for a greener tomorrow

MITSUBISHI ELECTRIC
Changes for the Better

FACTORY AUTOMATION

FR-FAMILY

Frequency inverters

- Cost-effective
- Reliable
- Safe
- User-friendly
- Network-capable
- Flexible

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, maximizing 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.

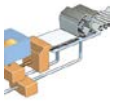
Electronic devices
A wide portfolio of cutting-edge semiconductor devices for systems and products.

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.

Contents

The six ingredients for success	**5**	
The right solution everytime	**6**	
FR-A800 – Leading drive performance	**7–8**	
FR-F800 – Power saving inverters	**9**	
FR-E800 – Compact inverters	**10**	
FR-D700 SC – Standard inverters	**11**	
FR-C80 – Micro inverters	**12–13**	
TMdrive®-MVe2/MVG2 series – Energy saving medium voltage inverter	**14**	
Peripherals and software	**15**	
Increased productivity	**16**	
Optimum speed	**17**	
Extreme cost efficiency	**18**	
Potential savings	**19**	
Technical information section		

Universally accepted

Drives for all conceivable applications: there's something for everyone at Mitsubishi Electric! With more than 32 million of our frequency inverters installed we are one of the largest manufacturers in the world. Day after day, in heavy-duty industrial use, our frequency inverters prove their high levels of cost-effectiveness, reliability, functionality and flexibility.

Frequency inverters developed by Mitsubishi Electric are used routinely in many sectors and systems – and that's not all. Mitsubishi Electric know-how also features in many frequency inverters made by other manufacturers who are utterly convinced by its technical edge and economic benefit.

Always one step ahead of technology

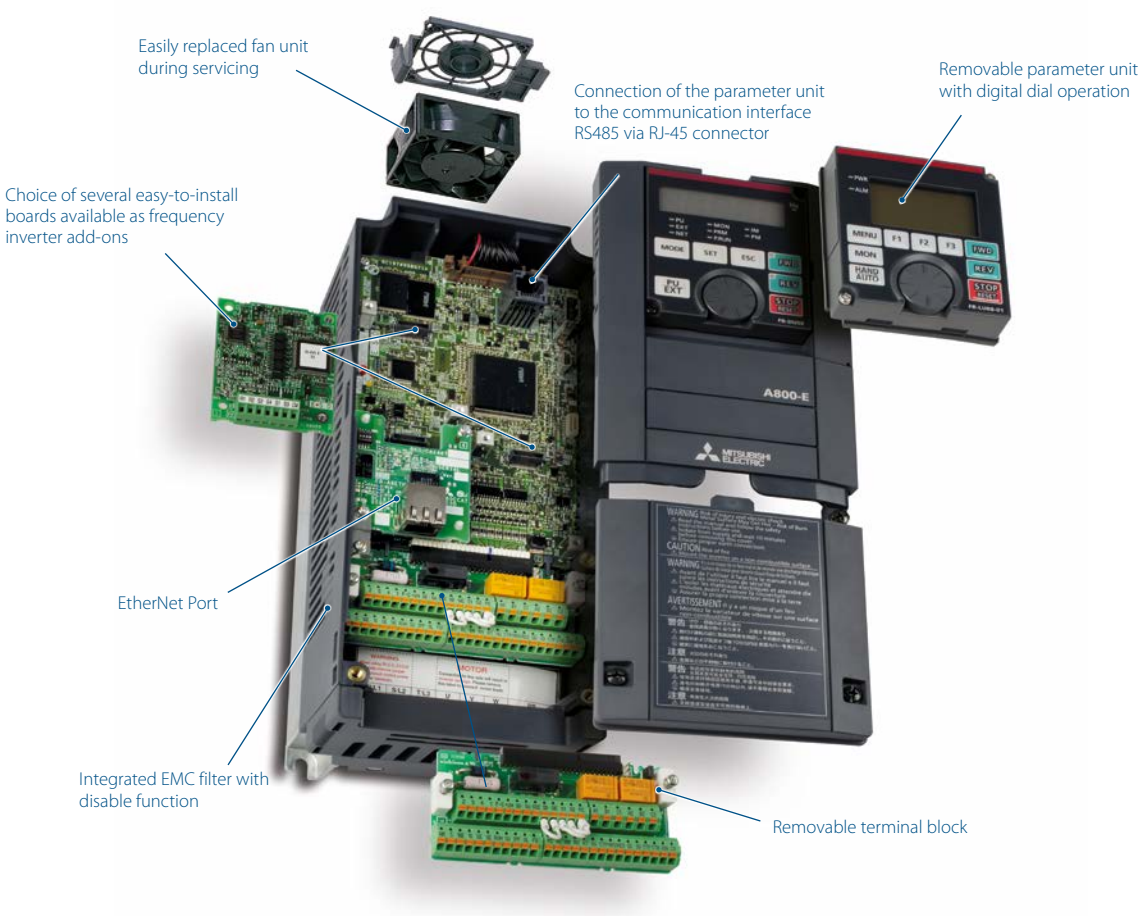
Innovative technologies applied by Mitsubishi Electric in developing their frequency inverters result in highly dynamic drive systems and genuine power misers. Examples of this innovative power are the new functions RSV control (Real Sensorless Vector Control) and AOEC control (Advanced Optimum Excitation Control).

Meeting global norms and standards

Mitsubishi Electric's frequency inverters meet all the standards and specifications laid down in the EU Low Voltage Directive 73/23/EEC and the Machinery Directive 98/37/EC. Needless to say, all the units carry the CE mark and are certified as conforming to UL, cUL and EAC.

Frequency inverters made by Mitsubishi Electric carry all the major national and international marks of conformity.

The six ingredients for success



Cost effectiveness

Energy savings of up to 60 % can be made by using Mitsubishi Electric frequency inverters, thereby also reducing CO_2 emissions and protecting the environment.

Reliability

Safe and fault-free operation is guaranteed by various protective mechanisms and overload functions, top-quality temperature-resistant capacitors, permanently lubricated fans and dual-coated power and control PCBs.

The Six Sigma certified production ensures a high-quality level at Mitsubishi Electric.

Standards

In addition to complying with well-known international norms and standards, the frequency inverters are also certified by DNV, ABS, BV, LR and NK.

An increased level of safety is ensured in some frequency inverter ranges by the integrated emergency stop function (Safety Stop).

Convenience

The integral multifunction user panel, complete with digital dial, facilitates rapid and efficient input of all necessary drive parameters. It can also provide display of various performance data and error messages.

Flexibility

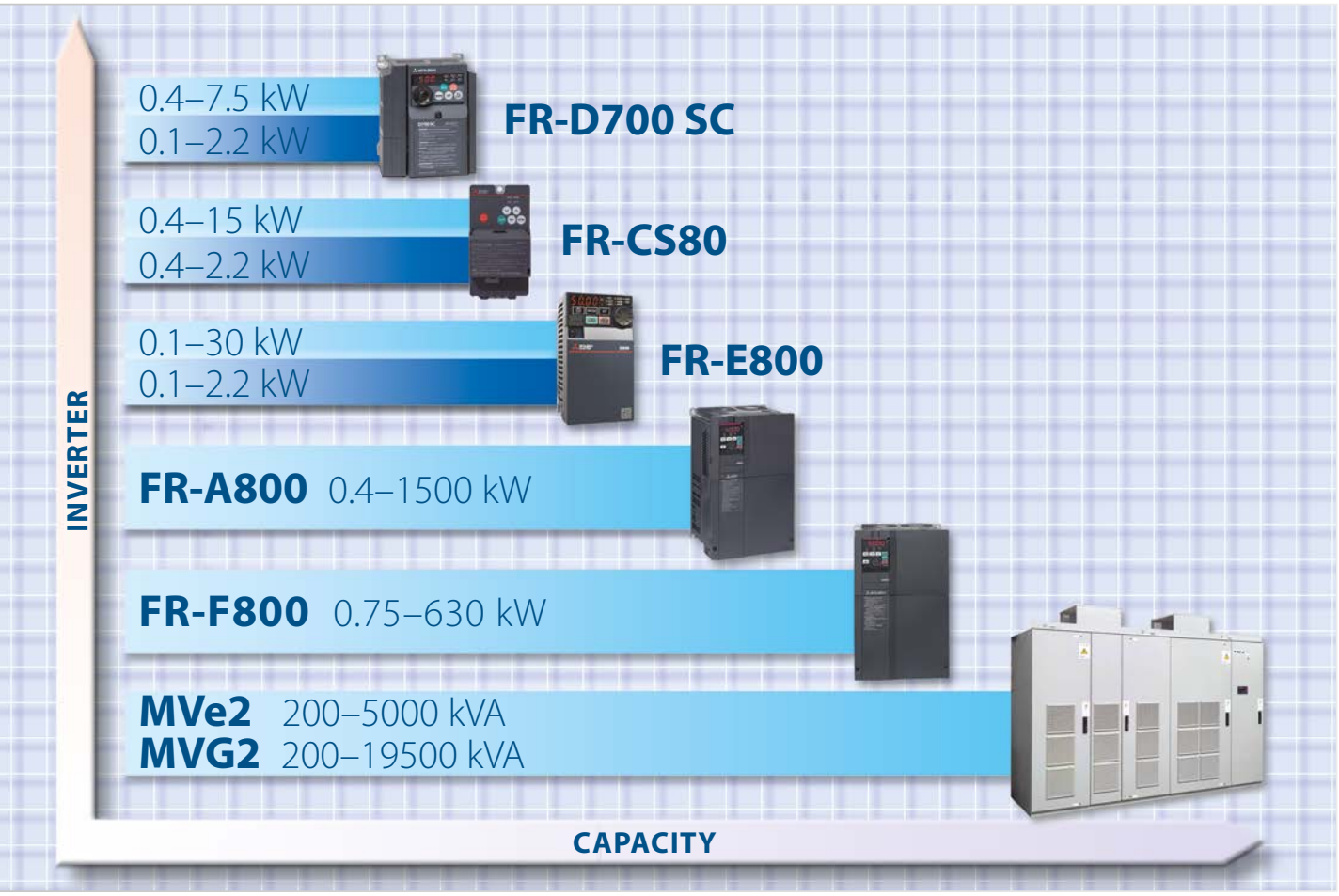
Compatible with all major field bus systems such as CC-Link IE TSN (Time sensitve Network), CC-Link IE Field, CC-Link IE Field basic, CC-Link, Profibus DP/V1, Profinet, DeviceNet®, EtherNet IP, EtherCat, CanOpen, SSCNET III/H, LonWorks, BACnet (many of the networks are embedded based on series).

Functionality

Functionality, compatibility and perfect mechanical design are the main features of the frequency inverters supplied by Mitsubishi Electric.

Not all features are available on all Inverters.
Please check applicability.

The right solution every time



A diverse product range helps you make the right product choice.

Well said

Mitsubishi Electric always has the right drive system for straightforward and complex applications alike. With so many sizes, outputs and features, the right frequency inverter solution is available for every conceivable drive requirement.

Indeed, in applications where space is at a premium, it can pay to know that Mitsubishi Electric frequency inverters have numerous overload versions.

In many cases, a smaller frequency inverter can be used – logically resulting in reduced purchase costs, lower running costs and a smaller footprint.

Some of the frequency inverters supplied by Mitsubishi Electric come as standard with 250 % overload capacity. The benefit for the user is that our frequency inverters offer more than the double output of comparable types made by our competitors.

Our current range of modern frequency inverters is complemented by the smallest regenerative medium-voltage frequency inverter on the market, the TMdrive®-MVe2, and the powerful TMdrive®-MVG2.

FR-A800 – Leading drive performance

The frequency inverters, developed by Mitsubishi Electric, boast cutting-edge technologies for optimum motor torque and speed control.

The FR-A800 is equipped with the latest high-speed processors from Mitsubishi Electric. With better than ever control performance and response level, a safe and accurate operation is assured in a diverse range of applications.

Some of the outstanding features are the integrated USB ports for programming and parameter copying, an-easy to-read control panel, optimum power usage, and energy saving functions, improved system safety, three expansion slots for a range of option and supported network cards.

With its impressive versatility to meet equipment system needs ranging from machining and molding to winding, the FR-A800 is an extremely economical and highly-versatile solution for a wide range of applications.

The FR-A800 is suitable for use in a broad range of applications e.g. conveying and handling systems.

The FR-A800 series is fully backward compatible with the FR-A700 series. Parameters can be easily copied by FR Configurator2.

In order to match the former machine response time, the input/output signals of the FR-A800 can be delayed.

FR-A800 at a glance

POWER RANGE 0.4–630 kW
(In parallel operation up to approx. 1500 kW)

INPUT
200/400/500/600/690 V
3 ph (50/60 Hz)

OUTPUT FREQUENCY
0–590 Hz

SAFETY
Integrated STO function (SIL3 PLe)

PROTECTION
FR-A840/A820: up to 30 kW IP20
FR-A840/A820: from 37 kW IP00
FR-A860: IP00, FR-A870: IP00/IP20

CONTROL
V/f, OEC, RSV, CLV, built-in PLC, autotuning for AC and PM (Permanent Magnet) motors

INTERFACES
Modbus®/RTU, Modbus®/TCP/IP, SLMP, CC-Link, CC-Link IE Field, CC-Link IE Field Basic, CanOpen, PROFINET, Profibus DP V1, DeviceNet®, EtherNet IP, EtherCat, SSCNET III/H, CAN-Bus, RS485, USB

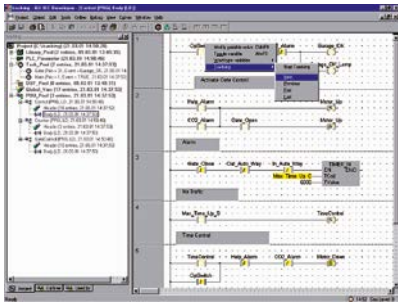
OPTIONAL EXTRAS
Analogue + digital I/Os, encoder feedback

EMC PROTECTION
Integrated

Intelligent solutions for every requirement.

The drive behind your success

Easy operation with GOT



Clear user interface layout with project navigator for rapid programming

Tuning made simple

Intelligent functions for any application

Sensorless vector control (RSV)

Equipped with their innovative RSV function (Real Sensorless Vector Control), Mitsubishi Electric frequency inverters have the ability to control the speed and torque of an AC motor without an encoder. The result is maximum performance across the full speed range in terms of dynamic response, precision and control. The motor thus sustains optimum dynamic speed characteristics, smooth rotation, and high starting torque. As such, the FR-A800 is capable of achievements which used to be the reserve of high-end DC or servo systems.

Simple positioning

The FR-A800 can also be used for positioning in conjunction with the "Closed Loop Vector Control". Full point to point positioning including different homing functions is available.

Optimum excitation control

Optimum control of the excitation current maximizes motor efficiency for additional energy savings. As an example, an approximately 15 % increase in efficiency is obtained at a motor load torque of 10 % compared to conventional V/F control.

Boost productivity while saving energy

Energy-saving functions well suited to the system and purpose application An energy monitor lets you confirm energy-saving at a glance. Measured values for power output can also be output as pulse signals. An external 24 V DC power source can be used to operate control circuits other than the drive unit.

PLC functions

The PLC function is integrated into the entire "800" series, allowing optimum tailoring requirements of the user. The PLC offers direct access to all the drive parameters and will, on request, undertake plant management as a stand-alone control and monitoring unit. Password protection prevents unauthorized access to the PLC code.

FR Configurator2 supports all PLC programming functionality eliminating the need for additional programming software.

Integrated positioning

All FR-A800 series drives can be used within a motion system. Connection is simple and can be used with all our standard SSCNETIII/H motion modules, if you do not have a PLC then you can use the drives integral positioning table giving you ultimate flexibility. The FR-A800 can even work as a leading axis drive. As such, there is no reason why the drives cannot be integrated further in existing control concepts.

Fourfold overload capacity

Many manufacturers of frequency inverters have specified various overload rating classes for their products – but rarely more than two. The FR-A800 is designed for no less than four overload ranges! This makes it easier to select the best frequency inverter for any application.

Simple visualization of the plant status

The 800 series also allows the connection of a Mitsubishi Electric graphical operation terminal (GOT). The connection to GOT2000 series is made by just plug and play (automatic setting of all needed parameters). The GOT provides operators with an easy-to-follow and intuitively high-resolution display and facilitates easy operation via a touch panel.

FR-F800 – The power saving inverter

The frequency inverters in the FR-F800 range have been especially designed for pump and fan applications as well as heating, ventilation and air-conditioning installations (HVAC). Besides their protection rating IP00/IP20, the outstanding features of these power-saving frequency inverters include their simple but safe operation and start-up, perfect control management and optional network-capability. The FR-F846 frequency inverter with a protective structure of IP55 is suitable for use under harsh environmental conditions.

Built-in functions, such as the pre-charge function or the PLC functionality, help to reduce the costs and the complexity of many applications, because additional components are eliminated.

Pump systems in industry – one domain of the FR-F800 frequency inverters

Effective energy savings

Pumps and fans are particularly good targets for great reductions in energy consumption. Energy costs can be slashed by up to 60 %, notably in the lower speed or light load range of such applications.

Additional energy savings are realized by the cutting-edge "Advanced Optimum Excitation Control (AOEC) algorithm" developed by Mitsubishi Electric. It supplies the motor with the optimum magnetic flux at any given time, thereby reducing losses. The result is maximum motor performance teamed with supreme efficiency.

User-friendly operation

The built-in "digital dial" permits the efficient input of all the necessary drive parameters, cutting down on both programming and start-up time.

Long service life

The FR-F800 can lay claim to a 10-year service life thanks to advanced capacitors and ventilators. These features, along with its simple maintenance and automatic warning signals, make the FR-F800 one of the most reliable inverters on the market.

FR-F800 at a glance

POWER RANGE
0.75–630 kW

INPUT
200/400 V AC 3 ph (50/60 Hz)

OUTPUT FREQUENCY
0–590 Hz

PROTECTION
FR-F840/F820: up to 30kW IP20
FR-F840/F820: from 37kW IP00
FR-F846: IP55

SAFETY
Integrated STO function (SIL3 PLe)

CONTROL
V/f, AOEC, SMFV, Built-in PLC

INTERFACES
Modbus®/RTU, Modbus®/TCP/IP, CC-Link, CC-Link IE Field, CC-Link IE Field Basic, PROFINET, Profibus DP V1, DeviceNet®, EtherNet IP, EtherCat, CAN-Bus, BacNet, BacNet IP, BacNet MSTP, RS485, USB

OPTIONAL EXTRAS
Analogue + digital I/Os

EMC PROTECTION
Integrated

FR-E800 – The compact inverter

Material transport systems like this example in a printing works are just one of the many applications for the new FR-E700 series.

The multi-purpose inverter

The FR-E800 series frequency inverter is built upon Mitsubishi Electric's proven variable speed control technology throughout years of reliable operation across various constant and variable torque applications. Designed to save energy and minimize cost, the FR-E800 brings together advances in quality, performance, and predictive maintenance capabilities in one multi-purpose inverter.

These frequency inverters, with safety functionality meeting IEC 61508 standards, support various networks such as Ethernet or CC-Link IE TSN, a next-generation open industrial network, and make manufacturing smarter in various fields by integrating the world's first corrosive gas environment detection circuit and the industry's first AI-based diagnostic functions.

Three different models

- Standard models
- Ethernet models, which allows switching between Ethernet protocols simply by changing internal parameters
- Safety communication models that support Ethernet-based safety communication protocols certified as compliant with international standards.

FR-E800 at a glance

POWER RANGE
0.1–2.2 kW 1 ph, 0.1–11 kW 3 ph

INPUT
200 V 1/3 ph, 400 V and 600 V 3 ph (50/60 Hz)

OUTPUT FREQUENCY
0.2–590 Hz

PROTECTION
IP20

SAFETY
STO integrated

CONTROL
V/f, optimum excitation control, vector, advanced magnetic flux vector control

INTERFACES
Modbus®/RTU, Modbus®/TCP/IP, SLMP, CC-Link IE TSN, CC-Link IE Field, CC-Link IE Field Basic, CC-Link, Profinet, DeviceNet®, EtherNet IP, EtherCat, BacNet IP, Mitsubishi-Electric frequency inverter protocol, RS485, USB

FR-D700 SC – The standard inverter

Enter the new drive universe

The inverters of the FR-D700 SC series set standards for small-format drives and provide an easy entry to the world of modern variable-speed drive technology. Despite their ultra-compact dimensions, they feature a wealth of advanced functions. The FR-D700 SC series is ideal for simple drive applications in environments where space is limited.

Improved functions and device properties such as simplified cabling thanks to spring clamps, the integrated Digital Dial with LED display, improved performance yield in the low-speed range make the FR-D700 the new standard in the ultra-compact class.

Door and gate drives are only some of the multiple applications of the FR-D700 SC series

Built-in emergency stop function (STO)

The FR-D700 SC series features a dual-channel emergency stop function for a safe torque off. With that, the FR-D700 SC conforms to ISO 13849-1, PLd and IEC 60204-1 Cat 0.

Simple operation

The user-friendliness of the FR-D700 SC series makes these units a particularly good choice for standard applications. Entering drive parameters and settings is quick and easy with the one-touch Digital Dial on the integrated control panel, saving time and cutting costs.

These features make the FR-D700 SC an excellent performer for both simple and more demanding tasks. Typical applications include feed and conveyor drives, machine tools and door and gate drives.

Space-saving installation

The ultra-compact FR-D700 SC can be mounted directly side by side. This saves valuable space in the cabinet.

FR-D700 SC at a glance

POWER RANGE
0.1–2.2 kW 1 ph, 0.4–7.5 kW 3 ph

INPUT
100 V 1 ph/200 V
1/3 ph/400 V 3 ph (50/60 Hz)

OUTPUT FREQUENCY
0.2–400 Hz

PROTECTION
IP20

SAFETY
STO integrated

CONTROL
V/f, optimum excitation control, general-purpose magnetic flux vector control

INTERFACES
Modbus®/RTU, MitsubishiElectric frequency inverter protocol, RS485

FR-CS80 – The micro inverter

The FR-C80 series many applications include food processing machinery, conveyor systems, and processing machinery.

Environment consciousness in global standard

Compliant with the EU RoHS directive
Being RoHS compliant, the inverter is friendly to people and the environment.

EMC directive compliant noise filter
EMC compliant to EN61800-3 2nd environment, when an optional EMC filter is connected.

Compatibility with various standards
The inverters are compatible with UL, cUL, EAC, EC directives (CE marking).

Easy connection with GOT
When the automatic connection is enabled, the inverter can communicate with the GOT2000 series simply by connecting the GOT.

Reduced wiring check time
The wiring can be checked easily by lifting the control terminal cover, which makes maintenance easier.

Easy wiring to the control circuit
Spring clamp terminals provide high reliability and easy wiring.

Protected in hazardous environments
The circuit board coating conforms to IEC 60721-3-3 3C2/3S2 for improved environmental resistance.

The FR-CS80 series of inverters sets new standards for the micro range of inverters. If you are looking for advanced motor control and space is a concern then the FR-CS80 is the inverter for you.

The FR-CS80 is the most compact inverter in our portfolio and with the ability to mount these inverters without the standard air gap, considerably space can be saved in your control system.

Easy maintenance

Conventional model
2 units

But do not let its compact size fool you. The FR-CS80 supports general-purpose magnetic flux vector control, allowing you to control demanding applications as well as supporting the Mitsubishi Electric Optimum excitation control allowing you to realise substantial energy saving.

With the addition of spring clamp terminal.

FR-CS80 at a glance

POWER RANGE
0.4–2.2 kW 1 ph, 0.4–15 kW 3 ph

INPUT
200 V 1 ph, 400 V 3 ph (50/60 Hz)

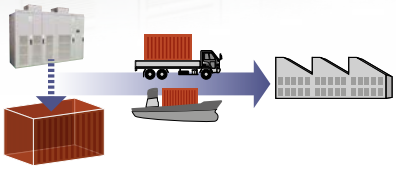
OUTPUT FREQUENCY
0.2–400 Hz

PROTECTION
IP20

CONTROL
V/f control, optimum excitation control or general-purpose magnetic flux vector control

INTERFACES
RS485, Modbus®/RTU, Mitsubishi-Electric frequency inverter protocol

TMdrive®-MVe2/MVG2 series Energy saving medium voltage inverter



The TMdrive®-MVe2 and TMdrive®-MVG2 are medium voltage, AC fed drives designed for high-efficiency and power-friendly operation in a broad range of industrial applications. High reliability, low harmonic distortion, and high power factor operation are designed into the drive.

World's smallest class size*1

The compact design of the TMdrive®-MVe2 contributes to significant construction cost reduction, the enclosure height is 2100 mm for the classes up to 6.6 kV-3000 kVA.

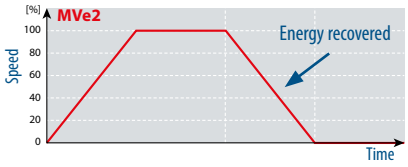
Units up to 6.6 kV-1600 kVA can be transported as a single enclosure, simplifying transport, unloading and installation.

Since the input transformer and the frequency inverter enclosure are placed side by side, external cable work is not required.

*1: Smallest in the 6 kV class (based on the result of our survey)

Reduced load on air conditioning systems

When there is limited space in the switch room, the input transformer can be installed externally (optional). The switchroom heating load can be reduced (by 50 %), which lightens the load to the air conditioning system. Consequentially the running costs of the air conditioning system are reduced.



Regenerative power feed-back to the power supply

The power regeneration function enables stopping of large inertia loads in a short time. During deceleration, the rotational energy is returned to the power supply, which contributes to a reduction in energy consumption and a reduction in electricity costs.

TMdrive®-MVG2 – Designed for the most demanding applications

The MVG2 family of medium voltage variable frequency AC drives seamlessly integrates into a broad range of industrial applications with a choice of 3/3.3 kV, 4.16 kV, 6/6.6 kV, 10kV or 11 kV options. The MVG2 can be applied to existing motors and cabling, making them an excellent option in modernization/ retrofit applications, like oil pumps, fans, mixers etc.

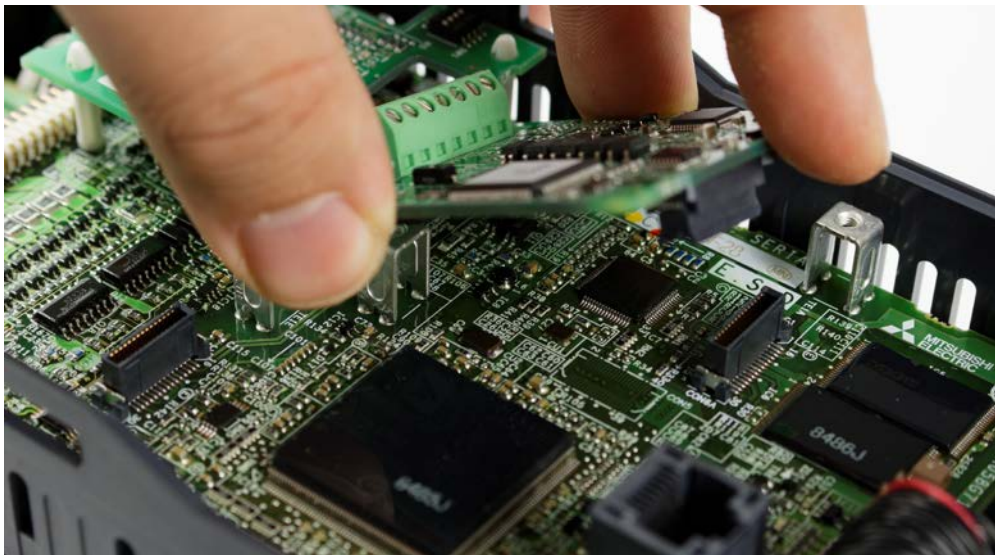
Accurate torque control is key in controlling large conveyors. The MVG2's flux vector algorithm provides the accuracy and response for constant torque applications. Regardless of the torque profile, MVG2 drives are designed to meet motor control needs in a variety of industries.

Peripherals and software

Wide range of expansion options

Optional extras are available to optimize and expand system capability. Additional brake components, reactors and filters guarantee operation even in difficult conditions.

The range of functions can be expanded by optional boards, such as additional analog/digital inputs/outputs.



Connector system for time-saving installation

Effective Harmonic Converters

In most cases, the energy given off by a motor in the regenerative mode is converted to heat by braking resistors and thereby is lost. The Harmonic Converter FR-HC2 returns this energy back to the power source or supplies it to other inverters. The Harmonic Converters is equipped with high-quality filters to effectively suppress harmonics.

Power regeneration combined with effctive harmonic suppression, the FR-HC2.

Handy parameter units

For added ease and convenience users may opt for integrated parameter units (FR-E/FR-D700 only) or clip-on parameter units (for all other inverters). A numeric keypad is available for direct input of numerical values. A four-line LCD display provides plain text information about performance data, parameter names, status signals and error messages – in eight languages.

User-friendly set-up Software

The user-friendly set-up software FR-Configurator 2 runs on Windows®, i.e. the inverters can be configured using standard PCs. Several inverters can be set up, operated and monitored in parallel in one network. A connection is possible either via an RS485 interface, USB port or the optional SC-FR PC adapter cable.

Configuring the drive via a Windows® laptop

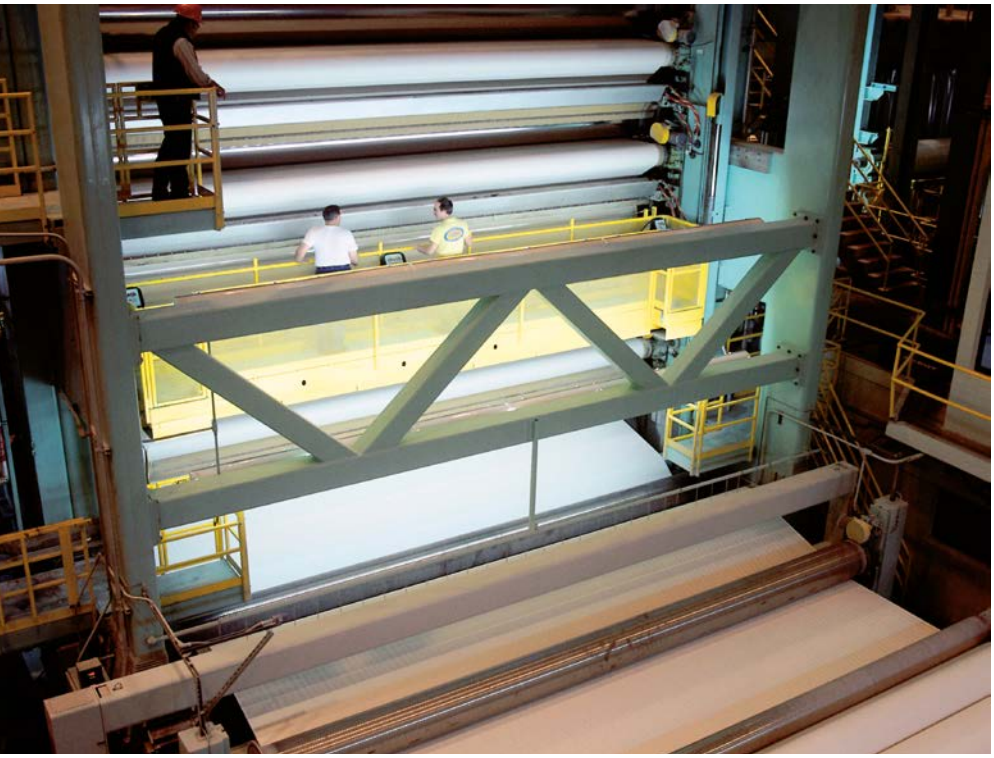
FR-Configurartor Mobile APP Google

GET IT ON Google Play

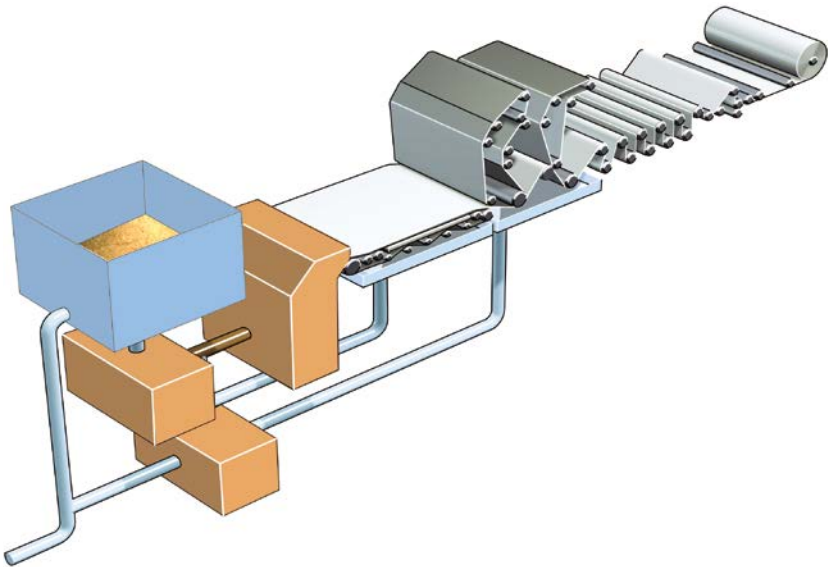
FR-Configurartor Mobile APP APPLE

Download on the App Store

Increased productivity



Productivity in paper production has one size parameter: tonnes per hour



Simplified schematic of paper production

Synchronization – the ultimate priority

Precise synchronism of the drives is synonymous with maximum productivity and top quality in the printing and paper production industry. The drives need to retain control of the sheets throughout the entire printing and production process. The intelligent motor control function in Mitsubishi Electric frequency inverters processes the actual values and matches the speed and torque to the specified setpoint. This prevents the sheets from tearing or bunching.

Another feature which helps in this regard is the power-down braking function which controls the deceleration of all the drives after a power failure or an emergency machine shutdown. All this translates into maximum productivity and quality.

An advanced version of this control has the ability to operate up to four motors consecutively in alternate and/or changeover mode via one single frequency inverter.

Prepared for the toughest applications

High temperatures and high air humidity are routine conditions in the printing and paper industry. The capacitors in the top-of-the-range models are therefore designed to withstand internal temperatures of 105 °C. The power and control PCBs support IC60721-3-3 level 3C2 compliant coating, the cooling fans are housed in sealed, specially lubricated industrial bearings. There is no better way to prepare frequency inverters to meet human and mechanical requirements.

Optimum speed

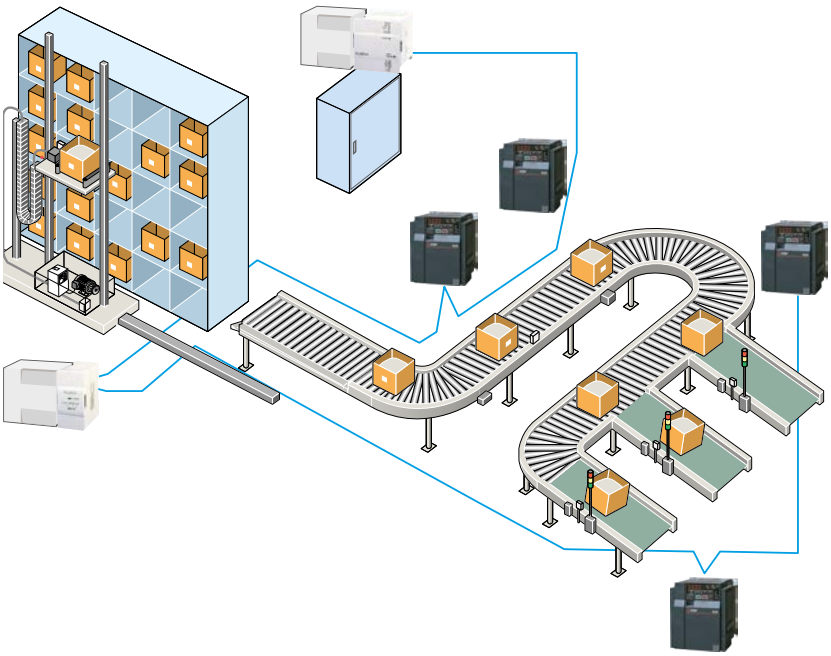
Rapid response times essential

Conveyor belts and stock logistics systems need constant speeds and velocities for rapid and systematic transportation of products. As such, the dynamic response generated by the drives needs to be the same when the conveyor belt is empty and when it is full. If there are sudden variations in load, e. g. caused by materials piling up in an uncontrolled way on the conveyor belt, then the drives need to react as quickly as possible in order to smooth the flow of materials.

This is precisely where top speed and torque response times are required for efficient compensation for sudden changes in load. Response times of no more than 5 ms are guaranteed to prevent product congestion and avert any risk to the follow-up process.

Rapid installation and start-up

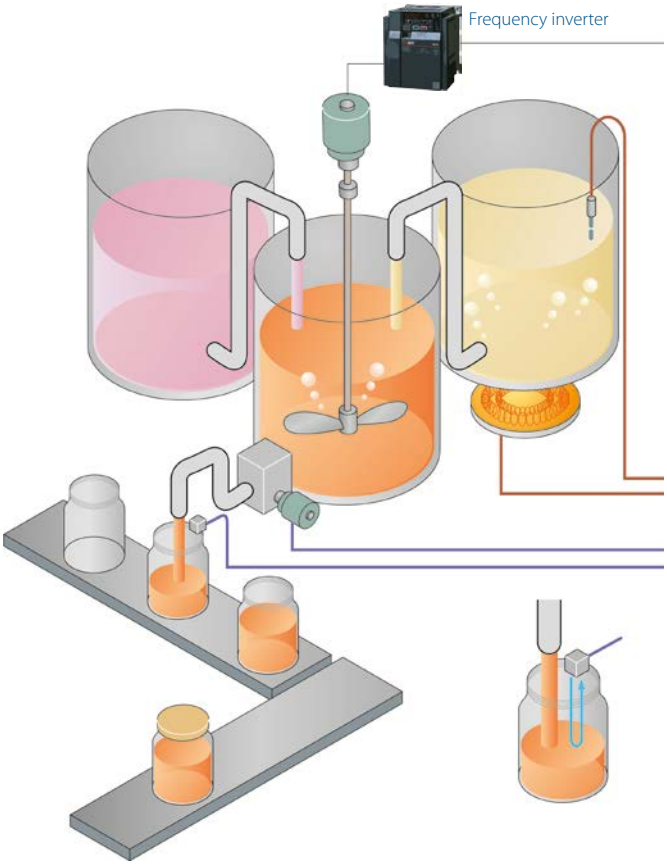
Customers in the haulage and logistics sector want Plug and Play in order to cut installation and start-up times. Many of our frequency inverters are therefore fitted as standard with an integrated EMC filter / integrated brake unit. All part of being prepared for anything.



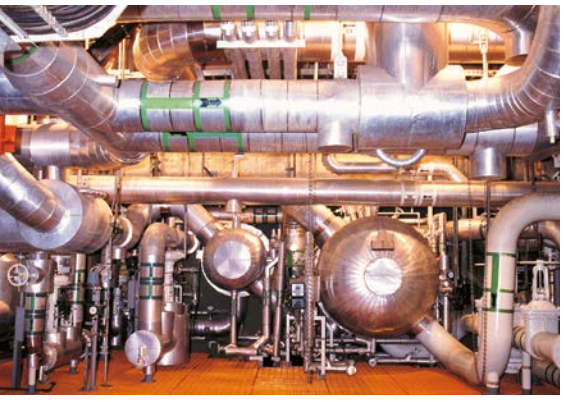
Palletising and warehousing in a high rack stacking system

Saving where motors never stop, Mitsubishi Electric inverters work round the clock!

Extreme cost efficiency



The conversion of analog values is an important aspect of automation technology and facilitates process control.



Optimum energy efficiency, e.g. in complex pumping applications

Variable speed and efficiency

Maximum efficiency is required from each individual drive in pump and fan applications as well as in mixers and stirrers.

In comparison with mechanical solutions, frequency inverters developed by Mitsubishi Electric are always able to tap the full potential when it comes to savings in energy consumption.

Replacing conventional DC drives with modern AC variable seed drive removes one less maintenance procedure, by utilizing the drives inbuilt predictive maintenance function costly plant failures can all but be eliminated.

Saving energy when starting and braking

The AOEC technology (Advanced Optimum Excitation Control) developed by Mitsubishi Electric combines maximum drive efficiency with minimum power consumption. The only thing supplied to the connected motor is the magnetic flux which brings about the optimum degree of efficiency at all times. This leads to inordinate improvement in energy efficiency is achieved, particularly in the acceleration and braking phases.

Potential savings

Too powerful and too expensive!

Energy costs are rising all the time. Over half of the power consumed in the industry is accounted for by electric motors. Up to 96 % of the life cycle costs of a motor are accounted for by energy costs. Unfortunately, when analyzing costs, it is precisely this point which is paid precious little attention or is ignored altogether. The biggest potential source of savings is frequently disregarded.

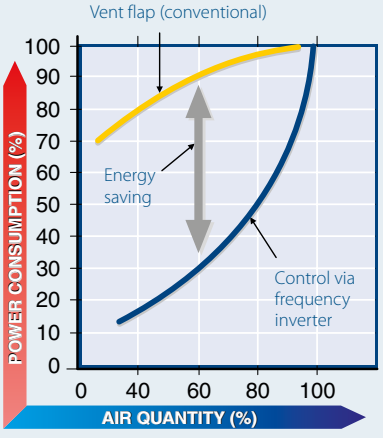
For example, in order to guarantee that an air handling plant will run smoothly even at full load, which is seldom the case, and to have spare capacity for expansion the systems fans are often over-specified. In some cases, fans in these applications can be operating at an average efficiency of 65 % or less.

In addition, in conventional systems, the equipment is usually controlled by mechanical ventilation flaps which slashes efficiency levels, especially with medium loads. The flap control function can very easily be replaced by the use of frequency inverters and the power consumption reduced by 20 to 60 %.

A Mitsubishi Electric frequency inverter is a safe investment

Energy costs example

A motor controlled by a frequency inverter (blue line) is using the energy to extract air. The mechanically throttled motor doing the same task but operated directly on the mains (yellow line) is wasting a large amount of the energy.



Result: wasted energy

Oversized fan, pump and motor systems combined with continuous operation at maximum capacity means many systems are operated at levels far below ideal in terms of efficiency. This leads to excess power consumption which can only really be explained by ignorance or poor practice.

Countermeasures

The power consumption of slow running motors can be reduced if the speed is controlled by changing the frequency. The frequency inverter allows the motor to be adjusted to the load. Frequency inverters which generate variable frequencies and voltage levels save energy, reduce wear on the motor and minimize wear and tear on the motor drive train.

Save on energy costs by investing in the Mitsubishi Electric family of inverters

A world of applications

Mitsubishi Electric frequency inverters are used in a wide range of areas.

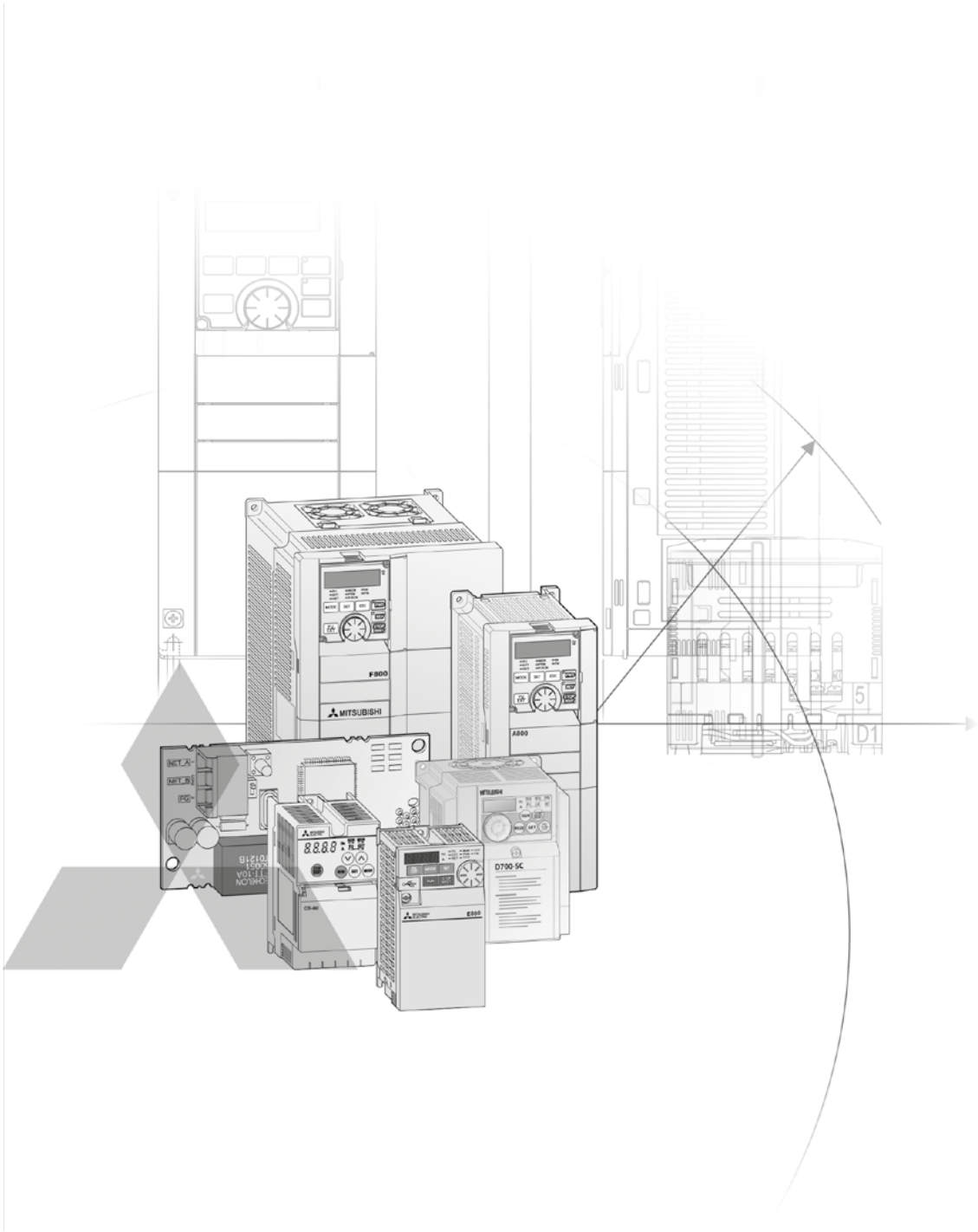
Mitsubishi Electric operates 13 branches in Europe, where it has maintained a presence for more than 35 years and developed a constantly growing and far-extending network comprising links to other companies and reliable partnerships.

On the technical side, three manufacturing and automation centers form the basis of tailored automated solutions, further centers already being planned.

A Europe-wide network provides interfaces to experienced engineers and offers distributors support throughout every phase of the project.

Mitsubishi Electric products are found in a variety of industrial, infrastructure and service sector contexts, ranging from critical applications in the pharmaceuticals industry to state-of-the-art leisure and entertainment facilities. Here are just a few examples of recent applications:

- Agriculture
  - Irrigation systems
  - Plant handling systems
  - Sawmills
- 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 manufacture (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 moulding machines
  - Loading/unloading machines
  - Blow moulding test machines
  - Injection moulding machines
- Printing
- Textiles
- Transportation
  - Sanitation on passenger ships
  - Fire tender, pump management
  - Waste disposal truck management
- Utilities
  - Waste water treatment
  - Fresh water pumping
- Rail
  - from railways



Technical Information Section

Further publications within the Mitsubishi Electric family

Brochures
https://eu3a.mitsubishielectric.com/fa/en/service/download

Modular PLC family

Product catalogues for modular programmable logic controllers and accessories for the MELSEC iQ-R series, MELSEC System Q, and MELSEC L series
https://eu3a.mitsubishielectric.com/fa/en/dl/9774/C_iQ-R_Q_L-Family_D_UK_260570.pdf

Compact PLC family

Product catalogue for compact programmable logic controllers and accessories for the MELSEC FX family
https://eu3a.mitsubishielectric.com/fa/en/dl/835/C_FX_Family_I_UK_167840.pdf

HMI family

Product catalogue for operator terminals, supervision software and accessories
https://eu3a.mitsubishielectric.com/fa/en/dl/11153/207075.pdf

MR family

Product catalogue for servo amplifiers and servo motors as well as motion controller and accessories
https://eu3a.mitsubishielectric.com/fa/en/dl/5886/209265.pdf

Robots family

Product catalogue for industrial robots and accessories
https://eu3a.mitsubishielectric.com/fa/en/dl/4786/203684.pdf

LVS family

Product catalogue for low voltage switchgears, magnetic contactors and circuit breakers
https://eu3a.mitsubishielectric.com/fa/en/dl/6481/216798.pdf

Automation book

Overview on all Mitsubishi Electric automation products, like frequency inverters, servo/motion, robots etc.
https://eu3a.mitsubishielectric.com/fa/en/dl/2341/170021.pdf

Further service supplies

This product catalogue is designed to give an overview of the extensive range of the Mitsubishi Electric frequency inverters. 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.

Scan or click QR code for Inverter Selection Tool

About this product catalogue

This product catalogue 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.

Specifications are subject to change without notice. All trademarks acknowledged.
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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.

1 Inverter series

- Product overview 5
- Special functions 7
- System Description 13

2 Specifications

- The FR-CS80 series 16
- The FR-D700 SC series 20
- The FR-E800 series 24
- The FR-F800 series 33
- The FR-A700 series 42
- The FR-A800 series 46
- MVe2/MVG2 68
- Parameter overview 72
- General operating conditions for all frequency inverters 73
- Overseas types 136

3 Accessories

- Overview of internal and external options 77
- Noise filters 82
- du/dt filters 85
- Sinusoidal filters 85
- Harmonic filter 86
- AC chokes 87
- DC chokes 88
- External heatsinks and floor standing units 89
- Parameter units 90
- Brake units 91
- Brake resistors 92
- Harmonic converter 93
- Software FR Configurator2 96

4 Dimensions

- Parameter units 97
- Frequency inverters 98
- Noise filters 122
- du/dt filters and sinusoidal filters 125
- Harmonic filter 126
- AC chokes 126
- DC chokes 127
- Brake units 129
- Brake resistors 131
- Harmonic converter 132

5 Appendix

- Index 138

Mitsubishi Electric frequency inverters

The great variety of the Mitsubishi Electric frequency inverter models makes it easy for the user to choose the optimum inverter for his application.

There are basically six different inverter series:

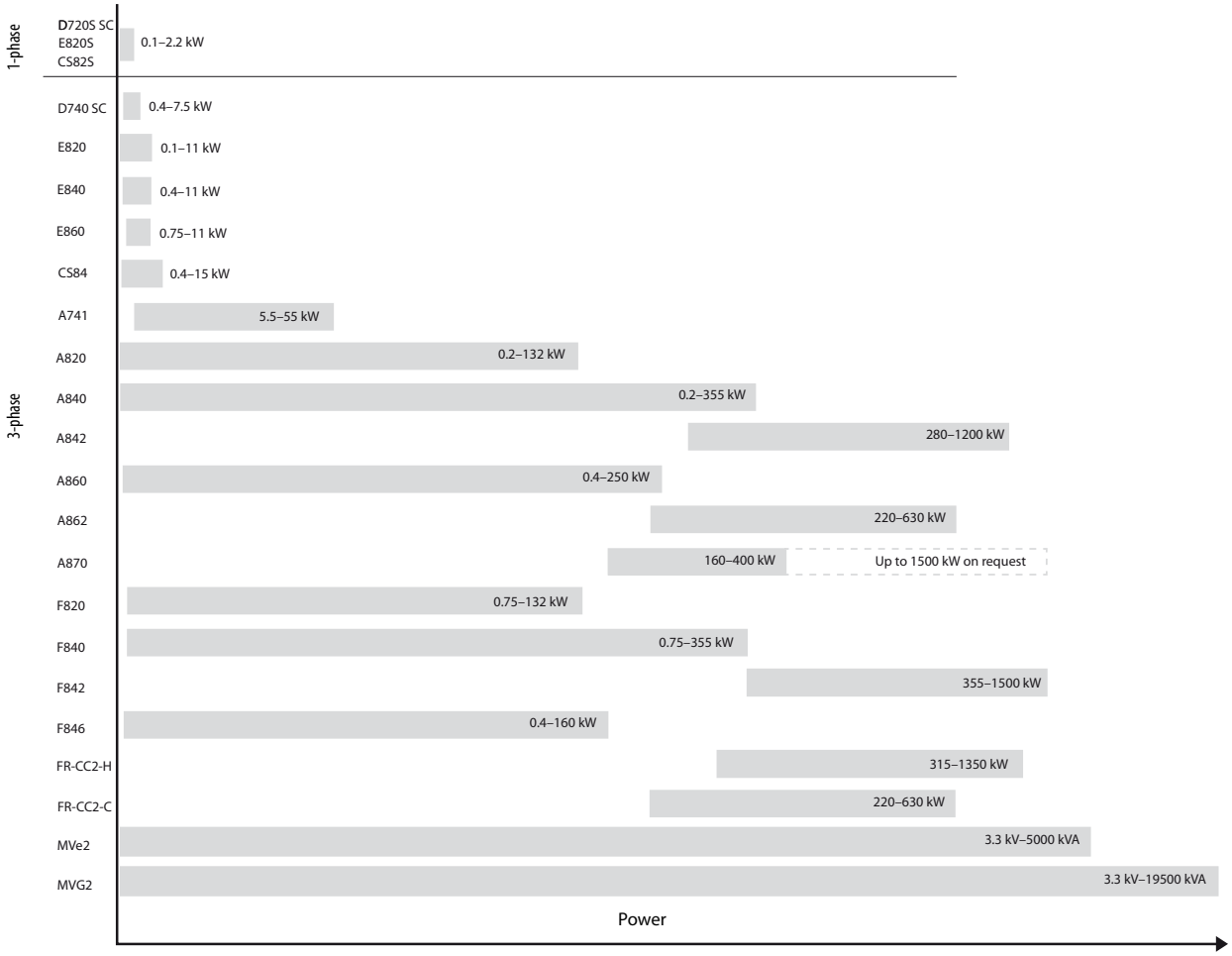
The frequency inverters are available with an output range from 0.1 kW to 630 kW.

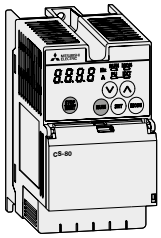
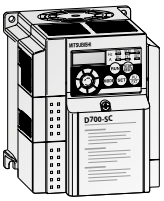
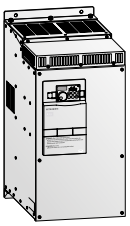
The Mitsubishi Electric frequency inverters have an overload capacity of 250 % as standard. This means they deliver double the performance of the competing frequency inverters with the same rating. Mitsubishi Electric inverters also have active current limiting. This provides the perfect response characteristics of the current vector system and gives you the confidence you need for demanding drive applications.

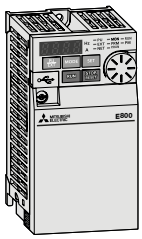
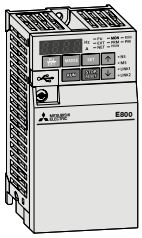
The system instantly identifies over currents and limits them automatically with fast response, allowing the motor to continue operating normally at the current threshold.

Mitsubishi Electric frequency 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 making it possible to integrate frequency inverters as part of a complete automation system.

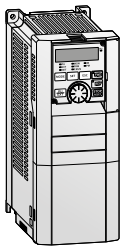
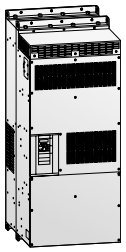
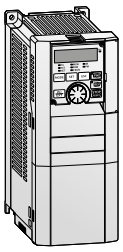
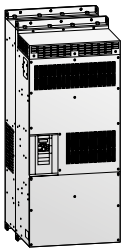
Mitsubishi Electric inverters are real energy savers achieving maximum drive capacity utilisation with minimum power consumption. Flux optimisation ensures that the connected motor only gets exactly the amount of magnetic flux required for optimum efficiency. This is particularly important at low speeds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



	FR-CS80		FR-D700 SC		FR-A700
					
	200 V	400 V	200 V	400 V	400 V
Type	**FR-CS82S-□-60**	**FR-CS84S-□-60**	**FR-D720S-□SC-EC**	**FR-D740-□SC-EC**	**FR-A741-□**
Rated motor output range	0.4–2.2 KW	0.4–15 KW	0.1–2.2 kW	0.4–7.5 kW	5.5–55 kW
Frequency range	0.2–400 Hz		0.2–400 Hz	0.2–400 Hz	0.2–400 Hz
Power supply	3-phase, 200–240 V (-15 %/+10 %)	3-phase, 380–480 V (-15 %/+10 %)	1-phase, 200–240 V (-15 %/+10 %)	3-phase, 380–480 V (-15 %/+10 %)	3-phase, 380–480 V (-15 %/+10 %)
Protection	IP20		IP20	IP20	IP00
Specifications	Refer to page 16		Refer to page 20	Refer to page 20	Refer to page 42

	FR-E800			
				
	200 V		400 V	600 V
Type	**FR-E820S-□-4 FR-E820S-□-EPA FR-E820S-□-EPB FR-E820S-□-SCEPA FR-E820S-□-SCEPB**	**FR-E820-□-4 FR-E820-□-EPA FR-E820-□-EPB FR-E820-□-SCEPA FR-E820-□-SCEPB**	**FR-E840-□-4 FR-E840-□-EPA FR-E840-□-EPB FR-E840-□-SCEPA FR-E840-□-SCEPB**	**FR-E860-□-5 FR-E860-□-EPA FR-E860-□-EPB FR-E860-□-SCEPA FR-E860-□-SCEPB**
Rated motor output range	0.1–2.2 kW		0.4–11 KW	0.75–11 KW
Frequency range	0.2–590 Hz		0.2–590 Hz	
Power supply	1-phase, 200–240 V (-15 %/+10 %)	3-phase, 200–240 V (-15 %/+10 %)	3-phase, 380–480 V (-15 %/+10 %)	3-phase, 525–600 V (-15 %/+10 %)
Protection	IP20		IP20	
Specifications	Refer to page 24		Refer to page 24	

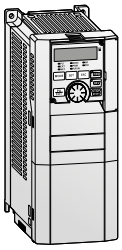
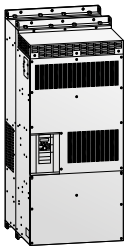
FR-A800

	200 V	400 V		600 V		690 V
Type	**FR-A820-□-E1-N6 FR-A820-□-E1-60 FR-A820-□-E1-U6**	**FR-A840-□-E2-60 FR-A840-□-2-60R2R FR-A840-□-E2-60CRN FR-A840-□-E2-60-SCM FR-A840-□-2-60LC**	**FR-A842-□-E2-60 ① FR-A842-□-2-60R2R ① FR-A842-□-E2-60CRN ① FR-F842-□-E2-60-SCM ① FR-A842-□-2-60P ①**	**FR-A860-□-1-N6 FR-A860-□-E1-N6 FR-A860-□-1-60 FR-A860-□-E1-60**	**FR-A862-□-1-60 ②**	**FR-A870-□-E2-60 FR-A870-□-E2-60B FR-A870-□-E2-06B FR-A870-□-2-60LC FR-A870-□-E2-60LC**
Rated motor output range	0.2–132 kW	0.2–355kW	280–630 kW	0.4–250 kW	220–630 kW	160–1500kW
Frequency range	0.2–590 Hz	0.2–590 Hz	0.2–590 Hz	0.2–590 Hz	0.2–590 Hz	50 Hz/60 Hz
Power supply	3-phase, 200–240 V (-15 %/+10 %)	3-phase, 380–500 V (-15 %/+10 %)	3-phase, 380–500 V (-15 %/+10 %)	3-phase, 525–600 V (-15 %/+10 %)	3-phase, 525–600 V (-15 %/+10 %)	3-phase, 525–690 V (-15 %/+10 %)
Protection	IP20	IP00/IP20	IP00	IP00	IP00	IP20
Specifications	Refer to page 54	Refer to page 48	Refer to page 52	Refer to page 56	Refer to page 57	Refer to page 58

① Set of frequency inverter and converter unit FR-CC2-H (refer to the table below) ② Set of frequency inverter and converter unit FR-CC2-C (refer to the table below)

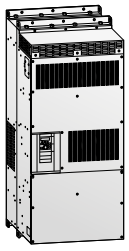
FR-F800

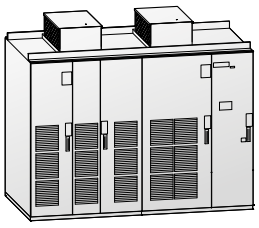

	200 V	400 V		
Type	**FR-F820-□-E2-60 FR-F820-□-E3-N6 FR-F820-□-E3-60 FR-F820-□-E3-U6**	**FR-F840-□-E2-60 FR-F840-□-E2-60-SCM**	**FR-F842-□-E2-60 FR-F842-□-E2-60-SCM ①**	**FR-F846-□-E2-60L2**
Rated motor output range	0.75–132 kW	0.75–355 kW	355–630 kW	0.4–160 kW
Frequency range	0.2–590 Hz	0.2–590 Hz	0.2–590 Hz	0.2–590 Hz
Power supply	3-phase, 200–240 V (-15 %/+10 %)	3-phase, 380–500 V (-15 %/+10 %)	3-phase, 380–500 V (-15 %/+10 %)	3-phase, 380–500 V (-15 %/+10 %)
Protection	IP20	IP00/IP20	IP00	IP55
Specifications	Refer to page 38	Refer to page 34	Refer to page 36	Refer to page 37

① Set of frequency inverter and converter unit FR-CC2-H (refer to the table below)

FR-CC2



TMdrive®



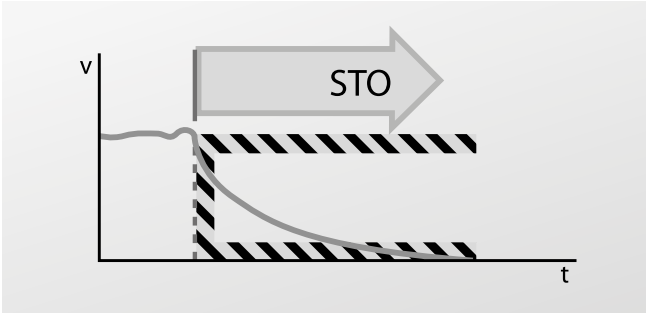
	600 V		Medium-voltage devices	
Type	**FR-CC2-H□K-60 FR-CC2-H□K-60P**	**FR-CC2-C□K-60**	**MVe2**	**MVG2**
Rated motor output range	315–1350 kW	220–630 kW	5000 kVA	19500 kVA
Frequency range	—	—	0–60 Hz	0–60 Hz
Power supply	3-phase, 380–500 V (-15 %/+10 %)	3-phase, 525–600 V AC, (-15 %/+10 %)	3-phase, 3–11 kV AC (±10 %/±5 %)	3-phase, 3–11 kV AC (±10 %/±5 %)
Protection	IP00	IP00	IP30 (except fan)	IP30 (except fan)
Specifications	Refer to page 36, and page 52		Refer to page 68	Refer to page 70

■ Safety function "Safe Torque Off" (STO) according EN 61800-5-2

☑D700 ☐CS80 ☑E800 ☑A700 ☑A800 ☑F800

The "Safe Torque Off" function (STO) disconnects the power from the motor and prevents an unexpected re-start. Thereupon the motor coasts to a halt. Compared to the traditional technology with contactors, this integrated Safety function reduces the effort in hardware, wiring and maintenance and offers higher performance and lifetime.

The STO function is standard integrated into the frequency inverters and certified according to EN61800-5-2.



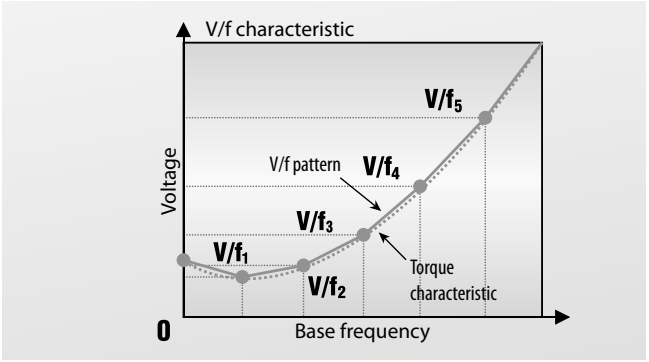
■ Flexible 5-point V/f curve

☐D700 ☐CS80 ☐E800 ☑A700 ☑A800 ☑F800

By setting a desired V/f characteristic from the start up to the base frequency or base voltage with the V/f control (frequency voltage/frequency), a dedicated V/f pattern can be generated.

Optimal V/f pattern matching the torque characteristics of the facility can be set.

- By setting the V/f_1 (first frequency voltage/first frequency) to V/f_5 parameters in advance, a desired V/f characteristic can be obtained.
- For an example, with the equipment with large static friction factor and small dynamic friction factor, large torque is required only at the start up, so a V/f pattern that will raise the voltage only at the low-speed range is set.



■ Magnetic flux vector control

☑D700 ☑CS80 ☑E800 ☑A700 ☑A800 ☑F800

The integrated flux vector control of the inverter system makes it possible to achieve high torques, even at low motor speeds.

The sensorless vector control system of the FR-A700 series enables fast, high-precision speed and torque regulation, even when using general-purpose motors without an encoder.

When the FR-A8AP is mounted either to A800 or E800, full-scale vector control operation can be performed using a motor with encoder.

Fast response/high accuracy speed control (zero speed control, servo lock), torque control, and position control can be performed. Vector control offers excellent control characteristics when compared to V/f control and other control techniques, achieving the control characteristics equal to those of DC machines.

■ PM sensorless vector control

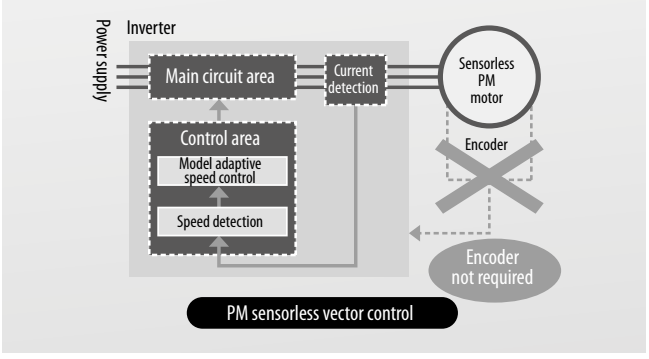
☐D700 ☐CS80 ☑E800 ☐A700 ☑A800 ☑F800

What is a permanent magnet (PM) motor?

A PM motor is a synchronous motor with strong permanent magnets embedded in its rotor. The two major PM motor types are: the interior permanent magnet (IPM) motor with its magnets embedded inside the rotor, and the surface permanent magnet (SPM) motor with its permanent magnets attached on the rotor surface.

What is PM sensorless vector control?

The speed and magnetic pole positions, the two essential bits of information to control a PM motor, are detected without a sensor (encoder). The speed detection internally-performed in an inverter enables highly accurate control of a PM motor, almost as accurate as an AC servo system, without the need of a sensor (encoder).



■ Regeneration avoidance function

☑D700 ☑CS80 ☑E800 ☑A700 ☑A800 ☑F800

The regeneration avoidance function can prevent the inverter from being shut down by regenerative overvoltages when strong regenerative loads cause power to be released into the frequency inverter (for example when braking the motor or with loads that actively drive the motor).

The inverter can automatically increase the output frequency or disable the braking ramp when a programmed threshold value is reached. The response sensitivity, dynamics and working range are all adjustable.

For example, this function can prevent a shutdown with an overvoltage error when the speed of a fan controlled by the inverter is increased by the draft from another fan operating in the same ventilation duct.

The function then temporarily increases the output frequency above the setpoint value.

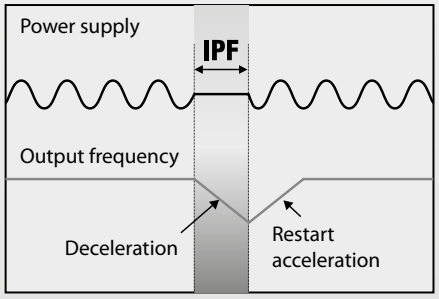
This function can also be used to brake loads with the DC bus voltage, without using braking modules.

■ Automatic restart after instantaneous power failures

☑D700 ☑CS80 ☑E800 ☑A700 ☑A800 ☑F800

In pump and fan applications normal operation can be continued automatically after brief power failures. The system simply reactivates the coasting motor and automatically accelerates it back up to its setpoint speed.

The graphic below shows how the frequency inverter can respond to a brief power outage. Instead of coasting down completely and stopping, the motor is automatically "caught" by the frequency inverter and re-accelerated back up to its previous speed.



■ The cutting-edge auto tuning function

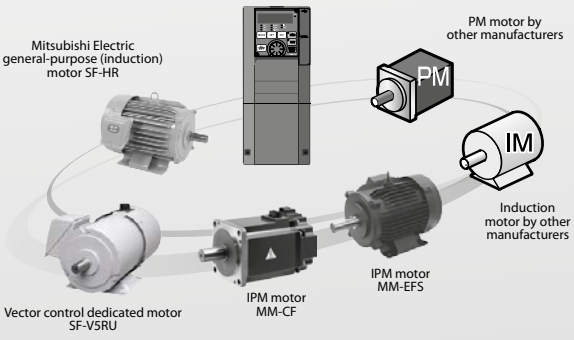
☐D700 ☐CS80 ☑E800 ☐A700 ☑A800 ☑F800

Connect any motor

The PM motor auto tuning function, which has been newly developed, enables operation of other manufacturers' permanent magnet (PM) motors. Induction and synchronous motors by Mitsubishi Electric and by other manufactures are all operable. That means you need less motors for spare and stocks.

Sharing the spare inverter

One spare inverter is enough for the two types of motors (IM and PM); the number of required spare inverters is halved.

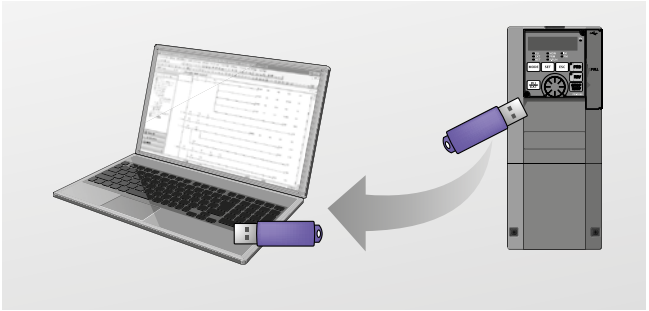


■ Easy monitoring and Fault diagnosis

☐D700 ☐CS80 ☑E800 ☐A700 ☑A800 ☑F800

The operating status, including output frequency immediately before an activation of a protective function, can be output to a standard USB stick (trace function) This can then be imported to FR Configurator2 to aid with diagnosis of the trip condition.

