MITSUBISHI ELECTRIC

Changes for the Better
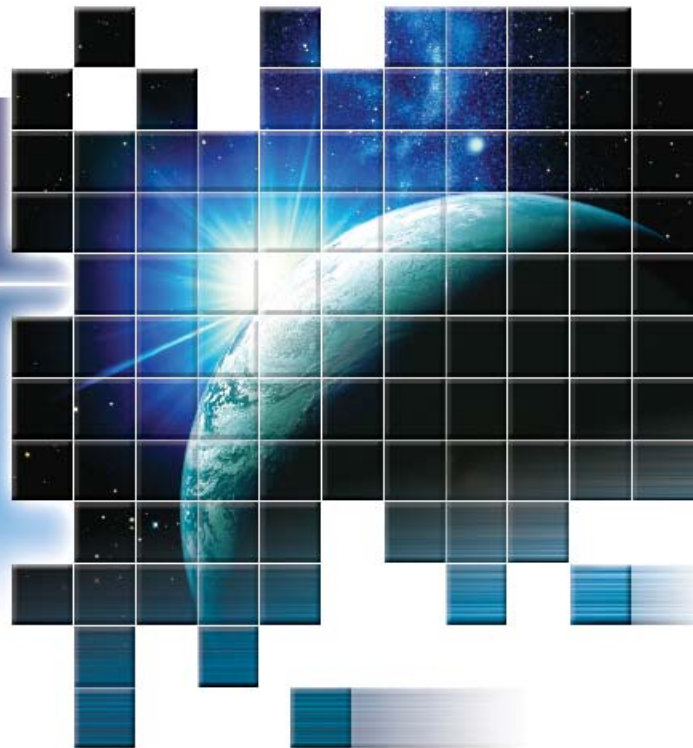
Servo System Network
SSCNETⅢ

Here the History of Optical Networks

SSCNETⅢ
Servo System Controller NETwork

Mitsubishi Electric Corporation Nagoya Works is a factory certified for ISO14001
(standards for environmental management systems) and ISO9001(standards for
quality assurance management systems)

SSCNET
SERVO SYSTEM CONTROLLER NETWORK

MELSOFT

ISO 14001
JACO
UKAS ENVIRONMENTAL MANAGEMENT
EC97J1113   051

Certified ISO 9001 by
BVQi
UKAS QUALITY MANAGEMENT
008

Evolving Quickly to New Areas... to Optics!

