
Technical Information

Range-free Multi-controller FA-M3R
New Product Introduction
Positioning Module
(with MECHATROLINK-III Interface)



The IT M@chine Controller



www.yokogawa.com/itc/



Introduction

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- Product information in this document is current as of October 2009. For the latest product information, contact Yokogawa sales office.

- Trademarks

- MECHATROLINK is a trademark of the MECHATROLINK Members Association.
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- Citation

- This document contains information extracted from documentation published by the MECHATROLINK Members Association.



CONTENTS








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- FA-M3R Positioning Module Product Lineup
- New Product Introduction
 - Introduction to MECHATROLINK?
 - Positioning Module F3NC97-0N (with MECHATROLINK-III Interface)
 - Features
 - Specification
 - Scope of MECHATROLINK-III Support
 - Positioning Function Overview
 - Interpolation motion commands
 - MECHATROLINK-III commands
 - Compatible External Devices
 - Application Examples
 - New Products Summary
 - Differences from Positioning Module F3NC96-0N (with MECHATROLINK-II Interface)
- Related Products
 - Direct Drive Motor DYNASERV/LINEARSERV

FA-M3R Positioning Module Product Lineup



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	Pulse Output	Communication	Analog Output
Single-function PTP (4, 8 and 15 axes)	F3YP14-0N / F3YP18-0N - 4 or 8 axes per module - Max. pulse rate : 4Mpps - Startup time: 0.09ms min. 	F3NC96-0N / F3NC97-0N - Built-in MECHATROLINK-II / -III interface - Up to 15 axes per module - High-speed, high-throughput communication - Transmission rate: 100Mbps - Cycle time: 0.25ms for 4 axes (for F3NC97-0N) 	
Advanced PTP (1, 2 and 4 axes)	F3NC32-0N / F3NC34-0N - 2 or 4 axes per module - Max. pulse rate: 5Mpps - Linear, circular, helical interpolation - Built-in pulse counter & general I/O contacts 		F3NC51-0N / F3NC52-0N - 1 or 2 axes per module - Speed reference voltage output - Linear/circular interpolation 
Motion	Techno's PLMC40 - Up to 4 axes per module - Precise motion control - Synchronous control, electronic cam, contour control, multi-axial interpolation 	Techno's PLMC-M II EX - Built-in MECHATROLINK-II interface - Up to 16 axes per module - Precise motion control - Synchronous control, electronic cam, contour control, multi-axial interpolation 	F3NC61-0N - for torque control - Analog output (2ch), analog input, built-in pulse counter 

TI 34M06H60-03E 3

New Product Introduction



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

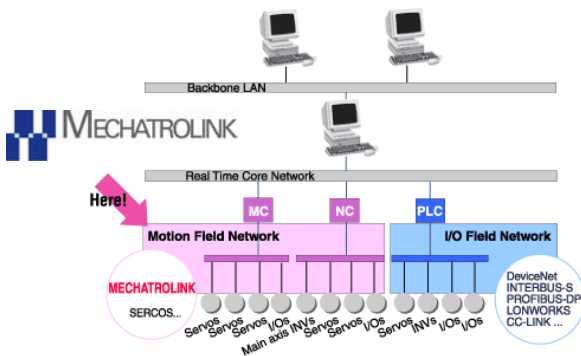
TI 34M06H60-03E 4

Introduction to MECHATROLINK



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- MECHATROLINK is a high performance, advanced, open-architecture motion field network standard published by the MECHATROLINK Members Association (MMA).
- Enables distributed control of multiple FA units (servo drives, inverters, I/O modules, etc.) by one FA controller.
- Certified as compliant with SEMI standard E54.19, and expected to be widely used in the semiconductor industry, especially for transfer, drive and I/O equipment control in semiconductor or LCD manufacturing machines.



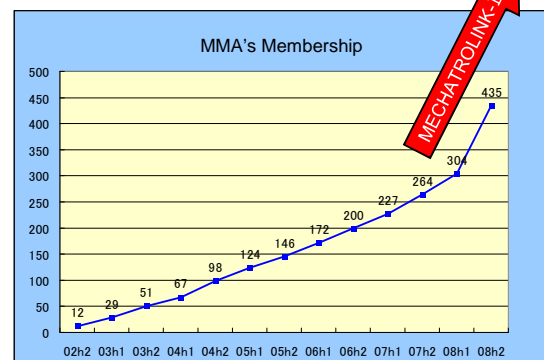
- Motion field network
 - Focuses on precise, synchronous control of servo drives and fast response.
 - Examples: MECHATROLINK, SERCOS
- I/O field network
 - Focuses on connection of various I/O equipment rather than synchronization.
 - Examples: DeviceNet, Profibus-DP

MECHATROLINK Members Association (MMA)



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- Objectives
 - MMA is a group of MECHATROLINK product developers and users committed to promoting worldwide use of MECHATROLINK, a motion field network.
 - All members support the construction and promotion of a larger MECHATROLINK family.
- Executive Committee: Yaskawa Electric, Yokogawa Electric, Digital, Yaskawa Information Systems, OMRON
- Membership : 435 companies (Japan: 239, Asia: 120, US: 29, EU: 47)
- No. of nodes shipped: 1.5 million
- No. of MECHATROLINK products: 201 (controllers, servo motors, stepping motors, inverters, I/O, sensors, etc.)
- URL: www.mechatrolink.org/



What is MECHATROLINK-III?