Clock setting is now available in addition to the already-available cumulative energization time. The time and date at a protective function activation are easily identified. (The clock is reset at power-OFF.) The date and time are also saved with the trace data, making the fault analysis easier. Real Time clock is also available with the optional FR-LU08 (to be released soon). The real-time clock is not reset even at power-OFF.



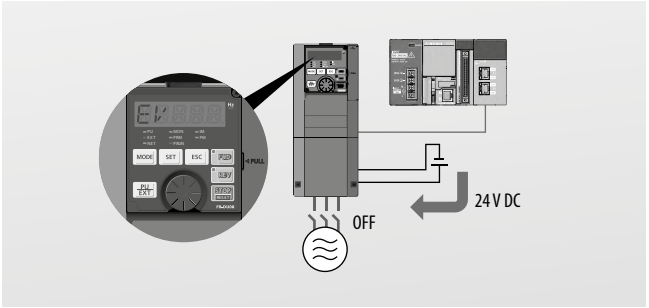
■ Standard 24 V DC power supply for the control circuit

☐D700 ☐CS80 ☑E800 ☐A700 ☑A800 ☑F800

With the addition of a separate 24 V DC powers supply, power to the control board can be maintained when the mains supply is removed, this allows safe maintenance to be carried out on the drive while giving full accesses to parameter changes and maintaining any network options installed in the drive.

The memorized operating status includes the output frequency, etc.

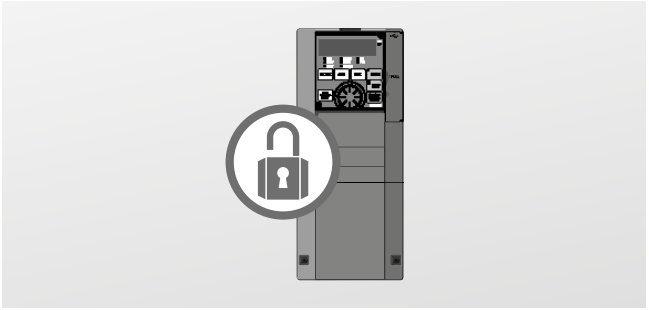
The E800 is not equipped whith a 24 V DC input. However, an option allows connection to a separate 24 V DC power supply.



■ Parameter setting protection with password function

☐D700 ☑CS80 ☑E800 ☐A700 ☑A800 ☑F800

Parameter reading and writing can be restricted by setting a 4-digit password, thus eliminating the need to rewrite parameter settings due to misoperation.

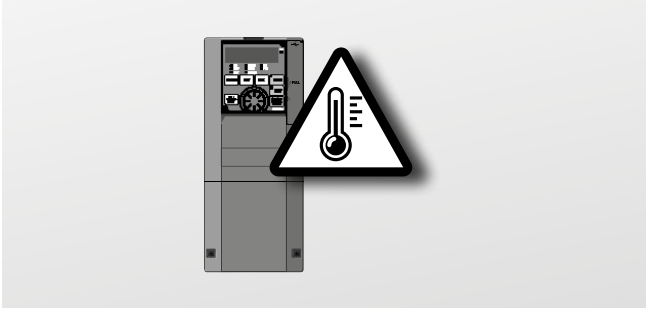


■ Surrounding air temperature measured by inverter

☐D700 ☐CS80 ☐E800 ☐A700 ☑A800 ☑F800

You can easily select the installation method and determine whether the operating conditions are acceptable.

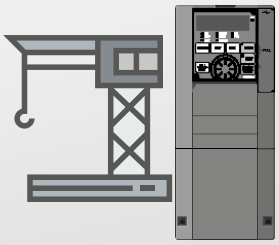
If the surrounding air temperature exceeds the specified range, a warning is issued and the temperature at a warning occurrence is recorded, helping to prevent trouble.



■ Ready for crane applications due to

☐D700 ☐CS80 ☐E800 ☐A700 ☑A800 ☐F800

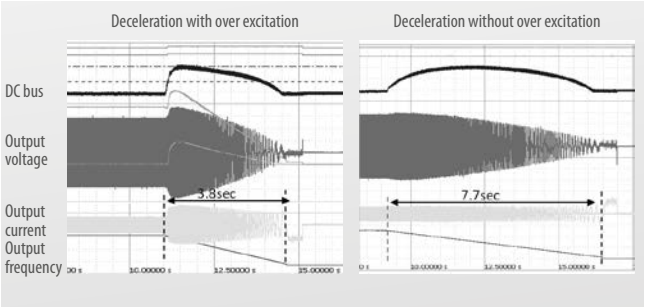
- Built-in 100 % ED brake transistor
- Intergrated crane functions
  e. g. Anti sway function
- Control of 2 motors
- Zero speed torque



■ Braking without resistor

☐D700 ☐CS80 ☑E800 ☐A700 ☑A800 ☑F800

The inverter applies over excitation current to the motor, in order to convert regenerative energy during deceleration without a brake resistor.



■ Advanced PID controller

☐D700 ☐CS80 ☐E800 ☐A700 ☑A800 ☑F800

Fan, pump and compressor control is easily handled without the need for external controllers. Furthermore the built in PLC means true stand-alone capability. Some of the new PID functions are;

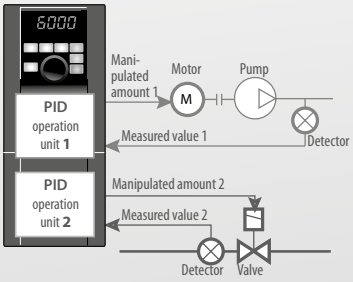
PID multiple loops (two loops)

PID pre-charge function

Multi-pump function

PID output shutoff (sleep) function

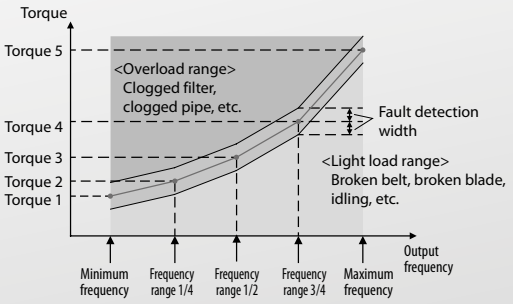
PID automatic switchover function



■ Intelligent load detection

☐D700 ☐CS80 ☑E800 ☐A700 ☐A800 ☑F800

Through a unique algorithm we are able to accurately detect the fan or pump curve of the attached load and alarm when the load falls outside of adjustable limits. This means that we can detect for example, jammed pumps, dirty impellors or broken belts. Because we utilise this method of detection, nuisance trips that are associated with other systems are avoided.



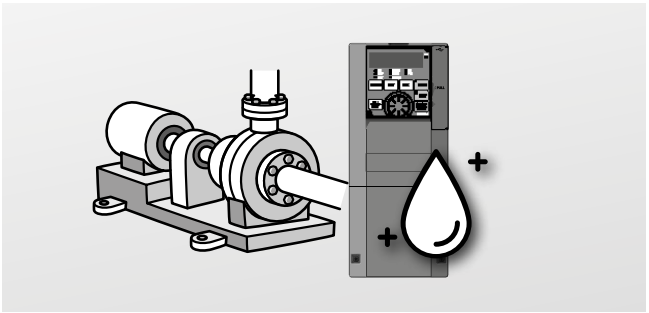
■ Pump clean function (de ragging)

☐D700 ☐CS80 ☐E800 ☐A800 ☑F800

If impellers or fans of pumps are blocked by debris, the motor stop can be resolved by repeating forward and reverse run.

Use this function, when backwashing is no problem.

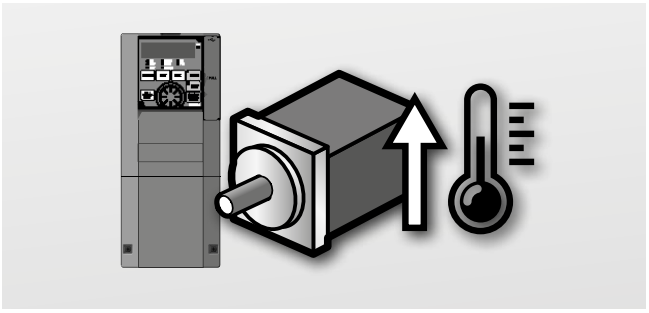
This function can also be started automatically, when the measured result of the load characteristic lays outside the allowable range (overload).



■ Motor preheat function

☐D700 ☑CS80 ☑E800 ☑A700 ☑A800 ☑F800

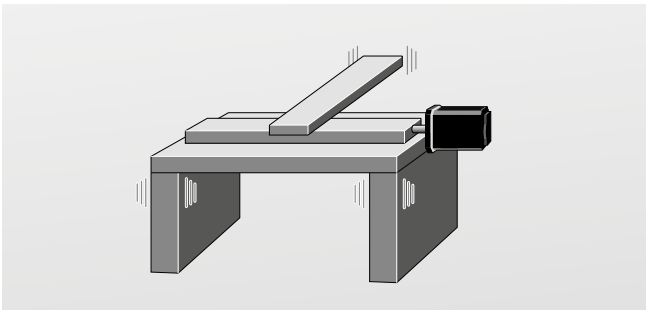
The motor preheat function can be used to avoid moisture collecting on the motor windings in periods of inactivity and prior to motor start up. This can also be used to reduce condensation, or freezing of a pump station.



■ Mechanical resonance suppression

☑D700 ☐CS80 ☑E800 ☑A700 ☑A800 ☑F800

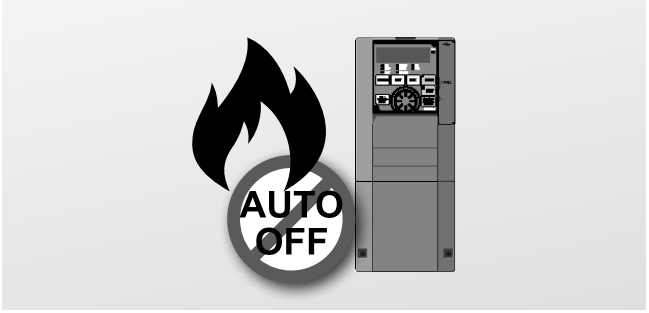
Vibration due to natural resonance can be compensated by this function, extending mechanical life of the system.



■ Fire override mode

☐D700 ☐CS80 ☐E800 ☐A700 ☐A800 ☑F800

In cases of emergencies such as fires, continuing to drive the extraction or pressurisation fan motor is often the highest priority. This function can be used to allow the drive to continue to operate the motor until destruction, ignoring protective functions even if the inverter detects a fault.



■ Intelligent energy optimisation

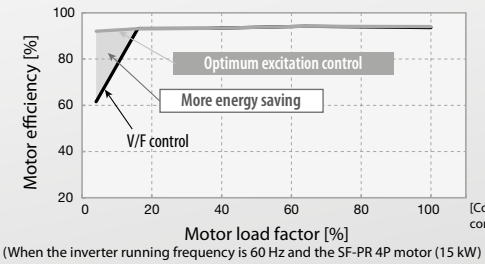
☑D700 ☐CS80 ☑E800 ☑A700 ☑A800 ☑F800

All Mitsubishi Electric drives allow the user to save energy, however the FR-F800 has many dedicated functions that allow for even more efficiency. For example we have developed a tuning algorithm called AOEC, Advanced Optimum Excitation Control. This all new feature means that even for loads that require high torque for acceleration or deceleration energy saving can be maximised.

The drive is able to control for example the external cooling fans through the built in environmental temperature detection, maximising system efficiency. This also reduces the ingress of external air which may be polluted.

Similar to the start/stop function used in modern cars, the 800 series drives feature the ability that during standby all unnecessary circuits are shut down to reduce energy usage, so only 24 VDC is supplied to keep control alive. Restart happens within 1 second meaning there is no effect on system availability.

The effect of the energy saving can be distributed by Network or Display.



(When the inverter running frequency is 60 Hz and the SF-PR 4P motor (15 kW) is used)

■ Easy to start up

☐D700 ☐CS80 ☑E800 ☐A700 ☑A800 ☑F800

By using USB stick or FR-Configurator2 sofware package, you can comfortably down/upload Parameters. Or use the integrated application wizard. The integrated Oscilloscope / Trace function are perfect tools to assist with fault finding and commissioning. An additional feature is the integrated free PLC programming software based on GX Works2, so programming can be done by just one connection.

■ Easy configuration with parameter unit

☑D700 ☐CS80 ☐E800 ☑A700 ☐A800 ☐F800

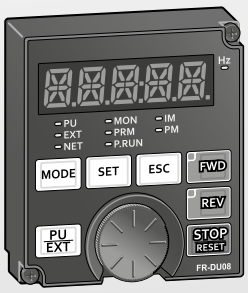
The parameter unit FR-DU08 is included as standard equipment with the inverters FR-F800 and FR-A800. The FR-D700 SC and FR-E800 are equipped with an integrated operation panel. All these panels use a digital dial for making the settings. For the FR-D700 SC and FR-E800 the parameter unit FR-PA07 is optional.

The parameter unit makes operation of the inverter simple and intuitive and displays operating parameters and alarm messages. The integrated digital dial control provides fast and efficient access to all key drive parameters.

The optional FR-PU07 parameter unit features a long-life LC display with a backlight and integrated numeric keypad for direct entry of operating parameters. The user interface can be displayed in eight different languages. This panel is designed as a remote unit that is connected to the inverter with a cable. The panel is compatible with all inverter models.

For FR-F800/A800 inverters a fixed installation is also possible. It also supports definition of user groups. Editable parameter sets can be implemented, which can be selected according to specific application requirements.

The operation panel equipped with an LCD panel (FR-LU08) is optionally available for an enhanced display.



FR-DU08

FR-PU07

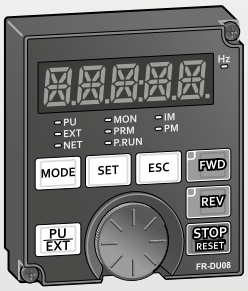
■ Easy-to-read operation panel

☐D700 ☐CS80 ☑E800 ☐A700 ☑A800 ☑F800

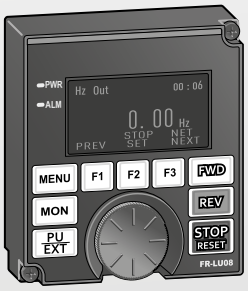
The parameter unit FR-DU08 is the standard equipment for all FR-A800/ FR-F800 inverters. A 5-digit 12-segment display is employed for the operation panel to provide an easy-to-follow view to the users. The operation panel equipped with an LCD panel (FR-LU08) is optionally available for an enhanced display.

The FR-LU08 supports up to

- 5 lines of text or trend graphs
- Start up wizard
- Real Time clock with Battery buffer
- "HELP" button for Parameter explanation
- Exchange of language packs or up/download of Parameter files by the integrated USB port.
- USB connection with PC
- Direct setting for PID set-point
- Unit indicator for the application
- Display of process values in selctable units e. g. m/s, bar, ppm etc.



FR-DU08 12-segment type



FR-LU08 LCD type (option)

Communication

Extended I/Os for additional control functions

The following I/Os are included as standard equipment on the inverters. The number of I/Os depends on the inverter model.

- Digital inputs
- Analog inputs
- Analog outputs
- Open collector outputs
- Relay outputs

The digital inputs, open collector outputs and relay outputs can all be used for a wide range of functions.

The switching status of the input and output terminals can be displayed on the control panel.

In addition the FR-A800 is equipped with a pulse input for positioning.

Remote I/Os

Instead of using the remote I/Os of a PLC you can use a network connection to read out the status of the frequency inverter's inputs and set its outputs.

Expansion slot

The frequency inverters have up to 3 expansion slots (except FR-D700 SC) that can be used to install an I/O expansion module or a network module. These modules are cards that are installed by plugging them into the slot of the inverter.

Communications capability as a standard function

All frequency inverters have an RS485 interface (Mitsubishi frequency inverter protocol, Modbus® RTU protocol) for data communication, e. g. with a PC. The FR-F800/A800 does have standard Modbus TCP/IP Ethernet connection. The FR-E800 does support multiple Ethernet protocols, depending on FR-E800 version.

Many frequency inverters can also be connected via USB.

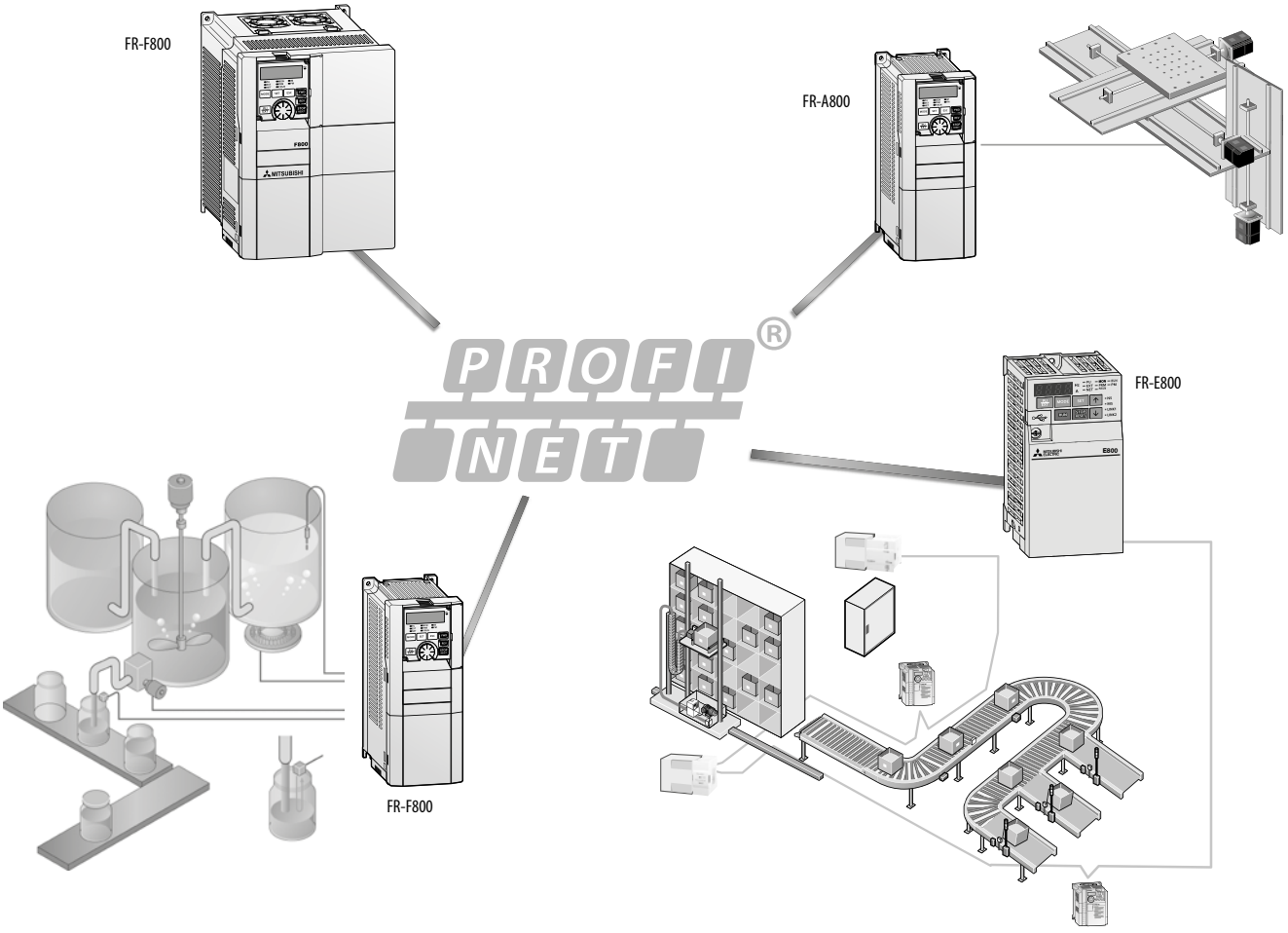
Support for integration in larger networks

Open communications with standard industrial bus systems can be implemented easily with optional expansion cards (except FR-D700 SC).

This makes it possible to integrate the frequency inverter in large-scale automation systems.

The following networks are supported by the inverters:

- CC-Link
- CC-Link IE Field
- CC-Link IE Field Basic
- Modbus® TCP
- Profibus DP
- Profibus DPV1
- Profinet
- DeviceNet™
- EtherNet IP
- EtherCat
- CANopen
- SSCNETIII/H
- LonWorks
- BACnet
- BACnet IP
- ControlNet
- TSN (Time sensiteive Network)



Maintenance and standards

Simplified maintenance

Easy installation and maintenance

Since the control and power terminal block is easy to access, the installation and maintenance of the inverter is also very easy.

All connection points are designed as screw terminals or spring clamps. The housing includes a cable routing facility which can be removed for installing.

Easy access to cooling fans

The easily accessible cooling fans can be replaced quickly and easily if required.

The integrated cooling fan can be switched OFF automatically in stand-by operation to increase its lifetime significantly.

Even the cabinet fan can be activated based on environment temp measurement of the Inverter.

Service timer

The frequency inverters offer up to 3 integrated service timers that automatically triggers a diagnostic alarm after a set number of operating hours. This feature can be used for monitoring the frequency inverter itself or a peripheral component. The values of the average output current and the service timer can also be output as analog signals.

Modern diagnostics functions and industry 1st further extend service life

The ageing of the main circuit capacitors, the control circuit power capacitor, the internal cooling fans, and the inrush current limiter circuit can be checked with the monitoring functions.

If the inrush resistor overheats an alarm is displayed.

The ability to internally monitor corosive gases, such as H2S contamination , is an industry 1st for Mitsubishi Elecktric

The alarms for the main circuit capacitors, control circuit capacitor, inrush current limiter and internal fans can all be output to a network or via the optional FR-A8AY module.

This makes it possible to prevent malfunctions by configuring diagnostics alarms to be triggered when the end of the service life is reached.

The inverter also has an internal program that can evaluate the ageing of the main circuit capacitors. This feature is only available when a motor is connected to the inverter.

Due to built-in environment temperature sensor the real cooling situation can be judged more precisely and e. g. IGBT overtemperature alarms can be avoided.

Environment-friendly and international compliance

Electromagnetic compatibility

Latest technologies have been used to significantly reduce the interference levels generated by this frequency inverter.

Regarding its electromagnetic compatibility, the frequency inverters comply with the European EMC directives.

To meet these standards noise filters have been developed for each performance range.

The FR-A800 and FR-F800 have a built-in EMC filter and comply to the strict electromagnetic compatibility regulations of the European Union (EMC Directive, Environment 2, EN 61800-3).

In order to meet these standards, the inverters are fitted with a new, Integrated EMC filter, which can easily be deactivated with a jumper if necessary.

You can also further limit the make current and reduce network interference by fitting the input of the inverter with an optional AC choke and a DC choke, which is connected to special terminals on the inverter unit.

Circuit boards with two coats of protective varnish

The twin coating on the internal PCBs provides even better protection against environmental influences. This is particularly important in sewage plant applications where the switchgear cabinets are exposed to aggressive fermentation gases that can reduce the service life of the equipment.

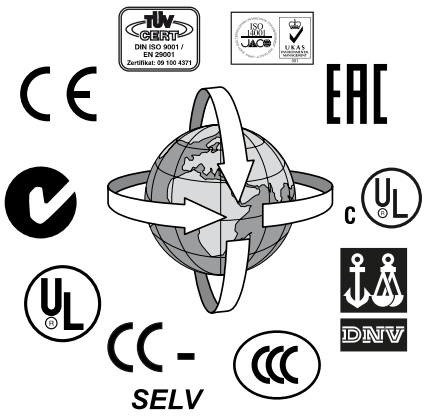
The FR-A800 and FR-F800 series complies to the Environmental requirements of IEC60721-3-3 level 3C2 as standard.

International standards

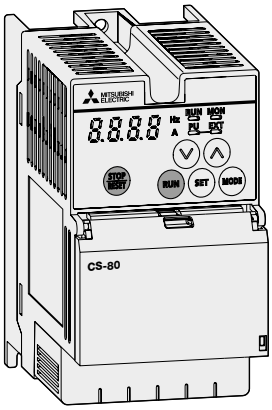
The inverters are designed so that they can be used worldwide without any additional modifications or certifications.

- The units conform to the international standards CE, UL, cUL, EAC, CCC, ISO 9001, ISO 14001 and C-Tick (FR-A741: CE/UL/cUL/GOST). In addition, the series FR-A800 conform to DNV/GL, ABS/BV/LR/NK marine approvals.
- User-selectable positive or negative switching logic. Users can select positive or negative switching logic for input and output signals, enabling flexible and simple adaptation of the units for varying world market requirements.
- Multilingual programming/control unit (optional)
- Support for a variety of international industrial bus systems
- Internationally standardised, frequency inverter configuration software package for MS Windows®, with multilingual user interface.

These features make the inverters a truly international product that meets all relevant standards and can be easily adjusted for national requirements.



The FR-CS80 series



By providing general-purpose magnetic-flux control in the world's smallest compact body, the FR-CS80 offers cost-efficient solutions. This makes the FR-CS80 suitable for almost all industrial applications.

Technical details FR-CS80

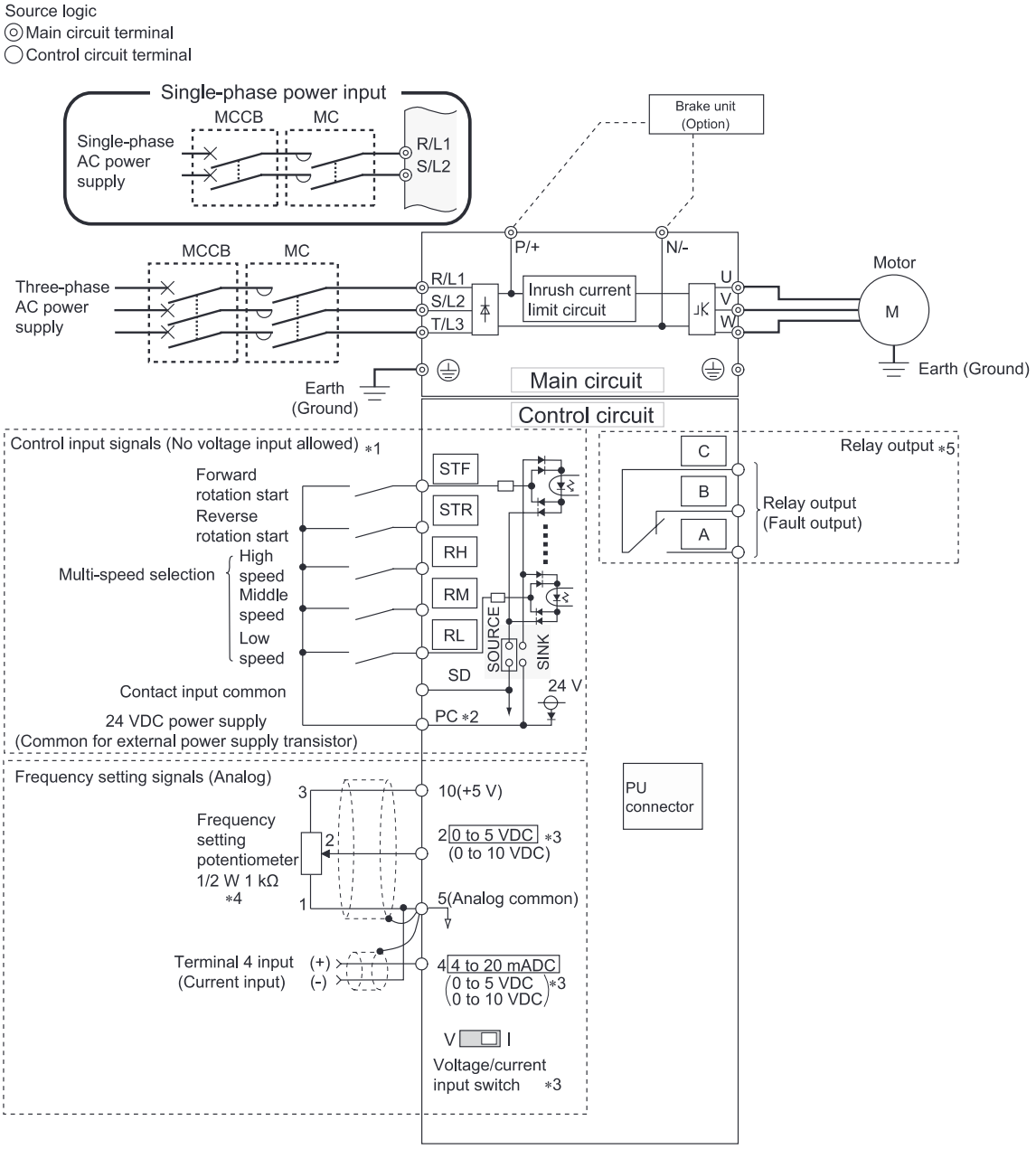
Product line			FR-CS82S-□-60				FR-CS84-□-60								
			025	042	070	0100	012	022	036	050	080	120	160	230	295
Output	Rated motor capacity ①	kW	0.4	0.75	1.5	2.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11.0	15
	Rated output capacity ②	kVA	1.0	1.7	2.8	4.0	0.9	1.7	2.7	3.8	6.1	9.1	12.2	17.5	22.5
	Rated current ③	A	2.5	4.2	7.0	10.0	1.2 (1.0)	2.2 (1.9)	3.6 (3.1)	5.0 (4.3)	8.0 (6.8)	12.0 (10.2)	16.0 (13.6)	23.0 (19.6)	29.5 (25.1)
	Overload capacity ④		150 % of rated motor capacity for 60 s; 200 % for 0.5 s												
	Voltage ⑤		3-phase 200 to 240 V				3-phase 380 to 480 V								
	Frequency range	Hz	0.2–400												
	Control method		V/f control, optimum excitation control or general-purpose magnetic flux vector control												
	Modulation control		Sine evaluated PWM, soft PWM												
Input	Power supply voltage		1-phase, 200–240 V AC, -15 %/+10 %				3-phase, 380–480 V AC, -15 %/+10 %								
	Voltage range		170 to 264 V, 50/60 Hz				325 to 528 V, 50/60 Hz								
	Power supply frequency		50/60 Hz ±5 %												
	Power supply capacity ⑥	kVA	0.6	0.6	1.4	1.4	1.5	2.5	4.5	5.5	9.5	12.0	17.0	20.0	28.0
Others	Cooling		Self cooling			Fan cooling	Self cooling					Fan cooling			
	Storage temperature		-20 to +65 °C												
	Weight	kg	0.6		1.4		0.6		0.9		1.4	1.9		3.5	
	Dimensions (WxHxD)	mm	68x128x118		108x128x160		68x128x118		108x128x130		108x128 x160	197.5x150x134		180x260x165	
Order information		Art. no.	325716	325717	325718	325719	325720	325721	325722	325723	325724	325745	325746	325747	325748

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 230 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. For single-phase power input model, the bus voltage decreases to power failure detection level and the load of 100 % or higher may not be available if the automatic restart after instantaneous power failure function (Pr.57) or the power failure stop function (Pr.261) is set and power supply voltage is low while the load increases.
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√2 that of the power supply.
⑥ The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input choke and cables).

FR-CS80			Description
Control specifications	Frequency setting resolution	Analog input	0.06 Hz/0–60 Hz (terminal 2, 4: 0–10 V/10 Bit) 0.12 Hz/0–60 Hz (terminal 2, 4: 0–5 V/9 Bit) 0.06 Hz/0–60 Hz (terminal 4: 0–20 mA/10 Bit)
		Digital input	0.01 Hz
	Frequency accuracy		0.2 % of the maximum output frequency (temperature range 25 °C ±10 °C) via analog input; ±0.01 % of the set output frequency (via digital input)
	Voltage/frequency characteristics		Base frequency adjustable from 0 to 400 Hz Constant torque/variable torque pattern can be selected
	Starting torque		≥150 %/1 Hz (for vector control oder slip compensation)
	Torque boost		Manual torque boost
	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
	DC injection brake		Operation frequency: 0 to 120 Hz, operation time: 0 to 10 s, operation voltage: 0 to 30 % variable
	Stall prevention operation level		Operation current level setting 0–200 %, user adjustable
Control signals for operation	Frequency setting signal	Analog input ②	Terminal 2: Selectable from 0 to 10 V / 0 to 5 V Terminal 4: Selectable from 0 to 10 V / 0 to 5 V / 4 to 20 mA
		Digital input	Input from the operation panel or parameter unit, with selectable frequency setting increments
	Start signal		Separate forward/reverse signal, with selectable start self-holding input (3-wire input)
	Input signals ⑥		Using Pr.178 to Pr.182 (Input terminal function selection), the signal can be selected from the following: Multi-speed selection, Remote setting, Second acceleration/deceleration function selection, Terminal 4 input selection, JOG operation selection, PID control valid terminal, External thermal relay input, Output stop, Start self-holding selection, Forward rotation command, Reverse rotation command, Inverter reset, Traverse function selection
	Operational function		Maximum frequency, minimum frequency, frequency jump operation, external thermal relay input selection, automatic restart after instantaneous power failure operation, forward/reverse rotation prevention, remote setting, second acceleration/deceleration function, multi-speed operation, regeneration avoidance, slip compensation, operation mode selection, offline auto tuning, PID control, computer link operation (RS-485 communication), Optimum excitation control, power failure stop, MODBUS RTU, increased magnetic excitation deceleration.
	Output signal Relay output ①		Using Pr.195 Output terminal function selection, the signal can be selected from the following: Inverter running, Up to frequency, Overload warning, Output frequency detection, Electronic thermal O/L relay pre-alarm, Inverter operation ready, Output current detection, PID lower limit, PID upper limit, PID forward/reverse rotation output, Heatsink overheat pre-alarm, During deceleration at occurrence of power failure, During PID control activated, PID output interruption, During retry, Alarm output, Fault output, Fault output 3.
Indication	Operation panel Parameter unit (FR-PU07)	Operating status monitoring	Selectable from the following: output frequency, output current(steady state), output voltage, frequency setting, cumulative energization time, actual operation time, converter output voltage, electronic thermal relay function load factor, motor load factor, PID set point, PID measured value, PID deviation, inverter I/O terminal monitor, output power, cumulative power, motor thermal load factor, inverter thermal load factor.
		Fault monitoring	Fault record is displayed when a protective function is activated. Past 8 fault records are stored. (output voltage, output current, frequency, and cumulative energization time right before the protective function is activated.)
		Interactive guidance	Help function for operation guide ①
Protection	Protective functions	Fault	Overcurrent during acceleration, Overcurrent during constant speed, Overcurrent during deceleration, Overvoltage during acceleration, Overvoltage during constant speed, Overvoltage during deceleration, Inverter overload trip (electronic thermal relay function), Motor overload trip (electronic thermal relay function), Heatsink overheat, Input phase loss ③, Output side earth (ground) fault overcurrent as start, Output short circuit, Output phase loss, External thermal relay operation ②, Parameter error, PU disconnection ②, Retry count excess ②, CPU fault, Inrush current limit circuit fault, 4 mA input fault ②, Stall prevention stop, Output current detection value exceeded ②, Inverter output fault ⑤, Undervoltage
		Warning	Overcurrent stall prevention, Overvoltage stall prevention, PU stop, Parameter write error, Electronic thermal O/L relay pre-alarm, Undervoltage, Inrush current limit resistor heating, Operation panel lock, Password locked, Inverter reset
Others	Surrounding air temperature		-10 to +40 °C (non-freezing) ④ or -10 to +50 °C (non-freezing) at the rated current reduced by 15 %
	Surrounding air humidity		95 % RH or less (non-condensing)for models with circuit board coating
	Storage temperature ⑥		-20 °C to +65 °C
	Ambience		Indoors (free from corrosive gas, flammable gas, oil mist, dust or dirt)
	Altitude/vibration		2500 m or less (For the installation at an altitude above 1000 m, consider a 3 % reduction in the rated current per 500 m increase in altitude.) / 5.9 m/s2 or less at 10 to 55 Hz (directions of X, Y, Z axes)

Remarks:
① Available for the option parameter unit (FR-PU07) only.
② Not available in the initial status.
③ Available for the three-phase power input models.
④ When using the inverters at the surrounding air temperature of 40 °C or less, the inverters can be installed closely attached (0 cm clearance).
⑤ Available for the FR-CS84-160 or lower or the FR-CS82S.
⑥ Applicable to conditions for a short time, for example, in transit.

Block diagram FR-CS80



*1 The signal assigned to each of these terminals can be changed to the reset signal, etc. using the input terminal assignment function (**Pr.178** to **Pr.182**).
*2 To use terminals PC and SD for a 24 VDC power supply, check the wiring for an incorrect short of these terminals.
*3 Terminal input specifications can be changed by analog input specification switchover (**Pr.73**, **Pr.267**). To input voltage via terminal 4, set the voltage/current input switch to "V" position. To input current (4 to 20 mA), set it to "I" position (initial setting).
*4 It is recommended to use a 2 W 1 kΩ potentiometer when the frequency setting is frequently changed.
*5 The function of these terminals can be changed with the output terminal assignment (**Pr.195**).

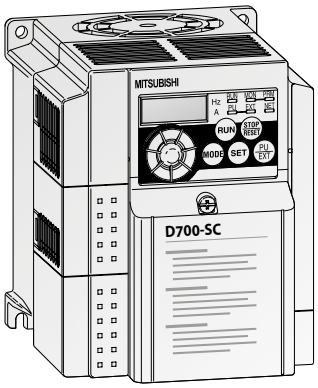
Assignment of signal terminals (FR-CS80)

Function	Terminal	Designation	Description
Control connection (programmable)	STF	Forward rotation start	The motor rotates forward, if a signal is applied to terminal STF.
	STR	Reverse rotation start	The motor rotates reverse, if a signal is applied to terminal STR.
	RH, RM, RL	Multi-speed selection	Preset of 15 different output frequencies according to the combination of the RH, RM and RL signals.
Common	SD	Reference potential (0 V) for the PC terminal (24 V)	Common terminal for contact input terminal (sink logic); Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the source logic to avoid malfunction by undesirable current. Common terminal for the 24 V DC power supply (terminal PC, terminal +24) Isolated from terminals 5 and SE.
	PC	24 V DC output	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the source logic to avoid malfunction by undesirable current. Common terminal for contact input terminal (source logic). Can be used as a 24 V DC 0.1 A power supply.
Setting value specification	10	Voltage output for potentiometer	Output voltage 10 V DC. Max. output current 10 mA. Recommended potentiometer: 1 kΩ, 2 W linear
			Output voltage 5 V DC. Max. output current 10 mA. Recommended potentiometer: 1 kΩ, 2 W linear
	2	Input for frequency setting value signal	The setting value 0–5 V DC (or 0–10 V, 0/4–20 mA) is applied to this terminal. You can switch between voltage and current setpoint values with parameter 73. The input resistance is 10 kΩ.
	5	Frequency setting common and analog outputs	Terminal 5 provides the common reference potential (0 V) for all analog set point values and for the analog output signals CA (current) and AM (voltage). The terminal is isolated from the digital circuit's reference potential (SD). This terminal should not be grounded.
	4	Input for setting value signal	The setting value 0/4–20 mA or 0–10 V is applied to this terminal. You can switch between voltage and current setpoint values with parameter 267. The input resistance is 250 Ω. The current setting value is enabled via terminal function AU.
Signal output (programmable)	A, B, C	Potential free relay output 1 (Alarm)	The alarm is output via relay contacts. The block diagram shows the normal operation and voltage free status. If the protective function is activated, the relay picks up. The maximum contact load is 200 V AC/0.3 A or 30 V DC/0.3 A.
Interface	—	PU connector	A parameter unit can be connected. Communications via RS485 I/O standard: RS485, multi drop operation: max 1152 baud (overall length: 500 m)

Assignment of main circuit terminals

Function	Terminal	Designation	Description
Main circuit connection	R/L1, S/L2, T/L3	AC power input	Mains power supply of the inverters
	U, V, W	Inverter output	Connect a 3-phase squirre-cage motor to these terminals.
	P/+, N/-	Brake unit connection	A brake unit can be connected.
	⏚	PE	Protective earth connection of inverter

The 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 ultra-compact dimensions, simple and secure operation and a wide range of technology functions. The integrated digital dial gives the user fast, direct access to all important drive parameters.

Output range:

FR-D720S SC:
0.1–2.2 kW, 200–240 V AC, single-phase

FR-D740 SC:
0.4–7.5 kW, 380–480 V AC, three-phase

Available accessories:

Optional control units, versatile options and useful accessories are available for this frequency inverter.

Please refer to page 90 for details.

Technical details FR-D700 SC

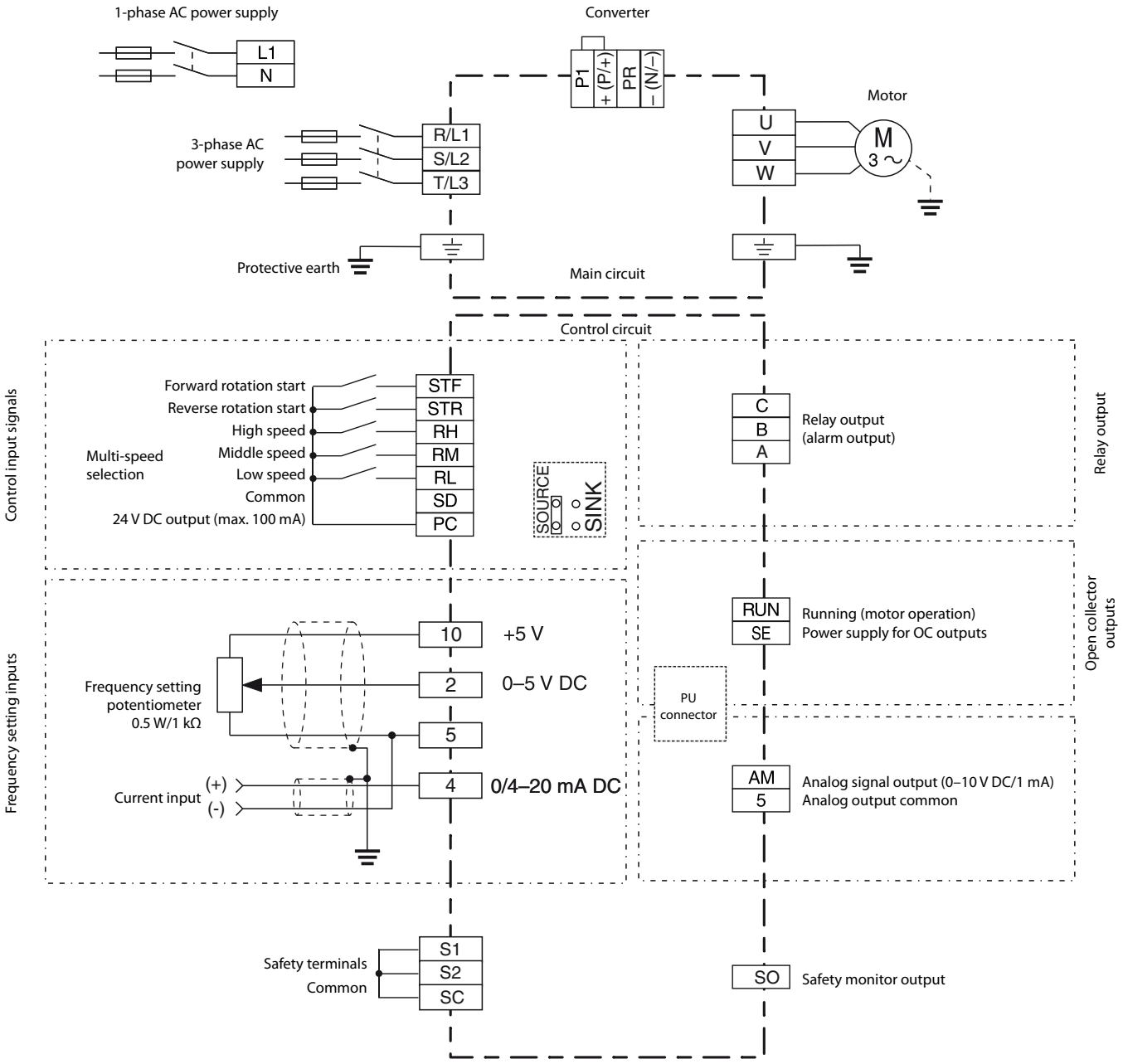
Product line				FR-D720S-□-SC-EC						FR-D740-□-SC-EC						
				008	014	025	042	070	100	012	022	036	050	080	120	160
Output	Rated motor capacity ①		kW	0.1	0.2	0.4	0.75	1.5	2.2	0.4 (0.55)	0.75 (1.1)	1.5 (2.2)	2.2 (3)	3.7 (4)	5.5 (7.5)	7.5 (11)
	Rated output capacity ②		kVA	0.3	0.5	1.0	1.6	2.8	3.8	1.2	2.0	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												
	Frequency range		Hz	0.2–400												
	Control method			V/f control, optimum excitation control or general-purpose magnetic flux vector control												
	Modulation control			Sine evaluated PWM, soft PWM												
	Brake transistor			—		Built-in										
	Maximum brake torque	Regenerative ⑥		150 %		100 %		50 %	20 %	100 %		50 %	20 %			
		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	PWM switching frequency			0.7–14.5 kHz, user adjustable												
	Frequency resolution	Analog		0.06 Hz/0–50 Hz (terminal 2, 4: 0–10 V/10 Bit) 0.12 Hz/0–50 Hz (terminal 2, 4: 0–5 V/9 Bit) 0.06 Hz/0–50 Hz (terminal 4: 0–20 mA/10 Bit)												
		Digital		0.01 Hz												
	Frequency precision			±1 % of max. output frequency (temperature range 25 °C ±10 °C) during analog input; ±0.01 % of max. output frequency during digital input (set via Digital Dial)												
	Voltage/frequency characteristics			Base frequency adjustable from 0 to 400 Hz Constant torque/variable torque pattern can be selected												
	Possible starting torque			≥150 %/1 Hz (for vector control oder slip compensation)												
	Torque boost			Manual torque boost												
	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)												
	Current stall prevention operation level			Operation current level setting 0–200 %, user adjustable												
	Motor protection			Electronic motor protection relay (rated current user adjustable)												

Remarks:
Explanation for ① to ⑦ see next page.

Product line			FR-D720S-☐-SC-EC						FR-D740-☐-SC-EC						
			008	014	025	042	070	100	012	022	036	050	080	120	160
Control signals for operation	Frequency setting signal	Analog input	Terminal 2: 0–5 V DC, 0–10 V DC Terminal 4: 0–5 V DC, 0–10 V DC, 0/4–20 mA												
		Digital input	Entered from operation panel or parameter unit. Frequency setting increment is selectable.												
	Operation functions		Maximum/minimum frequency setting, frequency jump operation, external thermal relay input selection, automatic restart after instantaneous power failure operation, forward/reverse rotation prevention, remote setting, second function, multi-speed operation, regeneration avoidance, slip compensation, operation mode selection, offline auto tuning function, PID control, computer link operation (RS485), optimum excitation control, power failure stop, speed smoothing control, Modbus®-RTU												
Control signals for operation	Input signals		Any of 5 signals can be selected using parameters 178 to 182 (input terminal function selection): multi-speed selection, remote setting, second function selection, terminal 4 input selection, JOG operation selection, PID control valid terminal, external thermal input, PU-external operation switchover, V/f switchover, output stop, start self-holding selection, traverse function selection, forward rotation, reverse rotation command, inverter reset, PU-NET operation switchover, external-NET operation switchover, command source switchover, inverter operation enable signal, and PU operation external interlock												
	Output signals	Operating status	Can be selected using parameters 190 and 192 (output terminal function selection): inverter operation, up-to-frequency, overload alarm, output frequency detection, regenerative brake prealarm, electronic thermal relay function prealarm, inverter operation ready, output current detection, zero current detection, PID lower limit, PID upper limit, PID forward/reverse rotation output, fan alarm ⑦, heatsink overheat pre-alarm, deceleration at an instantaneous power failure, PID control activated, safety monitor output, safety monitor output 2, during retry, life alarm, fault output 3, current average value monitor, maintenance timer alarm, remote output, alarm output, fault output												
		Analog signal	0–10 V DC												
Display option	Displays on operation panel or parameter unit (FR-PU07)	Operating status	Output frequency, motor current (steady), output voltage, frequency setting, cumulative energization time, actual operation time, converter output voltage, regenerative brake duty, electronic thermal relay function load factor, output current peak value, converter output voltage peak value, motor load factor, PID set point, PID measured value, PID deviation, inverter I/O terminal monitor, output power, cumulative power, motor thermal load factor, inverter thermal load factor, PTC thermistor resistance.												
		Alarm display	Fault definition is displayed when the fault occurs and the past 8 fault definitions (output voltage/current/frequency/cumulative energization time right before the fault occurs) are stored.												
	Additional displays on parameter unit FR-PU07	Operating status	Not used												
		Interactive guidance	Interactive guide for operation and troubleshooting via help function												
Protection	Functions		Overcurrent during acceleration, overcurrent during constant speed, overcurrent during deceleration, overvoltage during acceleration, overvoltage during constant speed, overvoltage during deceleration, inverter protection thermal operation, motor protection thermal operation, heatsink overheat, input phase failure ⑦, output side earth (ground) fault overcurrent at start ⑨, output phase failure, external thermal relay operation ⑨, PTC thermistor operation ⑨, parameter error, PU disconnection, retry count excess ⑧, CPU fault, brake transistor alarm, inrush resistance overheat, analog input error, stall prevention operation, output current detection value exceeded, safety circuit fault, PLd/SIL2, fan alarm ⑦, overcurrent stall prevention, overvoltage stall prevention, PU stop, parameter write error, regenerative brake prealarm, electronic thermal relay function prealarm, maintenance output, undervoltage, operation panel lock, password locked, inverter reset, safety torque off												
	Protective structure		IP20												
Others	Cooling		Self cooling				Fan cooling		Self cooling		Fan cooling				
	Surrounding air temperature		-10 °C to +50 °C												
	Storage temperature ⑪		-20 °C to +65 °C												
	Power loss	W	14	20	32	50	80	110	40	55	90	100	180	240	280
	Weight	kg	0.5	0.6	0.9	1.1	1.5	1.9	1.2	1.2	1.3	1.4	1.5	3.1	3.1
	Dimensions (WxHxD)	mm	68x128x80.5		68x128 x142.5	68x128 x162.5	108x128 x155	140x150 x145	108x128x129.5		108x128 x135.5	108x128 x155.5	108x128 x165.5	220x150x155	
Order information		Art. no.	247595	247596	247597	247598	247599	247600	247601	247602	247603	247604	247605	247606	247607

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 √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 resisitor 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).
⑧ FR-D720S-070SC or above, FR-D740-036SC or above.
⑨ This protective function is available with the three-phase power input specification model only.
⑩ This protective function does not function in the initial status.
⑪ Temperature applicable for a short time, e. g. in transit.
For overseas types refer to page 136

Block diagram FR-D700 SC



Assignment of signal terminals

Function	Terminal	Designation	
Control connection	STF	Forward rotation start	The motor rotates forward, if a signal is applied to terminal STF. If the signals STF and STR are applied simultaneously, the STOP command is given.
	STR	Reverse rotation start	The motor rotates reverse, if a signal is applied to terminal STR. If the signals STF and STR are applied simultaneously, the STOP command is given.
	RH, RM, RL	Multi-speed selection	Preset of 15 different output frequencies; programmable.
Common	SD	Contact input common (sink) 24 V DC power supply common	A determined control function is activated, if the corresponding terminal is connected to the terminal SD (sink logic). The SD terminal is isolated from the digital circuits via optocouplers. When connecting the transistor output (open collector output), such as a programmable controller (PLC), connect the negative external power supply for transistor output to this terminal to prevent a malfunction caused by undesirable currents. When source logic has been selected, connect this terminal with 0 V of the external power supply.
	PC	Contact input common (source) 24 V DC power supply	24 V DC/0.1 A output In sink logic, when activated by open collector transistors (e. g. PLC) the positive pole of an external power supply has to be connected to the PC terminal. In source logic, the PC terminal serves as common reference point for the control inputs.
Setting value specification	10	Voltage output for potentiometer	Output voltage 5 V DC. Max. output current 10 mA Recommended potentiometer: 1 kΩ, 0.5 W linear (multi-turn potentiometer)
	2	Input for frequency setting value signal	The voltage setting value 0–5 (10) V is applied to this terminal. The voltage range is preset to 0–5 V. The input resistance is 10 kΩ ±1kΩ. The maximum permitted voltage is 20 V DC.
	5	Reference point for frequency setting value signal	Terminal 5 is the reference point for all analog setting values and for the analog output signal AM. The terminal is isolated from the reference potential of the control circuit and should not be earthed for reasons of noise immunity.
	4	Input for current setting value signal	Inputting 4–20 mA DC (or 0–5 V, 0–10 V) provides the maximum output frequency at 20 mA and makes input and output proportional. This input signal is valid only when the AU signal is on (terminal 2 input is invalid). Use Pr. 267 to switch from among input 4 to 20 mA (initial setting), 0–5 V DC and 0–10 V DC. Set the voltage/current input switch in the "V" position to select voltage input (0–5 V/0–10 V).
Signal outputs	A, B, C	Relay output (alarm output)	The alarm is output via relay contacts (C-B = normally open, C-A = normally closed). The maximum contact load is 230 V AC/0.3 A or 30 V DC/0.3 A.
	RUN	Signal output for motor operation	Switched low (voltage of terminal SE is output) when the inverter output frequency is equal to or higher than the starting frequency (initial value 0.5 Hz). Switched high during stop or DC injection brake operation. (Low indicates that the open collector output transistor is on (conducts). High indicates that the transistor is off (does not conduct).) Permissible load 24 V DC (maximum 27 V DC)/0.1 A (a voltage drop is 3.4 V maximum when the signal is on).
	SE	Reference potential for signal outputs	Reference potential for the signal RUN. This terminal is isolated from the reference potential of the control circuit 5 and SD.
	AM	Analog voltage output	Select one e. g. output frequency from monitor items. Not output during inverter reset. The output signal is proportional to the magnitude of the corresponding monitoring item. Output item (initial setting): output frequency Output signal 0–10 V DC. Permissible load current 1 mA (load impedance 10 kΩ or more), resolution 8 bit
Interface	—	PU connector (RS485)	Communications via RS485
Safety connection	S1, S2	Safety inputs	When the safety functions are not used, the existing jumpers between the terminals S1-SC and S2-SC must not be removed, otherwise an operation of the frequency inverter is not possible.
	SC	Reference potential for safety inputs	
	SO	Safety monitor output	

Assignment of main circuit terminals

Function	Terminal	Designation	Description
Main circuit connection	L1, N	Power supply 1-phase	Connect to the commercial power supply. Keep these terminals open when using the Harmonic Converter (FR-HC) or power regeneration common converter (FR-CV).
	R/L1, S/L2, T/L3	Power supply 3-phase	
	+ (P/+), – (N/–)	External brake unit connection	Connect the brake unit (FR-BU2), power regeneration common converter (FR-CV) or the Harmonic Converter (FR-HC) to the terminals + (P/+) and – (N/–).
	+ (P/+), P1	DC choke connection	An optional DC choke can be connected to the terminals P1 and + (P/+). Before connecting the DC choke, disconnect the jumper from terminals P1 and + (P/+).
	+ (P/+), PR	External brake resistor connection	Connect a brake transistor (FR-ABR, MRS) across terminals + (P/+) and PR. (The brake resistor can not be connected to the FR-D720S-008 and 014.)
	U, V, W	Motor connection	Voltage output of the inverter (3-phase, 0 V up to input voltage, 0.2–400 Hz)
	⏚	PE	Protective earth connection of inverter

The FR-E800 series

Various applications are supported.
For the three-phase input model, two rating types of different rated current and permissible load can be selected by setting parameters.
The choice of inverters is widened for intended applications of users. When users select the LD rating for light duty applications, inverters with smaller capacities can be used as compared to the FR-E700 series inverters. For example, when the LD rating (light duty) is selected for a 22K inverter, the inverter can drive a motor with a capacity up to 30 kW.

It is possible to reduce line noise by shortening the wiring length between the inverter and the motor.

Switching between control methods with the FR-E800 inverter, Vector control for lift application (with the plug-in option), Advanced magnetic flux vector control for conveyors, etc., reduces the number of required spare inverters. PM sensorless vector control is available when inverters are used with PM motors.

High-level control such as positioning control is enabled without using an encoder (to be supported).

FR-E800-E/SCE

Ethernet models and safety communication models support various open industrial networks such as CC-Link IE TSN, EtherNet IP, and Modbus® TCP. This will contribute to productivity improvement and energy saving at facilities including infrastructure such as air conditioning units and water treatment facilities.

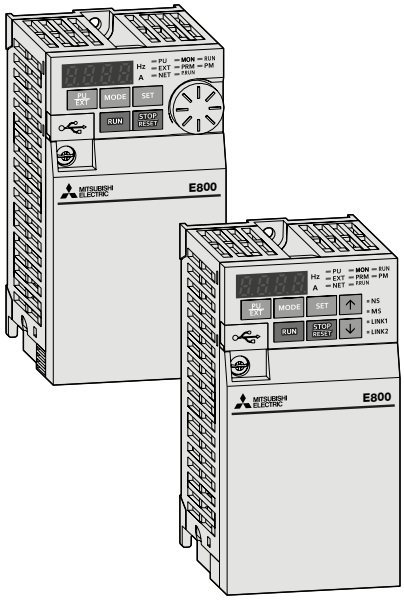
Two Ethernet ports are provided as standard, enabling flexible connection in line topology without using a switching hub.

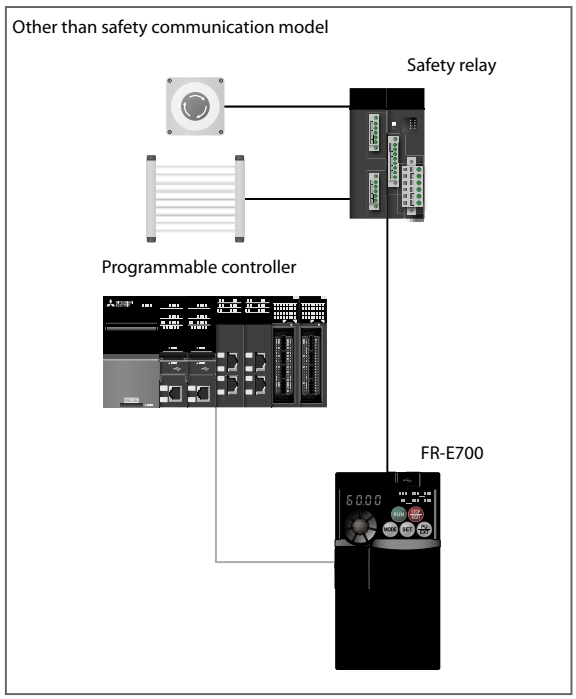
(A compatible master module is required for ring topology. For Profinet, only line topology and star topology are supported.)

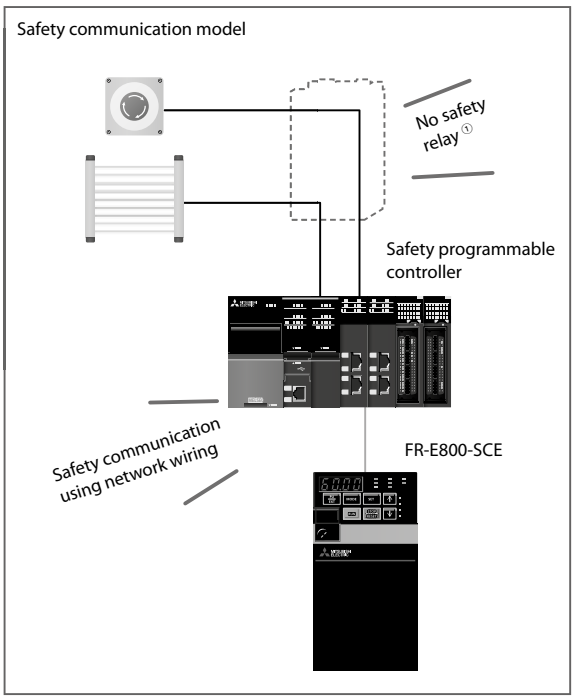
Complex networks can be created just by connecting devices with a cable to a free port.

The network can even accommodate changes in the specifications of devices.

Safety communication models support Ethernet-based safety communication protocols certified as compliant with international standards. The safety control system on the existing network can be easily enhanced with less cost.







① By using a safety programmable controller, safety control and safety communication functions of the safety relay are integrated into the control system.

Technical details FR-E820S-□

Product line					FR-E820S-□/-4/-EPA /EPB /-SCEPA /SCEPB					
					0008	0015	0030	0050	0080	0110
Output	Rated motor capacity ①	kW	200 % overload capacity (ND)		0.1	0.2	0.4	0.75	1.5	2.2
	Rated output capacity ②	kVA	200 % overload capacity (ND)		0.3	0.6	1.2	2.0	3.2	4.4
	Rated current ③	A	200 % overload capacity (ND)	I rated	0.8 (0.8)	1.5 (1.4)	3.0 (2.5)	5.0 (4.1)	8.0 (7.0)	11.0 (10.0)
				I max. 60 s	1.2 (1.2)	2.3 (2.1)	4.5 (3.8)	7.5 (6.2)	12.0 (10.5)	16.5 (15)
				I max. 3 s	1.6 (1.6)	3.0 (2.8)	6.0 (5.0)	10.0 (8.2)	16.0 (14.0)	22.0 (20.0)
	Overload capacity ④	ND			150 % of rated motor capacity for 60 s; 200 % for 3 s (max. ambient temperature 50 °C) – inverse time characteristics					
	Voltage ⑤				3-phase AC, 200 to 240 V					
	Frequency range			Hz	0.2–590					
	Control method				V/f control, general-purpose magnetic flux vector, advanced magnetic flux vector, real sensorless vector (RSV) or PM sensorless vector control					
	Modulation control				Sine evaluated PWM, soft PWM					
	Brake transistor				—		Built-in			
	Maximum brake torque		Regenerative ⑥		150 %		100 %		50 %	20 %
Input	Power supply voltage				1-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 current ⑦	A	ND		2.3	4.1	7.9	11.2	17.9	25.0
	Power supply capacity ⑧	kVA	ND		0.5	0.9	1.7	2.5	3.9	5.5
Others	Cooling				Self cooling				Fan cooling	
	Surrounding air temperature				-20° C to +60° C (The rated current must be reduced at a temperature above 50° C.)					
	Storage temperature				-40° C to +70° C					
	Power loss		ND	W	12	18	33	50	81	96
	Weight			kg	0.5		0.8	1.3	1.4	1.9
	Dimensions (WxHxD)			mm	68x128x80.5		68x128x142.5	108x128x135	108x128x161	140x128x142.5

Order information	Art. no.						
		-4	504746	504747	504748	504749	504750	504751
		-EPA	523663	523664	523665	523666	523667	523668
		-EPB	504752	504753	504754	504755	504756	504757
		-SCEPA	577176	577177	577178	577179	577180	577181
		-SCEPB	504758	504759	504760	504761	504762	504763

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 230 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. For single-phase power input model, the bus voltage decreases to power failure detection level and the load of 100 % or higher may not be available if the automatic restart after instantaneous power failure function (Pr.57) or the power failure stop function (Pr.261) is set and power supply voltage is low while the load increases.
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√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 resisitor cannot be used for FR-E820S-0008 and FR-E820S-0015.)
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 reactor and cables) affects the rated input current.
⑧ The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input choke and cables).

Technical details FR-E820-□

Product line				FR-E820-□/-4/-EPA /EPB /-SCEPA /SCEPB								
				0008	0015	0030	0050	0080	0110	0175	0240	0330
Output	Rated motor capacity ① kW	150 % overload capacity (LD)		0.2	0.4	0.75	1.1	2.2	3.0	5.5	7.5	11
		200 % overload capacity (ND)		0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5
	Rated output capacity ② kVA	150 % overload capacity (LD)		0.5	0.8	1.4	2.4	3.8	4.8	7.8	12.0	15.9
		200 % overload capacity (ND)		0.3	0.6	1.2	2.0	3.2	4.4	7.0	9.6	13.1
	Rated current ③ A	150 % overload capacity (LD)	I rated	1.3 (1.1)	2.0 (1.7)	3.5 (3.0)	6.0 (5.1)	9.6 (8.2)	12.0 (10.2)	19.6 (16.7)	30.0 (25.5)	40.0 (34.0)
			I max. 60 s	1.6 (1.3)	2.4 (2.0)	4.2 (3.6)	7.2 (6.1)	11.5 (9.8)	14.4 (12.2)	23.5 (20.0)	36.0 (30.6)	48.0 (40.8)
			I max. 3 s	2.0 (1.7)	3.0 (2.6)	5.3 (4.5)	9.0 (7.7)	14.4 (12.3)	18.0 (15.3)	29.4 (25.1)	45.0 (38.3)	60.0 (51)
		200 % overload capacity (ND)	I rated	0.8 (0.8)	1.5 (1.4)	3.0 (2.5)	5.0 (4.1)	8.0 (7.0)	11.0 (10.0)	17.5 (16.5)	24.0 (23.0)	33.0 (31.0)
			I max. 60 s	1.2 (1.2)	2.3 (2.1)	4.5 (3.8)	7.5 (6.2)	12.0 (10.5)	16.5 (15)	26.3 (24.8)	36.0 (34.5)	49.5 (46.5)
			I max. 3 s	1.6 (1.6)	3.0 (2.8)	6.0 (5.0)	10.0 (8.2)	16.0 (14.0)	22.0 (20.0)	35.0 (33.0)	48.0 (46.0)	66.0 (62.0)
	Overload capacity ④	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								
	Voltage ⑤			3-phase AC, 200 to 240 V								
	Frequency range		Hz	0.2–590								
	Control method			V/f control, general-purpose magnetic flux vector, advanced magnetic flux vector, real sensorless vector (RSV) or PM sensorless vector control								
	Modulation control			Sine evaluated PWM, soft PWM								
	Brake transistor			—		Built-in						
	Maximum brake torque	Regenerative ⑥		150 %		100 %		50 %	20 %			
Input	Power supply voltage			3-phase, 200–240 V AC, -15 %/+10 % (283 to 339 V DC ⑨)								
	Voltage range			170–264 V AC at 50/60 Hz (240 to 373 V DC ⑨)								
	Power supply frequency			50/60 Hz ±5 %								
	Rated input current ⑦ A	LD		1.9	3.0	5.1	8.2	13.0	16.0	26.0	37.0	49.0
		ND		1.4	2.3	4.5	7.0	11.0	15.0	23.0	30.0	41.0
	Power supply capacity ⑧ kVA	LD		0.7	1.1	1.9	3.1	4.8	6.2	9.7	14.0	19.0
		ND		0.5	0.9	1.7	2.7	4.1	5.7	8.8	12.0	16.0
Others	Cooling			Self cooling				Fan cooling				
	Surrounding air temperature			-20° C to +60° C (The rated current must be reduced at a temperature above 50° C.)								
	Storage temperature			-40° C to +70° C								
	Power loss	LD	W	17	22	36	62	92	108	178	252	318
		ND		12	17	30	49	75	92	154	192	250
	Weight		kg	0.5		0.7	1.0	1.4		1.8	3.3	
	Dimensions (WxHxD)		mm	68x128x80.5		68x128x112.5	68x128x132.5	108x128x135.5		140x128x142.5	180x260x165	

Order information	Art. no.									
		-4	500101	500102	500103	500104	500105	500106	500107	500108	500109
		-EPA	500119	500120	500121	500172	500173	500174	500175	500176	500177
		-EPB	500178	500179	500180	500181	500182	500183	500184	500185	500186
		-SCEPA	577182	577183	577184	577185	577186	577187	577188	577189	577190
		-SCEPB	584369	584370	584371	584462	584463	584464	584465	584466	584467

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 √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.

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 reactor and cables) affects the rated input current.

⑧ The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input choke and cables).

⑨ - Connect the DC power supply to the inverter terminals P/+ and N/-. Connect the positive terminal of the power supply to terminal P/+ and the negative terminal to terminal N/-.
- When the energy is regenerated from the motor, the voltage between terminals P/+ and N/- may temporarily rise to 415 V (200 V class) or 830 V (400 V class) or more. Use a DC power supply resistant to the regenerative voltage/energy. When a power supply that cannot resist the regenerative voltage/energy is used, connect a reverse current prevention diode in series.
- Powering ON produces up to four times as large current as the inverter rated current. Prepare a DC power supply resistant to the inrush current at power ON, although an inrush current limit circuit is provided in the FR-E800 series inverter.
- The power capacity depends on the output impedance of the power supply. Select a power capacity around the AC power supply capacity.

