Variable Speed Drives

FR-CS80

Adroit Technologies

Authorised Distributor

MITSUBISHI ELECTRIC

FACTORY AUTOMATION

Compact | Smart | High-performance | Inexpensive

Various Functions in a Small Body Compact and Smart Inverter

Feature 1 World's smallest class compact body

Compact Size achieved by the low heat generation design

In-house comparison Volume reduction to

57%

For the FR-CS84-012-60
<Conventional model>
128 mm (H) x 108 mm (W) x 129.5 mm (D)
<CS80>
128 mm (H) x 68 mm (W) x 117.9 mm (D)

Actual Size of the FR-CS84-012-60

Space saving by the side-by-side installation

Side-by-side installation is possible*.
Three FR-CS84-012- 60 inverters can be installed in space for two conventional models to save space.
A DIN rail installation attachment (FR-UDA[][]) option can be used.
* Keep the surrounding air temperature of the inverter at 40 °C maximum.

Feature 2 High Performance

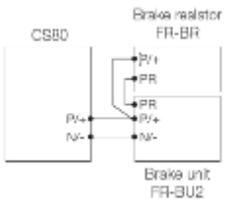
Compact yet high performance

General-purpose magnetic flux vector control

General-purpose magnetic flux vector control and auto tuning functions are available. These functions ensure the applications that require high starting torque, such as washing machines, agitators, and transfer machines including conveyors, hoists, and elevators.
- High torque of 150% / 1 Hz is realized (when the slip compensation function is valid).
- Auto tuning With our "non-rotation" auto tuning function the motor constant (R1) can be automatically calculated.

Brake unit connection - Option

Brake unit can be connected using terminal P/+ and terminal N/-.
It is useful for applications require regenerative braking torque during deceleration, such as transfer machines and food machines.



When using the inverter with the brake unit, use the FR-CS84-050-60 or higher capacity inverter

Optimum excitation control

The excitation current is constantly adjusted to its optimum value to drive the motor most efficiently. With a small load torque, a substantial energy saving can be achieved.

Feature 3 Easy to use

Easy-to-read operation panel

Operation panel FR-LU08 - Option

An optional LCD operation panel (FR-LU08) is also available.

Enclosure surface operation panel FR-PA07

The operation panel enables inverter operation and monitoring of frequency setting from the enclosure surface.

Parameter unit FR-PU07 - Option

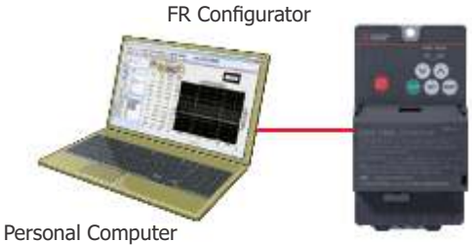
The parameter unit features helpful settings such as direct input with ten-key pad, operating status display, and help function. Eight languages are supported. Parameter settings for up to three units can be saved.

The operation panel cannot be removed from the inverter. The separate parameter unit connection cable (FR-CB20[]) is required.
To connect the FR-LU08, the operation panel connection connector (FR-ADP) is also required.

Shorter startup time with easy setup

Inverter setup software FR Configurator2 - Option

The software is easy to use and has unity as Mitsubishi Electric FA products with MELSOFT common design and good operability. Free trial version, which contains start-up functions, is available. It can be downloaded at Mitsubishi Electric FA Global Website.



Supporting high-speed communication

RS-485 communication

Using a controller, the inverter can be controlled and monitored via network. The standard model with an RS-485 interface (Mitsubishi inverter protocol, MODBUS RTU protocol) enables communication with the speed of up to 115200 bps.

Easy-to-follow display improves the operability

When the automatic connection is enabled, the inverter can communi-cate with the GOT2000 series or the GOT SIMPLE (to be supported soon) simply by connecting the GOT.

