



for a greener tomorrow



**MITSUBISHI
ELECTRIC**

Changes for the Better

FACTORY AUTOMATION

THE AUTOMATION BOOK

A world of solutions



- Global service & support
- Standards driven
- Innovative solutions
- Improving financial performance

Global impact of Mitsubishi Electric



Through Mitsubishi Electric's vision, "Changes for the Better" are possible for a brighter future.

Changes for the Better

We bring together the best minds to create the best technologies. At Mitsubishi Electric, we understand that technology is the driving force of change in our lives. By bringing greater comfort to daily life, maximising the efficiency of businesses and keeping things running across society, we integrate technology and innovation to bring changes for the better.

Mitsubishi Electric is involved in many areas including the following

Energy and electric systems

A wide range of power and electrical products from generators to large-scale displays.

Electronic devices

A wide portfolio of cutting-edge semiconductor devices for systems and products.

Home appliance

Dependable consumer products like air conditioners and home entertainment systems.



Information and communication systems

Commercial and consumer-centric equipment, products and systems.

Industrial automation systems

Maximising productivity and efficiency with cutting-edge automation technology.

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Section 2: Technical information

Global partner. Local friend.

Present right through Europe

From the development of products to the management of entire plants, our experience in the industrial market spans more than 80 years. The knowledge we have built up over the decades and our complete product portfolio allow us to work together with customers to create complete turnkey solutions that meet all specific needs. With a globe-spanning service network, we not only provide after-sales service, but also training and technical consultation.



An open working relationship between supplier and customer gets results faster and more efficiently.

Global partner, local friend

Mitsubishi Electric Factory Automation is synonymous with innovative, high-quality products. Our programmable logic controllers, drive solutions and industrial robots are among the most powerful on the market, and have been contributing to the success of European manufacturing for over 35 years.

Sales and support, never far away

The Factory Automation division has its own sales organisations in Germany, Great Britain, France, Ireland, Italy, Spain, Russia, Poland and Czech Republic. In addition, we have developed an extensive network of partner companies across the whole of Europe and neighbouring countries.

We coordinate and organise our local support throughout Europe to ensure the highest possible standards. Additional support services are available from our European Development Centre (EDC) and EMC Competence Centre.

Trust and loyalty is as important as products

Collaboration with capable partners in the automation industry is one of the key elements in Mitsubishi Electric's success. Today more than ever, customers expect automation solutions tailored to the specific requirements of their applications. Our partners' expertise in specific industries, coupled with Mitsubishi Electric's innovative automation technology, are the two main ingredients of a successful recipe for made-to-order solutions and perfect customer service.

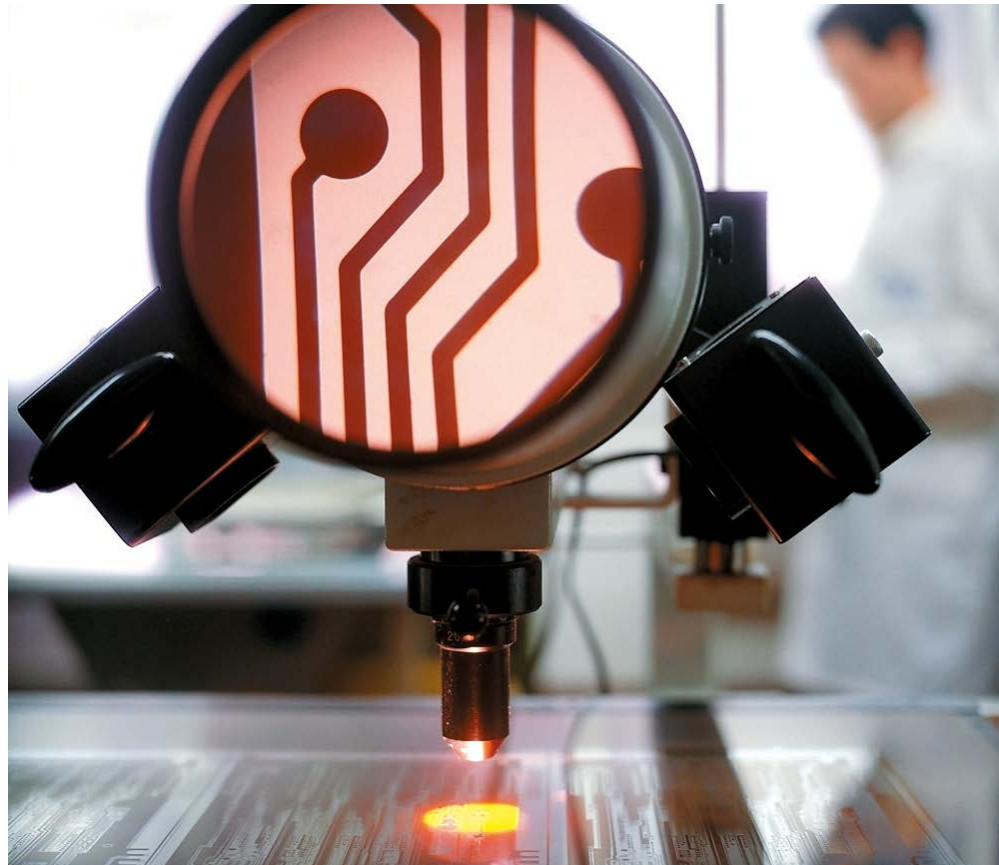
A focus on service

The customer is always the focus of all our service activities. Our customers get the best possible support from experienced staff, who provide competent advice and help with planning, projects, installation and configuration, training and all automation questions and tasks. Optimized stocks and a central logistics centre ensure fast, efficient deliveries of replacement and spare parts. For fast technical information and support, we handle questions from customers all over Europe via our telephone hotline.

Setting the standards

Mitsubishi Electric has a reputation for producing high quality products. This comes, in part, from our commitment to understanding and meeting the requirements of international standards and directives. In addition to European CE compliance, many products also have additional approvals such as:

- Shipping approvals like ABS, DNV, GL, RINA, BV, Lloyd's register
- International approvals like UL (USA), cUL (Canada) and EAC mark.



Attention to detail leaves little to chance.

Market leaders

In the world of manufacturing, change is omnipresent. To ensure our products reflect the current needs of customers, we base every aspect of product development and production on the voice of the market. To keep our high levels of product reliability, we incorporate a quality control program that leaves nothing to chance, resulting in the high level of quality synonymous with the Mitsubishi Electric name.

Mitsubishi Electric products are widely regarded as being among the most innovative in the industry. In terms of volume, one in three PLCs in the world today is a Mitsubishi Electric.

Indeed, some of our competitors use Mitsubishi Electric's innovative power management technology in their own frequency inverters.

When all these factors are taken together, it is no wonder our customers think of Mitsubishi Electric's automation products as leading the market.

Water



Water is a critical element of life. Without a constant, clean supply for drinking and washing and effective handling of grey waste, society quickly breaks down. Automation solutions need to be reliable and flexible to meet the changing

demands of the public but also the pressures to deliver shareholder value. That is why so many utility companies use Mitsubishi Electric.

Application in action

COMPANY

Klinting Vandvaerk

LOCATION

Denmark

AUTOMATION SPECIALIST

PRO/AUTOMATIC

APPLICATION

Water pumping station

PRODUCTS

Mitsubishi Electric modular PLCs, frequency inverter drives, Wago remote I/Os

NETWORK

CC-Link

NOTE

Bore holes were up to 1.2 km away from the main water station.

COMMENT

"It was easy to create the network systems and it has some very powerful unique features."
Jean Petersen PRO/AUTOMATIC



Food



The range of food available to the consumer today is vast, from ready prepared salads to pre-cooked pies and frozen meats. Much of it comes from far off places but must be processed and delivered on time, every time. Because food is so important to our daily lives there

are strict rules and guidelines regarding traceability, labelling, packaging and quality control. Mitsubishi Electric has expertise in all of these areas.



Application in action

COMPANY

Virgin Trading (Virgin Cola)

LOCATION

Ireland

AUTOMATION SPECIALIST

Charles Wait

APPLICATION

Manufacture of cola concentrate

PRODUCTS

Mitsubishi Electric software and modular PLCs

NOTE

Production facility built to be one of the most efficient in the world with an on-site staff of 6 producing up to 2 billion litres of Cola per year

COMMENT

"We chose Mitsubishi Electric ... because of their reputation for reliability and worldwide support particularly in the food and beverage industry."
Rod Golightly, Charles Wait

Manufacturing



Manufacturing, like all engineering fields, is constantly under pressure to deliver innovative products in the most cost effective way. Generally, manufacturers are looking for suppliers who offer automation solutions that support the wide variety of standards they need, as well as offering flexibility, availability and reliability.

This is one reason why the world's manufacturers have bought more than twelve million Mitsubishi Electric FX family PLCs and 23 million inverters since their introduction over 30 years ago.

Application in action

COMPANY

Kaba Group

LOCATION

Austria

APPLICATION

Manufacture of keys

PRODUCTS

Mitsubishi Electric robots

NOTE

Two robots are used, one's to place the brass workpiece in to the milling machine while a second robot picks up machined keys and applies the final finish from a rotating brush.

COMMENT

"Thanks to the use of the robot we were able to reduce costs and significantly improve the transit time." Robert Weninghofer Production Manager at Kaba



Automotive



Shorter production cycles, adaptive manufacturing and integration of all areas in the manufacturing process are what make the automotive industry one of the most high power, high pressure, manufacturing sectors in the world.

This is also why these global brands turn to Mitsubishi Electric for the highest level of automation expertise.



Application in action

COMPANY

Global Engine Manufacturing Alliance (GEMA)

LOCATION

USA

APPLICATION

Manufacture of automotive engines

PRODUCTS

Mitsubishi Electric modular PLCs, HMI, servo amplifiers, CNC controllers and software

NOTE

GEMA is an alliance of the Chrysler Group, Mitsubishi Motors and Hyundai Motor Co. There are two facilities which will, together, produce up to 840,000 engines per year.

COMMENT

The Chrysler Group estimates that they will save annual costs of around 100 million dollars per year with the new automation concept.

Chemical



The chemical and pharmaceutical industries are among the world's most competitive, facing tough "speed to market" issues. New products developed in the laboratory have to be rushed into production. To do this safely, quickly and reliably, manufacturers need flexible

automation solutions that support a wide range of standards. Mitsubishi Electric automation products answer these needs.

Application in action

COMPANY

Follmann & Co.

LOCATION

Germany

APPLICATION

Adhesive manufacture

PRODUCTS

Mitsubishi Electric compact PLCs, HMI, frequency inverter drives

NETWORK

Ethernet + Fieldbus

NOTE

The system has control over the manufacturing process for 17 different adhesives

COMMENT

"It was easy to create the network systems and it has some very powerful unique features."

Jean Petersen PRO/AUTOMATIC



Process



Many automated applications are a continuous process. They vary widely, ranging from power stations to waste incineration. However, all share a need for highly reliable systems. Moreover, control and management of operational waste is an issue undergoing greater

regulation through directives such as IPPC. Mitsubishi Electric developed its MELSEC System Q specifically to meet these requirements.



Application in action

COMPANY

European Vinyls Corporation (EVC)

LOCATION

United Kingdom

AUTOMATION SPECIALIST

Tritec

APPLICATION

Combined Heat and Power (CHP) plant

PRODUCTS

Mitsubishi Electric modular PLCs and software

NOTE

Dual redundant PLC solution cost 25 % of traditional DCS solution. Installed system now saves £500,000 (approx. €530k) per year. Payback for the control system was 6 months.

COMMENT

"The PLC control system we developed had a system cost of around £0.25m, compared to £1m or more for a conventional system."
Tim Hartley, Tritec

Tomorrow's quality ...



Tomorrow's technology requires investment today

for a greener tomorrow

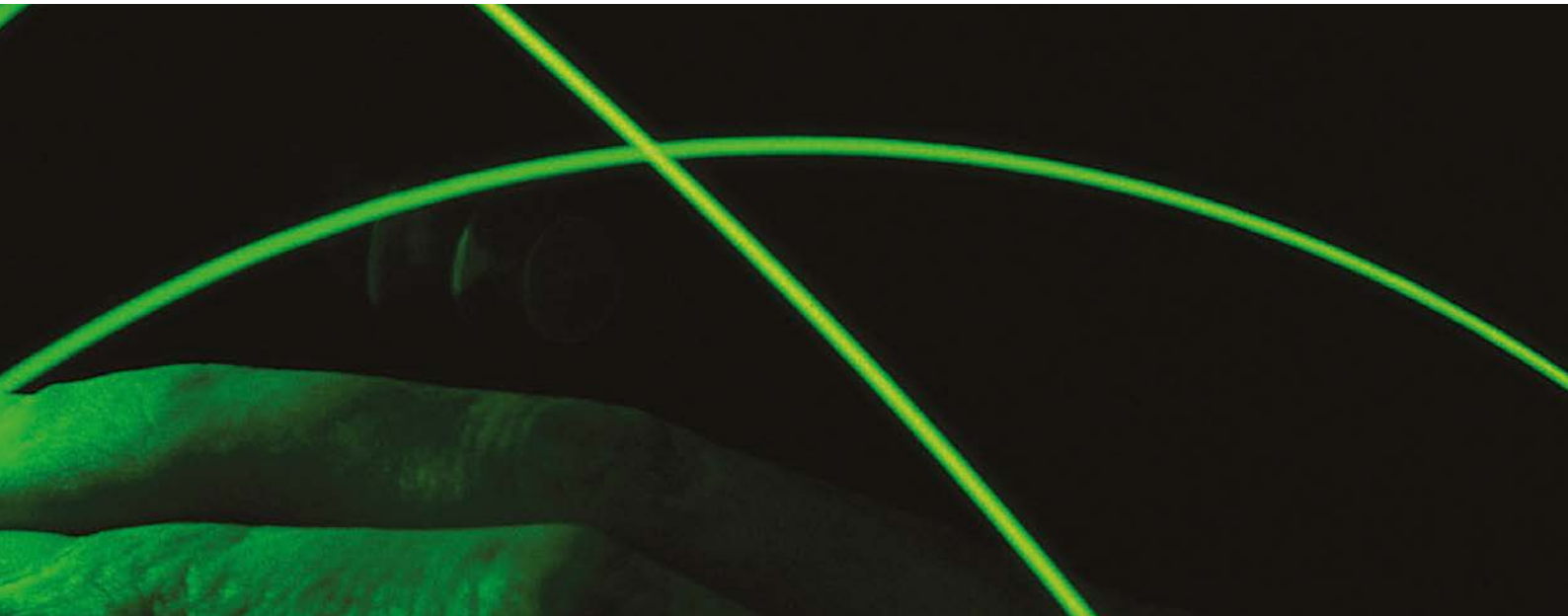


Eco Changes – for a greener future

Eco Changes is an expression of Mitsubishi Electric's commitment to environmental management. The programme is directed towards a greener future, achieved with innovative environmental technologies and manufacturing expertise.

Mitsubishi Electric's goal is to help create an ecological society by means of a broad spectrum of technologies and solutions for private households, offices, businesses, infrastructure and even space exploration. As a global company, we intend to make a key contribution to achieving the goal of a world with low carbon dioxide emissions and high recycling rates.

... today's goals



No matter what the application, the industry or a company's size, Mitsubishi Electric offers its customers the best service possible. This involves getting to know and understand the customer's needs, and being responsive to changing legal and social attitudes in order to develop products required tomorrow, in one year, or in five years.

R&D – lifeblood of the future

Research and development is the lifeblood of Mitsubishi Electric. Our research and development centres in Japan, the United States and in Europe are working on innovative technologies today for the breakthrough products of tomorrow. Mitsubishi Electric invests approximately 4 % of sales in developing tomorrow's technologies.

In a variety of ways, putting programmes and systems into place that help us get closer to our goal of actualizing a sus-

tainable planet. From procurement to product design and manufacturing to logistics these activities demonstrate how environmentally conscious thinking and action are steadily becoming ingrained in our corporate culture.

Helping the environment

It's all about balance: the balance between effective use of resources, efficient use of energy, and safeguards against potentially harmful substances.

This insight into the balance between efficient automated manufacture and care for our environment helps us to better

understand the needs of our customers. For example, the need to monitor and control waste in accordance with the European Integrated Pollution Prevention Control (IPPC) directive.

This is an immense challenge, but one that Mitsubishi Electric is actively pursuing on a daily basis, while keeping focused on one goal. That goal is a global society where life can continually improve in harmonious coexistence with the natural environment.

And so Mitsubishi Electric factories work to ensure full ISO 14000 compliance, and to produce products with fewer harmful substances.



Working for a sustainable future.

Product and service



When choosing an automation partner our customers look at many different factors, from company stability to market-leading products. Yet one thing they are all interested in is service and support.

Service in Europe

Networks, technology centres and partners spanning Europe ensure outstanding local support services.

Technical support is about getting the right answers first time.

The human element



Reliable technical support is only a call away

Our customer hotline supports both current and older product lines. Local engineers then provide telephone support in native languages.

This local service can also provide in-depth technical support when necessary. Thanks to this mix of local and centralized support customers can always be sure they can get the support they need, when they need it.

Complementing our local support, the website <https://eu3a.mitsubishielectric.com> offers MyMitsubishi users access to manuals, CAD drawings, HMI drivers, GSD files and EPlan files for easy design etc. for free.



All repairs are carried out by qualified and experienced engineers.

Minimizing downtime

Downtime caused by an operational failure is never good news. In today's tough business environment returning to full production as soon as possible is critical.

Our comprehensive services will help you to get your plant up and running again fast, keeping expensive downtime to a minimum.



Comprehensive training programs

Training for performance

Dealing with complex automation equipment in a fast-paced manufacturing environment requires well-trained personnel. Mitsubishi Electric offers the latest automation training in the use and maintenance of automation systems. This ensures optimum operating performance.

Automation solutions whatever the application

e-F@ctory is the Mitsubishi Electric solution for improving the performance of any manufacturing enterprise, providing three key benefits: Reduced total cost of ownership (TCO), Maximized productivity, and Seamless integration.

Companies often mull over and discuss factory or plant-wide management solutions for many years – but without ever actually implanting them. After all, they are understandably reluctant to halt production for an extended period while the new system is being fitted, and find the prospect of organizing and planning the whole activity daunting, especially since they often want to implement a new solution all at once.

e-F@ctory

The e-F@ctory solution from Mitsubishi Electric answers a lot of these issues. It is based on the MELSEC System Q and MELSEC iQ-R series automation platform

concept. Thanks to the modular design of these automation controllers, it is now much easier to implement plant-wide control based on segmented or manufacturing cell solutions.

Communication

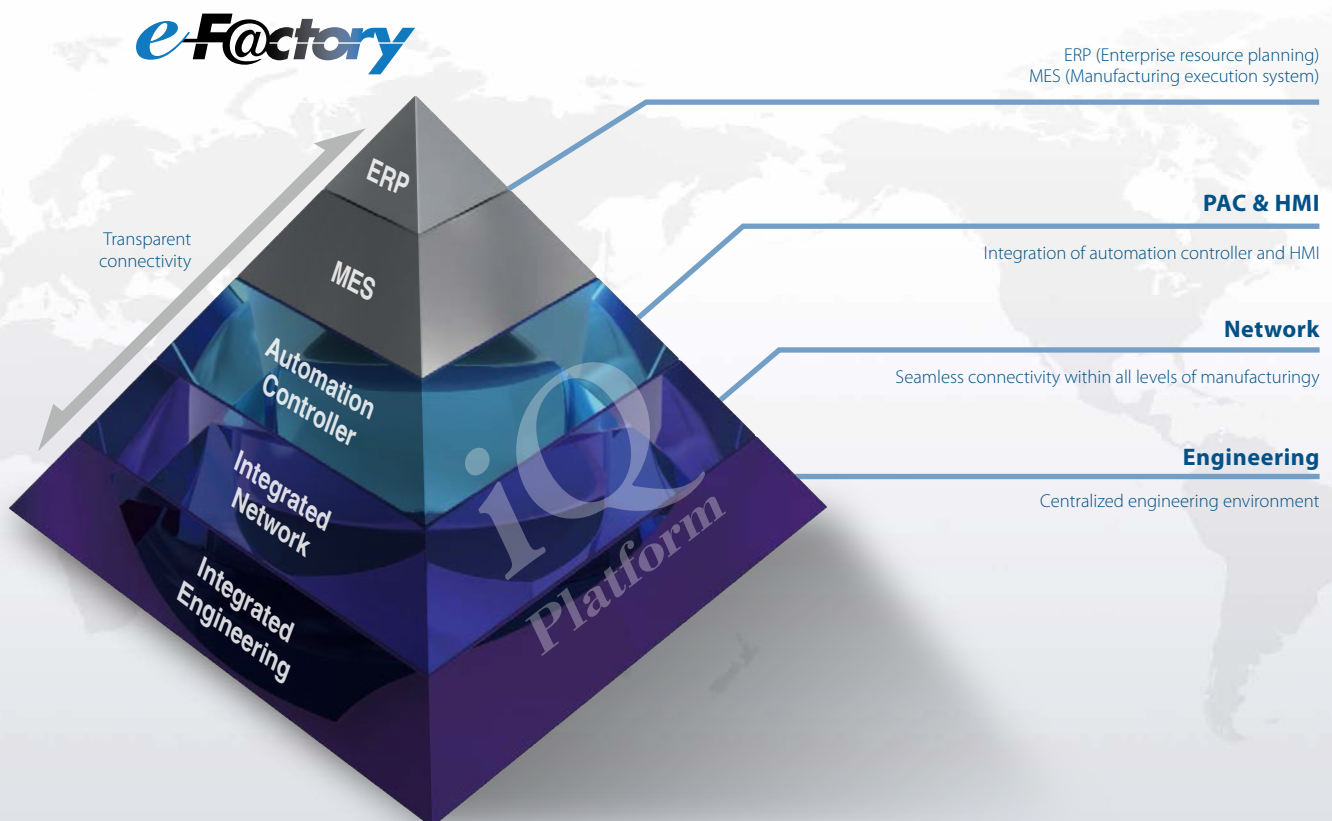
Plant-wide operations rely on good communication strategies. The MELSEC automation platform can support over 50 different forms of communication, including standard RS232, fieldbuses, Ethernet, web servers and redundant networks.

Making life easy

Traditionally, the interface between MES and the production environment has been separated by a layer of management PCs and master PLCs used for concentrating data and cell information. With the MELSEC automation platform, this structure can be simplified by em-

bedding the PC directly on the same backplane. This removes a layer of management structure as well as simplifies implementation.

Each customer's requirements are different and the automation solutions from Mitsubishi Electric are designed to offer a wide range of solutions that can be easily adapted. The MELSEC automation platform enables the use of local embedded webserver technology, meaning that Ethernet and web-based browsing can be used for capturing data. Moreover, a dedicated MES interface allows MELSEC System Q and the iQ-R series to "talk" directly to the MES software without any intermediary devices, reducing implementation and on-going maintenance costs.



Compact PLCs

The world's favourite compact PLC brings together power and simplicity in equal measure.



Motion control

Mitsubishi Electric Servo and Motion systems offer scalable solutions from 1 to 192 synchronized axes.



Modular PLCs

The MELSEC L series, iQ-R series and MELSEC System Q are high-performance modular controllers. With a wealth of integrated functions, they enable configuration of optimum solutions for all automation tasks.



Robots

MELFA robots offer class leading technology for both SCARA and articulated arm systems.



MELSOFT

Productivity tools and software solutions to help you get the best out of your automation investment.



LV switchgear and energy management

Advanced low voltage technology covering switchgear and circuit breakers.

HMIs, GOTs and IPC

Mitsubishi Electric offers what is probably the biggest range of control terminals and industrial PCs (IPCs) available from any single manufacturer.



CNC control

Maximise your production and control with the utmost reliability.

Inverters

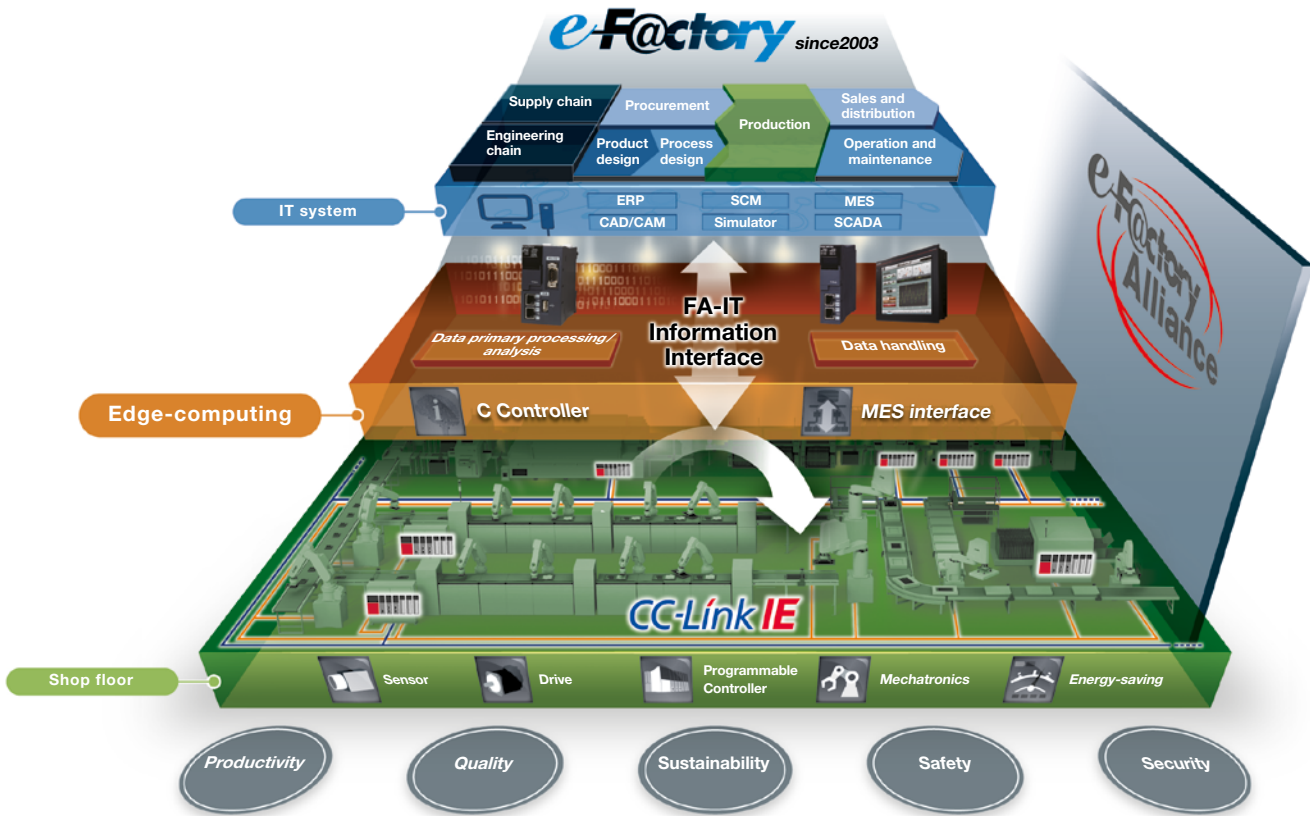
Mitsubishi Electric offers reliable frequency inverters for any application. Our FR family stands for consistent engineering, highest energy efficiency and easy start up.



EDM machines

Mitsubishi Electric EDM - voted as the "Global Market Leader 2005" by Frost and Sullivan.

The e-F@ctory solution



Get maximum system efficiency and performance with e-F@ctory

Our solutions for your benefit

e-F@ctory was born out of the expertise Mitsubishi Electric has developed as a global manufacturing enterprise, facing essentially the same challenges our customers face. Our solution has been implemented in our factories with dramatic results. We are now sharing this expertise with those who are looking for the same benefits from their own manufacturing operations.

An e-F@ctory plant solves various issues through the direct collection of a wide variety of production site data, such as production and operation performance results and quality information, in real-time from equipment and devices, and then utilizes this data in an enterprise IT system.

This real time integration of production data and enterprise IT solidly aids in improving quality, reducing lead time and increasing productivity. The e-F@ctory solution has several key parts as follows.

CC-Link network architecture

CC-Link provides a complete open network architecture that links all factory devices. The top layer is CC-Link IE, which provides the first gigabit industrial Ethernet backbone to meet the ever increasing data communication needs of modern factories.

This extends down the hierarchy with CC-Link IE Field, bringing gigabit bandwidth to all devices.

iQ Platform

The iQ Platform is the enabling controller hardware for the e-F@ctory solution. An iQ system unites PLC, motion, CNC, robot and process control in a single unified controller architecture, linked seamlessly by a high speed backbone.

MES Interface

The MES Interface IT products provide the vital link between the shop floor controllers such as the iQ Platform, and the enterprise IT systems. The connection is direct, with no intermediate PC hardware introducing maintenance or security issues.

For more information about Mitsubishi Electric MES interface products please refer to the technical part, chapter 11 in this catalogue.

The e-F@ctory Alliance

A key part of the e-F@ctory solution is the "e-F@ctory Alliance". We have teamed with other best-in-class suppliers to create partnerships that allow our customers to truly benefit from the most comprehensive solutions available. The e-F@ctory Alliance currently has over 31 partners and their number is growing.

Safety solutions

Comprehensive safety solutions

The European Machinery Directive or international standards such as ISO12100 impose strict regulations for the safety of plant and machinery. Just like the machines themselves, the automation systems that control them must also comply with the directives and stand-

ards to ensure the safety of personnel in all phases of the machines' service life.

At the same time, the safety concept has shifted from human intervention based "zero accidents" to risk assessment based "zero risk". As a solution for this, Mitsubishi Electric provides a total safety solution by incorporating safety control devices, safety drive devices, and safety

components required for safety systems. This allows optimal safety control to be realized, boosting productivity.

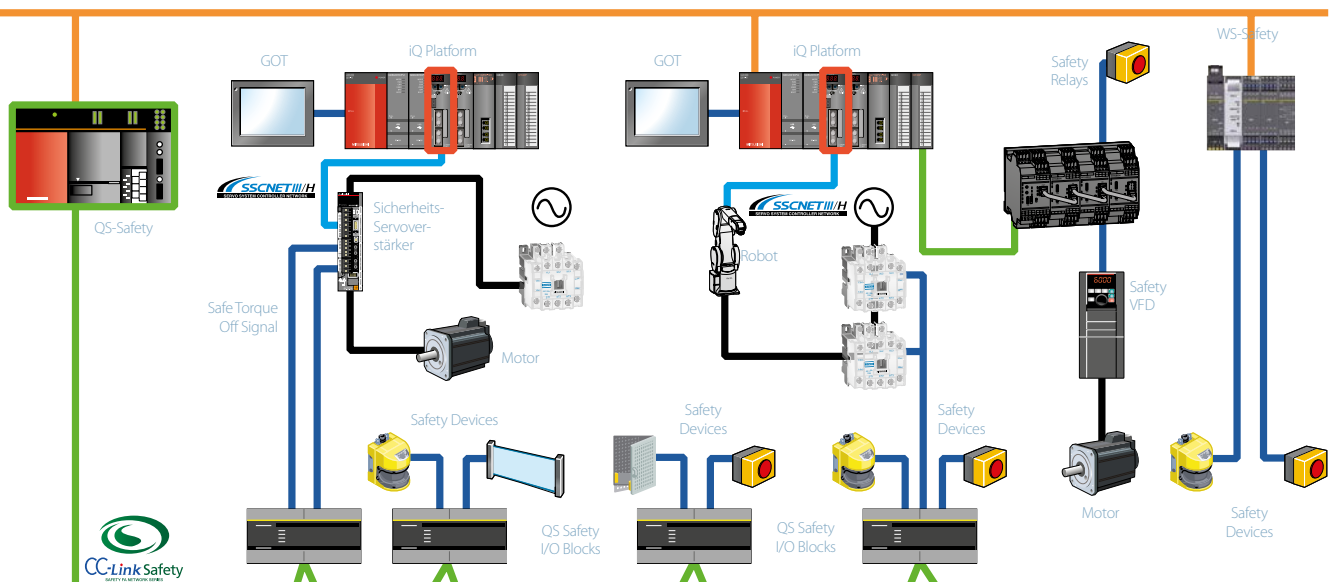
Many companies can offer you a choice of safety devices, or perhaps a safety system of some kind. However, few can provide a complete safety solution that fully integrates with the conventional automation of your systems. The result is not only worker, machine and process safety, but industry leading productivity and performance.

Please refer to the technical information section of this catalogue for more information and ask for our separately available safety brochure.



Safety in every phase of your production

Safety control is fully integrated into the Mitsubishi Electric automation solution



Simple, easy, reliable



Proven reliability from standalone to complete installations

Simple

Mitsubishi Electric PLCs are simple to use. We have reduced many complex actions to a single instruction, making our PLCs much easier to program.

Easy

Moreover, we have designed programming and system configuration to be as flexible as possible. For example, our GX Works programming tools allow users to quickly create PLC programs and configure new modules.

Furthermore customers who wish to use more structured programming methods can choose from an array of languages supported by the IEC61131-3 standards.

All software packages are designed to reduce programming overheads through the use of intuitive layouts and functionality that guides the development of efficient code.

In addition, we offer innovative support tools such as GX Simulator. This package permits users to run PLC programs in a simulation mode without any additional hardware, helping to reduce expensive on-site commissioning time.

Reliable

We design and build our PLCs to the highest international standards gaining many marine and other special approvals in the process. We do this as part of our drive to supply the best quality products possible. A prime example of Mitsubishi Electric quality is the widespread use of our components in the global auto industry, where zero tolerance of product failure is fast becoming the norm.

A unified tool – iQ Works

The iQ Automation Platform is a leading solution for simplified management of complex and heterogeneous industrial production systems. The concept unites PLC, motion, robot and CNC technologies in a single compact hardware platform, enabling seamless interaction between the different control systems. One of the key benefits is the ability to use a single unified tool for development and maintenance of the component systems. iQ Works is that tool: A unified development environment that encompasses all aspects of development and maintenance and can be controlled entirely from a single central location.

| PLC PROGRAMMING | | | | | |
|------------------------|-------------------------|-------------------|---------|--------------|--------------|
| Package | GX Works3 | GX Works2 | | GX Works2 FX | AL-PCS/WIN |
| | MELSEC iQ-F/iQ-R series | MELSEC Q/L series | FX3 SPS | FX3 SPS | ALPHA series |
| Ladder | ● | ● | ● | ● | |
| Function Block Diagram | ● | ● | ● | ● | ● |
| Structured Text | ● | ● | ● | ● | |
| SFC | ● | ● | ● | ● | |
| IEC61131 Compliant | ● | ● | ● | ● | |



One system, one tool

Control to fit

A wide range of solutions

Mitsubishi Electric PLC and controller solutions are divided into three simple groups.

Logic controllers

These Mitsubishi Electric products are called ALPHA controllers. They are small compact units with input/output (I/O), CPU, memory, power supply and HMI built into a single unit. The units are programmed with a very intuitive Function Block-style programming tool (AL-PCS/WIN).

Compact PLCs

Compact PLCs are widely used in applications ranging from machine control to networked systems. Mitsubishi Electric's famous FX3 and FX5 range of PLCs are some of the most popular compact PLCs on the market, as demonstrated by sales of over 17 million controllers worldwide. Compact PLCs contain I/O, CPU, memory and power supply in a single unit.

Moreover, it can extend its capabilities by selecting different options such as I/O, analogue, temperature control, positioning and simple motion. One of the most popular additions is a networking connection. Network options can include Ethernet, Profibus DP, CC-Link, DeviceNet™ as well as CANopen and SAE J1939.

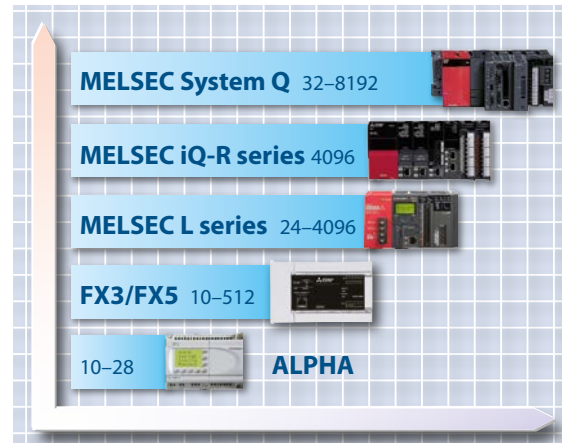
Modular PLCs

Modular controllers like Mitsubishi Electric's MELSEC L series, iQ-R series and MELSEC System Q are high-performance PLC systems with broad functionality. The range, power and function of these high-end PLCs is impressive, with operation times measured in nanoseconds. They are equipped with a separate power supply, CPU, I/O and special options mounted on a backplane.

Additional backplanes can be added as the system expands. Their modular architecture makes it easy to configure these controllers for any task. Modular PLCs comprise a power supply, one or more CPU modules and I/O and/or special function modules. These special function modules include analogue, communications and network modules and a special MES interface. A Web server module is also available for Internet access.

The CPU comes with an integrated Ethernet port for easy access to this standard network.

Mitsubishi Electric's MELSEC System Q demonstrates one of the greatest benefits of an automation platform. It makes it possible to integrate PLC CPUs, motion controllers, robot controllers and process CPUs all in a single system. In addition there are options for systems built around industrial PCs, redundant PLCs, as well as a recent innovation, the C controller.



There is a solution to match your needs



iQ Platform

Mitsubishi Electric's iQ is the world's first automation platform combining all key automation types in one system. No longer are valuable engineering resources spent trying to make different systems from separate vendors work together. With iQ, Mitsubishi Electric takes care of system integration. We provide an extensive array of controller types that seamlessly operate together on the same backplane. Now your engineering staff can concentrate on the demands of the application itself right from the beginning.

| | LOGIC CONTROLLER | COMPACT PLC | MODULAR PLC | | |
|-------------------------------|---------------------|---------------------------|-----------------------------|--------------------|----------------------------|
| I/O | ALPHA2 | FX3/FX5 series | MELSEC L series | MELSEC iQ-R series | MELSEC System Q |
| | 10-28 | 10-512 | 24-4096 | 4096 | 4096 |
| Memory | 200 function blocks | 20-260 k steps | 40-1200 k steps | 40-1200 k steps | 10-1000 k steps |
| Cycle period/log. instruction | 20 µs | 0.065-0.55 µs (65-550 ns) | 0.0095-0.040 µs (9.5-40 ns) | 0.98-1.96 ns | 0.0095-0.2 µs (9.5-200 ns) |

Seeing is believing



Production line or remote plant intelligence – Mitsubishi Electric makes data accessible.

Mitsubishi Electric's visualization concept brings together a wide range of human machine interfaces, industrial PCs and software solutions that let you see what is really happening in the production process.

This combination of three visualisation technologies from a single supplier, allows users to choose the best solution to fit their requirements.

Dedicated HMI solutions

The GOT1000, GOT Simple and GOT2000 series of graphic operator terminals provide the very latest in touch-screen display technology. This gives users bright clear display of information with the flexibility of touch screen input.

The GOT units are designed for fundamental integration with Mitsubishi Electric automation technology. This means easier, faster project development as well as increased system performance and additional access to core functions in Mitsubishi's automation hardware.

Industrial PC (IPC) solutions

Mitsubishi Electric's range of IPC solutions offer customers a robust platform for developing their own solutions. They are designed to provide the flexibility of high-performance PC power but with a sturdy industrial design to protect them during operation. This means users can install an IPC in their manufacturing environment with complete confidence.

A range of Mitsubishi Electric automation software called MELSOFT supports the IPCs. This provides users with a choice of software components that they can embed in their own solution to complete visualisation packages, such as GT SoftGOT.



Perfect vision

| HMI PROGRAMMING/SIMULATION | |
|-----------------------------------|-----------------------------------|
| Package | GT Works3 |
| Feature | |
| Functions: Programming Simulation | ● ● |
| Graphics Library | ● |
| HMI Hardware | GOT1000 series/ GOT2000 series |
| Soft HMI Capability | GT SoftGOT1000/ GT SoftGOT2000 |

| PC BASED VISUALISATION | | | | |
|---|-------------|-------------|---------------|---------------|
| Package | Soft HMI | PC Control | | |
| | GT Soft-GOT | MX Sheet | MX Com-ponent | MX OPC Server |
| Feature | | | | |
| OPC | | | ● | ● |
| Active X | | | ● | |
| VB/VBA | ● | ● | ● | ● |
| Web Deploy-able | | | ● | ● |
| ODBC | | | | |
| Operation: Information Open Plant Factory Floor | | ● ● ● | ● ● ● | ● ● ● |

Hardware with flexibility

When selecting the right visualisation application, a number of basic factors have to be taken into account.

Water protection

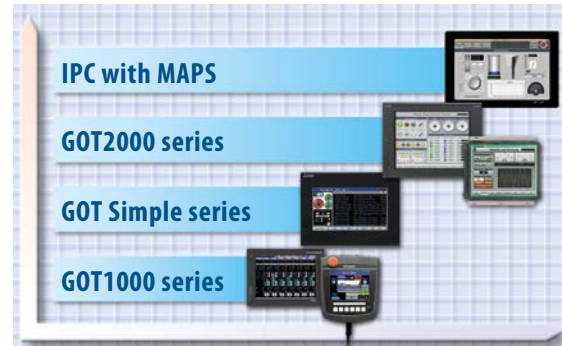
HMI products from Mitsubishi Electric provide a wide range of solutions catering to virtually every application need. All units have an IP65 ingress protection rating or higher – they can be safely hosed down for cleaning, for example. This is often the case in the food industry where high levels of hygiene have to be maintained at all times.

Communication

An important part of automation is communication. Mitsubishi Electric's HMI solutions can connect to leading networks like Ethernet, CC-Link (IE) and Modbus®. With access to hundreds of drivers, Mitsubishi Electric's HMI and SCADA solutions can also be used with automation products from other manufacturers.

Ease of use

Programming and using Mitsubishi Electric HMIs is easy. All of the packages come with pre-defined graphic libraries to help users get started quickly. More than one hundred drivers are available, making it possible to use Mitsubishi's HMI solutions with automation products from third-party manufacturers.



There is a solution to match your needs

MELSOFT

The MELSOFT automation software suite offers users a range of solutions including PLC and HMI programming software components such as OPC servers and Active X containers for embedding directly into a user's solution.

MAPS (Mitsubishi Adroit Process Suite)

MAPS is an engineering tool that encompasses the entire product life cycle of automation solutions. The benefits of MAPS are already available in the development and integration phases. MAPS also makes it easier to integrate your data and enables customers to install extensions and perform maintenance themselves. The program uses pre-defined, user-configurable PLC function blocks and SCADA graphics based on the international S88 and S95 standards. This standardisation means that in addition to saving time, MAPS also reduces the development, testing and commissioning overheads of your automation projects. A range of import functions facilitate fast and easy configuration of the user interfaces for both SCADA and PLC projects. MAPS uses a central database for exchanging global variables, making accidental duplication of data records impossible.



Driving performance



Intelligent solutions for every task

Frequency inverters offer a good example of a widely accepted, widely used automation technology. Inverters allow engineers greater control over a motor's speed and torque performance. Increasingly, inverters are also seen as a simple but important way to reduce energy costs. Today, over 23 million Mitsubishi Electric frequency inverters are in operation around the world in a wide range of applications.

High standards

Our commitment to meeting international standards guides the design of Mitsubishi Electric inverters. Current certifications include the European CE, America's UL and cUL, the Russian EAC, as well as shipping approvals. These certifications help exporters who sell machines and systems with embedded inverters.

Mitsubishi Electric inverters mean reliability and performance. This is why two consecutive IMS Customer Satisfaction Surveys gave Mitsubishi Electric inverters top marks for reliability and technology.

The FR-D700 SC and FR-E700 SC inverter drive series come with the two-channel STO (Safe Torque Off) safety system integrated as standard equipment. This makes it possible to operate multiple inverter drives inexpensively with a single safety relay.

Cut costs

A standard industrial motor in a typical fan or pump application may only cost a few hundred euros to purchase. However, that same motor will consume hundreds of thousands of euros in electricity costs over its operational lifetime. Using an inverter can significantly reduce this outlay.

Intelligent solutions for every task

Mitsubishi Electric offers four types of inverter: Simple, Economy, Flexible and Advanced. Each has been optimized to offer the very best in control and performance.

In addition, depending upon the type selected, Mitsubishi Electric inverters can support the following networks: EtherNet/IP, CC Link, CC-Link IE Field, Profibus DP/DPV1, Profinet, DeviceNet™, EtherCat, CanOpen, SSCNET III/H, LonWorks, RS485, Modbus®/RTU and Modbus®/TCP/BacNet. This extensive communication ability makes it easier to integrate inverter control into larger automation systems.



Inverters help to reduce power consumption and machine wear.

Powering the future

FR-D700 SC

Micro

Mitsubishi Electric's entry level series combines ultra-compact dimensions with a wealth of new functions, including an emergency stop input for reliable stopping. Current vector control ensures that this frequency inverter can always deliver high torque, even at low speeds. An integrated brake transistor enables direct connection of a brake resistor for better braking performance. The FR-D700 SC is the ideal choice for driving fans, agitators and conveyor belt systems.

FR-E700 SC

Compact

Improved functions and capabilities make the FR-E700 SC inverters an economical and universal choice for a huge range of applications such as conveyor belts, hoists, stage systems, pumps, fans and extruders. Features include an integrated USB port, safe stop inputs for safety stop function, improved power delivery in the low-speed range, options for controlled shut down and a slot in which you can install one of the many available option cards for the 700 series.



Comprehensive range from ultra compact to ultra powerful

| INVERTER RANGE | | | | | | | | | | | | | |
|----------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| | FR-D700 SC | | FR-E700 SC | | FR-F800 | | | FR-A800 | | | | | |
| | D720S SC | D740 SC | E720S SC | E740 SC | F820 | F840/ F842 | F846 | A820 | A840/ A842 | A860 ① | A870 | A862 | FR-CC2 |
| Input voltage | 1-phase 200– 240 V AC | 3-phase 380– 480 V AC | 1-phase 200– 240 V AC | 3-phase 380– 480 V AC | 3-phase 200– 240 V AC | 3-phase 380– 500 V AC | 3-phase 380– 500 V AC | 3-phase 200– 240 V AC | 3-phase 380– 500 V AC | 3-phase 525– 600 V AC | 3-phase 525– 690 V AC | 3-phase 525– 600 V AC | 3-phase 380– 600 V AC |
| Output [kW] | 0.1–2.2 | 0.4–7.5 | 0.1–2.2 | 0.4–15 | 0.75–132 | 0.75–630 | 0.4–132 | 0.2–132 | 0.2–1300 | 0.4–250 | 160–200 ② | 220–630 | 220–630 |
| Overload | 200 % | | 200 % | | 250 %/ 120 % | 250 %/ 120 % | 250 %/ 120 % | 250 %/ 120 % | 250 %/ 120 % | 250 %/ 120 % | 250 %/ 120 % | 250 %/ 120 % | 250 %/ 120 % |
| Rating | IP20 | | IP20 | | IP20 | IP00/IP20 | IP55 | IP20 | IP00 | IP00 | IP00 | IP00 | IP00 |

① not for the european market ② to be launched soon 37 to 630 kW

FR-F800*

Flexible

Many frequency inverter drives save power but the FR-F800 saves more. Its innovative AOEC technology (Advanced Optimum Excitation Control) ensures that exactly the right magnetic flux is always applied to the motor for maximum motor efficiency and minimum power consumption. FR-F800 inverters are particularly well suited for pump and fan, HVAC and building services applications.

FR-A800*

Powerful

The frequency inverters of the FR-A800 series deliver high-end performance and power. Their RSV (Real Sensorless Vector control) technology ensures maximum torque and optimum smooth running.



For greater flexibility these inverters have four overload ranges, options for controlled shutdown and integrated PLC functions. With their dynamic performance the FR-A800 inverters are ideal for cranes and hoisting gear, high-shelf storage systems, extruders, centrifuges, winding systems and positioning applications for IM and PM Motors.

* with built-in Ethernet connection (Modbus® TCP/IP & CCLIEFB)

Poetry in motion



Speed, accuracy and control when you need it

As the demands on manufacturing increase, there is a growing need to produce higher quantities of finished goods with lower wastage. To achieve this, all areas of automation are evolving to meet these new demands.

One area undergoing rapid growth is servo and motion control. The development of high performance servomotors combined with intuitive motion control is replacing traditional movement solutions.

Speed and performance

Servomotors allow users to create automation solutions that are faster, more precise and more compact.

Mitsubishi Electric has been pushing forward the boundaries of servomotor design, creating ultra compact brushless motors. All motors of the MR-JE series have an encoder with a resolution of 131,072 pulses per revolution. All motors of the MR-J4 series have an encoder with a resolution of 4,194,304 pulses per revolution. This permits greater machine speed and accuracy.

Plug and Play

Mitsubishi Electric servo and motion solutions offer easy system building and configuration based on PC “plug and play” concepts.

Simple connections

The availability of pre-made cables of different lengths means that connecting a servomotor to an amplifier or any other combination is quick and error free.

Automatic motor recognition

When a Mitsubishi Electric servomotor is connected to an amplifier it is automatically recognized. The correct parameters are then automatically loaded, ready for operation. This reduces the set-up time and the chance of errors.

Simple networking

High-speed servo and motion applications need special high-speed networking. Mitsubishi Electric’s Servo System Controller Network (SSCNET III/H) provides the system capability, connecting and fully synchronising up to 192 axes using a simple plug and cable construction.

*) The MR-JE-BF and MR-J4-B series products use SSCNET III/H, a fibre based version of the network giving complete noise immunity.

Power and precision

Powerful amplifiers

A wide spectrum of Mitsubishi Electric MR-J4 series amplifiers is available, ranging in power from 100 W to 37 kW for 200 V operation, and 600 W to 55 kW for 400 V systems. With such a wide choice of types and series users are sure to find the solution they need.

Performance

With a speed frequency response of up to 2500 Hz Mitsubishi Electric servo systems offer world class performance.

Vibration suppression

Machine performance is often limited by mechanical constraints. The built-in vibration suppression of Mitsubishi Electric's amplifiers overcomes some of these limitations through precise control, reducing the effect of micro vibrations at the pulse point, helping users to get better more reliable machine performance. This function suppresses not only residual vibrations of the machine but also at the end of an arm.

„One-Touch-Tuning“

The new one-touch tuning function minimises time consuming system adjustments between machine and electronics by touching one button. Control parameters are optimised and resonance frequencies of the machine and the mechanics are detected and filtered. An individual adjustment of single applications is not needed. The result is a vibration free, highly precise and high speed positioning process – only by one click.

Motor solutions for all

Featuring the most advanced concentrated winding techniques and the latest technology, Mitsubishi Electric servomotors are among the most compact on the market.

Motors are available in a range of options from 50 W to 55 kW in different designs, including specialised motors such as hollow shaft and pancake designs that suit most application needs.

Moreover, Mitsubishi Electric's low, ultra-low and medium inertia motor designs allow users to select the best motor characteristics for their application.

Motion controllers

Mitsubishi Electric offers a comprehensive range of solutions for positioning tasks and high-end motion control. Options include simple pulse train positioning controllers and dedicated motion cards. And for the most complex applications there are dedicated MELSEC System Q and iQ-R series motion CPUs. Users are able to select the type and style of control they are most familiar with, making system construction fast and efficient.



HG motor series – IP65/IP67 standard protection

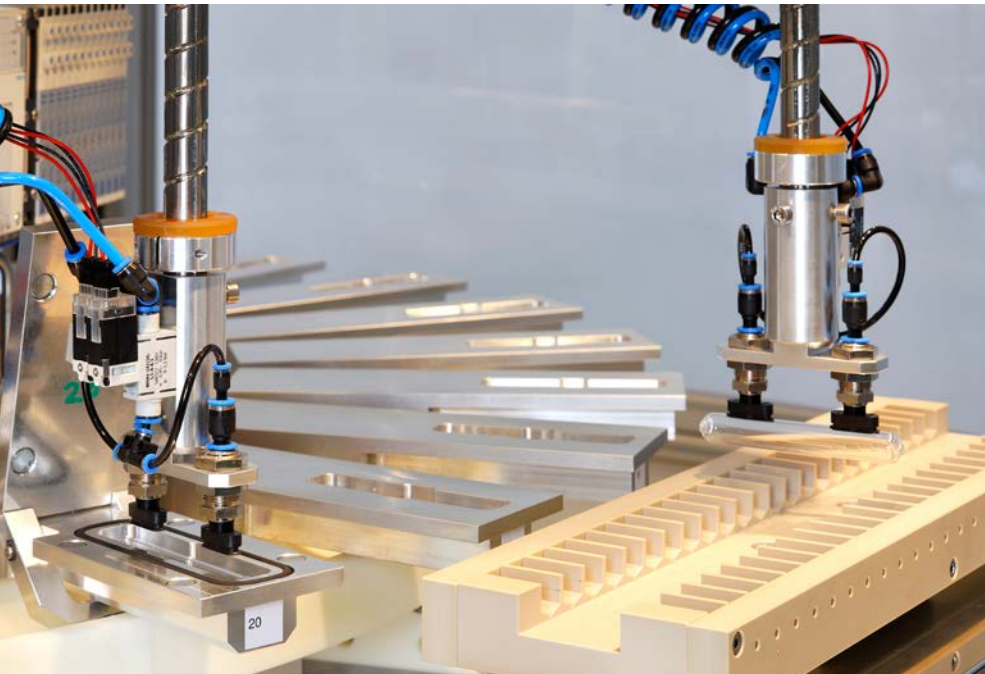


A wide range of powerful amplifiers



Plug and play technology

Innovation in movement



High speed, high accuracy pick and place applications

Robots are already widely accepted as a cost-effective solution for high-speed, high-accuracy pick-and-place applications as well as some basic assembly tasks.

€ 1.65/hr

Robot usage can vary widely but an average application over a typical 7-year life cycle can cost as little as € 1.65 per hour to purchase and operate.



Powerful software helps you get the most out of your robot application.

Making life easy

With the software RT ToolBox3 all robot models are programmable in a quick and easy way. Imported 3D CAD data, program variables and robot simulations can easily be displayed on the graphical surface of the programming software RT Toolbox3.

This leading edge software allows a robot application to be programmed and its operation simulated before the hardware is purchased. This makes system design and building quicker and easier. Moreover, it can identify potential hazards before robot integration begins.

Advanced control as standard

All Mitsubishi Electric robot controllers are shipped with the full control software as standard. This means users do not need to buy additional task-driven software modules at a later date.

BASIC talk

Programming a Mitsubishi Electric robot arm is easier than most people think. The programming language is a BASIC-like structure with commands reflecting the requested action. For example, the command MOV means "move", HCLOSE means "hand close". Furthermore, all Mitsubishi Electric robots are programmed using the same language, reducing the user's learning curve.

Task driven

Thoughtful design

Due to the new motors developed by Mitsubishi Electric, the high arm rigidity and the unique controller technology the robots of the FR series achieve the highest speed in their class.

Ease of connection

Mitsubishi Electric robot arms feature a single connection point for power and pneumatics, making setup and commissioning easier.

In addition, each robot has body-mounted compressed air and signal connections mounted locally to the gripper flange for ease of use.

Standard gripper plates

All arm gripper mounting flanges are designed and built-in accordance with ISO9409-1, ensuring ease of connection to the user's choice of robot hand.

Extended axis

All MELFA robots can be mounted on an additional linear axis to provide greater reach and utilization of the robot arm.

Networked

Mitsubishi Electric's robot controllers can be embedded into larger automation cells by using networks such as Ethernet, Profibus, Profinet, Ethernet/IP and CC-Link, keeping users in control at every step of their process.

Articulated arm robots

The range of the articulated-arm robots of the RV series starts with the powerful compact class with a payload from 2 kg



The ideal robots for all applications with payloads of up to 70 kg

up to the power pack with a payload of 70 kg. These robots are also available as a long arm version.

Higher handling weights and a larger movement area can be realised by the compact and slim construction of the robot arm. The standard protection class of IP67 allows the operation of the robots in industries like food, beverage and packaging.

SCARA robots

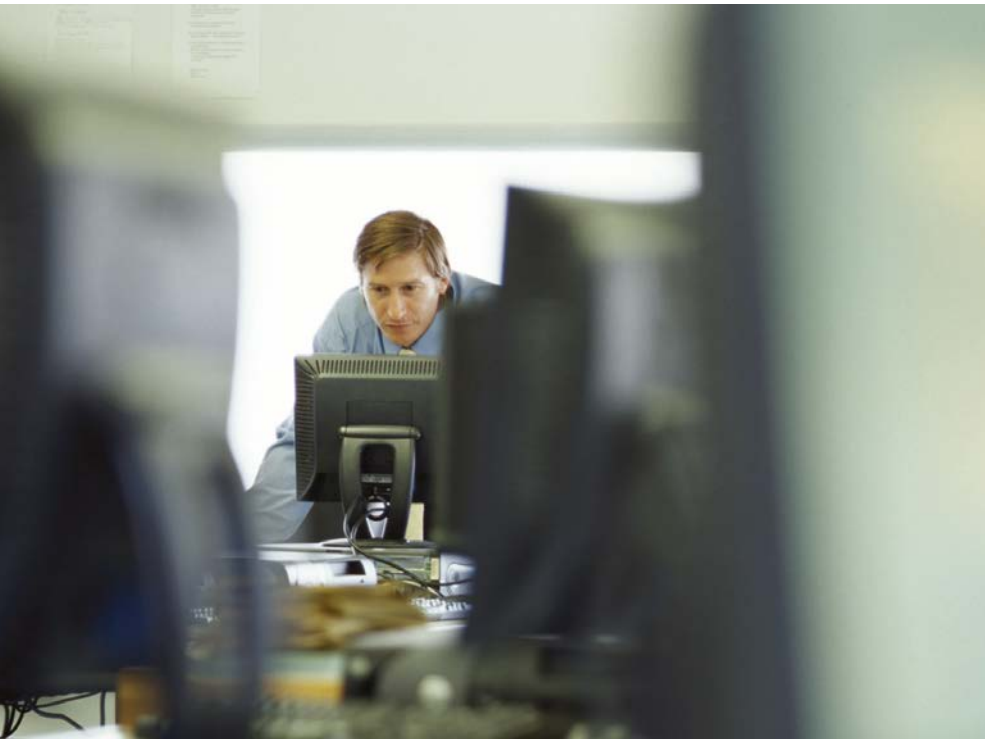
Mitsubishi Electric's range of SCARA robots divides into two categories. The small RP-ADH robots feature outstanding repeatability (+/- 0.005 mm) at very high speed, making them ideal for micro assembly tasks and the population and soldering of SMD circuit boards.

The robots of the RH-FRH series are suitable ex factory for a multitude of industrial applications and can be adopted intersectoral. A cycle time of only 0.29 s for the 12" cycle ensures highly precise and powerful operation for increasing productivity on-site. By protection class IP54 and utilisation of lubrication grease suitable for use in food industry. The robots are capable of being fully integrated. The wiring routed inside the robot and led through at the ball screw end offers protection and safety.



| ROBOT RANGE | | | |
|-------------------|---------|----------|-----------------|
| Range | RP | RH | RV |
| Type | SCARA | SCARA | Articulated arm |
| Weight class [kg] | 1-5 | 3-20 | 2-70 |
| Reach [mm] | 236-453 | 350-1000 | 504-2050 |

Breakthrough technology



Groundbreaking research and design



Standards are at the centre of our product development.

Mitsubishi Electric has been active in the low voltage (LV) switchgear market since 1933. Ever since Mitsubishi Electric developed and manufactured the first moulded case circuit breakers, the company has been committed to research and development in this field, making it one of the world's leading manufacturers of circuit breakers.

Innovation

Groundbreaking research and design has resulted in innovative LV switchgear, providing users with greater quality, safety and reliability. Today's LV products feature meticulously designed technology: even the casing material used in the PA (Polymer Ablation type Auto-Puffer) provides greater safety and high voltage breaking performance.

Leading edge

Jet Pressure Trip (JPT) is an extension of the PA concept, allowing switchgear to trip even faster than a traditional magnetic solution. This means that the switchgear can improve its current-limiting performance and circuit breaking reliability. Any connected devices are then better protected, a major benefit to users.

Other technologies such as ISTAC (Impulsive Slot-Type Accelerator, used as a high-speed arc-controlling technology) and developments in digital ETR (Electronic Trip Relay) and VJC (Vapour Jet Control) all contribute to making Mitsubishi Electric's LV products leading edge.

Global products

All LV products are designed to comply with international standards such as JIS, IEC, EN, GB, UL/CSA.

A complete solution

Mitsubishi Electric offers a complete solution for line and load side distribution, ranging from air circuit breakers to moulded case breakers and magnetic contactors.

Air circuit breakers (ACBs)

These compact Super AE units come in a broad spectrum of performance categories from 1,000 to 6,300 Amps. The basic unit is available as a fixed or "draw out" design, which can be augmented with options for enhanced overload control, network and energy consumption.

Thanks to these features Mitsubishi Electric's ACBs provide users with the flexibility to meet most applications.

Moulded case circuit breakers (MCCBs)

Mitsubishi Electric's MCCBs of the World Super Series (WS) provide protection across the current range from 32 to 1,600 Amps. Each unit is available in a fixed or slot-in design and has a range of additional options such as electronic trips

Magnetic contactors, thermal overload relays, contactor relays

The MS range of LV switchgear is a reliable and customizable solution for load side connection. The MS-N range is made up of magnetic contactors, thermal overload relays and contactor relays.

These space-efficient products are up to 25 % smaller than similar units. In addition the MS range has enhanced performance. For example, the magnetic contactors withstand voltage drops of up to 35 % while still ensuring reliable operation.

The MS-N units can be customised with a wide range of options, including thermal overload relays, time delay modules, auxiliary contacts and trip indicators to suit the user's specific needs.

Miniature circuit breakers (MCB)

- Trip free mechanism

During fault MCB trips even if handle is held in ON position.

- Low watt loss

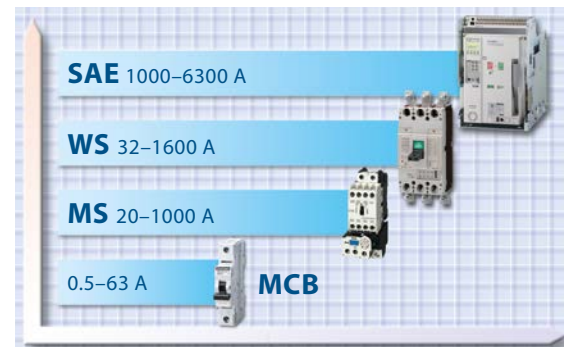
Power loss values are much lesser than IEC specified values; making it one of the most energy efficient MCB.

- Energy limiting class: 3

High current limiting performance under fault conditions achieved due to ultra fast contact opening and rapid quenching of arc.

- Circuit identification

Legend plates for circuit identifications and hence enhanced safety



Advanced low voltage technology

Motor circuit breaker (MMP)

- Self-protected manual motor controller
- Reliable protection and superior performance
- Compact design
- Smart wiring
- Safety & quality
- Global standards

Energy monitoring (ME96 and EMU4)

- Multi-measuring instrument Super-S series (ME96)

Mitsubishi Electric multi-measuring instrument SS series features high performance and crystal clear display. With simple operating functions, SS series is the best support to your measuring and monitoring systems.

- Energy measuring unit EcoMonitorLight (EMU4)

Simple & easier providing energy visualization. Introducing the EcoMonitorLight, an energy measuring unit with an integrated display that provides easy energy visualization in order to provide ways to save energy and to comply with the Energy Saving Act in response to the need for a simple manner to figure out energy consumption.



Where have Mitsubishi Electric products been used?



Remote management solutions include SCADA, Networking, Telemetry and Industrial Modems.

Customer applications with Mitsubishi Electric products have been wide spread from critical applications in pharmaceutical industries to sublime applications in the leisure industry.

Here are just a few examples of applications that customers have completed in the past:

- Agriculture
 - Plant watering systems
 - Plant handling systems
 - Sawmill (wood)
- Building management
 - Smoke detection monitoring
 - Ventilation and temperature control
 - Lift (elevator) control
 - Automated revolving doors
 - Telephone management
 - Energy management
 - Swimming pool management

- Construction
 - Steel bridge manufacturing
 - Tunnel boring systems
- Food and drink
 - Bread manufacturing (mixing/baking)
 - Food processing (washing/sorting/slicing/packaging)
- Leisure
 - Multiplex cinema projection
 - Animated mechatronics (museums/theme parks)
- Medical
 - Respiration machine testing
 - Sterilization
- Pharmaceutical/chemical
 - Dosing control
 - Pollution measurement systems
 - Cryogenic freezing
 - Gas chromatography
 - Packaging
- Plastics
 - Plastic welding systems
 - Energy management systems for injection molding machines
 - Loading/unloading machines
 - Blow molding test machines
 - Injection molding machines
- Automotive
- Printing
- Textiles
- Transportation
 - Sanitation on passenger ships
 - Sanitation on rail rolling stock
 - Fire tender pump management
 - Waste disposal truck management
- Utilities
 - Waste water disposal
 - Fresh water pumping
 - Clarification plants



Automotive control solutions



Technical Information Section

More information?

The catalogue at hand is designed to give an overview of the extensive product range of Mitsubishi Electric Europe B.V., Factory Automation. If you cannot find the information you require in this catalogue, there are a number of ways you can get further details on configuration and technical issues, pricing and availability.

For technical issues visit the <https://eu3a.mitsubishielectric.com> website. Our website provides a simple and fast way of accessing further technical data and up to the minute details on our products and services. Manuals and catalogues are available in several different languages and can be downloaded for free.

For technical, configuration, pricing and availability issues contact our distributors and partners. Mitsubishi Electric partners and distributors are only too happy to help answer your technical questions or help with configuration building. For a list of Mitsubishi Electric partners please see the back of this catalogue or alternatively take a look at the "contact us" section of our website.

About this technical information section

This section is a guide to the range of products available. For detailed configuration rules, system building, installation and configuration the associated product manuals must be read. You must satisfy yourself that any system you design with the products in this catalogue is fit for purpose, meets your requires and conforms to the product configuration rules as defined in the product manuals.

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The products of Mitsubishi Electric Europe B.V., that are listed and described in this document, are neither subject to approval for export nor subject to the Dual-Use List.

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Software



Our MELSOFT suite embodies a wide range of software to optimise your plant productivity: from visualisation and control systems to historic and downtime monitoring capabilities. A core design feature of our software is that it is scalable. It is a well accepted truism that one solution rarely fits all, so within each application category there are a range of products offering different levels of functionality and connectivity designed to meet your individual needs. All products are based on Microsoft standards (OPC etc), giving you a broad range of connectivity options and a familiar interface. The MELSOFT suite consists of three main areas:

- **Visualisation.** This type of software is aimed at monitoring and controlling your automation processes.
- **Programming.** Our extensive range of programming software enables users to write their own PLC code for their application. We have software solutions for each of the following products groups; servos, inverters, logic blocks, PLCs, HMIs and networking.
- **Communication.** Our communication software is designed to integrate our products with common third party software packages. This provides you with the reliability and quality of Mitsubishi Electric hardware, combined with the familiarity of software packages/tools such as Microsoft Excel, ActiveX and OPC.

Unified engineering environment: iQ Works

iQ Works integrates the functions necessary to manage every part of the system cycle.

System design

The intuitive system configuration diagram allows for the graphic assembly of systems, centralized management of disparate projects and batch configuration of the entire control system.

Programming

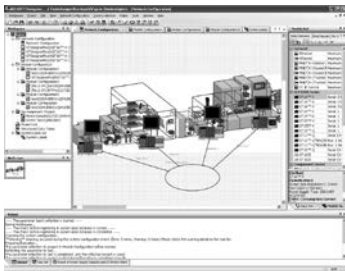
Use system labels to seamlessly share device data between GOTs, PLCs and motion controllers. Save the time and hassle of changing device values in each program by using the update system labels feature.

Test and startup

Debug and optimize programs using the simulation functions. Use the included diagnostics and monitoring functions to quickly identify the source of errors.

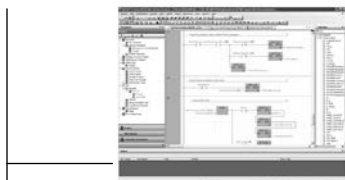
Operation and maintenance

Speed up the process of commissioning, configuring and updating the system by using the batch read feature. Virtually eliminate the confusion associated with system management.



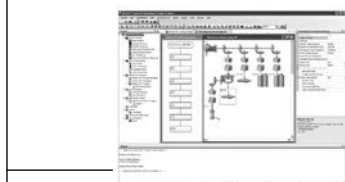
MELSOFT Navigator

– is the heart of iQ Works. It enables the effortless design of entire upper-level systems and seamlessly integrates the other MELSOFT programs included with iQ Works. Functions such as system configuration design, batch parameter setting, system labels and batch read all help to reduce TCO.



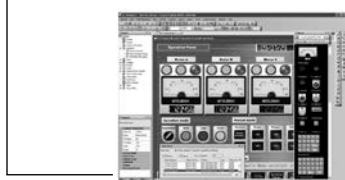
MELSOFT GX Works

– represents the next generation in MELSOFT PLC maintenance and programming software, with improvements made throughout to increase productivity and drive down engineering costs.



MELSOFT MT Works

– is a comprehensive motion CPU maintenance and program design tool. Its many useful functions, such as intuitive settings, graphical programming and digital oscilloscope, simulator, different Motion OS support, assistance help, to reduce the MT Works2 associated with motion systems.

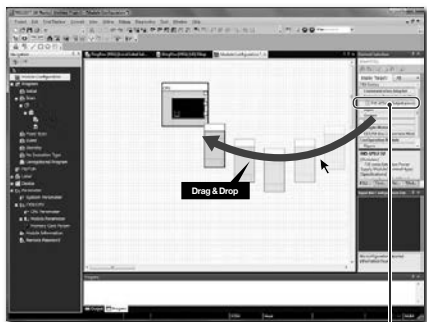


MELSOFT GT Works

– is a complete HMI programming, screen creation and maintenance program. In order to reduce the labor required to create detailed and impressive applications, the software's functionality has been built around the concepts of ease of use, simplifications (without sacrificing functionality) and elegance (in design and screen graphics).

PLC programming

GX Works2/GX Works3



Simply drag & drop when adding a module

GX Works2 supports all MELSEC PLCs (except MELSEC iQ-R/iQ-F), while GX Works3 supports the MELSEC iQ-R and iQ-F series and offers numerous functions to facilitate programming

work and support the user. GX Works2 FX has the same functionality as GX Works2 but just for FX3 PLC's.

| Programming | MELSEC series | | | | |
|--------------|---------------|------|------|---|---|
| | FX | iQ-F | iQ-R | Q | L |
| GX Works2 | ● | | | ● | ● |
| GX Works3 | | ● | ● | | |
| GX Works2 FX | ● | | | | |

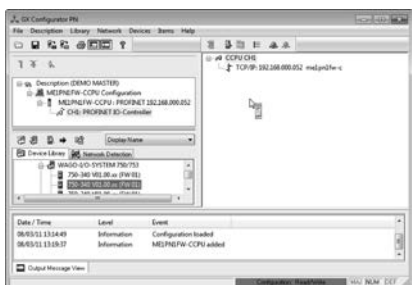
GX Configurator DP



GX Configurator DP is a setup and configuration software for Profibus DP networks. It can be used to configure Mitsubishi Electric Profibus

DP master and all slave modules including inverters and HMI's as well as other manufacturer's products.

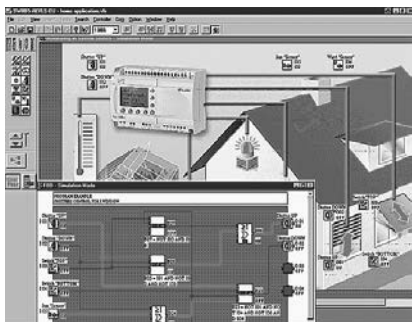
GX Configurator PN



GX Configurator PN is the configuration tool for Profinet I/O modules. This software offers functions for the configuration of the Profinet I/O

network, testing the configuration and transfer of the settings to the Profinet module.

ALPHA – ALVLS (AL-PCS/WIN)



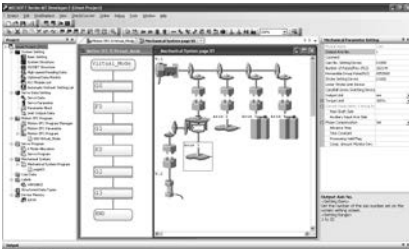
The original visual based function block programming software for logic controllers. Easy to use Windows based software that requires no prior experience or training by the user.

Program elements are placed on screen, with inputs on the left and outputs on the right and the function blocks in the middle.

Software

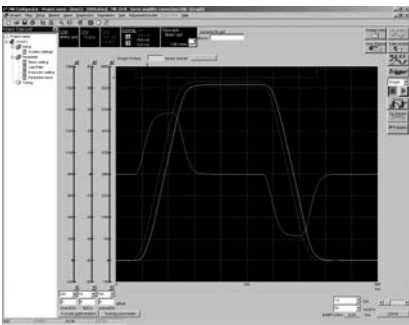
Programming of drive systems

MT Works2



MT Works2 is an integral start-up software used to structure and configure a system for MELSEC System Q motion and iQ-R series controller applications.

MR Configurator2



MR Configurator2 is a user-friendly software for easy setup, tuning and operation of the MELSERVO servo systems. Tuning, monitor display, diagnosis, reading/writing parameters,

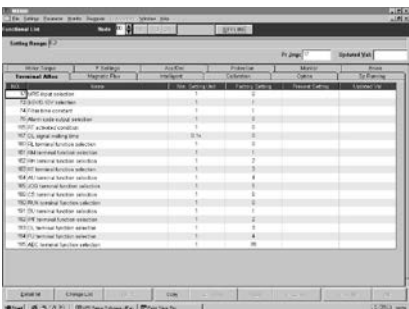
and test operations are easily performed on a personal computer. This start-up support tool achieves a stable machine system, optimum control, and short setup time.

FX Configurator FP



FX Configurator FP is a special configurator tool for the FX3U PLC SSCNET III positioning module. This software reduces programming and setup time for any level of positioning application.

FR Configurator/FR Configurator2



| Parameter Name | Initial Value | Minimum Value | Maximum Value | Resolution | Unit | Parameter Group |
|---------------------------|---------------|---------------|---------------|------------|------|-----------------|
| FR-001 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-002 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-003 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-004 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-005 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-006 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-007 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-008 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-009 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-010 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-011 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-012 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-013 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-014 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-015 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-016 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-017 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-018 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-019 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-020 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-021 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-022 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-023 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-024 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-025 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-026 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-027 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-028 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-029 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-030 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-031 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-032 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-033 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-034 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-035 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-036 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-037 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-038 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-039 Inverter selection | 1 | 1 | 1 | 1 | | General |
| FR-040 Inverter selection | 1 | 1 | 1 | 1 | | General |

FR Configurator and FR Configurator 2 are powerful frequency inverter configuration and management tools. It runs in Windows making it possible to manage your inverters

with a standard PC. It allows the inverters to be monitored and the parameters to be configured, providing a user friendly environment to control single or multiple inverters.

Visualisation software – HMI programming

GT Works3

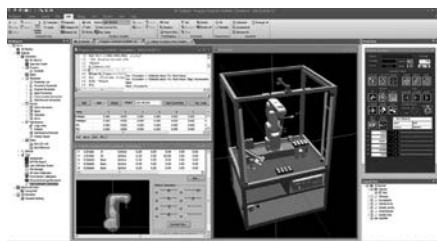


With GT Works3 you will get a comprehensive tool for programming, maintenance and screen creation. It is composed of the software GT Designer3, GT SoftGOT1000 and

GT SoftGOT2000 as well as the simulation tool GT Simulator and a converter for already existing projects.

Robots programming

RT Toolbox3



RT Toolbox3 is a software for program creation and total engineering support.

This PC software supports everything from system startup to debugging, simulation, maintenance and operation. This includes programming and editing, operational checking before robots are installed, measuring process

tact time, debugging during robot startup, monitoring robot operation after startup, and trouble shooting.

RT Toolbox3 Pro offers an add-in tool 1 for SolidWorks 2 used for robot simulation in production systems on PC's converting processing paths of workpieces into robot position data.

PC data management

MX Sheet

MX Sheet enables users to gather data from their PLC and analyse it using the familiar tools and functions of Excel. MX Sheet can analyse and display real-time data in tables, graphs and charts as it happens.

MX OPC Server

The MX OPC Server is a Mitsubishi Electric I/O driver OPC Data Access (DA) and Alarm/Events (AE) server that provides the interface and communications protocol between a wide range of Mitsubishi Electric hardware and your process control software. Mitsubishi Electric drivers incorporate OLE Automation technology and OPC compliance to provide flexibility and ease-of-use.

MX Component

MX Component provides users with powerful ActiveX controls that simplify the communication between a PC and PLC. Users do not have to design complex communication protocols and is ideal for implementing specific software applications requiring PLC connectivity.

MX Component supports a wide variety of powerful and standardised programming languages such as Visual C++ .NET, VBA and VB Script.

MAPS visualisation solutions

Life-cycle engineering, SCADA, HMI, reports and operational excellence for industrial applications



The Mitsubishi Electric Adroit Process Suite (MAPS) creates advanced, secure and integrated solutions that deliver value to your business. The MAPS SCADA/MAPS HMI and related software products provide the latest automation software for general industrial users including water utilities, telecommunications, food and beverage, manufacturing, life sciences, processing or building and facilities management industries. MAPS is also built to deliver solutions around IIoT applications.

MAPS takes raw data from the front end device like a Programmable Logic Controller (PLC) or

Remote Telemetry Unit (RTU) in the process field and transforms it into an easy to understand graphic representation, whilst adding the ability to log history, do alarming and process values.

MAPS SCADA helps identify and manage key factors such as quality, production and energy efficiency, which ultimately lead to greater business profits.

The MAPS SCADA is at the forefront of the SCADA/HMI market, making it one of the most open, advanced and scalable SCADA platforms available.

Networks

From simple stand alone systems and basic AS-Interface networks to Ethernet based networks and even Global networks based on Remote Telemetry Technology, Mitsubishi Electric has the answers. Here is an overview of some of the networks Mitsubishi Electric provides:

Ethernet

If you are looking for the widest possible set of connectable technologies, Ethernet is unrivalled. The Ethernet interface allows communication via CC-Link IE Field, Profinet, Modbus®/TCP, EtherNet/IP and EtherCat.

