

MELSEC Q series

March 2005
No. EBG154E

**MELSEC Q Series
Redundant System**

"Hot Standby" System Control for maximum availability



- **22ms Hot Standby switchover time - ensuring continuous, available operation**



- **Full redundant concept for CPU, power supply and network architecture**



- **Easy to use engineering tools built into the programming software**



- **On-line swap for function cards, standby CPU and base rack**

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



System Q - Redundant PLC System

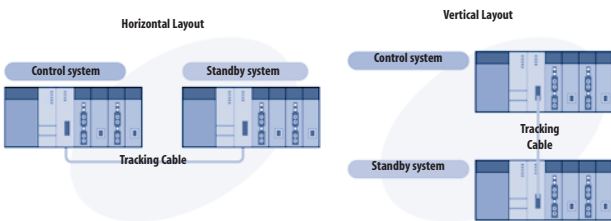


A redundant System Q configuration offers a flexible alternative to a traditional DCS solution. The System Q concept is to use standard PLC components with a proven high reliability, supported by an advanced network architecture and a dedicated tracking CPU.

High availability

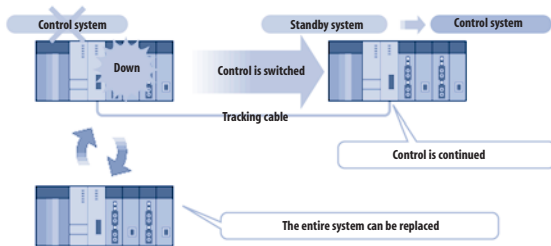
Redundant CPU configuration

At the center of the System Q redundant configuration are two dedicated process CPUs (QnPRH) linked together as a live system and a standby system. Each system is identical in configuration, offering a fully redundant construction to be installed in one of two ways.



Continuous operation even when errors occur

- 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. This is called a Hot Standby Configuration.
- The redundant system can be recovered from a malfunction by simply replacing the faulty module or the entire main base of that system.

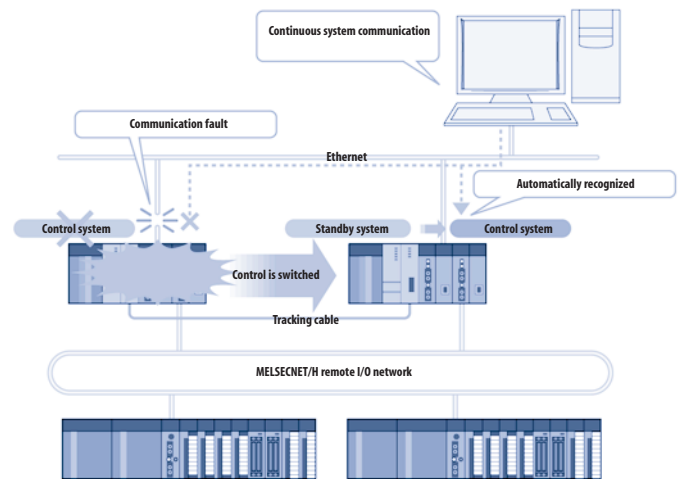


Redundant network architecture

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

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

- In the event of failure, continuous operation of the remote I/O network is maintained through the use of the redundant standby master.
- MES and SCADA operation remains unaffected during the switch over. The standby master automatically continues operation between the remote control system and the management level processes.



Easy to use

Build your system using standard Q series components

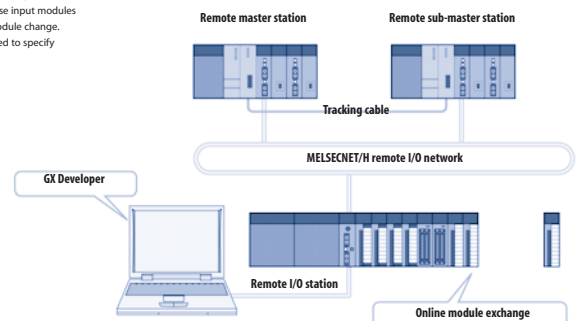
Designing a redundant system Q application is quick and easy. At the center of the system are two dedicated, redundant process CPUs that are then configured with standard Q series components. This reduces the Total Cost of Ownership of the system, keeps maintenance parts to a minimum and benefits from using standard, proven technology.