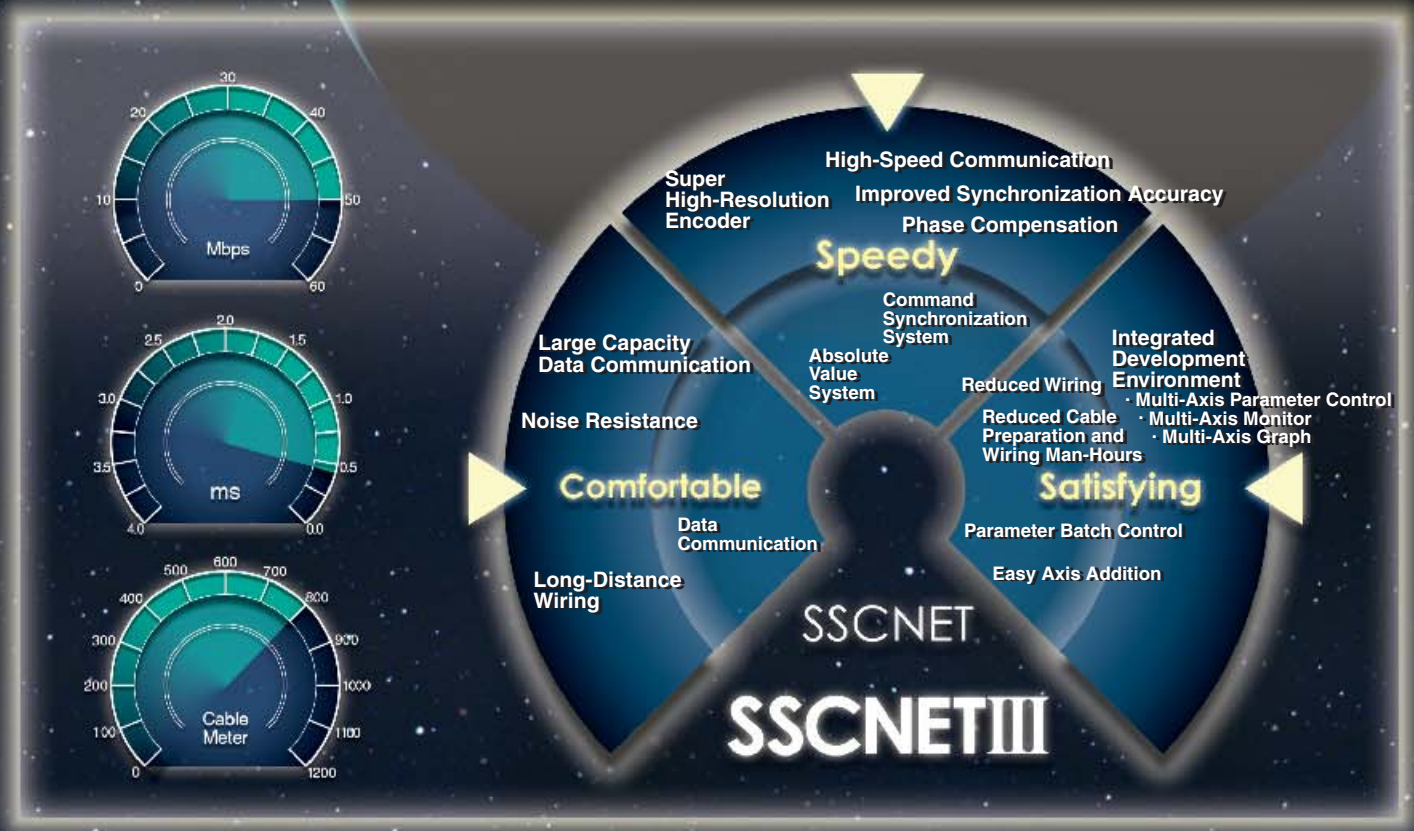## Raising the Bar to Reach Higher Performance with High-Speed Synchronous Network SSCNETⅢ!

Mitsubishi has invented an original servo system network <SSCNET> in pursuit of reliability.

SSCNET is an optical network that realizes smooth, high-response and high-accuracy operation under all circumstances.

※ SSCNET (Servo System Controller NETwork)

Speedy

Satisfying

SSCNETⅢ

Comfortable

Speedy

High-Speed Communication
Super High-Resolution Encoder
Improved Synchronization Accuracy
Phase Compensation

Command Synchronization System
Absolute Value System

Large Capacity Data Communication

Noise Resistance

Comfortable

Data Communication

Long-Distance Wiring

Reduced Wiring
Reduced Cable Preparation and Wiring Man-Hours

Integrated Development Environment
· Multi-Axis Parameter Control
· Multi-Axis Monitor
· Multi-Axis Graph