EtherNet/IP

EtherNet/IP is an open Ethernet standard for industrial networks using TCP/IP technology. It incorporates the Common Industrial Protocol (CIP) as application protocol.

CC-Link, CC-Link IE Control, CC-Link IE Field, CC-Link IE Field Basic and CC-Link Safety

If you need unparalleled ease of connection between Mitsubishi Electric products or you are looking for a single supplier for your control network needs, then CC-Link is the natural choice.

AnyWireASLINK

AnyWireASLINK is a sensor-level network that realizes a smaller installation space and reduces wiring due to its easy wiring topology. The ability to monitor the network system from a centralized location reduces commissioning time and improves productivity.

Profibus DP

Profibus is one of the most widely used automation networks in Europe. It provides a wide possible range of compatible devices while delivering fast and robust communication.

Profinet

Open industrial Ethernet standard for automation. Profinet uses TCP/IP and IT standards, is capable of real-time Ethernet and allows the integration of field bus systems.

Modbus®/TCP, Modbus®/RTU

The Modbus® protocol is a messaging structure which is used to establish master-slave/client-server communication between intelligent devices. It is a de facto standard, truly open and a widely used network protocol in the industrial manufacturing environment.

DeviceNet™

DeviceNet™ is another widely accepted open network type with a large variety of third party products. This network type is particularly popular in North America.

AS-Interface (Actuator Sensor Interface)

The Actuator Sensor Interface (AS-Interface) is the international standard for the lowest field bus level. The network suits versatile demands, as it's very flexible and easy to install. It is usually used to control sensors, actuators, I/O units and gateways.

MELSECNET/H

For the systems that demand uncompromising reliability and high speed performance, only a dedicated network can deliver. MELSECNET/H and it's predecessor MELSECNET/10 use high speed, redundant functionality to give deterministic delivery of large data volumes.

SSCNET III/H

Mitsubishi Electric's SSCNET III (Servo System Controller Network) is a dedicated motion controller network ensuring maximum control and flexibility for motion systems under all conditions.

The motion controllers and servo amplifiers can be linked via the SSCNET network.

CANopen

CANopen is an "open" implementation of the Controller Area Network (CAN), which is defined in the EN50325-4 standard. It was developed by members of the CAN in Automation international users and manufacturers group.

BACnet

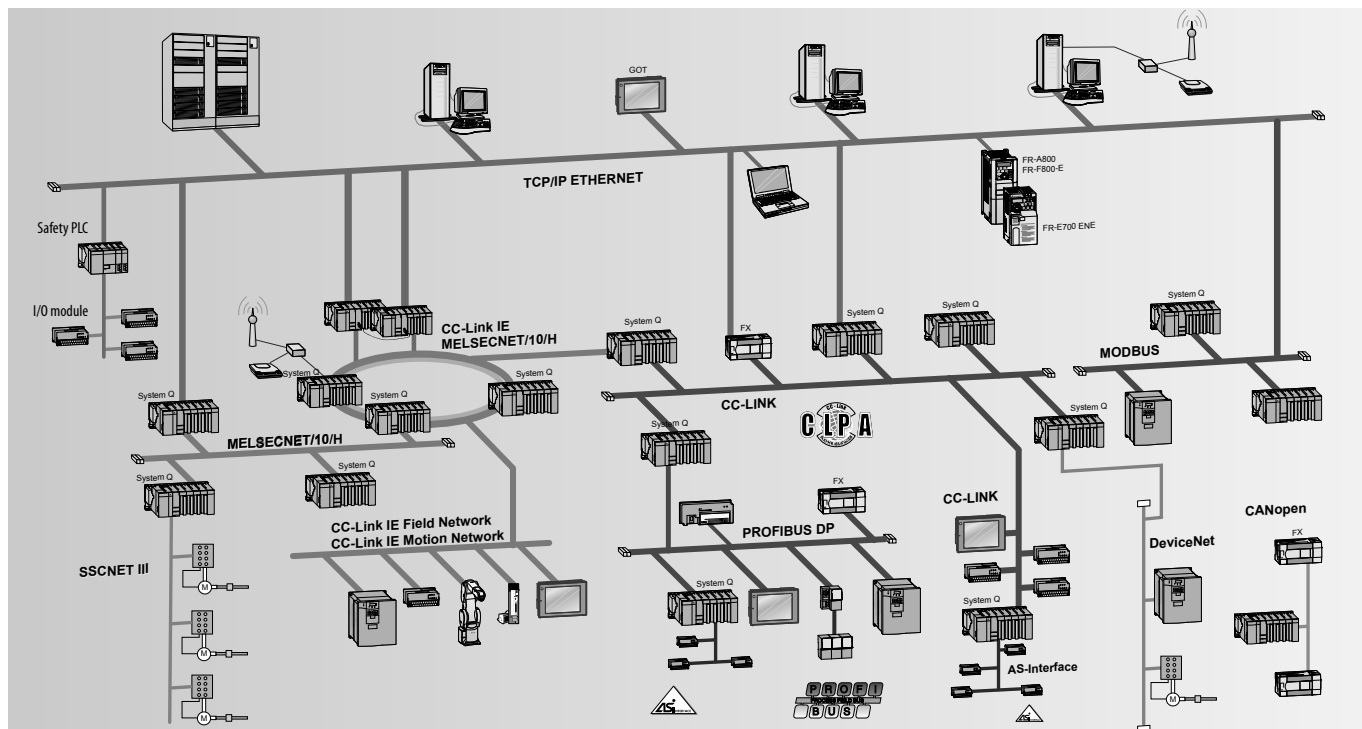
BACnet is a communications protocol for Building Automation and Control (BAC) networks that leverage the ASHRAE, ANSI and ISO 16484-5 protocol.

EtherCAT

EtherCAT is the abbreviation of Ethernet for Control Automation Technology. It is an open network communication between a master and slaves that uses real-time Ethernet.

| Network | PLC | | | HMI | Inverter | Servo | Breaker | Robot | Energy meters |
|--------------|------------------------|---------|-------|-----|----------|-------|---------|-------|---------------|
| | Modular | Compact | ALPHA | | | | | | |
| Ethernet | TCP/IP | ● | ● | — | ● | ● | — | ● | — |
| | CC-Link IE Field | ● | ● | — | ● | ● | — | ● | — |
| | CC-Link IE Control | ● | — | — | ● | — | — | — | — |
| | CC-Link IE Field Basic | ● | ● | — | ● | ● | — | ● | — |
| | Modbus®/TCP | ● | ● | — | ● | ● | — | — | ● |
| | Profinet | ● | — | — | — | ● | ● | — | ● |
| | EtherNet/IP | — | — | — | — | ● | ● | — | ● |
| | EtherCat | — | — | — | — | ● | ● | — | — |
| CC-Link | ● | ● | — | ● | ● | ● | ● | ● | ● |
| Profibus DP | ● | ● | — | — | ● | — | ● | ● | — |
| Modbus®/RTU | ● | ● | — | ● | ● | ● | ● | — | — |
| DeviceNet™ | ● | ● | — | — | ● | — | — | ● | — |
| AS-Interface | ● | — | ● | — | — | — | — | — | — |
| MELSECNET/H | ● | — | — | ● | — | — | — | — | — |
| SSCNET III/H | ● | ● | — | — | ● | ● | — | ● | — |
| CANopen | ● | ● | — | — | ● | — | — | — | — |
| BACnet | ● (iQ-R) | — | — | — | — | — | — | — | — |

Typical distributed control structure



CC-Link, CC-Link IE Control, CC-Link IE Field, CC-Link IE Field Basic and CC-Link Safety

Standard CC-Link modules

| Series | Master/slave modules | Description | Art. no. |
|---------------------|----------------------|---|----------|
| MELSEC iQ-R series | RJ61BT11 | CC-Link master/local module | 279572 |
| MELSEC System Q | QJ61BT11N | CC-Link master/local module | 154748 |
| | QSJ61BT12 | CC-Link Safety master module | 203209 |
| MELSEC L series | L26CPU-BT | CPU with integrated CC-Link master/local module | 238056 |
| | L26CPU-PBT | CPU with integrated CC-Link master/local module | 244977 |
| | LJ61BT11 | CC-Link master/local module | 238099 |
| MELSEC iQ-F series | LJ61CL12 | CC-Link/LT master module | 284432 |
| | FX5-CCL-MS | CC-Link master module/intelligent device station | 312299 |
| MELSEC FX series | FX3U-16CCL-M | CC-Link master module | 248224 |
| | FX3U-64CCL | CC-Link local module on FX3 | 217915 |
| PCI Express | FX2N-32CCL | CC-Link local module | 102961 |
| | Q81BD-J61BT11 | Master/local module for PCI Express bus | 221859 |
| PCI | Q80BD-J61BT11N | Master/local module for PCI/F PC master | 200758 |
| Frequency inverters | FR-A7NC | CC-Link interface for FR-A700/FR-F700 | 156778 |
| | FR-A7NC-Ekit-SC-E | CC-Link interface for FR-E700 SC | 239644 |
| | FR-A8NC | CC-Link interface for FR-A800/FR-F800 | 269431 |
| HMI | GT15-J61BT13 | CC-Link interface for GOT1000 | 203494 |
| Breakers | BIF-CC-W | CC-Link interface for SUPER AE air circuit breakers | 168571 |
| MELFA robots | 2D-TZ576 | CC Link Interface for robot controller CR750-D | 219063 |
| Energy meters | ME0040C-SS96 | CC Link Interface for ME96SSA | 273874 |
| | EMU4CM-C | CC Link Interface for ME96SSA | 292655 |

CC-Link IE Field Basic modules

| Series | Master/slave modules | Description | Art. no. |
|--------------------|----------------------|-------------------------------|----------|
| MELSEC iQ-R series | R□CPU | CC-Link IE Field Basic master | various |
| MELSEC System Q | R□ENCPU | | |
| | Q□UDVPCPU | | |
| MELSEC L series | Q□UDPVCPU | | |
| MELSEC iQ-F series | L□CPU | CC-Link IE Field Basic slave | |
| | FX5U | | |
| HMI | FX5UC | | |
| | GT27 | | |
| | GT25 | | |
| | GT23 | | |
| | GT21 | | |
| | GS21 | | |

CC-Link IE modules

| Series | Master/slave modules | Description | Art. no. |
|---------------------|----------------------|--|----------|
| MELSEC iQ-R series | RJ71GF21-SX | Control/normal station for CC-Link IE Control, 1 Gbps, fiber-optic cable | 279571 |
| | RJ71GF11-T2 | CC-Link IE Field master/local station, 1 Gbps | 279569 |
| | RJ72GF15-T2 | CC-Link IE Field remote head module, 1 Gbps, Cat5e | 297947 |
| | R04ENCPU | | 290226 |
| | R08ENCPU | | 290227 |
| | R16ENCPU | CC-Link IE Control master/slave or CC-Link IE Field master/slave | 290228 |
| | R32ENCPU | | 290232 |
| MELSEC System Q | R120ENCPU | | 290234 |
| | QJ71GF11-T2 | CC-Link IE Field master/slave modul, 1 Gbps, Cat5e | 236484 |
| | QS0J71GF11-T2 | CC-Link IE Field master/local module | 245177 |
| | QJ71GP21-SX | 1 Gbps, master/slave module for FO GI | 208815 |
| | QJ71GP21S-SX | 1 Gbps, master/slave module for FO GI with external voltage supply | 208816 |
| | Q80BD-J71GP21-SX | 1 Gbps, PCI PC card, master/slave for FO GI | 208817 |
| | Q80BD-J71GP21S-SX | 1 Gbps, PCI PC card, master/slave for FO GI with external voltage supply | 208818 |
| | Q81BD-J71GF11-T2 | PCI PC card, master/local module | 253008 |
| MELSEC L series | NZ2GF-ETB | CC-Link IE Field network Ethernet adapter | 253007 |
| | LJ71GF11-T2 | CC-Link IE Field master/local module | 246346 |
| MELSEC iQ-F series | LJ72GF15-T2 | CC-Link IE Field head module | 238100 |
| | FX5-CCLIEF | CC-Link IE Field intelligent device station | 297444 |
| Frequency inverters | FR-A7NCE | Option card for integration of a FR-A700/FR-F700 into a CC-Link IE Field network | 244993 |
| | FR-A8NCE | Option card for integration of a FR-A800/FR-F800 into a CC-Link IE Field network | 273102 |
| HMI | GT15-J71GP23-SX | GOT CC-Link IE interface for GT15/16 HMIs, 1 Gbps, fibre optic ring network | 218576 |
| | GT15-J71GF13-T2 | GT16/15 CC Link IE Field network module | 247574 |
| MELFA robots | 2F-DQ535-CCIEF-SET | CC-Link IE Field interface card for CR800-D robot controller | 324560 |
| Servo | MR-J4-□GF | MR-J4 servo amplifiers with integrated CC-Link IE Field interface from 50 W to 22 kW | various |

Ethernet interface modules for various network protocols

| Series | Modules | Description | Art. no. |
|---------------------|-----------------|---|----------|
| MELSEC iQ-R series | RJ71EN71 | Ethernet interface module, 1 Gbps, 100 Mbps, 10 Mbps, two interfaces, multi-network connectivity (Ethernet/CC-Link IE) | 279570 |
| MELSEC System Q | QJ71E71-100 | Ethernet interface module, 100 Mbps, 100BASE-TX/10BASE-T | 138327 |
| | QJ71E71-B2 | Ethernet interface module, 10BASE2 | 129614 |
| | QJ71E71-B5 | Ethernet interface module, 10BASE5 | 147287 |
| | QJ71MT91 | Modbus®/TCP master and client 10BASE-T/100BASE-TX | 155603 |
| | NZ2EHG-T8 | Compact-sized industrial switching HUB equipped with 8 ports capable of 1000BASE-T | 259221 |
| | NZ2EHF-T8 | Compact-sized industrial switching HUB equipped with 8 ports capable of 100BASE-T | 259222 |
| MELSEC L series | LJ71E71-100 | Ethernet interface module, 100 Mbps, 10 Mbps, 10BASE-T/100BASE-TX | 263072 |
| MELSEC FX series | FX3U-ENET-ADP | Ethernet interface module, 10BASE-T | 157447 |
| | FX3U-ENET | Ethernet interface module, 100BASE-TX/10BASE-T | 166086 |
| | FX3U-ENET-P502 | Ethernet interface module, 100BASE-TX/10BASE-T, Modbus®/TCP ready | 225142 |
| HMI | GT15-J71E71-100 | Ethernet interface module, 100BASE-TX/10BASE-T | 166309 |
| Frequency inverters | FR-A7N-WIE | WiFi Ethernet multi-protocol (Modbus®/TCP, EtherNet/IP, Bacnet, MELSEC ABCSP according Modbus®/RTU) for FR-A700/FR-F700 | 264932 |
| | A7NETH-2P | Ethernet protocol (EtherNet/IP ProfiNet I/O, BacNet/IP, EtherCat, Modbus®/TCP&MC) for FR-A700/FR-F700/FR-E700 | 283759 |
| | A8NEIP_2P | EtherNet/IP 2port interface for FR-A800/FR-F800 | 262950 |

EtherCat

| Series | Modules | Description | Art. no. |
|---------------------|---------------|--|----------|
| Frequency inverters | A8NECT_2P | EtherCat/IP 2port interface for FR-A800/FR-F800 | 284809 |
| | A7NETH-2P | EtherCat/IP 2port interface for FR-A700/FR-E700 | 283759 |
| Servo | MR-J4-□TM-ECT | MR-J4 servo amplifiers with integrated EtherCAT interface from 50 W to 22 kW | various |

Modbus®/TCP, Modbus®/RTU

| Series | Master/slave modules | Description | Art. no. |
|--------------------|----------------------|--|----------|
| MELSEC System Q | QJ71MB91 | Serial Modbus® interface master/slave module | 167757 |
| | QJ71MT91 | Modbus®/TCP interface master/slave module for Ethernet | 155603 |
| MELSEC L series | CPU-Module | Built-in Modbus®/TCP functionality (master/slave) | — |
| | LJ71C24 | Serial Modbus®/RTU master module | 238093 |
| MELSEC iQ-F series | LJ71C24-R2 | Serial Modbus®/RTU master module | 238094 |
| | FX5-232ADP | Serial Modbus® RS232C interface master/slave module | 280513 |
| MELSEC FX series | FX5-485ADP | Serial Modbus® RS485 interface master/slave module | 280514 |
| | FX3U-232ADP-MB | Serial Modbus® RS232C interface master/slave module | 165276 |
| | FX3U-485ADP-MB | Serial Modbus® RS485 interface master/slave module | 165277 |
| Breaker | FX3U-ENET-P502 | Ethernet modul, 100BASE-TX/10BASE-T, Modbus®/TCP ready | 225142 |
| | BIF-MD-W | Modbus® interface for SUPER AE air circuit breakers | 168573 |
| Energy meters | ME000MT-SS96 | Modbus® interface for ME96SSA | 297420 |
| | EMU4-CM-MT | Modbus® interface for ME96SSA | 304060 |
| Servo | MR-JE-□C | MR-JE servo amplifiers with Modbus®/TCP interface from 100 W to 3 kW | various |

DeviceNet™

| Series | Master/slave modules | Description | Art. no. |
|---------------------|----------------------|--|----------|
| MELSEC System Q | QJ71DN91 | DeviceNet™ interface master/slave module | 136390 |
| MELSEC FX series | FX2N-64DNET | DeviceNet™ interface slave module | 131708 |
| Frequency inverters | FR-A7ND | DeviceNet™ interface for FR-A700/FR-F700 | 158525 |
| | FR-A7ND-Ekit-SC-E | DeviceNet™ interface for FR-E700 SC | 239648 |
| | FR-A8ND | DeviceNet™ interface for FR-A800 | 269432 |

AnyWireASLINK

| Series | Modules | Description | Art. no. |
|--------------------|------------|------------------------------------|----------|
| MELSEC iQ-R series | RJ51AW12AL | AnyWireASLINK system master module | 301856 |
| MELSEC iQ-F series | FX5-ASL-M | AnyWireASLINK system master module | 312300 |
| MELSEC L series | LJ51AW12AL | AnyWireASLINK system master module | 290898 |

AS-Interface

| Series | Master/slave modules | Description | Art. no. |
|-----------------|----------------------|--|----------|
| MELSEC System Q | QJ71AS92 | AS-Interface module, version 2.11, dual network master | 143531 |
| ALPHA | AL2-ASI-BD | AS-Interface board for use with AL2-14MR or AL2-24MR | 142525 |

Profinet

| Series | Modules | Description | Art. no. |
|---------------------|-----------------|--|----------|
| MELSEC iQ-R series | RJ71PN92 | Profinet master module | 308713 |
| MELSEC System Q | ME1PN1FW-CCPU | Profinet master module | 252935 |
| Frequency inverters | A8NPRT_2P | Profinet interface for FR-A800/FR-F800, compliant to Profidrive | 262949 |
| | A7NETH-2P | Profinet interface for FR-A700/FR-E700 | 283759 |
| MELFA robots | 2D-TZ535-PN-SET | Profinet I/O interface for robot controller CR750-D/CR800-D | 269546 |
| Servo | MR-J4-□TM-PNT | MR-J4 Servo amplifiers with integrated Profinet interface from 50 W to 22 kW | various |

Profibus DP(V1)

Master/slave module

| Series | Modules | Description | Art. no. |
|--------------------|-----------|------------------------------|----------|
| MELSEC iQ-R series | RJ71PB91V | Profibus master/slave module | 308714 |

Master modules

| Series | Modules | Description | Art. no. |
|------------------|-------------|---|----------|
| MELSEC System Q | QJ71PB92V | Profibus DP interface master module (DP V1/V2) | 165374 |
| MELSEC L series | ME1PB1-L | Profibus DP interface master module | 268527 |
| MELSEC FX series | FX3U-64DP-M | Profibus DP interface master module for FX3U PLCs | 166085 |

Slave modules

| Series | Modules | Description | Art. no. |
|---------------------|----------------------|--|----------|
| MELSEC System Q | QJ71PB93D | Profibus DP slave module | 143545 |
| MELSEC L series | ME2PB1-L | Profibus DP slave module | 278167 |
| MELSEC FX series | FX3U-32DP | Profibus DP slave module for FX3U PLCs | 194214 |
| Frequency inverters | A8NDPV1 | Profibus DPV1 interface for FR-A800, compliant to Profidrive, with D-sub connector | 262948 |
| | FR-A8NP | Profibus interface for FR-A800, only PPO support, compatible to FR-A7NP | 274514 |
| | FR-A7NP | Profibus interface for FR-A700/FR-F700 | 158524 |
| | FR-A7NP-Ekit-SC-E | Profibus interface for FR-E700 SC | 239646 |
| | FR-A7NP-Ekit-SC-E-01 | Profibus interface with D-sub connector for FR-E700/FR-E700 SC | 273138 |
| Breaker | BIF-PR-W | Profibus interface for SUPER AE air circuit breakers | 168572 |

Slave I/O

| Series | Module | Description | Art. no. |
|---------------|-------------------------|---|--------------------------------|
| All PLC types | ST series/STlite series | Modular input/output system for connection to Profibus DP | refer to page 16 and following |

I/O bridge modules

| Series | Modules | Description | Art. no. |
|------------------|----------------|---|----------|
| MELSEC FX series | FX2N-32DP-IF-D | Profibus remote I/O using FX2N I/O and special function modules; 24 V DC power supply | 142763 |
| MELFA robots | 2D-TZ577 | Profibus DP interface for robot controller CR750-D | 218861 |

Networks

MELSECNET/H

Master, local station

| Series | Modules | Description | Art. no. |
|-----------------|-------------|---|----------|
| MELSEC System Q | QJ71BR11 | MELSECNET/H master/local, coaxial cable | 127592 |
| | QJ71LP21GE | MELSECNET/H master/local, GI 62.5/125 fibre optic cable | 138959 |
| | QJ71LP21-25 | MELSECNET/H master/local, SI fibre optic cable | 136391 |
| | QJ71NT11B | MELSECNET/H master/local, twisted pair | 221861 |

Slave (remote I/O)

| Series | Modules | Description | Art. no. |
|-----------------|-------------|---|----------|
| MELSEC System Q | QJ72LP25-25 | MELSECNET/H remote I/O controller, SI fibre optic cable | 136392 |
| | QJ72BR15 | MELSECNET/H remote I/O controller, coaxial cable | 136393 |

Normal station

| Series | Modules | Description | Art. no. |
|--------|-----------------|---|----------|
| HMI | GT15-J71LP23-25 | MELSECNET/H communication unit, fiber-optic cable | 229842 |
| | GT15-J71BR13 | MELSECNET/H communication unit, coaxial cable | 229843 |

SSCNET III/H

| Series | Modules | Description | Art. no. |
|---------------------|----------------|---|--------------------|
| MELSEC FX series | FX3U-20SSC-H | FX3U positioning module, 2 axes (SSCNET III) | 206189 |
| MELSEC iQ-F series | FX5-40SSC-S | Simple motion module, 4 axes | 281405 |
| | FX5-80SSC-S | Simple motion module, 8 axes | 304187 |
| MELSEC L series | LD77MS2 | Simple motion module, 2 axes | 268199 |
| | LD77MS4 | Simple motion module, 4 axes | 268200 |
| | LD77MS16 | Simple motion module, 16 axes | 268201 |
| | LJ72MS15 | Remote station (head module with END cover) | 271040 |
| MELSEC System Q | QD77MS2 | Simple motion module, 2 axes | 248702 |
| | QD77MS4 | Simple motion module, 4 axes | 248703 |
| | QD77MS16 | Simple motion module, 16 axes | 248704 |
| | Q172DSCPU | Motion controller, 16 axes | 248700 |
| | Q173DSCPU | Motion controller, 32 axes | 248701 |
| Motion controller | Q170MSCPU(-S1) | Stand alone motion controller, 16 axes | 266524 (266535) |
| | MR-MQ100 | Singe axis motion controller, 1 axis (SSCNET III) | 217705 |
| Frequency inverters | FR-A7NS | SSCNET III interface for FR-A700 | 191403 |
| | FR-A8NCE | SSCNET III/H interface for FR-A800 | 273102 |
| Servo | MR-JE-□BF | MR-JE servo amplifiers with SSCNET III/H interface from 100 W to 3 kW | various |
| | MR-J4-□B | MR-J4 servo amplifiers with SSCNET III/H interface from 50 W to 55 kW | various |

CANopen

| Series | Modules | Description | Art. no. |
|---------------------|----------------|--|----------|
| MELSEC iQ-R series | RJ71CN91* | CANopen communication module | 308735 |
| MELSEC System Q | ME3CAN1-Q | CANopen communication module | 278799 |
| MELSEC L series | ME3CAN1-L | CANopen communication module | 283159 |
| MELSEC FX series | FX3U-CAN | CANopen communication module | 252845 |
| Frequency inverters | FR-A7NCA | CANopen communication module for FR-A700 | 191424 |
| | FR-A7NCA E kit | CANopen communication module for FR-E700 | 210705 |
| | FR-A8NCA | CANopen communication module for FR-A800/FR-F800 | 298153 |

* Please consult local Mitsubishi Electric representative to determine availability of these modules.

LonWorks

| Series | Modules | Description | Art. no. |
|---------------------|-------------------|---|----------|
| Frequency inverters | FR-A7NL | Option card for integration of a FR-A700 into a LonWorks network | 156779 |
| | FR-A7NL-Ekit-SC-E | Option card for integration of a FR-E700 SC into a LonWorks network | 239645 |
| | FR-A8NL | LonWorks Interface for FR-A800/FR-F800 | 318109 |

SAE J1939

| Series | Module | Description | Art. no. |
|------------------|------------|--|----------|
| MELSEC FX series | FX3U-J1939 | Communication module for SAE J1939 network | 254276 |

CC-Link/CC-Link IE Field remote modules

These remote modules are intended to be installed near the control target. The advantages are reduced cabling and the capability of acquiring data and operation results of individual machine modules autonomously.

For wet environments six types of low profile waterproof remote I/O modules with IP67 protection are available featuring Input, Output and Combination modules.

- Up to 64 I/O modules with a maximum of 32 inputs or 32 outputs each can be connected.
- All modules have a very compact design which is tough and highly shock-resistant.
- Status indicator LEDs for the inputs
- Standard electrical isolation between process and control via optocouplers
- Mounting with DIN rail adapters or screws
- Modules can be mounted in horizontal arrangement or in one of 4 orientations on a flat surface.
- Ready for use with all CC-Link master modules.

| Product Range | Module | Type | No. of input | No. of output | Description | Art. no. |
|------------------|------------------|--------------------------|---------------|---|---|---|
| Digital in | AJ65BTB1-16D | Remote module | 16 | — | DC input (+COM/-COM) | 75447 |
| | AJ65BTB2-16D | | 16 | — | DC input with 8 potential terminals (+COM/-COM) | 75450 |
| | AJ65SBTB1-8D | Compact remote module | 8 | — | DC input (+COM/-COM) | 104422 |
| | AJ65SBTB1-16D | | 16 | — | DC input (+COM/-COM) | 136026 |
| | AJ65SBTB3-16D | | 16 | — | DC input (+COM/-COM), 3-wire sensors | 151186 |
| | AJ65SBTB1-16D1 | | 16 | — | Fast DC input (+COM/-COM) | 140144 |
| | AJ65SBTB1-32D1 | | 32 | — | Fast DC input (+COM/-COM) | 140145 |
| | AJ65SBTB1-32D | | 32 | — | DC input (+COM/-COM) | 136025 |
| | AJ65FBTA4-16D | Waterproof remote module | 16 | — | Protection IP67, DC input (sink type) | 137587 |
| AJ65FBTA4-16DE | 16 | | — | Protection IP67, DC input (source type) | 137588 | |
| Digital out | AJ65BTB1-16T | Remote module | — | 16 | Transistor output, (sink type), 0.5 A | 75449 |
| | AJ65BTB2-16R | | — | 16 | Relay output, 2 A | 75453 |
| | AJ65SBTB1-8TE | Compact remote module | — | 8 | Transistor output (source type), short circuit proof, 0.1 A | 129574 |
| | AJ65SBTB2-8T1 | | — | 8 | Transistor output (sink type), 0.5 A | 144062 |
| | AJ65SBTB1-16TE | | — | 16 | Transistor output (source type), 0.5 A | 129575 |
| | AJ65SBTB1-32T | | — | 32 | Transistor output (sink type), 0.5 A | 138957 |
| | AJ65SBTB2N-8R | | — | 8 | Relay output, 2 A | 140148 |
| | AJ65SBTB2N-16R | | — | 16 | Relay output, 2 A | 140149 |
| | AJ65SBTB1-16T1 | Waterproof remote module | — | 16 | Transistor output (sink type), 0.5 A | 163966 |
| | AJ65SBTB1B-16TE1 | | — | 16 | Transistor output (source type), 0.1 A | 204679 |
| | AJ65SBTB1-32TE1 | | — | 32 | Transistor output (source type), 0.1 A | 204680 |
| | AJ65SBTB2N-16S | | — | 16 | Triac output, 0.6 A | 159954 |
| | AJ65FBTA2-16T | | — | 16 | Protection IP67, DC output (sink type), 0.5 A | 150380 |
| | AJ65FBTA2-16TE | | — | 16 | Protection IP67, DC output (source type), 1 A | 150381 |
| | Combine | AJ65BTB1-16DT | Remote module | 8 | 8 | DC input (sink type), transistor output (sink type) |
| AJ65BTB2-16DT | | 8 | | 8 | DC input with 16 potential terminals (sink type), transistor output (sink type) | 75452 |
| AJ65BTB2-16DR | | Waterproof remote module | 8 | 8 | DC input (source type), relay output | 75451 |
| AJ65FBTA42-16DT | | | 8 | 8 | Protection IP67, DC output (sink type), DC input (sink type) | 137589 |
| AJ65FBTA42-16DTE | | | 8 | 8 | Protection IP67, DC output (source type), DC input (source type) | 137590 |
| AJ65SBTB1-32DT1 | | Compact combined modules | 16 | 16 | DC input (sink type), DC output (sink type), short circuit proof | 166822 |
| AJ65SBTB1-32DTE1 | | | 16 | 16 | DC input (source type), DC output (source type) | 204681 |
| Analog in | AJ65BT-64AD | Remote module | 4 | — | 4-channel input, -10–10 V, -20–20 mA | 75444 |
| | AJ65BT-64RD3 | | 4 | — | 4-channel input, for 3-wire-type Pt100 temperature sensors | 88026 |
| | AJ65BT-64RD4 | | 4 | — | 4-channel input, for 4-wire-type Pt100 temperature sensors | 88027 |
| | AJ65BT-68TD | Compact remote module | 8 | — | 8-channel thermocouple input | 88025 |
| | AJ65SBT-64AD | | 4 | — | 4-channel input, -10–10 V, 0 A–20 mA | 140146 |
| | AJ65SBT2B-64RD3 | | 4 | — | 4-channel input, for Pt100 with three-wire technology | 221862 |
| Analog out | AJ65BT-64DAV | Remote module | — | 4 | 4-channel voltage output, -10–10 V | 75446 |
| | AJ65BT-64DAI | | — | 4 | 4-channel current output, 4–20 mA | 75445 |
| | AJ65SBT-62DA | Compact remote module | — | 2 | 2-channel voltage output, -10–10 V, 0 A–20 mA | 140147 |
| | AJ65SBT2B-64DA | | — | 4 | 4-channel voltage output, -10–10 V, 0 A–20 mA | 221863 |
| Repeater | AJ65SBT-RPT | Compact repeater | — | — | Repeater allowing 'T' branching and network extension | 130353 |

Remote I/O modules

High-speed counter

The high-speed counter modules acquire signals at frequencies beyond the range of normal digital input modules. Positioning tasks or frequency measurements for example can be performed.

Data exchange with peripherals

These modules allow communication with peripheral devices through a standard RS232C interface. The peripherals are connected point to point (1:1).

Open control loop positioning

Locating the positioning unit near the servo/mechanical system not only reduces cable costs but also eliminates problems arising from noise and cable losses.

| Product range | Module | Type | Description | Art. no. | |
|----------------|--|--|---|---|--------|
| Counter | AJ65BT-D62 | Remote module | 2 high-speed counter inputs, 5–24 V DC, up to 200 kHz | 88028 | |
| | AJ65BT-D62D | | 2 high-speed counter inputs, EIA standard RS422 connection, up to 400 kHz (low current consumption) | 88029 | |
| | AJ65BT-D62D-S1 | | 2 high-speed counter inputs, EIA standard RS422 connection, up to 400 kHz | 88030 | |
| Interface | AJ65BT-R2N | Remote module | Serial interface, RS232C (D-Sub, 9 pole), 1 channel | 216545 | |
| Positioning | AJ65BT-D75P2-S3 | Remote module | 2 axes positioning module, pulse output, linear and circular interpolation | 88002 | |
| Bridge Module | NZ2GF-CCB | CC-Link IE Field to CC-Link | Allows the connection of a CC-Link network to a CC-Link IE network. | 266160 | |
| | NZ2AW1C1BY | CC-Link to AnyWire Bitty | Used for the connection between AnyWire Bitty having the DC transmission line system and CC-Link. | 291717 | |
| | NZ2AW1C2AL | CC-Link to AnyWire ASLINK | Bridge module used for the connection between AnyWire ASLINK and CC-Link. | 294278 | |
| | NZ2AW1C2D2 | CC-Link to AnyWire DB A20 | Used for the connection between AnyWire DB A20 having the full-duplex transmission mode and CC-Link Ver 2.00. | 290899 | |
| | NZ2AW1GFAL | CC-Link IE Field to AnyWire ASLINK | Seamlessly connects AnyWire ASLINK products to CC-Link IE Field Network | 297161 | |
| I/O modules | NZ2GF2B1-16D | CC-Link IE Field network remote I/O module | 16 points input, 24 V DC (positive/negative common shared) 1-wire, terminal block type, response time 0–70 ms | 260472 | |
| | NZ2GF2B1-32D | | 32 points input, 24 V DC (positive/negative common) 1-wire, terminal block type | 312890 | |
| | NZ2GF2B1-32DT | | 32 points I/O, 24 V DC (16 inputs: positive common, 16 outputs: sink type, 0.5 A/point), 1-wire, screw terminal block | 312893 | |
| | NZ2GF2B1-32DTE | | 32 points I/O, 24 V DC (16 inputs: negative common, 16 outputs: source type, 0.5 A/point), 1-wire, screw terminal block | 312894 | |
| | NZ2GF2B1-16T | | 16 points output, 12 to 24 V DC, 0.5 A/point, 4 A/common, transistor output (sink type) 1-wire, terminal block type | 260473 | |
| | NZ2GF2B1-32T | | 32 points output, 12/24 V DC (0.5 A), sink type, screw terminal block, 1-wire | 312891 | |
| | NZ2GF2B1-16TE | | 16 points output, 12 to 24 V DC, 0.5 A/point, 4 A/common, transistor output (source type) 1-wire, terminal block type | 260474 | |
| | NZ2GF2B1-32TE | | 32 points output, 12/24 V DC (0.5 A), source type, screw terminal block, 1-wire | 312892 | |
| | NZ2GF2B2-16A | | 16 points input, 100–120 V AC, 50/60 Hz, screw terminal block, 2-wire | 312905 | |
| | NZ2GF2B2-16R | | 16 points output, relay output, 24 V DC/240 V AC (2 A), screw terminal block, 2-wire | 312906 | |
| | NZ2GF2B2-16S | | 16 point output, triac output, 100–240 V AC/0.6 A, screw terminal block, 2-wire | 312907 | |
| | NZ2GF2S2-16A | | 16 point input, 100–120 V AC, 50/60 Hz, spring clamp terminal block, 2-wire | 312908 | |
| | NZ2GF2S2-16R | | 16 points, relay output, 24 V DC/240 V AC (2 A), spring clamp terminal block, 2-wire | 312909 | |
| | NZ2GF2S2-16S | | 16 points, triac output, 100–240 V AC/0.6 A, spring clamp terminal block, 2-wire | 312910 | |
| | NZ2GFCF-D62PD2 | | | 2 high-speed counter inputs, 5/24 V DC/Differential inputs, up to 8 MHz | 266159 |
| | NZ2EX2B1-16D | | CC-Link IE Field network extension I/O module | 16 points input, 24 V DC (positive/negative common shared) 1-wire, terminal block type, response time 0–70ms | 260507 |
| | NZ2EX2B1-16T | | | 16 points output, 12 to 24 V DC, 0.5 A/point, 4 A/common, transistor output (sink type) 1-wire, terminal block type | 260508 |
| | NZ2EX2B1-16TE | | | 16 points output, 12 to 24 V DC, 0.5 A/point, 4 A/common, transistor output (source type) 1-wire, terminal block type | 260509 |
| | NZ2EXSS2-8TE | | CC-Link IE Field Safety extension output module | 8 points with single wiring/4 points with double wiring, 24 V DC (0.5 A), sink + source type, spring clamp terminal block, 2-wire | 289991 |
| | NZ2EX2B1N-16D | | CC-Link IE Field extension module for block type remote module | 16 input points, 24 V DC, response time 0–70 ms, positive/negative common shared, screw terminal block, 1-wire | 304894 |
| NZ2EX2B1N-16T | 16 points output, 12/24 V DC (0.5 A), transistor output (sink type), screw terminal block, 1-wire | 305035 | | | |
| NZ2EX2B1N-16TE | 16 points output, 24 V DC, 12/24 V DC (0.5 A), transistor output (source type), screw terminal block, 1-wire | 305036 | | | |
| NZ2EX2S1-16D | 6 points input, 24 V DC, response time 0–70 ms, positive/negative common shared, spring clamp terminal block, 1-wire | 297155 | | | |
| NZ2EX2S1-16T | 16 points output, 12/24 V DC (0.5 A), transistor output (sink type), spring clamp terminal block, 1-wire | 297156 | | | |
| NZ2EX2S1-16TE | 16 points output, 12/24 V DC (0.5 A), transistor output (source type), spring clamp terminal block, 1-wire | 297157 | | | |
| NZ2GFSS2-32D | CC-Link IE Field Safety remote I/O module | Main safety input, 32 points with single wiring/16 points with double wiring, 24 V DC, response time 0.4 ms, negative common, spring clamp terminal block, 2-wire | 289990 | | |
| NZ2GF2B1N-16D | CC-Link IE Field block type remote module | 16 points input, 24 V DC, response time 0–70 ms, positive/negative common shared, screw terminal block, 1-wire | 291254 | | |
| NZ2GF2B1N-16T | | 16 points output, 12/24 V DC (0.5 A), transistor output (sink type), screw terminal block, 1-wire | 291275 | | |
| NZ2GF2B1N-16TE | | 16 points output, 12/24 V DC (0.5 A), transistor output (source type), screw terminal block, 1-wire | 291276 | | |
| NZ2GFCE3-32D | | 32 points input, 24 V DC, response time 0–70 ms, positive common, sensor connector (e-CON), 3-wire | 296462 | | |
| NZ2GFCE3-32T | | 32 points transistor (sink type), e-CON 32 points output, 12/24 V DC (0.5 A), transistor output (sink type), sensor connector (e-CON), 3-wire | 296463 | | |
| NZ2GFCE3-32DT | | 32 point I/O combined, 16 points input, 24 V DC, response time 0–70 ms, positive common, 16 points output, 12/24 V DC (0.5 A), transistor output (sink type), sensor connector (e-CON), 3-wire | 296464 | | |
| NZ2GFCF1-32D | | 32 points input, 24 V DC, response time 0–70 ms, positive/negative common shared, 40-pin connector, 1-wire | 296515 | | |
| NZ2GFCF1-32T | | 32 points output, 12/24 V DC (0.1 A), transistor output (sink type), 40-pin connector, 1-wire | 296516 | | |
| NZ2GFCF1-32DT | | 32 point I/O combined, 16 points input, 24 V DC, response time 0–70 ms, positive/negative common shared, 16 points output, 12/24 V DC (0.1 A), transistor output (sink type), 40-pin connector, 1-wire | 296517 | | |
| NZ2GF2S1-16D | | 16 points input, 24 V DC, response time 0–70 ms, positive/negative common shared, spring clamp terminal block, 1-wire | 297158 | | |
| NZ2GF2S1-16T | 16 points output, 12/24 V DC (0.5 A), transistor output (sink type), spring clamp terminal block, 1-wire | 297159 | | | |
| NZ2GF2S1-16TE | 16 points output, 12/24 V DC (0.5 A), transistor output (source type), spring clamp terminal block, 1-wire | 297160 | | | |
| NZ2GFCE3-16D | 16 points input, 24 V DC, response time 0–70 ms, positive common, sensor connector (e-CON), 3-wire | 306593 | | | |
| NZ2GFCE3-16DE | 16 points input, 24 V DC, response time 0–70 ms, negative common, sensor connector (e-CON), 3-wire | 306594 | | | |
| NZ2GFCE3-16T | 16 points output, 12/24 V DC (0.5 A), transistor output (sink type), sensor connector (e-CON), 3-wire | 306625 | | | |
| NZ2GFCE3-16TE | CC-Link IE Field block type remote module | 16 points output, 12/24 V DC (0.5 A), transistor output (source type), sensor connector (e-CON), 3-wire | 306626 | | |

| Product range | Module | Type | Description | Art. no. |
|------------------------------|---|--|--|--|
| I/O modules | NZ2GF12A4-16DE | CC-Link IE Field Waterproof/ dustproof type (IP67) remote module | 16 points input, 24 V DC, response time 0–70 ms, negative common, waterproof connector, 2–4-wire | 307261 |
| | NZ2GF12A2-16TE | | 16 points output, 12/24 V DC (2 A), transistor output (source type), waterproof connector, 2-wire | 307262 |
| | NZ2GF12A2-16T | | 16 points output, 12/24 V DC (2 A), transistor output (sink type), waterproof connector, 2-wire | 307420 |
| | NZ2GF12A42-16DT | | 16 point I/O combined, 8 points input, 24 V DC, response time 0–70 ms, positive common, 2–4-wire, 8 points output, 12/24V DC (2 A), transistor output (sink type), 2-wire waterproof connector | 307421 |
| | NZ2GF12A42-16DTE | | 16 point I/O combined, 8 points input, 24 V DC, response time 0–70 ms, negative common, 2–4-wire, 8 points output, 12/24V DC (2 A), transistor output (source type), 2-wire waterproof connector | 307422 |
| | NZ2GF12A4-16D | | 16 points input, 24 V DC, response time 0–70 ms, positive common, waterproof connector, 2–4-wire | 307423 |
| | NZ2GF2B1N1-16D | | CC-Link IE Field block type remote module | 16 points input, 24 V DC, response time 0–70 ms, positive/negative common shared, screw terminal block, 1-wire |
| NZ2GF2B1N1-16TE | 16 points output, 12/24 V DC (0.5 A), transistor output (sink type), screw terminal block, 1-wire | 311859 | | |
| Temperature control units | NZ2GF2B-60TCTT4 | CC-Link IE Field | 4 channels, thermocouple input, transistor output, screw terminal block | 306627 |
| | NZ2GF2B-60TCRT4 | | 4 channels, RTD input, transistor output, screw terminal block | 306628 |
| Analog modules | NZ2GF2B-60AD4 | CC-Link IE Field network analog-digital converter module | 4 channels voltage/current analog-digital converter module (analog input type) | 260505 |
| | NZ2GF2S-60MD4 | | 4 channel voltage/current/temperature analog-digital converter module (multi analog input type); conversion speed 40 ms/4 ch, spring clamp terminal block | 312911 |
| | NZ2GFCE-60ADV8 | | 8 channel voltage analog-digital converter module (analog input type), -10–10 V DC; conversion speed 1 ms/ch; sensor connector (e-CON) | 312912 |
| | NZ2GFCE-60ADI8 | | 8 channel current analog-digital converter module (analog input type), 0–20 mA DC; conversion speed 1 ms/ch; sensor connector (e-CON) | 312913 |
| | NZ2GF2B-60DA4 | | 4 channels voltage/current digital-analog converter module (analog output type) | 260506 |
| | NZ2GFCE-60DAV8 | | 8 channel voltage digital-analog converter module (analog output type), -10–10 V DC; conversion speed 1 ms/ch; sensor connector (e-CON) | 312914 |
| | NZ2GFCE-60DAI8 | | 8 channel voltage digital-analog converter module (analog output type), 0–20 mA DC; conversion speed 1 ms/ch; sensor connector (e-CON) | 312915 |

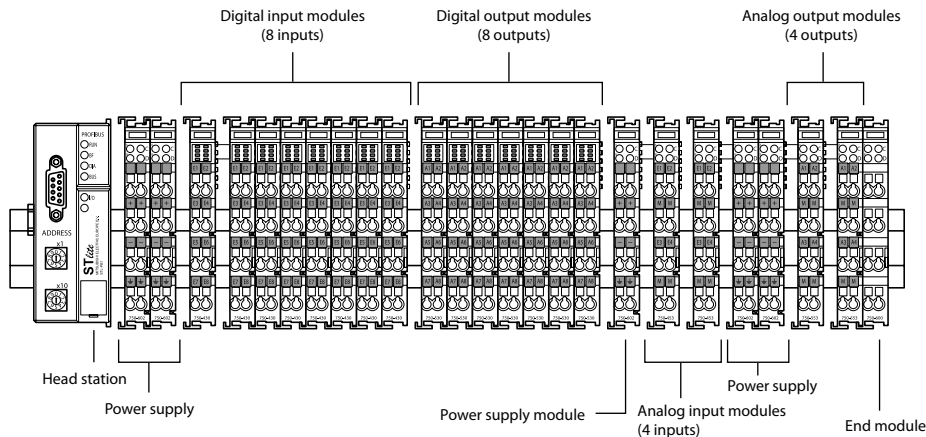
See also CC-Link Safety remote I/O modules, page 38
See also CC-Link Safety relays, page 39

The MELSEC STlite series – scalable I/O solutions for CC-Link, Profibus and Ethernet

Approved for a very wide range of applications, the STlite series features excellent module granularity and fieldbus-agnostic design, making it ideally suited for the requirements of today's distributed fieldbus systems. The devices are optimised for efficient processlevel communication, with scalable performance and high integration density.

- The range of potential applications is virtually unlimited.
- Reduces hardware and system overheads to a minimum.
- Simplifies handling and maximises efficiency.

The uncompromisingly modular architecture of the system also extends to its support for a wide range of fieldbus systems. You can install different head stations for different protocols, depending on the needs of your applications.



Optimised for real-life requirements

Module granularity:

- 2, 4 or 8 channels in a single I/O module

Fieldbus-agnostic:

- Head stations available for the leading fieldbus protocols CC-Link, Profibus DP and Ethernet

Safe investment:

- Fieldbus node design enables easy switching to new bus standards without changing the bus modules.

Clear labelling:

- Colour-coded group identification plate brackets and terminal tags

Versatile:

- Configuration options for digital/analog inputs/outputs and special functions with different voltages, powers and signals on a single fieldbus node.

Reliable:

- Approvals for industrial and marine automation applications ensure a wide range of deployment options – even in heavy-duty environments.
- Automatic contacting for power and data contacts
- Pluggable connections with bus plug connector
- CAGE CLAMP® spring terminals for input/output point connections

STlite series head stations

The head stations connect the STlite I/O systems with the Profibus DP, CC-Link or Ethernet fieldbus systems. Each head station recognises all inserted I/O and special function modules and generates a local process image from the configuration.

| Specifications | | STL-BT1 | STL-PB1 | STL-ETH1 |
|-------------------------------|----------------------|--|------------------|---|
| Number of I/O modules | | 64 | 64 | 64 |
| Communication protocol | | CC-Link-Standard | Profibus DP | Ethernet TCP/IP ECO, Modbus®/TCP |
| Fieldbus | input process image | 256 bytes | 244 bytes | 14 bytes digital, 2 bytes system, 32 bytes analog |
| | output process image | 256 bytes | 244 bytes | 14 bytes digital, 2 bytes system, 32 bytes analog |
| Number of addressable modules | | 64 | 96 with repeater | Limited by Ethernet specification |
| Order information | | Art. no. 242280 | 242279 | 242281 |
| Accessories | | STL-CCLink con: Art. no. 242314 The fieldbus connector connects a CC-Link device to a CC-Link line. | | |

Power supply modules

The power supply modules deliver power to the bus terminals at the required voltages.

| Specifications | | STL-PS | STL-BPS |
|-------------------------------|------|--------------------|--------------------|
| Voltage supply | | 24 V DC (-25–30 %) | 24 V DC (-25–30 %) |
| Input current | max. | — | 500 |
| Total current for I/O modules | | — | 2000 |
| Order information | | Art. no. 242311 | 242312 |

Bus end module

One of these end modules must be installed at the end of each fieldbus node. The end module terminates the internal terminals bus and ensures reliable data communications.

| Specifications | | STL-ET |
|--------------------------|--|-----------------|
| Order information | | Art. no. 242313 |

Temperature input module

The analog temperature input module enables direct connection of Pt100 resistance temperature sensors, with either a 2-wire or 3-wire cable.

| Specifications | | STL-TI2 |
|-----------------------------|--|----------------------------------|
| Module type | | Analog temperature input module |
| Number of input channels | | 2 |
| Sensor types | | Pt100 and resistance measurement |
| Temperature measuring range | | -200–850 °C (Pt100) |
| Resolution | | 0.1 °C |
| Order information | | Art. no. 242307 |

Incremental encoder input module

This module provides an interface for incremental encoders with an RS422 port. A counter with a quadrature decoder and a null point signal latch can be read and activated by the controller.

| Specifications | | STL-ENC |
|--------------------------|--|-------------------------------|
| Module type | | Incremental Encoder Interface |
| Encoder connection | | 3 input channels |
| Counting range | | 32 bits binary |
| Max. counting frequency | | 250 kHz |
| Order information | | Art. no. 242308 |

Remote I/O modules

Digital I/O modules

Digital input modules

The digital input modules have 8 channels. They are used for inputting control signals from the field, for example from sensors.

Digital output modules

Digital output modules are available with 4 or 8 outputs. They are used to send control signals from the automation controller to the connected actuators.

Digital relay output module

The relay output modules have two make contacts. The relays have floating contacts and are actuated with the internal system voltage.

Analog I/O modules

Analog input modules

The analog input modules with current input process standard 4–20 mA signals. The modules with voltage inputs can handle standard ± 10 V or 0–10 V signals.

Analog output modules

The analog output modules with current outputs generate standard 4–20 mA signals. The modules with voltage outputs generate standard ± 10 V or 0–10 V signals.

Up/Down counter module

This counter inputs binary 24 V signals and transmits the counter value to the installed bus system. An input is used to switch between Up and Down counting.

Interface module

The SSI transmitter interface module enables direct connection of an SSI transmitter. To read out the transmitter the module emits a clock signal and represents the data flow as a data word in the process image.

| Specifications | STL-DI8-V1 | STL-DI8-V2 |
|--------------------------|--|--|
| Module type | Digital input module | Digital input module |
| Integrated inputs | 8, source type, 1-conductor connection | 8, source type, 1-conductor connection |
| Order information | Art. no. 242282 | 242283 |

| Specifications | STL-D04 | STL-D08 | STL-R02 |
|--------------------------|-----------------------|-----------------------|-----------------------------|
| Module type | Digital output module | Digital output module | Digital relay output module |
| Integrated outputs | 4, source type | 8, source type | 2 contacts (normally open) |
| Order information | Art. no. 242284 | 242295 | 242296 |

| Specifications | STL-AD2-V | STL-AD2-I | STL-AD4-V1 | STL-AD4-V2 | STL-AD4-I |
|--------------------------|---------------------|-----------|------------|------------|-----------|
| Module type | Analog input module | | | | |
| Number of input channels | 2 | 2 | 4 | 4 | 4 |
| Signal input | 0–10 V | 4–20 mA | ± 10 V | 0–10 V | 4–20 mA |
| Order information | Art. no. 242297 | 242298 | 242299 | 242300 | 242301 |

| Specifications | STL-DA2-I | STL-DA2-V | STL-DA4-V1 | STL-DA4-V2 | STL-DA4-I |
|---------------------------|----------------------|-----------|------------|------------|-----------|
| Module type | Analog output module | | | | |
| Number of output channels | 2 | 2 | 4 | 4 | 4 |
| Signal output | 4–20 mA | 0–10 V | 0–10 V | ± 10 V | 4–20 mA |
| Order information | Art. no. 242302 | 242303 | 242304 | 242305 | 242306 |

| Specifications | STL-C100 |
|--------------------------|-----------------|
| Module type | Up/Down counter |
| Switching outputs | 2 |
| Counter inputs | 1 |
| Max. counting frequency | 100 kHz |
| Order information | Art. no. 242309 |

| Specifications | STL-SSI |
|--------------------------|--------------------------|
| Module type | Transmitter interface |
| Interface | SSI |
| Sensor connection | 1 input/1 output channel |
| Order information | Art. no. 242310 |

The MELSEC ST series – premium product for process industry

System description

The ST series is designed as a modular input/output system for connection to CC-Link and Profibus DP. It comprises of:

- basic module (head station and bus node for CC-Link and Profibus DP)
- power supply modules
- digital and analog I/O modules

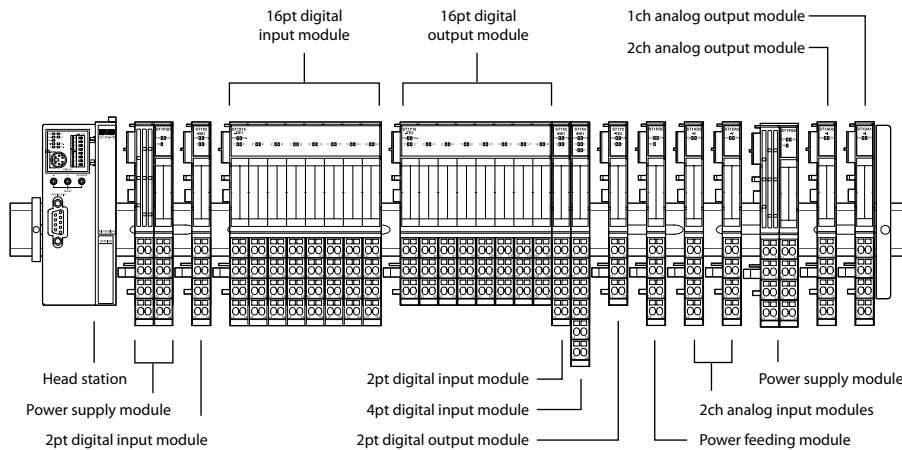
They can be combined freely to provide an efficient system configuration depending on your demands.

The name „ST“ means „Slice-type Terminal“ and comes from the physical appearance of the very slim modules (12.6 mm). As well as slice type modules, cost saving block modules with 16 inputs or outputs are also available.

The extension modules are designed as a 2-component system, that means they consist of electronic modules for the function and base modules as modular backplane bus (available with two types of terminals: spring clamp or screw clamp terminals).

The electronic modules can be clipped easily in the base modules without any tool. The combined unit can then be mounted on a DIN rail. Exchange of the electronic modules can be made on-line, so the system keeps running. Re-wiring is not needed.

Every electronic module provides LEDs for quick and easy diagnostics and also additional information. Error and status messages are also shown on the basic module.



Special features:

- ST = Slice terminals, only 12.6 mm wide
- Modular structure with no restriction on installation position
- Easy and complete handling via 3 push buttons

- Connection diagram on every module
- Applicable wire size for all base modules 0.5–2.5 mm², flexible wire with ferrule or solid core wire without ferrule
- Expandable in two-point increments
- Replaceable electronic modules
- Hot swap function without re-wiring

- Quick diagnostics via LED's
- Distributed 24 V DC for actuators/sensors
- Gold contacts for all bus and signal connections
- Electronic modules are coded to prevent an incorrect unit being inserted
- Easy parameter setting with GX Configurator DP

Basic modules (head stations) of the MELSEC ST series

The basic module ST1H-PB connects the remote I/O modules of the ST series to CC-Link and Profibus DP.

| Specifications | ST1H-BT | ST1H-PB |
|---------------------------|----------------------|------------------------|
| Occupied I/O points | 4 inputs/4 outputs | 4/4 |
| Communications | protocol | CC-Link standard |
| | medium | CC-Link cable |
| Interface | type | Profibus DP |
| | | CC-Link |
| Supported operation modes | Remote station (1–4) | RS485 |
| | | Sync mode, freeze mode |
| Order information | Art. no. 214496 | 152951 |

Bus power for head station and power feeding module

You need one ST1PSD beside the basic module to operate the ST station, a second or more are only needed depending on the power consumption of the connected items.

The power feeding module ST1PDD distributes 24 V DC only for the I/Os of the actuators and sensors.

| Specifications | ST1PSD | ST1PDD |
|--|---|----------------------------------|
| Module type | Power supply for head station, internal 5 V DC backplane bus and 24 V DC for I/Os (double function) | Power feeding module |
| Nominal voltage | V DC 24.0 | 24.0 |
| Max. output current (5 V DC) | A 2.0 | — |
| Max. output current (24 V DC) | A 8 (10 with fuse) | 8 (10 with fuse) |
| Order information | Art. no. 152952 | 152953 |
| Applicable base module for basic module supply | spring clamp type | ST1B-S4P2-H-SET, art. no. 152908 |
| | screw clamp type | ST1B-E4P2-H-SET, art. no. 152918 |
| Applicable base module for bus refreshing within the station | spring clamp type | ST1B-S4P2-R-SET, art. no. 152909 |
| | screw clamp type | ST1B-E4P2-R-SET, art. no. 152919 |
| | | ST1B-S4P2-D, art. no. 152910 |
| | | ST1B-E4P2-D, art. no. 152920 |

Remote I/O modules

Digital I/O modules

Digital input modules

The digital input modules of the ST series directly connect field devices (contacts, limit switches, sensors, etc.).

Digital output modules

The digital output modules of the ST series connect directly to field devices (e.g. contactors, valves, lights).

The TPE3 models provide advanced protection functions e.g. for thermal and short circuit failures.

| Specifications | ST1X2-DE1 | ST1X4-DE1 | ST1X16-DE1 | ST1X1616-DE1-S1 | |
|--------------------------|------------------------------|----------------------------|------------------------------|------------------------------|-----------------------------|
| Number of input points | 2 | 4 | 16 | 32 | |
| Applicable base module | spring clamp type | ST1B-S4X2, art. no. 152911 | ST1B-S6X4, art. no. 152912 | ST1B-S4X16, art. no. 152913 | ST1B-S6X32, art. no. 169313 |
| | screw clamp type | ST1B-E4X2, art. no. 152921 | ST1B-E6X4, art. no. 152922 | ST1B-E4X16, art. no. 152923 | ST1B-E6X32, art. no. 169314 |
| Connection cable type | 3-wire 24 V DC (with shield) | 3-wire 24 V DC | 3-wire 24 V DC (with shield) | 3-wire 24 V DC (with shield) | |
| Order information | Art. no. 152964 | 152965 | 152966 | 169309 | |

| Specifications | ST1V2-TE2 | ST1V16-TE2 | ST1V2-TE8 | ST1V2-TPE3 | ST1V16-TPE3 | ST1V2-R2 |
|--------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|------------------------------|
| Number of output points | 2 | 16 | 2 | 2 | 16 | 2 |
| Output type | Transistor | Transistor | Transistor | Transistor | Transistor | Relay |
| Applicable base module | spring clamp type | ST1B-S3Y2, art. no. 152914 | ST1B-S3Y16, art. no. 152915 | ST1B-S3Y2, art. no. 152914 | ST1B-S3Y16, art. no. 152915 | ST1B-S4IR2, art. no. 152916 |
| | screw clamp type | ST1B-E3Y2, art. no. 152924 | ST1B-E3Y16, art. no. 152925 | ST1B-E3Y2, art. no. 152924 | ST1B-E3Y16, art. no. 152925 | ST1B-E4IR2, art. no. 152927 |
| Connection cable type | 2-wire 24 V DC with shield | 2-wire 24 V DC with shield | 2-wire 24 V DC with shield | 2-wire 24 V DC with shield | 2-wire 24 V DC with shield | 2 wires (internal connected) |
| Order information | Art. no. 152967 | 152968 | 169408 | 152969 | 152970 | 152971 |

Analog I/O modules

Analog input modules

The analog input modules of the ST series convert analog process data like pressure, temperature, etc. into digital values that are sent to the Profibus DP/CC-Link master.

Analog output modules

The analog output modules of the ST series convert the digital values sent from the Profibus DP/CC-Link master into an analog voltage signal.

Analog temperature input modules

The analog temperature input modules of the ST series convert analog temperature data into digital values that are sent to the Profibus DP/CC-Link master.

| Specifications | ST1AD2-V | ST1AD2-I | ST1TD2 | ST1RD2 |
|--------------------------|--------------------------------|-----------------------------|--|---------------------------------|
| Module type | Analog input module | Analog input module | Analog temperature input module | Analog temperature input module |
| Occupied I/O points | 4/4 | 4/4 | 4/4 | 4/4 |
| Signal input | -10–10 V, 0–10 V, 0–5 V, 1–5 V | 0–20 mA, 4–20 mA | Thermocouple input: K, T, E, J, B, R, S or N | Pt100, Pt1000 |
| Resolution | 12 bit + sign | 12 bit + sign | 0.1–0.8 °C ^① | 0.1 °C |
| Conversion speed | 0.1 ms per channel | 0.1 ms per channel | 30/60 ms per channel | 80 ms per channel |
| Applicable base module | spring clamp type | ST1B-S4IR2, art. no. 152916 | ST1B-S4TD2, art. no. 161736 | ST1B-S4TD2, art. no. 161736 |
| | screw clamp type | ST1B-E4IR2, art. no. 152927 | ST1B-E4TD2, art. no. 161737 | ST1B-E4TD2, art. no. 161737 |
| Order information | Art. no. 152972 | 152973 | 161734 | 169406 |

① Depends on the thermocouple used

| Specifications | ST1DA2-V/-F01 | ST1DA1-I/-F01 | ST1SS1 |
|--------------------------|--------------------------------|-----------------------------|--|
| Module type | Analog output module | Analog output module | Absolute encoder interface with SSI (synchronous serial interface) |
| Occupied I/O points | 4/4 | 4/4 | 4/4 |
| Signal output range | -10–10 V, 0–10 V, 0–5 V, 1–5 V | 0–20 mA, 4–20 mA | 31 bit binary (0–2147483647) |
| Resolution | 12 bit + sign | 12 bit + sign | 2 to 31 bits |
| Applicable base module | spring clamp type | ST1B-S4IR2, art. no. 152916 | ST1B-S4IR2, art. no. 152916 |
| | screw clamp type | ST1B-E4IR2, art. no. 152927 | ST1B-E4IR2, art. no. 152927 |
| Order information | Art. no. 152975/217631 | 152976/217632 | 193660 |

For detailed information, please refer to the family catalogues.



Modular PLCs – MELSEC iQ-R series, System Q and L series

Modular controllers like Mitsubishi Electric's MELSEC iQ-R series, System Q and the L series are high-performance PLC systems with broad functionality. The range, power and function of these high-end PLCs is impressive, with operation times measured in nanoseconds.

The modular design allows flexible usage in a broad range of applications. Additional backplanes can be added as the system expands.

Modular PLCs comprise a power supply, one or more CPU modules and I/O and/or special function modules.

Use of digital and special function modules

The use of digital and analog modules and most special function modules is dependent only on the maximum available number of addresses and thus on the CPU used in each case.

The following modules are available for assembling the system:

Pulse catch and interrupt modules

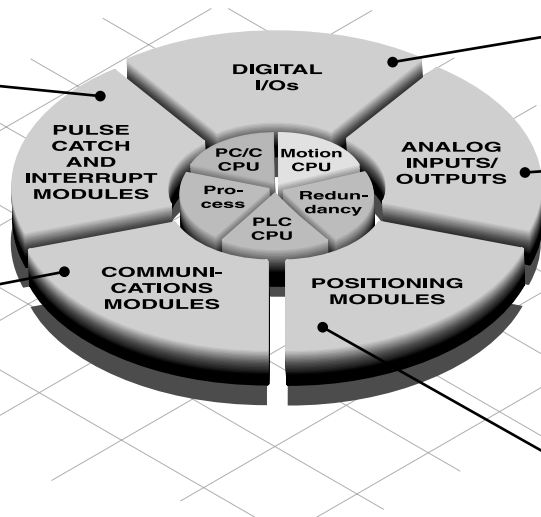
Digital input modules for pulse storage and for processing subroutines.

Communications modules

Interface modules with RS232/RS422/RS485 interface for connection of peripherals or for PLC-PLC communication.

Network modules

For interfacing with Ethernet, CC-Link, CC-Link IE, Profibus DP/Profinet, Modbus®/TCP/RTU, DeviceNet™, AS-Interface and MELSEC networks.



Digital input/output modules

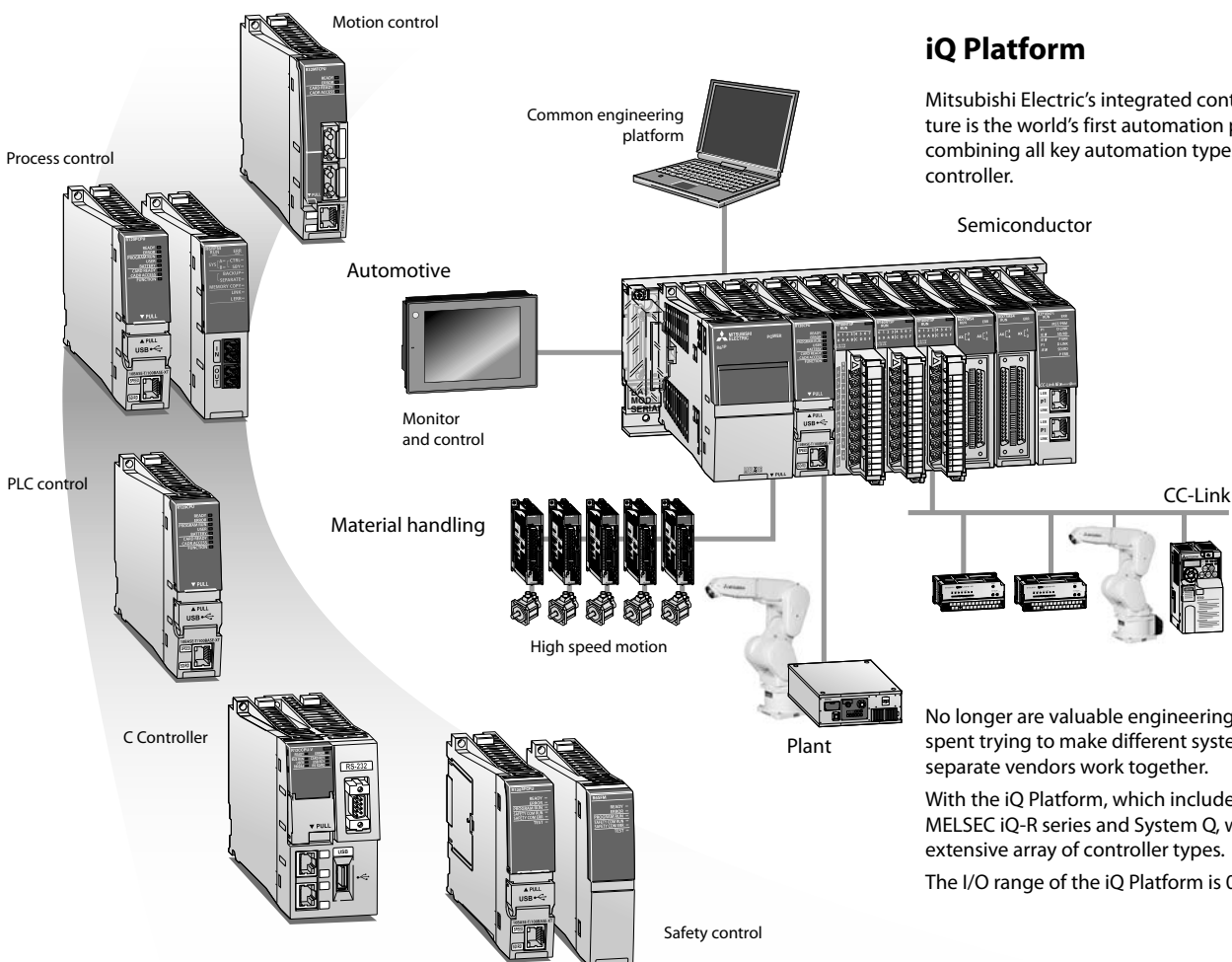
For various signal levels with transistor, relay or triac switches.

Analog input/output modules

For processing current/voltage signals and for temperature value acquisition as well as temperature control with direct connection of Pt100 resistance thermometers or thermocouples. A HART enabled module for current input is also available for the MELSEC System Q.

Positioning modules

High-speed counter modules with possibility for connection of incremental shaft encoder or multi-axial positioning modules for servo and step drives with up to 8 axes per module.



iQ Platform

Mitsubishi Electric's integrated control architecture is the world's first automation platform combining all key automation types on one controller.

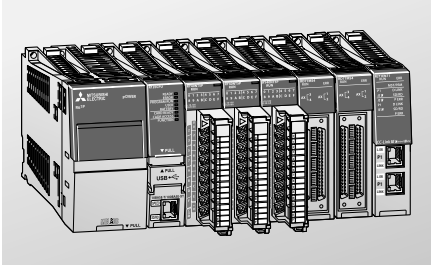
Semiconductor

No longer are valuable engineering resources spent trying to make different systems from separate vendors work together.

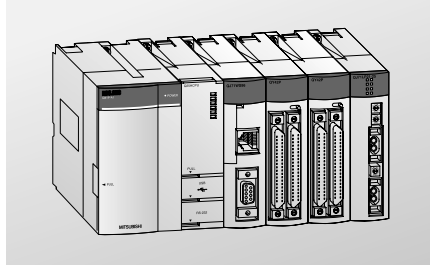
With the iQ Platform, which includes the MELSEC iQ-R series and System Q, we provide an extensive array of controller types.

The I/O range of the iQ Platform is 0 to 12,228.

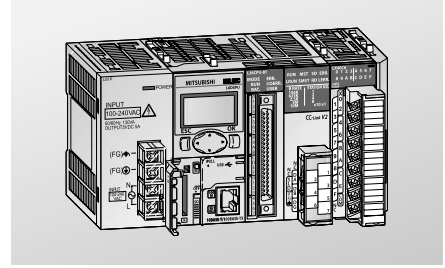
Modular PLCs



MELSEC iQ-R series



MELSEC System Q



MELSEC L series

MELSEC iQ-R series

The iQ Platform builds on the power of Mitsubishi Electric's high performance programmable automation controllers (PAC), complementing this with a broad range of control modules and network interfaces.

The iQ-R series CPU offers dramatic improvements in performance, setting new benchmark standards for processing speed. At the same time, the iQ-R series offers reductions in development cost, maintenance cost and risk of system failure, while providing an innovative upgrade path that will enable users to take advantage of ongoing developments through software upgrades rather than hardware upgrades.

Mounting of multiple CPUs on an iQ-R series backplane is supported, enabling users to develop vastly more complex and sophisticated automation applications from a single PAC backplane.

- Productivity – Improve productivity through advanced performance/functionality
- Scalability – offers Multi CPU solutions on a single backplane
- Connectivity – Seamless connectivity within all levels of manufacturing
- Flexibility – solutions can combine various CPU types as a seamless solution; PLC, Motion, Robots, NC, PC and Process CPUs

- Engineering – Reducing development costs through intuitive engineering
- Compatibility – Compatible with most existing MELSEC System Q I/O
- Security – Unauthorized access protection across distributed control network
- Maintenance – Reduce maintenance costs and downtime utilizing easier maintenance features

MELSEC System Q

MELSEC System Q has been designed to be at the heart of your manufacturing process, as it is at the heart of Mitsubishi Electric's component automation concept. It offers you total integration of your control and communication needs from a single platform – connecting your automation with your business needs.

- Communication – is a communication hub connecting to fieldbus or data networks including 100 Mbps Ethernet
- Scalability – offers Multi CPU solutions on a single backplane
- Flexibility – solutions can combine various CPU types as a seamless solution; PLC, Motion, Robots, NC, PC and Process CPUs

- MES and web server module for quick and simple connectivity to the IT world
- Redundancy options ranging from full redundant PLC hardware to redundant network options improve uptime and productivity

MELSEC L series

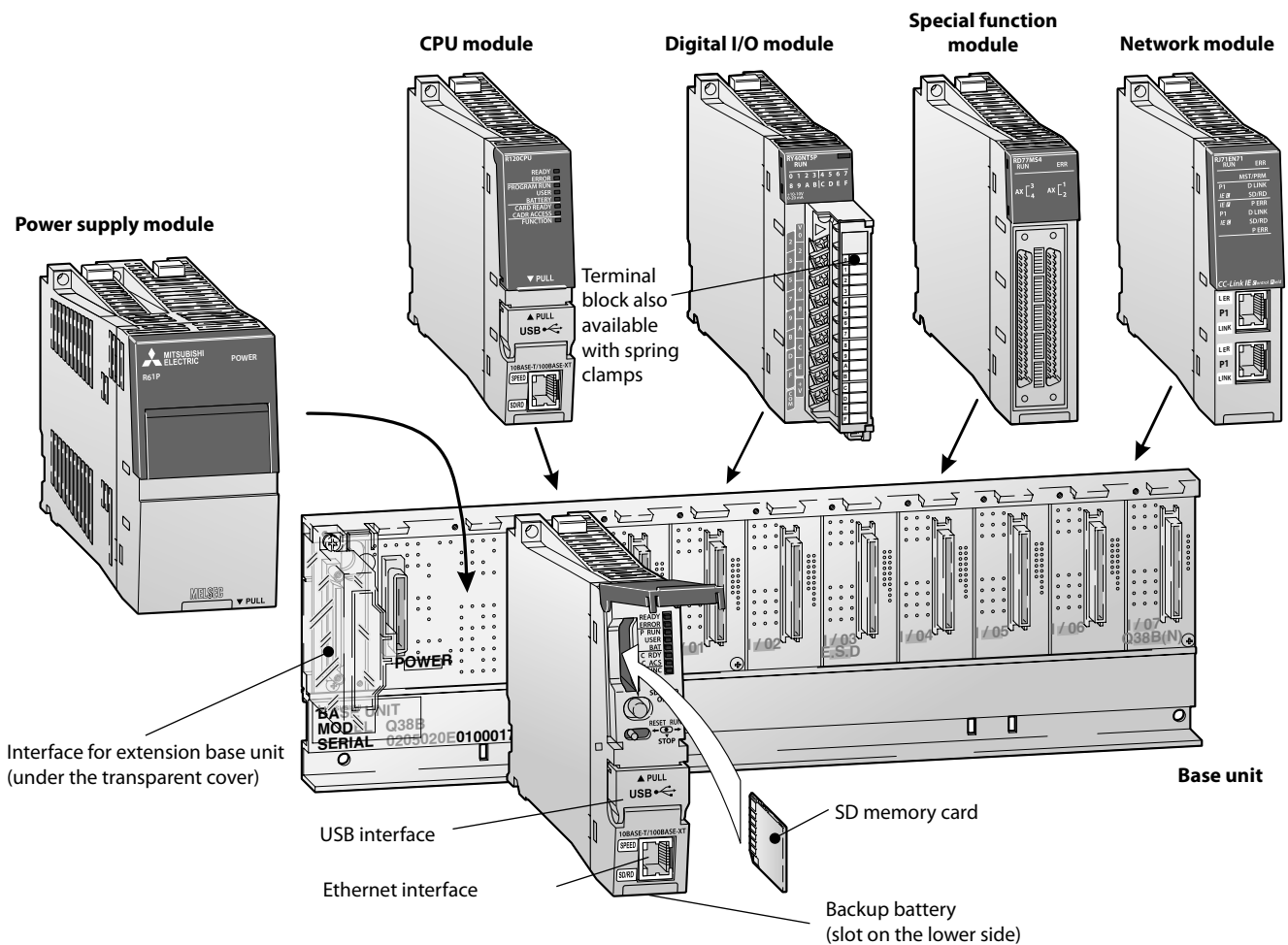
The MELSEC L series is a powerful but compact modular controller with many features built-in to the CPU itself. The rack-free design promotes high system flexibility with minimum form factor. Built-in Mini-B USB and Ethernet allow for easy communication, along with a built-in SD/SDHC memory slot for data logging and memory storage, and built-in digital I/O for simple high-speed counting and positioning functions.

The high-performance version CPU also includes a built-in CC-Link interface for Master/Local Station networking. This highly flexible architecture makes the MELSEC L series ideal for both stand-alone and networked machines.

- Rack-free design
- CPUs packed with comprehensive built-in features/functions
- Integrated data logging

- Built-in I/O features
- Communication and networking capabilities
- High-end 16-axis motion expansion possible using SSCNET III/H

MELSEC iQ-R series – What a system looks like



System structure

The CPU and modules are connected to a base unit which has an internal bus connection for high-speed communication between the individual modules and the CPUs. A power supply module which supplies the voltage for the entire modules is also installed on this base unit. The base units are available in different versions with 5 to 12 module slots.

Each base unit can be supplemented by means of an extension unit providing additional slots. Up to seven extension base units can be connected and a maximum of 64 modules installed at any one time. An RQ extension base unit is also available, ensuring compatibility with existing MELSEC System Q modules.

For cabling larger systems and machines – e.g. in a modular design – the use of remote I/O modules offers additional communications facilities

What you need

Base units

Main base units (Standard, Extended temperature range)

The main base unit is used for mounting and connecting up to four CPUs, power supply unit, input modules, output modules and special function modules.

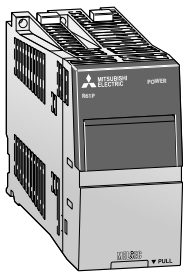
Extension base units (Standard, Extended temperature range), RQ extension base unit

The extension base units are connected to the main base unit by means of preassembled bus cables. The RQ extension base units are for MELSEC System Q modules.

