

# MITSUBISHI

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PROGRAMMABLE CONTROLLER

# MELSEC-A

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**Mitsubishi General Use PC User's Manual**

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**Model A1S64TCTT, TCTI, TCRT, and TCRI  
Temperature Control Module  
Model A1S64BW Heater Disconnection  
Detection Module  
(Hardware)**

Thank you for buying the Mitsubishi General Use PC MELSEC-A Series.  
Before use, please read this manual carefully and correctly operate the module with a  
sufficient understanding of the A series PC functions and performance.  
Please place this manual in a location where it is available to end users.

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IB (NA)-66662-A(9604) MEE

## ● SAFETY PRECAUTIONS ●

(Please read these precautions before using.)

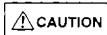
When using this Model, thoroughly read this manual and the associated manuals introduced in this manual. Also pay careful attention to safety and handle the module properly. These precautions apply only to this Model. Refer to the CPU module user's manual for a description of the PC system safety precautions.

These ● SAFETY PRECAUTIONS ● classify the safety precautions into two categories: "DANGER" and "CAUTION".



**DANGER**

Procedures which may lead to a dangerous condition and cause death or serious injury if not carried out properly.



**CAUTION**

Procedures which may lead to a dangerous condition and cause superficial to medium injury, or physical damage only, if not carried out properly.

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

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]



- Construct a safety circuit external to the PC to assure safe operation of the system main unit even if there is a problem with the external power supply or if the PC main unit is damaged.

(1) The outputs to external devices conducted by the output state settings when the settings mode that controls the external outputs are as follows. Please exercise sufficient caution when making settings.

State		Description of Processing	
		Output State (Buffer Memory Address 1E <sub>H</sub> ) Settings While in the Setting Mode	
		Control Output OFF	Hold
When an A1S64TC single unit error occurs	When an error occurs when calculation is continued, such as a write error.	When a write error occurs in the buffer memory address data, calculation is continued with the data before the write and this is output externally.	
When a PC CPU error occurs	When an error that stops the PC CPU calculation occurs	If calculation is stopped, then external output is turned OFF.	The state immediately prior to the error occurrence is maintained and output externally.
	When an error occurs in which the PC CPU continues to calculate	Calculation is continued and output externally.	
When the PC CPU changes from RUN to STOP		Calculation is stopped, and external output is turned OFF.	The state immediately prior to the PC CPU's STOP is maintained and externally output.
When there is a remote I/O station link error (When installed in the remote I/O station)		Calculation is stopped, and external output is turned OFF.	The state immediately prior to the link down is maintained and output externally.

- (2) When the output element or the internal circuit is damaged, there may be times when normal output cannot be performed or when error output is conducted. So please construct an external monitoring circuit to determine if an output signal could lead to a serious problem.

## [DESIGN PRECAUTIONS]

### CAUTION

- Do not bundle, on install, the control cables and communication cables with, or near, main circuit and power cables. Keep them at least 100mm away from such cables. Noise may cause erroneous operation.

## [INSTALLATION PRECAUTIONS]

### CAUTION

- Use the PC in the environment given in the general specifications section of this manual.  
Using the PC outside the range of the general specifications may result in electric shock, fire, or erroneous operation or may damage or degrade the product.
- Insert the tabs at the bottom of the module into the holes in the base unit before installing the module.  
Improper installation may cause erroneous operation, accidents, or the module to fall out.

## [WIRING PRECAUTIONS]

### CAUTION

- Use a special PC No.3 type ground or above to ground the FG terminal. Not doing so could cause a malfunction.
- Correctly wire the PC after checking the product's rated voltage and the terminal layout. Connecting to other than the rated voltage or incorrectly wiring the PC could cause fire or damage.
- Tighten the terminal screws with the specified torque. Loose terminal screws could cause short circuits, fires, or a malfunction.
- Be sure that cuttings, wire chips, or other foreign matter do not enter the module.  
Foreign matter may start a fire or cause an accident or erroneous operation.

