Changes for the Better

MITSUBISHI ELECTRIC

Mitsubishi Programmable Logic Controller

Digest Version

MAY 2004

No.226E

MELSEC Q series

To a new level of high reliability control

MELSEC Q series Redundant System

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MELSOFT

CC-Link

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

ISO 14001 JACO UKAS ENVIRONMENTAL MANAGEMENT 051

BVQI ISO 9001 UKAS QUALITY MANAGEMENT 008

The redundant system offers high reliability, whilst inheriting the excellent performance of the Q series.

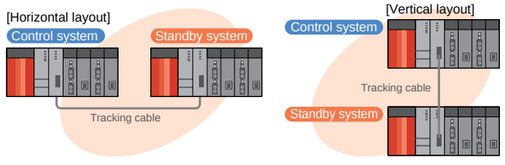
MELSEC Q series
Redundant System

The redundant design of the basic configuration, including the power supply, the CPU, and the base, ensures continuous system control.

High reliability

Redundant design of the main base

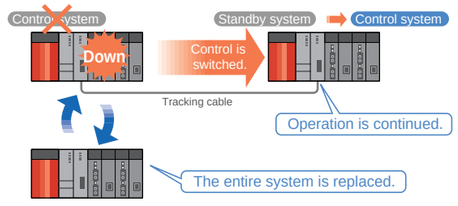
Continuous system control is maintained even if any component of the main base unit fails, as both bases are separated. Also, the base units can be positioned either horizontally or vertically relative to each other.



Continuous operation even when error occurs

■The redundant design of the entire system, including the power supply, the CPU, and the base enables the system to continue operation by switching control to the standby system even if the control system develops an error. (Hot standby system.)

■The redundant system can be recovered form a malfunction by simply replacing the faulty module or the entire main base of that system.



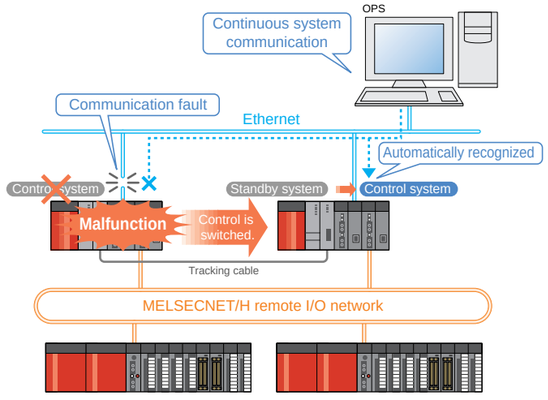
Redundant network concept

■Network communication is maintained by switching over to the standby system when the network module fails or the cable disconnected.

*Control is not switched over when using MC protocol communication over Ethernet.

■In the MELSECNET/H remote I/O network, remote I/O operation is ensured by the inclusion of the network remote standby station (multiplex function) when a network error occurs.

■After system switchover to the standby system, the new control system is automatically recognized by the Enterprise level control system (OPS), therefore eliminating the need to reconfigure the system parameters. Also both control and standby systems are fully accessible from the OPS.



Realize compact redundant system by fully utilizing the Q series small footprint and high performance features!

Easy to use

Standard features and performance utilized

Easily design a redundant system by utilizing the features and performance of the Q series, such as the I/O, intelligent function, and network.*1

*1: A dedicated module for redundant system construction is required. See page 7.
*2: The CPU can be backed up with a standard base and a power supply.

Reduced TCO*

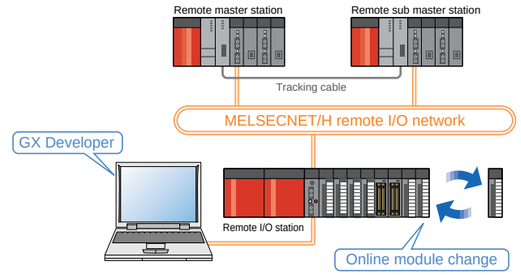
By utilizing the standard Q series products, cost is kept to a minimum whilst easily providing parts for maintenance.