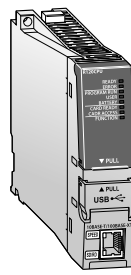
| Specifications | R35B | R38B | R310RB | R312B | R310B-HT | R38RB-HT |
|--------------------------------|-----------------|--------|--------|--------|----------|----------|
| Slots for I/O modules | 5 | 8 | 10 | 12 | 10 | 8 |
| Slots for power supply modules | 1 | 1 | 2 | 1 | 1 | 2 |
| Order information | Art. no. 279583 | 279584 | 301652 | 279585 | 308780 | 301650 |

| Specifications | R65B | R68B | R610RB | R612B | RQ65B | RQ68B | RQ612B | R610B-HT | R68RB-HT |
|--------------------------------|-----------------|--------|--------|--------|--------|--------|--------|----------|----------|
| Slots for I/O modules | 5 | 8 | 10 | 12 | 5 | 8 | 12 | 10 | 8 |
| Slots for power supply modules | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 |
| Order information | Art. no. 279590 | 279589 | 301653 | 279588 | 279591 | 279586 | 279587 | 308782 | 301651 |

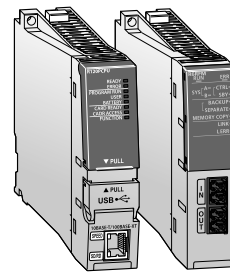
MELSEC iQ-R series



R61P
Power supply



R120CPU
PLC CPU module



R120PCPU/R6RFM
Process CPU and
redundant function
module

Standard and redundant power supply modules

These units power all the modules mounted to a base unit. The choice is dependent on the power consumption of the individual modules (this is especially important when using multiple CPUs) and the available input power supply voltage.

| Specifications | R61P | R62P | R63P | R63RP | R64P* | R64RP |
|--------------------------|--------------------------|--------------------------|------------------------|------------------------|--------------------------|--------------------------|
| Input voltage | 100–240 (85–264) V AC | 100–240 (85–264) V AC | 24 (15.6–31.2) V DC | 24 (19.2–31.2) V DC | 100–240 (85–264) V AC | 100–240 (85–264) V AC |
| Rated output current | 5 V DC A | 6.5 | 3.5 | 6.5 | 6.5 | 9 |
| | 24 V DC ±10 % A | — | 0.6 | — | — | — |
| Order information | Art. no. 279581 | 285507 | 279582 | 308710 | 285508 | 301649 |

* Redundant power supply

CPU modules

The MELSEC iQ-R series includes a wide range of programmable automation controllers capable of catering to diversified automation control needs.

PLC CPU modules

At the core of the MELSEC iQ-R series is a programmable controller CPU. This CPU is the heart of the control system and includes various features for different applications. The most common CPU is the programmable controller CPU, into which various features are embedded, enabling it to perform a wide range of control tasks.

| Specifications | R04CPU R04ENCPU | R08CPU R08ENCPU | R16CPU R16ENCPU | R32CPU R32ENCPU | R120CPU R120ENCPU |
|---------------------------------|---|---------------------------|----------------------------|-----------------------------|------------------------------|
| I/O points | 4096 | 4096 | 4096 | 4096 | 4096 |
| Memory capacity for PLC program | 40 k steps (160 kByte) | 80 k steps (320 kByte) | 160 k steps (640 kByte) | 320 k steps (1280 kByte) | 1200 k steps (4800 kByte) |
| Order information | Art. no. 279576 290226 | 279577 290227 | 279578 290228 | 279579 290232 | 279580 290234 |
| Accessories | NZ1MEM-2GBSD; 2 GB SD memory card; NZ1MEM-4GBSD; 4 GB SDHC memory card; NZ1MEM-8GBSD; 8 GB SDHC memory card; NZ1MEM-16GBSD; 16 GB SDHC memory card; NZ2MC-1MBS; 1 MB extended SRAM cassette; NZ2MC-2MBS; 2 MB extended SRAM cassette; NZ2MC-4MBS; 4 MB extended SRAM cassette; NZ2MC-8MBS(E); 8 MB extended SRAM cassette; only supported by safety and process CPU; NZ2MC-16MBS; 16 MB extended SRAM cassette; safety CPU is not supported | | | | |

Process CPU modules and redundant function module

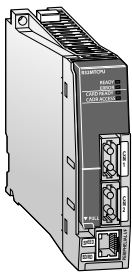
The MELSEC iQ-R process CPUs are designed specifically for medium- to large-scale process control systems requiring high-speed performance coupled with the handling of large PID loops.

When paired with a redundant function module, a highly reliable (redundant) control system can be realized with a tracking data capacity of up to 1 M words between the control and standby systems supported.

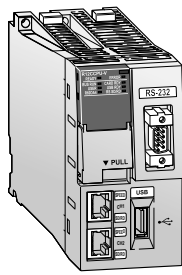
| Specifications | R08PCPU | R16PCPU | R32PCPU | R120PCPU |
|---------------------------------|-----------------|---------------------------|----------------------------|-----------------------------|
| I/O points | 4096 | 4096 | 4096 | 4096 |
| Memory capacity for PLC program | data memory | 5 MByte | 10 MByte | 20 MByte |
| | | 80 k steps (320 kByte) | 160 k steps (640 kByte) | 320 k steps (1280 kByte) |
| Order information | Art. no. 285496 | 285499 | 285500 | 285497 |

| Specifications | R6RFM |
|-------------------------------------|-----------------------|
| Type | Redundant process CPU |
| Occupied I/O points | 32 |
| Tracking cable data capacity (word) | 1 M |
| Order information | Art. no. 301648 |

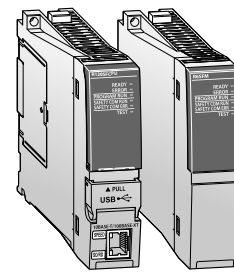
| Specifications | R08PSFCPU-SET | R16PSFCPU-SET | R32PSFCPU-SET | R120PSFCPU-SET | |
|---------------------------------|-------------------|--|---|---|--|
| Type | SIL2 Process CPUs | | | | |
| Memory capacity for PLC program | overall | 5 MByte | 10 MByte | 20 MByte | 40 MByte |
| | | 80 k steps (40 k steps for safety programs) | 160 k steps (40 k steps for safety programs) | 320 k steps (40 k steps for safety programs) | 1200 k steps (40 k steps for safety programs) |
| Order information | Art. no. 317842 | 317843 | 317844 | 317895 | |



R32MTCPU
Motion CPU



R12CCPU-V
C Controller CPU



R120SFCPU/R6SFM
Safety CPU and
safety function module

Motion CPUs for advanced applications

The motion CPU module is a dedicated high-precision control CPU module, designed solely for applications that require advanced motion control such as positioning control, synchronous control, and speed-torque control at a very high accuracy. A motion system requires a motion controller CPU and a PLC CPU. Only after combining a highly dynamic positioning control CPU and a PLC, an innovative Motion Control system is created.

C Controller CPU

The C Controller module is part of the application-specific range in the MELSEC iQ-R series. The multi-core ARM®-based controller pre-installed with VxWorks® version 6.9, realizes the simultaneous execution of programs, thereby providing a robust and deterministic alternative to computer based systems.

Safety function module and safety CPU

The safety function module must be mounted next to the iQ-R safety CPU module. It is included with the purchase of an iQ-R safety CPU set, and cannot be purchased independent from the set.

| Specifications | R16MTCPU | R32MTCPU | R64MTCPU |
|--------------------------|--|----------|----------|
| Number of control axes | 16 | 32 | 64 |
| Interpolation functions | Linear interpolation for up to 4 axes, circular interpolation for 2 axes, helical interpolation for 3 axes | | |
| Programming language | Motion SFC, dedicated instruction | | |
| Interfaces | Ethernet 100/10 Mbps, SSCNET III/H (USB, RS232C via PLC CPU), PERIPHERAL I/F, SD memory card | | |
| Order information | Art. no. 280227 | 280288 | 295076 |

| Specifications | R12CCPU-V |
|--------------------------|---|
| Number of I/Os | 4096 |
| Memory | Work RAM: 256 MB; ROM: 12 MB; battery-backed-up RAM: 4 MB |
| Communication interfaces | Ethernet 100BASE-T/100BASE-TX (2 ch.), RS232 (1 ch.) |
| SD memory card slot | 1 slot |
| Order information | Art. no. 285498 |

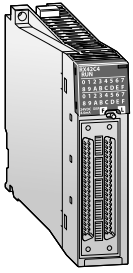
| Specifications | R6SFM | |
|-----------------|---------------------------------|-----------|
| I/O points | 16 | |
| Control method | Stored program cyclic operation | |
| Memory capacity | 40 k steps (160 kByte) | |
| Safety program | program memory | 160 kByte |
| | device/label memory | 80 kByte |

Note: This product ships as part of the R□SFCPU-SET.

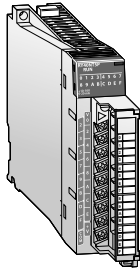
| Specifications | R08SFCPU-SET ① | R16SFCPU-SET ① | R32SFCPU-SET ① | R120SFCPU-SET ① | |
|------------------------------|-----------------------|--|---|---|--|
| Safety integrity level (SIL) | SIL 3 (IEC 61508) | | | | |
| Performance level (PL) | PL e (EN/ISO 13849-1) | | | | |
| Memory capacity | program capacity | 80 k steps (40 k steps for safety programs) | 160 k steps (40 k steps for safety programs) | 320 k steps (40 k steps for safety programs) | 1200 k steps (40 k steps for safety programs) |
| | program memory | 320 kByte | 640 kByte | 1280 kByte | 4800 kByte |
| | device/label memory | 1178 kByte | 1710 kByte | 2306 kByte | 3370 kByte |
| | data memory | 5 MByte | 10 MByte | 20 MByte | 40 MByte |
| Order information | Art. no. 289989 | 290199 | 290200 | 290201 | |

① Product package includes a safety CPU(R□SFCPU) and safety function module (R6SFM).

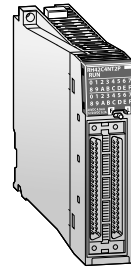
MELSEC iQ-R series



RX42C4
Digital input module



RY40NT5P
Digital output module



RH42C4NT2P
Combined I/O module

Digital (high-speed) input and output modules

Digital I/O modules are the senses of the automation system and provide an interface of various processes to the controller.

I/O modules are available in a wide range of densities (16, 32 and 64-points) depending on the I/O requirements and minimum use of space in the control cabinet.

Terminal blocks are interchangeable with MELSEC System Q I/O terminals and can save on the cost of upgrading from existing control systems.

Digital input modules

| Specifications | RX10 | RX28 | RX40C7 | RX40PC6H*/ RX40NC6H* | RX40NC6B | RX41C4 | RX41C6HS* | RX42C4 | RX61C6HS* |
|--------------------------|--------------------------------|--------------------------------|---------|-------------------------|----------|---------|-----------|---------|-----------|
| Number of input channels | 16 | 8 | 16 | 16 | 16 | 32 | 32 | 64 | 32 |
| Rated input voltage | 100– 120 V AC (50/60 Hz) | 100– 120 V AC (50/60 Hz) | 24 V DC | 24 V DC | 24 V DC | 24 V DC | 24 V DC | 24 V DC | 5 V DC |
| Order inform. | Art. no. 279546 | 308711 | 279533 | 290235/290236 | 301646 | 279534 | 307424 | 279545 | 304546 |

* High-speed module

Digital output modules

| Specifications | RY10R2 | RY18R2 | RY20S6 | RY40NT5P | RY40PT5P | RY40PT5B |
|---------------------------|----------------------|----------------------|--------------|-------------------|---------------------|---|
| Number of output channels | 16 | 8 | 16 | 16 | 16 | 16 |
| Output type | Relay | Relay | Triac | Transistor (sink) | Transistor (source) | Transistor with diagnostic functions (source) |
| Rated output voltage | 24 V DC/ 240 V AC | 24 V DC/ 240 V AC | 100–240 V AC | 12–24 V DC | 12–24 V DC | 24 V DC |
| Order inform. | Art. no. 279550 | 308712 | 308676 | 279547 | 279551 | 301647 |

| Specifications | RY41PT1P | RY41NT2H* | RY41NT2P | RY41PT2H* | RY42NT2P | RY42PT1P |
|---------------------------|---------------------|-------------------|-------------------|---------------------|-------------------|---------------------|
| Number of output channels | 32 | 32 | 32 | 32 | 64 | 64 |
| Output type | Transistor (source) | Transistor (sink) | Transistor (sink) | Transistor (source) | Transistor (sink) | Transistor (source) |
| Rated output voltage | 12–24 V DC | 5–24 V DC | 12–24 V DC | 5–24 V DC | 12–24 V DC | 12–24 V DC |
| Order inform. | Art. no. 279552 | 308707 | 279548 | 304547 | 279549 | 279553 |

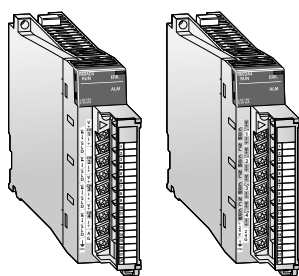
* High-speed module

Combined I/O module

| Specifications | RH42C4NT2P |
|---------------------------|-----------------|
| Number of input channels | 32 |
| Rated input voltage | 24 V DC |
| Number of output channels | 32 |
| Rated output voltage | 12–24 V DC |
| Order inform. | Art. no. 279554 |

Flexible high-speed I/O control module

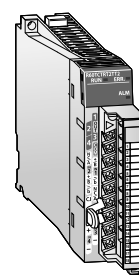
| Specifications | RD40PD01 |
|---------------------------|-----------------|
| Number of input channels | 12 |
| Rated input voltage | 5/24 V DC |
| Number of output channels | 8 |
| Rated output voltage | 5–24 V DC |
| Order inform. | Art. no. 307562 |



R60AD4/R60DA4
Analog I/O modules



R60TD8-G
Analog module for
temperature measurement



R60TCRT2T2
Temperature control module

Analog (high-speed) input modules

MELSEC iQ-R series analog modules are the interface between external analog signals and the control system. Various modules are available to cover a wide range of requirements.

| Specifications | R60AD4 | R60ADV8 | R60ADI8 | R60AD8-G | R60AD16-G | R60ADH4* |
|--------------------------|-----------------|----------------|----------------|----------|-----------|---------------|
| Number of input channels | 4 | 8 | 8 | 8 | 16 | 4 |
| Analog input | voltage V | -10-10 | -10-10 | — | -10-10 | -10-10 |
| | current mA | 0-20 | — | 0-20 | 0-20 | 0-20 |
| Overall accuracy | ±0.3 %, ±0.1 % | ±0.3 %, ±0.1 % | ±0.3 %, ±0.1 % | ±0.1 % | ±0.1 % | ±0.2 % ±0.1 % |
| Order information | Art. no. 279556 | 279558 | 279561 | 285502 | 285501 | 308708 |

*High-speed analog input module

Analog output modules

MELSEC iQ-R series analog output modules reliably deliver accurate analog values. A variety of modules (voltage, current, or mixed) are available to cover a wide range of application requirements, such as frequency inverters, valves or slide valves.

Faster, smoother predefined wave signal output

The analog output module enables pre-registration of waveforms easily using MELSOFT GX Works3, realizing a smoother continuous output that closely matches the precision required for the application, such as torque control for a press or injection molding machine.

| Specifications | R60DA4 | R60DAH4 | R60DAV8 | R60DAI8 | R60DA8-G | R60DA16-G |
|---------------------------|-----------------|----------------|----------------|----------------|----------|-----------|
| Number of output channels | 4 | 4 | 8 | 8 | 8 | 16 |
| Analog output | voltage V | -10-10 | -10-10 | -10-10 | — | -10-10 |
| | current mA | 0-20 | 0-20 | — | 0-20 | 0-20 |
| Overall accuracy | ±0.3 %, ±0.1 % | ±0.3 %, ±0.1 % | ±0.3 %, ±0.1 % | ±0.3 %, ±0.1 % | ±0.1 % | ±0.1 % |
| Order information | Art. no. 279557 | 307260 | 279560 | 279559 | 285504 | 285503 |

Analog modules for temperature measurement

Temperature sensors are connected directly to these modules. They convert measured analog values into 16-bit signed binary temperature measurement values.

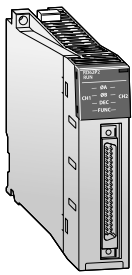
| Specifications | R60RD8-G | R60TD8-G |
|-------------------------------|----------------------------------|------------------------|
| Number of input channels | 8 | 8 |
| Connectable thermocouple type | Pt100, JPt100, Ni100, Pt50 | B, R, S, K, E, J, T, N |
| Temperature measuring range | Depends on the thermocouple used | |
| Order information | Art. no. 285505 | 285506 |

Temperature control modules

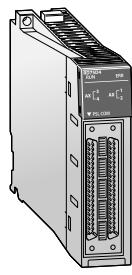
MELSEC iQ-R series temperature control modules are ideal for applications requiring highly stable and responsive temperature control. The series comes with thermocouple and RTD input module types and are available with or without heater disconnection detection.

| Specifications | R60TCRT2T2 | R60TCRT4 | R60TCRT2T2BW | R60TCRT4BW |
|-------------------------------|---|---------------|--|---------------|
| Control output type | Transistor | Transistor | Transistor | Transistor |
| Supported temperature sensors | R, K, J, T, S, B, E, N, U, L, PLII, W5Re/W26Re | Pt100, JPt100 | R, K, J, T, S, B, E, N, U, L, PLII, W5Re/W26Re | Pt100, JPt100 |
| Sampling cycle | Switchable between 250 ms and 500 ms/4 channels | | | |
| Control output cycle s | 0.5-100 | 0.5-100 | 0.5-100 | 0.5-100 |
| Temperature control method | PID ON/OFF impulse or 2-position control | | | |
| Order information | Art. no. 290202 | 290203 | 290204 | 290225 |

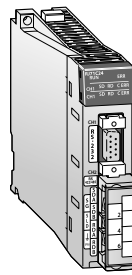
MELSEC iQ-R series



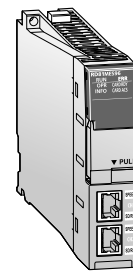
RD62P2
High-speed counter module



RD75D4
Positioning modules



RJ71C24
Interface module



RD81MES96
MES Interface module

High-speed counter modules

The MELSEC iQ-R series counter modules are capable of 200k pulse/s for the DC input type, and 8M pulse/s for differential input. When used with a high-accuracy incremental encoder, positional tracking can also be realized.

The pulse measurement feature enables measuring of the pulse cycle.

| Specifications | RD62P2 | RD62P2E | RD62D2 |
|----------------------------------|-----------------|---|-----------------------|
| Number of counter input channels | 2 | 2 | 2 |
| Count input signal | phase | 1-phase-input (multiple of 1 or 2), CW/CCW input, 2-phase input (multiple of 1, 2 or 4) | |
| | signal levels | 5/12/24 V DC (2–5 mA) | 5/12/24 V DC (2–5 mA) |
| Max. counting speed | 200 kHz | 200 kHz | 8 MHz |
| Order information | Art. no. 279566 | 279568 | 279567 |

Positioning modules

The MELSEC iQ-R series offers a choice of two positioning modules, transistor output or differential drive output, depending on the connected amplifier. The modules are capable of transmission speeds up to 5 M pulses/s, and the differential driver output module supports wiring up to a distance of 10 m.

| Specifications | RD75P2 | RD75P4 | RD75D2 | RD75D4 |
|--------------------------------------|--|--------|--------|--------|
| Number of control axes | 2 | 4 | 2 | 4 |
| Acceleration/deceleration processing | Trapezoidal acceleration/deceleration, S-curve acceleration/deceleration | | | |
| Max. output pulse | 200 kpps | 5000 | 200 | 5000 |
| Internal power consumption (5 V DC) | A 0.38 | 0.54 | 0.42 | 0.78 |
| Order information | Art. no. 279562 | 279563 | 279564 | 279565 |

Interface modules

The serial communication modules enable serial devices with up to 230.4 kbps transmission speeds to be connected per channel. Communications protocols such as Modbus® are supported via the pre-defined protocol feature.

| Specifications | RJ71C24 | RJ71C24-R2 | RJ71C24-R4 |
|--------------------------|-----------------|---|------------------------------------|
| Interface type | channel 1 | RS232-compliance (D-sub 9P female) | RS232-compliance (D-sub 9P female) |
| | channel 2 | RS422/485-compliance (2-piece terminal block) | RS232-compliance (D-sub 9P female) |
| Order information | Art. no. 279573 | 279574 | 279575 |

Network modules

The network and interface modules of the MELSEC iQ-R series ensure a vast selection of interconnectivity possibilities with various protocols and network topologies providing the best-fit solution for various applications.

| Specifications | RJ71GF11-T2 | RJ71EN71 | RJ71GP21-SX | RJ61BT11 | RJ72GF15-T2 |
|--------------------------|------------------|----------|--------------------|----------|------------------------------|
| Network type | CC-Link IE Field | Ethernet | CC-Link IE control | CC-Link | CC-Link IE Field remote head |
| Order information | Art. no. 279569 | 279570 | 279571 | 279572 | 297947 |

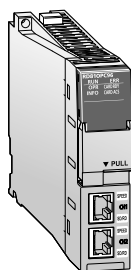
| Specifications | RJ71PN92 | RJ71PB91V | RJ71CN91 | RJ71BAC96 | RJ71DN91 |
|--------------------------|-----------------|-------------|----------|-----------|-----------|
| Network type | Profinet | Profibus DP | CANopen | BACnet | DeviceNet |
| Order information | Art. no. 308713 | 308714 | 308735 | 311945 | 317838 |

MES Interface module

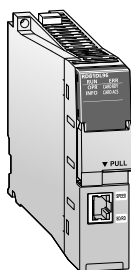
A MES Interface module provides direct database connectivity for IT systems and facilitates automatic SQL* text generation using intuitive configuration setup software. This module allows production data from the shop floor to be inserted into database records directly.

* Structured Query Language is a programming language designed for managing data in a relational database.

| Specifications | RD81MES96 | |
|--------------------------|-----------------------|--|
| Module type | MES Interface module | |
| Transmission method | Ethernet | |
| Database connection | supported database | Oracle® Database, Microsoft® SQL Server, Microsoft® Access |
| | SQL text transmission | SELECT, INSERT, UPDATE, DELETE, Multi-SELECT, STORED PROCEDURE |
| | accessible CPU module | iQ-R series (direct, remote), Q series (remote), L series (remote) |
| Order information | Art. no. 295423 | |



RD81OPC96
OPC UA module



RD81DL96
High-speed data logger module



RD55UP06-V
C intelligent function module

OPC UA server module

The MELSEC iQ-R series OPC UA server module integrates the OPC UA server directly into the equipment control system as a robust alternative to a computer-based configuration.

| Specifications | | RD81OPC96 |
|--------------------------|---|---|
| Card slot | | SD memory card/SDHC memory card (2–16 GB) |
| Ethernet port | number of channels | 2 |
| | data transmission speed | 1 Gbps, 100 Mbps, 10 Mbps |
| | max. number of cascaded stages ^① | 2 (100 Mbps), 4 (10 Mbps) |
| | max. segment length ^② | m 100 (between hup and node) |
| | interface | RJ45 |
| Setup software | | MX OPC UA Module Configurator-R (SW1DND-ROPCUA-E) |
| Order information | | Art. no. 312973 |

- ① Based on use with a repeater hup. For switching hup, refer to the manufacturers documentation.
 ② for maximum segment length between hups, refer to switching hup manufacturer documentation.

iQ-R C-Application server

The C-Application server is based on modern web services and supports all kind of IoT requests. Its strength is to collect information in real time, provide analysis and forwards the results to a variety of cloud systems.

| Specifications | | C-Application server for R12CCPU-V |
|--------------------------|--|--|
| Transmission type | | Ethernet, Serial |
| Database | | SQLite3, MySQL, Redis |
| Function | | CCPU and MD library function support, CAS specific functions, HTML5, Websocket, Lua API, Lua server pages, XML parser, Event handler, REST, AJAX, SOAP, JSON, XML-RPC Web-Services, WebDAV, SMTP, SMTPS, STARTTLS, SSL, Shark SSL, SMQ, PikeHTTP |
| Order information | | Art. no. 308736 |

High-speed data logger module

This module enables logging of various data such as Unicode, CSV, and BIN text formats, which can be utilized for spreadsheet reporting owing to the automatic report generation feature: BIN text format data can be ported directly to Microsoft® Windows® Excel®. Logging files can also be automatically sent to a FTP server or directly into a Microsoft® Windows® share folder.

| Specifications | | RD81DL96 |
|--------------------------|---------------|---|
| Accessible CPU modules | | iQ-R series (direct, remote), System Q series (remote), L series (remote) |
| Function | data logging | Logs CPU module device values at specified data sampling intervals. |
| | event logging | Monitors sampled device values from the CPU module, and logs events that occur. |
| | report | Outputs the data sampled by the high speed data logger module as an Excel® file. |
| | recipe | Executes the following operations using recipe files stored in the SD memory card: ● Transfer device values written on the recipe files to devices in the CPU module. ● Transfer device values in the CPU module to the recipe files. |
| Order information | | Art. no. 308709 |

C intelligent function module

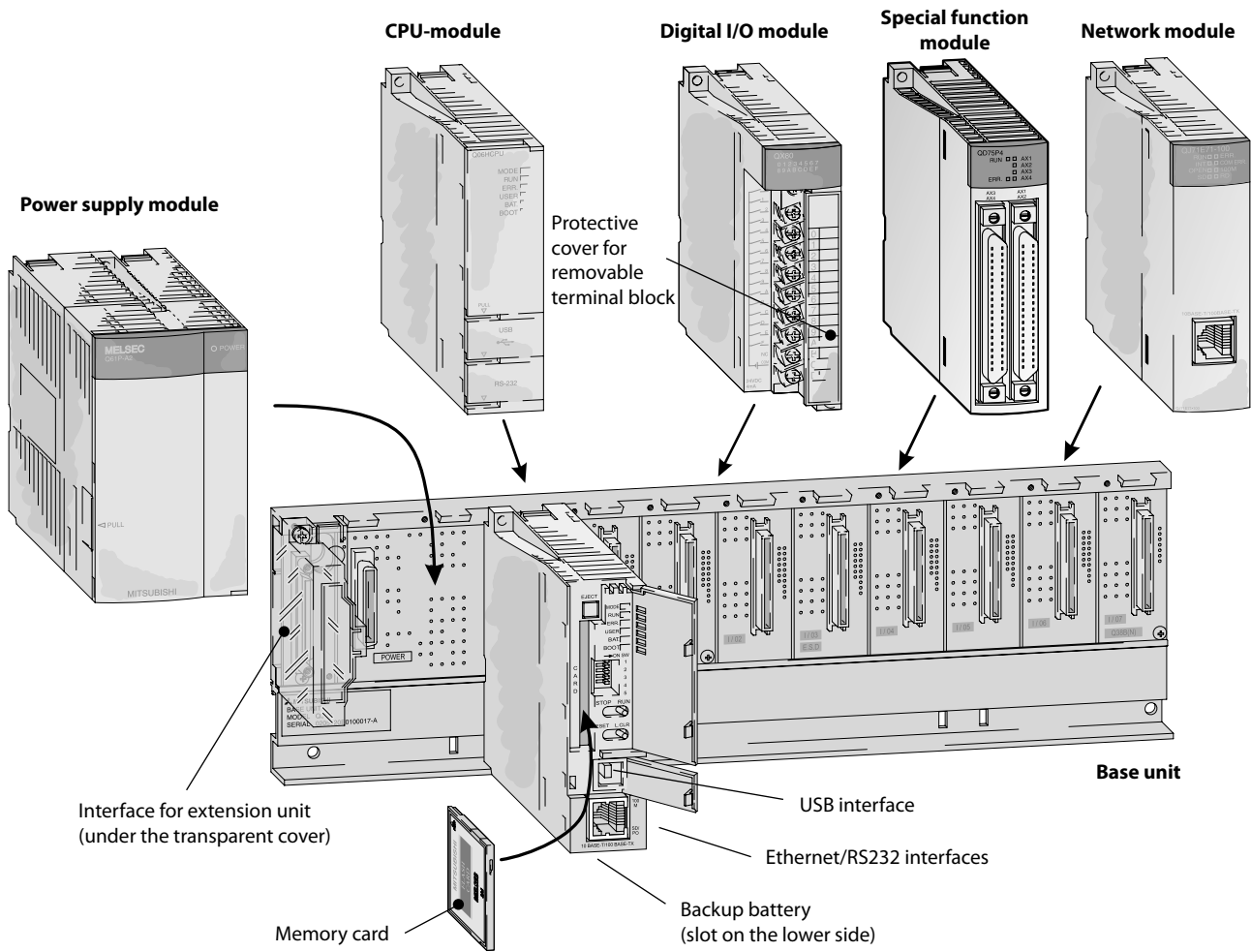
C/C++ program execution

The C Intelligent function module is available with a multi-core ARM®-based controller pre-installed with VxWorks® Version 6.9, which realizes simultaneous execution of programs, thereby providing a robust and deterministic alternative to computer-based systems. This module can be used for applications such as in-line production quality testing or as a gateway for various industry-specific communications protocols.

| Specifications | | RD55UP06-V |
|--------------------------|-------------------------------------|---|
| Hardware | endian format | Little endian |
| | MPU | ARM® Cortex-A9 Dual Core |
| Software | operating system | VxWorks Version 6.9 |
| | programming language | C language (C/C++) |
| | programming development environment | CW Workbench/Wind River Workbench3.3 |
| | setting/monitoring tool | GX Works3 (SW1DND-GXW3-E) ^① |
| Communication interface | | Ethernet (1000BASE-T/100BASE-TX/10BASE-T) (1 ch.) |
| Order information | | Art. no. 303298 |

- ① Setting and monitoring of the module is integrated within the GX Works3 engineering software.

MELSEC System Q – What a system looks like



System structure

The CPU and modules are connected to a base unit which has an internal bus connection for communication between the individual modules and the CPUs. The power supply module which supplies the voltage for the entire system is also installed on this base unit.

The base units are available in 4 different versions with 3 to 12 module slots.

Each base unit can be supplemented by means of an extension unit providing additional slots.

If you wish to keep open the option of subsequent extension of your PLC or if you have free slots on your base unit, you can insert dummy modules in vacant module positions.

They serve to protect the free slots from soiling or from mechanical effects and can also be used for reserving I/O points.

For cabling larger systems and machines – e.g. in a modular design – the use of remote I/O modules offers additional communications facilities.

What you need

Base units

Main base units

The main base unit is used for mounting and connecting CPUs, power supply unit, input modules, output modules and special function modules.

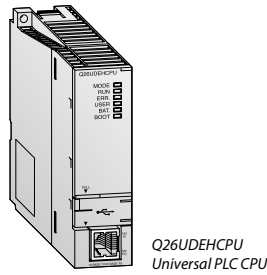
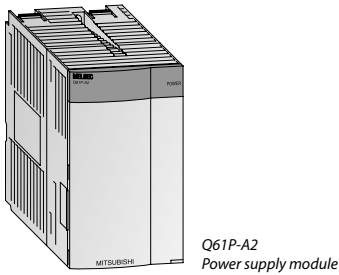
| Specifications | Q325B | Q33B | Q335B | Q35B | Q355B | Q35DB | Q38B | Q38DB* | Q38RB | Q312B | Q312DB* |
|--------------------------------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|
| Slots for I/O modules | 2 | 3 | 3 | 5 | 5 | 5 | 8 | 8 | 8 | 12 | 12 |
| Slots for power supply modules | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 |
| Order inf. | Art. no. 147273 | 136369 | 147284 | 127586 | 147285 | 249091 | 127624 | 207608 | 157067 | 129566 | 207609 |

* These base units are required for the new iQ Platform motion, NC and robot CPUs.

Safety main base unit

The safety main base unit holds and connects the safety CPU and up to two CC-Link safety master modules as well as network modules (CC-Link IE Field, CC-Link IE Controller Network, Ethernet and MELSECNET/H, one module each).

| Specifications | Q5034B |
|--------------------------------|-----------------|
| Slots for I/O modules | 4 |
| Slots for power supply modules | 1 |
| Order inf. | Art. no. 203206 |



Extension base units

The extension base units are connected to the main base unit by means of pre-assembled bus cables.

| Specifications | Q52B | Q55B | Q63B | Q65B | Q68B | Q68RB | Q612B | Q65WRB | QA1551B | |
|--------------------------------|----------|--------|--------|--------|--------|--------|--------|--------|---------|--------|
| Slots for I/O modules | 2 | 5 | 3 | 5 | 8 | 8 | 12 | 5 | 1 | |
| Slots for power supply modules | — | — | 1 | 1 | 1 | 2 | 1 | 1 | — | |
| Order inf. | Art. no. | 140376 | 140377 | 136370 | 129572 | 129578 | 157066 | 129579 | 210163 | 249092 |

Power supply modules

These units power all the modules on the backplane. The choice is dependent on the power consumption of the individual modules (this is especially important when using multiple CPUs).

| Specifications | Q61P | Q61P-D | Q61SP | Q62P | Q63P | Q63RP | Q64PN | Q64RPN | Q5061P-A1 | Q5061P-A2 | |
|--------------------------|-------------------------|--------------|-------------|--------------|---------|---------|--------------|--------------|--------------|--------------|--------|
| Input voltage | 85–264 V AC | 100–240 V AC | 85–264 V AC | 100–240 V AC | 24 V DC | 24 V DC | 100–240 V AC | 100–240 V AC | 100–120 V AC | 200–240 V AC | |
| Rated output current | 5 V DC 24 V DC ±10 % | A | 6 | 6 | 2 | 3 | 6 | 8.5 | 8.5 | 6 | 6 |
| Order information | Art. no. | 190235 | 221860 | 147286 | 140379 | 136371 | 166091 | 217627 | 283021 | 203207 | 203208 |

PLC CPU modules

Universal PLC CPUs

These universal PLC CPUs are the latest generation of modular CPUs for the MELSEC System Q controller platform and they are the foundation of the iQ Platform system. They can be combined with the motion, robot and NC CPUs to configure scalable and highly flexible modular automation systems.

The CPU modules of the MELSEC System Q are available as single and multi processor CPUs through which they achieve a wide application range.

| Specifications | Q00UJCPU | Q00UCPU | Q01UCPU | Q02UCPU | Q03UDCPU, Q03UDECPU | |
|---------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|----------------|
| I/O points | 256/8192 | 1024/8192 | 1024/8192 | 2048/8192 | 4096/8192 | |
| Memory capacity for PLC program | 10 k steps (40 kByte) | 10 k steps (40 kByte) | 15 k steps (60 kByte) | 20 k steps (80 kByte) | 30 k steps (120 kByte) | |
| Order information | Art. no. | 221575 | 221576 | 221577 | 207604 | 207605, 217899 |

| Specifications | Q04UDHCPU, Q04UDEHCPU | Q06UDHCPU, Q06UDEHCPU | Q10UDHCPU, Q10UDEHCPU | Q13UDHCPU, Q13UDEHCPU | |
|---------------------------------|------------------------|------------------------|-------------------------|-------------------------|----------------|
| I/O points | 4096/8192 | 4096/8192 | 4096/8192 | 4096/8192 | |
| Memory capacity for PLC program | 40 k steps (160 kByte) | 60 k steps (240 kByte) | 100 k steps (400 kByte) | 130 k steps (520 kByte) | |
| Order information | Art. no. | 207606, 217900 | 207607, 215808 | 221578, 221579 | 217619, 217901 |

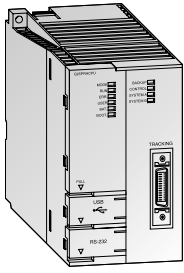
| Specifications | Q20UDHCPU, Q20UDEHCPU | Q26UDHCPU, Q26UDEHCPU | Q50UDEHCPU * | Q100UDEHCPU * | |
|---------------------------------|-------------------------|--------------------------|--------------------------|---------------------------|--------|
| I/O points | 4096/8192 | 4096/8192 | 4096/8192 | 4096/8192 | |
| Memory capacity for PLC program | 200 k steps (800 kByte) | 260 k steps (1040 kByte) | 500 k steps (2000 kByte) | 1000 k steps (4000 kByte) | |
| Order information | Art. no. | 221580, 221581 | 217620, 217902 | 242368 | 242369 |

* is supported by GX Works2 only

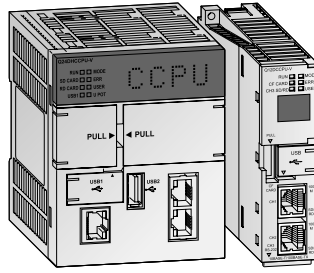
| Specifications | Q03UDVCPU | Q04UDVCPU | Q06UDVCPU | Q13UDVCPU | Q26UDVCPU | |
|---------------------------------|------------------------|------------------------|------------------------|-------------------------|--------------------------|--------|
| I/O points | 4096/8192 | | | | | |
| Memory capacity for PLC program | 30 k steps (120 kByte) | 40 k steps (160 kByte) | 60 k steps (240 kByte) | 130 k steps (520 kByte) | 260 k steps (1040 kByte) | |
| Order information | Art. no. | 266161 | 266162 | 266163 | 266164 | 266165 |

| Accessories | Q4MCA-1MBS; 1 MB memory cassette for Q□UDVCPU Q4MCA-2MBS; 2 MB memory cassette for Q□UDVCPU Q4MCA-4MBS; 3 MB memory cassette for Q□UDVCPU Q4MCA-8MBS; 4 MB memory cassette for Q□UDVCPU | Art. no. 266134; Art. no. 266155; Art. no. 266156 Art. no. 266157 |
|-------------|--|--|
|-------------|--|--|

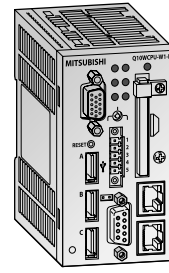
MELSEC System Q



Q12PRHCPU
Redundant PLC CPU



Q24DHCCPU-V
Q12DCCPU-V
C Controller CPU



Q10WCPU-WI-E
PC CPU

Process CPU modules

The MELSEC System Q process CPU allows flexible system design based on off-the-shelf components, which reduces both initial and implementation costs.

The MELSEC Process Control system is best suited for food manufacturing and chemical plant applications.

| Specifications | Q02PHCPU | Q06PHCPU | Q12PHCPU | Q25PHCPU |
|--------------------------|----------------------|------------------------|------------------------|-------------------------|
| I/O points | 4096/8192 | 4096/8192 | 4096/8192 | 4096/8192 |
| Memory capacity | overall | ≤32 MByte | ≤32 MByte | ≤32 MByte |
| | max. for PLC program | 28 k steps (112 kByte) | 60 k steps (240 kByte) | 124 k steps (496 kByte) |
| Order information | Art. no. 218138 | 218139 | 143529 | 143530 |

Redundant PLC CPU modules

Two PLC systems with the same configuration can provide a hot standby system through automatic synchronisation of data. This is the key to a redundant system and high availability. Down time and costs for re-starting are also dramatically reduced. If the control system fails, the standby system takes over without interruption of the process.

| Specifications | Q12PRHCPU | Q25PRHCPU |
|--------------------------|----------------------|-------------------------|
| I/O points | 4096/8192 | 4096/8192 |
| Memory capacity | overall | ≤32 MByte |
| | max. for PLC program | 124 k steps (496 kByte) |
| Order information | Art. no. 157070 | 157071 |

C Controller CPUs

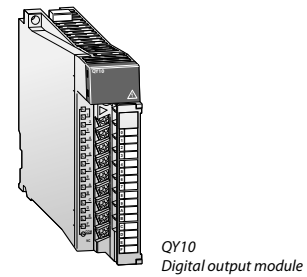
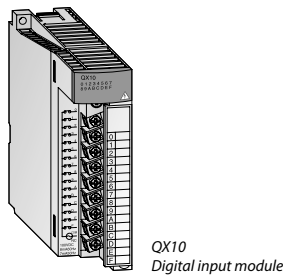
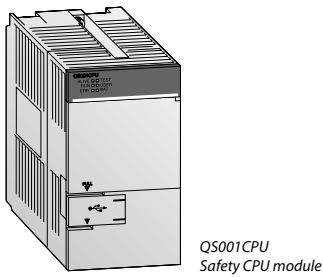
The C Controller allow the integration and programming of the MELSEC System Q automation platform with C++. Using the worldwide established real time operating system VxWorks, the realisation of complex tasks, communication and protocols becomes very easy.

| Specifications | Q12DCCPU-V | Q24DHCCPU-V | Q24DHCCPU-LS |
|--------------------------|---|--|---|
| Programming language | C or CC++ | C or CC++ | — |
| Memory | Standard RAM: 3 MB; Work RAM: 128 MB; Battery-backed-up RAM: 128 kB | Standard RAM: 0–4 MB; Standard ROM: 382 MB; Work RAM: 512 MB; Battery-backed-up RAM: 1–5 MB | Work RAM: 512 MB; Battery-backed-up RAM: 5 MB |
| Communication interfaces | RS232 (1 ch.), 10BASE-T/100BASE-TX (2 ch.), USB (1 ch.) | Ethernet (3 ch.), USB (2x), PCI Express, RS232 | Ethernet (3 ch.), USB (2x), PCI Express, RS232 |
| CF card I/F | 1 slot for a TYPE I card (Max. 8 GB CF card is supported) | 1 slot for SD memory card | 1 slot for SD memory card |
| Order information | Art. no. 221925 | 260296 | 273605 |

PC CPU modules

The Q10WCPU uses the Microsoft Windows® operating system and can be combined with the power supplies, racks, I/O and special modules from the MELSEC System Q. The CPU module can be used in stand-alone mode or in multi-CPU mode, in conjunction with PLC CPU modules for example. This enables a seamless connection between the process and the data processing system.

| Specifications | Q10WCPU-WI-E | Q10WCPU-WI-CFE |
|--------------------------|---|--------------------------------|
| CPU | Intel® Atom™ Processor N450 1.66 GHz | |
| Chip set | Intel® ICH8M | |
| Processing frequency | GHz 1.66 | |
| Memory | L1 cache | Instruction 32 kB + data 24 kB |
| | L2 cache | 512 kB |
| | Main | 1 GB |
| Video | Analog-RGB, resolution 1400x1050 at 60 Hz (16 million colors) | |
| Interfaces | Serial (RS232C), USB, keyboard/mouse, LAN, monitor | |
| PC card slots | 1 slot for CF memory card (type I) | |
| Order information | Art. no. 252826 | 252827 |



Safety CPU module

The CC-Link safety network eliminates the complex wiring needed in conventional safety controller systems. The remote safety I/O stations are connected to the CC-Link safety master module in the safety PLC using standard CC-Link cables.

The safety CPU module conforms to the safety requirements of EN 954-1 Category 4, ISO 13849-1 PL e, and IEC 61508 (JIS C 0508) SIL 3 and is certified by TÜV Rheinland.

iQ Platform CPUs

Robot CPU (see Robots chapter)
NC CPU (please contact your nearest Mitsubishi Electric distributor for more details)

Digital I/O modules

Various input modules are available for converting digital process signals with different voltage levels into the levels required by the PLC.

The MELSEC System Q output modules have different switching elements for adaptation to many control tasks.

| Specifications | QS001CPU |
|---|---------------------------------------|
| I/O points | 4096/8192 |
| Programming language (Sequence Control) | Relay symbol language, function block |
| Memory capacity | 128 kB |
| Order information | Art. no. 203205 |

Digital input modules

| Specifications | QX10 | QX10-TS | QX28 | QX40 | QX40-TS | QX40-S1 | QX41 | QX41-S1 | QX41-S2 | QX42 | QX42-S1 |
|---------------------|-------------------------|-------------------------|-------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Input points | 16 | 16 | 8 | 16 | 16 | 16 | 32 | 32 | 32 | 64 | 64 |
| Rated input voltage | 100–120 V AC (50/60 Hz) | 100–120 V AC (50/60 Hz) | 100–240 V AC (50/60 Hz) | 24 V DC | 24 V DC | 24 V DC | 24 V DC | 24 V DC | 24 V DC | 24 V DC | 24 V DC |
| Order inf. | Art. no. 129581 | 221838 | 136396 | 132572 | 221839 | 136574 | 132573 | 146921 | 229239 | 132574 | 146922 |

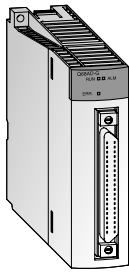
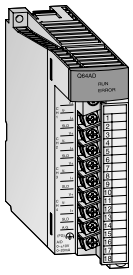
| Specifications | QX50 | QX70 | QX71 | QX72 | QX80 | QX80-TS | QX81 | QX81-S2 | QX82 | QX82-S1 |
|---------------------|-----------------|----------------|----------------|----------------|---------|---------|---------|---------|---------|---------|
| Input points | 16 | 16 | 32 | 64 | 16 | 16 | 32 | 32 | 64 | 64 |
| Rated input voltage | 48 V DC | 5 V DC/12 V DC | 5 V DC/12 V DC | 5 V DC/12 V DC | 24 V DC | 24 V DC | 24 V DC | 24 V DC | 24 V DC | 24 V DC |
| Order inf. | Art. no. 204678 | 136397 | 136398 | 136399 | 127587 | 221840 | 129594 | 229240 | 150836 | 150837 |

Digital output modules

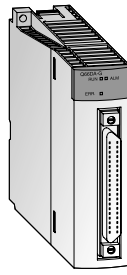
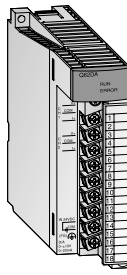
| Specifications | QY10 | QY10-TS | QY18A | QY22 | QY40P | QY40P-TS | QY41H | QY41P |
|----------------------|------------------|------------------|------------------|--------------|------------------------|------------------------|-----------------------------------|------------------------|
| Output points | 16 | 16 | 8 | 16 | 16 | 16 | 32 | 32 |
| Output type | Relay | Relay | Relay | Triac | Transistor (sink type) | Transistor (sink type) | Transistor high-speed (sink type) | Transistor (sink type) |
| Rated output voltage | 24 V DC/240 V AC | 24 V DC/240 V AC | 24 V DC/240 V AC | 100–240 V AC | 12/24 V DC | 12/24 V DC | 5–24 V DC | 12/24 V DC |
| Order inf. | Art. no. 129605 | 221841 | 136401 | 136402 | 132575 | 221842 | 308738 | 132577 |

| Specifications | QY42P | QY50 | QY68A | QY70 | QY71 | QY80 | QY80-TS | QY81P | QY82P |
|----------------------|------------------------|------------------------|-------------------------------|------------------------|------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Outputs | 64 | 16 | 8 | 16 | 32 | 16 | 16 | 32 | 64 |
| Output type | Transistor (sink type) | Transistor (sink type) | Transistor (sink/source type) | Transistor (sink type) | Transistor (sink type) | Transistor (source type) | Transistor (source type) | Transistor (source type) | Transistor (source type) |
| Rated output voltage | 12/24 V DC | 12/24 V DC | 5–24 V DC | 5/12 V DC | 5/12 V DC | 12/24 V DC | 12/24 V DC | 12/24 V DC | 12/24 V DC |
| Order inf. | Art. no. 132577 | 132578 | 136403 | 136404 | 136405 | 127588 | 221843 | 129607 | 242366 |

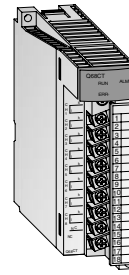
MELSEC System Q



Q64AD/Q68AD-G
Analog input modules



Q62DA/Q66DA-G
Analog output modules



Q68CT
Analog CT input module

Combined analog I/O module

With the analog input/output module Q64AD2DA the user has a module that has both, four analog inputs and two analog outputs.

| Specifications | | Q64AD2DA |
|----------------------|------------|-------------------------------------|
| Input points | | 4 |
| Analog input | voltage V | -10–10 |
| | current mA | 0–20 |
| Accuracy | | ±0.4 % (0–55 °C), ±0.1 % (20–30 °C) |
| Output points | | 2 |
| Analog output | voltage V | -10–10 |
| | current mA | 0–20 |
| Accuracy | | ±0.3 % (0–55 °C), ±0.1 % (20–30 °C) |
| Order inform. | Art. no. | 229238 |

Analog input modules

The analog input modules convert analog process signals, for example pressure, flow or fill level, linearly into digital values, which are further processed by the Q CPU.

The analog input modules Q62AD-DGH, Q64ADGH, Q66AD-DG and Q68AD-G are designed for applications requiring high accuracy.

The functionality of a HART master station is integrated in the ME1AD8HAI-Q.

| Specifications | Q62AD-DGH | Q64AD | Q64ADH | Q64AD-GH | Q66AD-DG | Q68AD-G | Q68ADV | Q68ADI | ME1AD8HAI-Q | |
|----------------------|------------|----------------------|----------------------|----------------------|-----------|----------------------|----------------------|----------------|-------------|--------|
| Input points | 2 | 4 | 4 | 4 | 6 | 8 | 8 | 8 | 8 | |
| Analog input | 4 mA/20 mA | -10 V/10 V (0/20 mA) | -10 V/10 V (0/20 mA) | -10 V/10 V (0/20 mA) | 0/4/20 mA | -10 V/10 V (0/20 mA) | -10 V/10 V (0/20 mA) | 0/20 mA | 0/4/20 mA | |
| Overall accuracy | ±0.05 % | ±0.4 %, ±0.1 % | ±0.2 %, ±0.1 % | ±0.05 % | ±0.1 % | ±0.1 % | ±0.4 %, ±0.1 % | ±0.4 %, ±0.1 % | ±0.15 % | |
| Order inform. | Art. no. | 145036 | 129615 | 251331 | 143542 | 204676 | 204675 | 129616 | 129617 | 229238 |

Analog output modules

The analog output modules convert digital values predetermined by the CPU into analog current or voltage signal. For example, frequency inverters, valves or slide valves are controlled by means of these signals.

The analog output module Q66DA-G is especially designed for applications requiring high accuracy.

The analog output modules Q62DAN, Q64DAN, Q68DAVN and Q68DAIN isolate the analog output channel from the external power supply.

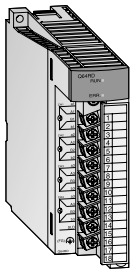
The functionality of a HART master station is integrated in the ME1DA6HAI-Q.

| Specifications | Q62DAN | Q62DA-FG | Q64DAN | Q64DAH | Q66DA-G | Q68DAVN | Q68DAIN | ME1DA6HAI-Q | |
|----------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-------------|---------------|-----------------|--------|
| Output points | 2 | 2 | 4 | 4 | 6 | 8 | 8 | 6 | |
| Analog output | -10–10 V DC (0 mA–20 mA DC) | -10–10 V DC (0 mA–20 mA DC) | -10–10 V DC (0 mA–20 mA DC) | -10–10 V DC (0 mA–20 mA DC) | -12–12 V DC (0 mA–22 mA DC) | -10–10 V DC | 0 mA–20 mA DC | 0/4 mA–20 mA DC | |
| Overall accuracy | ±0.1 % | ±0.1 % | ±0.1 % | ±0.1 % | ±0.1 % | ±0.1 % | ±0.1 % | 0.15 % | |
| Order inform. | Art. no. | 200689 | 145037 | 200690 | 266158 | 204677 | 200691 | 200692 | 236649 |

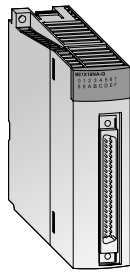
Analog CT input module

Up to eight current transformers can be connected directly to the analog CT input module Q68CT. External signal converters are not required anymore.

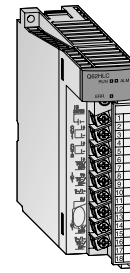
| Specifications | Q68CT | |
|------------------------------|---------------------------|--------|
| Input points | 8 | |
| Analog input (via CT sensor) | 5/50/100/200/400/600 A AC | |
| Overall accuracy | ±0.5 % | |
| Order inform. | Art. no. | 145036 |



Q64RD
Analog module for temperature measurement



ME1X16NA-Q
NAMUR input module



Q62HLC
Loop control module

Analog modules for temperature measurement

These modules are designed to convert external platinum temperature-measuring resistor input values into 16 or 32-bit signed binary temperature measurement values and scaling values.

| Specifications | Q64RD | Q64RD-G | Q64TD | Q64TDV-GH | Q68RD3-G | Q68TD-G-H01/H02 |
|-------------------------------|----------------------------------|-----------------------|------------------------|------------------------|-----------------------|------------------------|
| Input channels | 4 | 4 | 4 | 4 | 8 | 8 |
| Connectable thermocouple type | Pt100, JPt100 | Pt100, JPt100, Ni100Ω | K, E, J, T, B, R, S, N | K, E, J, T, B, R, S, N | Pt100, JPt100, Ni100Ω | K, E, J, T, B, R, S, N |
| Temperature measuring range | Depends on the thermocouple used | | | | | |
| Order information | Art. no. 137592 | 154749 | 137591 | 143544 | 216482 | 216481/221582 |

Temperature control modules

These modules enable PID algorithm temperature control without placing any load on the PLC CPU for the temperature control tasks.

| Specifications | Q64TCRTN | Q64TCRTBWN | Q64TCTTN | Q64TCTTBWN |
|-------------------------------|---|---|-----------------------|---|
| Control output type | Transistor | Transistor | Transistor | Transistor |
| Inputs | 4 channels per module | 4 channels per module/ broken wire detection | 4 channels per module | 4 channels per module/ broken wire detection |
| Supported temperature sensors | Pt100 (-200–600 °C), JPt100 (-200–500 °C) | | | |
| Order information | Art. no. 255456 | 255458 | 255455 | 255457 |

NAMUR input module

The ME1X16NA-Q is a digital input module for connection of up to 16 NAMUR sensors.

In contrast to an ordinary binary sensor with only two states (ON and OFF), a NAMUR sensor can indicate four states: ON, OFF, wire break and short circuit.

| Specifications | ME1X16NA-Q |
|--|-----------------|
| Number of NAMUR inputs | 16 |
| Sensor voltage (from internal power supply) V DC | 8.2 |
| Order information | Art. no. 257846 |

Load cell input module

The load cell input module Q61LD can connect load cells directly to MELSEC System Q programmable controllers. External signal converters are no longer required.

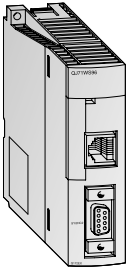
| Specifications | Q61LD |
|--|--|
| Analog input points (load cell output) | 1 |
| Resolution | 0–10 000 |
| Accuracy | Nonlinearity: within ±0.01 %/FS (Ambient temperature: 25 °C) |
| Order information | Art. no. 229237 |

Loop control module

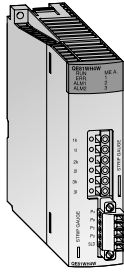
The Q62HLC loop control module uses a continuous proportional PID control format, which features a sampling period of 25 ms for high-accuracy, high-resolution thermocouple inputs, microvoltage inputs, voltage inputs, current inputs, and current outputs.

| Specifications | Q62HLC |
|--------------------------|--|
| Input points | 2 |
| Analog input | Thermocouple -200–2300 °C, microvoltage -100–100 mV, voltage -10–10 V, current 0–20 mA |
| Supported thermocouples | K, J, T, S, R, N, E, B, PL II, W5Re/W26Re |
| Order information | Art. no. 200693 |

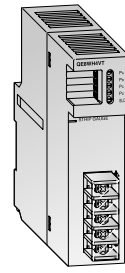
MELSEC System Q



QJ71WS96
Web server module



QE81WH4W
Power measurement module



QE8WH4VT
Voltage converter

High-speed counter modules

These counter modules detect high frequency signals which cannot be handled by normal input modules. For example, simple positioning tasks or frequency measurements can be realised.

| Specifications | QD62 | QD62E | QD62D | QD60P8-G | QD63P6 | QD64D2 | |
|--------------------------|----------|--------|--------------|----------|--------|--------------|--------|
| Counter inputs | 2 | 2 | 2 | 8 | 6 | 2 | |
| Max. counting frequency | 200 | 200 | 500 | 30 | 200 | 4000 | |
| I/O type | Sink | source | differential | — | — | differential | |
| Order information | Art. no. | 132579 | 128949 | 132580 | 145038 | 213229 | 278855 |

Web server module

The web server module QJ71WS96 enables the remote control monitoring of MELSEC System Q.

| Specifications | QJ71WS96 |
|--------------------------|-------------------------------|
| Module type | Web server, FTP server/client |
| Communications method | Ethernet: CSMA/CD |
| Interface | type 10BASE-T/100BASE-TX |
| Order information | Art. no. 147115 |

Power measurement modules

The power measurement modules QE81WH4W and QE83WH4W detect the voltage and current consumption of loads and calculate the power of the absorbed and emitted energy.

| Specifications | QE81WH4W | QE83WH4W |
|---------------------------|---|----------|
| No. of measuring circuits | 1 | 3 |
| Measured items | Current, voltage, frequency, current demand*, active power, active power demand*, power factor, active energy (consumption, regenerative), reactive energy, energy consumption over a specified time period | |
| Order information | Art. no. 259456 | 259457 |

*"Demand" is the average movement within the specified time period.

Voltage converter

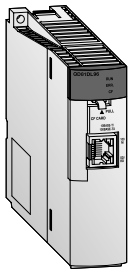
The voltage converter QE8WH4VT is required for voltage input to a power measurement module Q81WH4W or QE83WH4W.

| Specifications | QE8WH4VT |
|--------------------------|---|
| Phase wire system | 3-phase (4-wire) |
| Input voltage range | 63.5/110 V to 277/480 V AC (cannot operate at less than 55/95 V AC) |
| Frequency | 50/60 Hz |
| Order information | Art. no. 259458 |

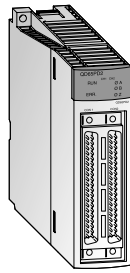
MES interface module

The MELSEC System Q MES module allows users to interface their production control systems directly to an MES database.

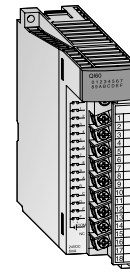
| Specifications | QJ71MES96N |
|--------------------------|--------------------------|
| Module type | MES interface module |
| Communications method | Ethernet |
| Interface | type 10BASE-T/100BASE-TX |
| Order information | Art. no. 323230 |



QD81DL96
High speed data logger module



QD65PD2
Multi-function counter/timer module



QI60
Interrupt module

Q series C-Application server

The C-Application server is based on modern web services and supports all kind of IoT requests. Its strength is to collect information in real time, provide analysis and forwards the results to a variety of cloud systems.

| Specifications | | C-Application server for Q12DCCPU-V |
|--------------------------|----------|---|
| Transmission type | | Ethernet, Serial |
| Database | | SQLite3 |
| Function | | QBF and MD library function support, CAS specific functions, HTML5, WebSocket, Lua API, Lua server pages, XML parser, Event handler, REST, AJAX, SOAP, JSON, XML-RPC Web-Services, WebDAV, SMTP, SSL, Shark SSL, PikeHTTP |
| Order information | Art. no. | 289014 |

High speed data logger module

The high speed data logger module can log programmable controller devices without using a personal computer.

| Specifications | | QD81DL96 |
|--|------------------------|---|
| Ethernet | interface | 10BASE-T/100BASE-TX |
| | data transmission rate | 10BASE-T: 10 Mbps; 100BASE-TX: 100 Mbps |
| Number of mountable CompactFlash cards | | 1 |
| Order information | Art. no. | 221934 |

Multi-function counter/timer module

Due to its high-speed counter inputs, PWM outputs for control DC drives and the integrated cam switching function with 8 outputs, the QD65PD2 is well suited for high precision positioning tasks.

| Specifications | | QD65PD2 |
|--------------------------------|----------|---|
| Counter inputs | | 2 |
| Max. counting frequency | | DC input 200 kHz, differential input 8 MHz |
| Counting range | | 32 bits + sign (binary), -2147483648~2147483647 |
| External digital input points | | 6 |
| External digital output points | | 8 |
| Order information | Art. no. | 245113 |

Interrupt module and high-speed inputs

The interrupt module QI60 is suitable for applications demanding quick responses.

| Specifications | | QI60 | QX40H | QX70H | QX80H | QX90H |
|--------------------------|----------|----------------|--------|--------|--------|--------|
| Input points | | 16 | 16 | 16 | 16 | 16 |
| Rated input voltage | V DC | 24 (sink type) | 24 | 5 | 24 | 5 |
| Order information | Art. no. | 136395 | 221844 | 221855 | 221856 | 221857 |

Interface modules

This module enables communication with peripheral devices via a standard RS232 interface. The peripherals are connected point-to-point on a 1:1 basis.

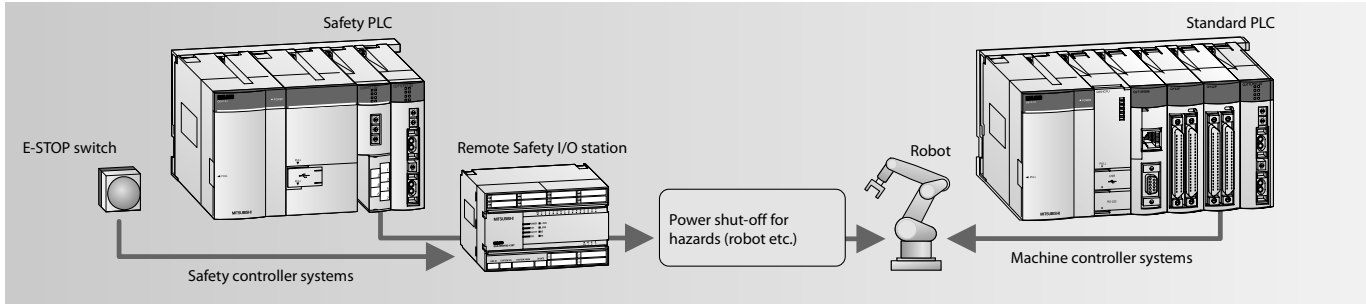
| Specifications | | QJ71C24N | QJ71C24N-R2 | QJ71C24N-R4 | QJ71MB91 | QJ71MT91 |
|--------------------------|-----------|-------------------------------|---------------------|-------------------------------|-------------------------------|-----------------|
| Interface type | channel 1 | RS232 (9-pin D-sub) | RS232 (9-pin D-sub) | RS422/RS485 (screw terminals) | RS232 (9-pin D-sub) | Ethernet (RJ45) |
| | channel 2 | RS422/RS485 (screw terminals) | RS232 (9-pin D-sub) | RS422/RS485 (screw terminals) | RS422/RS485 (screw terminals) | — |
| Order information | Art. no. | 149500 | 149501 | 149502 | 167757 | 155603 |

MELSEC Safety PLC

Even with increasing productivity, the safety of humans operating machinery and manufacturing facilities must still always have top priority. The MELSEC System QS PLC is specially designed for managing safety systems.

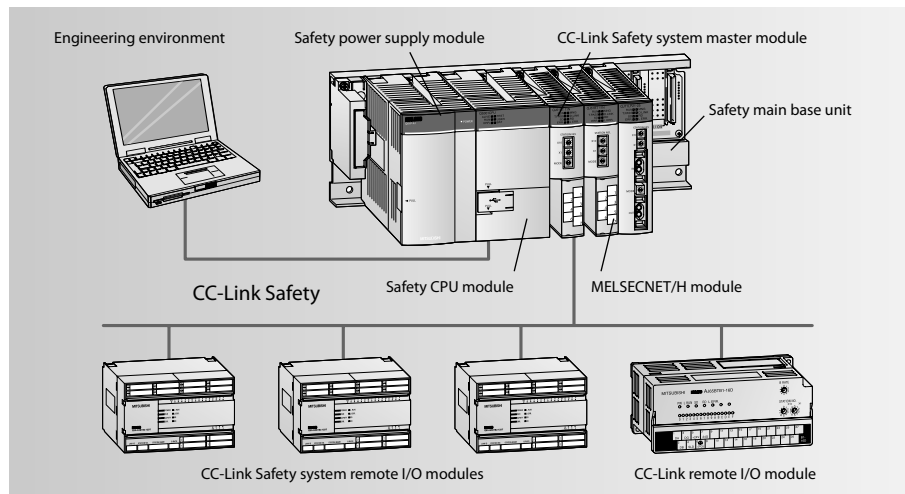
It is connected to safety devices like Emergency Stop switches and light curtains and has extensive diagnostics functions that enable it to reliably switch safety-critical outputs at the right time to turn machines off in the event of danger.

The actual machinery (conveyor belts, robots etc.) is still controlled by a conventional PLC.



CC-Link Safety

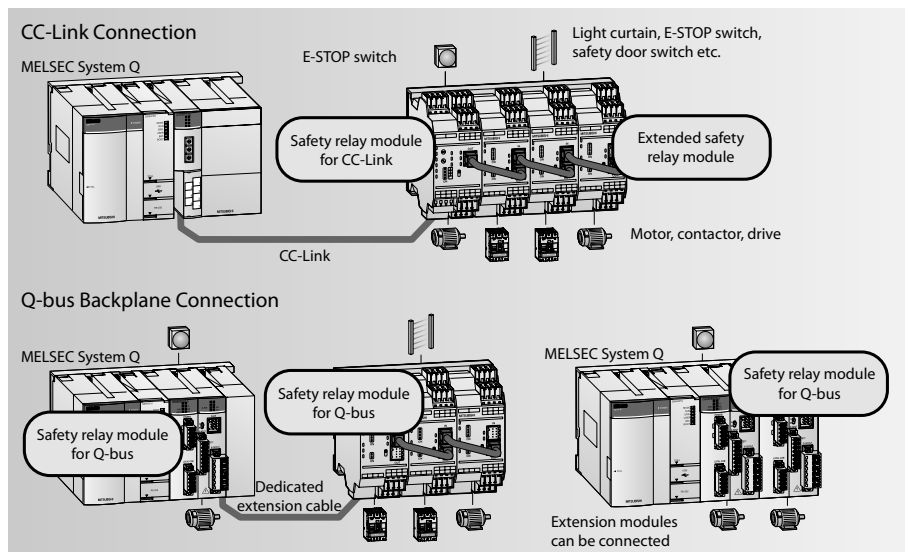
The CC-Link Safety network eliminates the complex wiring needed in conventional safety controller systems. The remote Safety I/O stations are connected to the CC-Link master module in the Safety PLC using standard CC-Link cables. In the event of communications errors powerful and effective error identification routines automatically switch off the outputs of both the Safety PLC and the remote Safety I/O stations. CC-Link Safety is also compatible with CC-Link. This means you can also use standard CC-Link I/O modules in a CC-Link Safety network for those inputs and outputs that are not critical for safety.



| Type | Safety Controller Components | Art. no. |
|-----------------|---|----------|
| QS001CPU | Safety PLC, 14 K steps program capacity | 203205 |
| QS034B-E | Safety base unit, accommodates power supply unit, CPU and up to 4 modules | 203206 |
| QS061P-A1 | Safety power supply unit, 100–120 V AC | 203207 |
| QS061P-A2 | Safety power supply unit, 200–240 V AC | 203208 |
| QS0J61BT12 | CC-Link Safety master module | 203209 |
| QS0J65BTB2-12DT | Safety remote I/O module, 8 dual safety inputs + 4 dual safety outputs | 203210 |
| QS0J65BTS2-8D | CC-Link Safety remote I/O module, 8 dual safety inputs | 217625 |
| QS0J65BTS2-4T | CC-Link Safety remote I/O module, 4 dual safety outputs | 217626 |
| QS0J71GF11-T2 | CC-Link Safety master module (local module) | 245177 |

Safety relays

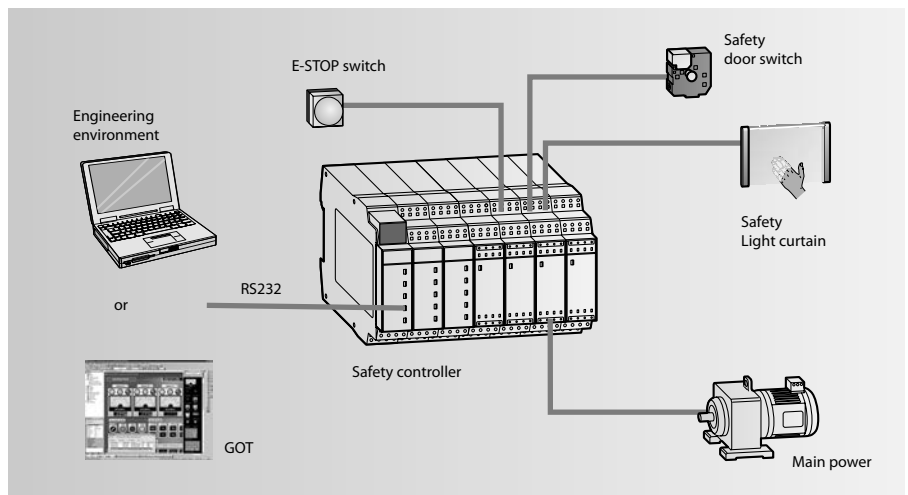
Safety relay modules are the ideal solution for applications where you don't need a separate Safety PLC. These modules are installed together with the standard MELSEC System Q components on the same base unit, or in a CC-Link network. This enables a normal PLC used as a controller to also perform safety functions, without the added cost of a separate safety controller and without additional programming and configuration.



| Specifications | Module | Type | Art. no. | |
|----------------------|---|--------------|---|--------|
| Safety relay modules | For installation in a CC-Link station | QS90SR2SP-CC | P-Type, 1 safety input, 1 safety output | 215801 |
| | | QS90SR2SN-CC | N-Type, 1 safety input, 1 safety output | 215803 |
| | For installation on a MELSEC System Q base unit | QS90SR2SP-Q | P-Type, 1 safety input, 1 safety output | 215799 |
| | | QS90SR2SN-Q | N-Type, 1 safety input, 1 safety output | 215800 |
| Extension modules | Can be connected to safety relay modules | QS90SR2SP-EX | P-Type, 1 safety input, 1 safety output | 215804 |
| | | QS90SR2SN-EX | N-Type, 1 safety input, 1 safety output | 215805 |

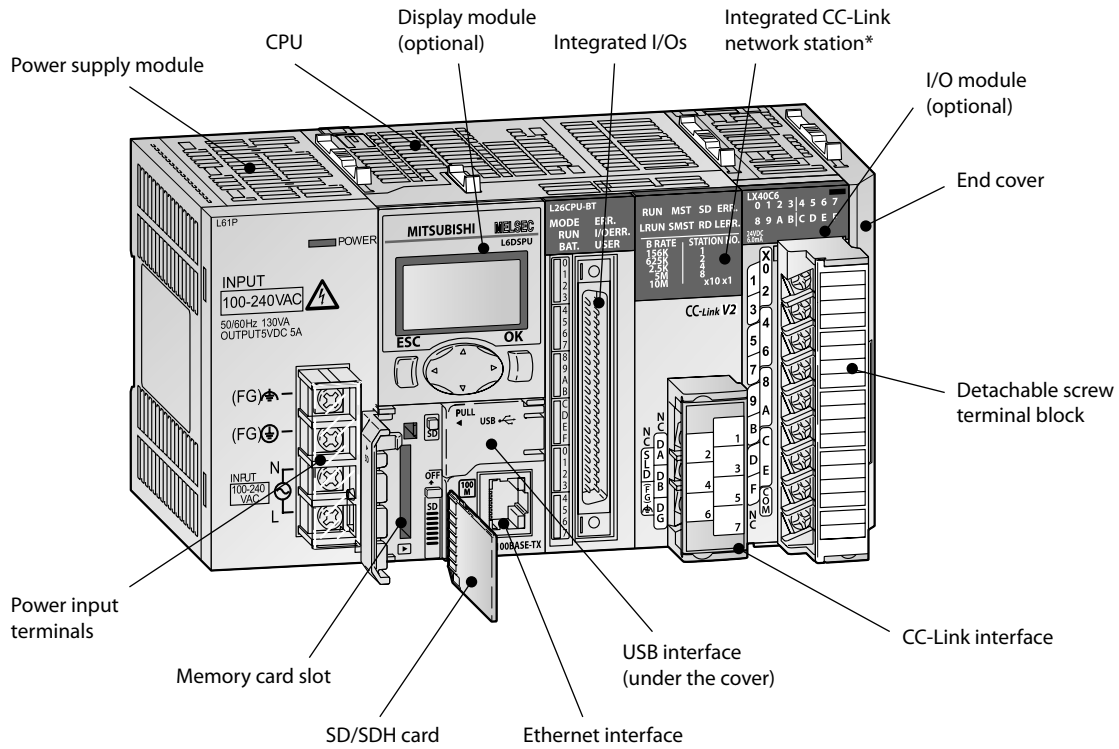
MELSEC WS Safety Controller

The MELSEC WS Safety Controller provides a cost effective way to add a safety controller capability to individual machines, or smaller scale systems. Mitsubishi Electric is proud to announce that the WS is a joint development with SICK AG of Germany, an acknowledged leader in the global machine safety industry. Its compact size insures easy placement in most control cabinets, without adding extra cost. Configuration saves engineering time by using a graphical icon based method, and program development and certification is simplified by the use of safety function blocks. For more complex needs, the WS is also scalable by simply adding additional I/O modules. Finally, integration with conventional control systems is easily achieved with the CC-Link open network connection or Ethernet.



| Function | Module | Description | Art. no. |
|----------------------|---------------|--|----------|
| CPU | WS0-CPU000200 | Program memory: 255 function blocks | 230057 |
| | WS0-CPU130202 | Program memory: 255 function blocks; EFI (direct communication with SICK safety devices) | 230058 |
| Input module | WS0-XTD180202 | 8 safety inputs | 230059 |
| Input/output modul | WS0-XTI084202 | 8 safety inputs; 4 safety outputs | 230060 |
| Output module | WS0-4R04002 | 4 safety relay outputs | 230064 |
| Communication module | WS0-GETH00200 | Module for Ethernet communication | 230063 |
| | WS0-GCC100202 | Module for CC-Link communication | 235441 |
| Memory | WS0-MPL000201 | Memory plug | 230061 |
| Programming cable | WS0-C20R2 | Serial programming cable | 230062 |

MELSEC L series – What a system looks like



* High-performance CPU only

System structure

The MELSEC L series is a powerful but compact modular controller with many features built-in to the CPU itself. The rack-free design promotes high system flexibility with minimum form factor. By connecting various types of modules, the system can be enhanced according to the application. Up to 10 expansion modules can be added per system configuration. As a baseless structure is employed, the space of the control panel can be used effectively without being limited by the size of the base.

MELSEC L series controllers are all-in-one programmable controllers that have the following functions built into the CPU module:

- 2 channels of high-speed counters up to 200 kHz
- Positioning possibilities for two axes, also up to 200 k pulses per second
- Built-in Ethernet communication
- Built-in I/Os which are available via a 40-pin high density connector supporting several I/O options
- High-speed data logging to the SD memory card
- CC-Link Ver. 2 Master/Slave interface (in the high-performance CPU)
- Full support in iQ Works and GX Works2
- Modbus®/TCP functionality (Master/Slave)

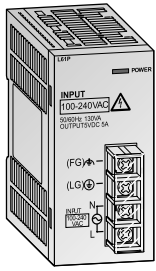
What you need

CPU modules

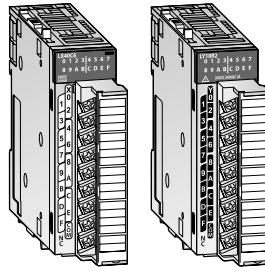
The CPU modules are the heart of a MELSEC L series system and contain a diverse range of control functions. Every CPU comes with 24 points of built-in I/Os.

| Specifications | L02S CPU/ L02S CPU-P | L02 CPU/ L02 CPU-P | L06 CPU/ L06 CPU-P | L26 CPU/ L26 CPU-P | L26 CPU-BT/ L26 CPU-PBT |
|-----------------------------|-------------------------|-----------------------|-----------------------|-----------------------|----------------------------|
| Number of I/O points | 1024/8192* | 1024/8192* | 4096/8192* | 4096/8192* | 4096/8192* |
| Program size (no. of steps) | 20 k | 20 k | 60 k | 260 k | 260 k |
| Order information | Art. no. 263070/269668 | 238057/244976 | 263068/** | 263069/** | 238056/244977 |

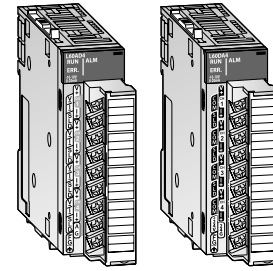
* number of points available on a program ** on request
Model name with "P": source type digital output, model name without "P": sink type digital output.



L61P
Power supply module



LX40C6/LY10R2
Digital I/O modules



L60AD4/L60DA4
Analog I/O modules

Power supply modules

This provides 5 V DC power for all modules on the back plane. There are three types of power supplies available, the selection is dependent on the available supply voltage.

| Specifications | L61P | L63P | L63SP |
|-------------------------------|-----------------|---------|---------|
| Input voltage | 100–240 V AC | 24 V DC | 24 V DC |
| Rated output current (5 V DC) | 5 A | 5 | 5 |
| Order information | Art. no. 238063 | 238064 | 279592 |

Digital I/O modules

There is a wide selection of digital input and output modules depending on the signal level, sink or source designation and density of points required. Modules are available in 16 point input or output with screw terminals mounted on the module, higher densities of 32 and 64 point require a connector, cable and terminal block.

Digital input modules

| Specifications | LX40C6 | LX10 | LX41C4 | LX28 | LX42C4 |
|--------------------------|-----------------|------------------------|---------|------------------------|---------|
| Number of input points | 16 | 16 | 32 | 8 | 64 |
| Rated input voltage | 24 V DC | 100–120 V AC, 50/60 Hz | 24 V DC | 100–240 V AC, 50/60 Hz | 24 V DC |
| Order information | Art. no. 238085 | 255566 | 238086 | 255567 | 238087 |

Digital output modules

| Specifications | LY10R2 | LY18R2A | LY28S1A | LY20S6 |
|--------------------------|-----------------|---------|---------|--------|
| Number of output points | 16 | 8 | 8 | 16 |
| Output type | Relay | Relay | Triac | Triac |
| Order information | Art. no. 238088 | 279074 | 279075 | 255568 |

| Specifications | LY40NTSP | LY41NT1P | LY42NT1P | LY40PT5P | LY41PT1P | LY42PT1P |
|--------------------------|------------------------|------------------------|------------------------|--------------------------|--------------------------|--------------------------|
| Number of output points | 16 | 32 | 64 | 16 | 32 | 64 |
| Output type | Transistor (sink type) | Transistor (sink type) | Transistor (sink type) | Transistor (source type) | Transistor (source type) | Transistor (source type) |
| Order information | Art. no. 242167 | 238089 | 238090 | 242168 | 242169 | 242170 |

Analog I/O modules

The analog input module converts analog process signals, for example pressure, flow or fill level, linearly into digital values, which are further processed by the MELSEC L series CPU. The analog output module converts digital values predetermined by the CPU into analog current or voltage signal.

