

Recommendation of Preventive Maintenance for CC-Link IE TSN Industrial Managed Switches

■Date of Issue

January 2022 (Ver. B: April 2023)

■Relevant Models

NZ2MHG-TSNT8F2 and NZ2MHG-TSNT4

Thank you for your continued support of the industrial managed switches corresponding to CC-Link IE TSN. We summarized the concepts of the product service life and preventive maintenance of the industrial managed switches corresponding to CC-Link IE TSN (hereinafter, managed switches). Please perform preventive maintenance in a planned manner.

We have developed and manufactured the managed switches in cooperation with Moxa Inc.

1 SERVICE LIFE OF MANAGED SWITCHES

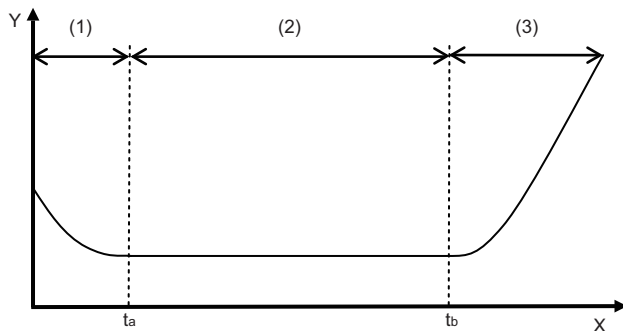
The service life indicates the duration of a product which can meet the specified functions and performance as a managed switch.

Managed switches are included in double brand products. The approximate service life of a managed switch, excluding limited-life components, is five years. For details on the service life of each limited-life component, refer to the following.

☞ Page 3 LIFE-LIMITED COMPONENTS AND PREVENTIVE MAINTENANCE

2 YEARS OF USE AND FAILURE OCCURRENCE

Generally, the failure rate of electronic devices is shown by the bathtub curve as below. The curve is divided into three stages: initial failure, random failure, and wear-out failure.



X: Years of use

Y: Failure rate

(1) Initial failure period

(2) Random failure period

(3) Wear-out failure period

Initial failure

Initial failure occurs during initial operation, which includes faulty components and a manufacturing defect found during the first use of a product.

We make an effort to prevent the initial failure by performing a pre-shipment test.

Random failure

Random failure occurs unpredictably and suddenly during the service life of the product before deterioration or abrasion progresses.

It is so named because the failure occurs unexpectedly from the viewpoint of statistics and genesis phenomenon. The failure can be prevented with corrective maintenance by preparing spare product.

Wear-out failure

Wear-out failure occurs as a result of the product deterioration or abrasion happens at around the end of a product service life. The failure rate drastically increases over time. It can be prevented with preventive maintenance.

Components or products should be replaced before the failure rate starts to increase (the time point of t_b in the figure above). The recommended replacement cycle for managed switches as part of preventive maintenance is five years.

3 NECESSITY OF PREVENTIVE MAINTENANCE

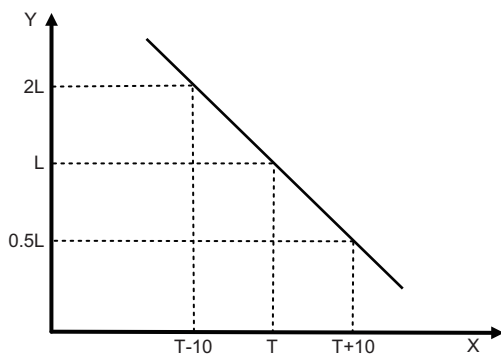
Managed switches consist of various electric components, and can perform the best functions and performance when all the components operate normally. By conducting daily and periodic inspections, a sign of product failure can be found at an early stage and adequate corrective action can be taken. Life-limited components, needless to say, cannot be used indefinitely. Exceeding the pre-determined usable years (the useful life of components) according to each component may affect the performance of a managed switch, resulting in malfunction or failure of the switch. By replacing components or the entire managed switch in every fixed period as preventive maintenance, a product failure can be prevented.

4 LIFE-LIMITED COMPONENTS AND PREVENTIVE MAINTENANCE

Managed switches contain life-limited components such as aluminum electrolytic capacitor and relays (contacts).

