MITSUBISHI ELECTRIC

High-Speed Counter Module

User's Manual
(Hardware)

AJ65BT-D62
AJ65BT-D62D
AJ65BT-D62D-S1

Thank you for purchasing the Mitsubishi programmable controller
MELSEC-A series.

Prior to use, please read this and relevant manuals thoroughly to
fully understand the product.

MODEL	AJ65BT-D62-U-H-E
MODEL CODE	13JL44
IB(NA)-66822-G(1806)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.

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

● If data link becomes faulty, the status of the faulty station changes as follows. Using the communication status information, construct an interlock circuit in the sequence program so that the system operates safety.
There is a risk of an accident due to output error or malfunction.
(1) All general-use inputs from this module turn off.
(2) All general-use outputs from this module turn off.
● The inputs and outputs may be turned on or off when a failure occurs within the module. Provide a circuit that externally monitors the input and output signals that might lead to a serious accident.

[Design Precautions]

⚠ CAUTION

● Do not have control cables and communication cables bundled with or placed near by the main circuit and/or power cables.
Wire those cables at least 100mm (3.94 inch) away from the main circuit and/or power cables.
Not doing so could result in noise that would cause erroneous operation.

[Installation Precautions]

⚠ CAUTION

● Use each module in an environment as specified in the "general specification" in the detailed manual.
Usage of the module outside the general specification range may cause electric shock, fire, malfunction, product damage or deterioration.
● Tighten the module securely using DIN rail or installation screws within the specified torque range of the installation screws. Loose screws may cause falling or malfunction. Also, if the screws are too tight, it may cause falling or malfunction due to damage of the screws or module.
● Do not touch the conductive area of the module.
Doing so may cause module malfunction or breakdowns.

[Wiring Precautions]

⚠ WARNING

● Perform installation and wiring after disconnecting the power supply at all phases externally.
If the power is not disconnected at all phases an electric shock, product damage or malfunction may result.
● When powering up or operating the module after performing installation or wiring work, always attach the terminal cover that came with the product.
It may cause an electric shock if the terminal cover is not attached.

[Wiring Precautions]

⚠ CAUTION

● Be sure to ground the FG terminal to the class-3 or higher grounding. Otherwise there will be a danger of malfunctions.
● Use applicable solderless terminals and tighten them with the specified torque. If any solderless spade terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.
● Perform correct wiring for the module according to the product's rated voltage and terminal arrangement. Connecting to a power supply different from rating or mis-wiring may cause fire and/or product failure.
● Fix terminal screws securely within the specified torque range. Loose terminal screws may cause short circuit or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
● Make sure foreign objects do not get inside the module, such as dirt and wire chips. It may cause fire, product failure or malfunction.
● Be sure to fix the wires or cables that are connected to the module in place, either by running them through a duct or by using clamps.
  If the cables are not fixed in one of these ways, dispersion, movement, or careless pulling of the cables may cause damage to the module or malfunction due to cable contact faults.
● Do not install the control lines together with the communication cables, or bring them close to each other. Failure to do so may cause malfunctions due to noise.
● When disconnecting a communication or power supply cable from the module, do not pull on the cable itself.
  Disconnect cables fitted with connectors by holding and pulling the cable connector. Disconnect cables not fitted with a connector by removing the screws from the part connected to the module.
  Pulling on a cable that is connected to the module can cause damage to the module or cable, or malfunction due to cable connection faults.

[Starting and Maintenance Precautions]

⚠ WARNING

● Do not touch the terminals when the power is on. It may cause an electric shock or malfunction.
● Perform cleaning the module after turning off the all external power supply for sure. If you do not switch off the external power supply, it will cause electric shock.

[Starting and Maintenance Precautions]

⚠ **CAUTION**

● Never try to disassemble or modify module. It may cause product failure, malfunction, fire or cause injury.

● Do not drop or apply strong shock to the module case. Failure to do so may damage the module.

● Make sure to switch all phases of the external power supply off before installing or removing the module to/from the panel.
If you do not switch off the external power supply, it will cause failure or malfunction of the module.

● Always set the setting pins for pulse and external input voltage after externally shutting down all phases of the power supply.
Failure to shut down all phases of the power supply may cause a failure or malfunction of the module.

● Do not install/remove the terminal block more than 50 times after the first use of the product. (IEC 61131-2 compliant)

[Disposal Precautions]

⚠ **CAUTION**

● When disposing of the product, treat it 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。
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。
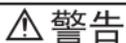
⚠ 警告	表示错误操作可能造成危险后果，导致死亡或重伤事故。
⚠ 注意	表示错误操作可能造成危险后果，导致中度伤害、轻伤或财产损失。
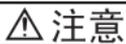
此外，根据情况不同，即使标注为"⚠注意"的事项也有可能会引发严重后果。
这两个等级的注意事项记载的均为重要内容，请务必遵守。
请妥善保管本手册以备需要时取阅，并将本手册交给最终用户。

【设计注意事项】

⚠ 警告

● 数据链接异常时，通信异常站会变为以下状态。应使用通信状态信息，在顺控程序上配置互锁电路，以保证系统能安全运行。
否则可能由于误输出、误动作而导致事故发生。
(1) 来自本模块的通用输入为全点OFF。
(2) 来自本模块的通用输出为全点OFF。

● 根据模块故障的不同，输入输出可能变为ON状态或OFF状态。对于可能导致重大事故发生的输入输出信号，应在外部设置监视电路。

【设计注意事项】

⚠ 注意

● 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100mm以上距离。
因为噪声有可能导致误动作。

【安装注意事项】

⚠ 注意

● 应在详细手册记载的一般规格环境下使用模块。如果在一般规格范围以外的
环境中使用模块，可能导致触电、火灾、误动作、产品损坏或性能劣化。
● 模块应通过DIN导轨或者安装螺栓切实地加以固定，安装螺栓应在规定的扭
矩范围内切实地扭紧。如果螺栓拧得过松，有可能导致掉落或误动作。如果
螺栓拧得过紧，有可能造成螺栓及模块破损从而导致掉落或误动作。
● 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。

【配线注意事项】

⚠ 警告

● 在安装、配线作业等时，必须将系统使用的外部供应电源全部断开后再进
行操作。
如果未全部断开，有可能导致触电、产品损坏或误动作。
● 安装、配线作业等之后进行通电、运行时，必须安装产品附带的端子盖。
如果未安装端子盖，有可能导致触电。

【配线注意事项】

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⚠ 注意

● 必须将FG端子与可编程控制器的专用接地线连接。
 否则有可能导致误动作。

● 应使用合适的压装端子，并按规定扭矩拧紧。
 如果使用Y型压装端子，端子螺栓松动时可能导致脱落或故障。

● 进行模块配线作业时，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。

● 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，有可能导致短路或误动作。
 如果端子螺栓拧得过紧，有可能造成螺栓及模块破损从而导致掉落、短路或误动作。

