

**Programmable
Logic
Controllers**

**The
MELSEC
PLC Family**



**Our Automation Solutions
Are the Key to Your Success**



**MITSUBISHI
ELECTRIC**

The right decision

Mitsubishi Electric is a multinational company with 106 subsidiaries and 63 manufacturing facilities in locations all over the world. Over 110,000 employees produce and market electrical and electronic products and components for many industries and countless applications. The spectrum ranges from semiconductors, consumer electronics, PCs and mobile phones to air conditioning equipment, elevators, colour stadium displays and even satellite technology. In the year 2000 the group generated consolidated turnover of DM 68.4 billion.

The European headquarters has been in Ratingen, Germany, since 1978, where 600 employees serve Mitsubishi's customers.



All over the world, state-of-the-art automation technology from Mitsubishi Electric is helping to further technological progress and the success of business enterprises. Well over 4.1 million MELSEC PLC systems are now in service, demonstrating their outstanding quality and reliability every day in demanding industrial applications.

Our experience and expertise have made us one of the biggest international suppliers of application-oriented PLC systems and the market leader in the micro PLC sector. In Asia Mitsubishi Electric is the unchallenged number one in the industrial automation market. Customers and users alike profit from our profound experience and market knowledge. Mitsubishi Electric is a sought-after partner among industrial users all over the world, for everything from

MITSUBISHI ELECTRIC - Worldwide Leader in Industrial Automation

simple, single-machine controllers to integrated automation systems for entire plants.

High Quality

Our PLC systems are technology leaders, high-end products with truly outstanding reliability and quality. They exceed the requirements of all applicable international quality standards, something that is confirmed by many certifications and approvals. The mature, reliable technology of our PLC systems makes them a safe investment that will pay off for years to come.

Just in Time

Short-term availability of our products is ensured by a comprehensive network of manu-

facturing facilities and distributors, also in Europe. Our large central warehouse in Ratingen near Düsseldorf is always kept stocked to meet current market needs. An efficient logistics system and our network of local distribution warehouses make sure that you always get your products delivered when and where you need them.

Worldwide Service

Our experienced service staff provide advice, planning, installation, setup, training and all the other help and support you need for your automation problems. Our focus is on fast, effective service and support



without unnecessary red tape. Our central service department is always there to help if you experience technical problems. If you have a particularly complex application we can even put together a special project team of application technicians and engineers for you. At Mitsubishi service means we are always there when you need us, effectively round the clock, because we are also accessible via the Internet. At www.mitsubishi-automation.de you will find the latest information on our products and examples of successful applications.

Total Quality Management

Our quality philosophy does not end with good products and customer service. It encompasses everything,



including the environment and our own staff. This comprehensive commitment to quality has been confirmed by ISO 9000 quality certification from the TÜV-CERT institute in Cologne. In addition to this all our products conform to the

CE requirements, just as you would expect from a leading international company in Europe.



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MELSEC PLCs

The worldwide triumph of quality

At Alfing Kessler this transfer line for finishing injection pump housings is controlled by Mitsubishi PLC systems connected in a network.



The World of MELSEC PLCs

Industrial manufacturing of top-quality products is no longer possible without automation. And because of the rapidly-growing complexity of modern automation applications, users now need more than just solutions – they need complete, integrated automation concepts from a single supplier.

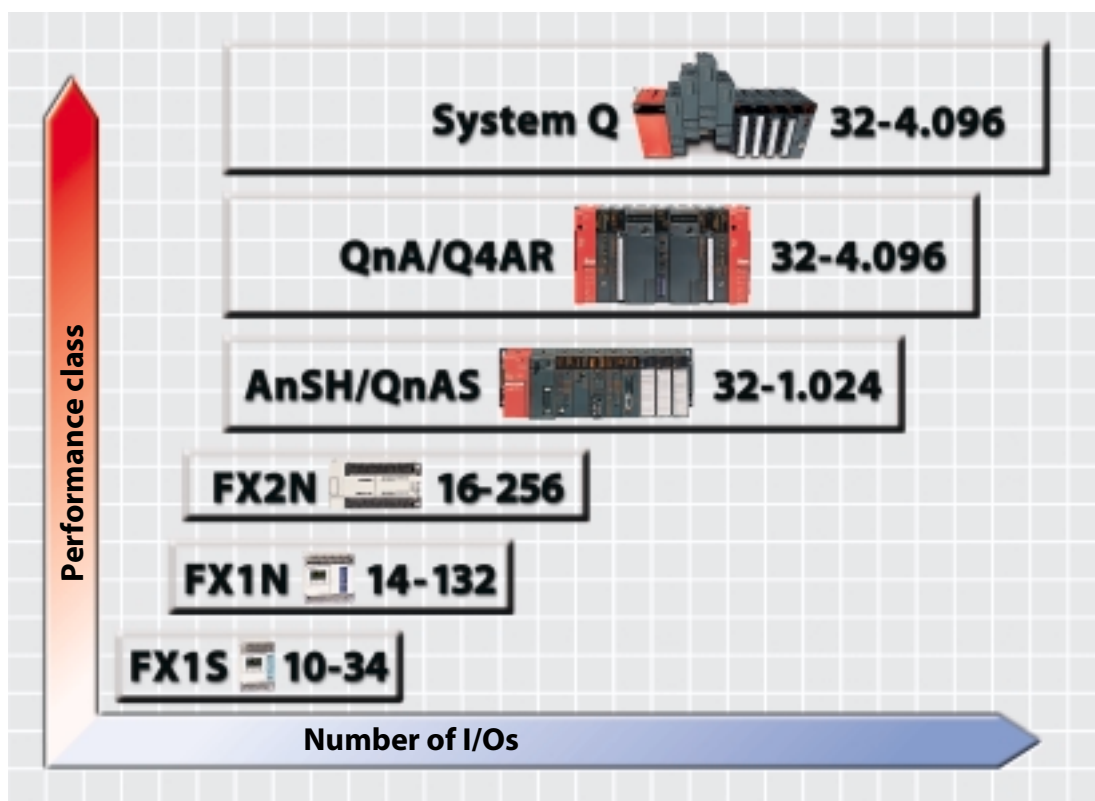
It takes state-of-the-art technology to create optimum solutions for demanding automation tasks. However, even the best technology is not much use if it's not easy to use, and this is where products from Mitsubishi Electric are particularly strong. MELSEC PLC systems are ready for the needs of tomorrow's markets today, guaranteeing a really future-proof automation investment. Mitsubishi Electric's outstanding technology also ensures truly outstanding reliability – yet another reason for the high level of satisfaction of the many manufacturing companies who use MELSEC PLC systems.

In 1981 Mitsubishi Electric introduced the MELSEC F series, which were the very first compact controllers in Europe with everything in a single unit. Since then we have continually improved and developed this innovative technology, which laid the foundation for all the integrated PLC systems available today. And just one year later we presented the first modular PLC system in Europe. We have stuck to the modular architecture ever since – the MELSEC System Q is the latest high point of this development, with mature technology and reliability that speak for themselves.

Uncompromising commitment to compatibility of all systems is another key element of Mitsubishi Electric's design philosophy that is reflected in all the company's industrial automation products. Standard Mitsubishi products like control units and visualisation software can be connected to all MELSEC controllers. This product transparency enables economic solutions for all automation tasks. No matter whether your application is simple or complex, standard or customised, all PLC systems from Mitsubishi Electric give you the confidence of knowing that your investments are going to be safe in the future.



Mitsubishi PLC systems, frequency inverters, circuit breakers and contactors are used in the machines and systems that Kronos AG produces for the beverages and packaging industry.



The Performance Profile of the MELSEC PLC Series

The various MELSEC PLC series produced by Mitsubishi Electric are a comprehensive and complete product range. All the compact and modular controllers can be operated with control units. MELSECNET and open networks enable fast data communications and a wide range of connection options.

The compact controllers of the MELSEC FX series are available with between 10 and 256 I/Os. With everything they need in a single unit these controllers are ready for action immediately.

Their ultra-compact housings fit in every switchgear cabinet, and a wide selection of special function and expansion modules enable them to grow with your needs.

The modular AnSH/QnAS series is for applications requiring between 32 and 1,024 I/Os. These systems combine extremely compact dimensions with almost unlimited flexibility. Over 60 different user modules and powerful network support enable the configuration of very attractively-priced PLC

systems for medium-scale applications.

The MELSEC QnA series delivers very high integration density with up to 4,096 I/Os. The MELSEC Q4AR features redundant system architecture for additional reliability.

The top dog in Mitsubishi's PLC family is the new MELSEC System Q with multi-CPU technology, a controller that redefines the standards of PLC performance.

Model	MELSEC FX1S	MELSEC FX1N	MELSEC FX2N	MELSEC AnSH/QnAS	MELSEC QnA/Q4AR	MELSEC System Q
Power supply	100 – 240 V AC, 24 V DC	100 – 240 V AC, 12 – 24 V DC	100 – 240 V AC, 24 V DC	100 – 240 V AC, 24 V DC	100 – 240 V AC, 24 V DC	100 – 240 V AC, 24 V DC
Inputs	6 – 20	8 – 88	8 – 248	32 – 1,024	32 – 4,096	32 – 4,096
Outputs	4 – 16	6 – 66	8 – 248	32 – 1,024	32 – 4,096	32 – 4,096
Digital outputs	Relay/transistor	Relay/transistor	Relay/transistor	Relay/transistor/triac	Relay/transistor/triac	Relay/transistor/triac
Cycle period/log. instr.	0.55 µs	0.55 µs	0.08 µs	0.25 – 0.33 µs	0.075 – 0.2 µs	0.034 – 0.2 µs
PLC program memory	2 K steps	8 K steps	8 – 16 K steps	8 – 60 K steps	28 – 124 K steps	8 – 252 K steps

MELSEC FX1S
Full Power for
10 I/Os and Up

The following controllers are available in the MELSEC FX1S series:

- Basic units with 10, 14, 20 and 30 I/Os
- Transistor or relay outputs



Originalgröße

MELSEC FX1S – The Inexpensive Entry-level PLC

In recent years PLC systems have undergone radical miniaturisation. At the same time as becoming smaller their performance has also increased. Now Mitsubishi Electric presents the PLC generation of the future: The new FX1S.

The stand-alone FX1S unit comes with 10-34 I/Os, 2 K

steps of program memory, a maintenance-free EEPROM and a real-time clock.

Compared to its predecessors this innovative controller has significantly greater functionality, much more power, enhanced memory capacity and more comprehensive network support than its predecessors in the FX0S series.