Technical details FR-E840-□ and FR-E860-□

Product line				FR-E840-□/-4/-EPA /EPB /-SCEPA /SCEPB							FR-E860-□/-5/-EPA /EPB /-SCEPA					
				0016	0026	0040	0060	0095	0120	0170	0017	0027	0040	0061	0090	0120
Output	Rated motor capacity ① kW	150 % overload capacity (LD)		0.75	1.5	2.2	3.0	5.5	7.5	11.0	1.5	2.2	3.7	5.5	7.5	11.0
		200 % overload capacity (ND)		0.4	0.75	1.5	2.2	3.7	5.5	7.5	0.75	1.5	2.2	3.7	5.5	7.5
	Rated output capacity ② kVA	150 % overload capacity (LD)		1.6	2.7	4.2	5.3	8.5	13.3	17.5	2.5	3.6	5.6	8.2	11.0	15.9
		200 % overload capacity (ND)		1.2	2.0	3.0	4.6	7.2	9.1	13.0	1.7	2.7	4.0	6.1	9.0	12.0
	Rated current ③ A	150 % overload capacity (LD)	I rated	2.1 (1.8)	3.5 (3.0)	5.5 (4.7)	6.9 (5.9)	11.1 (9.4)	17.5 (14.9)	23.0 (19.6)	2.5 (2.1)	3.6 (3.0)	5.6 (4.8)	8.2 (7.0)	11.0 (9.0)	16.0 (13.6)
			I max. 60 s	2.5 (2.2)	4.2 (3.6)	6.6 (5.6)	8.3 (7.1)	13.3 (11.3)	21.0 (17.9)	27.6 (23.5)	3 (2,5)	4,3 (3,6)	6,7 (5,8)	9,8 (8,4)	13,2 (10,8)	19,2 (16,3)
			I max. 3 s	3.2 (2.7)	5.3 (4.5)	8.3 (7.1)	10.4 (8.9)	16.7 (14.1)	26,3 (22.4)	34.5 (29.4)	3,8 (3,2)	5,4 (4,5)	8,4 (7,2)	12,3 (10,5)	16,5 (13,5)	24 (20,4)
		200 % overload capacity (ND)	I rated	1.6 (1.4)	2.6 (2.2)	4.0 (3.8)	6.0 (5.4)	9.5 (8.7)	12.0	17.0	1.7	2.7	4.0	6.1	9.0	12.0
			I max. 60 s	2.4 (2.1)	3.9 (3.3)	6.0 (5.7)	9.0 (8.1)	14.3 (13.1)	18.0	25.5	2,6	4,1	6	9,2	13,5	18
			I max. 3 s	3.2 (2.8)	5.2 (4.4)	8.0 (7.6)	12.0 (10.8)	19.0 (17.4)	24.0	34.0	3,4	5,4	8	12,2	18	24
	Overload capacity ④	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												
	Voltage ⑤			3-phase AC, 380 to 480 V							3-phase AC, 525 to 600 V					
	Frequency range		Hz	0.2–590												
	Control method			V/f control, general-purpose magnetic flux vector, advanced magnetic flux vector, real sensorless vector (RSV) or PM sensorless vector control												
	Modulation control			Sine evaluated PWM, soft PWM												
	Brake transistor			Built-in												
	Maximum brake torque	Regenerative ⑥		100 %		50 %	20 %				100%	50%	20%			
Input	Power supply voltage			3-phase, 380–480 V AC, -15 %/+10 % (537 to 679 V DC ⑨)							3-phase, 575 V AC, –15 %/+10 %					
	Voltage range			323–528 V AC at 50/60 Hz (457 to 740 V DC ⑨)							490 to 632 V AC at 60 Hz					
	Power supply frequency			50/60 Hz ±5 %							60 Hz ± 5 %					
	Rated input current ⑦ A	LD		3.3	6.0	8.9	11.0	16.0	25.0	32.0	4.3	5.9	8.9	12.0	16.0	22.0
		ND		2.7	4.4	6.7	9.5	14.0	18.0	25.0	3.0	4.6	6.6	10.0	13.0	17.0
	Power supply capacity ⑧ kVA	LD		2.5	4.5	6.8	8.2	12.0	19.0	25.0	4.3	5.9	8.9	12.0	16.0	22.0
		ND		2.1	3.4	5.1	7.2	11.0	14.0	19.0	3.0	4.6	6.6	9.5	13.0	17.0
Others	Cooling			Self cooling		Fan cooling					Self cooling	Fan cooling				
	Surrounding air temperature			-20° C to +60° C (The rated current must be reduced at a temperature above 50° C.)												
	Storage temperature			-40° C to +70° C												
	Power loss	LD	W	34	56	85	89	137	224	300	40	49	72	104	129	179
		ND		26	39	59	76	113	137	198	33	39	53	77	104	128
	Weight		kg	1.2		1.4	1.8		2.4		1.9			2.4		
	Dimensions (WxHxD)		mm	108x128x129.5		108x128 x135	140x150x135		220x150x147		140x150x135			220x150x147		

Order information	Art. no.															
		-4	500110	500111	500112	500113	500114	500115	500116	—	—	—	—	—	—
		-5	—	—	—	—	—	—	—	573446	573447	573448	573449	573450	573451
		-EPA	500187	500188	500189	500190	500191	500192	500193	573428	573429	573430	573431	573432	573433
		-EPB	500194	500195	500196	500197	500198	500199	500100	573440	573441	573442	573443	573444	573445
		-SCEPA	577191	577192	577193	577194	577195	577196	577197	573434	573435	573436	573437	573438	573439
		-SCEPB	504764	504765	504766	504767	504768	504769	504770	—	—	—	—	—	—

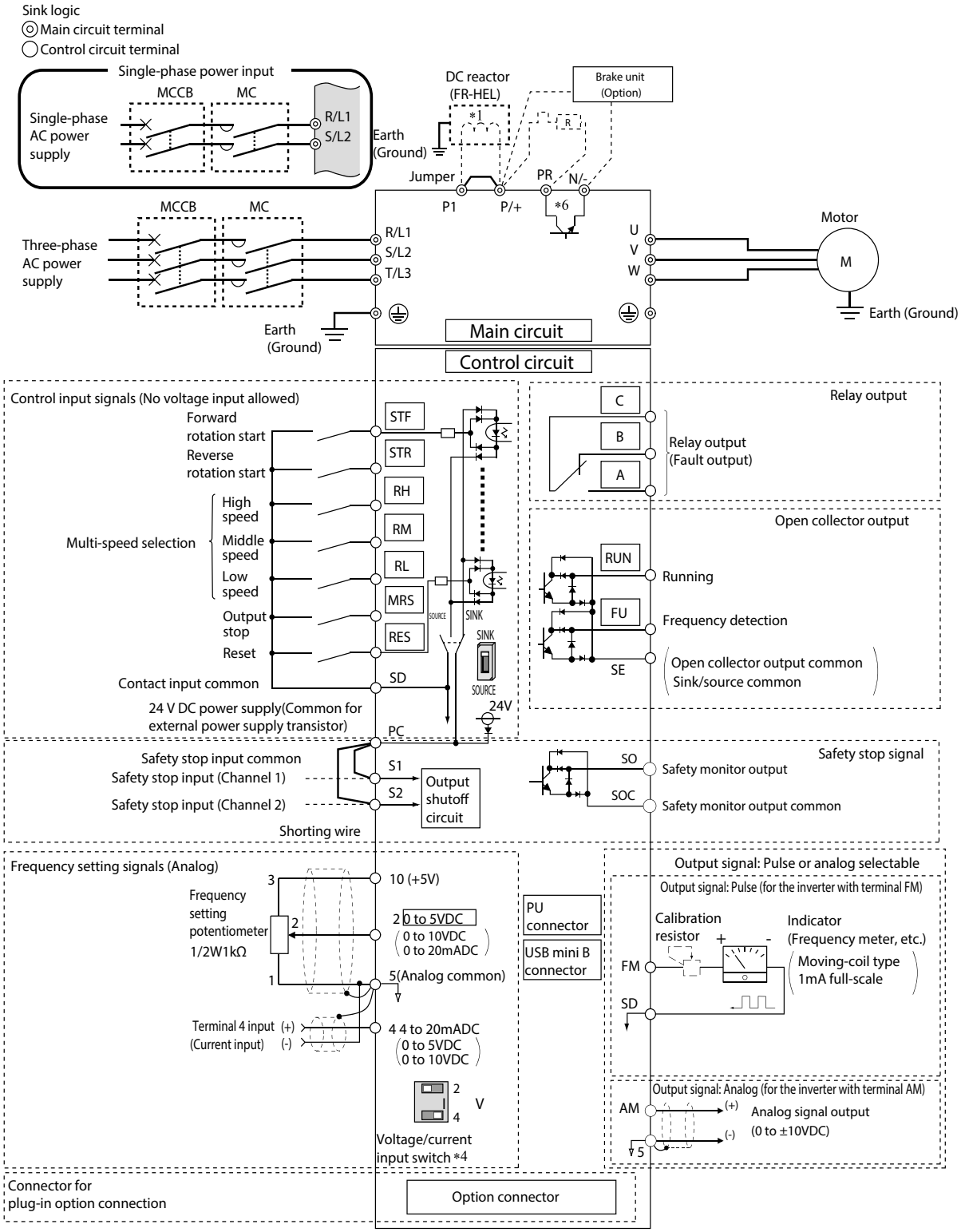
Remarks:
① The applied motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi Electric 4-pole standard motor.
② The specifications of the rated output capacity are related to a motor voltage of 440 V.
③ Setting 2 kHz or more in Pr. 72 PWM frequency selection to perform 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 √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.
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 reactor and cables) affects the rated input current.
⑧ The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input choke and cables).
⑨ - Connect the DC power supply to the inverter terminals P/+ and N/-. Connect the positive terminal of the power supply to terminal P/+ and the negative terminal to terminal N/-.
- When the energy is regenerated from the motor, the voltage between terminals P/+ and N/- may temporarily rise to 415 V (200 V class) or 830 V (400 V class) or more. Use a DC power supply resistant to the regenerative voltage/energy. When a power supply that cannot resist the regenerative voltage/energy is used, connect a reverse current prevention diode in series.
- Powering ON produces up to four times as large current as the inverter rated current. Prepare a DC power supply resistant to the inrush current at power ON, although an inrush current limit circuit is provided in the FR-E800 series inverter.
- The power capacity depends on the output impedance of the power supply. Select a power capacity around the AC power supply capacity.

Common specifications FR-E800

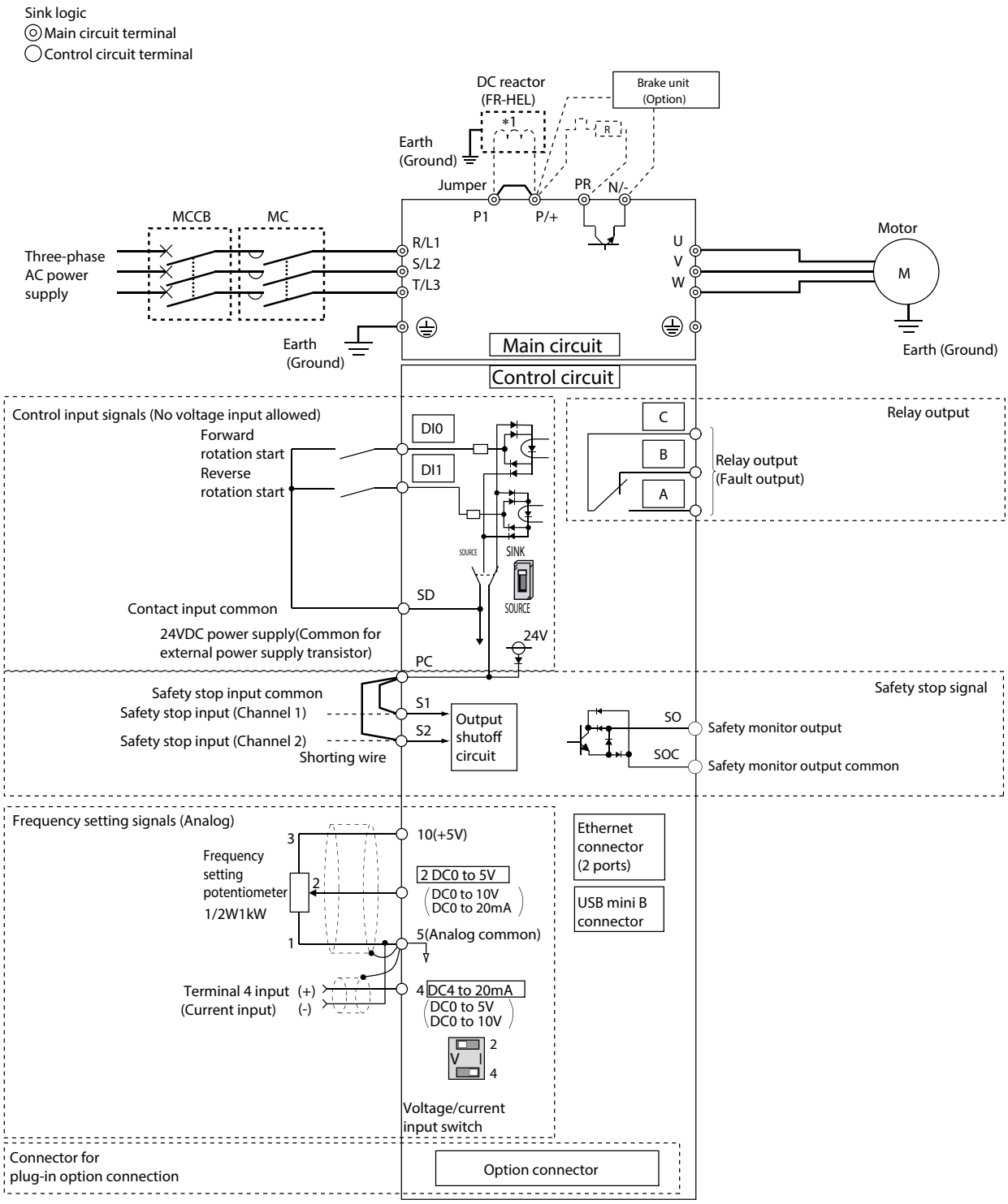
Product line			FR-E820S-□/-E/-SCE									FR-E840-□/-E/-SCE						
			0008	0015	0030	0050	0080	0110	0175	0240	0330	0016	0026	0040	0060	0095	0120	0170
Control	Carrier frequency		0.7–14.5 kHz (user adjustable)															
	Frequency resolution	Analog	0.015 Hz/0–50 Hz (terminal 2, 4: 0–10 V/12 bit) 0.03 Hz/0–50 Hz (terminal 2, 4: 0–5 V/11 bit) 0.03 Hz/0–50 Hz (terminal 2, 4: 0–20 mA/11 bit)															
		Digital	0.01 Hz															
	Frequency precision		±0.2 % of max. output frequency (temperature range 25 °C ±10 °C) during analog input; ±0.01 % of max. output frequency during digital input															
	Voltage/frequency characteristics		Base frequency adjustable from 0 to 590 Hz; Constant torque/variable torque pattern can be selected															
	Possible starting torque		200 %/0.3 Hz when advanced magnetic flux vector control is set (3.7 K or less)															
	Torque boost		Manual torque boost (induction motor only)															
	Acceleration/deceleration time		0–3600 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 %															
	Current stall prevention operation level		Response threshold 0–220 %, user adjustable															
	Motor protection		Electronic motor protection relay (rated current user adjustable)															
Control signals for operation	Frequency setting values	Analog input	Terminals 2 and 4: 0–10 V DC, 0–5 V DC, 0/4–20 mA															
		Digital input	From operation panel or parameter unit, Frequency setting increment can be set. 4 digit BCD or 16bit binary data (when the option FR-A8AX E kit is used)															
	Input signals (standard model: 7, Ethernet model: 2)		Any of 7 signals can be selected using parameters 178 to 184 (input terminal function selection): low-speed operation command, middle-speed operation command, high-speed operation command, output stop, forward rotation command, reverse rotation command, inverter reset															
	Operation functions		Maximum and minimum frequency settings, multi-speed operation, acceleration/deceleration pattern, thermal protection, DC injection brake, starting frequency, JOG operation, output stop (MRS), stall prevention, regeneration avoidance, frequency jump, rotation display, automatic restart after instantaneous power failure, remote setting, automatic acceleration/deceleration, retry function, carrier frequency selection, fast-response current limit, forward/reverse rotation prevention, operation mode selection, slip compensation, droop control, speed smoothing control, traverse, auto tuning, applied motor selection, RS485 communication ②, Ethernet communication ③, PID control, easy dancer control, cooling fan operation selection, stop selection (deceleration stop/coasting), power failure time deceleration-to-stop function, stop-on-contact control, PLC function, life diagnosis, maintenance timer, current average monitor, multiple rating, speed control, torque control, pre-excitation, torque limit, safety stop function															
	Output signals	Open collector output (standard model: two terminals) Relay output (one terminal)	Can be selected using parameters 190 to 192 (output terminal function selection): Inverter running, up to frequency, fault															
		Pulse train output (FM type inverter)	1440 pulses/s at full scale, 2400 pulses/s at maximum.															
		Analog output (AM type inverter)	-10–+10 V DC/12 bits															
Protection	Functions	Protective functions	Overcurrent trip during acceleration, overcurrent trip during constant speed, overcurrent trip during deceleration or stop, regenerative overvoltage trip during acceleration, regenerative overvoltage during constant speed, regenerative overvoltage trip during deceleration or stop, inverter overload trip (electronic thermal relay function), motor overload trip (electronic thermal relay function), heat sink overheat, undervoltage, input phase loss ④, stall prevention stop, loss of synchronism detection ⑤, upper limit fault detection, lower limit fault detection, brake transistor fault, output earth (ground) fault overcurrent, output short circuit, output phase loss, external thermal relay operation, option fault, communication option fault, parameter storage device fault, PU disconnection, retry count excess, CPU fault, abnormal output current detection, inrush current circuit fault, USB communication fault, analog input fault, safety circuit fault, overspeed occurrence ⑤, speed deviation excess detection ①⑤, signal loss detection ①⑤, brake sequence fault ⑤, PID signal fault, Ethernet communication fault, opposite rotation deceleration fault ⑤, internal circuit fault, user definition error by the PLC function, Board combination fault															
		Warning functions	Fan alarm, stall prevention (overcurrent), stall prevention (overvoltage), regenerative brake prealarm ⑤, electronic thermal relay function pre-alarm, PU stop, maintenance timer alarm, parameter write error, operation panel lock ⑤, password locked, speed limit indication, safety stop, Ethernet communication fault ③, duplicate IP address ③, IP address fault ③, incorrect parameter setting															
	Protection rating		IP20															

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 230 V (200 V class) or 440 V (400 V class).
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 √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-E820-0008/-E/-SCE and FR-E820-0015/-E/-SCE.)
⑦ The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input choke and cables).

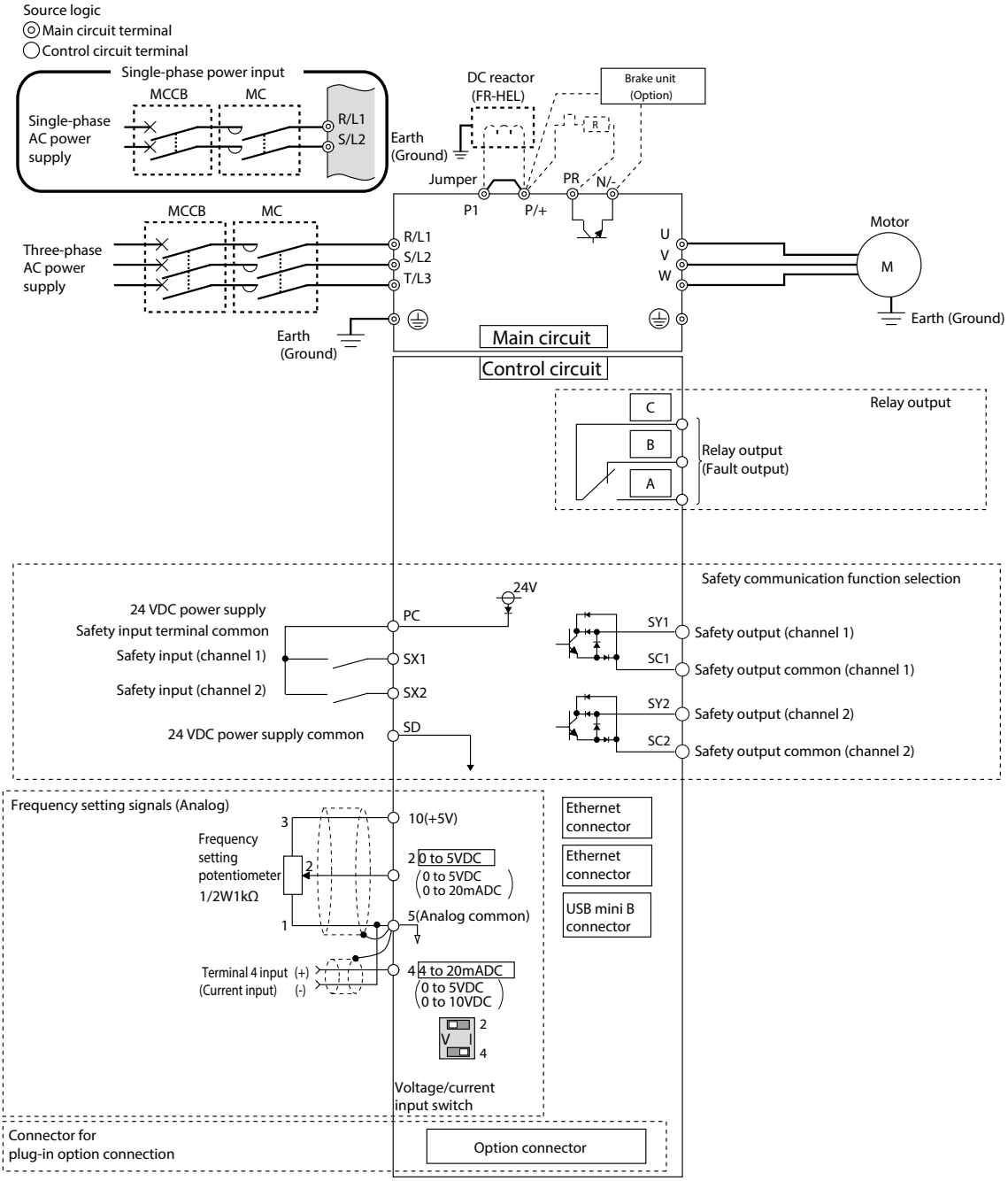
Block Diagram FR-E800



Block Diagram FR-E800-E



Block Diagram FR-E800-SCE



Assignment of signal terminals

Function	Terminal	FR-E800	FR-E800-E	FR-E800-SCE	Designation	Description
Control connection (programmable)	STF	●			Forward rotation start	The motor rotates forward, if a signal is applied to terminal STF.
	STR	●			Reverse rotation start	The motor rotates reverse, if a signal is applied to terminal STR.
	DI0		●		Forward rotation start	The motor rotates forward, if a signal is applied to terminal DI0.
	DI1		●		Reverse rotation start	The motor rotates reverse, if a signal is applied to terminal DI1.
	RH, RM, RL	●			Multi-speed selection	Preset of 15 different output frequencies according to the combination of the RH, RM and RL signals.
	RT				Second parameter settings	A second set of parameter settings is selected, if a signal is applied to terminal RT.
	MRS	●			Output stop	The inverter lock stops the output frequency without regard to the delay time.
	RES	●			RESET input	An activated protective circuit is reset, if a signal is applied to the terminal RES (t >0.1 s).
	SD	●	●	●	Reference potential (0 V) for the PC terminal (24 V)	Common terminal for contact input terminal (sink logic); Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the source logic to avoid malfunction by undesirable current. Common terminal for the 24 V DC power supply (terminal PC, terminal +24) Isolated from terminals 5 and SE.
	PC	●	●	●	24 V DC output	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the source logic to avoid malfunction by undesirable current. Common terminal for contact input terminal (source logic). Can be used as a 24 V DC 0.1 A power supply.
Setting value specification	10	●	●	●	Voltage output for potentiometer	Output voltage 10 V DC. Max. output current 10 mA. Recommended potentiometer: 1 kΩ, 2 W linear
						Output voltage 5 V DC. Max. output current 10 mA. Recommended potentiometer: 1 kΩ, 2 W linear
	2	●	●	●	Input for frequency setting value signal	The setting value 0–5 V DC (or 0–10 V, 0/4–20 mA) is applied to this terminal. You can switch between voltage and current setpoint values with parameter 73. The input resistance is 10 kΩ.
	5	●	●	●	Frequency setting common and analog outputs	Terminal 5 provides the common reference potential (0 V) for all analog set point values and for the analog output signals CA (current) and AM (voltage). The terminal is isolated from the digital circuit's reference potential (SD). This terminal should not be grounded.
	4	●	●	●	Input for setting value signal	The setting value 0/4–20 mA or 0–10 V is applied to this terminal. You can switch between voltage and current setpoint values with parameter 267. The input resistance is 250 Ω. The current setting value is enabled via terminal function AU.
Signal output (programmable)	A, B, C	●	●	●	Relay output (fault output)	1 changeover contact output indicates that the inverter protective function has activated and the outputs are stopped. Fault: discontinuity across B and C (continuity across A and C), Normal: continuity across B and C (discontinuity across A and C) Contact capacity: 240 VAC 2A (power factor = 0.4) or 30 VDC 1 A
	RUN	●			Signal output for motor operation	The output is switched low, if the inverter output frequency is equal to or higher than the starting frequency. The output is switched high, if no frequency is output or the DC brake is in operation.
	FU	●			Signal output for monitoring output frequency	The output is switched low once the output frequency exceeds a value preset in parameter 42 (or 43). Otherwise the FU output is switched high.
	SE	●			Reference potential for signal outputs	The potential that is switched via open collector outputs RUN, SU, OL, IPF and FU is connected to this terminal.
	CA				Analog current output	One of 18 monitoring functions can be selected, e. g. external frequency output. CA- and AM output can be used simultaneously. The functions are determined by parameters. — Output item: output frequency (initial setting), Load impedance: 200 Ω–450 Ω, output signal: 0–20 mA
	AM	●			Analog signal output 0–10 V DC (1 mA)	One of 18 monitoring functions can be selected, e. g. external frequency output. CA- and AM output can be used simultaneously. The functions are determined by parameters. — Output item: output frequency (initial setting), output signal 0–10 V DC, permissible load current 1 mA (load impedance ≥10 kΩ), resolution 8 bit
Safety connection	S1, S2	●	●		Safety inputs	When the safety functions are not used, the existing jumpers between the terminals S1-PC, S2-PC and SIC-SD must not be removed, otherwise an operation of the frequency inverter is not possible.
	S0	●	●		Safety monitor output	
	SOC	●	●		Safety monitor output common	
	SX1			●	Safety input (channel 1)	Terminal functions can be selected using Pr.S051 SX1/SX2 terminal function selection. For details, refer to the FR-E800-SCE Instruction Manual (Functional Safety).
	SX2			●	Safety input (channel 2)	
	SY1			●	Safety output (channel 1)	Terminal functions can be selected using Pr.S055 SY1/SY2 terminal function selection. For details, refer to the FR-E800-SCE Instruction Manual (Functional Safety).
	SY2			●	Safety output (channel 2)	
	SC1			●	Safety output common (channel 1)	For details, refer to the FR-E800-SCE Instruction Manual (Functional Safety).
	SC2			●	Safety output common (channel 2)	
Communication	—	●			PU connector	A parameter unit can be connected. Communications via RS485 I/O standard: RS485, multi drop operation: max 1152 baud (overall length: 500 m)
	—	●	●		USB connector	This USB interface is used to connect the inverter to a personal computer (conforms to USB1.1)
	—		●		Ethernet connector	Communication can be made via Ethernet.

Assignment of main circuit terminals

Function	Terminal	Designation	Description
Main circuit connection	R/L1, S/L2, T/L3	AC power input	Connect to the commercial power supply. Keep these terminals open when using the Harmonic Converter (FR-HC) or multifunction regeneration converter (FR-XC).
	P/+, N/–	Brake unit connection	Connect the brake unit (FR-BU2), multifunction regeneration converter (FR-XC) or Harmonic Converter (FR-HC).
	P/+, PR	Brake resistor connection	Connect a brake transistor (MRS, MYS, FR-ABR) between terminal P/+and PR. (Not available for FR-E820-0008(0.1K), FR-E820-0015(0.2K), FR-E820S-0008(0.1K), and FR-E820S-0015(0.2K).)
	P+, P1	DC choke connection	Remove the jumper across terminals P/+ and P1 and connect a DC choke. When a DC choke is not connected, the jumper across terminals P/+ and P1 should not be removed.
	U, V, W	Inverter output	Connect a three-phase Induction motor or PM motor.
	⏚	PE	Protective earth connection of inverter

The FR-F800 series

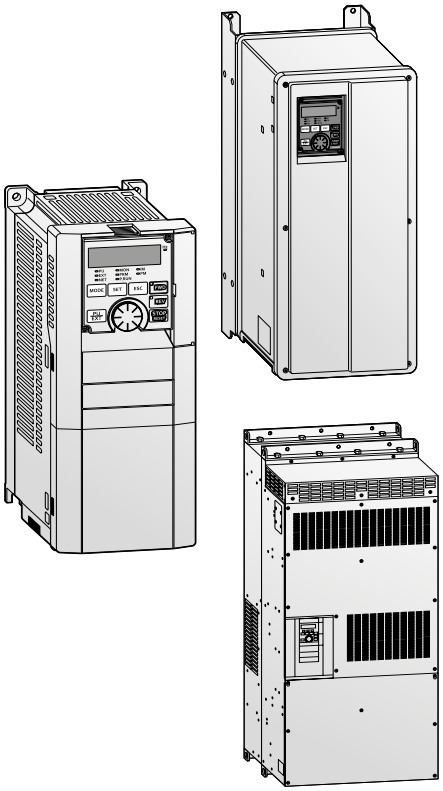
The frequency inverter FR-F800-E is optimized for applications with fans and pumps and is equipped with an integrated PLC as well as an integrated Ethernet interface with 100 MBit/s. This interface enables simple integration into an existing network and offers communication via Modbus® TCP/IP or CC-Link IE Field Basic networks as standard. Up to 3 different protocols can communicate in parallel via the built-in Ethernet interface. This also enables inverter-to-inverter communication without a master. Due to the standard Ethernet interface, the FR-F800-E frequency inverter is supplied only with one serial interface.

The FR-F842 series frequency inverters are operated with a separate converter unit (FR-CC2).

FR-F846-E

The FR-F846 series covers the wide range of features of the FR-F800, but offers additional features in comparison:

- IP55 protective structure
- Integrated C3 EMC filter
- Integrated DC choke for harmonic suppression
- High-capacity DC Bus to avoid problems with fluctuating power supply
- Integrated multilingual display for output in plain text including English, German, French, Spanish, Italian, Russian, Turkish, Polish and Japanese
- Meets the requirements according to EN 61800-3



FR-F842-E

The F842 is separated into control and power unit. FR-CC2 (converter unit) and FR-F842 (frequency inverter).

This concept enables simple installation and commissioning of cost-effective DC bus systems.

Power range:

FR-F820-E: 0,75– 110 kW, 200–240 V AC

FR-F840-E: 0,75–315 kW, 380–500 V AC

FR-F846-E: 0,75–160 kW, 380–500 V AC
(IP55 compatible model)

FR-F842-E: 355–560 kW, 380–500 V AC
(Separated converter type)

Converter unit FR-CC2-□

The converter units FR-CC2-H are diode rectifiers and enable the connection via a twelve-pulse rectifier, resulting in low harmonic content. They are used together with the FR-F842 frequency inverter. The separation of the units allows the flexible design of different systems such as parallel drives and common bus systems. This saves costs and minimizes the space required for installation.

Technical details FR-F840-00023 to -01160

Product line				FR-F840-□-E2-60/-E2-60-SCM1													
				00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160
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	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 A	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
			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
		150 % overload capacity (LD)	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 kVA	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		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													
	Voltage ③			3-phase AC, 0 V to power supply voltage													
	Frequency range			0.2–590 Hz													
	Control method			V/f control, optimum excitation control or advanced magnetic flux vector control													
	Modulation control			Sine evaluated PWM, soft PWM													
	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 kVA	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
Others	Cooling			Self cooling			Fan cooling										
	Protective structure			IP20											IP00		
	Max. heat dissipation kW	SLD ⑤		0.055	0.075	0.085	0.13	0.175	0.245	0.345	0.37	0.45	0.565	0.74	0.93	1.11	1.34
		LD		0.05	0.07	0.08	0.12	0.16	0.23	0.315	0.345	0.415	0.52	0.675	0.825	1.02	1.22
	Weight kg			2.5	2.5	2.5	3.0	3.0	6.3	6.3	8.3	8.3	15	15	23	41	41
	Dimensions (WxHxD) mm			150x260x140					220x260x170		220x300x190		250x400x190		325x550 x195	435x550x250	

Order information ⑦ Art. no.															
	Ethernet version (E2)	307171	307172	307173	307174	307215	307216	307217	307218	307219	307220	307221	—	—	—
	Input power frame	—	—	—	—	—	—	—	—	—	—	—	307162	307163	307164
	Control card (Ethernet)	—	—	—	—	—	—	—	—	—	—	—	307205	307205	307205
	Smart condition monitoring (SCM) kit	314607	314608	314609	314610	314611	314612	314613	314614	314615	314616	314617	314618	314619	314620

Remarks:
① The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
② The overload capacity in % is the ratio of the overload capacity 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^2t), 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)

Attention: Mandatory DC choke need to be ordered separately if 75 kW motor or bigger is connected to the FR-F840. Please select the mandatory choke on page 88

Technical details FR-F840-01800 to -06830

Product line				FR-F840-□-E2-60/-E2-60-SCM									
				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 s	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 s	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		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									
	Voltage ③			3-phase AC, 380–500 V to power supply voltage									
	Frequency range			0.2–590 Hz									
	Control method			V/f control, optimum excitation control or advanced magnetic flux vector control									
	Modulation control			Sine evaluated PWM, soft PWM									
	Carrier frequency			0.7–6 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 kVA	SLD ⑤		137	165	198	248	275	329	367	417	465	520
		LD		110	137	165	198	248	275	329	367	417	465
Others	Cooling			Fan cooling									
	Protective structure			IP00									
	Max. heat dissipation kW	SLD ⑤		2.0	2.52	3.15	3.6	4.05	4.65	5.3	5.85	6.65	7.55
		LD		1.64	2.1	2.575	2.8	3.6	3.8	4.65	5.1	5.85	6.6
	Frequency inverter weight		kg	37	50	57	72	72	110	110	220	220	220
	Choke weight		kg	20	22	26	28	29	30	35	38	42	46
	Dimensions (WxHxD)		mm	435x550x250	465x620x300		465x740x360		498x1010x380		680x1010x380		
Order information ⑦ Art. no.	Ethernet version (E2)			—	—	—	—	—	—	—	—	—	—
	Input power frame			307185	307186	307187	307188	307189	307190	307191	307192	307193	307194
	Control card (Ethernet)			307205	307205	307205	307205	307205	307205	307205	307205	307205	307205
	Smart condition monitoring (SCM) kit			314621	314622	314623	314624	314625	314626	314627	314628	314629	314630

Remarks:
① The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
② The overload capacity in % is the ratio of the overload capacity 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^2t), 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)

Attention: Mandatory DC choke need to be ordered separately if 75 kW motor or bigger is connected to the FR-F840. Please select the mandatory choke on page 88

Technical details FR-F842-07700 to -12120 and converter unit FR-CC2-H

The FR-F842 frequency inverters must be operated together with a FR-CC2 converter unit, which must be ordered separately.

Product line					FR-F842-□-2-60/-E2-60				
					07700	08660	09620	10940	12120
Output	Rated motor capacity ①	kW	120 % overload capacity (SLD) ⑤		400	450	500	560	630
			150 % overload capacity (LD)		355	400	450	500	560
	Rated current ⑥	A	120 % overload capacity (SLD) ⑤	I rated ⑥	770	866	962	1094	1212
				I max. 60 s	847	953	1058	1203	1333
				I max. 3 s	924	1039	1154	1313	1454
			150 % overload capacity (LD)	I rated ⑥	683	770	866	962	1094
				I max. 60 s	820	924	1039	1154	1313
				I max. 3 s	1024	1155	1299	1443	1641
	Rated output capacity [kVA]		SLD ⑤		587	660	733	834	924
			LD		521	587	660	733	834
	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				
	Voltage ③				3-phase AC, 380–500 V to power supply voltage				
	Frequency range			Hz	0.2–590 Hz				
	Control method				V/f control, optimum excitation control or advanced magnetic flux vector control				
	Modulation control				Sine evaluated PWM, soft PWM				
	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 %				
Others	Cooling				Fan cooling				
	Protective structure				IP00				
	Max. heat dissipation	kW	SLD ⑤		5.8	6.69	7.37	8.6	9.81
			LD		5.05	5.8	6.48	7.34	8.63
	Frequency inverter weight			kg	260	260	370	370	370
	Choke weight			kg	50	57	67	85	95
	Dimensions (WxHxD)			mm	790x1330x440		995x1580x440		

Order information ⑦	Art. no.	Ethernet version		—	—	—	—	—	
		Serial version		—	—	—	—	—	
		Input power frame		307195	307196	307197	307198	307199	
		Control card (Ethernet)		307205	307205	307205	307205	307205	
		Control card (serial)		307204	307204	307204	307204	307204	

Product line			FR-CC2-H□K-60						
			315	355	400	450	500	560	630
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 ⑧						
	Regenerative braking torque		10 % torque/100 % ED						
Input	Power supply voltage		3-phase, 380–500 V AC, -15 %/+10 %						
	Voltage/frequency range		323–550 V AC at 50/60 Hz ±5 %						
	Rated input capacity ⑦	kVA	465	521	587	660	733	833	924
Others	Cooling		Fan cooling						
	DC choke		Built-in						
	Protective structure		Open type (IP00)						
	Weight	kg	210	213	282	285	288	293	294
	Dimensions (WxHxD)	mm	600x1330x440		600x1580x440				

Order information	Art. no.	274507	274508	274509	274510	274511	279637	279638	

Remarks:
① The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
② The overload capacity in % is the ratio of the overload capacity 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.
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)
⑦ 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).
⑧ 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)
⑨ 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 √2.

Technical details FR-F846-00023 to -03610

Product line				FR-F846-□-E2-60L2																		
				00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600	03250	03610
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	30	37	45	55	75	90	110	132	160
	Rated current	A	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	144	180	216	260	325
			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	173	216	260	312	390
			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	216	270	324	390	488
	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 AC, 380–500 V to power supply voltage																		
	Frequency range		Hz	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		Regenerative	10 % torque/100 % ED																		
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 ④	A	LD	2.1	3.5	4.8	7.6	11.5	16	23	29	35	43	57	70	85	106	144	180	216	260	325
	Power supply capacity ⑤	kVA	LD	1.6	2.7	3.7	5.8	9	12	18	22	27	33	43	53	65	81	110	137	165	198	248
Others	Cooling			Self cooling						Fan cooling												
	Protective structure ⑥			Dust- and water-proof type (IP55)																		
	Max. heat dissipation ⑦	kW	LD	50	70	80	120	160	230	325	370	440	530	700	840	1060	1260	1750	2210	2700	2900	3700
	Weight		kg	15	15	15	15	16	17	26	26	27	27	59	60	63	64	147	150	153	189	193
	Dimensions (WxHxD)		mm	238x520x271						238x650x285				345x790x357				420x1360x 456.6		420x1510x456.6		

Order information ⑧	Art. no.	318057	318058	318059	318060	318061	318062	318063	318064	318065	318066	318067	318068	318069	318070	318071	318072	318073	318074	318075

Remarks:
① The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
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^2t), 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 rated input capacity varies depending on the impedance values on the power supply side of the inverter (including the cables and input choke).
⑥ FR-DU08: IP40 (except for the PU connector)
⑦ The values displays the maximum possible heat dissipation. Please consider this values during setup of the cabinet.
⑧ All inverters with circuit board coating (IEC60721-3-3 3C2/3S2)

Technical details FR-F820-00046 to -04750

Product line				FR-F820-□-E2-60/E3-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 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 ⑥	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
	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		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								
	Voltage ③			3-phase AC, 0 V to power supply voltage								
	Frequency range			0.2–590 Hz								
	Control method			V/f control, optimum excitation control or advanced magnetic flux vector control								
	Modulation control			Sine evaluated PWM, soft PWM								
	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
Others	Cooling			Self cooling		Fan cooling						
	Protective structure			IP20								
	Max. heat dissipation kW	SLD ⑤		0.06	0.095	0.14	0.20	0.31	0.355	0.525	0.57	0.77
		LD		0.055	0.085	0.13	0.185	0.285	0.32	0.48	0.515	0.7
	Weight		kg	1.9	2.1	3.0	3.0	3.0	6.3	6.3	8.3	15
	Dimensions (WxHxD)		mm	110x310x112	110x310x127	150x318x141.6			220x324x170		220x363x190	250x517x190
Order information ⑦			Art. no.	315474	315485	315486	315487	315488	315489	315490	315491	315492
				333226	333227	333228	333229	333230	333231	333232	333233	333234

Product line				FR-F820-□-E2-60/E3-N6		FR-F820-□-E2-60/-E3-60				FR-F820-□-E2-60/ E3-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 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 ⑥	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
	Rated output capacity kVA	SLD ⑤		35	48	59	71	89	120	145	181
		LD		32	43	53	65	81	110	132	165
	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							
	Voltage ③			3-phase AC, 0 V to power supply voltage							
	Frequency range			0.2–590 Hz							
	Control method			V/f control, optimum excitation control or advanced magnetic flux vector control							
	Modulation control			Sine evaluated PWM, soft PWM							
	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
Others	Cooling			Fan cooling							
	Protective structure			IP20	IP00						
	Max. heat dissipation kW	SLD ⑤		0.95	1.0	1.45	1.65	2.12	2.75	3.02	3.96
		LD		0.85	0.95	1.3	1.48	1.9	2.45	2.71	3.53
	Weight		kg	15	15	22	42	42	54	74	74
	Dimensions (WxHxD)		mm	250x517x190		325x550x195	435x550x250		465x700x250	465x740x360	
Order information ⑦			Art. no.	315493	315494	315495	315496	315497	315498	315499	315500
				333255	333256	333257	333258	333259	333260	333261	333262

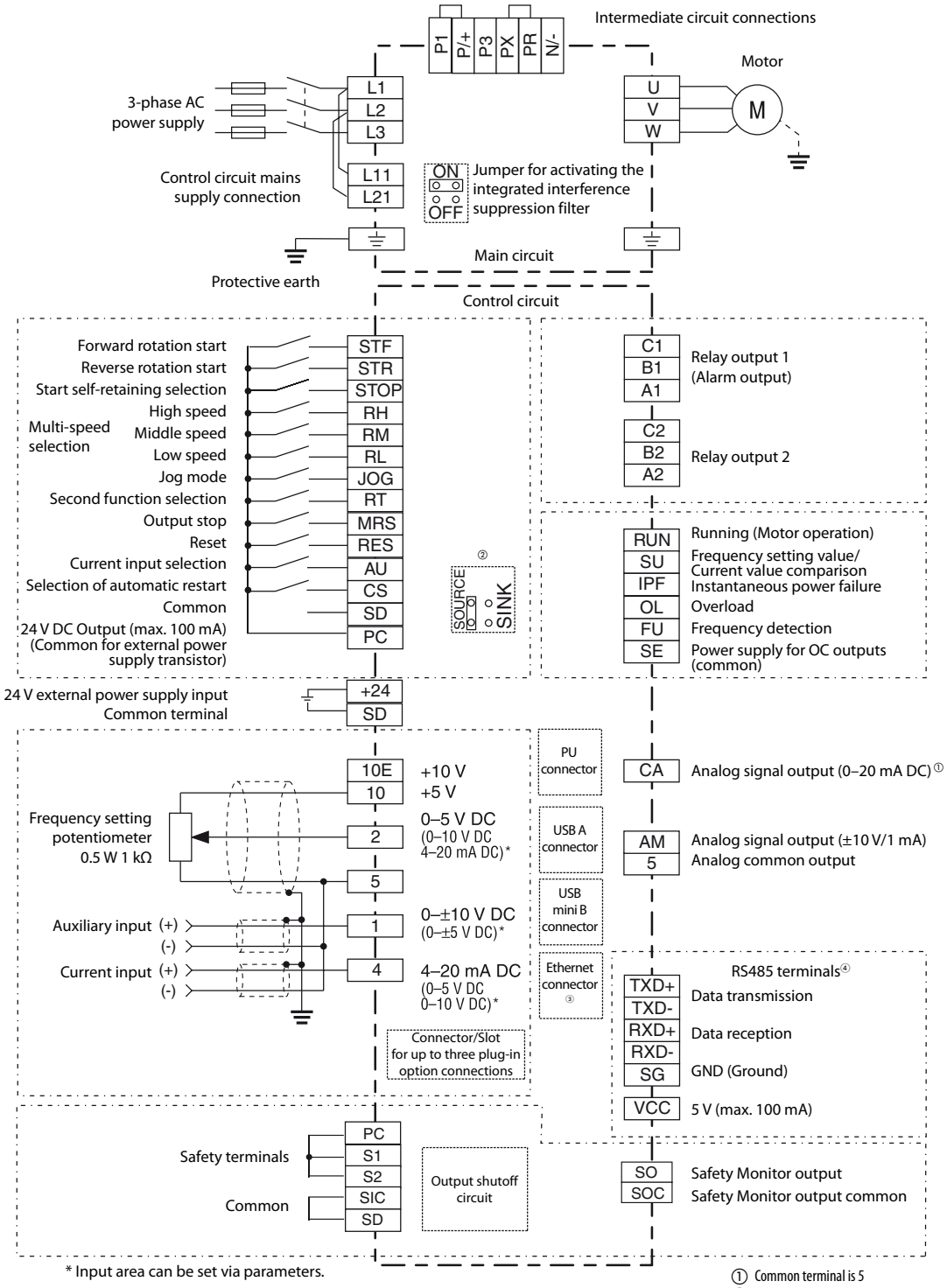
Remarks:
Explanation for ① to ⑦ seepage 34.

Common specifications FR-F800

FR-A840			Description
Control specifications	Frequency setting resolution	Analog input	0.015 Hz/0–50 Hz (terminal 2, 4: 0–10 V/12 bit) 0.03 Hz/0–50 Hz (terminal 2, 4: 0–5 V/11 bit, 0–20 mA/11 bit, terminal 1: -10–+10 V/12 bit) 0.06 Hz/0–50 Hz (terminal 1: 0–±5 V/11 bit)
		Digital input	0.01 Hz
	Frequency accuracy		0.2 % of the maximum output frequency (temperature range 25 °C ±10 °C) via analog input; ±0.01 % of the set output frequency (via digital input)
	Voltage/frequency characteristics		Base frequency adjustable from 0 to 590 Hz; selection between constant torque, variable torque or optional flexible 5-point V/f characteristics
	Starting torque		120 % (3 Hz) when set to simple magnetic flux vector control and slip compensation
	Torque boost		Manual torque boost
	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.
	Stall prevention operation level		Operation current level can be set (0–150 % adjustable), whether to use the function or not can be selected
	Motor protection		Electronic motor protection relay (rated current user adjustable)
	Torque limit level		Torque limit value can be set (0–400 % variable)
Control signals for operation	Frequency setting values	Analog input	Terminal 2, 4: 0–5 V DC, 0–10 V DC, 0/4–20 mA Terminal 1: 0–±5 V DC, 0–±10 V DC
		Digital input	Input using the setting dial of the parameter unit Four-digit BCD or 16 bit binary (when used with option FR-A8AX)
	Start signal		Available individually for forward rotation and reverse rotation. Start signal automatic self-holding input (3-wire input) can be selected.
	Input signals	Common	Low-speed operation command, middle-speed operation command, high-speed operation command, second function selection, terminal 4 input selection, JOG operation selection, output stop, start self-holding selection, forward rotation command, reverse rotation command, inverter reset The input signal can be changed using Pr. 178 to Pr. 189 (input terminal function selection).
		Pulse train input	100 kpps
		Operating status	Maximum and minimum frequency settings, multi-speed operation, acceleration/deceleration pattern, thermal protection, DC injection brake, starting frequency, JOG operation, output stop (MRS), stall prevention, regeneration avoidance, increased magnetic excitation deceleration, DC feeding ①, frequency jump, rotation display, automatic restart after instantaneous power failure, electronic bypass sequence, remote setting, retry function, carrier frequency selection, fast-response current limit, forward/reverse rotation prevention, operation mode selection, slip compensation, speed smoothing control, traverse, auto tuning, applied motor selection, RS485 communication, PID control, PID pre-charge function, cooling fan operation selection, stop selection (deceleration stop/coasting), power-failure deceleration stop function, PLC function, life diagnosis, maintenance timer, current average monitor, multiple rating, test run, 24 V power supply input for control circuit, safety stop function, self power management, BACnet communication, PID gain tuning, cleaning, load characteristics storage, emergency drive
	Output signal	Open collector output (five terminals) Relay output (two terminals)	Inverter running, up to frequency, instantaneous power failure/undervoltage ①, overload warning, output frequency detection, fault Fault codes of the inverter can be output (4 bits) from the open collector.
Indication	For meter	Current output	Max. 20 mA DC: one terminal (output current) The monitored item can be changed using Pr. 54 FM/CA terminal function selection.
		Voltage output	Max. ±10 V DC: one terminal (output voltage) The monitored item can be changed using Pr. 158 AM terminal function selection.
	Operation panel (FR-DU08)	Operating status	Output frequency, output current, output voltage, frequency setting value The monitored item can be changed using Pr. 52 Operation panel main monitor selection.
		Fault record	Fault record is displayed when a fault occurs. Past 8 fault records and the conditions immediately before the fault (output voltage/current/frequency/cumulative energization time/year/month/date/time) are saved.
Protection	Protective functions		Overcurrent trip during acceleration, overcurrent trip during constant speed, overcurrent trip during deceleration or stop, regenerative overvoltage trip during acceleration, regenerative overvoltage trip during constant speed, regenerative overvoltage trip during deceleration or stop, inverter overload trip (electronic thermal relay function), motor overload trip (electronic thermal relay function), heatsink overheat, instantaneous power failure ①, undervoltage ①, input phase loss ①②, stall prevention stop, loss of synchronism detection ②, upper limit fault detection, lower limit fault detection, Output side earth (ground) fault overcurrent, output short circuit, output phase loss, external thermal relay operation ②, PTC thermistor operation ②, option fault, communication option fault, parameter storage device fault, PU disconnection, retry count excess ②, CPU fault, operation panel power supply short circuit/RS485 terminals power supply short circuit, 24 V DC power fault, abnormal output current detection ②, inrush current limit circuit fault ①, communication fault (inverter), analog input fault, USB communication fault, safety circuit fault, overspeed occurrence ②, 4 mA input fault ②, pre-charge fault ②, PID signal fault ②, internal circuit fault, user definition error in the PLC function
	Warning function		Fan alarm, stall prevention (overcurrent), stall prevention (overvoltage), electronic thermal relay function pre-alarm, PU stop, parameter copy, safety stop, maintenance timer 1 to 3 ②, USB host error, operation panel lock ②, password locked ②, parameter write error, copy operation error, 24 V external power supply operation
Others	Surrounding air temperature		-10 °C to +50 °C
	Storage temperature ③		-20 °C to +65 °C

Remarks:
① Available only for the standard model.
② This protective function is not available in the initial status.
③ Temperature applicable for a short time, e. g. in transit.

Block diagram FR-F800



* Input area can be set via parameters.

① Common terminal is 5
② Initial setting is source logic.
③ Only for FR-F800-E
④ Not for FR-F800-E
If RS485 terminals are needed, install the interface card FR-A8ERS

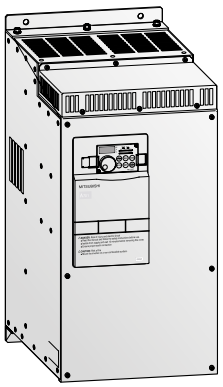
Assignment of main circuit terminals

Function	Terminal	Designation	Description
Main circuit connection	L1, L2, L3	Mains supply connection	Mains power supply of the inverters (FR-F820: 200–240 V AC, 50/60 Hz); (FR-F840: 380–500 V AC, 50/60 Hz)
	P/+, N/-	Brake unit connection	Connect the brake unit (FR-BU, BU), power regeneration common converter (FR-CV), Harmonic Converter (FR-HC and MT-HC) or power regeneration converter (MTRC).
	P/+, P1	DC choke connection	An optional DC choke can be connected to the terminals P1 and P/+. The jumper on terminals P1 and P/+ must be removed when this optional choke is used on frequency inverter models FR-F820-03160 or lower and FR-F840-01800 or lower. When using a motor with 75 kW or higher, always connect a mandatory DC choke. The DC choke must be installed on frequency inverter models FR-F820-03800 or higher and FR-F840-02160 or higher.
	PR, PX	Built-in brake circuit connection	When the jumper is connected across terminals PR and PX (initial status), the built-in brake resistor circuit is valid.
	U, V, W	Motor connection	Voltage output of the inverter (3-phase, 0 V up to power supply voltage, 0.2–590 Hz)
	L11, L21	Power supply for control circuit	To use external power for the control circuit connect the mains power to L11/L21 (and remove jumpers L1 and L2).
	⏚	PE	Protective earth connection of inverter

Assignment of signal terminals

Function	Terminal	Designation	Description
Control connection (programmable)	STF	Forward rotation start	The motor rotates forward, if a signal is applied to terminal STF.
	STR	Reverse rotation start	The motor rotates reverse, if a signal is applied to terminal STR.
	STOP	Start self-retaining selection	The start signals are self-retaining, if a signal is applied to terminal STOP.
	RH, RM, RL	Multi-speed selection	Preset of 15 different output frequencies according to the combination of the RH, RM and RL signals.
	JOG	Jog mode selection	The JOG mode is selected, if a signal is applied to this terminal (factory setting). The start signals STF and STR determine the rotation direction.
		Pulse train input	The JOG terminal can be used as pulse train input terminal (parameter 291 setting needs to be changed)
	RT	Second parameter settings	A second set of parameter settings is selected, if a signal is applied to terminal RT.
	MRS	Output stop	The inverter lock stops the output frequency without regard to the delay time.
	RES	RESET input	An activated protective circuit is reset, if a signal is applied to the terminal RES (t >0.1 s).
	AU	Current input selection	The 0/4–20 mA signal on terminal 4 is enabled by a signal on the AU terminal.
		PTC input	If you connect a PTC temperature sensor you must assign the PTC signal to the AU terminal and set the slide switch on the control circuit board to the PTC position.
	CS	No function	Use Pr.186 CS terminal function selection for function assignment.
Common	SD	Reference potential (0 V) for the PC terminal (24 V)	Common terminal for contact input terminal (sink logic); Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the source logic to avoid malfunction by undesirable current. Common terminal for the 24 V DC power supply (terminal PC, terminal +24) Isolated from terminals 5 and SE.
	PC	24 V DC output	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the source logic to avoid malfunction by undesirable current. Common terminal for contact input terminal (source logic). Can be used as a 24 V DC 0.1 A power supply.
	+24	24 V external power supply input	For connecting a 24 V external power supply. If a 24 V external power supply is connected, power is supplied to the control circuit while the main power circuit is OFF.
Setting value specification	10 E	Voltage output for potentiometer	Output voltage 10 V DC. Max. output current 10 mA. Recommended potentiometer: 1 kΩ, 2 W linear
	10		Output voltage 5 V DC. Max. output current 10 mA. Recommended potentiometer: 1 kΩ, 2 W linear
	2	Input for frequency setting value signal	The setting value 0–5 V DC (or 0–10 V, 0/4–20 mA) is applied to this terminal. You can switch between voltage and current setpoint values with parameter 73. The input resistance is 10 kΩ.
	5	Frequency setting common and analog outputs	Terminal 5 provides the common reference potential (0 V) for all analog set point values and for the analog output signals CA (current) and AM (voltage). The terminal is isolated from the digital circuit's reference potential (SD). This terminal should not be grounded.
	1	Auxiliary input for frequency setting value signal 0–±5 (10) V DC	An additional voltage setting value signal of 0–±5 (10) V DC can be applied to terminal 1. The voltage range is preset to 0–±10 V DC. The input resistance is 10 kΩ.
	4	Input for setting value signal	The setting value 0/4–20 mA or 0–10 V is applied to this terminal. You can switch between voltage and current setpoint values with parameter 267. The input resistance is 250 Ω. The current setting value is enabled via terminal function AU.
Signal output (programmable)	A1, B1, C1	Potential free relay output 1 (Alarm)	The alarm is output via relay contacts. The block diagram shows the normal operation and voltage free status. If the protective function is activated, the relay picks up. The maximum contact load is 200 V AC/0.3 A or 30 V DC/0.3 A.
	A2, B2, C2	Potential free relay output 2	Any of the available 42 output signals can be used as the output driver. The maximum contact load is 230 V AC/0.3 A or 30 V DC/0.3 A.
	RUN	Signal output for motor operation	The output is switched low, if the inverter output frequency is equal to or higher than the starting frequency. The output is switched high, if no frequency is output or the DC brake is in operation.
	SU	Signal output for frequency setting value/current value comparison	The SU output supports a monitoring of frequency setting value and frequency current value. The output is switched low, once the frequency current value (output frequency of the inverter) approaches the frequency setting value (determined by the setting value signal) within a preset range of tolerance.
	IPF	Signal output for instantaneous power failure	The output is switched low for a temporary power failure within a range of 15 ms ≤tIPF ≤100 ms or for under voltage.
	OL	Signal output for overload alarm	The OL is switched low, if the output current of the inverter exceeds the current limit preset in parameter 22 and the stall prevention is activated. If the output current of the inverter falls below the current limit preset in parameter 22, the signal at the OL output is switched high.
	FU	Signal output for monitoring output frequency	The output is switched low once the output frequency exceeds a value preset in parameter 42 (or 43). Otherwise the FU output is switched high.
	SE	Reference potential for signal outputs	The potential that is switched via open collector outputs RUN, SU, OL, IPF and FU is connected to this terminal.
	CA	Analog current output	One of 18 monitoring functions can be selected, e. g. external frequency output. CA- and AM output can be used simultaneously. The functions are determined by parameters. Output item: output frequency (initial setting), Load impedance: 200 Ω–450 Ω, output signal: 0–20 mA
	AM	Analog signal output 0–10 V DC (1 mA)	Output item: output frequency (initial setting), output signal 0–10 V DC, permissible load current 1 mA (load impedance ≥10 kΩ), resolution 8 bit
Interface	—	PU connector	A parameter unit can be connected. Communications via RS485 I/O standard: RS485, multi drop operation: max 1152 baud (overall length: 500 m)
	—	RS485 terminal (via RS485 terminal)	Communications via RS485; I/O standard: RS485, multi drop operation: max 1152 baud (overall length: 500 m)
	—	2 USB connectors (Conforms to USB1.1/USB2.0)	USB A connector: a USB memory device enables parameter copy, PLC code download and trace function. USB mini B connector: connected to a personal computer via USB to enable operations of the inverter by FR Configurator2.
Safety connection	S1, S2	Safety inputs	When the safety functions are not used, the existing jumpers between the terminals S1-PC, S2-PC and SIC-SD must not be removed, otherwise an operation of the frequency inverter is not possible.
	SIC	Reference potential for safety inputs	
	SO	Safety monitor output	
	SOC	Safety monitor output common	

FR-A741 high end inverters with integrated power regeneration function



The FR-A741 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.

When compared to a frequency inverter with standard braking technology the required space can be reduced by up to 40 %, depending on the power range. An AC choke is integrated into the the FR-A741 and due to the 100 % regeneration capability of the FR-A741 no braking resistor or external brake transistor is required.

The FR-A741 has an builtin PLC function, which allows you to program your own functions.

The output frequency ranges from 0.2 to 400 Hz.

Output range:

5.5–55 kW, 380–480 V AC

Available accessories:

Optional control units, versatile options and useful accessories are available for this frequency inverter.

Please refer to page 90 for details.

Technical details FR-A741-5.5K–55K

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) I rated	12	17	23	31	38	44	57	71	86	110
			I max. 60 s	18	26	35	47	57	66	86	107	129	165
			I max. 3 s	24	34	46	62	76	88	114	142	172	220
	Rated output capacity ②		kVA	9.1	13	17.5	23.6	29	32.8	43.4	54	65	84
	Overload capacity ③			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									
	Modulation control			Sine evaluated PWM, soft PWM									
	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
Others	Cooling			Fan cooling									
	Protective structure			IP00									
	Power loss		kW	0.33	0.44	0.66	0.86	1.1	1.29	1.45	1.95	2.36	2.7
	Frequency inverter weight		kg	25	26	37	40	48	49	65	80	83	115
	Dimensions (WxHxD)		mm	250x470 x270	250x470 x 270	300x600 x294	300x600 x 294	360x600 x320	360x600 x320	450x700 x340	470x700 x368	470x700 x368	600x900 x405
Order information			Art. no.	216905	216906	216907	216908	216909	217397	216910	216911	216912	216913

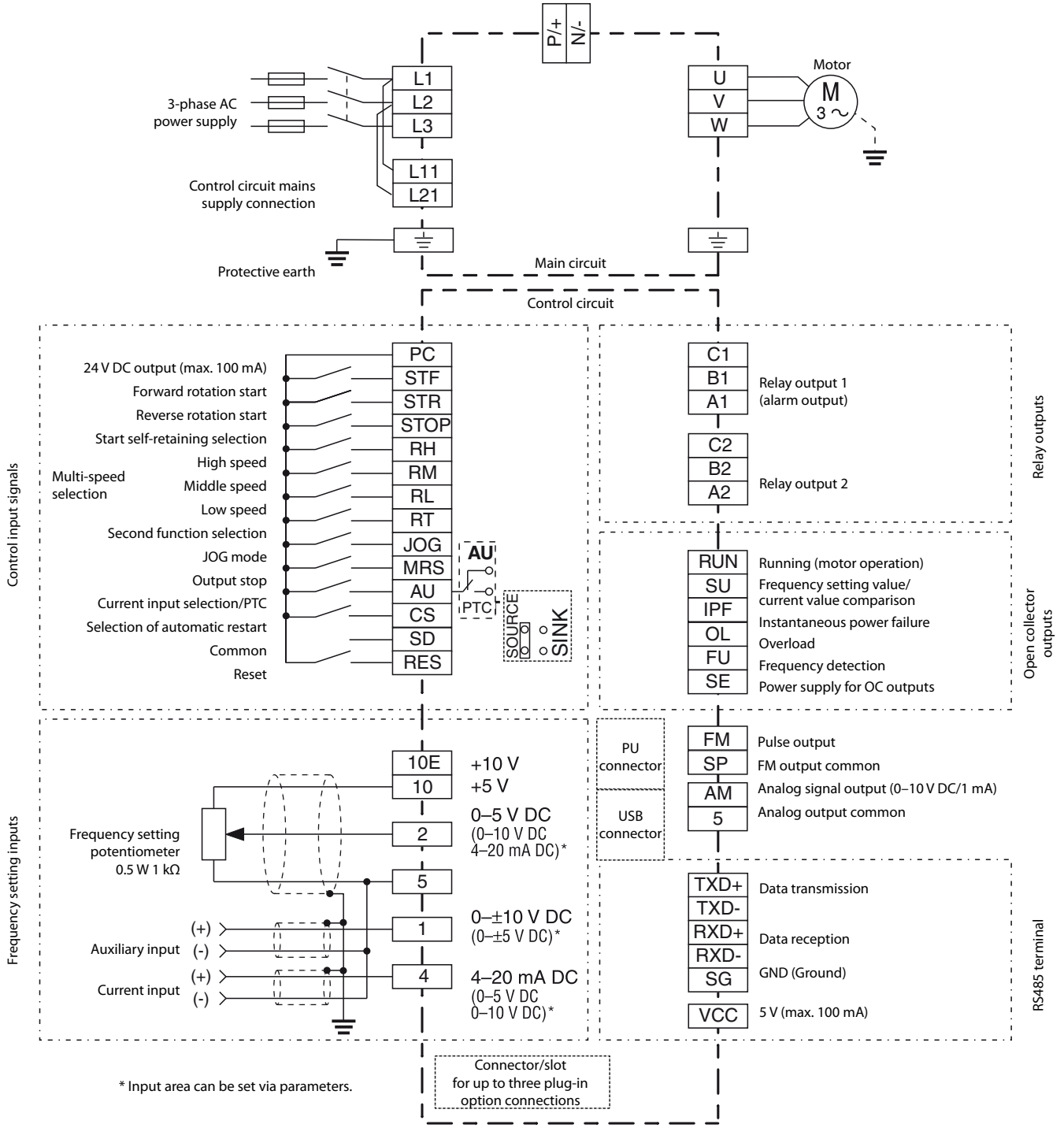
Remarks:
① The rated motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi Electric 4-pole standard motor.
② The rated output capacity indicated assumes that the output voltage is 440 V.
③ The % value of the overload capacity indicates the ratio of the overload current 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 √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).
For overseas types refer to page 136.

Common specifications FR-A741

A741			Description
Control specifications	Frequency setting resolution	Analog input	0.015 Hz/0–50 Hz (terminal 2, 4: 0–10 V/12 bit) 0.03 Hz/0–50 Hz (terminal 2, 4: 0–5 V/11 bit, 0–20 mA/11 bit, terminal 1: -10–+10 V/12 bit) 0.06 Hz/0–50 Hz (terminal 1: 0–±5 V/11 bit)
		Digital input	0.01 Hz
	Frequency accuracy		0.2 % of the maximum output frequency (temperature range 25° ±10 °C) via analog input; ±0.01 % of the set output frequency (via digital input)
	Voltage/frequency characteristics		Base frequency adjustable from 0 to 400 Hz; selection between constant torque, variable torque or optional flexible 5-point V/f characteristics
	Starting torque		200 % 0.3 Hz (0.4–3.7 kVA), 150 % 0.3 Hz (5.5 kVA or more) (under real sensorless vector control or vector control)
	Torque boost		Manual torque boost
	Acceleration/deceleration time		0; 0.1–3600 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.
	Stall prevention operation level		Operation current level can be set (0–220 % adjustable), whether to use the function or not can be selected
	Motor protection		Electronic motor protection relay (rated current user adjustable)
	Torque limit level		Torque limit value can be set (0–400 % variable)
Control signals for operation	Frequency setting values	Analog input	Terminal 2, 4: 0–5 V DC, 0–10 V DC, 0/4–20 mA Terminal 1: 0–±5 V DC, 0–±10 V DC
		Digital input	Input using the setting dial of the parameter unit Four-digit BCD or 16 bit binary (when used with option FR-A7AX)
	Start signal		Available individually for forward rotation and reverse rotation. Start signal automatic self-holding input (3-wire input) can be selected.
	Input signals	Common	Any of 12 signals can be selected using parameters 178 to 189 (input terminal function selection) from among: multi speed selection, remote setting, stop-on-contact, second function selection, third function selection, terminal 4 input selection, JOG operation selection, selection of automatic restart after instantaneous power failure, flying start, external thermal relay input, PU operation/external inter lock signal, external DC injection brake operation start, PID control enable terminal, brake opening completion signal, PU operation/external operation switchover, load pattern selection forward rotation reverse rotation boost, V/f switching, load torque high-speed frequency, S-pattern acceleration/deceleration C switchover, pre-excitation, output stop, start self-holding selection, control mode changing, torque limit selection, start-time tuning start external input, torque bias selection 1, 2 ①, P/PI control switchover, traverse function selection, forward rotation command, reverse rotation command, inverter reset, PTC thermistor input, PID forward reverse operation switchover, PU-NET operation switchover, NET-external operation switchover, command source switchover, conditional position pulse train sign ①, conditional position droop pulse clear ①, magnetic flux decay output shutoff ⑤
		Pulse train input	100 kpps
	Output signals	Operating status	Any of 7 signals can be selected using parameter 190 to 196 (output terminal function selection) from among: inverter running, up-to-frequency, instantaneous power failure/undervoltage, overload warning, output frequency (speed) detection, second output frequency (speed) detection, third output frequency (speed) detection, electronic thermal relay function pre-alarm, PU operation mode, inverter operation ready, output current detection, zero current detection, PID lower limit, PID upper limit, PID forward rotation reverse rotation output, commercial power supply-inverter switchover MC1, commercial power supply-inverter switchover MC2, commercial power supply-inverter switchover MC3, orientation completion ①, orientation error ①⑤, brake opening request, fan fault output, heatsink overheat pre-alarm, deceleration at an instantaneous power failure, PID control activated, during retry, PID output interruption, position control preparation ready ⑤, life alarm, alarm output 1, 2, 3 (power-off signal), power savings average value update timing, current average monitor, maintenance timer alarm, remote output, forward rotation output ①, reverse rotation output ①, low speed output, torque detection, regenerative status output ①, start-time tuning completion, in-position completion ①, minor failure output and alarm output. Open collector output (5 points), relay output (2 points) and alarm code of the inverter can be output (4 bit) from the open collector
		When using the FR-A7AY, FR-A7AR option	In addition to the above operating modes parameters 313 to 319 (function selection for the additional 7 output terminals) can also be used to assign the following four signals: control circuit capacitor life, main circuit capacitor life, cooling fan life, inrush current limit circuit life (only positive logic can be set for extension terminals of the FR-A7AR)
		Analog output	You can select any signals using Pr. 54 FM terminal function selection (pulse train output) and Pr. 158 AM terminal function selection (analog output) from among output frequency, motor current (steady or peak value), output voltage, frequency setting, operation speed, motor torque, converter output voltage (steady or peak value), electronic thermal relay function load factor, input power, output power, load meter, motor excitation current, reference voltage output, motor load factor, PID set point, PID measured value, motor output, torque command, torque current command, and torque monitor.
Display	Parameter unit display (FR-PU07/ FR-DU07)	Operating status	Output frequency, motor current (steady or peak value), output voltage, frequency setting, running speed,motor torque, overload, converter output voltage (steady or peak value), electronic thermal relay function load factor, input power, output power, load meter, motor excitation current, cumlative energization time, actual operation time, motor load factor, cumulative power, energy saving effect, cumulative saving power, PID set point, PID measured value, PID deviation, inverter I/O terminal monitor, input terminal option monitor ②, output terminal option monitor ②, option fitting status ③, terminal assignment status ③, torque command, torque current command, feed back pulse ①, motor output
		Alarm definition	Alarm definition is displayed when the protective function is activated, the output voltage/current/frequency/cumulative energization time right before the protection function was activated and the past 8 alarm definitions are stored.
		Interactive guidance	Operation guide/trouble shooting with a help function ③
Protection	Protective functions		Overcurrent during acceleration, overcurrent during constant speed, overcurrent during deceleration, overvoltage during acceleration, overvoltage during constant speed, overvoltage during deceleration, inverter protection thermal operation, motor protection thermal operation, heatsink overheat, instantaneous power failure occurrence, undervoltage, input phase failure, motor overload, output side earth (ground) fault overcurrent, output short circuit, main circuit element overheat, output phase failure, external thermal relay operation ④, PTC thermistor operation ④, option alarm, parameter error, PU disconnection, retry count excess ④, CPU alarm, parameter unit power supply short circuit, 24 V DC power output short circuit, output current detection value excess ④, inrush current limit circuit alarm, communication alarm (inverter), opposite rotation deceleration error ④, analog input error, fan fault, overcurrent stall prevention, overvoltage stall prevention, electronic thermal relay function prealarm, PU stop, maintenance timer alarm ②④, parameter write error, copy operation error, parameter unit lock, parameter copy alarm, speed limit indication, encoder no-signal ①④, speed deviation large ①④, overspeed ①④, position error large ①④, encoder phase error ①④, regeneration converter overcurrent ⑤ , regeneration converter circuit fault ⑤, regeneration converter transistor protection thermal ⑤, brake sequence error ④⑤
Others	Surrounding air temperature		-10 °C to +50 °C
	Storage temperature ⑥		-20 °C to +65 °C

Remarks:
① Only when the option (FR-A7AP) is mounted
② Can be displayed only on the parameter unit (FR-DU07).
③ Can be displayed only on the parameter unit (FR-PU07).
④ This protective function does not function in the initial status.
⑤ FR-A741 only
⑥ Temperature applicable for a short time, e. g. in transit.