## [STARTING AND MAINTENANCE PRECAUTIONS]

### CAUTION

- Do not touch live terminals.  
It may cause erroneous operation.
- Turn OFF the power before cleaning the module or retightening the screws. Doing this work while the power is on may damage the module or cause erroneous operation.

### CAUTION

- Do not disassemble or rebuild the module.  
It may cause accidents, erroneous operation, injury, or fire.
- Turn OFF the power before mounting and dismounting the module.  
Mounting or dismounting the module while the power is on may damage the module or cause erroneous operation.

## [DISPOSAL PRECAUTIONS]

### CAUTION

- When disposing of this product, handle it as industrial waste.

## About the Manuals

The following product manuals are available. Please use this table as a reference to request the appropriate manual as necessary.

### Related Manuals

Manual Name	Manual No. (Model Code)
Model A1S64TCTT, TCTI, TCRT, and TCRI Temperature Control Module Model A1S64BW Heater Disconnection Detection Module	IB-66663 (13J846)

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# 1 Overview

This manual explains the specifications, names of parts, and wiring, for the following modules that are combined with the MELSEC-A series AnSCPU module (hereafter abbreviated PC CPU).

- Model A1S64TCTT Temperature Control Module (hereafter abbreviated A1S64TCTT)
  - Model A1S64TCTI Temperature Control Module (hereafter abbreviated A1S64TCTI)
  - Model A1S64TCRT Temperature Control Module (hereafter abbreviated A1S64TCRT)
  - Model A1S64TCRI Temperature Control Module (hereafter abbreviated A1S64TCRI)
  - Model A1S64BW Heater Disconnection Detection Module (hereafter abbreviated A1S64BW)
- } Hereafter all called A1S64TC

The A1S64TC is a special module that controls the temperature by converting the external temperature sensor (thermocouple/resistance thermometer bulb) input values to a 16 bit coded BIN data digital value and then externally outputs this data to the transistor output/current output that automatically conducts PID calculation.

In addition, if BIN data handled by the PC CPU, such as from another A/D conversion module, is written to this module's buffer memory by the sequence program as a temperature measurement value, external output is possible from the transistor output/current output that automatically conducts PID calculation, so it can be used for a wide variety of process controls.

The A1S64BW is a special unit that can detect disconnection of the input power to a unit being controlled by being used in combination with a transistor output type temperature control module (A1S64TCTT/TCRT).

Following is shown the temperature control module, temperature input types, and control output types.

Model	Temperature Input Types	Control Output Types
A1S64TCTT	Thermocouple (R, K, J, T)	Transistor Output
A1S64TCTI		Current Output
A1S64TCRT	Resistance Thermometer Bulb Pt100, JPt100	Transistor Output
A1S64TCRI		Current Output



# 2 Performance Specifications

The A1S64TC and A1S64BW performance specifications are shown below.