*TCO: Total cost of ownership

Online module change

Modules on the remote I/O system support Mitsubishi's "Online Module Change" functionality which allow faulty modules to be replaced whilst the system is online, reducing overall downtime.*3 *4

*3: The I/O, analog, temperature input, temperature control, and pulse input modules can be replaced by online module change.
*4: GX Developer must be used to specify the module to be replaced.



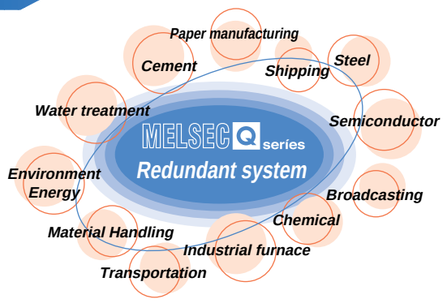
Diverse range of applications

A system ideally designed for a diverse range of applications

The redundant system can be designed for various applications, such as environment/energy, steel, chemistry, industrial furnace, paper manufacturing, cement, shipping, water treatment, conveyance, transportation, and broadcasting.

High functionality and high-speed processing of the Q series realized

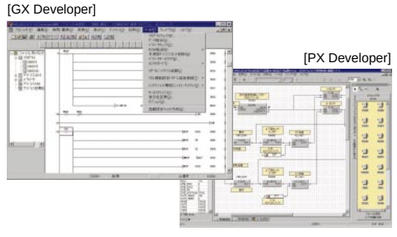
Utilizing the high functionality, high-speed processing, and process control function of the Q series.



Simplified engineering

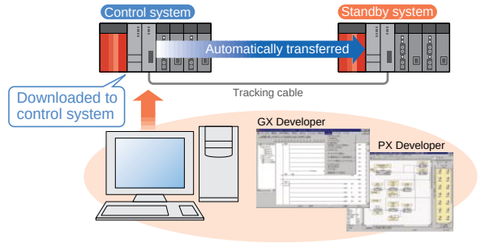
Easy setup using GX Developer and PX Developer

Two high level software's are available for the Redundant system. GX Developer as the basis for sequence programming. Also PX Developer, which is designed for the process industry using function block programming technology.



Automatic program transfer

Both program and parameters created using GX Developer and PX Developer can be automatically transferred to the standby system. This ensures that the program does not have to be downloaded twice, therefore reducing total setup and design time.

