MITSUBISHI ELECTRIC

TECHNICAL BULLETIN

FA-A-0152-D

Precautions for Using FA Integrated Controllers/Programmable Controllers at High Altitude

■Date of Issue

April 2013 (Ver.D: May 2025)

■Relevant Models

MELSEC MX Controller MX-R model, MELSEC iQ-R series models, MELSEC-Q/L series models, and network-related products

Thank you for your continued support of Mitsubishi Electric products; FA Integrated Controller MELSEC MX controller MX-R model, programmable controller MELSEC iQ-R/-Q/-L series, CC-Link IE TSN, CC-Link IE Field Network, CC-Link IE Field Network Basic, and CC-Link.

This technical bulletin provides precautions for using the following products at high altitude.

- MELSEC MX Controller MX-R model
- MELSEC iQ-R/Q/L series
- Remote modules of the CC-Link IE TSN, CC-Link IE Field Network, CC-Link IE Field Network Basic, and CC-Link

1 PRECAUTIONS FOR THE WITHSTAND VOLTAGE PERFORMANCE

Generally, the withstand voltage performance decreases at altitude above 2000m because of the drop in atmospheric pressure. (The details are shown in the following table which is quoted from Safety requirements for electrical equipment for measurement, control, and laboratory defined in IEC 61010-1: 2010/AMD1: 2016 (Edition 3.1).)

The withstand voltage value of Mitsubishi Electric programmable controllers at altitude 2000m is defined as "2300VAC: 1 minute for AC" and "510VAC: 1 minute for DC". However, those for use at altitude above 2000m are undefined. Handle with care for use at altitude above 2000m because the withstand voltage becomes 0.78 to 0.92 times for AC and 0.88 to 0.96 times for DC and the performance decreases.

Altitude	AC		DC	
	Withstand voltage	Correction factor	Withstand voltage	Correction factor
2000m	2300VAC 1 minute	1.0	510VAC 1 minute	1.0
3000m	2116VAC 1 minute	0.92	490VAC 1 minute	0.96
4000m	1955VAC 1 minute	0.85	470VAC 1 minute	0.92
5000m	1794VAC 1 minute	0.78	449VAC 1 minute	0.88

In addition, noise immunity (especially against lightning surge noise, static electricity) decreases at altitude above 2000m. Configure protection circuits external to the programmable controllers by using isolation transformers or noise filters which are described in the User's Manual for the CPU module used. Before handling the module, touch a conducting object such as a grounded metal to discharge the static electricity from the human body.

2 PRECAUTIONS FOR THE AMBIENT TEMPERATURE

Programmable controllers are designed for operation within the ambient temperature of 0 to 55℃ at altitude 0m. The heat dissipation capability of the module decreases at higher altitude because of the drop in atmospheric pressure, leading the temperature rise inside the programmable controllers. This may shorten the product lifetime. To keep the good performance, lower the ambient temperature when using the products at higher altitude.

Ambient temperature concerning the altitude can be calculated by the following formula.

- Ambient temperature = 55[℃] - 0.005 × altitude [m]

Ex.

At altitude 2500m

55℃ - (0.005 × 2500m) = 42.5℃ (ambient temperature)

REVISIONS

Version	Date of Issue	Revision
—	April 2013	First edition
A	December 2013	Addition of the withstand voltage performance at altitude 4000m and 5000m
B	July 2014	Addition of MELSEC iQ-R series
C	September 2020	• Available for e-Manual Viewer • Addition of CC-Link IE TSN, CC-Link IE Field Network, CC-Link IE Field Network Basic, and CC-Link to the relevant models
D	May 2025	• Addition of MELSEC MX Controller MX-R model to the relevant models • Updated the described standards