## 2.1 A1S64TC Performance Specifications

Item	Specifications			
	A1S64TCTT	A1S64TCTI	A1S64TCRT	A1S64TCRI
Control Output Value	Transistor Output (Open Collector)	Current Output	Transistor Output (Open Collector)	Current Output
Temperature Input Number of Points	4 Channels/1 Module			
Temperature Sensor Input *1	Thermal Couple		Resistance Thermometer Bulb	
Accuracy	*2			
Sampling Period	1s/4 Channels			
Temperature Control Method	PID ON/OFF Pulse or ON/OFF Pulse	Current Output PID	PID ON/OFF Pulse or ON/OFF Pulse	Current Output PID
PID Constant Range	PID Formula	Deviation PID Model (With Autotuning Function)		
	Proportional Constant P	0 ~ 100%		
	Integral Constant I	0 ~ 999s		
	Derivative Constant D	0 ~ 999s		
Target Value Setting Range	-9999 to +9999 (Within the Measurement Range of the Thermocouple or Resistance Thermometer Bulb Used)			
Dead Zone Setting Range	0.1~9.9%			
Correct Output	Output Signal	—	4 to 20mADC (Resistance Load 600ohm or Less)	—
	External Power Source	24VDC		24VDC
Transistor Output	Output Signal	ON/OFF Pulse Signal	—	ON/OFF Pulse Signal
	Rated Load Voltage	12/24VDC		12/24VDC
	Maximum Load Current	0.1A/1 Point 0.4A/1 Common		0.1A/1 Point 0.4A/1 Common
	Maximum Rush Current	0.4A 10ms or Less		0.4A 10ms or Less
	Maximum Voltage Drop During ON	1.0VDC (TYP) 0.1A 2.5VDC (MAX) 0.1A		1.0VDC (TYP) 0.1A 2.5VDC (MAX) 0.1A
	Response Time	OFF to ON 2ms or Less ON to OFF 2ms or Less (Resistance Load)		OFF to ON 2ms or Less ON to OFF 2ms or Less (Resistance Load)
	ON/OFF Pulse Period	1~99s		1~99s
Insulation Method	Between the Thermal Couple Input and the Ground	: Transformer Insulation	Between Channels	: Non-Isolated
	Between the Thermal Couple Input and the Channel	: Transformer Insulation	Between the Input Terminals and the PC Power Source	: Photo Coupler Insulation
I/O Number of Occupied Points	32 Points			
Connection Terminals	20 Point Terminal Block			
Compatible Wire Size	0.75~1.5mm			
Compatible Crimp Style Terminal	RAV1.25-3			
Internal Current Consumption (DC5V)	290mA	290mA	290mA	290mA
Mass	0.3kg (0.66 lb)	0.3kg (0.66 lb)	0.3kg (0.66 lb)	0.3kg (0.66 lb)
External Dimensions	130 (H) × 34.5 (W) × 93.6 (D) mm (5.20 (H) × 1.38 (W) × 3.74 (D) inch)			

For information regarding the noise resistance, withstand voltage, insulation resistance, etc., in the PC system used in this module, refer to the power source unit's specifications contained in the CPU module user's manual.

\*1: The thermal couple types (R, K, J, T), resistance thermometer bulb types (Pt100, JPt100), and measurement temperature units (°C, °F) are set using the buffer memory addresses.

Following is shown the usable temperature input sensors and measurement temperature range.

① Thermal Couple Input

Thermal Couple	°C		°F	
	Measurement Temperature Range	Data Resolution	Measurement Temperature Range	Data Resolution
R	0~1700	1	32~3000	1
K	-200~1300	1	-300~2300	1
J	-200~1200	1	-300~2100	1
T	-200.0~400.0	0.1	-300.0~700.0	0.1

② Resistance Thermometer Bulb Input

Resistance Thermometer Bulb		°C		°F	
		Measurement Temperature Range	Data Resolution	Measurement Temperature Range	Data Resolution
Pt 100	(600)	-200.0~600.0	0.1	-300~1100	1
	(200)	-200.0~200.0	0.1	-300.0~300.0	0.1
JPt 100	(600)	-200.0~600.0	0.1	-300~1100	1
	(200)	-200.0~200.0	0.1	-300.0~300.0	0.1

\*2: The following shows the measurement accuracy (accuracy for the input span voltage) for the standard operation conditions.

Temperature Sensor		Rated Accuracy	(Exception)
Thermal Couple	R	±0.3%	0~200°C : ±0.6%
	K		-200~0° : ±0.6%
	J		
	T		
Resistance Thermometer Bulb	Pt100	—	
	JPt100		

#### Standard Operation Conditions

Environment Temperature	: 23°C ± 2°C
Environment Humidity	: 55% ± 5% RH
Power Supply Voltage Period	: 5VDC ± 1%
Conductor Resistance	: 0.5 ohm or less
Vibration, Shock	: 0G