- Fast cycle period of just 0.55 µs per logical instruction

The outstanding features of the FX1S make it the ideal choice for all the following applications:

- Wood working
- Packaging and wrapping
- Custom-built machines
- Handling systems
- Motor industry
- Environmental systems



Programmable Logic Controllers

- Improved high-speed counter inputs and output signals
- Memory cassettes for easy program exchange
- New comparison and positioning instructions
- 6 interrupt inputs for fast, event-triggered responses

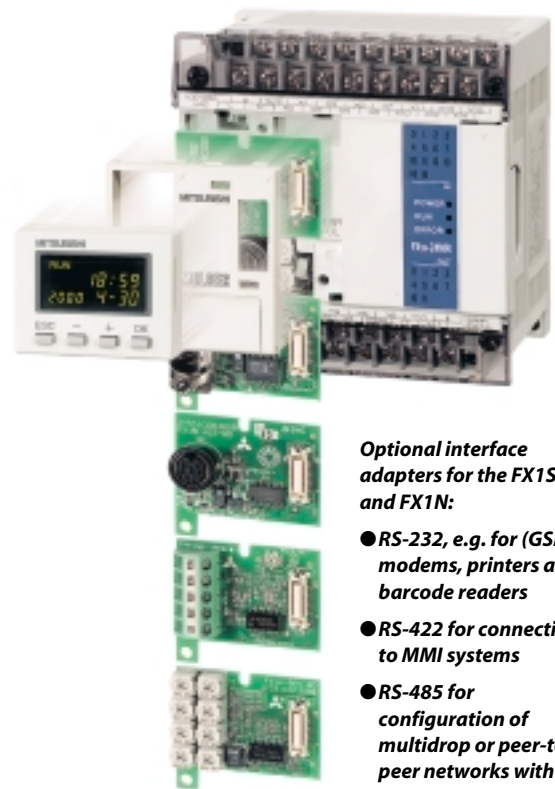
All these features are standard equipment in the PLC generation of the future:

- Serial RS-422 programming port
- Two analog potentiometers
- Interface for optional additional modules

Full information at a glance

In addition to the standard hardware and the optional interfaces you can also add a display with the following features:

- Monitor for bit and word devices
- Ability to edit device values
- Display of the internal real-time clock
- Backlight

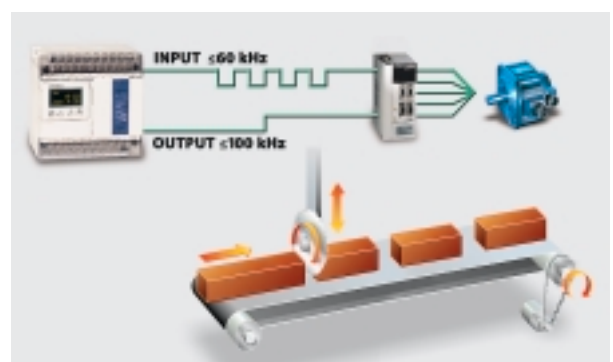


Optional interface adapters for the FX1S and FX1N:

- RS-232, e.g. for (GSM) modems, printers and barcode readers
- RS-422 for connection to MMI systems
- RS-485 for configuration of multidrop or peer-to-peer networks with up to 8 stations
- An optional module with eight analog setpoint potentiometers is also available
- I/O adapter modules are also available, with 4 digital inputs, 2 digital outputs, 2 analog inputs and 1 analog output

I/O range	10-34 I/Os
Program memory	2,000 steps
Cycle period	0.55 µs/log. instr.
Positioning	6 high-speed counters (max. 60 k Hz) 2 impulse outputs (100 k Hz)
Power supply	100 – 240 V AC, 24 V DC
Dimensions/mm (W x H x D)	60/75/100 x 90 x 75/49

The new FX1S/FX1N can combine controller and drive control functionality, illustrated here with MELSERVO.



MELSEC FX1N

Positioning Has a Bright Future

The MELSEC FX1N series includes the following products:

- Basic controller units with 14, 24, 40 and 60 I/Os
- Expansion units with 8 – 48 I/Os
- Special function modules for analog value processing, temperature measurement and communications

The controllers of the MELSEC FX1N series are particularly well suited for the following applications:

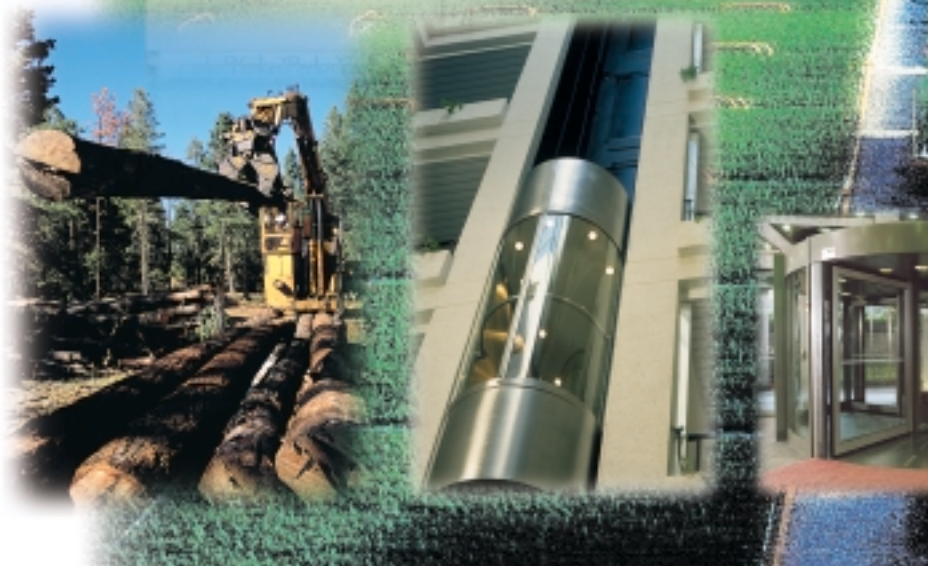
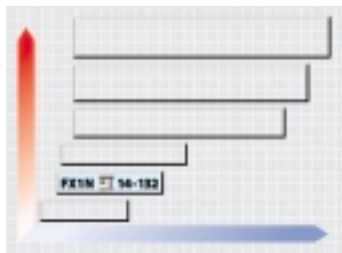
- Wood working
- Weighing systems
- Revolving doors, door control systems
- Motor vehicle industry
- Elevator control systems
- Sewage and effluent systems

MELSEC FX1N – Comprehensive Functionality and Expansion Options



Network capability and powerful performance

Support for the digital expansion and special function modules of the existing FX0N and FX2N enables expansion of the FX1N for processing analog signals, temperature data etc. Together with a variety of interface modules this makes it possible to configure this controller precisely for specific application profiles. Support for variable power supplies from 12–24 V DC makes it possible to use the FX1N in motor vehicles and similar applications.



Programmable Logic Controllers
Compatibility cuts costs

Making the switch is easy because existing FX0S and FX0N applications are terminal- and program-compatible to the FX1S/FX1N. The new, integrated two-point DIN rail adapter enables single-handed installation and removal.

Support for remote programming and debugging via modem links makes application program maintenance extremely simple.

All controllers from the smallest FX1S to the biggest FX2N can now communicate directly via network links, making restrictive island solutions a thing of the past.


Positioning control has a big future

The FX1S/FX1N can handle both control and drive applications. New positioning instructions, integrated counter inputs with frequencies of up to 60 kHz, digital signal outputs with frequencies of up to 100 kHz and user-defined acceleration and deceleration

ramps enable independent control of up to two stepping or servo motors. This means that you can dispense with specialised modules and positioning units for simple positioning tasks with up to two independent axes.

The new FX1S/FX1N is compatible to its predecessor, FX0N.

- *The following expansion modules are available for the FX1N:*
- **RS-232** for peripherals, e.g. (GSM) modems, printers or barcode readers
- **RS-422** for the connection of MMI systems
- **RS-485** for the configuration of multidrop or peer-to-peer networks with up to 8 stations
- **FX0N-232ADP and FX0N-485ADP** communications modules
- *All expansion modules and devices of FX0N and FX2N*
- *An expansion module with 8 analog setpoint potentiometers*
- *I/O adapters with 4 digital inputs, 2 digital outputs, 2 analog inputs and 1 analog output*

I/Os	14-132 I/Os
Program memory	8,000 steps
Cycle period	0.55 µs/log. instr.
Positioning	6 high-speed counters (max. 60 kHz) 2 impulse outputs (100 kHz) 2 ext. high-speed counters (50 kHz) 2 positioning modules
Analog signal processing	Up to 16 I/Os
Resolution	8, 12 or 16 bits
Network support	Profibus/DP CC-Link DeviceNet AS-Interface MELSEC I/O-Link MELSEC FX Peer-to-Peer (PPN)
Power supply	100 – 240 V AC, 12 – 24 V DC
Dimensions/mm (W x H x D)	90/130/175 x 90 x 75

Can be connected to a variety of networks as a slave station.



MELSEC FX2N

Small, but
amazingly powerful

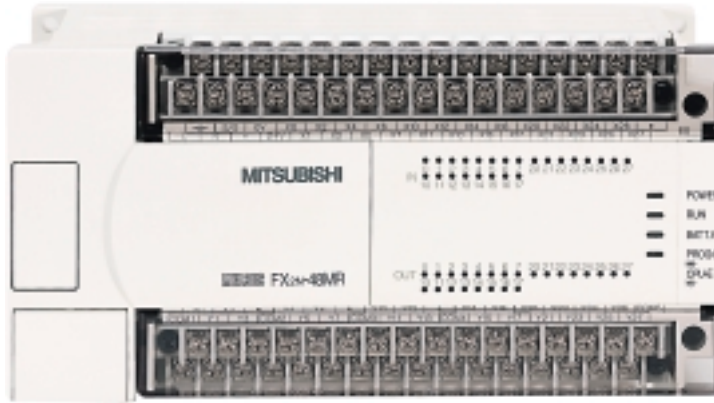
The MELSEC FX2N series includes the following products:

- Basic controllers with 16, 32, 48, 64, 80 and 128 I/Os
- Expansion units with 8 – 48 I/Os
- Special function modules for analog signal processing, temperature measurement and communications

The controllers of the MELSEC FX2N series are particularly well suited for the following applications:

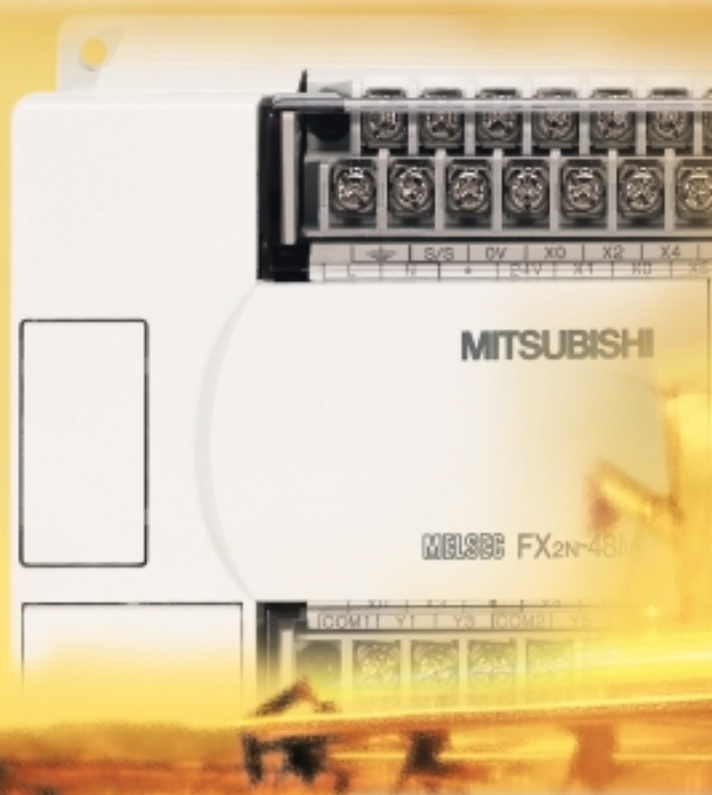
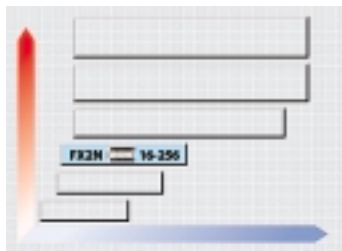
- Paint-spraying systems
- Bakery machines
- Automobile manufacturing
- Custom-built machines
- Packaging machines
- Water resources and environmental systems
- Textiles machines
- Ship equipment
- Harvesting machines
- Handling systems

MELSEC FX2N – Maximum Performance, Minimum Dimensions



A big performer in a compact package

The MELSEC FX2N brings the performance of big PLC systems to the world of mini controllers. It combines all the features of the FX1N with the power and speed of much larger PLC systems. With a cycle period of just 0.08 μ s per logical instruction it's one of the fastest PLC systems available in the range up to 256 I/Os, even putting some bigger modular controller systems in the shade.

