TOSHIBA

Transistor Inverter



3-phase 200V class 0.4kW to 90kW 3-phase 400V class 0.75kW to 630kW



SAVE POWER AND SAVE MONEY

The VF-PS1 has arrived! Specially engineered to meet the global demand for energy saving and harmonic regulation.

"VF-PS1" is all you need for Industrial fan and pump application.



Photo is PS1 with LCD remote keypad option.

point 1 More energy saving

Advanced energy-saving mode
 Best for exhaust fan, primary pump, boiler and feed water pump that require energy saving.

point 2 High-frequency noise reduction and harmonics reduction

• The integrated noise filter*1 and reactor*1
Best for HVAC fan and pump.

*1 Depends on the voltage and capacity range

point 3 Built-in special softwares for fan and pump application

• Bumpless function, Fire control, Sleep function, Multi-PID control, etc Best for exhaust fan, primary pump and HVAC fan.

oint 4 Simple Setup by EASY Key

• EASY key, and 8 basic parameters
Best for exhaust fan, dust collector, drier machine and water pump.

point 5 For more flexibility and usefulness

• Built-in RS485, My function, LONWORKS® and BAC net® fieldbus options Best for process pump and fan.

"Power Removal" safety function

Built-in Power Removal safety function which complies with EN954-1 category 3 and IEC/EN61508-1 SIL2.

It saves the installation of a line side or motor side contactor.





Variable torque Inverter TOSVERT™

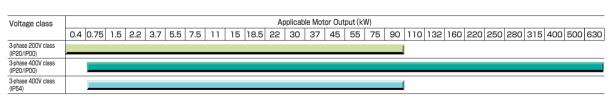


3-phase 200V class 0.4kW to 90kW 3-phase 400V class 0.75kW to 630kW

TOSVERT™ is a registered trademark of TOSHIBA CORPORATION

- \bullet Built-in thermal protection function which complies with NEC $\!^{@}$ 2005
- Comply with SEMI F47(Semiconductor Equipment and Materials International)





Up to 5.5kW, 3-phase 200V class can be applied to 1-phase input power supply by using 1 size-up rating.





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point 1

More energy saving



In order to meet the Kyoto protocol requirements, energy efficiency is becoming one of the top priority matters for the international organization and government.

VF-PS1 can help to achieve energy saving by the advanced energy saving mode operation.

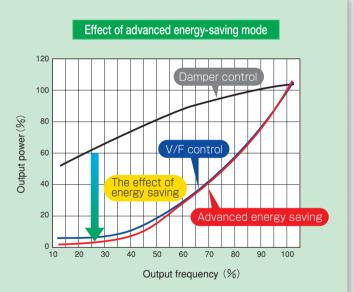
*1:Photos of machinery are illustrative purposes only.

More energy saving

The efficiency of induction motor normally fall at the light load and low speed.

The advanced energy-saving mode minimize the loss of induction motor by controlling excitation current belong to the load.

Therefore, this mode increase fan and pump efficiency even in the low speed.



The Energy saved power consumption can be monitored by operation panel or through serial communication data.

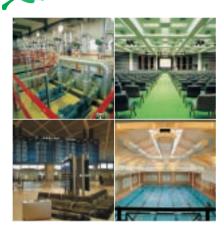


Monitor

Output power	H 7.5	The inverter output power (kW) is displayed.
Integral output power	H90	The integrated amount of power (KWh) supplied from the inverter is displayed.

7.5kW motor
Output power:7.5kW
Integral output power:900kWh

point 2 High-frequency noise reduction and harmonics reduction



The integrated noise filter*2 and reactor*2 drastically reduce high-frequency noise and harmonics. The power factor and energy saving are also improved.

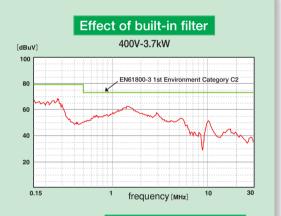
- *1:Photos of machinery are illustrative purposes only.
- *2:Depends on the voltage and capacity.

High-frequency Noise Reduction

Built-in noise filters are ideal for site such as commercial facilities and offices where attention must be paid to peripheral devices.

Compared to filter not integrated models, space and wiring can be saved by incorporating filter in the panel. Models with built-in EMC noise filter comply with the European EMC Directive as individual inverter units.

