

12. Specifications

12.1 Models and their standard specifications

■ Standard specifications

Item		Specification										
Input voltage		3-phase 240V										
Applicable motor (kW)		0.2	0.4	0.55	0.75	1.5	2.2	4.0	5.5	7.5	11	15
Rating	Type	VFS11										
	Form	2002PM	2004PM	2005PM	2007PM	2015PM	2022PM	2037PM	2055PM	2075PM	2110PM	2150PM
	Capacity (kVA) Note 1)	0.6	1.3	1.4	1.8	3.0	4.2	6.7	10	13	21	25
	Rated output/current (A) Note 2)	1.5 (1.5)	3.3 (3.3)	3.7 (3.3)	4.8 (4.4)	8.0	11.0 (10.0)	17.5 (16.4)	27.5 (25.0)	33 (33)	54 (49)	66 (60)
	Output voltage Note 3)	3-phase 200V to 240V										
Power supply	Overload current rating	150%-60 seconds, 200%-0.5 second										
	Voltage-frequency	3-phase 200V to 240V - 50/60Hz										
	Allowable fluctuation	Voltage + 10% -15% Note 4), frequency ±5%										
Protective method		IP20 Enclosed type (JEM1030)										
Cooling method		Self-cooling					Forced air-cooled					
Color		Munsel 5Y+8/0.5										
Built-in filter		Basic filter										

Item		1-phase 240V					3-phase 500V								
Input voltage		1-phase 240V					3-phase 500V								
Applicable motor (kW)		0.2	0.4	0.75	1.5	2.2	0.4	0.75	1.5	2.2	4.0	5.5	7.5	11	15
Rating	Type	VFS11S					VFS11								
	Form	2002PL	2004PL	2007PL	2015PL	2022PL	4004PL	4007PL	4015PL	4022PL	4037PL	4055PL	4075PL	4110PL	4150PL
	Capacity (kVA) Note 1)	0.6	1.3	1.8	3.0	4.2	1.1	1.8	3.1	4.2	7.2	11	13	21	25
	Rated output current (A) Note 2)	1.5 (1.5)	3.3 (3.3)	4.8 (4.4)	8.0 (7.9)	11.0 (10.0)	1.5 (1.5)	2.3 (2.1)	4.1 (3.7)	5.5 (5.0)	9.5 (8.6)	14.3 (13.0)	17.0 (17.0)	27.7 (25.0)	33 (30)
	Rated output voltage Note 3)	3-phase 200V to 240V					3-phase 380V to 500V								
Power supply	Overload current rating	150%-60 seconds, 200%-0.5 second					150%-60 seconds, 200% -0.5 second								
	Voltage-current	1-phase 200V to 240V - 50/60Hz					3-phase 380V to 500V - 50/60Hz								
	Allowable fluctuation	Voltage + 10%, -15% Note 4), frequency±5%					Voltage + 10%, -15% Note 4), frequency ±5%								
Protective method,		IP20 Enclosed type (JEM1030)					IP20 Enclosed type (JEM1030)								
Cooling method		Self-cooling			Forced air-cooled		Forced air-cooled								
Color		Munsel 5Y+8/0.5													
Built-in filter		EMI filter					EMI filter								

Item		Specification									
Input voltage		3-phase 600V									
Applicable motor (kW)		0.75	1.5	2.2	4.0	5.5	7.5	11	15		
Rating	Type	VFS11-									
	Form	6007P	6015P	6022P	6037P	6055P	6075P	6110P	6150P		
	Capacity (kVA) Note 1)	1.7	2.7	3.9	6.1	9	11	17	22		
	Rated output/current (A) Note 2)	1.7 (1.5)	2.7 (2.4)	3.9 (3.5)	6.1 (5.5)	9 (8.1)	11 (9.9)	17 (15.3)	22 (19.8)		
	Output voltage Note 3)	3-phase 525V to 600V									
Power supply	Overload current rating	150%-60 seconds, 200%-0.5 second									
	Voltage-frequency	3-phase 525V to 600V - 50/60Hz									
	Allowable fluctuation	Voltage + 10%, -15% Note 4), frequency ±5%									
Protective method		IP20 Enclosed type (JEM1030)									
Cooling method		Forced air-cooled									
Color		Munsel 5Y+8/0.5									

Built-in filter	No filter
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Note 1. Capacity is calculated at 220V for the 240V models, at 440V for the 500V models and at 575V for the 600V models.