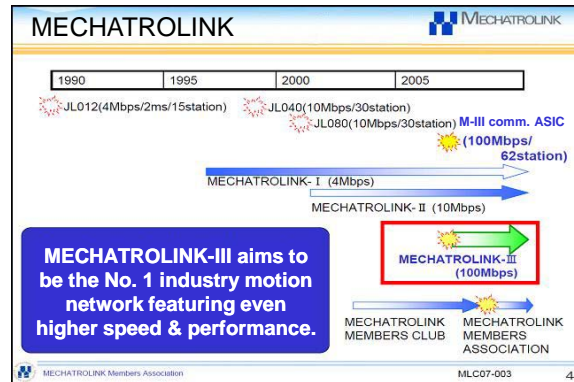


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- With higher communication spec. than MECHATROLINK-I (4Mbps) & MECHATROLINK-II (10Mbps), MECHATROLINK-III offers faster speed and more functions.

Features

- Ethernet as physical layer
- Even higher-speed communication
 - Transmission rate: 10Mbps → 100Mbps
 - Min. cycle time: 250μs → 31.25μs
- Better MECHATROLINK compatibility
 - Data size: 8, 16, 32, 48, 64 bytes (intermixing allowed)
- Support for larger systems
 - Number of slaves: 30 → 62 max.
 - Transmission distance: 50 m total → 100m inter-station distance
 - Topology: Cascade or star



Function Specification	MECHATROLINK-III	MECHATROLINK-II
Transmission rate	100 Mbps	10 Mbps
Transmission cycle time	31.25 μs to 64 ms	250 μs to 8 ms
Transmission data size	8, 16, 32, 48, or 64 bytes	16 or 32 bytes
Number of connected stations	C1 master: 1 (mandatory) C2 master: 1 (optional) Slaves: 62 max.	C1 master: 1 (mandatory) C2 master: 1 (optional) Slaves: 30 max.
Max. transmission distance	100 m (between stations)	50 m
Min. distance between stations	15 cm	50 cm
Topology	Cascade, star or point-to-point	Bus
Cyclic/Event-driven communications	Cyclic and event-driven communications supported	Cyclic communication
Message communications	Available (standard: MEMOBUS)	Private
Retry function	Max. 62 stations (n times per station)	Max. 7 stations (time1 per station)
Slave monitoring other stations	Yes	No
Gateway	M-III to M-II	N.A.
Power supply	3.3 V/1.8V	JL-080:5V JL-052:3.3V

TI 34M06H60-03E 7

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



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Overview

- MECHATROLINK-III interface (C1 master) functions
 - Sends MECHATROLINK-III commands based on instructions from CPU module
 - Receives MECHATROLINK-III responses from external devices



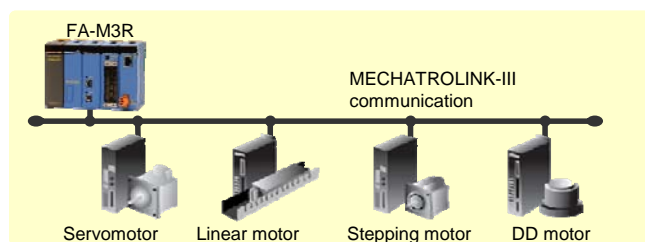
Functions

- Independent axis motion using MECHATROLINK-III commands
- Linear interpolation motion (start/stop axes simultaneously)
- Read external device statuses
 - Reference position, current position, speed, torque, etc.
- Read/write external device parameters
- External device I/O



Application examples

- Extraction robot, handler
- Semiconductor manufacturing machines
- Electrical & electronic component assembly machines



TI 34M06H60-03E 8

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



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First PLC with MECHATROLINK-III interface

■ Features

- **Latest open motion field network**
 - Standard published by the MECHATROLINK Members Association
 - Latest, Ethernet-based, high-performance, advanced network
- **Reduced wiring, simpler configuration, lower cost**
 - Good cost performance: one module controls up to 15 axes
 - Easy connection using connectors
- **Fast, accurate position control thru' high-speed, high-throughput communication**
 - Transmission rate: 100Mbps, cycle time: 0.25, 0.5 or 1 ms for 4-, 8- or 15-axis control
 - Shorter control cycle and faster startup enable improved control performance, tact time and productivity
 - Up to 8 monitor data per axis can be read simultaneously for better external device operation monitoring.
 - Control by transmitted commands enables full exploitation of motor performance (high speed and high resolution).
 - Versatile position control includes linear interpolated motion of up to 15 axes, simultaneous linear interpolated motion of any combination of axes, and change of speed or target position during motion.
- **Flexible system configuration**
 - Supports star and cascade network topologies
 - Inter-station distance up to 100 m enables flexible system configuration.
- **More MECHATROLINK-III compliant devices upcoming**
 - Stepping motors, I/O equipment and inverters from more manufacturers supported in future.