Online module change

Modules on the remote I/O system also have the same support for "Online Module Change" function as the Control and Standby CPU systems.^{*1 *2}

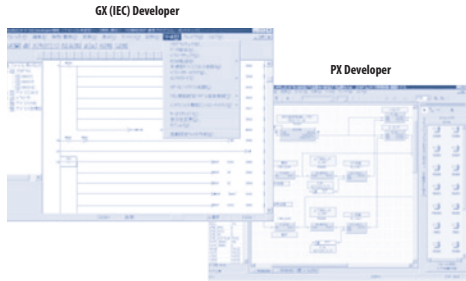
*1: The I/O, analog, temperature input, temperature control, and pulse input modules can be replaced by online module change.
*2: GX Developer must be used to specify the module to be replaced



Simplified engineering

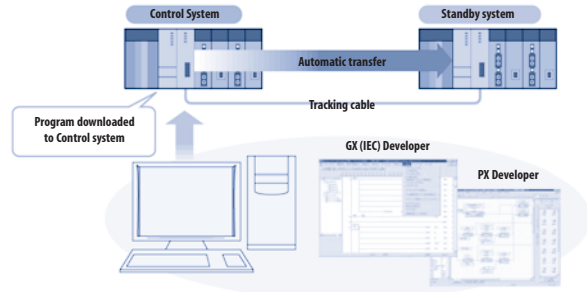
Choose the programming tool to suit

System Q redundant CPUs can be programmed with a number of programming tools; GX Developer for general sequence control; GX IEC Developer for IEC61131 systems and PX Developer for dedicated process industry applications.



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.