Feature 4 Easy Maintenance

Reduced wiring check time

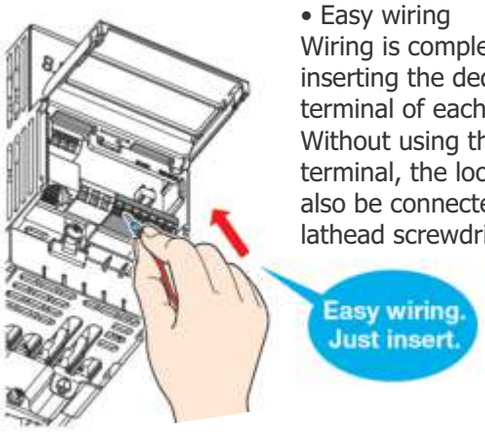
The wiring can be checked only by lifting the control terminal cover, which makes maintenance work easier.

Easy Wiring to the control circuit

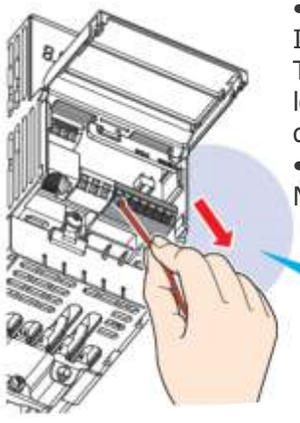
Spring clamp terminals (control circuit terminals)

Spring clamp terminals*1 provide high reliability and easy wiring.

*1: The main circuit terminals are screw terminals.



• Easy wiring
Wiring is completed only by inserting the dedicated blade terminal of each cable.
Without using the blade terminal, the loose wires can also be connected using a f lathead screwdriver.



• High reliability
Internal terminal contacts are spring-type. Therefore, wires can be protected against loosening or contact faults due to vibrations during operation on a bogie or during transport
• Maintenance-free
No additional screw tightening is required.

(Example: transport of the inverters)

Protected in hazardous environments

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

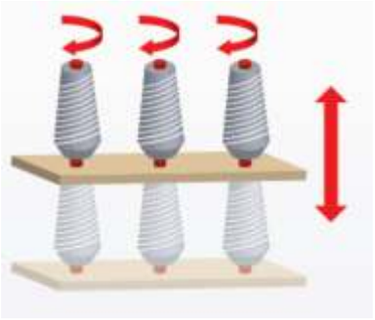
Front

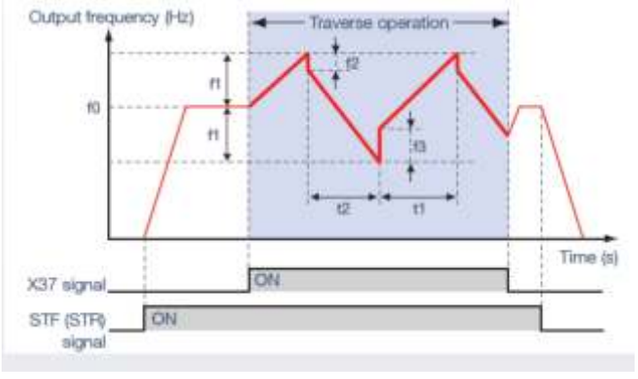
Back

Variety of Functions to Support Various Applications

Spinning

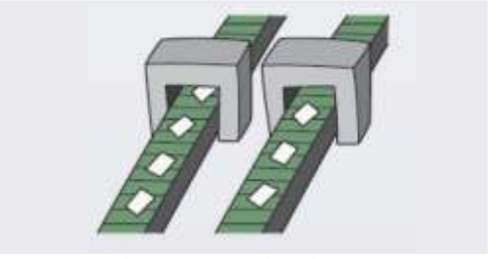
- Traverse function
  The traverse function, used for the traverse axis of spinning machine, prevents uneven winding or collapsing.
- Continuous operation function at instantaneous power failure
- Power failure time deceleration-to-stop function





f0: set frequency
f1: amplitude amount from the set frequency
f2: compensation amount at transition from acceleration to deceleration
f3: compensation amount at transition from deceleration to acceleration
t1: time for acceleration during traverse operation
t2: time for deceleration during traverse operation

