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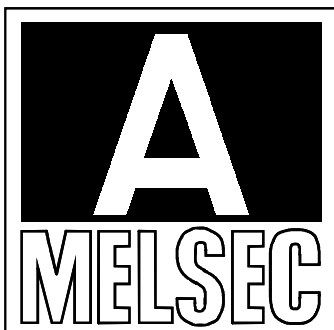
Model AJ71DN91/A1SJ71DN91 DeviceNet Master Module

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	AJ71DN91-U-H-E
MODEL CODE	13JL68
IB (NA)-66867-C(0407) MEE	

● 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 instructions are ranked as "DANGER" and "CAUTION".

◇**DANGER**	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.

Depending on circumstances, procedures indicated by ⚠**CAUTION** may also be linked to serious results.

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

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

[DESIGN PRECAUTIONS]

◇DANGER

- 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]

◇DANGER

● 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.
● 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.

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		
	A1NCPU		
	A2NCPU(S1)		
	A3NCPU		
	A3MCPU		
	A3HCPU		
	A2ACPU(S1)		
	A3ACPU		
	A2UCPU(S1)		
	A3UCPU		
	A4UCPU		
	Q2ACPU(S1)		
	Q3ACPU		
	Q4ACPU		
	Q4ARCPU		
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 AJ72BR15		No limitations
		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				
Communications 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				
	Rate of communications data	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.				
	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 coexit
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
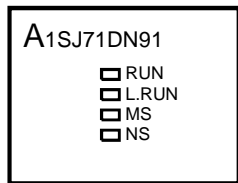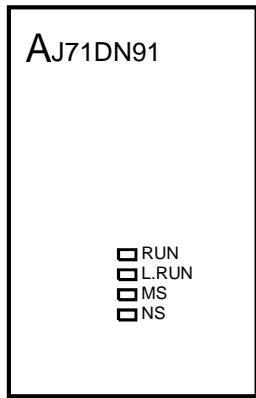This section describes the part names of DN91.