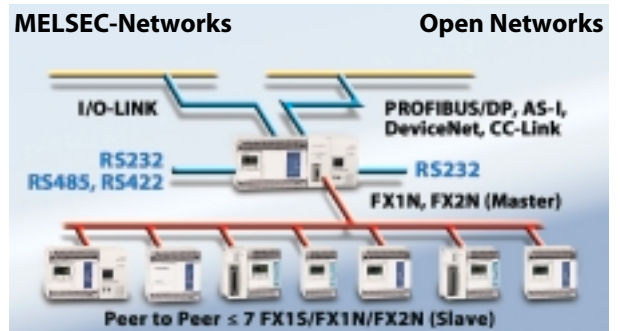


**Programmable
Logic
Controllers**
Power reserves for every situation

The MELSEC FX2N is an uncompromising development and improvement of the design concept of the FX1N. It features integrated high-speed counters supporting input frequencies of up to 60 kHz. The standard 8,000 PLC program step internal memory with backup battery can be expanded to 16,000 steps. A significantly enlarged instruction and device set makes the controller even more effective and easier to use. The standard equipment of the MELSEC FX2N also includes a PID controller with autotuning functionality, floating-point math, trig functions and an integrated real-time clock.

Comprehensive connectivity

A wide range of optional interfaces are available to complement the controller's standard RS-422 port. You can install additional RS-232/422 or RS-485 active programming interfaces. Add-on RS-232 interfaces provide broad communications functionality and enable connection of serial peripherals like printers and barcode readers. An optional RS-485 interface can be used to configure a peer-to-peer network with up to eight PLC systems from the FX family: The FX2N functions as the master with up to seven FX1S/1N or FX2N controllers configured as slaves. Remote



I/Os are supported both by the open AS-Interface and the MELSEC I/O-Link networks. CC-Link, Profibus/DP and DeviceNet interfaces are also available for the FX1N/FX2N controllers, enabling connection to a wide variety of host controller systems.



I/Os	16-256 I/Os
Program memory	Up to 16,000 steps
Cycle period	0.08 µs/log. instr.
Analog signal processing	Up to 64 I/Os
Resolution	8, 12 or 16 bits
Positioning	4 high-speed counters (60 kHz) 2 impulse outputs (20 kHz) 8 ext. high-speed counters (50 kHz) 8 positioning modules
Network support	Profibus/DP CC-Link DeviceNet AS-Interface MELSEC I/O-Link MELSEC FX Peer-to-Peer (PPN)
Power supply	100 – 240 V AC, 24 V DC
Dimensions/mm (W x H x D)	130 – 350 x 90 x 87

The range of serial interfaces available for all basic controller units can be replaced quickly and easily.



MELSEC AnSH/QnAS – High-End Power in a Compact Format

The following application modules are available for the MELSEC AnSH/QnAS series:

- Digital I/O modules
- Analog I/O modules
- Special-function modules for interrupt processing, temperature logging, temperature control, positioning, serial interfaces, network modules

The MELSEC AnSH/QnAS controllers are particularly well suited for the following applications:

- Water resources and environmental systems
- Plastics technology
- Laundry systems
- Weighing systems
- Machine tools, bakery, textiles and packaging machines, custom machines
- Bottle filling plants
- Paper manufacturing
- Cigarette manufacturing
- Engine assembly
- Ship automation and offshore systems



The modular AnSH/QnAS models can be configured precisely for a wide range of different control tasks. You can choose from a range of finely-graduated CPUs and over 60 different application modules. Despite this power

and versatility, the AnSH/QnAS system takes up very little cabinet space. It can pack a full 160 I/Os into an area measuring just 32.5 x 13 cm, guaranteeing extremely cost-effective automation solutions.

Comprehensive communication and networking

The network capabilities of the AnSH/QnAS are equally impressive. Support for Profibus, Ethernet, DeviceNet and CC-Link are standard, as is support for the Mitsubishi networks MELSECNET/B and MELSECNET/10. The AnSH/QnAS series is a universal controller for a very broad range of applications and needs.



Programmable Logic Controllers

Flexible memory expansion options

Extremely short response times predestine the QnAS for complex automation solutions. Program memory for up to 60 K of PLC program steps is standard and a PCMCIA slot can accommodate up to 2 MB of additional RAM, providing the capacity needed by demanding applications, including extensive recipe management systems.

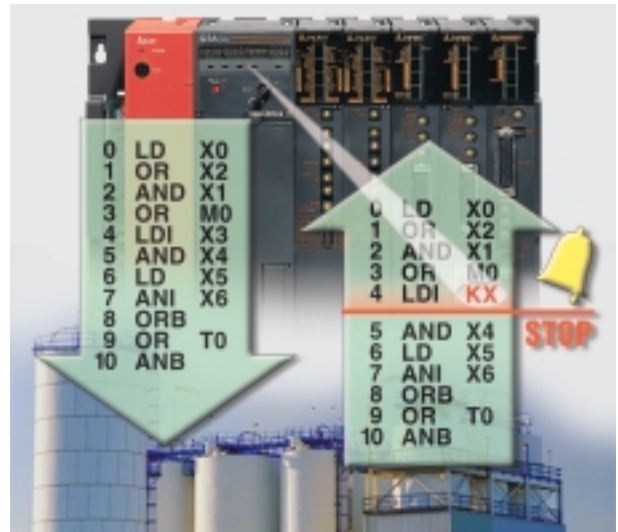
Performance spectrum

You can configure complex positioning applications controlling up to 32 axes per module with linear or circular interpolation. S-shaped acceleration and deceleration ramps go easy on

your valuable machines. The ANSH can also control up to 96 stepping motors. That's the kind of all-round flexibility that modern factories need.

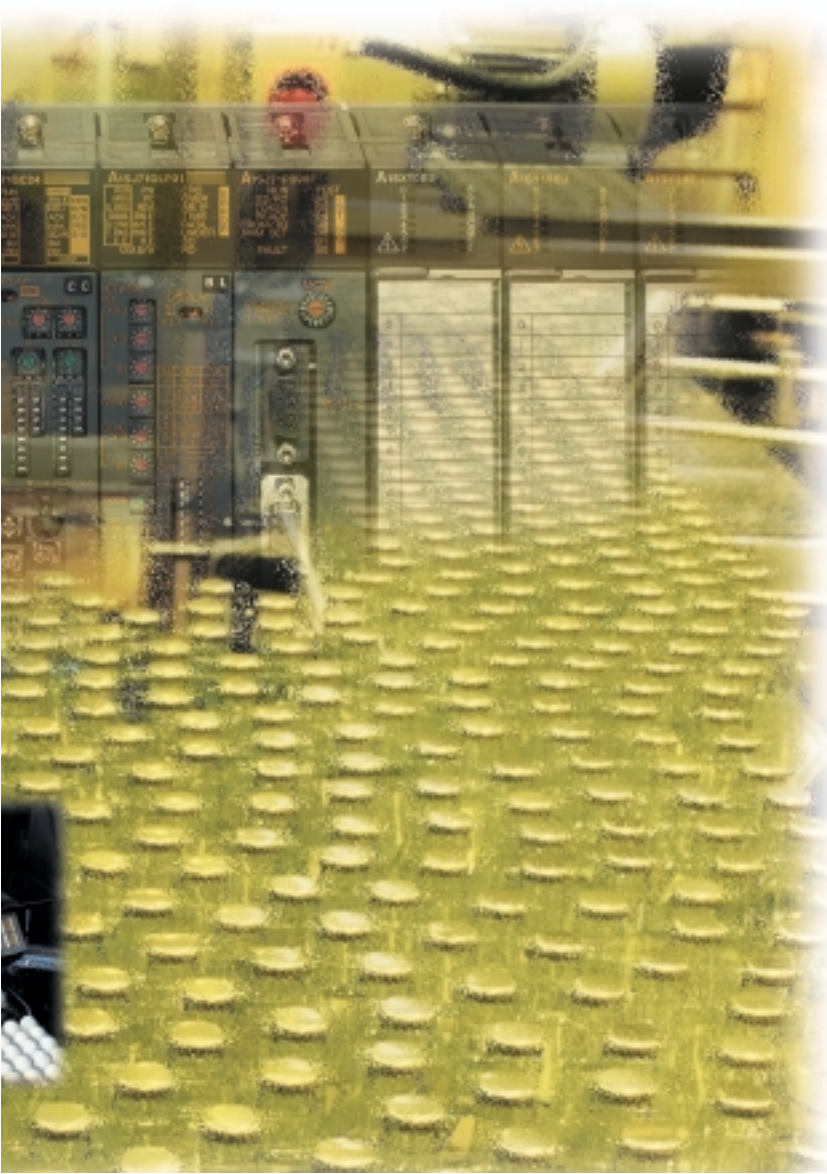
Communications performance

The high-speed module rack of the QnAS system makes it possible for the network modules to provide extremely fast data transfer rates between the controller and the network. It takes less than 1 second to transfer a 50 KB recipe from the host computer to the controller via an Ethernet link – the PLC program execution cycle continues normally during the transfer, of course.



A comprehensive range of marine approvals also makes this controller an excellent choice for ship automation and offshore applications.

2,048 relays and data registers are reserved for diagnostics functions.



Digital I/Os	1,024 local, 8,192 remote
Analog I/Os	256, resolution max. 14 bits
Program memory	60 K steps 1,018,000 file registers
Cycle period	Binary: min. 0.25/0.075 µs Word: min. 9.0/0.25 µs
Positioning	Max. 96 stepping motors Max. 32 servo motors Max. 64 high-speed counters
Network support	Comprehensive network support
Power supply	100 – 240 V AC, 24 V DC
Dimensions/mm (W x H x D)	220 – 430 x 130 x 94/110

Over 60 different application modules are available for a wide variety of functions.



MELSEC QnA/Q4AR

Process control with redundant architecture

The following application modules are available for the MELSEC QnA/Q4AR series:

- Digital I/O modules
- Analog I/O modules
- Special-function modules for interrupt processing, temperature logging, temperature control, positioning, serial interfaces, network modules

The MELSEC QnA/Q4AR controllers are particularly well suited for the following applications:

- Ship equipment, airport logistics
- Industrial exhaust treatment systems and petrochemical plants
- Power generation, turbine and press control systems
- Motor industry applications:
- Motor assembly and final vehicle assembly

MELSEC QnA/Q4AR – Redundant Architecture for Full Process Continuity



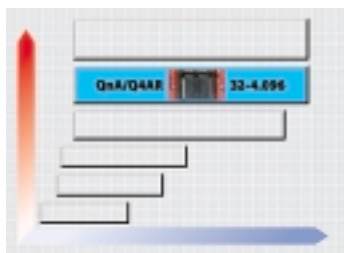
Five finely-spaced CPUs are available, with 28 – 124 K steps of program memory and processing speeds of 0.075 – 0.2 μ s per logical instruction. The system grows

with your needs: Up to 64 expansion slots on eight racks provide ample configuration options. A large number of special function modules with their own proces-

sors are available for the configuration of perfectly-tailored systems for every application, including temperature logging modules, positioning modules with linear and circular interpolation, high-speed counters, interfaces and network modules.

