MITSUBISHI

High Speed Counter Module
Type A1SD62, A1SD62E, A1SD62D

User's Manual
(Hardware)

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

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

MODEL	A1SD62-U(H/W)-E
MODEL CODE	13J811
	IB(NA)-66588-H(1112)MEE

A MELSEC

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● 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.
The instructions given in this manual are concerned with this product. Refer to the User's Manual of the CPU module in use for details on the safety instructions for the programmable logic controller system.

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 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]

⚠ **CAUTION**

● Do not touch any conductive part of the module directly.
Doing so may cause malfunction or failure on the module.
● 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 or detachment.

[Wiring Precautions]

⚠ **CAUTION**

● Ground the shield wire to the encoder (relay box) (using class D (class 3) grounding or higher). Otherwise, malfunctioning will result.
● Before connecting wires to the Programmable controller, 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.

[Startup/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.
● Do not mount/remove the module onto/from the base unit more than 50 times (IEC 61131-2 compliant), after the first use of the product.
Doing so may cause malfunctions.
● Before handling the module, always touch grounded metal, etc. to discharge static electricity from the human body. Failure to do so can cause the module to fail 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

● 应在所使用的 CPU 模块的用户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及凸出部分。
否则可能导致误动作、故障。
● 请将模块下部的模块固定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。
● 应以规定的扭矩拧紧端子螺栓。
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，有可能造成螺栓损坏从而导致短路或误动作。
● 应注意防止切屑及配线头等异物混入模块内。
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。否则可能导致误动作。
● 在清洁模块或重新固接接子螺栓时，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，应从外部将电源全部断开后进行操作。
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，模块和基板以及端子排的拆装次数不应超过 50 次（根据 IEC61131-2 规范）。如果超过了 50 次，有可能导致误动作。
● 在触碰模块之前，必须先触碰已接地的金属等，释放掉人体等所携带的静电。如果不释放掉静电，有可能导致模块故障或误动作。

【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 A1SD62, A1SD62E, A1SD62D(S1) User's Manual	IB-66593 (13J816)

Please read High Speed Counter Module Type A1SD62, A1SD62E, A1SD62D(S1) User's Manual before using this module.

1. GENERAL DESCRIPTION

This manual describes specifications, handling and wiring of an A1SD62, A1SD62E, A1SD62D high speed counter module (hereinafter referred to as the A1SD62 (E/D)).

(1) Product in the same package
After unpacking, please confirm that the following product is contained.

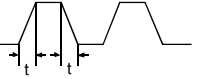| Product Name	No. of Items
A1SD62☐ high speed counter module	1

2. PERFORMANCE SPECIFICATIONS

A1SD62 (E)

Item			Specifications		
Counting speed selection pin			100K side		10K side
Number of occupied I/O points			32		
Number of channels			2		
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	100k pps		10k pps
		2-phase input	100k pps		7k pps
	Counting range		24-bit binary 0 to 16777215		
	Type		Equipped with UP/DOWN preset counter and ring counter functions		
	Minimum count pulse width	Set input rise and fall times to 2.5 μ s or less. Duty ratio: 50%	Unit: μ s ... (1-phase and 2-phase input)	Unit: μ s ... (1-phase input)	(2-phase input)
Coincidence output	Comparison range		24-bit binary		
	Comparison result		Set value < count value / Set value = count value / Set value > count value		
External input	Preset		5/12/24 VDC		
	Function start		2 to 5 mA		
External output	Coincidence output		Transistor (sink type) output 12/24 VDC 0.5 A/point 2 A/common		
		A1SD62	Transistor (sink type) output 12/24 VDC 0.5 A/point 2 A/common		
		A1SD62E	Transistor (source type) output 12/24 VDC 0.1 A/point 0.4 A/common		

*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	100k		10k	
Leading Edge/Fall Time	1-phase input	2-phase input	1-phase input	2-phase input
t=2.5 μ s or less	100k pps	100k pps	10k pps	7k pps
t=25 μ s or less	10k pps	10k pps	1k pps	700 pps
t=500 μ s	—	—	500 pps	250 pps