Note 2. Indicates rated output current setting when the PWM carrier frequency (parameter F300) is 4kHz or less. When exceeding 4kHz, the rated output current setting is indicated in the parentheses. It needs to be further reduced for PWM carrier frequencies above 12 kHz.

The rated output current is reduced even further for 500V models with a supply voltage of 480V or more.

The default setting of the PWM carrier frequency is 12kHz.

Note 3. Maximum output voltage is the same as the input voltage.

Note 4. $\pm 10\%$ when the inverter is used continuously (load of 100%).

Note 5. If you are using 600V model, be sure to connect an input reactor (ACL).

■ Common specification

Item	Specification	
Principal control functions	Control system	Sinusoidal PWM control
	Rated output voltage	Adjustable within the range of 50 to 600V by correcting the supply voltage (not adjustable above the input voltage)
	Output frequency range	0.5 to 500.0Hz, default setting: 0.5 to 80Hz, maximum frequency: 30 to 500Hz
	Minimum setting steps of frequency	0.01Hz: Operation panel setting and communication setting, 0.1Hz: analog input (when the max. frequency is 100Hz).
	Frequency accuracy	Digital setting: within $\pm 0.01\%$ of the max. frequency (-10 to $+60^\circ\text{C}$) Analog setting: within $\pm 0.5\%$ of the max. frequency ($25^\circ\text{C} \pm 10^\circ\text{C}$)
	Voltage/frequency characteristics	V/f constant, variable torque, automatic torque boost, vector control, automatic energy-saving, dynamic automatic energy-saving control, PM motor control, Auto-tuning, Base frequency (25 - 500Hz) adjusting to 1 or 2, torque boost (0 - 30%) adjusting to 1 or 2, adjusting frequency at start (0.5 - 10Hz)
	Frequency setting signal	Potentiometer on the front panel, external frequency potentiometer (connectable to a potentiometer with a rated impedance of 1 - 10k Ω), 0 - 10Vdc (input impedance: VIA/VIB=30k Ω , 4 - 20mAdc (Input impedance: 250 Ω))
	Terminal board base frequency	The characteristic can be set arbitrarily by two-point setting. Possible to set individually for three functions: analog input (VIA and VIB) and communication command.
	Frequency jump	Three frequencies can be set. Setting of the jump frequency and the range.
	Upper- and lower-limit frequencies	Upper-limit frequency: 0 to max. frequency, lower-limit frequency: 0 to upper-limit frequency
PWM carrier frequency	Adjustable within a range of 2.0 to 16.0Hz (default: 12kHz).	
PID control	Setting of proportional gain, integral gain, differential gain and control wait time. Checking whether the amount of processing amount and the amount of feedback agree.	
Operation specifications	Acceleration/deceleration time	Selectable from among acceleration/deceleration times 1, 2 and 3 (0.0 to 3200 sec.). Automatic acceleration/deceleration function, S-pattern acceleration/deceleration 1 and 2 and S-pattern adjustable. Control of forced rapid deceleration and dynamic rapid deceleration
	DC braking	Braking start-up frequency: 0 to maximum frequency, braking rate: 0 to 100%, braking time: 0 to 20 seconds, emergency DC braking, motor shaft fixing control
	Dynamic braking	Control and drive circuit is built in the inverter with the braking resistor outside (optional).
	Input terminal function (programmable)	Possible to select from among 65 functions, such as forward/reverse run signal input, jog run signal input, operation base signal input and reset signal input, to assign to 8 input terminals. Logic selectable between sink and source.
	Output terminal functions (programmable)	Possible to select from among 58 functions, such as upper/lower limit frequency signal output, low speed detection signal output, specified speed reach signal output and failure signal output, to assign to FL relay output, open collector output and RY output terminals.
	Forward/reverse run	The RUN and STOP keys on the operation panel are used to start and stop operation, respectively. The switching between forward run and reverse run can be done from one of the three control units: operation panel, terminal board and external control unit.
	Jog run	Jog mode, if selected, allows jog operation from the operation panel or the terminal board.
	Preset speed operation	Base frequency + 15-speed operation possible by changing the combination of 4 contacts on the terminal board.
	Retry operation	Capable of restarting automatically after a check of the main circuit elements in case the protective function is activated, 10 times (Max.) (selectable with a parameter)
	Various prohibition settings	Possible to write-protect parameters and to prohibit the change of panel frequency settings and the use of operation panel for operation, emergency stop or resetting.
	Regenerative power ride-through control	Possible to keep the motor running using its regenerative energy in case of a momentary power failure (default: OFF).
	Auto-restart operation	In the event of a momentary power failure, the inverter reads the rotational speed of the coasting motor and outputs a frequency appropriate to the rotational speed in order to restart the motor smoothly. This function can also be used when switching to commercial power.
	Drooping function	When two or more inverters are used to operate a single load, this function prevents load from concentrating on one inverter due to unbalance.
Override function	The sum of two analog signals (VIA/VIB) can be used as a frequency command value.	
Failure detection signal	1c-contact output: (250Vac-0.5A-cos $\phi=0.4$)	

