General Specification

GS 34M06H60-03E

F3NC97-0N
Positioning Module
(with MECHATROLINK-III Interface)

FA-M3

■ General

This positioning module is to be installed on the base module of an FA-M3 range-free controller system, and supports MECHATROLINK-III* communications.

It provides the C1 master function of the MECHATROLINK-III communications, transmitting MECHATROLINK-III commands to external devices (slaves) according to instructions from a CPU module and receiving MECHATROLINK-III responses from external devices.

It enables:

(1) Independent axis motion using MECHATROLINK-III commands
(2) Linear interpolation motion (starting and stopping multiple axes simultaneously)
(3) Reading of the statuses (target position, current position, etc.) of external devices
(4) Reading and writing of parameters of external devices
(5) External device I/O

*: MECHATROLINK is a trademark of the MECHATROLINK Members Association.

■ Features

This module has the following features:

● **Latest open motion field network**

- MECHATROLINK-III is a high-performance, advanced, open-architecture motion field network standard published by the MECHATROLINK Members Association. It adopts proven Ethernet as its physical layer.

● **Fewer cables, simpler configuration, lower wiring cost**

- The module implements position control for up to 15 axes from a single slot. It can be networked with servo drives, servomotors and other external devices using fewer cables terminated with easy-to-attach connectors, contributing to lower wiring cost.

● **High-speed, accurate position control through high-speed, high-throughput communication**

- High transmission rate of 100 Mbps and short cycle time of 0.25, 0.5, or 1 ms for 4-, 8-, or 15-axis control respectively enable shorter control cycle, faster startup, better control performance, shorter tact time, and higher productivity.
- Up to 8 monitor data (target position, current position, speed, torque, etc.) per axis can be read simultaneously for better monitoring of external device operation.
- Control by transmitted commands enables full exploitation of motor performance (high speed and high resolution) to achieve fast and accurate position control.
- Versatile position control includes linear interpolation motion of up to 15 axes (starting and stopping multiple axes simultaneously), simultaneous linear interpolation motion of any combination of axes, and change of speed or target position during motion.

● **Flexible system configuration**

- Cascade and star network topologies with inter-station distance up to 100 m are supported, enabling optimal system configuration.

● **More compatible external devices available**

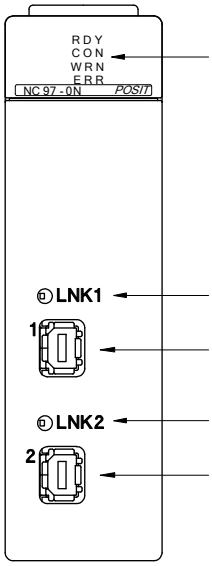
- In addition to AC servomotors from Yaskawa Electric Corporation, stepping motors, I/O devices, and inverters from other manufacturers are supported as well.

■ Specifications

Item		Specifications
Interface		MECHATROLINK-III compliant
Physical layer		Ethernet
Transmission rate		100 Mbps
Cycle time / No. of stations		0.25 ms for 4 axes, 0.5 ms for 8 axes, or 1.0 ms for 15 axes (multislave function compliant*1)
Transmission bytes		16, 32, 48, or 64 bytes (intermixing allowed)
Communications method		Cyclic communication
Network topology		Cascade or star
Transmission media		Ethernet STP Cat5e (dedicated cable)
Maximum transmission distance		100 m (between stations)
Minimum distance between stations		0.2 m
Supported profiles		- Standard servo profile - Standard stepping motor drivers profile*1 - Standard inverter profile*1 - Standard I/O profile*2
Positioning functions	Position reference	-2,147,483,648 to 2,147,483,647 (reference unit)
	Functions	- Independent axis motion using standard servo profile commands and standard stepping motor drivers profile commands*1 - Linear interpolation motion (starting and stopping multiple axes simultaneously) and speed/target position change during motion
	Others	- Status monitoring of external devices (target position, current position, speed, and torque) - Reading and writing parameters of external devices - Inverter control by standard inverter profile commands*1 - External device I/O using standard I/O profile commands
Number of installed modules		8 modules max. (controlling 120 axes max.)
Current consumption		530 mA (at 5 V DC)
External connection		Two MECHATROLINK-III connectors (industrial mini-connector)
External dimensions		28.9 (W) x 100 (H) x 83.2 (D) mm*3
Weight		130 g
Surrounding air temperature range		Operating : 0 to 55°C
		Storage : -20 to 75°C
Surrounding humidity range		Operating : 10 to 90%RH (non-condensing)
		Storage : 10 to 90%RH (non-condensing)
Surrounding atmosphere		Must be free of corrosive gases, flammable gases or heavy dust.