● 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。

● 与模块相连接的电线及电缆必须收入套管中，或者用夹具进行固定处理。
 如果未将电缆收入套管或未用夹具进行固定处理，可能由于电缆的晃动及移动、不经意的拉拽等造成模块及电缆破损、电缆接触不良而导致误动作。

● 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。

● 在拆卸与模块相连接的通信电缆及电源电缆时，请勿用手拉扯电缆部分。带接口的电缆应握住与模块相连接部分的接口进行拆卸。
 没有接口的电缆请在松开与模块相连接的部分的螺栓后再进行拆卸。如果在与模块连接的状态下拉扯电缆，可能导致模块及电缆破损、电缆接触不良而导致误动作。

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【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、误动作。
● 在清洁模块或重新紧固端子螺栓、模块安装螺栓时，必须将系统使用的外部供应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。
  如果螺栓拧得过松，有可能导致掉落、短路或误动作。
  如果螺栓拧得过紧，有可能造成螺栓及模块破损从而导致掉落、短路或误动作。

⚠ **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。
● 请勿使模块掉落或受到强烈撞击。
  否则可能导致模块破损。
● 在控制盘内拆装模块时，必须将系统使用的外部供应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）
● 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。
● 在设置脉冲／外部输入电压设置钮时，必须将系统使用的外部供应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。

【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.

REVISIONS

Print date	*Manual number	Revision
October 1997	IB(NA)-66822-A	First edition
November 1998	IB(NA)-66822-B	Full revision
July 2005	IB(NA)-66822-C	Partial correction SAFETY PRECAUTIONS
September 2006	IB(NA)-66822-D	Partial correction SAFETY PRECAUTIONS
December 2011	IB(NA)-66822-E	Partial correction SAFETY PRECAUTIONS, MANUALS, Chapter 1, 2, Section 2.1, 2.2, 2.3, 2.4, Chapter 3, Section 4.1, 4.2, Chapter 5, Section 5.3, 5.4, 5.5 Addition SAFETY PRECAUTIONS (Chinese), CONDITIONS OF USE FOR THE PRODUCT
April 2015	IB(NA)-66822-F	Partial correction Section 2.1, 2.2, 2.3, 2.4, Chapter 3, Section 4.1, 5.3
June 2018	IB(NA)-66822-G	The standard name (standard number) for the Chinese standardized law is added.

CONTENTS

MANUAL

The manuals related to this product are listed below.
Please place an order as needed.

User's Manual

Manual name	Manual number (Model code)
High-Speed Counter Module type AJ65BT-D62/AJ65BT-D62D/AJ65BT-D62D-S1 User's Manual	IB-66823 (13JL45)

Related Manuals

Manual name	Manual number (Model code)
CC-Link System Master/Local Module Type AJ61BT11/A1SJ61BT11 User's Manual	IB-66721 (13J872)
CC-Link System Master/Local Module Type AJ61QBT11/A1SJ61QBT11 User's Manual	IB-66722 (13J873)
CC-Link System Master/Local Module User's Manual	SH-080394E (13JR64)
MELSEC-L CC-Link System Master/Local Module Use's Manual	SH-080895ENG (13JZ41)

COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES

(1) Method of ensuring compliance
To ensure that Mitsubishi programmable controllers maintain EMC and Low Voltage Directives when incorporated into other machinery or equipment, certain measures may be necessary. Please refer to one of the following manuals.
 • User's manual for the CPU module or head module used
 • Safety Guidelines (this manual is included with the CPU module, base unit, or head module)
The CE mark on the side of the programmable controller indicates compliance with EMC and Low Voltage Directives.

(2) Additional measures
To ensure that this product maintains EMC and Low Voltage Directives, please refer to one of the manuals listed under (1).

1. OVERVIEW

This manual describes specifications, handling, and wiring of the AJ65BT-D62/AJ65BT-D62D/AJ65BT-D62D-S1 high-speed counter modules (hereafter abbreviated as high-speed counter module) to be used in a CC-Link system.

After unpacking the product you purchased, check to see that the following equipment is included.

Product name	Quantity
High-speed counter module	1

There are three types of high-speed counter module, as indicated below:

Item		AJ65BT-D62	AJ65BT-D62D	AJ65BT-D62D-S1
Type		DC input sink output type	Differential input sink output type	
External input	Preset	5/12/24VDC, 2 to 5mA		Differential input
	Function start			5/12/24VDC 2 to 5mA
Maximum counting speed		Maximum 200kPPS	Maximum 400kPPS	
CC-Link station type		Remote device station		
Signal level		24-bit binary (0 to 16777215)		
Counting switching		200k/10k	Phase 1: 400k Phase 2: 300k	/10k

2. SPECIFICATION

Specifications for the high-speed counter module are given below.
For general specifications, refer to the user's manual.

2.1 Performance Specifications for AJ65BT-D62

Item			Specification	
Setting switch for counting speed switching			HIGH side	LOW side
Number of channels			2 channels	
Count input signal	Phase		1 phase input, 2 phase input	
	Signal level (ϕA, ϕB)		5VDC 12VDC 24VDC $\Big\}$ 2 to 5mA	
Counter	Counting speed (maximum)[*1]	1 phase input	200kPPS	10kPPS
		2 phase input	200kPPS	7kPPS
	Signal level		24-bit binary 0 to 16777215	
	Model		UP/DOWN preset counter and ring counter functions	
	Smallest count pulse width (Adjust rise/fall time of input to 2μs or less. Duty ratio: 50%)		 5μs 2.5μs 2.5μs (1, 2 phase input)	 100μs 142μs 50 50 71 71 μs μs μs μs (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		5/12/24VDC, 2 to 5mA	
	Function start		OFF → ON: 0.5ms or less ON → OFF: 3ms or less	
	Response time			
External output	Coincidence output		2A/common	
	Response time		0.1ms or less	
CC-Link station type			Remote device station	
Number of occupied stations			4 stations	
Connection cable			CC-Link dedicated cable	
Dielectric withstand voltage			1 minute at 500V AC between batch of DC external terminals and ground	

Item	Specification
Insulation resistance	10MΩ or more on an insulation resistance tester at 500V DC between batch of DC external terminals and ground
Noise durability	Based on a noise simulator with 500Vp-p noise voltage, 1μs noise width and 25-60Hz noise frequency
Connected terminal block	27 terminal blocks (seven M3.5 screws)
Applicable wire size	0.75 to 2.00mm^2
Applicable crimp contact	RAV1.25-3, RAV2-3.5 (JIS C 2805 compliant)
Module installation screws	M4×0.7mm(0.03in.)×16mm(0.63in.) or larger screws (tightening torque range 0.78 to 1.18N•m) Can also be mounted using a DIN rail
Applicable DIN rail	TH35-7.5Fe, TH35-7.5Al, TH35-15Fe (JIS C 2812 compliant)
External power supply	18 to 28.8VDC
	Current consumption: 70mA (for 24VDC)
Allowable momentary power failure period	1ms
Weight	0.41kg

*1 Counting speed is affected by the duration of rise and fall periods. The speeds that can be counted are indicated in the table below.
Take note that the count may become incorrect when a pulse with a large rise or fall period is counted.

