700 pps
t=500 μsec	—	—	500 pps	250 pps

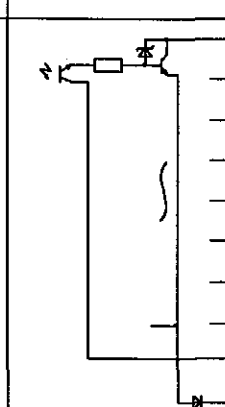


Input/Output	Internal Circuit	Terminal No	Signal Name	Operating Status	Input Voltage (Guaranteed Value)	Operating Current
Input		3	Phase B pulse input 24 V	ON	21.6 to 26.4 V	2 to 5 mA
				OFF	5 V or lower	0.1 mA or lower
		4	Phase B pulse input 12 V	ON	10.8 to 13.2 V	2 to 5 mA
				OFF	4 V or lower	0.1 mA or lower
		5	Phase B pulse input 5 V	ON	4.5 to 5.5 V	2 to 5 mA
				OFF	2 V or lower	0.1 mA or lower
Input		5	Preset input 12 V/24 V	ON	10.2 to 26.4 V	2 to 6 mA
				OFF	2 V or lower	0.1 mA or lower
		6	Preset input 5 V	ON	4.5 to 5.5 V	3.5 to 5.5 mA
				OFF	1.5 V or lower	0.1 mA or lower
		7	Function start input 24 V	ON	21.6 to 26.4 V	2 to 5 mA
				OFF	5 V or lower	0.1 mA or lower
8	Function start input 12 V	ON	10.8 to 13.2 V	2 to 5 mA		
		OFF	4 V or lower	0.1 mA or lower		
Input		7	Function start input 5 V	ON	4.5 to 5.5 V	2 to 5 mA
				OFF	2 V or lower	0.1 mA or lower
Output		6	COM	Response time	OFF → ON: 1 msec or less ON → OFF: 3.5 msec or less	ON → OFF: 3.5 msec or less OFF → ON: 1 msec or less
				8	COM	Response time

### 23 Functions

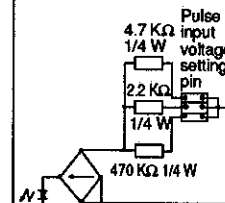
Function	Description	
Preset	<ul style="list-style-type: none"> <li>Change the present value of the counter</li> <li>The preset operation can be done either by a sequence program or by an external preset input</li> </ul>	
Ring counter	<ul style="list-style-type: none"> <li>Counting alternates between the preset value and the ring counter value.</li> </ul>	
Limit switch output	<ul style="list-style-type: none"> <li>Output an ON/OFF signal in a specified output status, comparing it with the present value of the limit switch output command counter.</li> </ul>	
Counter function selection	Latch counter	<ul style="list-style-type: none"> <li>Stores the present value of the counter when the signal of the counter function selection start command is input.</li> </ul>
	Sampling counter function	<ul style="list-style-type: none"> <li>After inputting the signal of the counter function selection start command, the input pulse is counted during a specified period and stored in the buffer memory.</li> </ul>
	Periodic pulse counter	<ul style="list-style-type: none"> <li>While inputting the signal of the counter function selection start command, the input pulses are stored in the buffer memory at specified intervals.</li> </ul>
	Count disable	<ul style="list-style-type: none"> <li>Stops counting pulses while the count enable command is ON</li> </ul>

\* Counter function selection means that only one out of the 4 functions can be used

Input/Output	Internal Circuit	Terminal No	Signal Name	Operating Status	Input Voltage (Guaranteed Value)	Operating Current
Output		11	OUT 1	Operating voltage: 10.2 to 30 V Rated current: 0.5 A Rated voltage: 0.1 A/point 0.8 A/common Maximum rush current: 0.6 A 10 msec Maximum voltage drop at ON: 0.7 V(TYP) 1.3 V(MAX) Response time: OFF → ON: 1 msec (MAX) 0.3 msec (MIN) ON → OFF: 1 msec (MAX) 0.3 msec (MIN)	Input voltage: 10.2 to 30 V Current consumption: 8 mA (TYP 24 VDC)	
		12	OUT 2			
		13	OUT 3			
		14	OUT 4			
		15	OUT 5			
		16	OUT 6			
		17	OUT 7			
		18	OUT 8			
		19	12/24 V			
		20	0 V			