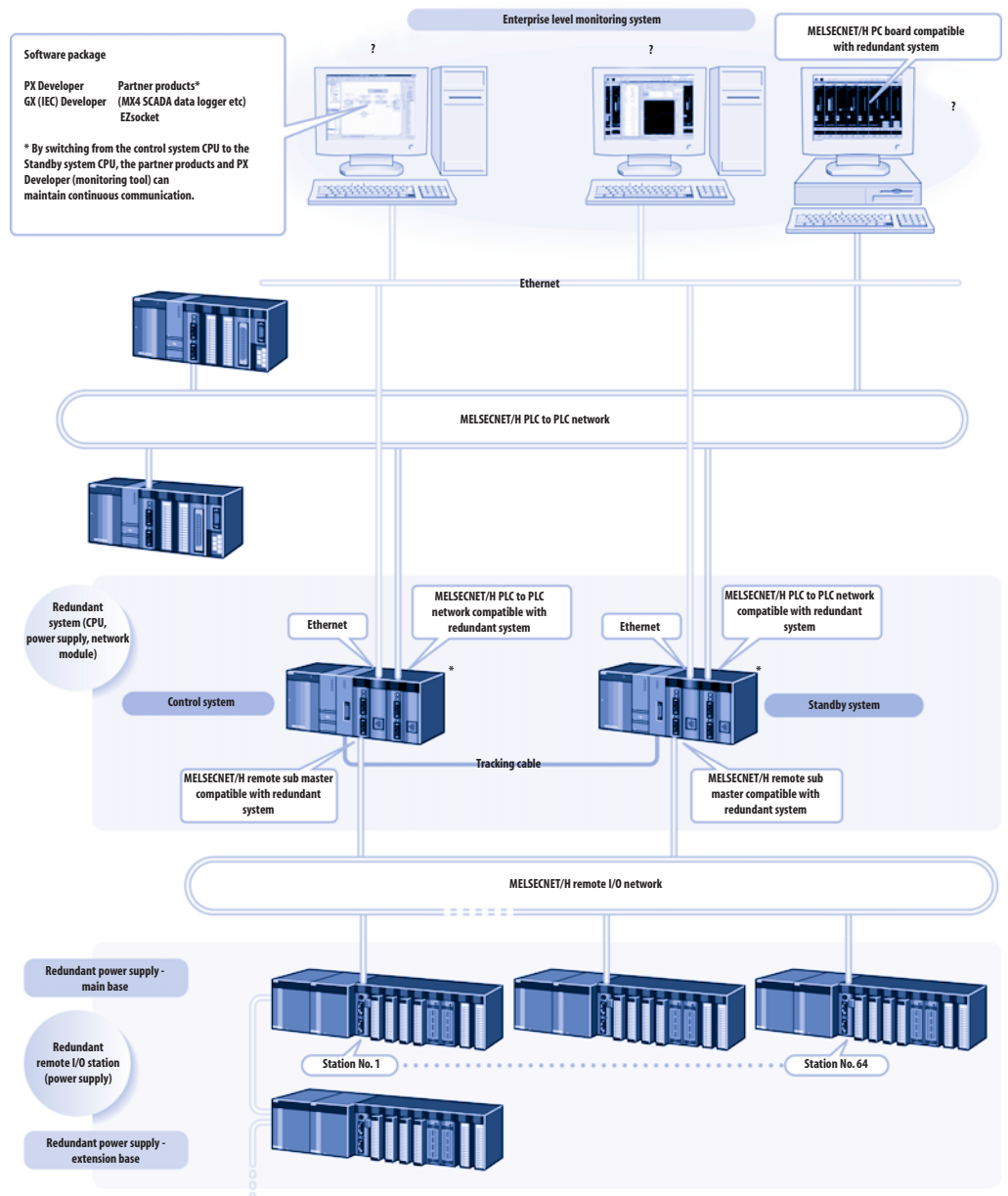
System configuration

Redundancy to suit your needs

Each System Q solution can be designed with the level of redundancy to suit the application including; redundant CPU, power supply, network interface and remote I/O.

An example system

- The operating system can be 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.



Specifications

Performance Specifications

Item	CPU model	
	Q12PRHCPU	Q25PRHCPU
Control system	Cyclic program scan	
I/O control	Refresh mode	
Programming language	Ladder, list, ST, SFC	
Sequence control dedicated language	FBD for process control ^{Note 1)}	
Process control language		
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 configuration is 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	
Number of remote I/O points	(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.)) 8192 points (up to 2048 points per station)	
Program capacity	124 ksteps	252 ksteps
Number of steps	124	252 ^{Note 4)}
Number of programs	Device memory: 29 kwords	
Device memory capacity ^{Note 5)}	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	<ul style="list-style-type: none"> 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 pairing 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/MELSP-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.

EUROPEAN BRANCHES

MITSUBISHI ELECTRIC EUROPE B.V. 25, Boulevard des Bouvels F-92741 Nanterre Cedex Phone: +33 1 55 68 55 68	FRANCE
MITSUBISHI ELECTRIC EUROPE B.V. Gothaer Straße 8 D-40880 Ratingen Phone: +49 (0) 2102 / 486-0	GERMANY
MITSUBISHI ELECTRIC EUROPE B.V. Westgate Business Park, Ballymount IRL-Dublin 24 Phone: +353 (0) 1 / 419 88 00	IRELAND
MITSUBISHI ELECTRIC EUROPE B.V. Via Paracelso 12 I-20041 Agrate Brianza (MI) Phone: +39 039 6053 1	ITALY
MITSUBISHI ELECTRIC EUROPE B.V. Carrereta de Rubi 76-80 Via Paracelso del Vallès Phone: +34 9 3 / 565 3131	SPAIN
MITSUBISHI ELECTRIC EUROPE B.V. Travelers Lane GB-Hatfield Herts. AL10 8 XB Phone: +44 (0) 1707 / 27 61 00	UK