Counting speed setting switch	HIGH		LOW	
Rise/fall period	1 phase input	2 phase input	1 phase input	2 phase input
t = 2μs or less	200kPPS	200kPPS	10kPPS	7kPPS
t = 25μs or less	10kPPS	10kPPS	1kPPS	700PPS
t = 500μs	-	-	500PPS	250PPS

2.2 Performance Specifications for AJ65BT-D62D

Item			Specification	
Setting switch for counting speed switching			HIGH side	LOW side
Number of channels			2 channels	
Count input signal	Phase		1 phase input, 2 phase input	
	Signal level (ϕA, ϕB)		EIA Standard RS-422-A Differential line driver level (AM26LS31 (manufactured by Texas Instrument Japan) or equivalent)	
Counter	Counting speed (maximum)[*1]	1 phase input	400kPPS	10kPPS
		2 phase input	300kPPS	7kPPS
	Signal level		24-bit binary 0 to 16777215	
	Model		UP/DOWN preset counter and ring counter functions	
	Smallest count pulse width		Adjust rise/fall time of input to 2µs or less. Duty ratio: 50%	
Coincidence output	Comparison range		24-bit binary	
	Comparison result		Set value < Count value Set value = Count value Set value > Count value	
External input	Preset		5/12/24VDC, 2 to 5mA	
	Function start		OFF → ON: 0.5ms or less ON → OFF: 3ms or less	
	Response time			
External output	Coincidence output		2A/common	
	Response time		0.1ms or less	
CC-Link station type			Remote device station	
Number of occupied stations			4 stations	
Connection cable			CC-Link dedicated cable	
Dielectric withstand voltage			1 minute at 500V AC between batch of DC external terminals and ground	
Insulation resistance			10MΩ or more across all DC external terminals and grounding terminal using a 500VDC insulation resistance tester	

Item	Specification
Noise durability	Based on a noise simulator with 500Vp-p noise voltage, 1μs noise width and 25-60Hz noise frequency
Connected terminal block	27 terminal blocks (seven M3.5 screws)
Applicable wire size	0.75 to 2.00mm²
Applicable crimp contact	RAV1.25-3, RAV2-3.5 (JIS C 2805 compliant)
Module installation screws	M4×0.7mm(0.03in.)×16mm(0.63in.) or larger screws (tightening torque range 0.78 to 1.18N·m) Can also be mounted using a DIN rail
Applicable DIN rail	TH35-7.5Fe, TH35-7.5Al, TH35-15Fe (JIS C 2812 compliant)
External power supply	18 to 28.8VDC
	Current consumption: 100mA (for 24VDC)
Allowable momentary power failure period	1ms
Weight	0.42kg

*1 Counting speed is affected by the duration of rise and fall periods. The speeds that can be counted are indicated in the table below.
Take note that the count may become incorrect when a pulse with a large rise or fall period is counted.

Counting speed setting switch	HIGH		LOW		
Rise/fall period	1 phase input	2 phase input	1 phase input	2 phase input	
t = 0.1μs or less	400kPPS	300kPPS	-	-	
t = 1.25μs or less	200kPPS	200kPPS	10kPPS	7kPPS	
t = 12.5μs or less	20kPPS	20kPPS	1kPPS	700PPS	
t = 250μs or less	-	-	500PPS	250PPS	

2.3　Performance Specifications for AJ65BT-D62D-S1

Item			Specification	
Setting switch for counting speed switching			HIGH side	LOW side
Number of channels			2 channels	
Count input signal	Phase		1 phase input, 2 phase input	
	Signal level (ϕA, ϕB)		EIA Standard RS-422-A Differential line driver level (AM26LS31 (manufactured by Texas Instrument Japan) or equivalent)	
Counter	Counting speed (maximum)[1]	1 phase input	400kPPS	10kPPS
		2 phase input	300kPPS	7kPPS
	Signal level		24-bit binary 0 to 16777215	
	Model		UP/DOWN preset counter and ring counter functions	
	Smallest count pulse width			
Coincidence output	Comparison range		24-bit binary	
	Comparison result		Set value < Count value Set value = Count value Set value > Count value	
External input	Preset		EIA Standard RS-422-A differential type line driver level {equivalent to AM26LS31 (Japan Texas Instruments make)}	
	Function start		5/12/24VDC, 2 to 5mA	
	Response time		OFF → ON: 0.5ms or less ON → OFF: 3ms or less	
External output	Coincidence output		2A/common	
	Response time		0.1ms or less	
CC-Link station type			Remote device station	
Number of occupied stations			4 stations	
Connection cable			CC-Link dedicated cable	
Dielectric withstand voltage			1 minute at 500V AC between batch of DC external terminals and ground	

Item	Specification
Insulation resistance	10MΩ or more across all DC external terminals and grounding terminal using a 500VDC insulation resistance tester
Noise durability	Based on a noise simulator with 500Vp-p noise voltage, 1μs noise width and 25-60Hz noise frequency
Connected terminal block	27 terminal blocks (seven M3.5 screws)
Applicable wire size	0.75 to 2.00mm^2
Applicable crimp contact	RAV1.25-3, RAV2-3.5 (JIS C 2805 compliant)
Module installation screws	M4×0.7mm(0.03in.)×16mm(0.63in.) or larger screws (tightening torque range 0.78 to 1.18N•m) Can also be mounted using a DIN rail
Applicable DIN rail	TH35-7.5Fe, TH35-7.5Al, TH35-15Fe (JIS C 2812 compliant)
External power supply	18 to 28.8VDC
	Current consumption: 120mA (for 24 VDC)
Allowable momentary power failure period	1ms
Weight	0.42kg

*1 Counting speed is affected by the duration of rise and fall periods. The speeds that can be counted are indicated in the table below.
Take note that the count may become incorrect when a pulse with a large rise or fall period is counted.