European EMC Directive : IEC/EN61800-3, 1st Environment, C2 (200V-0.4~2.2kW or IEC/EN61800-3, 2nd Environment, C3



Built-in EMC filter

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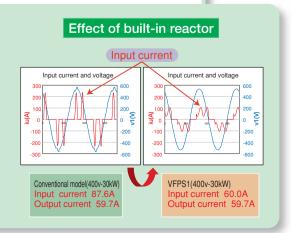
200V class models, 0.4 to 7.5kW: EMI noise filter (complies with the European EMC Directive) built-in standard 200V class models, 11 to 45kW: Basic noise filter (not complies with the European EMC Directive) built-in standard 400V class models, 0.75 to 75kW: EMI noise filter (complies with the European EMC Directive)built-in standard 400V class models, 90 to 630kW: EMI noise filter (complies with the European EMC Directive) built-in standard

Harmonics Reduction, Power Factor Improvement

New types of compact and space-saving DC reactor is built-in for 200 V class 11 to 45 kW and 400 V 18.5 to 75 kW models.

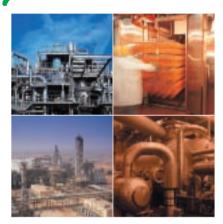
In addition to reducing harmonics, this reactor limits the input current to 110% of the rated output current, and it has been designed to be compatible with power supply systems containing transformers, molded-case circuit breakers, and power lines.

Optional DC reactor meets IEC harmonics standards.



point 3

Built-in special softwares for fan and pump application



The following functions are available for fan and pump application.

- -Bumpless function and Local/Remote mode
- -Fire control
- -Multi-PID control
- -Sleep function
- -Low torque detection

Built-in software for fan and pump application

Local/Remote mode

You can simply switch between Local and Remote by EASY key.

By switching from Remote to Local (Bumpless function), the operating frequency and status are shifted to Local mode.

It is easier for operation and adjustment.

Fire control

Fire control keeps operation with specified speed even if light fault occurs.

Multi-PID function

The PID operation can be changed at direct and inverse proportion by pressure, flow and temperature.

Sleep function (automatic stop function)

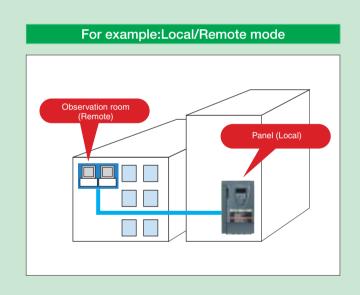
Additional energy saving can be realized by stopping at lower limit setting

Low torque detection function

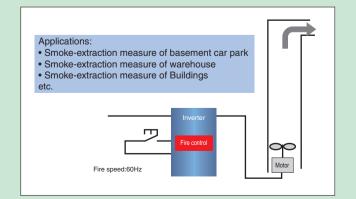
Low torque detection can notice a broken belt of AHU or low load to avoid pump trouble.

PTC thermistor input

This function is used to protect motor from overheating using the signal of PTC built-in motor.



For example: Fire control enables forced operation



Simple set up by EASY key



Installation, maintenance, and parameter setting are easier by EASY key.

You can choose, customize and display maximum of 32 parameters.

*1:Photos of machinery are illustrative purposes only.

Simple setup by EASY key

In the Quick mode, pressing the EASY key on the panel allows you to operate the inverter by eight basic parameters.

When setting each functions, press the EASY key to switch to the standard mode by one-touch operation. In this mode, you can access all parameters.

You can customize the Quick mode display, maximum of 32target parameters are displayed to suit your specific setup requirements.

You can also use the EASY key as a Local/Remote key to switch between Local and Remote operation, and as a shortcut key to directly access any specific setup or display screen.



Quick mode (EASY)

Title	Function
ЯШЧ	Parameter setting macro function
PE	V/F control mode selection
FH	Maximum frequency
ACC	Accelertion time 1
d E C	Deceleration time 1
EHr	Motor overload protection level 1
FΠ	FM terminal meter selection
PSEL	Parameter display selection

Easy Installation, Easy Commissioning, Easy Maintenance

Side-by-side installation

• Side-by-side installation is possible for all VF-PS1 models. You can save and optimize space inside of control panel. Heat sink can be installed outside of the panel as an option.

Removable control terminal board

• A removable terminal board allows you to use the control wiring when replacing the inverter, which also makes maintenance easier.