Block diagram FR-A741



Assignment of main circuit terminals

Function	Terminal	Designation	Description
Main circuit connection	L1, L2, L3	Mains supply connection	Mains power supply of the inverters (380–480 V AC, 50/60 Hz)
	P/+, N/-	Brake unit connection	Connect the brake unit (FR-BU, BU), power regeneration common converter (FR-CV), Harmonic Converter (FR-HC and MT-HC) or power regeneration converter (MTRC).
	U, V, W	Motor connection	Voltage output of the inverter (3-phase, 0 V up to power supply voltage, 0.2–400 Hz)
	L11, L21	Power supply for control circuit	To use external power for the control circuit connect the mains power to L11/L21 (and remove jumpers L1 and L2).
	⏚	PE	Protective earth connection of inverter

Assignment of signal terminals

Function	Terminal	Designation	Description
Control connection (programmable)	STF	Forward rotation start	The motor rotates forward, if a signal is applied to terminal STF.
	STR	Reverse rotation start	The motor rotates reverse, if a signal is applied to terminal STR.
	STOP	Start self-retaining selection	The start signals are self-retaining, if a signal is applied to terminal STOP.
	RH, RM, RL	Multi-speed selection	Preset of 15 different output frequencies according to the combination of the RH, RM and RL signals.
	JOG	JOG mode selection	The JOG mode is selected, if a signal is applied to this terminal (factory setting). The start signals STF and STR determine the rotation direction.
		Pulse train input	The JOG terminal can be used as pulse train input terminal (parameter 291 setting needs to be changed)
	RT	Second parameter settings	A second set of parameter settings is selected, if a signal is applied to terminal RT.
	MRS	Output stop	The inverter lock stops the output frequency without regard to the delay time.
	RES	RESET input	An activated protective circuit is reset, if a signal is applied to the terminal RES (t >0.1 s).
	AU	Current input selection	The 0/4–20 mA signal on terminal 4 is enabled by a signal on the AU terminal.
		PTC input	If you connect a PTC temperature sensor you must assign the PTC signal to the AU terminal and set the slide switch on the control circuit board to the PTC position.
	CS	Automatic restart after instanta-neous power failure	The inverter restarts automatically after a power failure, if a signal is applied to the terminal CS.
Common	SD	Reference potential (0 V) for the PC terminal (24 V)	When "sink" control logic is selected by setting the control signal jumper a specific control function is triggered when the corresponding control terminal is connected to the SD terminal. When "source" control logic is selected and you are using external 24 V power you must connect the 0 V of the external power supply to terminal SD. The SD terminal is isolated from the terminals 5 and SE with optocouplers.
	PC	24 V DC output	Internal power supply 24 V DC/0.1 A output
Setting value specification	10 E	Voltage output for potentiometer	Output voltage 10 V DC. Max. output current 10 mA. Recommended potentiometer: 1 kΩ, 2 W linear
	10		Output voltage 5 V DC. Max. output current 10 mA. Recommended potentiometer: 1 kΩ, 2 W linear
	2	Input for frequency setting value signal	The setting value 0–5 V DC (or 0–10 V, 0/4–20 mA) is applied to this terminal. You can switch between voltage and current setpoint values with parameter 73. The input resistance is 10 kΩ.
	5	Frequency setting common and analog outputs	Terminal 5 provides the common reference potential (0 V) for all analog set point values and for the analog output signals CA (current) and AM (voltage). The terminal is isolated from the digital circuit's reference potential (SD). This terminal should not be grounded.
	1	Auxiliary input for frequency setting value signal 0–±5 (10) V DC	An additional voltage setting value signal of 0–±5 (10) V DC can be applied to terminal 1. The voltage range is preset to 0–±10 V DC. The input resistance is 10 kΩ.
	4	Input for setting value signal	The setting value 0/4–20 mA or 0–10 V is applied to this terminal. You can switch between voltage and current setpoint values with parameter 267. The input resistance is 250 Ω. The current setting value is enabled via terminal function AU.
Signal output (programmable)	A1, B1, C1	Potential free relay output 1 (alarm)	The alarm is output via relay contacts. The block diagram shows the normal operation and voltage free status. If the protective function is activated, the relay picks up.The maximum contact load is 200 V AC/0.3 A or 30 V DC/0.3 A.
	A2, B2, C2	Potential free relay output 2	Any of the available 42 output signals can be used as the output driver. The maximum contact load is 230 V AC/0.3 A or 30 V DC/0.3 A.
	RUN	Signal output for motor operation	The output is switched low, if the inverter output frequency is equal to or higher than the starting frequency. The output is switched high, if no frequency is output or the DC brake is in operation.
	SU	Signal output for frequency setting value/current value comparison	The SU output supports a monitoring of frequency setting value and frequency current value. The output is switched low, once the frequency current value (output frequency of the inverter) approaches the frequency setting value (determined by the setting value signal) within a preset range of tolerance.
	IPF	Signal output for instantaneous power failure	The output is switched low for a temporary power failure within a range of 15 ms ≤tIPF ≤100 ms or for under voltage.
	OL	Signal output for overload alarm	The OL is switched low, if the output current of the inverter exceeds the current limit preset in parameter 22 and the stall prevention is activated. If the output current of the inverter falls below the current limit preset in parameter 22, the signal at the OL output is switched high.
	FU	Signal output for monitoring output frequency	The output is switched low once the output frequency exceeds a value preset in parameter 42 (or 43). Otherwise the FU output is switched high.
	SE	Reference potential for signal outputs	The potential that is switched via open collector outputs RUN, SU, OL, IPF and FU is connected to this terminal.
	CA	Analog current output	One of 18 monitoring functions can be selected, e. g. external frequency output. CA- and AM output can be used simultaneously. The functions are determined by parameters. Output item: output frequency (initial setting), load impedance: 200 Ω–450 Ω, output signal: 0–20 mA
	AM	Analog signal output 0–10 V DC (1 mA)	Output item: output frequency (initial setting), output signal 0–10 V DC, permissible load current 1 mA (load impedance ≥10 kΩ), resolution 8 bit
Interface	—	PU connector	A parameter unit can be connected. Communications via RS485 I/O standard: RS485, multi-drop operation, 4,800–38,400 baud (overall length: 500 m)
	—	RS485 terminal (via RS485 terminal)	Communications via RS485 I/O standard: RS485, multi-drop operation, 300–38,400 baud (overall length: 500 m)
	—	USB connector	This USB interface is used to connect the inverter to a personal computer (conforms to USB1.1)

FR-A800 series frequency inverters

The FR-A800 series is pure high technology. This generation of Mitsubishi Electric inverters combines innovative functions and reliable technology with maximum power, economy, and flexibility. Among many other features, like the possibility to run vector control also in LD/SLD, or a 100 % ED brake transistor up to 55 kW, Online Autotuning for outstanding speed/torque accuracy, excellent smooth running performance of a synchronous motor, built-in STO emergency stop and a large number of digital/analog inputs and outputs.

The FR-A800-E series inverter has an integrated interface for Ethernet communication, which enables monitoring of the inverter status or setting of parameters via a network.

Various frequency inverters of the FR-A800 series are operated with a separate converter unit (FR-CC2).

FR-A800-E

The FR-A800-E frequency inverters are equipped with an integrated Ethernet interface with 100 MBit/s. This enables simple integration into an existing network and offers communication via Modbus® TCP/IP or CC-Link IE Field Basic networks as standard. Multiple protocols and inverter-to-inverter communication are also supported. Due to the standard Ethernet interface, the FR-A800-E frequency inverters are equipped with one serial interface. The frequency inverters FR-A870-E have a compact design and in addition, an EMC filter and a DC choke are integrated.

Power range:

FR-A820-E,0,4– 90 kW, 200–240 V AC,

FR-A840-E:0,4–280 kW, 380–500 V AC

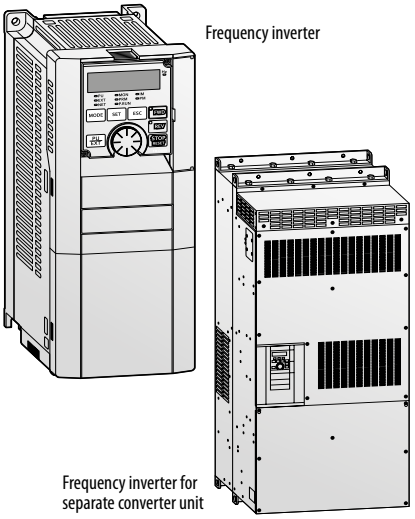
FR-A842-E: 315–500 kW, 380–500 V AC (Separated converter type)

FR-A860-E:0,75–220 kW, 525–600 V AC

FR-A862-E: 280–450 kW, 525–600 V AC (Separated converter type)

FR-A870-E:110 kW, 132 kW, 525–600 V AC

160 kW, 200 kW, 600–690 V AC



FR-A800plus – Specialists for their application

The FR-A800Plus series extends the frequency inverters of the series with optimized functions for special applications.

FR-A800plus Crane (CRN)

These frequency inverters have an integrated crane function. By using Mitsubishi's original anti-sway control technology, the swinging of an object moved by a crane is suppressed at the time of stopping, even without an operator's input adjustment. Further additional functions are load slip avoidance and extended monitoring functions. Special parameter settings are available for the Plus functions.

Power range:

FR-A840-CRN: 0.4–280 kW, 380–500 V AC

FR-A842-CRN: 315–500 kW, 380–500 V AC (Separated converter type)

FR-A800plus Roll to Roll (R2R)

The FR-A800-R2R frequency inverters have been specially developed for winding applications. They have various special functions that enable stable winding and unwinding control independently of each other. These include the calculation of the winding diameter, the speed control via the actual position of the dancer roll (dancer feedback control) as well as the sensorless torque control for constant tension.

Power range:

FR-A840-R2R: 0.4–280 kW, 380–500 V AC

FR-A842-R2R: 315–500 kW, 380–500 V AC (Separated converter type)

FR-A800plus Liquid Cooled (LC)

This drive offers the same outstanding performance levels as the standard A800 series inverters but is liquid cooled. This opens up entirely new applications where it is difficult to dissipate the heat generated by the frequency inverter. Cooling with a liquid also means that a smaller housing is used, since the amount of heat dissipated in the housing is smaller.

Power range:

FR-A840-LC: 110–280 kW, 380–500 V AC

FR-A870-LC: 280 kW, 355 kW, 525–690 V AC

Converter unit FR-CC2-□

The converter units FR-CC2-H/FR-CC2-C/FR-CC2-P are diode rectifiers and enable the connection via a twelve-pulse rectifier, resulting in low harmonic content. They are used together with the FR-F842/FR-A842-P and FR-A862 frequency inverter. The separation of the units allows the flexible design of different systems such as parallel drives and common bus systems. This saves costs and minimizes the space required for installation.

Technical details FR-A840-00023 to -01160

Product line				FR-A840-□-E2-60/-2-60R2R/-E2-60CRN												
				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 ⑦		100 % torque/10 %ED							100 % torque/6 %ED				—		
	Minimum brake resistance values ⑥		Ω	371	236	190	130	83	66	45	34	34	21	21	13.5	13.5	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 ⑧ 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 ④ 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
Others	Cooling			Self cooling			Fan cooling										
	Protective structure ⑤			Enclose type (IP20)											Open type (IP00)		
	Max. heat dissipation ⑨ kW	SLD		0.055	0.075	0.085	0.13	0.175	0.245	0.345	0.37	0.45	0.565	0.74	0.93	1.11	1.34
		LD		0.05	0.07	0.08	0.12	0.16	0.23	0.315	0.345	0.415	0.52	0.675	0.825	1.02	1.22
		ND		0.04	0.055	0.07	0.1	0.13	0.17	0.22	0.28	0.39	0.45	0.52	0.69	0.84	1.02
		HD		0.03	0.04	0.05	0.075	0.09	0.135	0.165	0.21	0.285	0.385	0.45	0.56	0.7	0.86
	Weight		kg	2,8	2,8	2,8	3,3	3,3	6,7	6,7	8,3	8,3	15	15	23	41	41
	Dimensions (WxHxD)		mm	150x260x140					220x260x170		220x300x190		250x400x190		325x550 x195	435x550x250	

Order information																
	Art. no.	Ethernet Version (E2)	297566	297567	297568	297569	297570	297571	297572	297573	297574	297575	297576	—	—	—
		Input Power frame	—	—	—	—	—	—	—	—	—	—	—	307162	307163	307164
		Control card (Ethernet)	—	—	—	—	—	—	—	—	—	—	—	307202	307202	307202
		Roll to Roll (R2R)	296422	296423	296424	296465	296466	296467	296468	296469	296470	296471	296472	296473	296474	296475
		Crane (CRN)	409257	409258	409259	409260	409261	409322	409323	409324	409325	409326	409327	409328	409329	409330

Remarks:
① The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 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^2t), 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 √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 FR-DU08: IP40 (except for the PU connector)
⑥ Value for the ND rating
⑦ The braking capability of the inverter can be improved with a optional brake resistor. Please do not use resistor values below the given minimum values.
⑧ 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.
⑨ The values displays the maximum possible heat dissipation. Please consider this values during setup of the cabinet.

Technical details FR-A840-01800 to -06830

Product line				FR-A840-□-E2-60/-2-60R2R/-E2-60CRN									
				01800	02160	02600	03250	03610	04320	04810	05470	06100	06830
Output	Rated motor capacity ① kW	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 A	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 ⑥	Regenerative		20 % torque/ continuous	10 % torque/continuous								
		With FR-ABR option ⑦		—	—								
	Minimum brake resistance values ⑧		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 ⑧ kVA	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 ④ kVA	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
Others	Cooling			Fan cooling									
	Protective structure ⑤			Open type (IP00)									
	Max. heat dissipation ⑨ kW	SLD		2.0	2.52	3.15	3.6	4.05	4.65	5.3	5.85	6.65	7.55
		LD		1.64	2.1	2.575	2.8	3.6	3.8	4.65	5.1	5.85	6.6
		ND		1.29	1.79	2.2	2.3	2.8	3.45	3.85	4.55	5.1	5.9
		HD		1.06	1.35	1.77	1.85	2.25	2.65	3.4	3.7	4.5	5.05
	Weight		kg	43	52	55	71	78	117	117	166	166	166
	Dimensions (WxHxD)		mm	435x550x250	465x620x300		465x740x360		498x1010x380		680x1010x380		

Order information	Art. no.	Ethernet Version (E2)		—	—	—	—	—	—	—	—	—	—
		Input Power frame		307185	307186	307187	307188	307189	307190	307191	307192	307193	307194
		Control card (Ethernet)		307202	307203	307203	307203	307203	307203	307203	307203	307203	307203
		Roll to Roll (R2R)		296476	296477	296478	296479	296480	296481	296482	296483	296484	296485
		Crane (CRN)		409331	409332	409333	409334	409335	409336	409337	409338	409339	409340

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 √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 FR-DU08: IP40 (except for the PU connector)
⑥ Value for the ND rating
⑦ The braking capability of the inverter can be improved with a optional brake resistor. Please do not use resistor values below the given minimum values.
⑧ 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.
⑨ The values displays the maximum possible heat dissipation. Please consider this values during setup of the cabinet.

Attention: Mandatory DC choke need to be ordered seperately if 75 kW motor or bigger is connected to the FR-A840. Please select the mandatory choke on page 87.

Technical details FR-A840-03250 to -06830 Liquid Cooled

Product line					FR-A840-□-2-60LC						
					03250	03610	04320	04810	05470	06100	06830
Output	Rated motor capacity ①	kW	150 % overload capacity (LD)		132	160	185	220	250	280	315
			200 % overload capacity (ND)		110	132	160	185	220	250	280
	Rated current	A	150 % overload capacity (LD)	I rated	260	325	361	432	481	547	610
				I max. 60 s	312	390	433	518	577	656	732
				I max. 3 s	390	488	542	648	722	821	915
			200 % overload capacity (ND)	I rated	216	260	325	361	432	481	547
				I max. 60 s	324	390	488	542	648	722	821
				I max. 3 s	432	520	650	722	864	962	1094
	Overload capacity ②		LD		120 % of rated motor capacity for 60 s; 150 % for 3 s (max. ambient temperature 50 °C)						
			ND		150 % of rated motor capacity for 60 s; 200 % for 3 s (max. ambient temperature 50 °C)						
	Voltage ③				3-phase AC, 380–500 V to power supply voltage						
	Frequency range				50/60 Hz						
	Control method				V/f; advanced magnetic flux vector, real sensorless vector (RSV), closed loop vector, PM sensorless vector control						
	Brake transistor 100 % ED				FR-BU2/BU-UFS (option)						
	Maximum brake torque ⑥		Regenerative		10 % torque/100 % ED						
			With FR-ABR option		—						
	Minimum brake resistance values ⑥			Ω	—						
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	kVA	LD		260	325	361	432	481	547	610
			ND		216	260	325	361	432	481	547
	Power supply capacity ④	kVA	SLD		198	248	275	329	367	417	465
			LD		165	198	248	275	329	367	417
Others	Cooling				Liquid cooling and fan cooling						
	Protective structure ⑤				Open type (IP00)						
	Max. heat dissipation ⑧	kW	LD		2.8	3.6	3.8	4.65	5.1	5.85	6.6
			ND		2.3	2.8	3.45	3.85	4.55	5.1	5.9
	Weight			kg	83	83	124	124	172	172	172
	Dimensions (WxHxD)			mm	465x795x360		498x1077x380		680x1064x380		
Order information				Art. no.	339639	339640	339641	339642	339643	339644	339645

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 FR-DU08: IP40 (except for the PU connector)
⑥ Value for the ND rating
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 The values displays the maximum possible heat dissipation. Please consider this values during setup of the cabinet.

Attention: Mandatory DC choke need to be ordered seperately if 75 kW motor or bigger is connected to the FR-A840. Please select the mandatory choke on page 87:

Technical details FR-A842-07700 to -12120 and converter unit FR-CC2-H

The FR-A842 frequency inverters must be operated together with an FR-CC2 converter unit, which must be ordered separately.

Product line				FR-A842-□-E2-60/-2-60R2R/-2-60CRN				
				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
			I max. 3 s	924	1039	1154	1314	1454
		150 % overload capacity (LD)	I rated	683	770	866	962	1094
			I max. 60 s	820	924	1039	1154	1314
			I max. 3 s	1024	1155	1299	1443	1641
		200 % overload capacity (ND)	I rated	610	683	770	866	962
			I max. 60 s	915	1024	1155	1299	1443
			I max. 3 s	1220	1366	1540	1732	1924
		250 % overload capacity (HD)	I rated	547	610	683	770	866
			I max. 60 s	1094	1220	1366	1540	1732
			I max. 3 s	1367	1525	1707	1925	2165
	Rated output capacity ② kVA	SLD		587	660	733	834	924
		LD		521	587	660	733	834
		ND		465	521	587	660	733
		HD		417	465	521	587	660
	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, 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		Regenerative	10 % torque/continuous				
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 %				
Others	Cooling			Fan cooling				
	Protective structure ⑤			Open type (IP00)				
	Max. heat dissipation ⑥ kW	SLD		5.8	6.69	7.37	8.6	9.81
		LD		5.05	5.8	6.48	7.34	8.63
		ND		4.45	5.1	5.65	6.5	7.4
		HD		3.9	4.41	4.93	5.65	6.49
	Weight		kg	163	163	243	243	243
	Dimensions (WxHxD)		mm	540x1330x440		680x1580x440		

Order information ⑦	Art. no.	Ethernet Version (E2)		—	—	—	—	—
		Input Power frame		307195	307196	307197	307198	307199
		Control card (Ethernet)		307203	307203	307203	307203	307203
		Roll to Roll (R2R)		296486	296487	296488	296489	296490
		Crane (CRN)		301309	301310	301311	301312	301313

Product line			FR-CC2-H□K-60						
			315	355	400	450	500	560	630
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
	Rated Voltage ②		430–780 V DC ⑤						
	Regenerative braking torque		10 % torque/continuous						
Input	Power supply voltage		3-phase, 380–500 V AC, -15 %/+10 %						
	Voltage/frequency range		323–550 V AC at 50/60 Hz ±5 %						
	Rated input capacity ③	kVA	465	521	587	660	733	833	924
Others	Cooling		Fan cooling						
	DC chokes		Built-in						
	Protective structure ④		Open type (IP00)						
	Weight	kg	210	213	282	285	288	293	294
	Dimensions (WxHxD)	mm	600x1330x440		600x1580x440				
Order information		Art. no.	274507	274508	274509	274510	274511	279637	279638

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 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. The waiting periods can be calculated using the r.m.s. current method (I^2xt), 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 √2 that of the power supply.
⑤ FFR-DU08: IP40 (except for the PU connector section)
⑥ The values displays the maximum possible heat dissipation. Please consider this values during setup of the cabinet.
⑦ For the power voltage exceeding 480 V, set Pr. 977 Input voltage mode selection.
⑧ 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).
⑨ 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)
⑩ 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 √2.

Technical details FR-A842-09620 to -12120-□P and converter unit FR-CC2-H-□P

Product line				FR-A842-□-2-60P					
				Two in parallel			Three in parallel		
				09620	10940	12120	09620	10940	12120
Output	Rated motor capacity ① kW	150 % overload capacity (LD)		710	800	900	1065	1200	1350
		200 % overload capacity (ND)		630	710	800	945	1065	1200
	Rated current A	150 % overload capacity (LD)	I rated	1386	1539	1750	2078	2309	2626
			I max. 60 s	1663	1846	2100	2493	2770	3151
			I max. 3 s	2079	2308	2625	3117	2463	2939
		200 % overload capacity (ND)	I rated	1232	1386	1539	1848	2078	2309
			I max. 60 s	1848	2079	2308	2772	3117	3463
			I max. 3 s	2464	2772	3078	3696	4156	4618
	Rated output capacity ② kVA	LD		1056	1173	1334	1584	1759	2002
		ND		939	1056	1173	1409	1584	1759
	Overload capacity ③	LD		120 % of rated motor capacity for 60 s; 150 % for 3 s (max. ambient temperature 50 °C)					
		ND		150 % of rated motor capacity for 60 s; 200 % for 3 s (max. ambient temperature 50 °C)					
	Voltage ④			3-phase, 380–500 V					
	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/100 % ED					
Input	DC Power supply voltage			430–780 V DC					
	Control power supply voltage			1-phase, 380–500 V AC, 50/60 Hz ⑦					
	Control power supply range			Frequency ±5 %, voltage ±10 %					
Others	Cooling			Fan cooling					
	Protective structure ⑤			Open type (IP00)					
	Max. heat dissipation ⑥ kW	LD		11.7	13.2	15.5	17.5	19.8	23.3
		ND		10.2	11.7	13.3	15.3	17.6	20
	Weight ⑧		kg	486	486	486	729	729	729
	Dimensions (WxHxD)		mm	680x1580x440			680x1580x440		
Order information			Art. no.	314880	314881	314882	314880	314881	314882

Product line			FR-CC2-H□K-60P							
			Two in parallel				Three in parallel			
			400	450	500	560	400	450	500	560
Output	Rated motor capacity	kW	630	710	800	900	945	1065	1200	1350
	Overload capacity ③		150 % 60 s, 200 % 3 s							
	Voltage ⑪		430–780 V ⑩							
	Regenerative braking torque		10 % torque/100 % ED							
Input	Power supply voltage		3-phase, 380–500 V AC							
	Voltage/frequency range		323–550 V AC at 50/60 Hz ±5 %							
	Rated input capacit ⑨	kVA	939	1056	1173	1334	1409	1584	1759	2002
Others	Cooling		Fan cooling							
	DC chokes		Built-in							
	Max. heat dissipation ⑥	kW	5.5	6.1	6.8	7.9	8.2	9.2	10.3	11.9
	Protective structure ⑤		Open type (IP00)							
	Weight ⑫	kg	564	570	576	586	846	855	864	879
	Dimensions (WxHxD)	mm	600x1580x440							
Order information		Art. no.	314883	314884	314905	314906	314883	314884	314905	314906

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 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. The waiting periods can be calculated using the r.m.s. current method (I^2xt), 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 √2 that of the power supply.
⑤ FFR-DU08: IP40 (except for the PU connector section)
⑥ The values displays the maximum possible heat dissipation. Please consider this values during setup of the cabinet.
⑦ For the power voltage exceeding 480 V, set Pr. 977 Input voltage mode selection.
⑧ The mass is the total mass of all frequency inverters during the parallel operation.
⑨ 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).
⑩ 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)
⑪ 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 √2.
⑫ The mass is the total mass of all frequency inverters during the parallel operation.

Technical details FR-A820-00046 to -00770

Product line				FR-A820-□-E1-N6										
				00046	00077	00105	00167	00250	00340	00490	00630	00770	00930	01250
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
		150 % overload capacity (LD)		0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.0	22	30
		200 % overload capacity (ND)		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15.0	18.5	22
		250 % overload capacity (HD)		0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11.0	15	18.5
	Rated current A	120 % overload capacity (SLD)	I rated	4.6	7.7	10.5	16.7	25.0	34.0	49.0	63.0	77.0	93	125
			I max. 60 s	5.1	8.5	11.5	18.4	27.5	37.4	53.9	69.3	84.7	102.3	137.5
			I max. 3 s	5.5	9.3	12.6	20.0	30.0	40.8	58.8	75.6	92.4	111.6	150
		150 % overload capacity (LD)	I rated	4.2	7.0	9.6	15.2	23.0	31.0	45.0	58.0	70.5	85	114
			I max. 60 s	5.0	8.4	11.5	18.2	27.6	37.2	54.0	69.6	84.6	102	136.8
			I max. 3 s	6.3	10.5	14.4	22.8	34.5	46.5	67.5	87.0	105.8	127.5	171
		200 % overload capacity (ND)	I rated	3.0	5.0	8.0	11.0	17.5	24.0	33.0	46.0	61.0	76	90
			I max. 60 s	4.5	7.5	12.0	16.5	26.3	36.0	49.5	69.0	91.5	114	135
			I max. 3 s	6.0	10.0	16.0	22.0	35.0	48.0	66.0	92.0	122.0	152	180
		250 % overload capacity (HD)	I rated	1.5	3.0	5.0	8.0	11.0	17.5	24.0	33.0	46.0	61	76
			I max. 60 s	3	6.0	10.0	16.0	22.0	35.0	48.0	66.0	92.0	122	152
			I max. 3 s	3.8	7.5	12.5	20.0	27.5	43.8	60.0	82.5	115.0	152.5	190
	Rated output capacity ② kVA	SLD		1.8	2.9	4.0	6.4	10.0	13.0	19.0	24.0	29.0	35	48
		LD		1.6	2.7	3.7	5.8	8.8	12.0	17.0	22.0	27.0	32	43
		ND		1.1	1.9	3.0	4.2	6.7	9.1	13.0	18.0	23.0	29	34
		HD		0.6	1.1	1.9	3.0	4.2	6.7	9.1	13.0	18.0	23	29
	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 kVA	SLD		2.0	3.4	5.0	7.5	12.0	17.0	24.0	31.0	37.0	44.0	58.0
		LD		1.9	3.2	4.7	7.0	11.0	16.0	22.0	29.0	35.0	41.0	53.0
		ND		1.5	2.4	4.0	5.4	8.6	13.0	17.0	23.0	30.0	37.0	43.0
		HD		0.9	1.5	2.4	4.0	5.4	8.6	13.0	17.0	23.0	30.0	37.0
Others	Cooling			Self cooling		Fan cooling								
	Protective structure ⑧			Enclose type IP20										
	Max. heat dissipation ⑨ kW	SLD		0.06	0.095	0.14	0.20	0.31	0.355	0.525	0.57	0.77	0.95	1.0
		LD		0.055	0.085	0.13	0.185	0.285	0.32	0.48	0.515	0.7	0.85	0.95
		ND		0.04	0.06	0.11	0.13	0.19	0.24	0.35	0.37	0.59	0.72	0.88
		HD		0.03	0.04	0.07	0.1	0.135	0.16	0.23	0.28	0.45	0.6	0.84
	Weight		kg	2.0	2.2	3.3	3.3	3.3	6.7	6.7	8.3	15	15.0	15.0
	Dimensions (WxHxD)		mm	110x310x 112	110x310x 127	150x318x141.6			220x324x170 220x363x190			250x517x190		
Order information ⑩			Art. no.	297613	297614	297615	297616	297617	297618	297619	297620	297621	297622	297623

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 (I^2xt), 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 a 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 FR-DU08: IP40 (except for the PU connector)
⑨ The values displays the maximum possible heat dissipation. Please consider this values during setup of the cabinet.
⑩ All inverters with circuit board coating (IEC60721-3-3 3C2/3S2)

Technical details FR-A820-00930 to -04750

Product line				FR-A820-□-E1-60				FR-A820-□-E1-U6	
				01540	01870	02330	03160	03800	04750
Output	Rated motor capacity ① kW	120 % overload capacity (SLD)		37	45	55	75	90/110	132
		150 % overload capacity (LD)		37	45	55	75	90	110
		200 % overload capacity (ND)		30	37	45	55	75	90
		250 % overload capacity (HD)		22	30	37	45	55	75
	Rated current ③ A	120 % overload capacity (SLD)	I rated	154	187	233	316	380	475
			I max. 60 s	169.4	205.7	256.3	347.6	418	522.5
			I max. 3 s	184.8	246.8	279.6	379.2	456	570
		150 % overload capacity (LD)	I rated	140	170	212	288	346	432
			I max. 60 s	168	204	257.4	345.6	415.2	518.4
			I max. 3 s	210	255	318	432	519	648
		200 % overload capacity (ND)	I rated	115	145	175	215	288	346
			I max. 60 s	172.5	217.5	262.5	322.5	432	519
			I max. 3 s	230	290	350	430	576	692
		250 % overload capacity (HD)	I rated	90	115	145	175	215	288
			I max. 60 s	180	230	290	350	430	576
			I max. 3 s	225	287.5	362.5	437.5	537.5	720
	Rated output capacity ② kVA	SLD		59	71	89	120	145	181
		LD		53	65	81	110	132	165
		ND		44	55	67	82	110	132
		HD		34	44	55	67	82	110
	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 (max. ambient temperature 50 °C) – inverse time characteristics					
	Voltage ⑤			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 ⑥	Regenerative		20 % torque/continuous				10 % torque/continuous	
		With FR-ABR option		—					
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 kVA	SLD		70	84	103	120	145	181
		LD		68	79	97	110	132	165
		ND		57	69	82	101	110	132
		HD		43	57	69	82	82	110
Others	Cooling			Fan cooling					
	Protective structure ⑧			Open type (IP00)					
	Max. heat dissipation ⑨ kW	SLD		1.45	1.65	2.12	2.75	3.02	3.96
		LD		1.3	1.48	1.9	2.45	2.71	3.53
		ND		1.05	1.27	1.61	1.83	2.18	2.7
		HD		0.88	1.05	1.3	1.45	1.7	2.22
	Weight		kg	22.0	42.0	42.0	54.0	74.0	74.0
	Dimensions (WxHxD)		mm	325x550x195	435x550x250		465x700x250	465x740x360	
Order information			Art. no.	297624	297625	297626	297627	297628	297629

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 (I^2xt), 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 √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 a 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 FR-DU08: IP40 (except for the PU connector)
⑨ The values displays the maximum possible heat dissipation. Please consider this values during setup of the cabinet.

Attention: Mandatory DC choke need to be ordered seperately if 75 kW motor or bigger is connected. Please select the mandatory choke on page 87.

Technical details FR-A860-00027 to -00450

Product line				FR-A860-□-1-N6/-E1-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
Others	Cooling			Self-cooling	Fan cooling				
	Protective structure ⑩			Enclosed type (UL type 1 plenum rated) ⑧ ⑨			Enclosed type (UL type 1 plenum rated) ⑧		
	Max. heat dissipation ⑪ kW	SLD		0.065	0.115	0.16	0.27	0.51	0.68
		LD		0.060	0.105	0.145	0.25	0.41	0.61
		ND		0.045	0.075	0.11	0.185	0.32	0.48
		HD		0.035	0.055	0.075	0.14	0.23	0.34
	Weight		kg	5.3	5.8	5.8	7	9	17
	Dimensions (WxHxD)		mm	150x318x140			220x324x170	220x363x190	250x517.3x190

Order information	Art. no.							
		-1-N6	286057	286058	286059	286060	286061	286062
		-E1-N6	500426	500427	500428	500429	500430	500431

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 575 V.
③ 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 carries frequency is automatically lowered. The motor noise becomes louder accordingly.
④ 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.
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 √2 that of the power supply.
⑥ Value by the built-in brake resistor.
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 UL Type 1 Enclosure - Suitable for Installation in a Compartment Handling Conditioned Air (Plenum)
⑨ When an provided brake resister is used, the protective structure is open type (NEMA 1).
⑩ FR-DU08: IP40 (except for the PU connector)
⑪ The values displays the maximum possible heat dissipation. Please consider this values during setup of the cabinet.

Please note that these products bear no CE marking and must not be operated within the EU.

Technical details FR-A860-00680 to -04420

Product line				FR-A860-□-1-60/ -E1-60							
				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							
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		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
Others	Cooling			Fan cooling							
	Protective structure ⑧⑨⑩			Open type IP00							
	Max. heat dissipation ⑪ kW	SLD		0.98	1.45	2	2.4	3.4	3.6	4.3	5.5
		LD		0.88	1.3	1.8	2.2	3.1	3.2	3.9	5
		ND		0.77	1.08	1.5	1.8	2.2	2.6	3.2	3.7
		HD		0.56	0.80	1.2	1.5	1.8	1.9	2.4	2.9.
	Weight		kg	36	41	52	52	55	112	115	153
	Dimensions (WxHxD)		mm	432x550x250		465x620x300			498x1010x380		680x1010x380

Order information	Art. no.								
		-1-60	286063	286064	286065	286066	286067	286068	286069	286070
		-E1-60	500472	500473	500474	500475	500476	500477	500478	500479

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 575 V.
③ 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 carries frequency is automatically lowered. The motor noise becomes louder accordingly.
④ 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.
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 √2 that of the power supply.
⑥ Value by the built-in brake resistor.
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 UL Type 1 Enclosure - Suitable for Installation in a Compartment Handling Conditioned Air (Plenum)
⑨ When an provided brake resister is used, the protective structure is open type (NEMA 1).
⑩ FR-DU08: IP40 (except for the PU connector)
⑪ The values displays the maximum possible heat dissipation. Please consider this values during setup of the cabinet.

Please note that these products bear no CE marking and must not be operated within the EU.

Technical details FR-A862-05450 to -08500

The FR-A862 frequency inverters must be operated together with an FR-CC2 converter unit, which must be ordered separately.

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 ③ 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 ② 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 %		
Others	Cooling			Fan cooling		
	Protective structure ⑩			Open type (IP00) ⑧ ⑨		
	Max. heat dissipation ⑪ kW	SLD		4.8	5.6	7.7
		LD		4.3	5.1	7.0
		ND		3.35	4.3	5.8
		HD		2.25	3.3	5.1
	Weight		kg	163	163	243
	Dimensions (WxHxD)		mm	540x1330x440	680x1580x440	
Order information			Art. no.	286240	286241	286242

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 DC5		
	Regenerative braking torque		10 % torque/continuous		
Input	Power supply voltage		3-phase, 525–600 V AC, -15 %/+10 %		
	Voltage range		472–660 V AC at 60 Hz		
	Power supply frequency		60 Hz ±5 %		
	Rated input capacity ③ kVA	SLD	543	644	847
		LD	494	587	770
		ND	400	494	660
		HD	303	400	587
Others	Cooling		Fan cooling		
	DC chokes		Built-in		
	Protective structure ④		Open type (IP00)		
	Weight	kg	205	255	269
	Dimensions (WxHxD)	mm	600x1330x440	600x1580x440	
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 √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 FR-DU08: IP40 (except for the PU connector section)
⑤ 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)

Technical details FR-A870-00550 to -07150

Product line				FR-A870-□-E2-60/-E2-60B/-E2-06B					FR-A872-□-E2-60/-E2-60B		
				00550	00660	00890	02300	02860	05690	06470	07150
Output	Rated motor capacity ① kW	120 % overload capacity (SLD)		45	55	75	200	250	500	560	630
		200 % overload capacity (ND)		37	45	55	160	200	450	500	560
	Rated current ③ A	120 % overload capacity (SLD)	I rated	55	66	89	230	286	569	647	715
			I max. 60 s	61	73	98	253	314	626	712	787
			I max. 3 s	66	79	107	276	343	683	776	858
		200 % overload capacity (ND)	I rated	46	55	66	185	230	512	569	647
			I max. 60 s	69	83	99	276	345	768	854	971
			I max. 3 s	92	110	132	370	460	1024	1138	1294
	Rated output capacity ② kVA		SLD	66	79	106	275	342	680	773	855
			ND	55	66	79	221	275	612	680	773
	Overload capacity ④		SLD	110 % of rated motor capacity for 60 s; 120 % for 3 s (max. ambient temperature 40 °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							
	Voltage ⑤			3-phase AC, 525–690 V to power supply voltage							
	Frequency range			50 Hz/60 Hz ±5%							
	Control method			V/f; advanced magnetic flux vector, real sensorless vector (RSV), closed loop vector, PM sensorless vector control							
	Brake transistor			—							
	Maximum brake torque			20 % torque/100 % ED							
Input	Voltage			3-phase 600–690 V AC 50 Hz/60 Hz							
	Voltage range			540–759 V AC							
	Power supply frequency			50 Hz/60 Hz ±5 %							
	Rated input current ⑥ A		SLD	55	66	89	230	286	569	647	715
			ND	46	55	66	185	230	512	569	647
	Rated input capacity ⑦ kVA		SLD	66	79	106	275	342	—	—	—
			ND	55	66	79	221	275	—	—	—
Others	Cooling			Fan cooling							
	Protective structure ⑧			Open type (IP20)							
	Max. heat dissipation ⑨ kW		SLD	0.9	1.0	1.4	3.7	4,6	5.1	5.8	6.4
			ND	0.6	0.7	0.9	3.0	3,7	4.6	5.1	5.8
	Weight kg			54	56	59	120	122	186		
	Dimensions (WxHxD) mm			251x753x410			380x900x410		240x1600x565		

Order information	Art. no.									
		-E2-60	406262	406263	406264	404451	404672	406273	406274	406275
		-E2-60B	406376	406377	406378	406393	406394	—	—	—
		-E2-06B	—	—	—	416516	416517	—	—	—

Remarks:
① The rated output capacity indicated assumes that the output voltage is 690 V AC. (ND) is initial setting
② The rated output capacity indicated assumes that the output voltage is 690 V AC.
③ The PWM carrier frequency is automatically decreased to 2 kHz for heavy duty applications when operating the motor under Real sensorless vector control or Vector control with a PWM carrier frequency of 6 kHz or more (Pr.72 ≥ 6). The carrier frequency stays at 4 kHz in fast-response operation.
④ 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.
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 √2 that of the power supply.
⑥ 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.
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 FR-DU08: IP40 (except for the PU connector)
⑨ The values displays the maximum possible heat dissipation. Please consider this values during setup of the cabinet.

Technical details FR-A870-03590 to -0460 Liquid Cooled

Product line					FR-A870-□-2-60LC/-E2-60LC	
					03590	04560
Output	Rated motor capacity ①	kW	120 % overload capacity (SLD)		315	400
			200 % overload capacity (ND)		280	355
	Rated current ③	A	120 % overload capacity (SLD)	I rated	359	456
				I max. 60 s	394	501
				I max. 3 s	430	547
			200 % overload capacity (ND)	I rated	320	405
				I max. 60 s	480	607
				I max. 3 s	640	810
	Rated output capacity ②	kVA		SLD	429	545
				ND	359	456
	Overload capacity ④			SLD	110 % of rated motor capacity for 60 s; 120 % for 3 s (max. ambient temperature 40 °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	
	Voltage ⑤				3-phase AC, 600–690 V to power supply voltage	
	Frequency range				50 Hz/60 Hz ±5%	
	Control method				V/f; advanced magnetic flux vector, real sensorless vector (RSV), closed loop vector, PM sensorless vector control	
	Bremstransistor				—	
	Maximales Bremsmoment				20 % torque/100 % ED	
Input	Voltage				3-phase 600–690 V AC 50 Hz/60 Hz	
	Voltage range				525–759 V AC	
	Power supply frequency				50 Hz/60 Hz ±5 %	
	Rated input current ⑥	A		SLD	359	456
				ND	320	405
	Rated input capacity ⑦	kVA		SLD	429	545
				ND	382	484
Others	Cooling				Liquid cooling and fan cooling	
	Protective structure ⑧				Open type (IP20)	
	Max. heat dissipation ⑨	kW		SLD	6.15	6.85
				ND	5.55	7.65
	Weight			kg	212	
	Dimensions (WxHxD)			mm	675x1551x440	

Order information	Art. no.			
		-2-60LC	404673	404674
		-E2-60LC	412429	412430

Remarks:
① The rated output capacity indicated assumes that the output voltage is 690 V AC. (ND) is initial setting
② The rated output capacity indicated assumes that the output voltage is 690 V AC.
③ The PWM carrier frequency is automatically decreased to 2 kHz for heavy duty applications when operating the motor under Real sensorless vector control or Vector control with a PWM carrier frequency of 6 kHz or more (Pr.72 ≥ 6). The carrier frequency stays at 4 kHz in fast-response operation.
④ 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.
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 √2 that of the power supply.
⑥ 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.
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 FR-DU08: IP40 (except for the PU connector)
⑨ The values displays the maximum possible heat dissipation. Please consider this values during setup of the cabinet.

Common specifications FR-A800

FR-A840			Description
Control specifications	Frequency setting resolution	Analog input	0.015 Hz/0–50 Hz (terminal 2, 4: 0–10 V/12 bit) 0.03 Hz/0–50 Hz (terminal 2, 4: 0–5 V/11 bit, 0–20 mA/11 bit, terminal 1: -10–+10 V/12 bit) 0.06 Hz/0–50 Hz (terminal 1: 0–±5 V/11 bit)
		Digital input	0.01 Hz
	Frequency accuracy		0.2 % of the maximum output frequency (temperature range 25 °C ±10 °C) via analog input; ±0.01 % of the set output frequency (via digital input)
	Voltage/frequency characteristics		Base frequency adjustable from 0 to 590 Hz; selection between constant torque, variable torque or optional flexible 5-point V/f characteristics
	Starting torque		200 % 0.3 Hz (0.4–3.7 kVA), 150 % 0.3 Hz (5.5 kVA or more) (under real sensorless vector control or vector control)
	Torque boost		Manual torque boost
	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.
	Stall prevention operation level		Operation current level can be set (0–220 % adjustable), whether to use the function or not can be selected
	Motor protection		Electronic motor protection relay (rated current user adjustable)
	Torque limit level		Torque limit value can be set (0–400 % variable)
Control signals for operation	Frequency setting values	Analog input	Terminal 2, 4: 0–5 V DC, 0–10 V DC, 0/4–20 mA Terminal 1: 0–±5 V DC, 0–±10 V DC
		Digital input	Input using the setting dial of the parameter unit Four-digit BCD or 16 bit binary (when used with option FR-A8AX)
	Start signal		Available individually for forward rotation and reverse rotation. Start signal automatic self-holding input (3-wire input) can be selected.
	Input signals	Common	Low-speed operation command, middle-speed operation command, high-speed operation command, second function selection, terminal 4 input selection, JOG operation selection, electronic bypass function ④, selection of automatic restart after instantaneous power failure ⑤, flying start ⑤, output stop, start self-holding selection, forward rotation command, reverse rotation command, inverter reset The input signal can be changed using Pr. 178 to Pr. 189 (input terminal function selection).
		Pulse train input	100 kpps
		Operating status	Maximum and minimum frequency settings, multi-speed operation, acceleration/deceleration pattern, thermal protection, DC injection brake, starting frequency, JOG operation, output stop (MRS), stall prevention, regeneration avoidance, increased magnetic excitation deceleration, DC feeding ④, frequency jump, rotation display, automatic restart after instantaneous power failure, electronic bypass sequence, remote setting, automatic acceleration/deceleration, intelligent mode, retry function, carrier frequency selection, fast-response current limit, forward/reverse rotation prevention, operation mode selection, slip compensation, droop control, load torque high-speed frequency control, speed smoothing control, traverse, auto tuning, applied motor selection, gain tuning, machine analyzer ①④, RS485 communication, PID control, PID pre-charge function, easy dancer control, cooling fan operation selection, stop selection (deceleration stop/coasting), power-failure deceleration stop function ④, stop-on-contact control, PLC function, life diagnosis, maintenance timer, current average monitor, multiple rating, orientation control ①, speed control, torque control, position control, pre-excitation, torque limit, test run, 24 V power supply input for control circuit, safety stop function, vibration control ⑥, swinging suppression control ⑦
	Output signal	Open collector output (five terminals) Relay output (two terminals)	Inverter running, up to frequency, instantaneous power failure/undervoltage ④, overload warning, output frequency detection, fault Fault codes of the inverter can be output (4 bits) from the open collector.
Indication	For meter	Current output	Max. 20 mA DC: one terminal (output current) The monitored item can be changed using Pr. 54 FM/CA terminal function selection.
		Voltage output	Max. ±10 V DC: one terminal (output voltage) The monitored item can be changed using Pr. 158 AM terminal function selection.
	Operation panel (FR-DU08)	Operating status	Output frequency, output current, output voltage, frequency setting value The monitored item can be changed using Pr. 52 Operation panel main monitor selection.
		Fault record	Fault record is displayed when a fault occurs. Past 8 fault records and the conditions immediately before the fault (output voltage/current/frequency/cumulative energization time/year/month/date/time) are saved.
Protection	Protective functions		Overcurrent trip during acceleration, overcurrent trip during constant speed, overcurrent trip during deceleration or stop, regenerative overvoltage trip during acceleration, regenerative overvoltage trip during constant speed, regenerative overvoltage trip during deceleration or stop, inverter overload trip (electronic thermal relay function), motor overload trip (electronic thermal relay function), heatsink overheat, instantaneous power failure ④, undervoltage ④, input phase loss ②④, stall prevention stop, loss of synchronism detection ②, brake transistor alarm detection ④, output side earth (ground) fault overcurrent, output short circuit ⑦, output phase loss, external thermal relay operation ②, PTC thermistor operation ②, option fault, communication option fault, parameter storage device fault, PU disconnection, retry count excess ②, CPU fault, operation panel power supply short circuit/RS485 terminals power supply short circuit, 24 V DC power fault, abnormal output current detection ②, inrush current limit circuit fault ④, communication fault (inverter), analog input fault, USB communication fault, safety circuit fault ⑥, overspeed occurrence ②, speed deviation excess detection ①②, signal loss detection ①②, excessive position fault ①②, brake sequence fault ②, encoder phase fault ①②, 4 mA input fault ②, pre-charge fault ②, PID signal fault ②, option fault, opposite rotation deceleration fault ②, internal circuit fault, abnormal internal temperature ③④⑥
	Warning function		Fan alarm, stall prevention (overcurrent), stall prevention (overvoltage), regenerative brake pre-alarm ②④, electronic thermal relay function pre-alarm, PU stop, speed limit indication (output during speed limit) ②, parameter copy, safety stop ⑦ maintenance signal output ②④, maintenance timer 1 to 3 ②⑤, USB host error, home position return setting error ②, home position return uncompleted ②, home position return parameter setting error ②, operation panel lock ②, password locked ②, parameter write error, copy operation error, 24 V external power supply operation, internal-circulation fan alarm ③④
Others	Surrounding air temperature		-10 °C to +50 °C
	Storage temperature ⑧		-20 °C to +65 °C

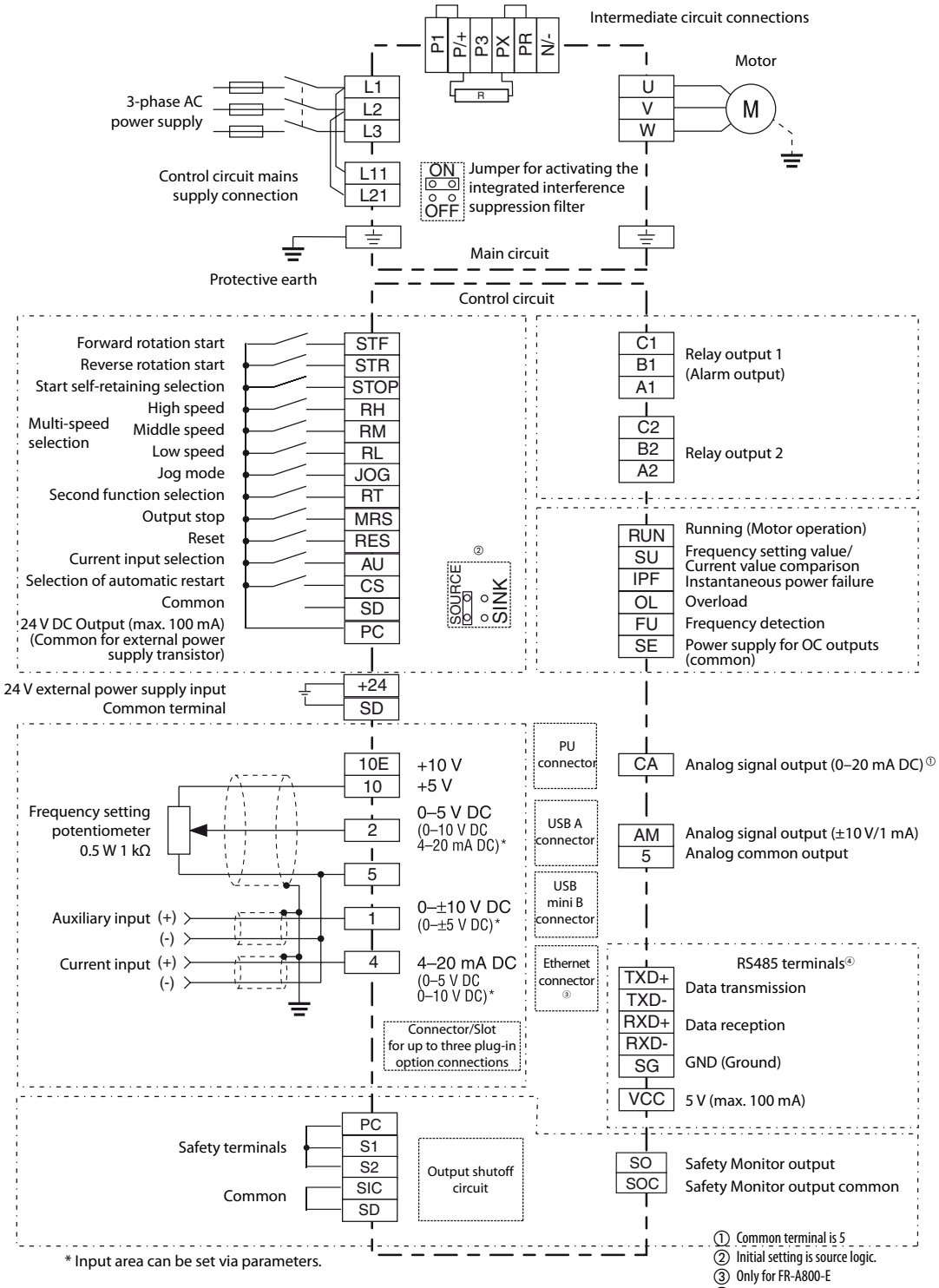
Remarks:
① Available only when the option (FR-A8AP) is mounted.
② This protective function is not available in the initial status.
③ For PM sensorless vector control.
④ Not for A842
⑤ Only for A842
⑥ Not for A860
⑦ Only for A860
⑧ Temperature applicable for a short time, e. g. in transit.

Common specifications FR-CC2

FR-CC2		Description
Input signals (three terminals)		External thermal relay input, converter reset The input signal can be changed using Pr.178, Pr.187, and Pr.189 (input terminal function selection).
Operational functions		Thermal protection, DC injection brake, automatic restart after instantaneous power failure, retry function, RS485 communication, life diagnosis, maintenance timer, 24 V power supply input for control circuit
Output signal, open collector output (five terminals) Relay output (one terminal)		Inverter operation enable (positive logic, negative logic), instantaneous power failure/undervoltage, inverter reset, fan fault output, fault The output signal can be changed using Pr.190 to Pr.195 (output terminal function selection).
Operation panel (FR-DU08)	Operating status	Converter output voltage, input current, electric thermal relay function load factor The monitored item can be changed using Pr.774 to Pr.776 operation panel monitor selection 1 to 3.
	Fault record	Fault record is displayed when a fault occurs. Past 8 fault records and the conditions immediately before the fault (converter output voltage/input current/electronic thermal relay function load factor/cumulative energization time/year/month/date/time) are saved.
Protective/warning function	Protective function	Overcurrent trip, overvoltage trip, converter overload trip (electronic thermal relay function), heatsink overheat, instantaneous power failure, under-voltage, input phase loss ③, external thermal relay operation, PU disconnection③, retry count excess③, parameter storage device fault, CPU fault, 24 V DC power fault, inrush current limit circuit fault, communication fault (inverter), option fault, operation panel power supply short circuit RS485 terminals power supply short circuit, Internal circuit fault
	Warning function	Fan alarm, electronic thermal relay function pre-alarm, maintenance timer 1 to 3 ③, operation panel lock ③, password locked ③, parameter write error, copy operation error, 24 V external power supply operation
Environment	Surrounding air temperature	FR-CC2-H315K–H560K: -10 °C to +50 °C (non-freezing) FR-CC2-H630K: -10 °C to +40 °C (non-freezing)
	Surrounding air humidity	With IEC60721-3-3 3C2/3S2 conforming circuit board coating: 95 % RH or less (non-condensing) With standard circuit board coating: 90 % RH or less (non-condensing)
	Storage temperature ①	-20 °C to +65 °C
	Atmosphere	Indoors (without corrosive gas, flammable gas, oil mist, dust and dirt, etc.)
	Altitude/vibration	Maximum 1000 m above sea level, 2.9 m/s^2 or less ② at 10 to 55 Hz (directions of X, Y, Z axes)

Remarks:
① Temperature applicable for a short time, e. g. in transit.
② For the installation in an altitude above 1000 m (up to 2500 m), derate the rated current 3 % per 500 m.
③ This protective function is not available in the initial status.

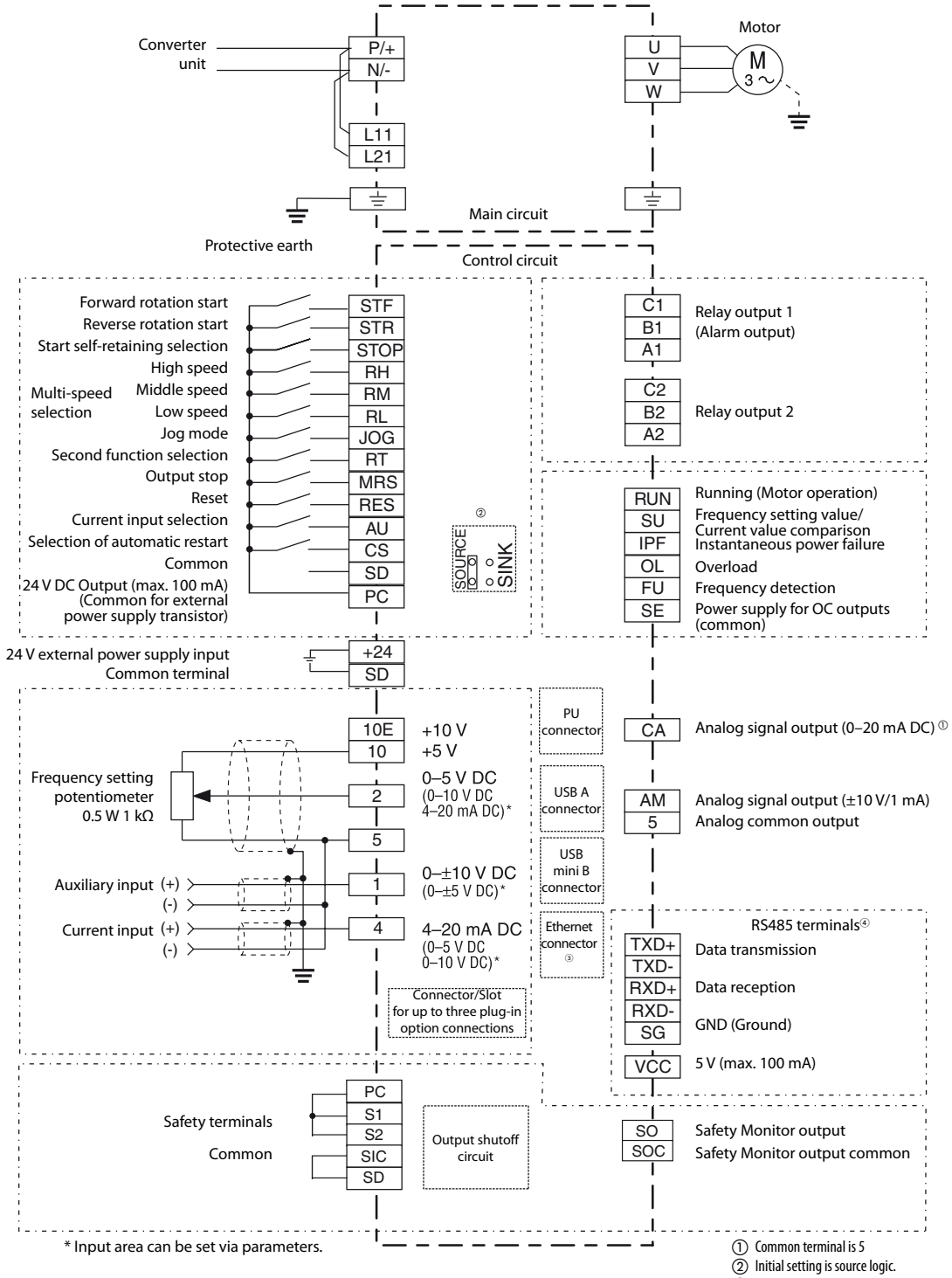
Block diagram FR-A800



Assignment of main circuit terminals

Function	Terminal	Designation	Description
Main circuit connection	L1, L2, L3	Mains supply connection	Mains power supply of the inverters (FR-A820: 200–240 V AC, 50/60 Hz); (FR-A840: 380–500 V AC, 50/60 Hz)
	P/+, PR	Brake resistor connection FR-ABR	FR-A820-00046–00490/FR-A840-00023–00250
	P3, PR		FR-A820-00770–01250/FR-840-00470–01800
	P/+, N/-	Brake unit connection	Connect the brake unit (FR-BU, BU), power regeneration common converter (FR-CV), Harmonic Converter (FR-HC and MT-HC) or power regeneration converter (MTRC).
	P/+, P1	DC choke connection	An optional DC choke can be connected to the terminals P1 and P/+. The jumper on terminals P1 and P/+ must be removed when this optional choke is used on frequency inverter models FR-A820-03160 or lower and FR-A840-01800 or lower. When using a motor with 75 kW or higher, always connect a mandatory DC choke. The DC choke must be installed on frequency inverter models FR-A820-03800 or higher and FR-A840-02160 or higher.
	PR, PX	Built-in brake circuit connection	When the jumper is connected across terminals PR and PX (initial status), the built-in brake resistor circuit is valid.
	U, V, W	Motor connection	Voltage output of the inverter (3-phase, 0 V up to power supply voltage, 0.2–590 Hz)
	L11, L21	Power supply for control circuit	To use external power for the control circuit connect the mains power to L11/L21 (and remove jumpers L1 and L2).
	⏚	PE	Protective earth connection of inverter

Block diagram FR-A842



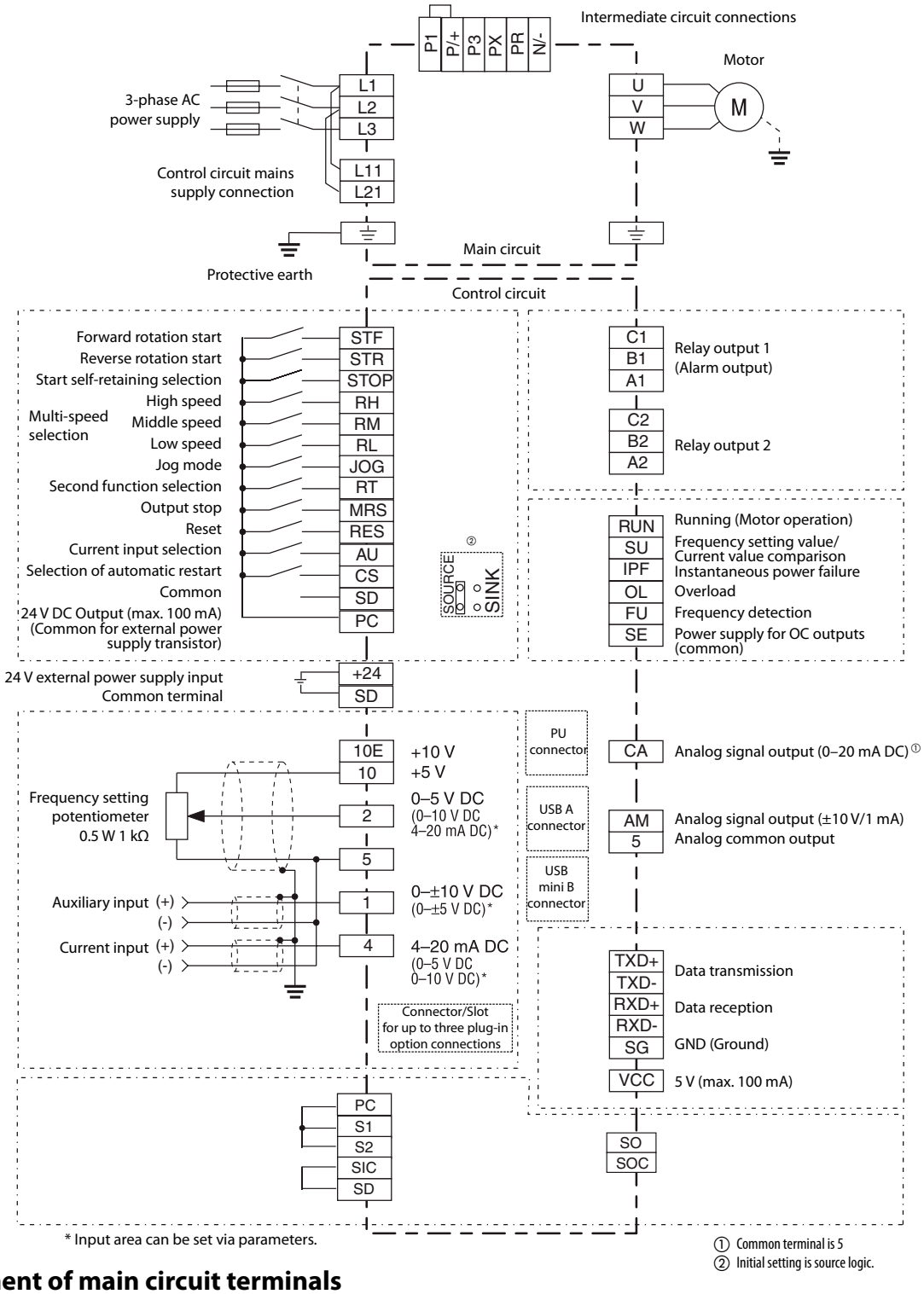
* Input area can be set via parameters.

① Common terminal is 5
② Initial setting is source logic.
③ Only for FR-A800-E
④ Not for FR-A800-E
If a 2nd serial interface is required, remove the initial installed Ethernet board and install the FR-A8ERS option board.

