

DANGER Procedures which may lead to a dangerous condition and cause death or serious injury if not carried out properly. Procedures which may lead to a dangerous condition and cause superficial to medium injury, or physical damage only, if not carried out properly.

Depending on circumstances, procedures indicated by ACAUTION may also be linked to serious results.

In any case, it is important to follow the directions for usage.

Store this manual in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.

#### [DESIGN PRECAUTIONS]

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 Failure of external output transistors could cause outputs to remain continually ON or continually OFF.

Provide an external circuit to monitor output signals whose disruption could cause serious accidents.

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- Use the PC in the environment specified in the General Specifications section in this manual
- Using it in an environment which does not meet the general specifications could cause electric shock, fire or malfunctions, and damage or deterioration of the module.
- Do not bundle the control wire and the communication cable with the main circuit or power line or keep them close to one another.
- Keep the control wire and the communication cable at least 150 mm away from the main circuit or power line: otherwise, noise or malfunctions will occur.

## [INSTALLATION PRECAUTIONS]

- Do not directly touch the conducting part of the module. Failure to observe this instruction will cause the module to malfunction or break down
- Install the module by engaging the module mounting projections on the lower part of the module in the mounting holes of the base unit. Incorrect installation could result in malfunctions, failure of detachment.

#### [WIRING PRECAUTIONS]

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- The twisted shielded wire must be grounded to at least class 3 specifications at the encoder side (relay box).
- Ground the AG terminal using third class grounding or higher exclusively for the PC. If you do not, the PC will malfunction.
- Before connecting wires to the PC, check the rated voltage and the terminal arrangement. Connecting power of a different voltage or wiring incorrectly will result in fire or failure.
- Do not apply the voltage higher than the value set with a jumper. Failure to observe this instruction will result in failure.
- Tighten the terminal screws to the specified torque. Loose terminal screws will cause a short, fire or malfunctions.
- Tightening the terminal screws too far may cause damage to the screws resulting in short circuits or malfunctions.
- Take all possible measures to prevent chips or wire scraps from entering the
- module. Entry of foreign material will cause fire, failure of malfunctions.

## [STARTING AND MAINTENANCE PRECAUTIONS]

# DANGER

- Do not touch the terminals while they are live. This will cause malfunctions.
- Switch the power off before cleaning the module or retightening the terminal
- screws. If the power is left on, the module will break down or malfunction.

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- Do not disassemble or tamper with the module. This will cause failure, malfunctions, injuries or fire.
- Switch the power off before installing or removing the module. If the power is left on, the module will break down or malfunction.

#### [DISPOSAL PRECAUTIONS]

**∧** CAUTION Dispose of the module as industrial waster

#### About This Manual

The following manuals are also related to this product. In necessary, order them by quoting the details in the tables below.

### Detailed Manual

Manual Name	Manual No. (Type code)
High speed counter module type A1SD61	IB-66337
User's Manual	(13J674)