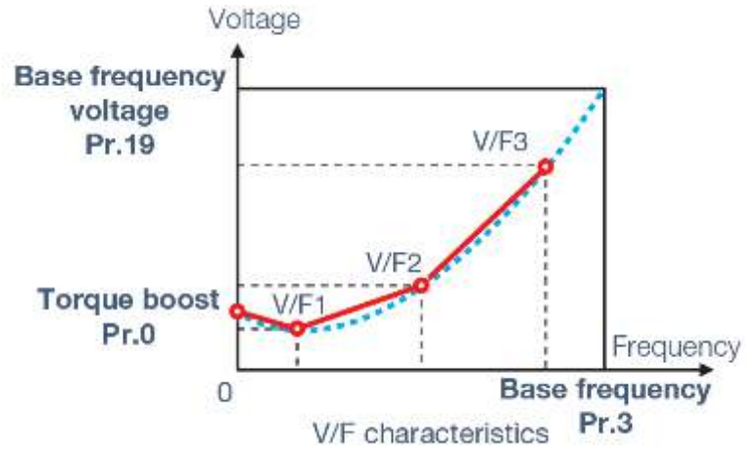
Conveyor



- Increased excitation deceleration
  Increase the loss in the motor by increasing the magnetic flux during deceleration to avoid regenerative overvoltage from occurring and to shorten the deceleration time.
  The deceleration time can be reduced without using a brake resistor.
  The tact time can be reduced for a transfer line or the like.
- Power failure time deceleration-to-stop function
- S-pattern acceleration/deceleration
- Communication function

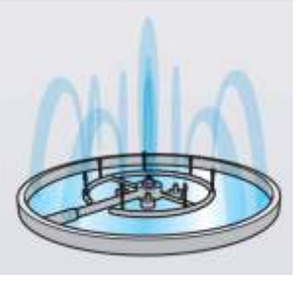
Fan and pump

- Adjustable 3 points V/F
The optimal V/F pattern matching the torque characteristics of the facility can be set.
- PID control To save energy in low speed operation:
  PID output shutoff (sleep) function
To shorten
  the start-up time of PID control:
  PID automatic switchover function
  To use various types of detectors:
  PID measured value inputs in voltage (0 to 5 V / 0 to 10 V) or current (4 to 20 mA) (set point: voltage only)
- Automatic restart after instantaneous power failure
- Regeneration avoidance function



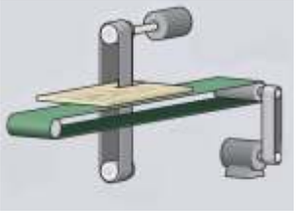
Fountain

- General-purpose magnetic flux vector control
- Power failure time deceleration -to-stop function
- Continuous operation function at instantaneous power failure
- Brake unit connection



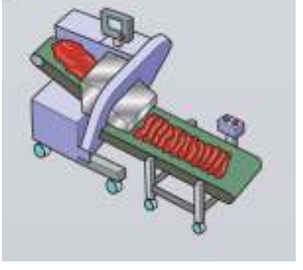
Wood processing machine

- Continuous operation function at instantaneous power failure
- Power failure time deceleration-to-stop function
- Tripless operation
- Multi-speed setting



Food machinery

- General-purpose magnetic flux vector control
- Multi-speed function (Up to 15-speed switching operation)
- S-pattern acceleration/ deceleration
- Brake unit connection



Lineup

FR-CS8 4 □ - 080 - 60

Symbol	Voltage class
2	200 V class
4	400 V class

Symbol	Power supply
None	Three-phase
S	Single-phase

Symbol	Description
012 to 295	Inverter rated current (A)

Symbol	Circuit board coating (conforming to IEC 60721-3-3 3C2/3S2)
60	With

Power supply	Inverter model	012	022	036	050	080	120	160	230	295
Three-phase 400 V	FR-CS84-[]-60	●	●	●	●	●	●	●	●	●

Power supply	Inverter model	025	042	070	100
Single-phase 200 V	FR-CS82S-[]-60	●	●	●	●

●: Released model

Compliant with the EU RoHS Directive (Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment)

Being RoHS compliant, the inverter is friendly to people and the environment.