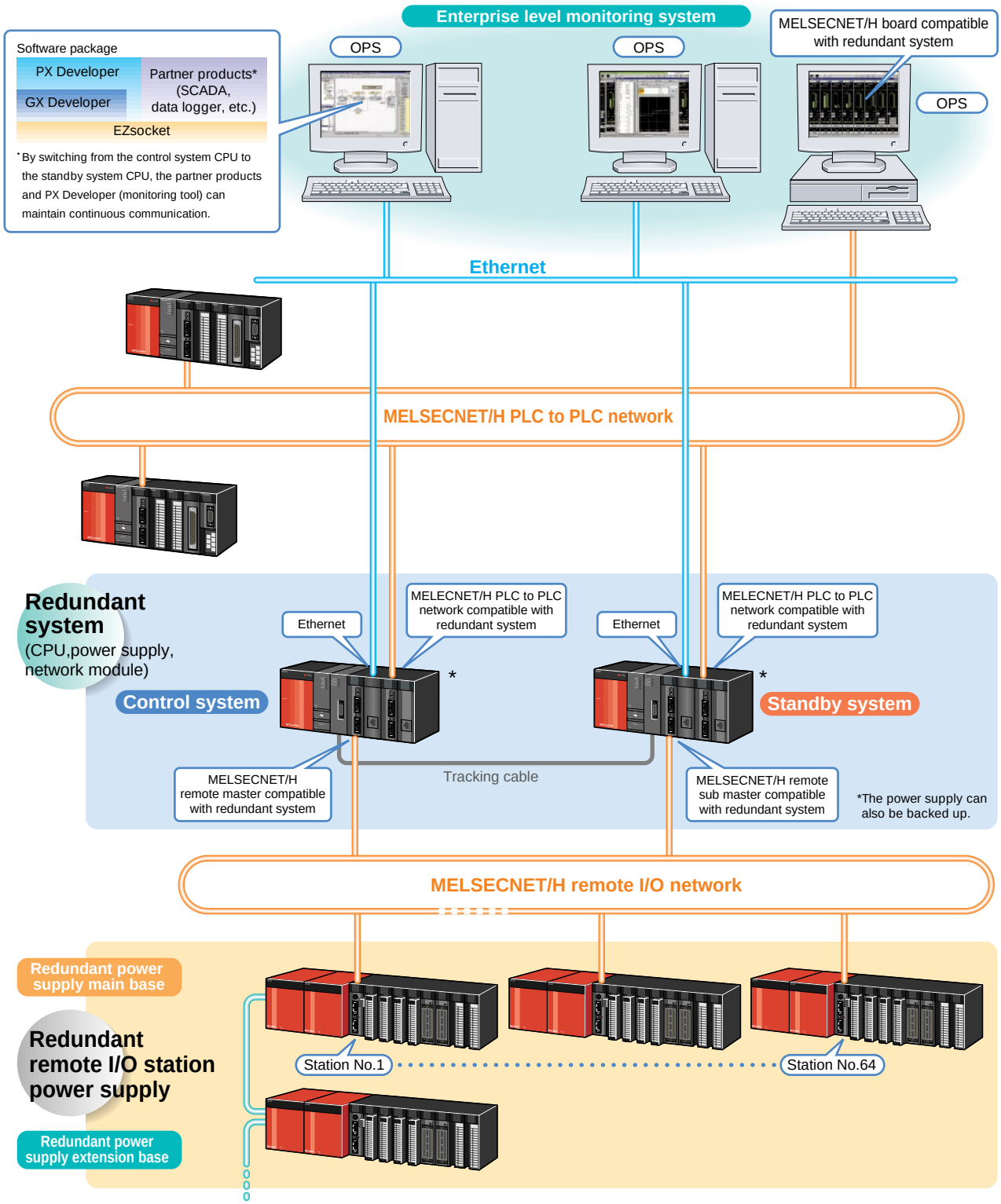


SYSTEM

System configuration

The CPU, the network, and the power supply are backed up, and the MELSECNET/H remote I/O is used as extension I/O.

- The operating system is switched over in order to maintain control in case of CPU, network, or power supply malfunction.
- Since the remote I/O is connected via a network, it can be installed in a location far from the main base.
- Using a dual optical loop for the MELSCNET/H remote I/O ensures continuous control even if there is a problem with the network cable.
- The remote I/O can be used in distributed control, the effect of any problem with a remote station (I/O, etc.) on the system can be easily limited.