Latest open technology

Ethernet-based
(10x higher)

MMA-certified

High speed, High throughput
(2x faster, 2x more)

Startup time
(1/4x shorter)

Flexible

Good device
compatibility

TI 34M06H60-03E 9

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



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■ Specification

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
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)
Max. transmission distance		100 m (between stations)
Min. distance between stations		0.2 m
Supported profiles		- Standard servo profile - Standard I/O profile
Positioning functions	Position reference	-2,147,483,648 to 2,147,483,647 (reference unit)
	Functions	- Independent axis motion using standard servo profile commands (availability dependent on connected external device and supported standard servo profile commands) - Linear interpolation motion (starting and stopping multiple axes simultaneously), speed/target position change during motion
	Others	- Status monitoring of external devices (target position, current position, speed, and torque) - Reading and writing of parameters of external devices - External device I/O using standard I/O profile commands

For more details, please refer to GS 34M06H60-03E.

TI 34M06H60-03E 10

Scope of MECHATROLINK-III Support (1)



■ Standard servo profile

□ Main commands

Profile	Command Code	Command	Function	Supported?
Common commands	\$00	NOP	No operation	⊙
	\$01	PRM_RD	Read parameter	x ^{*1}
	\$02	PRM_WR	Write parameter	x ^{*1}
	\$03	ID_RD	Read ID	○
	\$04	CONFIG	Setup device	⊙
	\$05	ALM_RD	Read alarm or warning	○
	\$06	ALM_CLR	Clear alarm or warning	⊙
	\$0D	SYNC_SET	Start synchronous communication	⊙
	\$0E	CONNECT	Establish connection	△
	\$0F	DISCONNECT	Release connection	△
	\$1B	PPRM_RD	Read stored parameter	x ^{*1}
	\$1C	PPRM_WR	Write stored parameter	x ^{*1}
	\$1D	MEM_RD	Read memory	○
	\$1E	MEM_WR	Write memory	○
	\$20	POS_SET	Set coordinates	⊙
	\$21	BRK_ON	Apply brake	⊙ ^{*2}
	Standard servo commands	\$22	BRK_OFF	Release brake
\$23		SENS_ON	Turn sensor ON	⊙
\$24		SENS_OFF	Turn sensor OFF	⊙
\$30		SMON	Servo status monitor	⊙
\$31		SV_ON	Servo ON	⊙
\$32		SV_OFF	Servo OFF	⊙
\$34		INTERPOLATE	Interpolation	△
\$35		POSING	Positioning	⊙
\$36		FEED	Feed	⊙
\$37		EX_FEED	External input feed	○
\$39		EX_POSING	External input positioning	○
\$3A		ZRET	Zero point return	⊙
\$3C		VELCTRL	Velocity control	⊙
\$3D		TRQCTRL	Torque control	⊙
\$40		SVPRM_RD	Read servo parameter	⊙
\$41		SVPRM_WR	Write servo parameter	⊙

□ Subcommands

Profile	Command Code	Command	Function	Supported?
Standard servo commands	\$00	NOP	No operation	△
	\$01	PRM_RD	Read parameter	x ^{*1}
	\$02	PRM_WR	Write parameter	x ^{*1}
	\$05	ALM_RD	Read alarm or warning	x
	\$06	ALM_CLR	Clear alarm or warning	x
	\$1B	PPRM_RD	Read stored parameter	x ^{*1}
	\$1C	PPRM_WR	Write stored parameter	x ^{*1}
	\$1D	MEM_RD	Read memory	x
	\$1E	MEM_WR	Write memory	x
	\$30	SMON	Servo status monitor	△
	\$40	SVPRM_RD	Read servo parameter	x
	\$41	SVPRM_WR	Write servo parameter	x

⊙: Executable by user using MECHATROLINK-III command parameters for each axis.
 ○: Executable by user using extended MECHATROLINK-III command parameters.
 △: Not executable by user but executed automatically by positioning module or external device.
 x: Not supported

*1: The standard servo command profile uses SVPRM_RD and SVPRM_WR instead of PRM_RD, PRM_WR, PPRM_RD and PPRM_WR.

*2: Brake On/Off should be controlled by an external device in tandem with Servo ON/OFF commands.



