

# MITSUBISHI

---

# Model AJ71DN91/A1SJ71DN91

---

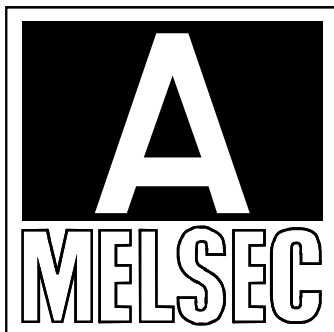
# DeviceNet Master Module

---

## 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	AJ71DN91-U-H-E
MODEL CODE	13JL68
IB (NA)-66867-D(1112) MEE	

©1998 MITSUBISHI ELECTRIC CORPORATION



## ● SAFETY PRECAUTIONS ●

(Always read before starting use)

Before using this product, read this manual and the relevant manuals introduced in this manual carefully and handle the product correctly with full attention to safety.

The instructions given 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".



Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.



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 a communications error occurs to a DeviceNetwork, the station in such a communications error will be in a state as follows:
  - (1) The master station (AJ71DN91, A1SJ71DN91) maintains input data which had been received from the slave station before the error occurred.
  - (2) Whether or not the output signal of the slave station to be turned off or maintained is determined by the specification of the slave station or by the parameter settings in the master station.By referring to communications states of the slave station, arrange an interlock circuit in a sequential program and provide safety mechanism externally of the slave station in order the system to operate safely.

### **CAUTION**

- Do not bundle the control wires and communication cables with the main circuit or power wires, or install them close to each other. They should be installed at least 100 mm (3.94 in.) away from each other. Failure to do so may generate noise that may cause malfunctions.

## [INSTALLATION PRECAUTIONS]

### **CAUTION**

- Use the PLC in the operating environment that meets the general specifications given in the user's manual of the CPU module. Using the PLC in any other operating environment may cause an electric shock, fire or malfunction, or may damage or degrade the product.
- While pressing the installation lever located at the bottom of module, insert the module fixing tab into the fixing hole in the base unit until it stops.  
Then, securely mount the module with the fixing hole as a supporting point.  
If the module is not installed properly, it may cause the module to malfunction, fail or fall off.  
Secure the module with screws especially when it is used in an environment where constant vibrations or strong impact may be expected.  
Be sure to tighten the screws using the specified torque. If the screws are loose, it may cause the module to malfunction or fall off. If the screws are tightened excessively, it may damage the screws and/or the module, and cause the module to malfunction or fall off.
- Before mounting or dismounting the module, make sure to shut off all phases of the external power supply. Failure to do so may damage the product.
- Do not directly touch the conducting parts and electronic parts of the module. This may cause the module to malfunction or fail.

## [WIRING PRECAUTIONS]

### **WARNING**

- Make sure to shut off all the phases of the external power supply before starting installation or wiring. Otherwise, the personnel may be subjected to an electric shock or the product to a damage.

### **CAUTION**

- Always ground the FG terminal for the PLC. There is a risk of malfunction.
- Tighten the terminal screws with the specified torque. If the terminal screws are loose, it could result in short circuits or erroneous operation. Tightening the terminal screws too far may cause damages to the screws or the module, resulting in fallout, short circuits, or malfunction.

## **[WIRING PRECAUTIONS]**

### **CAUTION**

- Make sure that foreign materials such as chips or wire pieces may not be caught inside the module. They could cause a fire, a malfunction, or an operation error.
- Make sure to place the communications and power supply cables connected to the module within a duct or clamp them. Unless the cables are placed within a duct or clamped, the module or cables could be broken by swinging or moving of the cables or unintentional pulling to cause an operation error resulting from a contact error.
- Do not pull cables by holding them with a hand for removing the communications or power supply cables that are connected to the module. To remove a cable having a connector, hold the connector connected to the module with a hand. To remove a cable not having a connector, loosen the screws fastening to connect the module. The cables being pulled while they are still connected to the module could break the module or cables, or cause an operation error resulting from a contact error.