Counting speed setting switch	HIGH		LOW	
Rise/fall period	1 phase input	2 phase input	1 phase input	2 phase input
t = 0.1μs or less	400kPPS	300kPPS	-	-
t = 1.25μs or less	200kPPS	200kPPS	10kPPS	7kPPS
t = 12.5μs or less	20kPPS	20kPPS	1kPPS	700PPS
t = 250μs or less	-	-	500PPS	250PPS

2.4 Interface Specifications for External Device Connections

The table below indicates the external device interfaces for the AJ65BT-D62, AJ65BT-D62D and AJ65BT-D62D-S1 high-speed counter modules.
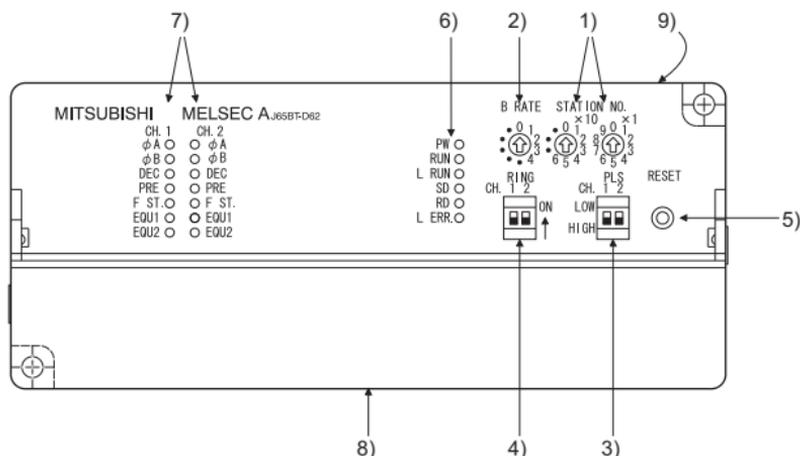
(1) External device interfaces for AJ65BT-D62

I/O classify-cation	Internal Circuit	Terminal number *1	Signal Name	Operation	Input (guaranteed value)	Operating current (guaranteed value)
Input	510Ω 1/3W, 4.7kΩ 1/3W For 5V, 4.7kΩ 1/3W For 12V, For 24V, Pulse input voltage setting pin	8 (15)	Phase A pulse input 24V	When ON	21.6 to 26.4V	2 to 5mA
				When OFF	5V or less	0.1mA or less
			Phase A pulse input 12V	When ON	10.8 to 13.2V	2 to 5mA
				When OFF	4V or less	0.1mA or less
			Phase A pulse input 5V	When ON	4.5 to 5.5V	2 to 5mA
				When OFF	2V or less	0.1mA or less
		9 (16)	Phase A pulse input COM		-	
	510Ω 1/3W, 4.7kΩ 1/3W For 5V, 4.7kΩ 1/3W For 12V, For 24V, Pulse input voltage setting pin	10 (17)	Phase B pulse input 24V	When ON	21.6 to 26.4V	2 to 5mA
				When OFF	5V or less	0.1mA or less
			Phase B pulse input 12V	When ON	10.8 to 13.2V	2 to 5mA
				When OFF	4V or less	0.1mA or less
			Phase B pulse input 5V	When ON	4.5 to 5.5V	2 to 5mA
				When OFF	2V or less	0.1mA or less
		11 (18)	Phase B pulse input COM		-	
	510Ω 1/3W, 4.7kΩ 1/3W For 5V, 4.7kΩ 1/3W For 12V, For 24V, External input voltage setting pin	12 (19)	Preset input 24V	When ON	21.6 to 26.4V	2 to 5mA
				When OFF	5V or less	0.1mA or less
			Preset input 12V	When ON	10.8 to 13.2V	2 to 5mA
				When OFF	4V or less	0.1mA or less
			Preset input 5V	When ON	4.5 to 5.5V	2 to 5mA
				When OFF	2V or less	0.1mA or less
		13 (20)	COM	Response time	OFF→ON 0.5ms or less	ON→OFF 3ms or less
	510Ω 1/3W, 4.7kΩ 1/3W For 5V, 4.7kΩ 1/3W For 12V, For 24V, External input voltage setting pin	14 (21)	Function start input 24V	When ON	21.6 to 26.4V	2 to 5mA
				When OFF	5V or less	0.1mA or less
			Function start input 12V	When ON	10.8 to 13.2V	2 to 5mA
				When OFF	4V or less	0.1mA or less
			Function start input 5V	When ON	4.5 to 5.5V	2 to 5mA
				When OFF	2V or less	0.1mA or less
		-	-	Response time	OFF→ON 0.5ms or less	ON→OFF 3ms or less

I/O classify-cation	Internal Circuit	Terminal number *1	Signal Name	Operation	Input (guaranteed value)	Operating current (guaranteed value)
Output		22 (24)	EQU1	Operating voltage :10.2 to 30V Rated current :0.5 A/point Maximum inrush current: 4A 10 ms Maximum voltage drop at ON: 1.5V Response time: OFF→ON 0.1 ms or less ON→OFF 0.1 ms or less		
		23 (25)	EQU2			
		26	12/24V	Input voltage: 10.2 to 30V Current consumption: 8mA (TYP 24VDC)		
		27	0V			

*1   Figure inside ( ) indicates the terminal number of channel 2.

(2) External device interfaces for AJ65BT-D62D

I/O classify-cation	Internal Circuit	Terminal number *1	Signal Name	Operation	Input (guaranteed value)	Operating current (guaranteed value)
Input		8 (15)	Phase A pulse input	EIA Standard RS-422-A line receiver (AM26C32 (manufactured by Texas Instruments Japan Limited.) or equivalent) The specifications of line receiver are as follows: • VIT+ differential input ON voltage (H level threshold voltage): 0.1V • VIT- differential input OFF voltage (L level threshold voltage): -0.1V • Vhys hysteresis voltage (VIT+ - VIT-): 60mV (A current type line driver cannot be used.)		
		9 (16)	Phase A̅ pulse input			
		10 (17)	Phase B pulse input			
		11 (18)	Phase B̅ pulse input			
		12 (19)	Preset input 24V	When ON	21.6 to 26.4V	2 to 5mA
				When OFF	5V or less	0.1mA or less
			Preset input 12V	When ON	10.8 to 13.2V	2 to 5mA
				When OFF	4V or less	0.1mA or less
			Preset input 5V	When ON	4.5 to 5.5V	2 to 5mA
				When OFF	2V or less	0.1mA or less
		13 (20)	COM	Response time	OFF→ON 0.5ms or less	ON→OFF 3ms or less
		14 (21)	Function start input 24V	When ON	21.6 to 26.4V	2 to 5mA
				When OFF	5V or less	0.1mA or less
			Function start input 12V	When ON	10.8 to 13.2V	2 to 5mA
				When OFF	4V or less	0.1mA or less
			Function start input 5V	When ON	4.5 to 5.5V	2 to 5mA
				When OFF	2V or less	0.1mA or less
		-	-	Response time	OFF→ON 0.5ms or less	ON→OFF 3ms or less
Output		22 (24)	EQU1	Operating voltage: 10.2 to 30V Rated current: 0.5A/point Max. inrush current: 4A 10ms Max. voltage drop at ON: 1.5V Response time: OFF→ON 0.1ms or less ON→OFF 0.1ms or less		
		23 (25)	EQU2			
		26	12/24V	Input voltage: 10.2 to 30V Current consumption: 8mA (TYP 24VDC)		
		27	0V			

*1 Figure inside ( ) indicates the terminal number of channel 2.