Analog input modules

| Specifications | L60AD4 | L60AD4-2GH | L60ADVL8 | L60ADIL8 |
|--------------------------|--|------------------------------|------------------------------|----------------------------|
| Input points | 4 | 4 | 8 | 8 |
| Digital output | -20480–20479 (-32768–32767)* | -32000–32000 (-32768–32767)* | -16384–16383 (-32768–32767)* | -8192–8191 (-32768–32767)* |
| Max. resolution | voltage input 200 µV current input 800 nA | 125 µV 500 nA | 500 µV | — 2000 nA |
| Overall accuracy | ±0.1 % | ±0.05 % | ±0.2 % | ±0.2 % |
| Conversion speed | 20 µs/channel | 40 µs/2 channels | 1 ms/channel | 1 ms/channel |
| Order information | Art. no. 238091 | 263071 | 279071 | 279065 |

Analog output modules

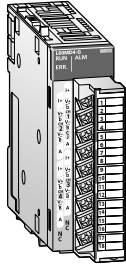
| Specifications | L60DA4 | L60DAVL8 | L60DAIL8 |
|--------------------------|--|--|--|
| Output points | 4 | 8 | 8 |
| Digital input | -20480–20479 (-32768–32767)* | -16384–16383 (-32768–32767)* | -8192–8191 (-32768–32767)* |
| Max. resolution | voltage input 200 µV current input 700 nA | 320 | — 707 |
| Overall accuracy | ±0.3 % (0–55 °C), ±0.1 % (20–30 °C) | ±0.5 % (0–55 °C), ±0.3 % (20–30 °C) | ±1.0 % (0–55 °C), ±0.3 % (20–30 °C) |
| Conversion speed | 20 µs/channel | 200 µs/channel | 200 µs/channel |
| Order information | Art. no. 238092 | 304494 | 304545 |

* Value in brackets when using the scaling function

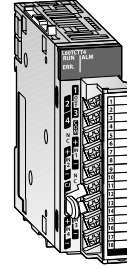
MELSEC L series



L60AD2DA2
Combined analog input/output module



L60MD4-G
Multiple input module



L60TCTT4
Temperature control module

Combined analog input/output module

An analog I/O module has two sets of A/D conversion channels and D/A conversion channels.

| Specifications | L60AD2DA2 |
|-------------------|--|
| Input channels | 2 |
| Analog input | voltage V -10–10 current mA 0–20 |
| Accuracy | ±0.3 % (0–55 °C), ±0.2 % (20–30 °C) |
| Output channels | 2 |
| Analog output | voltage V -10–10 current mA DC 0–20 |
| Accuracy | ±0.4 % (0–55 °C), ±0.2 % (20–30 °C) |
| Order information | Art. no. 269673 |

Multiple input module

The multiple input module L60MD4-G can measure voltages, currents and temperatures. An input type can be selected for each channel independently.

| Specifications | L60MD4-G |
|-------------------|---|
| Input points | 4 |
| Input range | voltage -10–10 V DC |
| | current 0–20 mA DC |
| | microvoltage -100–100 mV DC |
| | thermocouple K, J, T, E, N, R, S, B, U, L, PLII, W5Re/W26Re |
| | resistance thermometer Pt1000, Pt100, JPt100, Pt50 |
| Conversion time | 50 ms/channel |
| Order information | Art. no. 279072 |

Temperature input module

The RTD input module converts temperature data input by a corresponding RTD (nine types: Pt100, JPt100, Pt1000, Pt50, Ni100, Ni120, Ni500, Cu100, or Cu50) to a temperature measured value and digital operation value.

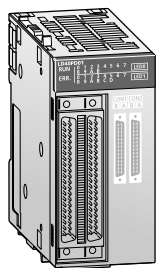
| Specifications | L60RD8 |
|-------------------|---|
| Input channels | 8 |
| Applicable RTD | Pt100, JPt100, Pt1000, Pt50, Ni100, Ni120, Ni500, Cu100 or Cu50 |
| Conversion speed | 40 ms/channel |
| Order information | Art. no. 289962 |

Temperature control modules

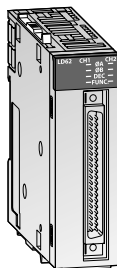
These modules apply the independent control of temperatures. This relieves the CPU of the PLC.

| Specifications | L60TCTT4 | L60TCRT4 | L60TCTT4BW * | L60TCRT4BW * |
|-------------------------------|-----------------------|------------------------------|-----------------------|------------------------------|
| Inputs | 4 channels per module | 4 channels per module | 4 channels per module | 4 channels per module |
| Supported temperature sensors | Thermocouple | Pt100 resistance thermometer | Thermocouple | Pt100 resistance thermometer |
| Order information | Art. no. 246347 | 246348 | 246349 | 246350 |

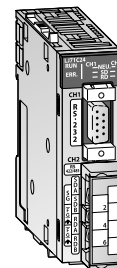
* Heating current monitoring to detect a defective or disconnected heater.



LD40PD01
Flexible high-speed I/O control module



LD62
High-speed counter module



LJ71C24
Interface module

Flexible high-speed I/O control module

Equipped with FPGA for high-speed I/O control

For the flexible high-speed I/O control module, users can easily create a high-speed, complicated hardware logic independent from the CPU module by graphically combining input/outputs, logical operation circuits, and counters with the configuration tool.

| Specifications | LD40PD01 | |
|--------------------------|------------------------------------|--------------|
| | DC | Differential |
| Number of input points | 12 points (5/24 V DC/differential) | |
| Number of output points | 8 points (5–24 V DC, 0.1 A/point) | 6 points |
| Number of interrupts | 8 interrupts | |
| Order information | Art. no. | 296588 |

IO-Link module

IO-Link is an extension of conventional digital inputs and outputs and allows the connection of intelligent sensors and actuators to a PLC.

| Specifications | ME1IOL6-L |
|--------------------------|--|
| No. of channels | 6 |
| Channel configuration | IO-Link, digital output, digital input, disabled |
| Order information | Art. no. 245825 |

High-speed counter modules

The counter modules detect high-frequency signals, which cannot be handled by normal input modules.

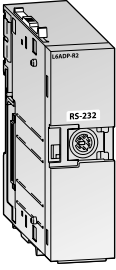
| Specifications | LD62 | LD62D |
|-----------------------------|--|---|
| Counter inputs (channels) | 2 | 2 |
| Count input signal phase | 1-phase input (multiple of 1/2), CW/CCW, 2-phase input (multiple of 1/2/4) | |
| Count input signal level | 5/12/24 V DC (2–5 mA) | EIA standard RS422A differential type line driver |
| Max. counting frequency kHz | 200 | 500 |
| Order information | Art. no. 238097 | 238098 |

Interface modules

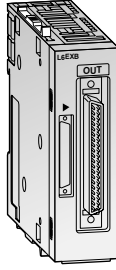
These modules enable communication with peripheral devices via a standard serial interface.

| Specifications | LJ71C24 | LJ71C24-R2 |
|--------------------------|---|--|
| Interface type | channel 1 RS232-compliance (D-sub 9P female) channel 2 RS422/485-compliance (2-piece terminal block) | RS232-compliance (D-sub 9P female) RS232-compliance (D-sub 9P female) |
| Order information | Art. no. 238093 | 238094 |

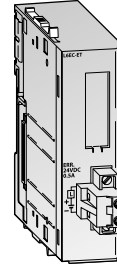
MELSEC L series



L6ADP-R2
Serial communications adapter



L6EXB
Branch module



L6EC-ET
End cover

Serial communications adapters

The L6ADP-R2 provides a RS232 and the L6ADP-R4 a RS422/485 interface for serial communication with the L series PLC.

| Specifications | L6ADP-R2 | L6ADP-R4 |
|--------------------------|--|---------------------------------------|
| Application | Serial connection, e.g. GT10 terminals | Serial connection, e.g. GOT terminals |
| Order information | Art. no. 238059 | 273657 |

Branch/extension module

Extension for MELSEC L series PLC

With a L6EXB branch module, which is connected to the CPU, and with up to two (L02CPU, L02CP-P) or up to three extension modules (L26CPU-BT, L26CPUPBT), a PLC can be extended to max. 30/40 modules.

| Specifications | L6EXB (branch module) | L6EXE (extension module) |
|---------------------------------------|-----------------------|--------------------------|
| Internal power consumption (5 V DC) A | 0.08 | 0.08 |
| Order information | Art. no. 247227 | 247226 |

End cover

This end cover can be used instead of the standard end cover which comes with the CPU in the basic equipment.

The L6EC-ET end cover has a single relay output for error notification.

| Specifications | L6EC-ET | L6EC |
|--------------------------|-------------------------------------|--------------------|
| Application | Error notification via relay output | Standard end cover |
| Output | Screw terminal | — |
| Order information | Art. no. 238062 | 249151 |

Note: L series CPU modules are supplied with a standard end cover L6EC.



Compact PLCs

FX family

Micro PLCs have opened up the world of opportunities in Industrial Automation due to their small size and low cost. Now many applications that were never previously considered can benefit – from barriers to security systems and a host of others. The FX family is the world's best selling cost-effective 'brick' type PLCs, consisting of eight independent but compatible product ranges.

Depending on your application and control needs, you can choose from the small, attractively priced, "stand-alone" FX3S series or the more powerful FX3G, FX3GC, FX3GE, FX3U, FX3UC, FX5U and FX5UC series.

The MELSEC iQ-F includes the FX5U and the FX5UC series. Designed on the concepts of outstanding performance, superior drive control and user centric programming, the iQ-F reaches to new areas of application with a high-speed system bus (approx. 150-times faster than

FX3U), extensive built-in functions and network support (built-in Ethernet and RS485 interface, build in analog inputs/output).

All FX series PLCs can be expanded to adapt them to the changing needs of your installations and applications.

Network integration is also supported, making it possible for your FX controllers to communicate with other PLCs, controllers and HMIs.

Equipment features

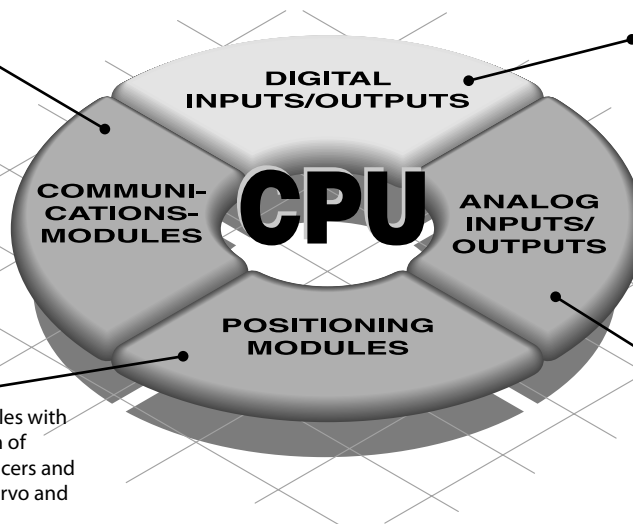
Communications modules

Interface modules with RS232/RS422/RS485 or USB for the connection of peripherals and PLC-PLC links.

Network modules for Ethernet, Profibus DP, CC-Link, DeviceNet™, CANopen, Ethernet, Modbus®/RTU/ASCII and for the configuration of proprietary Mitsubishi Electric networks.

Positioning modules

High-speed counter modules with support for the connection of incremental rotary transducers and positioning modules for servo and stepping motor drives.



Digital input/output modules

For a variety of signal levels with relay or transistor switches.

Analog input/output modules

For processing current/voltage signals and temperature registration with a direct connection option for Pt100, Pt1000 and Ni1000 resistance thermometers and thermocouples.

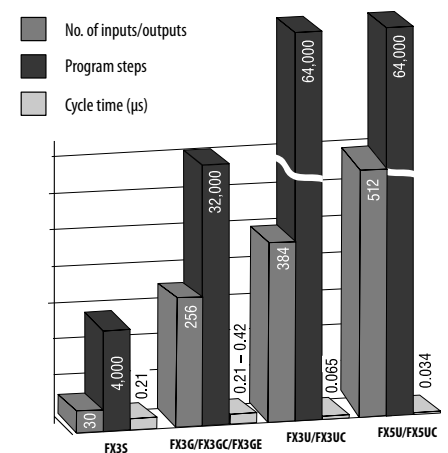
Expandability and power

The MELSEC FX family is highly flexible, enabling fast and efficient configuration and programming for the application at hand.

It is the ideal choice, no matter whether you need to install a simple control application requiring up to 30 I/Os (FX3S) or a demanding, complex system with up to 384 I/O points for FX3U/FX3UC and up to 512 I/O points for FX5U/FX5UC.

The capacity of the CPUs of the FX family can be expanded with memory cassettes.

The diagram highlights the capabilities of each FX PLC type.



Micro controllers ALPHA series

ALPHA fills the gap between traditional relays and timers and a PLC. Offering functionality, reliability and flexibility but without the worry of cost of overheads. ALPHA is the perfect maintenance product, and yet can adequately control a new process from the start.

The ALPHA can be expanded to provide a small increase in I/O, analogue output, temperature input or networking capability.

The ALPHA2 can process up to 200 function blocks in a single program, and every single function (timers, counters, analog signal processing, calendar, clock etc.) can be used as many times as you need in all your programs.

What components are required for an FX PLC system?

A basic FX PLC system can consist of a stand-alone base unit, with the functionality and I/O range increased by adding extension I/O and special function modules. The following section provides an overview of options available.

Base units

The FX3S, FX3G, FX3U and FX5U can be AC or DC powered, the FX3GC, FX3UC and the FX5UC are only DC powered, both with a mix of input and output styles. The PLCs can be programmed with the user friendly GX Works2 and GX Works3 (FX5 PLCs) programming software, allowing programs to be transferred between different FX PLCs. All PLC base units include an integrated real time clock.

Base units are available with different I/O configurations from 10 to 128 points but can be expanded to 512 points depending upon the FX range selected.

Extension boards

Except for the FX3GC, FX3UC and FX5UC series, extension adapter boards can be installed directly into the base unit and therefore do not require any additional installation space.

Programming is done directly via special commands and dedicated data register in the PLC.

For a small number of digital I/O (2 to 4) an extension adapter board can be installed directly into the FX3S, FX3G, FX3GE, FX3U or FX5U controller. Interface adapter boards can also provide the FX PLC with additional RS232, RS422, RS485 or USB interfaces.

Expansion adapters

The special Adapters, also called ADPs, add standard high-speed functions to a FX PLC. Mounted on the left side of a base unit, these units are extremely compact and easy to use.

The programming is similar to the expansion boards via special instructions and dedicated data registers in the PLC.

Available are various serial communication, analog, temperature input, positioning, high-speed counting and data logging ADPs. Compared to the BDs the ADPs offer more flexibility and performance. For the connection of ADP modules, a converter adapter is required for some base units.

Extension I/O modules

Unpowered and powered extension digital I/O modules can be added to the FX3G, FX3GC, FX3GE, FX3U, FX3UC, FX5U and FX5UC PLCs.

A wide range from 8 to 48 I/O points with different inputs and outputs are available. There is no limitation on the number of extension units or blocks, you can design the system to match application requirements, just make sure to check the system power supply and number of available I/O points.

Dedicated I/O blocks for the FX3GC and FX3UC are available as well.

Special function modules

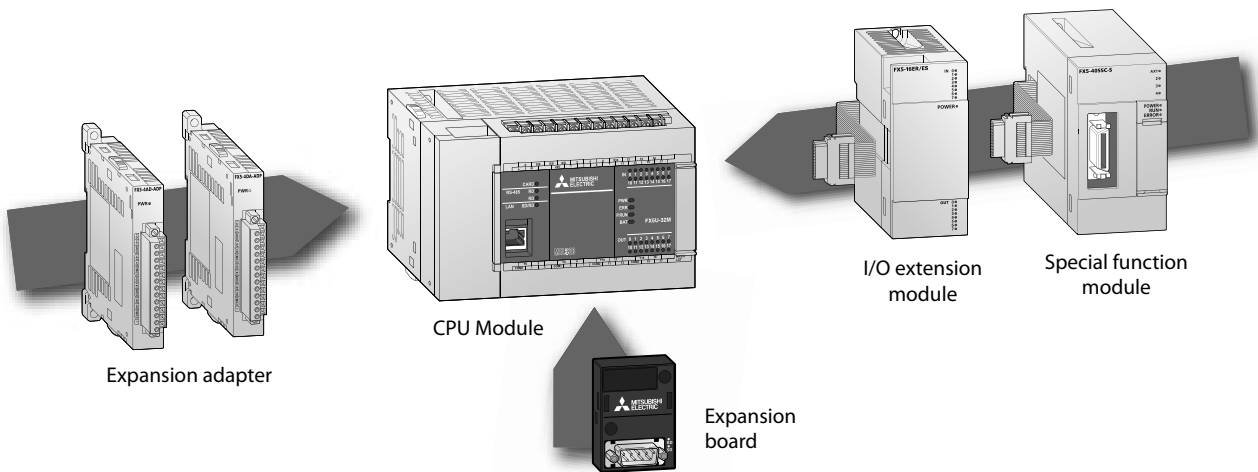
A wide variety of special function modules are available for the FX3G, FX3GC, FX3GE, FX3U, FX3UC, FX5U and FX5UC PLCs. They cover networking functionality, analog control, high speed input, pulse train outputs, data logging function, temperature inputs and Simple Motion modules.

Thanks to the standardized communication via memory integrated into the special function modules, programming is straightforward.

The integrated CPU performs PLC scan time independent operation perfectly fitted for networking or positioning tasks, thus reducing the load on the PLC base unit. Up to 8 different units can be connected to the base unit.

Memory extension and operator terminals

Each FX family base unit (except FX3GC/FX5U/FX5UC) can be equipped with a memory cassette. The programming unit interface enables the connection of programming tools like PC and hand held programming units as well as graphical operator terminals.



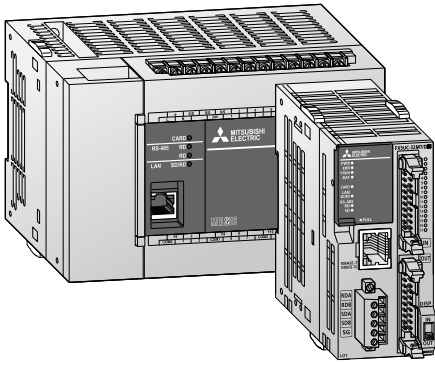
| Expansion possibilities | | ALPHA2 | FX3S | FX3G | FX3GC | FX3GE | FX3U | FX3UC | FX5U | FX5UC |
|--|--------------------|--------|------|------|-------|----------------|------|-------|----------------|----------------|
| Extensions for inside PLC installation | Digital | ● | — | — | — | — | — | — | — | — |
| | Analog | ● | — | — | — | — | — | — | — | — |
| Extension modules (installation outside the PLC) | Digital | — | — | ● | ● | ● | ● | ● | ● | ● |
| | Analog | — | ● | ● | ● | ● | ● | ● | ● | ● |
| | Temperature | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Network modules | Ethernet | — | ● | ● | ● | — ^① | ● | ● | ● | ● |
| | CC-Link | — | — | ● | ● | ● | ● | ● | ● | ● |
| | CANopen | — | — | ● | ● | ● | ● | ● | — | — |
| | Profibus DP | — | — | ● | ● | ● | ● | ● | — | — |
| | DeviceNet | — | — | ● | ● | ● | ● | ● | — | — |
| | Modbus® RTU/ASCII | — | — | ● | ● | ● | ● | ● | ● | ● |
| | SSCNET III | — | — | — | — | — | ● | ● | ● | ● |
| | SAE J1939 | — | — | ● | ● | ● | ● | ● | — | — |
| | Expansion boards | RS232 | ● | ● | ● | — | ● | ● | — | ● |
| RS422 | | — | ● | ● | — | ● | ● | — | ● | — |
| RS485 | | — | ● | ● | — | ● | ● | — | ● | — |
| USB | | — | — | — | — | — | ● | — | — | — |
| RS232 | | — | ● | ● | ● | ● | ● | ● | ● | ● |
| Communications modules | RS485 | — | ● | ● | ● | ● | ● | ● | ● | ● |
| | High speed counter | — | — | — | — | — | ● | ● | — | — |
| Dedicated function modules | Positioning | — | — | — | — | — | ● | ● | — | — |
| | Memory cassettes | ● | ● | ● | — | ● | ● | ● | — ^② | — ^② |
| External display | — | — | ● | — | ● | ● | — | — | — | |

① Base unit has built-in Ethernet interface

② No memory cassettes are used for FX5. SD card is available.

MELSEC iQ-F

FX5U/FX5UC series



The FX5U/FX5UC series CPU modules feature outstanding performance and superior drive control.

- High-speed system bus
- Built-in Ethernet port
- Built-in analog inputs/output (FX5U only)
- Built-in positioning (200 kpps, 4-axis)
- Built-in RS485 port (with Modbus® function)
- Built-in SD card slot
- Advanced security functions
- Battery-less and maintenance free
- Connection of FX5 and various FX3 expansion modules possible
- Connection of connector type FX5 I/O modules possible

FX5U base units with 32–80 I/Os

| Specifications | FX5U-32MR/DS | FX5U-32MT/DSS | FX5U-32MR/ES | FX5U-32MT/ESS |
|---------------------------|-----------------|---------------------------|--------------|---------------------------|
| Integrated inputs/outputs | 32 | 32 | 32 | 32 |
| Power supply | 24 V DC | 24 V DC | 100–240 V AC | 100–240 V AC |
| Integrated inputs | 16 | 16 | 16 | 16 |
| Integrated outputs | 16 | 16 | 16 | 16 |
| Output type | Relay | Transistor (source type)* | Relay | Transistor (source type)* |
| Order information | Art. no. 297436 | 297438 | 280489 | 280491 |

| Specifications | FX5U-64MR/DS | FX5U-64MT/DSS | FX5U-64MR/ES | FX5U-64MT/ESS |
|---------------------------|-----------------|---------------------------|--------------|---------------------------|
| Integrated inputs/outputs | 64 | 64 | 64 | 64 |
| Power supply | 24 V DC | 24 V DC | 100–240 V AC | 100–240 V AC |
| Integrated inputs | 32 | 32 | 32 | 32 |
| Integrated outputs | 32 | 32 | 32 | 32 |
| Output type | Relay | Transistor (source type)* | Relay | Transistor (source type)* |
| Order information | Art. no. 301923 | 301945 | 280492 | 280494 |

| Specifications | FX5U-80MR/DS | FX5U-80MT/DSS | FX5U-80MR/ES | FX5U-80MT/ESS |
|---------------------------|-----------------|---------------------------|--------------|---------------------------|
| Integrated inputs/outputs | 80 | 80 | 80 | 80 |
| Power supply | 24 V DC | 24 V DC | 100–240 V AC | 100–240 V AC |
| Integrated inputs | 40 | 40 | 40 | 40 |
| Integrated outputs | 40 | 40 | 40 | 40 |
| Output type | Relay | Transistor (source type)* | Relay | Transistor (source type)* |
| Order information | Art. no. 301946 | 301948 | 280495 | 280497 |

* Sink type transistor output units on request.

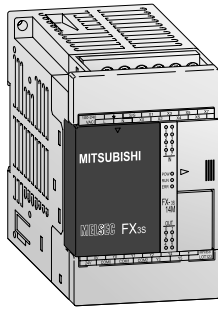
FX5UC base units with 32–96 I/Os

| Specifications | FX5UC-32MT/DSS | FX5UC-32MT/DSS-TS | FX5UC-64MT/DSS | FX5UC-96MT/DSS |
|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Integrated inputs/outputs | 32 | 32 | 64 | 96 |
| Power supply | 24 V DC | 24 V DC | 24 V DC | 24 V DC |
| Integrated inputs | 16 | 16 | 32 | 48 |
| Integrated outputs | 16 | 16 | 32 | 48 |
| Output type | Transistor (source type)* | Transistor (source type)* | Transistor (source type)* | Transistor (source type)* |
| Order information | Art. no. 283530 | 315551 | 294579 | 294581 |

* Sink type transistor output units on request.

MELSEC-F

FX3S series



The FX3S series base units are available with 10 to 30 input/output points.

It is possible to choose between relay and transistor output type.

- Integrated power supply (AC or DC powered)
- Maintenance-free EEPROM memory
- Ample memory capacity (4000 steps) and device ranges
- High-speed operations
- Incorporated positioning control
- Integrated real-time clock

- FX3S-30MT/ESS-2AD and FX3S-30MR/ES-2AD with two integrated analog inputs (0–10 V DC)
- System upgrades by exchangeable interface and I/O adapter boards for direct fitting into the base unit
- LEDs for indicating the input and output status
- Standard programming unit interface
- User-friendly programming systems, including IEC 61131-3 (EN 61131-3)-compatible programming software, HMIs and hand-held programming units

Base units with 10–14 I/Os

| Specifications | FX3S-10 MR/ES | FX3S-10 MR/DS | FX3S-10 MT/ESS | FX3S-10 MT/DSS | FX3S-14 MR/ES | FX3S-14 MR/DS | FX3S-14 MT/ESS | FX3S-14 MT/DSS |
|---------------------------|-----------------|---------------|----------------------|----------------------|---------------|---------------|----------------------|----------------------|
| Integrated inputs/outputs | 10 | 10 | 10 | 10 | 14 | 14 | 14 | 14 |
| Power supply | 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 |
| Integrated inputs | 6 | 6 | 6 | 6 | 8 | 8 | 8 | 8 |
| Integrated outputs | 4 | 4 | 4 | 4 | 6 | 6 | 6 | 6 |
| Output type | Relay | Relay | Transistor (source)* | Transistor (source)* | Relay | Relay | Transistor (source)* | Transistor (source)* |
| Order information | Art. no. 267110 | 271687 | 267112 | 271695 | 267113 | 271688 | 267125 | 271696 |

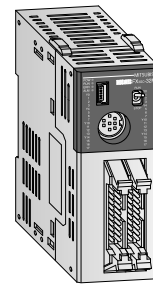
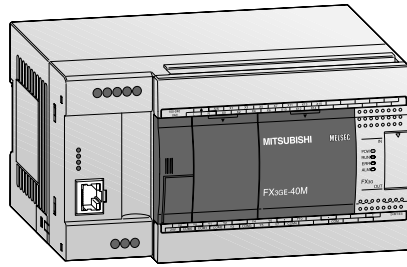
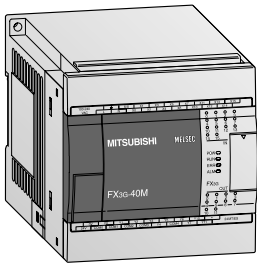
Base units with 20–30 I/Os

| Specifications | FX3S-20 MR/ES | FX3S-20 MR/DS | FX3S-20 MT/ESS | FX3S-20 MT/DSS | FX3S-30 MR/ES | FX3S-30 MR/DS | FX3S-30 MR/ES-2AD | FX3S-30 MT/ESS | FX3S-30 MT/ESS-2AD | FX3S-30 MT/DSS |
|---------------------------|-----------------|---------------|----------------------|----------------------|---------------|---------------|-------------------|----------------------|----------------------|----------------------|
| Integrated inputs/outputs | 20 | 20 | 20 | 20 | 30 | 30 | 30 | 30 | 30 | 30 |
| Power supply | 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 | 100–240 V AC | 100–240 V AC | 24 V DC |
| Integrated inputs | 12 | 12 | 12 | 12 | 16 | 16 | 16 | 16 | 16 | 16 |
| Integrated outputs | 8 | 8 | 8 | 8 | 14 | 14 | 14 | 14 | 14 | 14 |
| Output type | Relay | Relay | Transistor (source)* | Transistor (source)* | Relay | Relais | Relais | Transistor (source)* | Transistor (source)* | Transistor (source)* |
| Order information | Art. no. 267126 | 271689 | 267128 | 271697 | 267129 | 271690 | 271654 | 267131 | 271686 | 271698 |

* Sink type transistor output units on request.

Compact PLCs

FX3G/FX3GE/FX3GC series



The FX3G/FX3GE/FX3GC series base units are available in different versions and feature the following functions:

- Integrated USB interface for communication between PLCs and PC
- Integrated serial interface for communication between PCs and HMI
- LEDs for indicating the input and output status
- Detachable terminal blocks for all units
- Slot for memory cassettes*

- Integrated real-time clock
- Integrated positioning control
- Exchangeable interface and extension adapters for direct mounting into a base unit*
- Expandable with digital I/O modules, special function modules and ADP modules
- User-friendly programming systems, including IEC 61131-3 (EN 61131-3) compatible programming software, HMIs and hand-held programming units

* (only FX3G and FX3GE)

Special features of the FX3GE series:

- Integrated analog input (2ch)
- Integrated analog output (1ch)
- Integrated Ethernet interface

Special features of the FX3GC series:

- Connection of inputs and outputs via connectors.

FX3G base units with 14–60 I/Os

| Specifications | FX3G-14 MR/ES | FX3G-14 MT/ESS | FX3G-14 MR/DS | FX3G-14 MT/DSS | FX3G-24 MR/ES | FX3G-24 MT/ESS | FX3G-24 MR/DS | FX3G-24 MT/DSS |
|---------------------------|-----------------|---------------------------|---------------|---------------------------|---------------|---------------------------|---------------|---------------------------|
| Integrated inputs/outputs | 14 | 14 | 14 | 14 | 24 | 24 | 24 | 24 |
| Power supply | 100–240 V AC | 100–240 V AC | 24 V DC | 24 V DC | 100–240 V AC | 100–240 V AC | 24 V DC | 24 V DC |
| Integrated inputs | 8 | 8 | 8 | 8 | 14 | 14 | 14 | 14 |
| Integrated outputs | 6 | 6 | 6 | 6 | 10 | 10 | 10 | 10 |
| Output type | Relay | Transistor (source type)* | Relay | Transistor (source type)* | Relay | Transistor (source type)* | Relay | Transistor (source type)* |
| Order information | Art. no. 231466 | 231470 | 231474 | 231478 | 231467 | 231471 | 231475 | 231479 |

| Specifications | FX3G-40 MR/ES | FX3G-40 MT/ESS | FX3G-40 MR/DS | FX3G-40 MT/DSS | FX3G-60 MR/ES | FX3G-60 MT/ESS | FX3G-60 MR/DS | FX3G-60 MT/DSS |
|---------------------------|-----------------|---------------------------|---------------|---------------------------|---------------|---------------------------|---------------|---------------------------|
| Integrated inputs/outputs | 40 | 40 | 40 | 40 | 60 | 60 | 60 | 60 |
| Power supply | 100–240 V AC | 100–240 V AC | 24 V DC | 24 V DC | 100–240 V AC | 100–240 V AC | 24 V DC | 24 V DC |
| Integrated inputs | 24 | 24 | 24 | 24 | 36 | 36 | 36 | 36 |
| Integrated outputs | 16 | 16 | 16 | 16 | 24 | 24 | 24 | 24 |
| Output type | Relay | Transistor (source type)* | Relay | Transistor (source type)* | Relay | Transistor (source type)* | Relay | Transistor (source type)* |
| Order information | Art. no. 231468 | 231472 | 231476 | 231480 | 231469 | 231473 | 231477 | 231481 |

FX3GE base units with 24/40 I/Os

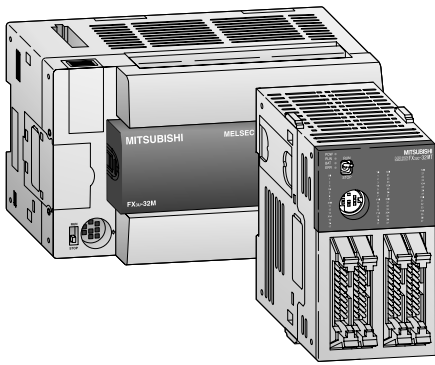
| Specifications | FX3GE-24 MR/ES | FX3GE-24 MT/ESS | FX3GE-24 MR/DS | FX3GE-24 MT/DSS | FX3GE-40 MR/ES | FX3GE-40 MT/ESS | FX3GE-40 MR/DS | FX3GE-40 MT/DSS |
|---------------------------|-----------------|---------------------------|----------------|---------------------------|----------------|---------------------------|----------------|---------------------------|
| Integrated inputs/outputs | 24 | 24 | 24 | 24 | 40 | 40 | 40 | 40 |
| Power supply | 100–240 V AC | 100–240 V AC | 24 V DC | 24 V DC | 100–240 V AC | 100–240 V AC | 24 V DC | 24 V DC |
| Integrated inputs | 14 | 14 | 14 | 14 | 24 | 24 | 24 | 24 |
| Integrated outputs | 10 | 10 | 10 | 10 | 16 | 16 | 16 | 16 |
| Output type | Relay | Transistor (source type)* | Relay | Transistor (source type)* | Relay | Transistor (source type)* | Relay | Transistor (source type)* |
| Order information | Art. no. 264869 | 269884 | 269917 | 269919 | 264870 | 269916 | 269920 | 269922 |

* Units with sink type transistor outputs on request.

FX3GC base units with 32 I/Os

| Specifications | FX3GC-32 MT/D | FX3GC-32 MT/DSS |
|---------------------------|------------------------|--------------------------|
| Integrated inputs/outputs | 32 | 32 |
| Power supply | 24 V DC | 24 V DC |
| Integrated inputs | 16 | 16 |
| Integrated outputs | 16 | 16 |
| Output type | Transistor (sink type) | Transistor (source type) |
| Order information | Art. no. 251545 | 251546 |

FX3U/FX3UC series



The FX3U/FX3UC series base units are available in different versions and feature the following functions:

- Integrated serial interface for communication between PCs and HMI
- Integrated positioning control
- Exchangeable interface modules for direct mounting into a base unit
- LEDs for indicating the input and output status
- Slot for memory cassettes (only FX3U)
- Integrated real-time clock

- Expandable with digital I/O modules, special function modules and ADP modules
- User-friendly programming systems, including IEC 61131-3 (EN 61131-3) compatible programming software, HMIs and hand-held programming units

Special features of the FX3UC series:

- Very compact dimensions
- Adapter modules and system cabling sets available for units with ribbon cable connectors

FX3U base units with 16–128 I/Os

| Specifications | FX3U-16 MR/ES | FX3U-32 MR/ES | FX3U-48 MR/ES | FX3U-64 MR/ES | FX3U-80 MR/ES | FX3U-128 MR/ES |
|---------------------------|-----------------|---------------|---------------|---------------|---------------|----------------|
| Integrated inputs/outputs | 16 | 32 | 48 | 64 | 80 | 128 |
| Power supply | 100–240 V AC | 100–240 V AC | 100–240 V AC | 100–240 V AC | 100–240 V AC | 100–240 V AC |
| Integrated inputs | 8 | 16 | 24 | 32 | 40 | 64 |
| Integrated outputs | 8 | 16 | 24 | 32 | 40 | 64 |
| Output type | Relay | Relay | Relay | Relay | Relay | Relay |
| Order information | Art. no. 231486 | 231487 | 231488 | 231489 | 231490 | 231491 |

| Specifications | FX3U-16 MT/ESS | FX3U-32 MT/ESS | FX3U-48 MT/ESS | FX3U-64 MT/ESS | FX3U-80 MT/ESS | FX3U-128 MT/ESS |
|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Integrated inputs/outputs | 16 | 32 | 48 | 64 | 80 | 128 |
| Power supply | 100–240 V AC | 100–240 V AC | 100–240 V AC | 100–240 V AC | 100–240 V AC | 100–240 V AC |
| Integrated inputs | 8 | 16 | 24 | 32 | 40 | 64 |
| Integrated outputs | 8 | 16 | 24 | 32 | 40 | 64 |
| Output type | Transistor (source type)* | Transistor (source type)* | Transistor (source type)* | Transistor (source type)* | Transistor (source type)* | Transistor (source type)* |
| Order information | Art. no. 231492 | 231493 | 231494 | 231495 | 231496 | 231497 |

| Specifications | FX3U-16 MR/DS | FX3U-32 MR/DS | FX3U-48 MR/DS | FX3U-64 MR/DS | FX3U-80 MR/DS |
|---------------------------|-----------------|---------------|---------------|---------------|---------------|
| Integrated inputs/outputs | 16 | 32 | 48 | 64 | 80 |
| Power supply | 24 V DC | 24 V DC | 24 V DC | 24 V DC | 24 V DC |
| Integrated inputs | 8 | 16 | 24 | 32 | 40 |
| Integrated outputs | 8 | 16 | 24 | 32 | 40 |
| Output type | Relay | Relay | Relay | Relay | Relay |
| Order information | Art. no. 231498 | 231499 | 231500 | 231501 | 231502 |

| Specifications | FX3U-16 MT/DSS | FX3U-32 MT/DSS | FX3U-48 MT/DSS | FX3U-64 MT/DSS | FX3U-80 MT/DSS |
|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Integrated inputs/outputs | 16 | 32 | 48 | 64 | 80 |
| Power supply | 24 V DC | 24 V DC | 24 V DC | 24 V DC | 24 V DC |
| Integrated inputs | 8 | 16 | 24 | 32 | 40 |
| Integrated outputs | 8 | 16 | 24 | 32 | 40 |
| Output type | Transistor (source type)* | Transistor (source type)* | Transistor (source type)* | Transistor (source type)* | Transistor (source type)* |
| Order information | Art. no. 231503 | 231504 | 231505 | 231506 | 231507 |

* Units with sink type transistor outputs on request.

FX3UC base units with 16–96 I/Os

| Specifications | FX3UC-16 MT/DSS | FX3UC-32 MT/DSS | FX3UC-64 MT/DSS | FX3UC-96 MT/DSS |
|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Integrated inputs/outputs | 16 | 32 | 64 | 96 |
| Power supply | 24 V DC (+20 %, -15 %) | 24 V DC (+20 %, -15 %) | 24 V DC (+20 %, -15 %) | 24 V DC (+20 %, -15 %) |
| Integrated inputs | 8 | 16 | 32 | 48 |
| Integrated outputs | 8 | 16 | 32 | 48 |
| Output type | Transistor (source type)* | Transistor (source type)* | Transistor (source type)* | Transistor (source type)* |
| Order information | Art. no. 231508 | 231509 | 231510 | 231511 |

* Units with sink type transistor outputs on request.

Compact PLCs

Expandability and functionality

Additional special function and expansion modules are available that make it possible to extend the capacity of the PLC system. There are three basic categories of modules:

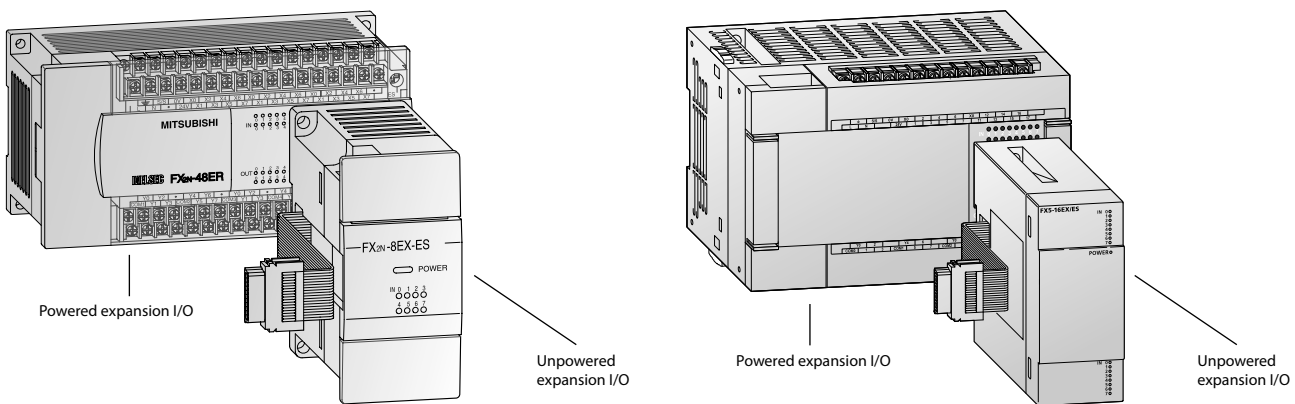
- Modules that occupy digital I/Os (connected on the right hand side of the base unit). These are the digital unpowered and powered extension units, as well as the special function modules.
- Communication and adapter modules that are connected to the left hand side of the base unit, for example FX3U-4AD-ADP and FX2NC-485ADP.

- Internal adapter boards for the FX3S, FX3G, FX3GE, FX3U and the FX5U series. These expansion units are installed directly in the base unit and do not occupy any digital I/O.

Note: To connect special function modules or extension units of the FX0N/FX2N/FX3U series to an FX3UC series base unit, an adapter FX2NC-CNV-IF or the power supply FX3UC-1PS-5V is required.

When connecting a special function module of the FX3U series to a FX5U/FX5UC base unit the communications adapter FX5U-CNV-BUS resp. FX5U-CNV-BUSC is required.

Expansion modules for the FX3/FX5 series



Various unpowered and powered extension units (FX3UC/FX5UC unpowered only) are available for extending the base units.

The unpowered units contain 16 or 32 digital inputs/outputs max. and do not need a separate power supply, since they are powered via the system bus.

The powered extension units contain a larger number of inputs/outputs and an integrated power supply unit, to power the system bus and the digital inputs.

Expansion modules for the FX3 series

| Specifications | POWERED | | | | | |
|--------------------------------------|---------------------------------------|-------------------------------------|------------------|---------------------|-------------------------------------|-------------------------------------|
| | FX2N-32 ER-ES/UL | FX2N-32 ET-ESS/UL | FX2N-48 ER-DS | FX2N-48 ER-ES/UL | FX2N-48 ET-DSS | FX2N-48 ET-ESS/UL |
| Integrated inputs/outputs | 32 | 32 | 48 | 48 | 48 | 48 |
| Application | FX3G and FX3U/FX3UC series base units | | | | | |
| Power supply AC range (+10 %, -15 %) | 100–240 V | 100–240 V | — | 100–240 V | — | 100–240 V |
| Integrated inputs | 16 | 16 | 24 | 24 | 24 | 24 |
| Integrated outputs | 16 | 16 | 24 | 24 | 24 | 24 |
| Output type | Relay | Transistor (source) ^① | Relay | Relay | Transistor (source) ^① | Transistor (source) ^① |
| Order information | Art. no. 65568 | 65569 | 66633 | 65571 | 66634 | 65572 |

| Specifications | UNPOWERED | | | | | | | | | | | | |
|---------------------------|---|--------------------|---------------------|-------------------------------------|---------------------|----------------------|-------------------------------------|-------------------------------|----------------------|-------------------|-------------------------------------|-------------------|-------------------------------------|
| | FX2N-8 ER-ES/UL | FX2N-8 EX-ES/UL | FX2N-8 EYR-ES/UL | FX2N-8 EYT-ESS/UL | FX2N-16 EX-ES/UL | FX2N-16 EYR-ES/UL | FX2N-16 EYT-ESS/UL | FX2NC-16 EX-T-DS | FX2NC-16 EYR-T-DS | FX2NC-16 EX-DS | FX2NC-16 EYT-DSS | FX2NC-32 EX-DS | FX2NC-32 EYT-DSS |
| Integrated inputs/outputs | 8 | 8 | 8 | 8 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 32 | 32 |
| Application | FX3G/FX3GC/FX3GE and FX3U/FX3UC series base units | | | | | | | FX3GC/FX3UC series base units | | | | | |
| Power supply | All modular extension blocks are supplied by the base unit. | | | | | | | | | | | | |
| Integrated inputs | 4 | 8 | — | — | 16 | — | — | 16 | — | 16 | — | 32 | — |
| Integrated outputs | 4 | — | 8 | 8 | — | 16 | 16 | — | 16 | — | 16 | — | 32 |
| Output type | Relay | — | Relay | Transistor (source) ^① | — | Relay | Transistor (source) ^① | — | Relay | — | Transistor (source) ^① | — | Transistor (source) ^① |
| Order information | Art. no. 166285 | 166284 | 166286 | 166287 | 65776 | 65580 | 65581 | 128152 | 128153 | 104503 | 104504 | 104505 | 104506 |

^① Sink type transistor output units on request.

Expansion modules for the FX5 series

| Specifications | POWERED | | | | | |
|--------------------------------------|------------------------|-------------------------------------|-----------------|-------------------------------------|-----------------|-------------------------------------|
| | FX5-16 ER/ES | FX5-16 ET/ESS | FX5-32 ER/DS | FX5-32 ET/DSS | FX5-32 ER/ES | FX5-32 ET/ESS |
| Integrated inputs/outputs | 16 | 16 | 32 | 32 | 32 | 32 |
| Application | FX5U/FX5UC CPU modules | | | | | |
| Power supply AC range (+10 %, -15 %) | — | — | — | — | 100–240 V | 100–240 V |
| Integrated inputs | 8 | 8 | 16 | 16 | 16 | 16 |
| Integrated outputs | 8 | 8 | 16 | 16 | 16 | 16 |
| Output type | Relay | Transistor (source) ^① | Relay | Transistor (source) ^① | Relay | Transistor (source) ^① |
| Order information | Art. no. 304652 | 304654 | 297439 | 297441 | 280506 | 280508 |

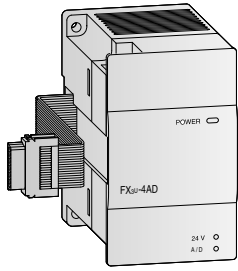
| Specifications | UNPOWERED | | | | | | |
|--------------------------------------|---|-----------------|-------------------------------------|-----------------|------------------|-------------------------------------|-------------------------------------|
| | FX5-8 EX/ES | FX5-8 EYR/ES | FX5-8 EYT/ESS | FX5-16 EX/ES | FX5-16 EYR/ES | FX5-16 EYT/ESS | FX5-16 ET/ESS-H |
| Integrated inputs/outputs | 8 | 8 | 8 | 16 | 16 | 16 | 16 |
| Application | FX5U/FX5UC CPU modules | | | | | | |
| Power supply AC range (+10 %, -15 %) | All unpowered I/O modules are supplied by the CPU module. | | | | | | |
| Integrated inputs | 8 | — | — | 16 | — | — | 8 |
| Integrated outputs | — | 8 | 8 | — | 16 | 16 | 8 |
| Output type | — | Relay | Transistor (source) ^① | — | Relay | Transistor (source) ^① | Transistor (source) ^① |
| Order information | Art. no. 280498 | 280499 | 280501 | 280505 | 280502 | 280504 | 297443 |

^① Sink type transistor output units on request.

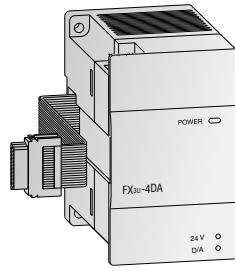
| Specifications | UNPOWERED | | | | | | | |
|--------------------------------------|---|-------------------------------------|------------------|---------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| | FX5-C16 EX/DS | FX5-C16 EYT/DSS | FX5-C32 EX/DS | FX5-C32 EX/DS-TS | FX5-C32 EYT/DSS | FX5-C32 EYT/DSS-TS | FX5-C32 ET/DSS | FX5-C32 ET/DSS-TS |
| Integrated inputs/outputs | 16 | 16 | 32 | 32 | 32 | 32 | 32 | 32 |
| Application | FX5U/FX5UC CPU modules | | | | | | | |
| Power supply AC range (+10 %, -15 %) | All unpowered I/O modules are supplied by the CPU module. | | | | | | | |
| Integrated inputs | 16 | — | 32 | 32 | — | — | 16 | 16 |
| Integrated outputs | — | 16 | — | — | 32 | 32 | 16 | 16 |
| Output type | — | Transistor (source) ^① | — | — | Transistor (source) ^① | Transistor (source) ^① | Transistor (source) ^① | Transistor (source) ^① |
| Order information | Art. no. 294583 | 294585 | 283532 | 315552 | 283556 | 315554 | 283534 | 315636 |

^① Sink type transistor output units on request.

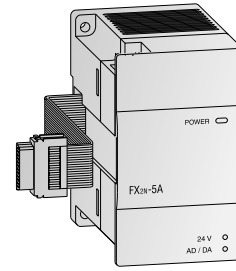
Compact PLCs



FX3U-4AD
Analog input module



FX3U-4DA
Analog output module



FX2N-5A
Combined analog
I/O module

Analog input modules

The analog input modules provide the user with two to eight analog inputs. The module converts analog process signals into digital values which are further processed by the base unit.

| Specifications | FX2N-2AD | FX3U-4AD | FX3UC-4AD | FX2N-8AD | FX5-4AD | FX5-8AD |
|----------------------------|---|--|---------------------------------------|---|----------------------------|--|
| Applicable for | Base units FX3G/FX3GC/ FX3GE/FX3U/ FX3UC | Base units FX3G/FX3GC/ FX3GE/ FX3U/FX3UC/ FX5U/FX5UC | Base units FX3GC/FX3UC | Base units FX3G/FX3GC/ FX3GE/FX3U/ FX3UC | Base units FX5U/FX5UC | Base units FX5U/FX5UC |
| Analog inputs | 2 | 4 | 4 | 8 | 4 | 8 |
| Analog input range | 0–10 V DC/ 0–5 V DC/ 0/4–20 mA | -10–10 V DC/ -20–20 mA/ 4–20 mA | -10–10 V DC/ -20–20 mA/ 4–20 mA | -10–10 V DC/ -20–20 mA/ 4–20 mA | -10–10 V DC/ -20–20 mA/ | -10–10 V DC/ -20–20 mA/ Temperature detector (K, J, T, B, R, S, Pt100, Ni100) ② |
| Resolution | voltage | 2.5 mV, 1.25 mV, 4 µA (12 bit) | 0.32 mV (15 bit + sign) | 0.32 mV (15 bit + sign) | 0.63 mV (14 bit + sign) | 0.3125 mV (16 bit + sign) |
| | current | | 1.25 µA (14 bit + sign) | 1.25 µA (14 bit + sign) | 2.5 µA (13 bit + sign) | 0.625 µA (16 bit + sign) |
| Fullscale overall accuracy | ±1 % | ±0.3–1 % ① | ±0.3–1 % ① | ±0.3–0.5 % ① | ±0.1–0.3 % ① | ±0.3–±0.5 % |
| Order information | Art. no. | 102869 | 169508 | 210090 | 129195 | 334430 |
| | | | | | 334430 | 312297 |

① Dependent on the ambient temperature

② Please refer to manuals for further details of specification of temperature detectors.

Notes: The FX2N-8AD can be configured to accept standard analog inputs as well as selected temperature inputs such as K, T or J type thermocouples.

To connect these modules to a FX3UC or FX3GC base unit, an adapter FX2N-CNV-IF or a power supply FX3UC-1PS-5V is required.

For the connection of a FX3U-4AD to a FX5U/FX5UC base unit, a bus conversion module FX5-CNV-BUSC resp. FX5-CNV-BUS is required.

Analog output modules

The analog output modules provide the user with two to four analog outputs. The modules convert digital values from a controller of the FX series to the analog signals required by the process.

| Specifications | FX2N-2DA | FX3U-4DA | FX5-4DA | |
|----------------------------|---|--|--------------------------|---------------------------|
| Applicable for | Base units FX3G/FX3GC/FX3GE/FX3U/FX3UC | Base units FX3G/FX3GC/FX3GE/ FX3U/FX3UC/FX5U/FX5UC | Base units FX5U/FX5UC | |
| Analog outputs | 2 | 4 | 4 | |
| Analog output range | 0–10 V DC/0–5 V DC/4–20 mA | -10–10 V DC/0–20 mA/4–20 mA | -10–10 V DC/0–20 mA | |
| Resolution | voltage | 2.5 mV (12 bit) | 0.32 mV (16 bit + sign) | 0.3125 mV (16 bit + sign) |
| | current | 4 µA (12 bit) | 0.63 µA (15 bit) | 0.625 µA (16 bit + sign) |
| Fullscale overall accuracy | ±1 % | ±0.3–0.5 % * | ±0.1–0.3 % * | |
| Order information | Art. no. | 102868 | 169509 | 325715 |

* Dependent on the ambient temperature

Notes: To connect these modules to a FX3UC or FX3GC base unit, an adapter FX2N-CNV-IF or a power supply FX3UC-1PS-5V is required.

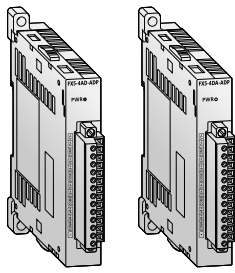
For the connection of a FX3U-4DA to a FX5U/FX5UC base unit, a bus conversion module FX5-CNV-BUSC resp. FX5-CNV-BUS is required.

Combined analog I/O module

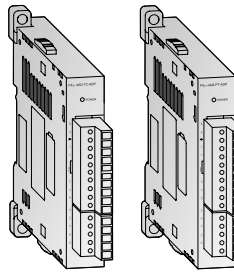
The analog input/output module provides the user with four analog inputs and one analog output. It serves for conversion of analog process signals into digital values, and vice versa.

| Specifications | FX2N-5A | |
|--------------------------|---|--|
| Applicable for | Base units FX3G/FX3GC/FX3GE/FX3U/FX3UC | |
| Analog channels | inputs | 4 |
| | outputs | 1 |
| Resolution (input) | voltage | -10–10 V (15 bit + sign), -100–100 mV (11 bit + sign) |
| | current | -20–20 mA (14 bit + sign), 0/4–20 mA (14 bit) |
| Resolution (output) | voltage | -10–10 V (12 bit) |
| | current | 0/4–20 mA (10 bit) |
| Order information | Art. no. | 153740 |

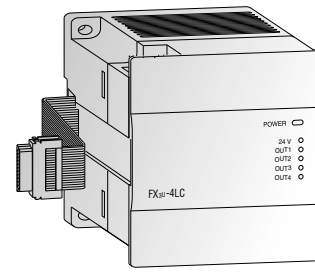
Note: To connect the module to a FX3UC or FX3GC base unit, an adapter FX2N-CNV-IF or a power supply FX3UC-1PS-5V is required.



FX5U-4AD-ADP
FX5U-4DA-ADP
Analog I/O adapter



FX3U-4AD-TC-ADP/
FX3U-4AD-PT-ADP
Analog temperature
input adapter



FX3U-4LC
Temperature
control module

Analog I/O adapters

The analog input adapter FX3U-4AD-ADP is mounted on the left side of the base unit and extends a controller of the FX3 series with four analog inputs.

The FX3U-4DA-ADP adapter module provides four analog outputs, the FX3U-3A-ADP two analog inputs and one analog output.

By adding a FX5U-4AD-ADP or FX5U-4DA-AD, a PLC of the FX5U or FX5UC series can be expanded with four analog inputs or four analog outputs respectively.

| Specifications | FX3U-3A-ADP | FX3U-4AD-ADP | FX5U-4AD-ADP | FX3U-4DA-ADP | FX5U-4DA-ADP |
|--------------------------|--|---------------------------------|------------------------------|--|---------------------------|
| Applicable for | Base units FX3S, FX3G, FX3GC, FX3GE, FX3U, FX3UC | | Base units FX5U, FX5UC | Base units FX3S, FX3G, FX3GC, FX3GE, FX3U, FX3UC | Base units FX5U, FX5UC |
| Analog channels | | | | | |
| inputs | 2 | 4 | 4 | — | — |
| outputs | — | — | — | 4 | 4 |
| Analog range | 0–10 V DC, 4–20 mA | 0–10 V DC, 4–20 mA | -10–10 V DC, -20–20 mA | 0–10 V DC, 4–20 mA | -10–10 V DC, -20–20 mA |
| Resolution | 2.5 mV/4 µA (12 bit) | 2.5 mV/10 µA (12 bit/11 bit) | 312.5 µV/1.25 µA (14 bit) | 2.5 mV/4 µA (12 bit) | 312.5 µV/1 µA (14 bit) |
| Overall accuracy | ±0.5–1 %* | ±0.5 %*/±1 % | ±0.1 %*/±1 % | ±0.5 %*/±1 % | ±0.1 %*/±1 % |
| Order information | Art. no. 221549 | 165241 | 283559 | 165271 | 283560 |

*Dependent on the ambient temperature and signal quality

Notes: When connecting the analog adapters to a FX3G, FX3S or FX3U base unit, a communications adapter is required. A direct connection without adapter is possible if these modules are connected to a FX3GC, FX3GE or FX3UC base unit.

Analog temperature input adapters

The analog input adapters for thermocouples are used for processing temperatures. They have four independent inputs for detecting signals from thermocouples of various types.

The FX3U/FX5U-4AD-PT-ADP, FX3U-4AD-PTW-ADP and FX3U-4AD-PNK-ADP analog input adapters enable the connection of up to four resistance thermometers to the PLC system.

| Specifications | FX3U-4AD-TC-ADP | FX3U-4AD-PT-ADP | FX3U-4AD-PTW-ADP | FX3U-4AD-PNK-ADP | FX5U-4AD-PT-ADP | FX5U-4AD-TC-ADP |
|-------------------------------|--|-------------------------|------------------|---|--|--|
| Applicable for | Base units FX3S, FX3G, FX3GC, FX3GE, FX3U, FX3UC | | | | Base units FX5U, FX5UC | |
| Analog inputs | 4 (thermocouples, J or K type) | 4 (Pt100) | 4 (Pt100) | 4 (Pt1000 or Ni1000) | 4 | 4 |
| Compensated temperature range | -100–600 (J)/ -100–1000 (K) | -50–250 | -100–600 | -50–250 (Pt1000)/ -40–110 (Ni1000) | -200–850 (Pt100)/ -60–250 (Ni100) | -40–750 (J)/ -200–1200 (K)/ 0–1600 (R, S) |
| Digital outputs | -1000–6000 (J)/ -1000–10000 (K) | -500–2500 | -1000–6000 | -500–2500 (Pt1000)/ -400–1100 (Ni1000) | -2000–8500 (Pt100)/ -600–2500 (Ni100) | -400–7500 (J)/ -2000–12000 (K)/ 0–16000 (R, S) |
| Resolution | 0.3 (J)/0.4 (K) | 0.1 | 0.2–0.3 | 0.1 | 0.1 | 0.1 (K, J, T), 0.1–0.3 (B, R, S) |
| Total accuracy | ±0.5 % (fullscale) | ±0.5–1.0 % (fullscale)* | | | ±0.4–2.4 °C (fullscale)* | ±2.8–7.2 °C (fullscale)* |
| Order information | Art. no. 165273 | 165272 | 214173 | 214172 | 304298 | 304299 |

*Dependent on the ambient temperature

Notes: When connecting the FX3 analog adapters to a FX3G, FX3S or FX3U base unit, a communications adapter is required. A direct connection without adapter is possible if these modules are connected to a FX3GC, FX3GE or FX3UC base unit.

Temperature control modules

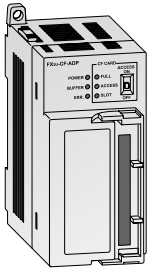
The temperature control module FX3U-4LC is equipped with four temperature input points and four transistor (open collector) output points. It is used to read temperature signals from thermocouples and Pt100 sensors, and performs PID output control.

The temperature control module FX5U-4LC supports parameter transfer/automatic refreshing. The spring clamp terminal enables compact size and enhances vibration resistance.

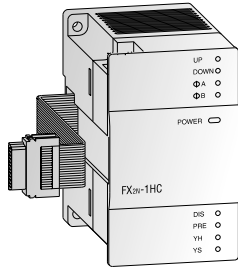
| Specifications | FX3U-4LC | FX5U-4LC |
|-------------------------------|--|---|
| Applicable for | Base units FX3G, FX3GC, FX3GE, FX3U, FX3UC, FX5U, FX5UC | Base units FX5U, FX5UC |
| Analog inputs | 4 (thermocouple and Pt100 sensors) | 4 (thermocouple, Pt100 and Pt1000 sensors) |
| Compensated temperature range | -200–2300 | -200–2300 |
| Digital outputs | 4 NPN transistor open collector output points | 4 NPN transistor open collector output points |
| Resolution | 0.1 or 1 | 0.1 °C, 1.0 °C, 0.5 µV or 5.0 µV Varies depending on input range of used sensors |
| Fullscale overall accuracy | ±0.3–0.7 % (fullscale, dependent on the ambient temperature) | |
| Order information | Art. no. 232806 | 312298 |

Notes: To connect these modules to a FX3UC or FX3GC base unit, an adapter FX2N-CNV-IF or a power supply FX3UC-1PS-5V is required. For the connection of a FX5U-4LC to a FX5U/FX5UC base unit, a bus conversion module FX5-CNV-BUSC resp. FX5-CNV-BUS is required.

Compact PLCs



FX3U-CF-ADP
Data logger module



FX2N-1HC
High speed counter and
pulse train module



FX5-485ADP
Communication
expansion adapter

Data logger module

The FX3U-CF-ADP is a general purpose data logging adapter. The difference to other available logging units is that the PLC main unit controls the data logging based on user requirements.

| Specifications | FX3U-CF-ADP |
|---------------------------|---|
| Data access method | Controlled by the main unit, no polling from the logging unit possible. |
| Connectable units | A maximum of one FX3U-CF-ADP can be connected per PLC. |
| Time stamp function | The real time clock data of the base unit is used. |
| Recommended storage media | CompactFlash memory card (GT05-MEM-256MC, -512MC, -1GC, -2GC) |
| Max. file size | 512 MB |
| File format | CSV |
| Max. number of files | 63 (plus one FIFO file.) |
| FIFO function | One pattern (the file name gets automatically generated.) |
| Order information | Art. no. 230104 |

High speed counter and pulse train modules

These high speed modules provide additional counting and pulse train output features to the FX3U/FX3UC PLC.

| Specifications | FX2N-1HC | FX2NC-1HC | FX3U-4HSX-ADP | FX3U-2HSY-ADP | FX3U-2HC |
|--|--------------------------|-------------------------------|----------------------------|-----------------------------|---|
| Applicable for | Base units FX3U/FX3UC | Base units FX3UC | Base units FX3U | Base units FX3U | Base units FX3U/FX3UC/ FX5U/FX5UC |
| Signal level | 5, 12, 24 V DC/7 mA | 5, 12, 24 V DC/7 mA | 5 V DC | Differential line driver | 5, 12, 24 V DC |
| Counter | inputs | 2 (1 phase) or 1 (2 phase) | 4 | — | 2 |
| | outputs | — | — | 2 | 2 |
| Max. frequency | inputs kHz | 50 | 100/200 | — | 100/200 |
| | outputs kHz | — | — | 200 | — |
| Counting range (Up/down & ring counter) | 16 bit | 0–65535 | — | — | 0–65535 |
| | 32 bit | -2147483648– 2147483647 | -2147483648– 2147483647 | — | — |
| Order information | Art. no. 65584 | 217916 | 165274 | 165275 | 232805 |

Note: For the connection of a FX3U-2HC to a FX5U/FX5UC base unit, a bus conversion module FX5-CNV-BUS resp. FX5-CNV-BUS is required.

Communication expansion adapters (RS485 and RS232)

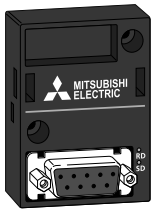
The addition of communication expansion adapters permit active communication between the PLC and surrounding devices.

An expansion adapter is mounted to the left side of an PLC base unit.

| Specifications | FX3U-232ADP-MB | FX5-232ADP | FX3U-485ADP-MB | FX5-485ADP |
|-----------------------------|--|---------------------------|--|---------------------------|
| Applicable for | Base units FX3G, FX3GC, FX3GE, FX3U, FX3UC | Base units FX5U, FX5UC | Base units FX3G, FX3GC, FX3GE, FX3U, FX3UC | Base units FX5U, FX5UC |
| Interface | RS232 with 9-pin D-sub connector; Modbus® RS232C | | | |
| Communication speed* | 0.3–19.2 | | 0.3–19.2 | |
| Max. communication distance | 15 | | 500 | |
| Order information | Art. no. 206190 | 280513 | 206191 | 280514 |

* Speed depends on communication method (Parallel link, N:N network, no protocol, dedicated protocol etc.)

Note: When connecting a FX3U adapter to a FX3U, a communications adapter FX3U-□□□□-BD is required. When connecting a FX3U adapter to a FX3G PLC the communications adapter FX3G-CNV-ADP is required.



FX5-485-BD
Communication
adapter board



FX3G-8AV-BD
Extension adapter

Interface module

The interface module FX2N-232IF provides an RS232C interface for serial data communications with the MELSEC FX3U and FX3UC.

Communication with PCs, printers, modems, barcode readers etc. is handled by the PLC program.

| Specifications | | FX2N-232IF |
|-----------------------------|----------|---|
| Applicable for | | Base units: FX3U, FX3UC |
| Interface | | RS232C with 9 pole D-SUB connector (photocoupler isolation) |
| Communication speed* | kbps | 0.3–19.2 |
| Max. communication distance | m | 15 |
| Order information | Art. no. | 66640 |

Note: To connect this module to a FX3UC base unit, an adapter FX2NC-CNV-IF or a power supply FX3UC-1PS-5V is required.

Communication adapter boards

The communication adapter boards provide an additional communication interface for a MELSEC FX PLC.

They are installed directly in a PLC base unit and therefore do not require any additional installation space.

| Specifications | | FX3G-232-BD | FX3U-232-BD | FX5-232-BD |
|--------------------------|----------|------------------------------------|-----------------|-----------------|
| Applicable for | | Base units FX3S/FX3G/FX3GE | Base units FX3U | Base units FX5U |
| Interface | | RS232C with 9 pole D-sub connector | | |
| Order information | Art. no. | 221254 | 165281 | 280511 |

| Specifications | | FX3G-422-BD | FX3U-422-BD | FX5-422-BD-GOT |
|--------------------------|----------|--------------------------------------|-----------------|-----------------|
| Applicable for | | Base units FX3S/FX3G/FX3GE | Base units FX3U | Base units FX5U |
| Interface | | RS422 with 8 pole Mini-DIN connector | | |
| Order information | Art. no. | 221252 | 165282 | 280515 |

| Specifications | | FX3G-485-BD | FX3G-485-BD-RJ | FX3U-485-BD | FX5-485-BD |
|--------------------------|----------|----------------------------|----------------------------|-----------------|-----------------|
| Applicable for | | Base units FX3S/FX3G/FX3GE | Base units FX3S/FX3G/FX3GE | Base units FX3U | Base units FX5U |
| Interface | | RS485 (terminal block) | | | |
| Order information | Art. no. | 221253 | 271699 | 165283 | 280512 |

The communication adapter board FX3U-USB-BD is an additional USB 2.0 interface for a FX3U base unit.

| Specifications | | FX3U-USB-BD |
|--------------------------|----------|--|
| Applicable for | | Base units FX3U |
| Function | | USB interface (USB MINI B connector, female) |
| Order information | Art. no. | 165284 |

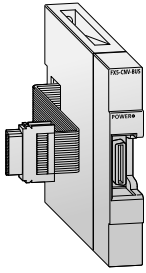
Extension adapters

For the FX3G series PLCs a analog-digital converter with two analog inputs and a digital-analog converter with one analog output is available.

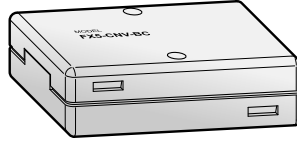
The FX3G-/FX3U-8AV-BD analog setpoint adapter enable the user to set 8 analog setpoint values.

| Specifications | | FX3G-2AD-BD | FX3G-1DA-BD | FX3G-8AV-BD | FX3U-8AV-BD |
|--------------------------|----------|-----------------|-----------------|----------------------------|-----------------|
| Applicable for | | Base units FX3G | Base units FX3G | Base units FX3S/FX3G/FX3GE | Base units FX3U |
| Function | | AD converter | DA converter | Analog setpoint | Analog setpoint |
| Order information | Art. no. | 221265 | 221266 | 221267 | 237307 |

Compact PLCs



FX5-CNV-BUS
Communications adapter



FX5-CNV-BC
Connector
conversion adapter

Communications adapters, connection conversion modules/adapters

Communications adapters

The communications adapters enable the connection of the adapter modules FX□□-□□□ADP on the left hand side of the FX3S, FX3G and FX3U base units.

| Specifications | FX3S-CNV-ADP | FX3G-CNV-ADP | FX3U-CNV-BD |
|--------------------------|-----------------|-----------------|-----------------|
| Applicable for | Base units FX3S | Base units FX3G | Base units FX3U |
| Order information | Art. no. 267132 | 221268 | 165285 |

Bus conversion modules

The FX5-CNV-BUS and the FX5-CNV-BUSC are connection conversion modules for connecting intelligent function modules of the FX3U series or an extension power supply unit FX3U-1PSU-5V to a FX5 series PLC.

| Specifications | FX5-CNV-BUS | FX5-CNV-BUSC |
|--------------------------|-----------------|------------------|
| Applicable for | Base units FX5U | Base units FX5UC |
| Order information | Art. no. 280510 | 283558 |

Connector conversion modules

The FX5-CNV-IF is used to connect extension connector type modules of the MELSEC FX5UC series to FX5U CPU module systems.

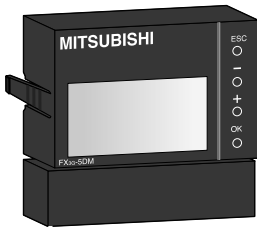
The FX5-CNV-IFC is used to connect I/O modules (extension cable type) or intelligent modules of the MELSEC FX5U series to FX5UC CPU module systems.

| Specifications | FX5-CNV-IF | FX5-CNV-IFC |
|--------------------------|--|--|
| Conversion type | FX5 (extension cable type) -> FX5 (extension connector type) | FX5 (extension connector type) -> FX5 (extension cable type) |
| Applicable for | Base units FX5U | Base units FX5UC |
| Order information | Art. no. 297455 | 283557 |

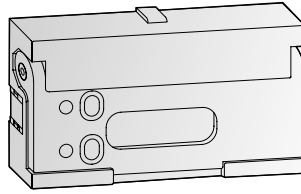
Connector conversion adapter

The FX5-CNV-BC is an adapter to convert the connector of an extended extension cable (FX5-30EC or FX5-65EC) used between modules of extension cable type.

| Specifications | FX5-CNV-BC |
|--------------------------|---|
| Conversion type | Extended extension cable -> FX5 module (extension cable type) |
| Applicable for | Base units FX5U/FX5UC |
| Order information | Art. no. 297456 |



FX3G-5DM
Display module



FX3U-FLROM-64L
Memory cassette

Control and display panels, display panel holder

The display modules FX3S-5DM and FX3G-5DM are inserted directly with space-saving into the controller and enable monitoring and editing of the data stored in the PLC.

The control and display panel FX-10-DM-E provides a key-oriented user-interface and enables you to monitor and edit process data in the PLC.

The FX3U-7DM display module can be incorporated in the main unit, or can be installed in the enclosure using the FX3U-7DM-HLD display module holder.

| Specifications | FX3S-5DM | FX3G-5DM | FX-10DM-E |
|--------------------------|----------------------|----------------------|----------------------|
| Applicable for | Base units FX3S | Base units FX3G | All base units FX3U |
| Display | LCD (with backlight) | LCD (with backlight) | LCD (with backlight) |
| Order information | Art. no. 282202 | 221270 | 132600 |

| Specifications | FX3U-7DM | FX3U-7DM-HLD |
|--------------------------|----------------------|-----------------|
| Applicable for | Base units FX3U | Base units FX3U |
| Display | 16 letters x 4 lines | — |
| Order information | Art. no. 165268 | 165287 |

Memory cassettes

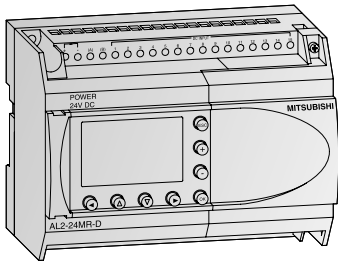
All FX base units are equipped with a slot for the memory cassettes. By connection of these memory cassettes, the internal memory of the controller is switched off and only the program specified in the respective memory cassette is run.

| Specifications | FX3G-EEPROM-32L |
|--------------------------|-----------------|
| Applicable for | Base units FX3G |
| Size | 32000 steps |
| Order information | Art. no. 221269 |

| Specifications | FX3U-FLROM-16 | FX3U-FLROM-64 | FX3U-FLROM-64L | FX3U-FLROM-1M |
|--------------------------|-----------------|-----------------|-----------------|-----------------------------------|
| Applicable for | Base units FX3U | Base units FX3U | Base units FX3U | Base units FX3U |
| Size | 16000 | 64000 | 64000 | 64000 + 1.3 MB for source data |
| Order information | Art. no. 165278 | 165279 | 165280 | 245565 |

Compact PLCs

The ALPHA2 series



ALPHA2 base units

The ALPHA2 brings the benefits of the ALPHA closer to the functionality of a Micro PLC. A program capacity of 200 functions and 38 function blocks including mathematical operations,

PWM, 1 KHz high speed counter and SMS text messaging, open up new possibilities in all areas of building and industrial automation.

Base units with 10–24 I/Os

| Specifications | AL2-10MR-A | AL2-10MR-D | AL2-14MR-A | AL2-14MR-D | AL2-24MR-A | AL2-24MR-D |
|---------------------------|-----------------|------------|--------------|------------|--------------|------------|
| Integrated inputs/outputs | 6/4 | 6/4 | 8/6 | 8/6 | 15/9 | 15/9 |
| Power supply | 100–240 V AC | 24 V DC | 100–240 V AC | 24 V DC | 100–240 V AC | 24 V DC |
| Order information | Art. no. 215070 | 215071 | 215072 | 215073 | 215074 | 215075 |

Digital extension modules

There are 4 different extension modules available for the ALPHA2, which allow the controller to be extended through additional inputs or outputs. The modules are inserted directly into the ALPHA2 and therefore do not take up any additional space.

The AL2-4EX has the additional feature that 2 inputs may be used as high-speed counters with a counting frequency of 1 kHz.

| Specifications | AL2-4EX-A2 | AL2-4EX | AL2-4EYR | AL2-4EYT |
|--------------------------|-----------------|------------------------|-----------|----------------|
| Inputs | 4 | 4 | — | — |
| Input voltage | 220–240 V AC | 24 V DC (+20 %, -15 %) | — | — |
| Outputs | — | — | 4 (relay) | 4 (transistor) |
| Order information | Art. no. 142522 | 142521 | 142523 | 142524 |

Analog extension modules

The analog extension modules significantly increase the range of applications for the ALPHA2. With these modules it is possible to output voltage or current signals or to measure temperatures.

Three different analog extension modules are available:

- The AL2-2DA offers two additional analog outputs for the ALPHA2 and converts a digital input value into a voltage or a current. This module is inserted directly onto the ALPHA2.
- The AL2-2PT-ADP connects an external Pt100 sensor to convert temperature readings into analog signals (0–10 V).
- The AL2-2TC-ADP connects thermocouple sensors (K type) to convert temperature readings into analog signals (0–10 V).

| Specifications | AL2-2DA | AL2-2PT-ADP | AL2-2TC-ADP |
|---------------------------------|-----------------|---|---|
| Analog inputs | — | 2 | 2 |
| Connectable temperature sensors | — | Pt100 sensor Temp. coefficient 3.850 ppm/°C (IEC 751) | Thermocouple (K type), isolated type (IEC 584-1 1977, IEC 584-2 1982) |
| Compensated range | — | -50–200 °C | -50–450 °C |
| Analog outputs | 2 | — | — |
| Analog output range | voltage | 0–10 V DC (5 kΩ–1 MΩ) | — |
| | current | 4–20 mA (max. 500 Ω) | — |
| Order information | Art. no. 151235 | 151238 | 151239 |



Human Machine Interfaces

HMI control units for interaction between operator and machine

The interface between operator and technics

In automation technology the HMI represents the face of the machine and should show all important process and status information to the operator. The control units of the HMI series provide an optimal dialog between operator and machine and they are completely integrated into the philosophy of Mitsubishi FA. Therefore they are the ideal extension for MELSEC PLC systems and other components of Factory Automation.

GOT control units provide a maximum transparency for all system processes and the deep integration into FA products offers a very fast troubleshooting and many other advantages. This reduces down time and raises the added value of the production.

GOTs can be installed directly to the machine while the connection to other FA products is simple and cost-efficient. Without big efforts it is possible to show all relevant information in graphical form to the operator.

Even under heavy duty conditions the HMIs remain operational due to the protective structure IP65 (and higher).

Special features

- Integration with Mitsubishi Electric FA components
- Diagnostic functions
- Alarm handling
- Data logging
- Data base connectivity
- User management

- Recipe management
- Remote access
- WLAN

Mitsubishi Electric offers three GOT series: GOT2000, GOT Simple and GOT1000. These series cover the whole range of individual applications from basic model to high end model.

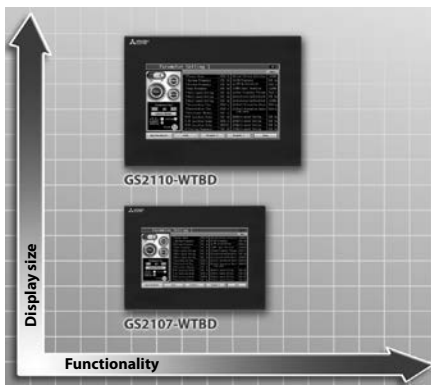
The graphs on this and the following page are showing the full range of the main ranges of HMIs.