Scope of MECHATROLINK-III Support (2)



■ Standard I/O profile

Profile	Command Code	Command	Function	Supported?
Common commands	\$00	NOP	No operation	⊙
	\$01	PRM_RD	Read parameter	x
	\$02	PRM_WR	Write parameter	x
	\$03	ID_RD	Read ID	○
	\$04	CONFIG	Setup device	⊙
	\$05	ALM_RD	Read alarm or warning	○
	\$06	ALM_CLR	Clear alarm or warning	⊙
	\$0D	SYNC_SET	Start synchronous communication	x
	\$0E	CONNECT	Establish connection	△
	\$0F	DISCONNECT	Release connection	△
	\$1B	PPRM_RD	Read stored parameter	x
	\$1C	PPRM_WR	Write stored parameter	x
	\$1D	MEM_RD	Read memory	x
\$1E	MEM_WR	Write memory	x	
Standard I/O commands	\$20	DATA_RWA	Data Read/write_a	⊙
	\$21	DATA_RWS	Data Read/write_s	x



⊙: Executable by user using MECHATROLINK-III command parameters for each axis.
 ○: Executable by user using extended MECHATROLINK-III command parameters.
 △: Not executable by user but executed automatically by positioning module or external devices.
 x: Not supported

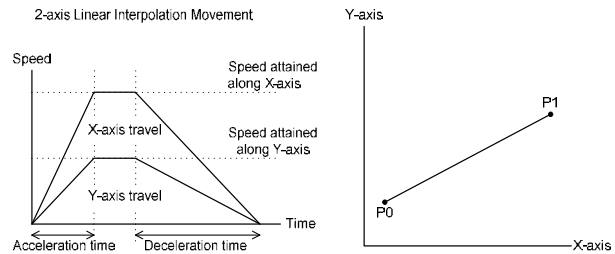
Positioning Function Overview (1)

— Interpolation motion commands



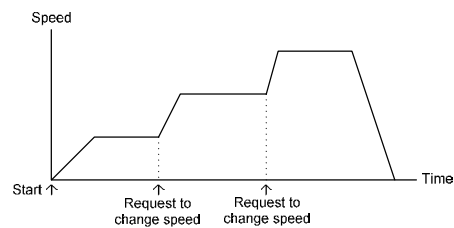
■ Start Positioning Command (\$0100)

- Performs positioning according to specified target position, target speed, acceleration time and deceleration time
 - Allows linear interpolation motion of up to 15 axes and linear interpolation motion of any combination of axes (starting and stopping axes simultaneously)
 - Allows change of speed or target position during positioning.



■ Change Speed Command (\$0400)

- Change of speed during positioning



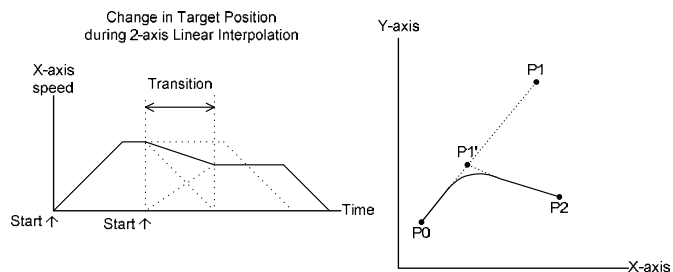
Positioning Function Overview (2)

— Interpolation motion commands



■ Change Target Position Command (\$0500)

- Change of target position during positioning
 - Target position change involving direction change is also allowed.



■ Decelerate and Stop Command (\$0200)

- Decelerates and stops positioning motion

■ Stop Immediately Command (\$0300)

- Stops positioning motion immediately

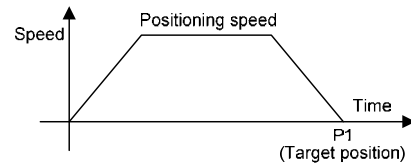
Positioning Function Overview (3)

— MECHATROLINK-III commands



■ Positioning Command (POSING: \$35)

- Positioning to specified position
 - Electronic gear
 - Set electronic gear ratio in driver
 - Acceleration/deceleration: trapezoidal, 2-segment, index, simple S-shaped
 - Set acceleration/deceleration parameter in driver
 - Allows change of target position or speed during motion
 - Target position change involving direction change is also allowed.
- Acceleration, deceleration, torque limit can be specified concurrently
- Up to 8 monitor data per axis can be read concurrently



■ MECHATROLINK-III commands

Byte	Command	Response
0	POSING (\$35)	POSING (\$35)
1	WDT	RWDT
2-3	Command Control (CMD_CTRL)	Command Status (CMD_STAT)
4-7	Servo Command Control Field (SVCMD_CTRL)	Servo Command Status Field (SVCMD_STAT)
8-11	Servo Command Output Signal (SVCMD_IO)	Servo Command Input Signal (SVCMD_IO)
12-15	Target Position (TPOS)	Fixed Monitor 1 (CPRM_SEL_MON1)
16-19	Target Speed (TSPD)	Fixed Monitor 2 (CPRM_SEL_MON2)
20-23	Acceleration (ACCR)	MONITOR1
24-27	Deceleration (DECR)	MONITOR2
28-31	Torque Limit (TLIM)	MONITOR3
32	SMON (\$30)	SMON (\$30)
33-35	Subcommand Control (SUB_CTRL)	Subcommand Status (SUB_STAT)
36-39	Reserved	MONITOR4
40-43		MONITOR5
44-47		MONITOR6