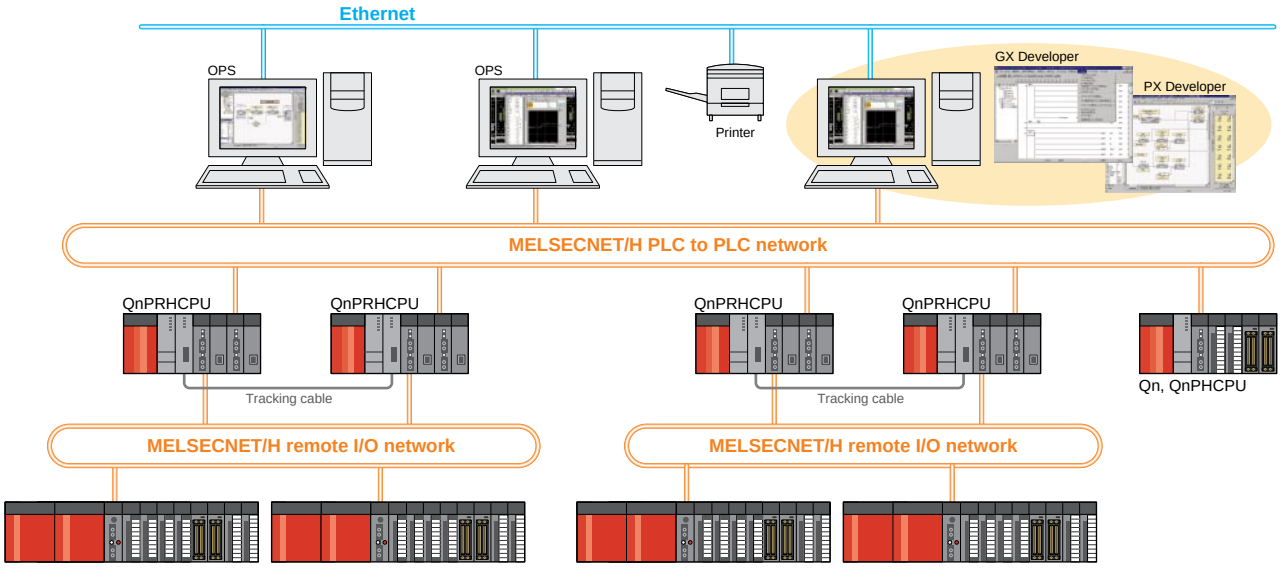


APPLICATION

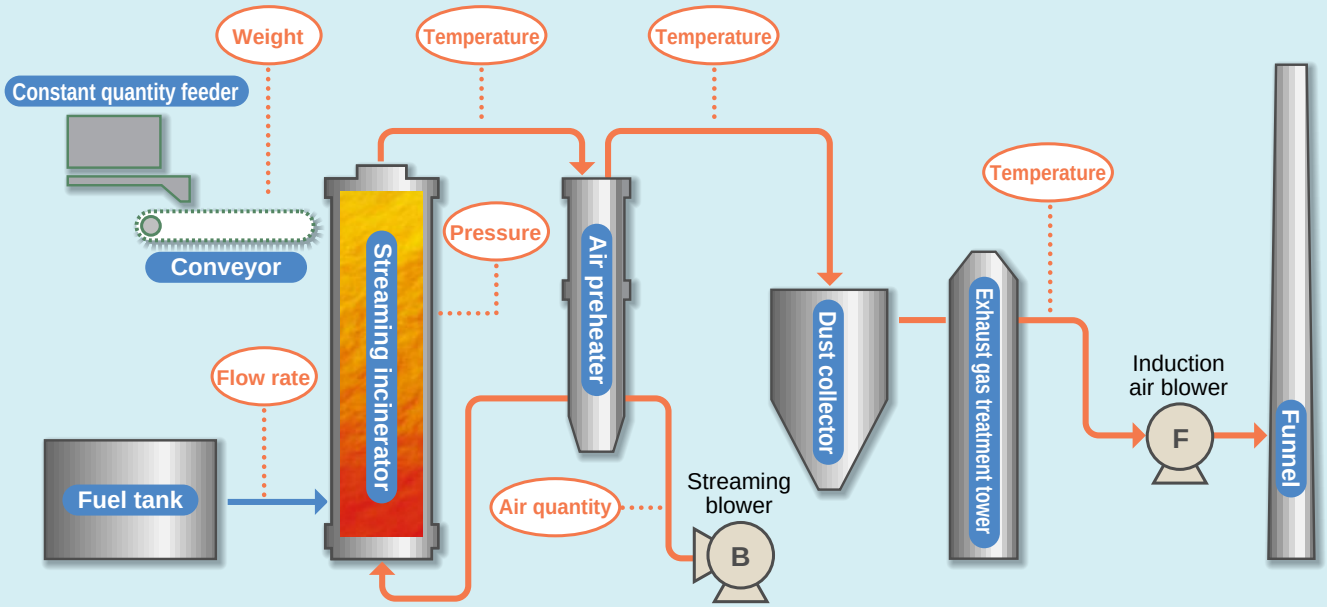
Application examples

Material processing systems

Environment/Energy	Refuse incineration, ash treatment, carbonization, sludge treatment, crushing, water desalination, biomass, fuel cells
Steel	Hot rolling line heating furnaces, annealing furnaces, continuous casting lines, reduction, separation
Chemical	Resin polymerization, heating/cooling, blending, proportioning, mixing, paints, detergents, cosmetics, films, fiber
Industrial furnace	Aluminum melting, heat treatment, calcinations, drying, heating furnaces, ceramic calcinations
Paper manufacturing	Conditioning/Mixing, paper manufacture, drying, finish
Cement	Crushing, kiln, dust collectors
Shipping	Boilers
Water treatment	Water supply (filtration, chemical charging, water feed/drain pumps), sewage (wastewater, sludge, concentration, heat treatment), deionized water