GOT2000



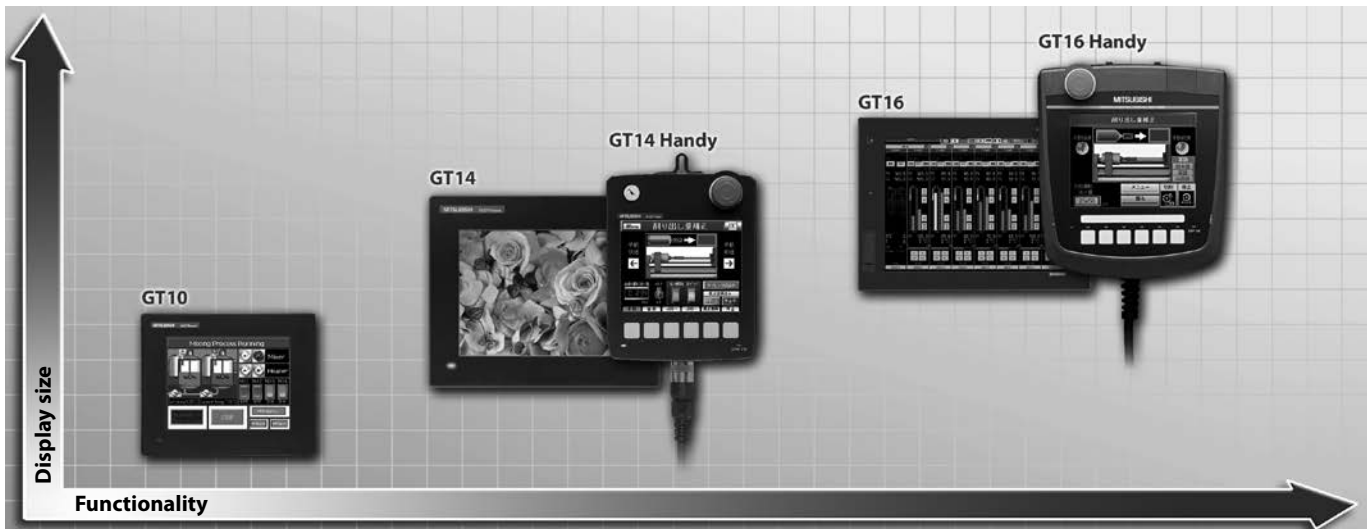
| GOT2000 series | GT21 (13 models) | GT23 (4 models) | GT25 (32 models) | GT27 (34 models) |
|---------------------------------------|---|---|--|--|
| Display type | TFT, LCD | TFT, LCD | TFT, LCD | TFT, LCD |
| Display dimensions | 3.8–7" | 8.4–10.4" | 5.7–12.1" | 5.7–15" |
| Display text | User definable | User definable | User definable | User definable |
| Display graphical resolution (pixels) | 320x128 to 800x480 | 640x480 | 640x480 to 800x600 | 640x480 to 1024x768 |
| Power supply | 24 V DC | 24 V DC/100–240 V AC | 24 V DC/100–240 V AC | 24 V DC/100–240 V AC |
| Internal memory capacity | Internal memory (ROM): 15 MB Working memory (RAM): 3 MB | Internal memory (ROM): 9 MB Working memory (RAM): 9 MB | Internal memory (ROM): 32 MB Working memory (RAM): 80 MB | Internal memory (ROM) 57 MB Working memory (RAM): 128 MB |
| External memory card | 1 (SD memory card) | 1 (SD memory card) | 1 (SD memory card) | 1 (SD memory card) |
| Keyboard | Touch panel | Touch panel | Touch panel | Touch panel |
| Function keys | Touch keys | Touch keys | Touch keys | Touch keys |
| Interfaces serial | RS232, RS422/485 | RS232, RS422/RS485 | RS232, RS422/RS485 | RS232, RS422/RS485 |
| Interfaces others | Ethernet (TCP/IP), USB, SD memory card | Ethernet (TCP/IP), USB (front), SD memory card | Ethernet (TCP/IP), USB (front), SD memory card | Ethernet (TCP/IP), USB (front), SD memory card |
| Network possibilities | Ethernet (TCP/IP), RS232, RS422/485, Modbus®/RTU, CC-Link/ID via G4, CC-Link IE Field Basic | Ethernet (TCP/IP), RS232, RS422/485, CC-Link IE Field Basic | Ethernet (TCP/IP), CC-Link (IE), CC-Link IE Field Basic, Modbus®, RS232, RS422/485, A bus, Q bus, MELSECNET/10/H | Ethernet (TCP/IP), CC-Link (IE), CC-Link IE Field Basic, Modbus®, RS232, RS422/485, A bus, Q bus, MELSECNET/10/H |
| IP rating (front panel) | IP67 | IP67 | IP67 | IP67 |

GOT Simple



| GOT Simple series | | GS21 (2 models) |
|--------------------------|-------------------------------|---|
| Display | type | TFT, LCD |
| | dimensions | 7–10" |
| | text | User definable |
| | graphical resolution (pixels) | 800x480 |
| Power supply | | 24 V DC |
| Internal memory capacity | | Internal memory (ROM): 9 MB, working memory (RAM): 9 MB |
| External memory card | | 1 (SD memory card) |
| Keyboard | | Touch panel |
| Function keys | | Touch keys |
| Interfaces | serial | RS232, RS422 |
| | others | Ethernet (TCP/IP), SD memory card |
| Network possibilities | | Ethernet (TCP/IP), RS232, RS422 |
| IP rating (front panel) | | IP65 |

GOT1000



| GOT1000 series | | GT10 (2 models) | GT14 (4 models) | GT16 (20 models) |
|--------------------------|-------------------------------|----------------------------------|---|---|
| Display | type | STN | TFT | TFT |
| | dimensions | 5.7" | 5.7" | 5.7–15" |
| | text | User definable | User definable | User definable |
| | graphical resolution (pixels) | 320x240 | 320x240 | 640x480 to 1024x768 |
| Power supply | | 24 V DC | 24 V DC | 24 V DC/100–240 V AC |
| Internal memory capacity | | 3.0 MB | 9 MB | 15 MB (expandable up to 57 MB) |
| External memory card | | — | 1 (CompactFlash, 2 GB max.) | 1 (CompactFlash, 2 GB max.) |
| Keyboard | | Touch panel | Touch panel | Touch panel |
| Function keys | | Touch keys | Touch keys | Touch keys |
| Interfaces | serial | RS422/RS232 (depending on model) | RS232, RS422, RS485 | RS232 |
| | others | GT104□/GT105□: USB (back side) | USB (Mini-B, front side), USB (Type A, back side) | USB (front), USB host for memory stick (2 GB max.) |
| Network possibilities | | Serial | Ethernet, RS422, RS485, RS232 | Ethernet (TCP/IP), CC-Link (IE), RS232, RS422, RS485, A bus, Q bus, MELSECNET/10/H, Modbus®/TCP |
| IP rating (front panel) | | IP67 | IP67 | IP67 |

GOT2000 series

Overview

| Model | Display unit | | | Interfaces | | | | | | | Art. no. | |
|----------------|--------------|----------------------------|---------------------|------------|--------|-------|-------|-----|----------|---------|------------|----------------|
| | Type | Colour | Dimensions (mm) | RS232 | RS232C | RS422 | RS485 | USB | Ethernet | CF slot | | SD memory card |
| GT2103-PMBD | TFT | monochrome, 32 grey scales | 89x35.6 (3.8") | | | ● | ● | ● | ● | | ● optional | 279809 |
| GT2103-PMBDS | TFT | monochrome, 32 grey scales | 89x35.6 (3.8") | ● | | ● | ● | ● | | | ● optional | 279810 |
| GT2103-PMBDS2 | TFT | monochrome, 32 grey scales | 89x35.6 (3.8") | ● | | | | ● | | | ● optional | 288038 |
| GT2103-PMBLS | TFT | monochrome, 32 grey scales | 89x35.6 (3.8") | ● | | ● | | ● | | | | 288039 |
| GT2104-PMBD | TFT | monochrome, 32 grey scales | 109.4x36.5 (4.5") | | | ● | ● | ● | ● | | ● | 290600 |
| GT2104-PMBDS | TFT | monochrome, 32 grey scales | 109.4x36.5 (4.5") | ● | | ● | ● | ● | | | ● | 290601 |
| GT2104-PMBDS2 | TFT | monochrome, 32 grey scales | 109.4x36.5 (4.5") | ● | | | | ● | | | ● | 312446 |
| GT2104-PMBLS | TFT | monochrome, 32 grey scales | 109.4x36.5 (4.5") | | | ● | | ● | | | ● | 298333 |
| GT2104-RTBD | TFT | LCD 65536 colours | 95x53.8 (4.3") | ● | | ● | ● | ● | ● | | ● | 283924 |
| GT2105-QMBDS | TFT | monochrome, 32 grey scales | 115x86 (5.7") | ● | | ● | ● | ● | | | ● | 297852 |
| GT2105-QTBD | TFT | LCD, 65536 colours | 115x86 (5.7") | ● | | ● | ● | ● | | | ● | 297851 |
| GT2107-WTBD | TFT | LCD, 65536 colours | 180.5x133.5 (7") | ● | | ● | ● | ● | ● | | ● | 313329 |
| GT2107-WTSD | TFT | LCD, 65536 colours | 180.5x133.5 (7") | ● | | ● | ● | ● | ● | | ● | 311489 |
| GT2308-VTBA | TFT | LCD, 65536 colours | 170.9x128.2 (8.4") | ● | | ● | ● | ● | ● | | ● | 270570 |
| GT2308-VTBD | TFT | LCD, 65536 colours | 170.9x128.2 (8.4") | ● | | ● | ● | ● | ● | | ● | 270571 |
| GT2310-VTBA | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 270568 |
| GT2310-VTBD | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 270569 |
| GT2505-VTBD | TFT | LCD, 65536 colours | 153x121 (5.7") | ● | | ● | ● | ● | ● | | ● | 323265 |
| GT2507-WTBD | TFT | LCD, 65536 colours | 180.5x133.5 (7") | ● | | ● | ● | ● | ● | | ● | 313826 |
| GT2507-WTSD | TFT | LCD, 65536 colours | 180.5x133.5 (7") | ● | | ● | ● | ● | ● | | ● | 313825 |
| GT2508-VTBA-GF | TFT | LCD, 65536 colours | 170.9x128.2 (8.4") | ● | | ● | ● | ● | ● | | ● | 293288 |
| GT2508-VTBD-GF | TFT | LCD, 65536 colours | 170.9x128.2 (8.4") | ● | | ● | ● | ● | ● | | ● | 293289 |
| GT2508-VTBA | TFT | LCD, 65536 colours | 170.9x128.2 (8.4") | ● | | ● | ● | ● | ● | | ● | 276819 |
| GT2508-VTBD | TFT | LCD, 65536 colours | 170.9x128.2 (8.4") | ● | | ● | ● | ● | ● | | ● | 276820 |
| GT2508-VTWA-GF | TFT | LCD, 65536 colours | 170.9x128.2 (8.4") | ● | | ● | ● | ● | ● | | ● | 293290 |
| GT2508-VTWD-GF | TFT | LCD, 65536 colours | 170.9x128.2 (8.4") | ● | | ● | ● | ● | ● | | ● | 293291 |
| GT2508-VTWA | TFT | LCD, 65536 colours | 170.9x128.2 (8.4") | ● | | ● | ● | ● | ● | | ● | 276821 |
| GT2508-VTWD | TFT | LCD, 65536 colours | 170.9x128.2 (8.4") | ● | | ● | ● | ● | ● | | ● | 276822 |
| GT2510-WXTSD | TFT | LCD, 65536 colours | 243.5x185.5 (10.1") | ● | | ● | ● | ● | ● | | ● | 313793 |
| GT2510-VTBA-GF | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 293284 |
| GT2510-VTBD-GF | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 293285 |
| GT2510-VTBA | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 276815 |
| GT2510-VTBD | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 276816 |
| GT2510-VTWA-GF | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 293286 |
| GT2510-VTWD-GF | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 293287 |
| GT2510-VTWA | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 276817 |
| GT2510-VTWD | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 276818 |
| GT2512-STBA-GF | TFT | LCD, 65536 colours | 246x184.5 (12.1") | ● | | ● | ● | ● | ● | | ● | 293282 |
| GT2512-STBD-GF | TFT | LCD, 65536 colours | 246x184.5 (12.1") | ● | | ● | ● | ● | ● | | ● | 293283 |
| GT2512-STBA | TFT | LCD, 65536 colours | 246x184.5 (12.1") | ● | | ● | ● | ● | ● | | ● | 281858 |
| GT2512-STBD | TFT | LCD, 65536 colours | 246x184.5 (12.1") | ● | | ● | ● | ● | ● | | ● | 281859 |
| GT2508F-VTND | TFT | LCD, 65536 colours | 170.9x128.2 (8.4") | ● | | ● | ● | ● | ● | | ● | 296314 |
| GT2508F-VTNA | TFT | LCD, 65536 colours | 170.9x128.2 (8.4") | ● | | ● | ● | ● | ● | | ● | 296313 |
| GT2510F-VTND | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 296312 |
| GT2510F-VTNA | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 296311 |
| GT2512F-STND | TFT | LCD, 65536 colours | 246x184.5 (12.1") | ● | | ● | ● | ● | ● | | ● | 296310 |
| GT2512F-STNA | TFT | LCD, 65536 colours | 246x184.5 (12.1") | ● | | ● | ● | ● | ● | | ● | 296309 |
| GT2705-VTBD-GF | TFT | LCD, 65536 colours | 115x86 (5.7") | ● | | ● | ● | ● | ● | | ● | 293281 |
| GT2705-VTBD | TFT | LCD, 65536 colours | 115x86 (5.7") | ● | | ● | ● | ● | ● | | ● | 288037 |
| GT2708-STBA-GF | TFT | LCD, 65536 colours | 170.9x128.2 (8.4") | ● | | ● | ● | ● | ● | | ● | 293277 |
| GT2708-STBD-GF | TFT | LCD, 65536 colours | 170.9x128.2 (8.4") | ● | | ● | ● | ● | ● | | ● | 293278 |
| GT2708-STBA | TFT | LCD, 65536 colours | 170.9x128.2 (8.4") | ● | | ● | ● | ● | ● | | ● | 270564 |
| GT2708-STBD | TFT | LCD, 65536 colours | 170.9x128.2 (8.4") | ● | | ● | ● | ● | ● | | ● | 270565 |
| GT2708-VTBA-GF | TFT | LCD, 65536 colours | 170.9x128.2 (8.4") | ● | | ● | ● | ● | ● | | ● | 293279 |
| GT2708-VTBD-GF | TFT | LCD, 65536 colours | 170.9x128.2 (8.4") | ● | | ● | ● | ● | ● | | ● | 293280 |
| GT2708-VTBA | TFT | LCD, 65536 colours | 170.9x128.2 (8.4") | ● | | ● | ● | ● | ● | | ● | 270566 |
| GT2708-VTBD | TFT | LCD, 65536 colours | 170.9x128.2 (8.4") | ● | | ● | ● | ● | ● | | ● | 270567 |
| GT2710-STBA-GF | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 293271 |
| GT2710-STBD-GF | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 293272 |
| GT2710-STBA | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 270558 |
| GT2710-STBD | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 270559 |
| GT2710-VTBA-GF | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 293273 |
| GT2710-VTBD-GF | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 293274 |
| GT2710-VTWA-GF | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 293275 |
| GT2710-VTWD-GF | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 293276 |
| GT2710-VTBA | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 270560 |
| GT2710-VTBD | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 270561 |
| GT2710-VTWA | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 270562 |
| GT2710-VTWD | TFT | LCD, 65536 colours | 211.2x158.4 (10.4") | ● | | ● | ● | ● | ● | | ● | 270563 |

| Model | Display unit | | | Interfaces | | | | | | | | Art. no. |
|----------------|--------------|--------------------|-------------------|------------|--------|-------|-------|-----|----------|---------|----------------|----------|
| | Type | Colour | Dimensions (mm) | RS232 | RS232C | RS422 | RS485 | USB | Ethernet | CF slot | SD memory card | |
| GT2712-STBA-GF | TFT | LCD, 65536 colours | 246x184.5 (12.1") | ● | | ● | ● | ● | ● | | ● | 293267 |
| GT2712-STWA-GF | TFT | LCD, 65536 colours | 246x184.5 (12.1") | ● | | ● | ● | ● | ● | | ● | 293269 |
| GT2712-STBD-GF | TFT | LCD, 65536 colours | 246x184.5 (12.1") | ● | | ● | ● | ● | ● | | ● | 293268 |
| GT2712-STWD-GF | TFT | LCD, 65536 colours | 246x184.5 (12.1") | ● | | ● | ● | ● | ● | | ● | 293270 |
| GT2712-STBA | TFT | LCD, 65536 colours | 246x184.5 (12.1") | ● | | ● | ● | ● | ● | | ● | 270504 |
| GT2712-STWA | TFT | LCD, 65536 colours | 246x184.5 (12.1") | ● | | ● | ● | ● | ● | | ● | 270556 |
| GT2712-STBD | TFT | LCD, 65536 colours | 246x184.5 (12.1") | ● | | ● | ● | ● | ● | | ● | 270555 |
| GT2712-STWD | TFT | LCD, 65536 colours | 246x184.5 (12.1") | ● | | ● | ● | ● | ● | | ● | 270557 |
| GT2715-XTBA-GF | TFT | LCD, 65536 colours | 304.1x228.1 (15") | ● | | ● | ● | ● | ● | | ● | 293265 |
| GT2715-XTBD-GF | TFT | LCD, 65536 colours | 304.1x228.1 (15") | ● | | ● | ● | ● | ● | | ● | 293266 |
| GT2715-XTBA | TFT | LCD, 65536 colours | 304.1x228.1 (15") | ● | | ● | ● | ● | ● | | ● | 275975 |
| GT2715-XTBD | TFT | LCD, 65536 colours | 304.1x228.1 (15") | ● | | ● | ● | ● | ● | | ● | 275976 |

GOT Simple series

Overview

| Model | Display unit | | | Interfaces | | | | | | | | Art. no. |
|-------------|--------------|--------------------|-----------------|------------|--------|-------|-------|-----|----------|---------|----------------|----------|
| | Type | Colour | Dimensions (mm) | RS232 | RS232C | RS422 | RS485 | USB | Ethernet | CF slot | SD memory card | |
| GS2107-WTBD | TFT | LCD, 65536 colours | 154x85.9 (7") | ● | | ● | | | ● | | ● | 273362 |
| GS2110-WTBD | TFT | LCD, 65536 colours | 222x132.5 (10") | ● | | ● | | | ● | | ● | 273361 |

GOT1000 series

Overview

| Model | Display unit | | | Interfaces | | | | | | | | Art. no. |
|----------------|--------------|----------------------------|-------------------|------------|--------|-------|-------|--------|----------|---------|--------------|----------|
| | Type | Colour | Dimensions (mm) | RS232 | RS232C | RS422 | RS485 | USB | Ethernet | CF slot | Human sensor | |
| GT1050-QBBD | STN | blue/white, 16 scales | 115x86 (5.7") | ● | | ● | | ● | | | | 218492 |
| GT1055-QSBD | STN | 256 colours | 115x86 (5.7") | ● | | ● | | ● | | | | 218491 |
| GT1450-QMBDE | TFT | 16 grey scales | 115x86 (5.7") | | | ● | ● | ● (2x) | | | | 281252 |
| GT1455-QTBDE | TFT | colour LCD | 115x86 (5.7") | ● | | ● | | ● (2x) | | | | 248881 |
| GT1455HS-QTBDE | TFT | colour LCD | 115x86 (5.7") | ● | | ● | | ● (2x) | | | | 271384 |
| GT1450HS-QMBDE | TFT | monochrome, 16 grey scales | 115x86 (5.7") | ● | | ● | | ● (2x) | | | | 271455 |
| GT1655-VTBD | TFT | 65536 colours | 115x86 (5.7") | ● | | ● | ● | ● | ● | ● | | 244210 |
| GT1662-VNBA | TFT | 16 colours | 171x128 (8.4") | ● | | ● | ● | ● | ● | ● | | 237194 |
| GT1662-VNBD | TFT | 16 colours | 171x128 (8.4") | ● | | ● | ● | ● | ● | ● | | 237194 |
| GT1665HS-VTBD | TFT | 65536 colours | 132.5x99.4 (6.5") | ● | | ● | ● | ● | ● | ● | | 237248 |
| GT1672-VNBA | TFT | 16 colours | 211x158 (10.4") | ● | | ● | ● | ● | ● | ● | | 237192 |
| GT1672-VNBD | TFT | 16 colours | 211x158 (10.4") | ● | | ● | ● | ● | ● | ● | | 237193 |
| GT1675-VNBA | TFT | 4096 colours | 211x158 (10.4") | ● | | ● | ● | ● | ● | ● | | 237190 |
| GT1675-VNBD | TFT | 4096 colours | 211x158 (10.4") | ● | | ● | ● | ● | ● | ● | | 237191 |
| GT1665M-STBA | TFT | 16 colours | 171x128 (8.4") | ● | | ● | ● | ● | ● | ● | ● | 221949 |
| GT1665M-STBD | TFT | 16 colours | 171x128 (8.4") | ● | | ● | ● | ● | ● | ● | ● | 221950 |
| GT1665M-VTBA | TFT | 16 colours | 171x128 (8.4") | ● | | ● | ● | ● | ● | ● | ● | 221951 |
| GT1665M-VTBD | TFT | 16 colours | 171x128 (8.4") | ● | | ● | ● | ● | ● | ● | ● | 221952 |
| GT1675M-STBA | TFT | 65536 colours | 211x158 (10.4") | ● | | ● | ● | ● | ● | ● | ● | 221945 |
| GT1675M-STBD | TFT | 65536 colours | 211x158 (10.4") | ● | | ● | ● | ● | ● | ● | ● | 221946 |
| GT1675M-VTBA | TFT | 65536 colours | 211x158 (10.4") | ● | | ● | ● | ● | ● | ● | ● | 221947 |
| GT1675M-VTBD | TFT | 65536 colours | 211x158 (10.4") | ● | | ● | ● | ● | ● | ● | ● | 221948 |
| GT1685M-STBA | TFT | 65536 colours | 249x184.5 (12.1") | ● | | ● | ● | ● | ● | ● | ● | 221360 |
| GT1685M-STBD | TFT | 65536 colours | 249x184.5 (12.1") | ● | | ● | ● | ● | ● | ● | ● | 221361 |
| GT1695M-XTBA | TFT | 65536 colours | 304.1x228.1 (15") | ● | | ● | ● | ● | ● | ● | ● | 221358 |
| GT1695M-XTBD | TFT | 65536 colours | 304.1x228.1 (15") | ● | | ● | ● | ● | ● | ● | ● | 221359 |

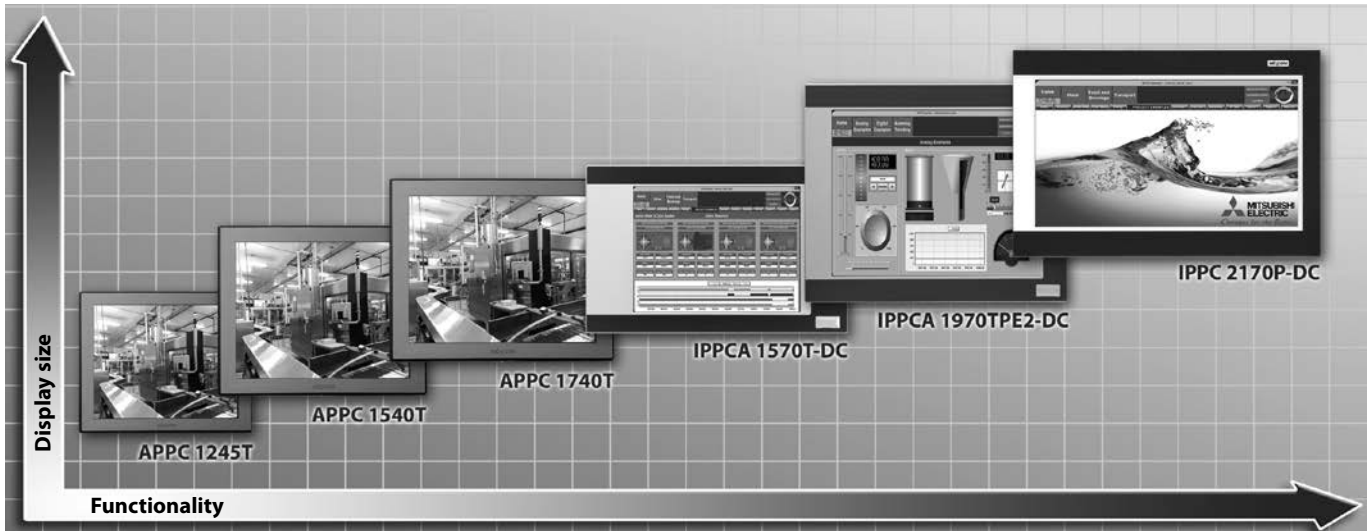
Industrial panel PCs

Nowadays industrial PCs are an inherent part of automation and process control. The series of APPC/IPPC panel PCs provides outstanding computer performance based on energy-saving Intel® processors. Designed for use in demanding applications in industrial environments, these IPCs feature high quality,

fast performance, attractive design and brilliantly legible displays. A wide operating and storage temperature range, tough vibration resistance and high IP ratings mean these IPCs can be used in locations users could never consider before.

All IPCs are equipped with a fanless high performance CPU (Intel® Celeron™/Core™ i3) and SSD drives. This reduces the risk of a production stop with all the consequences and cost due to the failure of a moving part.

APPC/IPPC panel PC series



| APPC/IPPC series | APPC 1245T-J1900-WL | APPC 1540T-J1900-WL | APPC 1740T-J1900-WL | IPPCA 1570T-DC | IPPCA 1970TPE2-DC | IPPC 2170P-DC |
|--------------------|--|--|--|--|---|---|
| Display | 12.1" TFT | 15" TFT | 17" TFT | 15" TFT | 19" TFT | 21.5" TFT |
| Resolution | 1024x768 | 1024x768 | 1280x1024 | 1024x768 | 1280x1024 | 1920x1080 |
| Format | 4:3 | 4:3 | 4:3 | 4:3 | 4:3 | 16:9 |
| Brightness | 500 cd/m ² | 400 | 350 | 400 | 350 | 300 |
| Touchscreen | Resistive, 5 wire | Resistive, 5 wire | Resistive, 5 wire | Resistive, 5 wire | Resistive, 5 wire | Projective capacitive |
| Backlight | LED | LED | LED | LED | LED | LED |
| Colour | Pantone black/ RAL 15 00 front bezel w/ Pantone 400C/RAL 090 80 10 metal style membrane | Pantone black/ RAL 15 00 front bezel w/ Pantone 400C/RAL 090 80 10 metal style membrane | Pantone black/ RAL 15 00 front bezel w/ Pantone 400C/RAL 090 80 10 metal style membrane | Pantone 432C/ RAL 70 24 front bezel Aluminum front bezel with SPPC nickel plated housing | Pantone 432C/ RAL 70 24 front bezel Aluminum front bezel with SPPC nickel plated housing | Pantone 432C/ RAL 70 24 front bezel Aluminum front bezel with SPPC nickel plated housing |
| Mounting | Panel/wall/stand/VESA | Panel/wall/stand/VESA | Panel/wall/stand/VESA | Panel/wall/stand/VESA 100x100 mm | Panel/wall/stand/VESA 100x100 mm | Panel/wall/stand/VESA 100x100 mm |
| Processor | Celeron J1900 2.42 GHz | Celeron J1900 2.42 GHz | Celeron J1900 2.42 GHz | Intel® Core™ i3-4350T, 3.1 GHz | Intel® Core™ i5-3610ME, 2.7 GHz | Intel® Core™ i3-4350T 3.1 GHz |
| RAM | 4 GB | 4 GB | 4 GB | 4 GB | 4 GB | 4 GB |
| Interfaces | 2x RS232/422/485, 2x LAN, 1x VGA, 1x Mic, 3x USB, PS2, 4x DIG/IN, 4x DIG/OUT | 2x RS232/422/485, 2x LAN, 1x VGA, 1x Mic, 3x USB, PS2 | 2x RS232/422/485, 2x LAN, 1x VGA, 1x Mic, 3x USB, PS2 | 1x RS232/422/485, 2xRJ45, 1x DVI-I, 1x DisplayPort, 1x Line- out, 1x Line-in, 1x Mic, 1x Front USB 2.0, 4x Rear USB 3.0, 1x PS2 | 1x RS232/422/485, 2x RJ45, 1x DVI-I, 1x DisplayPort, 1x Line- out, 1x Line-in, 1x Mic, 1x Front USB 2.0, 4x Rear USB 3.0, 1x PS2 | 2xRSJ45, 1xDVI-I (DVI-D + DVI-A), 1xDisplayPort, 1xLine- out; 1xLine-in; 1xMic-in, 4xUSB3.0, 1xPS2 |
| Field bus options | — | — | — | Profinet, Profibus, DeviceNet™, EtherNet/IP and EtherCAT | Profinet, Profibus, DeviceNet™, EtherNet/IP and EtherCAT | Profinet, Profibus, DeviceNet™, EtherNet/IP and EtherCAT |
| Drives | 64 GB SSD MLC | 64 GB SSD MLC | 64 GB SSD MLC | 64 GB SSD MLC | 64 GB SSD MLC | 64 GB SSD MLC |
| Power supply | 12V–30V DC | 12V–30V DC | 12V–30V DC | 9V–30V DC | 9V–30V DC | 12V–30V DC |
| Cooling | Fanless | Fanless | Fanless | Fanless | Fanless | Fanless |
| Protection class | IP65 (front) | IP65 (front) | IP65 (front) | IP66 (front) | IP66 (front) | IP66 (front) |
| OS | Windows®7 Pro | Windows®7 Pro | Windows®7 Pro | Windows®7 Pro | Windows®7 Pro | Windows®7 Pro |
| Weight | 4 kg | 5 | 6.7 | 9 | 10.6 | 11.7 |
| Dimensions (WxHxD) | 317x243x65.89 mm | 384.37x309.95x63.2 | 410.4x340.4x65.9 | 477.64x310x95.72 | 477.64x399.24x99.38 | 562.4x382.4x105.05 |
| Order information | Art. no. 314713 | 317456 | 317457 | 317458 | 325820 | 338701 |

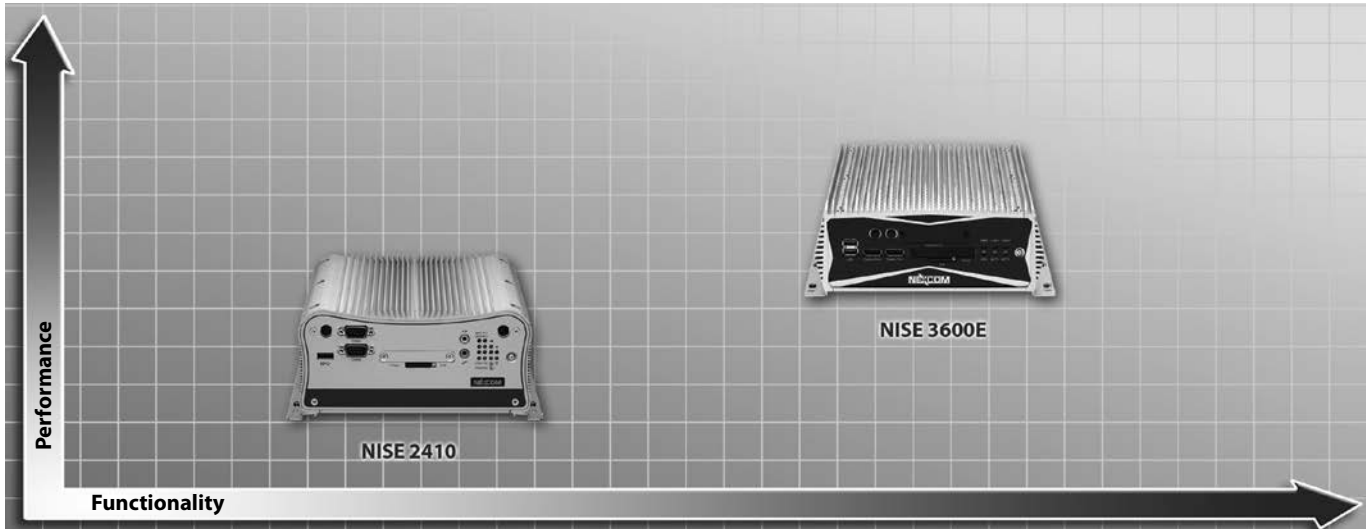
Industrial box PCs and displays

The industrial box PC and display offering is a flexible way to deploy an industrial PC system as it offers the possibility to combine the display and the PC part independently from each other to match the needs of an application perfectly.

All NISE series PCs offer the same technical features as the panel PCs like a fanless high performance CPU (Intel® Atom™/Core™ i5) and SSD drives.

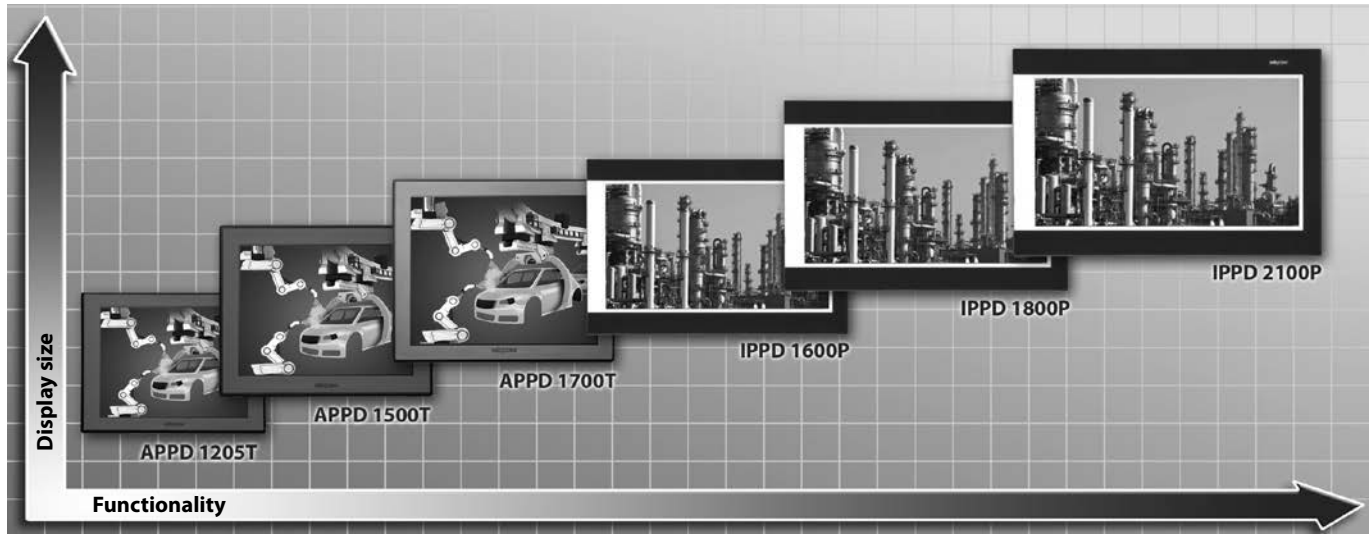
The high resolution APPD/IPPD series displays ranging from 12.1" to 21.5" are built for use in industrial environments. They are available as 4:3 resistive and 16:9 capacitive touchscreens.

NISE box PC series



| Specifications | NISE 2410 | NISE 3600E | |
|--------------------------|--|--|---|
| Processor | Intel® Atom™ E3827, 1.75 GHz | Intel® Core™ i5-3610ME, 2.7 GHz | |
| RAM | 4 GB | 4 GB | |
| Display option | Dual independent display | Three*/dual independent display (*only 3rd generation processor) | |
| I/O interface | front | ATX power on/off switch, 1x power status, 1x HDD access, 1x battery low, 4x programming, LEDs, 4x Tx/Rx LEDs, 2x DB9 RS232 for COM1/COM2, 1x external CFast socket, 1x SIM card holder, 1x USB 3.0 (900 mA per each), 1x mic-in and 1x line-out, 2x antenna holes for optional Wi-Fi/3.5 G antenna | ATX power on/off switch, HDD access/power status LEDs, 2x USB3.0 ports, 2x display port (can be converted to DVI-D or HDMI via cables), 2x antenna holes, 1x external CFast (optional), 1x SIM card socket |
| | rear | 4x USB 2.0, 1x DVI-I display output, 1x HDMI display output, 1x remote power on/off switch, 2x Intel® I210IT GbE LAN ports; support WoL, Teaming and PXE, 2x DB9 for COM3/COM4, both support RS232/422/485 with auto flow control, 1x 3-pin DC input, support 9–30 V DC input | 2x DB9 for COM5/COM6 (RS232), 1x DB44 serial port, 4x COM port (COM1/COM3/COM4: RS232; COM2: RS232/422/485), 2x Intel® GbE LAN ports (Intel® 82574L and 82579LM); support WoL, Teaming and PXE, 2x USB2.0 ports, 2x USB3.0 ports, 1x DB15 VGA port, 1x DVI-D port, 1x line-out and 1x mic-in, 2-pin remote power on/off switch, 9–30 V DC input |
| | internal | 4x GPI and 4 GPO (5V, TTL Type) | — |
| Drives | 64 GB SSD MLC | 64 GB SSD MLC | |
| Expansion slot | 2x mini-PCIe socket for optional Wi-Fi/4G LTE/3.5 G NISE 2410: one PCI expansion, NISE 2410E: 1x PCIe x4 expansion (only support PCIe1 speed and signal) | 1x PCIe4 expansion slot, 1x mini-PCIe socket | |
| Power supply | 9–30 V DC | 9–30 V DC | |
| Cooling | Fanless | Fanless | |
| OS | Windows®7 Pro | Windows®7 Pro | |
| Dimensions (WxHxD) | mm 195x90x200 | 215x93x272 | |
| Order information | Art. no. 296393 | 296394 | |

APPD/IPPD display series



| APPD/IPPD series | APPD 1205T | APPD 1500T | APPD 1700T | IPPD 1600P | IPPD 1800P | IPPD 2100P |
|-----------------------------------|------------------------------------|------------------------------------|------------------------------------|---|---|---|
| Display | 12.1" LCD | 15" LCD | 17" LCD | 15.6" LCD | 18.5" LCD | 21.5" LCD |
| Resolution | 1024x768 | 1024x768 | 1280x1024 | 1366x768 | 1366x768 | 1920x1080 |
| Format | 4:3 | 4:3 | 4:3 | 16:9 | 16:9 | 16:9 |
| Brightness | 500 | 400 | 380 | 300 | 400 | 300 |
| Touchscreen | Resistive, 5 wire | Resistive, 5 wire | Resistive, 5 wire | 10 points P-Cap (projected capacitive) | 10 points P-Cap (projected capacitive) | 10 points P-Cap (projected capacitive) |
| Backlight | LED | LED | CCFL | LED | LED | LED |
| Colour | Pantone black/ plastic front bezel | Pantone black/ plastic front bezel | Pantone black/ plastic front bezel | Pantone 425C/ RAL 70 24 front bezel Aluminum front bezel with metal housing | Pantone 425C/ RAL 70 24 front bezel Aluminum front bezel with metal housing | Pantone 425C/ RAL 70 24 front bezel Aluminum front bezel with metal housing |
| Mounting | Panel/wall/stand/ VESA 100x100 mm | Panel/wall/stand/ VESA 100x100 mm | Panel/wall/stand/ VESA 100x100 mm | Panel/wall/stand/ VESA 100x100 mm | Panel/wall/stand/ VESA 100x100 mm | Panel/wall/stand/ VESA 100x100 mm |
| Power supply | 12 V–24 V DC | 12 V–24 V DC | 12 V–24 V DC | 12–24 V DC | 12–24 V DC | 12–24 V DC |
| Cooling | Fanless | Fanless | Fanless | Fanless | Fanless | Fanless |
| Protection class | IP65 (front) | IP65 (front) | IP65 (front) | IP66 (front) | IP66 (front) | IP66 (front) |
| Weight | 2.9 | 3.98 | 5.3 | 5.48 | 6.24 | 7.87 |
| Dimensions (WxHxD) | 317x243x53.5 | 384.37x309.95x51.2 | 410.4x340.4x43.7 | 417.4x312.4x51.75 | 490.8x320.6x50.65 | 562.4x382.4x50.85 |
| Order information Art. no. | 296428 | 296429 | 296430 | 296425 | 296426 | 296427 |
| Accessory | DVI-D cable, art. no. 296431 | | | | | |



Frequency inverters

Mitsubishi Electric's comprehensive range of frequency inverters offers a wealth of benefits for the user, making it easy to choose the perfect solution for every drive application.

The Mitsubishi Electric frequency inverters support an overload capacity up to 250 % (depend on type) is standard. This means they deliver double the performance of the competing inverters with the same kw rating.

Mitsubishi Electric inverters also have active current limiting. This provides the perfect response characteristics of the current vector

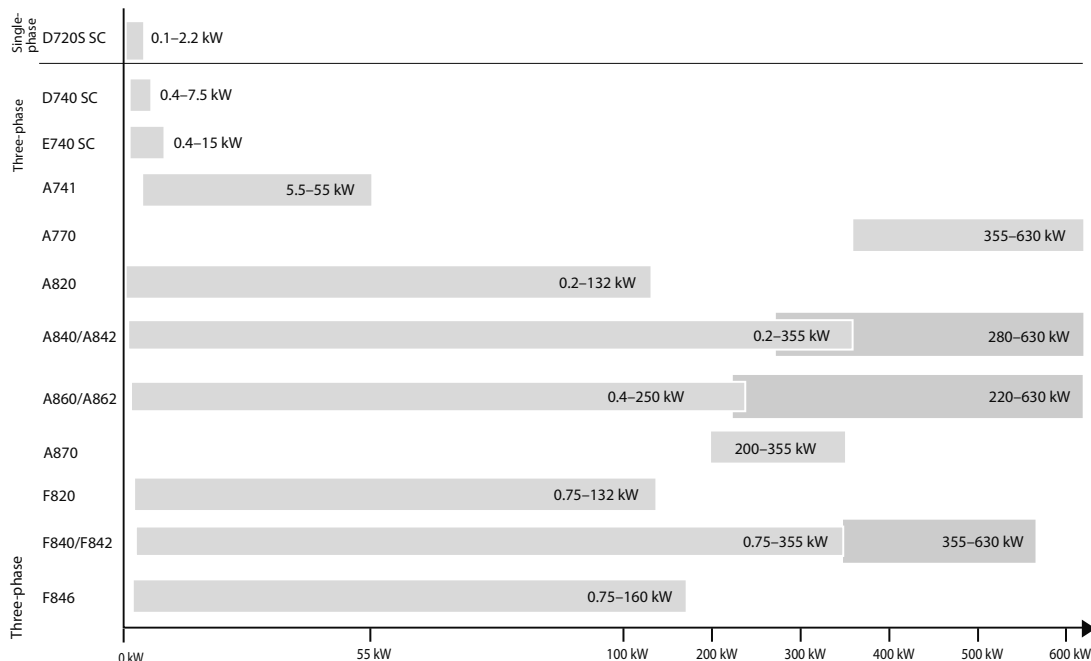
system and gives you the confidence you need for demanding drive applications. The system instantly identifies overcurrents and limits them automatically with its fast response, allowing the motor to continue operating normally at the current threshold.

Mitsubishi Electric inverters are also able to communicate with industry standard bus systems, like CC-Link, CC-Link IE Field, Profibus DP/V1, PROFINET, DeviceNet™, EtherNet/IP, EtherCat, CanOpen, LonWorks, RS485/Modbus®/RTU, SSCNET III making it

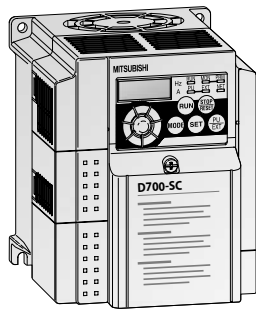
possible to integrate frequency inverters as part of a complete automation system.

Mitsubishi Electric inverters are real energy savers achieving maximum drive capacity utilisation with minimum power consumption. Flux optimisation ensures that the connected motor only gets exactly the amount of magnetic flux required for optimum efficiency. This is particularly important at low speeds as motors are normally using a voltage/frequency control system.

| Feature | FR-D700 SC | FR-E700-SC | FR-F800 | FR-A741/FR-A770 | FR-A800 |
|---------------------------------|---|--|--|---|--|
| Rated motor output range | 0.1–7.5 kW | 0.1–15 kW | 0.75–630 kW | FR-A741: 5.5–55 kW FR-A770: 355–560 kW | 0.2–630 kW (FR-A842 up to 1300 kW in parallel operation) |
| Frequency range | 0.2–400 Hz | 0.2–400 Hz | 0.2–590 Hz | 0.2–400 Hz | 0.2–590 Hz |
| Power supply | Single-phase, FR-D720S: 200–240 V (-15%/+10 %) Three-phase, FR-D720: 200–240 V (-15%/+10 %) FR-D740: 380–480 V (-15%/+10 %) | Single-phase, 200–240 V (-15%/+10 %) Three-phase, 380–480 V (-15%/+10 %) | Three-phase, FR-F820: 200–240 V FR-F840: 380–500 V (-15%/+10 %) | Three-phase, FR-A741: 380–480 V (-15%/+10 %) FR-A770: 600–690 V (±10 %) | Three-phase, FR-A820: 200–240 V FR-A840: 380–500 V FR-A860: 525–600 V FR-A870: 525–759 V (available soon) (-15%/+10 %) |
| Protection | IP20 | IP20 | FR-F820: IP20 FR-F840: IP00/IP20 FR-F842: IP00 | IP00 | FR-A820: IP20 FR-A840: IP00/IP20 FR-A842: IP00 FR-A846: IP55 FR-A860: IP00 FR-A870: IP00/20 |
| Special functions | <ul style="list-style-type: none"> ● V/f control ● Sensorless vector control ● Brake transistor ● Safe Torque Off (STO) according EN 61800-5-2 ● Energy saving control (Optimum excitation control) ● Life time diagnostics ● Dancer control | <ul style="list-style-type: none"> ● V/f control ● Modbus®/TCP, CC-Link IE Field ● Sensorless vector control ● Brake transistor ● Safe Torque Off (STO) according EN 61800-5-2 ● Torque limit ● Ext. brake control ● Flying start ● Remote I/O ● Life time diagnostics | <ul style="list-style-type: none"> ● Energy saving control ● Advanced magnetic flux vector control ● Modbus®/TCP, CC-Link IE Field Basic, BACnet ● Traverse function ● Switch motor to direct mains operation ● Special function for the water and HVAC application ● Regeneration avoidance function ● Flying start ● Life time diagnostics ● Integrated PLC function ● Integrated BACnet ● Pre-charge function | <ul style="list-style-type: none"> ● Torque control ● Positon control ● Real sensorless vector control ● Closed loop vector control ● Integrated PLC function ● Easy gain tuning ● Life time diagnostics ● 4 Quadrant operation with 100 % regeneration of brake energy to grid (only A741) | <ul style="list-style-type: none"> ● Torque control ● Positon control ● Real sensorless vector control ● PM sensorless vector control ● Closed loop vector control ● Safe Torque Off (STO) according EN 61800-5-2 ● Trace function ● Integrated PLC function ● AC & PM motor autotuning ● Anti sway function ● Easy gain tuning ● Life time diagnostics ● Integrated EMC filter |
| Specifications | Refer to page 69 | Refer to page 70 | Refer to page 71 | Refer to page 76 | Refer to page 78 |



FR-D700 SC series



The FR-D700 SC is a pace-setter in the miniature drive system class with integrated safe torque off function according EN61800-5-2. It features simple and secure operation and a wide range of technology functions.

The small dimensions render the FR-D700 SC series frequency inverters ideal for use in restricted spaces. New functions such as intermediate circuit control of the output frequency, the dancer roll control or the traverse function, facilitate universal use in numerous applications such as

- Pumps
- Fans
- Presses
- Conveyor belts
- Industrial washing machines
- Automatic shelf systems

| Product line | | FR-D720S-□-SC-EC/-E6 | | | | | | FR-D740-□-SC-EC/-E6 | | | | | | | |
|----------------------|---|---|--|--------|--------|--------|--------|------------------------------------|---------------|---------------|--------------|--------------|--------------|----------------|----------------|
| | | 008 | 014 | 025 | 042 | 070 | 100 | 012 | 022 | 036 | 050 | 080 | 120 | 160 | |
| Output | Rated motor capacity ^① | kW | 0.1 | 0.2 | 0.4 | 0.75 | 1.5 | 2.2 | 0.4 (0.55) | 0.75 (1.1) | 1.5 (2.2) | 2.2 (3) | 3.7 (4) | 5.5 (7.5) | 7.5 (11) |
| | Rated output capacity ^② | kVA | 0.3 | 0.5 | 1.0 | 1.6 | 2.8 | 3.8 | 1.2 | 2.0 | 3.0 | 4.6 | 7.2 | 9.1 | 13.0 |
| | Rated current ^③ | A | 0.8 | 1.4 | 2.5 | 4.2 | 7.0 | 10.0 | 1.2 (1.4) | 2.2 (2.6) | 3.6 (4.3) | 5.0 (6.0) | 8.0 (9.6) | 12.0 (14.4) | 16.0 (19.2) |
| | Overload capacity ^④ | 150 % of rated motor capacity for 60 s; 200 % for 0.5 s | | | | | | | | | | | | | |
| | Voltage ^⑤ | 3-phase AC, 0 V to power supply voltage | | | | | | | | | | | | | |
| Brake transistor | | — | | | | | | Built-in | | | | | | | |
| | regenerative ^⑥ | 150 % | | 100 % | | 50 % | | 20 % | | 100 % | | 50 % | | 20 % | |
| Maximum brake torque | with FR-ABR(H) option | 100 % torque/10 % ED | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| Input | Power supply voltage | 1-phase, 200–240 V AC, -15 %/+10 % | | | | | | 3-phase, 380–480 V AC, -15 %/+10 % | | | | | | | |
| | Voltage range | 170–264 V AC at 50/60 Hz | | | | | | 325–528 V AC at 50/60 Hz | | | | | | | |
| | Power supply frequency | 50/60 Hz ±5 % | | | | | | | | | | | | | |
| | Rated input capacity ^⑦ | kVA | 0.5 | 0.9 | 1.5 | 2.3 | 4.0 | 5.2 | 1.5 | 2.5 | 4.5 | 5.5 | 9.5 | 12 | 17 |
| Control | Acceleration/deceleration time | 0.1 to 3600 s (may be set individually for acceleration and deceleration) | | | | | | | | | | | | | |
| | Acceleration/deceleration characteristics | Linear or S-pattern acceleration/deceleration mode selectable | | | | | | | | | | | | | |
| | Braking torque | DC braking | Operating frequency: 0–120 Hz, operating time: 0–10 s, voltage: 0–30 % (externally adjustable) | | | | | | | | | | | | |
| Order information | Single painted PCB(EC) | Art. no. | 247595 | 247596 | 247597 | 247598 | 247599 | 247600 | 247601 | 247602 | 247603 | 247604 | 247605 | 247606 | 247607 |
| | Double painted PCB (E6) | Art. no. | 266097 | 266098 | 266099 | 266100 | 266101 | 266102 | 266103 | 266104 | 266135 | 266136 | 266137 | 266138 | 266139 |

Remarks:

- ① The applied motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi Electric 4-pole standard motor. The motor capacity ratings in brackets are for ambient temperatures up to 40 °C.
- ② The specifications of the rated output capacity are related to a motor voltage of 440 V.
- ③ The rated output current in brackets are for ambient temperatures up to 40 °C.
- ④ The % value of the overload capacity indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100 % load.
- ⑤ The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
- ⑥ The braking torque indicated is a short-duration average torque (which varies with motor loss) when the motor alone is decelerated from 60 Hz in the shortest time and is not a continuous regenerative torque. When the motor is decelerated from the frequency higher than the base frequency, the average deceleration torque will reduce. Since the inverter does not contain a brake resistor, use the optional brake resistor FR-ABR-(H) when regenerative energy is large. A brake unit FR-BU2 or BU2 may also be used. (Option brake resistor cannot be used for FR-D720S-008 SC and 014 SC.)
- ⑦ The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input choke and cables).

Frequency inverters

FR-E700 SC series



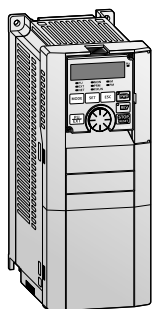
This frequency inverter has enhanced functions and performance, like an integrated USB interface, an digital dial with display and higher power output at low speed. For communication a wide range of network connections are available like BACnet, EtherNet/IP, Modbus®/TCP etc., which can be realized with optioncards. The FR-E700 ENE version is equipped with built in CC-Link IE-Field Basic and Modbus®/TCP. Additional removable optioncards, like 16 bit digital input card (FR-A7AX E kit) or CC-Link card FR-A7NC E kit makes the inverter suitable for versatile applications like:

- Textile machines
- Door and gate actuators
- Elevators
- Cranes
- Material handling systems

| Product line | | FR-E720S-□SC-EC-E6/-ENE | | | | | | FR-E740-□SC-EC-E6/-ENE | | | | | | | | | |
|-------------------|---|--|--|--------------|------------|------------|----------|------------------------|--------------|---|------------|------------|--------------|--------|--------|--------|-------------------------|
| | | 008 | 015 | 030 | 050 | 080 | 110 | 016 | 026 | 040 | 060 | 095 | 120 | 170 | 230 | 300 | |
| Output | Rated motor capacity ① | kW | 0.1 | 0.2 | 0.4 | 0.75 | 1.5 | 2.2 | 0.4 | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 |
| | Rated output capacity ② | kVA | 0.3 | 0.6 | 1.2 | 2 | 3.2 | 4.4 | 1.2 | 2 | 3 | 4.6 | 7.2 | 9.1 | 13 | 17.5 | 23 |
| | Rated current ③ | A | 0.8 (0.8) | 1.5 (1.4) | 3 (2.5) | 5 (4.1) | 8 (7) | 11 (10) | 1.6 (1.4) | 2.6 (2.2) | 4 (3.8) | 6 (5.4) | 9.5 (8.7) | 12 | 17 | 23 | 30 |
| | Overload capacity ④ | 150 % of rated motor capacity for 60 s; 200 % for 3 s | | | | | | | | | | | | | | | |
| | Voltage ⑤ | 3-phase AC, 0 V to power supply voltage | | | | | | | | 3-phase, 0 V up to power supply voltage | | | | | | | |
| | Brake transistor | — | | Built-in | | | | | | | | | | | | | |
| | Maximum brake torque | regenerative ⑥ | 150 % | | 100 % | | 50 % | | 20 % | | 100 % | | 50 % | | 20 % | | 100 % torque/ 6 % ED |
| Input | Power supply voltage | 1-phase, 200–240 V AC, -15 %/+10 % | | | | | | | | 3-phase, 380–480 V AC, -15 %/+10 % | | | | | | | |
| | Voltage range | 170–264 V AC at 50/60 Hz | | | | | | | | 325–528 V AC at 50/60 Hz | | | | | | | |
| | Power supply frequency | 50/60 Hz ±5 % | | | | | | | | | | | | | | | |
| | Rated input capacity ⑦ | kVA | 0.5 | 0.9 | 1.5 | 2.5 | 4 | 5.2 | 1.5 | 2.5 | 4.5 | 5.5 | 9.5 | 12 | 17 | 20 | 28 |
| Control | Acceleration/deceleration time | 0.01–360 s, 0.1–3600 s (may be set individually for acceleration and deceleration) | | | | | | | | | | | | | | | |
| | Acceleration/deceleration characteristics | Linear or S-pattern acceleration/deceleration mode selectable | | | | | | | | | | | | | | | |
| | Braking torque | DC braking | Operating frequency: 0–120 Hz, operating time: 0–10 s, voltage: 0–30 % (externally adjustable) | | | | | | | | | | | | | | |
| Order information | Single painted PCB (EC) | Art. no. | 234795 | 234796 | 234797 | 234798 | 234799 | 234800 | 234801 | 234802 | 234803 | 234804 | 234805 | 234806 | 234807 | 234808 | 234809 |
| | Single painted PCB (ENE) | | 316591 | 316592 | 316593 | 316594 | 316595 | 316596 | 316572 | 316573 | 316574 | 316585 | 316586 | 316587 | 316588 | 316589 | 316590 |
| | Double painted PCB (E6) | Art. no. | 240974 | 240975 | 240976 | 240977 | 240978 | 240979 | 240980 | 240981 | 240982 | 240983 | 240984 | 240985 | 240986 | 240987 | 240988 |

- Remarks:
- ① The applied motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi Electric 4-pole standard motor.
 - ② The specifications of the rated output capacity are related to a motor voltage of 440 V.
 - ③ Setting 2 kHz or more in Pr. 72 PWM frequency selection to perform low acoustic noise operation with the ambient temperature exceeding 40 °C, the rated output current is the value in parenthesis.
 - ④ The % value of the overload capacity indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100 % load.
 - ⑤ The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
 - ⑥ The braking torque indicated is a short-duration average torque (which varies with motor loss) when the motor alone is decelerated from 60 Hz in the shortest time and is not a continuous regenerative torque. When the motor is decelerated from the frequency higher than the base frequency, the average deceleration torque will reduce. Since the inverter does not contain a brake resistor, use the optional brake resistor FR-ABR-(H) when regenerative energy is large. A brake unit FR-BU2 or BU2 may also be used. (Option brake resistor cannot be used for FR-E720S-008SC and 015SC.)
 - ⑦ The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input choke and cables).

FR-F800 series



Mitsubishi Electric's FR-F800 series is designed for unparalleled energy saving, optimised speed control, simple start-up, and versatility.

Main applications are to be used with pumps, fans and compressors and HVAC applications. It features many innovative functions that allow for the best compromise between efficiency and accurate control.

Additional features are the integrated standard protocols for CC-Link IE Field Basic (CCLIEFB), SLMP, Modbus[®]/TCP, BACnet/IP and the Drive to Drive communication.

- Air conditioning systems, e.g. in building management (integrated BACnet/IP)
- Air extraction systems
- Fans and blowers
- Compressors
- Ground water pumps
- Heat pumps
- Drive systems with high idling rates

| Product line | | FR-F840-□-E2-60 | | | | | | | | | | | | | | | |
|--------------------------------|---|---|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | 00023 | 00038 | 00052 | 00083 | 00126 | 00170 | 00250 | 00310 | 00380 | 00470 | 00620 | 00770 | 00930 | 01160 | | |
| Output | Rated motor capacity ^① | 120 % overload capacity (SLD) ^⑤ | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | |
| | | 150 % overload capacity (LD) | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | |
| | Rated current ^⑥ | 120 % overload capacity (SLD) ^⑤ | I rated ^⑥ | 2.3 | 3.8 | 5.2 | 8.3 | 12.6 | 17 | 25 | 31 | 38 | 47 | 62 | 77 | 93 | 116 |
| | | | I max. 60 | 2.5 | 4.2 | 5.7 | 9.1 | 13.9 | 18.7 | 27.5 | 34.1 | 41.8 | 51.7 | 68.2 | 84.7 | 102.3 | 127.5 |
| | | 150 % overload capacity (LD) | I max. 3 s | 2.8 | 4.6 | 6.2 | 10 | 15.1 | 20.4 | 30 | 37.2 | 45.6 | 56.4 | 74.4 | 92.4 | 111.6 | 139.2 |
| | | | I rated ^⑥ | 2.1 | 3.5 | 4.8 | 7.6 | 11.5 | 16 | 23 | 29 | 35 | 43 | 57 | 70 | 85 | 106 |
| | | | I max. 60 | 2.5 | 4.2 | 5.8 | 9.1 | 13.8 | 19.2 | 27.6 | 34.8 | 42 | 51.6 | 68.4 | 84 | 102 | 127.2 |
| | | | I max. 3 s | 3.1 | 5.2 | 7.2 | 11.4 | 17.2 | 24 | 34.5 | 43.5 | 52.5 | 64.5 | 85.5 | 105 | 127.5 | 159 |
| | Rated output capacity | SLD ^⑤ | 1.8 | 2.9 | 4.0 | 6.3 | 9.6 | 13 | 19.1 | 23.6 | 29.0 | 35.8 | 47.3 | 58.7 | 70.9 | 88.4 | |
| | | LD | 1.6 | 2.7 | 3.7 | 5.8 | 8.8 | 12.2 | 17.5 | 22.1 | 26.7 | 32.8 | 43.4 | 53.3 | 64.8 | 80.8 | |
| Overload capacity ^② | SLD | 120 % of rated motor capacity for 3 s; 110 % for 1 min. (max. ambient temperature 40 °C) – inverse time characteristics | | | | | | | | | | | | | | | |
| | LD | 150 % of rated motor capacity for 3 s; 120 % for 1 min. (max. ambient temperature 50 °C) – inverse time characteristics | | | | | | | | | | | | | | | |
| Voltage ^③ | | 3-phase AC, 0 V to power supply voltage | | | | | | | | | | | | | | | |
| Frequency range | | 0.2–590 Hz | | | | | | | | | | | | | | | |
| Carrier frequency | | 0.7–14.5 kHz (user adjustable) | | | | | | | | | | | | | | | |
| Input | Power supply voltage | | 3-phase, 380–500 V AC, -15 %/+10 % | | | | | | | | | | | | | | |
| | Voltage range | | 323–550 V AC at 50/60 Hz | | | | | | | | | | | | | | |
| | Power supply frequency | | 50/60 Hz ±5 % | | | | | | | | | | | | | | |
| | Rated input capacity ^④ | SLD ^⑤ | 2.5 | 4.1 | 5.9 | 8.3 | 12 | 17 | 24 | 31 | 37 | 44 | 59 | 74 | 88 | 107 | |
| LD | | 2.3 | 3.7 | 5.5 | 7.7 | 12 | 17 | 24 | 29 | 34 | 41 | 57 | 68 | 81 | 99 | | |
| Control | External power supply 24 V | | 23–25.5 V DC, max. 1.4 A | | | | | | | | | | | | | | |
| | Acceleration/deceleration time | | 0 to 3600 s (can be set individually) | | | | | | | | | | | | | | |
| | Acceleration/deceleration characteristics | | Linear or S-form course, user selectable | | | | | | | | | | | | | | |
| | DC injection brake | | Operating frequency (0–120 Hz), operating time (0–10 s) and operating voltage (0–30 %) can be set individually. The DC brake can also be activated via the digital input. | | | | | | | | | | | | | | |
| Order information ^⑦ | Ethernet version | | 307171 | 307172 | 307173 | 307174 | 307215 | 307216 | 307217 | 307218 | 307219 | 307220 | 307221 | — | — | — | |
| | Input power frame | | Art. no. | | — | — | — | — | — | — | — | — | — | 307162 | 307163 | 307164 | |
| | Control card (Ethernet) | | — | — | — | — | — | — | — | — | — | — | — | — | 307205 | 307205 | 307205 |

Remarks:

- ① The performance figures at the rated motor capacity are based on a motor voltage of 440 V AC.
- ② The overload capacity in % is the ratio of the overload current to the inverter's rated current in the respective operating mode. For repeated duty cycles allow sufficient time for the inverter and the motor to cool below the temperature reached at 100 % load. The waiting periods can be calculated using the r.m.s. current method (I²t), which requires knowledge of the duty.
- ③ The maximum output voltage cannot exceed the power supply voltage. The output voltage can be varied over the entire power supply voltage range.
- ④ The rated input capacity varies depending on the impedance values on the power supply side of the inverter (including the cables and input choke).
- ⑤ When the load curve with 120 % overload capacity is selected the maximum permitted ambient temperature is 40 °C.
- ⑥ When operating with carrier frequencies ≥2.5 kHz this value is reduced automatically as soon as the frequency inverter exceeds 85 % of the rated output current.
- ⑦ All inverters with circuit board coating (IEC60721-3-3 3C2/3S2)

Frequency inverters

| Product line | | | FR-F840-□-E2-60 | | | | | | | | | | | |
|---|-----------------------------------|------------------------------|---|----------------------|--------|--------|--------|--------|--------|--------|--------|--------|-----|-----|
| | | | 01800 | 02160 | 02600 | 03250 | 03610 | 04320 | 04810 | 05470 | 06100 | 06830 | | |
| Output | Rated motor capacity ^① | kW | 120 % overload capacity (SLD) ^⑤ | 90 | 110 | 132 | 160 | 185 | 220 | 250 | 280 | 315 | 355 | |
| | | | 150 % overload capacity (LD) | 75 | 90 | 110 | 132 | 160 | 185 | 220 | 250 | 280 | 315 | |
| | Rated current ^⑥ | A | 120 % overload capacity (SLD) ^⑤ | I rated ^⑥ | 180 | 216 | 260 | 325 | 361 | 432 | 481 | 547 | 610 | 683 |
| | | | | I max. 60 | 198 | 238 | 286 | 357 | 397 | 475 | 529 | 602 | 671 | 751 |
| | | | | I max. 3 s | 216 | 259 | 312 | 390 | 433 | 518 | 577 | 656 | 732 | 820 |
| | | 150 % overload capacity (LD) | I rated ^⑥ | 144 | 180 | 216 | 260 | 325 | 361 | 432 | 481 | 547 | 610 | |
| | | | I max. 60 | 173 | 216 | 259 | 312 | 390 | 433 | 518 | 577 | 656 | 732 | |
| | | | I max. 3 s | 216 | 270 | 324 | 390 | 487 | 541 | 648 | 721 | 820 | 915 | |
| | Rated output capacity | kVA | SLD ^⑤ | 137 | 165 | 198 | 248 | 275 | 329 | 367 | 417 | 465 | 521 | |
| | | | LD | 110 | 137 | 165 | 198 | 248 | 275 | 329 | 367 | 417 | 465 | |
| Overload capacity ^② | | SLD | 120 % of rated motor capacity for 3 s; 110 % for 1 min. (max. ambient temperature 40 °C) – inverse time characteristics | | | | | | | | | | | |
| | | LD | 150 % of rated motor capacity for 3 s; 120 % for 1 min. (max. ambient temperature 50 °C) – inverse time characteristics | | | | | | | | | | | |
| Voltage ^③ | | | 3-phase AC, 380–500 V to power supply voltage | | | | | | | | | | | |
| Frequency range | | | 0.2–590 Hz | | | | | | | | | | | |
| Carrier frequency | | | 0.7–6 kHz (user adjustable) | | | | | | | | | | | |
| Power supply voltage | | | 3-phase, 380–500 V AC, -15 %/+10 % | | | | | | | | | | | |
| Voltage range | | | 323–550 V AC at 50/60 Hz | | | | | | | | | | | |
| Power supply frequency | | | 50/60 Hz ±5 % | | | | | | | | | | | |
| Rated input capacity ^④ | kVA | SLD ^⑤ | 137 | 165 | 198 | 248 | 275 | 329 | 367 | 417 | 465 | 520 | | |
| | | LD | 110 | 137 | 165 | 198 | 248 | 275 | 329 | 367 | 417 | 465 | | |
| External power supply 24 V | | | 23–25.5 V DC, max. 1.4 A | | | | | | | | | | | |
| Acceleration/deceleration time | | | 0 to 3600 s (can be set individually) | | | | | | | | | | | |
| Acceleration/deceleration characteristics | | | Linear or S-form course, user selectable | | | | | | | | | | | |
| DC injection brake | | | Operating frequency (0–120 Hz), operating time (0–10 s) and operating voltage (0–30 %) can be set individually. The DC brake can also be activated via the digital input. | | | | | | | | | | | |
| Order information ^⑦ | Ethernet version | | — | — | — | — | — | — | — | — | — | — | | |
| | Input power frame | Art. no. | 307185 | 307186 | 307187 | 307188 | 307189 | 307190 | 307191 | 307192 | 307193 | 307194 | | |
| | Control card (Ethernet) | | 307205 | 307205 | 307205 | 307205 | 307205 | 307205 | 307205 | 307205 | 307205 | 307205 | | |

- Remarks:
- ① The performance figures at the rated motor capacity are based on a motor voltage of 440 V AC.
 - ② The overload capacity in % is the ratio of the overload current to the inverter's rated current in the respective operating mode. For repeated duty cycles allow sufficient time for the inverter and the motor to cool below the temperature reached at 100 % load. The waiting periods can be calculated using the r.m.s. current method ($I^2 \times t$), which requires knowledge of the duty. When using the FR-F820-01250(30K) or lower and FR-F840-00620(30K) or lower at the surrounding air temperature of 40 °C or less (30 °C or less for the SLD rated inverter), side-by-side installation (0 cm clearance) is available.
 - ③ The maximum output voltage cannot exceed the power supply voltage. The output voltage can be varied over the entire power supply voltage range.
 - ④ The rated input capacity varies depending on the impedance values on the power supply side of the inverter (including the cables and input choke).
 - ⑤ When the load curve with 120 % overload capacity is selected the maximum permitted ambient temperature is 40 °C.
 - ⑥ When operating with carrier frequencies ≥ 2.5 kHz this value is reduced automatically as soon as the frequency inverter exceeds 85 % of the rated output current.
 - ⑦ All inverters with circuit board coating (IEC60721-3-3 3C2/3S2)

| Product line | | | FR-F842-□-E2-60 | | | | | | |
|--------------------------------|---|---|---|----------------------|--------|--------|--------|------|------|
| | | | 07700 | 08660 | 09620 | 10940 | 12120 | | |
| Output | Rated motor capacity ^① | kW | 120 % overload capacity (SLD) ^④ | 400 | 450 | 500 | 560 | 630 | |
| | | | 150 % overload capacity (LD) | 355 | 400 | 450 | 500 | 560 | |
| | Rated current ^⑤ | A | 120 % overload capacity (SLD) ^④ | I rated ^⑤ | 770 | 866 | 962 | 1094 | 1212 |
| | | | | I max. 60 | 847 | 953 | 1058 | 1203 | 1333 |
| | | | | I max. 3 s | 924 | 1039 | 1154 | 1313 | 1454 |
| | | 150 % overload capacity (LD) | I rated ^⑤ | 683 | 770 | 866 | 962 | 1094 | |
| | | | I max. 60 | 820 | 924 | 1039 | 1154 | 1313 | |
| | | | I max. 3 s | 1024 | 1155 | 1299 | 1443 | 1641 | |
| | Rated output capacity | kVA | SLD ^④ | 587 | 660 | 733 | 834 | 924 | |
| | | | LD | 521 | 587 | 660 | 733 | 834 | |
| Overload capacity ^② | SLD | 120 % of rated motor capacity for 3 s; 110 % for 1 min. (max. ambient temperature 40 °C) – inverse time characteristics | | | | | | | |
| | LD | 150 % of rated motor capacity for 3 s; 120 % for 1 min. (max. ambient temperature 50 °C) – inverse time characteristics | | | | | | | |
| Voltage ^③ | | 3-phase AC, 380–500 V to power supply voltage | | | | | | | |
| Frequency range | | 0.2–590 Hz | | | | | | | |
| Carrier frequency | | 0.7–6 kHz (user adjustable) | | | | | | | |
| Input | DC power supply voltage | | 430–780 V DC | | | | | | |
| | Control power supply voltage | | 1-phase, 380–500 V AC, 50/60 Hz | | | | | | |
| | Control power supply range | | Frequency ±5 %, voltage ±10 % | | | | | | |
| Control | External power supply 24 V | | 23–25.5 V DC, max. 1.4 A | | | | | | |
| | Acceleration/deceleration time | | 0 to 3600 s (can be set individually) | | | | | | |
| | Acceleration/deceleration characteristics | | Linear or S-form course, user selectable | | | | | | |
| | DC injection brake | | Operating frequency (0–120 Hz), operating time (0–10 s) and operating voltage (0–30 %) can be set individually. The DC brake can also be activated via the digital input. | | | | | | |
| Order information ^⑥ | Ethernet version | | — | | | | | | |
| | Input power frame | Art. no. | 307195 | 307196 | 307197 | 307198 | 307199 | | |
| | Control card (Ethernet) | | 307205 | 307205 | 307205 | 307205 | 307205 | | |

Remarks:

- ① The performance figures at the rated motor capacity are based on a motor voltage of 440 V AC.
- ② The overload capacity in % is the ratio of the overload current to the inverter's rated current in the respective operating mode. For repeated duty cycles allow sufficient time for the inverter and the motor to cool below the temperature reached at 100 % load. The waiting periods can be calculated using the r.m.s. current method (I^2xt), which requires knowledge of the duty.
- ③ The maximum output voltage cannot exceed the power supply voltage. The output voltage can be varied over the entire power supply voltage range.
- ④ When the load curve with 120 % overload capacity is selected the maximum permitted ambient temperature is 30 °C.
- ⑤ When operating with carrier frequencies ≥ 2.5 kHz this value is reduced automatically as soon as the frequency inverter exceeds 85 % of the rated output current.
- ⑥ All inverters with circuit board coating (IEC60721-3-3 3C2/3S2)

Frequency inverters

| Product line | | | FR-F846-□-E2-60L2 | | | | | | | | | |
|--|---|------------------------------|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | | 00023 | 00038 | 00052 | 00083 | 00126 | 00170 | 00250 | 00310 | 00380 | 00470 |
| Output | Rated motor capacity ^① kW | 150 % overload capacity (LD) | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 |
| | Rated current A | 150 % overload capacity (LD) | 2.1 | 3.5 | 4.8 | 7.6 | 11.5 | 16 | 23 | 29 | 35 | 43 |
| | Overload capacity ^② | LD | 120 % of rated motor capacity for 60 s; 150 % for 3 s (max. ambient temperature 50 °C) | | | | | | | | | |
| | Voltage ^③ | | 3-phase, 380–500 V to power supply voltage | | | | | | | | | |
| | Frequency range | Hz | 0.2–590 | | | | | | | | | |
| | Control method | | V/f; advanced magnetic flux vector, real sensorless vector (RSV), closed loop vector, PM sensorless vector control | | | | | | | | | |
| Maximum brake torque | regenerative | 10 % torque/continuous | | | | | | | | | | |
| Input | Power supply voltage | | 3-phase, 380–500 V AC, -15 %/+10 % | | | | | | | | | |
| | Voltage range | | 323–550 V AC at 50/60 Hz (low voltage level adjustable by parameter) | | | | | | | | | |
| | Power supply frequency | | 50/60 Hz ±5 % | | | | | | | | | |
| | Rated input current ^④ A | LD | 2.1 | 3.5 | 4.8 | 7.6 | 11.5 | 16 | 23 | 29 | 35 | 43 |
| Power supply capacity ^⑤ kVA | LD | 1.6 | 2.7 | 3.7 | 5.8 | 9 | 12 | 18 | 22 | 27 | 33 | |
| Control | External power supply 24 V | | 23–25.5 V DC, max. 1.4 A | | | | | | | | | |
| | Acceleration/deceleration time | | 0–3600 s (can be set individually), linear or S-pattern acceleration/deceleration mode, backlash measures acceleration/deceleration can be selected. | | | | | | | | | |
| | Acceleration/deceleration characteristics | | Linear or S-form course, user selectable | | | | | | | | | |
| | DC injection brake | | Operating frequency (0–120 Hz), operating time (0–10 s) and operating voltage (0–30 %) can be set individually. The DC brake can also be activated via the digital input. | | | | | | | | | |
| Order information ^⑥ | | Art. no. | 318057 | 318058 | 318059 | 318060 | 318061 | 318062 | 318063 | 318064 | 318065 | 318066 |

| Product line | | | FR-F846-□-E2-60L2 | | | | | | | | | |
|--|---|------------------------------|---|--------|--------|--------|--------|--------|--------|--------|--------|--|
| | | | 00620 | 00770 | 00930 | 01160 | 01800 | 02160 | 02600 | 03250 | 03610 | |
| Output | Rated motor capacity ^① kW | 150 % overload capacity (LD) | 30 | 37 | 45 | 55 | 75 | 90 | 110 | 132 | 160 | |
| | Rated current A | 150 % overload capacity (LD) | 57 | 70 | 85 | 106 | 144 | 180 | 216 | 260 | 325 | |
| | Overload capacity ^② | LD | 120 % of rated motor capacity for 60 s; 150 % for 3 s (max. ambient temperature 50 °C) | | | | | | | | | |
| | Voltage ^③ | | 3-phase, 380–500 V to power supply voltage | | | | | | | | | |
| | Frequency range | Hz | 0.2–590 | | | | | | | | | |
| | Control method | | V/f; advanced magnetic flux vector, real sensorless vector (RSV), closed loop vector, PM sensorless vector control | | | | | | | | | |
| Maximum brake torque | regenerative | 10 % torque/continuous | | | | | | | | | | |
| Power supply | Power supply voltage | | 3-phase, 380–500 V AC, -15 %/+10 % | | | | | | | | | |
| | Voltage range | | 323–550 V AC at 50/60 Hz (low voltage level adjustable by parameter) | | | | | | | | | |
| | Power supply frequency | | 50/60 Hz ±5 % | | | | | | | | | |
| | Rated input current ^④ A | LD | 57 | 70 | 85 | 106 | 144 | 180 | 216 | 260 | 325 | |
| Power supply capacity ^⑤ kVA | LD | 43 | 53 | 65 | 81 | 110 | 137 | 165 | 198 | 248 | | |
| Control | External power supply 24 V | | 23–25.5 V DC, max. 1.4 A | | | | | | | | | |
| | Acceleration/deceleration time | | 0–3600 s (can be set individually), linear or S-pattern acceleration/deceleration mode, backlash measures acceleration/deceleration can be selected. | | | | | | | | | |
| | Acceleration/deceleration characteristics | | Linear or S-form course, user selectable | | | | | | | | | |
| | DC injection brake | | Operating frequency (0–120 Hz), operating time (0–10 s) and operating voltage (0–30 %) can be set individually. The DC brake can also be activated via the digital input. | | | | | | | | | |
| Order information ^⑥ | | Art. no. | 318067 | 318068 | 318069 | 318070 | 318071 | 318072 | 318073 | 318074 | 318075 | |

Remarks:

- ① The applied motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi Electric 4-pole standard motor. The 200 % overload capacity (ND) is the factory default setting.
- ② The % value of the overload capacity indicates the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100 % load. The waiting periods can be calculated using the r.m.s. current method (I^2xt), which requires knowledge of the duty.
- ③ The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
- ④ The rated input capacity varies depending on the impedance values on the power supply side of the inverter (including the cables and input choke).
- ⑤ The power supply capacity is the value at the rated output current. It varies by the impedance at the power supply side (including those of the input choke and cables).
- ⑥ All inverters with circuit board coating (IEC60721-3-3 3C2/3S2)

| Product line | | FR-F820-□-3-N6 | | | | | | | | | | | |
|--------------------------------|---|---|---|----------------------|--------|--------|--------|--------|--------|--------|--------|-------|------|
| | | 00046 | 00077 | 00105 | 00167 | 00250 | 00340 | 00490 | 00630 | 00770 | | | |
| Output | Rated motor capacity ^① | kW | 120 % overload capacity (SLD) ^⑤ | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | |
| | | | 150 % overload capacity (LD) | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | |
| | Rated current ^⑥ | A | 120 % overload capacity (SLD) ^⑤ | I rated ^⑥ | 4.6 | 7.7 | 10.5 | 16.7 | 25.0 | 34.0 | 49.0 | 63.0 | 77.0 |
| | | | | I max. 60 | 5.1 | 8.5 | 11.5 | 18.4 | 27.5 | 37.4 | 53.9 | 69.3 | 84.7 |
| | | | I max. 3 s | 5.5 | 9.3 | 12.6 | 20.0 | 30.0 | 40.8 | 58.8 | 75.6 | 92.4 | |
| | | 150 % overload capacity (LD) | I rated ^⑥ | 4.2 | 7.0 | 9.6 | 15.2 | 23.0 | 31.0 | 45.0 | 58.0 | 70.5 | |
| | | | I max. 60 | 5.0 | 8.4 | 11.5 | 18.2 | 27.6 | 37.2 | 54.0 | 69.6 | 84.6 | |
| | | | I max. 3 s | 6.3 | 10.5 | 14.4 | 22.8 | 34.5 | 46.5 | 67.5 | 87.0 | 105.8 | |
| | Rated output capacity | kVA | SLD ^⑤ | 1.8 | 2.9 | 4.0 | 6.4 | 10.0 | 13.0 | 19.0 | 24.0 | 29.0 | |
| | | | LD | 1.6 | 2.7 | 3.7 | 5.8 | 8.8 | 12.0 | 17.0 | 22.0 | 27.0 | |
| Overload capacity ^② | SLD | 120 % of rated motor capacity for 3 s; 110 % for 1 min. (max. ambient temperature 40 °C) – inverse time characteristics | | | | | | | | | | | |
| | LD | 150 % of rated motor capacity for 3 s; 120 % for 1 min. (max. ambient temperature 50 °C) – inverse time characteristics | | | | | | | | | | | |
| Voltage ^③ | | 3-phase AC, 0 V to power supply voltage | | | | | | | | | | | |
| Frequency range | | 0.2–590 Hz | | | | | | | | | | | |
| Carrier frequency | | 0.7–14.5 kHz (user adjustable) | | | | | | | | | | | |
| Input | Power supply voltage | | 3-phase, 200–240 V AC, -15 %/+10 % | | | | | | | | | | |
| | Voltage range | | 170–264 V AC at 50/60 Hz | | | | | | | | | | |
| | Power supply frequency | | 50/60 Hz ±5 % | | | | | | | | | | |
| | Rated input capacity ^④ | kVA | SLD ^⑤ | 2.0 | 3.4 | 5.0 | 7.5 | 12.0 | 17.0 | 24.0 | 31.0 | 37.0 | |
| | | LD | 1.9 | 3.2 | 4.7 | 7.0 | 11.0 | 16.0 | 22.0 | 29.0 | 35.0 | | |
| Control | External power supply 24 V | | 23–25.5 V DC, max. 1.4 A | | | | | | | | | | |
| | Acceleration/deceleration time | | 0 to 3600 s (can be set individually) | | | | | | | | | | |
| | Acceleration/deceleration characteristics | | Linear or S-form course, user selectable | | | | | | | | | | |
| | DC injection brake | | Operating frequency (0–120 Hz), operating time (0–10 s) and operating voltage (0–30 %) can be set individually. The DC brake can also be activated via the digital input. | | | | | | | | | | |
| Order information ^⑦ | | Art. no. | 289229 | 289230 | 289231 | 289232 | 289233 | 289234 | 289235 | 289236 | 289237 | | |

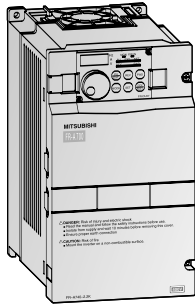
| Product line | | FR-F820-□-3-N6 | | | | FR-F820-□-3-60 | | | FR-F820-□-3-U6 | | | |
|--------------------------------|---|---|---|----------------------|--------|----------------|--------|--------|----------------|--------|-------|-------|
| | | 00930 | 01250 | 01540 | 01870 | 02330 | 03160 | 03800 | 04750 | | | |
| Output | Rated motor capacity ^① | kW | 120 % overload capacity (SLD) ^⑤ | 22 | 30 | 37 | 45 | 55 | 75 | 90/110 | 132 | |
| | | | 150 % overload capacity (LD) | 22 | 30 | 37 | 45 | 55 | 75 | 90 | 110 | |
| | Rated current ^⑥ | A | 120 % overload capacity (SLD) ^⑤ | I rated ^⑥ | 93 | 125 | 154 | 187 | 233 | 316 | 380 | 475 |
| | | | | I max. 60 | 102.3 | 137.5 | 169.4 | 205.7 | 256.3 | 347.6 | 418 | 522.5 |
| | | | I max. 3 s | 111.6 | 150 | 184.8 | 246.8 | 279.6 | 379.2 | 456 | 570 | |
| | | 150 % overload capacity (LD) | I rated ^⑥ | 85 | 114 | 140 | 170 | 212 | 288 | 346 | 432 | |
| | | | I max. 60 | 102 | 136.8 | 168 | 204 | 257.4 | 345.6 | 415.2 | 518.4 | |
| | | | I max. 3 s | 127.5 | 171 | 210 | 255 | 318 | 432 | 519 | 648 | |
| | Rated output capacity | kVA | SLD ^⑤ | 35 | 48 | 59 | 71 | 89 | 110 | 145 | 181 | |
| | | | LD | 32 | 43 | 53 | 65 | 81 | 110 | 132 | 165 | |
| Overload capacity ^② | SLD | 120 % of rated motor capacity for 3 s; 110 % for 1 min. (max. ambient temperature 40 °C) – inverse time characteristics | | | | | | | | | | |
| | LD | 150 % of rated motor capacity for 3 s; 120 % for 1 min. (max. ambient temperature 50 °C) – inverse time characteristics | | | | | | | | | | |
| Voltage ^③ | | 3-phase AC, 0 V to power supply voltage | | | | | | | | | | |
| Frequency range | | 0.2–590 Hz | | | | | | | | | | |
| Carrier frequency | | 0.7–14.5 kHz (user adjustable) | | | | | | | | | | |
| Input | Power supply voltage | | 3-phase, 200–240 V AC, -15 %/+10 % | | | | | | | | | |
| | Voltage range | | 170–264 V AC at 50/60 Hz | | | | | | | | | |
| | Power supply frequency | | 50/60 Hz ±5 % | | | | | | | | | |
| | Rated input capacity ^④ | kVA | SLD ^⑤ | 44 | 58 | 70 | 84 | 103 | 120 | 145 | 181 | |
| | | LD | 41 | 53 | 68 | 79 | 97 | 110 | 132 | 165 | | |
| Control | External power supply 24 V | | 23–25.5 V DC, max. 1.4 A | | | | | | | | | |
| | Acceleration/deceleration time | | 0 to 3600 s (can be set individually) | | | | | | | | | |
| | Acceleration/deceleration characteristics | | Linear or S-form course, user selectable | | | | | | | | | |
| | DC injection brake | | Operating frequency (0–120 Hz), operating time (0–10 s) and operating voltage (0–30 %) can be set individually. The DC brake can also be activated via the digital input. | | | | | | | | | |
| Order information ^⑦ | | Art. no. | 289238 | 289239 | 289240 | 289241 | 289242 | 289243 | 289255 | 289256 | | |

Remarks:

- ① The performance figures at the rated motor capacity are based on a motor voltage of 440 V AC.
- ② The overload capacity in % is the ratio of the overload current to the inverter's rated current in the respective operating mode. For repeated duty cycles allow sufficient time for the inverter and the motor to cool below the temperature reached at 100 % load. The waiting periods can be calculated using the r.m.s. current method (I^2xt), which requires knowledge of the duty.
- ③ The maximum output voltage cannot exceed the power supply voltage. The output voltage can be varied over the entire power supply voltage range.
- ④ The rated input capacity varies depending on the impedance values on the power supply side of the inverter (including the cables and input choke).
- ⑤ When the load curve with 120 % overload capacity is selected the maximum permitted ambient temperature is 30 °C.
- ⑥ When operating with carrier frequencies ≥ 2.5 kHz this value is reduced automatically as soon as the frequency inverter exceeds 85 % of the rated output current.
- ⑦ All inverters with circuit board coating (IEC60721-3-3 3C2/3S2)

Frequency inverters

FR-A770 series



The frequency inverter FR-A770 is the first choice for operation under rough environmental conditions like waste water treatment, mining, oil industry or shipping. It was especially designed for industrial networks with 690 V power supply.