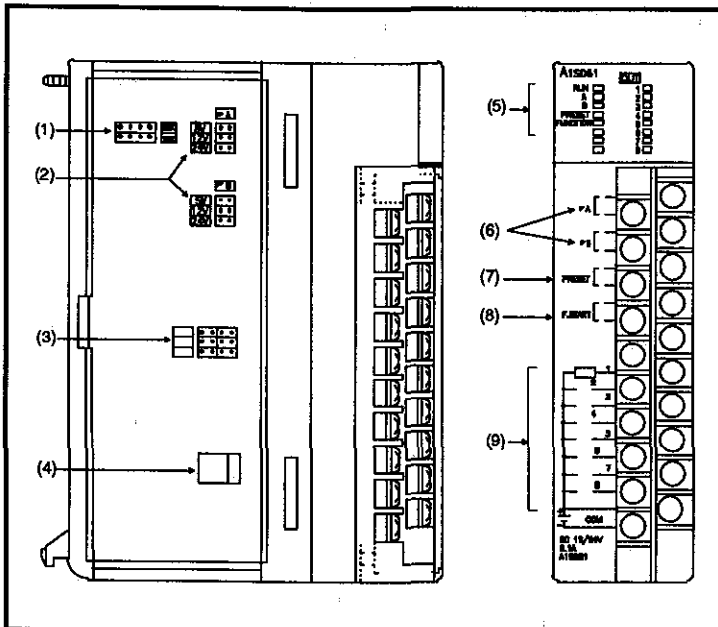
\* In the preset input and function start input, the same external input voltage setting pin is used

### 24 External Devices Interfaces

Input/Output	Internal Circuit	Terminal No	Signal Name	Operating Status	Input Voltage (Guaranteed Value)	Operating Current
Input		1	Phase A pulse input 24 V	ON	21.6 to 26.4 V	2 to 5 mA
				OFF	5 V or lower	0.1 mA or lower
			Phase A pulse input 12 V	ON	10.8 to 13.2 V	2 to 5 mA
				OFF	4 V or lower	0.1 mA or lower
			Phase A pulse input 5 V	ON	4.5 to 5.5 V	2 to 5 mA
				OFF	2 V or lower	0.1 mA or lower
		2	COM			

### 3. NOMENCLATURE

#### 3 NOMENCLATURE

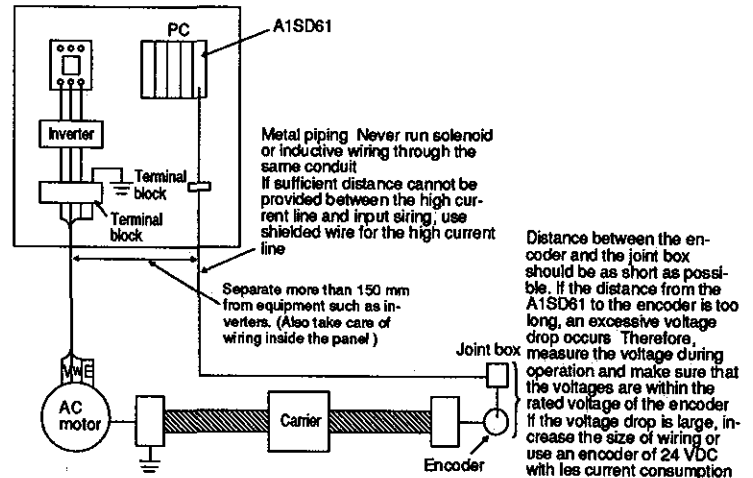


No.	Name	Description
(1)	Counting speed selection pin	50K: Counts pulses at a maximum speed of 50K pps in 1-phase or 2-phase input 10K: Counts pulses at 10K pps in 1-phase input, at 7K pps in 2-phase input (The factory-setting is 50K.)
(2)	Input pulse voltage selection pin	Select a pulse voltage that is input to Phase A or B (The factory-setting is 24 V) Mitsubishi cannot guarantee the module when a pulse whose voltage is higher than the selected voltage is applied
(3)	External input voltage selection pin	Select a voltage input to the PRESET/F START terminals (The factory-setting is 24 V) Mitsubishi cannot guarantee the module when a pulse whose voltage is higher than the selected voltage is applied
(4)	Fuse	Used for protecting outputs 1 to 8 from overcurrent.

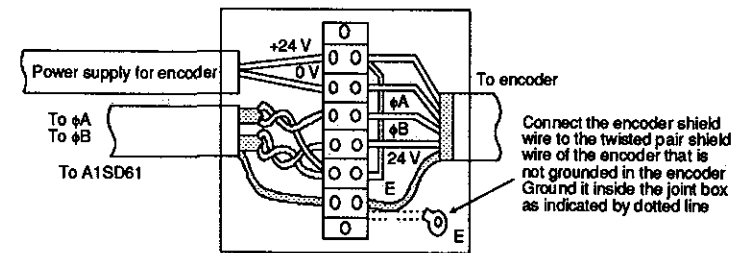
(2) For 1-phase input, connect count input signal to phase A only