Incineration system



APPLICATION

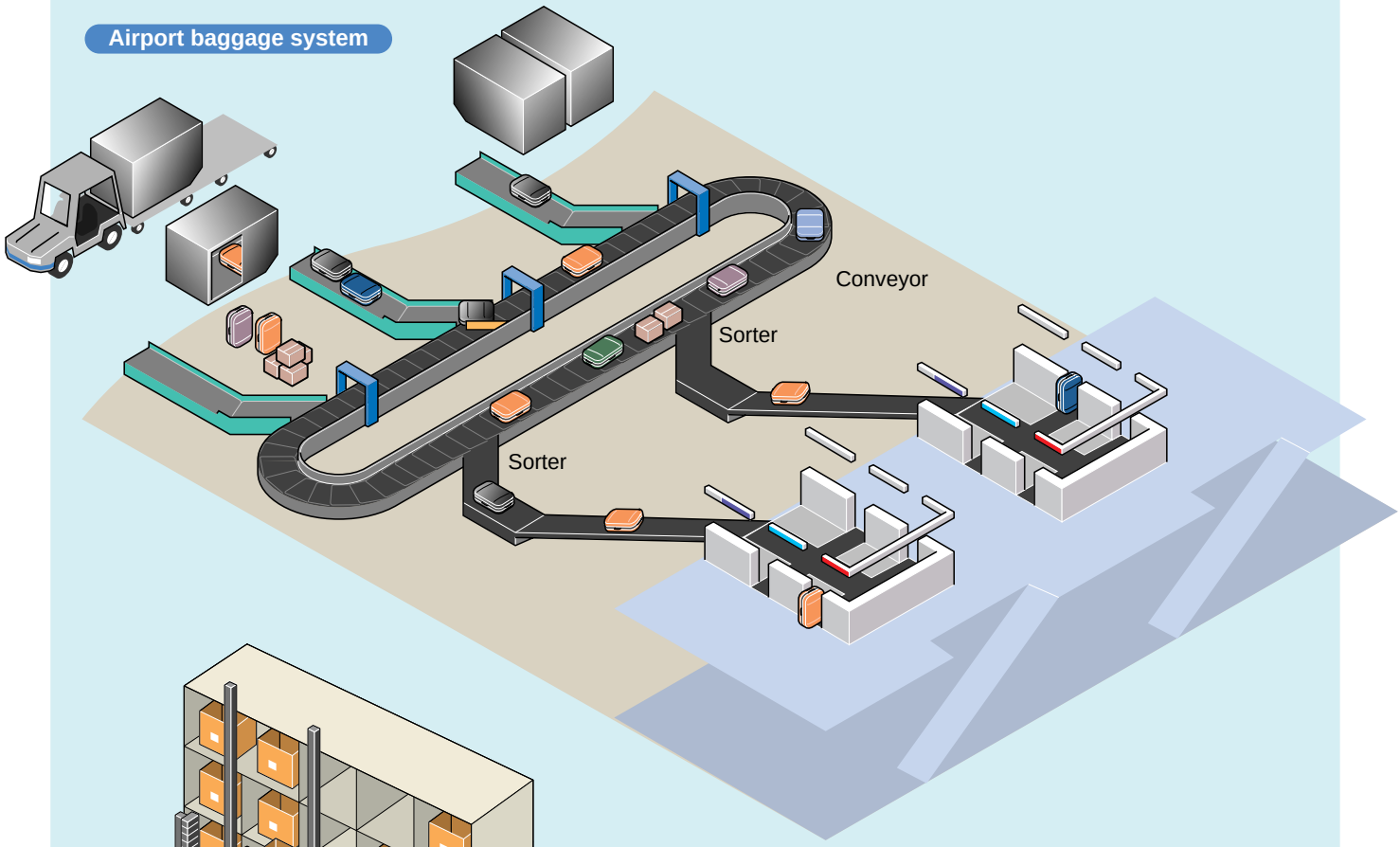
Application examples

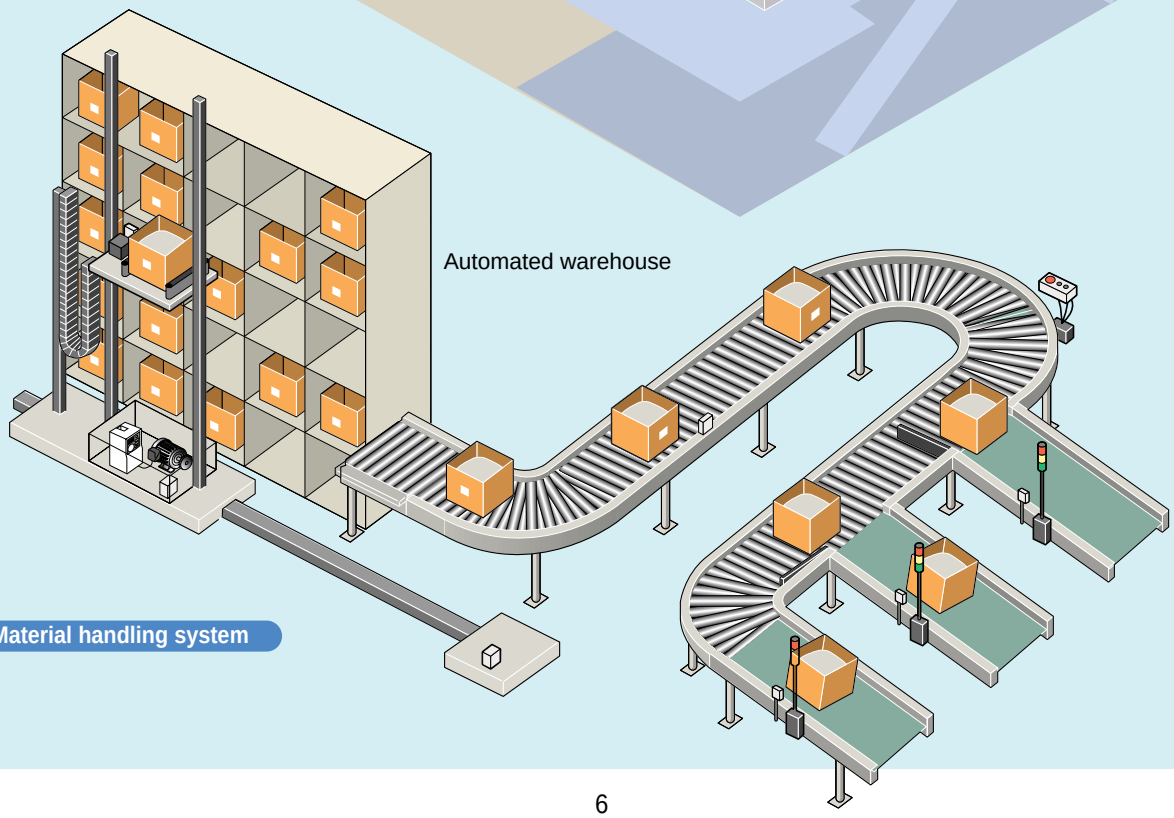
Automation systems, etc.

Material handling	Transporting equipment (equipment inside airports, etc.), automated warehouses
Broadcasting and communication	Surface wave digital master and relay stations, broadcasting equipment, etc.