[RoHS Directive]
RoHS Directive requires member nations to guarantee that new electrical and electronic equipment sold in the market after July 1, 2006 do not contain lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants. The <G> mark indicating RoHS Directive compliance is on the package.

EMC Directive compliant noise filter

Compliance to the EMC Directive (EN standard) is easier.
Noise filter option which is compliant with the EMC Directive (EN61800-3 2nd Environment Category C3) is available.

Compatibility with various standards

The inverters are compatible with UL, cUL, EC Directives (CE marking).The single-phase 100 V power input model is not compliant with the EMC Directive.

c UL us LISTED

CE

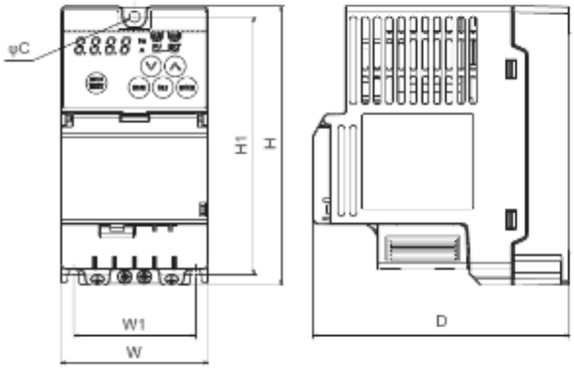
Rating

Model	FR-CS84-[]-60	012	022	036	050	080	120	160	230	295	–	–	–	–
	FR-CS82S-[]-60	–	–	–	–	–	–	–	–	–	025	042	070	100
Applicable motor capacity (kW)*1		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	0.4	0.75	1.5	2.2
Output	Rated capacity (kVA)*2	0.9	1.7	2.7	3.8	5.1	9.1	12.2	17.5	22.5	1.0	1.7	2.8	4.0
	Rated current (A)*4	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)	2.5 (2.1)	4.2 (3.6)	7.0 (6.0)	10.0 (8.5)
	Overload current rating*3	150% 60 s, 200% 0.5 s (inverse-time characteristics)												
	Rated voltage*5	Three-phase 380 to 480 V									Three-phase 200 to 240 V			
Power supply	Rated input AC voltage and frequency	Three-phase 380 to 480 V, 50/60 Hz									Single-phase 200 to 240 V, 50/60 Hz			
	Permissible AC voltage fluctuation	325 to 528 V, 50/60 Hz									170 to 264 V, 50/60 Hz			
	Permissible frequency fluctuation	±5%												
	Power supply capacity (kVA)*6	1.5	2.5	4.5	5.5	9.5	12.0	17.0	20.0	28.0	1.5	2.3	4.0	5.2
Protective structure (IEC 60529)		Open type (IP20)												
Cooling system		Natural					Forced air				Natural			Forced air
Approx. mass (kg)		0.6	0.6	0.9	0.9	1.4	1.9	1.9	3.5	3.5	0.6	0.6	1.4	1.4

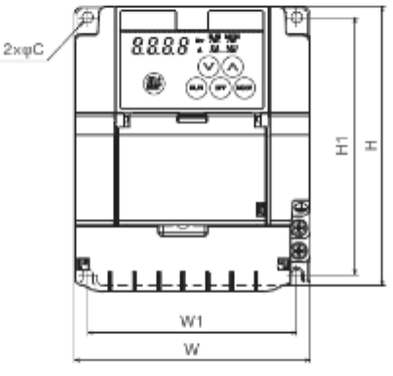
*1: The applicable motor capacity is the maximum allowable capacity of the motor with respect to a Mitsubishi Electric 4-pole standard motor.
*2: The rated output capacity indicated assumes that the output voltage is 230 V for single-phase 200 V class and 440 V for three-phase 400 V class.
*3: The percentage of the overload current rating 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 200 V 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 nd power supply voltage is low while the load increases.
*4: When operating the inverter with surrounding air temperature of 50°C, the rated output current is shown in parentheses.
*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 maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about .2.
*6: The power supply capacity is the value at the rated output current. The input power impedances (including those of the input reactor and cables) affect the value.