AJ71DN91

DeviceNet connector

RS-232C connector

A1SJ71DN91

DeviceNet connector

RS-232C connector
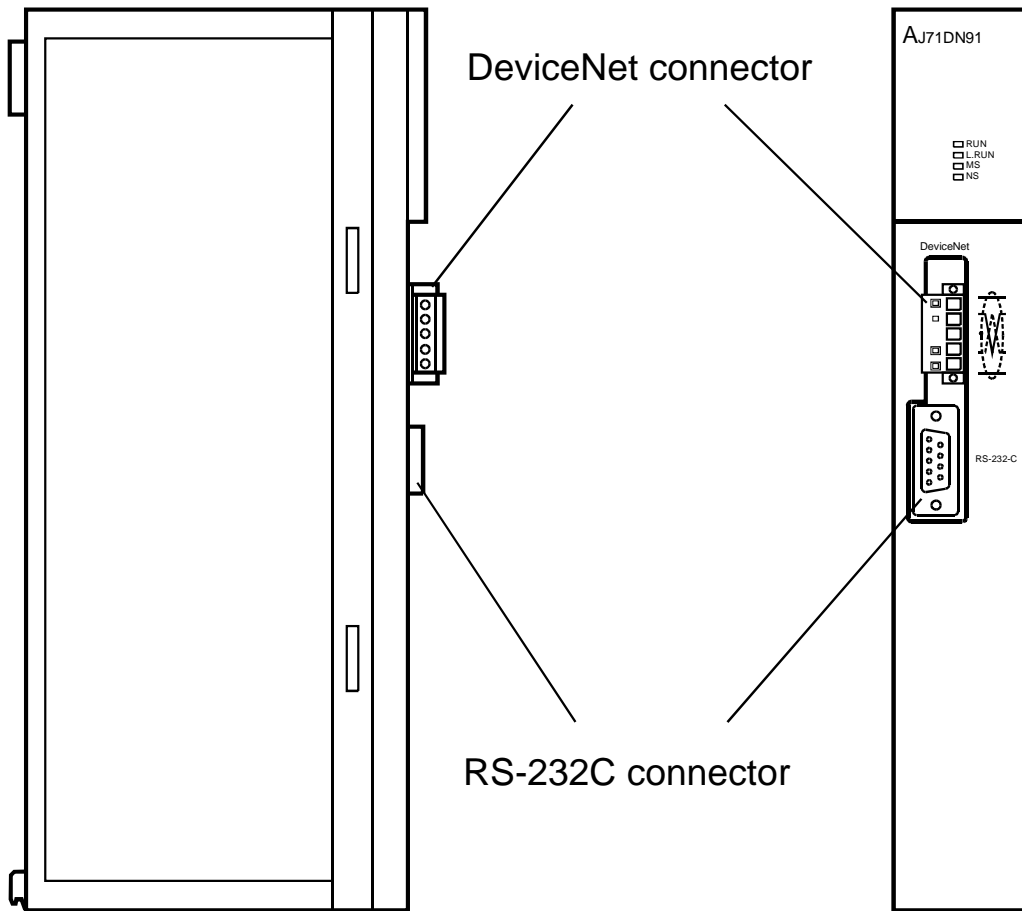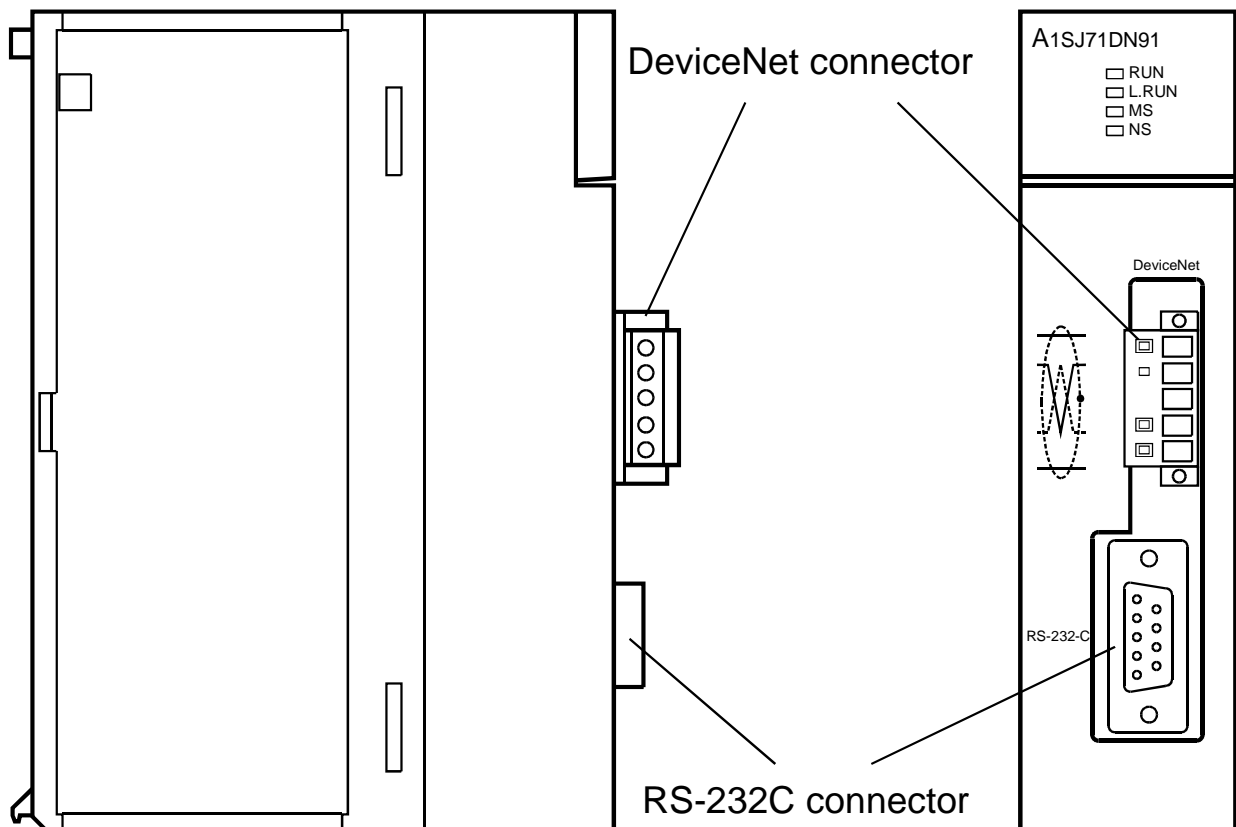
4.1.1 LED Display and Its Details

The table below explains LED display and its details.