<Continued>

Item		Specification
Protective function	Protective function	Stall prevention, current limitation, over-current, output short circuit, over-voltage, over-voltage limitation, undervoltage, ground fault, power supply phase failure, output phase failure, overload protection by electronic thermal function, armature over-current at start-up, load side over-current at start-up, over-torque, undercurrent, overheating, cumulative operation time, life alarm, emergency stop, braking resistor over-current/overload, various pre-alarms
	Electronic thermal characteristic	Switching between standard motor and constant-torque VF motor, switching between motors 1 and 2, setting of overload trip time, adjustment of stall prevention levels 1 and 2, selection of overload stall
	Reset function	Function of resetting by closing contact 1a or by turning off power or the operation panel. This function is also used to save and clear trip records.
Display function	Alarms	Stall prevention, overvoltage, overload, under-voltage, setting error, retry in process, upper/lower limits
	Causes of failures	Over-current, overvoltage, overheating, short-circuit in load, ground fault, overload on inverter, over-current through arm at start-up, over-current through load at start-up, CPU fault, EEPROM fault, RAM fault, ROM fault, communication error. (Selectable: Overload of braking resistor, emergency stop, under-voltage, low voltage, over-torque, motor overload, output open-phase)
	Monitoring function	Operation frequency, operation frequency command, forward/reverse run, output current, voltage in DC section, output voltage, torque, torque current, load factor of inverter, integral load factor of PBR, input power, output power, information on input terminals, information on output terminals, version of CPU1, version of CPU2, version of memory, PID feedback amount, frequency command (after PID), integral input power, integral output power, rated current, causes of past trips 1 through 4, parts replacement alarm, cumulative operation time
	Past trip monitoring function	Stores data on the past four trips: number of trips that occurred in succession, operation frequency, direction of rotation, load current, input voltage, output voltage, information on input terminals, information on output terminals, and cumulative operation time when each trip occurred.
	Output for frequency meter	Analog output: (1mAdc full-scale DC ammeter or 7.5Vdc full-scale DC ammeter / Rectifier-type AC voltmeter, 225% current Max. 1mAdc, 7.5Vdc full-scale), 4 to 20mA/AO to 20mA output
	4-digit 7-segments LED	Frequency: Inverter output frequency. Alarm: stall alarm "C", overvoltage alarm "P", overload alarm "L", overheat alarm "H". Status: inverter status (frequency, cause of activation of protective function, input/output voltage, output current, etc.) and parameter settings. Free-unit display: arbitrary unit (e.g. rotating speed) corresponding to output frequency.
	Indicator	Lamps indicating the inverter status by lighting, such as RUN lamp, MON lamp, PRG lamp, % lamp, Hz lamp, frequency setting potentiometer lamp, UP/DOWN key lamp and RUN key lamp. The charge lamp indicates that the main circuit capacitors are electrically charged.
Environments	Use environments	Indoor, altitude: 1000m (Max.), not exposed to direct sunlight, corrosive gas, explosive gas or vibration (less than 5.9m/s ²) (10 to 55Hz)
	Ambient temperature	-10 to +60°C Note)1,2,3
	Storage temperature	-20 to +65°C
	Relative humidity	20 to 93% (free from condensation and vapor).