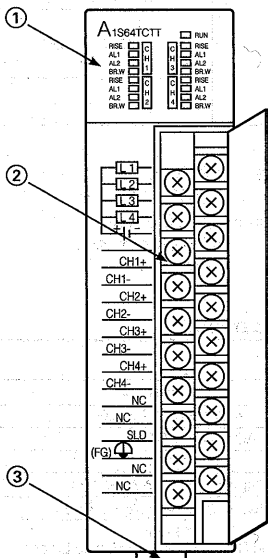
## 2.2 A1S64BW Performance Specifications

Item	Specifications
Input Number of Points	4 Channels/1 Module
Input Current	AC 0 to 5 A (CT Output) *
Resolution	1/100
Power Supply	Supplied from the A1S64TC
Insulation Method	Between Channels: Non-Isolated
I/O Number of Points Occupied	16 Points (Can be Set to 0 Points to Handle Empty Slots and I/O Allocation)
Connection Terminals	20 Point Terminal Block
Compatible Wire Size	0.75~1.5mm
Compatible Crimp Style Terminals	R1.25-3, 1.25-YS3, RAV1.25-3, V1.25-YS3A
Internal Current Consumption (DC5V)	10mA
Mass	0.25kg
External Dimensions	130 (H) × 34.5 (W) × 93.6 (D)mm

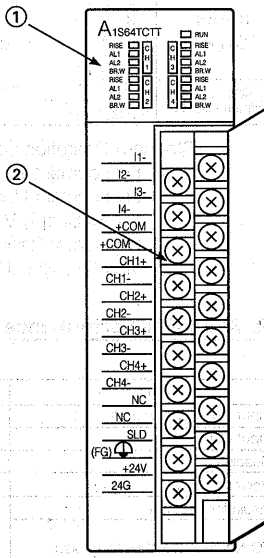
\*: Use 0 to 5 A CT for the secondary. The CT for which Mitsubishi has conducted an operation check is the Mitsubishi Electric CW series.