■ MECHATROLINK-II commands

Byte	Command	Response
0	POSING (\$35)	POSING (\$35)
1	0	Alarm
2-3	OPTION	Status
4-7	Target Position (TPOS)	MONITOR1
8-11	Target Speed (TSPD)	MONITOR2
12	MON_SEL 1, 2	MON_SEL 1, 2
13-14	0	I/O Signal Monitor (I/O)
15	WDT	RWDT
17	SMON (\$30)	SMON (\$30)
18	0	SUBSTATUS
19	MON_SEL 3, 4	MON_SEL 3, 4
20-23	0	MONITOR3
24-27	0	MONITOR4
28-31	0	0

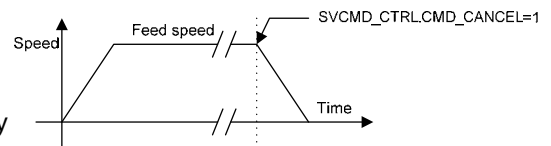
Positioning Function Overview (4)

— MECHATROLINK-III commands



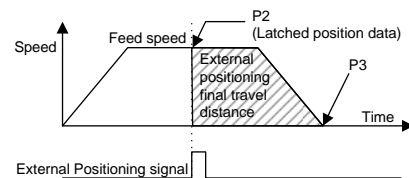
■ Feed Command (FEED: \$36)

- Performs constant speed feed at a specified feed speed
 - Allows change of speed during motion
 - Speed change involving direction change is also allowed.
- Acceleration, deceleration, torque limit can be specified concurrently
- Up to 8 monitor data per axis can be read concurrently



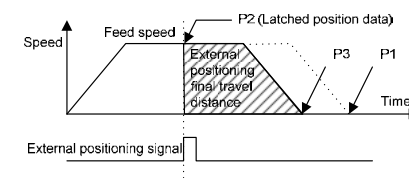
■ External Input Feed (EX_FEED: \$37)

- Performs positioning in response to the input of the external positioning signal during constant speed feed at the specified feed speed.
 - Allows change of speed during motion
 - Speed change involving direction change is also allowed.



■ External Input Positioning (EX_POSING: \$39)

- Performs positioning in response to the input of the external positioning signal during positioning to a specified position.
 - When external positioning signal is input, decelerates to rest by traveling through travel distance set in driver



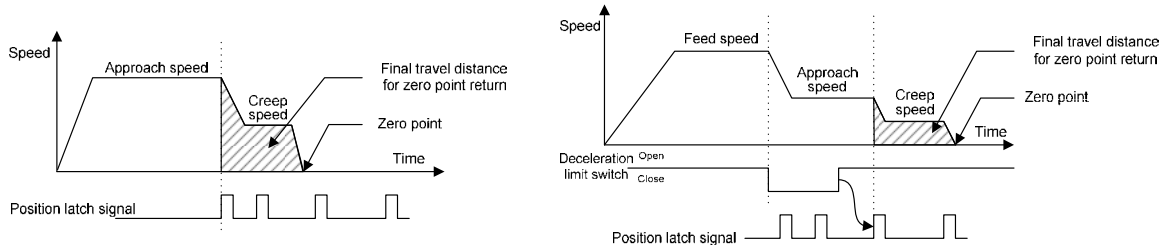
Positioning Function Overview (5)

— MECHATROLINK-III commands



■ Zero Point Return Command (ZRET: \$3A)

- Performs zero point return operation using deceleration limit switch and position latch signal (Z-phase, external input)
 - Zero Point Return Mode
 - Uses position latch signal
 - Uses deceleration limit switch + latch signal



■ Velocity Control Command (VELCTRL: \$3C)

- Sends speed reference to perform speed control.

■ Torque Control Command (TRQCTRL: \$3D)

- Sends torque reference to perform torque control.

Positioning Function Overview (6)

— MECHATROLINK-III commands



■ Servo Status Monitor Command (SMON: \$30)

- Select 8 out of 13 data types (command position, current position, speed, torque, etc.) to be read

Selection Code	Monitor Name	Contents	Remark
0	APOS	Feedback Position	Current position of the motor
1	CPOS	Command Position	Command position after acceleration/deceleration filter
2	PERR	Position Error	Position error of the control loop
3	LPOS1	Latched Position 1	Motor position 1 latched by the latch signal
4	LPOS2	Latched Position 2	Motor position 2 latched by the latch signal
5	FSPD	Feedback Speed	Current speed of the motor
6	CSPD	Reference Speed	Command speed of the motor
7	TRQ	Torque (Force) Reference	Command torque (force) of the motor
8	ALARM	Detailed Information of the Current Alarm	Current alarm/warning
9	MPOS	Command Position	Input command position of the position control loop
A	—		
B	—		
C	CMN1	Common Monitor 1	Selects the monitor data specified by parameter of the external device.
D	CMN2	Common Monitor 2	Selects the monitor data specified by parameter of the external device.
E	OMN1	Optional Monitor 1	Selects the monitor data specified by parameter.
F	OMN2	Optional Monitor 2	Selects the monitor data specified by parameter.