Conveyance systems

Airport baggage system





Material handling system

SPECIFICATIONS

Specifications

Performance Specifications

Item		CPU model	
		Q12PRHCPU	Q25PRHCPU
Control system		Cyclic program scan	
I/O control		Refresh mode	
Programming language	Sequence control dedicated language	Ladder, list, ST, SFC	
	Process control language	FBD for process control Note 1)	
Number of I/O device points Note 2)		8192 points	
Number of I/O points Note 3)		4096 points	
Number of CPUs mounted		1 (multiple-CPU configurationis not available)	
Number of mountable modules		11 on the main base unit (7 when the power supply is redundant type)	
Number of extension base		0 (All non-redundant modules are mounted on the remote I/O station (the maximum number of modules that can be mounted on a remote station is 64).)	
Number of remote I/O points		8192 points (up to 2048 points per station)	
Program capacity	Number of steps	124 ksteps	252 ksteps
	Number of programs	124	252 Note 4)
Device memory capacity Note 5)		Device memory: 29 kwords File register (internal): 128 kwords (It can be extended up to 1017 kwords by adding a memory card (2 MB).)	
Instruction types		Sequence basic/applied instructions, instrumentation instructions Instrumentation instruction types: Control/Operation instructions, I/O control instructions, compensation operation instructions, arithmetic operation instructions, comparison operation instructions, automatic tuning instructions	
Functions compatible with redundant system		• Redundant configuration of the entire system, including the CPU, the power supply, and the base unit Hot standby system for the control and standby systems online module change both backup and separate mode available. • Large-capacity data tracking ····· Large-capacity device data transfer (100 kwords) from the control system to the standby system • Network system compatible with redundant system ···· Switchover in case of MELSECNET/H or Ethernet module malfunction or network wire disconnection • Engineering environment (GX Developer) Communication with programming tools ····· The control system or standby system can be designated by direct connection to the CPU or connection via a network. Online program change function ····· PLC write, online program change, online multi-block change Program memory copy function ····· Copying control system programs to the standby system Redundant system setting ····· The tracking device and network paring can be set with parameters.	
Loop control specifications	Control cycle	10 ms -/control loop (Can be set for each loop.)	
	Number of control loops	No limit Note 6)	
	Main functions	2-degree-of-freedom PID control, cascade control, automatic tuning function, feed forward control	
RAS	Online module replacement	The I/O, analog, temperature input, temperature control, and pulse input modules can be replaced (on a remote I/O station).	
	Output in case of error stop	Clear or output retention can be designated for each module.	
Communication port		USB, RS-232	
Modules that can be mounted on the main base unit		Network modules for the Q series can be mounted (Ethernet, MELSECNET/H, and CC-Link only)	
Programming software		GX Developer	
		PX Developer	

Note 1) PX Developer is required for programming by FBD.
Note 2) Total number of the I/O points on the main base unit, which are directly controlled from the CPU module, and the I/O points controlled as remote I/O by the remote I/O network.
Note 3) The number of I/O points on the main base unit, which are directly controlled from the CPU module.
Note 4) The maximum number of files that can be executed is 124. It is impossible to execute 125 or more files. Two SFC/MELSAP-Ls are available, one of which is a program execution control SFC.
Note 5) Each number of device points in the data memory can be changed within 29 kwords, depending on the parameters.
Note 6) The number of control loops is restricted by the combination of the device memory capacity (128 kwords/loop used) and the control cycle.

New products compatible with redundant systems

Product name	Model	Overview
Redundant CPU module	Q12PRHCPU	Number of I/O points: 8192 (actual number of I/O points: 4096), program capacity: 124 ksteps
	Q25PRHCPU	Number of I/O points: 8192 (actual number of I/O points: 4096), program capacity: 252 ksteps
Tracking cable	QC10TR	1m cable for tracking
	QC30TR	3m cable for tracking
Base unit for redundant power supply systems	Q38RB	Q series I/O mounting main base: Number of power supply slots: 2, number of CPU slots: 1, number of I/O slots: 8
	Q68RB	Q series I/O mounting extension base: Number of power supply slots: 2, number of I/O slots: 8
Power supply module for edundant power supply systems	Q64RP	100 to 120/200 to 240 V AC input, 5 V DC, 8.5 A output

Products compatible with redundant systems (module that must be upgraded to be compatible with redundant systems)