- The functionality of the FR-A770 is based on the series FR-A740-EC.
- Power supply voltage 690 V
- Rated motor capacity of 355 kW and 630 kW

- Overload capacity of 150 % for 60 sec
- Integrated PLC function
- Standard interfaces USB, RS485 and Modbus®/RTU
- Compatible to standard networks like CC-Link, CC-Link IE Field, Profibus DP, Profinet, EtherNet/IP, DeviceNet™ and LonWorks
- Plug and play integration into motion systems

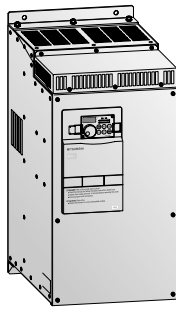
| Product line | | FR-A770-□-K-79 | | | |
|--------------------|---|-------------------------|---|--|------------------------|
| | | 355/400K | 560/630K | | |
| Output | Rated motor capacity ^① | 150 % overload capacity | 355/400 | 560/630 | |
| | Rated current A | 150 % overload capacity | I rated | 401 (344) ^② | 611 (545) ^② |
| | | | I max. 60 s | 602 (516) | 917 (818) |
| | Rated output capacity | | kVA | 479 (411) | 730 (651) |
| | Overload capacity | | | 150 % of rated motor capacity for 60 s | |
| | Frequency range | | | 0.2–400 Hz | |
| Modulation control | | | PPM control with 2 kHz carrier frequency | | |
| Input | Power supply voltage | | 3-phase, 600–690 V AC, ±10 % | | |
| | Voltage range | | 540–759 V AC at 50/60 Hz | | |
| | Power supply frequency | | 50/60 Hz ±5 % | | |
| | Rated input capacity | | kVA | 463 | 730 |
| Control | Acceleration/deceleration time | | 0; 0.1–3600 s (can be set individually) | | |
| | Acceleration/deceleration characteristics | | Linear or S-form course, user selectable | | |
| | DC injection brake | | Operating frequency (0–120 Hz), operating time (0–10 s) and operating voltage (0–30 %) can be set individually. The DC brake can also be activated via the digital input. | | |
| Order information | | Art. no. | 268859 | 268860 | |

Remarks:

① Motor capacity derating is required when input voltage is below 660 V.

② When operating the vector control using a motor with encoder and a plug-in option FR-A7AP/FR-A7AL, the related output current is the value in parentheses and maximum surrounding air temperature reduces to 40 °C. The following functions are not available: power failure-time deceleration-to-stop function, DC feeding, regenerative function, soft PWM operation selection.

FR-A741 high-end inverters with integrated power regeneration function



The FR-A741 is the latest addition to the high-performance FR-A700 series and sets new standards with an integrated power regeneration function that also improves braking performance.

Featuring a large number of innovative technologies, this compact frequency inverter delivers exceptional performance and is ideal for hoist drives and high-powered machines with torque that can be used for regenerative braking.

Compared to a frequency inverter with standard braking technology it offers decisive advantages:

- 100 % braking energy infeed
- No braking resistor required
- No external braking chopper required
- Up to 40 % less installation space, depending on the output capacity
- Integrated AC reactor
- Integrated PLC function
- PM auto tuning

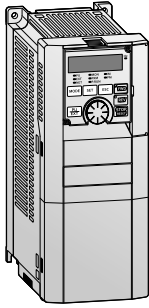
| Product line | | | FR-A741-□ | | | | | | | | | | |
|-----------------------------|---|---|---------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | | 5.5K | 7.5K | 11K | 15K | 18.5K | 22K | 30K | 37K | 45K | 55K | |
| Output | Rated motor capacity ① | kW 200 % overload capacity (ND) | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | |
| | Rated current ③ | A 200 % overload capacity (ND) | 12 | 17 | 23 | 31 | 38 | 44 | 57 | 71 | 86 | 110 | |
| | Rated output capacity ② | kVA | 9.1 | 13 | 17.5 | 23.6 | 29 | 32.8 | 43.4 | 54 | 65 | 84 | |
| | Overload capacity ④ | 150 % of rated motor capacity for 60 s; 200 % for 3 s (max. ambient temperature 50 °C) | | | | | | | | | | | |
| | Voltage ④ | 3-phase AC, 0 V to power supply voltage | | | | | | | | | | | |
| | Frequency range | Hz | 0.2–400 | | | | | | | | | | |
| Regenerative braking torque | | | 100 % continuous/150 % for 60 s | | | | | | | | | | |
| Input | Power supply voltage | 3-phase, 380–480 V AC, -15 %/+10 % | | | | | | | | | | | |
| | Voltage range | 323–528 V AC at 50/60 Hz | | | | | | | | | | | |
| | Power supply frequency | 50/60 Hz ±5 % | | | | | | | | | | | |
| | Rated input capacity ⑤ | kVA | 12 | 17 | 20 | 28 | 34 | 41 | 52 | 66 | 80 | 100 | |
| Control | Acceleration/deceleration time | 0; 0.1–3600 s (can be set individually) | | | | | | | | | | | |
| | Acceleration/deceleration characteristics | Linear or S-form course, user selectable | | | | | | | | | | | |
| | DC injection brake | Operating frequency (0–120 Hz), operating time (0–10 s) and operating voltage (0–30 %) can be set individually. The DC brake can also be activated via the digital input. | | | | | | | | | | | |
| Order information | | | Art. no. | 216905 | 216906 | 216907 | 216908 | 216909 | 217397 | 216910 | 216911 | 216912 | 216913 |

Remarks:

- ① The rated motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi Electric 4-pole standard motor.
- ② The rated output capacity indicated assumes that the output voltage is 440 V.
- ③ The % value of the overload capacity indicates the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100 % load.
- ④ The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
- ⑤ The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input choke and cables).

Frequency inverters

FR-A800 series



The FR-A800 frequency inverters combine innovative functions and reliable technology with maximum power, economy and flexibility.

The FR-A800 is the appropriate inverter for demanding drive tasks with requirements for high torque and excellent frequency precision and for positioning applications.

For applications under special environmental conditions, there is also a dust- and water-proof type available with protective structure IP55.

The wide range of functionality, like programmable PLC function, the outstanding drive features and the possibility of controlling IM and PM motors makes the inverter suitable for versatile applications like:

- Conveyor technology
- Chemical machines
- Winding machines
- Printing machines
- Cranes and lifting gear
- High-bay warehousing systems
- Extruders
- Centrifuges
- Machine tools

| Product line | | FR-A840-□-E2-60 | | | | | | | | | | | | | | | |
|--|---|---|-------------|--------|--------|--------|--------|--------|------------------------|--------|--------|--------|-------|--------|--------|--------|-------|
| | | 00023 | 00038 | 00052 | 00083 | 00126 | 00170 | 00250 | 00310 | 00380 | 00470 | 00620 | 00770 | 00930 | 01160 | | |
| Output | Rated motor capacity ^① kW | 120 % overload capacity (SLD) | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | |
| | | 150 % overload capacity (LD) | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | |
| | | 200 % overload capacity (ND) | 0.4 | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | |
| | | 250 % overload capacity (HD) | 0.2 | 0.4 | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | |
| | Rated current A | 120 % overload capacity (SLD) | I rated | 2.3 | 3.8 | 5.2 | 8.3 | 12.6 | 17 | 25 | 31 | 38 | 47 | 62 | 77 | 93 | 116 |
| | | | I max. 60 s | 2.1 | 4.2 | 5.7 | 9.1 | 13.9 | 18.7 | 27.5 | 34.1 | 41.8 | 51.7 | 68.2 | 84.7 | 102.3 | 127.6 |
| | | | I max. 3 s | 2.8 | 4.6 | 6.2 | 10.0 | 15.1 | 20.4 | 30.0 | 37.2 | 45.6 | 56.4 | 74.4 | 92.4 | 111.6 | 139.2 |
| | | 150 % overload capacity (LD) | I rated | 2.1 | 3.5 | 4.8 | 7.6 | 11.5 | 16 | 23 | 29 | 35 | 43 | 57 | 70 | 85 | 106 |
| | | | I max. 60 s | 2.5 | 4.2 | 5.8 | 9.1 | 13.8 | 19.2 | 27.6 | 34.8 | 42.0 | 51.6 | 68.4 | 84.0 | 102.0 | 127.2 |
| | | | I max. 3 s | 3.2 | 5.3 | 7.2 | 11.4 | 17.3 | 24.0 | 34.5 | 43.5 | 52.5 | 64.5 | 85.5 | 105.0 | 127.5 | 159.0 |
| | | 200 % overload capacity (ND) | I rated | 1.5 | 2.5 | 4 | 6 | 9 | 12 | 17 | 23 | 31 | 38 | 44 | 57 | 71 | 86 |
| | | | I max. 60 s | 2.3 | 3.8 | 6.0 | 9.0 | 13.5 | 18.0 | 25.5 | 34.5 | 46.5 | 57.0 | 66.0 | 85.5 | 106.5 | 129.0 |
| | | | I max. 3 s | 3.0 | 5.0 | 8.0 | 12.0 | 18.0 | 24.0 | 34.0 | 46.0 | 62.0 | 76.0 | 88.0 | 114.0 | 142.0 | 172.0 |
| | | 250 % overload capacity (HD) | I rated | 0.8 | 1.5 | 2.5 | 4 | 6 | 9 | 12 | 17 | 23 | 31 | 38 | 44 | 57 | 71 |
| | | | I max. 60 s | 1.6 | 3.0 | 5.0 | 8.0 | 12.0 | 18.0 | 24.0 | 34.0 | 46.0 | 62.0 | 76.0 | 88.0 | 114.0 | 142.0 |
| I max. 3 s | 2.0 | | 3.8 | 6.3 | 10.0 | 15.0 | 22.5 | 30.0 | 42.5 | 57.5 | 77.5 | 95.0 | 110.0 | 142.5 | 177.5 | | |
| Overload capacity ^② | SLD | 110 % of rated motor capacity for 60 s; 120 % for 3 s (max. ambient temperature 40 °C) – inverse time characteristics | | | | | | | | | | | | | | | |
| | LD | 120 % of rated motor capacity for 60 s; 150 % for 3 s (max. ambient temperature 50 °C) – inverse time characteristics | | | | | | | | | | | | | | | |
| | ND | 150 % of rated motor capacity for 60 s; 200 % for 3 s (max. ambient temperature 50 °C) – inverse time characteristics | | | | | | | | | | | | | | | |
| | HD | 200 % of rated motor capacity for 60 s; 250 % for 3 s (max. ambient temperature 50 °C) – inverse time characteristics | | | | | | | | | | | | | | | |
| Voltage ^③ | | 3-phase AC, 380–500 V to power supply voltage | | | | | | | | | | | | | | | |
| Frequency range | | 0.2–590 Hz | | | | | | | | | | | | | | | |
| Control method | | V/f; advanced magnetic flux vector, real sensorless vector (RSV), closed loop vector, PM sensorless vector control | | | | | | | | | | | | | | | |
| Brake transistor 100 % ED | | Built-in | | | | | | | | | | | | | | | |
| Maximum brake torque | regenerative | 100 % torque/2 % ED with built-in brake resistor | | | | | | | 20 % torque/continuous | | | | | | | | |
| | with FR-ABR option ^④ | 100 % torque/10 % ED | | | | | | | 100 % torque/6 % ED | | | | | | | | |
| Minimum brake resistance values ^⑤ | | Ω | 371 | 236 | 190 | 130 | 83 | 66 | 45 | 34 | 34 | 21 | 21 | 13.5 | 13.5 | 13.5 | |
| Power supply voltage | | 3-phase, 380–500 V AC, –15 %/+10 % | | | | | | | | | | | | | | | |
| Voltage range | | 323–550 V AC at 50/60 Hz (Undervoltage level is selectable by parameter.) | | | | | | | | | | | | | | | |
| Power supply frequency | | 50/60 Hz ±5 % | | | | | | | | | | | | | | | |
| Rated input current ^⑥ A | SLD | 3.2 | 5.4 | 7.8 | 10.9 | 16.4 | 22.5 | 31.7 | 40.3 | 48.2 | 58.4 | 76.8 | 97.6 | 115 | 141 | | |
| | LD | 3 | 4.9 | 7.3 | 10.1 | 15.1 | 22.3 | 31 | 38.2 | 44.9 | 53.9 | 75.1 | 89.7 | 106 | 130 | | |
| | ND | 2.3 | 3.7 | 6.2 | 8.3 | 12.3 | 17.4 | 22.5 | 31 | 40.3 | 48.2 | 56.5 | 75.1 | 91 | 108 | | |
| | HD | 1.4 | 2.3 | 3.7 | 6.2 | 8.3 | 12.3 | 17.4 | 22.5 | 31 | 40.3 | 48.2 | 56.5 | 75.1 | 91 | | |
| Power supply capacity ^⑦ kVA | SLD | 2.5 | 4.1 | 5.9 | 8.3 | 12 | 17 | 24 | 31 | 37 | 44 | 59 | 74 | 88 | 107 | | |
| | LD | 2.3 | 3.7 | 5.5 | 7.7 | 12 | 17 | 24 | 29 | 34 | 41 | 57 | 68 | 81 | 99 | | |
| | ND | 1.7 | 2.8 | 4.7 | 6.3 | 9.4 | 13 | 17 | 24 | 31 | 37 | 43 | 57 | 69 | 83 | | |
| | HD | 1.1 | 1.7 | 2.8 | 4.7 | 6.3 | 9.4 | 13 | 17 | 24 | 31 | 37 | 43 | 57 | 69 | | |
| External power supply 24 V | | 23–25.5 V DC, max. 1.4 A | | | | | | | | | | | | | | | |
| Control | Acceleration/deceleration time | 0–3600 s (can be set individually), linear or S-pattern acceleration/deceleration mode, backlash measures acceleration/deceleration can be selected. | | | | | | | | | | | | | | | |
| | Acceleration/deceleration characteristics | Linear or S-form course, user selectable | | | | | | | | | | | | | | | |
| | DC injection brake | Operating frequency (0–120 Hz), operating time (0–10 s) and operating voltage (0–30 %) can be set individually. The DC brake can also be activated via the digital input. | | | | | | | | | | | | | | | |
| Order information | Ethernet version | 297566 | 297567 | 297568 | 297569 | 297570 | 297571 | 297572 | 297573 | 297574 | 297575 | 297576 | — | — | — | | |
| | Input power frame | — | — | — | — | — | — | — | — | — | — | — | — | 307162 | 307163 | 307164 | |
| | Control card (Ethernet) | — | — | — | — | — | — | — | — | — | — | — | — | 307202 | 307202 | 307202 | |

Remarks:
Explanation for ① to ⑦ see next page.

| Product line | | FR-A840-□-E2-60 | | | | | | | | | | | | |
|--|------------------------------------|---|---|-------------|--------|--------|--------|--------|--------|--------|--------|--------|------|-----|
| | | 01800 | 02160 | 02600 | 03250 | 03610 | 04320 | 04810 | 05470 | 06100 | 06830 | | | |
| Output | Rated motor capacity ^① | 120 % overload capacity (SLD) | 75/90 | 110 | 132 | 160 | 185 | 220 | 250 | 280 | 315 | 355 | | |
| | | 150 % overload capacity (LD) | 75 | 90 | 110 | 132 | 160 | 185 | 220 | 250 | 280 | 315 | | |
| | | 200 % overload capacity (ND) | 55 | 75 | 90 | 110 | 132 | 160 | 185 | 220 | 250 | 280 | | |
| | | 250 % overload capacity (HD) | 45 | 55 | 75 | 90 | 110 | 132 | 160 | 185 | 220 | 250 | | |
| | Rated current | 120 % overload capacity (SLD) | I rated | 180 | 216 | 260 | 325 | 361 | 432 | 481 | 547 | 610 | 683 | |
| | | | I max. 60 s | 198 | 238 | 286 | 358 | 397 | 475 | 529 | 602 | 671 | 751 | |
| | | | I max. 3 s | 216 | 259 | 312 | 390 | 433 | 518 | 577 | 656 | 732 | 820 | |
| | | | 150 % overload capacity (LD) | I rated | 144 | 180 | 216 | 260 | 325 | 361 | 432 | 481 | 547 | 610 |
| | | | | I max. 60 s | 173 | 216 | 259 | 312 | 390 | 433 | 518 | 577 | 656 | 732 |
| | | | | I max. 3 s | 216 | 270 | 324 | 390 | 488 | 542 | 648 | 722 | 821 | 915 |
| | | 200 % overload capacity (ND) | I rated | 110 | 144 | 180 | 216 | 260 | 325 | 361 | 432 | 481 | 547 | |
| | | | I max. 60 s | 165 | 216 | 270 | 324 | 390 | 488 | 542 | 648 | 722 | 821 | |
| | | | I max. 3 s | 220 | 288 | 360 | 432 | 520 | 650 | 722 | 864 | 962 | 1094 | |
| | | 250 % overload capacity (HD) | I rated | 86 | 110 | 144 | 180 | 216 | 260 | 325 | 361 | 432 | 481 | |
| | | | I max. 60 s | 172 | 220 | 288 | 360 | 432 | 520 | 650 | 722 | 864 | 962 | |
| | | | I max. 3 s | 215 | 275 | 360 | 450 | 540 | 650 | 813 | 903 | 1080 | 1203 | |
| Overload capacity ^② | SLD | 110 % of rated motor capacity for 60 s; 120 % for 3 s (max. ambient temperature 40 °C) – inverse time characteristics | | | | | | | | | | | | |
| | LD | 120 % of rated motor capacity for 60 s; 150 % for 3 s (max. ambient temperature 50 °C) – inverse time characteristics | | | | | | | | | | | | |
| | ND | 150 % of rated motor capacity for 60 s; 200 % for 3 s (max. ambient temperature 50 °C) – inverse time characteristics | | | | | | | | | | | | |
| | HD | 200 % of rated motor capacity for 60 s; 250 % for 3 s (max. ambient temperature 50 °C) – inverse time characteristics | | | | | | | | | | | | |
| Voltage ^③ | | 3-phase AC, 380–500 V to power supply voltage | | | | | | | | | | | | |
| Frequency range | | 0.2–590 Hz | | | | | | | | | | | | |
| Control method | | V/f; advanced magnetic flux vector, real sensorless vector (RSV), closed loop vector, PM sensorless vector control | | | | | | | | | | | | |
| Brake transistor 100 % ED | | Built-in FR-BU2/BU-UFS (option) | | | | | | | | | | | | |
| Maximum brake torque ^⑤ | regenerative | 20 % torque/continuous | | | | | | | | | | | | |
| | with FR-ABR option ^⑥ | — | | | | | | | | | | | | |
| Minimum brake resistance values ^⑤ | | Ω | 13.5 | | | | | | | | | | | |
| Input | Power supply voltage | | 3-phase, 380–500 V AC, -15 %/+10 % | | | | | | | | | | | |
| | Voltage range | | 323–550 V AC at 50/60 Hz (Undervoltage level is selectable by parameter.) | | | | | | | | | | | |
| | Power supply frequency | | 50/60 Hz ±5 % | | | | | | | | | | | |
| | Rated input current ^⑦ | SLD | 180 | 216 | 260 | 325 | 361 | 432 | 481 | 547 | 610 | 683 | | |
| | | LD | 144 | 180 | 216 | 260 | 325 | 361 | 432 | 481 | 547 | 610 | | |
| | | ND | 134 | 144 | 180 | 216 | 260 | 325 | 361 | 432 | 481 | 547 | | |
| | | HD | 108 | 110 | 144 | 180 | 216 | 260 | 325 | 361 | 432 | 481 | | |
| | Power supply capacity ^⑧ | SLD | 137 | 165 | 198 | 248 | 275 | 329 | 367 | 417 | 465 | 521 | | |
| | | LD | 110 | 137 | 165 | 198 | 248 | 275 | 329 | 367 | 417 | 465 | | |
| | | ND | 102 | 110 | 137 | 165 | 198 | 248 | 275 | 329 | 367 | 417 | | |
| HD | | 83 | 84 | 110 | 137 | 165 | 198 | 248 | 275 | 329 | 367 | | | |
| External power supply 24 V | | 23–25.5 V DC, max. 1.4 A | | | | | | | | | | | | |
| Acceleration/deceleration time | | 0–3600 s (can be set individually), linear or S-pattern acceleration/deceleration mode, backlash measures acceleration/deceleration can be selected. | | | | | | | | | | | | |
| Acceleration/deceleration characteristics | | Linear or S-form course, user selectable | | | | | | | | | | | | |
| DC injection brake | | Operating frequency (0–120 Hz), operating time (0–10 s) and operating voltage (0–30 %) can be set individually. The DC brake can also be activated via the digital input. | | | | | | | | | | | | |
| Order information ^⑧ | Ethernet version | | — | | | | | | | | | | | |
| | Input power frame | Art. no. | 307185 | 307186 | 307187 | 307188 | 307189 | 307190 | 307191 | 307192 | 307193 | 307194 | | |
| | Control card (Ethernet) | | 307202 | 307203 | 307203 | 307203 | 307203 | 307203 | 307203 | 307203 | 307203 | 307203 | | |

Remarks:

- ① The applied motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi Electric 4-pole standard motor. The 200 % overload capacity (ND) is the factory default setting.
- ② The % value of the overload capacity indicates the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100 % load. The waiting periods can be calculated using the r.m.s. current method (I²t), which requires knowledge of the duty.
- ③ The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
- ④ The rated input capacity varies depending on the impedance values on the power supply side of the inverter (including the cables and input choke).
- ⑤ Value for the ND rating
- ⑥ The braking capability of the inverter can be improved with an optional brake resistor. Please do not use resistor values below the given minimum values.
- ⑦ The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input choke and cables) affects the rated input current.
- ⑧ All inverters with circuit board coating (IEC60721-3-3 3C2/3S2)

Frequency inverters

| Product line | | | FR-A842-□-E2-60 | | | | | | | |
|--------------------------------|---|--|---|-------------|--------|--------|--------|------|------|------|
| | | | 07700 | 08660 | 09620 | 10940 | 12120 | | | |
| Output | Rated motor capacity ^① | kW | 120 % overload capacity (SLD) | 400 | 450 | 500 | 560 | 630 | | |
| | | | 150 % overload capacity (LD) | 355 | 400 | 450 | 500 | 560 | | |
| | | | 200 % overload capacity (ND) | 315 | 355 | 400 | 450 | 500 | | |
| | | | 250 % overload capacity (HD) | 280 | 315 | 355 | 400 | 450 | | |
| | Rated current | A | 120 % overload capacity (SLD) | I rated | 770 | 866 | 962 | 1094 | 1212 | |
| | | | | I max. 60 s | 847 | 952 | 1058 | 1203 | 1333 | |
| | | | 150 % overload capacity (LD) | I max. 3 s | 924 | 1039 | 1154 | 1314 | 1454 | |
| | | | | I rated | 683 | 770 | 866 | 962 | 1094 | |
| | | | 200 % overload capacity (ND) | I max. 60 s | 820 | 924 | 1039 | 1154 | 1314 | |
| | | | | I max. 3 s | 1024 | 1155 | 1299 | 1443 | 1641 | |
| | | | 250 % overload capacity (HD) | I rated | 610 | 683 | 770 | 866 | 962 | |
| | | | | I max. 60 s | 915 | 1024 | 1155 | 1299 | 1443 | |
| | | | Rated output capacity ^② | kVA | LD | 1220 | 1366 | 1540 | 1732 | 1924 |
| | | | | | ND | 547 | 610 | 683 | 770 | 866 |
| | Overload capacity ^③ | SLD | 1094 | 1220 | 1366 | 1540 | 1732 | | | |
| | | LD | 1367 | 1525 | 1707 | 1925 | 2165 | | | |
| | | ND | 587 | 660 | 733 | 834 | 924 | | | |
| | | HD | 521 | 587 | 660 | 733 | 834 | | | |
| Voltage ^④ | | 3-phase AC, 380–500 V to power supply voltage | | | | | | | | |
| Frequency range | | 0.2–590 Hz | | | | | | | | |
| Control method | | V/f; advanced magnetic flux vector, real sensorless vector (RSV), closed loop vector, PM sensorless vector control | | | | | | | | |
| Maximum brake torque | | 10 % torque/continuous regenerative | | | | | | | | |
| Input | DC Power supply voltage | | 430–780 V DC | | | | | | | |
| | Control power supply voltage | | 2-phase AC, 380–500 V, 50/60 Hz | | | | | | | |
| | Control power supply range | | Frequency ±5 %, voltage ±10 % | | | | | | | |
| Control | External power supply 24 V | | 23–25.5 V DC, max. 1.4 A | | | | | | | |
| | Acceleration/deceleration time | | 0–3600 s (can be set individually), linear or S-pattern acceleration/deceleration mode, backlash measures acceleration/deceleration can be selected. | | | | | | | |
| | Acceleration/deceleration characteristics | | Linear or S-form course, user selectable | | | | | | | |
| | DC injection brake | | Operating frequency (0–120 Hz), operating time (0–10 s) and operating voltage (0–30 %) can be set individually. The DC brake can also be activated via the digital input. | | | | | | | |
| Order information ^⑤ | Ethernet version | | — | | | | | | | |
| | Art. no. | Input power frame | 307195 | 307196 | 307197 | 307198 | 307199 | | | |
| | | Control card (Ethernet) | 307203 | 307203 | 307203 | 307203 | 307203 | | | |

- Remarks:
- The applied motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi Electric 4-pole standard motor. The 200 % overload capacity (ND) is the factory default setting.
 - The rated output capacity indicated assumes that the output voltage is 440 V.
 - The % value of the overload capacity indicates the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100 % load. The waiting periods can be calculated using the r.m.s. current method (I^2xt), which requires knowledge of the duty.
 - The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
 - All inverters with circuit board coating (IEC60721-3-3 C2/3S2)

| Product line | | FR-A820-□-E1-N6 | | | | | | | | | | |
|---|------------------------------------|---|------------------------------------|--------|----------------------------------|--------|--------|----------------------------------|--------|------------------------|--------|-------|
| | | 00046 | 00077 | 00105 | 00167 | 00250 | 00340 | 00490 | 00630 | 00770 | | |
| Output | Rated motor capacity ^① | 120 % overload capacity (SLD) | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | |
| | | 150 % overload capacity (LD) | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.0 | |
| | | 200 % overload capacity (ND) | 0.4 | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15.0 | |
| | | 250 % overload capacity (HD) | 0.2 | 0.4 | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11.0 | |
| | Rated current | 120 % overload capacity (SLD) | I rated | 4.6 | 7.7 | 10.5 | 16.7 | 25.0 | 34.0 | 49.0 | 63.0 | 77.0 |
| | | | I max. 60 s | 5.1 | 8.5 | 11.5 | 18.4 | 27.5 | 37.4 | 53.9 | 69.3 | 84.7 |
| | | | I max. 3 s | 5.5 | 9.3 | 12.6 | 20.0 | 30.0 | 40.8 | 58.8 | 75.6 | 92.4 |
| | | 150 % overload capacity (LD) | I rated | 4.2 | 7.0 | 9.6 | 15.2 | 23.0 | 31.0 | 45.0 | 58.0 | 70.5 |
| | | | I max. 60 s | 5.0 | 8.4 | 11.5 | 18.2 | 27.6 | 37.2 | 54.0 | 69.6 | 84.6 |
| | | | I max. 3 s | 6.3 | 10.5 | 14.4 | 22.8 | 34.5 | 46.5 | 67.5 | 87.0 | 105.8 |
| | | 200 % overload capacity (ND) | I rated | 3.0 | 5.0 | 8.0 | 11.0 | 17.5 | 24.0 | 33.0 | 46.0 | 61.0 |
| | | | I max. 60 s | 4.5 | 7.5 | 12.0 | 16.5 | 26.3 | 36.0 | 49.5 | 69.0 | 91.5 |
| | | | I max. 3 s | 6.0 | 10.0 | 16.0 | 22.0 | 35.0 | 48.0 | 66.0 | 92.0 | 122.0 |
| | | 250 % overload capacity (HD) | I rated | 1.5 | 3.0 | 5.0 | 8.0 | 11.0 | 17.5 | 24.0 | 33.0 | 46.0 |
| | | | I max. 60 s | 3 | 6.0 | 10.0 | 16.0 | 22.0 | 35.0 | 48.0 | 66.0 | 92.0 |
| | | | I max. 3 s | 3.8 | 7.5 | 12.5 | 20.0 | 27.5 | 43.8 | 60.0 | 82.5 | 115.0 |
| | Rated output capacity ^② | SLD | 1.8 | 2.9 | 4.0 | 6.4 | 10.0 | 13.0 | 19.0 | 24.0 | 29.0 | |
| | | LD | 1.6 | 2.7 | 3.7 | 5.8 | 8.8 | 12.0 | 17.0 | 22.0 | 27.0 | |
| | | ND | 1.1 | 1.9 | 3.0 | 4.2 | 6.7 | 9.1 | 13.0 | 18.0 | 23.0 | |
| | | HD | 0.6 | 1.1 | 1.9 | 3.0 | 4.2 | 6.7 | 9.1 | 13.0 | 18.0 | |
| Overload capacity ^③ | SLD | 110 % of rated motor capacity for 60 s; 120 % for 3 s (max. ambient temperature 40 °C) – inverse time characteristics | | | | | | | | | | |
| | LD | 120 % of rated motor capacity for 60 s; 150 % for 3 s (max. ambient temperature 50 °C) – inverse time characteristics | | | | | | | | | | |
| | ND | 150 % of rated motor capacity for 60 s; 200 % for 3 s (max. ambient temperature 50 °C) – inverse time characteristics | | | | | | | | | | |
| | HD | 200 % of rated motor capacity for 60 s; 250 % for 3 s (max. ambient temperature 50 °C) – inverse time characteristics | | | | | | | | | | |
| Voltage ^④ | | 3-phase AC, 200–240 V to power supply voltage | | | | | | | | | | |
| Frequency range | | 0.2–590 Hz | | | | | | | | | | |
| Control method | | V/f; advanced magnetic flux vector, real sensorless vector (RSV), closed loop vector, PM sensorless vector control | | | | | | | | | | |
| Brake transistor 100 % ED | | Built-in | | | | | | | | | | |
| Maximum brake torque ^⑤ | regenerative | 150 % torque/3 % ED ^⑥ | | | 100 % torque/3 % ED ^⑥ | | | 100 % torque/2 % ED ^⑥ | | 20 % torque/continuous | | |
| | with FR-ABR option ^⑥ | 100 % ED | | | | | | | | | | |
| Input | Power supply voltage | | 3-phase, 200–240 V AC, -15 %/+10 % | | | | | | | | | |
| | Voltage range | | 170–264 V AC at 50/60 Hz | | | | | | | | | |
| | Power supply frequency | | 50/60 Hz ±5 % | | | | | | | | | |
| | Rated input capacity ^⑦ | SLD | 2.0 | 3.4 | 5.0 | 7.5 | 12.0 | 17.0 | 24.0 | 31.0 | 37.0 | |
| | | LD | 1.9 | 3.2 | 4.7 | 7.0 | 11.0 | 16.0 | 22.0 | 29.0 | 35.0 | |
| ND | | 1.5 | 2.4 | 4.0 | 5.4 | 8.6 | 13.0 | 17.0 | 23.0 | 30.0 | | |
| HD | | 0.9 | 1.5 | 2.4 | 4.0 | 5.4 | 8.6 | 13.0 | 17.0 | 23.0 | | |
| External power supply 24 V | | 23–25.5 V DC, max. 1.4 A | | | | | | | | | | |
| Acceleration/deceleration time | | 0–3600 s (can be set individually), linear or S-pattern acceleration/deceleration mode, backlash measures acceleration/deceleration can be selected. | | | | | | | | | | |
| Acceleration/deceleration characteristics | | Linear or S-form course, user selectable | | | | | | | | | | |
| DC injection brake | | Operating frequency (0–120 Hz), operating time (0–10 s) and operating voltage (0–30 %) can be set individually. The DC brake can also be activated via the digital input. | | | | | | | | | | |
| Order information ^⑧ | | Art. no. | 297613 | 297614 | 297615 | 297616 | 297617 | 297618 | 297619 | 297620 | 297621 | |

Remarks:

- ① The applied motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi Electric 4-pole standard motor. The 200 % overload capacity (ND) is the factory default setting.
- ② The rated output capacity indicated assumes that the output voltage is 220 V.
- ③ The % value of the overload capacity indicates the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100 % load. The waiting periods can be calculated using the r.m.s. current method (I²t), which requires knowledge of the duty.
- ④ The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
- ⑤ Value by the built-in brake resistor.
- ⑥ The braking capability of the inverter can be improved with an optional brake resistor. Please do not use resistor values below the given minimum values.
- ⑦ The rated input capacity varies depending on the impedance values on the power supply side of the inverter (including the cables and input choke).
- ⑧ All inverters with circuit board coating (IEC60721-3-3 3C2/3S2)
- ⑨ Value for the ND rating.

Frequency inverters

| Product line | | | FR-A820-□-E1-N6 | | FR-A820-□-E1-60 | | | FR-A820-□-E1-U6 | | | | |
|---|------------------------------------|---|---|-------------|-----------------|--------|--------|-----------------|--------|------------------------|--------|-------|
| | | | 00930 | 01250 | 01540 | 01870 | 02330 | 03160 | 03800 | 04750 | | |
| Output | Rated motor capacity ^① | kW | 120 % overload capacity (SLD) | 22 | 30 | 37 | 45 | 55 | 75 | 90/110 | 132 | |
| | | | 150 % overload capacity (LD) | 22 | 30 | 37 | 45 | 55 | 75 | 90 | 110 | |
| | | | 200 % overload capacity (ND) | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | 90 | |
| | | | 250 % overload capacity (HD) | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | |
| | Rated current | A | 120 % overload capacity (SLD) | I rated | 93 | 125 | 154 | 187 | 233 | 316 | 380 | 475 |
| | | | | I max. 60 s | 102.3 | 137.5 | 169.4 | 205.7 | 256.3 | 347.6 | 418 | 522.5 |
| | | | | I max. 3 s | 111.6 | 150 | 184.8 | 246.8 | 279.6 | 379.2 | 456 | 570 |
| | | | 150 % overload capacity (LD) | I rated | 85 | 114 | 140 | 170 | 212 | 288 | 346 | 432 |
| | | | | I max. 60 s | 102 | 136.8 | 168 | 204 | 257.4 | 345.6 | 415.2 | 518.4 |
| | | | | I max. 3 s | 127.5 | 171 | 210 | 255 | 318 | 432 | 519 | 648 |
| | | | 200 % overload capacity (ND) | I rated | 76 | 90 | 115 | 145 | 175 | 215 | 288 | 346 |
| | | | | I max. 60 s | 114 | 135 | 172.5 | 217.5 | 262.5 | 322.5 | 432 | 519 |
| | | | | I max. 3 s | 152 | 180 | 230 | 290 | 350 | 430 | 576 | 692 |
| | | | 250 % overload capacity (HD) | I rated | 61 | 76 | 90 | 115 | 145 | 175 | 215 | 288 |
| | | | | I max. 60 s | 122 | 152 | 180 | 230 | 290 | 350 | 430 | 576 |
| | | | | I max. 3 s | 152.5 | 190 | 225 | 287.5 | 362.5 | 437.5 | 537.5 | 720 |
| | Rated output capacity ^② | kVA | SLD | 35 | 48 | 59 | 71 | 89 | 120 | 145 | 181 | |
| | | | LD | 32 | 43 | 53 | 65 | 81 | 110 | 132 | 165 | |
| | | | ND | 29 | 34 | 44 | 55 | 67 | 82 | 110 | 132 | |
| | | | HD | 23 | 29 | 34 | 44 | 55 | 67 | 82 | 110 | |
| Overload capacity ^③ | SLD | 110 % of rated motor capacity for 60 s; 120 % for 3 s (max. ambient temperature 40 °C) – inverse time characteristics | | | | | | | | | | |
| | LD | 120 % of rated motor capacity for 60 s; 150 % for 3 s (max. ambient temperature 50 °C) – inverse time characteristics | | | | | | | | | | |
| | ND | 150 % of rated motor capacity for 60 s; 200 % for 3 s (max. ambient temperature 50 °C) – inverse time characteristics | | | | | | | | | | |
| | HD | 200 % of rated motor capacity for 60 s; 250 % for 3 s (max. ambient temperature 50 °C) – inverse time characteristics | | | | | | | | | | |
| Voltage ^④ | | | 3-phase AC, 200–240 V to power supply voltage | | | | | | | | | |
| Frequency range | | | 0.2–590 Hz | | | | | | | | | |
| Control method | | | V/f; advanced magnetic flux vector, real sensorless vector (RSV), closed loop vector, PM sensorless vector control | | | | | | | | | |
| Brake transistor 100 % ED | | | Built-in | | | | | | | | | |
| Maximum brake torque ^⑤ | regenerative | 20 % torque/continuous | | | | | | | | 10 % torque/continuous | | |
| | | with FR-ABR option ^⑥ | | | | | | | | 100 % ED | | |
| Power supply voltage | | | 3-phase, 200–240 V AC, -15 %/+10 % | | | | | | | | | |
| Voltage range | | | 170–264 V AC at 50/60 Hz | | | | | | | | | |
| Power supply frequency | | | 50/60 Hz ±5 % | | | | | | | | | |
| Input | Rated input capacity ^⑦ | kVA | SLD | 44 | 58 | 70 | 84 | 103 | 120 | 145 | 181 | |
| | | | LD | 41 | 53 | 68 | 79 | 97 | 110 | 132 | 165 | |
| | | | ND | 37 | 43 | 57 | 69 | 82 | 101 | 110 | 132 | |
| | | | HD | 30 | 37 | 43 | 57 | 69 | 82 | 82 | 110 | |
| External power supply 24 V | | | 23–25.5 V DC, max. 1.4 A | | | | | | | | | |
| Acceleration/deceleration time | | | 0–3600 s (can be set individually), linear or S-pattern acceleration/deceleration mode, backlash measures acceleration/deceleration can be selected. | | | | | | | | | |
| Acceleration/deceleration characteristics | | | Linear or S-form course, user selectable | | | | | | | | | |
| DC injection brake | | | Operating frequency (0–120 Hz), operating time (0–10 s) and operating voltage (0–30 %) can be set individually. The DC brake can also be activated via the digital input. | | | | | | | | | |
| Order information ^⑧ | | | Art. no. | 284532 | 284533 | 284760 | 284761 | 284762 | 284763 | 284764 | 284775 | |

- Remarks:
- The applied motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi Electric 4-pole standard motor. The 200 % overload capacity (ND) is the factory default setting.
 - The rated output capacity indicated assumes that the output voltage is 220 V.
 - The % value of the overload capacity indicates the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100 % load. The waiting periods can be calculated using the r.m.s. current method (I^2xt), which requires knowledge of the duty.
 - The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
 - The braking capability of the inverter can be improved with an optional brake resistor. Please do not use resistor values below the given minimum values.
 - The rated input capacity varies depending on the impedance values on the power supply side of the inverter (including the cables and input choke).
 - All inverters with circuit board coating (IEC60721-3-3 3C2/3S2)
 - Value for the ND rating.

| Product line | | FR-A860-□-1-N6 | | | | | | | |
|--|---|--|---|--------|---|--------|--------|--------|------|
| | | 00027 | 00061 | 00090 | 00170 | 00320 | 00450 | | |
| Output | Rated motor capacity ^① kW | 120 % overload capacity (SLD) | 1.5 | 3.7 | 5.5 | 11 | 18.5 | 30 | |
| | | 150 % overload capacity (LD) | 1.5 | 3.7 | 5.5 | 11 | 18.5 | 30 | |
| | | 200 % overload capacity (ND) | 0.75 | 2.2 | 3.7 | 7.5 | 15 | 22 | |
| | | 250 % overload capacity (HD) | 0.4 | 1.5 | 2.2 | 5.5 | 11 | 18.5 | |
| | Rated current ^② A | 120 % overload capacity (SLD) | I rated | 2.7 | 6.1 | 9 | 14.4 | 27.2 | 45 |
| | | | I max. 60 s | 2.97 | 6.71 | 9.9 | 15.84 | 29.92 | 49.5 |
| | | | I max. 3 s | 3.24 | 7.32 | 10.8 | 17.28 | 32.64 | 54 |
| | | 150 % overload capacity (LD) | I rated | 2.5 | 5.6 | 8.2 | 16 | 27 | 41 |
| | | | I max. 60 s | 3 | 6.72 | 9.84 | 19.2 | 32.4 | 49.2 |
| | | | I max. 3 s | 3.75 | 8.4 | 12.3 | 24 | 40.5 | 61.5 |
| | | 200 % overload capacity (ND) | I rated | 1.7 | 4 | 6.1 | 12 | 22 | 33 |
| | | | I max. 60 s | 2.55 | 6 | 9.15 | 18 | 33 | 49.5 |
| | | | I max. 3 s | 3.4 | 8 | 12.2 | 24 | 44 | 66 |
| | | 250 % overload capacity (HD) | I rated | 1 | 2.7 | 4 | 9 | 16 | 24 |
| | | | I max. 60 s | 2 | 5.4 | 8 | 18 | 32 | 48 |
| | | | I max. 3 s | 2.5 | 6.75 | 10 | 22.5 | 40 | 60 |
| | Rated output capacity ^③ kVA | SLD | 2.7 | 6.1 | 9 | 17 | 32 | 45 | |
| | | LD | 2.5 | 5.6 | 8.2 | 16 | 27 | 41 | |
| | | ND | 1.7 | 4 | 6.1 | 12 | 22 | 33 | |
| | | HD | 1 | 2.7 | 4 | 9 | 16 | 24 | |
| Overload capacity ^④ | SLD | 110 % of rated motor capacity for 60 s; 120 % for 3 s (max. ambient temperature 40 °C) – inverse time characteristics | | | 110 % of rated motor capacity for 60 s; 120 % for 3 s (max. ambient temperature 30 °C) – inverse time characteristics | | | | |
| | LD | 120 % of rated motor capacity for 60 s; 150 % for 3 s (max. ambient temperature 50 °C) – inverse time characteristics | | | | | | | |
| | ND | 150 % of rated motor capacity for 60 s; 200 % for 3 s (max. ambient temperature 50 °C) – inverse time characteristics | | | | | | | |
| | HD | 200 % of rated motor capacity for 60 s; 250 % for 3 s; 280 % for 0.5 s (max. ambient temperature 50 °C) – inverse time characteristics | | | | | | | |
| Voltage ^⑤ | | 3-phase AC, 525–600 V to power supply voltage | | | | | | | |
| Frequency range | | 0.2–590 Hz | | | | | | | |
| Control method | | V/f; advanced magnetic flux vector, real sensorless vector (RSV), closed loop vector, PM sensorless vector control | | | | | | | |
| Brake transistor 100 % ED | | Built-in | | | | | | | |
| Maximum brake torque ^⑥ regenerative | | 20 % torque/continuous | | | | | | | |
| Input | Power supply voltage | | 3-phase, 525–600 V AC at 60 Hz | | | | | | |
| | Voltage range | | 472–660 V AC at 60 Hz | | | | | | |
| | Power supply frequency | | 60 Hz ±5 % | | | | | | |
| | Rated input capacity ^⑦ kVA | SLD | 4.7 | 10.6 | 15 | 26.7 | 42.4 | 60.6 | |
| | | LD | 4.4 | 9.8 | 13.8 | 25.2 | 35.8 | 54.4 | |
| ND | | 3 | 7 | 10.3 | 18.9 | 29.2 | 43.8 | | |
| HD | | 1.8 | 4.7 | 6.7 | 14.2 | 21.2 | 31.9 | | |
| Control | External power supply 24 V | | 23–25.5 V DC, max. 1.4 A | | | | | | |
| | Acceleration/deceleration time | | 0–3600 s (can be set individually), linear or S-pattern acceleration/deceleration mode, backlash measures acceleration/deceleration can be selected. | | | | | | |
| | Acceleration/deceleration characteristics | | Linear or S-form course, user selectable | | | | | | |
| | DC injection brake | | Operating frequency (0–120 Hz), operating time (0–10 s) and operating voltage (0–30 %) can be set individually. The DC brake can also be activated via the digital input. | | | | | | |
| Order information | | Art. no. | 286057 | 286058 | 286059 | 286060 | 286061 | 286062 | |

Remarks:
Explanation for ① to ⑦ see next page.

Frequency inverters

| Product line | | | FR-A860-□-1-60 | | | | | | | | | |
|--|------------------------------------|-----|---|-------------|--------|--------|---|--------|--------|------------------------|--------|-------|
| | | | 00680 | 01080 | 01440 | 01670 | 02430 | 02890 | 03360 | 04420 | | |
| Output | Rated motor capacity ^① | kW | 120 % overload capacity (SLD) | 45 | 75 | 90 | 110 | 132 | 160 | 220 | 250 | |
| | | | 150 % overload capacity (LD) | 45 | 75 | 90 | 110 | 132 | 160 | 220 | 250 | |
| | | | 200 % overload capacity (ND) | 37 | 55 | 75 | 90 | 110 | 132 | 185 | 220 | |
| | | | 250 % overload capacity (HD) | 30 | 45 | 55 | 75 | 90 | 110 | 160 | 185 | |
| | Rated current ^② | A | 120 % overload capacity (SLD) | I rated | 68 | 108 | 144 | 167 | 242 | 288 | 335 | 441 |
| | | | | I max. 60 s | 74.8 | 118.8 | 158.4 | 183.7 | 266.2 | 316.8 | 368.5 | 485.1 |
| | | | | I max. 3 s | 81.6 | 129.6 | 172.8 | 200.4 | 290.4 | 345.6 | 402 | 529.2 |
| | | | 150 % overload capacity (LD) | I rated | 62 | 99 | 131 | 152 | 221 | 254 | 303 | 401 |
| | | | | I max. 60 s | 74.4 | 118.8 | 157.2 | 182.4 | 265.2 | 304.8 | 363.6 | 481.2 |
| | | | | I max. 3 s | 93 | 148.5 | 196.5 | 228 | 331.5 | 381 | 454.5 | 601.5 |
| | | | 200 % overload capacity (ND) | I rated | 55 | 84 | 104 | 131 | 152 | 221 | 254 | 303 |
| | | | | I max. 60 s | 82.5 | 126 | 156 | 196.5 | 228 | 331.5 | 381 | 454.5 |
| | | | | I max. 3 s | 110 | 168 | 208 | 262 | 304 | 442 | 508 | 606 |
| | | | 250 % overload capacity (HD) | I rated | 41 | 63 | 84 | 104 | 131 | 152 | 202 | 254 |
| | | | | I max. 60 s | 82 | 126 | 168 | 208 | 262 | 304 | 404 | 508 |
| | | | | I max. 3 s | 102.5 | 157.5 | 210 | 260 | 327.5 | 380 | 505 | 635 |
| | Rated output capacity ^③ | kVA | SLD | 68 | 108 | 144 | 167 | 242 | 288 | 335 | 441 | |
| | | | LD | 62 | 99 | 131 | 152 | 221 | 254 | 303 | 401 | |
| | | | ND | 55 | 84 | 104 | 131 | 152 | 221 | 254 | 303 | |
| | | | HD | 41 | 63 | 84 | 104 | 131 | 152 | 202 | 254 | |
| Overload capacity ^④ | | SLD | 110 % of rated motor capacity for 60 s; 120 % for 3 s (max. ambient temperature 50 °C) – inverse time characteristics | | | | | | | | | |
| | | LD | 120 % of rated motor capacity for 60 s; 150 % for 3 s (max. ambient temperature 40 °C) – inverse time characteristics | | | | 120 % of rated motor capacity for 60 s; 150 % for 3 s (max. ambient temperature 50 °C) – inverse time characteristics | | | | | |
| | | ND | 150 % of rated motor capacity for 60 s; 200 % for 3 s (max. ambient temperature 40 °C) – inverse time characteristics | | | | 150 % of rated motor capacity for 60 s; 200 % for 3 s (max. ambient temperature 50 °C) – inverse time characteristics | | | | | |
| | | HD | 200 % of rated motor capacity for 60 s; 250 % for 3 s; 280 % for 0.5 s (max. ambient temperature 40 °C) – inverse time characteristics | | | | | | | | | |
| Voltage ^⑤ | | | 3-phase AC, 525–600 V to power supply voltage | | | | | | | | | |
| Frequency range | | | 0.2–590 Hz | | | | | | | | | |
| Control method | | | V/f; advanced magnetic flux vector, real sensorless vector (RSV), closed loop vector, PM sensorless vector control | | | | | | | | | |
| Brake transistor 100 % ED | | | Built-in | | | | | | | | | |
| Maximum brake torque ^⑥ regenerative | | | 20 % torque/continuous | | | | | | | 20 % torque/continuous | | |
| Input | Power supply voltage | | 3-phase, 525–600 V AC at 60 Hz | | | | | | | | | |
| | Voltage range | | 472–660 V AC at 60 Hz | | | | | | | | | |
| | Power supply frequency | | 60 Hz ±5 % | | | | | | | | | |
| | Rated input capacity ^⑦ | A | SLD | 86.8 | 107.6 | 143 | 166 | 245 | 288 | 335 | 440 | |
| | | | LD | 79.1 | 98.6 | 130 | 151 | 220 | 254 | 303 | 400 | |
| ND | | | 70.2 | 107.6 | 104 | 130 | 151 | 220 | 254 | 303 | | |
| HD | | | 52.3 | 80.7 | 84 | 104 | 130 | 151 | 201 | 254 | | |
| External power supply 24 V | | | 23–25.5 V DC, max. 1.4 A | | | | | | | | | |
| Acceleration/deceleration time | | | 0–3600 s (can be set individually), linear or S-pattern acceleration/deceleration mode, backlash measures acceleration/deceleration can be selected. | | | | | | | | | |
| Acceleration/deceleration characteristics | | | Linear or S-form course, user selectable | | | | | | | | | |
| DC injection brake | | | Operating frequency (0–120 Hz), operating time (0–10 s) and operating voltage (0–30 %) can be set individually. The DC brake can also be activated via the digital input. | | | | | | | | | |
| Order information | | | Art. no. | 286063 | 286064 | 286065 | 286066 | 286067 | 286068 | 286069 | 286070 | |

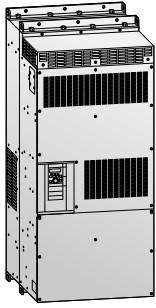
- Remarks:
- The applied motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi Electric 4-pole standard motor. The 200 % overload capacity (ND) is the factory default setting.
 - The rated output capacity indicated assumes that the output voltage is 575 V.
 - When an operation is performed with the carrier frequency set to 3 kHz or more, and the inverter output current reaches the value indicated in the parenthesis, the carrier frequency is automatically lowered. The motor noise becomes louder accordingly.
 - The % value of the overload capacity indicates the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100 % load. The waiting periods can be calculated using the r.m.s. current method (I^2xt), which requires knowledge of the duty.
 - The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
 - Value by the built-in brake resistor.
 - The rated input capacity varies depending on the impedance values on the power supply side of the inverter (including the cables and input choke).

| Product line | | FR-A862-□-1-60 | | | | | |
|------------------------|---|---|--|-------------|--------|-------|--------|
| | | 05450 | 06470 | 08500 | | | |
| Output | Rated motor capacity ① | kW | 120 % overload capacity (SLD) | 400 | 450 | 630 | |
| | | | 150 % overload capacity (LD) | 355 | 400 | 560 | |
| | | | 200 % overload capacity (ND) | 280 | 355 | 450 | |
| | | | 250 % overload capacity (HD) | 220 | 280 | 400 | |
| | Rated current ② | A | 120 % overload capacity (SLD) | I rated | 545 | 647 | 850 |
| | | | | I max. 60 s | 599.5 | 711.7 | 935 |
| | | | | I max. 3 s | 654 | 776.4 | 1020 |
| | | | 150 % overload capacity (LD) | I rated | 496 | 589 | 773 |
| | | | | I max. 60 s | 595.2 | 706.8 | 927.6 |
| | | | | I max. 3 s | 744 | 883.5 | 1159.5 |
| | | | 200 % overload capacity (ND) | I rated | 402 | 496 | 663 |
| | | | | I max. 60 s | 603 | 744 | 994.5 |
| | | | | I max. 3 s | 804 | 992 | 1326 |
| | | | 250 % overload capacity (HD) | I rated | 304 | 402 | 589 |
| | | | | I max. 60 s | 608 | 804 | 1178 |
| | | | | I max. 3 s | 760 | 1005 | 1472.5 |
| | Rated output capacity ③ | kVA | SLD | 543 | 645 | 847 | |
| | | | LD | 494 | 587 | 770 | |
| | | | ND | 401 | 494 | 661 | |
| HD | | | 302 | 401 | 578 | | |
| Overload capacity ④ | | SLD | 110 % of rated motor capacity for 60 s; 120 % for 3 s (max. ambient temperature 40 °C) – inverse time characteristics | | | | |
| | | LD | 120 % of rated motor capacity for 60 s; 150 % for 3 s (max. ambient temperature 50 °C) – inverse time characteristics | | | | |
| | | ND | 150 % of rated motor capacity for 60 s; 200 % for 3 s (max. ambient temperature 50 °C) – inverse time characteristics | | | | |
| | | HD | 200 % of rated motor capacity for 60 s; 250 % for 3 s; 280 % for 0.5 s (max. ambient temperature 50 °C) – inverse time characteristics | | | | |
| Voltage ⑤ | | 3-phase AC, 525–600 V to power supply voltage | | | | | |
| Frequency range | | 0.2–590 Hz | | | | | |
| Control method | | V/f; advanced magnetic flux vector, real sensorless vector (RSV), closed loop vector, PM sensorless vector control | | | | | |
| Maximum brake torque ⑥ | regenerative | 10 % torque/continuous | | | | | |
| Input | DC power supply voltage | | 618–933 V DC | | | | |
| | Control power supply voltage | | 1-phase, 525–600 V AC, 50/60 Hz | | | | |
| | Control power supply range | | Frequency ±5 %, voltage ±10 % | | | | |
| Control | External power supply 24 V | | 23–25.5 V DC, max. 1.4 A | | | | |
| | Acceleration/deceleration time | | 0–3600 s (can be set individually), linear or S-pattern acceleration/deceleration mode, backlash measures acceleration/deceleration can be selected. | | | | |
| | Acceleration/deceleration characteristics | | Linear or S-form course, user selectable | | | | |
| DC injection brake | | Operating frequency (0–120 Hz), operating time (0–10 s) and operating voltage (0–30 %) can be set individually. The DC brake can also be activated via the digital input. | | | | | |
| Order information | | Art. no. | 286240 | 286241 | 286242 | | |

Remarks:
 Explanation for ① to ⑥ see a page before.

Frequency inverters

Converter module FR-CC2



The converter module FR-CC2 is a diode converter unit. The FR-CC2-H has to be used together with the FR-A842, the FR-CC2-C together with the FR-A862 inverter unit. The separation of the inverter and the converter module allows flexible design of different systems such as parallel drive and common bus line to reduce cost and to minimize installation space.

At a rated motor capacity of 220 kW and higher the frequency inverter is divided in a converter unit (FR-CC2) and an inverter unit (FR-A842/FR-A862). Both units are connected via DC bus. The FR-CC2 supports a 12 pulse connection with additional phase-shifting transformers for reducing low-degree harmonic currents.

| Product line | | FR-CC2-H□K-60 | | | | | | | |
|-------------------|--------------------------------------|---------------|------------------------------------|--------|--------|--------|--------------------------|--------------------------|--------------------------|
| | | 315K | 355K | 400K | 450K | 500K | 560K | 630K | |
| Output | Rated motor capacity | kW | 315 | 355 | 400 | 450 | 500 | 560 | 630 |
| | Overload current rating ^① | | 200 % 60 s, 250 % 3 s | | | | 150 % 60 s, 200 % 3 s | 120 % 60 s, 150 % 3 s | 110 % 60 s, 120 % 3 s |
| | Voltage ^② | | 430–780 V ^③ | | | | | | |
| Input | Power supply voltage | | 3-phase, 380–500 V AC, -15 %/+10 % | | | | | | |
| | Voltage range | | 323–550 V AC at 50/60 Hz | | | | | | |
| | Power supply frequency | | 50/60 Hz ±5 % | | | | | | |
| | Rated input capacity ^③ | kVA | 465 | 521 | 587 | 660 | 733 | 833 | 924 |
| Order information | | Art. no. | 274507 | 274508 | 274509 | 274510 | 274511 | 279637 | 279638 |

| Product line | | FR-CC2-C□K-60 | | | | |
|----------------------|--------------------------------------|---------------------------|--|--------|--------|-----|
| | | 355 | 400 | 560 | | |
| Output | Rated motor capacity | kW | 355 | 400 | 560 | |
| | Overload current rating ^① | SLD | 110 % of rated motor capacity for 60 s; 120 % for 3 s (max. ambient temperature 40 °C) – inverse time characteristics | | | |
| | | LD | 120 % of rated motor capacity for 60 s; 150 % for 3 s (max. ambient temperature 50 °C) – inverse time characteristics | | | |
| | | ND | 150 % of rated motor capacity for 60 s; 200 % for 3 s (max. ambient temperature 50 °C) – inverse time characteristics | | | |
| | | HD | 200 % of rated motor capacity for 60 s; 250 % for 3 s; 280 % for 0.5 s (max. ambient temperature 40 °C) – inverse time characteristics | | | |
| Voltage ^② | | 618–933 V DC ^③ | | | | |
| Input | Power supply voltage | | 3-phase, 525–600 V AC, -15 %/+10 % | | | |
| | Voltage range | | 323–550 V AC at 50/60 Hz | | | |
| | Power supply frequency | | 60 Hz ±5 % | | | |
| | Rated input capacity ^③ | SLD | kVA | 543 | 644 | 847 |
| | | LD | | 494 | 587 | 770 |
| ND | | | 400 | 494 | 660 | |
| HD | | | 303 | 400 | 587 | |
| Order information | | Art. no. | 286237 | 286238 | 286239 | |

- ① The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the converter unit and the inverter to return to or below the temperatures under 100 % load.
- ② The converter unit output voltage varies according to the input power supply voltage and the load. The maximum point of the voltage waveform at the converter unit output side is approximately the power supply voltage multiplied by $\sqrt{2}$.
- ③ The power supply capacity is the value at the rated output current. It varies by the impedance at the power supply side (including those of the input choke and cables).
- ④ The permissible voltage imbalance ratio is 3 % or less. (Imbalance ratio = (highest voltage between lines – average voltage between three lines)/average voltage between three lines x100)

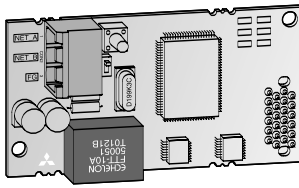
Compatible inverters

The table below shows the inverter models compatible with the FR-CC2 converter units.

| Motor capacity [kW] ^① | Converter unit FR-CC2-H□ | Inverter | | | | | | | | | | | |
|----------------------------------|--------------------------|-----------------------|-------------------|-----------------|-------------------|---------------------------------|-------------------|-----------------|-------------------|-------|-------|-------|-----|
| | | SLD (superlight duty) | | LD (light duty) | | ND (normal duty, initial value) | | HD (heavy duty) | | | | | |
| | | Model FR-A842-□ | Rated current [A] | Model FR-A842-□ | Rated current [A] | Model FR-A842-□ | Rated current [A] | Model FR-A842-□ | Rated current [A] | | | | |
| 280 | 315K | — | — | — | — | — | — | — | 315K | 07700 | 547 | | |
| 315 | 315K | — | — | — | — | 315K | 07700 | 610 | 355K | 08660 | 610 | | |
| 355 | 355K | — | — | 315K | 07700 | 683 | 355K | 08660 | 683 | 400K | 09620 | 683 | |
| 400 | 400K | 315K | 07700 | 770 | 355K | 08660 | 770 | 400K | 09620 | 770 | 450K | 10940 | 770 |
| 450 | 450K | 355K | 08660 | 866 | 400K | 09620 | 866 | 450K | 10940 | 866 | 500K | 12120 | 866 |
| 500 | 500K | 400K | 09620 | 962 | 450K | 10940 | 962 | 500K | 12120 | 962 | — | — | — |

① The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi Electric 4-pole standard motor.

Internal and external options



A large number of options allows an individual adoption of the inverter to the according task. The options can be installed quickly and easily. Detailed information on installation and functions is included in the manual of the options.

The options can be divided into two major categories:

- Internal options
- External options

Internal options

The internal options comprise input and output extensions as well as communications options supporting the operation of the inverter within a network or connected to a personal computer or PLC.

External options

In addition to the parameter unit that enables interactive operation of the frequency inverter the available external options also include additional EMC noise filters, chokes for improving efficiency and brake units with brake resistors.

| Option | Description | FR-D700 SC | FR-E700 SC | FR-F800 | FR-A700 | FR-A800 | FR-HC2 |
|--|--|--|------------|---------|---------|---------|--------|
| Digital input | Input of the frequency setting via BCD or binary code | — | ● | ● | ● | ● | — |
| Digital output | Selectable standard output signals of the inverter can be output at the open collector. | — | ● | ● | ● | ● | — |
| Expansion analog output | Selectable additional signals can be output and indicated at the analog output. | — | ● | ● | ● | ● | — |
| Relay output | Selectable standard output signals of the inverter can be output through relay terminals. | — | ● | ● | ● | ● | — |
| Orientation control, encoder feedback (PLG), vector and master slave control | These options are used for position control, precise speed control and master/slave control. | — | — | — | ● | ● | — |
| Internal options | CC-Link | Integration of a frequency inverter into a CC-Link. | — | ● | ● | ● | ● |
| | CC-Link IE Field | Integration of a frequency inverter into a CC-Link IE Field network. | — | — | — | ● | — |
| | CC-Link IE Field Basic | Integration of a frequency inverter into a CC-Link IE Field Basic network. | — | — | ● | — | — |
| | Modbus®/TCP | Integration of a frequency inverter into a Modbus®/TCP network. | — | ● | ● | ● | ● |
| | EtherNet/IP | Integration of a frequency inverter into a EtherNet/IP network. | — | ● | ● | ● | ● |
| | EtherCat | Integration of a frequency inverter into a EtherCat network. | — | ● | ● | ● | — |
| | LonWorks | Integration of a frequency inverter into a LonWorks network. | — | ● | ● | ● | — |
| | Profibus DPV1 | Integration of a frequency inverter into a Profibus DPV1 network. | — | — | ● | — | — |
| | Profibus DP PPO | Integration of a frequency inverter into a Profibus DP PPO network. | — | ● | ● | ● | — |
| | Profinet | Integration of a frequency inverter into a Profinet network. | — | ● | ● | ● | ● |
| | DeviceNet™ | Integration of a frequency inverter into a DeviceNet™. | — | ● | ● | ● | — |
| | SSCNET III/H | Integration of a frequency inverter into a SSCNET III/H. | — | — | — | ● | — |
| | CAN Bus | Integration of a frequency inverter into a CAN Bus network | — | — | ● | — | — |
| | RS485 multi-protocol | RS485 multi-protocol interface card | — | — | ● | ● | — |

| Option | Description | FR-D700 SC | FR-E700 SC | FR-F800 | FR-A700 | FR-A800 |
|-----------------------------------|--|------------|------------|---------|---------|---------|
| Parameter unit (8 languages) | Interactive parameter unit with LC display. | ● | ● | ● | ● | ● |
| FR-Configurator software | Parameterization and setup software for the Mitsubishi Electric inverter series. | ● | ● | ● | ● | ● |
| EMC noise filter | Noise filter for compliance with EMC directives. | ● | ● | ● | ● | ● |
| Brake unit | For an improvement of the brake capacity. For high inertia loads and active loads. Used in combination with a resistor unit. | ● | ● | ● | ● | ● |
| External high-duty brake resistor | To improve the brake capacity; used in combination with the internal brake transistor. | ● | ● | — | ● | ● |
| DC choke AC chokes | For increased efficiency, reduction of mains feedback and compensation of voltage fluctuations. | ● | ● | ● | ● | ● |
| Floor standing unit FSU | IP20 physical contact protection in a freely-locatable floor-standing unit. Detailed information on request. | — | — | ● | ● | ● |
| Harmonic filter module | Passive harmonic filter to reduce mains pollution | ● | ● | ● | ● | ● |
| Regenerative unit | Regeneration of electrical energy in short-term operation (ED <50 %) | ● | ● | ● | ● | ● |
| Regenerative unit | Regeneration of electrical energy in short-term operation (ED =100 %) | ● | ● | ● | ● | ● |
| Harmonic converter | For power supply and regeneration of electrical energy (ED = 100 %) | ● | ● | ● | ● | ● |
| Communications Profibus DP | High speed converter for Profibus DP to RS485 inverter protocol | ● | ● | ● | ● | ● |



Servo and motion systems

Mitsubishi Electric offers a variety of servo and motion system products providing solutions for applications covering point-to-point and synchronised systems. Systems can be built using a single axis or multi-axes, for example when using a MELSEC iQ-R motion CPU solution up to 192 axes can be controlled.

Therefore operation is possible by standard pulse train outputs as well as by different networks like SSCNET III/H, CC-Link IE Field, CC-Link IE Field Basic, EtherCAT, PROFINET und EtherNet/IP™.

The servo motors and amplifiers take Mitsubishi Electric Motion Control to new levels of precision with a wide range of motors and a wide range of amplifiers (up to 220 kW).

All MR-JE series motors are fitted with 131,072 pulse-per-revolution encoders, all MR-J4 series motors with 4,194,304 pulse-per-revolution encoders.

All Mitsubishi Electric servo and motion system hardware is complimented by a range of software packages allowing easy programming and set-up of the units.

What are the components of a MR-J4 servo system?

Servo motors

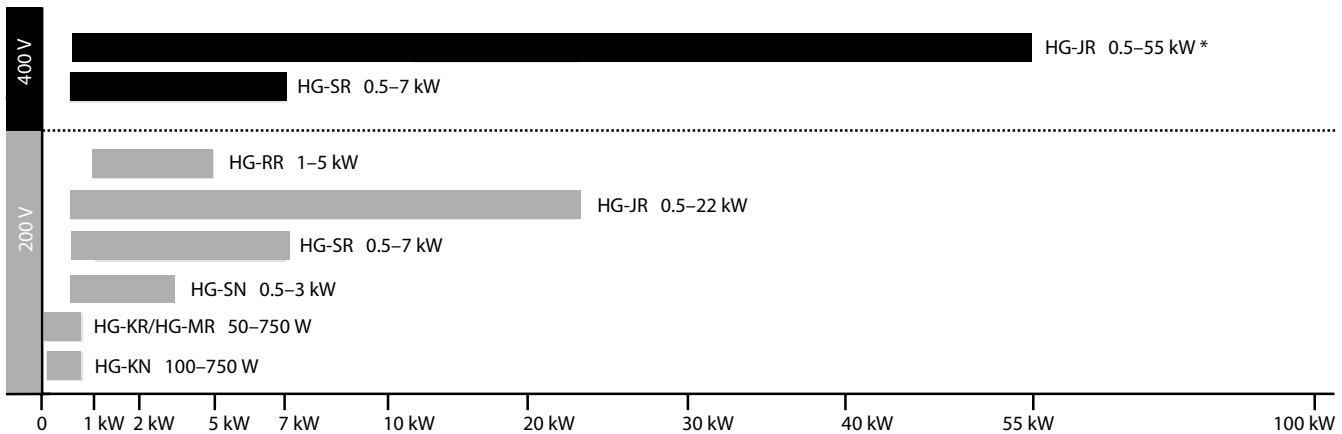
Utilising the most advanced concentrated winding techniques and latest technology, these brushless servo motors are among the most compact on the market.

Mitsubishi Electric servo motors are made to high standards and offer a wide range of power, speed and inertia ratings providing a motor for all applications. With a range from 50 W to 55 kW

and with a considerable number of motor types like rotary, linear and direct drive servo motors a complete line-up of products can be offered by Mitsubishi Electric.

Also, all motors in the MR-J4 series are fitted with absolute encoders as standard. Therefore, an absolute position system can be created by simply providing power to servo amplifier via

a battery. Once this has been done the super capacitor inside the motor and back-up battery allow the servo motor position to be constantly monitored.



* For order information about servo motors higher than 22 kW, please contact your Mitsubishi Electric representative

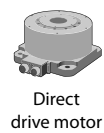
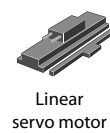
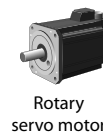
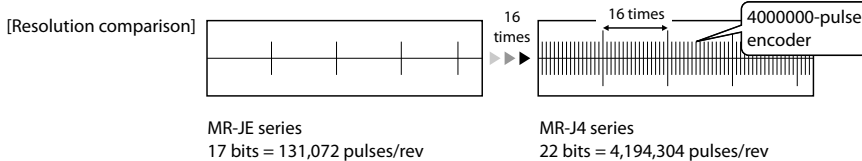
Improving machine performance with high-performance motors

To raise your machine on a high productive level, you need not only powerful servo amplifiers but also high performance servo motors. These motors have to support the high encoder resolution of 22 bits with the MR-J4 series for improved accuracy and speed. Fully closed loop control is supported as standard. A variety of models is available to match various applications.

Rotary servo motors achieve high-accuracy, high-torque output during high speed positioning and smooth rotation with a high resolution encoder and improved processing speed. Linear servo motors support highly accurate tandem synchronous control. Direct drive motors are used for compact and rigid machine and high-torque operations.

For rough environment conditions some motor series are also available with higher protection class like IP65 or IP67.

The MR-J4 series servo amplifiers are able to operate rotary servo motors, linear servo motors, and direct drive motors as standard.



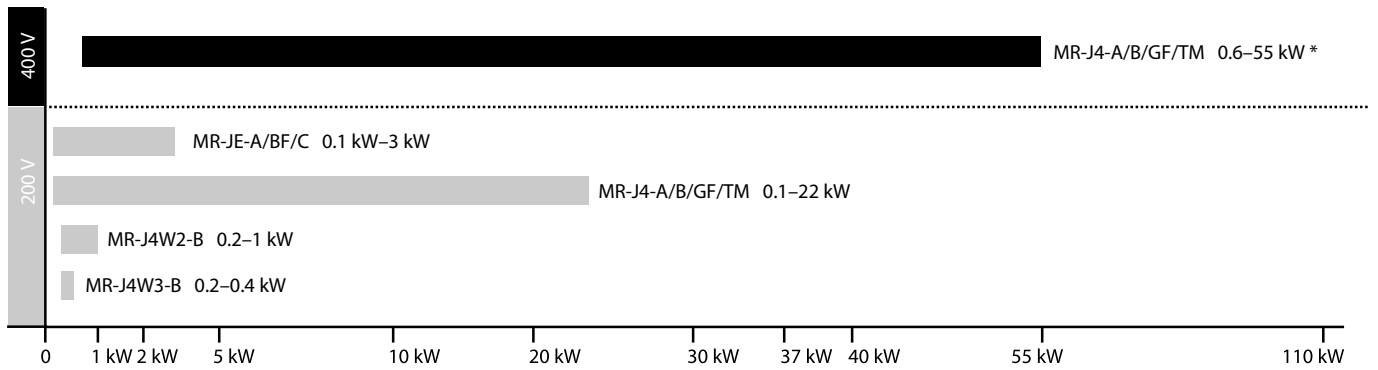
Servo amplifiers

Mitsubishi Electric offers a wide range of servo amplifiers to meet the demands of all types of applications. From standard digital pulse and analogue controlled amplifiers through to dedicated network bus type amplifiers, there is a product for all circumstances.