Satisfying

Parameter Batch Control

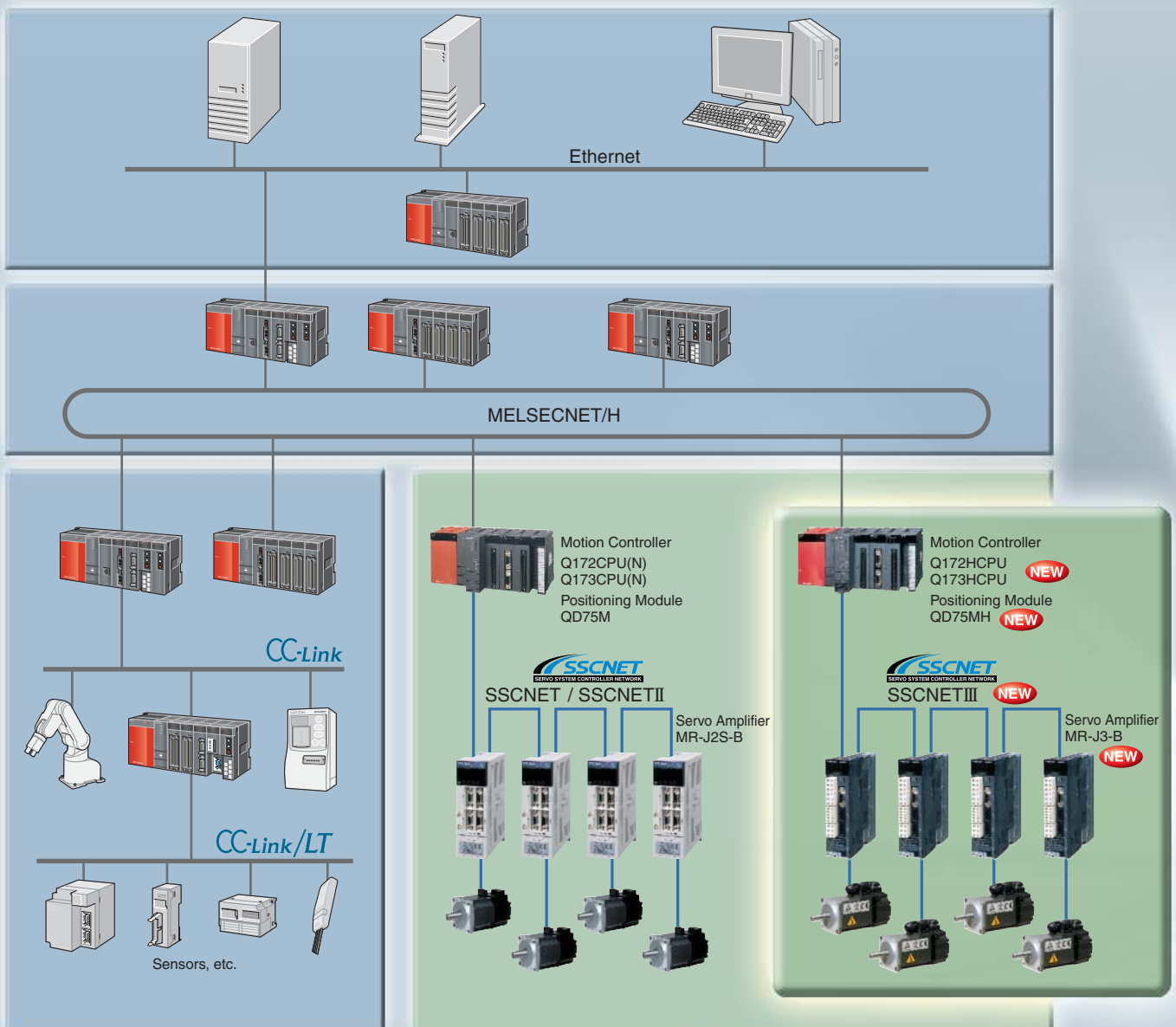Easy Axis Addition

SSCNET

SSCNETⅢ

Mbps
ms
Cable Meter

What is SSCNET?

Smooth, High-Speed and High-Accuracy Operation

Servo technology has been remarkably advanced. SSCNET realizes high-performance and high-accuracy devices that could not be attained with conventional pulse train command or analogue command.

There were problems with both pulse-train command and analogue command: former had a limited pulse frequency for a high-speed and high-accuracy control, and the latter was vulnerable to the line noise, voltage drop due to the cable length, and temperature drift. SSCNET, however, resolves these problems and realizes smoother operations with high speed and accuracy. The high-speed serial communication system in SSCNET allows the servo motor synchronous control system and absolute-position system to be easily structured, and the one-touch connection with the connector simplifies wiring.