(3) External device interfaces for AJ65BT-D62D-S1

I/O classify-cation	Internal Circuit	Terminal number *1	Signal Name	Operation		Input (guaranteed value)	Operating current (guaranteed value)
Input		8 (16)	Phase A pulse input	EIA Standard RS-422-A line receiver (AM26C32 manufactured by Texas Instruments Japan Limited.) or equivalent) The specifications of line receiver are as follows: • VIT+ differential input ON voltage (H level threshold voltage): 0.1V • VIT- differential input OFF voltage (L level threshold voltage): -0.1V • Vhys hysteresis voltage (VIT+ - VIT-): 60mV (A current type line driver cannot be used.)			
		9 (17)	Phase $\overline{A}$ pulse input				
		10 (18)	Phase B pulse input				
		11 (19)	Phase $\overline{B}$ pulse input				
		12 (20)	Preset input				
		13 (21)	$\overline{Preset}$ input				
		14 (22)	Function start input 24V	When ON		21.6 to 26.4V	2 to 5mA
				When OFF		5V or less	0.1mA or less
			Function start input 12V	When ON		10.8 to 13.2V	2 to 5mA
				When OFF		4V or less	0.1mA or less
			Function start input 5V	When ON		4.5 to 5.5V	2 to 5mA
				When OFF		2V or less	0.1mA or less
		15 (23)	COM	Response time		OFF→ON 0.5ms or less	ON→OFF 3ms or less
Output		24 (25)	EQU1	Operating voltage: 10.2 to 30V Rated current: 0.5 A/point Maximum inrush current: 4A 10 ms Maximum voltage drop at ON: 1.5V Response time: OFF→ON 0.1 ms or less ON→OFF 0.1 ms or less			
		26	12/24V	Input voltage: 10.2 to 30V Current consumption: 8mA (TYP 24VDC)			
		27	0V				

*1 Figure inside ( ) indicates the terminal number of channel 2.

3. PART IDENTIFICATION NOMENCLATURE AND SETTINGS

This section shows the name of each part within the high-speed counter module and explains how to set each switch. (The illustration below indicates the AJ65BT-D62).

No.	Name	Description	
1)	Station number setting switch	$\oplus \times 10$ $\oplus \times 1$	Used to set the station number of the high-speed counter module between 1 and 61. (When shipped from the factory: 00)
2)	Transmission baud rate setting switch	Used to set the transmission speed of the high-speed counter module. (For data link)	
		Setting number	Transmission baud rate
		0	156kbps (factory set value)
		1	625kbps
		2	2.5Mbps
		3	5Mbps
		4	10Mbps
		Other than 0 to 4	Not used (When a number other than 0 to 4 is used, the L ERR. LED lights up and a communication error is generated.)

No.	Name		Description	
3)	Counting speed setting switch	LOW side:	With Phase 1 input, up to 10kPPS and with Phase 2, up to 7kPPS can be counted.	
		HIGH side:	With Phase 1 input, up to 400(200)kPPS and with Phase 2, up to 300(200)kPPS can be counted. The figures in ( ) are for the AJ65BT-D62. (When shipped from the factory: set at HIGH side)	
4)	Ring counter setting switch		Set whether the ring counter function can be used. • When ring counter used: ON side • When ring counter not used: OFF side (When shipped from the factory: set at OFF side)	
5)	Reset switch		Hardware reset Initializes the remote register for the high-speed counter module. By turning the switch on, the initial data processing request flag turns on.	
6)	LED display	PW	Lit: power is on Unlit: power is off	
		RUN	Lit: operating normally Unlit: 24V DC power supply is disconnected or WDT error	
		L RUN	Lit: communication is normal Unlit: communication is disconnected (time over error)	
		SD	SD: lit when data is being transmitted	
		RD	RD: lit when data is being transmitted	
		L ERR.	On: Communication data error (CRC error)	
			Flashing at constant interval:	Station number settings and baud rate settings are changed during power supply.
			Flashing at non-constant interval:	Termination resistor is not provided or the unit or the dedicated cable for CC-Link is subject to noise.
			Off: Normal communication	

No.	Name		Description
7)	LED display	φA	Lights up when voltage is being applied to the Phase A pulse input terminal.
		φB	Lights up when voltage is being applied to the Phase B pulse input terminal.
		DEC	Lights up during subtraction.
		PRE	Lights up stays lit when voltage is being applied to the PRESET terminal. Turns off when the external preset detection reset command rises.
		F ST.	Lights up when voltage is being applied to the F.START terminal.
		EQU1	Lights up when coincidence output set value No.1 = counter value.
		EQU2	Lights up when coincidence output set value No.2 = counter value. (This does not exist in the AJ65BT-D62D-S1 model.)

8) Terminal block

```
 1   3   5   7   9  11  13  15  17  19  21  23  25  27
⊗  ⊗  ⊗  ⊗  ⊗  ⊗  ⊗  ⊗  ⊗  ⊗  ⊗  ⊗  ⊗  ⊗
○  ⊗  ⊗  ⊗  ⊗  ⊗  ⊗  ⊗  ⊗  ⊗  ⊗  ⊗  ⊗  ○
   2   4   6   8  10  12  14  16  18  20  22  24  26
```

• For AJ65BT-D62

Pin Number	Signal name		Pin Number	Signal name	
1	DA		15		φA
2	DB		16		
3	SG		17	CH2	φB
4	SLD		18		
5	24V		19		PRESET
6	F.G.		20		COM
7	24G		21		F.START
8		φA	22	CH1	EQU1
9			23		EQU2
10		φB	24	CH2	EQU1
11	CH1		25		EQU2
12		PRESET	26	12/24V	
13		COM	27	COM	
14		F.START			

No.	Name	Description

8) Terminal block

• For AJ65BT-D62D

Pin Number	Signal name			Pin Number	Signal name		
1	DA			15		φA	A
2	DB			16			Ā
3	SG			17		φB	B
4	SLD			18	CH2		B̄
5	24V			19	PRESET		
6	F.G.			20	COM		
7	24G			21	F.START		
8		φA	A	22	CH1	EQU1	
9			Ā	23		EQU2	
10		φB	B	24	CH2	EQU1	
11	CH1		B̄	25		EQU2	
12	PRESET			26	12/24V		
13	COM			27	COM		
14	F.START						

• For AJ65BT-D62D-S1

Pin Number	Signal name			Pin Number	Signal name		
1	DA			16		φA	A
2	DB			17			Ā
3	SG			18		φB	B
4	SLD			19	CH2		B̄
5	24V			20	PRESET		
6	F.G.			21	PRESET̄		
7	24G			22	F.START		
8		φA	A	23			
9			Ā	24	CH1	EQU1	
10		φB	B	25	CH2	EQU1	
11	CH1		B̄	26	12/24V		
12	PRESET			27	COM		
13	PRESET̄						
14	F.START						
15							