Comprehensive automatic diagnostics

The QnA/Q4AR has 2,048 relays and data registers that are exclusively reserved for diagnostics functions. The operating status of all controller components are automatically stored in these relays and registers.



Programmable Logic Controllers

Redundant controller hardware

The Q4AR provides the security needed for mission-critical processes that must be protected against controller failure. In normal operation the active CPU executes the control program while the standby CPU continuously tracks and copies the process data. If the active CPU fails as the result of an abnormal condition etc. the standby CPU instantly cuts in and assumes control, on the basis of the last valid process image.

Maintenance during process execution

Maintenance work can be carried out on the main module rack without interrupting active

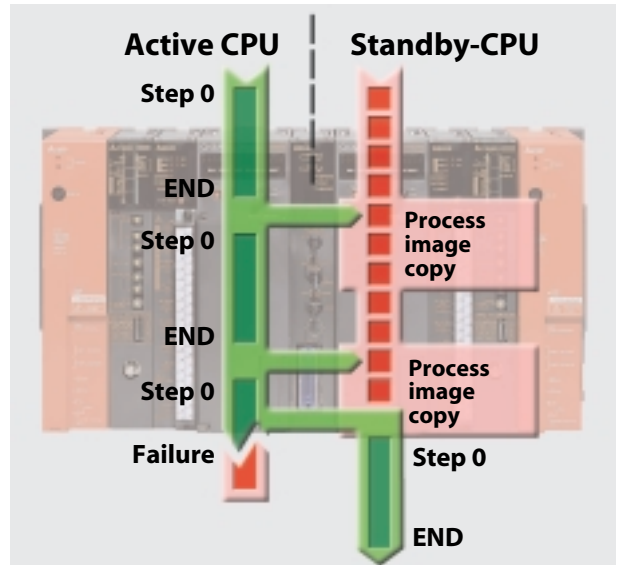
processes. The user selects the active CPU with a key-operated switch, and the inactive CPU's modules can then be replaced safely.

Redundant network technology

Remote I/Os are controlled via the 10/20Mbaud MELSEC-NET/10 network. If abnormal behaviour is registered in the master CPU the standby CPU automatically cuts in and takes over control of the remote I/Os.

Automatic program synchronisation

The programs of the master and standby CPUs must always be identical. If program changes are performed online



in the active CPU the program of the standby is synchronised automatically.

The redundant controller architecture of Q4AR provides maximum control reliability for critical processes. Active switching to the standby CPU. The redundant system can be precisely configured for the needs of the individual application.

Digital I/Os	4,096 local, 8,192 remote
Analog I/Os	1,024, max. resolution 14 bits
Program memory	124 K steps 2,036,000 file registers
Cycle period	Binary: min. 0.075 µs Word: min. 0.25 µs
Positioning	Max. 192 stepping motors Max. 128 servo motors Max. 128 high-speed counters
Network support	Comprehensive network support
Power supply	100 – 240 V AC, 24 V DC
Dimensions/mm (W x H x D)	382 – 570 x 250 x 121

PCMCIA memory cards enable external program editing and easy program exchange.



MELSEC System Q – The System Platform for Automation

The following application modules are available for MELSEC System Q:

- Digital I/O modules
- Analog I/O modules
- Special-function modules for interrupt processing, temperature logging, temperature control, positioning, serial interfaces, network modules

A variety of different CPU modules with PLC, motion controller and PC functionalities

MELSEC System Q is particularly well suited for these types of applications:

- Packaging
- Textiles machines
- Paint-spraying and welding lines
- Industrial applications with high levels of automation
- Process integration in a single controller
- Semiconductors/IT



Multiprocessor power for tomorrow's challenges

Ever more demanding manufacturing systems, new forms of communication and the need to integrate new technologies are pushing the performance limits of conventional PLC systems. Mitsubishi Electric's response to

these growing challenges is a new high-end controller with advanced multi-processor technology: MELSEC System Q!

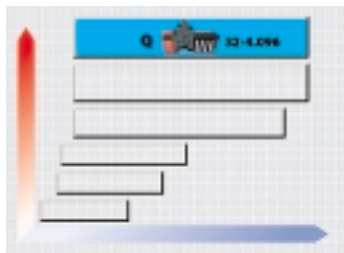
In each system up to four separate CPUs share the processing load of control, motion control, PC and communications tasks. This brilliantly simple solution,

introducing the concept of teamwork to controllers, brings a drastic boost in system availability and performance.

Fast, flexible and service-friendly

With its unique design concept and outstanding features MELSEC System Q can rightfully claim to be the controller platform of the future.

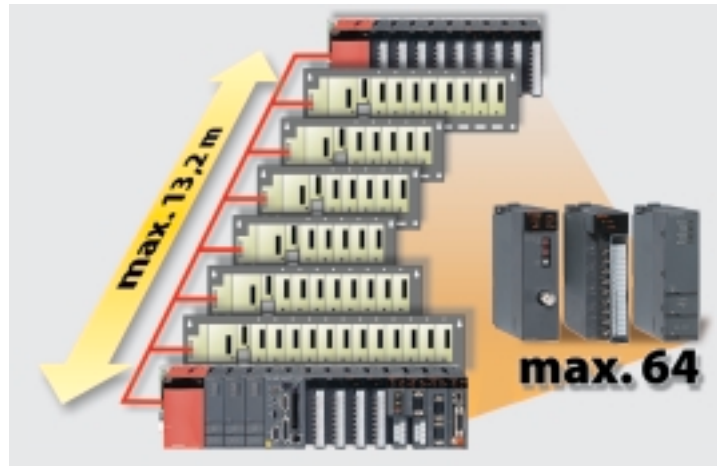
- All program cycle periods continuously adjustable from 0.5 – 2.000 ms in 0.5 ms steps
- Self-diagnostics with error history stored in the CPU
- Memory expansion options up to 32 MB



Programmable Logic Controllers

- Support for remote diagnostics and programming (modem, Internet, intranet)
- Monitoring of special function modules, online system analysis on screen
- All CPUs fitted with integrated Flash ROM
- Utility tools enable simple configuration and functional tests of analog and special function modules
- Programmable with IEC 1131.3/EN 61131-3 compatible software or (via a PC CPU) in high-level languages like C++ or Visual Basic
- Soft PLC available for the PC CPUs

The extremely compact design of the MELSEC System Q saves valuable space in your



switchgear cabinet. The large number of available CPUs makes it possible to configure systems precisely for application needs. And thanks to the platform-based architecture you can reconfigure at any time

without changing the remaining components. All in all a very solid investment in the future.

The following modules are available for the MELSEC System Q:

- A selection of PLC CPUs
- A selection of motion controller CPUs
- Complete, full-function PC module
- Digital I/O modules
- Analog I/O modules
- Communications modules for Ethernet, MELSECNET10/H, serial ports, Profibus/DP, CC-Link, DeviceNet and AS-I
- Special-function modules for interrupt processing, temperature acquisition, temperature control, positioning and high-speed counters

Digital I/Os

Q00J 256 local, 2,048 total
Q00/01 1,024 local, 2,048 total
Q02 – 25 H 4,096, 8,192 total

Analog I/Os

Resolution 16 bits (15 bits + sign)
Conversion time 80 µs/channel
Precision ±0.1% of measurement range
Auto temperature drift compensation

Program memory Single PLC CPU models

Q00JCPU 8 K steps
Q00CPU 8 K steps
Q01CPU 14 K steps

Program memory Multiprocessor PLC CPU models

Q02CPU 28 K Steps
Q02HCPU 28 K steps
Q06HCPU 60 K steps
Q12HCPU 124 K steps
Q25HCPU 252 K steps

Memory PC CPU models

64/128 MB RAM
32 MB – 1 GB silicon drive
Up to 2 x 5 GB UDMA hard disks

Operating systems

Windows NT 4.0/NTe/2000 Prof.

Cycle periods

200 ns/log. instruction (Q00JCPU)
160 ns/log. instruction (Q00CPU)
100 ns/log. instruction (Q01CPU)
79 ns/log. instruction (Q02CPU)
34 ns/log. instruction (H models)

Positioning

1, 2 and 4 axis positioning modules

Motion control

8 or 32 axes per Motion CPU

Motion CPU models

Q172CPU 8 axes
Q173CPU 32 axes

Network technology

Complete network support

Power supply

100 – 240 V AC, 24 V DC

Dimensions/mm (WxHxD)

189 – 439 x 98 x 98

MELSEC System Q – The High-Performance System



Mitsubishi Electric has once again set unique new standards in the industrial automation industry: The new MELSEC System Q features advanced multiprocessor technology, with support for up to four CPUs in a single controller.

Integrated motion controller for universal functionality

Equally unique is MELSEC System Q's ability to seamlessly integrate PLC and drive applications (see the Motion Controllers catalogue for details). You can install PLC CPUs, motion controller CPUs and PC CPUs together on a single platform. Motion controllers with up to 32 axes per Motion CPU are available, and you can install up to four PLC CPUs, one PC CPU or

three Motion Controller CPUs per system – allowing you to control up to 96 servo axes simultaneously.

Full-featured slot PC for open-platform functionality

MELSEC System Q's ability to integrate a full-featured PC module opens up a whole range of new possibilities. The combination of the MS Windows® world with traditional PLC technology and/or drive systems technology on a single platform makes MELSEC System Q a really safe investment in the future.

There's no more need to install multiple PLCs and a network to connect them.

- *Now you can control multiple applications within a single system using MELSEC System Q's powerful multiprocessor functionality.*



PLC CONTROLLER
NEW
PC TECHNOLOGY



Programmable Logic Controllers

Online Change for maximum efficiency

The Online Change function makes it possible to implement PLC program modifications while the system is actually running. New programming interfaces and a new operating system guarantee that the Online Change functionality is fast, efficient and safe. The Q CPUs have two programming interfaces:

- RS-232 (115.2 Kbps)
- USB (12 Mbaud, for H-CPU models)

In addition to faster program transfers and editing, these high-speed interfaces also improve the performance of the monitoring and diagnostics functions.



IT technology for worldwide connectivity

The e-mail function can be used to automatically send alarms generated by system components to up to sixteen recipients. You can also send files with the FTP function (service requests, reports etc).

Programming with high-level languages

The PC CPU can handle control tasks on its own, without any additional CPUs. Using C++ or Visual Basic you can control all or part of your system with a high-level language. Or you can use Mitsubishi Electric's Soft PLC, the SX Controller. It really would be very difficult to create a more open and versatile system than this one.

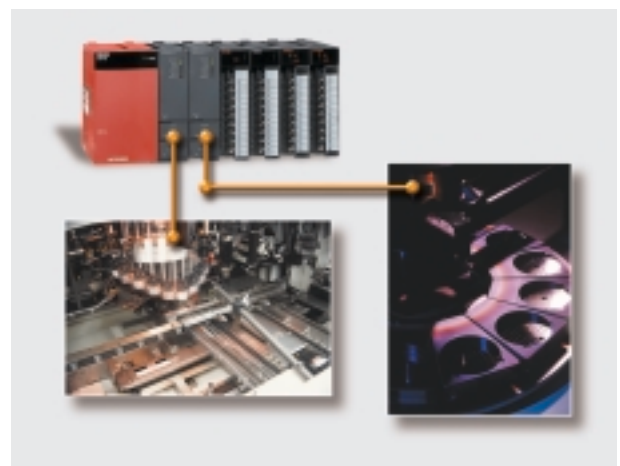
With its integrated IT technology the new MELSEC System Q opens up a wide range of options for worldwide communication, including all the following functions:

- Remote maintenance and diagnostics via the Internet
- Automated reports via e-mail
- Automated alarm messages via SMS
- FTP file transfer
- Storage of and access to HTML pages in the PLC
- Integration of a full-function slot-in PC



The 3 in 1 benefit factor: PLC, motion controller and PC

- The MELSEC Q enables you to execute controller, PC and drive system applications simultaneously with a single system.