A1SD62D

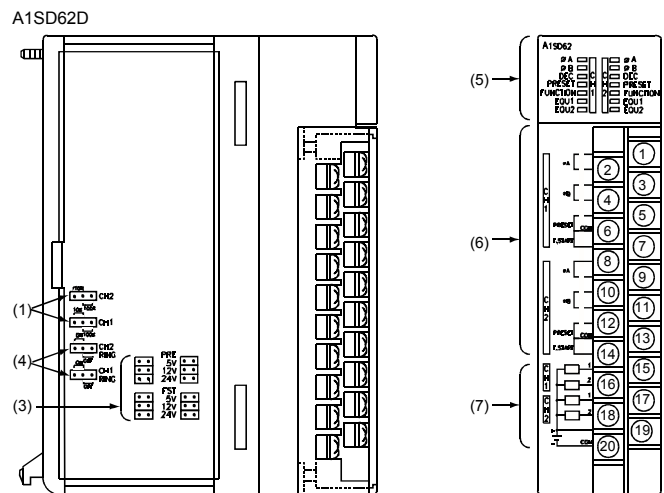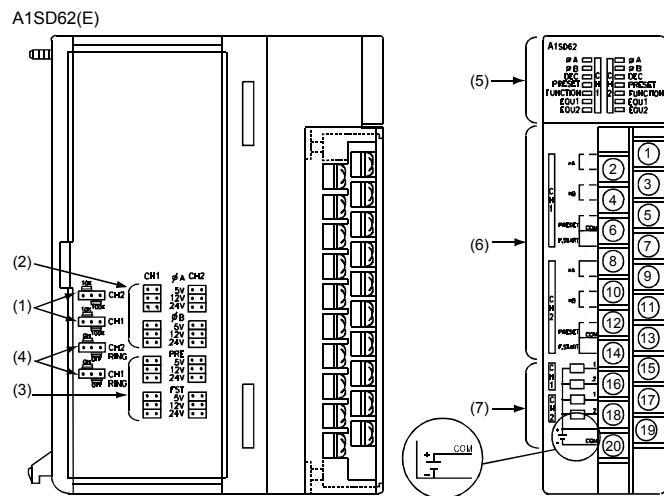| Item		Specifications		
Counting speed selection pin		200K side		10K side
Number of occupied I/O points		32		
Number of channels		2		
Count input signal	Phase	1-phase and 2-phase inputs		
	Signal levels (ϕ A and ϕ B)	EIA standard RS-422-A Differential driver level (equivalent to Am26LS31)		
Counter	Maximum counting speed *1	1-phase input	200k pps	10k pps
		2-phase input	200k pps	7k pps
	Counting range	24-bit binary 0 to 16777215		
	Type	Equipped with UP/DOWN preset counter and ring counter functions		
	Minimum count pulse width	Set input rise and fall times to 1.25 μ s or less. Duty ratio: 50%	Unit: μ s ... (1-phase and 2-phase input)	Unit: μ s ... (1-phase input) (2-phase input)
Coincidence output	Comparison range	24-bit binary		
	Comparison result	Set value < count value / Set value = count value / Set value > count value		
External input	Preset	5/12/24 VDC		
	Function start	2 to 5 mA		
External output	Coincidence output	Transistor (sink type) output 12/24 VDC 0.5 A/point 2 A/common		

Counting Speed Setting Pin	200k		10k	
Leading Edge/Fall Time	1-phase input	2-phase input	1-phase input	2-phase input
t=1.25 μ s or less	200k pps	200k pps	10k pps	7k pps
t=12.5 μ s or less	20k pps	20k pps	1k pps	700 pps
t=250 μ s	—	—	500 pps	250 pps
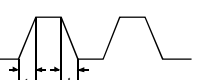
For the general specifications, refer to the User's Manual for the Programmable controller CPU used.