## **[SETUP AND MAINTENANCE PRECAUTIONS]**

### **CAUTION**

- Do not touch the terminals while the power is on. Doing so may cause malfunctions.
- Make sure to shut off all the phases of the power supply before starting to clean the module or retighten the terminal screws. Otherwise, an operation error could occur.  
If the screws are loose, it may cause the module to short-circuit, malfunction or fall off. If the screws are tightened excessively, it may damage the screws and cause the module to short circuit, malfunction or fall off.
- Do not disassemble or modify the module. Disassembling or modifying the module could cause a failure, an operation error, an injury, or a fire.
- Make sure to shut off all the phases of the power supply externally before installing or removing the module. Otherwise, the module could cause a failure or an operation error.
- 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**



- To dispose of this product, treat it as an 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。

本手册中的注意事项记载与本产品有关的内容。关于使用本产品的系统方面的安全注意事项，请参阅所使用的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。



表示错误操作可能造成危险后果，导致死亡或重伤事故。



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”的事项也有可能引发严重事故。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

- DeviceNet 网络通信异常时，通信异常站会变为以下状态。
  - (1) 主站 (AJ71DN91、A1SJ71DN91) 保持通信异常前来自从站的输入数据。
  - (2) 从站的输出信号是 OFF 还是保持，由从站的规格或主站的参数设置决定。使用从站的通信状态在顺控程序上配置互锁电路的同时，应在从站也配置安全装置，以保证系统能安全运行。

### 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。
- 应将模块下部的模块固定用凸起部切实插入基板的固定孔中，以模块固定孔为支点进行安装。  
如果模块未正确安装，有可能造成误动作、故障或掉落。  
在振动、撞击较大的环境下使用时，应使用螺栓固定模块。  
应在规定的扭矩范围内拧紧螺栓。  
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。
- 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，有可能导致产品损坏。
- 请勿直接接触模块的导电部分及电子部件。  
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，有可能导致触电或产品损坏。

### 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。
- 应在规定的扭矩范围内切实地拧紧端子螺栓。  
如果端子螺栓拧得过松，有可能导致短路或误动作。  
如果拧得过紧，有可能造成螺栓及模块破损从而导致短路、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。
- 与模块相连接的通信电缆及电源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。
- 在拆卸与模块相连接的电缆时，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。  
不带接口的电缆应在松开与模块相连接部分的螺栓后再进行拆卸。  
如果在与模块相连接的状态下拉扯电缆，可能造成模块及电缆破损、电缆接触不良而导致误动作。

## 【启动 / 维护注意事项】

### 注意

- 在通电状态下请勿触摸端子。  
否则可能导致误动作。
- 在清洁模块或重新紧固端子螺栓时，应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。
- 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。
- 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 the Manuals

The following product are available for this equipment.  
Refer to the table given below to choose suitable manuals.

Detailed Manual

Manual name	Manual No. (Model code)
Model AJ71DN91/A1SJ71DN91 DeviceNet Master Module User's Manual	SH-4004 (13JL69)

## 1. Introduction

This manual describes the specifications and part names of Model AJ71DN91/A1SJ71DN91 DeviceNet Master Module (referred to as AJ71DN91, A1SJ71DN91, or DN91, hereafter) which is used in combination with MELSEC-A/QnA Series PLC CPU.

DN91 controls DeviceNet devices as the master station for DeviceNet. For specifications of DeviceNet, see DeviceNet Specifications (Release 2.0) Volumes 1 and 2.

DeviceNet is a registered trademark of Open DeviceNet Vendor Association, Inc.



## 2. System Configuration

The table below lists installable PLC CPUs, applicable data link systems/network systems, and the number of CPUs, with regard to DN91.

Installation location		Number of installable CPUs		
		A1SJ71DN91	AJ71DN91	
PLC CPU	A0J2CPU	Not applicable	No limitations	
	A0J2HCPU			
	A1SCPU(S1)	No limitations		
	A1SHCPU			
	A1SJCPU(S3)			
	A1SJHCPU			
	A1SCPUC24-R2			
	A2SCPU(S1)			
	A2SHCPU(S1)			
	A2USCPU(S1)			
	A2USHCPU-S1			
	A2ASCPU(S1/S30/S60)			
	Q2ASCPU(S1)			
	Q2ASHCPU(S1)			
	A1CPU			Not applicable
	A2CPU(S1)			
	A3CPU			
	A1NCP			
	A2NCP(S1)			
	A3NCP			
	A3MCP			
	A3HCP			
	A2ACP(S1)			
	A3ACP			
	A2UCP(S1)			
	A3UCP			
	A4UCP			
Q2ACP(S1)				
Q3ACP				
Q4ACP				
Q4ARCP				
Data link and network	Remote I/O station of MELSECNET		Not applicable	Not applicable
	Remote I/O station of MELSECNET/B			
	Remote I/O station of MELSECNET/10	AJ72LP25	Not applicable	No limitations
		AJ72BR15		
	AJ72QLP25			
	AJ72QBR15			

## 3. Specifications

### 3.1 Performance specifications

The table below lists the performance specifications of DN91. The table below lists the performance specifications of DN91.