SSCNET consists of metal cable SSCNET/SSCNETII and optical fiber cable SSCNETIII.
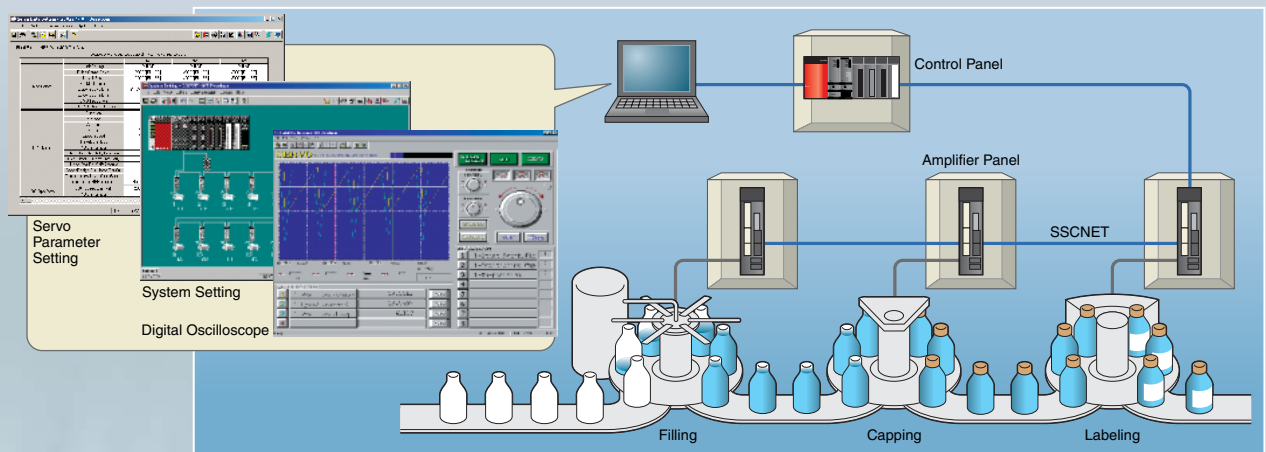
Network Hierarchy

Ethernet

MELSECNET/H

CC-Link

CC-Link/LT

Sensors, etc.

Motion Controller
Q172CPU(N)
Q173CPU(N)

Positioning Module
QD75M

SSCNET
SERVO SYSTEM CONTROLLER NETWORK

SSCNET / SSCNETII

Servo Amplifier
MR-J2S-B

Motion Controller
Q172HCPU
Q173HCPU **NEW**

Positioning Module
QD75MH **NEW**

SSCNET
SERVO SYSTEM CONTROLLER NETWORK

SSCNETIII **NEW**

Servo Amplifier
MR-J3-B **NEW**

Powerful Device with Synchronous Communication

With the conventional pulse-train command, some operations such as synchronous startup and high-accuracy two-axis interpolation were difficult because the servo amplifier and Motion controller were asynchronously operated.
SSCNET realizes powerful functionality of the devices (ex. printing machines, food-processing machines, machine tool, etc.) that require accurate synchronization.