*1: Supported from the revision REV: 01:□□ of the module
*2: Synchronous communication is supported and commands are added from the revision REV: 01:□□ of the module
*3: Excluding protrusions (for details, see the external dimensions drawing)

■ Components and Functions



LED indicators
RDY (green):
Lit when the internal circuit is functioning normally.
CON (green):
Lit during MECHATROLINK-III communication.
WRN (yellow):
Lit when a warning is detected by external device.
ERR (red):
Lit when an error (alarm) is detected by the module or external device.

LINK1 LED
Lit when external device is physically connected.

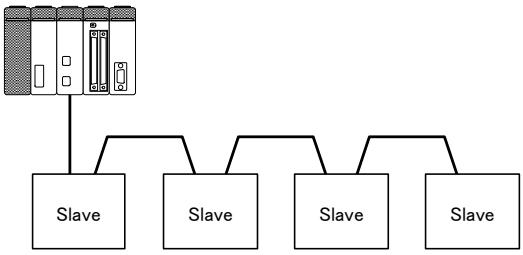
MECHATROLINK-III connector 1
Connect to MECHATROLINK-III-compliant external device using a dedicated cable.

LINK2 LED
Lit when external device is physically connected.

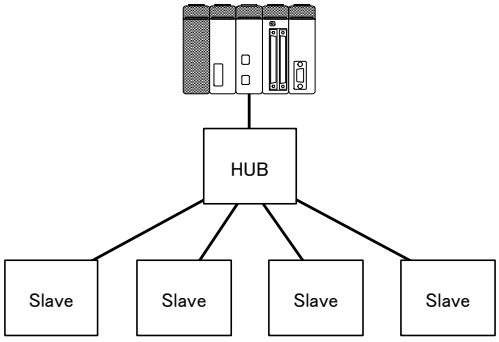
MECHATROLINK-III connector 2
Connect to MECHATROLINK-III-compliant external device using a dedicated cable.

■ System Configuration Examples

- **Cascade topology**



- **Star topology**



■ External Connection Diagram

Connector Specifications

Pin No.	Signal	Function
1	TXP	Send data (+)
2	TXN	Send data (-)
3	RXP	Receive data (+)
4	—	—
5	—	—
6	RXN	Receive data (-)
7	—	—
8	—	—

Note: The connector shell is connected to the FG terminal. These signal lines are isolated from the internal circuitry by pulse transformers.

■ Operating Environment

This module is compatible with the following CPU modules:

CPU Modules	Style Code and ROM version
F3SP28-3N, F3SP38-6N, F3SP53-4H, F3SP58-6H	Rev. 7 or later
Other CPU modules	No restriction

■ Model and Suffix Code

Model	Suffix Code	Style Code	Option Code	Description
F3NC97	-0N	—	—	Controls up to 15 axes with MECHATROLINK-III interface

■ Compatible External Devices and Cables

For details on the latest compatible external devices, please contact our sales staff.

● **Servo drive, inverters and I/O devices**

- Products from Yaskawa Electric Corporation

Products	Model	Remarks
Σ-V series AC servo drive	SGDV-□□□□2□□	
Σ-7 series AC servo drive	SGD7S-□□□□20□ SGD7W-□□□□20□ *1	
Compact vector control inverter V1000	SI-ET3/V*1	
64-point I/O module	JEPMC-MTD2310-E	
Analog input module	JEPMC-MTA2900-E	

● **MECHATROLINK-III communications cable**

- Products from Yaskawa Controls Co., Ltd.

Products	Model	Remarks
MECHATROLINK-III communications cable	JEPMC-W6012-□□ -E	No core
	JEPMC-W6013-□□ -E	With core
	JEPMC-W6014-□□ -E	No core; no connector on the other end

● **MECHATROLINK-III peripheral devices**

- Products from Yaskawa Electric Corporation

Products	Model	Remarks
MECHATROLINK-III compatible hub module	JEPMC-MT2000-E	

*1: Supported from the revision REV: 01:□□ of the module

■ External Dimensions

Unit: mm