MELSEC Network Technology – The Right Connection for Every Application

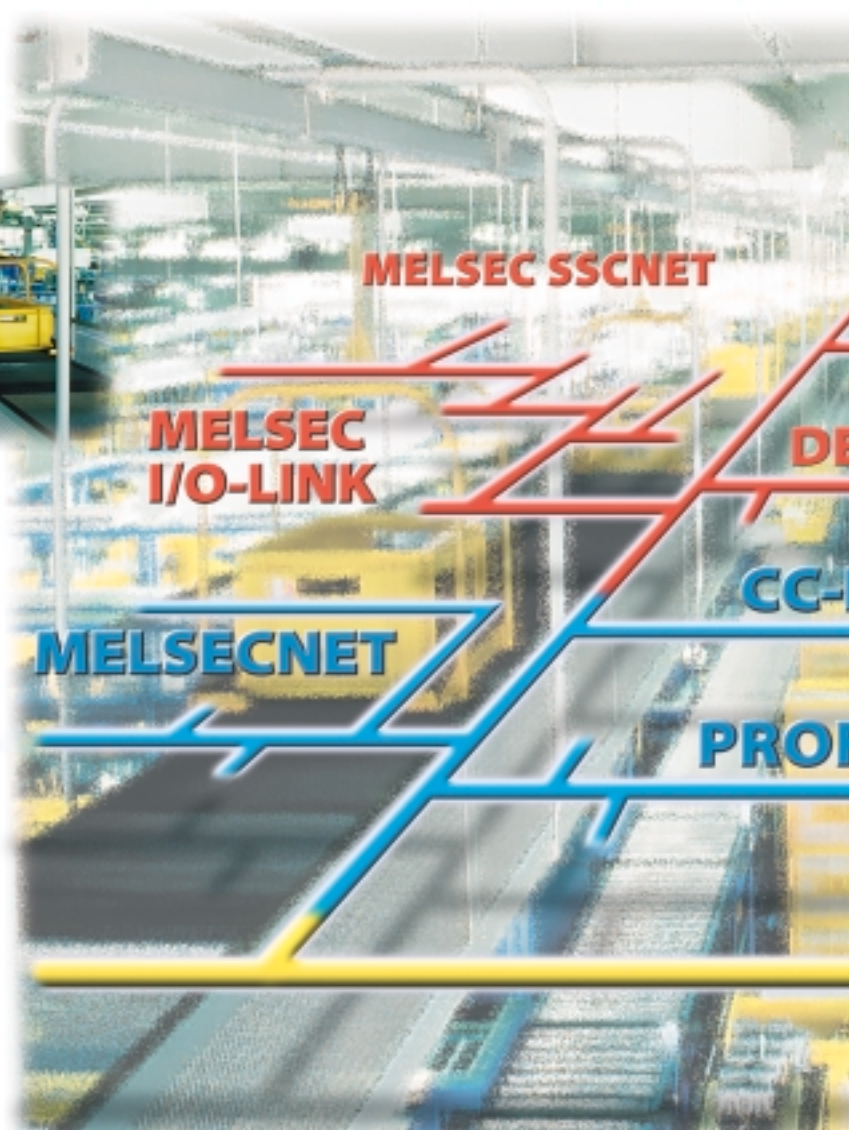
Production facilities without data exchange and communication technologies are unthinkable in today's world. More and more manufacturers are now implementing ISO

9000 systems in response to growing consumer quality awareness. This makes production data logging essential, either as paper printouts or as trend records in a control computer. At the same time, the costs pressure exerted by the global market is forcing companies to find new ways to reduce the prices of complex machines. All this quickly leads to demands for remote I/Os – and no matter how unusual or complex the application, Mitsubishi always has the perfect network solution.

First example:

A customer wants to automate a production system with a large number of machines, using sensor and actuator hardware from a number of different manufacturers. The customer also wants to be able to use a control unit to display the status of all the machines. The ideal solution here is PROFIBUS/DP, a non-proprietary network supported by over 1,500 products available worldwide. A MELSEC PLC can easily be configured to control this network.

MELSEC networks are available for all manufacturing technology levels



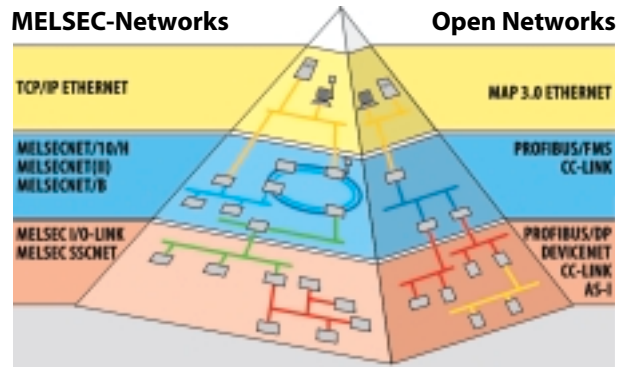
MELSEC-Networks	MELSEC NET/10/H	MELSEC NET(II)	MELSEC NET/B	MELSEC PPN	MELSEC I/O-LINK	MELSEC SSCNET
Topology	Ring (redundant), bus	Ring (redundant)	Bus	Bus	Bus (tree)	Serial bus
NW management	Floating master	Master/Slave	Master/Slave	Master/Slave	Master/Slave	Master/Slave
Protocol	Proprietary	Proprietary	Proprietary	Proprietary	Proprietary	Proprietary
Transfer media	Coax, fibre-optic	Coax, fibre-optic	2-wire	2-wire	2-wire	4-wire
Transfer rate	10 Mbit/s 20 Mbit/s 25 Mbit/s	1.25 Mbit/s	125/250 /500/ 1,000 Kbit/s	38.4 Kbit/s	38.4 Kbit/s	5.6 Mbit/s
Total extent	Up to 30 km per network	Up to 10 km	1.2/0.6/ 0.4/0.2 km	0.5 km	0.2 km	Max 600,000 servo axes

You can also integrate the powerful GOT900 or MAC E control units and the very flexible, modular remote O/I units of the MC and MT series in the PROFIBUS/DP network. The powerful ProfiMap tool makes network configuration efficient and simple. Networks like these are now often used in the car, food and wood working industries.

Second example:

A customer needs to transfer large amounts of data between several controllers over large distances. Requirements include very high data rates plus outstanding reliability and failsafe performance.

The best network solution for this application is MELSECNET/10/H. Personal computers can easily be integrated in this network, which uses a redundant ring topology, an architecture that guarantees maximum availability. In addition to this MELSECNET/10/H uses a token ring protocol, which ensures that power failures at individual stations have no effects on the other network stations. Data is transferred at extremely high speeds – you can choose between 10 and 25 Mbaud – with a maximum network extent of 30 km. Furthermore, up to 255 of these network segments can be linked, enabling the

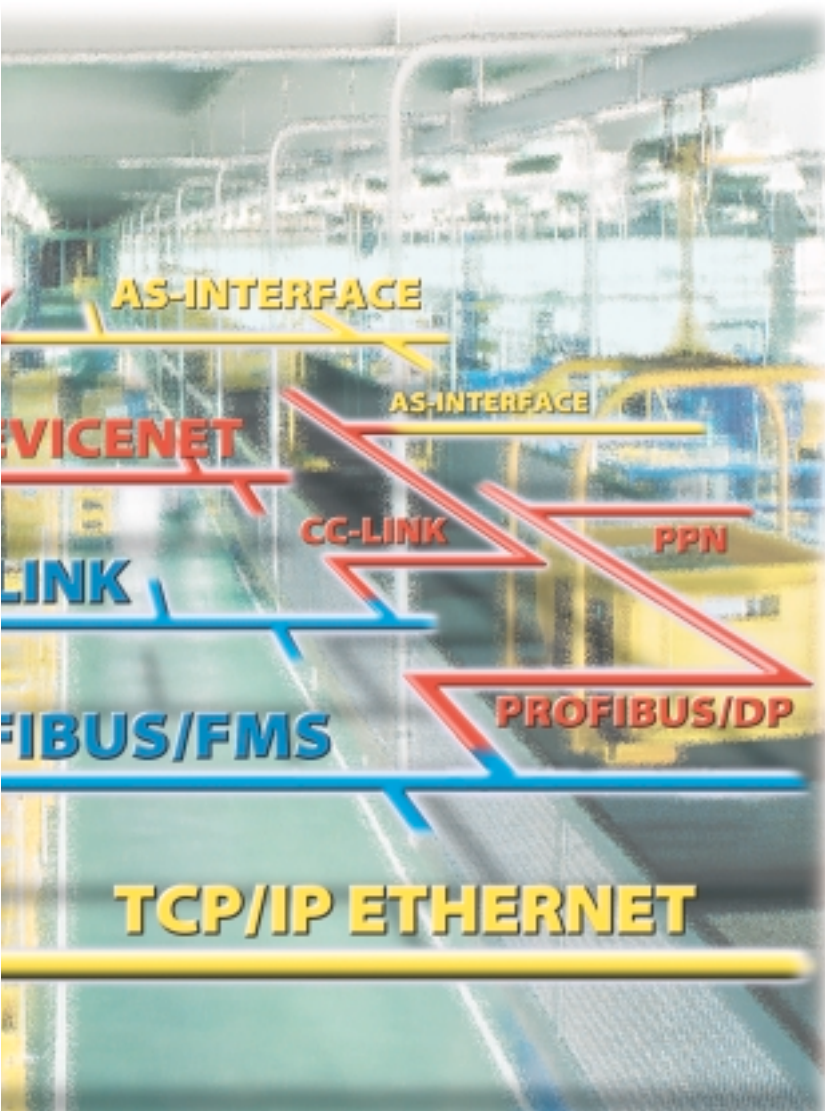


configuration of network structures with almost unlimited complexity. Networks like these are needed in power stations, airports and all other big installations where maximum performance and reliability are required.

Whatever your application, you can always be sure that Mitsubishi Electric has the right MELSEC network for the job!

Reliable and versatile – MELSECNET/10/H:

- **Redundant network manager for maximum communications reliability and availability**
- **Flexible structure with bus or ring topology**
- **Virtually unlimited expansion – up to 255 networks with 64 stations per network**
- **Also supports star configurations**
- **Direct network access from every connected station**
- **Central monitoring of all network stations**



Open Networks	MAP/Ethernet	CC-Link	PROFIBUS FMS/DP	Device Net	AS-Interface
Topology	Bus	Bus	Bus	Bus	Bus
NW management	CSMA/CD (IEEE 801.3)	Master/Slave	Log. Token Ring, Master/slave	CSMA	Master/slave
Protocol	Conf. MAP 3.0	Proprietary	Conf. DIN 19245	DeviceNet	AS-I specific
Transfer media	100 BASE-T 10 BASE2, 10 BASE5	2-wire	2-wire	2-wire	Coded ribbon cable
Transfer rate	10 Mbit/s	10 Mbit/s	FMS: 9.6-500Kbit/s, DP: 1.5 – 12 Mbit/s	500 Kbaud	Cycle period <5 ms
Total extent	Up to 2.5 km	1.2 km	1.2/0.6/0.2 km	500 m	up to 300 m

MELSEC-Networks

TCP/IP Ethernet

The worldwide TCP/IP standard gets you up and running without delays. Ethernet gives connected PCs access to all PLCs in the entire MELSECNET configuration, all the way down to the individual I/Os on the production level.