No.	Name	Description
9)	Pulse/external input voltage setting pin	This is the same for CH2. AJ65BT-D62 Circuit board [CH.1] φB F ST. φA PRE Jumper 24V 12V 5V (When a jumper is connected to 5V) AJ65BT-D62D [CH.1] F ST. PRE 24V 12V 5V (When a jumper is connected to 12V) AJ65BT-D62D-S1 [CH.1] F ST. 24V 12V 5V (When a jumper is connected to 24V)
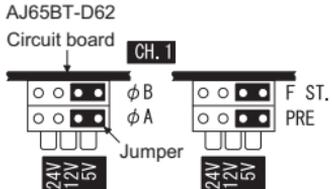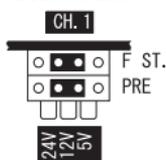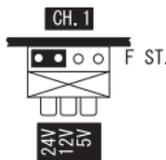
4. LOADING AND INSTALLATION

4.1 Handling Precautions

(1) Do not drop or apply strong shock to the module case.

(2) Do not remove the module printed circuit board from the case. This will cause a breakdown.

(3) Be careful not to let foreign matters such as fillings or wire chips get inside the module. If these do get inside, remove them.

(4) Tighten the module installation screws within the following tightening torque range.

Screw	Tightening Torque Range
Module installation screws (M4 screw)	0.78 to 1.18N•m
Terminal block terminal screws (M3.5 screw)	0.59 to 0.88N•m
Module installation screws (M4 screw)	0.78 to 1.18N•m

(5) When using a DIN rail adapter, take note of the following points when mounting the DIN rail.

(a) Applicable DIN rail type (JIS C 2812 compliant)
   TH-35-7.5Fe
   TH-35-7.5Al
   TH-35-15Fe

(b) Screw spacing when mounting the DIN rail
   When mounting the DIN rail, tighten the screws at a pitch of 200mm (7.84in.) or less.

4.2   Installation Environment

Do not install the A series programmable controller in the following environment.

(1)   Where the ambient temperature exceeds the 0 to 55°C range.

(2)   Where the ambient humidity exceeds the 10 to 90% RH range.

(3)   Where condensation is produced by sudden temperature changes.

(4)   Where corrosive or combustible gas is present.

(5)   Where dust, iron powder and other conductive powder, oil mist, salt, or organic solvents are prevalent.

(6)   In direct sunlight.

(7)   Where a strong electric or magnetic field is generated.

(8)   Where vibration and shock may be transmitted directly to the module.

5. WIRING

This section explains the wiring for the high-speed counter module.

5.1 Wiring Method to Each Module

The following diagram shows the wiring of the master module, remote module and high-speed counter module with dedicated cable for CC-Link.
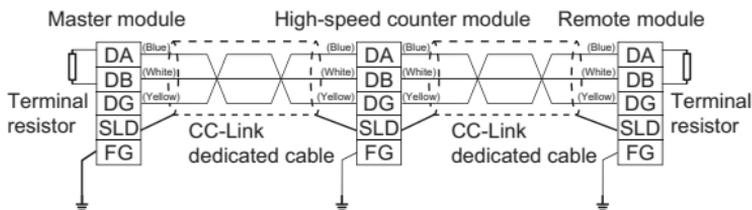

Point

Always connect the "terminal resistors" provided with the master module to the modules at both ends of data link.
(Connect between DA and DB)

5.2　Precautions When Wiring to the Pulse Generator

(1) Implement the following types of noise measures for high-speed pulse input.

    (a) Always use a twisted shielded wire and perform class 3 grounding.

    (b) Do not run the twisted wire parallel to the power cord or I/O line with a lot of noise. Secure a distance of 150mm (5.91in.) or more and run the cable for the shortest distance possible.

(2) In the case of Phase 1 input, always wire to the Phase A side.

(3) The high-speed counter module counts up when a pulse-state noise is input, resulting in a count error.

(4) Wiring for noise measure is indicated below.
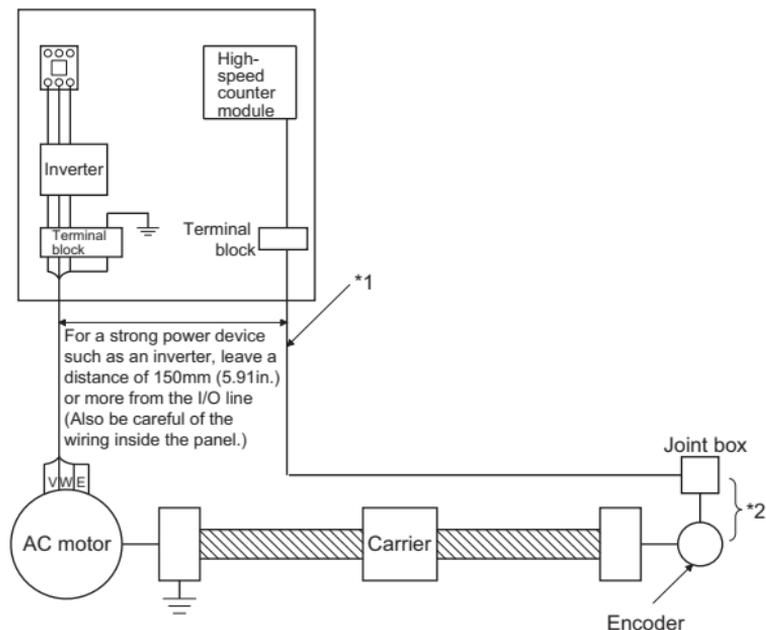
*1　When using metal piping, avoid intermingling solenoid valves and inductive loads in the same piping. Also, if an isolation distance from a strong power line such as duct wiring cannot be secured, use a CVVS or other shielded cable for the strong power line.
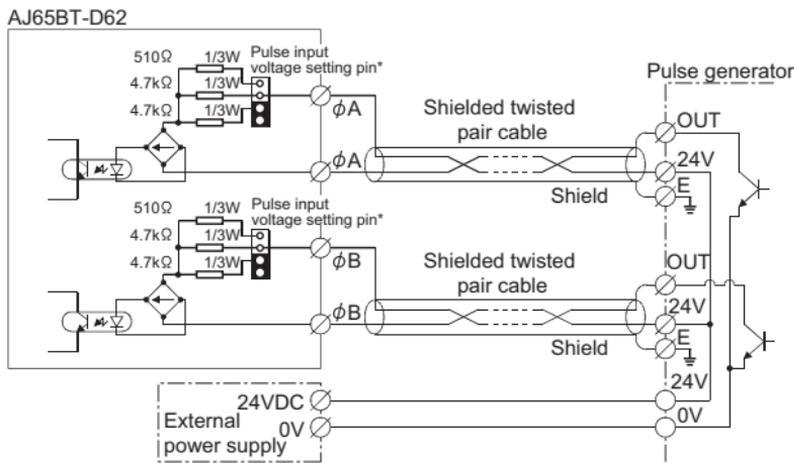
*2 Make the distance from the encoder to the joint box short. When there is long distance from the high-speed counter module to the encoder, voltage drops will occur. Therefore, use a measuring device such as a tester on the joint box terminal block to check whether the voltage while the encoder is operating and at a standstill is within the rated voltage for the encoder. If the drop in voltage is large, make the cable size thicker or use a 24V DC type encoder with small current consumption.