# 3 Part Names

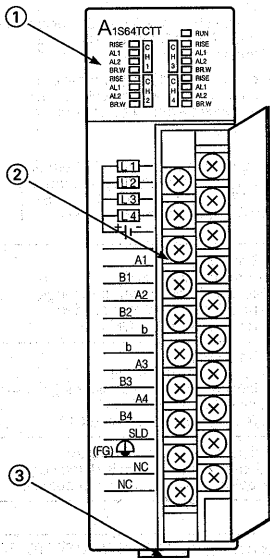
## 3.1 A1S64TC Part Names



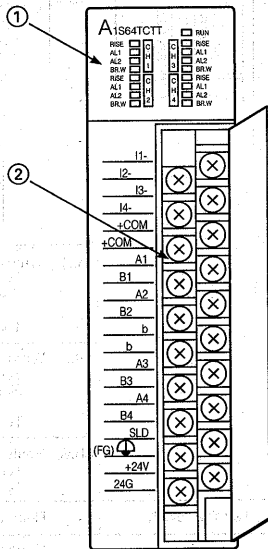
A1S64TCTT



A1S64TCTI



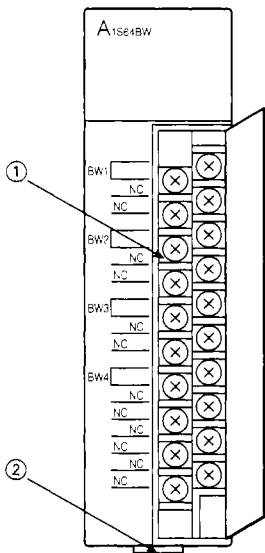
A1S64TCRT



A1S64TCRI

No.	Name	Description																																		
①	<div data-bbox="215 170 363 317" style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center;"><b>A1S64TCTT</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;"> <table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%;">RISE</td><td style="width: 50%;">RUN</td></tr> <tr><td>AL1</td><td>AL1</td></tr> <tr><td>AL2</td><td>ALP</td></tr> <tr><td>SEW</td><td>SEW</td></tr> <tr><td>RISE</td><td>RISE</td></tr> <tr><td>AL1</td><td>AL1</td></tr> <tr><td>AL2</td><td>AL2</td></tr> <tr><td>SEW</td><td>SEW</td></tr> </table> </td> <td style="width: 50%; text-align: center;"> <table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%;">RISE</td><td style="width: 50%;">RISE</td></tr> <tr><td>AL1</td><td>AL1</td></tr> <tr><td>AL2</td><td>AL2</td></tr> <tr><td>SEW</td><td>SEW</td></tr> <tr><td>RISE</td><td>RISE</td></tr> <tr><td>AL1</td><td>AL1</td></tr> <tr><td>AL2</td><td>AL2</td></tr> <tr><td>SEW</td><td>SEW</td></tr> </table> </td> </tr> </table> </div>	<table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%;">RISE</td><td style="width: 50%;">RUN</td></tr> <tr><td>AL1</td><td>AL1</td></tr> <tr><td>AL2</td><td>ALP</td></tr> <tr><td>SEW</td><td>SEW</td></tr> <tr><td>RISE</td><td>RISE</td></tr> <tr><td>AL1</td><td>AL1</td></tr> <tr><td>AL2</td><td>AL2</td></tr> <tr><td>SEW</td><td>SEW</td></tr> </table>	RISE	RUN	AL1	AL1	AL2	ALP	SEW	SEW	RISE	RISE	AL1	AL1	AL2	AL2	SEW	SEW	<table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%;">RISE</td><td style="width: 50%;">RISE</td></tr> <tr><td>AL1</td><td>AL1</td></tr> <tr><td>AL2</td><td>AL2</td></tr> <tr><td>SEW</td><td>SEW</td></tr> <tr><td>RISE</td><td>RISE</td></tr> <tr><td>AL1</td><td>AL1</td></tr> <tr><td>AL2</td><td>AL2</td></tr> <tr><td>SEW</td><td>SEW</td></tr> </table>	RISE	RISE	AL1	AL1	AL2	AL2	SEW	SEW	RISE	RISE	AL1	AL1	AL2	AL2	SEW	SEW	<p><b>RUN</b> A1S64TC Operation State Display</p> <p>Turned on : Operating normally</p> <p>Flashing : Write data error has occurred</p> <p>Turned off : 5V power supply is off</p>
		<table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%;">RISE</td><td style="width: 50%;">RUN</td></tr> <tr><td>AL1</td><td>AL1</td></tr> <tr><td>AL2</td><td>ALP</td></tr> <tr><td>SEW</td><td>SEW</td></tr> <tr><td>RISE</td><td>RISE</td></tr> <tr><td>AL1</td><td>AL1</td></tr> <tr><td>AL2</td><td>AL2</td></tr> <tr><td>SEW</td><td>SEW</td></tr> </table>	RISE	RUN	AL1	AL1	AL2	ALP	SEW	SEW	RISE	RISE	AL1	AL1	AL2	AL2	SEW	SEW	<table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%;">RISE</td><td style="width: 50%;">RISE</td></tr> <tr><td>AL1</td><td>AL1</td></tr> <tr><td>AL2</td><td>AL2</td></tr> <tr><td>SEW</td><td>SEW</td></tr> <tr><td>RISE</td><td>RISE</td></tr> <tr><td>AL1</td><td>AL1</td></tr> <tr><td>AL2</td><td>AL2</td></tr> <tr><td>SEW</td><td>SEW</td></tr> </table>	RISE	RISE	AL1	AL1	AL2	AL2	SEW	SEW	RISE	RISE	AL1	AL1	AL2	AL2	SEW	SEW	
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<p><b>RISE</b> Control Output State</p> <p>Turned on : When <math>-2\% \leq PV \text{ value} - SV \text{ value} \leq 2\%</math></p> <p>Flashing : When <math>2\% &lt; PV \text{ value} - SV \text{ value}</math></p> <p>Turned off : When <math>PV \text{ value} - SV \text{ value} &lt; -2\%</math></p> <p>The <math>-2\%</math> and <math>2\%</math> is the % for the measurement temperature range for each set thermal conductor/resistance thermometer bulb for the input range setting.</p> <p style="margin-left: 20px;">{ Example: When the input range is set to "1" (thermal couple type R, measurement temperature range 0 to 1700) and the PV value — SV value is larger than 34, the LED flashes. }</p>																																				
<p><b>AL1</b> Warning Alarm 1 State Display</p> <p>Turned on : Warning alarm 1 is ON.</p> <p>Flashing : Measurement temperature range upper limit (+side) is exceeded</p> <p>Turned off : Warning alarm 1 is OFF</p>																																				
<p><b>AL2</b> Warning Alarm 2 State Display.</p> <p>Turned on : Warning alarm 2 is ON</p> <p>Flashing : Measurement temperature range lower limit (-side) is exceeded</p> <p>Turned off : Warning alarm 2 is turned OFF</p>																																				
<p><b>BR.W</b> Heater Disconnection Detection State Display</p> <p>Turned on : Heater disconnection is detected</p> <p>Turned off : Heater disconnection is not detected</p>																																				
②	Terminal Block	Refer to Item 4.2																																		
③	Connector	<p>Connector for connecting the A1S64BW (A1S64TCTT/TCRT only).</p> <p>To make the connection, use model A C01MX or A C12MX heater disconnection detection unit connection cable (the AC01MX is packaged with the A1S64BW).</p>																																		