MELSECNET/10/H and (II)

Inexpensive cabling, unbeatably simple configuration and

maximum availability thanks to redundant architecture and Floating Master. Maximum extent 30km with up to 255 segments.

MELSECNET/B, MELSEC PPN

These two networks provide inexpensive solutions within the production level. They enable distributed intelligence that simplifies the implementation of complex applications.

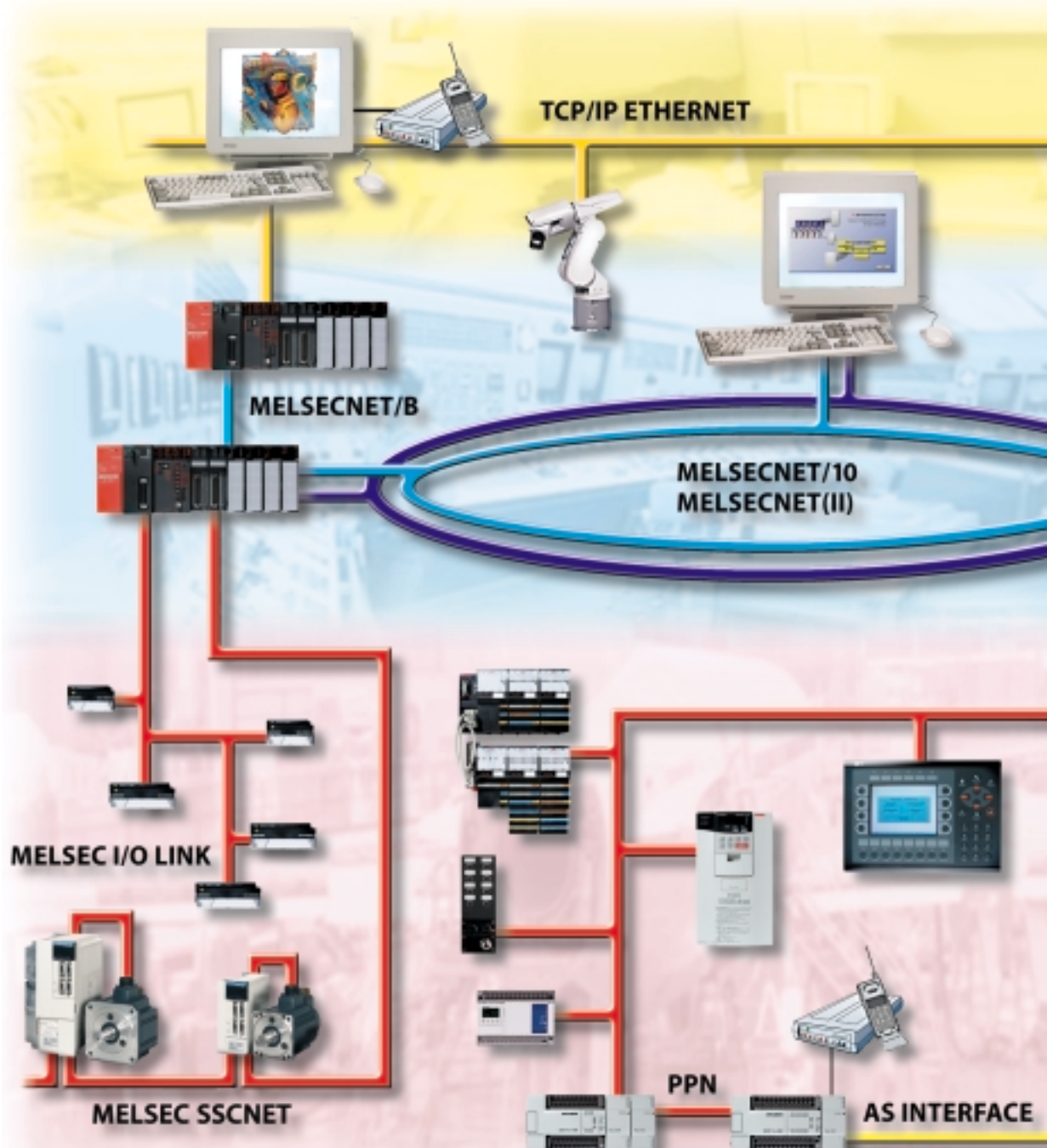
MELSEC I/O-LINK

Network that enables remote installation of modules on the individual machines. Uses twisted-pair cabling and a user-definable tree structure.

MELSEC SSCNET

Synchronous high-speed network for servo and motion applications. Extremely reliable performance. Very simple cabling and connection.

TCP/IP Ethernet
MELSECNET/10
MELSECNET/H
MELSECNET(II)
MELSECNET/B
MELSEC PPN
MELSEC I/O-LINK
MELSEC SSCNET



Open Networks

MAP 3.0 Ethernet

Interdepartmental data communications between the command and production levels with a standard, non-proprietary protocol and fast throughput.

Profibus/FMS und /DP

Communication with third-party systems. Data transparency with MELSEC networks. Simple handling

of large data volumes with complex sensors and good diagnostics capabilities. High-speed and secure communications technology.

DeviceNet

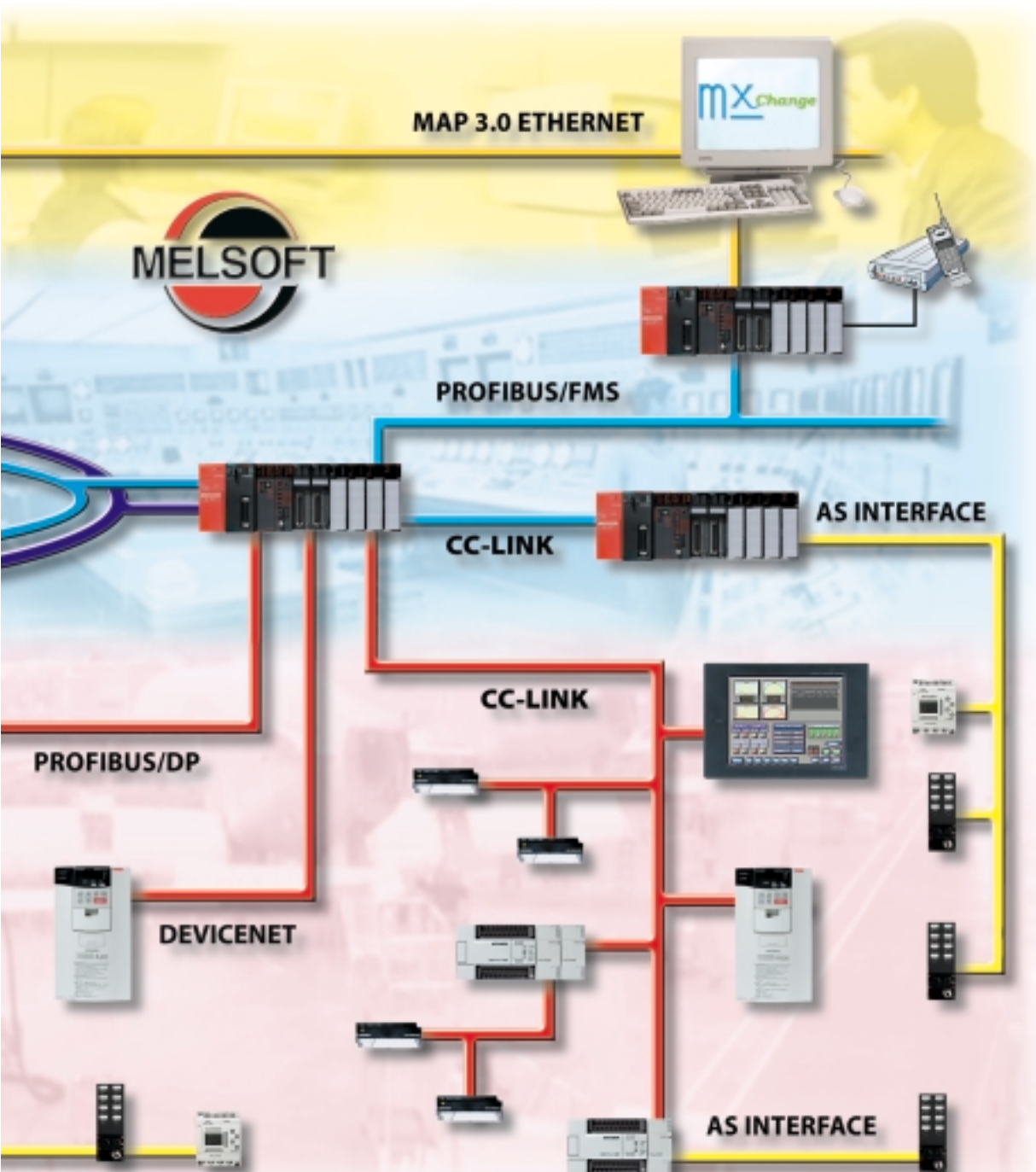
CAN-based communications network. An error-tolerant network that allows fast and easy connection of components from a wide variety of manufacturers.

CC-Link

Network for the control and I/O level with real-time processing and distributed intelligence. Supports connection of third-party hardware.

AS-Interface

Inexpensive field bus solution with user-definable tree structure. Single line for data and power. Very short cycle periods combined with outstanding reliability.



*MAP 3.0 Ethernet
Profibus/FMS
CC-Link
Profibus/DP
DeviceNet
AS-Interface*



MELSOFT – The Progressive Software Concept from MITSUBISHI ELECTRIC

Around the globe, state-of-the-art automation systems from Mitsubishi Electric are contributing to technological progress and economic success. The legendary reliability and user-friendly operation of Mitsubishi Electric's hardware components are also key features of the integrated **M**itsubishi **E**lectric **S**oftware concept MELSOFT.