Assignment of main circuit terminals

Function	Terminal	Designation	Description
Main circuit connection	P/+, N/-	Converter unit connection	Connect the converter unit FR-CC2.
	U, V, W	Motor connection	Voltage output of the inverter (3-phase, 0 V up to power supply voltage, 0.2–590 Hz)
	L11, L21	Power supply for control circuit	The voltage for separate power supply of the control circuit is 380 to 480 V AC, 50/60 Hz.
	⏚	PE	Protective earth connection of inverter

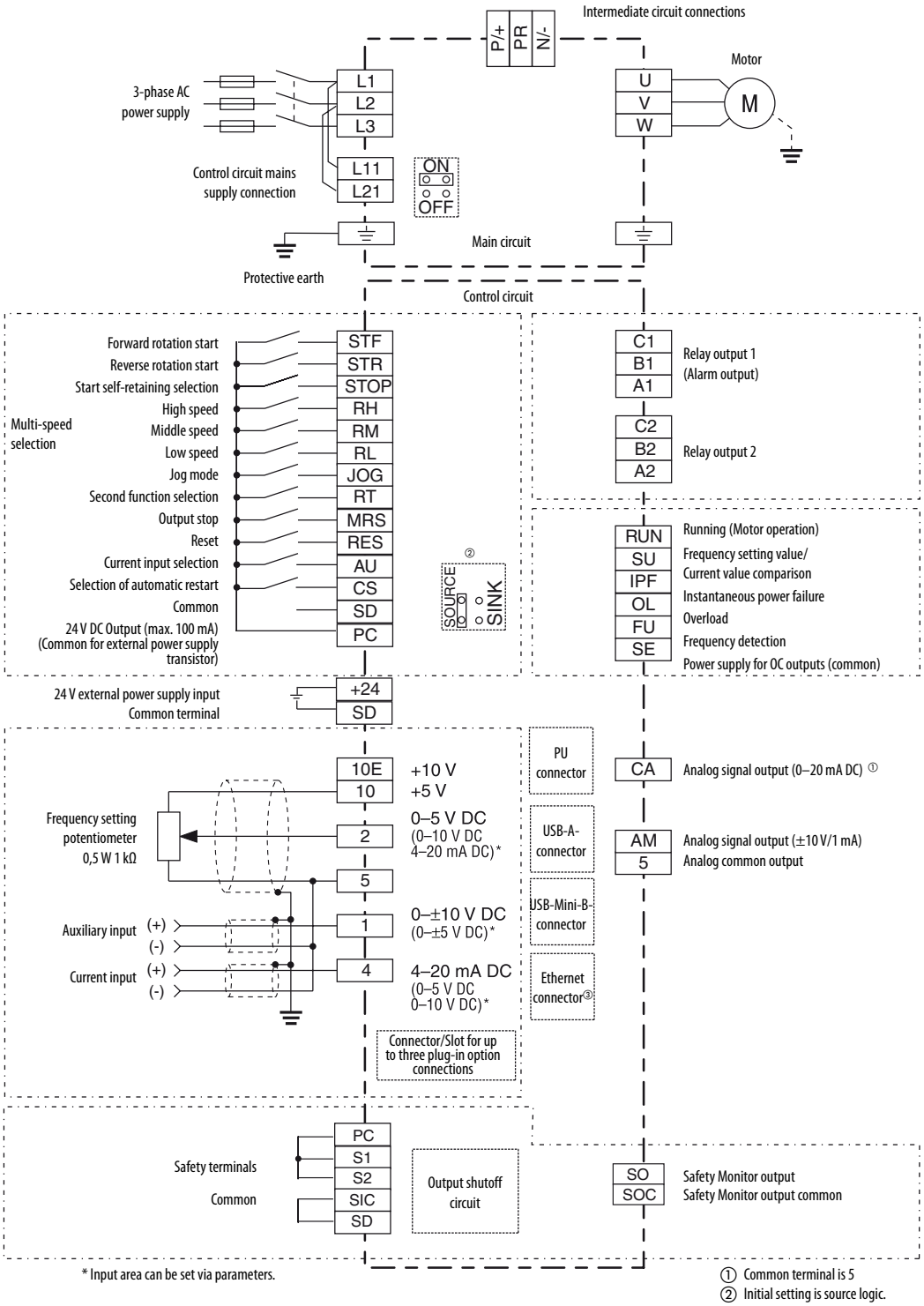
Block diagram FR-A860



Assignment of main circuit terminals

Function	Terminal	Designation	Description
Main circuit connection	L1, L2, L3	Mains supply connection	Mains power supply of the inverters
	P/+, PR P3, PR	Brake resistor connection FR-ABR	A brake resistor is provided with the FR-A860-00090 or lower. Connect the provided brake resistor to terminals P3 and PR as required.
	P/+, N/-	Brake unit connection	A brake unit can be connected.
	P/+, P1	DC choke connection	An optional DC choke can be connected to the terminals P1 and P/+. The jumper on terminals P1 and P/+ must be removed when this optional choke is used on frequency inverter models FR-A860-1080 or lower. When using a motor with 75 kW or higher, always connect a mandatory DC choke. The DC choke must be installed on frequency inverter models FR-A860-01440 or higher.
	PR, PX	Built-in brake circuit connection	When the jumper is connected across terminals PR and PX (initial status), the built-in brake resistor circuit is valid.
	U, V, W	Motor connection	Voltage output of the inverter (3-phase, 0 V up to power supply voltage, 0.2–590 Hz)
	L11, L21	Power supply for control circuit	To use external power for the control circuit connect the mains power to L11/L21 (and remove jumpers L1 and L2).
	⏚	PE	Protective earth connection of inverter

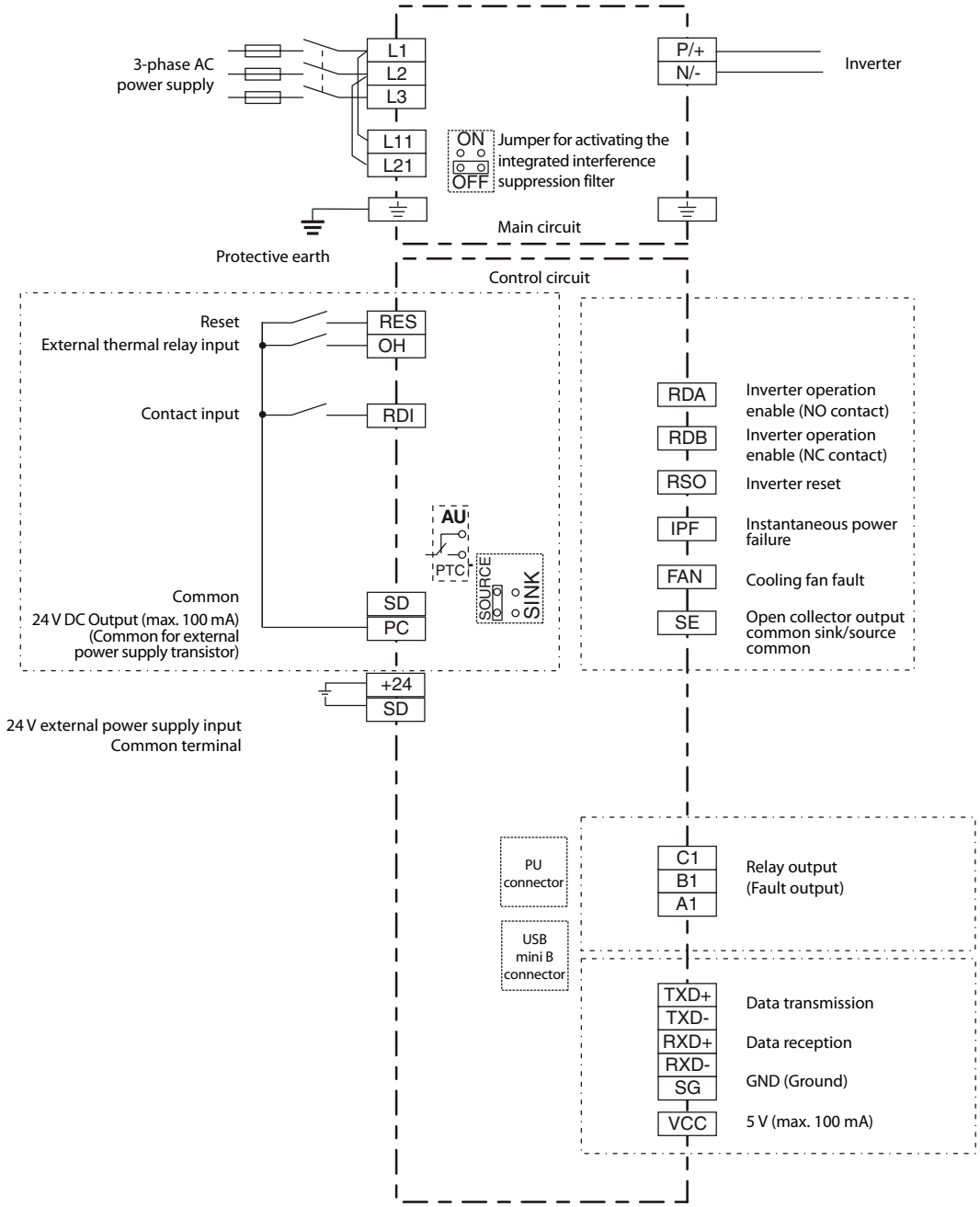
Block diagram FR-A870



Assignment of main circuit terminals

Function	Terminal	Designation	Description
Main circuit connection	L1, L2, L3	Mains supply connection	Mains power supply of the inverter
	P/+, PR	Brake resistor connection FR-ABR	A brake resistor is provided with the FR-A860-00090 or lower. Connect the provided brake resistor to terminals P3 and PR as required.
	P/+, N/-	Brake unit connection	A brake unit can be connected.
	P/+, P1	DC choke connection	An optional DC choke can be connected to the terminals P1 and P/+. The jumper on terminals P1 and P/+ must be removed when this optional choke is used on frequency inverter models FR-A860-1080 or lower. When using a motor with 75 kW or higher, always connect a mandatory DC choke. The DC choke must be installed on frequency inverter models FR-A860-01440 or higher.
	PR, PX	Built-in brake circuit connection	When the jumper is connected across terminals PR and PX (initial status), the built-in brake resistor circuit is valid.
	U, V, W	Motor connection	Voltage output of the inverter (3-phase, 0 V up to power supply voltage, 0.2–590 Hz)
	L11, L21	Power supply for control circuit	To use external power for the control circuit connect the mains power to L11/L21 (and remove jumpers L1 and L2).
	⏚	PE	Protective earth connection of inverter

Block diagram FR-CC2



Assignment of main circuit terminals

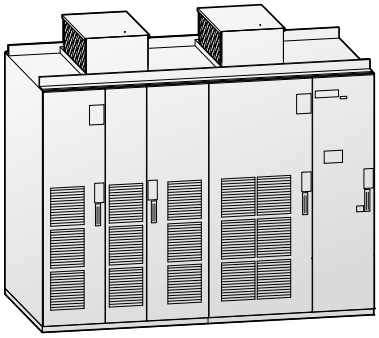
Function	Terminal	Designation	Description
Main circuit connection	L1, L2, L3	Mains supply connection	Mains power supply of the inverters (380–480 V AC, 50/60 Hz)
	L11, L21	Power supply for control circuit	To use external power for the control circuit connect the mains power to L11/L21 (and remove jumpers L1 and L2).
	P/+, N/-	Inverter connection	Connect to terminals P/+ and N/- of the inverter.
	⏚	PE	Protective earth connection of inverter

Assignment of signal terminals (FR-A800 and FR-CC2)

Function	Terminal	Designation	Description
Control connection (programmable)	STF	Forward rotation start	The motor rotates forward, if a signal is applied to terminal STF.
	STR	Reverse rotation start	The motor rotates reverse, if a signal is applied to terminal STR.
	STOP	Start self-retaining selection	The start signals are self-retaining, if a signal is applied to terminal STOP.
	RH, RM, RL	Multi-speed selection	Preset of 15 different output frequencies according to the combination of the RH, RM and RL signals.
	JOG	Jog mode selection	The JOG mode is selected, if a signal is applied to this terminal (factory setting). The start signals STF and STR determine the rotation direction.
		Pulse train input	The JOG terminal can be used as pulse train input terminal (parameter 291 setting needs to be changed)
	RT	Second parameter settings	A second set of parameter settings is selected, if a signal is applied to terminal RT.
	MRS	Output stop	The inverter lock stops the output frequency without regard to the delay time.
	RES	RESET input	An activated protective circuit is reset, if a signal is applied to the terminal RES (t >0.1 s).
	OH ①	External thermal relay input	The external thermal relay input (OH) signal is used when using an external thermal relay or a thermal protector built into the motor to protect the motor from overheating. When the thermal relay is activated, the inverter trips by the external thermal relay operation (E.OHT).
	RDI ①	Contact input	No function is assigned in the initial setting. The function can be assigned by setting Pr.178.
	AU	Current input selection	The 0/4–20 mA signal on terminal 4 is enabled by a signal on the AU terminal.
		PTC input	If you connect a PTC temperature sensor you must assign the PTC signal to the AU terminal and set the slide switch on the control circuit board to the PTC position.
	CS	Automatic restart after instanta-neous power failure	The inverter restarts automatically after a power failure, if a signal is applied to the terminal CS.
Common	SD	Reference potential (0 V) for the PC terminal (24 V)	Common terminal for contact input terminal (sink logic); Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the source logic to avoid malfunction by undesirable current. Common terminal for the 24 V DC power supply (terminal PC, terminal +24) Isolated from terminals 5 and SE.
	PC	24 V DC output	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the source logic to avoid malfunction by undesirable current. Common terminal for contact input terminal (source logic). Can be used as a 24 V DC 0.1 A power supply.
	+24	24 V external power supply input	For connecting a 24 V external power supply. If a 24 V external power supply is connected, power is supplied to the control circuit while the main power circuit is OFF.
Setting value specification	10 E	Voltage output for potentiometer	Output voltage 10 V DC. Max. output current 10 mA. Recommended potentiometer: 1 kΩ, 2 W linear
	10		Output voltage 5 V DC. Max. output current 10 mA. Recommended potentiometer: 1 kΩ, 2 W linear
	2	Input for frequency setting value signal	The setting value 0–5 V DC (or 0–10 V, 0/4–20 mA) is applied to this terminal. You can switch between voltage and current setpoint values with parameter 73. The input resistance is 10 kΩ.
	5	Frequency setting common and analog outputs	Terminal 5 provides the common reference potential (0 V) for all analog set point values and for the analog output signals CA (current) and AM (voltage). The terminal is isolated from the digital circuit's reference potential (SD). This terminal should not be grounded.
	1	Auxiliary input for frequency setting value signal 0–±5 (10) V DC	An additional voltage setting value signal of 0–±5 (10) V DC can be applied to terminal 1. The voltage range is preset to 0–±10 V DC. The input resistance is 10 kΩ.
	4	Input for setting value signal	The setting value 0/4–20 mA or 0–10 V is applied to this terminal. You can switch between voltage and current setpoint values with parameter 267. The input resistance is 250 Ω. The current setting value is enabled via terminal function AU.
Signal output (programmable)	A1, B1, C1	Potential free relay output 1 (Alarm)	The alarm is output via relay contacts. The block diagram shows the normal operation and voltage free status. If the protective function is activated, the relay picks up. The maximum contact load is 200 V AC/0.3 A or 30 V DC/0.3 A.
	A2, B2, C2	Potential free relay output 2	Any of the available 42 output signals can be used as the output driver. The maximum contact load is 230 V AC/0.3 A or 30 V DC/0.3 A.
	RUN	Signal output for motor operation	The output is switched low, if the inverter output frequency is equal to or higher than the starting frequency. The output is switched high, if no frequency is output or the DC brake is in operation.
	RDA ①	Inverter operation enable (NO contact)	The contact is closed when the converter unit is ready.
	RDB ①	Inverter operation enable (NC contact)	The contact is open when the converter unit has a fault or is resetted.
	RSO ①	Inverter reset (NO contact)	The contact is closed while the converter unit is resetting.
	SU	Signal output for frequency setting value/current value comparison	The SU output supports a monitoring of frequency setting value and frequency current value. The output is switched low, once the frequency current value (output frequency of the inverter) approaches the frequency setting value (determined by the setting value signal) within a preset range of tolerance.
	IPF	Signal output for instantaneous power failure	The output is switched low for a temporary power failure within a range of 15 ms ≤tIPF ≤100 ms or for under voltage.
	FAN ①	Cooling fan fault	Switched to LOW when a cooling fan fault occurs.
	OL	Signal output for overload alarm	The OL is switched low, if the output current of the inverter exceeds the current limit preset in parameter 22 and the stall prevention is activated. If the output current of the inverter falls below the current limit preset in parameter 22, the signal at the OL output is switched high.
	FU	Signal output for monitoring output frequency	The output is switched low once the output frequency exceeds a value preset in parameter 42 (or 43). Otherwise the FU output is switched high.
	SE	Reference potential for signal outputs	The potential that is switched via open collector outputs RUN, SU, OL, IPF and FU is connected to this terminal.
	CA	Analog current output	One of 18 monitoring functions can be selected, e. g. external frequency output. CA- and AM output can be used simultaneously. The functions are determined by parameters. — Output item: output frequency (initial setting), Load impedance: 200 Ω–450 Ω, output signal: 0–20 mA
	AM	Analog signal output 0–10 V DC (1 mA)	Output item: output frequency (initial setting), output signal 0–10 V DC, permissible load current 1 mA (load impedance ≥10 kΩ), resolution 8 bit
Interface	—	PU connector	A parameter unit can be connected. Communications via RS485 I/O standard: RS485, multi drop operation: max 1152 baud (overall length: 500 m)
	—	RS485 terminal (via RS485 terminal)	Communications via RS485; I/O standard: RS485, multi drop operation: max 1152 baud (overall length: 500 m)
	—	2 USB connectors (Conforms to USB1.1/USB2.0)	USB A connector: a USB memory device enables parameter copy, PLC code download and trace function. USB mini B connector: connected to a personal computer via USB to enable operations of the inverter by FR Configurator2.
Safety connection	S1, S2	Safety inputs	When the safety functions are not used, the existing jumpers between the terminals S1-PC, S2-PC and SIC-SD must not be removed, otherwise an operation of the frequency inverter is not possible.
	SIC	Reference potential for safety inputs	
	SO	Safety monitor output	
	SOC	Safety monitor output common	

① only for FR-CC2

TMdrive®-MVe2/MVG2 – Energy Saving Medium Voltage Inverter



TMdrive®-MVe2 and TMdrive®-MVG2 are AC frequency inverter for medium-voltage drives and provide highly efficient and energy-saving operation in a wide range of industrial applications. High reliability, low harmonic distortion, and operation with high power factor are the characteristics of these drive series. MVe2 is additionally characterized by a 100% ED regenerative capability, as well as reactive power compensation of the system.

Technical details MVe2

Product line			MVe2								
			3.3/3.0 kV								
Output	Rated capacity at 3.3 kV	kVA	200	300	400	600	800	950	1100	1300	1500
	Overload capacity	60 s	110 %								
	Rated current	A	35	53	70	105	140	166	192	227	263
	Rated motor capacity	kW	160	250	320	450	650	750	900	1000	1250
Cell frame			100			200		300		400	

Product line			MVe2			
			4.16 kV			
Output	Rated capacity at 4.16 kV	kVA	500	1000	1380	1890
	Overload capacity	60 s	110 %			
	Rated current	A	69	138	191	262
	Rated motor capacity	kW	400	810	1120	1600
Cell frame			100	200	300	400

Product line			MVe2										
			6.6/6.0 kV										
Output	Rated capacity at 6.6 kV	kVA	400	600	800	1000	1200	1400	1600	1900	2200	2600	3000
	Overload capacity	60 s	110 %										
	Rated current	A	35	53	70	87	105	122	140	166	192	227	262
	Rated motor capacity	kW	315	450	650	810	1000	1130	1250	1600	1800	2250	2500
Cell frame			100			200				300		400	

Product line			MVe2								
			10/11 kV								
Output	Rated capacity at 11 kV	kVA	660	990	1320	2000	2640	3080	3630	4290	5000
	Overload capacity	60 s	110 %								
	Rated current	A	35	53	70	105	139	162	191	226	263
	Rated motor capacity	kW	500	800	1000	1600	2040	2500	2800	3500	3860
Cell frame			100			200		300		400	

Common specifications MVe2

MVe2		Description
Output	Output frequency (Hz)	Rated output frequency of 50 or 60 Hz
	Overload capacity	110 % of rated current for 60 seconds
Input	Input voltage	3-phase, 3000, 3300, 4160, 6000, 6600, 10000, 11000 V, ±10 %,
	Frequency range	50/60 Hz ±5 %
	Control/fan circuit	400 V/50 Hz, 440 V/60 Hz, other options
	Input power factor/ regenerative capacity	Fundamental wave power factor of approximately pf = 1.0, regenerative capacity of 80 %
Control function	Control method	Sensorless vector control, vector control with sensor, or V/f control + Multilevel PWM (Pulse Width Modulation)
	Frequency accuracy	±0.5% for maximum output frequency (for the analog frequency reference input)
	Load torque characteristic	Variable torque load, constant-torque load
	Acceleration/deceleration time	0.1 to 3270 seconds, individual setting possible (Setting depends on the load GD2)
	Primary control functions	Soft stall (Programmable speed reduction for fans and pumps during periods of overload), Ride-through control during instantaneous power failures, break point acceleration/deceleration function, specific frequency evasion function, continuous operation function during speed reference loss, total run time display function
	Primary protective functions	Current limit, overcurrent, overvoltage, overload, load side ground fault, undervoltage, CPU error, cooling fan fault, etc.
	Communication (option)	DeviceNet™, Profibus DP, Modbus® RTU, TC-net I/O, CC-Link
Display function	Display	LCD display (240×64 dots) 4 LED indicators (READY, RUN, ALARM/FAULT, Discharge check)
	Push buttons	NAVIGATION key, CONTLROL key, Operation, stop, fault reset, interlock (drive run inhibit)
Input transformer		Class H, dry type, TMdrive-MVe2 dedicated specifications (External options available)
Enclosure	Structure	IP30 (except for the cooling fan opening) (Options available)
	Enclosure structure	Steel-plate, semi-closed, self-supporting enclosure structure for a front maintenance. The devices with 11 kV require maintenance from front and rear.
	Cooling	Forced air cooling by a ceiling fan
	Finish color	Munsell 5Y7/1, leather-tone finish
Ambient condition	Ambient temperature	0 to 40 °C (Higher temperatures with derating)
	Humidity	85 % or less (non-condensing)
	Altitude	Up to 1000 m (Higher with derating)
	Vibration	4.9 m/s^2 or less (10 to 50 Hz)
	Installation location	For indoor use only, avoid environments containing corrosive gases, install in a dust-free location
Load pattern		Fans, blowers, pumps, compressors, extruders, fan pumps, mixers, conveyors, etc.
Applicable standards		IEC, JIS, JEM, CSA, NEMA, CE, UL on request

Detailed specifications and ordering details are available on request from your distributor.

Technical details MVG2

Product line				MVG2																				
				3.0/3.3 kV																				
Output	Rated capacity	kVA	at 3.0 kV	180	270	360	400	540	720	800	860	1000	1080	1180	1360	1500	1630	1810	2000	2200	2720	3410	4090	5180
			at 3.3 kV	200	300	400	440	600	800	880	950	1100	1200	1300	1500	1650	1800	2000	2200	2400	3000	3750	4500	5700
	Overload capacity		60 s	110%																				
	Rated current		A	35	53	70	77	105	140	154	166	192	210	227	263	289	315	350	385	420	525	657	787	CF 997
	Rated motor capacity		kW	160	250	320	355	450	650	710	750	900	970	1000	1250	1340	1400	1600	1800	2000	2500	3060	3600	4560
Cell frame				1				2			3A			3B			4			5		6	7	Twin 5

Product line				MVG2			
				4.0/4.16 kV			
Output	Rated capacity	kVA	at 4.0 kV	2770	3780	5050	6000
			at 4.16 kV	—	4147	5537	6580
	Overload capacity		60 s	110%			
	Rated current		A	384	525	701	833
	Rated motor capacity		kW	1640	3026	4040	4800
Cell frame				4	5	6	7

Product line				MVG2																
				6.0/6.6 kV																
Output	Rated capacity	kVA	at 6.0 kV	360	540	720	800	900	1090	1260	1450	1600	1720	2000	2160	2360	2720	3000	3270	3630	4000
			at 6.6 kV	400	600	800	880	1000	1200	1400	1600	1760	1900	2200	2400	2600	3000	3300	3600	4000	4400
	Overload capacity		60 s	110%																
	Rated current		A	35	53	70	77	87	105	122	140	154	166	192	210	227	262	289	315	350	385
	Rated motor capacity		kW	315	450	650	710	810	1000	1130	1250	1420	1600	1800	1940	2250	2500	2670	2800	3150	3550
Cell frame				1				2					3A			3B			4		

Product line				MVG2																
				6.0/6.6 kV																
Output	Rated capacity	kVA	at 6.0 kV	4360	4900	5450	—	—	—	6000	6500	7000	7500	8200	9000	—	—	8270	9320	10360
			at 6.6 kV	4800	5400	6000	6500	7000	7500	—	—	—	—	—	—	8200	9000	9100	10260	11400
	Overload capacity		60 s	110%																
	Rated current		A	420	473	525	569	612	656	578	626	674	730	790	—	718	790	CF 796	CF 898	CF 997
	Rated motor capacity		kW	4000	4500	5000	5200	5600	6000	5000	5600	6000	6500	6500	7360	6300	7200	8000	8500	10000
Cell frame				5			6							7				Twin 5		

Product line				MVG2																
				10/11 kV																
Output	Rated capacity	kVA	at 10 kV	600	900	1200	1330	1500	1800	2100	2400	2660	2800	3300	3630	3900	4500	5000		
			at 11 kV	660	660	1320	1460	1650	2000	2310	2640	2930	3080	3630	4000	4290	5000	5500		
	Overload capacity		60 s	110%																
	Rated current		A	35	53	70	77	87	105	122	139	154	162	191	210	226	263	289		
	Rated motor capacity		kW	500	800	1000	1040	1350	1600	1800	2040	2375	2500	2800	3250	3500	3860	4400		
Cell frame				1				2					3A			3B				

Product line				MVG2																
				10/11 kV																
Output	Rated capacity	kVA	at 10 kV	5400	6000	6680	7200	8100	9000	10000	11000	12600	—	—	13600	14700	—	—	—	15000	17500
			at 11 kV	6000	6600	7350	8000	9000	10000	—	—	—	11000	12600	—	—	13600	15000	16100	—	19500
	Overload capacity		60 s	110%																
	Rated current		A	315	347	386	420	473	525	578	636	730	578	662	790	850	718	788	850	867	CF 1024
	Rated motor capacity		kW	4900	5400	5800	6500	7300	8000	8000	8800	10000	8800	10000	10800	11500	10800	11500	13500	12265	16000
Cell frame				4			5			6					7						Twin 5

Common specifications MVG2

MVG2		Beschreibung
Output	Output frequency (Hz)	Rated output frequency 50 Hz or 60 Hz
	Overload capacity	125 % of rated current for 60 seconds
Input	Input voltage	3-phase, 3000, 3300, 4000, 4160, 6000, 6600, 10000, 11000 V, ±10 %
	Frequency range	50/60 Hz ±5 % (60 Hz only at 4.16 kV)
	Lüfterversorgung	380/400/440 V AC, 3-phase, 50 Hz or 60 Hz
	Control circuit	120 V AC, 3-phase, 60 Hz or 220 V AV, 3-phase, 50 Hz
	Input power factor/ regenerative capacity	Fundamental wave power factor of approximately pf = 0.95, regenerative capacity of 100 %
Control function	Control method	Primary control functions
	Primary control functions	Ride-through control during instantaneous power failures up to 300 ms, option for synchronous transfer to line, option for synchronous motor control, non-volatile memory for parameters and fault data
	Accuracy of vector control	Maximum speed regulator response: 20 rad/sec Speed regulation without speed sensor ± 0.5% Maximum torque current response: 500 rad/sec Torque accuracy: ± 3% with temp sensor, ± 10% without Speed control range, 5-100%
	Protective Functions	Overcurrent, overvoltage, undervoltage or loss of power supply, motor ground fault, motor overload, Cooling fan failure, overtemperature, CPU error etc.
	Communication (option)	Profibus DP, Ethernet IP, Ethernet EGD, DeviceNet™, TOSLINE®-S20 oder Modbus® RTU
Display function	Display	Backlit LCD, animated displays Four configurable bar graphs, parameter editing, optional multilingual display, drive control
	Push buttons	NAVIGATION key, CONTLROL key, Operation, stop, fault reset, interlock (drive run inhibit)
Input transformer		Class H, dry type, TMdrive-MVe2 dedicated specifications (External options available)
Enclosure	Structure	IP30 (except for the cooling fan opening) (Options available)
	Cooling	Forced air cooling by a ceiling fan
	Finish color	Munsell 5Y7/1, leather-tone finish
Ambient condition	Ambient temperature	0 to 40 ˚C (Higher temperatures with derating)
	Humidity	85 % or less (non-condensing)
	Altitude	Up to 1000 m (Higher with derating)
	Installation location	For indoor use only, avoid environments containing corrosive gases, install in a dust-free location
Applicable standards		IEC61800-4, JIS, JEC, JEM, IEEE1566

Detailed specifications and ordering details are available on request from your distributor.

Parameter overview

For simple variable-speed operation of the inverter, the initial setting of the parameters may be used as they are.

Set the necessary parameters to meet the load and operational specifications.

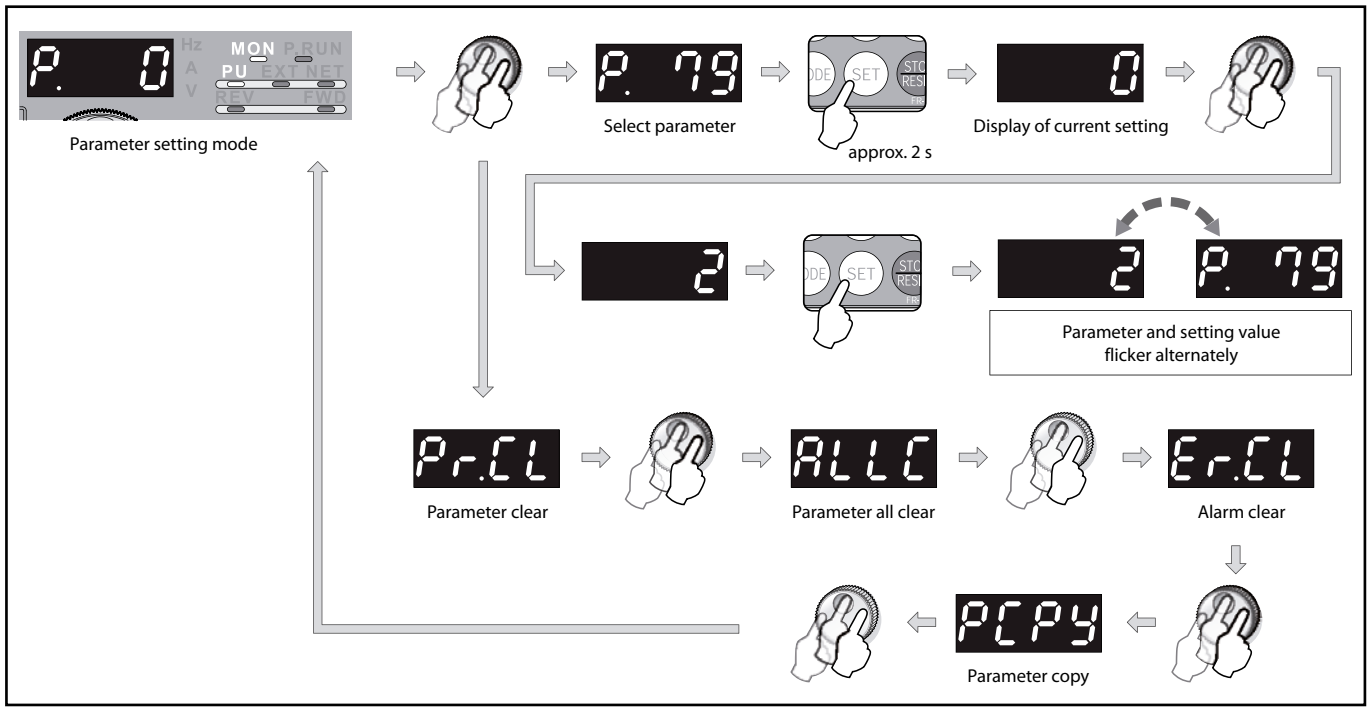
Parameter setting, change and check can be made from the parameter unit or by the Software FR Configurator (FR-700) and FR Configurator2 (FR-800) (see page 96 for more details).

The following list is an overview on the capabilities and functions of each inverter. For details of parameters, refer to the appropriate instruction manual see https://eu3a.mitsubishielectric.com.

Function	FR-CS80	FR-D700 SC	FR-E800	FR-A741	FR-F800	FR-A800
2nd parameter settings	●	●	●	●	●	●
3rd parameter settings	—	—	—	●	●	●
Restart	●	●	●	●	●	●
Vector control	●	●	●	●	●	●
Adjustable 5 points V/f	●	—	●	●	●	●
Orientation control	—	—	—	●	—	●
Encoder feedback	—	—	—	●	—	●
Pulse train input	—	—	—	●	●	●
Positioning function	—	—	—	●	—	●
Torque command	—	—	●	●	●	●
Torque limit	—	—	●	●	—	●
Torque bias	—	—	—	●	—	●
Speed limit	—	—	●	●	—	●
Easy gain tuning	—	—	—	●	●	●
Adjustment function	—	—	●	●	●	●
PLC function	—	—	●	●	●	●
PID control	●	●	●	●	●	●
Commercial power supply switch-over	—	—	—	●	●	●
Backlash	—	—	—	●	●	●
Variable current limiting	—	●	●	●	●	●
Output current detection	●	●	●	●	—	●
User functions	—	—	●	●	●	●
Terminal functions selection	●	●	●	●	●	●
Multi-speed setting	●	●	●	●	●	●
Help functions	●	●	—	●	●	●
Slip compensation	●	●	●	●	●	●
Lifetime detection	—	●	●	●	—	●
Power failure stop	●	●	●	●	●	●
Load torque high speed frequency control	—	—	—	●	—	●
External brake control	—	—	●	●	—	●
Droop control	—	—	●	●	—	●
Password lock	●	●	●	●	●	●
Remote outputs	—	●	●	●	●	●
Maintenance functions	—	●	●	●	●	●
Current average monitor	—	●	●	●	●	●
Speed smoothing control	—	●	●	—	●	●
PID Sleep function	●	●	●	—	—	●
Advanced PID control	—	—	●	—	—	●
Traverse function	●	●	●	●	●	●
Anti sway function	—	—	—	—	—	●
Regeneration avoidance function	●	●	●	●	●	●
Free parameter	—	●	●	●	●	●
Energy saving monitor	—	—	●	●	●	●
Calibration function	●	●	●	●	—	●
Analog current output calibration function	—	—	—	●	—	●
PTC input	—	●	—	●	●	●
Pre-charge function	—	—	—	—	●	●
24 V power supply	—	—	—	—	●	●
Increased magnetic excitation deceleration	●	—	—	—	●	●
PM motor control	—	—	●	—	●	●

Remark:
For an overview of all parameters, refer to the inverter manual.

Setting parameters (example)

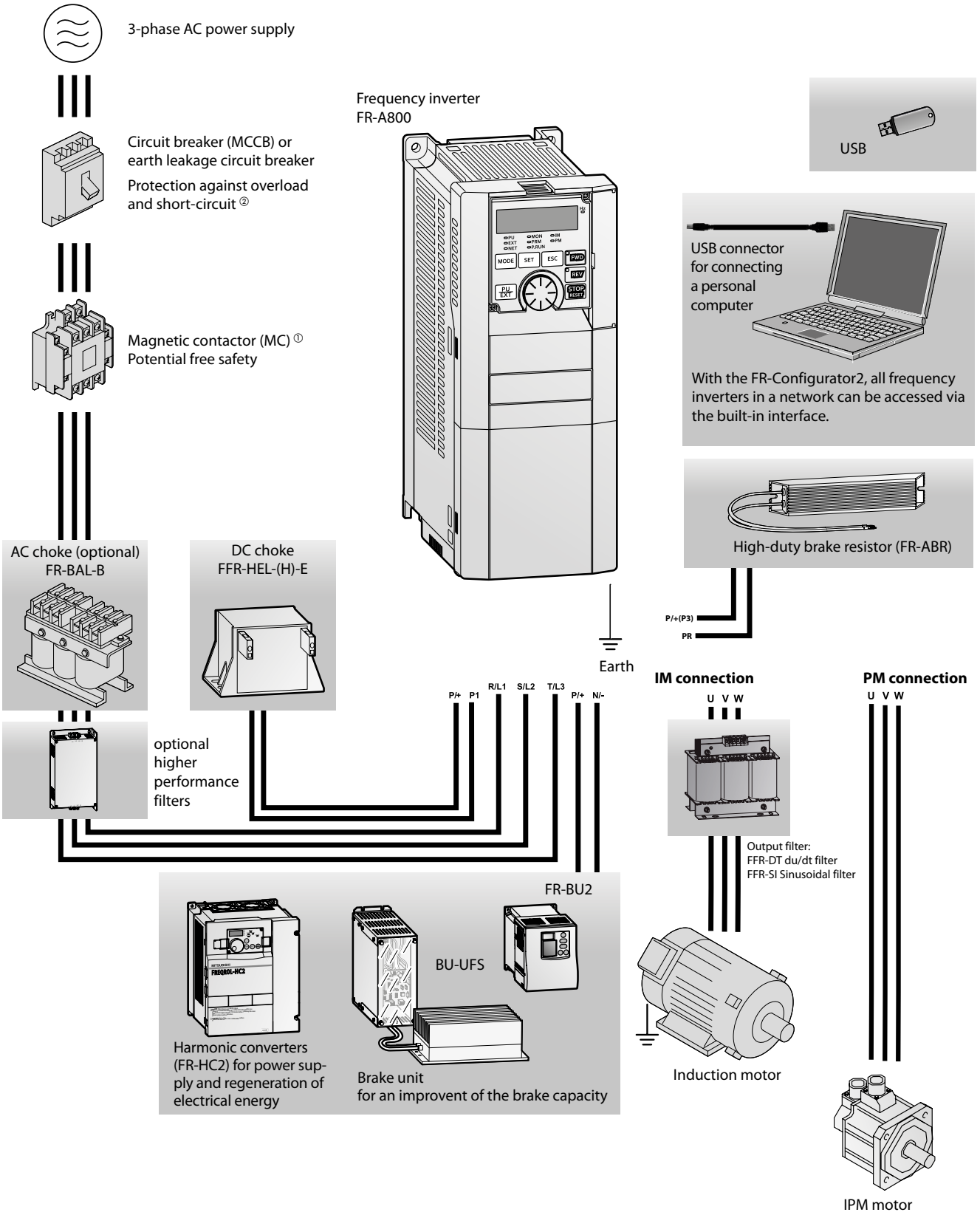


General operating conditions for all inverters

Specifications	FR-CS80	FR-D700 SC	FR-E800	FR-F800	FR-A741	FR-A800
Ambient temperature in operation	-10 °C to +40 °C (non-freezing)	-10 °C to +50 °C (non-freezing)	-20 °C to +60 °C (non-freezing)	-10 °C to +50 °C; (non-freezing) ①	-10 °C to +50 °C (non-freezing)	-10 °C to +50 °C (non-freezing)
Storage temperature ②	-20 °C to +65 °C	-20 °C to +65 °C	-40 °C to +70 °C	-20 °C to +65 °C	-20 °C to +65 °C	-20 °C to +65 °C
Ambient humidity	Max. 95 % (non-condensing)	Max. 90 % (non-condensing)	Max. 90 % (non-condensing)	Max. 95 % (non-condensing)	Max. 90 % (non-condensing)	Max. 95 % (non-condensing)
Altitude	Max. 2500 m above sea level	Max. 1000 m above sea level ③	Max. 3000 m above sea level	Max. 1000 m above sea level	Max. 1000 m above sea level	Max. 1000 m above sea level
Protective structure	Open Type IP20	Enclosed type IP20	Open type IP20	FR-F840: IP00/IP20 ④ FR-F842: IP00	IP00	FR-A840/842/846/860/862: IP00/IP20
Environmental protection	IEC60721-3-3 Class 3C2	—	IEC60721-3-3 Class 3C2	IEC60721-3-3 Class 3C2/3S2	—	IEC60721-3-3 Class 3C2/3S2
Shock resistance	10 g (3 times each in 3 directions)	10 g (3 times each in 3 directions)	10 g (3 times each in 3 directions)	10 g (3 times each in 3 directions)	10 g (3 times each in 3 directions)	10 g (3 times each in 3 directions)
Vibration resistance	Max. 5.9 m/s^2	Max. 5.9 m/s^2	Max. 5.9 m/s^2	Max. 5.9 m/s^2 (max. 2.9 m/s^2 for the 04320 or above and FR-F842)	Max. 5.9 m/s^2	Max. 5.9 m/s^2 (max. 2.9 m/s^2 for the 04320 or above and FR-A842)
Ambient conditions	For indoor use only, avoid environments containing corrosive gases, install in a dust-free location.	For indoor use only, avoid environments containing corrosive gases, install in a dust-free location.	For indoor use only, avoid environments containing corrosive gases, install in a dust-free location.	For indoor use only, avoid environments containing corrosive gases, install in a dust-free location.	For indoor use only, avoid environments containing corrosive gases, install in a dust-free location.	For indoor use only, avoid environments containing corrosive gases, install in a dust-free location.
Approvals	UL/CSA/CE/EN/EAC/CCC	UL/CSA/CE/EN/EAC/CCC	CE/UL/cUL/EAC/CCC	CE/UL/cUL/EAC/CCC	CE/UL/cUL/EAC/CCC	CE/UL/cUL/EAC/CCC/DNV/ ABS/BV/LR/NK

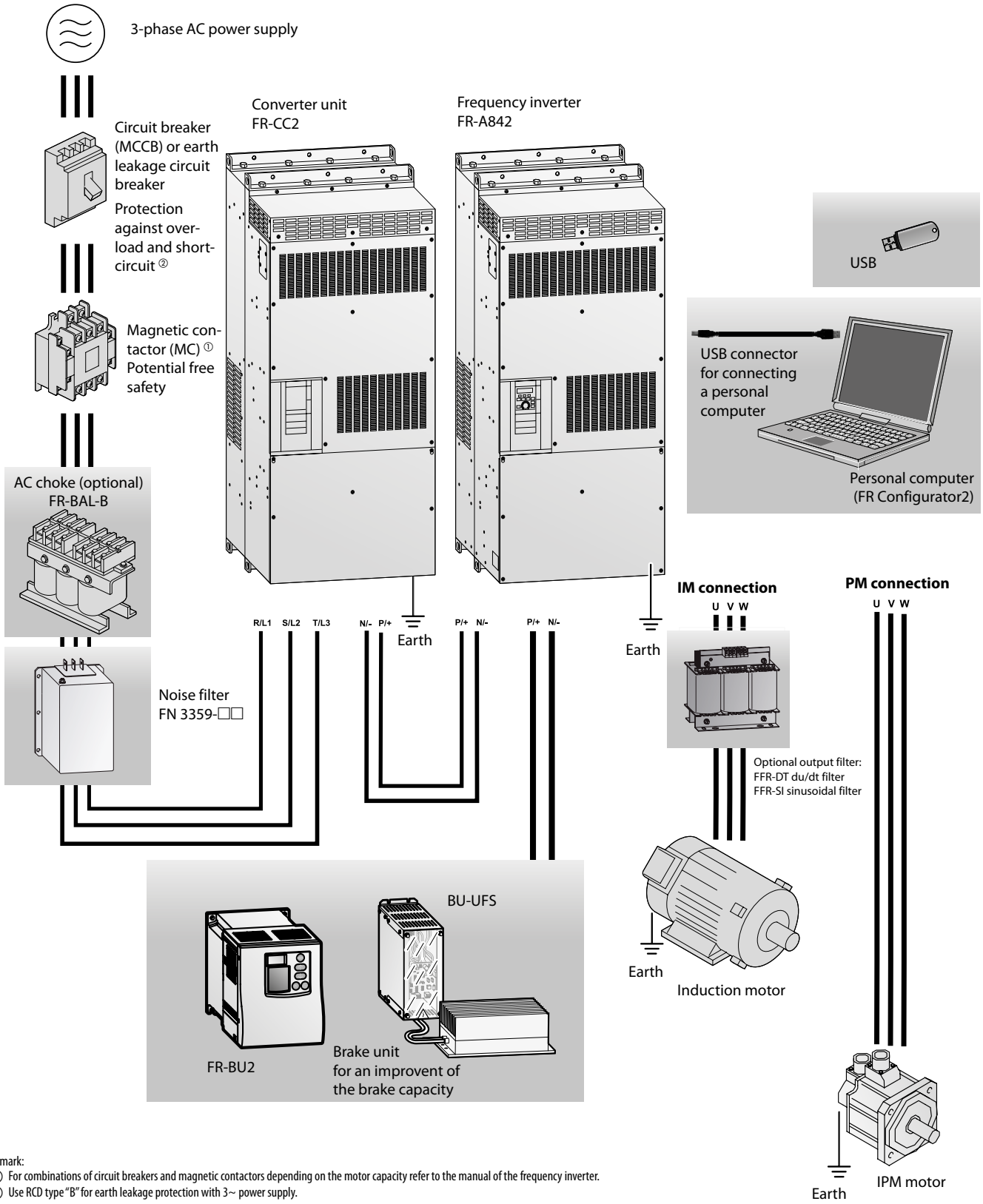
Remarks:
① For selection of the load characteristics with a 120 % overload rating the max. temperature is 40 °C (F840)
② The product may only be exposed to the full extremes of this temperature range for short periods (e. g. during transportation).
③ After that derate 2.87 % for every extra 500 m up to 5000 m.
④ When the cable bushing for the optional expansion cards is broken out the unit has an IP00 protection rating.

Example system configuration (FR-A800)



Remark:
① For combinations of circuit breakers and magnetic contactors depending on the motor capacity refer to the manual of the frequency inverter.
② Use RCD type "B" for earth leakage protection with 3~ power supply.

Example system configuration (FR-A842)

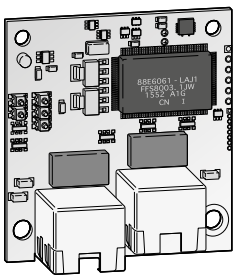


Remark:
① For combinations of circuit breakers and magnetic contactors depending on the motor capacity refer to the manual of the frequency inverter.
② Use RCD type "B" for earth leakage protection with 3~ power supply.

You can quickly and easily find the right selection of frequency inverters and converter units with the Selection Tool. Scan or click QR code and get started.

QR code to Selection Tool

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-CS80	FR-D700 SC	FR-E800	FR-F800	FR-A741	FR-A800	FR-HC2
Internal options	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.	—	—	—	—	●	●	—
	Communications	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.	—	—	—	—	●	●	—
		BACnet IP	Integration of a frequency inverter into a BACnet IP 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™.	—	—	●	●	●	●	—
		SSCNETIII/H	Integration of a frequency inverter into a SSCNETIII/H.	—	—	—	—	●	●	—
		CAN Bus	Integration of a frequency inverter into a CAN Bus network	—	—	—	●	—	●	—
		RS485 multi-protocol	RS485 multi-protocol interface card	—	—	—	●	●	—	●

Option		Description	FR-CS80	FR-D700 SC	FR-E800	FR-F800	FR-A741	FR-A800
External options	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.	●	●	●	●	—	●
	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 %)	●	●	●	●	—	●

Overview internal options

Internal options		Description	Remarks/specifications	Type	Applicable inverter	Art. no.
16 digital inputs		Interface for the input of the frequency setting via 3-digit or 4-digit BCD or 12-bit or 16-bit binary code, setting of gain and bias supported	Input: 24 V DC; 5 mA; open collector or switching signal, sink or source logic	FR-A7AX	FR-A700	156775
				FR-A8AX-60 E-KIT	FR-E800	506377
				FR-A8AX	FR-F800 FR-A800	269426
7 digital outputs 2 analog outputs		Selectable among 43 standard output signals of the inverter can be output at the open collector. The outputs are isolated with optocouplers. Selectable among 37 standard monitor signals of the inverter can be output at the analog outputs.	Ouput load: 24 V DC; 0.1 A, source or sink logic Output: max. 0–10 V DC; 0–20 mA; Resolution: 3 mV at voltage output, 10 µA at current output, accuracy: ±10 %	FR-A7AY	FR-A700	156776
				FR-A8AY-60 E-KIT	FR-E800	506378
				FR-A8AY	FR-F800 FR-A800	269427
3 relay outputs		Selectable among 43 standard output signals of the inverter can be output through the isolated relay terminals.	Switching load: 230 V AC/0.3 A, 30 V DC/0.3 A	FR-A7AR	FR-A700	156777
				FR-A8AR-60 E-KIT	FR-E800	506379
				FR-A8AR	FR-F800 FR-A800	269428
8 inputs 120 V AC 2 relay output		120 V AC contact input Relay output with changeover contact	Input voltage: 90–132 V AC Relay contact capacity: 230 V AC, 0,3 A; 30 V DC, 0,3 A	FR-A8AC	FR-A800	290118
1 analog output 1 analog input		Selectable among 24 analog output signals Analog input of torque and speed related data Selectable among 37 standard monitor signals of the inverter can be output at the analog output.	Bipolar analog output max. 0–(±)10 V DC Bipolar analog input (16 bit) 0–(±)10 V DC	FR-A7AZ	FR-A700	191401
				FR-A8AZ	FR-A800 FR-F800	283940
1 analog input 2 analog outputs		Isolated analog current input Isolated analog current output	2 x current input 4 to 20 mA DC or 2 x current output 4 to 20 mA DC	FR-A8AN	FR-A800	290117
Phase position detection		Option board for FR-A/F800	Option for phase-synchronous switching between electronic bypass operation and frequency inverter operation	FR-A8AVP	FR-A800 FR-F800	403133
		Converter box for FR-A8AVP		FR-A8VPB-H		403134
Encoder power supply		Control terminal block with integrated power supply	12 V DC	FR-A7PS	FR-A700	191399
Vector control with encoder feedback		Closed loop vector control with encoder can be performed. Encoder feedback enables high-precision speed, torque and position control.	5 V TTL differential 1024–4096 pulse 11–30 V HTL complimentary	FR-A7AP	FR-A700	166133
				FR-A8AP-60 E-KIT	FR-E800	573101
				FR-A8AP	FR-A800	269429
			Resolver encoder feedback	FR-A8APR	FR-A800	283939
			Incremental encoder feedback (EnDat)	FR-A8APS	FR-A800	297422
			Sine cosine encoder feedback (SynCos)	SinCos	FR-A800	403614
Incremental encoder feedback terminal block		Vector control terminal block. Closed loop vector control with encoder can be performed. Encoder feedback enables high-precision speed, torque and position control.	Terminal bloc with integrated vector control	FR-A8TP	FR-A800	285244
Master-Slave control		Closed loop vector control with encoder can be performed. Master-Slave position and speed synchronisation are possible with command pulse scaling and position control.	5 V TTL differential 1024–4096 pulse 11–30 V HTL complimentary	FR-A8AL	FR-A800	269430
				FR-A7AL	FR-A700	191402
Communi-cations	CC-Link	Option board for the integration of a frequency inverter into a CC-Link network.	Maximum transfer distance: 1200 m (at 156 kBaud)	FR-A7NC	FR-A700	156778
				FR-A8NC-60 E-KIT	FR-E800	506412
				FR-A8NC	FR-F800 FR-A800	269431
	CC-Link IE Field	Option board for the integration of a frequency inverter into a CC-Link IE Field network	Maximum transfer rate: 1 GBaud	FR-A7NCE	FR-A700	244993
				FR-A8NCE	FR-F800 FR-A800	273102
	CC-Link IE TSN	Option board for the integration of a frequency inverter into a CC-Link IE TSN network		FR-A8NCG	FR-A800	487882
	Control Net	Control Net Interface		FR-A8NCN	FR-F800 FR-A800	290115
	Ethernet multi-protocol	Ethernet multi-protocol interface card, Modbus® TCP, Ethernet/IP, Profinet, BACnet to Modbus® RTU	Interfacecard	FR-A7NETH-2P	FR-A700	283759
			Cover to use A7NETH-2P with E700SC			
		WiFi Ethernet multi-protocol interface card, Modbus® TCP, Ethernet/IP, BACnet, MELSEC ABCSP to Modbus® RTU		FR-A7N-WiE	FR-A700	264932
	EtherNet IP	Option board for integration of a frequency inverter in an EtherNet IP network. Webserver for easy setup is included.	Ethernet with 2 RJ45 ports	A8NEIP_2P	FR-F800 FR-A800	262950
	EtherCat	Option board for integration of a frequency inverter in an EtherCat network. Webserver for easy setup is included.	Ethernet 2port Interface	A8NECT_2P	FR-F800 FR-A800	284809
	LonWorks	Option board for integration of a frequency inverter in a LonWorks network.	Connection of up to 64 inverters supported. Maximum transfer rate: 78 kBaud			
	Profibus DPV1	Option board for the integration of a frequency inverter into a Profibus DPV1 network, including cyclic and acyclic communication with drive profile	D-Sub interface	A8NDPV1	FR-F800 FR-A800	262948

Internal options		Description	Remarks/specifications	Type	Applicable inverter	Art. no.
Communications	Profibus DP	Option board for the integration of a frequency inverter into a Profibus DP network.	Connection of up to 126 inverters supported. Maximum transfer rate: 12 MBaud	FR-A7NP	FR-A700	158524
				FR-A8NP	FR-F800 FR-A800	274514
				FR-A8NP-60 E-KIT	FR-E800	506380
			D-Sub9 connection adapter for FR-A8NP	FR-D-Sub9-A8NP-01	FR-F800 FR-A800	294939
	Profinet	Option board for the integration of a frequency inverter into a Profinet network. Siemens drives profile is supported. Webserver for easy setup is included.	Profinet with 2 RJ45 ports	A8NPRT_2P	FR-F800 FR-A800	262949
	DeviceNet™	Option board for the integration of a frequency inverter into a DeviceNet™.	Maximum transfer rate: 10 MBaud	FR-A7ND	FR-A700	158525
				FR-A8ND-60 E-KIT	FR-E800	506381
				FR-A8ND	FR-F800 FR-A800	269432
	SSCNETIII	Option board for the integration of a frequency inverter into the Mitsubishi Electric servo system network SSCNETIII. The operation and display functions can be controlled by Motion Controller (Q172H CPU, Q173H CPU).	Maximum transfer rate: 50 MBaud	FR-A7NS	FR-A700	191403
		Operation control is possible from the motion controller by SSCNET III communication	SSCNET III(/H) communication function	FR-A8NS	FR-A800	289335
	CAN Bus	CANopen communication function		FR-A8NCA	FR-F800 FR-A800	298153
	RS485 communication terminals	Option board to modify A/F800-E to use RS485 communication by terminals.		FR-A8ERS	FR-F800-E FR-A800-E	307170
Terminal blocks	Terminal adapter	Control circuit terminal block	Intercompatibility attachment	FR-A8TAT	FR-F700 FR-A700 FR-F800 FR-A800	274526
		Screw terminal block		FR-A8TR	FR-F800 FR-A800	290116

Overview external options

External options	Description	Remarks/specifications	Type	Applicable inverter	Art. no.
Parameter unit	Interactive standard parameter unit with copy function	For mounting on the switchgear cabinet door (for instance) Refer to page 89 for details.	FR-DU07	All	157514
	Interactive standard parameter unit with copy function, protection level IP54		FR-DU07-IP54	All	207067
	Interactive parameter unit like FR-PU07 with additional HAND/AUTO keys and advanced PID monitor		FR-PU07-01	All	242151
	Interactive parameter unit with LC display and battery pack		FR-PU07BB-L	FR-E800, FR-A700, FR-A800, FR-F800	157515
	Interactive standard parameter unit with copy function		FR-PA07	FR-D700 SC, FR-E800	214795
	Grafical full text LCD display, including E-Manual, multilanguage and copy function.		FR-LU08	FR-A800, FR-E800	274525
		IP55 compatible parameter unit for mounting on the switchgear cabinet door	FR-LU08-01	FR-A800, FR-F800, FR-E800	296613
Adapter	Connection adapter for FR-DU07	Required for remote connection of the FR-DU07/FR-DU08/FR-LU08 with FR-A5CBL	FR-ADP	FR-A700, FR-F700, FR-A800, FR-F800	157515
Connection cable for remote parameter unit	Cable for a remote connection of a parameter unit	Available length: 1; 2.5 and 5 m	FR-A5 CBL	All	1 m: 70727 2.5 m: 70728 5 m: 70729
DIN-Rail Adapter	Adapter for mounting the inverter on a DIN rail	Width: 68 mm	FR-UDA01	FR-D700 SC, FR-E800	130833
		Width: 108 mm	FR-UDA02		130832
Heatsink Protrusion Attachment	For installation of the heatsink on the rear side of the enclosure Reduces temperature in switchgear cabinet of about 2/3, IP20	FR-F/A840 to 00126 FR-A820-00105/00250	FR-A8CN01	FR-A800, FR-F800	277880
		FR-F/A840-00170/00250 FR-A820-00340/0049	FR-A8CN02		277881
		FR-F/A840-00310/00380 FR-A820-00630	FR-A8CN03		277882
		FR-F/A840-00470/00620 FR-A820-00770/0125	FR-A8CN04		277883
		FR-F/A840-00770 FR-A820-01540	FR-A8CN05		277884
		FR-F/A840-00930 to 01800 FR-A820-01870	FR-A8CN06		277945
		FR-A820-03160	FR-A8CN07		277946
		FR-F/A840-03250/03610 FRA820-03800/04750	FR-A8CN08		277947
		FR-F/A840-02160/02600	FR-A8CN09		277948
Distributor module for RJ45 connections	Distributor for connection of multiple inverters in a serial network	For up to 2 frequency inverters	FR-RJ45-HUB4	All	167612
		For up to 8 frequency inverters	FR-RJ45-HUB10		167613
	Terminating resistor for RJ45	120 Ω	FR-RJ45-TR	All	167614
Interface cable	Communications cable for RS232 or RS485 interface to connect an external personal computer	Length 3 m	SC-FR PC	All	88426
USB-RS232 converter	Port converter adapter cable from RS232 to USB	USB specification 1.1, 0.35 m long	USB-RS232	FR-D700 SC	155606
FR Configurator	Parametrisation and PLC function programming software for Mitsubishi Electric inverter.	Refer to page 96 for details.	—	All	275503
FR Configurator2					
EMC noise filter	Noise filter for compliance with EMC directives.	Refer to page 81 for details.	FFR-□□, FR-, FN-□□	All	refer to page 81
du/dt filter	Output filter for du/dt reduction	Refer to page 85 for details.	FFR-DT-□□A-SS1	All	refer to page 85
Sinusoidal filter	Output filter for sine wave output voltage	Refer to page 85 for details.	FFR-SI-□□A-SS1	All	refer to page 85
AC chokes	For increased efficiency, reduction of mains feedback and compensation of voltage fluctuations.	Refer to page 87 for details.	FR-BAL-B	FR-D700 SC, FR-E800, FR-A700, FR-A800, FR-F800	refer to page 87
DC chokes	DC choke for compensation of voltage fluctuations.	For connection up to 55 kW motor capacity	FFR-HEL-(H)-E	FR-D700 SC, FR-E800, FR-A700, FR-A800, FR-F800	refer to page 88
		For connection from 75 kW motor capacity	FR-HEL-(H) ①	FR-A800, FR-F800	refer to page 88
Filter module	Passive harmonic filter to reduce mains pollution	<5 % THDi to <16 % THDi	on request	All	on request
Regenerative unit	Regeneration of electrical energy in short-term operation	(ED <50 %)	on request	All	
Regenerative unit	Regeneration of electrical energy in short-term operation	(ED = 100 %)	on request	All	
Harmonic converter	For power supply and regeneration of electrical energy for one or several frequency inverters and class leading harmonics filtration.	THDi <4 %	FR-HC2	All	refer to page 93
Brake units	For an improvement of the brake capacity. For high inertia loads and active loads. Used in combination with a resistor unit.	Refer to page 91 for details.	FR-BU2	All	refer to page 91
		Refer to page 91 for details.	BU-UFS + RUFC	FR-D700 SC, FR-E800, FR-A700, FR-F800	refer to page 91
External high-duty brake resistor	To improve the brake capacity of the inverter; used in combination with the internal brake transistor	Refer to page 92 for details.	FR-ABR(H)	FR-D700, FR-E800, FR-A800	refer to page 92

① This choke is essential for operation and must be installed. It has to be ordered according to the application.

EMC

1st and 2nd environment

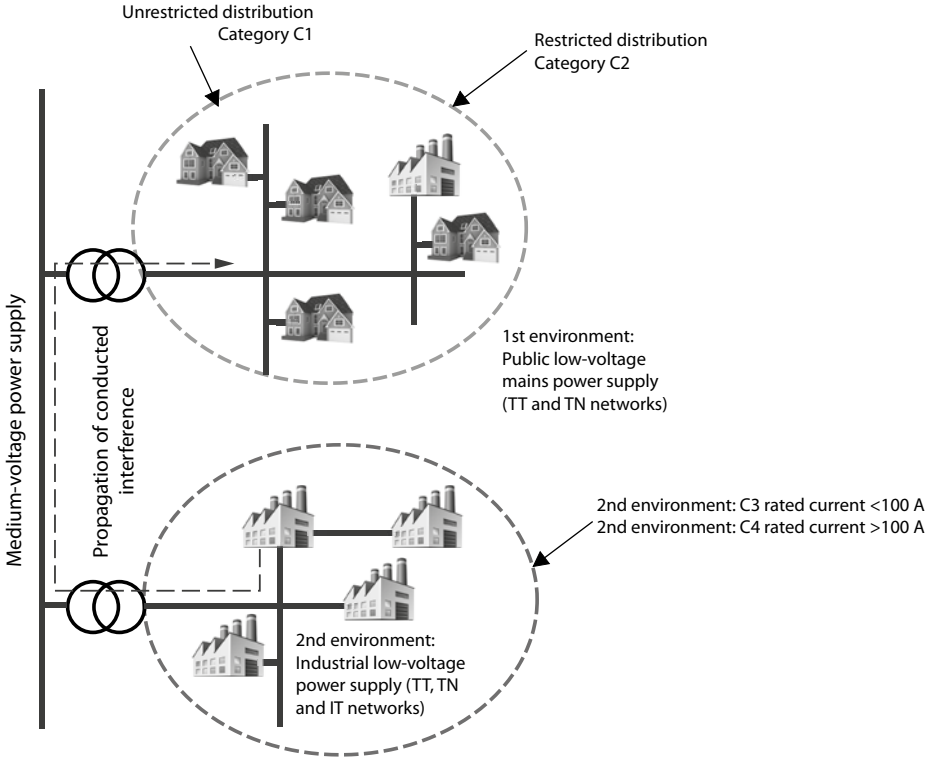
Different interference levels are permissible depending on the place of use. Differentiation is made between 1st and 2nd environment. The first environment includes residential and business areas which are connected directly to the low-voltage network, i.e. which are not supplied via dedicated high-voltage or medium-voltage transformers. In contrast, the second environment is not connected directly to the public low-voltage network. The second environment is also referred to as the industrial environment.

Norms and directives

The limits for the respective environments are specified in norms. The environmental norm EN 55011 defines the limits of the basic environments in the industrial area with Classes A1 and A2 and in the residential area with Class B. In addition, the product norm EN 61800-3 for electrical drive systems, which defines the categories C1 to C4, has been in force since June 2007.

These days, the operator or user of the system is responsible for complying with the statutory directives and norms. With the help of solutions provided by the manufacturer, he must ensure that any interference which occurs is eliminated. Mitsubishi Electric offers a wide range of EMC filters, chokes, harmonic filters and much more, which are optimized for use with the appropriate inverter. To ensure that all units are capable of fulfilling their function without interference, the user of the system must also take into account the connection requirements of the local power supply company.

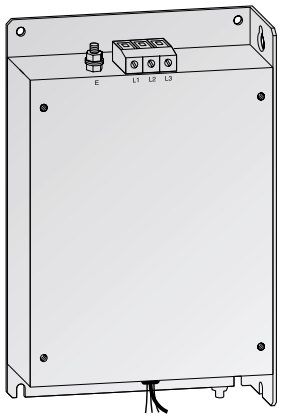
Product norm EN 61800-3 (2005-07) for electrical drive systems				
Assignment by category	C1	C2	C3	C4
Environment	1st environment	1st or 2nd environment (user's decision)		2nd environment
Voltage/Current	<1000 V			<1000 V; I_n >400 A , connection to IT network
EMC expertise	No requirements	Installation and commissioning by an EMC specialist		EMC plan required
Limit according to EN 55011	Class B	Class A1 (+ warning notice)	Class A2 (+ warning notice)	Values exceed Class A2



Overview of noise filters

No.	Frequency inverter (EC/E1/E6/2-60)	Noise filter for environment 1 category C2 conforming 55011A	Art. no.	Noise filter for environment 1 category C1 conforming 55022B	Art. no.
D1	FR-D720S-008–042SC	FFR-CS-050-14A-SF1	312348	FFR-CS-050-14A-SF1	312348
		FFR-CS-050-14A-SF1-LL	312351	FFR-CS-050-14A-SF1-LL	312351
D2	FR-D720S-070SC	FFR-CS-080-20A-SF1	312349	FFR-CS-080-20A-SF1	312349
		FFR-CS-080-20A-SF1-LL	312352	FFR-CS-080-20A-SF1-LL	312352
D3	FR-D720S-100SC	FFR-CS-110-26A-SF1	312350	FFR-CS-110-26A-SF1	312350
		FFR-CS-110-26A-SF1-LL	312353	FFR-CS-110-26A-SF1-LL	312353
D4	FR-D740-012–036SC	FFR-CSH-036-8A-SF1	312332	FFR-CSH-036-8A-SF1	312332
		FFR-CSH-036-8A-SF1-LL	312334	FFR-CSH-036-8A-SF1-LL	312334
D5	FR-D740-050/080SC	FFR-CSH-080-16A-SF1	312333	FFR-CSH-080-16A-SF1	312333
		FFR-CSH-080-16A-SF2-LL	312345	FFR-CSH-080-16A-SF2-LL	312345
D6	FR-D740-120/160SC	FFR-MSH-170-30A-SF1	312356	FFR-MSH-170-30A-SF1	312356
		FFR-MSH-170-30A-SF1-LL	312346	FFR-MSH-170-30A-SF1-LL	312346
		FFR-MSH-170-30A-SB2-LL	404037	FFR-MSH-170-30A-SB2-LL	404037
E1	FR-E820S-008–030	FFR-CS-050-14A-SF1	312348	FFR-CS-050-14A-SF1	312348
		FFR-CS-050-14A-SF1-LL	312351	FFR-CS-050-14A-SF1-LL	312351
E2	FR-E820S-050/080	FFR-CS-080-20A-SF1	312349	FFR-CS-080-20A-SF1	312349
		FFR-CS-080-20A-SF1-LL	312352	FFR-CS-080-20A-SF1-LL	312352
E3	FR-E820S-110	FFR-E-CS-110-26A-SF1	572856	FFR-E-CS-110-26A-SF1	572856
		FFR-E-CS-110-26A-SF1-LL	572857	FFR-E-CS-110-26A-SF1-LL	572857
E4	FR-E840-0016/0026/0040	FFR-CSH-036-8A-SF1	312332	FFR-CSH-036-8A-SF1	312332
		FFR-CSH-036-8A-SF1-LL	312334	FFR-CSH-036-8A-SF1-LL	312334
E5	FR-E840-060/095	FFR-MSH-095-16A-SF1	312355	FFR-MSH-095-16A-SF1	312355
E6	FR-E840-120/170	FFR-MSH-170-30A-SF1	312356	FFR-MSH-170-30A-SF1	312356
		FFR-MSH-170-30A-SF1-LL	312346	FFR-MSH-170-30A-SF1-LL	312346
		FFR-MSH-170-30A-SB2-LL	404037	FFR-MSH-170-30A-SB2-LL	404037
AF1	FR-A840/F840-00023–00126	FFR-BS-00126-18A-SF100	193677	FFR-BS-00126-18A-SF100	193677
AF2	FR-A840/F840-00170/00250	FFR-BS-00250-30A-SF100	193678	FFR-BS-00250-30A-SF100	193678
AF3	FR-A840/F840-00310/00380	FFR-BS-00380-55A-SF100	193679	FFR-BS-00380-55A-SF100	193679
AF4	FR-A840/F840-00470/00620	FFR-BS-00620-75A-SF100	193680	FFR-BS-00620-75A-SF100	193680
AF5	FR-A840/F840-00770	FFR-BS-00770-95A-SF100	193681	FFR-BS-00770-95A-SF100	193681
AF6	FR-A840/F840-00930	FFR-BS-00930-120A-SF100	193682	FFR-BS-00930-120A-SF100	193682
AF7	FR-A840/F840-01160/01800	FFR-BS-01800-180A-SF100	193683	FFR-BS-01800-180A-SF100	193683
AF8	FR-A840/F840-02160/02600	FN3359-250-28	104663		
AF9	FR-A840/F840-03250–04320	FN3359-400-99	104664		
AF10	FR-A840/F840-04810–06100	FN3359-600-99	104665		
AF11	FR-A840/F840-06830 FR-CC2-500K/F842-09620	FN3359-1000-99	104666		
AF12	FR-F842-10940/12120	FN3359-1600-99	130229		
A1	FR-A741-5.5K/7.5K	FFR-RS-7.5K-27A-EF100	227840	FFR-RS-7.5K-27A-EF100	227840
A2	FR-A741-11K/15K	FFR-RS-15K-45A-EF100	227841	FFR-RS-15K-45A-EF100	227841
A3	FR-A741-18.5K/22K	FFR-RS-22K-65A-EF100	227842	FFR-RS-22K-65A-EF100	227842
A4	FR-A741-30K/37K/45K	FFR-RS-45K-127A-EF100	227843	FFR-RS-45K-127A-EF100	227843
A5	FR-A741-55K	FFR-RS-55K-159A-EF100	227844	FFR-RS-55K-159A-EF100	227844

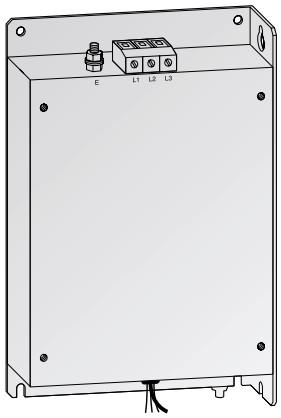
■ Noise filters for FR-D700 SC



Filter	Frequency inverter	Power loss [W]	Rated current [A]	Leakage current [mA]	Weight [kg]	Protective structure	Art. no.
FFR-CS-050-14A-SF1 ①	FR-D720S-008–042SC	9	12	<20	0.4		312348
FFR-CS-050-14A-SF1-LL ②	FR-D720S-008–042SC	9	12	<3.5	0.4		312351
FFR-CS-080-20A-SF1 ①	FR-D720S-070SC	13	20	<20	0.7		312349
FFR-CS-080-20A-SF1-LL ②	FR-D720S-070SC	13	20	<3.5	0.8		312352
FFR-CS-110-26A-SF1 ①	FR-D720S-100SC	18	26	<20	0.9		312350
FFR-CS-110-26A-SF1-LL ②	FR-D720S-100SC	18	26	<3.5	1.0		312353
FFR-CSH-036-8A-SF1	FR-D740-012–036SC	6	8	<20	0.8	IP20	312332
FFR-CSH-036-8A-SF1-LL ③	FR-D740-012–036SC	6	8	<3.5	0.8		312334
FFR-CSH-080-16A-SF1	FR-D740-050/080SC	14	16	<20	0.9		312333
FFR-CSH-080-16A-SF2-LL ③	FR-D740-050/080SC	14	16	<3.5	0.9		312345
FFR-MSH-170-30A-SF1	FR-D740-120/160SC	42	30	<20	1.8		312356
FFR-MSH-170-30A-SF1-LL ③	FR-D740-120/160SC	42	30	<3.5	1.8		312346
FFR-MSH-170-30A-SB2-LL	FR-D740-120/160SC	42	30	<3.5	1.4		404037

The maximum motor cable length must not be exceeded in order to meet the required limits. Usually, the European filters of Mitsubishi Electric can be used for motor cable lengths up to 20 m C1/100 m C2. The following filters don't fulfill this standard:
① C1: 25 m/C2: 50 m
② C1: 10 m/C2: —
③ C1: 10 m/C2: 30 m

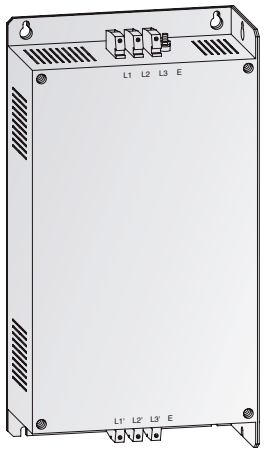
■ Noise filters for FR-E800



Filter	Frequency inverter	Power loss [W]	Rated current [A]	Leakage current [mA]	Weight [kg]	Protective structure	Art. no.
FFR-CS-050-14A-SF1 ①	FR-E820S-0008–0030	9	12	<20	0.4		312348
FFR-CS-050-14A-SF1-LL ②	FR-E820S-0008–0030	9	12	<3.5	0.4		312351
FFR-CS-080-20A-SF1 ①	FR-E820S-0050–0080	13	20	<20	0.7		312349
FFR-CS-080-20A-SF1-LL ②	FR-E820S-0050–0050	13	20	<3.5	0.8		312352
FFR-E-CS-110-26A-SF1 ①	FR-E820S-0110	10	26	<20	0.9		572856
FFR-E-CS-110-26A-SF1-LL ②	FR-E820S-0110	15.6	26	<3.5	1.1		572857
FFR-CSH-036-8A-SF1 ④	FR-E840-0016/0026/0040	6	8	<20	0.8	IP20	312332
FFR-CSH-036-8A-SF1-LL ③	FR-E840-0016/0026/0040	6	8	<3.5	0.8		312334
FFR-MSH-095-16A-SF1 ④	FR-E840-0060/0095	26	16	<20	1.0		312355
FFR-MSH-170-30A-SF1 ④	FR-E840-0120/0170	42	30	<20	1.8		312356
FFR-MSH-170-30A-SF1-LL ③	FR-E840-0120/0170	42	30	<3.5	1.8		312346
FFR-MSH-170-30A-SB2-LL ③	FR-E840-0120/0170	42	30	<3.5	1.4		404037

The maximum motor cable length must not be exceeded in order to meet the required limits. Usually, the European filters of Mitsubishi Electric can be used for motor cable lengths up to 20 m C1/100 m C2. The following filters don't fulfill this standard:
① C1: 20 m/C2: 50 m
② C1: 10 m/C2: —
③ C1: 10 m/C2: 30 m
④ C1: 20 m/C2: 100 m

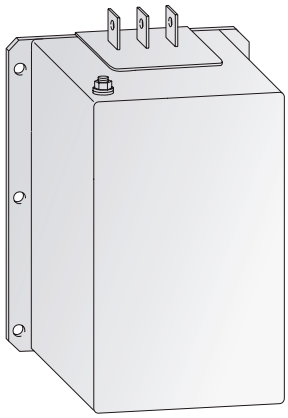
■ Noise filters for FR-A840/F840-00023–01800



Filter	Frequency inverter	Power loss [W]	Rated current [A]	Leakage current [mA]	Weight [kg]	Protective structure	Art. no.
FFR-BS-00126-18A-SF100	FR-A840/F840-00023–00126	11.5	18	<30	1.25	IP20	193677
FFR-BS-00250-30A-SF100	FR-A840/F840-00170/00250	15.8	30	<30	1.8		193678
FFR-BS-00380-55A-SF100	FR-A840/F840-00310/00380	27.1	55	<30	2.42		193679
FFR-BS-00620-75A-SF100	FR-A840/F840-00470/00620	43.9	75	<30	4.25		193680
FFR-BS-00770-95A-SF100	FR-A840/F840-00770	45.8	95	<30	6.7		193681
FFR-BS-00930-120A-SF100	FR-A840/F840-00930	44.9	120	<30	10.0		193682
FFR-BS-01800-180A-SF100	FR-A840/F840-01160/01800	60.7	180	<30	12.0		193683

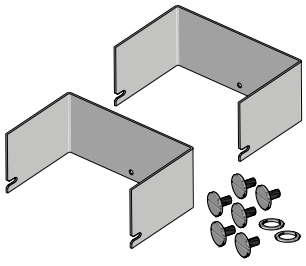
The filters can provide conformity with following limits: C1 up to 20 m, C2 up to 100 m.
These filters are UL/cUL ertified.

■ Noise filters for FR-A840/F840-02160–12120



Filter	Frequency inverter	Power loss [W]	Rated current [A]	Leakage current [mA]	Weight [kg]	Protective structure	Art. no.
FN 3359-250-28	FR-A840/F840-02160/02600	38	250	<6	7	IP00	104663
FN 3359-400-99	FR-A840/F840-03250–04320	51	400	<6	10.5		104664
FN 3359-600-99	FR-A840/F840-04810–06100	65	600	<6	11		104665
FN 3359-1000-99	FR-A840/F840-06830 FR-CC2-H500K	84	1000	<6	18		104666
FN 3359-1600-99	FR-CC2-H560K/FR-CC2-H630K	130	1600	<6	27		130229

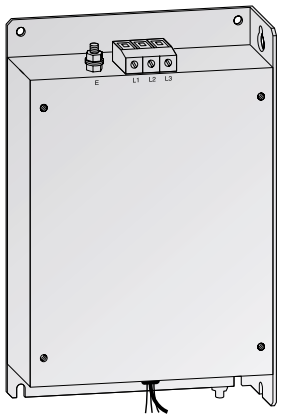
The filters can provide conformity with following limits: C2 up to 100 m.



Plastic covers for the copper rails

Filter	Cover	Art. no.
FN 3359-250-28	1151-051	252702
FN 3359-400-99	1151-052	252703
FN 3359-600-99	1151-053	252704
FN 3359-1000-99	1151-054	252705

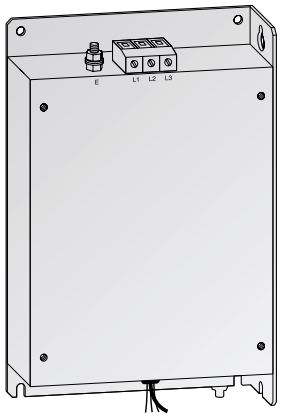
■ Noise filters for FR-A741-5.5K–55K



Filter	Frequency inverter	Power loss [W]	Rated current [A]	Leakage current [mA]	Weight [kg]	Protective structure	Art. no.
FFR-RS-7.5k-27A-EF100	FR-A741-5.5K–7.5K	12	27	6.8	6	IP20	227840
FFR-RS-15k-45A-EF100	FR-A741-11K–15K	25	45	6.8	8.5		227841
FFR-RS-22k-65A-EF100	FR-A741-18.5K–22K	37	65	12.2	13		227842
FFR-RS-45k-127A-EF100	FR-A741-30K–45K	64	127	15.9	18		227843
FFR-RS-55k-159A-EF100	FR-A741-55K	73	159	15.9	28		227844

The filters can provide conformity with following limits: C1 up to 20 m, C2 up to 100 m.