#### 1. GENERAL DESCRIPTION

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

#### 2. PERFORMANCE SPECIFICATIONS

	Item	Specifications						
	peed selection	50K sid	0	0,000		10K side		
pin Number of		JUN SIL	e			TURS	lue	
points	occupied I/O	32						
Number of		1		-				
Count	Phase		and 2-ph	ase input	S			
input Signal levels signal ( ¢ A and ¢ B)		5 VDC 12 VDC 24 VDC 24 VDC						
	Maximum counting	1-phase input 50k pps			10k p	ps		
	speed *1	2-phase	2-phase input 50k pps			7k pp	s	
	Counting range	32-bit binary -2147483648 to 2147483647 Equipped with UP/DOWN preset counter and						
	Туре		ed with UF functions	/DOWN	preset co	unter a	nd ring	
Counter Minimum count pulse width (Set input rise) and fall times to 5 $\mu$ or less. Duty		Unit: $\mu$ s $\downarrow$ $20$ $\downarrow$ $\downarrow$ $100$ $\downarrow$ $100$ $\downarrow$ $100$ $\downarrow$ $100$ $\downarrow$ $100$ $\downarrow$ $100$ $\downarrow$ $100$ $\downarrow$ $100$ $\downarrow$ $100$ $\downarrow$ $100$				se Se	Unit: $\mu$ s	
	(ratio: 50%) Comparison	input) input) input)						
Limit	range	32-bit binary						
switch output Comparison result		A contact operation: Dog ON address <u>≤</u> Count value <u>≤</u> Dog OFF address B contact operation: Dog OFF address <u>≤</u> Count value <u>≤</u> Dog ON address						
External Preset				Dog C	IN addres	SS		
		-	DC 3/6 m		DN addres	SS		
input	Function start	5 VDC	5 mA	A		SS		
		5 VDC Transis		A collector)	output			
input External	Function start Coincidence	5 VDC Transis 12/24 V	5 mA tor (open o	A collector) /point 0.8	output A/commo on Die with	on lectric nstand	Insulation resistance	
input External	Function start Coincidence output	5 VDC Transis 12/24 V Spec area Betwe input and F suppl Betwe input and F suppl Betwe start i termi powe Betwe coinc courc	5 mA tor (open of DC 0.1 A/ ific isolate een pulse terminal PLC power y een prese terminal PLC power y een function nput nal and PL r supply een idence t terminal PLC power y	A collector) point 0.8 d Isolati metho Photo pler isolati	output A/commo on Die with volt	on lectric nstand tage		
input External output Isolation sp	Function start Coincidence output ecifications wire size	5 VDC Transis 12/24 V Spec area Betwe input and F suppl Betwe start i termii powe Betwe start i termii powe Betwe coinc outpu and F suppl	5 mA tor (open of DC 0.1 A/ ific isolate een pulse terminal PLC power y een prese terminal PLC power y een function nput nal and PL r supply een idence t terminal PLC power y	A collector) point 0.8 d Isolati metho Photo pler isolati	output A/commo on Die with volt	DN lectric hstand tage	resistance 5M Ω or more by 500V DC insulation resistance	
input External output Isolation sp Applicable of Applicable of	Function start Coincidence output ecifications wire size	5 VDC Transis 12/24 V Spec area Betwe input and F suppl Betwe start i termin powe Betwe coinc outpu and F suppl 0.75 to	5 mA tor (open of DC 0.1 A/ fific isolate even pulse terminal PLC power y even prese terminal PLC power y even function nput nal and PL r supply even idence t terminal LC power y	A collector) point 0.8 d Isolati metho Photo pler isolati	output A/commo on Die witt volt icou 500 AC. on min	DN lectric hstand lage	5M Ω or more by 500V DC insulation resistance tester.	
input External output Isolation sp	Function start Coincidence output ecifications ecifications wire size solderless rent	5 VDC Transis 12/24 V Spec area Betwe input and F suppl Betwe start i termin powe Betwe coinc outpu and F suppl 0.75 to	5 mA tor (open of DC 0.1 A/ fific isolate even pulse terminal PLC power y even prese terminal PLC power y even function nput nal and Pl r supply even idence t terminal PLC power y 1.5 mm <sup>2</sup>	A collector) point 0.8 d Isolati metho Photo pler isolati	output A/commo on Die witt volt icou 500 AC. on min	DN lectric hstand lage	5M Ω or more by 500V DC insulation resistance tester.	

\*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.

Counting Speed Setting Pin	50	)k	10k		
Leading Edge/Fall Time	1-phase input	2-phase input	1-phase input	2-phase input	
t=5 μs or less	50k pps	50k pps	10k pps	7k pps	┥ <sub>╏</sub> ┝╴┥ <sub>╏</sub> ┝╴
t=50 μ s or less	5k pps	5k pps	1k pps	700 pps	
t=500 μ s			500 pps	250 pps	

For the general specifications, refer to the User's Manual for the PC CPU used.

## 3. NOMENCLATURE



NO.	Name		Description
(1)	Counting speed selection pin		Counts pulses at a maximum speed of 50k pps in 1-phase or 2-phase input. Counts pulses at 10k pps in 1-phase input, at 7k pps in 2-phase input. (The factory-setting is 50k.) (Set with the jumper)
(2)	Input pulse voltage selection pin $\phi A$ $\phi B$ $5V$ $\circ \circ$ $12V$ $\circ \circ$ $24V$ $\circ \circ$ $24V$ $\circ \circ$		Select a pulse voltage that is input to Phase A or B. (The factory-setting is 24 V.) The module operation cannot be guaranteed when the pulse voltage higher than the set value is applied. (Set with the jumper)
(3)	External input voltage selection pin 5V 0 0 0 0 12V 0 0 0 0 24V 0 0 0 0		Select a voltage input to the PRESET/F.START terminals. (The factory-setting is 24 V.) The module operation cannot be guaranteed when the voltage higher than the set value is applied. (Set with the jumper).
(4)	Fuse		Used for protecting outputs 1 to 8 from overcurrent. (Circuit board soldering type)
		RUN ØA	Lit when the module operates normally. Flashes when a data write error has occurred. OFF when a watchdog timer error has occurred. Lit when voltage is applied to phase A pulse input terminal.
		¢В	Lit when voltage is applied to phase B pulse input terminal.
(5)	LED indicators	PRESET	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.
		OUTs 1 to 8	ON when a corresponding limit switch is turned ON by he limit switch output function. OFF when the limit switch is turned OFF.
(6)	φ A/ φ B		Pulse input terminals ( $\phi$ B 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)	9) OUTs 1 to 8		An external output terminal used for limit switch output.

#### 4. LOADING AND INSTALLATION

#### 4.1 Cautions on Handling

- (1) The case of the A1SD61 is made of resin: do not drop it or subject it to strong impact
- (2) Do not remove the printed circuit board from the case. This could cause failure.
- (3) Make sure that no wire offcuts or other debris enters the top of the module during wiring. If anything does enter the module, remove it.
- (4) Tighten the module mounting and terminal screws as specified below:

Screw	Tightening Torque Range N-cm [kg-cm] (lb-inches)
Module mounting screw (M4 screw)	78 to 118 [8 to 12] (6.93 to 10.4)
Terminal block terminal screw (M3.5 screw)	59 to 88 [6 to 9] (5.19 to 7.8)
Terminal block mounting screw (M4 screw)	78 to 118 [8 to 12]

## 5. WIRING

The method for wiring a pulse generator to the A1SD61 is described here.

#### 5.1 Wiring precautions

Wire a pulse generator to the A1SD61 while paying attention to the followings; (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
- arounded 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 (5.91in.) away from the above-mentioned
- lines and over the shortest distance possible.
- (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;



\*1: Metal piping Never run solenoid or inductive wiring through the same conduit.

If sufficient distance cannot be provided between the high current line and input siring, use shielded wire for the high current line

\*2: Distance between the encoder and the joint box should be as short as possible. If the distance from the A1SD61 to the encoder is too long, an excessive voltage drop occurs. Therefore, measure the voltage during operation and make sure that the voltage are within the rated voltage of the encoder. If the voltage drop is large, increase the size of wiring or use an encoder of 24 VDC with les current consumption.

#### • Ground twisted shielded wire on the encoder side (joint box)



Grounded it inside the joint box as indicated by dotted line

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

(1) Connection of a 24 VDC pulse generator





# REMARK

\* : Set the pulse input voltage setting pin to the **D** position.

(2) Connection of a voltage output pulse generator (5 VDC)



## REMARK

\*: Set the pluse input voltage setting pin to the **D** position.

#### 5.3 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.

#### REMARK

\* : Set the external input voltage setting pin to the 💶 position.

#### 5.4 Wiring examples at external output terminals (OUT1 to OUT8)

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

A1SD61







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