Item		Specifications						
Node type		Group 2 dedicated client						
Station numbers which can be set		0 to 63						
Number of connections which can be generated		63 connections for I/O communications 63 connections for message communications						
Communications data	Rate of communications	I/O communications	Transmitting	2048 points (256 bytes) *2				
			Receiving	2048 points (256 bytes) *2				
	Message communications	Transmitting	240 bytes					
		Receiving	240 bytes					
Communications speed		One speed can be selected from 125kbps, 250kbps, and 500kbps.						
Communications specifications	Maximum cable length *1	Communications speed	Maximum transmitting distance of trunk line			Length of drop line		
			Thick Cables	Thick and Thin Cables	Thick and thin cables coexist	Maximum	Total	
			125 kbaud	500m	100m	See Section 3.1.1	6m	156 m
			250 kbaud	250m				78m
500 kbaud	100m	39m						
Number of input/output occupied points		Special 32 points						
Internal current consumption (5V DC)(A)		0.24						
Mass(kg)		A1SJ71DN91: 0.23, AJ71DN91: 0.43						

\*1: The maximum cable length complies with that in the DeviceNet specification (Release 2.0) Volumes 1 and 2.

\*2: Up to 255 bytes can be transferred per slave station.

#### 3.1.1 Maximum Transmitting Distance when Thick and Thin Cables Coexist

The table below lists both the maximum transmitting distance when thick and thin cables coexist.

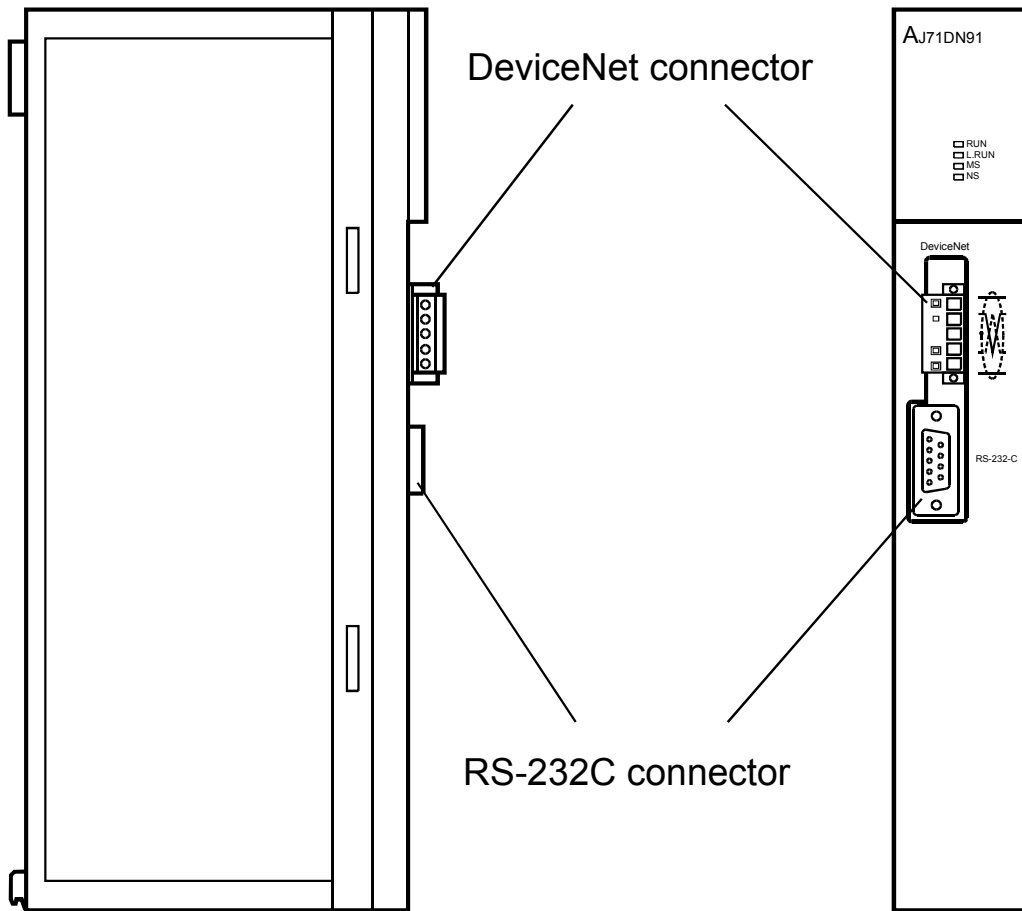
Communications speed	Maximum transmitting distance of trunk line when thick and thin cables coexist
125kbaud	Thick cable length+5×Thin cable length≤500m
250kbaud	Thick cable length+2.5×Thin cable length≤250m
500kbaud	Thick cable length+Thin cable length≤100m