Note 1. Above 40°C : Remove the protective seal from the top of VF-S11.

Note 2. If the ambient temperature is above 50°C: Remove the seal from the top of the inverter and use the inverter with the rated output current reduced.

Note 3. If inverters are installed side by side (with no sufficient space left between them): Remove the seal from the top of each inverter.

When installing the inverter where the ambient temperature will rise above 40°C, remove the seal from the top of the inverter and use the inverter with the rated output current reduced.

12.2 Outside dimensions and mass

■ Outside dimensions and mass

Voltage class	Applicable motor (kW)	Inverter type	Dimensions (mm)								Drawing	Approx. weight (kg)
			W	H	D	W1	H1	H2	D2			
1-phase 240V	0.2	VFS11S-2002PL									A	1.0
	0.4	VFS11S-2004PL	72	130	130	60	121.5	15	8	1.0		
	0.75	VFS11S-2007PL			140					1.2		
	1.5	VFS11S-2015PL	105	130	150	93		13	8	B	1.4	
	2.2	VFS11S-2022PL	140	170	150	126	157	14		C	2.2	
3-phase 240V	0.2	VFS11-2002PM									A	0.9
	0.4	VFS11-2004PM	72	130	120	60	121.5	15	8	0.9		
	0.55	VFS11-2005PM			130					1.1		
	0.75	VFS11-2007PM			130				8	B	1.1	
	1.5	VFS11-2015PM	105	130	150	93		13		1.2		
	2.2	VFS11-2022PM	140	170	150	126	157	14	C	1.3		
	4.0	VFS11-2037PM	140	170	150	126	157	14	8	D	2.2	
	5.5	VFS11-2055PM	180	220	170	160	210	12		4.8		
	7.5	VFS11-2075PM	180	220	170	160	210	12	E	4.9		
	11	VFS11-2110PM	245	310	190	225	295	19.5	9.3			
15	VFS11-2150PM	245	310	190	225	295	19.5	9.6				
3-phase 500V	0.4	VFS11-4004PL									B	1.4
	0.75	VFS11-4007PL	105	130	150	93	121.5	13	8	1.5		
	1.5	VFS11-4015PL								1.5		
	2.2	VFS11-4022PL	140	170	150	126	157	14	8	C	2.3	
	4.0	VFS11-4037PL	140	170	150	126	157	14		2.5		
	5.5	VFS11-4055PL	180	220	170	160	210	12	8	D	5.0	
	7.5	VFS11-4075PL	180	220	170	160	210	12		5.1		
	11	VFS11-4110PL	245	310	190	225	295	19.5	E	9.6		
15	VFS11-4150PL	245	310	190	225	295	19.5	9.6				
3-phase 600V	0.75	VFS11-6007P									B	1.3
	1.5	VFS11-6015P	105	130	150	93	121.5	13	8	1.3		
	2.2	VFS11-6022P	140	170	150	126	157	14		C		2.1
	4.0	VFS11-6037P	140	170	150	126	157	14	8	D	2.2	
	5.5	VFS11-6055P	180	220	170	160	210	12		4.7		
	7.5	VFS11-6075P	180	220	170	160	210	12	E	4.7		
	11	VFS11-6110P	245	310	190	225	295	19.5	8.8			
	15	VFS11-6150P	245	310	190	225	295	19.5	8.8			