• Grounding for the twisted, shielded cable is done on the encoder side (in the joint box). (The following is an example of a connection for a 24V sink load.)
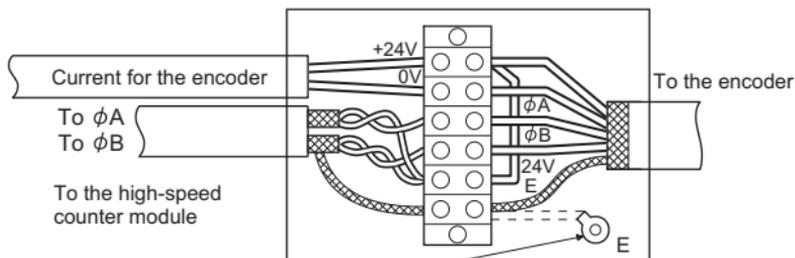
The shielded cable for the encoder and that for the twisted cable are connected inside the joint box. If the shielded cable for the encoder is not grounded inside the encoder, then perform grounding inside the joint box as shown by the dotted line.

5.3 Example of Wiring for the Pulse Generator

(1) Example of wiring to an open collector output type pulse generator (24V DC)

*Set the pulse input voltage setting pin to the ▐ side.

Point

The wiring between the AJ65BT-D62 and the encoder should be separate from the power supply line and signal line.
• An example is shown below.

• An example of wiring to be avoided.
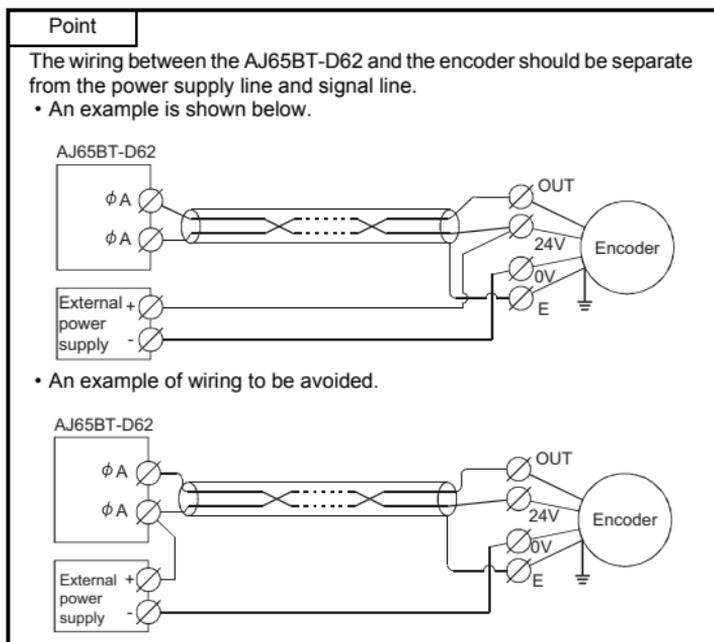
(2) Example of wiring to a voltage output type pulse generator (5V DC)
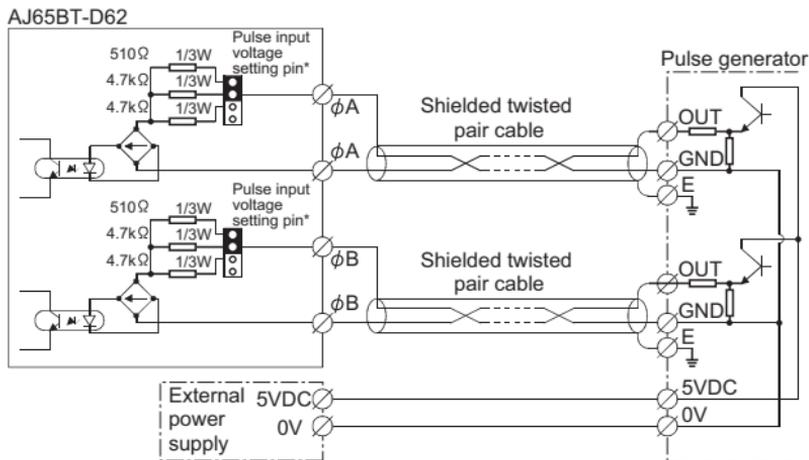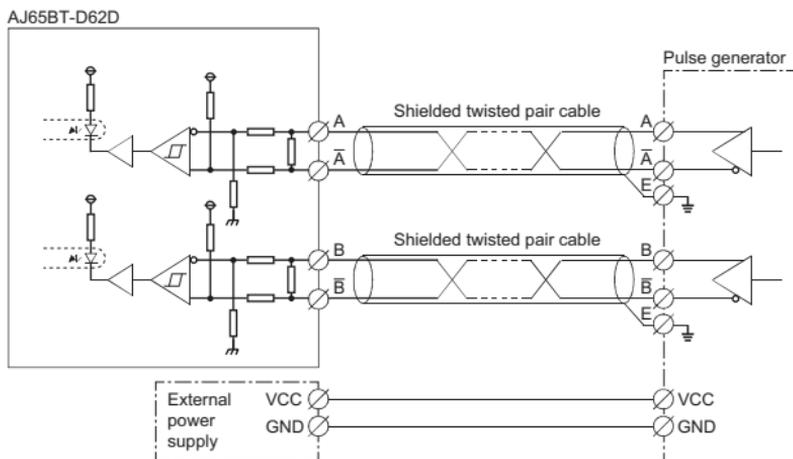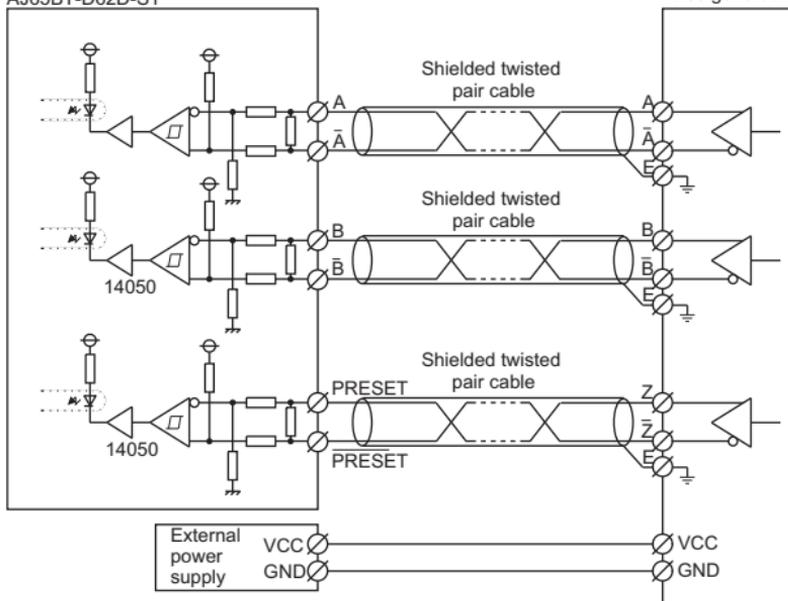

*Set the pulse input voltage setting pin to the ■ side.