## 4. Part Names

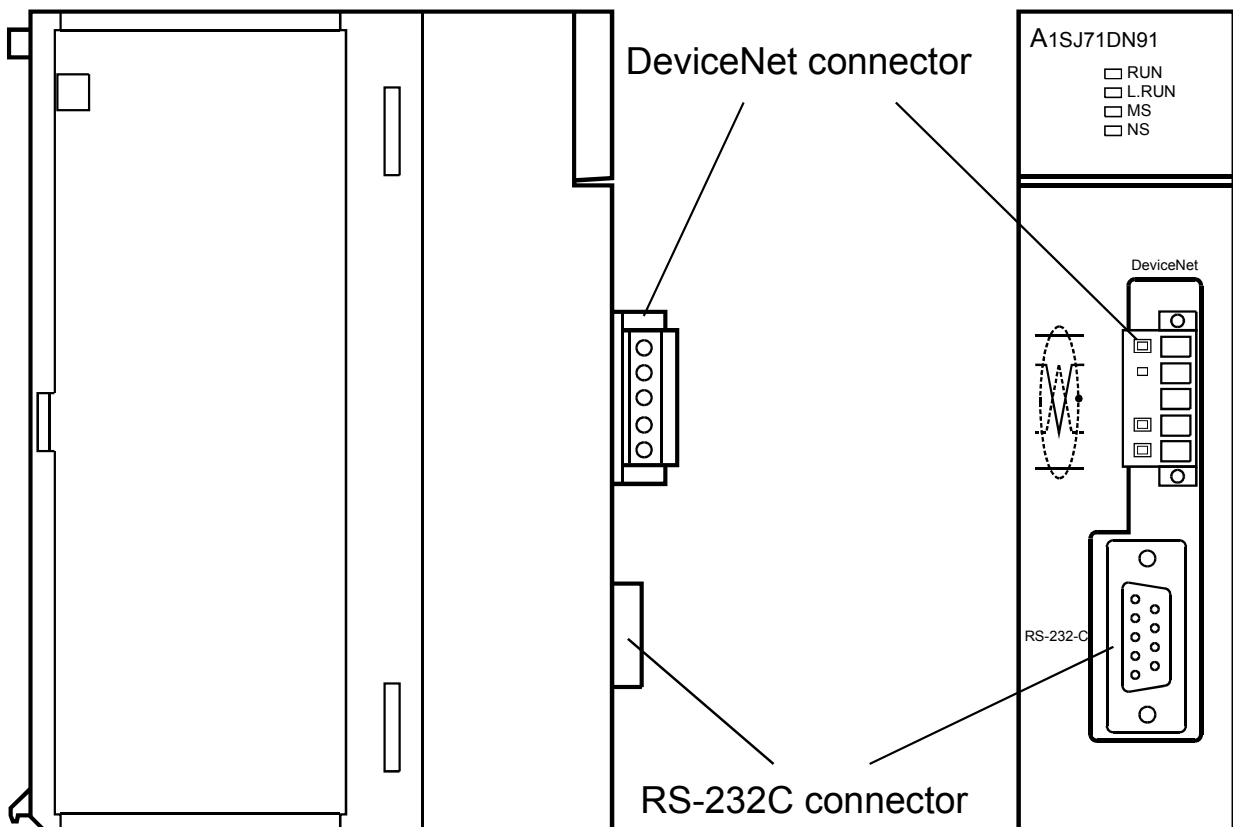
### 4.1 Part Names

This section describes the part names of DN91.

AJ71DN91



A1SJ71DN91



## 4.1.1 LED Display and Its Details

The table below explains LED display and its details.