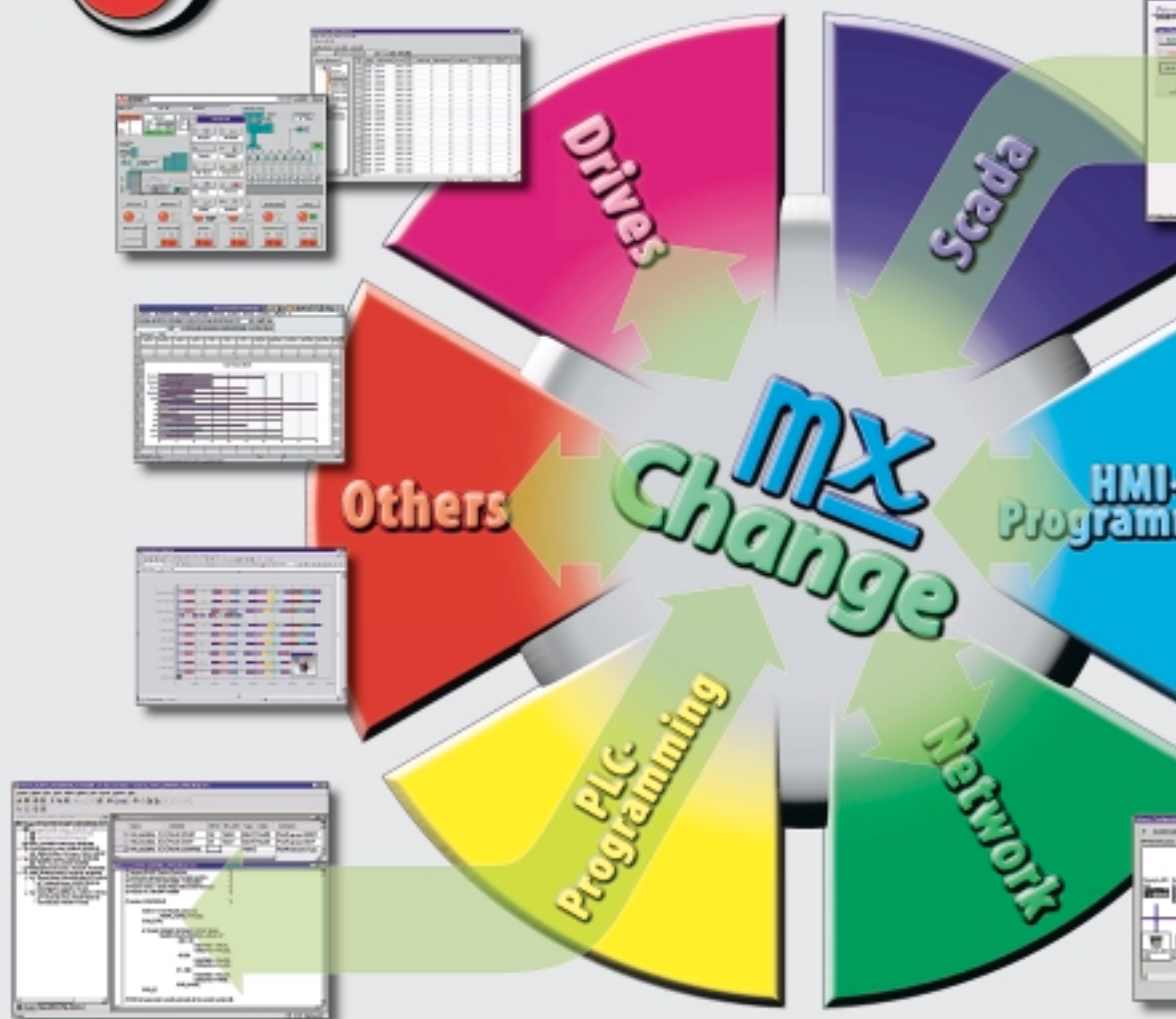
Data and programs are fully compatible and portable between all the many software packages within the MELSOFT system. The foundation for this transparent data exchange is the MX Change package.

In recent years growing requirements and new specifications have almost doubled automation development costs. Networks, positioning, analog signal processing,

open bus systems, control units and complete process visualisation links are now all standard components of automation systems. Many projects have become so complex that the project teams must now include a large number of skilled workers to write the PLC programs, program the control units and create the visualisation applications.

The MELSOFT concept encompasses the following software packages:

- GX IEC Developer
- GX Developer
- GX Configurator DP
- E Designer
- GT Works
- GT SoftGOT
- E-View
- MX Components
- MX Monitor
- MX Chart
- MX OPC Server
- MX SCADA



Programming and Process Visualisation

MX Change helps to keep development and maintenance overheads, and thus the system price, within reasonable limits. It does this by handling the entire data management within your project team, co-ordinating the transparent exchange of data and code between the individual MELSOFT programs. It even supports links to other systems, such as CAD systems.

MX Change's efficient performance is achieved with several different program modules. The foundation is



MELSOFT is a fully-integrated concept encompassing all industrial automation levels.

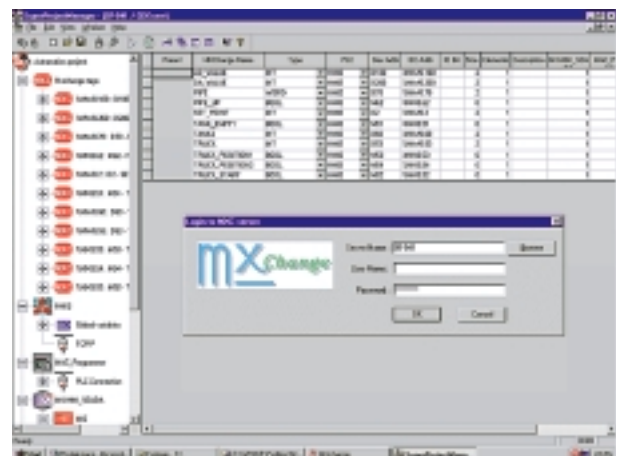
the MX Change server, which is a database that can be accessed by all programs integrated in the system. It is used both as a local server and as a network server. A variable declared in any program connected to MX Change can be accessed by all the other programs in the system. If the declaration causes a data conflict all the programmers are informed automatically, eliminating the time-consuming search for the problem during the system commissioning phase.

The second MX Change program module is the project manager with integrated tag editor. This module is a powerful project navigator that gives the user full project transparency and consistency. It can display all variables in the entire project and its component programs. The user can copy any variable from one part of the project to another by drag & drop. A single click on a project button in the tag editor is all it takes to make a variable available to the associated program. The variable editing capabilities of the project manager and tag editor opens up hitherto undreamed-of

possibilities for programmers, combined with maximum flexibility.

MX Change also helps to cut costs in the system commissioning stage. For example, if an error is encountered you can use the appropriate strings in your visualisation system to open the GX IEC Developer to immediately start monitoring your program at the right point.

The Project Manager generates a comprehensive report of all the variables used in the project.





The GX IEC Developer is more than an IEC 1131.3/EN 61131-3 programming and documentation system.

Support for sequential function chart language (SFC) provides a clear overview of application structure.

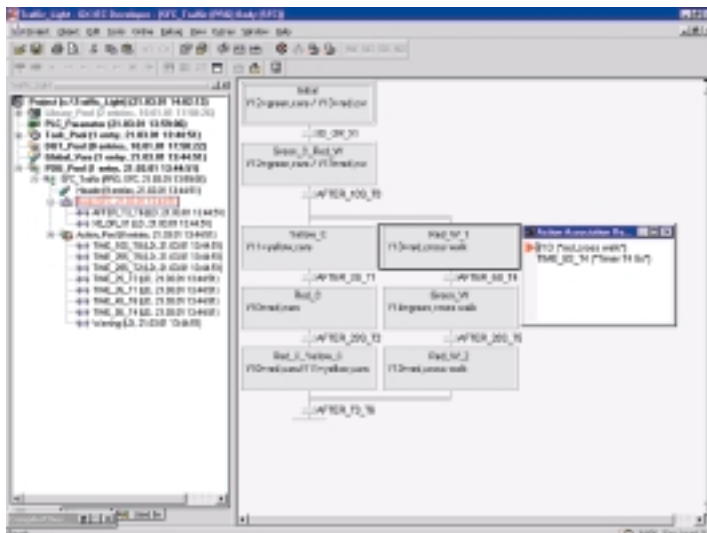
GX IEC Developer – When Your Time Is Money

GX IEC Developer is more than a powerful IEC 1131.3 programming and documentation package. It supports your entire MELSEC PLC implementation from the initial project planning to everyday operation, with a wealth of advanced functions that will help you to cut costs and increase your productivity. The sophisticated program architecture comes with a

range of new, user-friendly functions, including structured programming and support for function libraries.

Top-down application architecture

During the planning phase GX IEC Developer's structuring tools help you to organise your project efficiently, with clear graphical representation of your application structures.



Flexible implementation

During the engineering phase you choose the best programming language for your project. GX IEC Developer supports structure text (ST), sequential function chart (SFC) ladder diagram (LD), function block diagram (FBD) and instruction list (IL) programming.

Program frequently-used functions in function blocks and organise them in libraries. This gives you the confidence that comes with knowing you are using tested, reliable code. Password support helps you to protect your valuable expertise.

Hardware setup and network configuration

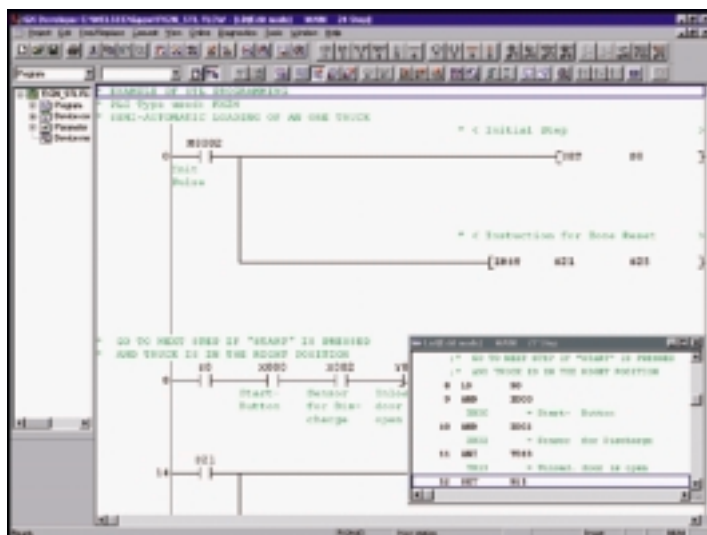
Special testing and debugging tools provide information on the current status of the controllers and the networks they are connected to.



GX Developer supports all MELSEC controllers, from the MELSEC FX series to MELSEC System Q.

Simultaneous display in ladder diagram (LD) and instruction list (IL) formats.

GX Developer – Programming and More



The GX Developer package combines power with an outstandingly simple, intuitive structure. It supports MELSEC ladder diagram (LD), instruction list (IL) and sequential function chart (SFC) programming. The programmer can switch back and forth between LD and IL at any time while working on a project. You can also test all of your program's key functions before they are implemented with the Ladder Logical Test offline simulation mode, which includes user-selectable simulation of all devices and application responses.

**Programming
and Process
Visualisation**

E Designer – Fast MAC E Programming

The E Designer programming software package makes it very easy to create and edit projects for the control units of the MAC E series. The Block Manager provides a complete graphical overview of the project, and the package comes complete with a library of ready-to-use symbols and objects. Drivers for all MELSEC PLCs and many third-party PLCs are available directly. Drivers can be updated online via the Internet without exiting E Designer.

You can create multi-lingual projects with up to ten user-

selectable languages. In RUN mode the operator can then choose the language he or she prefers to use. Selecting a different language changes all text objects, alarm messages and system texts. All the necessary special characters required by the different languages are supported, including accents etc. All texts can be easily exported and imported with the Application Languages Manager.

HMI tools are included for exchanging data like HTML Internet pages or recipe alarm files between the control unit



and the PC. These data links can be realised via serial and Ethernet (FTP) interfaces.

Highlights:

- Multi-language hardware and software support
- New graphics objects
- Dual driver support



E Designer is a programming package for the MAC series of control units.

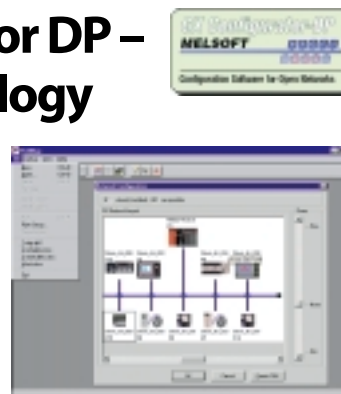
GX Configurator DP and GX Monitor DP – Transparency for Network Technology

GX Configurator DP can be used to configure all Profibus/DP modules of the MELSEC A/Q series. In addition to MELSEC PLCs it also supports connection of Mitsubishi frequency inverters, the E series of graphical control units and remote I/O modules.

Integrating slave modules from third-party manufacturers is as easy as importing the GSD data. GX Configurator DP makes Profibus/DP very easy to handle. To configure your network with this software system you just drag ready-to-use graphical images of your devices onto the Profibus/DP network representation on the screen. Then you enter the device station numbers and specify which PLC addresses

you want to allocate to the remote Profibus/DP slaves. A wide range of user parameters are supported for the Profibus/DP-Slaves; configuration is handled transparently with the GSD files.