■ Noise filters for FR-CS80

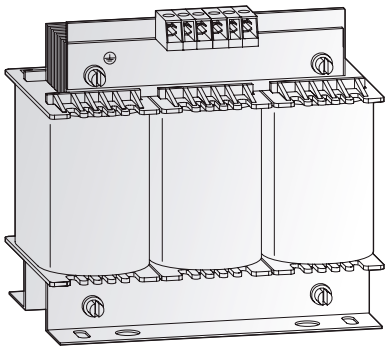


Filter	Frequency inverter	Power loss [W]	Rated current [A]	Leakage current [mA]	Weight [kg]	Protective structure	Art. no.
FFR-CS-050-14A-SF1 ①	FR-CS82S-025-042	9	14	11.8	0.39	IP20	312348
FFR-C-CS-050-14A-SF1-LL ②	FR-CS82S-025-042	9	14	2.59	0.49		334917
FFR-CS-080-20A-SF1 ①	FR-CS82S-070	13	20	11.8	0.64		312349
FFR-C-CS-080-20A-SF1-LL ②	FR-CS82S-070	13	20	2.59	0.8		334918
FFR-C-CS-100-26A-SF1 ①	FR-CS82S-100	18	26	11.8	0.75		334867
FFR-C-CS-100-26A-SF1-LL ②	FR-CS82S-100	18	26	2.59	0.9		334874
FFR-C-CSH-022-6A-SF1 ④	FR-CS84-012-022	6	6	5	0.51		334868
FFR-C-CSH-022-6A-SF1-LL ③	FR-CS84-012-022	6	6	3.11	0.51		334871
FFR-CSH-036-8A-SF1 ⑥	FR-CS84-036	6	8	4.98	0.77		312332
FFR-CSH-036-8A-SF1-LL ③	FR-CS84-036	6	8	3.11	0.77		312334
FFR-CSH-080-16A-SF1 ⑦	FR-CS84-050-080	14	16	6.01	0.9		312333
FFR-C-CSH-080-16A-SF1-LL ③	FR-CS84-050-080	14	16	2.31	0.9		334872
FFR-C-MSH-160-30A-SF1 ⑥	FR-CS84-120-160	42	30	6.79	1.7		334869
FFR-C-MSH-160-30A-SF1-LL ③	FR-CS84-120-160	42	30	2.56	1.7		334873
FFR-C-MSH-295-50A-SF1	FR-CS84-230-295	26	50	6.89	2.4		334870

The maximum motor cable length must not be exceeded in order to meet the required limits. Usually, the European filters of Mitsubishi Electric can be used for motor cable lengths up to 20 m C1/100 m C2. The following filters don't fulfill this standard:

① C1: 20 m/C2: 35 m
② C1: 10 m/C2: —
③ C1: 10 m/C2: 30 m
④ C1: 20 m/C2: 50 m
⑤ C1: 20 m/C2: 60 m
⑥ C1: 20 m/C2: 70 m
⑦ C1: 20 m/C2: 75 m

■ du/dt filters for FR-D700 SC/E800/F800/A700/A800



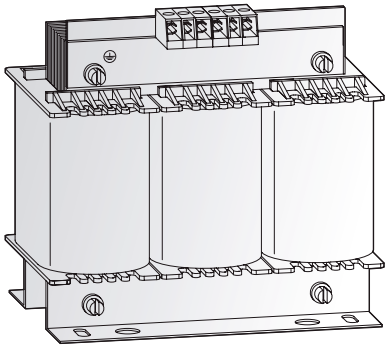
du/dt filter

The du/dt output filter efficiently reduces the voltage rise time, motor heat generation, insulation stressing and motor noise generation.

du/dt Filter	Motor output power [kW] ①			Rated current [A]	Power loss [W]	Weight [kg]	Protective structure	Dimensions (WxHxD)	Art. no.
	400 V	230 V	200 V						
FFR-DT-10A-SS1	4	2.2	2.2	10	25	1.2	IP00	100x120x65	209755
FFR-DT-25A-SS1	11	5.5	5.5	25	45	2.5		125x140x80	209756
FFR-DT-47A-SS1	22	—	11	47	60	6.1		155x195x110	209757
FFR-DT-93A-SS1	45	—	22	93	75	7.4		190x240x100	209758
FFR-DT-124A-SS1	55	—	30	124	110	8.2		190x170x150	209759
FFR-DT-182A-SS1	90	—	75	182	140	16		210x185x160	209760
FFR-DT-330A-SS1	160	—	90	330	240	32		240x220x240	209761
FFR-DT-500A-SS1	250	—	—	500	340	35		240x325x220	209762
FFR-DT-610A-SS1	315	—	—	610	380	37		240x325x230	209763
FFR-DT-683A-SS1	400	—	—	683	410	38		240x325x230	209764
FFR-DT-790A-SS1	450	—	—	790	590	43		300x355x218	209765
FFR-DT-1100A-SS1	630	—	—	1100	760	66		360x380x250	209766
FFR-DT-1500A-SS1	800	—	—	1500	1045	97		360x485x265	209767

① Selection based on 4pole (50 Hz 1500 rpm) standard motor

■ Sinusoidal filter for FR-D700 SC/E800/F800/A700/A800



Sinusoidal filter

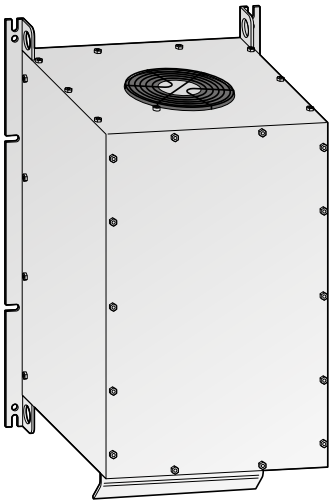
The sinusoidal output filter ensures a sinusoidal output voltage with low voltage ripple. This makes it possible to use motors with lower insulation resistance and it also increases the maximum possible motor power cable length.

It also reduces leakage current, motor heat and noise generation.

Filter	Motor output power [kW] ①			Rated current [A]	Power loss [W]	Weight [kg]	Protective structure	Dimensions (WxHxD) [mm]	Art. no.
	400 V	230 V	200 V						
FFR-SI-4.5A-SS1	1.5	0.75	0.75	4.5	45	3.1	IP00	125x180x75	209735
FFR-SI-8.3A-SS1	3.0	1.5	1.5	8.0	65	6.9		155x205x95	209736
FFR-SI-18A-SS1	7.5	4.0	4.0	18	118	12.4		190x210x130	209737
FFR-SI-25A-SS1	11	5.5	5.5	24	130	15.7		210x270x125	209738
FFR-SI-32A-SS1	15	7.5	7.5	32	140	16.1		210x270x135	209739
FFR-SI-48A-SS1	22	—	11	48	230	25		240x300x210	209740
FFR-SI-62A-SS1	30	—	15	62	270	27		240x300x220	209741
FFR-SI-77A-SS1	37	—	18.5	75	290	34.4		300x345x210	209742
FFR-SI-93A-SS1	45	—	22	90	360	37.2		300x345x215	209743
FFR-SI-116A-SS1	55	—	30	110	430	46.8		300x360x237	209744
FFR-SI-180A-SS1	90	—	45	180	870	72.4		420x510x235	209745
FFR-SI-260A-SS1	132	—	55	260	1300	123.4		420x550x295	209746
FFR-SI-432A-SS1	220	—	90	432	1580	162.8		510x650x320	209747
FFR-SI-481A-SS1	250	—	—	480	2170	196.8		510x750x340	209748
FFR-SI-683A-SS1	355	—	—	660	2650	218		600x880x390	209749
FFR-SI-770A-SS1	400	—	—	770	3900	410		600x990x430	209750
FFR-SI-880A-SS1	500	—	—	880	3970	570		600x1000x500	209751
FFR-SI-1212A-SS1	630	—	—	1212	5900	660		870x1050x420	209752
FFR-SI-1500A-SS1	800	—	—	1500	On request	On request		On request	209754
FFR-SI-10940-SS1	—	—	—	1094	4450	550		600x1100x500	499509

① Selection based on 4pole IE2 motor (1500 rpm^{-1})

■ Harmonic filter



THiD ≤16 %, 10 % combined with a DC choke

RHF-A AC choke integrated/RHF-AS with external AC choke

Filter	Motor output power [kW] ① 400 V	Rated current [A]	Power dissipation [W]	Weight [kg]	Protective structure	Dimensions (WxHxD) [mm]	Art. no.
RHF-A 10-400-50-20-A	0.75/1.5/2.2/4.0/5.5	10	93	13.5	IP20	190x347x206	240698
RHF-A 14-400-50-20-A	7.5	14	118	16.3		190x347x206	240699
RHF-A 22-400-50-20-A	11	22	206	22		232x451x248	240700
RHF-A 29-400-50-20-A	15	29	224	25		232x451x248	240701
RHF-A 35-400-50-20-A	18.5	35	233	37		378x605x242	240702
RHF-A 43-400-50-20-A	22	43	242	39		378x605x242	240703
RHF-A 58-400-50-20-A	30	58	274	44		378x634x333	240704
RHF-A 72-400-50-20-A	37	72	352	56		378x634x333	240705
RHF-A 86-400-50-20-A	45	86	374	62		418x747x333	240706
RHF-A 101-400-50-20-A	55	101	428	74		418x747x333	240707
RHF-A 144-400-50-20-A	75/90	144	488	85		418x778x400	240708
RHF-A 180-400-50-20-A	110	180	692	102		418x778x400	240709
RHF-A 217-400-50-20-A	132	217	743	119		468x911x450	240710
RHF-A 252-400-50-20-A	160	252	864	136		468x911x450	240711
RHF-A 304-400-50-20-A	185	304	905	142		468x911x450	240712
RHF-A 380-400-50-20-A	200/220	380	1175	185		468x911x450	240714
RHF-A 433-400-50-20-A	250	433	1542	203		468x911x515	240715
RHF-AS 480-400-50-20-A	280	480	635	80		420x380x230	295045
RHF-AS 550-400-50-20-A	315/630	550	650	100		420x380x245	295046
RHF-AS 600-400-50-20-A	355	600	690	125		420x380x280	295047
RHF-AS 670-400-50-20-A	400	670	730	130		420x380x280	295048
RHF-AS 750-400-50-20-A	450	750	900	140		480x440x270	295049
RHF-AS 850-400-50-20-A	500	850	1070	150		480x440x285	295050
RHF-AS 980-400-50-20-A	560	980	1250	160		480x440x300	295051

① Selection based on 4pole IE2 motor (1.500 rpm^{-1}). RHF-A □□□-400-50-20A □□□= filter rated current. The selection of the filter should be checked individually.

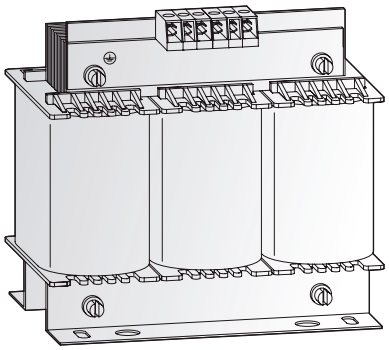
THiD ≤10 %, 5 % combined with a DC choke

RHF-B AC choke integrated/RHF-BS with external AC choke

Filter	Motor output power [kW] ① 400 V	Rated current [A]	Power dissipation [W]	Weight [kg]	Protective structure	Dimensions (WxHxD) [mm]	Art. no.
RHF-B 10-400-50-20-A	0.75/1.5/2.2/4.0/5.5	10	131	18	IP20	190x347x206	240716
RHF-B 14-400-50-20-A	7.5	14	184	20		190x347x206	240717
RHF-B 22-400-50-20-A	11	22	258	30		232x451x248	240718
RHF-B 29-400-50-20-A	15	29	298	34		232x451x248	240719
RHF-B 35-400-50-20-A	18.5	35	335	53		378x605x242	240720
RHF-B 43-400-50-20-A	22	43	396	75		378x605x242	240721
RHF-B 58-400-50-20-A	30	58	482	82		378x634x333	240722
RHF-B 72-400-50-20-A	37	72	574	96		378x634x333	240723
RHF-B 86-400-50-20-A	45	86	688	104		418x747x333	240724
RHF-B 101-400-50-20-A	55	101	747	106		418x747x333	240725
RHF-B 144-400-50-20-A	75/90	144	841	126		418x778x400	240726
RHF-B 180-400-50-20-A	110	180	962	135		418x778x400	240727
RHF-B 217-400-50-20-A	132	217	1080	171		468x911x450	240728
RHF-B 252-400-50-20-A	160	252	1194	206		468x911x450	240729
RHF-B 304-400-50-20-A	185	304	1288	221		468x911x515	240730
RHF-B 380-400-50-20-A	200/220	380	1510	265		468x911x515	240732
RHF-B 433-400-50-20-A	250	433	1852	272		468x911x515	240733
RHF-BS 480-400-50-20-A	280	480	1560	185		540x520x300	295052
RHF-BS 550-400-50-20-A	315/630	550	1550	200		540x560x300	295053
RHF-BS 600-400-50-20-A	355	600	1640	225		600x640x300	295054
RHF-BS 670-400-50-20-A	400	670	1730	240		600x640x310	295055
RHF-BS 750-400-50-20-A	450	750	1870	260		600x640x325	295056
RHF-BS 850-400-50-20-A	500	850	2020	285		600x640x340	295057
RHF-BS 980-400-50-20-A	560	980	2180	310		600x640x360	295058

① Selection based on 4pole IE2 motor (1.500 rpm^{-1}). RHF-B □□□-400-50-20A □□□= filter rated current. The selection of the filter should be checked individually.

■ AC chokes for FR-D700 SC/E800/F800/A800



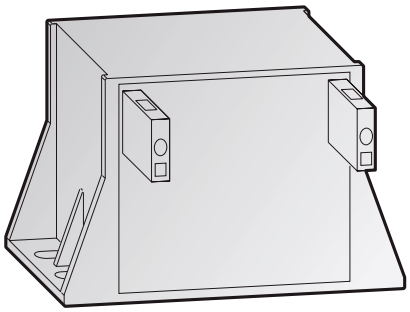
Mains supply chokes

The mains supply chokes compensate voltage fluctuations and simultaneously increase the efficiency. Applying the appropriate power choke an overall efficiency of up to 90 % can be achieved.

The use of a power choke is especially recommended for main circuits where high capacities are switched, for example via thyristors.

Choke		Motor output power [kW]	L [mH]	Current [A]	Power loss [W]	Weight [kg]	Protective structure	Art. no.
Single-phase	FR-BAL-S-B-0.2K	0.2	10	3	14	0.7	IP00	134968
	FR-BAL-S-B-0.4K	0.4	10	5.5	16	1.2		134969
	FR-BAL-S-B-0.75K	0.75	10	8	34	4.5		134970
Three-phase	FR-BAL-B-0.4K	0,4	42	2	25	1.1		134971
	FR-BAL-B-0.75K	0,75	24	3.5	38	3.0		134973
	FR-BAL-B-4.0K	4.0	2.340	12	31	3.0		87244
	FR-BAL-B-5.5K	5.0	1.750	16	44	3.7		87245
	FR-BAL-B-7.5K	7.5	1.220	23	59	5.5		87246
	FR-BAL-B-11K/-15K	11/15	0.667	42	68	10.7		71053
	FR-BAL-B-22K	22	0.483	58	77	11.2		87247
	FR-BAL-B-30K	30	0.369	76	86	11.6		87248
	FR-BAL-B-37K	37	0.295	95	113	18.6		87249
	FR-BAL-B-45K	45	0.244	115	118	21.4		71044
	FR-BAL-B3-55K	55	0.221	106	Approx. 145	16.0		296225
	FR-BAL-B3-75K	75	0.170	144	Approx. 150	22.0		296226
	FR-BAL-B3-90K	90	0.123	180	Approx. 255	25.0		296227
	FR-BAL-B3-110K	110	0.111	216	Approx. 275	29.0		296228
	FR-BAL-B3-132K	132	0.088	260	Approx. 255	29.0		296229
	FR-BAL-B3-160K	160	0.068	325	Approx. 285	32.0		296230
	FR-BAL-B3-185K	185	0.061	361	Approx. 320	33.0		296231
	FR-BAL-B3-220K	220	0.051	432	Approx. 390	47.0		296232
	FR-BAL-B3-250K	250	0.046	481	Approx. 340	48.0		296233

■ DC chokes



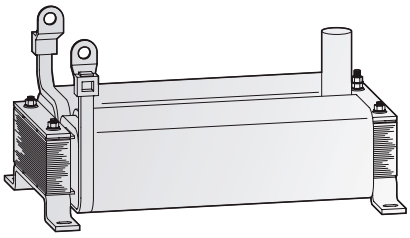
DC link chokes

The FFR-HEL DC chokes meet the requirements of the EN 61558 standard. The IP20 version is soaked and cast into a housing with resin.

By adding the optional DC choke to the inverter system, compliance to EN61000-3-12 can be reached.

Choke		Motor output power [kW]	Power loss [W]	Weight [kg]	Protective structure	Art. no.
200 V type	FFR-HEL-0.4K-E	0.4	9.8	0.6	IP20	238357
	FFR-HEL-0.75K-E	0.75	12.3	0.6		238358
	FFR-HEL-1.5K-E	1.5	19.1	1.2		238359
	FFR-HEL-2.2K-E	2.2	19.6	1.2		238360
	FFR-HEL-3.7K-E	3.7	19.8	1.5		238361
	FFR-HEL-5.5K-E	5.5	31.3	3.1		238362
	FFR-HEL-7.5K-E-1	7.5	30.4	3.1		283575
	FFR-HEL-11K-E-1	11	32.5	3.1		283576
	FFR-HEL-15K-E-1	15	32.5	4		283577
	FFR-HEL-18.5K-E	18.5	37.2	4		238366
	FFR-HEL-22K-E	22	44.1	5.5		238367
	FFR-HEL-30K-E	30	60.8	8.2	IP00	238368
	FFR-HEL-37K-E	37	58.8	10.7		238369
	FFR-HEL-45K-E	45	72.4	11.3		238370
	FFR-HEL-55K-E	55	65.5	14.4		238371
400 V type	FFR-HEL-H0.4K-E	0.4	8.8	0.35	IP20	238342
	FFR-HEL-H0.75K-E	0.75	9.4	0.6		238343
	FFR-HEL-H1.5K-E	1.5	15.2	0.61		238344
	FFR-HEL-H2.2K-E	2.2	17.8	1.2		238345
	FFR-HEL-H3.7K-E	3.7	19.4	1.2		238346
	FFR-HEL-H5.5K-E	5.5	19.5	1.5		238347
	FFR-HEL-H7.5K-E	7.5	25.4	2.2		238348
	FFR-HEL-H11K-E	11	24.9	3.1		238349
	FFR-HEL-H15K-E	15	33.5	3		238350
	FFR-HEL-H18.5K-E-1	18.5	34.6	4		283571
	FFR-HEL-H22K-E-1	22	40.5	5.3		283572
	FFR-HEL-H30K-E-1	30	48.7	5.75		283573
	FFR-HEL-H37K-E-1	37	44.3	8		283574
	FFR-HEL-H45K-E	45	64.6	11.3	IP00	238355
	FFR-HEL-H55K-E	55	72.6	14.4		238356

■ DC chokes

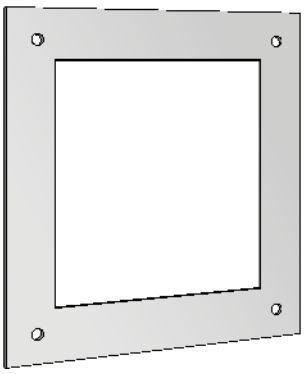


DC link chokes

In 800 series a DC choke needs to be ordered separately, based on the motor kW. This is mandatory from 75 kW and above.

Choke		Motor output power [kW]	Power loss [W]	Weight [kg]	Protective structure	Art. no.
200 V type	FR-HEL-75K	75	130	17	IP00	275836
	FR-HEL-90K	90	130	19		275837
	FR-HEL-110K	110	160	20		275838
400 V type	FR-HEL-H75K	75	130	16		273304
	FR-HEL-H90K	90	130	20		273305
	FR-HEL-H110K	110	140	22		273306
	FR-HEL-H132K	132	140	26		273307
	FR-HEL-H160K	160	170	28		273308
	FR-HEL-H185K	185	230	29		273309
	FR-HEL-H220K	220	240	30		273310
	FR-HEL-H250K	250	270	35		273311
	FR-HEL-H280K	280	300	38		273312
	FR-HEL-H315K	315	360	42		273313
	FR-HEL-H355K	355	360	46		273314

■ External heatsink frame for FR-F800/A800



External heatsink frame

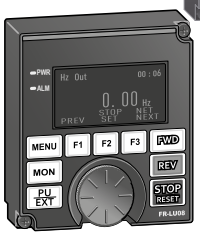
Frame for installing the inverter heatsink outside the switchgear cabinet (IP20).

Frame	Frequency inverter	Art. no.
FR-A8CN01	FR-A840/F840-00023–00126 FR-A820-00105/00250	277880
FR-A8CN02	FR-A840/F840-00170/00250 FR-A820-00340/00490	277881
FR-A8CN03	FR-A840/F840-00310/00380 FR-A820-00630	277882
FR-A8CN04	FR-A840/F840-00470/00620 FR-A820-00770/01250	277883
FR-A8CN05	FR-A840/F840-00770 FR-A820-01540	277884
FR-A8CN06	FR-A840/F840-00930/01160/01800 FR-A820-01870/02330	277945
FR-A8CN07	FR-A840/F840-02160	277946
FR-A8CN08	FR-A840/F840-03250/03610 FR-A820-03800/04750	277947
FR-A8CN09	FR-A840/F840-02160/02600	277948

■ Parameter units

FR-PU07-01

FR-DU07



FR-LU08

The parameter unit FR-LU08 is an optional operation panel adopting an LCD panel capable of displaying text and menus. It can save parameter settings for up to three inverters, which can be transferred to other inverters. When the FR-LU08 is connected to the inverter, the internal clock of the inverter can be synchronized with the clock of FRLU08. (Real time clock function).

The parameter unit displays text in the following selectable languages: English, German, French, Spanish, Swedish, Italian, Finnish, and Japanese.

In addition to the functions of the standard parameter unit the FR-PU07 displays and monitors 21 different values (like frequency, current, voltage, etc.) and states in total.

The parameter unit FR-PU07 is used instead of the standard control units FR-DU04 and FR-DU07 and can be replaced by this after use.

The parameter unit FR-PU07 conforms to the protection rating IP40.

Parameter unit	Frequency inverter	Description	Art. no.
FR-DU07	FR-D/E/A700	Interactive parameter unit with 7 Segment display	157514
FR-DU07-IP54	FR-D/E/A700	Interactive parameter unit with LC display	207067
FR-PU07	FR-D/E/A700	Interactive parameter unit with LC display	166134
FR-PU07-01 ①	FR-E800/F800/A800	Interactive parameter unit like FR-PU07 but with additional AUTO/ HAND keys and advanced PID monitor	242151
FR-PU07BB-L	FR-D700 SC/FR-E800/F800/A800	Interactive parameter unit with LC display and battery pack	209052
FR-PA07	FR-D700 SC/FR-E800	Interactive parameter unit with 7 Segment display	214795
FR-DU08	FR-E800/F800/A800	Interactive parameter unit with 12 Segment display	286226
FR-LU08	FR-E800/F800/A800	Interactive parameter unit with LC display	274525
FR-LU08-01	FR-E800/F800/A800	Interactive parameter unit with LC display (IP55)	296613

① The parameter unit FR-PU07-01 can be used for FR-A800/F800 series per connection cable. It cannot be mounted directly on the frequency inverter.

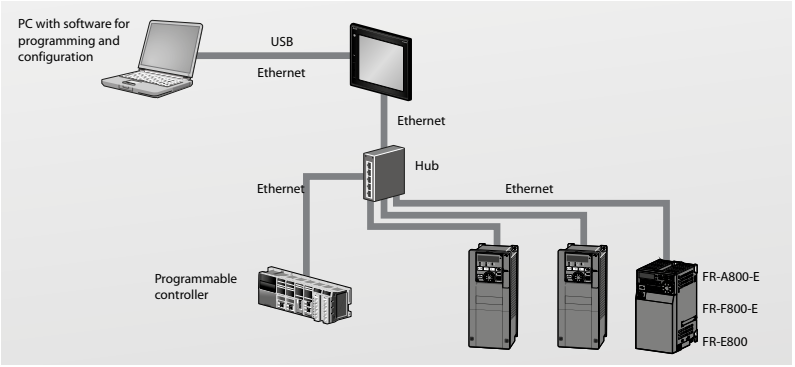
■ Transparent mode

Simplified commissioning and troubleshooting

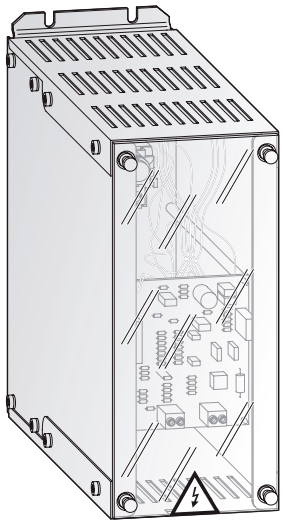
Simplify the commissioning if industrial automation systems.

When connected to a personal computer, the GOT acts as a transparent gateway that enables programming, commissioning and fine-tuning of an industrial automation system. The user can communicate with several frequency inverters via the network connection (RS485/Ethernet) without opening the control cabinet.

Simplified commissioning, maintenance, and troubleshooting is possible via the plain text display.



■ Brake units BU-UFS



For a braking torque higher than 20 % or a duty cycle higher than 30 % an external brake unit including the adequate brake resistors has to be installed.

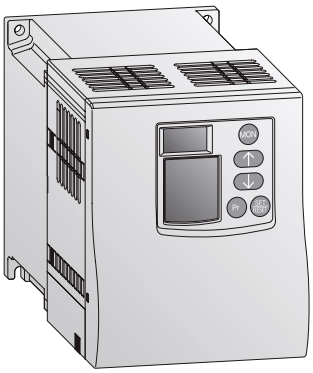
The brake units BU-UFS listed below are cascadable so that the optimum size can always be achieved.

The brake units here are not fitted with brake resistors, which must be ordered separately (see below).

The configurations in the table are only general recommendations. Please consult Mitsubishi Electric for advice on matching the correct brake modules and brake resistors for your application.

Brake unit	Frequency inverter	Rated voltage [V]	Max. peak current [A]	Max. instantaneous power [kW]	Max. duty cycle [%]	Power loss [W]	Weight [kg]	Protective structure	Art. no.
BU-UFS22	FR-D740/FR-E740 SC FR-A/F840-00023–00250	400	34	25	10	37	2.5	IP20	127947
BU-UFS40	FR-A/F840-00250–00470	400	55	41	10	42	2.5		127948
BU-UFS110	FR-A/F840-00470–01160	400	140	105	5	48	3.9		127950

■ Brake units FR-BU2



The brake unit FR-BU2 is used when a large brake torque is necessary such as when the motor is made to run by the load, quick deceleration is required, etc.

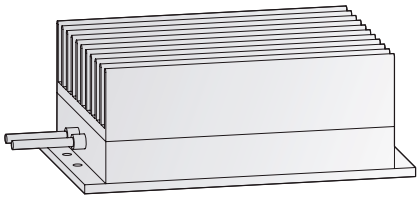
It is equipped with a control panel for monitoring different values, setting parameters and displaying the alarm history.

The brake units FR-BU2 listed below are cascadable so that the optimum size can always be achieved.

The brake units here are not fitted with brake resistors, which must be ordered separately (brake resistors available soon).

Brake unit		Applicable motor capacity	Multiple (parallel) operation	Powerloss 0 % ED	Powerloss 10 % ED	Powerloss 50 % ED	Powerloss 100 % ED	Weight [kg]	Protective structure	Art. no.
200 V class	FR-BU2-1.5K	Capacity of the motor to be used with differs according to the braking torque and duty (% ED)	10 units maximum (Note that torque generated is not more than the tolerable overcurrent amount of connected inverter)	5	8	18	31	0.9	IP00	202420
	FR-BU2-3.7K			5	10	27	49	0.9		202421
	FR-BU2-7.5K			5	12	36	67	0.9		202422
	FR-BU2-15K			5	23	86	165	0.9		202423
	FR-BU2-30K			5	38	149	288	5		202424
	FR-BU2-55K			5	91	318	601	5		202425
400 V class	FR-BU2-H7.5K			5	10	27	47	5		202426
	FR-BU2-H15K			5	13	40	74	5		202427
	FR-BU2-H30K			5	20	72	137	5		202428
	FR-BU2-H55K			5	37	140	268	5		202429
	FR-BU2-H75K			5	49	174	331	5		202430

■ Brake resistors for brake unit BU-UFS

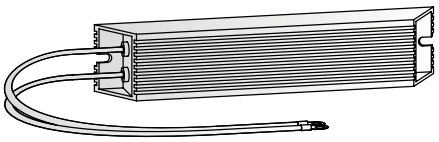


The brake resistors RUFC are designed for the exclusive use in combination with a brake unit BU-UFS.

Please note that the specifications for the allowed duty cycle (ED max.) included in the instruction manual for the brake unit.

Type	Application	Regenerative brake duty [%]	Resistance [Ω]	Capacity [W]	Protective structure	Art. no.
RUFC22	BU-UFS 22	10	1 x 24	2000	IP20	129629
RUFC40 (Set)	BU-UFS 40	10	2 x 6.8	2000		129630
RUFC110 (Set)	BU-UFS 110	10	4 x 6.8	2000		129631

■ External brake resistors FR-ABR-(H)☐☐K for FR-D700 SC/E800/A800



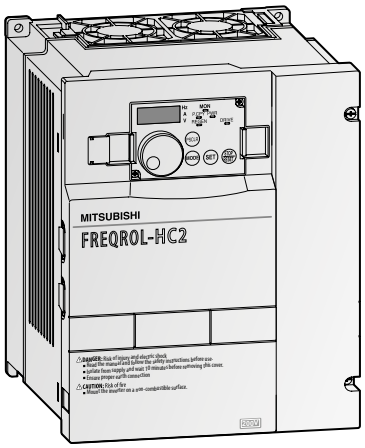
Among the capacity range of the FR-D720S-025–100/FR-D740 (all) and FR-E720S-030–110SC/FR-E740 SC (all) the inverter is equipped with an internal brake transistor as standard.

An improvement of the brake duty is achieved by the use of an external brake resistor with a higher rated capacity.

The duty cycle is selectable via parameter 30 and can be specified, according to the inverter, up to 10 % respectively 30 % via parameter 70.

Brake resistor	Frequency inverter	Regenerative brake duty	Resistor [Ω]	Protective structure	Art. no.
FR-ABR-0.4K	FR-D720S-025SC, FR-E720S-030SC, FR-A820-00046	10 % (ED)	200	IP20	46788
FR-ABR-0.75K	FR-D720S-042SC, FR-E720S-050SC, FR-A820-00077	10 % (ED)	100		46602
FR-ABR-2.2K	FR-D720S-070/100SC, FR-E720S-080/110SC, FR-A820-00167	10 % (ED)	60		46787
FR-ABR-3.7K	FR-A820-00240	10 % (ED)	40		46604
FR-ABR-5.5K	FR-A820-00340	10 % (ED)	25		48301
FR-ABR-7.5K	FR-A820-00490	10 % (ED)	20		50048
FR-ABR-11K	FR-A820-00630	10 % (ED)	13		191574
FR-ABR-15K	FR-A820-00770	10 % (ED)	18		191575
FR-ABR-22K	FR-A820-01250	10 % (ED)	13		191576
FR-ABR-H 0.4K	FR-D740-012SC, FR-E740-016SC, FR-A840-00023	10 % (ED)	1200		46601
FR-ABR-H 0.75K	FR-D740-022SC, FR-E740-026SC, FR-A840-00038	10 % (ED)	700		46411
FR-ABR-H 1.5K	FR-D740-036SC, FR-E740-040SC, FR-A840-00052	10 % (ED)	350		46603
FR-ABR-H 2.2K	FR-D740-050SC, FR-E740-060SC, FR-A840-00083	10 % (ED)	250		46412
FR-ABR-H 3.7K	FR-D740-080SC, FR-E740-095SC, FR-A840-00126	10 % (ED)	150		46413
FR-ABR-H 5.5K	FR-D740-120SC, FR-E740-120SC, FR-A840-00170	10 % (ED)	110		50045
FR-ABR-H 7.5K	FR-D740-160SC, FR-E740-170SC, FR-A840-00250	10 % (ED)	75		50049
FR-ABR-H 11K	FR-E740-230SC, FR-A840-00310	6 % (ED)	52		191577
FR-ABR-H 15K	FR-E740-300SC, FR-A840-00380	6 % (ED)	2x18 serial		191578
FR-ABR-H 22K	FR-A840-00620	6 % (ED)	2x52 parallel		191579

■ Harmonic converter FR-HC2



The harmonic converter FR-HC2 can supply the DC-bus of several inverters and can feedback energy to the grid in case of regenerative energy due to braking operation. One FR-HC2 can be used as the common DC bus for up to 10 frequency inverters. The harmonic converter is also equipped with a powerful filter for reducing main disturbances by suppressing the power supply harmonics.

- Effective suppression of harmonics with a THDi <4 % (THDi = Total Harmonic Distortion of Current)
- Energy saving by up to 200 % full regeneration
- DC Bus boost function, to adopt easily to different input voltage levels
- Parallel operation of 10 Frequency inverters with one unit (DC bus)
- Compact dimensions
- Longlife components and monitoring of operation time
- Easy to operate with digital dial
- Network communication

Output range:

7.5–560 kW,
200–220 V AC (50 Hz)/200–230 V AC (60 Hz)/
380–460 V AC (50/60 Hz)

Technical details FR-HC2

Product line		200 V type FR-HC2-□K					400 V type FR-HC2-H□K ①										
		7.5	15	30	55	75	7.5	15	30	55	75	110	160	220	280	400	560
Applicable inverter capacity	kW	7.5	15	30	55	75	7.5	15	30	55	75	110	160	220	280	400	560
Rated output capacity ③	kW	10.7	19.8	38	71	92	11	20.2	37	73	92	135	192	264	336	476	660
Rated input voltage		3-phase 200–220 V, 50 Hz/200–230 V, 60 Hz ②					3-phase 380–460 V, 50/60 Hz ②										
Rated input current	A	33	61	115	215	278	17	31	57	110	139	203	290	397	506	716	993
Overload capacity ④		150 % of rated motor capacity for 60 s															
Permissible power supply voltage fluctuation		170–242 V, 50 Hz 170–253 V, 60 Hz				170–230 V 50/60 Hz	323–506 V, 50/60 Hz				323–460 V, 50/60 Hz						
Permissible power supply frequency fluctuation		±5 %															
Input power factor		0.99 or more (when load ratio is 100 %)															
Power supply capacity	kVA	14	25	47	88	110	14	26	47	90	113	165	235	322	410	580	804
Protective structure ⑤		Enclosed type (IP20) ⑥		Open type (IP00)			Enclosed type (IP20) ⑥		Open type (IP00)								
Cooling		Fan cooling															
Order Information	Art.no	270271	270272	270273	270274	270285	270286	270287	270288	270289	270290	270291	270292	270293	270294	270295	270296

Remarks:
① Model name of the 400 V class ends with H.
② 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 x 100).
③ DC output capacity when the input voltage is 200 V AC (400 V for the 400 V class).
④ The % value of the overload current rating indicates the ratio of the overload current to the converter's rated input current. For repeated duty, allow time for the converter and the inverter to return to or below the temperatures under 100 % load.
⑤ The protective structure is IP40 for FR-DU07-CNV (except the PU connector) and IP00 for the outside box (220 K or lower) and the choke regardless of their capacities.
⑥ When the hook of the converter front cover is cut off for installation of the plug-in option, the protective structure changes to the open type (IP00).

Common specifications FR-HC2

FR-HC2			Description
Control specifications	Modulation control		PWM
	Frequency range		50–60 Hz
	Current limit level		Current limit value selectable (0–220 % variable)
Control signals for operation	Input signals (5 terminals)		The following signals can be assigned to Pr. 3 to Pr. 7 (Input terminal function assignment): converter stop, monitor switching, converter reset, external thermal relay, and inrush resistance overheat detection.
	Output signals open-collector outputs (5 outputs) Relay output (1 output)	Operating status	The following signals can be assigned to Pr. 11 to Pr. 16 (Output terminal function assignment): inverter run enable signal, converter reset, converter running, overload alarm, power supply phase detection, output voltage match, instantaneous power failure detection, regenerative drive recognition, electronic thermal relay pre-alarm, fan alarm, heatsink overheat pre-alarm, during retry, input current detection, zero current detection, life alarm, maintenance timer, instantaneous power failure detection hold, alarm, and fault output.
		For meter Pulse train output (Max. 2.4 kHz: 1 terminal) Analog output Max. 10 V DC: 1 terminal	
Display	Parameter unit display (FR-DU07-CNV/ FR-PU07)	Operating status	Power supply frequency, input current, input voltage, fault or alarm indication, converter output voltage, electronic thermal relay load factor, cumulative energization time, cumulative power, input power, input power (with regenerative display), I/O terminal status ①, power/regenerative drive indication, option fitting state ②
		Alarm definition	Alarm definition is displayed when the protective function is activated Past eight fault records and the data right before the fault (input voltage/current/bus voltage/cumulative energization) are stored.
		Interactive guidance	Operation guide/trouble shooting with a help function ②
Protection		Protective functions	Overcurrent, overvoltage, converter protection thermal, fin overheat, instantaneous power failure, undervoltage, input phase loss, HC2 dedicated board disconnection, input power supply fault, external thermal relay operation ④, parameter error, PU disconnection ④, retry count excess ④, converter CPU fault, operation panel power supply short circuit, 24 V DC power output short circuit, input current detection value exceeded ④, inrush current limit circuit fault, internal circuit fault, option fault ⑤, communication option fault ⑤
		Warnings	Fan alarm, overload signal detection, electronic thermal relay function pre-alarm, PU stop, maintenance timer alarm 4, parameter write error, copy operation error, operation panel lock, parameter copy alarm, no-phase detection
Environment	Ambient temperature		-10–+50 °C (non-freezing)
	Ambient humidity		Max. 90 % (non-condensing)
	Storage temperature ③		-20–+65 °C
	Ambient conditions		For indoor use only (without corrosive gas, flammable gas, oil mist, dust and dirt etc.)
	Altitude/Vibration resistance		Maximum 1000 m above sea level. 5.9 m/s² ⑥ or less f at 10 to 55 Hz (directions of X, Y, Z axes)

Remarks:
① Can be displayed only on the operation panel (FR-DU07-CNV).
② Can be displayed only on the option parameter unit (FR-PU07).
③ Temperature applicable for a short time, e. g. in transit.
④ This protective function does not function in the initial status.
⑤ This protective function is only availible with option FR-A7NC mounted.
⑥ 2.9 m/s² or less for capacity class of 160 K or higher

Provided peripheral devices

Peripheral device model name	Description	Designation	Protective structure	Number
FR-HC2-H7.5K–55K	Filter choke 1	FR-HCL21-(H)☐K	IP00	1
	Filter choke 2	FR-HCL22-(H)☐K		1
FR-HC2-H7.5K–H220K	Outside box	FR-HCB2-(H)☐K		1
FR-HC2-H7.5K–H560K	Y-Capacitor-Box	FFR-HC2-Y-Capacitor-Box-01	IP20	1

① The filter box must be installed towards the mains power supply. All three phases of the filter box must be protected against overload by a suitable protective device. The protective device must be set to 5.5 A.

Peripheral device model name	Designation	Model name of consisting parts	Protective structure			Number		
						280K	400K	560K
FR-HC2-H280–H560K	Filter choke 1	FR-HCL21-(H)mK-B1	IP00	—		1	1	1
	Filter choke 2	FR-HCL22-(H)☐K-B1		—		1	1	1
	Filter capacitor	FR-HCC2-(H)☐K		Filter capacitor	FR-HCC2-(H)☐K	1	2	3
				Filter capacitor alarm detector	MDA-1	—	2	3
	Inrush current limit resistor	FR-HCR2-(H)☐K		Inrush current limit resistor (without thermostat)	0.96OHM BKO-CA1996H21	8	15	15
				Inrush current limit resistor (with thermostat)	0.96OHM BKO-CA1996H31	1	3	3
	Voltage converter	FR-HCM2-(H)☐K		MC power supply stepdown transformer (400–200 V)	1PH 630VA BKO-CA2001H06	1	1	1
				Inrush current limit MC	S-N400FXYS AC200V 2A2B	—	3	3
					S-N600FXYS AC210V 2A2B	1	—	—
				Buffer relay	SR-N4FX AC210V 4A	1	2	2
				Terminal block	TS-807BXC-5P	6	—	—
				Mini relay for filter capacitor alarm detector	MYQ4Z AC200/220	—	1	1
				Mini relay terminal block	PYF14T	—	1	1
				Mini relay clip	PYC-A1	—	2	2

Compatible inverter for the harmonic converter

Up to ten frequency inverters can be connected to one FR-HC2. The capacity of the FR-HC2 is determined in that way, that it is equal or higher as the cumulative capacity of all connected inverters.

For maximum harmonic suppression, the cumulative capacity of all connected inverters should be greater than half the rated capacity of the FR-HC2.

Harmonic converter		Compatible frequency inverters by means of capacity class	
		Compatible	Restricted compatible *
200 V	FR-HC2-7.5K	3.7–7.5 kW	<3.7 kW
	FR-HC2-15K	7.5–15 kW	<7.5 kW
	FR-HC2-30K	15–30 kW	<15 kW
	FR-HC2-55K	30–55 kW	<30 kW
	FR-HC2-75K	37–75 kW	<37 kW
400 V	FR-HC2-H7.5K	3.7–7.5 kW	<3.7 kW
	FR-HC2-H15K	7.5–15 kW	<7.5 kW
	FR-HC2-H30K	15–30 kW	<15 kW
	FR-HC2-H55K	30–55 kW	<30 kW
	FR-HC2-H75K	37–75 kW	<37 kW
	FR-HC2-H110K	55–110 kW	<55 kW
	FR-HC2-H160K	90–160 kW	<90 kW
	FR-HC2-H220K	110–220 kW	<110 kW
	FR-HC2-H280K	160–280 kW	<160 kW
	FR-HC2-H400K	200–400 kW	<200 kW
	FR-HC2-H560K	280–560 kW	<280 kW

* The converter can be used as a common converter or a regenerative converter, but its harmonic suppression effect reduces, because the choke is not operated at the nominal point.

■ Software FR Configurator2

The setup software FR Configurator2 is a powerful tool for the operation of your frequency inverter.

The software runs under all versions of MS Windows and therefore allows the inverter operation via any conventional personal computer. Several frequency inverters can be set up, operated, and monitored simultaneously across a network or via a personal computer or laptop.

The FR Configurator2 software can be used for all Mitsubishi Electric frequency inverters.

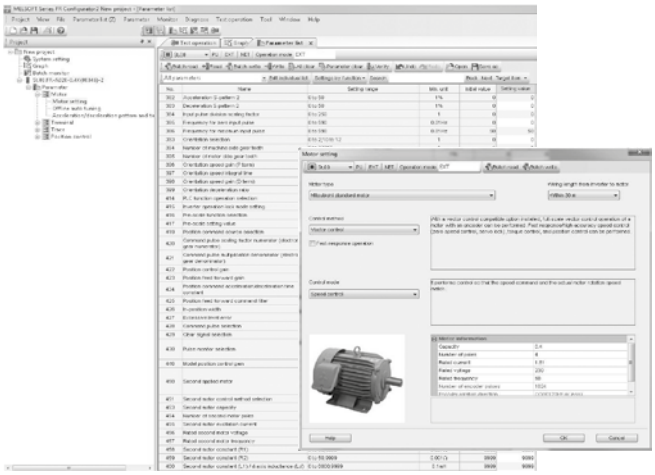
The Fr-Configurator2 software supports all Mitsubishi Electric VSD from 500 series up-to 800 series

Depending on the frequency inverter, the PC and frequency inverter are connected via Ethernet, an RS485 network or directly with the separately available adapter cable SC-FR PC and optionally via USB.

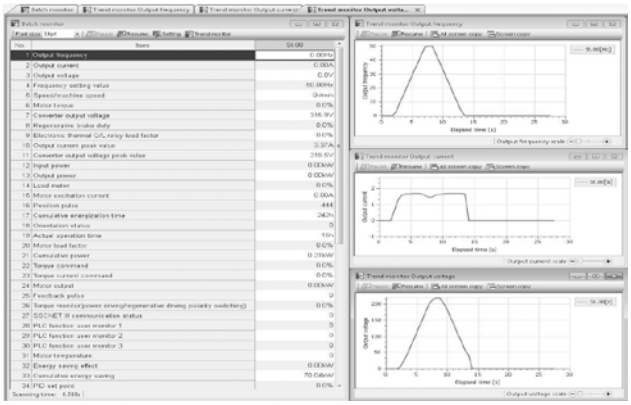
Benefits

- System settings
  Due to the Ethernet network capability of the frequency inverter, it is possible to communicate with up to 120 frequency inverters simultaneously via the software.
- Parameter settings
  By means of overall and function related overviews, different parameters can be adjusted easily.
- Display functions
  The comprehensible display functions enable data, analog, oscillograph, and alarm displays.
- Diagnostics and online Trace function
  The analysis of the inverter status provides a thorough error correction.
- Test operation
  The test operation provides a simulation of the operation and adjustment via the auto-tuning function.
- Positioning Wizzard
  For easy setup of positioning applications
- File management
  Parameters can be saved on the personal computer and printed out.
- Help
  The extensive online help provides support concerning all questions regarding settings and operation.
- FR-Confirurator2 include built-in PLC programming functionality, to program build in PLC of 800 series.
- FR Configurator2 include Maisart (Mitsubishi Electric's AI technology), to analyze data and help identify the cause of a fault.

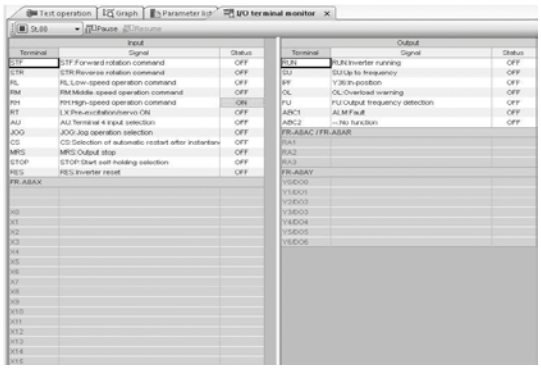
Parameter setting



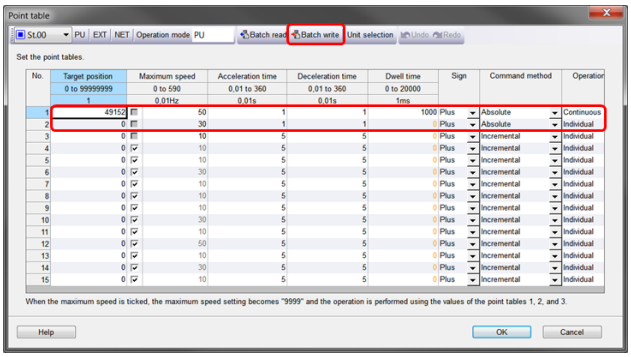
Display and monitor



Test operation

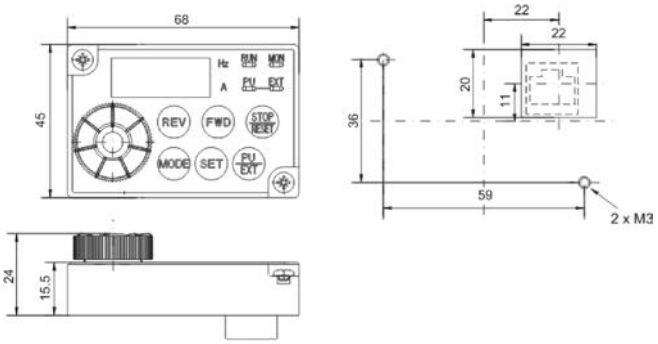


Positioning Wizzard

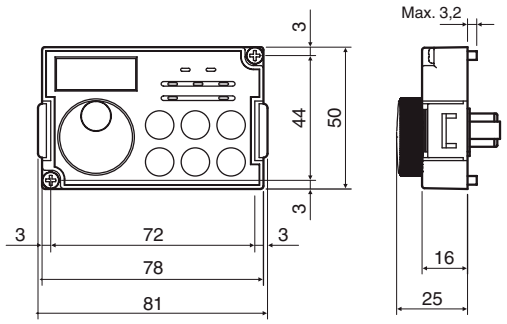


■ Parameter units FR-PA07 and FR-DU07/FR-DU07-IP54

FR-PA07



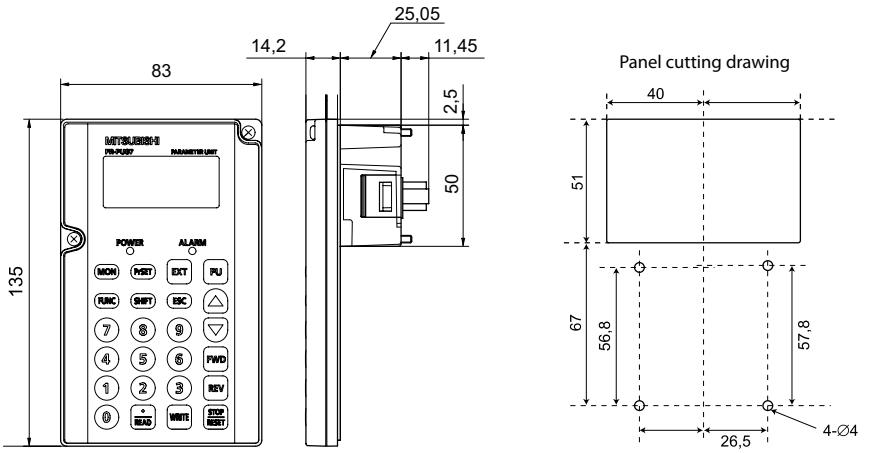
FR-DU07



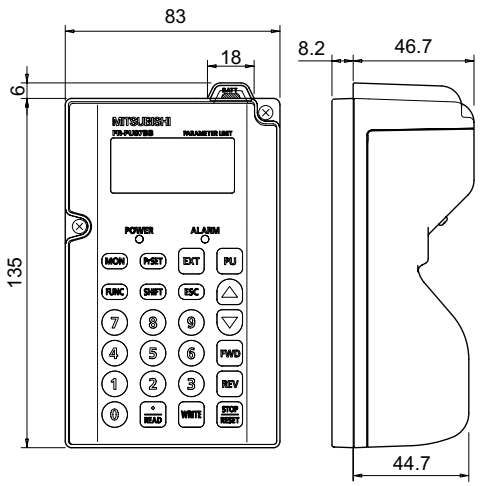
All dimensions in mm

■ Parameter units FR-PU07/FR-PU07/FR-DU07-IP54

FR-PU07



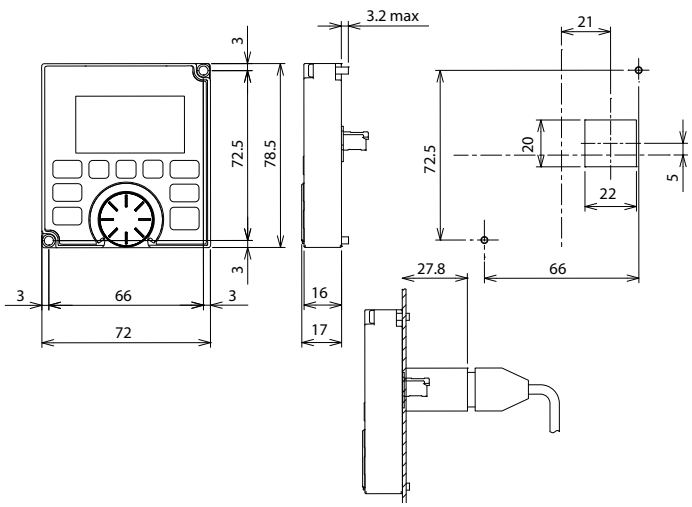
FR-PU07BB-L



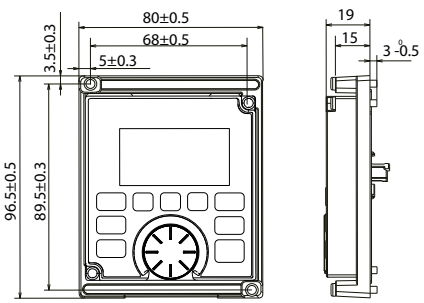
All dimensions in mm

■ Parameter unit FR-LU08/FR-LU08-01-IP55

FR-LU08

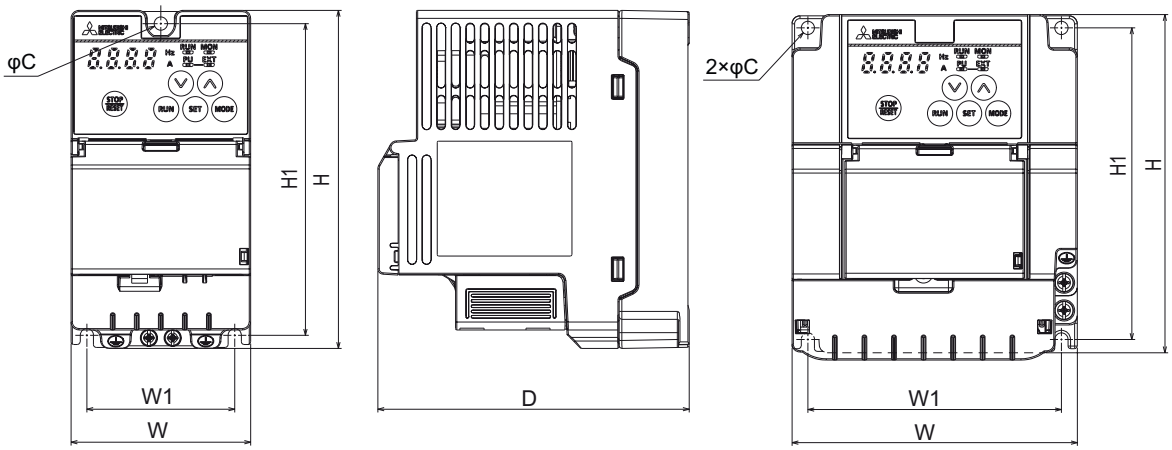


FR-LU08-01



All dimensions in mm

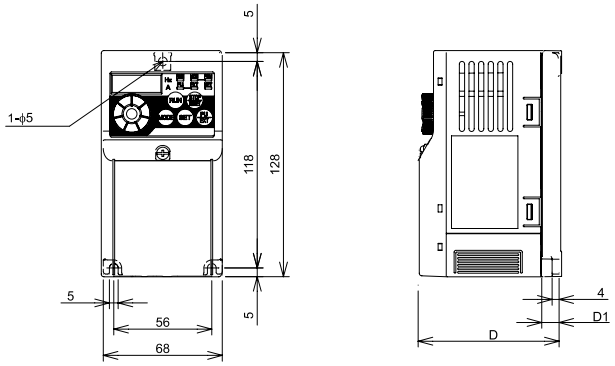
■ FR-CS80



All dimensions in mm

Type	D	H	H1	W	W1	C
FR-CS82S-025-60– FR-CS82S-042-60	118	128	118	68	56	5
FR-CS82S-070-60– FR-CS82S-100-60	160	128	118	108	96	
FR-CS84-012-60– FR-CS84-022-60	118	128	118	68	56	5
FR-CS84-036-60– FR-CS84-050-60	130	128	118	108	96	
FR-CS84-080-60	160	128	118	108	96	
FR-CS84-120-60– FR-CS84-160-60	134	150	138	197.5	185.5	
FR-CS84-230-60– FR-CS84-295-60	165	260	244	180	164	6

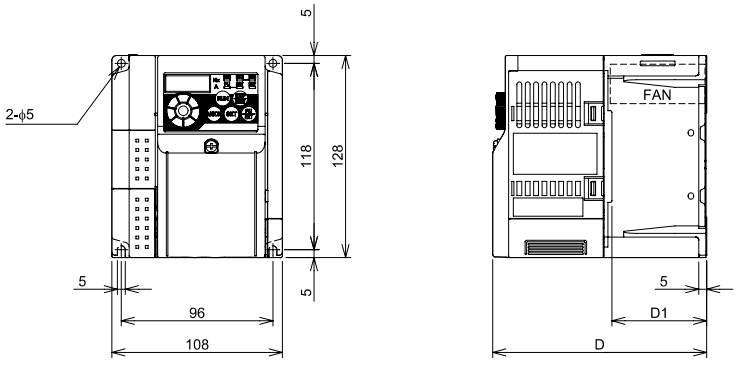
■ FR-D720S-008–042SC



Type	D	D1
FR-D720S-008–014SC	80.5	10
FR-D720S-025SC	142.5	42
FR-D720S-042SC	162.5	62

All dimensions in mm

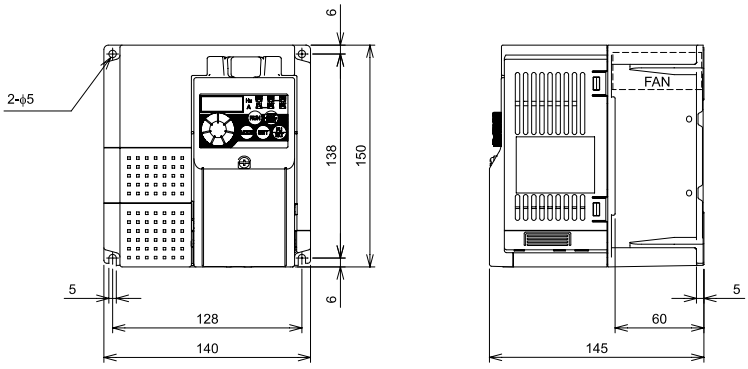
■ FR-D720S-070SC/FR-D740-012–080SC



Type	D	D1
FR-D720S-070SC	155.5	60
FR-D740-012/022SC	129.5	54
FR-D740-036SC	135.5	60
FR-D740-050SC	155.5	
FR-D740-080SC	165.5	

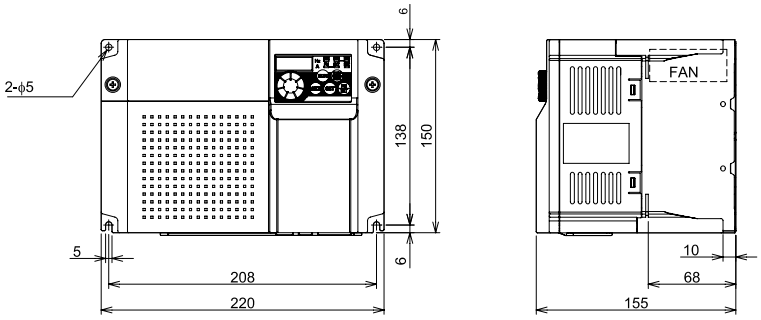
All dimensions in mm

■ FR-D720S-100SC



All dimensions in mm

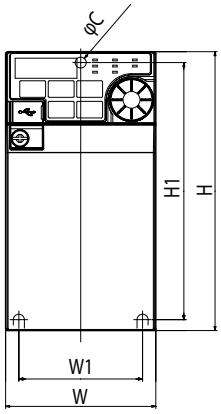
■ FR-D740-120/160SC



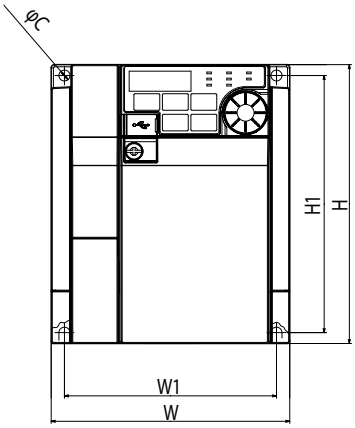
All dimensions in mm

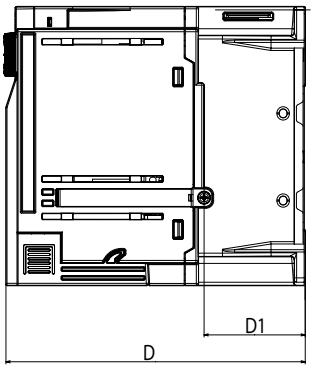
■ FR-E800

FR-E820-0008–0050

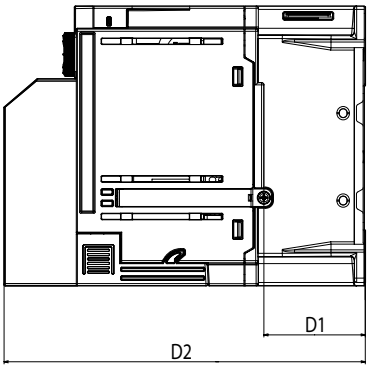


- FR-E820-0008–0330
- FR-E840-0016–0170
- FR-E860-0017–0120





When used with the plug-in option



All dimensions in mm

Type	D	D1	D2	H	H1	W	W1	C
FR-E820S-0008–FR-E820S-0015,	80.5	10	108,1			68	56	
FR-E820S-0030,	142.5	42	170.1			68	56	
FR-E820S-0050	135	45.5	162.6	128	118	108	96	5
FR-E820S-0080	161	45	188.6			108	96	
FR-E820S-0110	142.5	52.5	170.1			140	128	

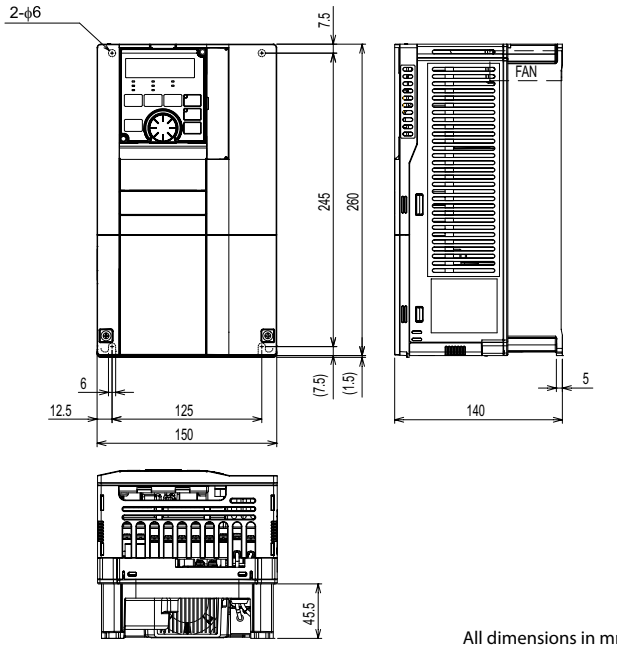
Type	D	D1	D2	H	H1	W	W1	C
FR-E820-0008–FR-E820-0015	80.5	10	108.1			68	56	
FR-E820-0030,	112.5	42	140.1			68	56	
FR-E820-0050	132.5	42	160.1	128	118	68	56	5
FR-E820-0080–FR-E820-0110	135.5	46	163.1			108	96	
FR-E820-0175	142.5	52.5	170.1			140	128	
FR-E820S-0240– FR-E820-0330	165	71.5	192.6	260	244	180	164	6

Type	D	D1	D2	H	H1	W	W1	C
FR-E840-0016–FR-E840-0026	129.5	40	157.1	128	118	108	96	
FR-E840-0040	135	46	157.1	128	118	108	96	5
FR-E840-0060–FR-E840-0095	135	43.5	162.6	150	138	140	128	
FR-E840-0120–FR-E840-0170	147	68	174.6	150	138	220	208	

Type	D	D1	D2	H	H1	W	W1	C
FR-E860-0017–FR-E860-0040	135	43.5	162.6	150	138	140	128	5
FR-E860-0061–FR-E860-0120	147	68	174.6	150	138	220	208	

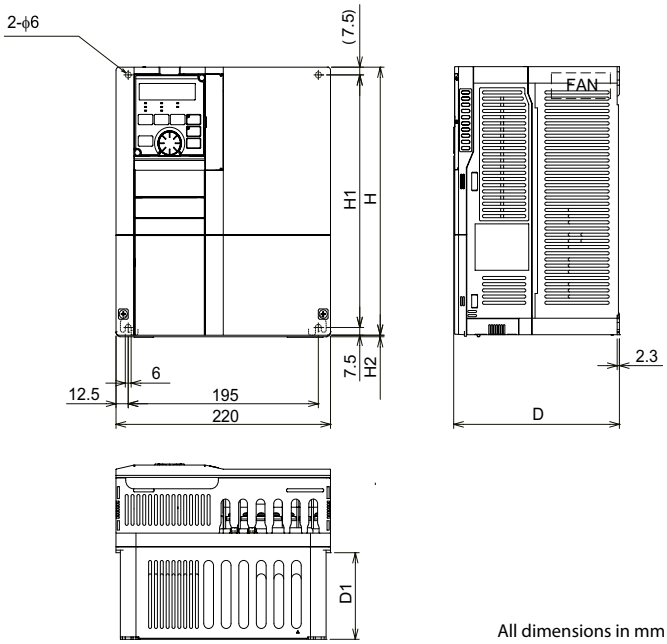
■ FR-F800

FR-F840-00023, FR-F840-00038, FR-F840-00052,
FR-F840-00083, FR-F840-00126



All dimensions in mm

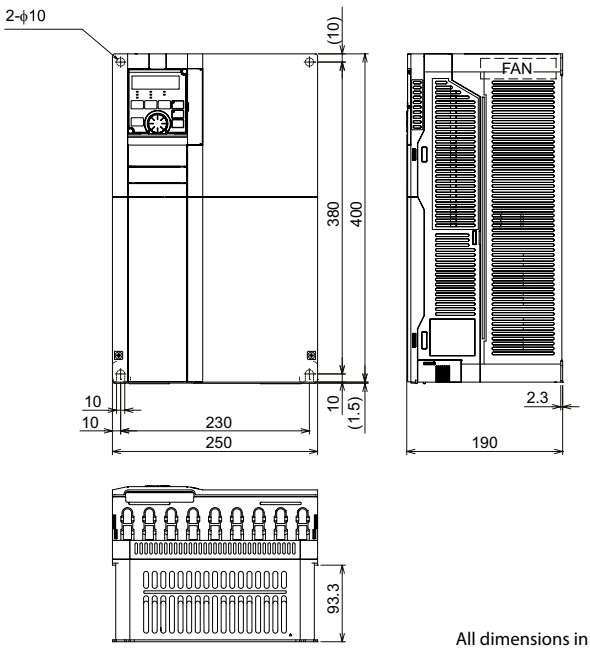
FR-F840-00170, FR-F840-00250, FR-F840-00310, FR-F840-00380



All dimensions in mm

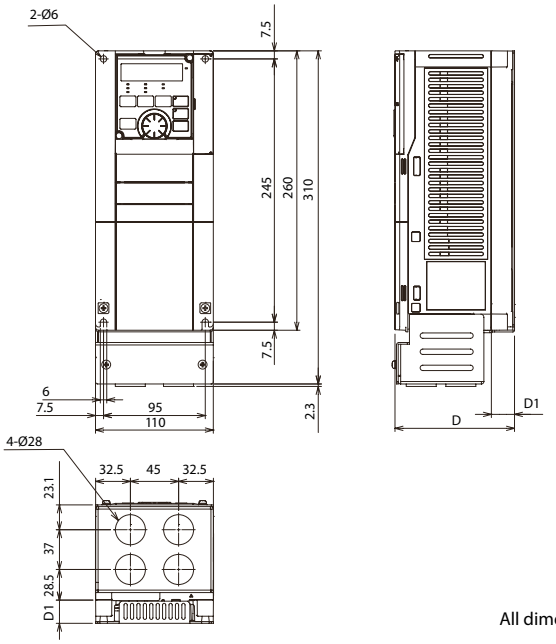
Type	D	D1	H	H1	H2
FR-F840-00170, FR-F840-00250	170	84	260	245	1.5
FR-F840-00310, FR-F840-00380	190	101.5	300	285	3

FR-F840-00470, FR-F840-00620



All dimensions in mm

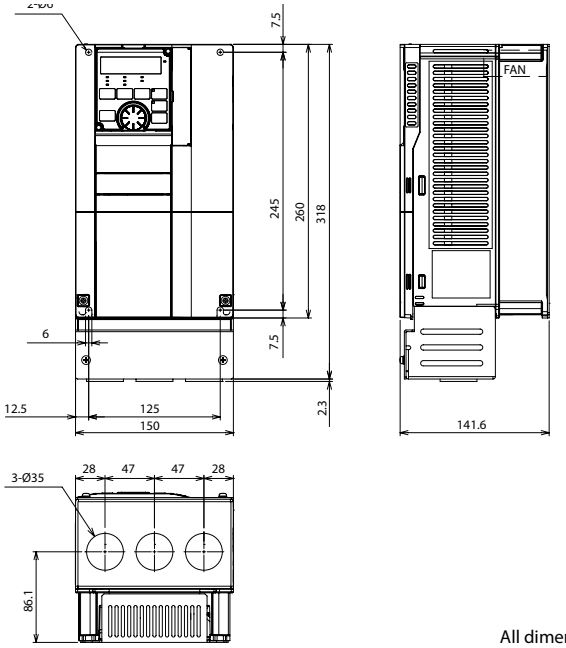
FR-F820-00046, FR-F820-00077



All dimensions in mm

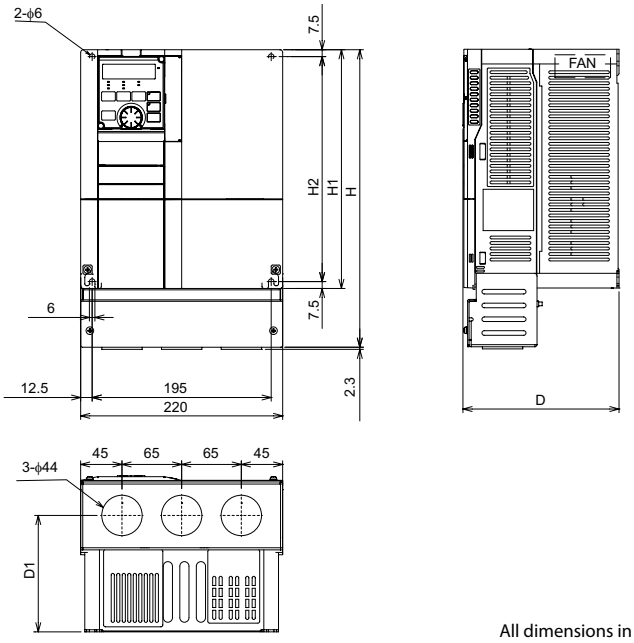
Type	D	D1
FR-F820-00046	111.6	21.6
FR-F820-00077	126.6	36.6