LED name	Color	Details	State of LED	
			State	Message
<b>AJ71DN91</b>  <input type="checkbox"/> RUN <input type="checkbox"/> L.RUN <input type="checkbox"/> MS <input type="checkbox"/> NS	Red	Displaying normal operation	illuminating	In normal operation
			Not illuminating	Module error detected
				Power not supplied
				Parameter being loaded
			Flickering	Module error detected
				Parameter being loaded
<b>A1SJ71DN91</b>  <input type="checkbox"/> RUN <input type="checkbox"/> L.RUN <input type="checkbox"/> MS <input type="checkbox"/> NS	Red	Displaying communications state	illuminating	In communications
			Not illuminating	Communications stopped
				Flickering (periodically)
			Flickering (random)	Communications parameter error
<input type="checkbox"/> RUN <input type="checkbox"/> L.RUN <input type="checkbox"/> MS <input type="checkbox"/> NS	Green (top)	Displaying module state	illuminating	DeviceNet interface in normal operation
	Red (bottom)	Displaying module state	Flickering	Parameter error
			Unused	
<input type="checkbox"/> RUN <input type="checkbox"/> L.RUN <input type="checkbox"/> MS <input type="checkbox"/> NS	Green (top)	Displaying network state	illuminating	In on-line state and communications possible with slave station
	Red (bottom)	Displaying network state	Flickering	In on-line state but communications impossible with slave station
			illuminating	Duplicated MAC ID error Bus off error occurred.

## 5. Handling Precautions

This section describes the cautions for handling the module.

- (1) Do not drop or give a hard physical shock to the enclosure and terminal block of the module as they are made of resin.
- (2) Do not remove the printed circuit board from the enclosure for the module. Removing it could cause a failure.
- (3) When wiring, make sure that no foreign materials such as wire pieces may be caught inside the module. Remove them if they are caught.
- (4) Apply a torque as specified in the table below for tightening fitting or terminal screws for the module.

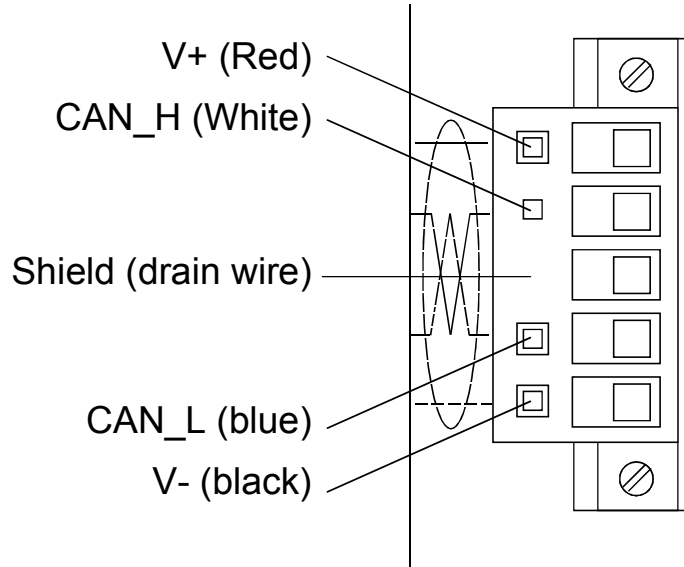
Type of screw	Tightening torque range
A1SJ71DN91 Module mounting screw (M4)	78 to 118 N • cm
DeviceNet Connector screw	35.3 to 48.0 N • cm
DeviceNet Connector wire screw	60.8 to 82.3 N • cm

## 6. Wiring

This section describes the communications cable and RS-232C cable.

### 6.1 Wiring Communications Cable

The DeviceNet connector of DN91 is configured as illustrated below, where a seal corresponding to its cable color is adhered to the top surface of the connector.