### 3.2 A1S64BW Part Names



No.	Name	Description
①	Terminal Block	Refer to Item 4.2
②	Connector	Connector for connecting the A1S64TCTT/TCRT. To make the connection, use model AC01MX or AC12MX heated connection detection unit connection cable (the AC01MX is packaged with the A1S64BW).

## 4 Wiring

This section explains the wiring precautions using an example module connection.

### 4.1 Wiring Precautions

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Sufficiently understanding the A1S64TC and A1S64BW functions shows that one of the conditions for building a highly reliable system is external wiring that is not easily affected by noise.

Following are given precautions for external wiring.

- (1) Use separate cables for the alternating current control circuit and the A1S64TC and A1S64BW external input signals so that there is no effect from the alternating current surge or inductance.

- (2) Do not place near or bundle with main circuit wires, high voltage wires, or load wires from other than the PC.

Be sure to place the thermal couple and resistance thermometer bulbs 100mm or farther from main circuit wires and alternating current control circuits.

Place sufficiently far from circuits that include high frequencies such as high voltage wires and inverted load main circuits.

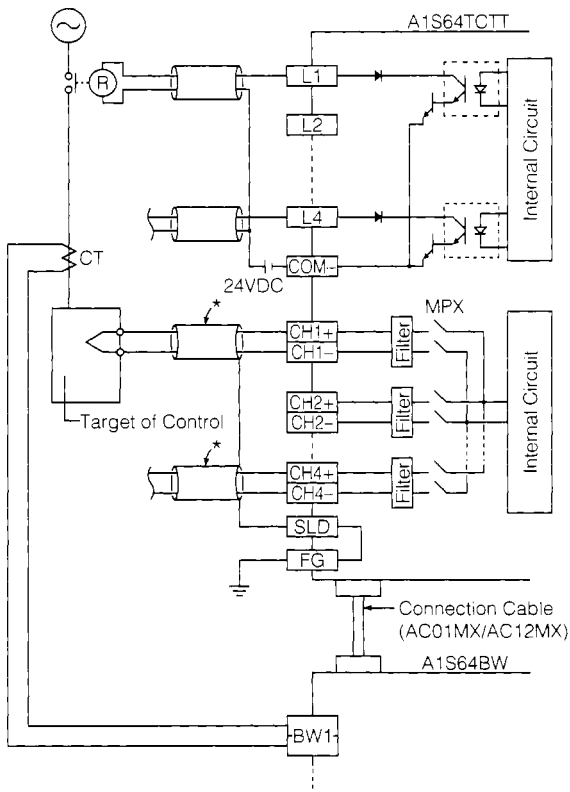
Not doing so makes it easy for the wires to be affected by noise, surges, and inductance.