FR-F820-00105, FR-F820-00167, FR-F820-00250



All dimensions in mm

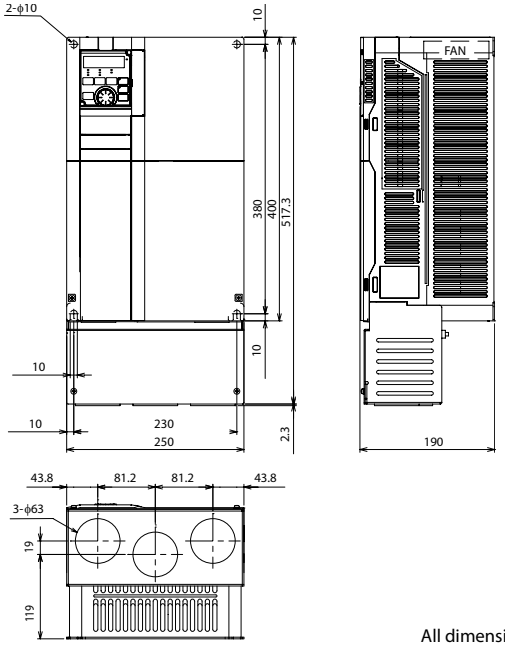
FR-F820-00340, FR-F820-00490, FR-F820-00630



All dimensions in mm

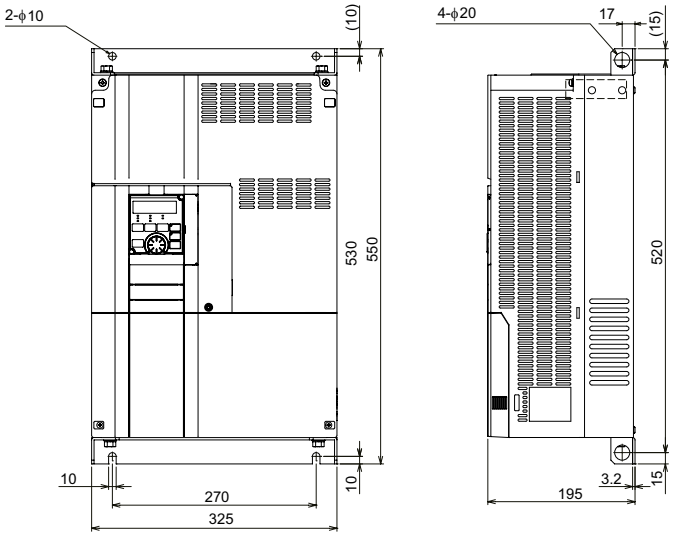
Type	H	H1	H2	D	D1
FR-F820-00340, FR-F820-00490,	324	84	260	245	1.5
FR-F820-00630	190	101.5	300	285	3

FR-F820-00770, FR-F820-00930, FR-F820-01250

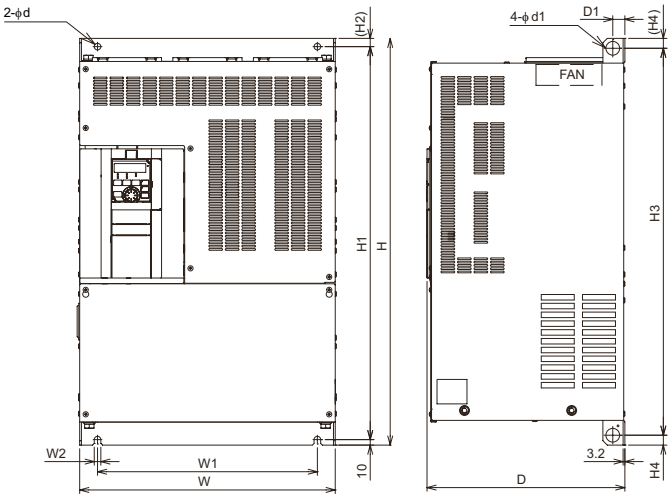


All dimensions in mm

FR-F820-01540,
FR-F840-00770



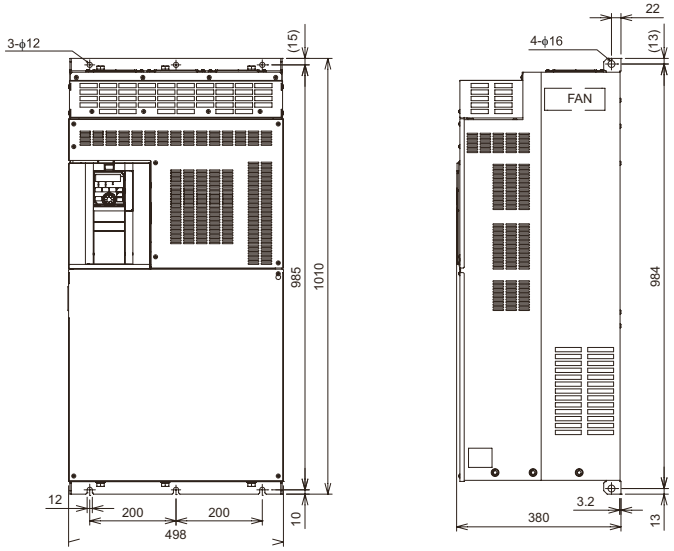
FR-F820-01870, FR-F820-02330, FR-F820-03160, FR-F820-03800,
FR-F820-04750
FR-F840-00930, FR-F840-01160, FR-F840-01800, FR-F840-02160,
FR-F840-02600, FR-F840-03250, FR-F840-03610



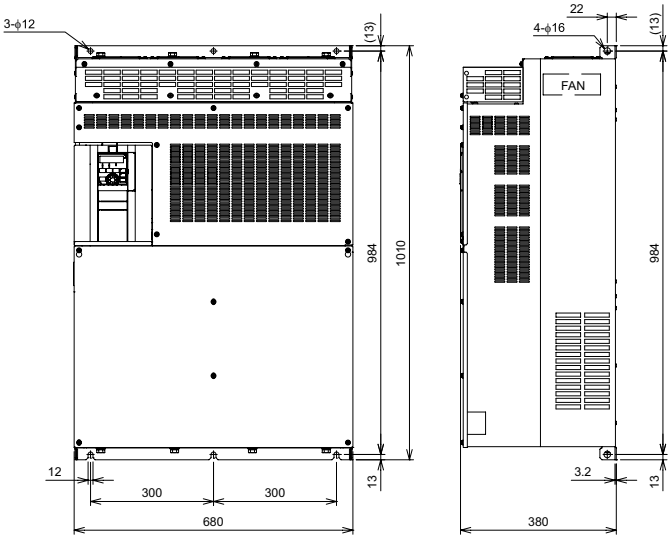
Type	d	d1	D	D1	H	H1	H2	H3	H4	W	W1	W2
FR-F820-01870, FR-F820-02330, FR-F840-00930, FR-F840-01160, FR-F840-01800	12	25	250	24	550	525	15	514	18	435	380	12
FR-F820-03160	12	25	250	22	700	675	15	664	18	465	410	12
FR-F820-03800, FR-F820-04750	12	24	360	22	740	715	15	704	18	465	400	12
FR-F840-02160, FR-F840-02600	12	24	300	22	620	595	15	584	18	465	400	12
FR-F840-03250, FR-F840-03610	25	25	360	22	740	715	15	704	18	465	400	12

All dimensions in mm

FR-F840-04320, FR-A840-04810



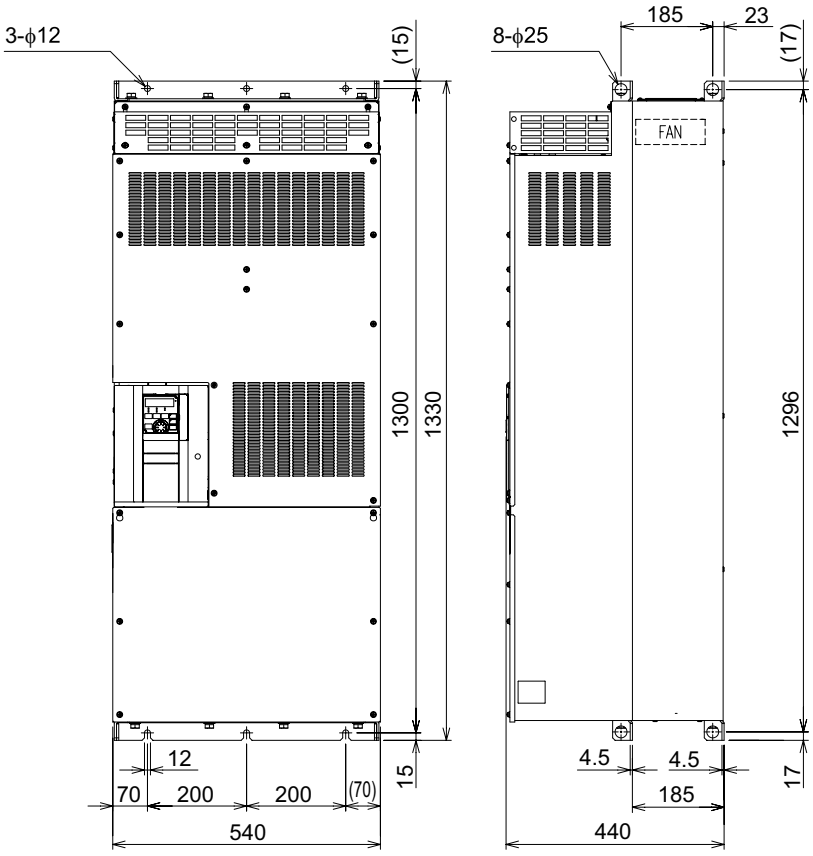
FR-F840-05470, FR-F840-06100, FR-F840-06830



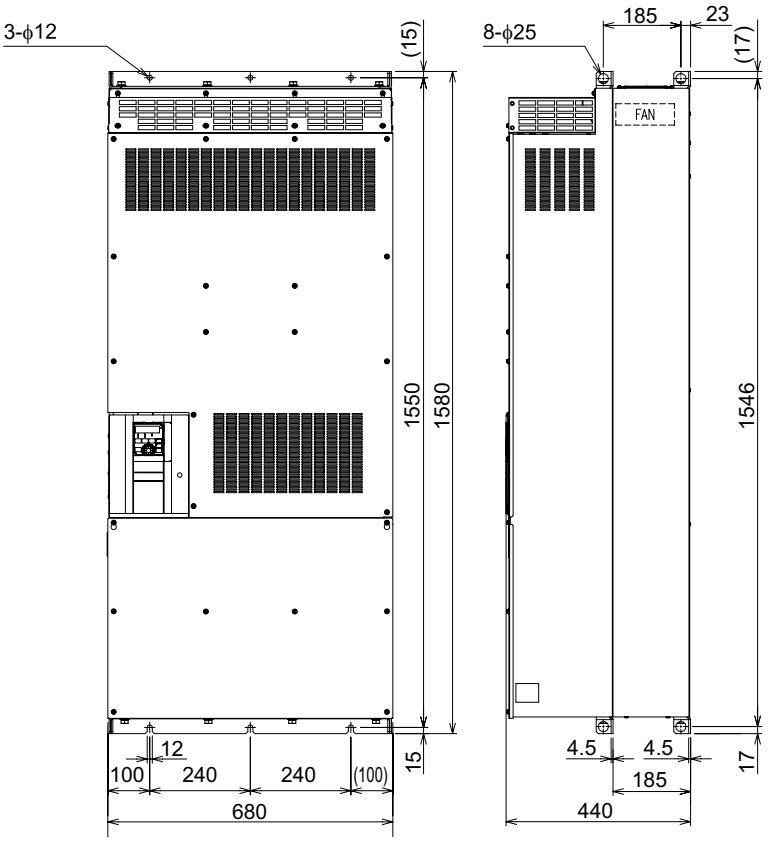
All dimensions in mm

■ FR-F842

FR-F842-07700, FR-F842-08660

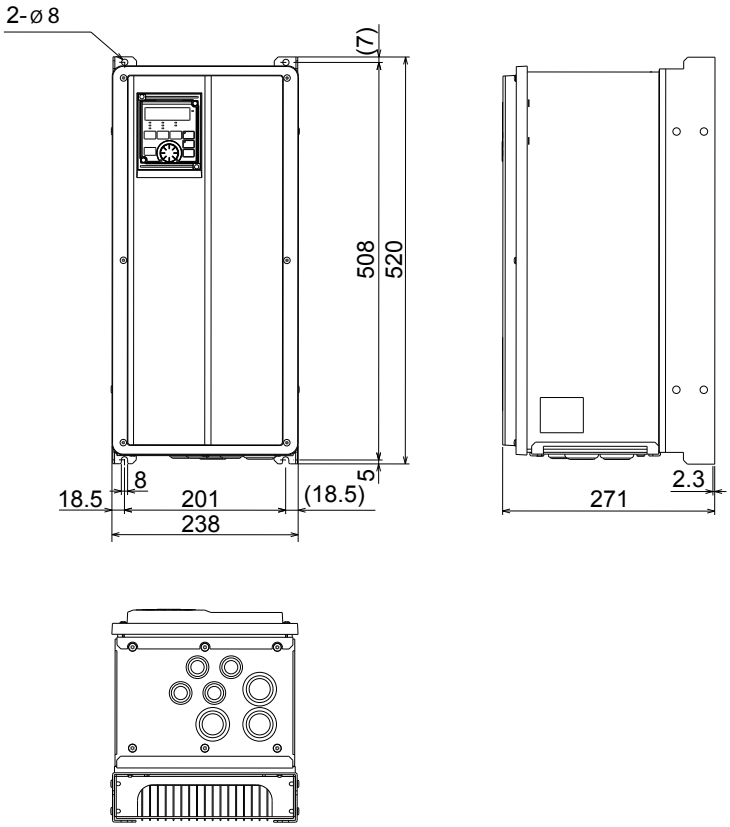


FR-F842-09620, FR-F842-10940, FR-F842-12120



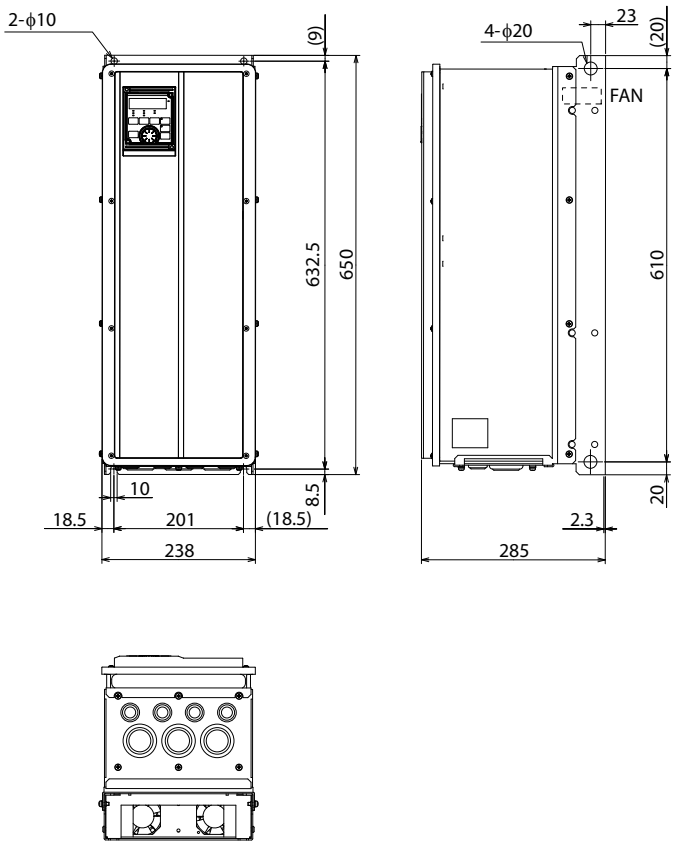
■ FR-F846

FR-F846-00023–00170



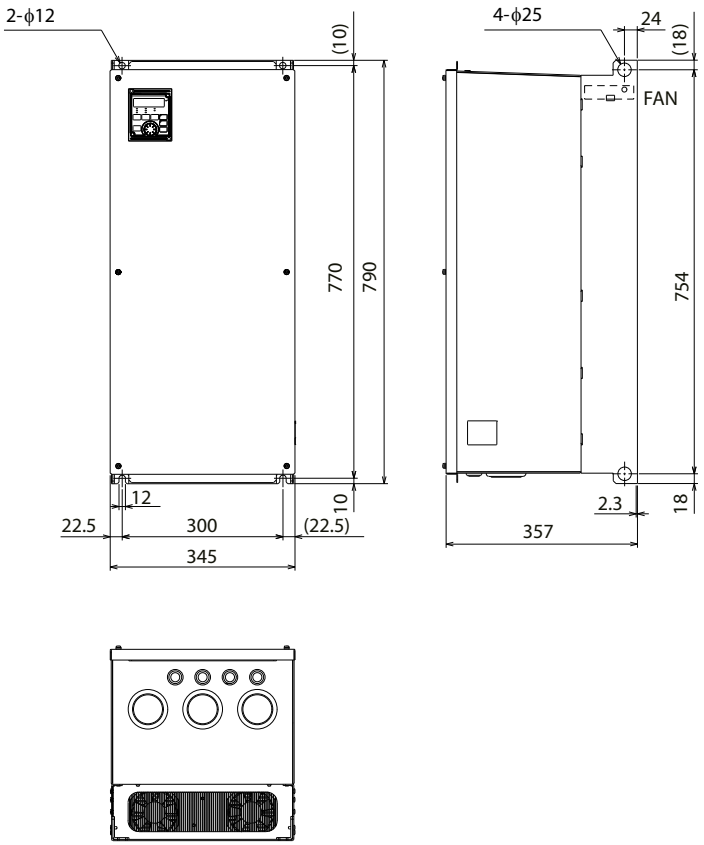
All dimensions in mm

FR-F846-00250–00470



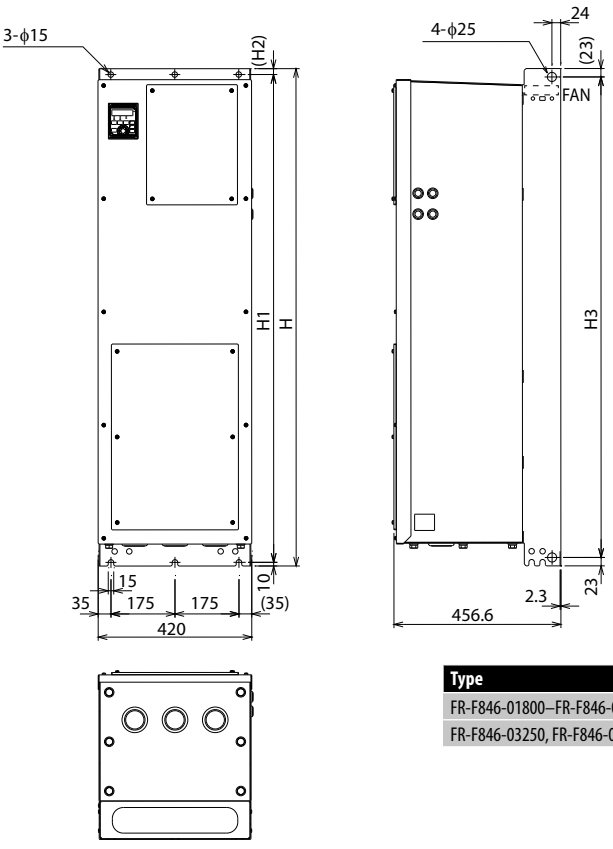
All dimensions in mm

FR-F846-00620–01160



All dimensions in mm

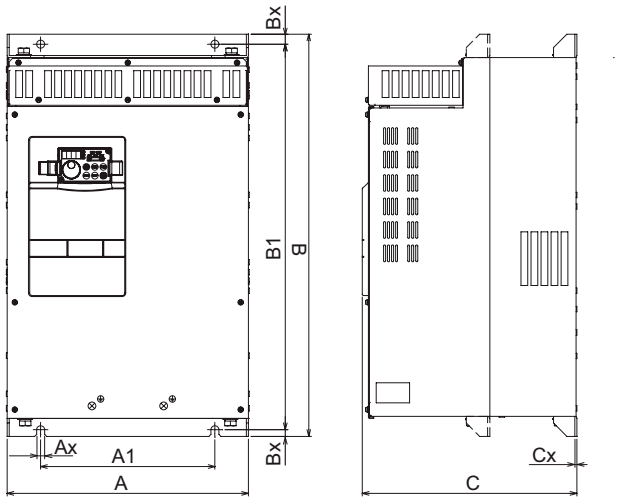
FR-F846-01800–03610



Type	H	H1	H2	H3
FR-F846-01800–FR-F846-02600	1360	1334	16	1314
FR-F846-03250, FR-F846-03610	1510	1482	18	1464

All dimensions in mm

■ FR-A741



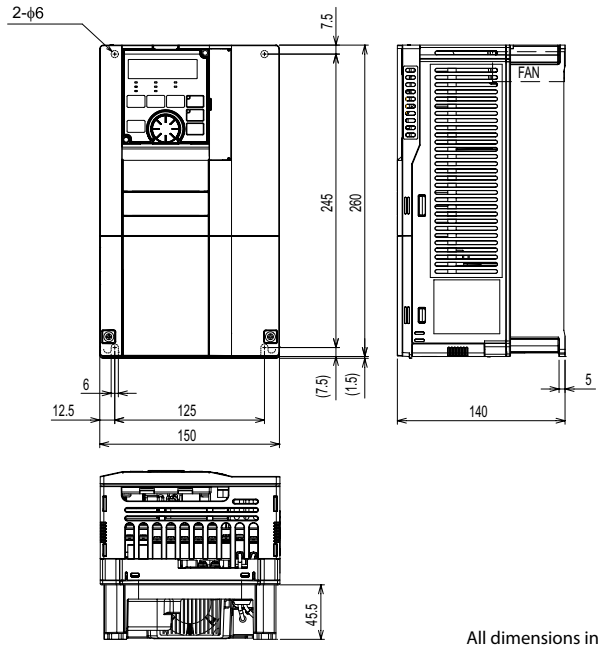
Type	A	A1	Ax	B	B1	Bx	C	Cx
FR-A741-5.5K/7.5K	250	190	10	470	454	8	270	2.3
FR-A741-11K/15K	300	220	10	600	575	15	294	3.2
FR-A741-18.5K/22K	360	260	12	600	575	15	320	3.2
FR-A741-30K	450	350	12	700	675	15	340	3.2
FR-A741-37K/45K	470	370	14	700	670	15	368	3.2
FR-A741-55K	600	480	14	900	870	15	405	3.2

Please consider also the dimensions of the corresponding DC chokes (see page 127)

All dimensions in mm

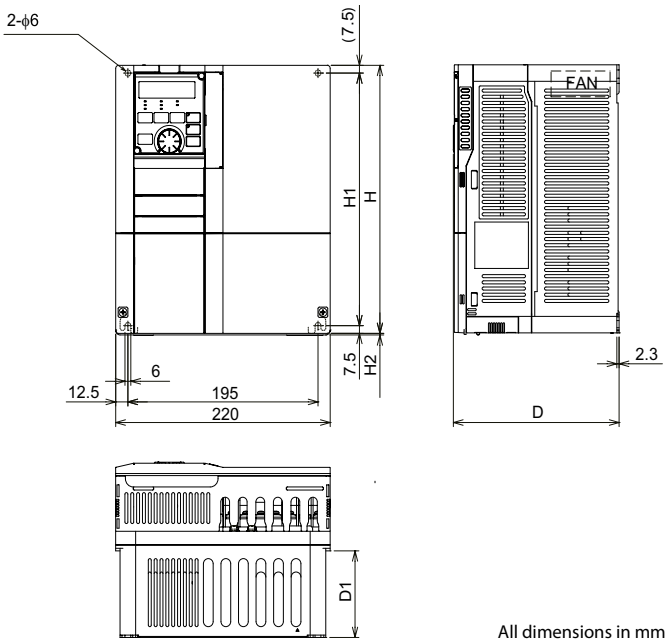
■ FR-A800

FR-A840-00023, FR-A840-00038, FR-A840-00052,
FR-A840-00083, FR-A840-00126



All dimensions in mm

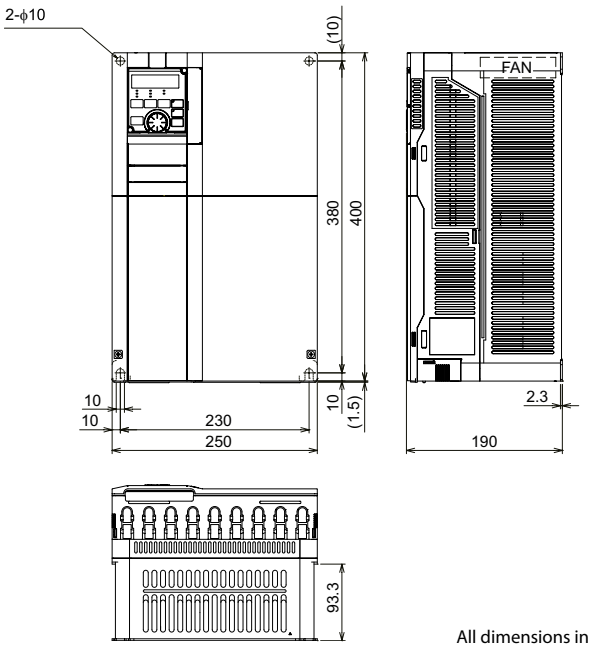
FR-A840-00170, FR-A840-00250, FR-A840-00310, FR-A840-00380



All dimensions in mm

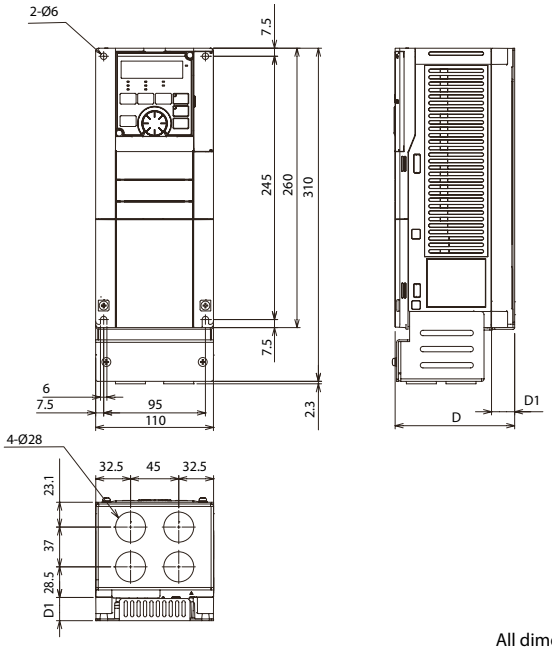
Type	D	D1	H	H1	H2
FR-A840-00170, FR-A840-00250	170	84	260	245	1.5
FR-A840-00310, FR-A840-00380	190	101.5	300	285	3

FR-A840-00470, FR-A840-00620



All dimensions in mm

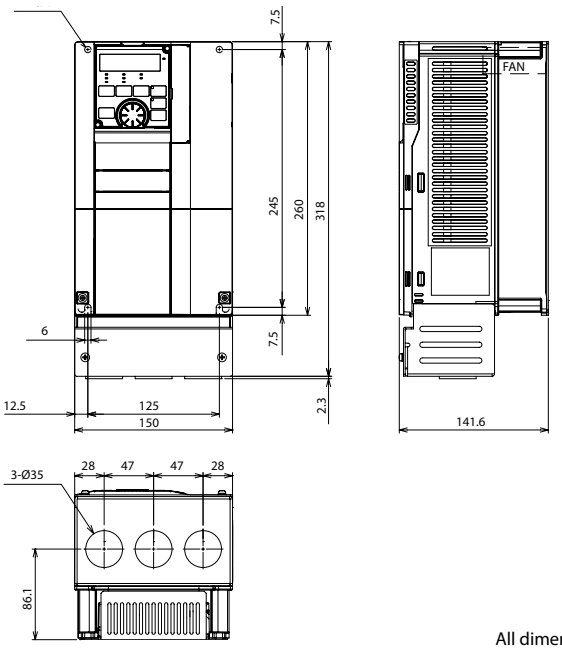
FR-A820-00046, FR-A820-00077



All dimensions in mm

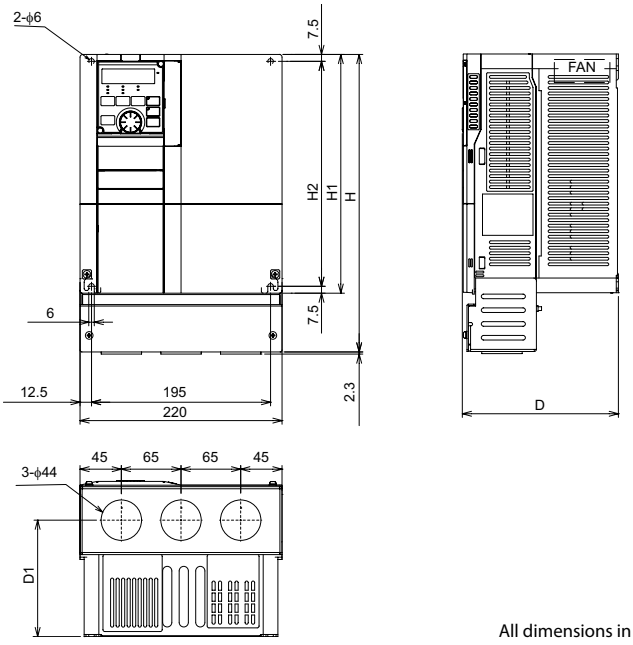
Type	D	D1
FR-A820-00046	111.6	21.6
FR-A820-00077	126.6	36.6

FR-A820-00105, FR-A820-00167, FR-A820-00250



All dimensions in mm

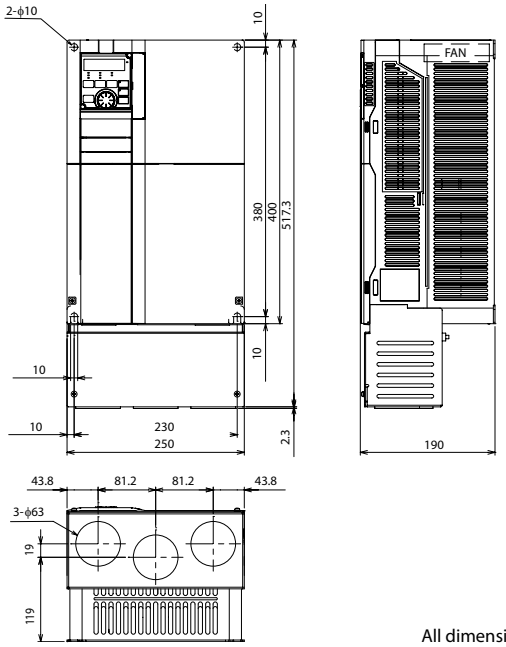
FR-A820-00340, FR-A820-00490, FR-A820-00630



All dimensions in mm

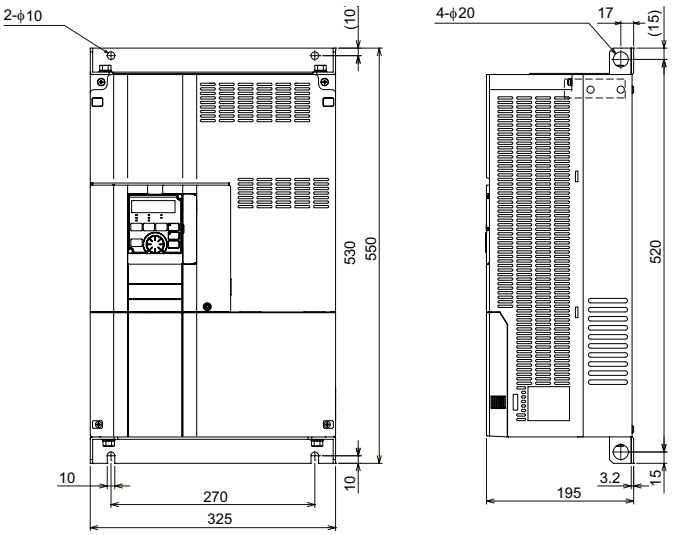
Type	H	H1	H2	D	D1
FR-A820-00340, FR-A820-00490	324	84	260	245	1.5
FR-A820-00630	190	101.5	300	285	3

FR-A820-00770, FR-A820-00930, FR-A820-01250

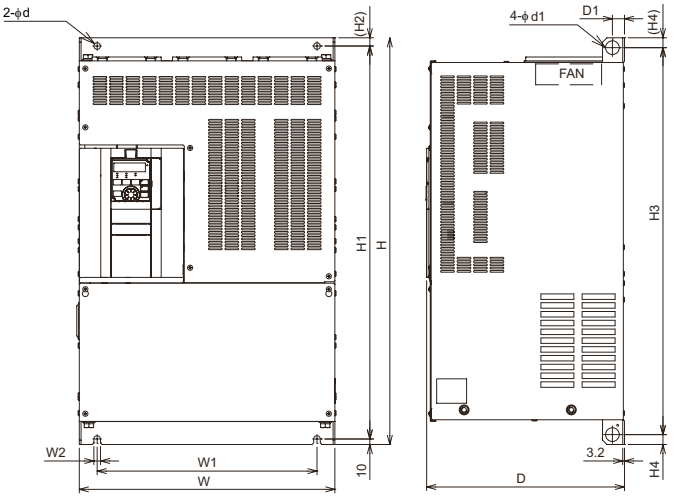


All dimensions in mm

FR-A820-01540,
FR-A840-00770



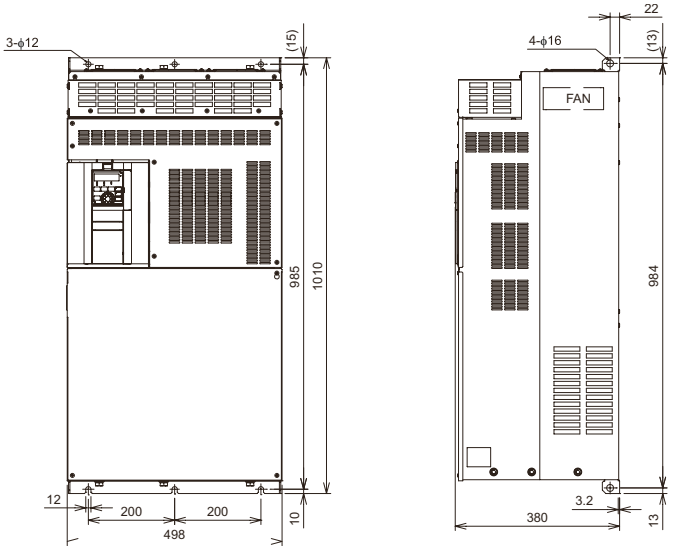
FR-A820-01870, FR-A820-02330, FR-A820-03160, FR-A820-03800,
FR-A820-04750
FR-A840-00930, FR-A840-01160, FR-A840-01800, FR-A840-02160,
FR-A840-02600 FR-A840-03250, FR-A840-03610



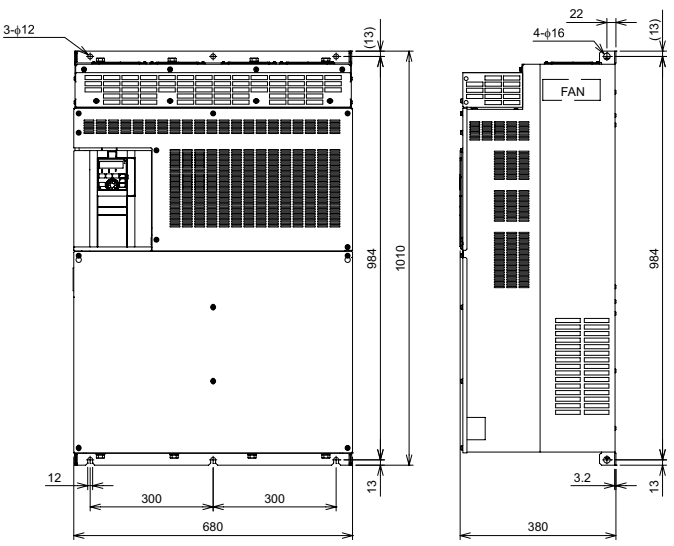
Type	d	d1	D	D1	H	H1	H2	H3	H4	W	W1	W2
FR-A820-01870, FR-A820 02330, FR-A840-00930, FR-A840-01160, FR-A840-01800	12	25	250	24	550	525	15	514	18	435	380	12
FR-A820-03160	12	25	250	22	700	675	15	664	18	465	410	12
FR-A820-03800, FR-A820-04750	12	24	360	22	740	715	15	704	18	465	400	12
FR-A840-02160, FR-A840-02600	12	24	300	22	620	595	15	584	18	465	400	12
FR-A840-03250, FR-A840-03610	25	25	360	22	740	715	15	704	18	465	400	12

All dimensions in mm

FR-A840-04320, FR-A840-04810



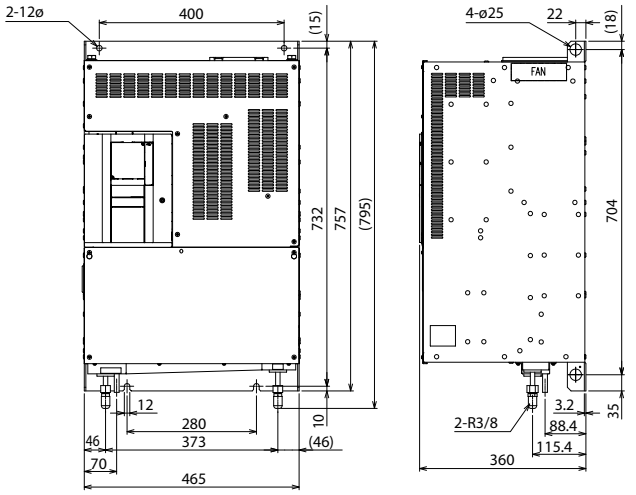
FR-A840-05470, FR-A840-06100, FR-A840-06830



All dimensions in mm

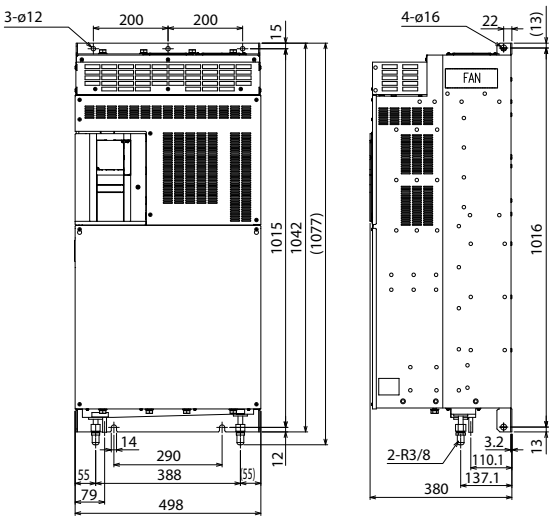
■ FR-A840-LC (Liquid cooled type)

FR-A840-03250(110K), 03610(132K)-LC



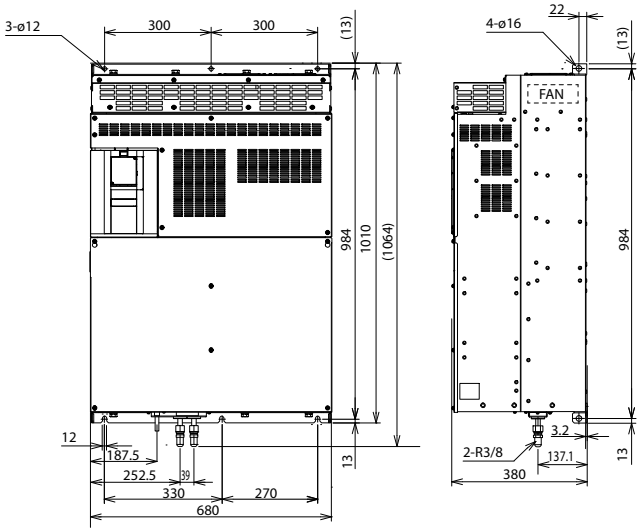
All dimensions in mm

FR-A840-04320(160K), 04810(185K)-LC



All dimensions in mm

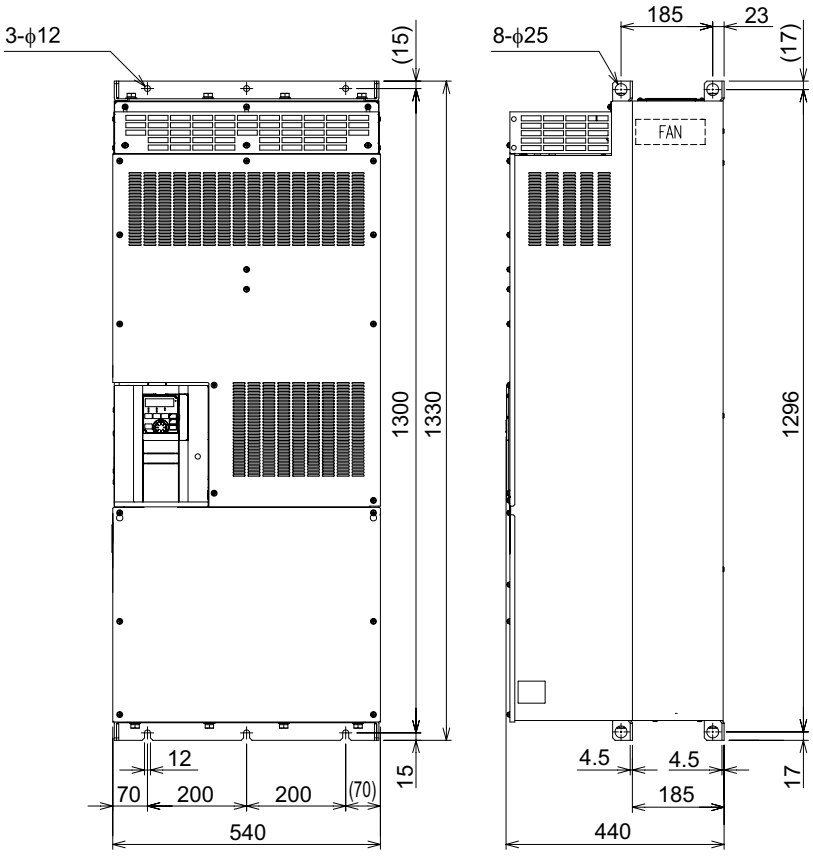
FR-A840-05470(220K), 06100(250K), 06830(280K)-LC



All dimensions in mm

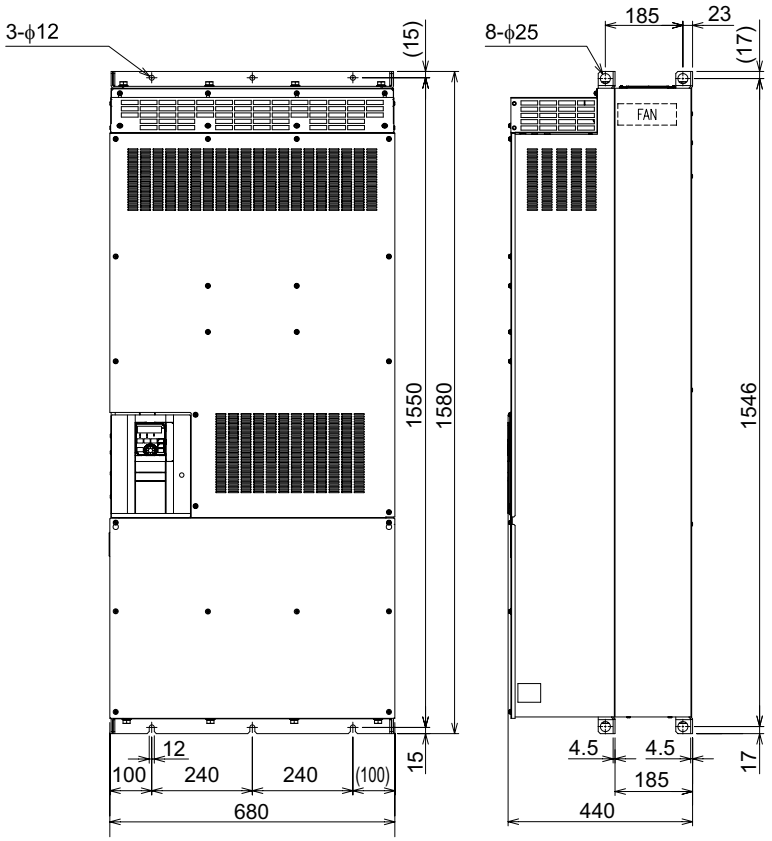
■ FR-A842

FR-A842-07700(315K), 08660(355K)(-E)(GF)



All dimensions in mm

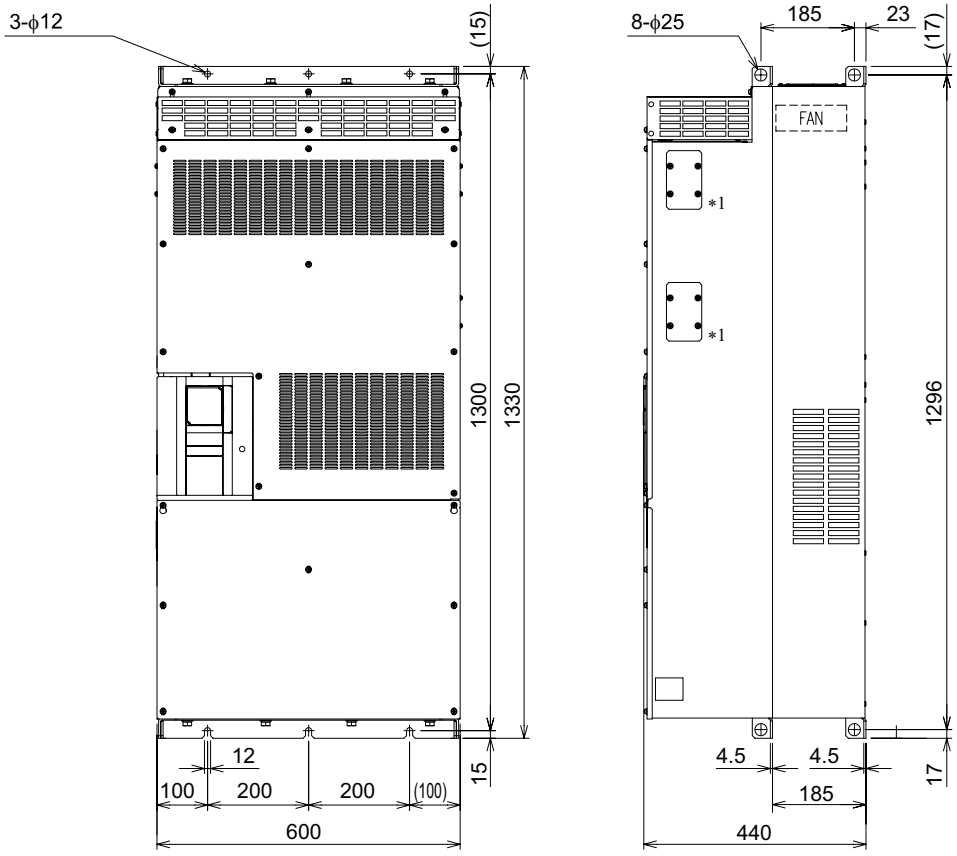
FR-A842-09620(400K), 10940(450K), 12120(500K)(-E)(GF)(-P)



All dimensions in mm

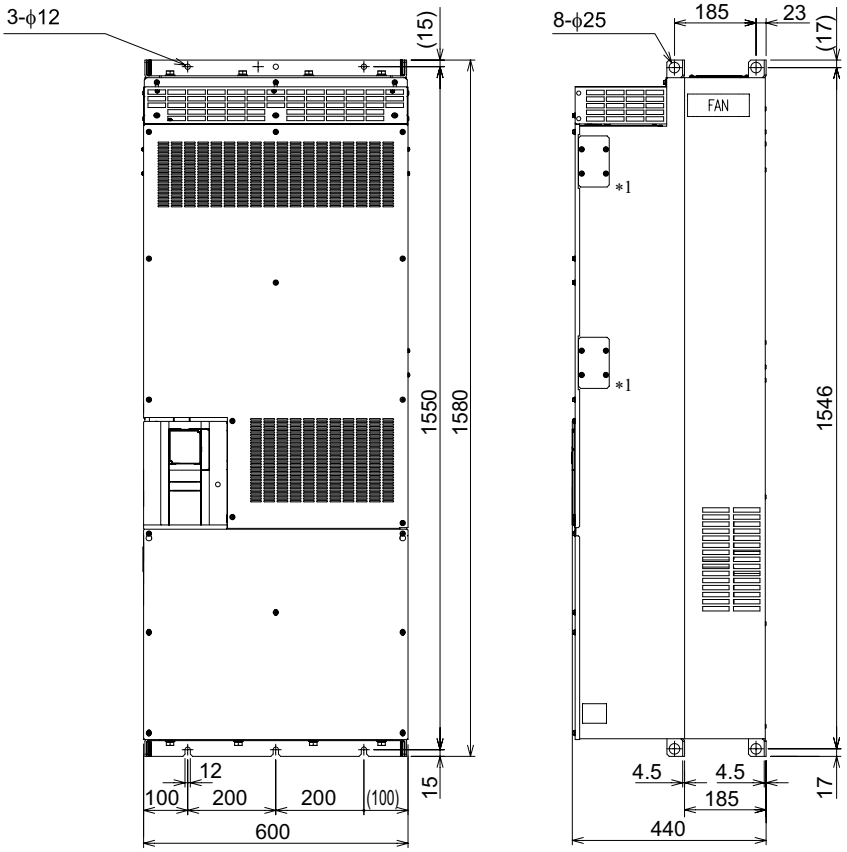
■ FR-CC2-H

FR-CC2-H315K, H355K



All dimensions in mm

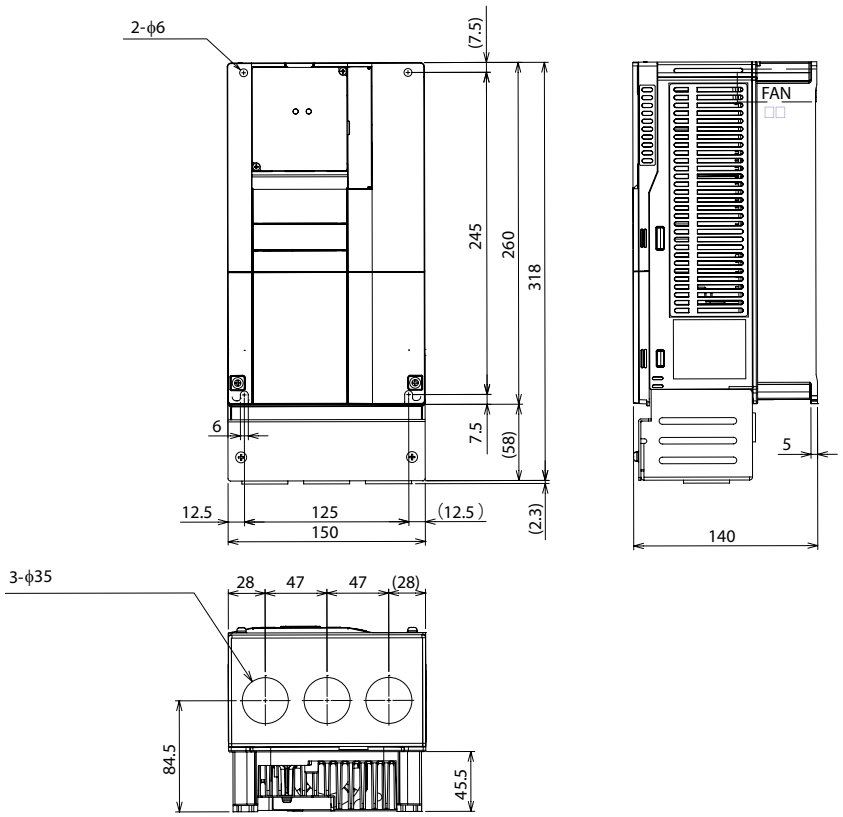
FR-CC2-H400K(-P), H450K(-P), H500K(-P), H560K(-P), H630K



All dimensions in mm

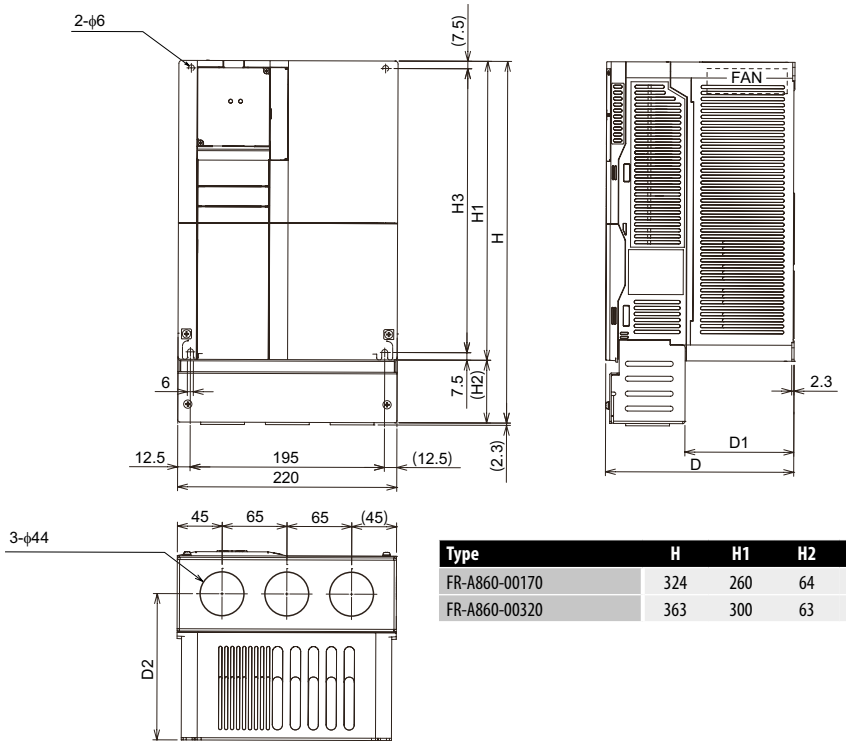
■ FR-A860

FR-A860-00027, FR-A860-00061, FR-A860-00090



All dimensions in mm

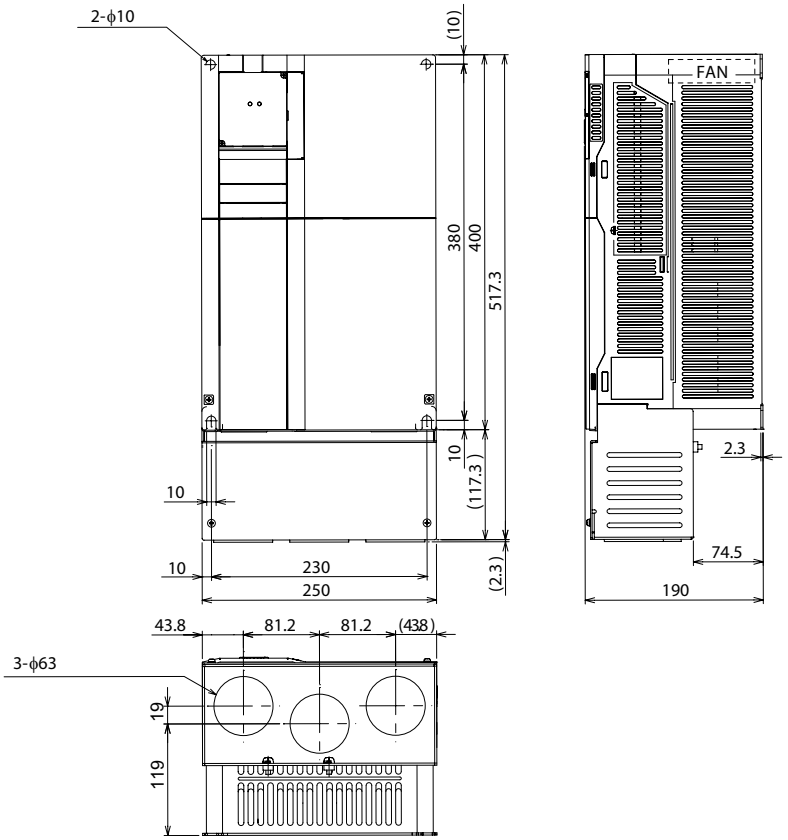
FR-A860-00170, FR-A860-00320



Type	H	H1	H2	H3	D	D1	D2
FR-A860-00170	324	260	64	245	170	89.3	126.8
FR-A860-00320	363	300	63	285	190	109.3	146.8

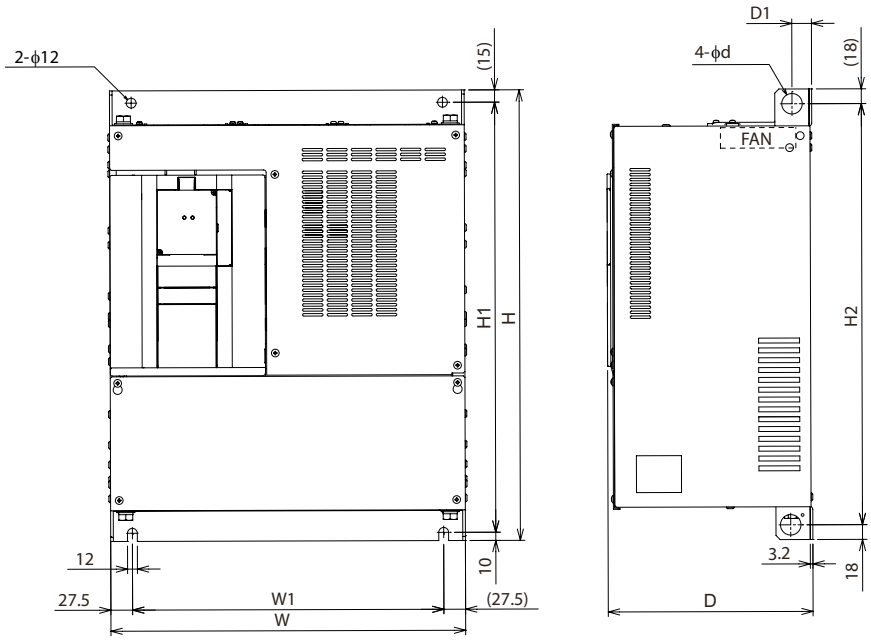
All dimensions in mm

FR-A860-00450



All dimensions in mm

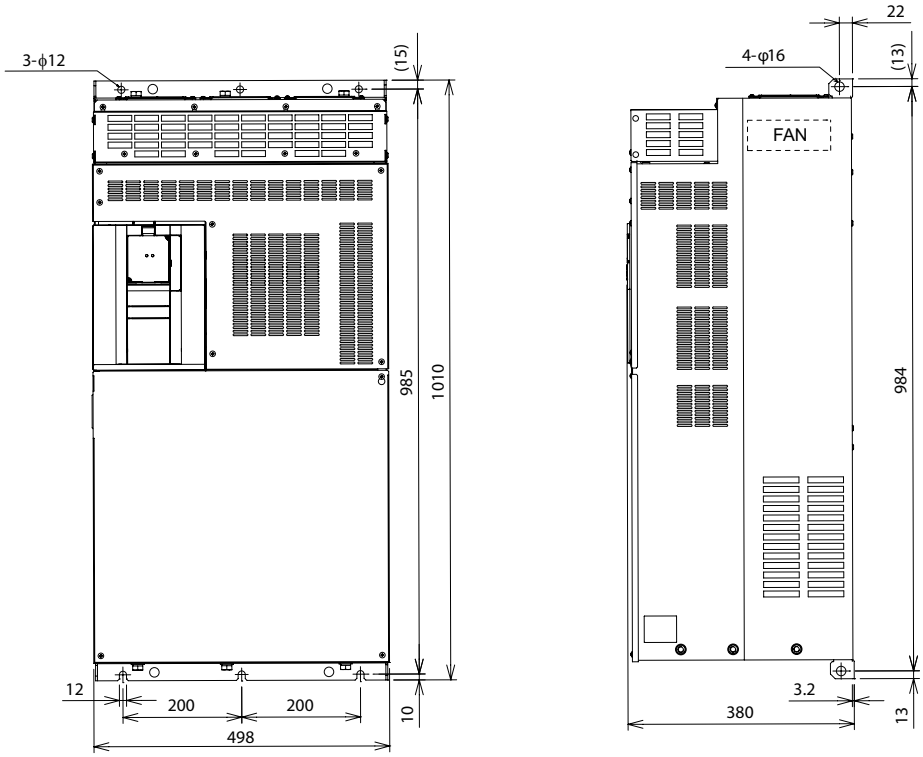
FR-A860-00680, FR-A860-01080, FR-A860-01440, FR-A860-01670, FR-A860-02430

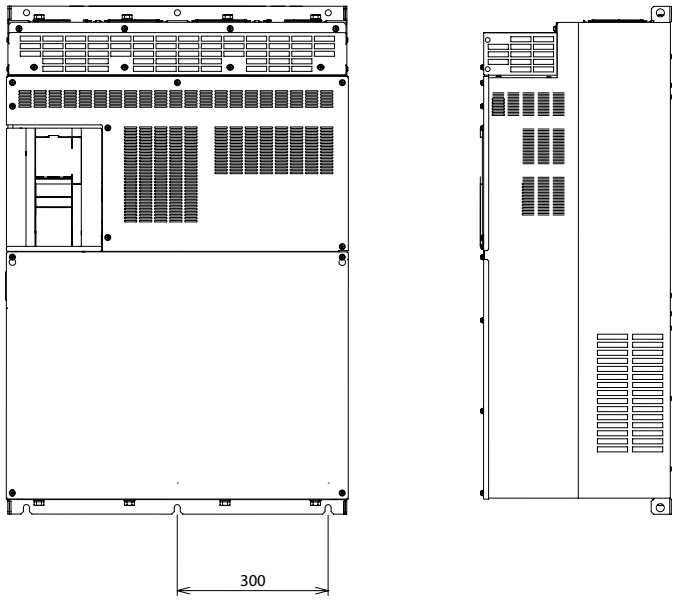


Type	W	W1	H	H1	H2	d	D	D1
FR-A860-00680, FR-A860-01080	435	380	550	525	514	25	250	24
FR-A860-01440, FR-A860-01670, FR-A860-02430	465	400	620	595	584	24	300	22

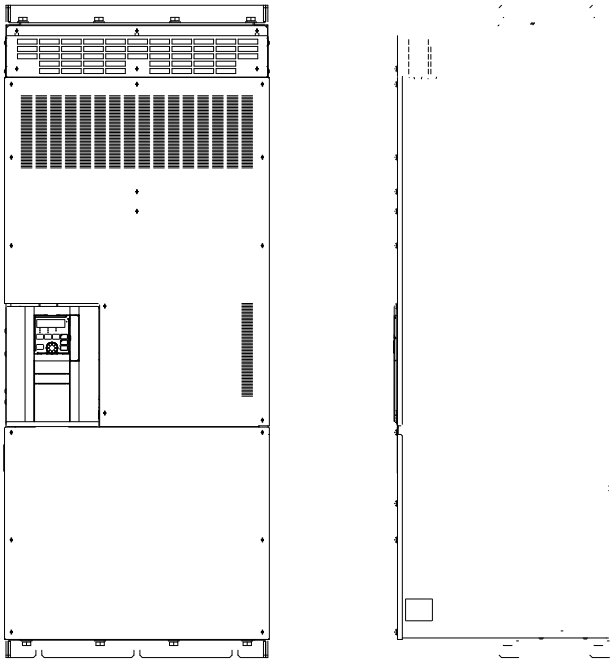
All dimensions in mm

FR-A860-02890, FR-A860-03360



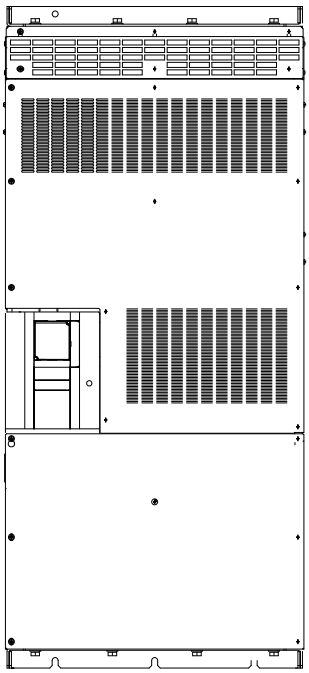


■ FR-A862

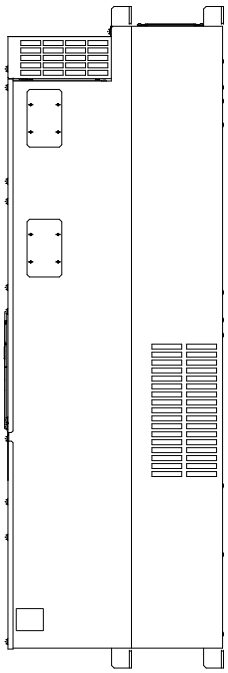


■ FR-CC2-C

3-ϕ12

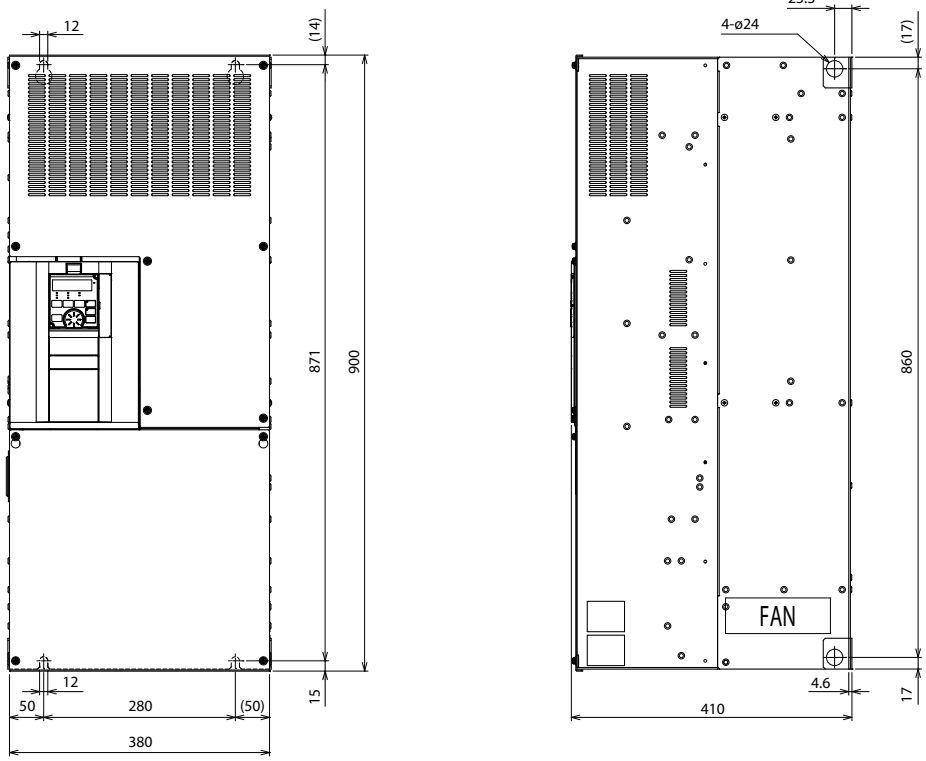


8-ϕ25



■ FR-A870

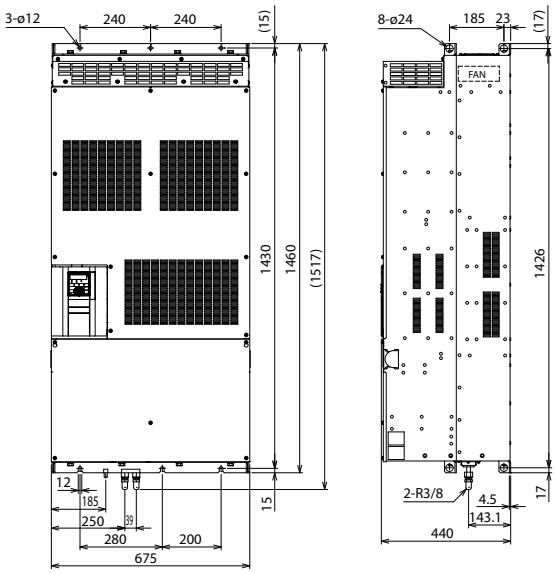
FR-A870-02300/02860



All dimensions in mm

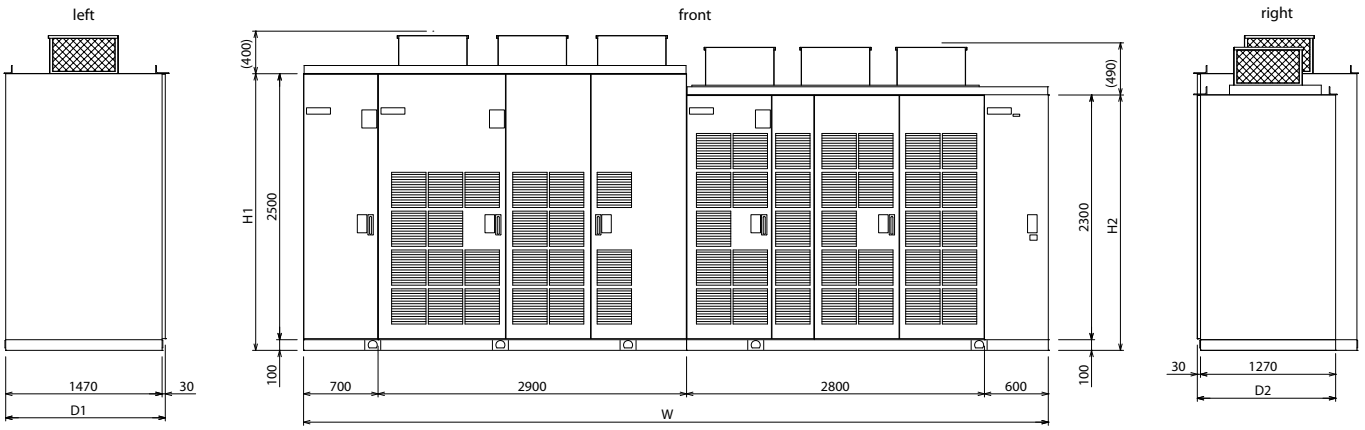
■ FR-A870-LC (Liquid cooled)