Aluminum electrolytic capacitor

When an aluminum capacitor reaches the end of service life, a managed switch may malfunction due to a decrease in noise resistance by capacity drop or due to damage to a printed-circuit board by liquid leakage. The service life of an aluminum electrolytic capacitor is affected by ambient operating temperature. In accordance with "Arrhenius law (10°C double rule)", when the ambient operating temperature increases by 10°C, the service life shortens to half. On the other hand, when the temperature decreases by 10°C, the service life is extended twice.



Arrhenius law
 X: Temperature (°C)
 Y: Life (logarithmic scale)

An aluminum electrolytic capacitor is used a compensation circuit for instantaneous power failure. When an aluminum capacitor reaches the end of service life, resistance to instantaneous power failure may decrease. Products should be replaced in approximately every five years as part of periodic preventive maintenance.

Relay (contact)

A relay (contact) reaches the end of service life mechanically or electrically; mechanical service life depends on the frequency of opening/closing and electrical service life depends on the switching current value or an inductance (L) of a load component. Relays (contacts) should be replaced before the frequency of opening/closing reaches the following frequency as part of periodic preventive maintenance.

- Mechanical service life: Approx. 20 million times
- Electrical service life: Approx. 100000 times

5 HANDLING MANAGED SWITCHES THAT HAVE NOT BEEN USED FOR A LONG PERIOD OF TIME

For managed switches that have not been used for a long time, ensure that the power supply is turned off to prevent problems such as electric leakage and insulation failure as a result of issues relating to service life end or deterioration.

6 MAINTENANCE AND INSPECTION

This chapter describes items that must be maintained or inspected daily or periodically to properly use a managed switch in optical condition at all times.



To minimize recovery time from the product failure of a managed switch, prepare spare managed switches.

Daily inspection

The following table lists items that must be inspected daily.

Item	Inspection item	Check method	Criterion	Corrective action
1	Installation status	Check the FG line mounting screws and DIN rail mounting kit for looseness.	The screws and kit must be fixed securely.	Retighten the screws.
2	Connection status	Check the terminal block mounting screws for looseness.	The terminal block mounting screws must not be loose.	Retighten the terminal block mounting screws.
3		Check the cable connector for looseness.	The cable connector must not be loose.	Connect the connector securely.
4	RUN LED status	Check that the LED is on.	On (green)	When the criterion is not satisfied, refer to the following and take the corrective action. CC-Link IE TSN Industrial Managed Switch User's Manual
5	PW1 and PW2 LED status	Check that the LED is on.	On (orange)	

Periodic inspection

The following table lists items that must be inspected one or two times every six months to one year.

Item	Inspection item	Check method	Criterion	Corrective action
1	Ambient temperature	Measure the temperature by using a thermometer.	-10 to 60°C	Create the environment that satisfies the criterion.
2	Ambient humidity	Measure the humidity by using a hygrometer.	5 to 95%RH	
3	Atmosphere	Measure corrosive gases.	No corrosive gases.	
4	Power supply voltage check	<ul style="list-style-type: none"> • PW1: Measure the voltage between the V+ and V- terminals. • PW2: Measure the voltage between the V+ and V- terminals. 	9.6 to 60.0VDC	When the power supply does not satisfy the criterion range, change the power supply.
5	Looseness and rattling	Touch the managed switch to check for looseness and rattling.	The switch must be mounted securely.	Retighten the screws.
6	Adhesion of dirt and foreign matter	Check visually.	Dirt and foreign matter must not adhere.	Remove them. Clean the managed switch. When cleaning the managed switch, use a dry cloth.
7	Installation status	Check the FG line mounting screws and DIN rail mounting kit for looseness.	The screws and kit must be fixed securely.	Retighten the screws.
8	Connection status	Check the terminal block mounting screws for looseness.	The terminal block mounting screws must not be loose.	Retighten the terminal block mounting screws.
9		Check the cable connector for looseness.	The cable connector must not be loose.	Connect the connector securely.

FA-A-0363-B

REVISIONS

Version	Date of Issue	Revision
A	January 2022	First edition
B	April 2023	Addition of the NZ2MHG-TSNT4 to the relevant models

TRADEMARKS

The company names, system names, and product names mentioned in this technical bulletin are either registered trademarks or trademarks of their respective companies.

In some cases, trademark symbols such as '™' or '®' are not specified in this technical bulletin.