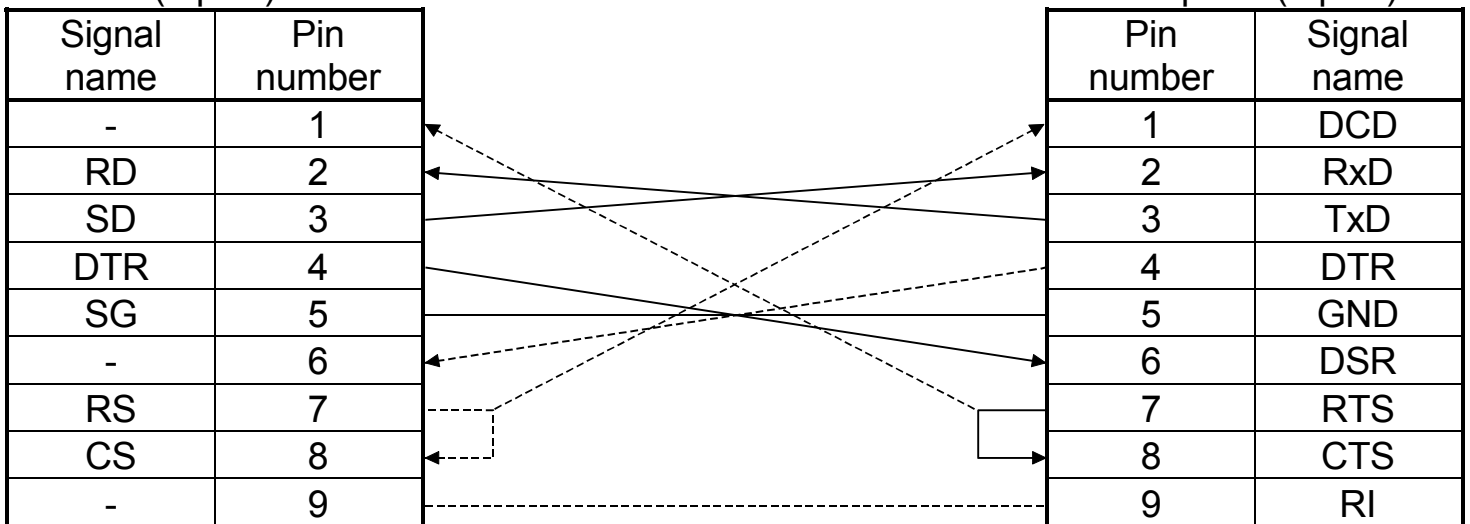


### 6.2 Wiring RS-232C Cable

The illustration below explains how to wire the RS-232C cable connecting DN91 with a PC/AT personal computer.

Dsub female connector  
for A(15)D530N15  
(9 pins)

Dsub female connector  
for PC/AT personal  
computer (9 pins)