- (3) Use one point grounding on the PC side for the shielding of shielded wires and shielded cables. However, external noise conditions may make it more favorable for the ground to be done on the external side.



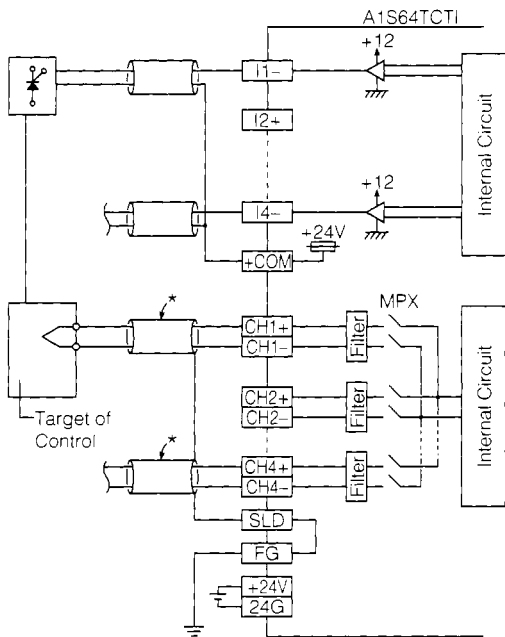
## 4.2 Module Wiring Example

(1) A1S64TCTT



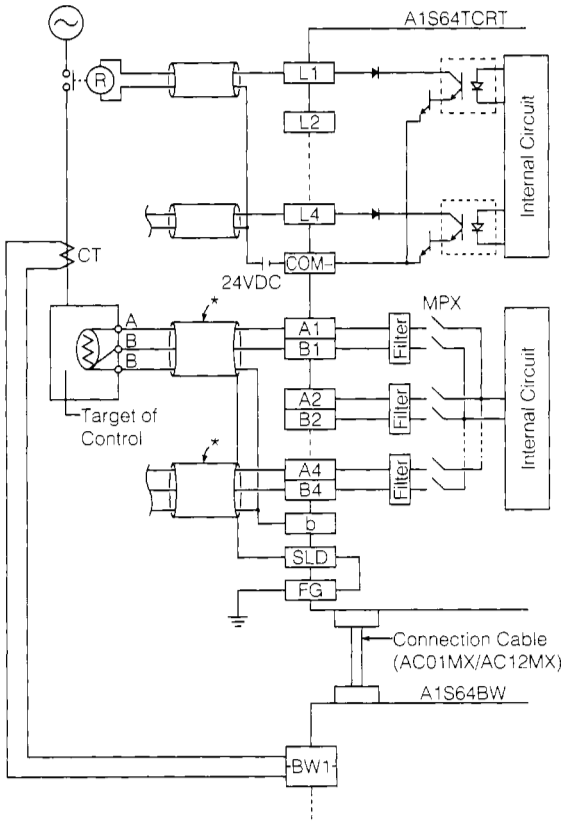
\*: For the cable use a compensating conductor with shielding.

(2) A1S64TCTI



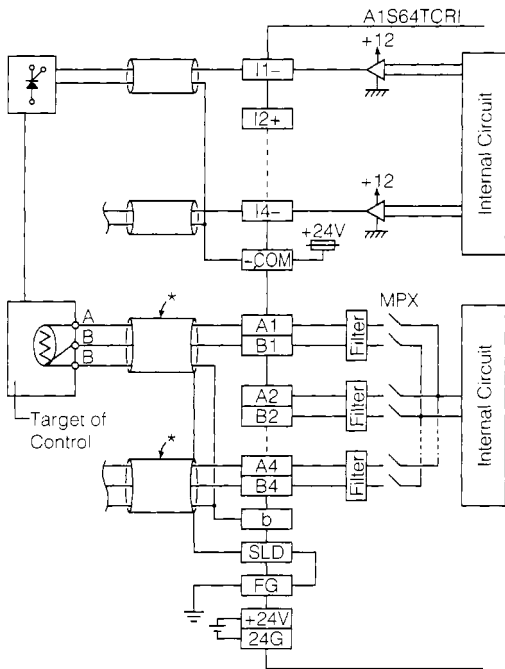
\*: For the cable use a compensating conductor with shielding.