(Right-hand table, top of page)

Item			Specifications			
Isolation specifications	Specific isolated area		Isolation method	Dielectric withstand voltage	Insulation resistance	
	Between pulse input terminal and Programmable controller power supply		Photocoupler isolation	500V AC/1 minute.	5M Ω or more by 500V DC insulation resistance tester.	
	Between preset input terminal and Programmable controller power supply					
	Between function start input terminal and Programmable controller power supply					
	Between coincidence output terminal and Programmable controller power supply					
Applicable wire size			0.75 to 1.5 mm² (AWG 18 to 16)			
Applicable solderless terminals			R1.25-3, 1.25-YS3, RAV1.25-3, V1.25-YS3A			
Internal current consumption (5 VDC)			0.1 A			
Weight			0.25 kg			

(Right-hand table for A1SD62D isolation)

Specific isolated area	Isolation method	Dielectric withstand voltage	Insulation resistance
Between pulse input terminal and Programmable controller power supply	Photocoupler isolation	500V AC/1 minute.	5M Ω or more by 500V DC insulation resistance tester.
Between preset input terminal and Programmable controller power supply			
Photocoupler isolation	Between function start input terminal and Programmable controller power supply		
	Between coincidence output terminal and Programmable controller power supply		

Applicable wire size	0.75 to 1.5 mm² (AWG 18 to 16)
Applicable solderless terminals	R1.25-3, 1.25-YS3, RAV1.25-3, V1.25-YS3A
Internal current consumption (5 VDC)	0.25A
Weight	0.25 kg

3. NOMENCLATURE

A1SD62(E)

A1SD62D

NO.	Name	Description
(1)	Counting speed selection pin A1SD62(E) (jumper diagram CH2 10k, CH1 10k, 100k) A1SD62D (jumper diagram CH2 10k, CH1 10k, 200k)	100(200)K: Counts pulses at a maximum speed of 100(200)k 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 100(200)k.) (Set with the jumper)
(2)	Input pulse voltage selection pin (jumper diagram φA CH1/CH2, φB CH1/CH2: 5V/12V/24V)	Select a pulse voltage that is input to Phase A or B. (The factory-setting is 24 V.) (Set with the jumper)
(3)	External input voltage selection pin (jumper diagram PRE/FST: 5V/12V/24V, CH1 CH2 CH1 CH2)	Select a voltage input to the PRESET/F.START terminals. (The factory-setting is 24 V.) (Set with the jumper).
(4)	Ring Counter selection pin (jumper diagram ON CH2 RING OFF, ON CH1 RING OFF)	Set whether of not the ring counter function can be used. (The factory-setting is OFF.) (Set with the jumper.)
(5)	LED indicators — φA	Lit when voltage is applied to phase A pulse input terminal.
	φB	Lit when voltage is applied to phase B pulse input terminal.
	DEC	Lit during subtraction.
	PRESET	Lit and latched when voltage is applied to the PRESET terminal. OFF when external preset detection reset signal (written to buffer memory 10, 42) is turned ON.
	FUNCTION	ON when voltage is applied to the F.START terminal.
	EQU1	Lit during channel 1 external coincidence output operation.
	EQU2	Lit during channel 2 external coincidence output operation.
(6)	Input terminals — φA/φB	
(7)	Output terminals — PRST	Pulse input terminals
	FST	The terminal in which voltage is applied when a preset is executed from an external device.
	EQU1 to 2	The terminal in which voltage is applied when a counter function selection is executed.

4. LOADING AND INSTALLATION

4.1 Cautions on Handling
(1) The case of the A1SD62/A1SD62E/A1SD62D 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
Module mounting screw (M4 screw)	78 to 118 N·cm
Terminal block terminal screw (M3.5 screw)	59 to 88 N·cm
Terminal block mounting screw (M4 screw)	78 to 118 N·cm

4.2 Installation Environment
Never install the A series in the following environment:
(1) Locations where the ambient temperature is outside the range of 0 to 55°C.
(2) Locations where the ambient humidity is outside the range of 10 to 90% RH.
(3) Locations where dew condensation takes place due to sudden temperature changes.
(4) Locations where there are corrosive and/or combustible gasses.
(5) Locations where there is a high level of conductive powder (such as dust and iron fillings, oil mist, salt, and organic solvents.)
(6) Locations exposed to the direct rays of the sun.
(7) Locations where strong power and magnetic fields are generated.
(8) Locations where vibration and shock are directly transmitted to the main module.