FR-A870-03590(280K), 04560(355K)-LC



All dimensions in mm

■ TMdrive®-MVe2/MVG2



All dimensions in mm

MVe2

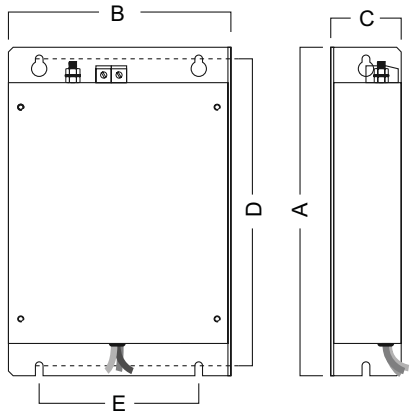
Type	W	H1	H2	D1	D2	Weight kg
3.3 kV–200/300/400 kVA 4.16 kV–500 kVA	1900	—	2050	1200	900	3800
3.3 kV–600/800 kVA 4.16 kV–1000 kVA	1900	—	2050	1300	1000	4000
3.3 kV–950/1100 kVA 4.16 kV–1380 kVA	2800	—	2050	1300	1000	5300
3.3 kV–1300/1500 kVA 4.16 kV–1890 kVA	2900	—	2050	1400	1100	5600
6.6 kV–400/600/800 kVA	3200	—	2050	970	—	3400
6.6 kV–1000/1200/1400/1600 kVA	3400	—	2050	1000	—	4700
6.6 kV–1900/2200/2600/3000 kVA	4800	—	2050	1100	—	< 7150
11 kV–660/990/1320/2000/2640 kVA	5500	—	2400	1500	1300	< 8000
11 kV–3080/3630/4290/5000 kVA	7000	2600	2400	1500	1300	< 13500

MVG2

Type	H2	D1	D2	Weight kg
3.3 kV–200/300/400/440 kVA	2690	2100	900	2900
3.3 kV–600/800/880 kVA	2690	2200	1000	3850
3.3 kV–950/1100/1200 kVA	2860	2800	1000	4700
3.3 kV–1300/1500/1650 kVA	2860	3100	1100	5800
3.3 kV–1800 kVA	2860	4000	1100	6450
3.3 kV–2000/2200 kVA	2860	4100	1100	6850
3.3 kV–2400/3000 kVA	2860	4600	1300	8300
3.3 kV–3750 kVA	2860	5400	1700	10000
3.3 kV–4500 kVA	3100	5700	1800	12000
3.3 kV–5700 kVA	2860	12800	1300	—
4.16 kV–2770kVA	2808	5730	1200	9850
4.16 kV–3780 kVA	2910	5750	1300	12300
4.16 kV–5050 kVA	2910	5750	1500	13600
4.16 kV–6000 kVA	3013	7050	1800	15600

Type	H2	D1	D2	Weight kg
6.6 kV–400/600/800/880 kVA	2640	3200	900	4320
6.6 kV–1000/1200 kVA	2690	4000	900	5550
6.6 kV–1400/1600/1760 kVA	2690	4000	1000	6250
6.6 kV–1900/2200/2400 kVA	2740	5000	1000	7500
6.6 kV–2600/3000/3300 kVA	2760	5100	1100	9100
6.6 kV–3600/4000/4400 kVA	2860	5900	1200	10850
6.6 kV–4800/5400/6000 kVA	2860	5900	1400	13050
6.6 kV–6500/7000/7500 kVA	2760	7100	1800	17350
6.6 kV–8200 kVA	3125	10400	1800	25000
6.6 kV–9000 kVA	3125	13000	1800	30000
6.6 kV–9100 kVA	2860	16200	1400	—
6.6 kV–10260 kVA	2860	16600	1400	—
6.6 kV–11400 kVA	2860	16800	1400	—
11 kV–660/990/1320/1460 kVA	3060	5600	1400	8620
11 kV–1650/2000/2310/2640/2930 kVA	3060	6800	1400	10280
11 kV–3080/3630/4000 kVA	3110	7500	1500	13560
11 kV–4290/5000/5500 kVA	3110	7700	1500	15880
11 kV–6000/6600/7350 kVA	3110	12200	1500	24490
11 kV–8000/9000/10000 kVA	3110	12200	1500	28520
11 kV–11000/12600 kVA	3107	13700	1500	31050
11 kV–13600/15000 kVA	3125	14500	1800	39350
11 kV–16100 kVA	—	—	1800	—
11 kV–19500 kVA	3110	14500	3860	65240

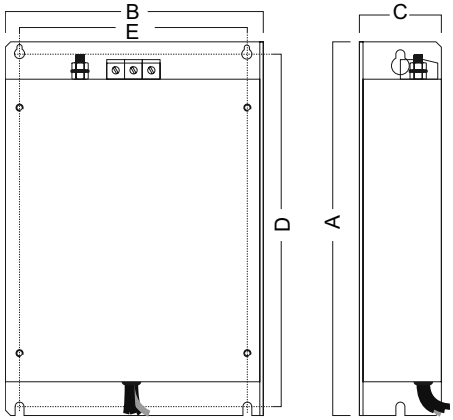
■ Noise filters for FR-D720S SC



Filter	Frequency inverter	A	B	C	D	E
FFR-CS-050-14A-SF1	FR-D720S-008–042SC	168	70	40	158	56
FFR-CS-050-14A-SF1-LL						
FFR-CS-080-20A-SF1	FR-D720S-070SC	168	113	42	158	96
FFR-CS-080-20A-SF1-LL						
FFR-CS-110-26A-SF1	FR-D720S-100SC	214	145	46	200	104
FFR-CS-110-26A-SF1-LL						

All dimensions in mm

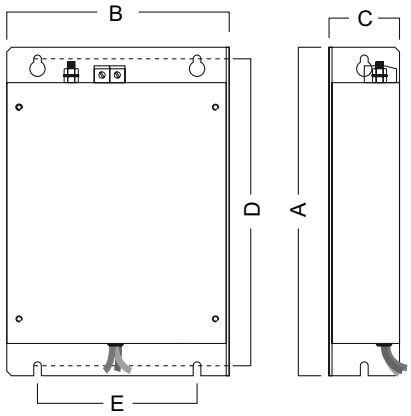
■ Noise filters for FR-D740 SC



Filter	Frequency inverter	A	B	C	D	E
FFR-CSH-036-8A-SF1	FR-D740-012–036SC	168	114	45	158	96
FFR-CSH-036-8A-SF1-LL						
FFR-CSH-080-16A-SF1	FR-D740-050/080SC	168	114	45	158	96
FFR-CSH-080-16A-SF2-LL						
FFR-MSH-170-30A-SF1	FR-D740-120/160SC	210	225	55	198	208
FFR-MSH-170-30A-SF1-LL						
FFR-MSH-170-30A-SB1-LL		210	55	150	200	30

All dimensions in mm

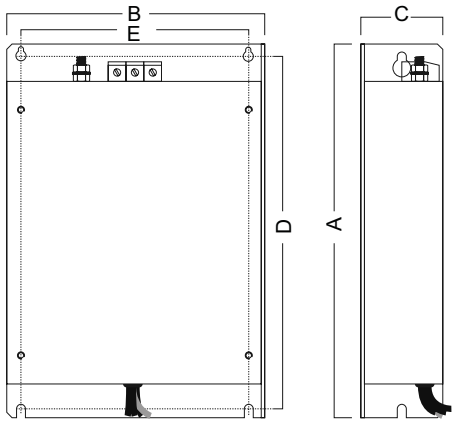
■ Noise filters for FR-E820S



Filter	Frequency inverter	A	B	C	D	E
FFR-CS-050-14A-SF1	FR-E820S-0008–0030	168	70	40	158	56
FFR-CS-050-14A-SF1-LL						
FFR-CS-080-20A-SF1	FR-E820S-0050–0080	168	113	42	158	96
FFR-CS-080-20A-SF1-LL						
FFR-E-CS-110-26A-SF1	FR-E820S-0110	194	145	46	—	—
FFR-E-CS-110-26A-SF1-LL						

All dimensions in mm

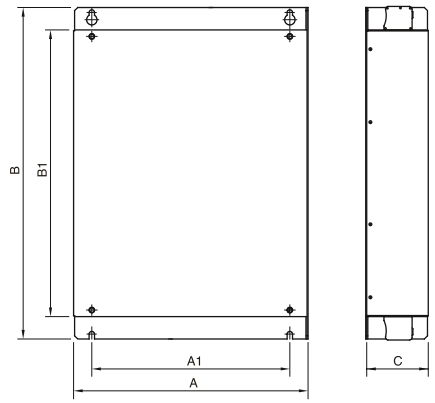
■ Noise filters for FR-E840



Filter	Frequency inverter	A	B	C	D	E
FFR-MSH-095-16A-SF1	FR-E840-0060/0095	210	145	45	198	128
FFR-MSH-170-30A-SF1	FR-E840-0120/0170	210	225	55	198	208
FFR-MSH-170-30A-SF1-LL						
FFR-MSH-170-30A-SB2-LL		210	55	150	200	30

All dimensions in mm

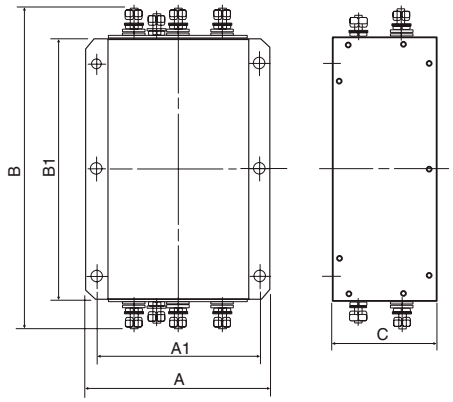
■ Noise filters for FR-A/F840-00023–01800



Filter	Frequency inverter	A	A1	B	B1	C
FFR-BS-00126-18A-SF100	FR-A/F840-00023–00126	150	110	315	260	50
FFR-BS-00250-30A-SF100	FR-A/F840-00170/00250	220	180	315	260	60
FFR-BS-00380-55A-SF100	FR-A/F840-00310/00380	221.5	180	360	300	80
FFR-BS-00620-75A-SF100	FR-A/F840-00470/00620	251.5	210	476	400	80
FFR-BS-00770-95A-SF100	FR-A/F840-00770	340	280	626	550	90
FFR-BS-01160-120A-SF100	FR-A/F840-01160	450	380	636	550	120
FFR-BS-01800-180A-SF100	FR-A/F840-00930/01800	450	380	652	550	120

All dimensions in mm

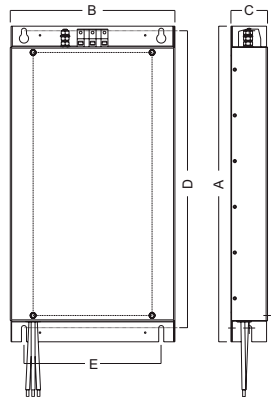
■ Noise filters for FR-A/F840-02160–12120



Filter	Frequency inverter	A	A1	B	B1	C
FN 3359-250-28	FR-A/F840-02160–02600	230	205	360	300	125
FN 3359-400-99	FR-A/F840-03250–04320	260	235	386	300	115
FN 3359-600-99	FR-A/F840-04810–06100	260	235	386	300	135
FN 3359-1000-99	FR-A/F840-06830–09620	280	255	456	350	170
FN 3359-1600-99	FR-A/F840-10940–12120	300	275	586	400	160

All dimensions in mm

■ Noise filters for FR-A741-5.5K–55K

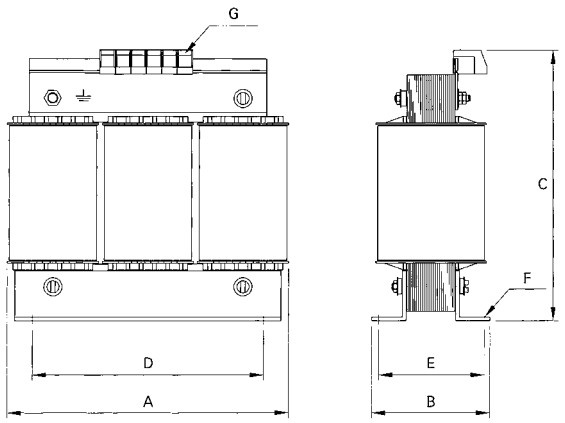


Filter	Frequency inverter	A	B	C	D	E
FFR-RS-7.5k-27A-EF100	FR-A741-5.5K–7.5K	560	250	60	525	200
FFR-RS-15k-45A-EF100	FR-A741-11K–15K	690	300	70	650	250
FFR-RS-22k-65A-EF100	FR-A741-18.5K–22K	690	360	80	650	300
FFR-RS-45k-127A-EF100	FR-A741-30K–45K	815	470	90	775	400
FFR-RS-55k-159A-EF100	FR-A741-55K	995	600	107	955	500

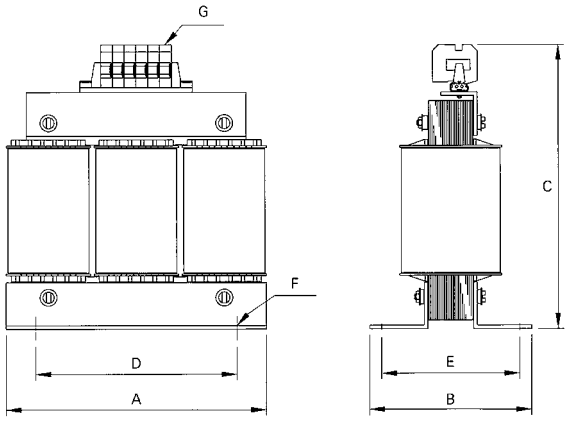
All dimensions in mm

■ du/dt filters

Filter type A



Filter type B



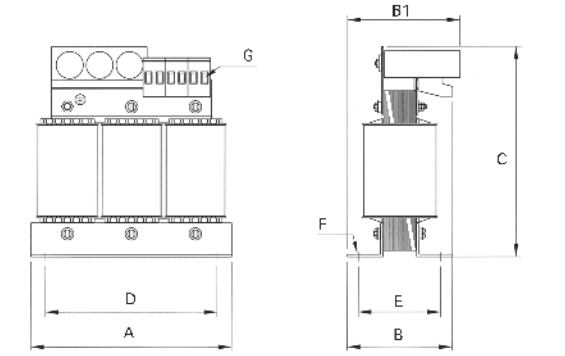
du/dt filter	A	B	C	D	E	F	G	Type
FFR-DT-10A-SS1	100	65	120	56	43	4.8x8	2.5 mm²	A
FFR-DT-25A-SS1	125	80	140	100	55	5x8	4 mm²	A
FFR-DT-47A-SS1	155	110	195	130	70	8x12	10 mm²	A
FFR-DT-93A-SS1	190	100	240	130	70	8x12	16 mm²	A
FFR-DT-124A-SS1	190	150	170	130	67	8x12	35 mm²	B
FFR-DT-182A-SS1	210	160	185	175	95	8x12	ø10	B
FFR-DT-330A-SS1	240	240	220	190	135	11x15	ø12	B
FFR-DT-500A-SS1	240	220	325	190	119	11x15	ø10	B
FFR-DT-610A-SS1	240	230	325	190	128	11x15	ø11	B
FFR-DT-683A-SS1	240	230	325	190	128	11x15	ø11	B
FFR-DT-790A-SS1	300	218	355	240	136	11x15	ø11	B
FFR-DT-1100A-SS1	360	250	380	310	144	11x15	ø11	B
FFR-DT-1500A-SS1	360 ①	250 ①	①	①	①	①	①	B
FFR-DT-1920A-SS1	360 ①	250 ①	①	①	①	①	①	B

① Under review, may be subject to change

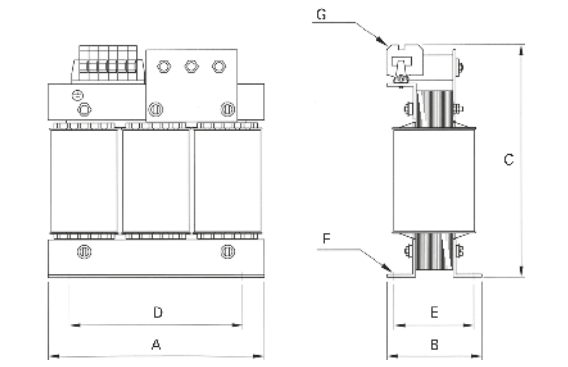
All dimensions in mm

■ Sinusoidal filters

Filter type A



Filter type B

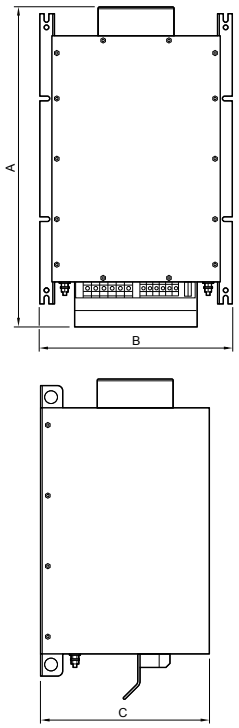


Sinusoidal Filter	A	B	C	D	E	F	G	Type
FFR-S I-4.5A-SS1	125	75	180	100	55	5x8	2.5 mm²	A
FFR-SI-8.3A-SS1	155	95	205	130	70	8x12	4 mm²	A
FFR-SI-18A-SS1	190	130	210	170	78	8x12	10 mm²	A
FFR-SI-25A-SS1	210	125	270	175	85	8x12	10 mm²	A
FFR-SI-32A-SS1	210	135	270	175	95	8x12	10 mm²	A
FFR-SI-48A-SS1	240	210	300	190	125	11x15	16 mm²	B
FFR-SI-62A-SS1	240	220	300	190	135	11x15	16 mm²	B
FFR-SI-77A-SS1	300	210	345	240	134	11x15	35 mm²	B
FFR-SI-93A-SS1	300	215	345	240	139	11x15	35 mm²	B
FFR-SI-116A-SS1	300	237	360	240	161	11x15	95 mm²	B
FFR-SI-180A-SS1	420	235	510	370	157	11x15	11 mm²	
FFR-SI-260A-SS1	420	295	550	370	217	11x15	11 mm²	
FFR-SI-432A-SS1	510	320	650	430	238	13x18	11 mm²	
FFR-SI-481A-SS1	510	340	750	430	247	13x18	14 mm²	
FFR-SI-683A-SS1	600	390	880	525	270	13x18	18 mm²	
FFR-SI-770A-SS1	600	430	990	525	290	13x18	18 mm²	
FFR-SI-880A-SS1	600	500	1000	525	350	13x18	18 mm²	
FFR-SI-1212A-SS1	870	420	1050	750	320	13x18	2x18 mm²	
FFR-SI-1500A-SS1 ①	①	①	①	①	①	①	①	
FFR-SI-1700A-SS1 ①	①	①	①	①	①	①	①	

① Under review, may be subject to change

All dimensions in mm

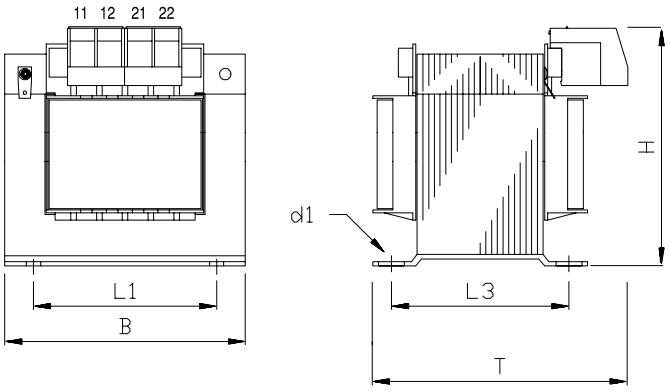
■ Harmonic filter



Filter	A	B	C	Weight [kg]	Filter	A	B	C	Weight [kg]
RHF-A 10-400-50-20-A	347	190	206	13.5	RHF-B 10-400-50-20-A	347	190	206	18
RHF-A 14-400-50-20-A				16.3	RHF-B 14-400-50-20-A				20
RHF-A 22-400-50-20-A	451	232	248	22	RHF-B 22-400-50-20-A	451	232	248	30
RHF-A 29-400-50-20-A				25	RHF-B 29-400-50-20-A				34
RHF-A 35-400-50-20-A	605	378	242	37	RHF-B 35-400-50-20-A	605	378	242	53
RHF-A 43-400-50-20-A				39	RHF-B 43-400-50-20-A				75
RHF-A 58-400-50-20-A	634	378	333	44	RHF-B 58-400-50-20-A	634	378	333	82
RHF-A 72-400-50-20-A				56	RHF-B 72-400-50-20-A				96
RHF-A 86-400-50-20-A	747	418	333	62	RHF-B 86-400-50-20-A	747	418	333	104
RHF-A 101-400-50-20-A				74	RHF-B 101-400-50-20-A				106
RHF-A 144-400-50-20-A	778	418	400	85	RHF-B 144-400-50-20-A	778	418	400	126
RHF-A 180-400-50-20-A				102	RHF-B 180-400-50-20-A				135
RHF-A 217-400-50-20-A	911	468	450	119	RHF-B 217-400-50-20-A	911	468	450	171
RHF-A 252-400-50-20-A				136	RHF-B 252-400-50-20-A				206
RHF-A 304-400-50-20-A				142	RHF-B 304-400-50-20-A				221
RHF-A 380-400-50-20-A				185	RHF-B 380-400-50-20-A				265
RHF-A 433-400-50-20-A	911	468	515	203	RHF-B 433-400-50-20-A				272
RHF-AS 480-400-50-20-A	380	420	230	80	RHF-BS 480-400-50-20-A	520	540	300	185
RHF-AS 550-400-50-20-A	380	420	245	100	RHF-BS 550-400-50-20-A	560	540	300	200
RHF-AS 600-400-50-20-A	380	420	280	125	RHF-BS 600-400-50-20-A	640	600	300	225
RHF-AS 670-400-50-20-A				130	RHF-BS 670-400-50-20-A	640	600	310	240
RHF-AS 750-400-50-20-A	440	480	270	140	RHF-BS 750-400-50-20-A	640	600	325	260
RHF-AS 850-400-50-20-A	440	480	285	150	RHF-BS 850-400-50-20-A	640	600	340	285
RHF-AS 980-400-50-20-A	440	480	300	160	RHF-BS 980-400-50-20-A	640	600	360	310

All dimensions in mm

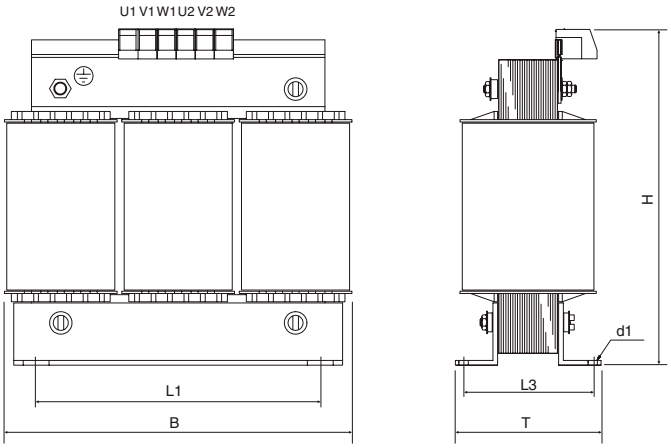
■ AC chokes FR-BAL-S-B-□□K



Choke	B	T	H	L1	L3	d1	Weight [kg]
FR-BAL-S-B-0.2K	66	70	86	50	41	4.5	0.7
FR-BAL-S-B-0.4K	78	88	95	56	47	4.5	1.2
FR-BAL-S-B-0.75K	96	120	115	84	86	5.5	4.5

All dimensions in mm

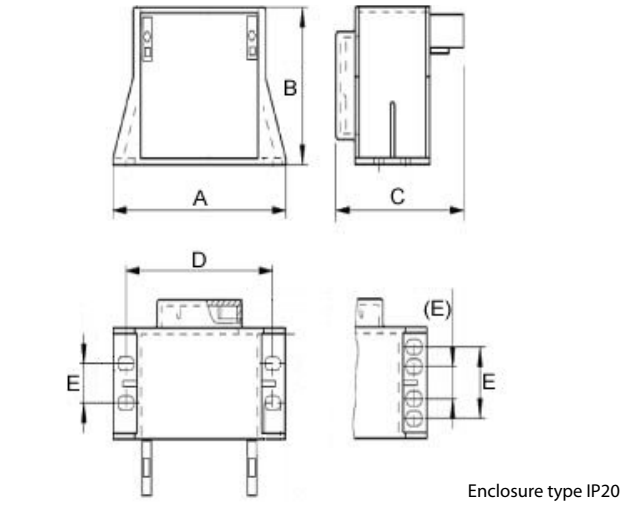
■ Three-phase AC chokes FR-BAL-B-□□K



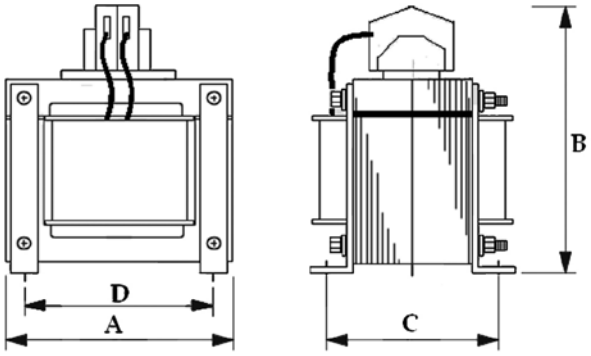
Choke	B	T	H	L1	L3	d1	Weight [kg]
FR-BAL-B-4.0K	125	82	130	100	56	5x8	3.0
FR-BAL-B-5.5K	155	85	145	130	55	8x12	3.7
FR-BAL-B-7.5K	155	100	150	130	70	8x12	5.5
FR-BAL-B-11K/-15K	190	115	210	170	79	8x12	10.7
FR-BAL-B-22K	190	115	210	170	79	8x12	11.2
FR-BAL-B-30K	190	118	230	170	79	8x12	3.0
FR-BAL-B-37K	210	128	265	175	97	8x12	3.7
FR-BAL-B-45K	230	165	280	180	122	8x12	5.5
FR-BAL-B3-55K	210	190	185	175	95	8x12	16
FR-BAL-B3-75K	230	210	200	180	122	8x12	22
FR-BAL-B3-90K	240	170	325	190	110	11x15	25
FR-BAL-B3-110K	240	185	325	190	120	11x15	29
FR-BAL-B3-132K	240	185	325	190	120	11x15	29
FR-BAL-B3-160K	240	205	325	190	130	11x15	32
FR-BAL-B3-185K	285	205	325	190	130	11x15	33
FR-BAL-B3-220K	300	220	330	240	155	11x15	47
FR-BAL-B3-250K	300	240	330	240	160	11x15	48

All dimensions in mm

■ DC choke FFR-HEL-(H)-E



Enclosure type IP20

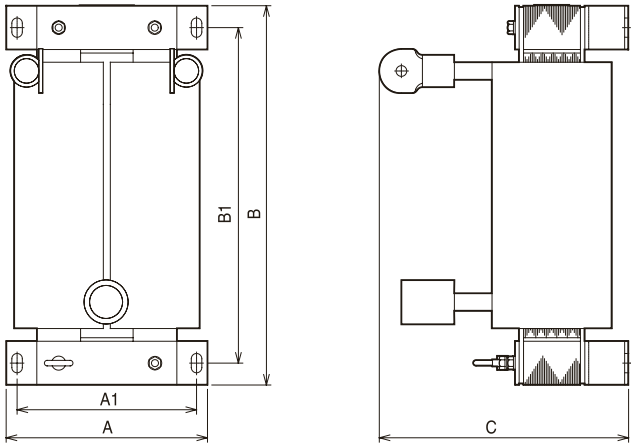


Enclosure type IP00

	Choke	A	B	C	D	E	Weight [kg]
200 V types	FFR-HEL-0.4K-E	88	53.5	70	75	13	0.6
	FFR-HEL-0.75K-E	88	53.5	70	75	13	0.6
	FFR-HEL-1.5K-E	112.5	71.5	81	98	33	1.2
	FFR-HEL-2.2K-E	112.5	71.5	81	98	33	1.2
	FFR-HEL-3.7K-E	120	74.7	86	102	33	1.5
	FFR-HEL-5.5K-E	133.2	85	112	115	50	3.1
	FFR-HEL-7.5K-E	133.2	85	112	115	50	3.1
	FFR-HEL-11K-E	133.2	85	112	115	50	3.1
	FFR-HEL-15K-E	133.2	85	156	115	64	4
	FFR-HEL-18.5K-E	133.2	85	163	115	64	4
	FFR-HEL-22K-E	172	107	166	150	65	5.5
	FFR-HEL-30K-E	150	237	94	125	—	8.2
	FFR-HEL-37K-E	150	237	114	125	—	10.7
	FFR-HEL-45K-E	150	237	134	125	—	11.3
	FFR-HEL-55K-E	150	237	134	125	—	14.4
400 V types	FFR-HEL-H0.4K-E	75	43	60	62	12	0.35
	FFR-HEL-H0.75K-E	88	53.5	70	75	13	0.6
	FFR-HEL-H1.5K-E	88	53.5	70	75	13	0.61
	FFR-HEL-H2.2K-E	112.5	71.5	81	98	33	1.2
	FFR-HEL-H3.7K-E	112.5	71.5	81	98	33	1.2
	FFR-HEL-H5.5K-E	120	74.7	86	102	33	1.5
	FFR-HEL-H7.5K-E	120	74.7	100	102	45	2.2
	FFR-HEL-H11K-E	133.2	85	112	115	50	3.1
	FFR-HEL-H15K-E	133.2	85	112	115	50	3
	FFR-HEL-H18.5K-E	133.2	85	128	115	64	4
	FFR-HEL-H22K-E	172	107	166	150	65	5.3
	FFR-HEL-H30K-E	172	107	166	150	65	5.75
	FFR-HEL-H37K-E	172	107	186	150	85	8
	FFR-HEL-H45K-E	150	202	114	125	—	11.3
	FFR-HEL-H55K-E	150	212	134	125	—	14.4

All dimensions in mm

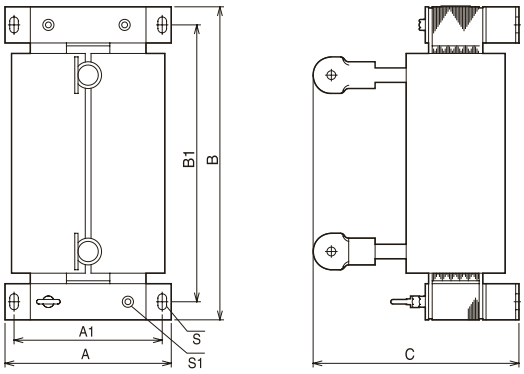
■ DC choke FR-HEL-H75K/H90K



	Choke	A	A1	B	B1	C	Weight [kg]
200 V types	FR-HEL-75K	150	130	340	310	190	17
	FR-HEL-90K	150	130	340	310	200	19
	FR-HEL-110K	175	150	400	365	200	20
400 V types	FR-HEL-H75K	140	120	320	295	185	16
	FR-HEL-H90K	150	130	340	310	190	20

All dimensions in mm

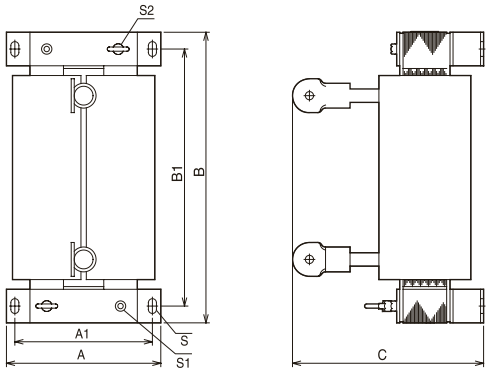
■ DC chokes FR-HEL-H110K–H160K



Choke	A	A1	B	B1	C	S	S1	Weight [kg]
FR-HEL-H110K	150	130	340	310	195	M6	M6	22
FR-HEL-H132K	175	150	405	370	200	M8	M6	26
FR-HEL-H160K	175	150	405	370	205	M8	M6	28

All dimensions in mm

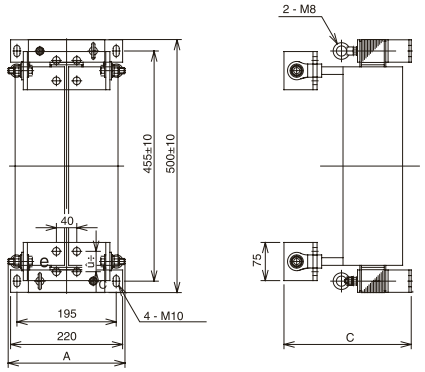
■ DC chokes FR-HEL-H185K–H355K



Choke	A	A1	B	B1	C	S	S1	S2	Ø	Weight [kg]
FR-HEL-H185K	175	150	405	370	240	M8	M6	—	M12	29
FR-HEL-H220K	175	150	405	370	240	M8	M6	M6	M12	30
FR-HEL-H250K	190	165	440	400	250	M8	M8	M8	M12	35
FR-HEL-H280K	190	165	440	400	255	M8	M8	M8	M16	38
FR-HEL-H315K	210	185	495	450	250	M10	M8	M8	M16	42
FR-HEL-H355K	210	185	495	450	250	M10	M8	M8	M16	46

All dimensions in mm

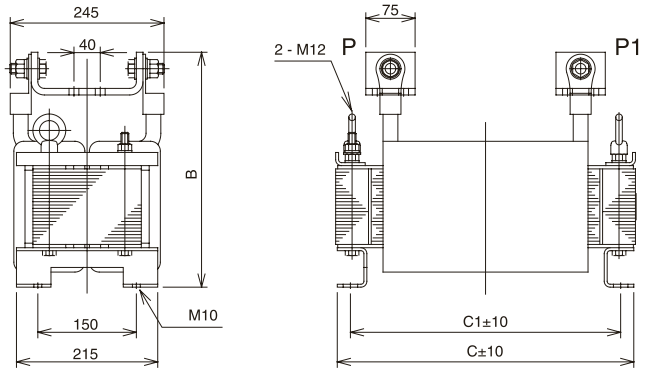
■ DC chokes FR-HEL-H400K–H450K



Choke	A	C	Weight [kg]
FR-HEL-H400K	235	250	50
FR-HEL-H450K	240	270	57

All dimensions in mm

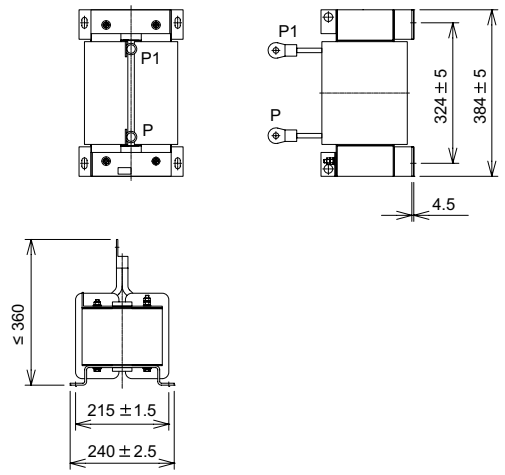
■ DC chokes FR-HEL-H500K–H630K



Choke	B	C	C1	Weight [kg]
FR-HEL-H500K	345	455	405	67
FR-HEL-H560K	360	460	410	85
FR-HEL-H630K	360	460	410	95

All dimensions in mm

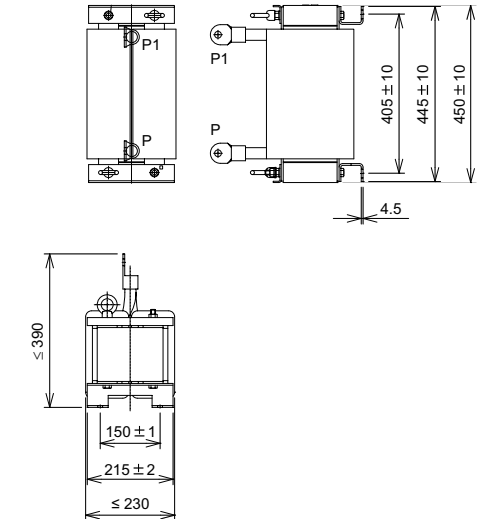
■ DC chokes FR-HEL-N355K



Choke	W	H	D	Weight [kg]
FR-HEL-N355K	≤360	384 ±5	240 ±2.5	80

All dimensions in mm

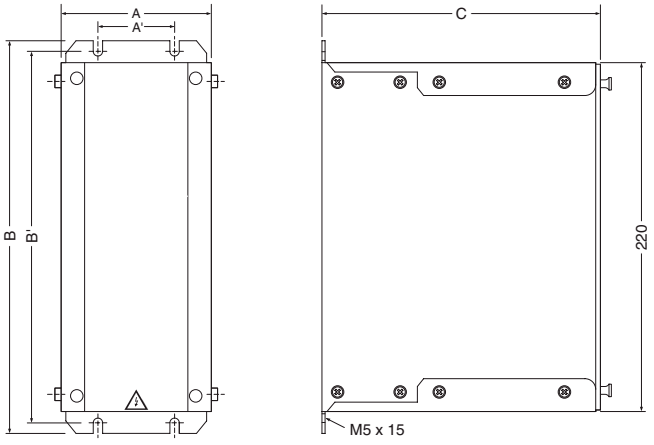
■ DC chokes FR-HEL-N560K



Choke	W	H	D	Weight [kg]
FR-HEL-N560K	≤390	450 ±10	≤230	105

All dimensions in mm

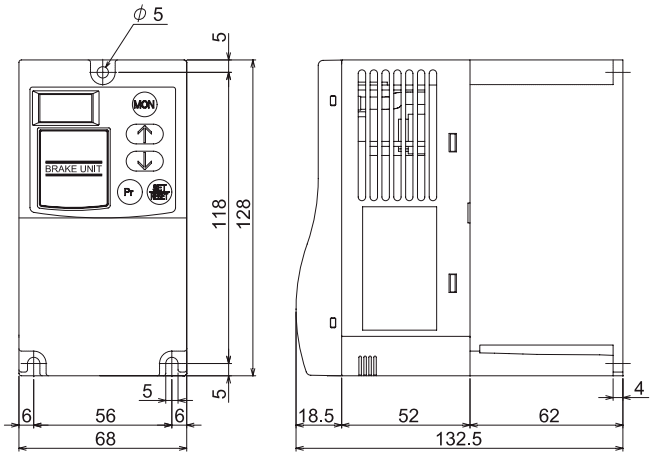
■ Brake units BU-UFS



Brake unit	A	A′	B	B′	C	Weight [kg]
BU-UFS22J	100	50	250	240	175	2.4
BU-UFS22	100	50	250	240	175	2.5
BU-UFS40	100	50	250	240	175	2.5
BU-UFS110	107	50	250	240	195	3.9

All dimensions in mm

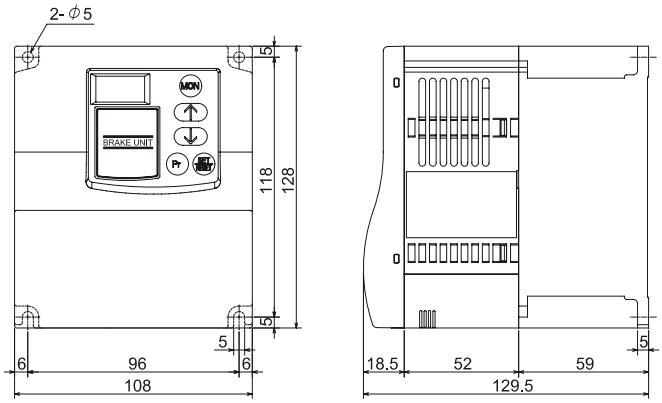
■ Brake units FR-BU2-1.5K–15K, FR-BU2-H7.5K/H15K



Brake unit	H	W	D	Weight [kg]
FR-BU2-1.5k	128	68	132.5	0.9
FR-BU2-3.7k	128	68	132.5	0.9
FR-BU2-7.5k	128	68	132.5	0.9
FR-BU2-15k	128	68	132.5	0.9
FR-BU2-H7.5k	128	68	132.5	5
FR-BU2-H15k	128	68	132.5	5

All dimensions in mm

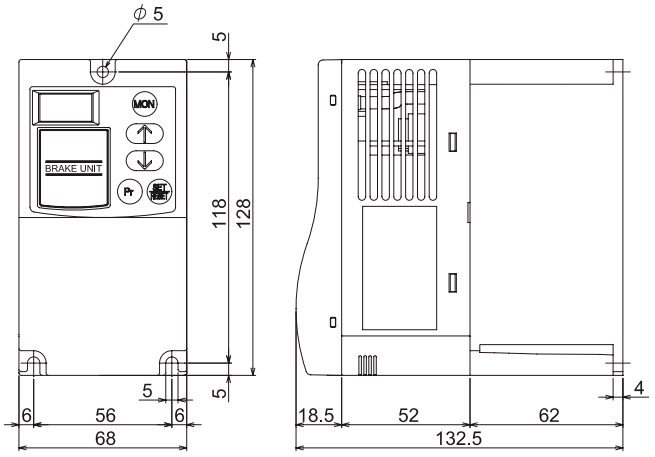
■ Brake units FR-BU2-30K/H30K



Brake unit	H	W	D	Weight [kg]
FR-BU2-30k	128	108	129.5	5
FR-BU2-H30k	128	108	129.5	5

All dimensions in mm

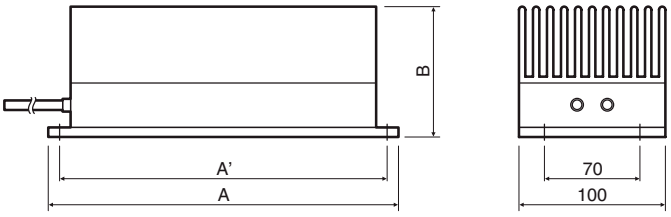
■ Brake units FR-BU2-55K/H55K/H75k



Brake unit	H	W	D	Weight [kg]
FR-BU2-55k	128	68	132.5	5
FR-BU2-H55k	128	68	132.5	5
FR-BU2-H75k	128	68	132.5	5

All dimensions in mm

■ External brake resistors RUFC

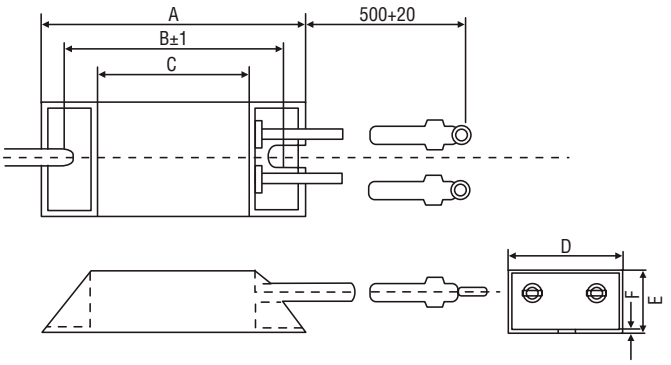


Brake resistor	A	A'	B	Weight [kg]
RUFC22	310	295	75	4.7
RUFC40	365	350	75	9.4
RUFC110	365	350	75	18.8

Remark:
RUFC40 contains a set of two brake resistors, and RUFC110 contains a set of four brake resistors as shown on the left.

All dimensions in mm

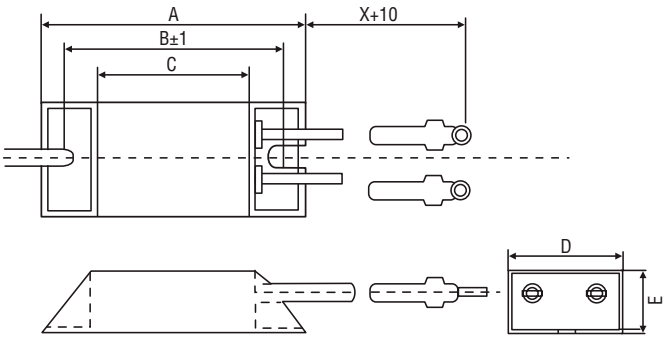
■ External brake resistors FR-ABR-□□K



Brake resistor	A	B	C	D	E	F	Weight [kg]
FR-ABR-0.4K	140	125	100	40	21	2.5	0.2
FR-ABR-0.75K	215	200	175	40	21	2.5	0.4
FR-ABR-2.2K	240	225	200	50	26	2.5	0.5
FR-ABR-3.7K	215	200	175	61	33	2.5	0.8
FR-ABR-5.5K	335	320	295	61	33	2.5	1.3
FR-ABR-7.5K	400	385	360	80	40	2.5	2.2
FR-ABR-11K	400	385	360	100	50	2.5	3.5
FR-ABR-15K	300	285	260	100	50	2.5	4.8
FR-ABR-22K	400	385	360	100	50	2.5	6.6

All dimensions in mm

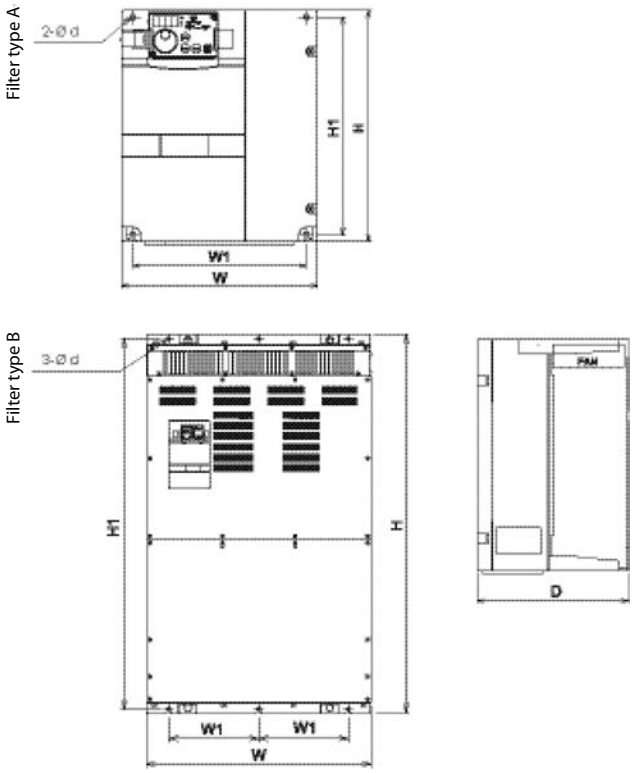
■ External brake resistors FR-ABR-H□□K



Brake resistor	A	B	C	D	E	X	Weight [kg]
FR-ABR-H0.4K	115	100	75	40	20	500	0.2
FR-ABR-H0.75K	140	125	100	40	20	500	0.2
FR-ABR-H1.5K	215	200	175	40	20	500	0.4
FR-ABR-H2.2K	240	225	200	50	25	500	0.5
FR-ABR-H3.7K	215	200	175	60	30	500	0.8
FR-ABR-H5.5K	335	320	295	60	30	500	1.3
FR-ABR-H7.5K	400	385	360	80	40	500	2.2
FR-ABR-H 11K	400	—	—	100	50	700	3.2
FR-ABR-H 15K	300	—	—	100	50	700	2.4 (x2) serial
FR-ABR-H 22K	400	—	—	100	50	700	3.3 (x2) parallel

All dimensions in mm

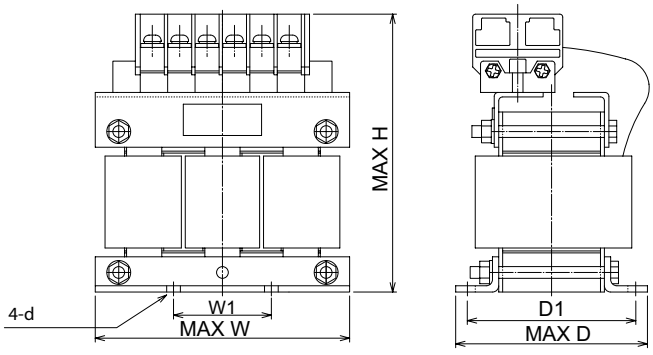
■ Harmonic converter FR-HC2-(H)□K



High power factor converter		W	W1	H	H1	D	d	Type	Weight [kg]
200 V types	FR-HC2-7.5K	220	195	260	245	170	6	A	7
	FR-HC2-15K	250	230	400	380	190	10	A	12
	FR-HC2-30K	325	270	550	530	195	10	A	24
	FR-HC2-55K	370	300	620	595	250	10	A	39
	FR-HC2-75K	465	400	620	595	300	12	A	53
400 V types	FR-HC2-H7.5K/H15K	220	195	300	285	190	6	A	9
	FR-HC2-H30K	325	270	550	530	195	10	A	26
	FR-HC2-H55K	370	300	670	645	250	10	A	43
	FR-HC2-H75K	325	270	620	595	250	10	A	37
	FR-HC2-H110K	465	400	620	595	300	12	A	56
	FR-HC2-H160K/H220K	498	200	1010	985	380	12	B	120
	FR-HC2-H280K	680	300	1010	984	380	12	B	160
	FR-HC2-H400K/H560K	790	315	1330	1300	440	12	B	250

All dimensions in mm

■ Filter chokes FR-HCL21-(H)□K for FR-HC2

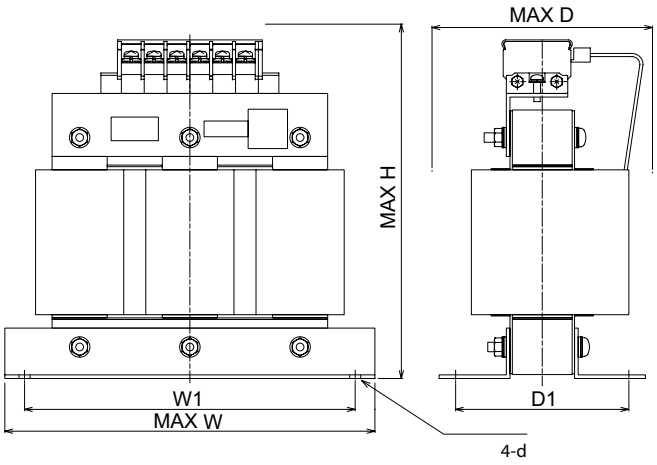


Filter chokes		W*	W1	H	D*	D1	d	Weight [kg]
200 V types	FR-HCL21-7.5K	132	50 ±0.5	150	100	86 +0/-2.5	M6	4.2
	FR-HCL21-15K	162	75 ±0.5	172	126	107 +0/-2.5	M6	7.0
	FR-HCL21-30K	195	75 ±0.5	210	150	87 +0/-2.5	M6	10.7
	FR-HCL21-55K	210	75 ±0.5	180	200.5	97 +0/-2.5	M6	17.4
	FR-HCL21-75K	240	150 ±1	215	215.5	109 +0/-2.5	M8	23
400 V types	FR-HCL21-H7.5K	132	50 ±0.5	140	105	90 +0/-1	M6	4
	FR-HCL21-H15K	162	75 ±0.5	170	128	105 +0/-1	M6	6
	FR-HCL21-H30K	182	75 ±0.5	195	145.5	90 +0/-1	M6	9
	FR-HCL21-H55K	282.5	255 ±1.5	245	165	112 ±1.5	M6	18
	FR-HCL21-H75K	210	75 ±1	175	210.5	105 +0/-2.5	M6	20
	FR-HCL21-H110K	240	150 ±1	230	220	99 +0/-5	M8	28
	FR-HCL21-H160K	280	150 ±1	295	274.5	150 +0/-5	M8	45
	FR-HCL21-H220K	330	170 ±1	335	289.5	150 +0/-5	M10	63
	FR-HCL21-H280K	330	170 ±1	335	321	203 +0/-5	M10	80
	FR-HCL21-H400K	402	250 ±1	460	550	305 ±10	M10	121
	FR-HCL21-H560K	452	300 ±1	545	645	355 ±10	M12	190

* The sizes indicated by W and D are not the sizes of the legs. These indicate the sizes of whole chokes.

All dimensions in mm

■ Filter chokes FR-HCL22-(H)□K for FR-HC2

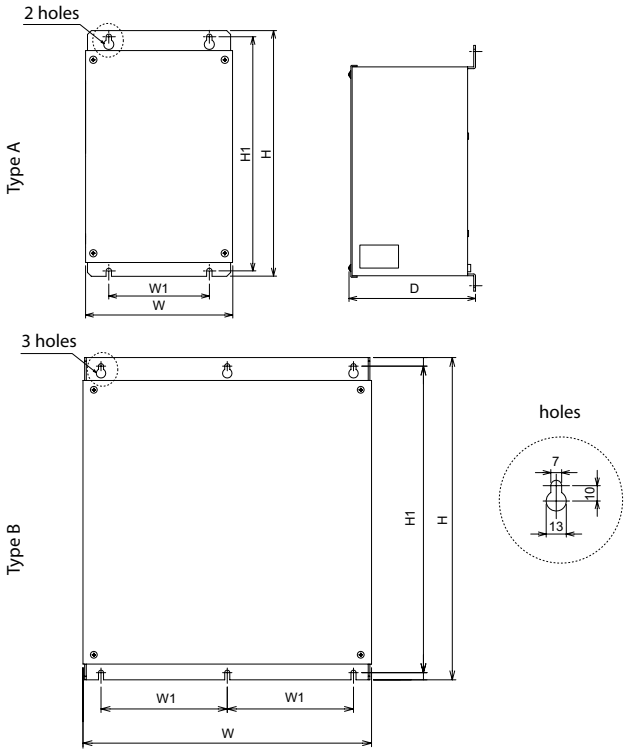


	Filter chokes	W*	W1	H	D*	D1	d	Weight [kg]
200 V types	FR-HCL22-7.5K	237.5	210 ±1.5	230	140	110 ±1.5	M6	9.8
	FR-HCL22-15K	257.5	230 ±1.5	260	165	120 ±1.5	M6	19
	FR-HCL22-30K	342.5	310 ±1.5	305	180	130 ±1.5	M8	36
	FR-HCL22-55K	432.5	270 ±1.5	380	280	240 ±1.5	M8	65
	FR-HCL22-75K	474	430 ±2	460	280	128 ±2	M12	98
400 V types	FR-HCL22-H7.5K	237.5	210 ±1.5	220	140	110 ±1.5	M6	9.8
	FR-HCL22-H15K	257.5	230 ±1.5	260	165	120 ±1.5	M6	19
	FR-HCL22-H30K	342.5	310 ±1.5	300	180	130 ±1.5	M8	36
	FR-HCL22-H55K	392.5	360 ±1.5	365	200	130 ±1.5	M8	65
	FR-HCL22-H75K	430	265 ±1.5	395	280	200 ±1.5	M10	120
	FR-HCL22-H110K	500	350 ±1.5	440	370	260 ±1.5	M10	175
	FR-HCL22-H160K	560	400 ±1.5	520	430	290 ±1.5	M12	250
	FR-HCL22-H220K	620	400 ±1.5	620	480	320 ±1.5	M12	345
	FR-HCL22-H280K	690	500 ±2	700	560	350 ±2	M12	450
	FR-HCL22-H400K	632	400 ±2	675	705	435 ±10	M12	391
	FR-HCL22-H560K	632	400 ±2	720	745	475 ±10	M12	507

* The sizes indicated by W and D are not the sizes of the legs. These indicate the sizes of whole chokes.

All dimensions in mm

■ Outside box FR-HCB2-(H)□K for FR-HC2-7.5K–75K, FR-HC2-H7.5K–H220K*



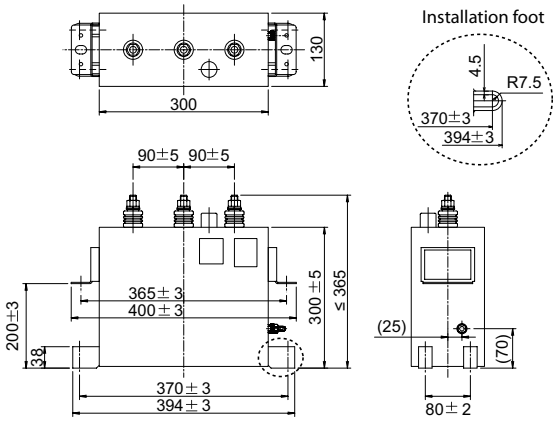
	Outside box	W	W1	H	H1	D	Type	Weight [kg]
200 V types	FR-HCB2-7.5K/15K	190	130	320	305	165	A	7
	FR-HCB2-30K	270	200	450	435	203	A	11
	FR-HCB2-55K							13
	FR-HCB2-75K	400	175	450	428	250	A	27
400 V types	FR-HCB2-H7.5K–H30K	190	130	320	305	165	A	8
	FR-HCB2-H55K	270	200	450	435	203	A	16
	FR-HCB2-H75K	300	250	350	328	250	B	16
	FR-HCB2-H110K	350	125	450	428	380	B	37
	FR-HCB2-H160K/ H220K	400	175	450	428	440	B	54

* Peripheral devices are separately provided for the FR-HC2-H280K or higher (not provided as the outside box).

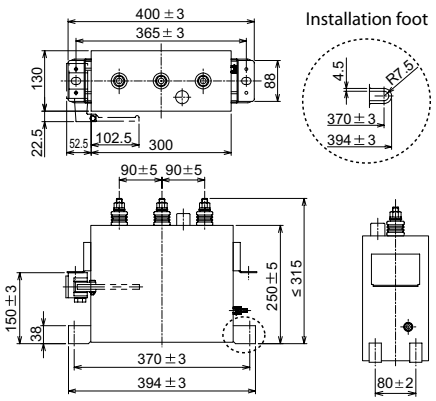
All dimensions in mm

■ Filter capacitor FR-HCC2-(H)□K for FR-HC2-H280K–H560K

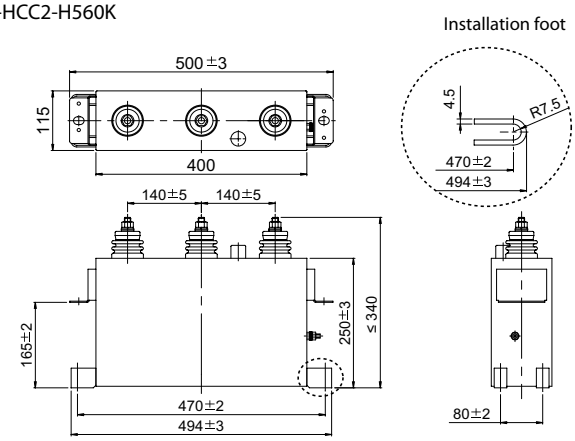
FR-HCC2-H280K



FR-HCC2-H400K



FR-HCC2-H560K

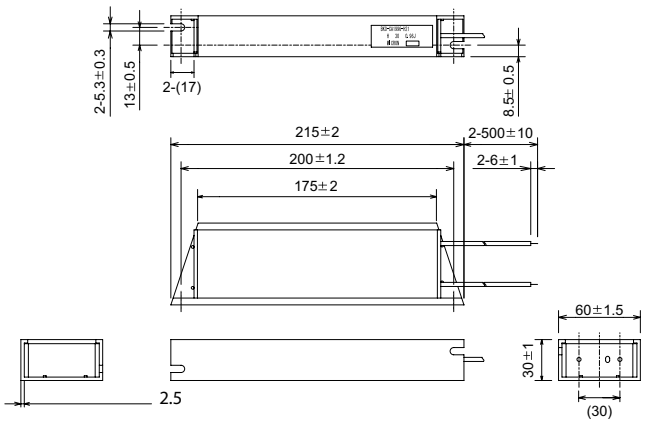


Filter capacitor	W	H	D	Weight [kg]
FR-HCC2-H280K	394 ±3	≤365	130	17
FR-HCC2-H400K	394 ±3	≤315	130	15
FR-HCC2-H560K	494 ±3	≤340	115	21

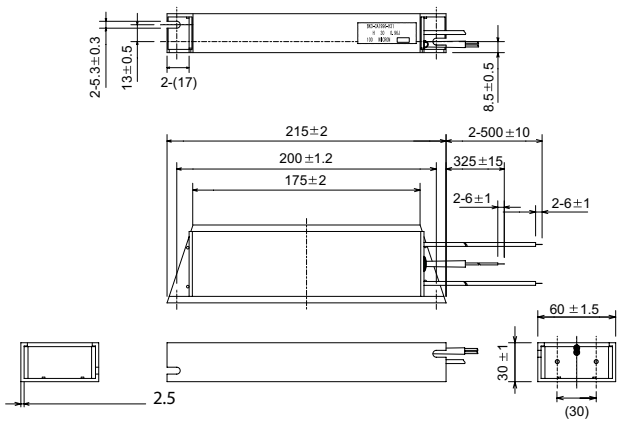
All dimensions in mm

■ Inrush current limit resistor FR-HCR2-(H)□K for FR-HC2-H280K–H560K

0.96OHM BKO-CA1996H21 (without thermostat)

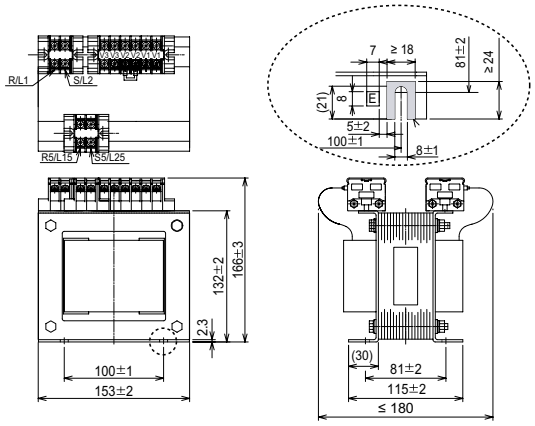


0.96OHM BKO-CA1996H31 (with thermostat)



■ Voltage converter FR-HCM2-(H)□K for FR-HC2-H280K–H560K

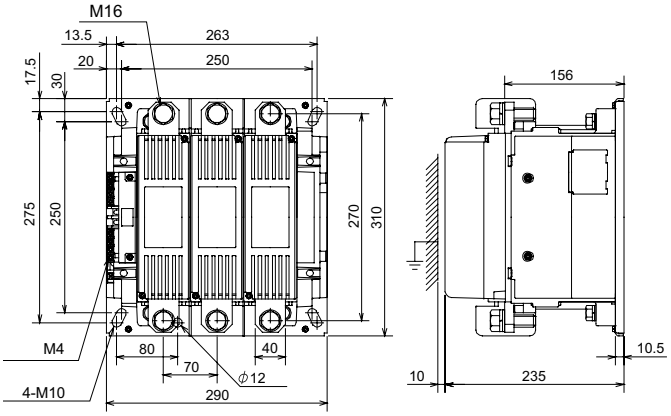
MC power supply stepdown transformer BKO-CA2001H06



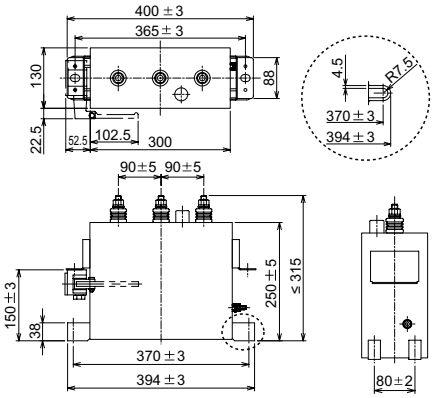
Tranformer	Voltage converter	W	H	D	Weight [kg]
1PH 630VA BKO-CA2001H06	FR-HCM2-H280K–H560K	153 ±2	166 ±3	≤180	10

All dimensions in mm

S-N600FXYS AC210V 2A2B



S-N400FXYS AC200V 2A2B



Inrush current limit MC	Voltage converter	W	H	D	Weight [kg]
S-N600FXYS AC210V 2A2B	FR-HCM2-H280K	290	310	235	24
S-N400FXYS AC200V 2A2B	FR-HCM2-H400K/560K	163	243	195	9.5

All dimensions in mm

Specifications of overseas types FR-D710W

Product line			FR-D710W			
			0.1K	0.2K	0.4K	0.75K
Output	Rated motor capacity	[kW]	0.1	0.2	0.4	0.75
	Rated current	[A]	0.8	1.4	2.5	4.2
	Overload capacity		150 % of rated motor capacity for 60 s; 200 % for 0.5 s (inverse-time characteristics)			
	Voltage		3-phase, 0 to 230 V AC			
	Frequency range		0.2–400 Hz			
Input	Power supply voltage		Single-phase, 100–115 V AC,			
	Voltage range		90–132 V AC at 50/60 Hz			
	Power supply frequency		50/60 Hz			
Others	Ambient temperature		50 °C			
Order information		Art. no.	219059	219060	219061	219062

Specifications of overseas types FR-D720

Product line			FR-D720									
			0.1K	0.2K	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11k	15k
Output	Rated motor capacity	[kW]	0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
	Rated current	[A]	0.8	1.4	2.5	4.2	7	10	16.5	23.8	31.8	45A	58A
	Overload capacity		150 % of rated motor capacity for 60 s; 200 % for 0.5 s (inverse-time characteristics)										
	Voltage		3-phase, 0 V up to power supply voltage										
	Frequency range		0.2–400 Hz										
Input	Power supply voltage		3-phase, 200–240 V AC,										
	Voltage range		170–264 V AC at 50/60 Hz										
	Power supply frequency		50/60 Hz										
Others	Ambient temperature		50 °C										
Order information		Art. no.	217399	217400	217401	217402	217403	217404	217415	217416	217417	243781	243782

Specifications of overseas types FR-E710W

Product line			FR-E710W-008-NA	FR-E710W-015-NA	FR-E710W-030-NA	FR-E710W-050-NA
Output	Rated motor capacity	[kW]	0.1	0.2	0.4	0.75
	Rated current	[A]	0.8	1.5	3	5
	Overload capacity		150 % of rated motor capacity for 60 s; 200 % for 3 s (inverse-time characteristics)			
	Voltage		3-phase, 0 to 230 V AC			
	Frequency range		0.2–400 Hz			
Input	Power supply voltage		Single-phase, 100–115 V AC,			
	Voltage range		90–132 V AC at 50/60 Hz			
	Power supply frequency		50/60 Hz			
Others	Ambient temperature		50 °C			
Order information		Art. no.	225922	225923	225924	225935

Index

A

Accessories
- EMC ... 80
- External options ... 79
- Internal and external options ... 76
- Internal options ... 77
- Overview of noise filters ... 81

AC chokes ... 87

Assignment of signal terminals
- FR-A741 ... 45
- FR-A800 and FR-CC2 ... 67
- FR-CS80 ... 19
- FR-E800 ... 32
- FR-F800 ... 41

B

Block diagram
- FR-A741 ... 44
- FR-A800 ... 62
- FR-A842 ... 63
- FR-A860 ... 64
- FR-A870 ... 65
- FR-CC2 ... 18, 66
- FR-CS80 ... 18
- FR-D700 SC ... 22
- FR-E800 ... 29, 30, 31
- FR-F800 ... 40

Brake Resistors ... 92

Brake units ... 91

C

Common specifications
- FR-A741 ... 43
- FR-A800 ... 60
- FR-CC2 ... 61
- FR-E800 ... 28
- FR-F800 ... 39
- MVe2 ... 69
- MVG2 ... 71

Communication ... 14

D

DC chokes ... 88

Dimensions
- AC chokes ... 126
- Brake units ... 129
- DC choke ... 127
- du/dt filters ... 125
- External brake resistors ... 131
- FR-A741 ... 107
- FR-A800 ... 108
- FR-A840-LC ... 111
- FR-A842 ... 112
- FR-A860 ... 114
- FR-A862 ... 117
- FR-A870 ... 119
- FR-A870-LC ... 119
- FR-CC2-C ... 118
- FR-CC2-H ... 113
- FR-CS80 ... 98
- FR-D700 SC ... 98
- FR-E800 ... 100
- FR-F800 ... 101
- FR-F842 ... 104
- FR-F846 ... 105
- Harmonic converter ... 132
- Harmonic filter ... 126
- MVe2/MVG2 ... 120
- Noise filters ... 122
- Parameter units ... 97
- Sinusoidal filters ... 125
- Three-phase AC chokes ... 126

du/dt filters ... 85

E

External heatsink frame ... 89

G

General operating conditions for all inverters ... 73

H

Harmonic converter FR-HC2 ... 93

Harmonic filter ... 86

M

Maintenance and standards ... 15

P

Parameter overview ... 72

Parameter units ... 90

Product overview ... 4

S

Sinusoidal filters ... 85

Software
- FR Configurator2 ... 96

Special functions
- 24 V DC power supply ... 9
- Advanced PID controller ... 10
- Automatic restart ... 8
- Braking without resistor ... 10
- Easy configuration with parameter unit ... 12
- Easy monitoring ... 9
- Easy-to-read operation panel ... 13
- Easy to start up ... 12
- Fire override mode ... 11
- Flexible 5-point V/f curve ... 7
- Intelligent energy optimisation ... 12
- Intelligent load detection ... 10
- Magnetic flux vector control ... 7
- Mechanical resonance suppression ... 11
- Motor preheat function ... 11
- Parameter setting protection with password function 9
- PM sensorless vector control ... 7
- Pump clean function ... 11
- Ready for crane applications due to ... 10
- Regeneration avoidance function ... 8
- Safety function ... 7
- Surrounding air temperature measured by inverter ... 9
- The cutting-edge auto tuning function ... 8

Specifications
- FR-A741 ... 42
- FR-A820 ... 53
- FR-A840 ... 47
- FR-A842 and FR-CC2-H ... 50
- FR-A860 ... 55
- FR-A862 ... 57
- FR-A870 ... 58
- FR-CS80 ... 16
- FR-D700 SC ... 16, 20
- FR-E800 ... 25
- FR-F820 ... 38
- FR-F840 ... 34
- FR-F842 ... 36
- FR-F846 ... 37
- MVe2 ... 68
- MVG2 ... 70
- Overseas types ... 136

System configuration
- FR-A800 ... 74
- FR-A842 ... 75

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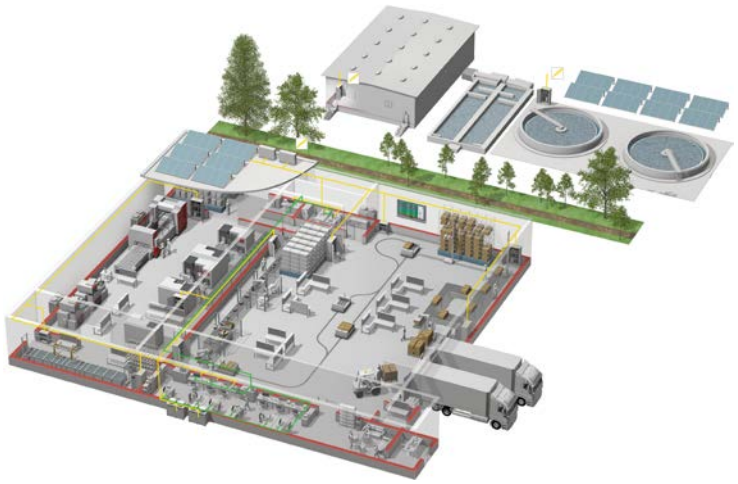

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