(3) A1S64TCRT



\*: For the cable use a compensating conductor with shielding.

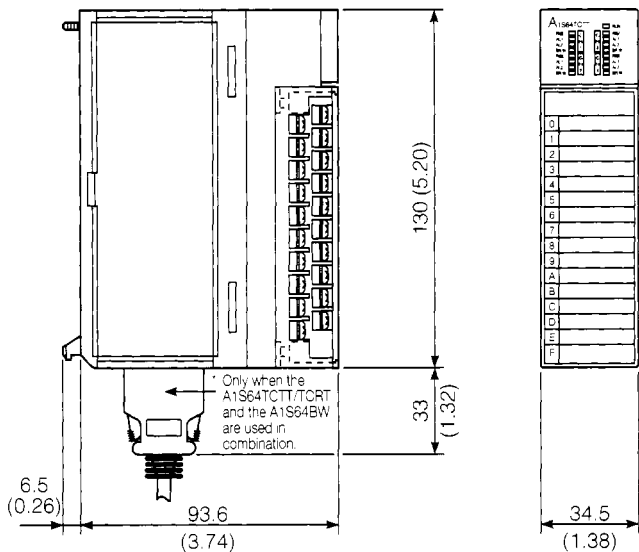
(4) A1S64TCRI



\*: For the cable use a compensating conductor with shielding.

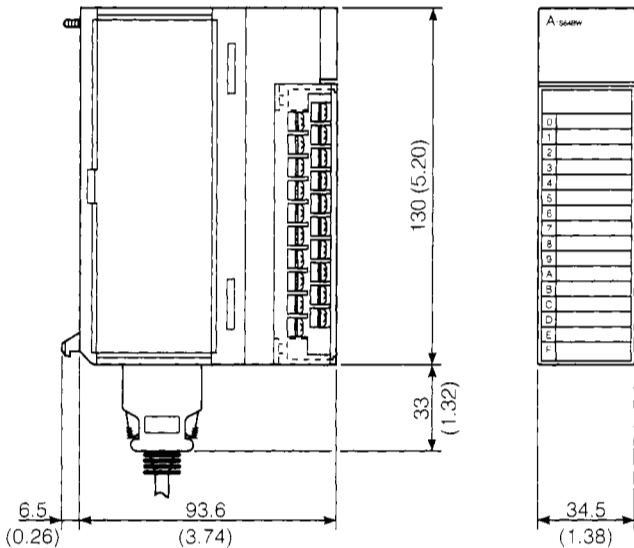
# 5 External Measurements Diagram

## 5.1 A1S64TC



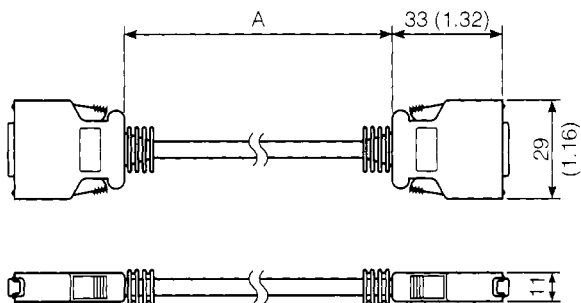
Unit: mm (inch)

## 5.2 A1S64BW



Unit: mm (inch)

### 5.3 AC□□MX



Unit: mm (inch)

Model Name	Change Dimensions
	A
AC01MX	$140 \pm 5$ ( $5.60 \pm 0.2$ )
AC12MX	$1200 \pm 20$ ( $48.00 \pm 0.8$ )