5. WIRING

The method for wiring pulse-generating equipment to the A1SD62(E/D) is described here. Be sure to use shielded twisted pair cables and ground twisted shield wire onto the encoder side (joint box).
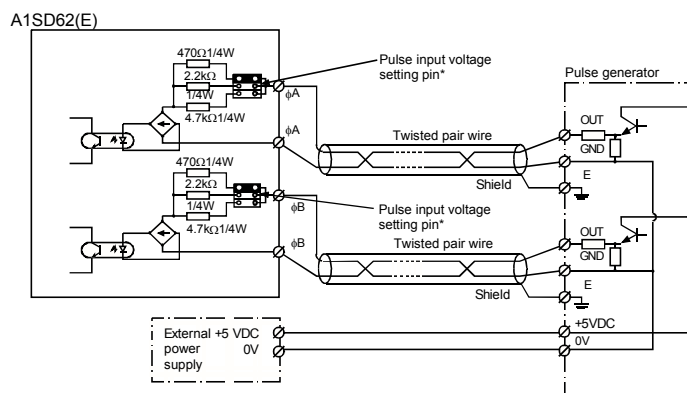
5.1 Wiring example for the connection with the open collector output pulse generator
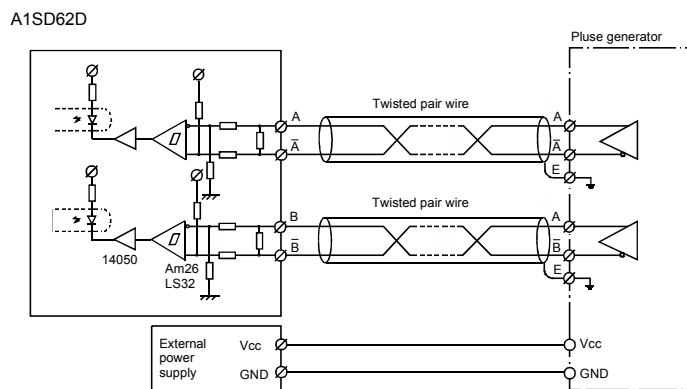(1) Connection of a 24 VDC pulse generator

A1SD62(E)
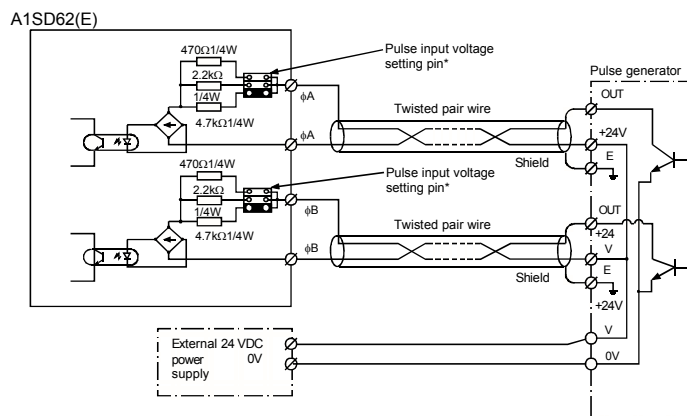
REMARK
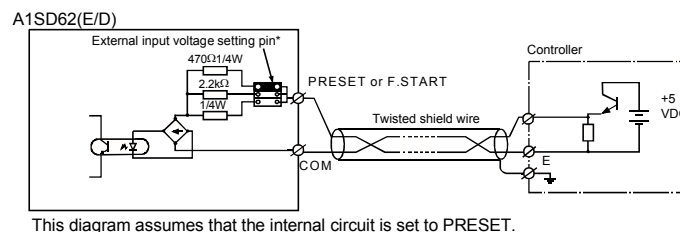* : Set the pulse input voltage setting pin to the ▢▢ position.
(2) Connection of a voltage output pulse generator (5 VDC)

A1SD62(E)