Advantages of Central Control with Network

SSCNET can exchange large volume of data between the controller and servo amplifier in real time.
Servo parameters can be set from the personal computer connected to the controller when Motion controller is in use.
Motor speed, current position and voltage value of each axis can be monitored with the digital oscilloscope function.
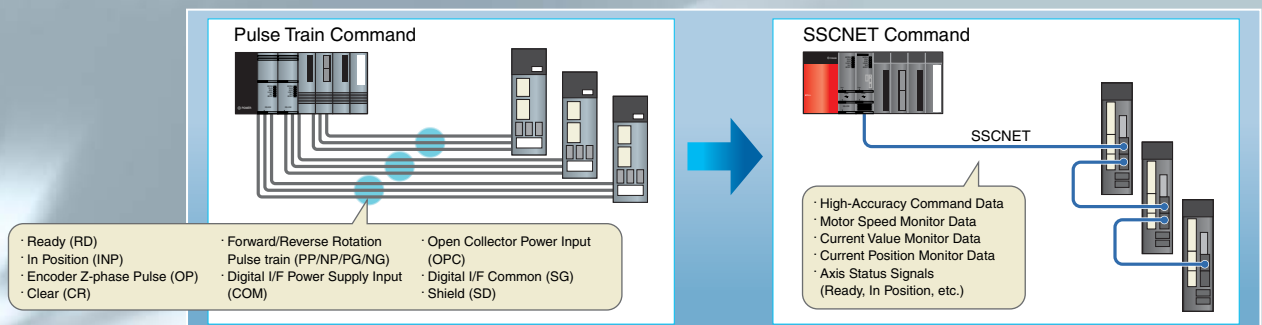
Servo Parameter Setting

System Setting

Digital Oscilloscope

Control Panel

Amplifier Panel

SSCNET

Filling   Capping   Labeling

Easy Structure of Absolute System

An I/O module is necessary for sending/receiving the ABS data to structure an absolute system with a pulse-train command, and wiring is also required between the I/O module and servo amplifier.
SSCNET does not require any wiring, and structuring an absolute system is very easy. Since home-position return operations are unnecessary, operations can be started up shortly after the power is on even with many axes.
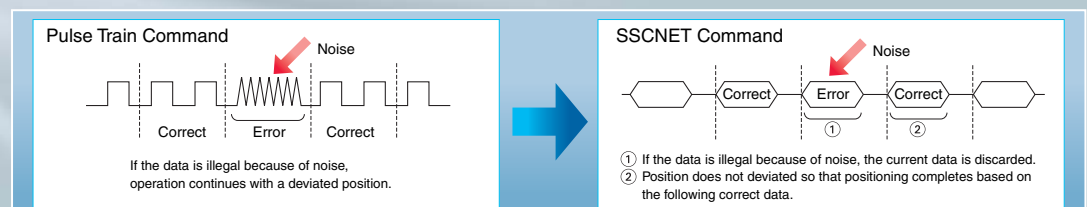
Reduced Wiring

SSCNET can be connected only by inserting the dedicated cable into connectors. No more complicated wiring is necessary.

Pulse Train Command

SSCNET Command

SSCNET

· High-Accuracy Command Data
· Motor Speed Monitor Data
· Current Value Monitor Data
· Current Position Monitor Data
· Axis Status Signals
  (Ready, In Position, etc.)

· Ready (RD)
· In Position (INP)
· Encoder Z-phase Pulse (OP)
· Clear (CR)

· Forward/Reverse Rotation
  Pulse train (PP/NP/PG/NG)
· Digital I/F Power Supply Input
  (COM)

· Open Collector Power Input
  (OPC)
· Digital I/F Common (SG)
· Shield (SD)
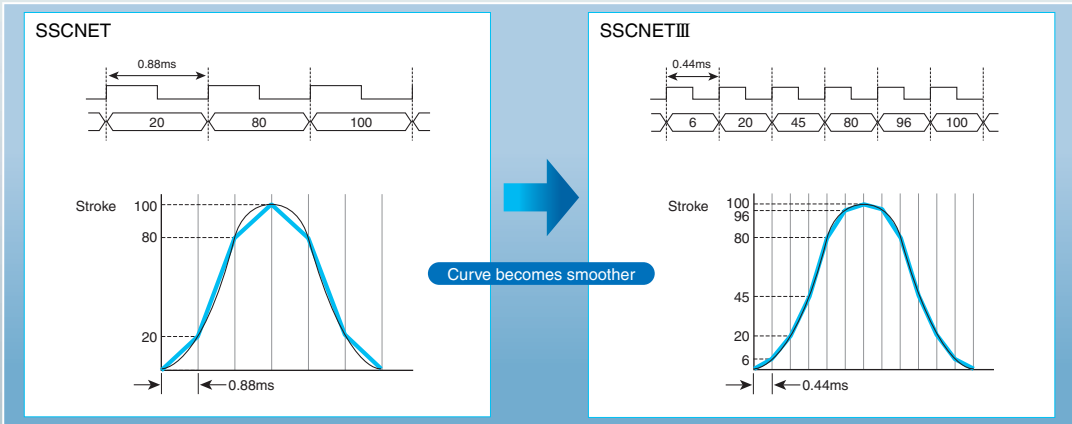
Improved Reliability