Program building blocks for the network are generated automatically by GX Configurator DP, and can then be integrated in your programs with the GX IEC Developer programming software package, cutting programming overheads for the PLC to an absolute minimum. You can upload configurations to the Profibus/DP very easily, either via the programming port of the CPU or via networks like Ethernet or MELSECNET.



The new GX Monitor DP software package provides remote diagnostics for Profibus/DP networks and PLCs – in plain text and with informative graphical displays. It is accessible with standard browsers like Microsoft Internet Explorer, guaranteeing direct access and intuitive operation from any location and on virtually any PC platform.



GX Configurator DP is a user-friendly configuration software package for the open network PROFIBUS/DP. GX Monitor DP is a system for remote diagnostics, including diagnostics via the Internet.

See our MELSOFT catalogue for full details of all our many other software packages.

HMI – Human-Machine Interface For Graphical and Text Dialog

HMI control units extend the functionality of programmable logic controllers with all these benefits:

- *Simple operation and control of the process*
- *Clear display of the process with text and graphics information*
- *Generation of reports for quality control and process data export to other applications via communications interfaces*
- *Precise error messages and instructions*
- *Simultaneous PLC communication with control units and PCs via a single interface (transparent mode)*
- *MELSEC drivers, other drivers (e. g. for Siemens or Allen Bradley) and Profibus/DP interface are available.*













Today's industrial users want greater access to the processes of their plant and machinery. HMI control units are the ideal complement to your MELSEC PLC systems, providing the facilities for a meaningful dialogue between operator and machine. With the functionality to replace entire control consoles in any modern application, Mitsubishi Electric's enormously flexible HMI systems are quite simply the better and more cost-effective solution. Their superior practicality and performance brings benefits to all aspects of your application and installation.

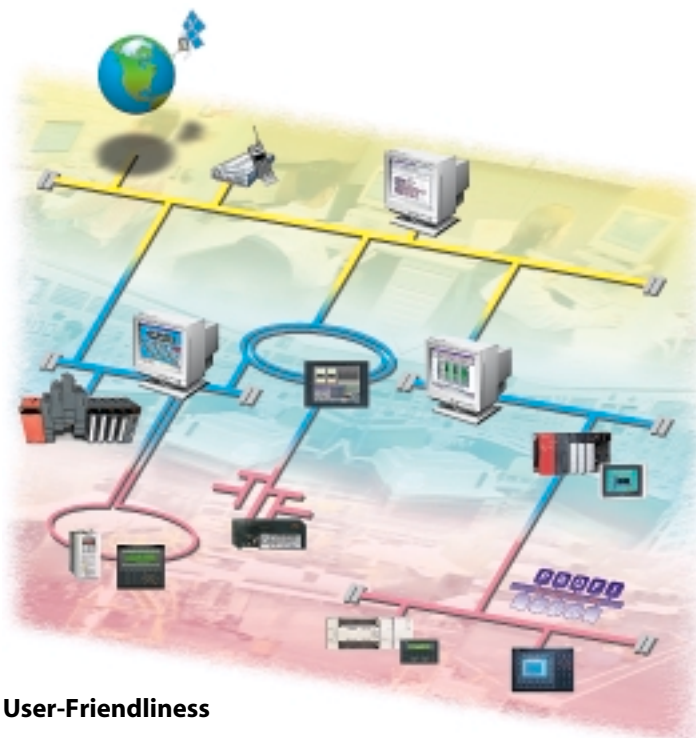
Communication Between Operator and Machine

HMI control units bring transparency to the operations of the controlled system and enable a process-oriented dialog between operator and machine. With the help of these units you can monitor and edit a wide range of process data parameters quickly and easily.



HMI Human-Machine Interface

-  **Colour graphics**
-  **Graphics**
-  **Printouts**
-  **Alarms**
-  **Time channels**
-  **Recipes**
-  **Data logging**
-  **LEDs**
-  **Touch keys**
-  **Trends**
-  **Function keys**
-  **Communications**



Simple Installation

HMI units are installed directly on the machine, and no additional modules are required for connection to the PLC system.

Versatility and Flexibility

All the information and process data required by the user are directly accessible, providing maximum process transparency. And thanks to their IP65 rating the HMI units are always completely reliable, even under the toughest production conditions.

User-Friendliness

HMI units are available with a choice of text or graphics displays. Their programmable, display-oriented function keys can be labelled by the user. Programming and configuration is very simple, performed with the help of a PC running user-friendly Windows software.

the MAC units even conform to the international IEC 801.4.4 standard. Networking support is also an integral part of the HMI concept. Nowadays networks are simply essential, for example for central monitoring and surveillance, making process data available to host systems and enabling the configuration of multi-user systems using the same data accounts. The link capabilities range from the standard serial connection to Ethernet communications.

Worldwide Compatibility

The user can choose from a large selection of national character sets. Like all other products in the MELSEC family, the HMI units have CE certification. And

Model	Display type	Display format	Memory	Protect. rating	Dimensions mm (WxHxD)	Applicable PLC
MAC E50	LCD	2 x 16 char.	16 KB	IP65	104x69x38	MELSEC FX/A
MAC E100	LCD	2 x 20 char.	64 KB	IP65	142x90x27	All MELSEC PLCs ¹
MAC E150	LCD	2 x 20 char.	64 KB	IP65	142x100x29	All MELSEC PLCs ¹
MAC E200	LCD	4 x 20 char.	64 KB	IP65	147x163.5x38	All MELSEC PLCs ¹
MAC E300	LCD	240 x 64 pixels	400 KB – 8 MB	IP65	211.4x198x69	All MELSEC PLCs ^{1, 2}
MAC E600	LCD	240 x 128 pixels	400 KB – 8 MB	IP65	214x232x69	All MELSEC PLCs ^{1, 2}
MAC E610/615	STN/16 grey/256 colours	320 x 240 pixels	400 KB – 8 MB	IP65	212x198x87	All MELSEC PLCs ^{1, 2}
MAC E700	STN/256 colours	320 x 240 pixels	400 KB – 8 MB	IP65	276x198x87	All MELSEC PLCs ^{1, 2}
MAC E710	STN/256 colours	320 x 240 pixels	400 KB – 8 MB	IP65	212x198x87	All MELSEC PLCs ^{1, 2}
MAC E900T	TFT/256 colours	640 x 480 pixels	1.6 MB – 8 MB	IP65	367x274x87	All MELSEC PLCs ^{1, 2}
MAC E900VT	TFT/256 colours	640 x 480 pixels	1.6 MB – 8 MB	IP65	335x430x87	All MELSEC PLCs ^{1, 2}
MAC E910T	TFT/256 colours	640 x 480 pixels	1.6 MB – 8 MB	IP65	290x250x105	All MELSEC PLCs ^{1, 2}
F930GOT-BWD-E	STN/mono	240 x 80 pixels	256 KB	IP65	145x75x49	All MELSEC PLCs ¹
F940GOT-LWD/SWD-E	STN/mono/8 colours	320 x 240 pixels	512 KB	IP65	162x130x57	All MELSEC PLCs ¹
F940/F943GOT-LBD/SBD-RH/H-E	STN/mono/8 colours	320 x 240 pixels	512 KB	IP54	156x191x63.5/69.5	All MELSEC PLCs ¹
F940WGOT-TWD-E	TFT/256 colours	480 x 234 pixels	1 MB	IP65	215x133x70.6	All MELSEC PLCs ¹
A950/A953GOT-LBD/SBD	STN/mono/8 colours	320 x 240 pixels	1 MB	IP65	164.5x136x65	All MELSEC PLCs ¹
A970GOT-LBA/SBA-EU	STN/mono/8 colours	640 x 480 pixels	1 MB – 8 MB	IP65	297x208x40	All MELSEC PLCs ¹
A975GOT-TBA-EU	TFT/256 colours	640 x 480 pixels	1 MB – 8 MB	IP65	297x208x40	All MELSEC SPS ¹
A985GOT-TBA-EU	TFT/256 colours	800 x 600 pixels	1 MB – 8 MB	IP65	312x238x43	All MELSEC SPS ¹

¹ Support for other manufacturers available on request, ² Profibus/DP optional



Our aim is to give you optimum service everywhere. Mitsubishi Electric is one of the world's biggest electronics companies, and our entire experience and expertise are available to you all over the globe. A worldwide network of service points, sales offices and system partners provides a comprehensive spectrum of on-the-spot services, advice and support, precisely geared to the needs of your local market. No matter where you are, in New York or Singapore, you can always be sure of getting competent advice on your application problems and practical help to get your systems up and running faster.

International Expertise For Global Markets

The global approach comes naturally to a world market leader - it's part of our daily business, and this is reflected in the design of our products: They conform to many national standards, can operate with a wide range of voltages and support interfaces in a large choice of local languages. All this is a great boon in international projects, enabling you to eliminate many technical problems before they even have a chance to occur.

Specialised know-how

In all projects we listen to our users to find out what they want from our products. Over the years we have collected a pool of specialised knowledge and optimised hardware and software solutions for a number of individual industries and applications. Solutions geared to the needs of specific industries often bring additional benefits by enhancing system power, simplifying operation and making the deployment of hardware and software more efficient. Projects conducted in the sectors

listed below have provided us with concrete information on the special benefits of our products in these applications. We are able to provide you with the ideal automation and drive system solutions for these applications, as well as the hardware:

Elevator and lifting gear systems, textiles machines, plastics processing, packaging technology, laundry systems

We'll get you into Asia

With an over 40-percent share of the market for automation components Mitsubishi Electric is the unchallenged leader in the Asian market. Our important economic role and extensive business connections in the region provide incalculable advantages for European enterprises. Nobody knows the conditions in the Asian markets better than we do, and nobody else has such a comprehensive range of products, precisely geared to the technical requirements and national standards of these markets. Our enormous base of Asian know-how is available



to you when you need it – from the acquisition to planning and implementation.

Strength in unity

In 1996, Mitsubishi Electric formed an "Automation Network" with a group of selected international system partners. This network can deliver solutions that are precisely tailored to your individual specifications. You can choose from a huge range of different offerings, ranging from complete automation systems to individual, custom packages. Each one of our system partners has specialised application expertise in specific fields. This market-oriented concept enables us to respond to your wishes without a large, unwieldy administration apparatus and a big base of permanent project teams. Instead, the lean network structure of system partners can regroup flexibly in response to new requirements, guaranteeing cost-effective solutions.



Our Industrial Automation Product Range

SUPER AE
Low-voltage circuit breakers

Moulded-case
circuit breakers and contactors

Frequency Inverters

MELSERVO

The MELSEC Compact
Programmable Logic Controllers

The MELSEC Modular
Programmable Logic Controllers

MELFA
Industrial robots

HMI Human-Machine Interface

The MELSOFT
Software Concept



www.mitsubishi-automation.com
www.blueNEWS.com



MELSEC FX Family
MELSEC AnSH/QnA(S) Family
MELSEC System Q
Programming
HMI Control Units
Process Visualisation
Frequency Inverters
Robots
Low-voltage Circuit Breakers
Molded-case Circuit Breakers and Contactors

For us, service means being there for you when you need us. Literally round the clock - Mitsubishi Electric is now also accessible via the Internet. At you will find the latest information on our products and interesting examples of successful applications. If you don't find what you need just send us an e-mail at

megfamail@meg.mee.com and we'll respond immediately. Or contact your local Mitsubishi sales representative in your country (you'll find an address list on the back cover of this brochure). And if you need on-the-spot service quickly just call our central hotline at 0180/5000765.

We're There to Serve You



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