AJ71DN91
- RUN
- L.RUN
- MS
- NS

A1SJ71DN91
- RUN
- L.RUN
- MS
- NS

LED name	Color	Details	State of LED	
RUN	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
L.RUN	Red	Displaying communications state	Illuminating	In communications
			Not illuminating	Communications stopped
			Flickering (periodically)	Communications ready
			Flickering (random)	Communications parameter error
MS	Green (top)	Displaying module state	Illuminating	DeviceNet interface in normal operation
			Flickering	Parameter error
	Red (bottom)	Displaying module state	Unused	
NS	Green (top)	Displaying network state	Illuminating	In on-line state and communications possible with slave station
			Flickering	In on-line state but communications impossible with slave station
	Red (bottom)	Displaying network state	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.
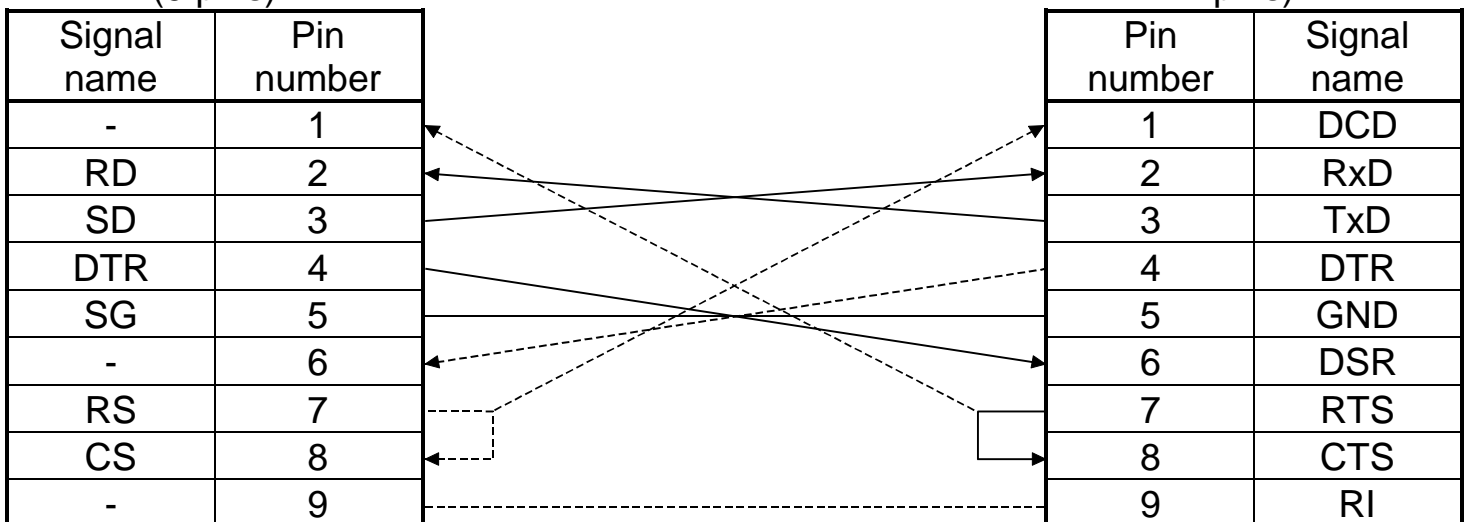
V+ (Red)
CAN_H (White)
Shield (drain wire)
CAN_L (blue)
V- (black)
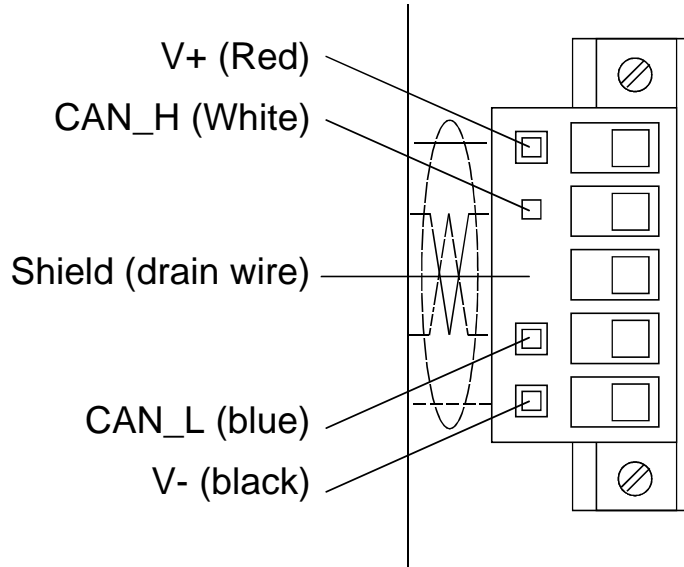
6.2 Wiring RS-232C Cable
The illustration below explains how to wire the RS-232C cable connecting DN91 with a PC/AT personal computer.