SSCNET offers a high degree of accuracy and communication reliability with its data communication. When an error occurs during communication, the current data is discarded and the following normal data is used.

Pulse Train Command

Noise

Correct   Error   Correct

If the data is illegal because of noise, operation continues with a deviated position.

SSCNET Command

Noise

Correct   Error   Correct
①   ②

① If the data is illegal because of noise, the current data is discarded.
② Position does not deviated so that positioning completes based on the following correct data.

SSCNETⅢ

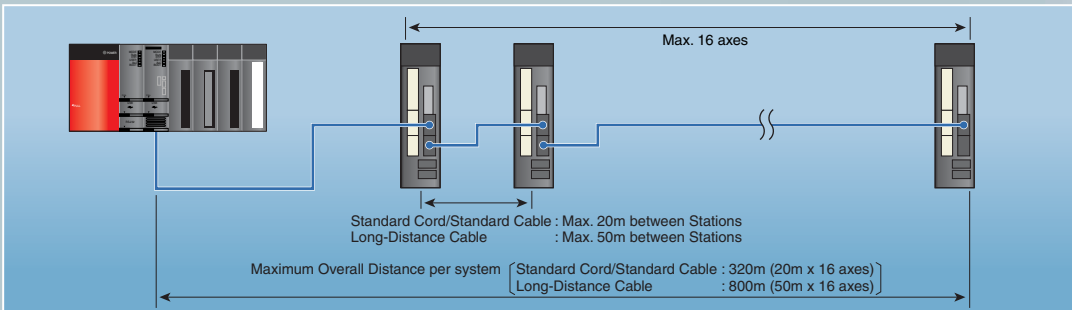## Improved Communication Speed and Command Communication Cycle

The command communication cycle (transmission communication cycle) to the servo amplifier is improved (SSCNET: 0.88ms→SSCNETⅢ: 0.44ms) by increasing the communication speed from 5.6Mbps to 50Mbps. This improvement also allows synchronization accuracy and speed/position accuracy to be enhanced.
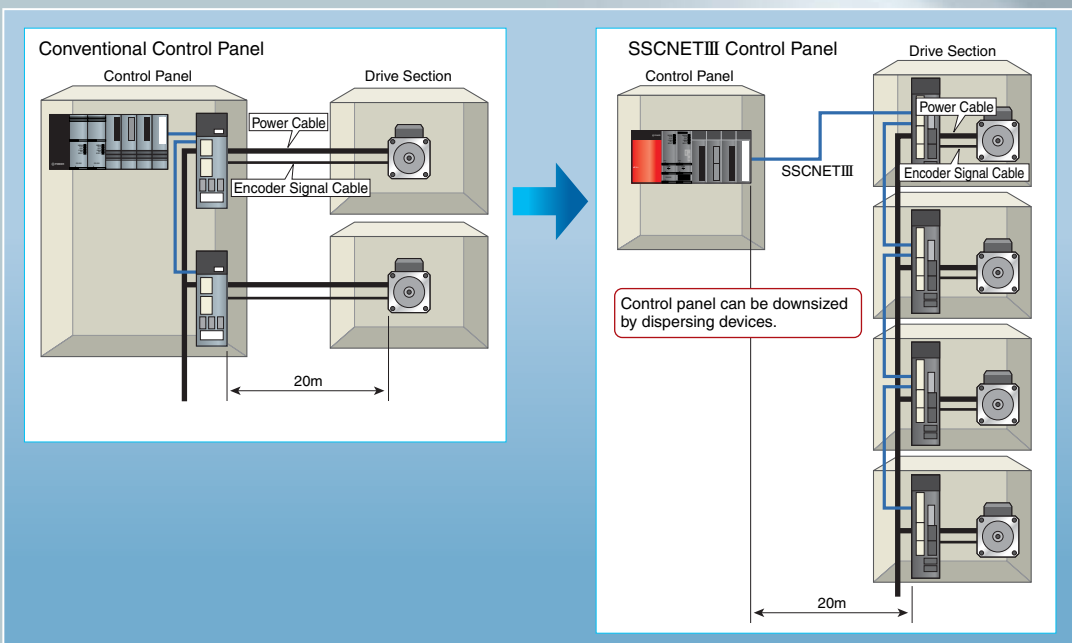
SSCNET