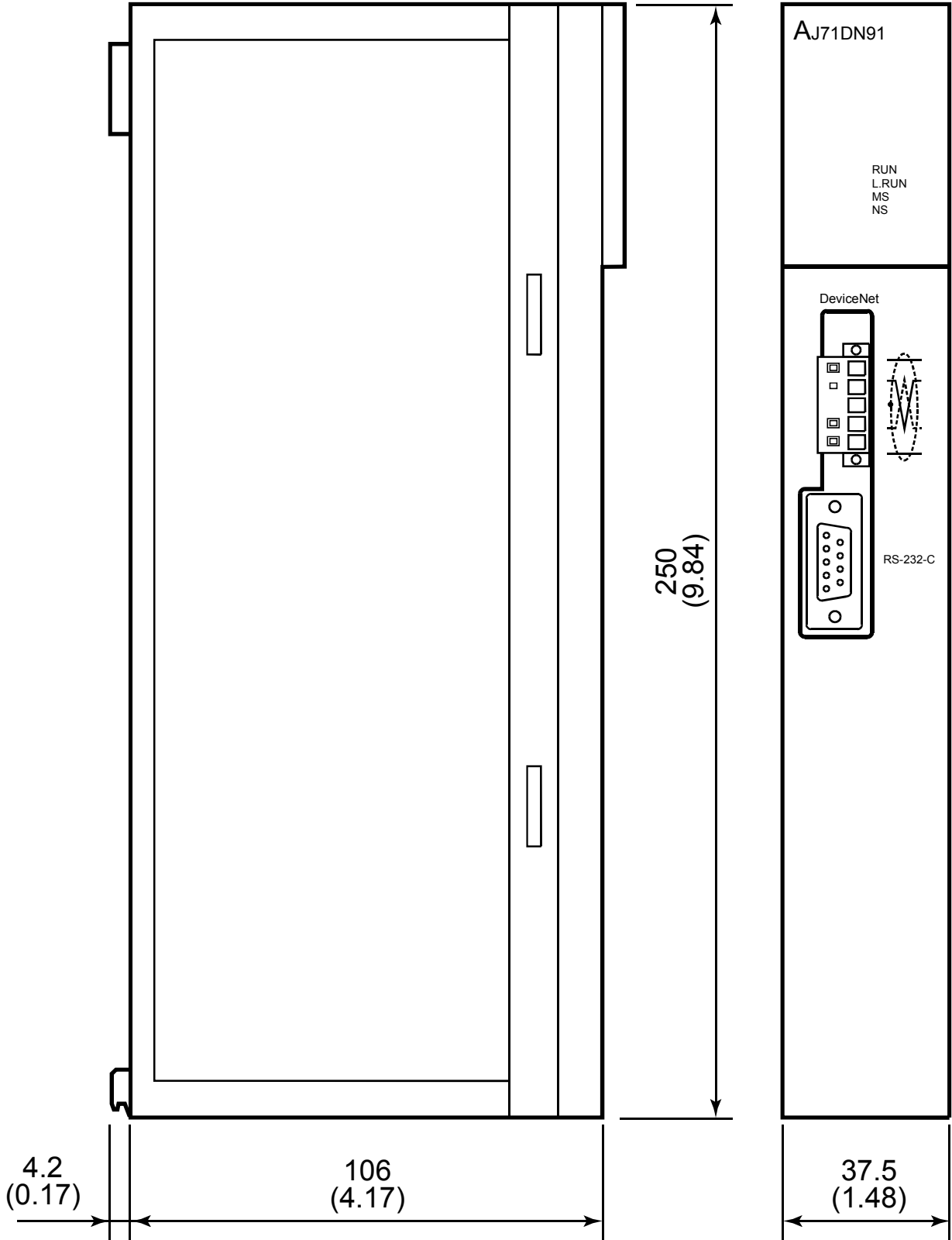


(1) Applying shielded cables are recommended.

(2) ----- indicates that no connection is needed but it is recommended to make a connection to eliminate specific orientation.