■ Servo ON Command (SV_ON: \$31)

■ Servo OFF Command (SV_OFF: \$32)

■ Set Coordinates Command (POS_SET: \$20)

■ Clear Alarm or Warning Command (ALM_CLR: \$06)

Compatible External Devices (1)



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■ Servo drives

□ Yaskawa Electric Corporation

- AC Servo Drive Σ -V Series
 - SGDV-□□□□2□□ SERVOPACK



■ I/O equipment

□ Yaskawa Electric Corporation

- 64-point I/O module
 - JEPMC-MTD2310-E (upcoming)



TI 34M06H60-03E 19

Compatible External Devices (2)



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■ MECHATROLINK-III communications cable

□ Yaskawa Controls Co., Ltd.

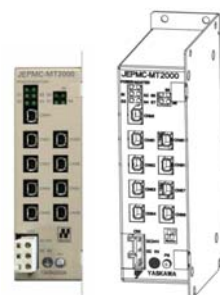
- MECHATROLINK-III communications cable
 - JEPMC-W6012-□□-E (no core)
 - JEPMC-W6013-□□-E (with core)
 - JEPMC-W6014-□□-E (no core, no connector on the other end)



■ Others

□ Yaskawa Electric Corporation

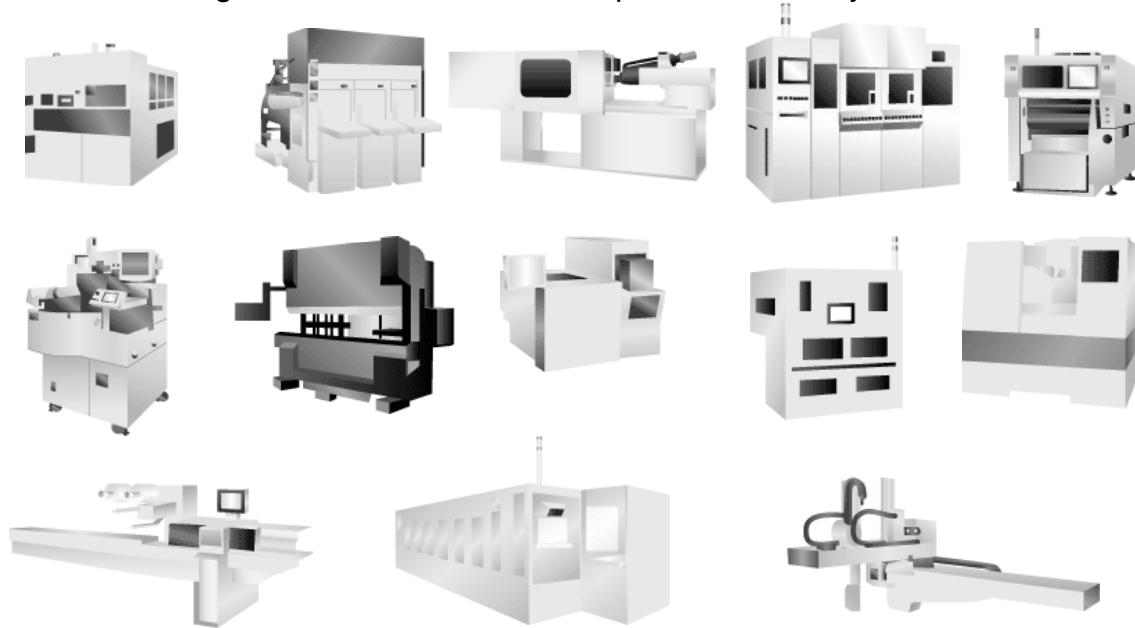
- MECHATROLINK-III compatible hub module
 - JEPMC-MT2000-E



TI 34M06H60-03E 20

Application Examples

- Most suited for systems having many axes such as semiconductor manufacturing machines, electronic component assembly machines



New Products Summary

- Module for FA-M3

Product Name	Model	Description
Positioning Module (with MECHATROLINK-III Interface)	F3NC97-0N	Controls up to 15 axes with MECHATROLINK-III interface

- User Manual for FA-M3

Name	Document No.
Positioning Module (with MECHATROLINK-III Interface) User's Manual	IM 34M06H60-03E

Differences from Positioning Module F3NC96-0N (with MECHATROLINK-II Interface) (1)