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

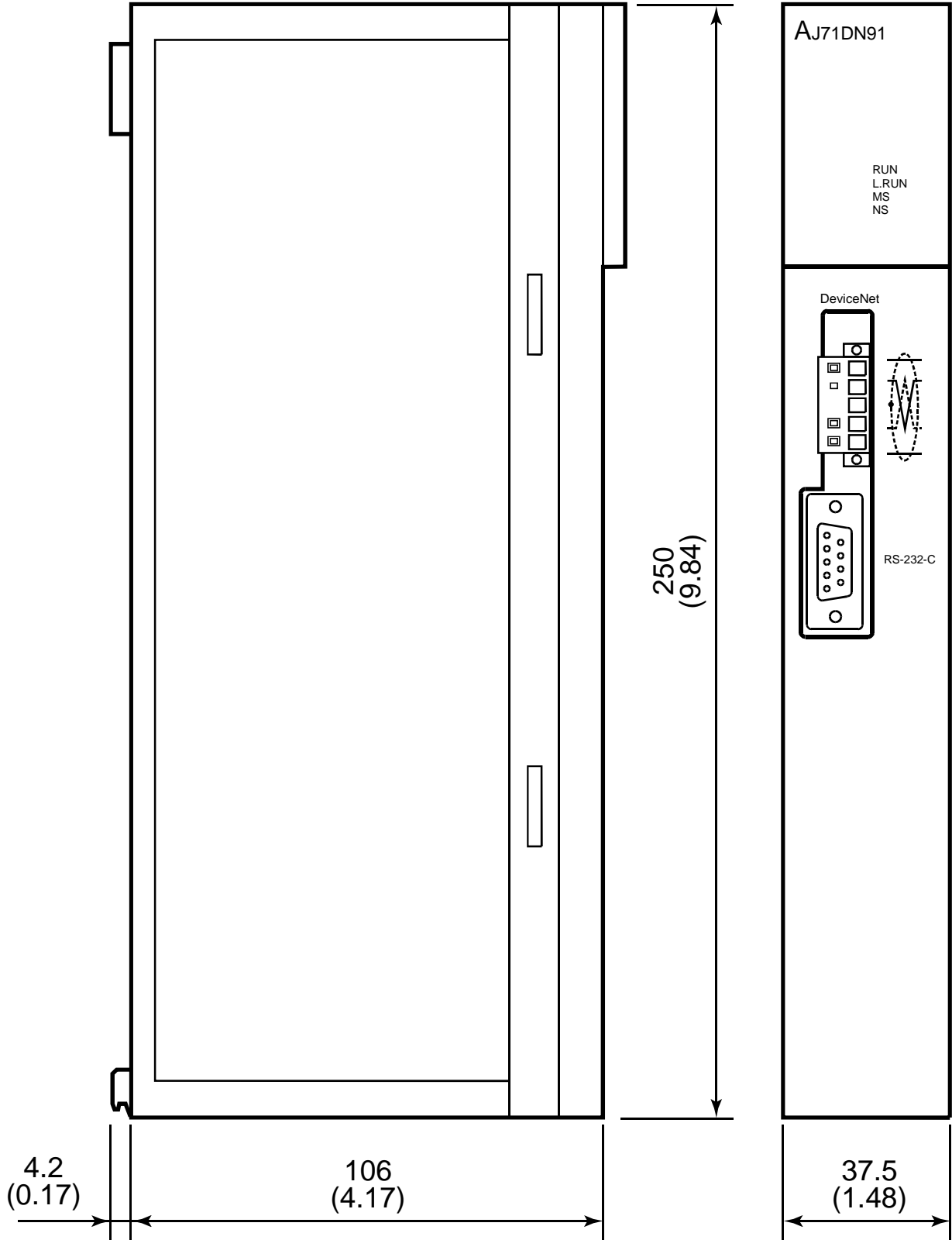Dsub female connector for PC/AT personal computer (9 pins)

Signal name	Pin number		Pin number	Signal name
-	1		1	DCD
RD	2		2	RxD
SD	3		3	TxD
DTR	4		4	DTR
SG	5		5	GND
-	6		6	DSR
RS	7		7	RTS
CS	8		8	CTS
-	9		9	RI