REMARK
* : Set the pluse input voltage setting pin to the ▢▢ position.
(3) Example of wiring to line driver (Am26LS31 or equivalent) pulse generator
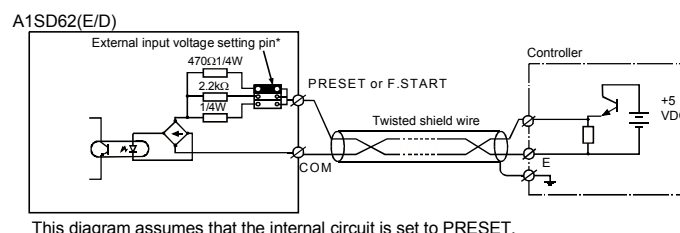
A1SD62D

5.2 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:

A1SD62(E/D)

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

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

A1SD62(E/D)

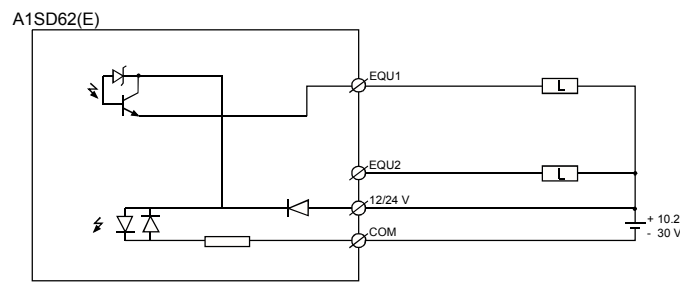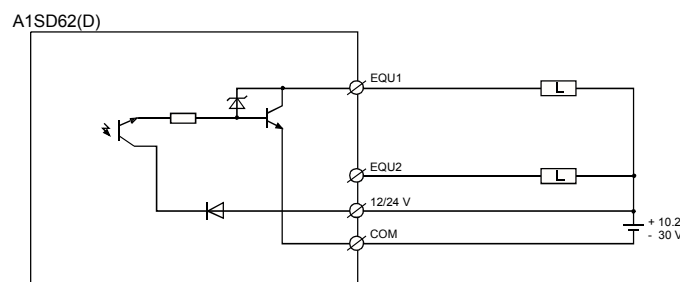This diagram assumes that the internal circuit is set to PRESET.

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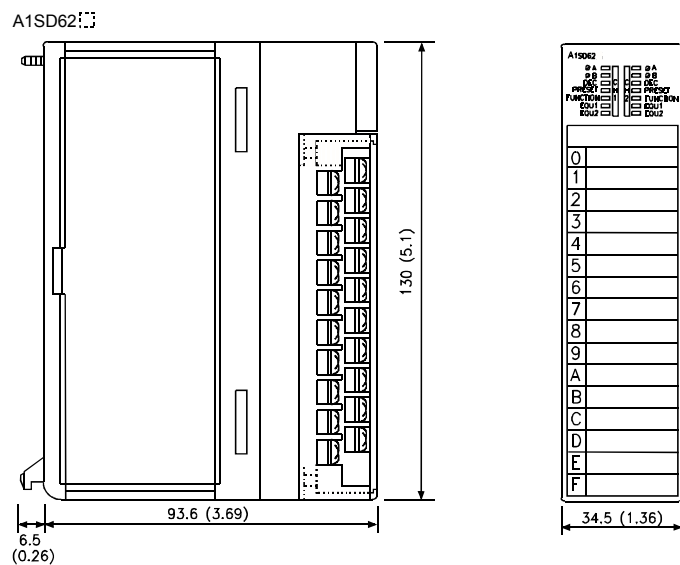* : Set the external input voltage setting pin to the ▢▢ position.

5.3 Wiring examples at external output terminals (EQUs 1 to 2)
To use an EQU terminal, the internal photocoupler should be activated.
For this example, 10.2 to 30 VDC external power is necessary. Connection methods are as follows:

A1SD62(D)

A1SD62(E)

6. OUTSIDE DIMENSIONS

A1SD62☐

Unit: mm (Inch)

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE : TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
NAGOYA WORKS : 1-14, YADA-MINAMI 5-CHOME, HIGASHIKU, NAGOYA, JAPAN