EUROPEAN REPRESENTATIVES

GEVA Wiener Straße 89 A1-2500 Baden Phone: +43 (0) 2252 / 85 55 20	AUSTRIA	UTU Elektrotehnika AS Pärnu mnt.160i EE-11317 Tallinn Phone: +372 (0) 6 / 51 72 80	ESTONIA	SIA POWEL Liense iela 28 LV-1009 Riga Phone: +371 784 / 22 80	LATVIA	Sirius Trad. & Serv. srl Str. Biharia No. 67-77 RO-013981 Bucuresti 1 Phone: +40 (0) 21 / 201 1146	ROMANIA	ICOS Ryazanskiy Prospekt, 8A, Off. 100 RU-109428 Moscow Phone: +7 095 232 0207	RUSSIA	Beijer Electronics AB Box 426 S-20124 Malmö Phone: +46 (0) 40 / 35 86 00	SWEDEN	CBI Ltd. Private Bag 2016 ZA-1600 Isando Phone: +27 (0) 11 / 928 2000	SOUTH AFRICA
TEHNIKON Oktjabrskaya 16/5, Ap 704 BY-220030 Minsk Phone: +375 (0)17 / 210 4626	BELARUS	Beijer Electronics OY Ansatie 6a FIN-01740 Vantaa Phone: +358 (0) 9 / 886 77 500	FINLAND	UAB UTU POWEL Savanoriu pr. 187 LT-2053 Vilnius Phone: +370 (0) 52323-101	LITHUANIA	Avtomatika Sever Ltd. RUSVIA Lva Tolstogo Str. 7, Off. 311 RU-197376 St Petersburg Phone: +7 812 1183 238	RUSSIA	NPP Uralelektra Sverdlova 11A RU-620027 Ekaterinburg Phone: +7 34 32 / 532745	RUSSIA	ECONOTEC AG Postfach 282 CH-8309 Nürensdorf Phone: +41 (0) 1 / 838 48 11	SWITZERLAND	GTS Darülaeace Cad. No. 43 Kat. 2 TR-80270 Okmeydanı-Istanbul Phone: +90 (0) 212 / 320 1640	TURKEY
Getronics b.v. Pontbeeklaan 43 BE-1731 Asse-Zellik Phone: +32 (0) 2 / 467 17 51	BELGIUM	UTECO A.B.E.E. 5, Mavrogenous Str. GR-18542 Piraeus Phone: +302 (0) 10 / 42 10 050	GREECE	INTEHSIS SRL Cuza-Voda 36/1-81 MD-2061 Chisinau Phone: +373 (0)2 / 562 263	MOLDOVA	Consys Promyshlennaya St. 42 RU-198099 St Petersburg Phone: +7 812 325 3653	RUSSIA	STC Drive Technique Poslanikov Per., 9, Str.1 RU-107005 Moscow Phone: +7 095 790 7210	RUSSIA	GTS Darülaeace Cad. No. 43 Kat. 2 TR-80270 Okmeydanı-Istanbul Phone: +90 (0) 212 / 320 1640	TURKEY		
TELECON CO. Andrej Ljapchev Lvd. Pb 21 4 BG-1756 Sofia Phone: +359 (0) 2 / 97 44 05 8	BULGARIA	Meltrade Automatika Kft. 55, Hamat St. HU-1105 Budapest Phone: +36 (0)1 / 2605 602	HUNGARY	Getronics b.v. Donauweg 2 B NL-1043 AJ Amsterdam Phone: +31 (0) 20 / 587 67 00	NETHERLANDS	Electrotechnical Shetlinkina St. 33, Office 116 RU-630088 Novosibirsk Phone: +7 3832 / 119598	RUSSIA	NEA S.R.d.o.o. Krasniy Prospekt 220-1, Office No. 312 Stegne 11 RU-630049 Novosibirsk Phone: +7 3832 / 106618	RUSSIA	CSC Automation Ltd. 15, M. Raskova St., Fl. 10, Office 1010 UA-02002 Kiev Phone: +380 (0) 44 / 494 3355	UKRAINE		
AutoCont Nemocnicni 12 CZ-702 00 Ostrava 2 Phone: +420 59 / 6152 111	CZECH REPUBLIC	Ilan & Gavish Ltd. 24 Shenkar St., Kiryat Arie IL-49001 Petah-Tiqva Phone: +972 (0) 3 / 922 18 24	ISRAEL	Beijer Electronics A/S Teglervksveien 1 N-3002 Drammen Phone: +47 (0) 32 / 24 30 00	NORWAY	Elektrostyle Poslanikov Per., 9, Str.1 RU-107005 Moscow Phone: +7 095 542 4323	RUSSIA	AutoCont Control s.r.o. Radlinského 47 SK-02601 Dolny Kubin Phone: +421 435868 210	SLOVAKIA	INEA d.o.o. Stegne 11 SI-1000 Ljubljana Phone: +386 (0) 1-513 8100	SLOVENIA		
Jouis poulsen Geminievej 32 DK-2670 Greve Phone: +45 (0) 70 / 10 15 35	DENMARK	TEXEL Electronics Ltd. Box 8272 IL-42160 Netanya Phone: +972 (0) 9 / 863 08 91	ISRAEL	MPL Technology Sp. z o.o. ul. Sliczna 36 PL-31-444 Kraków Phone: +48 (0) 12 / 632 28 85	POLAND	Elektrostyle Krasniy Prospekt 220-1, Office No. 312 Stegne 11 RU-630049 Novosibirsk Phone: +7 3832 / 106618	RUSSIA	INEA d.o.o. Stegne 11 SI-1000 Ljubljana Phone: +386 (0) 1-513 8100	SLOVENIA				



MITSUBISHI ELECTRIC EUROPE B.V.

Factory Automation, European Business Group, Gothaer Straße 8, 40880 Ratingen

www.mitsubishi-automation.com