0.88ms

20 80 100

Stroke 100
80

20

0.88ms

Curve becomes smoother

SSCNETⅢ

0.44ms

6 20 45 80 96 100

Stroke 100
96
80

45

20
6

0.44ms

※SSCNETⅢ communication cycle differs according to the controller specifications.

Long-Distance Wiring

The cable length per system can be extended for long-distance wiring with SSCNETⅢ.

Max. 16 axes

Standard Cord/Standard Cable : Max. 20m between Stations
Long-Distance Cable : Max. 50m between Stations

Maximum Overall Distance per system ⎡Standard Cord/Standard Cable : 320m (20m x 16 axes)⎤
⎣Long-Distance Cable : 800m (50m x 16 axes)⎦

Large devices can be handled if the control panel is placed away from the drive section in a large-scale device or production line. The separable controller section and drive section can shorten the power cable wired between the servo amplifier and servo motor.

Conventional Control Panel

Control Panel   Drive Section

Power Cable

Encoder Signal Cable

20m

SSCNETⅢ Control Panel

Control Panel   Drive Section

Power Cable

SSCNETⅢ   Encoder Signal Cable

Control panel can be downsized by dispersing devices.

20m

High Speed and Accuracy with Synergic Effect with MR-J3

Combined with MR-J3, SSCNETⅢ realizes faster and smoother operations for higher speed (maximum HF-KP motor speed: 6000r/min) and higher accuracy (HF-KP motor resolution: 262144p/rev).
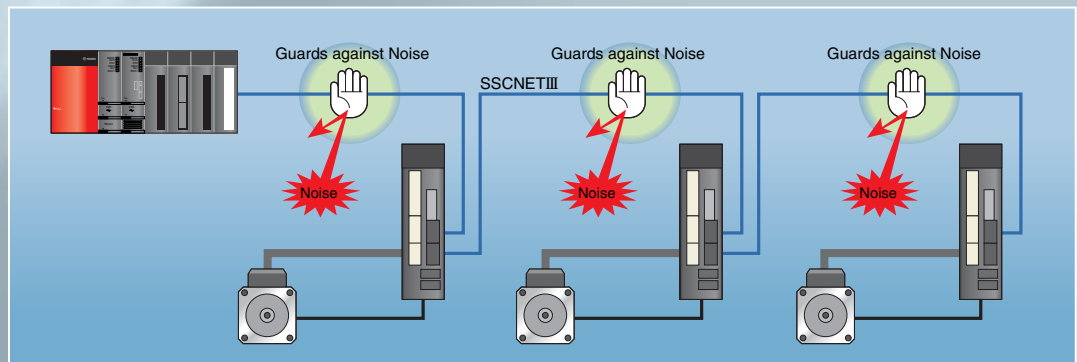
Shorter Adjustment Time with Servo Adjustment and Multiple Monitor

MR Configurator (Setup software) can be used via SSCNETⅢ. Parameters for the amplifier connected to SSCNETⅢ can be set and monitored only connecting a personal computer to the Motion controller.