(3) If the A1SD61 picks up pulse noise, it will count incorrectly

(4) The specific measures against noise are shown below:



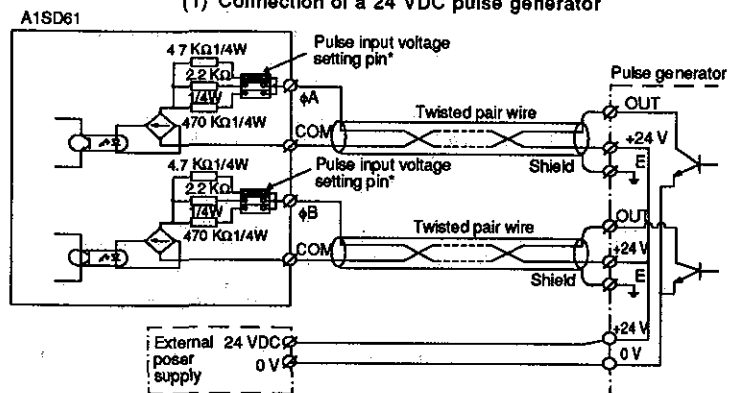
• Ground twisted shielded wire on the encoder side (joint box) (This is a connection example for 24 V send load)



No.	Name	Description
(5)	LED indicators	RUN Lit when the module operates normally Flashes when a data write error has occurred OFF when a watchdog timer error has occurred
		φA Lit when voltage is applied to phase A pulse input terminal
		φB Lit when voltage is applied to phase B pulse input terminal
(5)	LED indicators	PRE-SET Lit and latched when voltage is applied to the PRESET terminal OFF when external preset detection reset signal (Y16) is turned ON.
		FUNCTION ON when voltage is applied to the F START terminal
		O/Ps 1 to 8 ON when a corresponding limit switch is turned ON by the limit switch output function. OFF when the limit switch is turned OFF
(6)	φA/φB	Pulse input terminals (φB is used as decrement count command.)
(7)	PRESET	The terminal in which voltage is applied when a preset is executed from an external device.
(8)	F START	The terminal in which voltage is applied when a counter function selection is executed
(9)	OUTs 1 to 8	An external output terminal used for limit switch output.

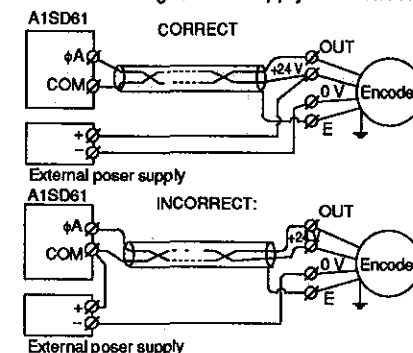
#### 4.2 Wiring example for the connection with the open collector output pulse generator

(1) Connection of a 24 VDC pulse generator



#### POINT

The encoder signal and supply lines should be wired as shown below:



#### REMARK

(1) \* Set the pulse input voltage setting pin to the position

### 4. WIRING

#### 4 WIRING

##### 4.1 Wiring Precautions

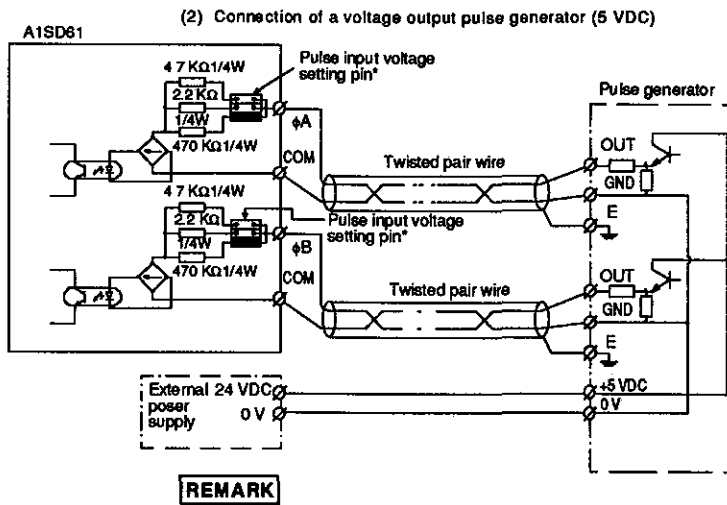
(1) For a high-speed pulse input, take the following counter measures against noise:

(a) Be sure to use shielded twisted pair cables. Also, make sure they are grounded to the earth

(b) Do not run a twisted pair cable in parallel with power cables or other I/O lines which may generate noise. Run cables at least 150 mm (5.91 in.) away from the above-mentioned lines and over the shortest distance possible