Real Time Adaptive Tuning (RTAT) is a unique Mitsubishi Electric technology, enabling the servo to deliver maximum dynamic performance, even if the load keeps changing, by automatically tuning online (during operation) to the application.

The digital pulse-train and analogue units of the MR-JE and the MR-J4 series from 100 W to 55 kW ab. The SSCNET III/H bus type amplifiers (type MR-J4-B/MR-JE-BF series) offer the user ease of connectivity, via SSCNET III/H.

Whereby the MR-J4-TM supports Ethernet based open network communication and MR-J4-GF communicates via CC Link IE Field.



* For order information about servo amplifiers higher than 22 kW, please contact your Mitsubishi Electric representative

Positioning controllers

For the compact, cost effective, FX range of PLCs, the FX2N-10PG unit provides single-axis control with built-in positioning tables, fast external start and an output pulse rate of up to 1 MHz. The module FX3U-20SSC-H is a positioning module for the MR-J4-B series. This module provides a quick and easy, but efficient positioning control system for simpler applications.

For larger and more complex applications the MELSEC iQ F series, MELSEC iQ-R series, MELSEC L series and MELSEC System Q provide numerous positioning and Simple Motion modules (1, 2, 4 and 16 axes).

These are: open-collector output type (LD75P/QD75P/RD77P series), differential output type (LD75D/QD75DN/RD77D series) and SSCNET III bus type (FX3U-20SSC-H), SSCNET III/H bus type (LD77MS/QD77MS).

Using the SSCNET III/H system can provide much improved, easier to use positioning systems, with reduced wiring and better noise immunity. All positioning modules provide functions such as interpolation, speed control and positioning operations, etc. For advanced motion applications like axes synchronisation and CAM control the Simple Motion modules (FX5-□SSC-S/LD77/QD77/RD77) are available.

Additionally the simple motion modules of the MELSEC iQ-R series and MELSEC System Q provide a CC-Link IE Field interface.

Motion Controllers

For specialist applications requiring the highest level of control and precision, the dynamic servo technology provided by the iQ-R motion CPU is combined with the powerful processing power of the MELSEC iQ-R PLC CPU, creating a completely new generation of Motion Controller products.

This fully integrated and flexible system has the capability to control up to 192 axes using SSCNET III/H, which is more than capable for handling any motion application.

Advanced one-touch tuning function

Servo gain adjustment for precise vibration suppression control can be done only by one touch. Machine resonance suppression filter, advanced vibration suppression control II (adjustment for one frequency), and robust filter are adjusted just by turning on this function. The advanced vibration suppression control function enables the machine to operate with high speed at the highest performance.

Advanced vibration suppression control II

The vibration suppression algorithm supports a three-inertia system so that two types of low frequency vibrations are suppressed at the same time. For adjustment the setup software MR Configurator2 is used. This function is effective in suppressing vibration at the end of an arm and in reducing residual vibration in a machine. Droop pulses are reduced to a minimum.

Machine diagnosis function

This function is a powerful monitoring and maintenance support tool. It detects changes of machine parts (ball screw, guide, bearing, belt, etc.) by analyzing machine friction, load moment of inertia, unbalanced torque, and changes in vibration component from the data inside the servo amplifier. Monitoring is done with the setup software MR Configurator2. Timely maintenance of wear parts will be indicated before breakdown.

Servo and motion systems

Multi-axis servo amplifier

2-axis and 3-axis servo amplifiers are available for operating two and three servo motors, respectively. They are designed to cut waste and save on space, wiring, and energy use. The 2-axis servo amplifier MR-J4W2-B requires 26 % less installation space than two units of MR-J4-B, and the 3-axis servo amplifier MR-J4W3-B requires

30 % less installation space than three units of MR-J4-B. Wiring of the 3-axis type is reduced by approx. 50 %, because the three axes use the same connections for main and control circuit power, peripheral equipment, control signal wire, etc. These multi-axis servo amplifiers enable energy-conservative and compact

machine design at lower cost. Different types of servo motors including rotary servo motors, linear servo motors, and direct drive motors are freely combined as long as the servo motors are compatible with the servo amplifier.

MR-J4-□A

(General-purpose interface compatible/ Built-in positioning function)

Pulse train and analog input, etc., are provided as a standard for the command interface. The control mode can be switched accordingly for position, speed or torque control.

The MR-J4-A-RJ has an integrated positioning function. A simple positioning system can be configured without a con-troller such as positioning module.

Safety functions according EN IEC 61800-5-2: "Safe Torque Off" (STO) and "Safe Stop" (SS1), "Safe Brake Control" (SBC), "Safely Limited Speed" (SLS), "Safe Speed Monitor" (SSM) with optional safety module MR-D30 and the amplifier type MR-J4-A-RJ.

MR-J4-□TM

(open network compatible)

The MR-J4-TM combines industry leading performance, features and reliability of the MR-J4 series servo system with different open network interfaces like EtherCAT, EtherNet/IP™ and PROFINET. Even if the control system is specified by endcustomer, system manufactures can use Mitsubishi Electric servo technology and benefit of the highly compact, powerful technology.

MR-J4-□B

(SSCNET III/H compatible/Drive safety compatible/Fully closed loop control/ Operation with up to three axes)

Safety functions according EN IEC 61800-5-2: "Safe Torque Off" (STO) and "Safe Stop" (SS1), "Safe Brake Control" (SBC), "Safely Limited Speed" (SLS), "Safe Speed Monitor" (SSM) with optional safety module MR-D30 and the amplifier type MR-J4-B-RJ. Fully closed loop control is also supported.

The MR-J4W2-B servo is designed to drive two servo motors, the MR-J4W3-B to drive three servo motors. Both servo amplifier models are SSCNET III/H compatible.

MR-J4-□GF

(CC-Link IE Field/CC-Link IE Field Basic compatible)

CC-Link IE Field Network is a single network which combines the versatility of Ethernet and highly accurate synchronous operation for Motion control. With the single network, various field devices, such as servo amplifiers, I/O modules, and high-speed counter modules, are connected with no restriction. Beside point-to-point positioning, speed and torque control, advanced motion functions are available in combination with the Simple Motion Module, like axes synchronisation, CAM and print mark control. The integrated safety function of the MR-J4-GF can be activated by the CC-Link IE Field network without additional wiring at the servo amplifier.

MR-JE-□A

(Multi function interface)

The MR-JE-A has a multi function interface, which is compatible to a maximum command pulse frequency of 4 Mpps. The response of 2.0 kHz reduces the settling time and the cycle time of the machine is considerably shortened. Additionally there are two analog control inputs available.

MR-JE-□BF

(SSCNET III/H compatible)

The servo amplifiers MR-JE-BF support the SSCNET III/H bus system and can be combined with Simple Motion modules. The module have several motion commands, like mark detection, electrical CAM functions and synchronous control. Up to 16 axes can be combined to a multi-axes system in an easy way. Safety function "Safe Torque Off" (STO) according to EN IEC 61800-5-2: is integrated and "Safe Stop" (SS1) is offered in combination with MR-J3-D05 module.

MR-JE-□C

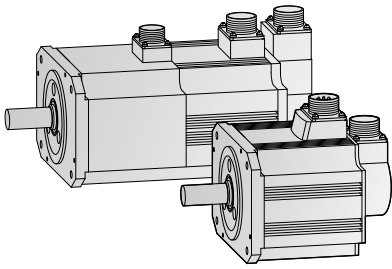
(CC-Link IE Field Basic compatible)

The network operates on the standard Ethernet protocol stack, which can be used together with TCP/IP communications (such as HTTP, FTP). This feature allows CC-Link IE Field Basic compatible network products and Ethernet compatible products to be connected on the same Ethernet communications line, enabling a highly-flexible and cost-effective system. In addition Modbus®/TCP network is supported for driving the servo from the master station.

| Specifications | MR-J4-□A | MR-J4-□B | MR-J4W□-□B | MR-J4-□GF | MR-J4-□TM | MR-JE-□A | MR-JE-□BF | MR-JE-□C |
|----------------------|--|--|---|--|--|--|---------------------------------------|---------------------------------------|
| Command interface | Pulse train/Analog/ RS422 multi-drop | SSCNET III/H | SSCNET III/H | CC-Link IE Field (Basic) | PROFINET, EtherCAT, Ethernet/IP | Pulse train/Analog/ RS422 | SSCNET III/H | CC-Link IE Field Basic |
| Control mode | Position/Speed/ Torque | Position/Speed/ Torque/Fully closed loop control | Position/Speed/ Torque/Fully closed loop control | Position/Speed/ Torque/Fully closed | Position/Speed/ Torque/Fully closed | Position/Speed/ Torque | Position/Speed/ Torque | Position/Speed/ Torque |
| Power specifications | 1-phase 200 V AC/ 3-phase 200 V AC/ 3-phase 400 V AC | 1-phase 200 V AC/ 3-phase 200 V AC/ 3-phase 400 V AC | 1-phase 200 V AC/ 3-phase 200 V AC | 1-phase 200 V AC/ 3-phase 200 V AC/ 3-phase 400 V AC | 1-phase 200 V AC/ 3-phase 200 V AC/ 3-phase 400 V AC | 1-phase 200 V AC/ 3-phase 200 V AC/ | 1-phase 200 V AC/ 3-phase 200 V AC | 1-phase 200 V AC/ 3-phase 200 V AC |
| Capacity range | 100 W to 55 kW | 100 W to 55 kW | MR-J4W2-□B: 200 W to 750 W per axis MR-J4W3-B: 200 W to 400 W per axis | 100 W to 22 kW | 100 W to 22 kW | 100 W to 3 kW | 100 W to 3 kW | 100 W to 3 kW |

For order information about servo amplifiers higher than 22 kW, please contact your Mitsubishi Electric representative

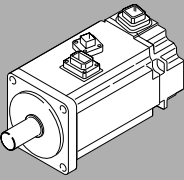
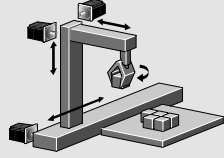
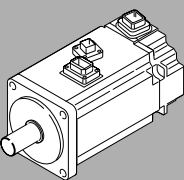
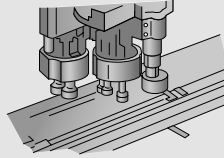
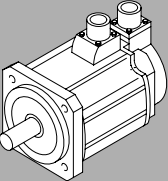
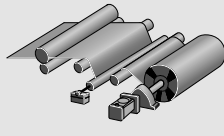
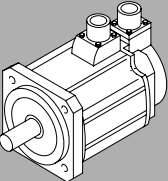
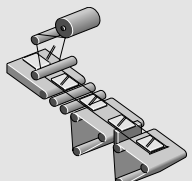
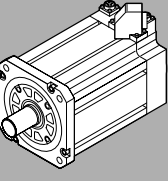
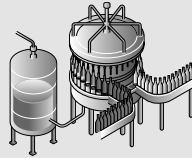
Servo motor features and typical applications



Absolute high-resolution encoder as standard equipment

Inclusion of an absolute position detection system eliminates the need for a homing sequence, approximate DOG and other sensors, helping to reduce time and enhance reliability. With these motors high performance and safety at low speed is ensured.

With Mitsubishi Electric original absolute mode, an absolute system can be configured using conventional I/O even with pulse-train control.

| Model designation | Features | Application example | |
|--|--|--|--|
| K  | Low inertia Larger motor inertia moment makes this unit well suited for machines with fluctuating load inertia moment or machines with low rigidity such as conveyors. | <ul style="list-style-type: none"> ● Conveyors ● Food preparation machinery ● Printers ● Small loaders and unloaders ● Small robots and component assembly devices ● Small X-Y tables ● Small press feeders |  <p>Handling systems</p> |
| M  | Ultra low inertia Small motor inertia moment makes this unit well suited for high-dynamic positioning operations with extra small cycle times. | <ul style="list-style-type: none"> ● Inserters, mounters, bonders ● Printed board hole openers ● In-circuit testers ● Label printers ● Knitting and embroidery machinery ● Ultra-small robots and robot tips |  <p>Inserter, mounters, bonders</p> |
| S  | Medium inertia Stable control is performed from low to high-speeds, enabling this unit to handle a wide range of applications (e.g. direct connection to ball screw components). | <ul style="list-style-type: none"> ● Conveyor machinery ● Specialised machinery ● Robots ● Loaders and unloaders ● Winders and tension devices ● Turrets ● X-Y tables ● Test devices |  <p>Winders and tension devices</p> |
| R  | Low inertia A compact sized low inertia moment model with medium capacity. Well suited for high-frequency operation. | <ul style="list-style-type: none"> ● Roll feeders ● Loaders and unloaders ● high-frequency conveyor machinery |  |
| J  | Low inertia (400 V) A 400 V servo motor for the MELSERVO-J4 series for a power range up to 55 kW with low inertia and high speed. It has a compact size, is equipped with high resolution encoder and is compatible to global standards. | <ul style="list-style-type: none"> ● Food and packaging ● Printing machine ● Pick up robot for injection molding machine ● Palletizing machine ● General machine which require high-speed and high-frequency |  <p>Wrapping machinery</p> |

Note: Other types of motors are available on request.

Servo motor specifications and matching amplifiers

Motors for MR-J4 (200 V) series servo amplifiers

| Motor series 200 V | Rated speed [r/min] | Maximum rotation speed [r/min] | Rated torque [Nm] | Peak running range [Nm] | Moment of inertia J [x10 ⁻⁴ kg m ²] | Rated output capacity [kW] | Servo motor model | Servo motor type | | Amplifier pairing MR-J4 | | | | | | | | | | Art. no. | | | | | | |
|-----------------------|------------------------|-----------------------------------|-----------------------------|-----------------------------|--|-------------------------------|-------------------|------------------|----------------------|-------------------------|----|----|----|----|-----|----------------|----------------|----------------|-----------------|----------------|-----|--------|--------|--------|--------|--------|
| | | | | | | | | Voltage | Protective structure | 10 | 20 | 40 | 60 | 70 | 100 | 200 | 350 | 500 | 700 | | 11K | 15K | 22K | | | |
| HG-MR M | 3000 | 6000 | 0.16 | 0.48 | 0.0162 | 0.05 | HG-MR053 | 200 V AC | IP65 | ● | | | | | | | | | | | | | 248661 | | | |
| | | | 0.32 | 0.95 | 0.0300 | 0.10 | HG-MR13 | | | ● | | | | | | | | | | | | | | 248662 | | |
| | | | 0.64 | 1.9 | 0.0865 | 0.20 | HG-MR23 | | | | ● | | | | | | | | | | | | | | 248663 | |
| | | | 1.3 | 3.8 | 0.142 | 0.40 | HG-MR43 | | | | | ● | | | | | | | | | | | | | | 248664 |
| | | | 2.4 | 7.2 | 0.586 | 0.75 | HG-MR73 | | | | | | ● | | | | | | | | | | | | | 248665 |
| HG-KR K | 3000 | 6000 | 0.16 | 0.56 | 0.0450 | 0.05 | HG-KR053 | 200 V AC | IP65 | ● | | | | | | | | | | | | | 248651 | | | |
| | | | 0.32 | 1.1 | 0.0777 | 0.10 | HG-KR13 | | | ● | | | | | | | | | | | | | | 248652 | | |
| | | | 0.64 | 2.2 | 0.221 | 0.20 | HG-KR23 | | | | ● | | | | | | | | | | | | | | 248653 | |
| | | | 1.3 | 4.5 | 0.371 | 0.40 | HG-KR43 | | | | | ● | | | | | | | | | | | | | 248654 | |
| | | | 2.4 | 8.4 | 1.26 | 0.75 | HG-KR73 | | | | | | ● | | | | | | | | | | | | | 248655 |
| HG-SR S | 2000 | 3000 | 2.4 | 7.2 | 7.26 | 0.50 | HG-SR52 | 200 V AC | IP67 | | | | ● | | | | | | | | | | 248671 | | | |
| | | | 4.8 | 14.3 | 11.6 | 1.00 | HG-SR102 | | | | | | | ● | | | | | | | | | | 248672 | | |
| | | | 7.2 | 21.5 | 16.0 | 1.50 | HG-SR152 | | | | | | | | ● | | | | | | | | | | 248673 | |
| | | | 9.5 | 28.6 | 46.8 | 2.00 | HG-SR202 | | | | | | | | | ● | | | | | | | | | | 248674 |
| | | | 16.7 | 50.1 | 78.6 | 3.50 | HG-SR352 | | | | | | | | | | ● | | | | | | | | | 248675 |
| | | | 23.9 | 71.6 | 99.7 | 5.00 | HG-SR502 | | | | | | | | | | | ● | | | | | | | | 248676 |
| | | | 33.4 | 100 | 151 | 7.00 | HG-SR702 | | | | | | | | | | | | ● | | | | | | | 248677 |
| HG-JR J | 3000 | 6000 | 1.6 | 4.8 <6.4> ^① | 1.52 | 0.5 | HG-JR53 | 200 V AC | IP67 ^④ | | | | ● | | | ● ^② | | | | | | | 261539 | | | |
| | | | 2.4 | 7.2 <9.6> ^① | 2.09 | 0.75 | HG-JR73 | | | | | | | ● | | ● ^② | | | | | | | | 261540 | | |
| | | | 3.2 | 9.6 <12.7> ^① | 2.65 | 1.0 | HG-JR103 | | | | | | | | ● | | ● ^② | | | | | | | | 261541 | |
| | | | 4.8 | 14.3 <19.1> ^① | 3.79 | 1.5 | HG-JR153 | | | | | | | | | ● | | ● ^② | | | | | | | | 261542 |
| | | | 6.4 | 19.1 <25.5> ^① | 4.92 | 2.0 | HG-JR203 | | | | | | | | | | ● | | ● ^② | | | | | | | 261543 |
| | | 10.5 | 32.0 <44.6> ^① | 13.2 | 3.3 <3.5> ^③ | HG-JR353 | | | | | | | | | | | ● | | ● ^{②③} | | | | | | 261544 | |
| | | 15.9 | 47.7 <63.7> ^① | 19.0 | 5.0 | HG-JR503 | | | | | | | | | | | | ● | | ● ^② | | | | | 261545 | |
| | | 5000 | 22.3 | 66.8 | 43.3 | 7.0 | HG-JR703 | | | | | | | | | | | | | ● | | | | | | 261546 |
| | | | 28.6 | 85.8 | 55.8 | 9.0 | HG-JR903 | | | | | | | | | | | | | | ● | | | | | 261547 |
| | | | 70.0 | 210 | 220 | 11 | HG-JR11K1M | | | | | | | | | | | | | | | ● | | | | 261557 |
| 95.5 | 286 | | 315 | 15 | HG-JR15K1M | | | | | | | | | | | | | | ● | | | 261558 | | | | |
| 2500 | 140 | | 420 | 489 | 22 | HG-JR22K1M | | | | | | | | | | | | | | ● | | 261559 | | | | |
| HG-RR R | 3000 | 4500 | 3.2 | 8.0 | 1.50 | 1.0 | HG-RR103 | 200 V AC | IP65 | | | | | | | | ● | | | | | | 262896 | | | |
| | | | 4.8 | 11.9 | 1.90 | 1.5 | HG-RR153 | | | | | | | | | | ● | | | | | | | 262897 | | |
| | | | 6.4 | 15.9 | 2.30 | 2.0 | HG-RR203 | | | | | | | | | | | ● | | | | | | 262898 | | |
| | | | 11.1 | 27.9 | 8.30 | 3.5 | HG-RR353 | | | | | | | | | | | | ● | | | | | | 262899 | |
| | | | 15.9 | 39.8 | 12.0 | 5.0 | HG-RR503 | | | | | | | | | | | | | ● | | | | | | 262900 |

① The value in angle brackets is applicable when the maximum torque is increased. The maximum torque will be increased by changing the servo amplifier to be combined (see ⑥).

② This combination of the HG-JR servo motor and the servo amplifier increases the maximum torque from 300 % to 400 % of the rated torque.

③ The value in angle brackets is applicable when the servo motor is used with MR-J4-500B or MR-J4-500A.

④ 22 kW of HG-JR series is rated IP44

Motors for MR-J4 (400 V) series servo amplifiers

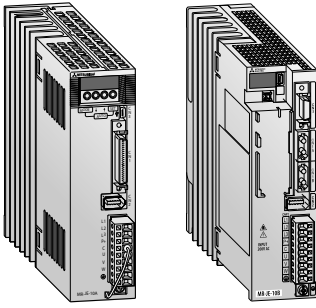
| Motor series 400 V | Rated speed [r/min] | Maximum rotation speed [r/min] | Rated torque [Nm] | Peak running range [Nm] | Moment of inertia J [x10 ⁻⁴ kg m ²] | Rated output capacity [kW] | Servo motor model | Servo motor type | | Amplifier pairing MR-J4 | | | | | | | | Art. no. | | | | |
|-----------------------|------------------------|-----------------------------------|-----------------------------|-----------------------------|---|-------------------------------|-------------------|------------------|----------------------|-------------------------|----------------|----------------|----------------|-----------------|----------------|-----|-----|----------|-----|--------|--------|--------|
| | | | | | | | | Voltage | Protective structure | 60 | 100 | 200 | 350 | 500 | 700 | 11K | 15K | | 22K | | | |
| HG-SR S | 2000 | 3000 | 2.4 | 7.2 | 7.26 | 0.5 | HG-SR524 | 400 V AC | IP67 | ● | | | | | | | | | | 261431 | | |
| | | | 4.8 | 14.3 | 11.6 | 1.0 | HG-SR1024 | | | | ● | | | | | | | | | 261432 | | |
| | | | 7.2 | 21.5 | 16.0 | 1.5 | HG-SR1524 | | | | | ● | | | | | | | | | 261433 | |
| | | | 9.5 | 28.6 | 46.8 | 2.0 | HG-SR2024 | | | | | | ● | | | | | | | | | 261434 |
| | | | 16.7 | 50.1 | 78.6 | 3.5 | HG-SR3524 | | | | | | | ● | | | | | | | | 261435 |
| | | | 23.9 | 71.6 | 99.7 | 5.0 | HG-SR5024 | | | | | | | | ● | | | | | | | 261436 |
| | | | 33.4 | 100 | 151 | 7.0 | HG-SR7024 | | | | | | | | | ● | | | | | | 261437 |
| HG-JR J | 3000 | 6000 | 1.6 | 4.8 <6.4> ^① | 1.52 | 0.5 | HG-JR534 | 400 V AC | IP67 ^④ | ● | ● ^② | | | | | | | | | 261445 | | |
| | | | 2.4 | 7.2 <9.6> ^① | 2.09 | 0.75 | HG-JR734 | | | | ● | ● ^② | | | | | | | | | 261446 | |
| | | | 3.2 | 9.6 <12.7> ^① | 2.65 | 1.0 | HG-JR1034 | | | | ● | ● ^② | | | | | | | | | 261447 | |
| | | | 4.8 | 14.3 <19.1> ^① | 3.79 | 1.5 | HG-JR1534 | | | | | ● | ● ^② | | | | | | | | | 261448 |
| | | | 6.4 | 19.1 <25.5> ^① | 4.92 | 2.0 | HG-JR2034 | | | | | ● | ● ^② | | | | | | | | | 261449 |
| | | | 10.5 <11.1> ^③ | 32.0 <44.6> ^① | 13.2 | 3.3 <3.5> ^① | HG-JR3534 | | | | | | ● | ● ^{②③} | | | | | | | | 261450 |
| | | | 15.9 | 47.7 <63.7> ^① | 19.0 | 5.0 | HG-JR5034 | | | | | | | ● | ● ^② | | | | | | | 261451 |
| | | 5000 | 22.3 | 66.8 | 43.3 | 7.0 | HG-JR7034 | | | | | | | ● | | | | | | | | 261452 |
| | | | 28.6 | 85.8 | 55.8 | 9.0 | HG-JR9034 | | | | | | | | ● | | | | | | | 261453 |
| | | 1500 | 3000 | 70.0 | 210 | 220 | 11 | | | HG-JR11K1M4 | | | | | | | | ● | | | | 261384 |
| | | | | 95.5 | 286 | 315 | 15 | | | HG-JR15K1M4 | | | | | | | | | ● | | | 261535 |
| | | | | 140 | 420 | 489 | 22 | | | HG-JR22K1M4 | | | | | | | | | | ● | | 261536 |

- ① The value in angle brackets is applicable when the maximum torque is increased. The maximum torque will be increased by changing the servo amplifier to be combined (see ②).
- ② This combination of the HG-JR servo motor and the servo amplifier increases the maximum torque from 300 % to 400 % of the rated torque.
- ③ The value in angle brackets is applicable when the servo motor is used with MR-J4-500B or MR-J4-500A.
- ④ 22 kW of HG-JR series is rated IP44

Motors for MR-JE-A/BF/C series servo amplifiers

| Motor series 200 V | Rated speed [r/min] | Maximum rotation speed [r/min] | Rated torque [Nm] | Peak running range [Nm] | Moment of inertia J [x10 ⁻⁴ kg m ²] | Rated output capacity [kW] | Servo motor model | Servo motor type | | Amplifier pairing MR-JE | | | | | | Art. no. | | | | |
|-----------------------|------------------------|-----------------------------------|----------------------|----------------------------|---|-------------------------------|-------------------|------------------|----------------------|-------------------------|----|----|----|-----|-----|----------|-----|---|--------|--------|
| | | | | | | | | Voltage | Protective structure | 10 | 20 | 40 | 70 | 100 | 200 | | 300 | | | |
| HG-KN K | 3000 | 4500 | 0,32 | 0,95 | 0,088 | 0,1 | HG-KN13 | 200 V AC | IP65 | ● | | | | | | | | | 282631 | |
| | | | 0,64 | 1,9 | 0,24 | 0,2 | HG-KN23K | | | | ● | | | | | | | | 282633 | |
| | | | 1,3 | 3,8 | 0,42 | 0,4 | HG-KN43K | | | | | ● | | | | | | | 282635 | |
| | | | 2,4 | 7,2 | 1,43 | 0,75 | HG-KN73JK | | | | | | ● | | | | | | | 282637 |
| | | | 2,39 | 7,16 | 6,1 | 0,5 | HG-SN52JK | | | | | | | ● | | | | | | 282639 |
| HG-SN S | 2000 | 3000 | 4,77 | 14,3 | 11,9 | 1,0 | HG-SN102JK | 200 V AC | IP67 | | | | | | ● | | | | 282641 | |
| | | | 7,16 | 21,5 | 17,8 | 1,5 | HG-SN152JK | | | | | | | | | ● | | | 282643 | |
| | | | 9,55 | 28,6 | 38,3 | 2,0 | HG-SN202JK | | | | | | | | | | ● | | 282645 | |
| | | | 14,3 | 42,9 | 58,5 | 3,0 | HG-SN302JK | | | | | | | | | | | ● | | 282647 |

MR-JE servo amplifier specifications



The MR-JE was designed to reach high performance and to get an easy-to-use servo system for all kind of machines. Proven reliability with a 2.0 kHz high-frequency response, an energy-saving design and the easy setup with Advanced One-Touch Tuning can be offered by MR-JE.

The servo motors are equipped with 131,072 pulses/rev (17-bit) incremental encoder for achieving high-accuracy positioning and smooth rotation for applications from 100 W to 3 kW. In combination with the MR Configurator2 software package the servo system is easy to start-up, to adjust and to analyze.

| Specifications MR-JE-□A | 10A | 20A | 40A | 70A | 100A | 200A | 300A |
|--------------------------|--|---|------------|------------|---|--------------------------|--------------------------------|
| Power supply | 3-phase or 1-phase 200–240 V AC, 50/60 Hz | | | | 3-phase or 1-phase 200–240 V AC, 50/60 Hz * | | 3-phase 200–240 V AC, 50/60 Hz |
| Control system | Sinusoidal PWM control/current control system | | | | | | |
| Dynamic brake | Built-in | | | | | | |
| Protective functions | Overcurrent shutdown, regeneration overvoltage shutdown, overload shutdown (electronic thermal), encoder fault protection, regeneration fault protection, undervoltage/sudden power outage protection, overspeed protection, excess error protection | | | | | | |
| Structure/protection | Self-cooling, open (IP20) | | | | | Fan-cooling, open (IP20) | |
| Environment | ambient temperature | Operation: 0–55 °C (no freezing); storage: -20–65 °C (no freezing) | | | | | |
| | ambient humidity | Operation: 90 % RH max. (no condensation); storage: 90 % RH max. (no condensation) | | | | | |
| | others | Elevation: 1000 m or less above sea level; oscillation: 5.9 m/s ² (0.6 G) max. | | | | | |
| Position control mode | max. input pulse frequency | 4 Mpps (differential receiver), 200 kpps (open collector) | | | | | |
| | positioning feedback pulse | 131072 pulses per servo motor rotation | | | | | |
| | torque limit | Set by parameters or external analog input (0–+ 10 V DC/maximum torque) | | | | | |
| Speed control mode | control range | Analog speed command 1:2000, internal speed command 1:5000 | | | | | |
| | fluctuation rate | ±0.01 % max. (load fluctuation 0–100 %) | | | | | |
| | torque limit | Set by parameters or external analog input (0–+10 V DC/maximum torque) | | | | | |
| Torque control mode | command input | 0–±8 V DC/maximum torque | | | | | |
| | speed limit | Set by parameters or external analog input (0–±10 V DC, rated speed) | | | | | |
| Weight | kg | 0.8 | 0.8 | 0.8 | 1.5 | 1.5 | 2.1 |
| Dimensions (WxHxD) | mm | 50x168x135 | 50x168x135 | 50x168x135 | 70x168x185 | 70x168x185 | 90x168x195 |
| Order information | Art. no. | 268792 | 268793 | 268794 | 268795 | 268796 | 268797 |

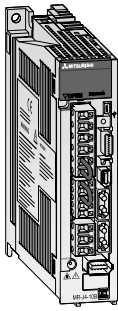
| Specifications MR-JE-□BF | 10BF | 20BF | 40BF | 70BF | 100BF | 200BF | 300BF |
|------------------------------------|--|---|------------|------------|---|--------------------------|--------------------------------|
| Power supply | 3-phase or 1-phase 200–240 V AC, 50/60 Hz | | | | 3-phase or 1-phase 200–240 V AC, 50/60 Hz * | | 3-phase 200–240 V AC, 50/60 Hz |
| Control system | Sinusoidal PWM control/current control system | | | | | | |
| Dynamic brake | Built-in | | | | | | |
| Protective functions | Overcurrent shutdown, regeneration overvoltage shutdown, overload shutdown (electronic thermal), encoder fault protection, regeneration fault protection, undervoltage/sudden power outage protection, overspeed protection, excess error protection | | | | | | |
| Safety function | STO (IEC/EN 61800-5-2); (SS1 function is available by using the safety option card MR-J3-D05) | | | | | | |
| Structure/protection | Self-cooling, open (IP20) | | | | | Fan-cooling, open (IP20) | |
| Environment | ambient temperature | Operation: 0–55 °C (no freezing); storage: -20–65 °C (no freezing) | | | | | |
| | ambient humidity | Operation: 90 % RH max. (no condensation); storage: 90 % RH max. (no condensation) | | | | | |
| | others | Elevation: 1000 m or less above sea level; oscillation: 5.9 m/s ² (0.6 G) max. | | | | | |
| Position/speed/torque control mode | Control via SSCNET III/H | | | | | | |
| Communication speed | 150 Mbps | | | | | | |
| Weight | kg | 0.8 | 0.8 | 0.8 | 1.5 | 1.5 | 2.1 |
| Dimensions (WxHxD) | mm | 50x168x135 | 50x168x135 | 50x168x135 | 70x168x185 | 70x168x185 | 90x168x195 |
| Order information | Art. no. | 312937 | 312938 | 312939 | 312940 | 312941 | 312942 |

* When 1-phase 200 V AC to 240 V AC power supply is used, use them with 75 % or less of the effective load ratio.

| Specifications MR-JE-□C | 10C | 20C | 40C | 70C | 100C | 200C | 300C |
|------------------------------------|--|---|------------|------------|---|------------|--------------------------------|
| Power supply | 3-phase or 1-phase 200–240 V AC, 50/60 Hz | | | | 3-phase or 1-phase 200–240 V AC, 50/60 Hz * | | 3-phase 200–240 V AC, 50/60 Hz |
| Control system | Sinusoidal PWM control/current control system | | | | | | |
| Dynamic brake | Built-in | | | | | | |
| Protective functions | Overcurrent shutdown, regeneration overvoltage shutdown, overload shutdown (electronic thermal), encoder fault protection, regeneration fault protection, undervoltage/sudden power outage protection, overspeed protection, excess error protection | | | | | | |
| Environment | ambient temperature | Operation: 0–55 °C (no freezing); storage: -20–65 °C (no freezing) | | | | | |
| | ambient humidity | Operation: 90 % RH max. (no condensation); storage: 90 % RH max. (no condensation) | | | | | |
| | others | Elevation: 1000 m or less above sea level; oscillation: 5.9 m/s ² (0.6 G) max. | | | | | |
| Position/speed/torque control mode | Control via CC-Link IE Field Basic | | | | | | |
| Weight | kg | 0.8 | 0.8 | 0.8 | 1.5 | 1.5 | 2.1 |
| Dimensions (WxHxD) | mm | 50x168x135 | 50x168x135 | 50x168x135 | 70x168x185 | 70x168x185 | 90x168x195 |
| Order information | Art. no. | 312314 | 312335 | 312336 | 312337 | 312338 | 316778 |

* When 1-phase 200 V AC to 240 V AC power supply is used, use them with 75 % or less of the effective load ratio.

MR-J4 servo amplifier specifications



The MELSERVO MR-J4 series is designed for ease of use and setup, safety, energy-efficiency and user friendly handling. With additional functions like “One-touch Tuning” and “Advanced Vibration Suppression Control” the servo performance achieves industry-leading level. The range covers 200 V amplifiers from 0.1 to 37 kW and 400 V amplifiers from 0.6 to 55 kW.

- Processing of encoder signals with 22 bit resolution (4,194,304 pulses/rev.)
- Speed frequency response is increased to 2.5 kHz
- Operating of rotary, linear and direct drive motors as standard

- Compatible with safety functions STO (Safe Torque Off) and SS1 (Safe Stop 1) corresponding EN 61800-5-2 as standard.

The MR-J4-B servo amplifier receives a command signal from a control system via high speed motion network SSCNET III/H with a communication speed of 150 Mbps and a cycle time of 0.22 ms. This optical network is very reliable in operation because it is not affected by EMC.

For control, the MR-J4-A servo amplifier has a pulse train input and two analog inputs for current or voltage. Possible modes of the MR-J4-A are torque, speed or position control.

| Specifications MR-J4-□A/B(-RJ) | 10A 10B | 20A 20B | 40A 40B | 60A 60B | 70A 70B | 100A 100B | 200A 200B | 350A 350B | 500A 500B | 700A 700B | 11KA 11KB | 15KA 15KB | 22KA 22KB |
|--------------------------------|---|------------|------------|------------|------------|--------------|---|--------------|--------------------------------|--------------|-----------------|--------------|--------------|
| Power supply | 3-phase or 1-phase 200–240 V AC, 50/60 Hz | | | | | | 1-phase or 3-phase 200–240 V AC, 50/60 Hz * | | 3-phase 200–240 V AC, 50/60 Hz | | | | |
| Control system | Sinusoidal PWM control/current control system | | | | | | | | | | | | |
| Dynamic brake | Built-in | | | | | | | | | | External option | | |
| Speed frequency response | 2500 Hz | | | | | | | | | | | | |
| Protective functions | Overcurrent shutdown, regeneration overvoltage shutdown, overload shutdown (electronic thermal), servomotor overheat protection, encoder fault protection, regeneration fault protection, undervoltage/sudden power outage protection, overspeed protection, excess error protection. | | | | | | | | | | | | |
| Safety function | STO (IEC/EN 61800-5-2); (The functions SS1, SS2, SOS, SBC, SLS and SSM are available in combination with the optional functional safety unit MR-D30.) | | | | | | | | | | | | |
| Structure | Self-cooling, open (IP20) | | | | | | Fan cooling, open (IP20) | | | | | | |

Order information

| | | | | | | | | | | | | | | |
|-----------|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| A-RJ type | Art. no. | 269247 | 269248 | 269249 | 269250 | 269251 | 269252 | 269253 | 269254 | 269265 | 269266 | 269267 | 269268 | 269269 |
| B-RJ type | Art. no. | 269279 | 269280 | 269281 | 269282 | 269283 | 269284 | 269285 | 269286 | 269287 | 269288 | 269289 | 269290 | 269291 |

* When 1-phase 200 V AC to 240 V AC power supply is used, use them with 75 % or less of the effective load ratio.

| Specifications MR-J4-□A4/B4(-RJ) | 60A4 60B4 | 100A4 100B4 | 200A4 200B4 | 350A4 350B4 | 500A4 500B4 | 700A4 700B4 | 11KA4 11KB4 | 15KA4 15KB4 | 22KA4 22KB4 |
|----------------------------------|---|----------------|----------------|----------------|--------------------------|----------------|-----------------|----------------|----------------|
| Power supply | 3-phase 380–480 V AC, 50/60 Hz | | | | | | | | |
| Control system | Sinusoidal PWM control/current control system | | | | | | | | |
| Dynamic brake | Built-in | | | | | | External option | | |
| Speed frequency response | 2500 Hz | | | | | | | | |
| Protective functions | Overcurrent shutdown, regeneration overvoltage shutdown, overload shutdown (electronic thermal), servomotor overheat protection, encoder fault protection, regeneration fault protection, undervoltage/sudden power outage protection, overspeed protection, excess error protection. | | | | | | | | |
| Safety function | STO (IEC/EN 61800-5-2); (The functions SS1, SS2, SOS, SBC, SLS and SSM are available in combination with the optional functional safety unit MR-D30.) | | | | | | | | |
| Structure | Self-cooling, open (IP20) | | | | Fan cooling, open (IP20) | | | | |

Order information

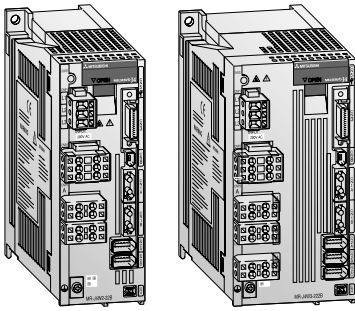
| | | | | | | | | | | |
|-----------|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| A-RJ type | Art. no. | 269270 | 269271 | 269272 | 269273 | 269274 | 269275 | 269276 | 269277 | 269278 |
| B-RJ type | Art. no. | 269292 | 269293 | 269294 | 269295 | 269296 | 269297 | 269298 | 269299 | 269300 |

| Common specifications MR-J4-□A/A4(-RJ) | 10A | 20A | 40A | 60A(4) | 70A | 100A(4) | 200A(4) | 350A(4) | 500A(4) | 700A(4) | 11KA(4) | 15KA(4) | 22KA(4) |
|--|-------------------------------|--|-----|--------|-----|---------|---------|---------|---------|---------|---------|---------|---------|
| Position control mode | maximum input pulse frequency | 4 Mpps (when using differential receiver), 200 kpps (when using open collector) | | | | | | | | | | | |
| | positioning feedback pulse | Resolution per encoder/servo motor rotation: 4194304 pulses/revolution (22 Bit) | | | | | | | | | | | |
| | command pulse multiple | A/B multiple; A: 1–16777215, B: 1–16777215, 1/10 <A/B <4000 | | | | | | | | | | | |
| | torque limit input | Set by parameters or external analog input (0–± 10 V DC/maximum torque) | | | | | | | | | | | |
| Speed control mode | speed control range | Analog speed command 1:2000, internal speed command 1:5000 | | | | | | | | | | | |
| | analog speed command input | 0–± 10 V DC/rated speed (The speed at 10 V can be changed by parameter.) | | | | | | | | | | | |
| | speed fluctuation rate | ±0.01 % max. (load fluctuation 0–100 %); 0 % (power fluctuation ±10 %) ±0.2 % max. (ambient temperature 25 °C ±10 °C), when using external analog speed command | | | | | | | | | | | |
| | torque limit | Set by parameters or external analog input (0–± 10 V DC/maximum torque) | | | | | | | | | | | |
| Torque control specifications | torque command input | 0–±8 V DC/maximum torque (input impedance 10–12 kΩ) | | | | | | | | | | | |
| | speed limit | Set by parameters or external analog input (0–± 10 V DC, rated speed) | | | | | | | | | | | |
| Integrated positioning | position tables | 255 table entries for target position, set speed value, acceleration/deceleration time, braking | | | | | | | | | | | |
| | programming style | 256 programs, 640 program steps, 25 commands | | | | | | | | | | | |
| | indexing function | 255 stations, rotational direction tightly adjustable or automatically shortest path | | | | | | | | | | | |

| Common specifications MR-J4-□B/B4(-RJ) (SSCNET III/H) | 10B | 20B | 40B | 60B(4) | 70B-RJ | 100B(4) | 200B(4) | 350B(4) | 500B(4) | 700B(4) | 11KB(4) | 15KB(4) | 22KB(4) |
|--|--------------------------|-----|-----|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|
| Position/speed control mode, torque control specifications | Control via SSCNET III/H | | | | | | | | | | | | |
| Communication speed | 150 Mbps | | | | | | | | | | | | |

Servo and motion systems

MR-J4W2-B/MR-J4W3-B servo amplifier specifications



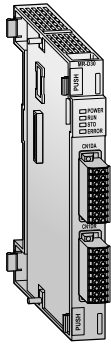
Additional to the standard version of the MR-J4 amplifiers (SSCNET III/H Motion Network) for one servo motor Mitsubishi Electric now offers also servo amplifiers for two or three servo motors. The amplifiers for two (MR-J4W2-B) and three axes (MR-J4W3-B) are space and wiring saving and more efficient than two or three single amplifiers. Therefore the engineer saves

not only space inside the cabinet and costs due to less wires, but also valuable energy what reduces the pollution of CO₂ at the same time. The range of output power for the amplifier for two axes is from 0.2 to 1 kW, for three axes from 0.2 to 0.4 kW per axis. All other specification items are identical with the standard version of the MR-J4-B for one axis.

| Specifications MR-J4W2-□B/MR-J4W3-□B | W2-22B | W2-44B | W2-77B | W2-1010B | W3-222B | W3-444B | |
|--------------------------------------|---|----------|----------|--------------------------------|---|----------|--------|
| Power supply | 1-phase or 3-phase 200–240 V AC, 50/60 Hz | | | 3-phase 200–240 V AC, 50/60 Hz | 1-phase or 3-phase 200–240 V AC, 50/60 Hz | | |
| Control system | Sinusoidal PWM control/current control system | | | | | | |
| Dynamic brake | Built-in | Built-in | Built-in | Built-in | Built-in | Built-in | |
| Speed frequency response | 2500 Hz | 2500 Hz | 2500 Hz | 2500 Hz | 2500 Hz | 2500 Hz | |
| Protective functions | Overcurrent shutdown, regeneration overvoltage shutdown, overload shutdown (electronic thermal), servomotor overheat protection, encoder fault protection, regeneration fault protection, undervoltage/sudden power outage protection, overspeed protection, excess error protection. | | | | | | |
| Safety function | STO (IEC/EN 61800-5-2); (SS1 function is available by using the safety option card MR-J3-D05) | | | | | | |
| Order information | Art. no. | 248645 | 248646 | 248647 | 248648 | 248649 | 248650 |

8

MR-D30 functional safety unit



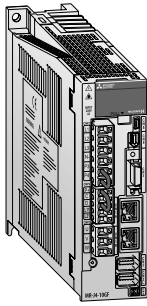
In combination with the optional MR-D30 functional safety unit, additional safety functions according to EN IEC 61800-5-2 can be realized. By combining the MR-D30 functional safety unit with a MR-J4 servo amplifier, safety functions "Safe Stop 1" (SS1), "Safe Brake Control" (SBC), "Safely Limited Speed" (SLS) and "Safe Speed Monitor" (SSM) according to EN IEC 61800-5-2 are available.

If additionally a servo motor with functional safety encoder is used, "Safe Stop 2" (SS2) and "Safe Operating Stop" (SOS) are supported.

The activation is possible by wiring the signals directly to the MR-D30 or in combination with the Motion Controller via a safe SSCNET III/H communication. Additionally the wiring will be reduced by activating via network.

| Specifications | MR-D30 | |
|--|--|--|
| Control power supply | voltage /frequency | 24 V DC |
| | permissible voltage fluctuation | 24 V DC ±10 % |
| | power supply capacity | 800 mA |
| Supported amplifiers | MR-J4-□A-RJ/B-RJ/GF-RJ/TM | |
| Shut-off input (Safety devices) | 6 redundant input points, source or sink logic | |
| Shut-off release input (restart devices) | 3 redundant output points, source logic | |
| Response time | 15 ms or less for Safe Torque Off (STO) | |
| Environment | ambient temperature | Operation: 0–55 °C (no freezing), storage: -20–65 °C (no freezing) |
| | ambient humidity | Operation: 90 % RH or less (no condensation), storage: 90 % RH or less (no condensation) |
| | atmosphere | Inside control panel; no corrosive gas, no flammable gas, no oil mist, no dust |
| | elevation | 1000 m or less above sea level |
| | oscillation | 5.9 m/s ² or less at 10 to 57 Hz (directions of X, Y and Z axes) |
| Order information | Art. no. | 275670 |

MR-J4-GF servo amplifier specifications



Compatible with CC-Link IE Field and CC-Link IE Field Basic Network

CC-Link IE Field Network compatible servo amplifier MR-J4-GF executes positioning of one or multiple axes, synchronous control, and speed-torque control by being connected to the various master modules compatible with CC-Link IE Field Network, including the Simple Motion module, and CC-Link IE embedded CPU module, etc.

The CC-Link IE Field Basic offers a cost effective network integration by direct control from the integrated Ethernet Port of MELSEC iQ-F, MELSEC iQ-R, MELSEC System Q and the MELSEC L series

In combination with the Simple Motion Module RD77GF, that can be used in the CC-Link IE Field network, the system offers extraordinary speed and performance, excellent flexibility, reduced wiring and simple programming.

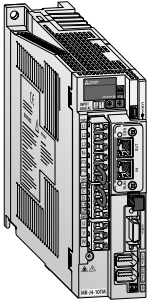
| Specifications MR-J4-□(-RJ) (200 V-Type) | | | 10GF | 20GF | 40GF | 60GF | 70GF | 100GF | 200GF | 350GF | 500GF | 700GF | 11KGf | 15KGf | 22KGf | |
|--|---------------------------------|-------------------|---|------------|------------|------------|------------|---|------------|--------------------------------|-------------|-------------|-----------------|-------------|--------|--------|
| Power supply | voltage /frequency ① | AC input | 1-phase or 3-phase 200–240 V AC, 50/60 Hz | | | | | 1-phase or 3-phase 200–240 V AC, 50/60 Hz ③ | | 3-phase 200–240 V AC, 50/60 Hz | | | | | | |
| | | DC input ② | 283–340 V DC | | | | | | | | | | | | | |
| | permissible voltage fluctuation | AC input | 1-phase or 3-phase 170–264 V AC | | | | | 1-phase or 3-phase 170–264 V AC ③ | | 3-phase 170–264 V AC | | | | | | |
| | | DC input ② | 241–374 V DC | | | | | | | | | | | | | |
| Dynamic brake | Built-in | | | | | | | | | | | | External option | | | |
| Weight | kg | 1.0 | 1.0 | 1.0 | 1.0 | 1.4 | 1.4 | 2.1 | 2.3 | 4.0 | 6.2 | 13.4 | 13.4 | 18.2 | | |
| Dimensions (WxHxD) | mm | 50x168x155 | 50x168x155 | 50x168x155 | 50x168x155 | 60x168x185 | 60x168x185 | 90x168x195 | 90x168x195 | 105x250x200 | 172x300x200 | 220x400x260 | 220x400x260 | 260x400x260 | | |
| | | Order information | Art. no. | 295435 | 295436 | 295437 | 295438 | 295439 | 295440 | 295441 | 295442 | 295443 | 295444 | 306875 | 306876 | 306877 |

| Specifications MR-J4-□(-RJ) (400 V-Type) | | | 60GF4 | 100GF4 | 200GF4 | 350GF4 | 500GF4 | 700GF4 | 11KGf4 | 15KGf4 | 22KGf4 |
|--|---------------------------------|--------------------------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-----------------|--------|
| Power supply | voltage /frequency ① | 3-phase 380–480 V AC, 50/60 Hz | | | | | | | | | |
| | permissible voltage fluctuation | 3-phase 323–528 V AC | | | | | | | | | |
| Dynamic brake | Built-in | | | | | | | | | External option | |
| Weight | kg | 1.7 | 1.7 | 2.1 | 3.6 | 4.3 | 6.5 | 13.4 | 13.4 | 18.2 | |
| Dimensions (WxHxD) | mm | 60x168x195 | 60x168x195 | 90x168x195 | 105x250x200 | 130x250x200 | 172x300x200 | 220x400x260 | 220x400x260 | 260x400x260 | |
| Order information | Art. no. | 295445 | 295446 | 295447 | 295448 | 295449 | 295450 | 306878 | 305879 | 306880 | |

| Common specifications | |
|-----------------------|---|
| Control system | Sinusoidal PWM control/current control system |
| Protective functions | Overcurrent shutdown, regeneration overvoltage shutdown, overload shutdown (electronic thermal), servomotor overheat protection, encoder fault protection, regeneration fault protection, undervoltage/sudden power outage protection, overspeed protection, excess error protection. |
| Safety function | STO (IEC/EN 61800-5-2); (The functions SS1, SS2, SOS, SBC, SLS and SSM are available in combination with the optional functional safety unit MR-D30.) |

- ① Rated output capacity and rated rotation speed of the servo motor used in combination with the servo amplifier are as indicated when using the power voltage and frequency listed.
Output and speed cannot be guaranteed when the power supply voltage is less than specified.
- ② The DC power supply input is available only with MR-J4-□GF-RJ servo amplifiers.
- ③ When 1-phase 200–240 V AC power supply is used, use them with 75 % or less effective load ratio.
- ④ The communication cycle depends on the controller specifications and the number of axes connected.

MR-J4-TM-ECT/MR-J4-TM-PNT/MR-J4-TM-EIP servo amplifier specifications



With the MR-J4-TM servo amplifier the industry leading performance, features and reliability of the MR-J4 series servo system is combined with Ethernet based open network interface.

Dedicated Servo amplifier control loops by Mitsubishi Electric developed components like One-Touch-Tuning, Vibration suppression control, Adaptive Real-Time Autotuning.

High resolution 4,194,304 pulse/rev absolute encoders for high-accuracy positioning and smooth rotation

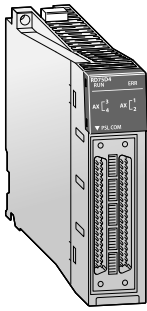
| Specifications MR-J4-□TM (200 V Type) | | 10TM | 20TM | 40TM | 60TM | 70TM | 100TM | 200TM | 350TM | 500TM | 700TM | |
|---------------------------------------|--------------------|---|------------|------------|------------|------------|---|------------|--------------------------------|-------------|-------------|--------|
| Power supply | voltage /frequency | 1-phase or 3-phase 200–240 V AC, 50/60 Hz | | | | | 1-phase or 3-phase 200–240 V AC, 50/60 Hz ① | | 3-phase 200–240 V AC, 50/60 Hz | | | |
| Weight | kg | 1.0 | 1.0 | 1.0 | 1.0 | 1.4 | 1.4 | 2.1 | 2.3 | 4.0 | 6.2 | |
| Dimensions (WxHxD) | mm | 50x168x161 | 50x168x161 | 50x168x161 | 50x168x161 | 60x168x191 | 60x168x191 | 90x168x201 | 90x168x201 | 105x250x206 | 172x300x206 | |
| Order information | MR-J4-□TM-ECT | Art. no. | 290156 | 290157 | 290158 | 290159 | 290160 | 290161 | 290162 | 290263 | 290164 | 290205 |
| | MR-J4-□TM-PNT | Art. no. | 298566 | 298567 | 298568 | 298569 | 298570 | 298571 | 298572 | 298573 | 298574 | 298695 |
| | MR-J4-□TM-EIP | Art. no. | 298708 | 298709 | 298710 | 298711 | 298712 | 298713 | 298714 | 298715 | 298716 | 298717 |

| Specifications MR-J4-□TM4 (400 V Type) | | 60TM4 | 100TM4 | 200TM4 | 350TM4 | 500TM4 | 700TM4 | 11KTM4 | 15KTM4 | 22KTM4 | |
|--|----------------------|-----------------------------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|--------|
| Power supply | voltage /frequency ① | 3-phase 380–480 V AC, 50 Hz/60 Hz | | | | | | | | | |
| Weight | kg | 1.7 | 1.7 | 2.1 | 3.6 | 4.3 | 6.5 | 13.4 | 13.4 | 18.2 | |
| Dimensions (WxHxD) | mm | 60x168x201 | 60x168x201 | 90x168x201 | 105x250x206 | 130x250x206 | 172x300x206 | 220x400x266 | 220x400x266 | 260x400x266 | |
| Order information | MR-J4-□TM4-ECT | Art. no. | 290206 | 290207 | 290208 | 290209 | 290210 | 290211 | 294050 | 294051 | 294052 |
| | MR-J4-□TM4-PNT | Art. no. | 298696 | 298697 | 298698 | 298699 | 298700 | 298701 | 298705 | 298706 | 298707 |
| | MR-J4-□TM4-EIP | Art. no. | 298718 | 298719 | 298720 | 298721 | 298722 | 298723 | 298727 | 298728 | 298729 |

① When 1-phase 200–240 V AC power supply is used, use them with 75 % or less effective load ratio.

| Common specifications | MR-J4-TM-ECT | MR-J4-TM-PNT | MR-J4-TM-EIP |
|------------------------|---|--|--|
| Safety function | STO (IEC/EN 61800-5-2) | | |
| Ethernet Interfaces | 2 ports RJ45 100 BASE-TX | | |
| Communication protocol | IEC61158 Type12 CAN application protocol over EtherCAT (CoE), IEC61800-7 CIA402 Drive Profile | PROFINET IO, Real Time (RT) communication, PROFIdrive v4.1 | THE CIP NETWORKS LIBRARY Volume 2, EtherNet/IP Adaptation of CIP |

Positioning modules MELSEC iQ-R

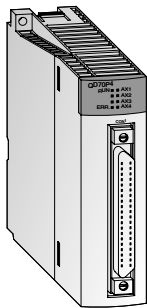


The MELSEC iQ-R series offers a choice of two positioning modules, transistor output or differential drive output, depending on the connected amplifier. The modules are capable of transmission speeds up to 5M pulses/s, and the differential driver output module supports wiring up to a distance of 10 m.

It can be used in positional control or speed control, and features include linear, circular, and helical interpolation, which is a complex control required for deep-thread milling applications.

| Specifications | RD75D2 | RD75D4 | RD75P2 | RD75P4 |
|--------------------------|--|--|---|--|
| Number of control axes | 2 | 4 | 2 | 4 |
| Interpolation | pulse/s 2-axis linear interpolation, 2-axis circular interpolation | 2-/3-/4-axis linear interpolation, 2-axis circular interpolation, 3-axis helical interpolation | 2-axis linear interpolation, 2-axis circular interpolation | 2-/3-/4-axis linear interpolation, 2-axis circular interpolation, 3-axis helical interpolation |
| Positioning data items | 600 | 600 | 600 | 600 |
| Output type | Differential driver | Differential driver | Open collector | Open collector |
| Output signal | Pulse chain | Pulse chain | Pulse chain | Pulse chain |
| Order information | Art. no. 279564 | 279565 | 279562 | 279563 |

Positioning modules MELSEC System Q



Multi-axis positioning

The modules are especially designed for systems including multiple axes that do not require any extensive control. The QD70P4 controls up to 4 axes and the QD70P8 up to 8 axes.

Since any number of positioning modules can be used the number of axes to be controlled as well is unlimited.

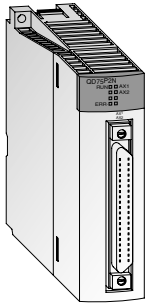
| Specifications | QD70P4 | QD70P8 |
|--------------------------|---|--------|
| Number of control axes | 4 | 8 |
| Interpolation | — | — |
| Points per axis | 10 (by PLC program or with the positioning software GX Configurator PT) | — |
| Output signal | Pulse chain | — |
| Output frequency | kHz 1–200 000 | — |
| Positioning method | PTP positioning; speed/locus positioning; path control | — |
| Pulse output type | Open collector output | — |
| Order information | Art. no. 138328 | 138329 |



Space efficient positioning

The QD72P3C3 and QD73A1 realize positioning applications with less space requirements.

| Specifications | | QD72P3C3 | QD73A1 |
|--------------------------|---------------------|--|---|
| Number of control axes | | 3 | 1 |
| Interpolation | | — | — |
| Positioning | data items | 1 per axis | 1 |
| | start time | Positioning control, speed control: 1 ms | 1.2 ms |
| | pulse output method | Open collector output | Analog output (0–±10 V DC, adjustable to ±5–±10 V DC) |
| | max. output pulse | 100 kpps | — |
| Counter function | count input signal | 1-phase input, 2-phase input; 5–24 V DC | 2-phase input |
| | counting speed | 100 kpps | 1000 |
| External connection | | 40-pin connector | 15-pin and 9-pin connector |
| Order information | | Art. no. 213230 | 257759 |

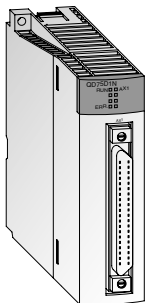


Positioning with an open control loop

The modules generate the travel command via a pulse chain.

The speed is proportional to the pulse frequency and the distance travelled is proportional to the pulse length.

| Specifications | | QD75P1N | QD75P2N | QD75P4N |
|--------------------------|--|---|--|--|
| Number of control axes | | 1 | 2 | 4 |
| Interpolation | | — | 2 axis linear and circular interpolation | 2, 3, or 4 axis linear and 2 axis circular interpolation |
| Points per axis | | 600 pieces of data with PLC program, 100 pieces of data with GX Configurator QP | | |
| Output type | | Open collector | Open collector | Open collector |
| Output signal | | Pulse chain | Pulse chain | Pulse chain |
| Output frequency | | max. 4000 kHz | max. 4000 | max. 4000 |
| Order information | | Art. no. 248389 | 248390 | 248391 |



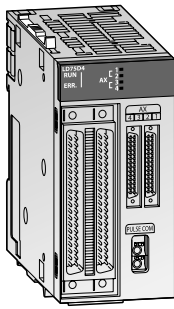
Long distance positioning

The modules of the QD75 series are suitable for bridging long distances between module and drive system.

The modules QD75D provide differential outputs.

| Specifications | | QD75D1N | QD75D2N | QD75D4N |
|--------------------------|--|---|--|--|
| Number of control axes | | 1 | 2 | 4 |
| Interpolation | | — | 2 axis linear and circular interpolation | 2, 3, or 4 axis linear and 2 axis circular interpolation |
| Points per axis | | 600 pieces of data with PLC program, 100 pieces of data with GX Configurator QP | | |
| Output type | | Differential driver | Differential driver | Differential driver |
| Output signal | | Pulse chain | Pulse chain | Pulse chain |
| Output frequency | | max. 4000 kHz | max. 4000 | max. 4000 |
| Order information | | Art. no. 248392 | 248393 | 248394 |

Positioning modules MELSEC L series



The MELSEC L series offers six different positioning modules for control of up to four axes.

- Differential output type (LD75D□)
- Open-collector output type (LD75P□)

These positioning modules can be used with standard type servo amplifiers (Mitsubishi Electric MR-JE-A, MR-J4-A).

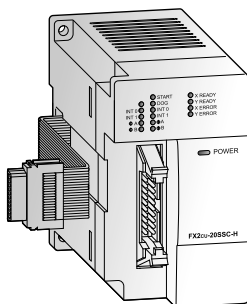
All MELSEC L series positioning modules can provide functionality such as interpolation, speed positioning operation etc.

The open-collector output type module provides positioning with open loop control. The module generates the travel command via the pulse chain. The speed is proportional to the pulse frequency and the distance travelled is proportional to the pulse length.

The differential output type module is suitable for bridging long distances between the module and the drive system due to the fact that the output allows large cable lengths.

| Specifications | LD75D1 | LD75D2 | LD75D4 | LD75P1 | LD75P2 | LD75P4 |
|---------------------------------|---------------------|---------------------|--|----------------|--|--|
| Accessible axes | 1 | 2 | 4 | 1 | 2 | 4 |
| Output frequency | pulse/s | — | 2-axis linear interpolation, 2-axis circular interpolation | — | 2-axis linear interpolation, 2-axis circular interpolation | 2-/3-/4-axis linear interpolation, 2-axis circular interpolation |
| Positioning data items per axis | 600 | 600 | 600 | 600 | 600 | 600 |
| Output type | Differential driver | Differential driver | Differential driver | Open collector | Open collector | Open collector |
| Output signal | Pulse chain | Pulse chain | Pulse chain | Pulse chain | Pulse chain | Pulse chain |
| Order information | Art. no. 251448 | 251449 | 238095 | 251446 | 251447 | 238096 |

Positioning module MELSEC FX series



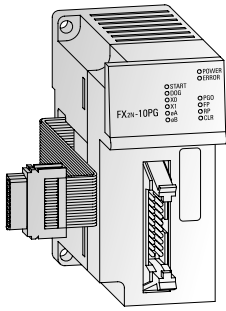
The SSCNET III module FX3U-20SSC-H can be used in combination with a FX3U or FX3UC programmable controller to achieve a cost effective solution for high precision, high speed positioning. The plug-and-play fiber optic SSCNET III cabling reduces setup time and increases control distance for positioning operations in a wide range of applications.

Servo parameters and positioning information for the FX3U-20SSC-H are easily set up with an FX3U/FX3UC base unit and a personal computer. For parameter setting, monitoring and testing the easy programming software FX Configurator-FP is available.

| Specifications | FX3U-20SSC-H |
|---------------------------------|--|
| Accessible axes | 2 (independent or interpolation) |
| Output frequency | 1 Hz to 50 MHz |
| Servo amplifier network | SSCNET III |
| Communications speed | 50 Mbps |
| Starting time | ms 1.6 (+1.7 SSCNET III cycle time) |
| Max. to PLC connectable modules | Up to 8 can be connected to the FX3U PLC |
| Status displays | Power, module status, axis status, error |
| Power supply | 5 V DC 100 mA 24 V DC — |
| Related I/O points | 8 |
| Weight | kg 0.3 |
| Dimensions (WxHxD) | mm 55x90x87 |
| Order information | Art. no. 231512 |

Notes: The FX3U-20SSC-H can be used in combination with a FX3U or FX3UC base unit only. Please refer to the Mitsubishi Electric MELSERVO catalog for suitable servo motors and amplifiers.

Single-axis positioning modules FX, iQ-F



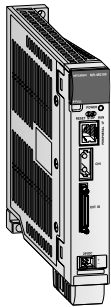
The positioning modules FX3U-1PG, FX2N-10PG and FX5-20PG-P are extremely efficient positioning modules for controlling either step drives or servo drives (by external regulator) with a pulse chain. They are very suitable for achieving accurate positioning in combination with the MELSEC FX series.

The configuration and allocation of the position data are carried out directly via the PLC program. A very wide range of manual and automatic functions are available to the user.

| Specifications | FX3U-1PG | FX2N-10PG | FX5-20PG-P |
|---------------------------------|----------------------------------|---------------------------------|------------------------------|
| Applicable for | Base units FX3U/FX3UC/FX5U/FX5UC | Base units FX3U/FX3UC | Base units FX5U/FX5UC |
| Accessible axes | 1 | 1 | 2 |
| Output frequency | pulses/s 10–200 000 | 1–1 000 000 | 1–200 000 |
| Signal level for digital inputs | 24 V DC/40 mA | 5 V DC/100 mA; 24 V DC/70 mA | 24 V DC/5 mA |
| Power supply | 5 V DC 24 V DC | 150 mA (from base unit) — | 120 mA (from base unit) — |
| Related I/O points | 8 | 8 | 8 |
| Weight | kg 0.3 | 0.2 | 0.2 |
| Dimensions (WxHxD) | mm 43x90x87 | 43x90x87 | 50x90x83 |
| Order information | Art. no. 259298 | 140113 | 312301 |

Note: For the connection of a FX3U-1PG to a FX5U/FX5UC base unit, a bus conversion module FX5-CNV-BUSC resp. FX5-CNV-BUS is required.

Single axis Motion Controller MR-MQ100

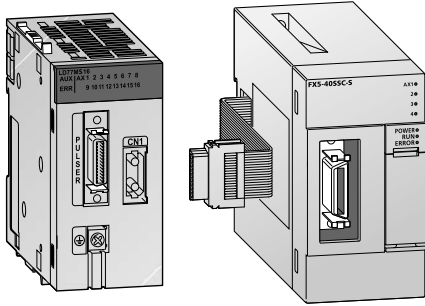


The MR-MQ100 allows a single axis to be completely controlled and synchronised to a separate encoder or virtual axis with no additional controller hardware like a PLC. Applications such as rotary cutters, flying saws and labelling can be realized cost-effectively.

A complete range of essential functions are available, including encoder and virtual axis synchronization, registration, point to point positioning and user defined cam profiles.

| Specifications | MR-MQ100 | |
|-------------------------------|--|---|
| Power supply | 24 V DC ±10 % (required current capacity: 400 mA) | |
| Digital inputs (mark sensors) | 4 inputs (24 V DC) | |
| Digital outputs | 2 outputs (24 V DC) | |
| Synchronous encoder | signal type | A/B phase pulse train input |
| | voltage input/open-collector type (5 V DC) | Up to 800 kpps (after magnification by 4), up to 10 m |
| | differential input type | Up to 4 Mpps (after magnification by 4), up to 30 m |
| Peripheral interface | 100 Mbps/10 Mbps Ethernet (for programming and additional options) | |
| Positioning | method | (PTP (Point To Point) control, speed control/speed-position control, fixed-pitch feed, constant speed control, position follow-up control, speed control with fixed position stop, speed switching control, high-speed oscillation control, synchronous control (SV22)) |
| | acceleration/deceleration control | Automatic trapezoidal acceleration/deceleration, S-curve acceleration/deceleration |
| | compensation | Backlash compensation, Electronic gear, Phase compensation |
| Order information | Art. no. 217705 | |

MELSEC Simple Motion modules



The MELSEC iQ-F, the iQ-R, System Q and the MELSEC L series lineup includes Simple Motion modules in addition to the regular positioning modules. Various control functions previously only possible with Motion Controllers, such as speed control, torque control, synchronous control and cam control, are now available with the Simple Motion modules.

These functions can be realized with simple parameter adjustments and via the PLC program.

| Specifications | FX5-40SSC-S | FX5-80SSC-S |
|--|--|--|
| Number of controllable axes | 4 | 8 |
| Interpolation functions | Linear interpolation for up to 4 axes, circular interpolation for 2 axes | |
| Servo amplifier network | SSCNET III/H | SSCNET III/H |
| Servo amplifier | MR-JE-BF/MR-J4-B/MR-J4W2-B/MR-J4W3-B | |
| Positioning | method | PTP (Point To Point) control, path control (linear and arc), speed control, speed-position switching control, position-speed switching control, torque control |
| | acceleration/deceleration control compensation | Trapezoidal acceleration/deceleration, S-curve acceleration/deceleration |
| Backlash compensation, electronic gear, near pass function | | |
| Number of positioning points | 600 per axis (can be set with GX Works2/GX Works3 or PLC program) | |
| External input signals | 1 encoder, A/B phase; 4 digital inputs [DI1–DI4] | |
| Cam function | 256 kBytes, max. 256 (depends on resolution) | |
| Order information | Art. no. 281405 | 304187 |

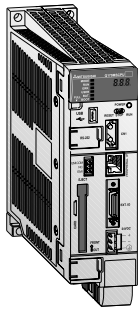
| Specifications | RD77GF4 | RD77GF8 | RD77GF16 | RD77GF32 | RD77MS2 | RD77MS4 | RD77MS8 | RD77MS16 |
|--|--|--|------------------|------------------|---|--|--------------|--------------|
| Number of controllable axes | 4 | 8 | 16 | 32 | 2 | 4 | 8 | 16 |
| Interpolation functions | Linear interpolation for up to 4 axes, circular interpolation for 2 axes, helical interpolation for 3 axes | | | | 2 axes linear and circular interpolation | Linear interpolation for up to 4 axes, circular interpolation for 2 axes | | |
| Servo amplifier network | CC-Link IE Field | CC-Link IE Field | CC-Link IE Field | CC-Link IE Field | SSCNET III/H | SSCNET III/H | SSCNET III/H | SSCNET III/H |
| Servo amplifier | MR-J4-GF(-RJ) | | | | MR-JE-BF/MR-J4(W2/W3)-B | | | |
| Positioning | method | PTP (Point To Point) control, path control (linear and arc), speed control, speed-position switching control, position-speed switching control, speed-torque control, advanced synchronous control | | | | | | |
| | acceleration/deceleration control compensation | Trapezoidal acceleration/deceleration, S-curve acceleration/deceleration | | | | | | |
| Backlash compensation, electronic gear, near pass function | | | | | | | | |
| Number of positioning points | 600 data/axis (All the data points can be set with the buffer memory.) | | | | 600 per axis (can be set with GX Works3 or PLC program) | | | |
| External input signals | External devices, like encoder or remote I/O are connected via CC-Link IE Field | | | | 1 encoder, A/B phase; 4 digital inputs [DI1–DI4] | | | |
| Cam function | 3 MBytes, max. 1024 (depends on resolution) | | | | 256 kBytes, max. 256 (depends on resolution) | | | |
| Order information | Art. no. 295077 | 295078 | 295079 | 304200 | 280229 | 280230 | 280231 | 280232 |

| Specifications | QD77GF4 | QD77GF8 | QD77GF16 | QD77MS2 | QD77MS4 | QD77MS16 |
|--|---|--|------------------|---|--|--------------|
| Number of controllable axes | 4 | 8 | 16 | 2 | 4 | 16 |
| Interpolation functions | Linear interpolation for up to 4 axes, circular interpolation for 2 axes | | | 2 axes linear and circular interpolation | Linear interpolation for up to 4 axes, circular interpolation for 2 axes | |
| Servo amplifier network | CC-Link IE Field | CC-Link IE Field | CC-Link IE Field | SSCNET III/H | SSCNET III/H | SSCNET III/H |
| Servo amplifier | MR-J4-GF(-RJ) | | | MR-JE-BF/MR-J4(W2/W3)-B | | |
| Positioning | method | PTP (Point To Point) control, path control (linear and arc), speed control, speed-position switching control, position-speed switching control, synchronous control, cam control | | | | |
| | acceleration/deceleration control compensation | Trapezoidal acceleration/deceleration, S-curve acceleration/deceleration | | | | |
| Backlash compensation, electronic gear, near pass function | | | | | | |
| Number of positioning points | 600 data/axis (All the data points can be set with the buffer memory.) | | | 600 per axis (can be set with GX Works3 or PLC program) | | |
| External input signals | External devices, like encoder or remote I/O are connected via CC-Link IE Field | | | 1 encoder, A/B phase; 4 digital inputs [DI1–DI4] | | |
| Cam function | storage area cam data | 256 kBytes, max. 256 (depends on resolution) | | | | |
| Order information | Art. no. 297645 | 297646 | 269032 | 248702 | 248703 | 248704 |

| Specifications | LD77MS2 | LD77MS4 | LD77MS16 |
|--|---|--|---|
| Number of controllable axes | 2 | 4 | 16 |
| Interpolation functions | 2 axes linear and circular interpolation | Linear interpolation for up to 4 axes, circular interpolation for 2 axes | Linear interpolation for up to 4 axes, 2 axes linear and circular interpolation |
| Servo amplifier network | SSCNET III/H | SSCNET III/H | SSCNET III/H |
| Servo amplifier | MR-JE-BF/MR-J4(W2/W3)-B | | |
| Positioning | method | PTP (Point To Point) control, path control (linear and arc), speed control, speed-position switching control, position-speed switching control, torque control | |
| | acceleration/deceleration control compensation | Trapezoidal acceleration/deceleration, S-curve acceleration/deceleration | |
| Backlash compensation, electronic gear, near pass function | | | |
| Number of positioning points | 600 per axis (can be set with GX Works2/GX Works3 or PLC program) | | |
| External input signals | 1 encoder, A/B phase; 4 digital inputs [DI1–DI4] | | |
| Cam function | 256 kBytes, max. 256 (depends on resolution) | | |
| Order information | Art. no. 268199 | 268200 | 268201 |

Servo and motion systems

Stand-alone Motion Controller Q170MSCPU/Q170MSCPU-S1

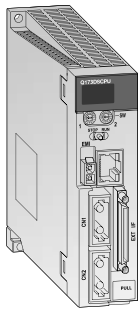


The Q170MSCPU/Q170MSCPU-S1 combines a PLC CPU, a Motion CPU and a power supply module into one compact unit. No base unit is required, although an extension base unit with standard PLC modules can be connected if required.

An encoder interface is included as standard, enabling multiple axes synchronization with an external encoder.

| Specifications | | Q170MSCPU | Q170MSCPU-S1 |
|--------------------------|-----------------------------------|---|--|
| Motion-CPU | number of controllable axes | 16 | |
| | operation cycle | 0.22 ms, 0.44 ms, 0.88 ms, 1.77 ms, 3.55 ms, 7.11 ms | |
| | programming languages | Motion SFC, dedicated instruction, mechanical support language (SV22) | |
| | servo program capacity | 16 k steps | |
| | servo amplifier | MR-J4-B over SSCNET III/H | |
| Interpolation functions | | Linear interpolation for up to 4 axes, circular interpolation for 2 axes, helical interpolation for 3 axes | |
| PLC CPU | number of I/O points | 4096 points | |
| | programming languages | Ladder, instruction list, SFC, structured text | |
| | program capacity | 30 k steps (120 k bytes) | 60 k steps (240 k bytes) |
| | processing speed | 20 ns (LD instruction); 40 ns (MOV instruction) | 9.5 ns (LD instruction); 19 ns (MOV instruction) |
| | total number of instructions | 858 (including real number operation instruction) | |
| Positioning | method | (PTP (Point To Point) control, speed control/speed-position control, fixed-pitch feed, constant speed control, position follow-up control, speed control with fixed position stop, speed switching control, high-speed oscillation control, synchronous control (SV22)) | |
| | acceleration/deceleration control | Automatic trapezoidal acceleration/deceleration, S-curve acceleration/deceleration | |
| | compensation | Backlash compensation, electronic gear, phase compensation | |
| Order information | | Art. no. 266524 | 266535 |

Motion Controller CPUs of MELSEC System Q and iQ-R series



The Q-Motion Controller CPU controls and synchronises the connected servo amplifiers and servo motors. A motion system besides the controller CPU, also includes a PLC CPU. Only after combining a highly dynamic positioning control CPU and a PLC, an innovative Motion Control system is created.

| Specifications | Q172DSCPU | Q173DSCPU | R16MTCPU | R32MTCPU | |
|--------------------------|--|---|-------------------------------------|------------|--------|
| Type | Motion CPU | Motion CPU | Motion CPU | Motion CPU | |
| I/O points | 8192 | 8192 | 8192 | 8192 | |
| No. of control axes | 16 | 32 | 16 | 32 | |
| Interpolation functions | | Linear interpolation for up to 4 axes, circular interpolation for 2 axes, helical interpolation for 3 axes | | | |
| Positioning | method | PTP (point to point), speed control/speed-position control, fixed pitch feed, constant speed control, position follow-up control, speed switching control, high-speed oscillation control, synchronous control (SV22) | | | |
| | acceleration/deceleration control | Automatic trapezoidal acceleration/deceleration, S-curve acceleration/deceleration | | | |
| | compensation | Backlash compensation, electronic gear | | | |
| Servo program capacity | 16 k steps, 3200 positioning points | | 32 k steps, 6400 positioning points | | |
| Interfaces | SSCNET III/H (USB, RS232C via PLC CPU) | | | | |
| Servo amplifier | MR-J4-B over SSCNET III/H | | | | |
| Order information | | Art. no. 248700 | 248701 | 280227 | 280228 |

MELSEC System Q-Motion system modules

| Type | Description | Art. no. |
|----------|--|----------|
| Q172DLX | Servo external signals interface module | 213894 |
| Q172DEX | Serial absolute synchronous encoder interface module | 213895 |
| Q173DPX | Manual pulse generator interface module | 213896 |
| Q173DSXY | Safety signal module | 251051 |



MELFA robot systems

Large range of robot models makes selection easy

Mitsubishi Electric produces a comprehensive range of robot models to cater to the full spectrum of modern needs.

All Mitsubishi Electric robots are powerful, fast and compact – that goes almost without saying.

The product range includes the almost universal **articulated-arm robots** with 6 degrees of freedom and payloads of 2 kg to 70 kg and **SCARA robots** with 4 degrees of freedom and payloads of 3 kg to 20 kg for assembly and palletising tasks.