Product name	Model	Overview	Version
MELSECNET/H master module	QJ71LP21-25	For MELSECNET/H dual optical loop interface module (compatible with SI and QSI) control / normal / master stations	Function version "D" or later
	QJ71LP21S-25	For MELSECNET/H dual optical loop interface module (compatible with SI and QSI) control / normal / master stations, equipped with an external power supply	
	QJ71LP21GE	For MELSECNET/H dual optical loop interface module (compatible with GI) control / normal / master stations	
	QJ71BR11	For MELSECNET/H coaxial single bus interface module control / normal / master stations	
MELSECNET/H remote I/O module	QJ72LP25-25	For MELSECNET/H dual optical loop interface module (compatible with SI and QSI) remote I/O stations	
	QJ72LP25GE	For MELSECNET/H dual optical loop interface module (compatible with GI) remote I/O stations	
	QJ72BR15	For MELSECNET/H coaxial single bus interface module remote I/O stations	
Ethernet interface module	QJ71E71-B2	Ethernet interface module (10BASE2)	
	QJ71E71-B5	Ethernet interface module (10BASE5)	
	QJ71E71-100	Ethernet interface module (100BASE-TX/10BASE-T)	
MELSECNET/H board for personal computers	Q80BD-J71LP21-25	For dual optical loop interface board (compatible with SI and QSI) control / normal stations *	
	Q80BD-J71LP21G	For dual optical loop interface board (compatible with GI) control / normal stations *	
	Q80BD-J71BR11	For coaxial single bus interface board control / normal stations *	
GOT	A9☐☐GOT	Graphic operation terminal	
Software package	SW8D5C-GPPW-E	GPP function package	8.18U or later
	SW1D5C-FBDQ-E	FBD software package for instrumentation control	1.05F or later
	SW3D5C-ACT-E	MX Component	3.05F or later

*The boards must be used in combination with the attached driver package SW0DNC-MNETH-B[90K] or later version.

The modules other than the abovementioned are available without restriction.

General specifications

General specifications mean the environmental specifications under which the product can be installed and operated. Unless otherwise specified, these specifications apply to all Q series products.
Use a Q series product in an environment that meet the general specifications.

Item	Specification			
Operating ambient temperature	0 to 55˚C			
Storage ambient temperature	-25 to 75˚C			
Operating ambient humidity	5 to 95%RH, no condensation is allowed.			
Storage ambient humidity	5 to 95%RH, no condensation is allowed.			
Vibration resistance	Comply with JIS B 3502 and IEC 61131-2	In case of intermittent vibration		Number of sweeps
		Frequency	Acceleration	Amplitude	10 times in each of X-, Y-, and Z-directions (for 80 minutes)
		10 to 57Hz	–	0.075mm	
		57 to 150Hz	9.8m/s^2	–	
		In case of continuous vibration			
		Frequency	Acceleration	Amplitude	
		10 to 57Hz	–	0.035mm	
		57 to 150Hz	4.9m/s^2	–	
Impact resistance	Comply with JIS B 3502 and IEC 61131-2 (147 m/s^2, three times in each of X-, Y-, and Z-directions).			
Operating atmosphere	The atmosphere shall be free of corrosive gas			
Operating altitude	2000 m or below (Note 3)			
Installation location	Inside the control cabinet			
Overvoltage category (Note 1)	Ⅱ or below			
Pollution level (Note 2)	2 or below			

Note 1) The overvoltage category indicates to which of the wires from the public wiring network to the machine inside the plant the appliance is connected. Category II applies to appliances powered by fixed equipment. The withstand surge voltage of appliances of a rating of up to 300 V is 2,500 V.

Note 2) The contamination level is an index indicating the level of occurrence of conductive substances in the environment where the appliance is used. Contamination level 2 indicates an environment where only nonconductive contamination occurs but temporary conduction may occur due to occasional condensation.

Note 3) The product cannot be used in an environment pressurized to the atmospheric pressure that may occur at an altitude of around 0 m.

Precautions for Choosing the Products

This catalog explains the typical features and functions of the Q series PLCs and does not provide restrictions and other information on usage and module combinations. When choosing the products, always check the detailed specifications, restrictions, etc. of the products in the Q series data book. When using the products, always read the user's manuals of the products.
Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; machine damage 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.

⚠ For safe use

- To use the products given in this catalog properly, always read the "manuals" before starting to use them.
- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi.
- This product has 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.

Country/Region	Sales office	Tel/Fax
U.S.A	Mitsubishi Electric Automation Inc. 500 Corporate Woods Parkway Vernon Hills, IL 60061	Tel : +1-847-478-2100 Fax : +1-847-478-2396
Brazil	MELCO-TEC Rep. Com.e Assessoria Tecnica Ltda. Av. Paulista 1471, Conj. 308, Sao Paulo State, Brazil	Tel : +55-11-283-2423 Fax : +55-11-288-3047
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