■ Outline drawing

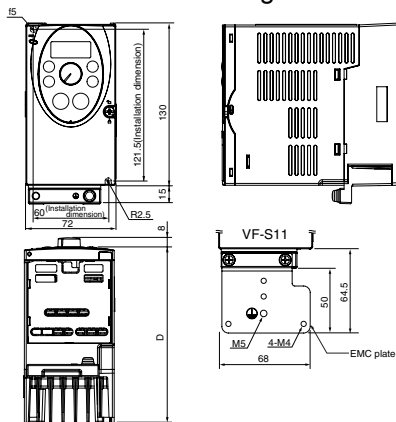


Fig.A

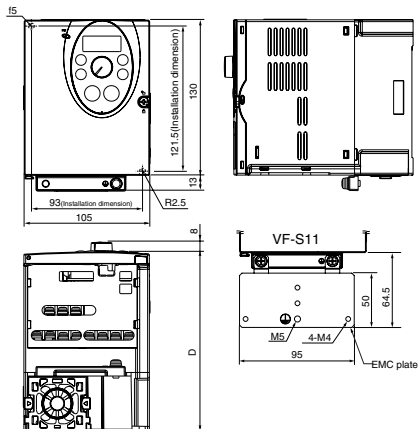


Fig.B

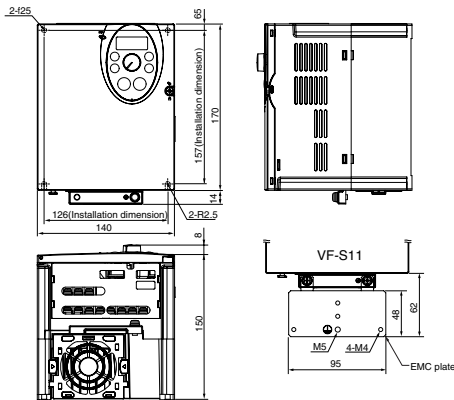


Fig.C

Note 1. To make it easier to grasp the dimensions of each inverter, dimensions common to all inverters in these figures are shown with numeric values but not with symbols.

Here are the meanings of the symbols used.

- W: Width
- H: Height
- D: Depth
- W1: Mounting dimension (horizontal)
- H1: Mounting dimension (vertical)
- H2: Height of EMC plate mounting area
- D2: Height of frequency setting knob

- Note 2. Here are the available EMC plate
- Fig.A : EMP003Z (Approx. weight : 0.1kg)
 - Fig.B, Fig.C : EMP004Z (Approx. weight : 0.1kg)
 - Fig.D : EMP005Z (Approx. weight : 0.3kg)
 - Fig.E : EMP006Z (Approx. weight : 0.3kg)

Note 3. The models shown in Fig. A and Fig. B are fixed at two points: in the upper left and lower right corners.

Note 4. The model shown in Fig. A is not equipped with a cooling fan.

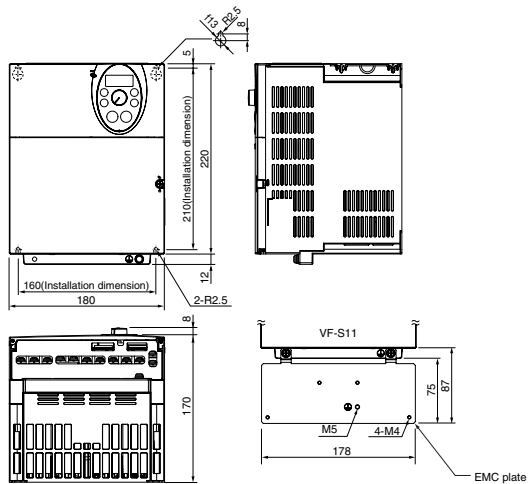


Fig.D

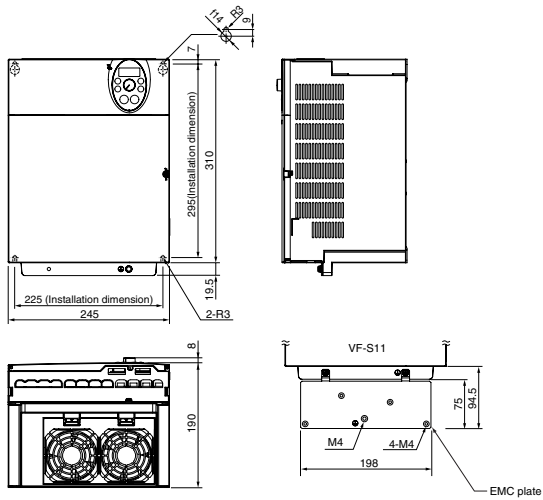


Fig.E