(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.
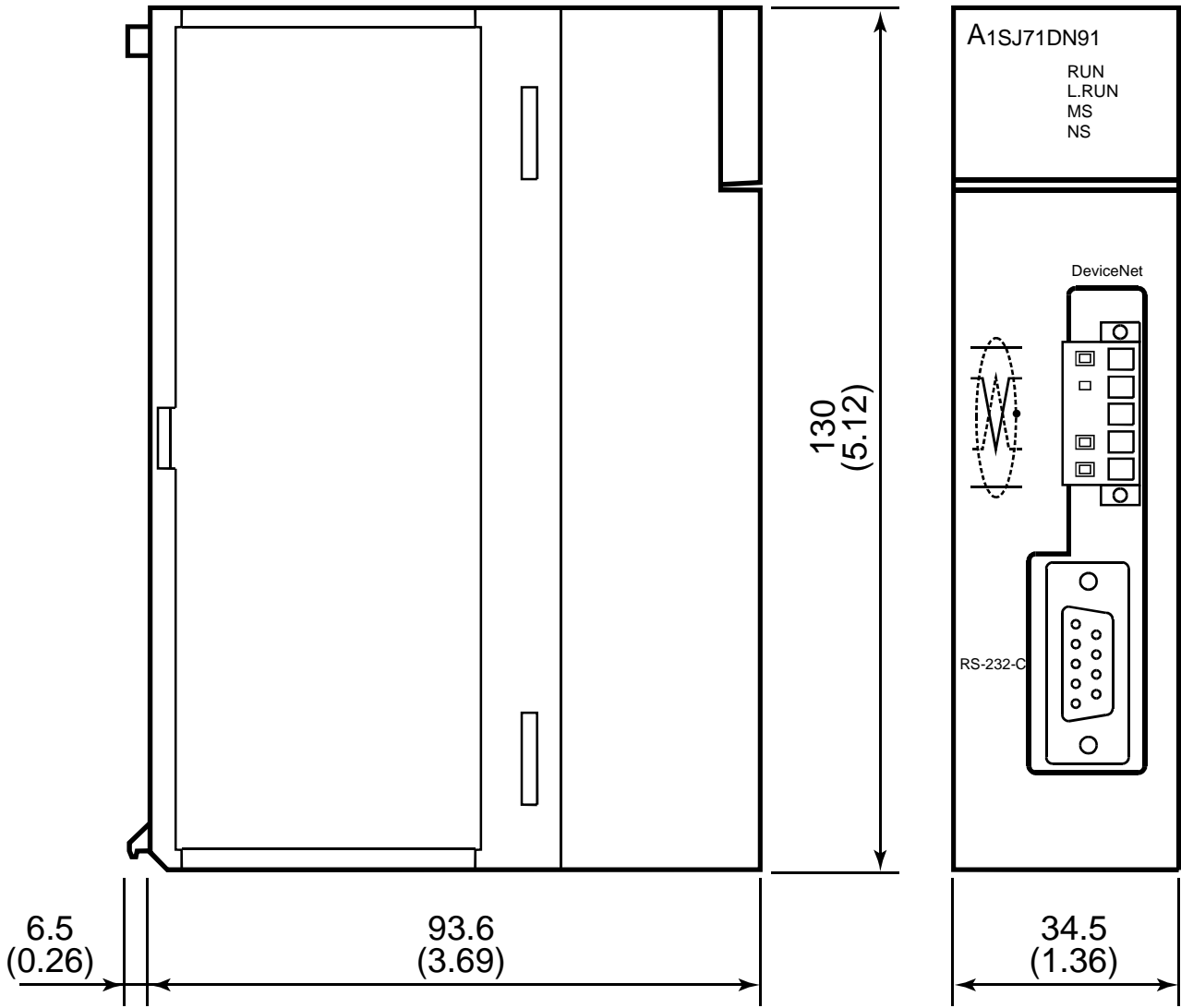
7. Outside Dimensions

(1) AJ71DN91

Unit: mm (inch)

(2) A1SJ71DN91

A1SJ71DN91	
	RUN
	L.RUN
	MS
	NS

DeviceNet

RS-232-C

6.5
(0.26)

93.6
(3.69)

130
(5.12)

34.5
(1.36)

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.

⚠ For safe use

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi.
- This product has been manufactured under strict quality control. However, when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.

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