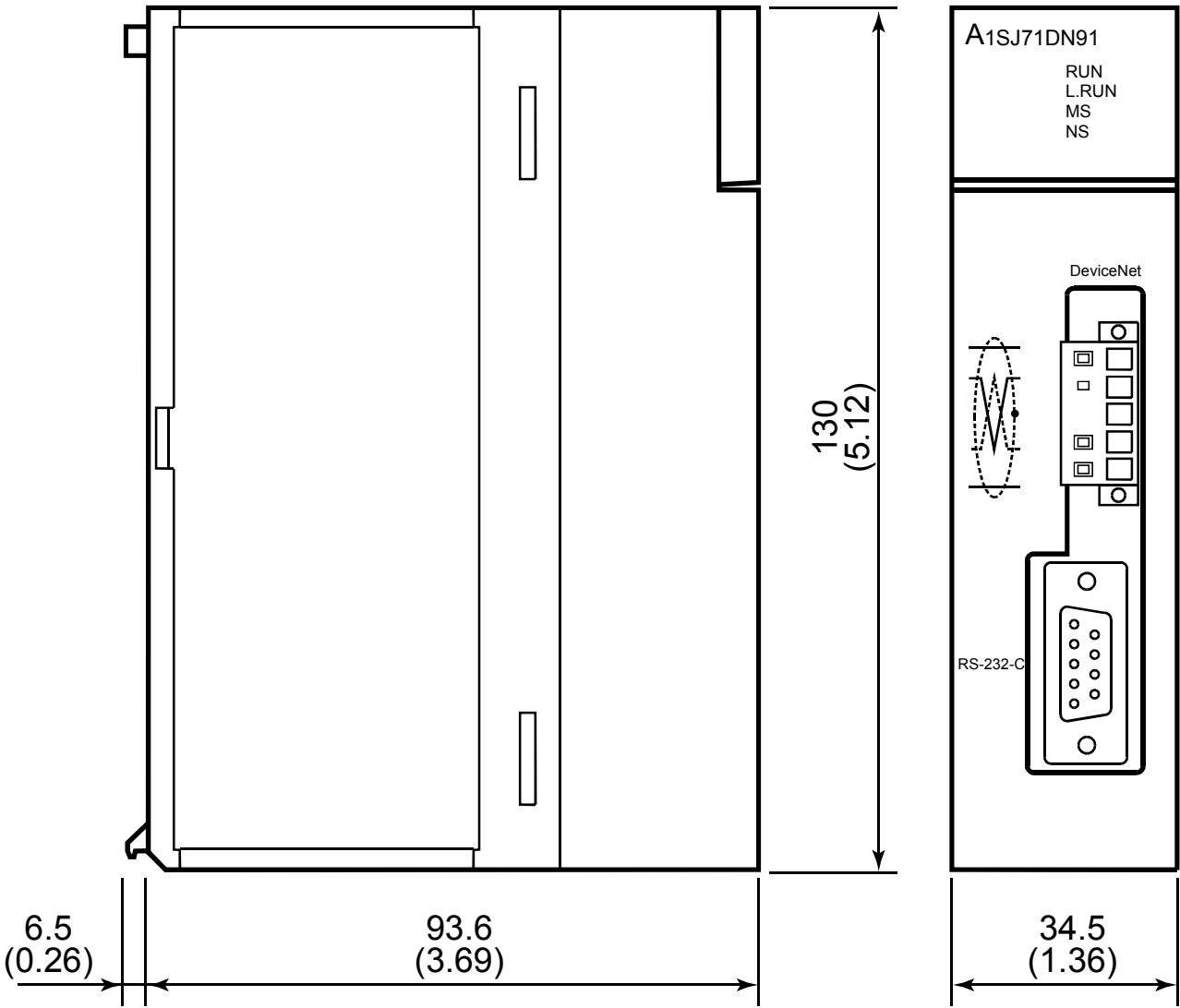
# 7. Outside Dimensions

(1) AJ71DN91



Unit: mm (inch)

(2) A1SJ71DN91



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.

Country/Region	Sales office/Tel	Country/Region	Sales office/Tel
U.S.A	Mitsubishi Electric Automation Inc. 500 Corporate Woods Parkway Vernon Hills, IL 60061, U.S.A. Tel : +1-847-478-2100	China	Mitsubishi Electric Automation (China) Ltd. 4/F Zhi Fu Plazz, No.80 Xin Chang Road, Shanghai 200003, China Tel : +86-21-6120-0808
Brazil	MELCO-TEC Rep. Com.e Assessoria Tecnica Ltda. Rua Correia Dias, 184, Edificio Paraiso Trade Center-8 andar Paraiso, Sao Paulo, SP Brazil Tel : +55-11-5908-8331	Taiwan	Setsuyo Enterprise Co., Ltd. 6F No.105 Wu-Kung 3rd.Rd, Wu-Ku Hsiang, Taipei Hsine, Taiwan Tel : +886-2-2299-2499
Germany	Mitsubishi Electric Europe B.V. German Branch Gothaer Strasse 8 D-40880 Ratingen, GERMANY Tel : +49-2102-486-0	Korea	Mitsubishi Electric Automation Korea Co., Ltd. 1480-6, Gayang-dong, Gangseo-ku Seoul 157-200, Korea Tel : +82-2-3660-9552
U.K	Mitsubishi Electric Europe B.V. UK Branch Travellers Lane, Hatfield, Hertfordshire., AL10 8XB, U.K. Tel : +44-1707-276100	Singapore	Mitsubishi Electric Asia Pte, Ltd. 307 Alexandra Road #05-01/02, Mitsubishi Electric Building, Singapore 159943 Tel : +65-6470-2480
Italy	Mitsubishi Electric Europe B.V. Italian Branch Centro Dir. Colleoni, Pal. Perseo-Ingr.2 Via Paracelso 12, I-20041 Agrate Brianza., Milano, Italy Tel : +39-039-60531	Thailand	Mitsubishi Electric Automation (Thailand) Co., Ltd. Bang-Chan Industrial Estate No.111 Moo 4, Serithai Rd, T.Kannayao, A.Kannayao, Bangkok 10230 Thailand Tel : +66-2-517-1326
Spain	Mitsubishi Electric Europe B.V. Spanish Branch Carretera de Rubi 76-80, E-08190 Sant Cugat del Valles, Barcelona, Spain Tel : +34-93-565-3131	Indonesia	P.T. Autoteknindo Sumber Makmur Muara Karang Selatan, Block A/Utara No.1 Kav. No.11 Kawasan Industri Pergudangan Jakarta - Utara 14440, P.O.Box 5045 Jakarta, 11050 Indonesia Tel : +62-21-6630833
France	Mitsubishi Electric Europe B.V. French Branch 25, Boulevard des Bouvets, F-92741 Nanterre Cedex, France Tel : +33-1-5568-5568	India	Messung Systems Pvt, Ltd. Electronic Sadan NO:III Unit No15, M.I.D.C Bhosari, Pune-411026, India Tel : +91-20-2712-3130
South Africa	Circuit Breaker Industries Ltd. Private Bag 2016, ZA-1600 Isando, South Africa Tel : +27-11-928-2000	Australia	Mitsubishi Electric Australia Pty. Ltd. 348 Victoria Road, Rydalmere, N.S.W 2116, Australia Tel : +61-2-9684-7777

## 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, HIGASHI-KU, NAGOYA, JAPAN

When exported from Japan, this manual does not require application to the Ministry of Economy, Trade and Industry for service transaction permission.

Specifications subject to change without notice.