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■ Specification

Item	Specification		
	F3NC96-0N	F3NC97-0N	
Interface	MECHATROLINK-II compliant	MECHATROLINK-III compliant	
Physical layer	RS485-equivalent	Ethernet	
Transmission rate	10 Mbps	100 Mbps	
Cycle time / No. of stations	1.0 ms for 8 axes or 2.0 ms for 15 axes	0.25 ms for 4 axes, 0.5 ms for 8 axes, or 1.0 ms for 15 axes	
Transmission bytes	32 bytes (with subcommand)	16, 32, 48, or 64 bytes (intermixing allowed)	
Communications method	Cyclic communication	Cyclic communication	
Network topology	Bus	Cascade or star	
Transmission media	2-wire shielded twisted pair cable (dedicated cable)	Ethernet STP Cat5e (dedicated cable)	
Max. transmission distance	50 m (total length)	100 m (between stations)	
Min. distance between stations	0.5 m	0.2 m	
Supported profiles	- Devices supporting comm. commands for servo drives - Devices supporting comm. commands for stepping motors	- Standard servo profile - Standard I/O profile	
Positioning functions	Position reference	-2,147,483,648 to 2,147,483,647 (reference unit)	-2,147,483,648 to 2,147,483,647 (reference unit)
	Functions	- Independent axis motion using MECHATROLINK-II commands (availability dependent on connected external device and supported MECHATROLINK-II commands) - Linear interpolation motion (starting & stopping multiple axes simultaneously) and speed/target position change during motion	- Independent axis motion using standard servo profile commands (availability dependent on connected external device and supported standard servo profile commands) - Linear interpolation motion (starting & 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 of parameters of external devices	- Status monitoring of external devices (target position, current position, speed, and torque) - Reading and writing parameters of external devices - External device I/O using standard I/O profile commands
Number of installed modules	8 modules max. (controlling 120 axes max.)	8 modules max. (controlling 120 axes max.)	
Current consumption	570 mA (at 5 V DC)	530 mA (at 5 V DC)	
External connection	One MECHATROLINK-II connector	Two MECHATROLINK-III connectors (industrial mini-connector)	
External dimensions	28.9 (W) x 100 (H) x 83.2 (D) mm	28.9 (W) x 100 (H) x 83.2 (D) mm	
Weight	120 g	130 g	

TI 34M06H60-03E 23

Differences from Positioning Module F3NC96-0N (with MECHATROLINK-II Interface) (2)



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■ MECHATROLINK commands

□ For standard servo profile

Profile	Command Code	Command	Function	II	III
Common commands	\$00	NOP	No operation	⊙	⊙
	\$01	PRM_RD	Read parameter	⊙	x ^{*1}
	\$02	PRM_WR	Write parameter	⊙	x ^{*1}
	\$03	ID_RD	Read ID	⊙	⊙
	\$04	CONFIG	Setup Device	⊙	⊙
	\$05	ALM_RD	Read alarm or warning	⊙	⊙
	\$06	ALM_CLR	Clear alarm or warning	⊙	⊙
	\$0D	SYNC_SET	Start synchronous communication	⊙	⊙
	\$0E	CONNECT	Establish connection	△	△
	\$0F	DISCONNECT	Release connection	△	△
	\$1B	PPRM_RD	Read stored parameter	x	x ^{*1}
	\$1C	PPRM_WR	Write stored parameter	⊙	x ^{*1}
	\$1D	MEM_RD	Read memory	⊙	⊙
	\$1E	MEM_WR	Write memory	⊙	⊙
Standard servo commands (common motion commands)	\$20	POS_SET	Set coordinates	⊙	⊙
	\$21	BRK_ON	Apply brake	⊙ ^{*2}	⊙ ^{*2}
	\$22	BRK_OFF	Release brake	⊙ ^{*2}	⊙ ^{*2}
	\$23	SENS_ON	Turn sensor ON	⊙	⊙
	\$24	SENS_OFF	Turn sensor OFF	⊙	⊙
	\$25	HOLD	Stop motion	⊙	⊙
	\$26	MLOCK_ON	Machine lock ON	x	⊙
	\$27	MLOCK_OFF	Machine lock OFF	x	⊙
	\$28	LTMOD_ON	Request latch mode	⊙	⊙
	\$29	LTMOD_OFF	Release latch mode	⊙	⊙

Profile	Command Code	Command	Function	II	III
Standard servo commands	\$30	SMON	Servo status monitor	⊙	⊙
	\$31	SV_ON	Servo ON	⊙	⊙
	\$32	SV_OFF	Servo OFF	⊙	⊙
	\$34	INTERPOLATE	Interpolation	△	△
	\$35	POSING	Positioning	⊙	⊙
	\$36	FEED	Feed	⊙	⊙
	\$37	EX_FEED	External input feed	⊙	⊙
	\$38	LATCH	Interpolation feed with position latch function	x	⊙
	\$39	EX_POSING	External input positioning	⊙	⊙
	\$3A	ZRET	Zero point return	⊙	⊙
	\$3C	VELCTRL	Velocity control	⊙	⊙
	\$3D	TRQCTRL	Torque control	⊙	⊙
	\$3E	ADJ	Adjusting	⊙	⊙
	\$3F	SVCTRL	General-purpose servo control	x	⊙
\$40	SVPRM_RD	Read servo parameter	⊙	⊙	
\$41	SVPRM_WR	Write servo parameter	⊙	⊙	

⊙: Executable by user using MECHATROLINK-III command parameters for each axis.
 ○: Executable by user using extended MECHATROLINK-III command parameters.
 △: Not executable by user but executed automatically by positioning module or external devices.
 x: Not supported

*1: The standard servo command profile uses SVPRM_RD and SVPRM_WR instead of PRM_RD, PRM_WR, PPRM_RD and PPRM_WR.