ON/OFF control of cooling fan

• Temperature-based cooling fan ON/OFF control reduces sound noise, saves energy, and extends the cooling fan's life.

Monitoring of serviceable service parts/alarm output

• The expected replacement cycle of main circuit capacitors, capacitors on control board, and cooling fan is monitored. And alarm is raise when the cycle is reached to the expected replacement time

Side-by-side installation



Removable control terminal board



^{*1:}Photos of machinery are illustrative purposes only.

point 5 For more flexibility and usefulness

Communications and Network

RS-485 communications

RS-485 communications is equipped as standard. Modbus-RTU protocol and TOSHIBA protocol is also supported.

Network options

DeviceNet®*1, PROFIBUS, CC-Link*1, LONWORKS®*1, BACnet®*1, Metasys®N2*1 and APOGEE®FLN*1 are also available.

Data tracing

The PCM001Z communication software allows you to edit, monitor, and trace parameter data on a PC, enabling easier data management from inverter



*1 DeviceNet is a registered trademarks of ODVA (Open DeviceNet Vendor Association). CC-Link is a registered trademarks of Mitsubishi Electric Corporation. LONWORKS is a registered trademark of Echelon Corporation. BACnet is a registered trademark of American Society of Heating. Refrigerating and Air-Conditioning Engineers, Incorporated. Metasys N2 is a registered trademark of Johnson Controls, Incorporated. APOGEE FLN is a registered trademark of Siemens Building Technologies, Incorporated.

Customizing by "My Function"

Using "My function", you can create programs up to 28 steps. This achieves logic operations and internal data operations. Parameters can also be set by analog input and minimum-peak hold of analog outputs.

For example:

(Ex.1)Inverter is automatically switched to commercial operation without external sequence when the inverter is tripped

(Ex.2)A signal is output when torque reaches 120% and frequency is 5 Hz.

(Ex.3)"Forward rotation operation," "preset-speed operation frequency 3"and "No.2 acceleration/deceleration"are simultaneously turned ON by input on a

(Ex.4)The acceleration/deceleration time is changed dynamically by a voltage within the range 0 to 10 V.

My function

Number of program steps: 28 Internal relays : 8 : 2 Internal counters

Logic commands : ST, STN, AND,

ANDN, OR, ORN, SET. RSET. HOLD

ON/OFF DELAY TIMER

: EQ, NE, GT, GE, Data commands

LT, LE, ASUB

Safety Environmental Compatibility

Ambient temperature 60°C

The VF-PS1 can be used at a rating up to an ambient temperature of 50°C or 45°C and in environments up to 60°C at a reduced current.

Eco Design

88% materials used on the VF-PS1 are recyclable, which was designed more than meets of the European WEEE (Waste Electrical and Electronic Equipment) Directive of 70%.

Power section IP54 all sizes

the power part of the drive outside the enclosure. (IP 54 degree of protection)

Complete isolation frame outer atmosphere. Option kit can be used to mount

12-pulse input connections

The 500~630kW class can suppress the harmonic current substantially by 12-pules input connections.

*12-pulse input requires a special transformer

Useful Options

LCD Remote Keypad Option



This panel indicates 8-line of 23 letters and can be used for simple setup and monitoring by selection of parameters using the jog dial.

Type:RKP004Z



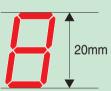
Status Monitor Mo	ide
Real-time informat	tion w
Rotative direction	Fwd
Frequency reference	10.4Hz
Output current	2%
Input voltage	99%
Output voltage	20%
Top 11 11	Prim E

LED Remote Keypad Option



20 mm LEDs, ensure outstanding visibility even in the darkness. It is designed to be mounted on the panels as extension display or remote keypad. In addition, parameter copy and storing function is also available

Type:RKP002Z



Expanded Terminal Block Option Fieldbus Option



I/O terminal block can be added for more complicated operation and wide range of systems:

- Contact inputs (4) Contact outputs (2) Analog inputs (2)
- Analog outputs (2) PTC input (1) Relay output (1 circuit)
- Pulse train input (1)

Type:APG001Z

For more information, refer to page 23.

Type:ETB003Z, ETB004Z

Main fieldbuses as built-in option card are supported for space saving and centralized control systems.