Outline dimension drawings

FR-CS84-012, 022-60
FR-CS82S-025, 042-60



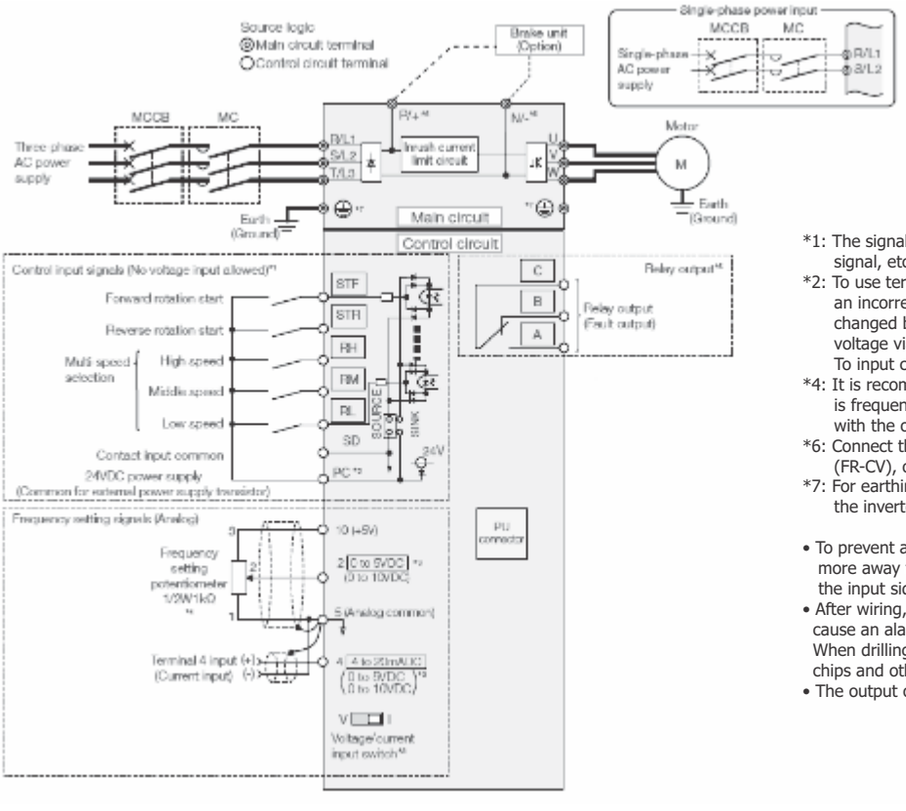
FR-CS84-036, 050, 080, 120, 160, 230, 295-60
FR-CS82S-070, 100-60



(Unit: mm)

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

Terminal connection diagram



*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 2W1k¥ potentiometer when the frequency setting is frequently changed. *5: The function of these terminals can be changed with the output terminal assignment (Pr.195).
*6: Connect the brake unit (FR-BU2), power regeneration common converter (FR-CV), or high power factor converter (FR-HC2) to these terminals.
*7: For earthing (grounding) the inverter chassis. Be sure to earth (ground) the inverter.

- To prevent a malfunction due to noise, keep the signal cables 10 cm or more away from the power cables. Also, keep the main circuit cables at the input side and those at the output side separated.
- After wiring, wire offcuts must not be left in the inverter. Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure, etc., take caution not to allow chips and other foreign matter to enter the inverter.
- The output of the single-phase power input model is three-phase 200 V.

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

Adroit Technologies

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