*2: Brake On/Off should be controlled by an external device in tandem with Servo ON/OFF commands

TI 34M06H60-03E 24

Differences from Positioning Module F3NC96-0N (with MECHATROLINK-II Interface) (3)



YOKOGAWA

MECHATROLINK Commands

Positioning Command (POSING: \$35)

For MECHATROLINK-III, acceleration, deceleration & torque limit can also be specified. Moreover, up to 8 monitor data per axis can be read concurrently.

MECHATROLINK-II command

Byte	Command	Response
0	POSING (\$35)	POSING (\$35)
1	0	Alarm
2-3	OPTION	Status
4-7	Target Position (TPOS)	MONITOR1
8-11	Target Speed (TSPD)	MONITOR2
12	MON_SEL 1, 2	MON_SEL 1, 2
13-14	0	I/O Signal Monitor (I/O)
15	WDT	RWDT
17	SMON (\$30)	SMON (\$30)
18	0	SUBSTATUS
19	MON_SEL 3, 4	MON_SEL 3, 4
20-23	0	MONITOR3
24-27	0	MONITOR4
28-31	0	0

MECHATROLINK-III command

Byte	Command	Response
0	POSING (\$35)	POSING (\$35)
1	WDT	RWDT
2-3	Command Control (CMD_CTRL)	Command Status (CMD_STAT)
4-7	Servo Command Control Field (SVCMD_CTRL)	Servo Command Status Field (SVCMD_STAT)
8-11	Servo Command Output Signal (SVCMD_IO)	Servo Command Input Signal (SVCMD_IO)
12-15	Target Position (TPOS)	Fixed Monitor 1 (CPRM_SEL_MON1)
16-19	Target Speed (TSPD)	Fixed Monitor 2 (CPRM_SEL_MON2)
20-23	Acceleration (ACCR)	MONITOR1
24-27	Deceleration (DECR)	MONITOR2
28-31	Torque Limit (TLIM)	MONITOR3
32	SMON (\$30)	SMON (\$30)
33-35	Subcommand Control (SUB_CTRL)	Subcommand Status (SUB_STAT)
36-39	Reserved	MONITOR4
40-43		MONITOR5
44-47		MONITOR6

To stop positioning:

For MECHATROLINK-II:

Send the Stop Motion command (HOLD: \$25)

For MECHATROLINK-III:

Set the CMD_CANCEL bit of the Servo Command Control Field (SVCMD_CTRL.CMD_CANCEL) to 1 and re-execute the POSING (\$35) command.

TI 34M06H60-03E 25

Differences from Positioning Module F3NC96-0N (with MECHATROLINK-II Interface) (4)



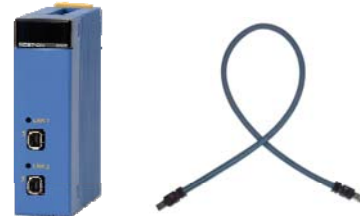
YOKOGAWA

Appearance (connector and cable)

F3NC96-0N



F3NC97-0N



Compatibility

Hardware

MECHATROLINK-II and MECHATROLINK-III differ and are incompatible in terms of communication media, connector, cable and compatible external devices.

Programs

Both have basically similar operations but in MECHATROLINK III, some commands have been changed and some have additional parameters so program modification is required.

TI 34M06H60-03E 26

■ Direct Drive Motor DYNASERV / LINEARSERV

Direct Drive Motor DYNASERV / LINEARSERV

MECHATROLINK-II compliant product

- Direct drive motor featuring improved accuracy, torque, stiffness with lower heat generation.
 - DYNASERV rotational motor:
 - Encoder resolution 4,096,000 pulse/rev max.
 - LINEARSERV linear motor:
 - Encoder resolution 0.05 μ m/pulse max.
- MECHATROLINK-II compliant DrvG III Intelligent Drive
 - High resolution coupled with high-speed position reference enables multi-axis synchronization and reduced wiring
 - Allows advanced position control, as well as higher-level driver parameter management and operation status monitoring
- Complete product lineup to suit different needs
 - Extensive application
Semiconductor and LCD manufacture, automatic assembly, printing, machine tool, etc.

■ For enquiries:
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URL: <http://www.yokogawa.co.jp/ddm/>
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Item	Specification	
Interface	Protocol	MECHATROLINK-II compliant
	Transmission rate	10Mbps
	Cycle time	1ms, 2ms or 4ms
	Transmission bytes	17 or 32 bytes (configurable)
	Comm. Cycles	x1 fixed
No. of stations	9 stations max. for 1 ms cycle	
Command method	Operation specifications	Position control by MECHATROLINK-II communications
	Input commands	MECHATROLINK-II commands (INTERPOLATE, POSING, FEED, ZRET)
Positioning functions	ACC/DCC control	Trapezoidal or S-shaped, acceleration time and deceleration time (configurable)
	Others	Position setting width selection, motion direction selection for rotational coordinates (by shortest travel)
I/O signals	Input	Homing signal, OT+ / OT- signals
	Output	Regeneration error
Others	Communication Functions	RS232-C / RS485 (Operation display panel, operation display pendant, PC)
	Analog monitor	Speed monitor, current command, etc.