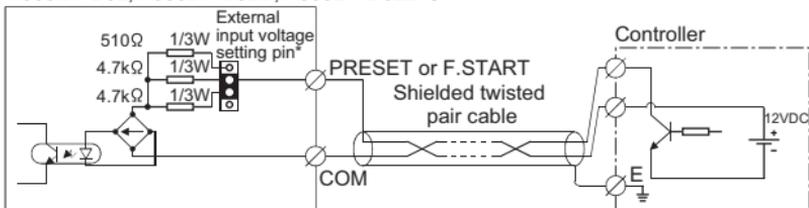(3) Example of wiring to the pulse generator for a line driver (AM26LS31 or equivalent)

5.4 Example of Wiring Between a Control Device and External Input Terminals (PRESET, F.START)

(1) When the control device (sink load type) is 12V

AJ65BT-D62, AJ65BT-D62D, AJ65BT-D62D-S1

· Internal circuit is set to PRESET.
· AJ65BT-D62D-S1 has F.START only.

*Set the external input voltage setting pin to the ■ side.

(2) When the control device (source load type) is 5V

AJ65BT-D62, AJ65BT-D62D, AJ65BT-D62D-S1
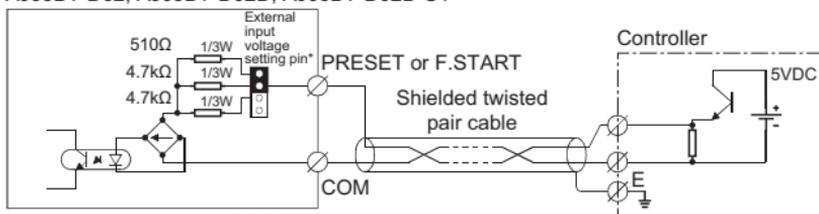
• Internal circuit is set to PRESET.
• AJ65BT-D62D-S1 has F.START only.

* Set the external input voltage setting pin to the ■ side.

CAUTION	• Set the pulse/external input voltage setting pin correctly after confirming the rated voltage for the external power supply. If there is a fault in the wiring (setting mistake), fire or breakdown can be caused. • Always set the pulse/external input voltage setting pin after shutting down all phases of the power supply externally. If all phases are not shut down, this will cause a breakdown of the module or an error in operation. • Make sure the insertion direction of the jumper for the pulse/ external-input voltage setting pin is correct. Incorrect insertion direction may cause the module to breakdown.

5.5 Example of Wiring to the External Output Terminals (EQU1 to EQU2)

When using an EQU terminal, an external power supply in the range of 10.2V DC to 30V DC is needed to operate the internal photocoupler. Run the wires as shown below.

(1) AJ65BT-D62, AJ65BT-D62D

AJ65BT-D62, AJ65BT-D62D
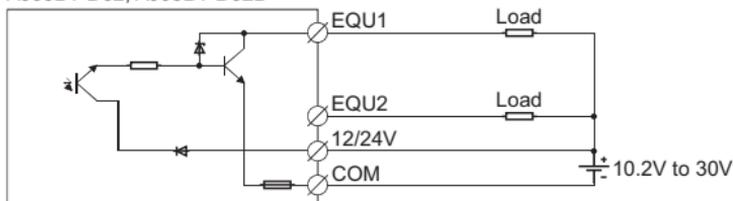
(2) AJ65BT-D62D-S1

AJ65BT-D62D-S1
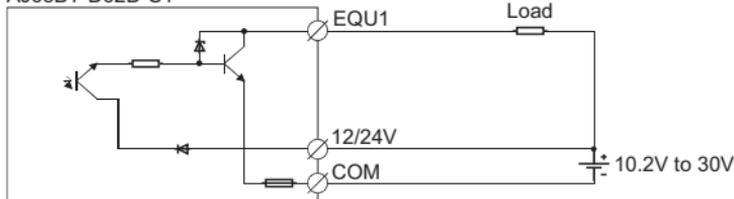
> Point
>
> Even when not using an EQU terminal, wire the 12/24V terminal (pin number: 26) and the COM terminal (pin number: 27) to an external power supply.
> If they are not wired, SW0088 to SW008B (fuse blown status) of the master module would be on.

6. EXTERNAL DIMENSIONS

2-φ4.5 mounting hole

63 (2.48)
9.5 (0.37)

NP

MITSUBISHI   MELSEC A

142.9 (5.63)
151.9 (5.98)
56 (2.2)
65 (2.56)
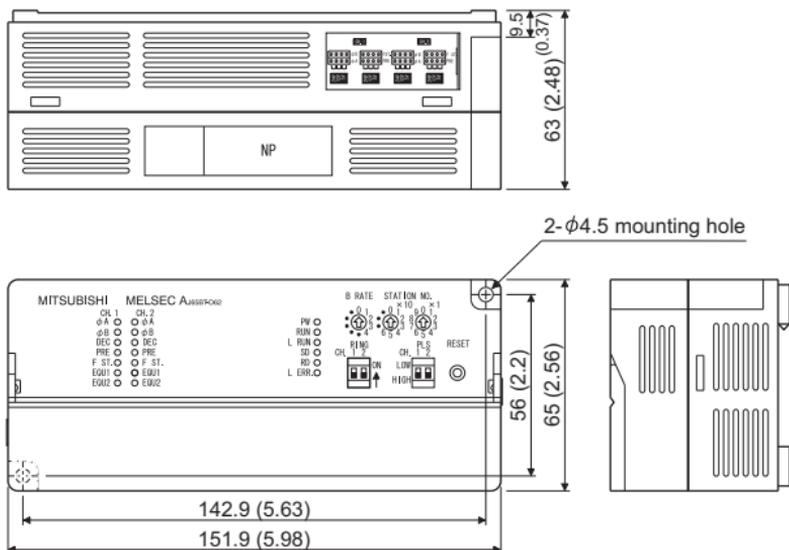
(Unit: mm (in.))

7. Information for the Chinese Standardized Low

基于中国标准法的参考规格：GB/T15969.2

Memo

Memo

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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