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[Title] Precautions for using MELSEC iQ-F and MELSEC-F series at high altitude

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[Relevant Models] MELSEC iQ-F series, MELSEC-F series

Thank you for your continued support of programmable controllers MELSEC iQ-F series and MELSEC-F series. This technical bulletin provides precautions for using MELSEC iQ-F series and MELSEC-F series at high altitude.

1. Precautions for the withstand voltage performance

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

The withstand voltage value of programmable controllers at altitude 2000 m is defined as “1500 V AC: 1 minute for AC” and “500 V AC: 1 minute for DC”. However, those for use at altitude above 2000 m are undefined. Handle with care for use at altitude above 2000 m 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.

Table 1 Correction factor conversion of withstand voltage

Altitude	AC		DC	
	Withstand voltage	Correction factor	Withstand voltage	Correction factor
2000 m	1500 V AC 1 minute	1.0	500 V AC 1 minute	1.0
3000 m	1380 V AC 1 minute	0.92	480 V AC 1 minute	0.96
4000 m	1275 V AC 1 minute	0.85	460 V AC 1 minute	0.92
5000 m	1170 V AC 1 minute	0.78	440 V AC 1 minute	0.88

In addition, noise immunity (especially against lightning surge noise, static electricity) decreases at altitude above 2000 m. Configure protection circuits external to the programmable controllers by using isolation transformers or noise filters which refer to 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 (-20°C in part) to 55°C at altitude 0 m. 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.

Operating ambient temperature of programmable controllers concerning the altitude can be calculated by the following formula.

- Operating ambient temperature = 55 [°C] - 0.005 × altitude [m]
 Example) At altitude 2500 m
 55°C - (0.005 × 2500 m) = 42.5°C (Operating ambient temperature)

REVISIONS

Revision	Date	Description
A	September 2017	First Edition

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