Parameter Setting

Batch Monitor

USB Cable

MR Configurator
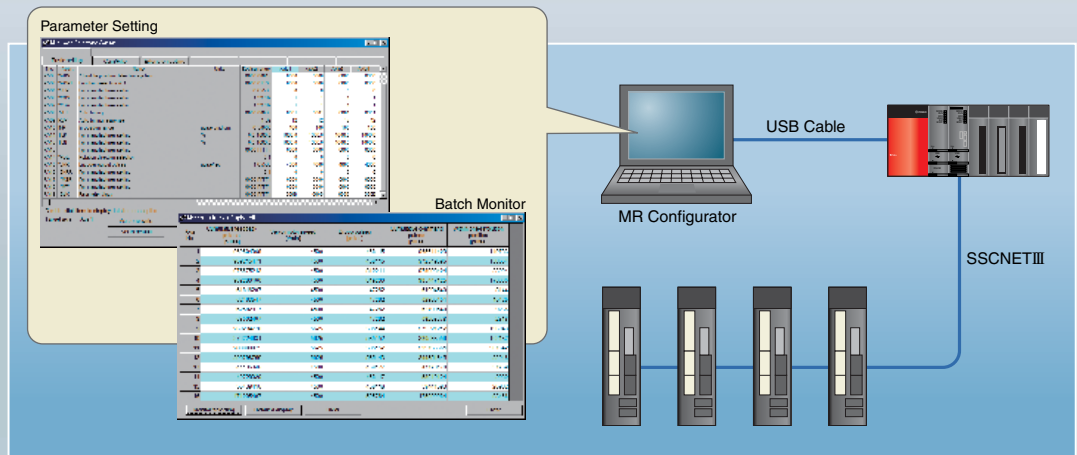
SSCNETⅢ

Improved Noise Resistance

The optical fiber cables used for SSCNETⅢ dramatically improve the resistance against noise which enters from the power cable or external devices.

Guards against Noise

Guards against Noise

Guards against Noise

SSCNETⅢ

Noise

Noise

Noise

SSCNET Specifications

Item		SSCNETⅢ		SSCNETⅡ	SSCNET
Communication Medium		Optical Fiber Cable		Metal Cable	Metal Cable
		Standard Cord for Inside Panel Standard Cable for Outside Panel	Long-Distance Cable (Note-1)		
Communication Speed		50Mbps		5.6Mbps	5.6Mbps
Communication Cycle (Note-2)	Send	0.44ms/0.88ms		0.88ms	0.88ms/1.77ms/3.55ms
	Receive	0.44ms/0.88ms		0.88ms	3.55ms
Maximum Control Axes per System		Communication Cycle 0.44ms : 8 axes/system Communication Cycle 0.88ms : 16 axes/system		6 axes/system	8 axes/system
Transmission Distance		Maximum 20m between Stations Maximum Overall Distance 320m (20m x 16 axes)	Maximum 50m between Stations Maximum Overall Distance 800m (50m x 16 axes)	Overall Distance 30m	Overall Distance 30m
Noise Resistance		◎		○	○

(Note-1) : Special-order product.
(Note-2) : Communication cycle differs according to the controller specifications.

7

Servo System Network –SSCNETⅢ–

⚠ For safe use

- To use the products given in this catalog properly, always read the "manuals" before starting to use them.
- These products have been manufactured as a general-purpose part for general industries, and have not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the products for special purposes such as nuclear power, electric power, aerospace, medicine, passenger movement vehicles or under water relays, contact Mitsubishi.
- These products have been manufactured under strict quality control. However, when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.
- When exporting any of the products or related technologies described in this catalog, you must obtain an export license if it is subject to Japanese Export Control Law.

Precautions for Choosing the Products

Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; opportunity loss or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors unpredictable by Mitsubishi; damages to products other than Mitsubishi products; and to other duties.

▲ MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE : MITSUBISHI DENKI BLDG., 2-2-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN