MITSUBISHI

High Speed Counter Module Type A1SD61

User's Manual

(Hardware)

Thank you for buying the Mitsubishi general-purpose programmable logic controller MELSEC-A Series

Prior to use, please read both this manual and detailed manual thoroughly and familiarize yourself with the product.

MODEL	A1SD61 (H/W)-U-E
MODEL CODE	13JE47
IB(NA)-66486-C(1112)MEE	

●SAFETY PRECAUTIONS●

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.
These precautions apply only to Mitsubishi equipment. Refer to the CPU module user's manual for a description of the PC system safety precautions.
In this manual, the safety precautions are classified into two levels:
"⚠WARNING" and "⚠CAUTION".

⚠WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under "⚠CAUTION" may lead to serious consequences.

Observe the precautions of both levels because they are important for personal and system safety.

Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[DESIGN PRECAUTIONS]

⚠ WARNING

- 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.

⚠ CAUTION

- Use the programmable controller in an environment that meets the general specifications in the user's manual for the CPU module used.
  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]

⚠ CAUTION

- 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]

⚠ CAUTION

- 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]

⚠ WARNING

- 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.

⚠ CAUTION

- 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 waste.

● 安全注意事项 ●

（使用之前请务必阅读）

在使用本产品之前，应仔细阅读本手册以及本手册中所介绍的相关手册，同时在充分注意安全的前提下正确操作。
本注意事项仅记载与本产品有关的内容。关于可编程控制器系统方面的安全注意事项，请参阅CPU模块的用户手册。
在“安全注意事项”中，安全注意事项被分为“⚠警告”和“⚠注意”两个等级。

⚠警告	表示错误操作可能造成危险后果，导致死亡或重伤事故。
⚠注意	表示错误操作可能造成危险后果，导致中度伤害、轻伤或财产损失。

此外，根据情况不同，即使标注为“⚠注意”的事项也有可能会引发严重后果。这两个等级的注意事项记载的均为重要内容，请务必遵守。
请妥善保管本手册以备需要时取阅，并将本手册交给最终用户。

【设计注意事项】

⚠ 警 告

- 根据外部输出的晶体管故障的不同，输出可能变为ON状态或OFF状态。对于可能导致重大事故发生的输出信号，应在外部设置监视电路。

⚠ 注 意

- 应在手册记载的一般规格环境下使用可编程控制器。
  如果在一般规格范围以外的环境中使用可编程控制器，可能导致触电、火灾、误动作、产品损坏或性能劣化。
- 请勿将控制线及通信电缆与主电路及动力线等捆扎在一起或相互靠得太近。应相距大约150mm以上距离。因为噪声有可能导致误动作。

【安装注意事项】

⚠ 注 意

- 请勿直接触碰模块的导电部分。
  否则可能导致模块误动作、故障。
- 请将模块下部的固定用凸起部切实插入基板的固定孔后，以规定的扭矩拧紧模块固定螺栓。
  如果模块未正确安装并以螺栓固定，有可能造成误动作、故障或掉落。

【配线注意事项】

⚠ 注 意

- 必须在编码器侧（中继箱）将屏蔽线进行接地（专用接地线）。否则可能导致误动作。
- 进行可编程控制器配线作业时，应在确认产品的额定电压及端子排列的基础上正确进行操作。如果连接了与额定值不符的电源或配线错误，可能导致火灾或故障。
- 如果输入的电压高于通过设置针脚设置的电压，可能导致故障。
- 应在规定的扭矩范围内拧紧端子螺栓。
  如果端子螺栓拧得过松，有可能导致短路、火灾或误动作。
  如果端子螺栓拧得过紧，有可能造成螺栓破损从而导致短路、误动作。
- 应注意防止切屑及配线头等异物掉入模块内。
  否则有可能导致火灾、故障或误动作。

【启动／维护注意事项】

⚠ 警 告

- 在通电状态下请勿触摸端子。
  否则可能导致触电或误动作。
- 在清洁模块或重新紧固端子螺栓时，必须从外部将电源全部断开后再进行操作。
  如果未全部断开，有可能导致模块故障或误动作。

⚠ 注 意

- 请勿拆解或改造各模块。否则可能导致故障、误动作、人身伤害或火灾。
- 在拆装模块时，必须从外部将电源全部断开后再进行操作。
  如果未全部断开，有可能导致模块故障或误动作。
- 产品投入使用后，端子排的拆装次数不应超过50次。（根据IEC61131-2规范）

【报废处理注意事项】

⚠ 注 意

- 本产品报废时，应当作工业废物处理。

● CONDITIONS OF USE FOR THE PRODUCT ●

(1) Mitsubishi programmable controller ("the PRODUCT") shall be used in conditions;
i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.
MITSUBISHI SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI'S USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.
("Prohibited Application")
Prohibited Applications include, but not limited to, the use of the PRODUCT in;

- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above, restrictions Mitsubishi may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTs are required. For details, please contact the Mitsubishi representative in your region.

About This Manual

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

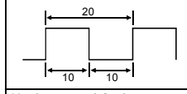
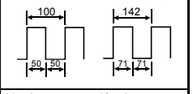
Detailed Manual

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

1. GENERAL DESCRIPTION

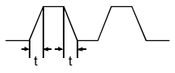
This manual describes specifications, handling and wiring of an A1SD61 high speed counter module (hereinafter referred to as the A1SD61).

2. PERFORMANCE SPECIFICATIONS

Item		Specifications		
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 (ϕ A and ϕ B)	5 VDC 12 VDC 24 VDC 2 to 5 mA		
Counter	Maximum counting speed *1	1-phase input	50k pps	10k pps
		2-phase input	50k pps	7k pps
	Counting range	32-bit binary -2147483648 to 2147483647		
	Type	Equipped with UP/DOWN preset counter and ring counter functions		
	Minimum count pulse width (Set input rise and fall times to 5 μ or less. Duty ratio: 50%	Unit: μ s 	Unit: μ s 	
		(1-phase and 2-phase input)	(1-phase input)	(2-phase input)
Limit switch output	Comparison range	32-bit binary		
	Comparison result	A contact operation: Dog ON address ≦ Count value ≦ Dog OFF address B 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	Coincidence output	Transistor (open collector) output 12/24 VDC 0.1 A/point 0.8 A/common		
Isolation specifications		Specific isolated area: Between pulse input terminal and PLC power supply; Between preset input terminal and PLC power supply; Between function start input terminal and PLC power supply; Between coincidence output terminal and PLC power supply Isolation method: Photocoupler isolation Dielectric withstand voltage: 500V AC/1 minute. Insulation resistance: 5M Ω or more by 500V DC insulation resistance tester.		
Applicable wire size		0.75 to 1.5 mm^2		
Applicable solderless terminals		R1.25-3, 1.25-YSA, RAV1.25-3, V1.25-YS3A		
Internal current consumption (5 VDC)		0.35 A		
Weight kg (lb)		0.27 (0.59)		

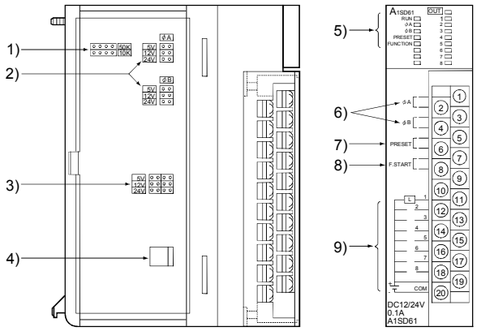
*1: The counting speed is influenced by the pulse leading edge/fall time.
The following counting speeds are possible. If a pulse is counted with a leading edge/fall time that is too long, a counter error may be caused.

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



Refer to the User's Manual of the programmable controller CPU for the general specifications.

3. NOMENCLATURE



NO.	Name		Description
(1)	Counting speed selection pin 50K / 10K		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 φA: 5V / 12V / 24V φB: 5V / 12V / 24V		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 / 12V / 24V		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)
(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.
		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)	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. 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:

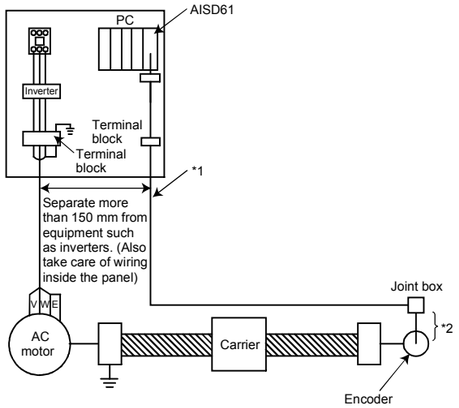
Screw	Tightening Torque Range N·cm [kg·cm] (lb·inches)
Module mounting screw (M4 screw)	78 to 118 [8 to 12] (6.93 to 10.4)
Terminal block terminal screw (M3.5 screw)	59 to 88 [6 to 9] (5.19 to 7.8)
Terminal block mounting screw (M4 screw)	78 to 118 [8 to 12]

5. WIRING

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

5.1 Wiring precautions

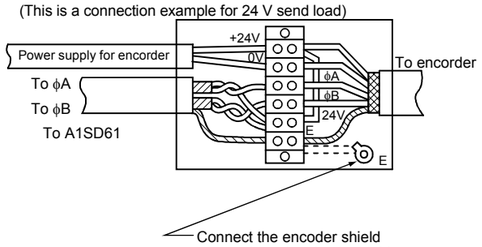
Wire a pulse generator to the A1SD61 while paying attention to the followings;
(1) For a high-speed pulse input, take the following counter measures against noise;
(a) Be sure to use shielded twisted pair cables. Also, make sure they are grounded to the earth.
(b) Do not run a twisted pair cable in parallel with power cables or other I/O lines which may generate noise.
Run cables at least 150 mm (5.91in.) 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.