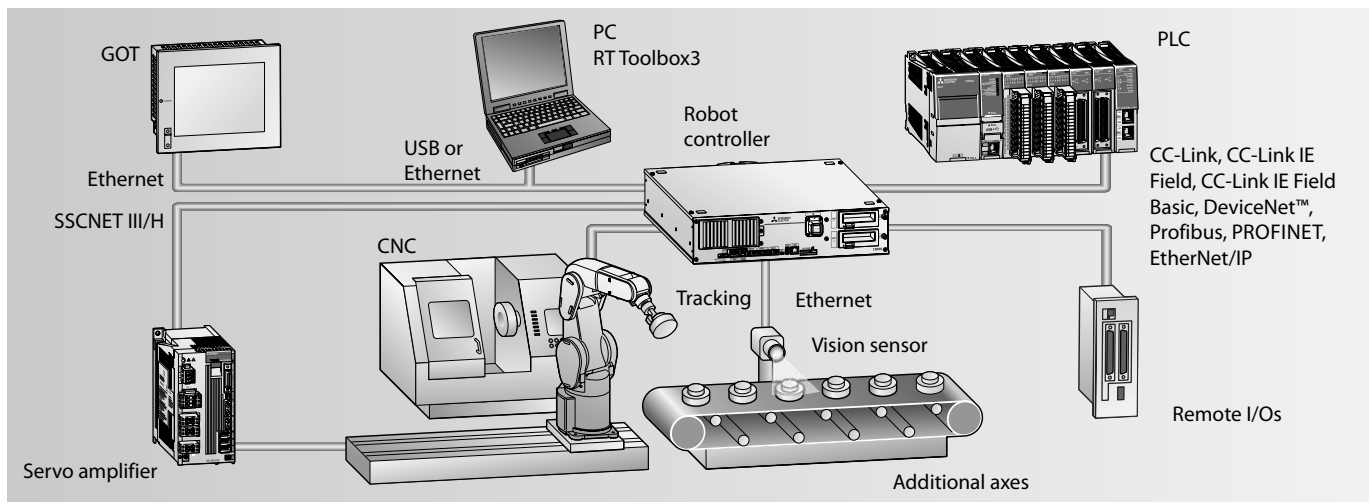
Two special models are the unique high-precision robots with their parallel arm structure for very fast micro handling tasks with payloads of 1 kg to 5 kg as well as the flexible high-speed SCARA robot for ceiling mounting.

Advanced intelligence, safety and integration

The concept of FR robots offers a simple approach to advanced and flexible production to handle all automation needs. This concept is based on 3 key features

- **Intelligence:** “MELFA Smart Plus” offers greater accuracy and shorter startup times, making installation simpler and more advanced tasks possible.
- **Safety:** A comprehensive range of safety functions, including position and speed monitoring, allow work to be conducted in cooperation with people
- **Integration:** MELSEC iQ-R compatible robot controller and the e-F@ctory integrated FA solution offers seamless integration of robots and IT systems.

Example of a robot system configuration

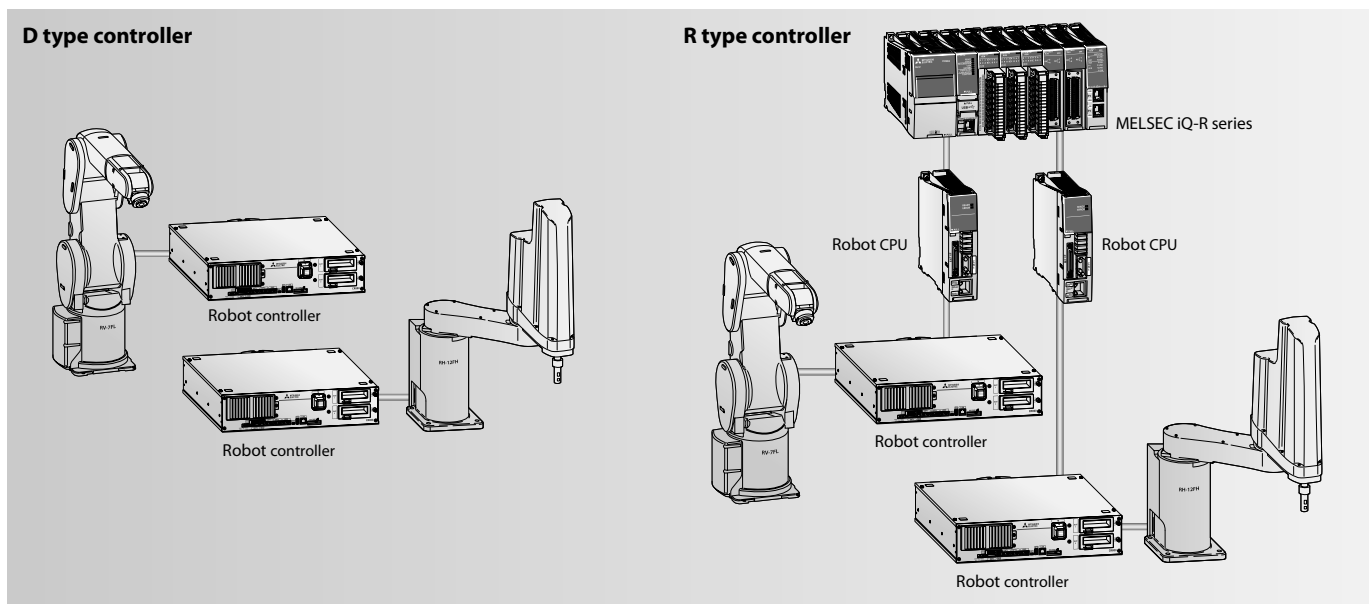


D type and R type controller

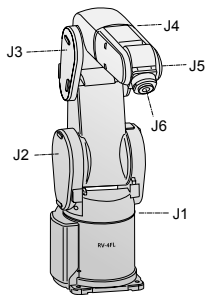
Mitsubishi Electric offers two basic robot families that meet all requirements - no matter how complex or demanding an application is. Advantages of the FR series are high performance and maximum productivity. Additional feature of the FR series with R type controller is the high integration potential, which is unique compared with other robot systems.

Full production line integration can easily be realised with R type controller robot systems. This is an iQ Platform based robot controller which directly communicates with the iQ-R PLC CPU and the complete range of iQ system modules (I/O, networking, special function, etc.).

Powerful features like fully integrated HMI terminal application monitoring, communication on most of the widely used networks and high performance MES functionality for 100 % data logging are just some of the features of this system.



Articulated robot for 2 kg and 4 kg payload



RV-4FRL

The compact and light RV-2FR(B)/RV-2FRL(B) can be seamlessly integrated into different automation systems. Flexibility and the wide range of motion permits acting in applications with limited space.

The RV-4FR series of robots have been designed to be very simple to integrate into an existing automation cell. Features such as the direct control over local I/Os allows the robot to interact directly with sensors and actuators.

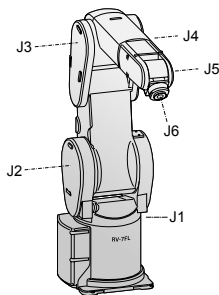
The RV-4FR series has been optimised with a choice of major networking technologies: Ethernet, EtherNet/IP, DeviceNet™, Profibus DP, PROFINET and CC-Link, CC-Link IE Field, CC-Link IE Field Basic.

For complex automation cells where movement is restricted, or there is a large distance between working points, the RV-4FR robots can control up to 8 additional axes to its standard robot arm configuration.

In addition, a clean room model is available that conforms to ISO Level III.

| Modell | RV-2FR-D/ RV-2FR-R | RV-2FRB-D-S25/ RV-2FRB-R-S25 | RV-2FRL-D-S25/ RV-2FRL-R-S25 | RV-2FRLB-D-S25/ RV-2FRLB-R-S25 | RV-4FRLM-D | RV-4FRLM-R | |
|--------------------------|----------------------------|---------------------------------|---------------------------------|-----------------------------------|----------------|--------------------|----------------|
| Degrees of freedom | 6 | 6 | 6 | 6 | 6 | 6 | |
| Maximum payload | kg 2 | 2 | 2 | 2 | 4 | 4 | |
| Gripper flange reach | mm 504 | 504 | 649 | 649 | 649 | 649 | |
| Repeatability | mm ±0.02 | ±0.02 | ±0.02 | ±0.02 | ±0.02 | ±0.02 | |
| Max. speed | mm/s 4955 | 4955 | 4955 | 4955 | 9048 | 9048 | |
| Controller type | CR800-D/CR800-R + R16RTCPU | | | | CR800-D | CR800-R + R16RTCPU | |
| Operating range (deg.) | J1 | 480 (-240–240) | 480 (-240–240) | 480 (-240–240) | 480 (±240) | 480 (±240) | |
| | J2 | 240 (-120–120) | 240 (-120–120) | 237 (-117–120) | 237 (-117–120) | 240 (-120–120) | |
| | J3 | 160 (0–160) | 160 (0–160) | 160 (0–160) | 160 (0–160) | 164 (0–164) | |
| | J4 | 400 (-200–200) | 400 (-200–200) | 400 (-200–200) | 400 (-200–200) | 400 (±200) | 400 (±200) |
| | J5 | 240 (-120–120) | 240 (-120–120) | 240 (-120–120) | 240 (-120–120) | 240 (-120–120) | 240 (-120–120) |
| | J6 | 720 (-360–360) | 720 (-360–360) | 720 (-360–360) | 720 (-360–360) | 720 (±360) | 720 (±360) |
| Robot weight | kg 19 | 19 | 21 | 21 | 41 | 41 | |
| Protection | IP30 | IP30 | IP30 | IP30 | IP67 | IP67 | |
| Order information | Art. no. 313052/ 314029 | 313053/ 314030 | 313054/ 314031 | 313085/ 314032 | 313089 | 314056 | |

Articulated robot for 7 kg to 20 kg payload



RV-7FRL

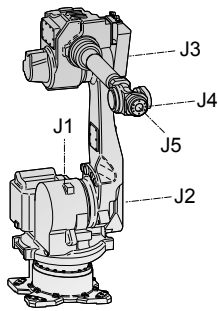
The RV-7FR with a nominal and maximum payload of 7 kg sets new benchmark standards for speed, flexibility, ease of integration and simplicity of programming. For an optimum work radius the robot is available in three versions with ranges from 713 mm to 1503 mm. Ethernet, USB, tracking, camera connection and additional axis connections are standard in all MELFA Robot Series.

The high-performance robots RV-13FR and RV-20FR are specially suited for handling heavy loads. Due to the compact body and slim arm design, the robots can operate in a large work area. The anti-collision function of the iQ Platform models prevents collisions between robots which are working close together.

There's also a clean room model available that conforms to ISO Level III.

| Modell | RV-7FRM-D/ RV-7FRM-R | RV-7FRLM-D/ RV-7FRLM-R | RV-7FRLLM-D/ RV-7FRLLM-R | RV-13FRM-D/ RV-13FRM-R | RV-13FRLM-D/ RV-13FRLM-R | RV-20FRM-D/ RV-20FRM-R |
|--------------------------|--------------------------------|---------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Degrees of freedom | 6 | 6 | 6 (super long arm) | 6 | 6 | 6 |
| Maximum payload | kg 7 | 7 | 7 | 13 | 13 | 20 |
| Gripper flange reach | mm 713 | 908 | 1503 | 1094 | 1388 | 1094 |
| Repeatability | mm ±0.02 | ±0.02 | ±0.06 | ±0.05 | ±0.05 | ±0.05 |
| Max. speed | mm/s 11064 | 10977 | 15300 | 10450 | 9700 | 4200 |
| Controller type | CR800-D/ CR800-R + R16RTCPU | | CR800-D/ CR800-R + R16RTCPU | CR800-D/ CR800-R + R16RTCPU | CR800-D/ CR800-R + R16RTCPU | CR800-D/ CR800-R + R16RTCPU |
| Operating range (deg.) | J1 | 480 (±240) | 480 (±240) | 380 (±190) | 380 (±190) | 380 (±190) |
| | J2 | 240 (-115–125) | 240 (-110–130) | 240 (-90–150) | 240 (-90–150) | 240 (-90–150) |
| | J3 | 156 (-0–156) | 162 (-0–162) | 167.5 (-10–157.5) | 167.5 (-10–157.5) | 167.5 (-10–157.5) |
| | J4 | 400 (±200) | 400 (±200) | 400 (±200) | 400 (±200) | 400 (±200) |
| | J5 | 240 (-120–120) | 240 (-120–120) | 240 (-120–120) | 240 (-120–120) | 240 (-120–120) |
| | J6 | 720 (±360) | 720 (±360) | 720 (±360) | 720 (±360) | 720 (±360) |
| Robot weight | kg 65 | 67 | 130 | 120 | 130 | 120 |
| Protection | IP67 | IP67 | IP67 | IP67 | IP67 | IP67 |
| Order information | Art. no. 313091/ 314058 | 313093/ 314060 | 313095/ 314062 | 313097/ 314064 | 313099/ 314066 | 312663/ 314068 |

Articulated robot for 35 kg to 70 kg payload



RV-35F/RV-50F/RV-70F

High capacity robots RV-35F/RV-50F/RV-70F

These robots with payload from 35 kg up to 70 kg are addressing applications that require higher payloads and longer reaches, including CNC machine tending, large material handling, palletizing and end of line packaging.

- Multiple environmental protection ratings – available in IP40 and IP67 protection ratings for various application requirements
- Seamless integration in the Mitsubishi Electric Automation world

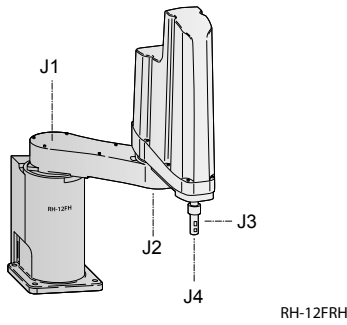
Highlights:

- Long reach arm up to 2050 mm for tasks can be spread farther apart and can accommodate larger parts and processes

| Modell | RV-35F ^① | RV-50F ^① | RV-70F ^① |
|--------------------------|---------------------|---------------------|---------------------|
| Degrees of freedom | 6 | 6 | 6 |
| Maximum payload | kg 35 | 50 | 70 |
| Gripper flange reach | mm 2050 | 2050 | 2050 |
| Repeatability | mm ±0.07 | ±0.07 | ±0.07 |
| Max. speed | mm/s 13450 | 13000 | 11500 |
| Controller type | CR760 ^① | | |
| Operating range (deg.) | J1 330(±165) | 330(±165) | 330(±165) |
| | J2 215 (-80–135) | 215 (-80–135) | 215 (-80–135) |
| | J3 261(-90–171) | 261(-90–171) | 261(-90–171) |
| | J4 720 (±360) | 720 (±360) | 720 (±360) |
| | J5 250 (±125) | 250 (±125) | 250 (±125) |
| | J6 900 (±450) | 900 (±450) | 900 (±450) |
| Robot weight | kg 640 | 640 | 640 |
| Protection | IP67 | IP67 | IP67 |
| Order information | Art. no. On request | On request | On request |

① Please contact your Mitsubishi Electric representative for more details.

SCARA robot for 1 kg to 20 kg payload



SCARA robots are ideal for sorting, palletizing and component installation.

This combination of compact dimensions and great precision predestine the RP robots for micro-handling tasks.

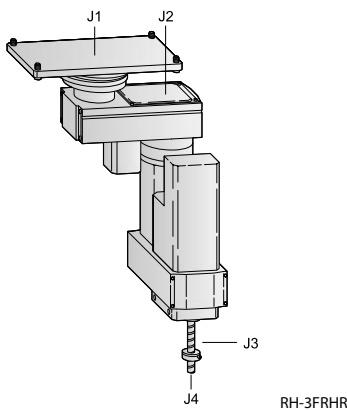
With a resulting reduced cycle time of only 0.29 seconds for a 12" cycle the robots of the RH-FRH series achieve the highest speeds in their class thanks to the new motors developed by Mitsubishi Electric, high arm rigidity and unique control technology.

Straight from the factory, the RH-FRH series offers many features, such as connections for pneumatic grippers, Ethernet, USB, tracking functions, camera interface, hand I/O, additional axis controller and an interface for GOT HMIs with freely programmable user interfaces. For pharmaceutical and micro electronic applications there is a clean room model available that conforms to ISO Level III.

| Modell | RP-1ADH-S15 | RP-3ADH-S15 | RP-5ADH-S15 |
|--------------------------|-------------------------|-------------------|-------------------|
| Degrees of freedom | 4 | 4 | 4 |
| Maximum payload | kg 1 | 3 | 5 |
| Controller type | CR1DA | CR1DA | CR1DA |
| Operating range | WxD (mm) | 150x105 (A6 size) | 210x148 (A5 size) |
| | J3 vertical motion (mm) | 30 | 50 |
| | J4 (deg.) | ±200 | ±200 |
| Repeat position accuracy | X-Y surface (mm) | ±0.005 | ±0.008 |
| | J3 vertical motion (mm) | ±0.01 | ±0.01 |
| | J4 (deg.) | ±0.02 | ±0.03 |
| Robot weight | kg 12 | 24 | 25 |
| Order information | Art. no. 252843 | 252844 | 252885 |

| Modell | RH-3FRH3515-D/ RH-3FRH5515-R | RH-6FRH5520N-D/ RH-6FRH5520N-R | RH-12FRH8535N-D/ RH-12FRH8535N-R | RH-20FRH10035N-D/ RH-20FRH10035N-R |
|-----------------------------|---------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|
| Degrees of freedom | 4 | 4 | 4 | 4 |
| Maximum payload | kg 3 | 6 | 12 | 20 |
| Controller type | CR800-D/ CR800-R + R16RTCPU | CR800-D/ CR800-R + R16RTCPU | CR800-D/ CR800-R + R16RTCPU | CR800-D/ CR800-R + R16RTCPU |
| Gripper flange reach | mm 550 | 550 | 850 | 1000 |
| Operating range | J1 (deg.) | 340 (±170) | 340 (±170) | 340 (±170) |
| | J2 (deg.) | 290 (±145) | 290 (±145) | 306 (±153) |
| | J3 (Z) (mm) | 150 | 200 | 350 |
| | J4 (θ axis) (deg.) | 720 (±360) | 720 (±360) | 720 (±360) |
| Repeatability X-Y direction | mm ±0.012 | ±0.012 | ±0.015 | ±0.015 |
| Max. speed | mm/s 8300 | 8300 | 11350 | 13283 |
| Robot weight | kg 32 | 37 | 69 | 77 |
| Protection | IP20 | IP54 (IP65 optional) | IP54 (IP65 optional) | IP54 (IP65 optional) |
| Order information | Art. no. 312930/ 313651 | 312985/ 313666 | 312991/ 313672 | 312995/ 313676 |

SCARA robot for overhead installation

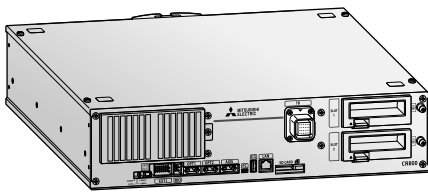


With its special compact design and support for overhead installation above the application, the robot RH-3FRHR3515 doesn't take up any valuable space in the work area next to the installation location, enabling even smaller work cell dimensions.

The RH-1FRHR5515 is a high-speed robot dedicated for handling of small parts up to 1 kg. Up to 150 picks/min with conveyer tracking including hand open/close are possible.

| Modell | RH-1FRHR5515-D | RH-1FRHR5515-R | RH-3FRHR3515-D-S25 | RH-3FRHR3515-R-S25 |
|-----------------------------|----------------------|--------------------|----------------------|--------------------|
| Degrees of freedom | 4 | | 4 | |
| Maximum payload | kg 3 | | 3 | |
| Controller type | CR800-D | CR800-R + R16RTCPU | CR800-D | CR800-R + R16RTCPU |
| Gripper flange reach | mm 550 | | 350 | |
| Operating range | J1 (deg.) | 354 (±177) | 450 (±225) | |
| | J2 (deg.) | 290 (±145) | 450 (±225) | |
| | J3 (Z) (mm) | 150 | 150 | |
| | J4 (θ axis) (deg.) | 720 (±360) | 1440 (±720) | |
| Repeatability X-Y direction | mm ±0.012 | | ±0.01 | |
| Max. speed | mm/s 6000 | | 6267 (J1, J2) | |
| Robot weight | kg 49 | | 24 | |
| Protection | IP20 (IP65 optional) | | IP20 (IP65 optional) | |
| Order information | Art. no. 312997 | 313661 | 312998 | 314028 |

Powerful controller



Every robot system has its own compact, modular robot controller, which contains the CPU and the power electronics for controlling the robot.

No matter which Mitsubishi robot you use the programming language and options are always the same. You can add special application functions by inserting expansion option cards in the slots in the controllers. Therefore it is possible, to integrate the controller into different types of networks.

The CR800 Controller has already implemented functions like Ethernet- and USB-Connection, Additional Axes Control over SSCNET III/H and Tracking Encoder interface as a standard.

| Characteristics/Functions | | CR1DA |
|-----------------------------|------------------------|--|
| Shipped with robot | | RP-1ADH/3ADH/5ADH |
| Number of controllable axes | | 6 robot axes + 2 interpolation axes + 6 independent axes |
| Interfaces | | USB, Ethernet, RS232 (all integrated) |
| Memory capacity | no. of teaching points | Max. 13000 |
| | no. program steps | Max. 26000 |
| | no. of programs | 256 |
| External inputs/ outputs | general purpose I/Os | Optional |
| | hand open/close | 8 |
| | emergency stop I/Os | 1 |
| | door switch input | 1 |

| Characteristics/Functions | | CR800-D | CR800-R |
|-----------------------------|------------------------|--|--------------------------------|
| Shipped with robot | | RV-2FR/2FRL/4FR/4FRL/7FR/7FRL/7FRL/13FR/13FRL/20FR RH-1FRHR/3FRHR/3FRH/6FRH/12FRH/20FRH | |
| Number of controllable axes | | 6 robot axes + 2 interpolation axes + 6 independent axes | |
| Interfaces | | Ethernet, USB, SSCNET III/H | |
| Memory capacity | no. of teaching points | 39000 | |
| | no. program steps | 78000 | |
| | no. of programs | 512 | |
| External inputs/ outputs | general purpose I/Os | up to 256 optional | up to 8192 shared with PLC CPU |
| | hand open/close | 8 inputs/8 outputs | |
| | emergency stop I/Os | 1 (redundant) | |
| | door switch input | 1 (redundant) | |

Robots teach panel



R32TB



R56TB

The R56TB teach panel is a multifunctional control and programming terminal for all Mitsubishi Electric FR series and F series, SD/SQ series and ADH series robots. Its intuitive user interface makes it easy to control robot movements and perform extensive diagnostics and monitoring functions for users of all levels. All safety-critical functions such as robot movements are assigned to keys.

Programming and monitoring functions are accessed and adjusted quickly and easily via the bright 6.5" touchscreen display.

| Specifications | | R56TB | R32TB |
|----------------------------|-----------------|---|--|
| Compatibility | | All Mitsubishi Electric FR series and F series, SD/SQ series and ADH series robots | |
| Functions | | Operation, programming and monitoring of all robot functions | |
| Programming and monitoring | | Read out information, also during operation; program editing with virtual keyboard; display up to 14 lines of program code; I/O monitoring for up to 256 inputs and 256 outputs; service display with information on maintenance intervals; error display with details of the last 128 alarms | Read out information, also during operation, program editing with T9-Key standard, supervising of I/Os, display of error alarms, Right-/Left-Hand usage, 36 keys for operation selection |
| | Software | Integrated operating system software with menu-based user interface | |
| Menu navigation (language) | | German, English, French, Italian | English, Japanese |
| Display | type/dimensions | 6.5" TFT display (640x480 pixels) | Monochrome LCD graphic display (24 characters x 8 lines) |
| | technology | Touchscreen with backlight | LCD with backlight |
| Interfaces | | USB, Ethernet for connection to the robot controller | RS422 for connection to the robot controller |
| Connection | | Direct connection to the robot controller, cable length 7m | |
| Protection rating | | IP65 | IP65 |
| Weight | | kg 1.25 | 0.9 |
| Order information | | Art. no. 218854 | 214968 |



Low voltage switch gears and energy monitoring

The complete solution for line and load side

Mitsubishi Electric offers the whole line from Air Circuit Breakers over Low Voltage Switchgear to Magnetic Contactors and Thermal Overload Relays.

A complete breaker program for complete, all-round protection.

SUPER AE series air circuit breakers

The SUPER AE air circuit breaker family consists of models from 1000 to 6300 A with a broad range of adjustable breaking capacities.

At the lower end of the scale the smallest current setting I_n is 125 A, with the AE1000 model. With the AE6300, the maximum possible setting is a full 6300 A.

Features include:

- Complete breaker program
- Frame size from 1000 A to 6300 A
- Wide performance range
- Breaking capacity up to 130 kA
- Growing power demands
- Optimum overload tripping system
- Additional disconnectors available

WSS series moulded case circuit breakers

The MCCBs of the Mitsubishi Electric breaker series are amongst the smallest compact circuit breakers in the world with electronic overload indication. The system is based, among other things, on the well-known and proven microprocessor technology. The WSS breaker series meets national and international protection ratings according to VDE, EN, and IEC standards for industrial applications as well as for extended shipping demands. The innovative tripping technology guarantees a high reliability and highest protection.

The highlights are

- 3 A to 1600 A rated capacity (3- and 4-pole)
- Interchangeable relay unit (thermal type or electronic type)
- Available in fixed and slot-in versions
- Breaking capacity up to 200 kA
- Additional disconnectors available

Miniature circuit breakers (MCB)

- Trip free mechanism
- During fault MCB trips even if handle is held in ON position.
- Low watt loss
- Power loss values are much lesser than IEC specified values; making it one of the most energy efficient MCB.
- Energy limiting class: 3
- High current limiting performance under fault conditions achieved due to ultra fast contact opening and rapid quenching of arc.
- Circuit identification
- Legend plates for circuit identifications and hence enhanced safety

MS series magnetic contactors and thermal overload relays

Compact, modular extensions and an energy-saving design – these are the main requirements set by users of contactors and auxiliary contactors.

MS meets these requirements plus:

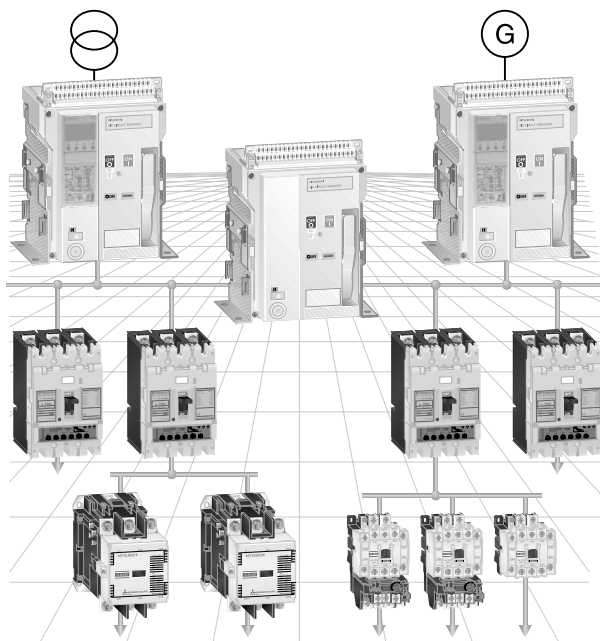
- Easy mounting and wiring
- Easy inspection
- Built-in surge absorber (from S-T65)
- Safety terminal functions
- Improvement of electromagnet
- International standard models

Motor circuit breaker (MMP)

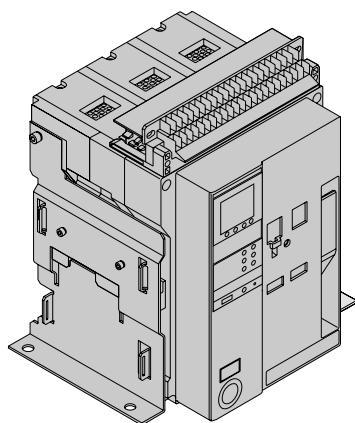
- Self-protected manual motor controller
- Reliable protection and superior performance
- Compact design
- Smart wiring
- Safety & quality
- Global standards

Energy monitoring (ME96 and EMU4)

- Multi-measuring instrument Super-S series (ME96)
Mitsubishi Electric multi-measuring instrument SS series features high performance and crystal clear display. With simple operating functions, SS series is the best support to your measuring and monitoring systems.
- Energy measuring unit EcoMonitorLight (EMU4)
Simple & easier providing energy visualization. Introducing the EcoMonitorLight, an energy measuring unit with an integrated display that provides easy energy visualization in order to provide ways to save energy and to comply with the Energy Saving Act in response to the need for a simple manner to figure out energy consumption.



SUPER AE series air circuit breakers (AE-SW series)



Built for the global demands of the 21st century

Mitsubishi Electric offers a really complete range of circuit breakers.

The World Super AE-SW air circuit family consist of models from 1000 to 6300 A and are available in both 3 and 4 pole versions with fixed or drawout configurations to suit your individual requirements. There are only 3 standard sizes, making planning much easier.

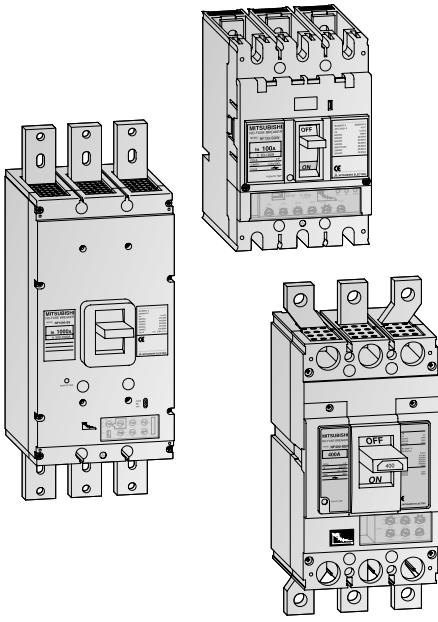
The development target was based on the features:

- Simple operation for maximum user-friendliness
- Flexible installation and customised protection for your systems
- Class leading performance range and extended service life
- Enhanced network support for comprehensive monitoring and control

| Type | AE1000-SW | | | | AE1250-SW | | | | AE1600-SW | | | | AE2000-SWA | | | | AE2000-SW | | | | AE2500-SW | | | | AE3200-SW | | | | AE4000-SWA | | | | AE4000-SW | | | | AE5000-SW | | | | AE6300-SW | | | | | | | | | |
|--|-----------------------|---|--|----|-----------|----|----|----|-----------|----|----|-----|------------|-----|----|-----|-----------|-----|--|-----|-----------|-----|-----|-----|-----------|-----|-----|-----|------------|-----|-----|-----|-----------|---|---|--|-----------|--|--|--|-----------|--|--|--|--|--|--|--|--|--|
| Frame type | 1 | | | | | | | | | | | | | | | | 2 | | | | | | | | | | | | | | | | 3 | | | | | | | | | | | | | | | | | |
| Rated current I _n (A) 40 °C | 1000 | | | | 1250 | | | | 1600 | | | | 2000 | | | | 2000 | | | | 2500 | | | | 3200 | | | | 4000 | | | | 4000 | | | | 5000 | | | | 6000 | | | | | | | | | |
| Max. rated operational voltage U _e (V) | 690 | | | | | | | | | | | | | | | | 690 | | | | | | | | | | | | | | | | 690 | | | | | | | | | | | | | | | | | |
| Rated insulation voltage U _i (V) | 1000 | | | | | | | | | | | | | | | | 1000 | | | | | | | | | | | | | | | | 1000 | | | | | | | | | | | | | | | | | |
| Rated impulse withstand voltage U _{imp} (kV) | 12 | | | | | | | | | | | | | | | | 12 | | | | | | | | | | | | | | | | 12 | | | | | | | | | | | | | | | | | |
| Suitable for isolation | ● | | | | | | | | | | | | | | | | ● | | | | | | | | | | | | | | | | ● | | | | | | | | | | | | | | | | | |
| Category | B | | | | | | | | | | | | | | | | B | | | | | | | | | | | | | | | | B | | | | | | | | | | | | | | | | | |
| Pollution degree | 3 | | | | | | | | | | | | | | | | 3 | | | | | | | | | | | | | | | | 3 | | | | | | | | | | | | | | | | | |
| Number of poles | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | | | | | | | | | | | | | | | | |
| Rated current I _n (A) adjustment range at 40 °C | 500–1000 | | | | 625–1250 | | | | 800–1600 | | | | 1000–2000 | | | | 625–2000 | | | | 1250–2500 | | | | 1600–3200 | | | | 2000–4000 | | | | 2000–4000 | | | | 2500–5000 | | | | 3150–6300 | | | | | | | | | |
| Rated current of neutral pole (A) | 1000 | | | | 1250 | | | | 1600 | | | | 2000 | | | | 2000 | | | | 2500 | | | | 3200 | | | | 4000 | | | | 2000 | | | | 2500 | | | | 3150 | | | | | | | | | |
| Rated service short-circuit breaking capacity ^① I _{cs} (kA, rms) | 690 V AC | | 65 | | | | | | | | | | | | | | | | 75 | | | | | | | | | | | | | | | | 85 | | | | | | | | | | | | | | | |
| | 400 V AC | | 65 | | | | | | | | | | | | | | | | 85 | | | | | | | | | | | | | | | | 130 | | | | | | | | | | | | | | | |
| Rated short-time withstand current (kA rms) I _{sw} | 1 s | | 65 | | | | | | | | | | | | | | | | 75 | | | | | | | | | | | | | | | | 100 | | | | | | | | | | | | | | | |
| Operating cycles ^② (ON/OFF) | without rated current | | 25000 | | | | | | | | | | | | | | | | 20000 | | | | | | | | | | | | | | | | 10000 (3P)/5000 (4P) | | | | | | | | | | | | | | | |
| | with rated current | | — | | | | | | | | | | | | | | | | — | | | | | | | | | | | | | | | | — | | | | | | | | | | | | | | | |
| Connecting terminal | horizontal | | ● | | | | | | | | | | | | | | | | ● | | | | | | | | | | | | | | | | — | | | | | | | | | | | | | | | |
| | vertical | | ● ^③ | | | | | | | | | | | | | | | | ● | | | | | | | | | | | | | | | | ● | | | | | | | | | | | | | | | |
| | frontal | | ● ^③ | | | | | | | | | | | | | | | | ● ^③ | | | | | | | | | | | | | | | | — | | | | | | | | | | | | | | | |
| Outline dimensions (mm) WxHxD | fixed type | | 3-pole: 410x340x290 4-pole: 410x425x290 | | | | | | | | | | | | | | | | 3-pole: 410x475x290 4-pole: 410x605x290 | | | | | | | | | | | | | | | | 3-pole: 414x873x290 4-pole: 414x1003x290 | | | | | | | | | | | | | | | |
| | draw-out type | | 3-pole: 430x300x368 4-pole: 430x385x368 | | | | | | | | | | | | | | | | 3-pole: 430x435x368 4-pole: 430x565x368 | | | | | | | | | | | | | | | | 3-pole: 430x439x368 4-pole: 480x875x368 430x569x368 4-pole: 480x1005x368 | | | | | | | | | | | | | | | |
| Weight (kg) | fixed type | | 41 | 51 | 41 | 51 | 42 | 52 | 47 | 57 | 60 | 72 | 61 | 73 | 63 | 75 | 81 | 99 | 160 | 180 | 160 | 180 | 160 | 180 | 160 | 180 | 160 | 180 | 160 | 180 | 160 | 180 | | | | | | | | | | | | | | | | | | |
| | draw-out type | | 64 | 78 | 64 | 78 | 65 | 79 | 70 | 84 | 92 | 113 | 93 | 114 | 95 | 116 | 108 | 136 | 233 | 256 | 233 | 256 | 240 | 263 | 233 | 256 | 233 | 256 | 240 | 263 | | | | | | | | | | | | | | | | | | | | |
| | cradle only | | 26 | 30 | 26 | 30 | 26 | 30 | 31 | 35 | 35 | 43 | 35 | 43 | 36 | 44 | 49 | 61 | 118 | 133 | 118 | 133 | 125 | 140 | 118 | 133 | 118 | 133 | 125 | 140 | | | | | | | | | | | | | | | | | | | | |

① Conforms to IEC60947-2, EN60947-2
 ② Number of mechanical operating cycles (on/off).
 ③ Optional

WS series moulded-case circuit breakers



The moulded-case circuit breakers of the Mitsubishi Electric breaker series are amongst the smallest compact circuit breakers in the world with electronic overload indication of this kind. The system is based, among other things, on the well-known and proven microprocessor technology.

WSS – World Super Series

The WSS breaker series meets national and international protection ratings according to VDE, EN, and IEC standards for industrial applications as well as for extended shipping demands.

The tripping technology guarantees a high reliability and highest protection.

- 16 A to 250 A in one model size (3- and 4-pole)
- Overcurrent tripping relay unit (thermal type or electronic type)
- Available in fixed and plug-in versions
- Breaking capacity up to 200 kA

Specifications

| Specifications | | NF32-SV | NF63-SV | NF63-HV | NF125-SV | NF125-SGV | NF125-SEV | NF125-LGV |
|--|-------------|-----------|---------------|---------------|----------------|----------------|----------------|----------------|
| Rated current $I_{n,max}$ [A] | | 32 | 63 | 63 | 125 | 125 | 125 | 125 |
| Rated insulation voltage U_i [V] | AC | 600 | 600 | 690 | 690 | 690 | 690 | 690 |
| Number of poles | | 3 | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 |
| Rated breaking capacity [kA] (I_{cu}/I_{cs}) | IEC 947-2 | 690 V | — | 2.5/2.5 | 8/8 | 8/8 | 8/8 | 8/8 |
| | EN 60 947-2 | 440 V | 2.5/2.5 | 7.5/7.5 | 10/8 | 25/25 | 36/36 | 50/50 |
| | VDE 0660 | 400 V | 5/5 | 7.5/7.5 | 10/8 | 30/30 | 36/36 | 50/50 |
| Dimensions (WxHxD) | mm | 75x130x68 | 75/100x130x68 | 75/100x130x68 | 90/120/x130x68 | 105/140x165x68 | 105/140x165x68 | 105/140x165x68 |

| Specifications | | NF125-HGV | NF125-HEV | NF125-RGV | NF125-UV | NF160-SGV | NF160-LGV | NF160-HGV |
|--|-------------|----------------|----------------|------------|----------------|----------------|----------------|----------------|
| Rated current $I_{n,max}$ [A] | | 125 | 125 | 125 | 125 | 160 | 160 | 160 |
| Rated insulation voltage U_i [V] | AC | 690 | 690 | 690 | 690 | 690 | 690 | 690 |
| Number of poles | | 3/4 | 3/4 | 3 | 3/4 | 3/4 | 3/4 | 3/4 |
| Rated breaking capacity [kA] (I_{cu}/I_{cs}) | IEC 947-2 | 690 V | 10/8 | — | 10/10 | 8/8 | 8/8 | 10/8 |
| | EN 60 947-2 | 440 V | 65/65 | 65/65 | 125/125 | 200/200 | 36/36 | 50/50 |
| | VDE 0660 | 400 V | 75/75 | 75/75 | 150/150 | 200/200 | 36/36 | 50/50 |
| Dimensions (WxHxD) | mm | 105/140x165x68 | 105/140x165x68 | 105x165x68 | 105/140x240x68 | 105/140x165x68 | 105/140x165x68 | 105/140x165x68 |

| Specifications | | NF250-SV | NF250-SGV | NF250-SEV | NF250-LGV | NF250-HGV | NF250-HEV | NF250-RGV | NF250-UV |
|--|-------------|----------------|----------------|----------------|----------------|----------------|----------------|------------|----------------|
| Rated current $I_{n,max}$ [A] | | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| Rated insulation voltage U_i [V] | AC | 690 | 690 | 690 | 690 | 690 | 690 | 690 | 690 |
| Number of poles | | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 | 3 | 3/4 |
| Rated breaking capacity [kA] (I_{cu}/I_{cs}) | IEC 947-2 | 690 V | 8/8 | 8/8 | 8/8 | 10/8 | 10/8 | — | 15/15 |
| | EN 60 947-2 | 440 V | 36/36 | 36/36 | 36/36 | 50/50 | 65/65 | 125/125 | 200/200 |
| | VDE 0660 | 400 V | 36/36 | 36/36 | 36/36 | 50/50 | 75/75 | 150/150 | 200/200 |
| Dimensions (WxHxD) | mm | 105/140x165x68 | 105/140x165x68 | 105/140x165x68 | 105/140x165x68 | 105/140x165x68 | 105/140x165x68 | 105x165x68 | 105/140x240x68 |

| Specifications | | NF400-SEW | NF400-HEW | NF400-REW | NF400-UW | NF630-SEW | NF630-HEW | NF630-REW |
|--|-------------|-----------------|-----------------|-------------|---------------------|-----------------|-----------------|-------------|
| Rated current $I_{n,max}$ [A] | | 400 | 400 | 400 | 400 | 630 | 630 | 630 |
| Rated insulation voltage U_i [V] | AC | 690 | 690 | 690 | 690 | 690 | 690 | 690 |
| Number of poles | | 3/4 | 3/4 | 3 | 3/4 | 3/4 | 3/4 | 3 |
| Rated breaking capacity [kA] (I_{cu}/I_{cs}) | IEC 947-2 | 690 V | 10/10 | 35/18 | — | 35/35 | 10/10 | 15/15 |
| | EN 60 947-2 | 440 V | 42/42 | 65/65 | 125/63 | 200/200 | 42/42 | 65/65 |
| | VDE 0660 | 400 V | 50/50 | 70/70 | 125/63 | 200/200 | 50/50 | 70/70 |
| Dimensions (WxHxD) | mm | 140/185x257x103 | 140/185x257x103 | 140x257x103 | 140/280x297/322x200 | 140/185x257x103 | 140/185x257x103 | 140x257x103 |

| Specifications | | NF800-SEW | NF800-HEW | NF800-REW | NF800-UW | NF1000-SEW | NF1250-SEW | NF1600-SEW |
|--|-------------|-----------------|-----------------|-------------|-----------------|-----------------|-----------------|-----------------|
| Rated current $I_{n,max}$ [A] | | 800 | 800 | 800 | 800 | 1000 | 1250 | 1600 |
| Rated insulation voltage U_i [V] | AC | 690 | 690 | 690 | 690 | 690 | 690 | 690 |
| Number of poles | | 3/4 | 3/4 | 3 | 3/4 | 3/4 | 3/4 | 3/4 |
| Rated breaking capacity [kA] (I_{cu}/I_{cs}) | IEC 947-2 | 690 V | 10/10 | 15/15 | — | 35/35 | 25/13 | 25/13 |
| | EN 60 947-2 | 440 V | 42/42 | 65/65 | 125/63 | 200/200 | 85/43 | 85/43 |
| | VDE 0660 | 400 V | 50/50 | 70/70 | 125/63 | 200/200 | 85/43 | 85/43 |
| Dimensions (WxHxD) | mm | 210/280x275x103 | 210/280x275x103 | 210x275x103 | 210/280x322x200 | 210/280x406x140 | 210/280x406x140 | 210/280x406x140 |

Magnetothermic and earth leakage protection

Earth leakage circuit breakers ELCB and residual current circuit breakers with overcurrent protection RCBO

| Type | BV-DN | NV125-CV | NV250-CV |
|--------------------------------|------------------------|---|--------------------------|
| Rated current I_n [A] | 10, 16, 20, 25, 32, 40 | 80, 100, 125 | 150, 175, 200, 225, 250 |
| Number of poles | 2 (1+N) | 3 | 3 |
| Rated voltage [V AC] | 230 | 100–440 | 100–440 |
| Rated current sensitivity [mA] | 30 | 100/200/500 selectable | 100/200/500 selectable |
| Max. operating time [s] | 0.04 | 0.45/1.0/2.0 selectable | 0.45/1.0/2.0 selectable |
| Pulsating current sensitivity | AC | A (Harmonic Surge Ready) | A (Harmonic Surge Ready) |
| Rated breaking capacity [kA] | 230 V AC | 4.5 | 30 |
| | 440 V AC | — | 10 |
| Number of operating cycles | without current | 20000 | 10000 |
| | with current | 20000 (I_n 10, 16, 20 A) 15000 (I_n 25 A) 10000 (I_n 32, 40 A) | 6000 |
| Dimensions [mm] | a | 36 | 90 |
| | b | 88 | 130 |
| | c | 44 | 68 |
| | ca | 70 | 90 |
| Mass [kg] | 0.19 | 1 | 1.7 |
| Automatic tripping device | Thermal-magnetic | Thermal-magnetic | Thermal-magnetic |
| Based on standard | IEC61009-1 | IEC60947-2 | IEC60947-2 |
| Breaker type | MCB | MCCB | MCCB |
| CE marking | Self-declaration | Self-declaration | TÜV approval |

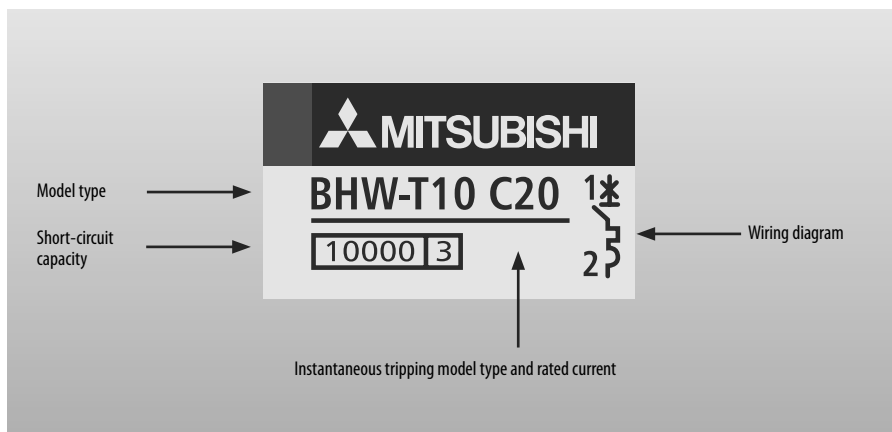
* All the accessories and dimensions of the NF125-SV are compatible with the NV125-CV. All the accessories and dimensions of the NF250-SGV are compatible with the NV250-CV. For internal accessories only is possible to fit it on the left side.

DIN series

Miniature circuit breakers and residual current circuit breakers

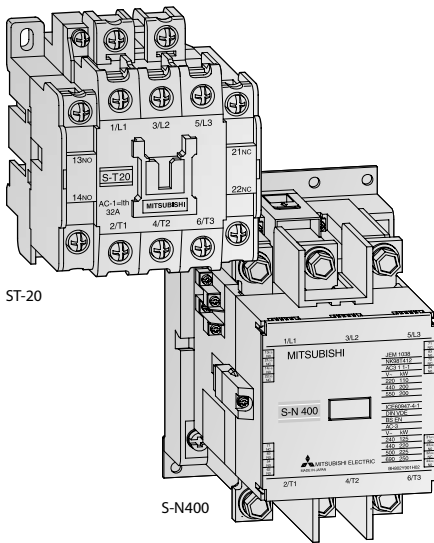
| Model type | No. of poles [P] | Rating | Instantaneous tripping | Voltage [V] | Short-circuit capacity [kA] | Compliance standard |
|-------------|---------------------|--------------------------|------------------------|-------------|-----------------------------|---------------------|
| MCB BHW-T10 | 1, 2, 3, 4 | 6 to 63 A 0.5 to 63 A | Type B Type C, D | 240/415 AC | 10 | IEC 60898-1 |
| RCCB BVW-T | 2 (1+N), 4 (3+N) | 16 to 63A | — | 240/415 AC | — | IEC 61008-1 |

Explanation of markings (example model type: BHW-T10)



Low voltage & energy monitoring

General purpose contactors



Compact, modular extensions and an energy-saving design – these are the main requirements set by users of contactors and auxiliary contactors.

Requirements that the MS-N/T series from Mitsubishi Electric fulfill.

Special features:

- Easy mounting and wiring
- Easy inspection
- Built-in surge absorber (from S-N50)

- Safety and speedy terminal functions
- Thermo-plastic improves the barrier strength
- Coil boasts lower coil consumption
- Improvement of Electromagnet (DC electromagnet with AC operation)
- Less noise nor surge from coil
- Conform to IEC947-4-1, EN-Standards
- Wide range for rated continuous current I_{th} from 20 A to 1000 A

Handling of the contactors

S-T10 to S-N65 units can all be mounted on DIN rail (35 mm wide).

A variety of auxiliary blocks and optional features are available including:

- Standard front clip-on auxiliary contact blocks (4-pole-type and 2-pole-type)
- Low-level signal front-clip-on auxiliary contact blocks

- Side clip-on auxiliary contact blocks
- Surge absorbers (varistor and CR models)
- Surge absorbers with LED operating indicators
- Mechanical interlocks

Compact arc quenching and magnet layout greatly reduces installation space.

The coil rating is displayed in a location readily visible even after the unit is installed onto the panel.

Contacts are visible when the cover is removed, allowing them to be checked easily.

Three-phase motor ratings IEC category AC3 for contactors

| Contactor | AC-operated | S-T10 | S-T12 | S-T20 | S-T21 | S-T25 | S-T32 | S-T35 | S-T50 | S-T65 |
|-----------------------------------|-------------|--------------|-----------------------------|---------------------|-------------|-------------|--------|-------------|-------------|-------------|
| | DC-operated | — | SD-T12 | SD-T20 | SD-T21 | SD-T25 | SD-T32 | SD-T35 | SD-T50 | SD-T65 |
| AC 380–440 V | kW | 4 | 5.5 | 7.5 | 11 | 15 | 15 | 18.5 | 22 | 30 |
| Rated continuous current I_{th} | A | 20 | 20 | 20 | 32 | 32 | 32 | 60 | 80 | 100 |
| Auxiliary contacts (standard) | | 1 NO or 1 NC | 1 NO + 1 NC or 2 NO or 2 NC | 1 NO + 1 NC or 2 NO | 2 NO + 2 NC | 2 NO + 2 NC | — | 2 NO + 2 NC | 2 NO + 2 NC | 2 NO + 2 NC |

Thermal overload relays

| Type | TH-T18KP | TH-T25KP | TH-T25KP/TH-T50KP | TH-T65KP |
|---------------|----------|----------|-------------------|----------|
| Setting range | A 0.1–18 | 0.24–26 | 0.24–34 A | 0.24–50 |

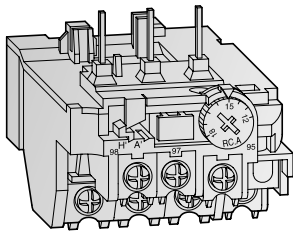
Three-phase motor ratings IEC category AC3 for contactors

| Contactor | AC-operated | S-T80 | S-T100 | S-N125 | S-N150 | S-N180 | S-N220 | S-N300 | S-N400 | S-N600 | S-N800 |
|-----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | DC-operated | SD-T80 | SD-T100 | SD-N125 | SD-N150 | — | SD-N220 | SD-N300 | SD-N400 | SD-N600 | SD-N800 |
| AC 380–440 V | kW | 45 | 55 | 60 | 75 | 90 | 132 | 160 | 220 | 330 | 440 |
| Rated continuous current I_{th} | A | 120 | 150 | 150 | 200 | 260 | 260 | 350 | 450 | 800 | 1000 |
| Auxiliary contacts (standard) | | 2 NO + 2 NC | 2 NO + 2 NC | 2 NO + 2 NC | 2 NO + 2 NC | 2 NO + 2 NC | 2 NO + 2 NC | 2 NO + 2 NC | 2 NO + 2 NC | 2 NO + 2 NC | 2 NO + 2 NC |

Thermal overload relays

| Type | TH-T65KP/TH-T100KP | TH-N120KP | TH-N120TAKP | TH-N220RHKP | TH-N400RHKP | TH-N600KP |
|---------------|--------------------|-----------|-------------|-------------|-------------|-----------|
| Setting range | A 12–80 | 12–100 | 34–100 | 85–150 | 65–250 | 85–400 |

Thermal overload relays



TH-T18KP

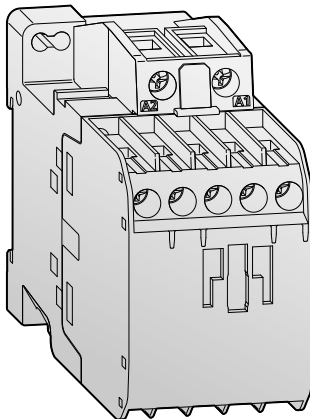
A selection of relays for optimum motor protection characteristics

The thermal relay line-up includes the phase failure protection type models (three-element relays).

This array of protection characteristics allows you to choose the units suited to your motor protection needs.

- An operation indicator makes maintenance and inspection easy.
- 1 NO and 1 NC contact
- Rated current can be set easily
- Finger protection up to TH-N60KPCX
- Trip-free reset bar
- Convenient reset release (optional)

Contactor relays



SR-T5

Contactor relays are designed for use in low voltage control circuit applications.

Our standard contactor relay version is with 5 auxiliary contacts.

With side clip-on and front clip-on configurations available, a maximum of 4 auxiliary contacts are possible.

- High reliability: By adopting bifurcated moving contacts and by improving the shape of the contacts, contact performance has been made more reliable than ever.
- Different types: Standard, large capacity, overlap contact

- Various contact arrangement and long life
- Mountable on 35 mm DIN rails
- Dust-proof construction
- Easily visible coil ratings
- Easy wiring (self-rising terminal screws)
- Various accessories common with the series S-N contactors (front and side clip-on type additional auxiliary contact blocks, surge absorbers)
- Finger protected types are available (DIN 57106/VDE 0106 Part 100) (Suffix "CX")

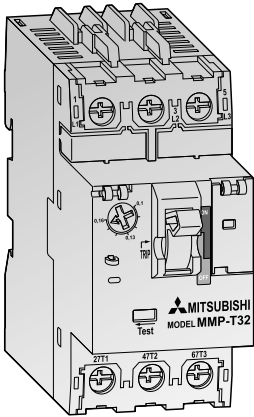
Contactor relays

| | | | |
|--------------------|-------------|---------------|---------------|
| DC-operated type | SRD-N4CX 4A | SRD-N4CX 3A1B | SRD-N4CX 2A2B |
| Auxiliary contacts | 4 NO | 3 NO, 1 NC | 2 NO, 2 NC |

Contactor relays RS-T series

| | | | | |
|-------------------------------|-------------|-----------|-------------|-------------|
| Contactor | AC-operated | SR-T5 5A | SR-T5 4A1B | SR-T5 3A2B |
| | DC-operated | SRD-T5 5A | SRD-T5 4A1B | SRD-T5 3A2B |
| Auxiliary contacts (standard) | | 5 NO | 4 NO + 1 NC | 3 NO + 2 NC |

Motor circuit breaker

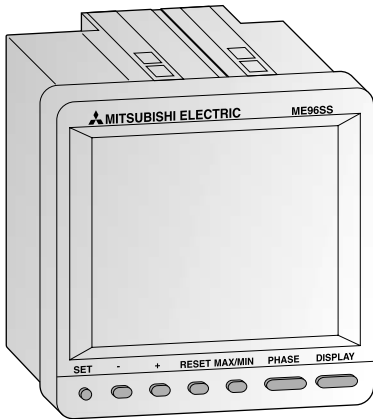


MMP-T32 integrates low voltage circuit breakers and thermal overload relay functions. This device is capable of protecting the motor branch circuits from overload, phase-loss and short-circuit occurrences. The MMP-T32 enables more secure wiring and motor protection than standard open type starters.

In addition to motor protection, integrating the Mitsubishi MS-T series contactor provides a smaller footprint, and the combination motor controller will help

- Self-protected manual motor controller
- Reliable protection and superior performance
- Compact design
- Smart wiring
- Safety & quality
- Global standards

| Frame A | 32 | | | | | | 32 | | | | | | |
|--|--|-----------|----------|-----------|----------|-----------|---|-----------|----------|-----------|----------|------------|----------|
| Type name | MMP-T32 | | | | | | MMP-T32LF | | | | | | |
| Standard | JIS C8201-2-1 Ann.1, JIS 8201-4-1, EN60947-2, EN60947-4-1, IEC60947-2, IEC60947-4-1, GB14048.2, UL60947-4-1A, CSAC22.2NO.60947-4-1 | | | | | | EN60947-2, EN60947-4-1, IEC60947-2, IEC60947-4-1, GB14048.2 | | | | | | |
| Number of poles | 3 | | | | | | | | | | | | |
| Handle shape | Tumbler handle | | | | | | | | | | | | |
| Rated current I_n [A] | 0.1 to 32 | | | | | | | | | | | | |
| Rated operational voltage U_n [V] | 200 to 690 | | | | | | | | | | | | |
| Rated frequency [Hz] | 50/60 | | | | | | | | | | | | |
| Rated insulation voltage U_i [V] | 690 | | | | | | | | | | | | |
| Rated impulse withstand voltage U_{imp} [kV] | 6 | | | | | | | | | | | | |
| Rated short-circuit breaking capacity [kA] | rated current I_n [A] | 200/240 V | | 400/415 V | | 440/460 V | | 200/240 V | | 400/415 V | | 440/460 V | |
| | heater designation | | | | | | | | | | | | |
| | current setting range | I_{cu} | I_{cs} | I_{cu} | I_{cs} | I_{cu} | I_{cs} | I_{cu} | I_{cs} | I_{cu} | I_{cs} | I_{cu} | I_{cs} |
| | 0.16 | 0.1–0.16 | | 100 | | 100 | | 100 | | 100 | | 100 | |
| | 0.25 | 0.16–0.25 | | 100 | | 100 | | 100 | | 100 | | 100 | |
| | 0.4 | 0.25–0.4 | | 100 | | 100 | | 100 | | 100 | | 100 | |
| | 0.63 | 0.4–0.63 | | 100 | | 100 | | 100 | | 100 | | 100 | |
| | 1 | 0.63–1 | | 100 | | 100 | | 100 | | 100 | | 100 | |
| | 1.6 | 1–1.6 | | 100 | | 100 | | 100 | | 100 | | 100 | |
| | 2.5 | 1.6–2.5 | | 100 | | 100 | | 100 | | 100 | | 100 | |
| | JIS C8201-2-1 Ann.1 | 4 | | 100 | | 100 | | 100 | | 100 | | 100 | |
| | IEC60947-2 | 6.3 | | 100 | | 100 | | 100 | | 100 | | 50 50 | |
| | | 8 | | 100 | | 100 | | 50 38 | | 100 | | 15 15 | |
| | | 10 | | 100 | | 100 | | 50 38 | | 100 | | 15 15 | |
| | | 13 | | 100 | | 100 | | 50 38 | | 100 | | 15 7.5 8 4 | |
| | | 18 | | 100 | | 50 38 | | 35 27 | | 100 | | 15 7.5 8 4 | |
| | 25 | | 100 | | 50 38 | | 35 27 | | 50 | | 15 6 6 3 | | |
| | 32 | | 100 | | 50 38 | | 35 27 | | 50 | | 10 5 6 3 | | |
| Selectivity category | JIS C8201-2-1 Ann.1 IEC60947-2 | | | | | | Cat.A | | | | | | |
| Utilization category | JIS C8201-4-1 IEC60947-4-1 | | | | | | AC-3 | | | | | | |
| Trip class (JIS C8201-4-1, IEC60947-4-1) | 10 | | | | | | | | | | | | |
| Instantaneous release current | 13 x Maximum I_n | | | | | | | | | | | | |
| Durability | mechanical [times] | | | | | | | | | | | | |
| | electrical [times] | | | | | | | | | | | | |
| Phase loss sensitive | Yes | | | | | | | | | | | | |
| Trip display | Yes | | | | | | | | | | | | |
| Test trip function | Yes | | | | | | | | | | | | |
| Auxiliary contact unit | UT-MAX (1a or 1b) AC-12: 125 V/5 A, 250 V/3 A | | | | | | | | | | | | |
| Alarm contact unit | UT-MAL (1a or 1b) DC-12: 125 V/0.4 A, 250 V/0.2 A | | | | | | | | | | | | |
| Short-circuit indicator unit | UT-TU | | | | | | | | | | | | |
| Weight [g] | 330 | | | | | | | | | | | | |



Electronic multi-measuring instruments

The ME96SS measures and displays all important values of a low voltage/medium voltage power distribution system. By optional plug-in modules, remote I/O's and open network communication can be added. The remote I/O will be used for monitoring the MCCB or ACB status or can be used for energy counters.

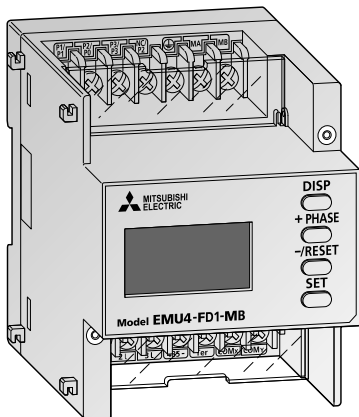
The ME96SS provides full integration in a CC-Link or Modbus® network and allows

therefore energy reduction and optimization controlled by our well-known PLC series.

Compact sizes according to DIN

- Easy to read display and simple to learn operation
- Flexible to use and modular expandable
- Conforms to CE standard

| Specifications | ME96SSHA-MB | ME96SSRA-MB | ME96SSEA-MB |
|--------------------------|--|-----------------|-----------------|
| Display | LCD, monochrome | LCD, monochrome | LCD, monochrome |
| Function keys | 7 | 7 | 7 |
| Memory for | Measurements and settings | | |
| Network connection | Modbus®/RTU communication | | |
| Expandability | CC-Link, digital or analogue I/Os via plug-in module | | |
| External power supply | AC 100–240 V (±15 %), DC 100–240 V (-30 % +15 %) | | |
| Operating conditions | -5 to +55 °C (average temperature: 35 °C or less per day), 0 to 85 % RH, non-condensing | | |
| Storage conditions | -25 to +75 °C (average temperature: 35 °C or less per day), 0 to 85 % RH, non-condensing | | |
| Standards | EMC: EN61326-1:2006 safety standard: EN61010-1:2001 | | |
| Order information | Art. no. 297417 | 297418 | 297419 |



Energy measuring unit EcoMonitorLight

Introducing the EcoMonitorLight, an energy measuring unit with an integrated display that provides easy energy visualization in order to provide ways to save energy and to comply with the Energy Saving Act in response to the need for a simple manner to figure out energy consumption.

| Type | EMU4-FD1-MB | |
|------------------------------------|--|--|
| Phase wire system | 3-phase 4-wire, 3-phase 3-wire (3 CT, 2 CT), 1-phase 3-wire, 1-phase 2-wire | |
| Rating | current | AC 5 A, AC 1 A |
| | voltage | 3-phase 4-wire: max. AC 277/480 V; 3-phase 3-wire: (DELTA) max. AC 220 V, (STAR) max. AC 440 V 1-phase 3-wire: max. AC 220/440 V; 1-phase 2-wire: (DELTA) max. AC 220 V, (STAR) max. AC 440 V |
| | frequency | 50–60 Hz (common) |
| Communication specification | Modbus®/RTU communication | |
| External input | input signal | Non-voltage form A contact, 1 input (choose the function from below) Setting to "pulse input": Pulse count (0–999,999 counts) |
| | function | Setting to "contact input": Contact monitoring only Contact monitoring and energy measuring at work (when contact is on) |
| External output | output signal | Non-voltage Form A contact, 1 output (choose the function from below) |
| | function | Upper limit monitoring of current demand, Lower limit monitoring of current demand, Upper/lower limit monitoring of voltage, Upper limit monitoring of power demand, Lower limit monitoring of power demand, Upper/lower limit monitoring of power factor, Upper limit monitoring of pulse count, Lower limit monitoring of pulse count Pulse output, Output item: Energy use |
| Accessible optional plug-in module | EMU4-CM-C | CC-Link communication |
| | EMU4-LM | Logging module (SD CARD) |
| | EMU4-CM-MT | Modbus®/TCP communication |
| Auxiliary power | AC 100–240 V (+10 %, -15 %) 50/60 Hz | |
| Attachment method | IEC rail mounting | |
| Operating temperature/humidity | -5 to +55 °C (average temperature: 35 °C or less per day), 0 to 85 % RH, non-condensing | |
| Storage temperature/humidity | -10 to +60 °C (average temperature: 35 °C or less per day), 0 to 85 % RH, non-condensing | |
| Optional part (For EMU4-LM) | SD memory card (EMU4-SD2GB) ① | |

① Make sure to use the SD memory card manufactured by Mitsubishi Electric Corporation (Model EMU4-SD2GB). Using other types of the SD memory cards may cause trouble such as data destruction of the memory card or system failure.

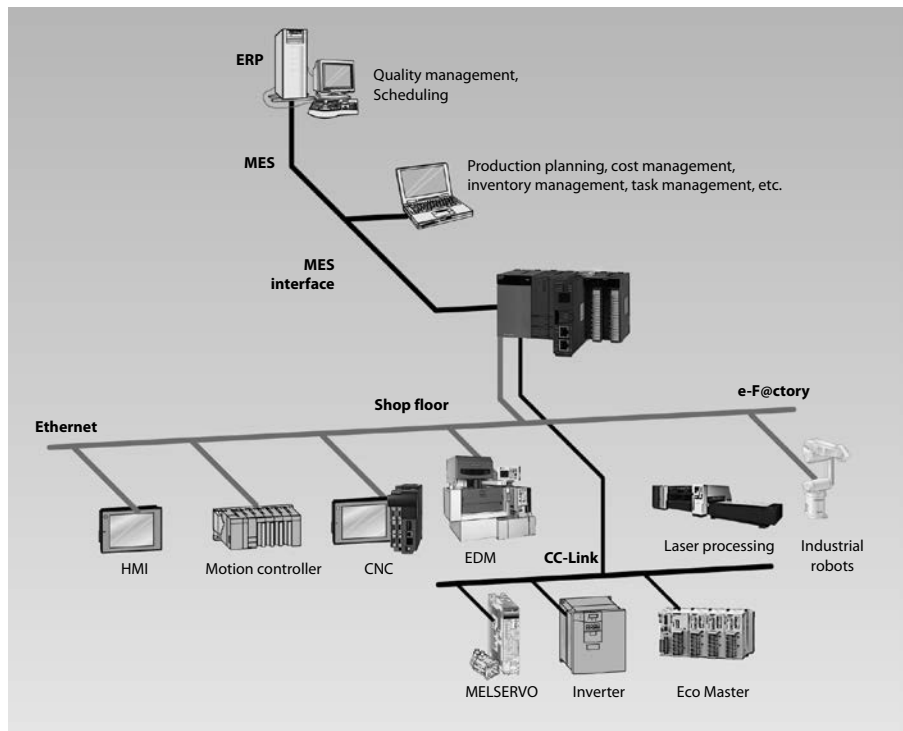
MES solutions

Effectively optimizing production by directly connecting enterprise systems with the shop floor.

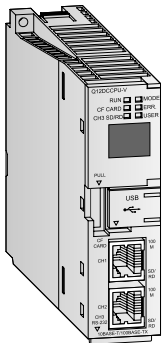
MES Solutions The MES interface product group enables direct connection between the MES (Manufacturing Execution System) database and shop floor equipment, without a communication gateway such as a PC.

The MES benefits are:

- accurate information in real-time through direct utilization of internal device information
- simple system implementation by direct connecting to database(s)
- no need for PCs and programs, which greatly reduces costs
- improved reliability by changing the gateway PC to a PLC
- no specialists and expensive interfacing software needed
- reduced installation costs
- reduced network load because of trigger executed database communication and not polling data



MELSEC System Q MES interface IT module



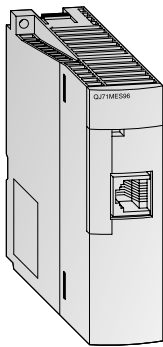
The MES Interface IT module provides a direct link from the iQ Platform to enterprise IT systems. Hence any shop floor system using the iQ Platform can communicate directly with high level IT systems.

This allows the removal of the usual intermediate layer of PC infrastructure required to process shop floor data. This saves cost, increases security and reduces maintenance requirements.

| Specifications | MESIT | |
|-------------------------------------|--------------------------------------|--|
| Module type | MES interface IT modul | |
| Communications method | Ethernet | |
| Interface | type 10BASE-T/100BASE-TX | |
| DB interface function | general databases | Interacts with databases via user-defined jobs (Windows, Linux, Unix ect) |
| | SQL commands | Oracle®/SAP, Microsoft® SQL, DB2, DB2/400 |
| | messaging | Insert, batch insert, update, select, select with delete, select with update, stored procedure and count rows delete |
| | trigger buffering function | Http, E-mail, TCP, IBM WebSphere MQ, MQTT, JBOSS |
| | arithmetic processing | The MES module buffers the data and trigger time to internal memory. |
| | program execution function | Formulas can be applied to data before sending from the MES interface module. Executes programs in the application server computer |
| Memory capacity | 1 CompactFlash card can be installed | |
| Internal power consumption (5 V DC) | mA 0.93 | |
| Dimensions (WxHxD) | mm 27.4x98x115 | |

| Order information | Art. no. | |
|-------------------|----------|--|
| | | MES-IT module Hardware: 134930 |
| | | Core software incl. Mitsubishi Electric driver and 5 connections to PLC 227387 |
| | | Database connection for SQL 227390 |
| | | Database connection for Oracle 227391 |
| | | Database connection for DB2 227392 |
| | | Additional 5 PLC connections 227388 |
| | | Siemens driver for S7-200, 300, 400, 12000 229481 |
| | | Mitsubishi Electric MC protocol driver 231543 |
| | | Modbus driver 231544 |
| | | Rockwell driver 227395 |
| | | Omron driver 227397 |

MELSEC System Q MES interface module



QJ71MES96

The MELSEC System Q MES module allows users to interface their production control systems directly to a MES database based on Windows technology.

| Specifications | | QJ71MES96 |
|-------------------------------------|----------------------------|---|
| Module type | | MES interface module |
| Communications method | | Ethernet |
| Interface | type | 10BASE-T/100BASE-TX |
| DB interface function | general | Interacts with databases via user-defined jobs |
| | tag function | Collects device data of the PLCs CPU on the network in units of tags. |
| | trigger monitor function | Monitors the status of conditions (time, tag values, etc.) |
| | trigger buffering function | The MES module buffers the data and trigger time to internal memory. |
| | SQL text transmission | Automatically generates the correct SQL message according to requirements. |
| | arithmetic processing | Formulas can be applied to data before sending from the MES interface module. |
| | program execution function | Executes programs in the application server computer |
| Memory capacity | | 1 CompactFlash card can be installed |
| I/O points | | 32 |
| Internal power consumption (5 V DC) | mA | 650 |
| Dimensions (WxHxD) | mm | 27.5x98x90 |
| Order information | | Art. no. 200698 |

MES option board for GOT (GT15 and GT16 series)

GT15-MESB-48M and GT16M-MESB

By using an MES option card the GT15 and GT16 are able to communicate directly with Windows databases without needing a Gateway-PC.

The information collected on the MELSEC System Q PLC is linked by the PLC MES interface module, and the information from existing equipment and 3rd party controllers is linked by the GOT1000 MES interface function.

The MES interface product series links shop floor equipment and MES information simply, with minimum cost.

| Specifications | | GT15-MESB48M | GT16M-MESB |
|--------------------------|----------------------------|---|--|
| Module type | | GT15 option card with 48 MB expansion memory and MES functionality (for direct database connection) | GT16 option card with MES functionality (for direct database connection) |
| DB interface function | general | Interacts with databases via user-defined jobs | |
| | tag function | Collects device data of the PLCs CPU on the network in units of tags. | |
| | trigger monitor function | Monitors the status of conditions (time, tag values, etc.) | |
| | trigger buffering function | The MES module buffers the data and trigger time to internal memory. | |
| | SQL text transmission | Automatically generates the correct SQL message according to requirements. | |
| | arithmetic processing | Formulas can be applied to data before sending from the MES interface module. | |
| | program execution function | Executes programs in the application server computer | |
| Order information | | Art. no. 203473 | 221369 |

For GT15 the additional Ethernet communication module GT15-J71E71-100 is required.
For GT15 and GT16 a standard CF card up to 2 GB is required

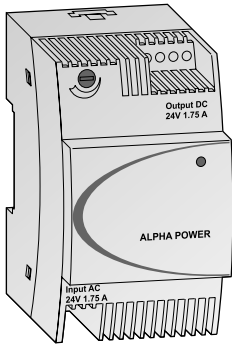
MES interface function for GOT (GT27 and GT25 series)

GT25-MESIFKEY-1

The MES interface function allows SQL text transmission from a GOT to a database in the server computer connected via the Ethernet, enabling writing GOT's device values to the database and reading database values to set them to GOT's devices. This direct communication with the server computer eliminates the need for gateway equipment.

| Specifications | | GT25-MESIFKEY-1 |
|--------------------------|----------------------------|--|
| MES interface function | | 1 license |
| DB interface function | general | Interacts with databases via user-defined jobs |
| | tag function | Collects device data of the PLCs CPU on the network in units of tags. |
| | trigger monitor function | Monitors the status of conditions (time, tag values, etc.) |
| | trigger buffering function | The SD memory card in the GOT stores the data and trigger time. |
| | SQL text transmission | Automatically generates the correct SQL message according to requirements. |
| | arithmetic processing | Formulas can be applied to data before sending via the MES function. |
| | program execution function | Executes programs in the application server computer |
| Order information | | Art. no. 274946 |

Power supplies

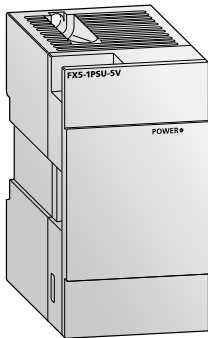


The ALPHA POWERs are convenient power supplies for the 24 V units and other external devices. They are applicable for wall or DIN rail mounting and their dimensions are matched to those of the ALPHA family.

Up to 5 ALPHA power units can be installed together for redundant mode operation or connected in parallel for more power.

The units have an integrated thermal overload protection circuit and a POWER LED. The output voltage is adjustable.

| Specifications | ALPHA POWER 24-0.75 | ALPHA POWER 24-1.75 | ALPHA POWER 24-2.5 |
|--------------------------|---|---------------------|--------------------|
| Application | Power supply for the 24 V ALPHA base units and external devices | | |
| Nominal input voltage | 100–240 V AC (45–65 Hz) | | |
| Output voltage | 24 V DC (+/-1 %) | | |
| Max. output current | 0.75 A | 1.75 A | 2.5 A |
| Protection | IP20 | | |
| Dimensions (WxHxD) | mm 36x90x61 | 54x90x61 | 72x90x61 |
| Order information | Art. no. 209029 | 209030 | 209031 |

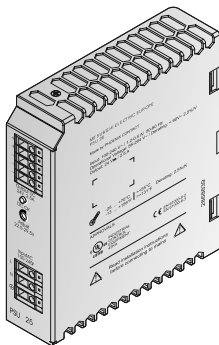


The power supply modules FX3U-1PSU-5V, FX3UC-1PS-5V, FX5-1PSU-5V and FX5-C1PS-5V are required when the built-in power supply of a PLC base unit is insufficient.

They reinforce the build-in 5 V DC and 24 V DC power supply of a FX3 resp. FX5 base unit. They do not occupy any I/O points and deliver up to 1.2 A for the 5 V system bus (for special function modules).

| Specifications | FX3U-1PSU-5V ^① | FX3UC-1PS-5V | FX5-1PSU-5V | FX5-C1PS-5V |
|--------------------------|--------------------------------------|---------------------------------------|--|--|
| Application | Power supply for the FX3U system bus | Power supply for the FX3UC system bus | Power supply for FX5U (AC power supply type) | Power supply for FX5U (DC power supply type) and FX5UC |
| Nominal input voltage | 100–240 V AC (50/60 Hz) | 24 V DC (+20 %/-15 %) | 100–240 V AC (50/60 Hz) | 24 V DC |
| Output voltage | 5 V DC/24 V DC | 5 V DC | 5 V DC/24 V DC | 5 V DC/24 V DC |
| Max. output current | 5 V DC | 1 A | 1.2 A at 40 °C; 0.8 A at 55 °C | 1.2 A at 40 °C; 0.8 A at 55 °C |
| | 24 V DC | — | 0.3 A at 40 °C; 0.2 A at 55 °C | 0.625 A at 40 °C; 0.4 A at 55 °C |
| Dimensions (WxHxD) | mm 55x90x87 | 24x90x74 | 50x90x83 | 20.1x90x74 |
| Order information | Art. no. 169507 | 210086 | 280509 | 294586 |

① The FX3U-1PSU-5V can't be used with a 24 V base unit!
When connecting an input extension module (e.g. FX2N-8ER-ES/UL, FX2N-8ER) to the FX3U-1PSU-5V, supply the power for it from the 24 V DC service power supply of the connected main unit or powered extension unit on the upstream side.



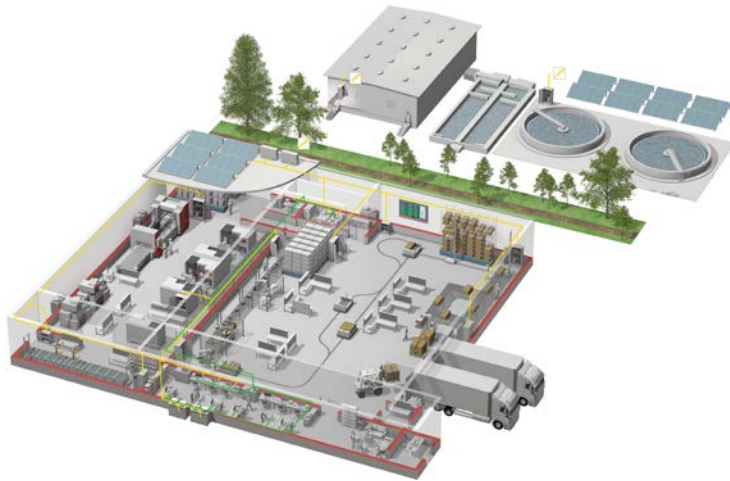
The primary switched-mode power supply units PSU are especially applicable for universal usage in batch mechanical engineering. The wide range input and the UL, cUL certifications allow a worldwide application. The 3-phase units supply the full permanent output power at breakdown of one phase.

The power supply units can be installed in parallel for more power or for redundant mode operation.

The units dispose of an adjustable output voltage, a thermal overload protection circuit and a POWER LED.

| Specifications | PSU 25 | PSU 50 | PSU 100 | PSU 200 | PSU 200-3 |
|---------------------------------|---|------------|--------------|---------------|---------------|
| Application | Power supply for all peripheral devices | | | | |
| Nominal input voltage | 100–240 V AC (45–65 Hz) | | | | 380–400 V AC |
| Output voltage | 24 V DC | | | | |
| Max. output current | 2.5 A | 5 A | 10 A | 20 A | 20 A |
| Protection | IP20 | | | | |
| Dimensions (WxHxD) | mm 32x130x115 | 40x130x115 | 60x130x152.5 | 115x130x152.5 | 115x130x152.5 |
| Order information | Art. no. 206147 | 206148 | 206149 | 208850 | 208851 |
| Accessories (PSU 100 or larger) | Wall mounting adapter PSU-UWA, art. no.: 208853 | | | | |

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