## 5. OUTSIDE DIMENSIONS

### 5 OUTSIDE DIMENSIONS

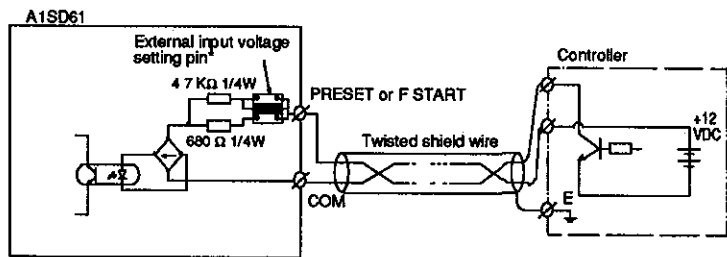


**REMARK**

(1) \* Set the pulse input voltage setting pin to the position

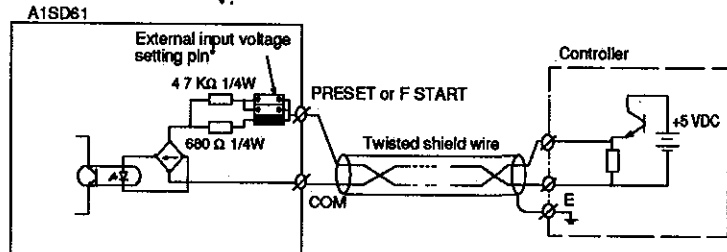
### 4.3 Wiring Example for the Connection of a Controller to External Input Terminals (PRESET and F START)

(1) When a controller (sink load type) is supplied with 12 V:



This diagram assumes that the internal circuit is set to PRESET

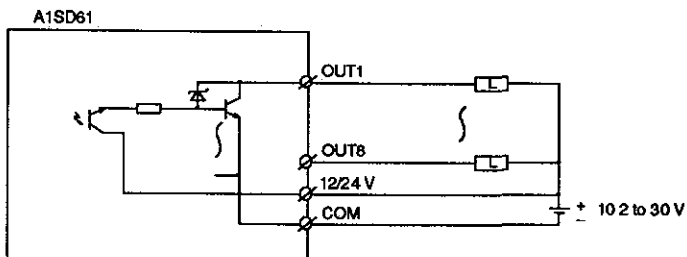
(2) When a controller (source load type) is supplied with 5 V:



This diagram assumes that the internal circuit is set to PRESET

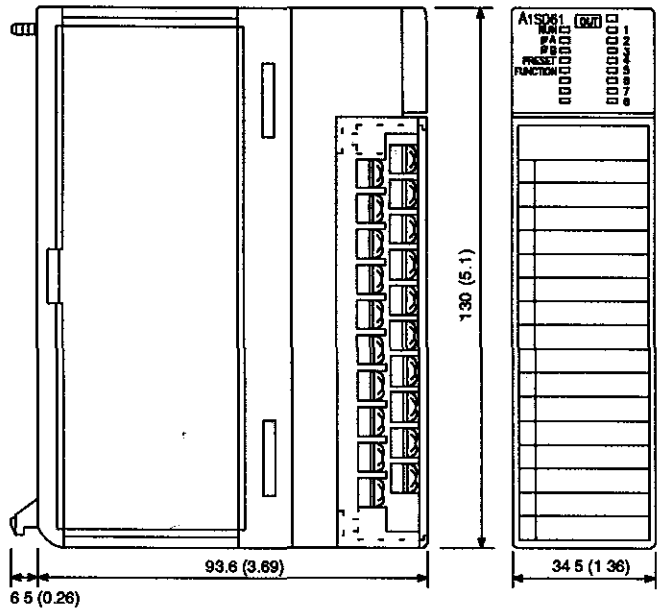
### 4.3.1 Wiring examples at external output terminals (OUTs 1 to 8)

To use an external terminal, the internal photocoupler should be activated. For this example, 10.2 to 30 VDC external power is necessary. Connection methods are as follows:



**REMARK**

(1) \* Set the pulse input voltage setting pin to the position



Unit: mm (in)

Item	Specifications
Weight (kg) (lb)	0.27 (0.60)

### REVISIONS

Revision	Description
A	
Jun. 1994	

### IMPORTANT

- (1) Design the configuration of a system to provide an external protective or safety interlocking circuit for the PCs
- (2) The components on the printed circuit boards can be damaged by static electricity, so avoid handling them directly. If it is necessary to handle them, take the following precautions:
  - (a) Ground human body and work bench
  - (b) Do not touch the conductive areas of the printed circuit board and its electrical parts with non-grounded tools, etc.

Under no circumstances will Mitsubishi Electric be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment.

All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation. Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.

Owing to the very great variety in possible applications of this equipment, you must satisfy yourself as to its suitability for your specific application.