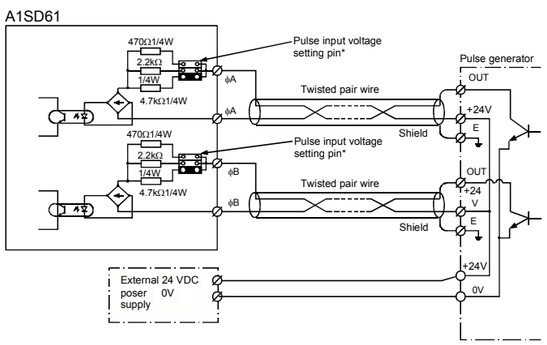
• Ground twisted shielded wire on the encoder side (joint box)

(This is a connection example for 24 V send load)



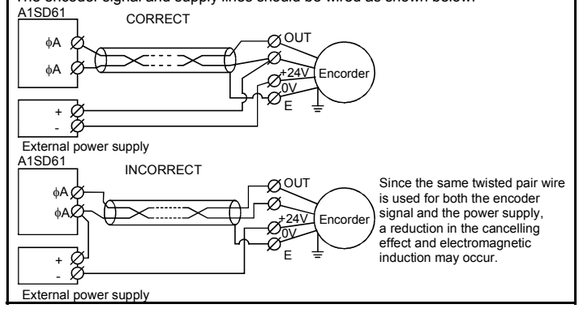
5.2 Wiring example for the connection with the open collector output pulse generator

(1) Connection of a 24 VDC pulse generator



POINT

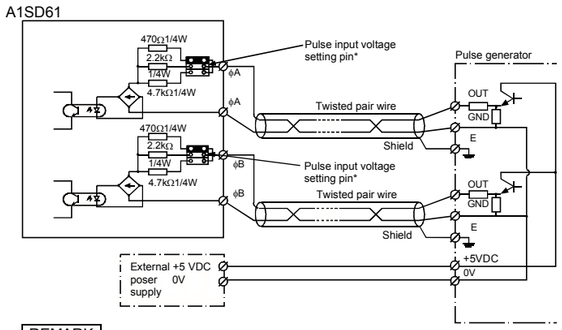
The encoder signal and supply lines should be wired as shown below:



REMARK

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

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

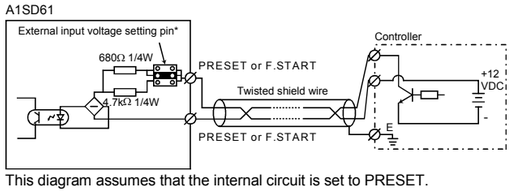


REMARK

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

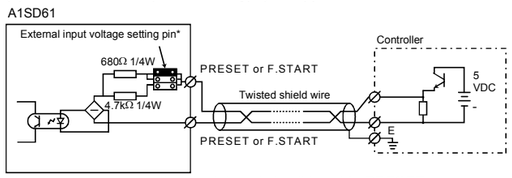
5.3 Wiring Example for the Connection of a Controller to External Input Terminals (PRESET and F.START)

(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:



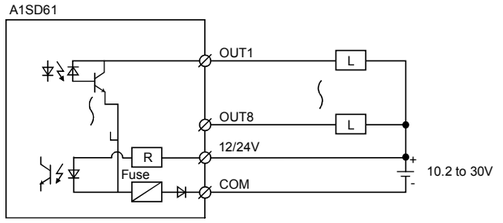
This diagram assumes that the internal circuit is set to PRESET.

REMARK

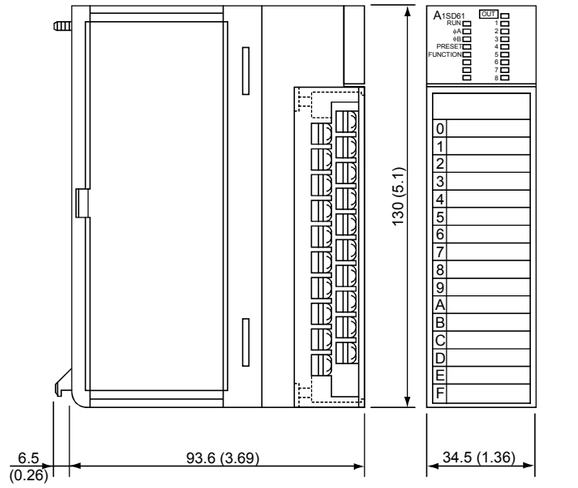
* : Set the external input voltage setting pin to the ●● position.

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:



6. OUTSIDE DIMENSIONS



Unit: mm (Inch)

WARRANTY

Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; machine damage or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors unpredictable by Mitsubishi; damages to products other than Mitsubishi products; and to other duties.

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