- PROFIBUS Type:PDP002Z • BAC net®
- Type:BCN001Z
- CC-Link Type:CCL001Z
- Metasys®N2 Type:MTS001Z

Basic functions

Each "setup item" that determines the control characteristics of the inverter is called a "parameter." For example, to change the acceleration time, you choose the acceleration time parameter (titled " $R \not\subseteq \mathcal{E}$ ").

Quick mode (EASY)

To enter the Quick mode, press the EASY key on the panel. In this mode, you can set eight of the basic parameters.

Standard mode

In this mode, you can set all parameters.

For details of parameters, refer to the Instruction Manual.

Title	Function
AUY	Parameter setting macro function
PE	V/f control mode selection
FH	Maximum frequency
ACC.	Acceleration time 1
dE[Deceleration time 1
EHr	Motor overload protection level 1
FΠ	FM terminal meter adjustment
PSEL	Parameter display selection

Basic parameters

Title	Function	Adjustment	Range			Default
FE	Frequency of operation panel	LL-UL Hz				0
Title	Function	Adjustment	Pango			Default
		Aujustinent	nalige			Delault
<u> </u>	History function Automatic acceleration/deceleration	0:Dipobled 1:Auto	omatic setting 2:Automatic setting (du	ring appalaration anhy)		0
	Automatic torque boost		omatic torque boost + auto-tuning 1 2:		etuning 1	0
	Automatic function setting		quency setting by means of voltage 2:			0
רטח	Automatic function setting				and operation by means of terminals	
			ing and operation on operation panel	squeriey setting on operation pane	and operation by means of terminals	
Enoa	Command mode selection		enabled 1:Operation panel input enab	led (including LED/LCD option inp	ut)	0
2,100					ion input 4:Communication option input	
FNOd	Frequency setting mode selection 1		rrent input) 2:RR/S4 (potentiometer/v	<u> </u>		2
	, , , , , , , , , , , , , , , , , , , ,		I input enabled (including LED/LCD o			
		5:Operation pane	RS485 (2-wire) communication inpu	t 6:Internal RS485 (4-wire) commi	unication input 7:Communication option input	
		8:Optional Al1 (di	ifferential current input) 9:Optional Al2	(voltage/current input) 10:UP/DO	WN frequency 11:RP pulse input	
		12:High-speed pu	ulse input 13:Binary/BCD input			
PE	V/f control mode selection	0:Constant torque	e characteristics 1:Voltage decrease of	curve 2:Automatic torque boost 3:5	Sensorless vector control (speed)	0
		4:- 5:V/f 5-point s	etting 6:PM control 7:PG feedback ve	ctor control (speed)		
		8:- 9:Energy-savi	ng 10:Advanced energy-saving			
uЬ	Manual torque boost 1	0.0~30.0%				Depends on the capacity
uL	Base frequency 1	25.0~500.0Hz				WN:60, WP:50.0
uLu	Base frequency voltage 1	200V class:50~33	30V 400V class:50~660V			Depends on the capacity
FH	Maximum frequency	30.0~500.0Hz				80.0
UL	Upper limit frequency	0.0~ <i>F ∺</i> Hz				WN:60.0, WP:50.0
LL	Lower limit frequency	0.0~U L Hz				0.0
<u> </u>	Acceleration time 1	0.1~6000 sec.				Depends on the capacity
4EC	Deceleration time 1	0.1~6000 sec.				Depends on the capacity
Ruf2	RR/S4 input point 2 frequency	0.0~ F H Hz				WN:60.0, WP:50.0
R IF 2	VI/II input point 2 frequency	0.0~ <i>F H</i> Hz				WN:60.0, WP:50.0
5-1	Preset speed operation frequency 1	LL~ULHz				0.0
<u>5 - 2</u>	Preset speed operation frequency 2	LL~ULHz				0.0
5-3	Preset speed operation frequency 3	LL~ULHz				0.0
5 r 4 5 r 5	Preset speed operation frequency 4 Preset speed operation frequency 5	L L ~ U L Hz				0.0
5r8	Preset speed operation frequency 6	L L~ U L Hz				0.0
	1 1 1					0.0
5 - 7 F -	Preset speed operation frequency 7 Forward run/reverse run selection	L L~UL Hz	Forward run 2:Forward run (Forward/r	overse switchable on operation pa	nal	0.0
	(operation panel operation)		orward/reverse switchable on operation		nei)	0
E H r	Motor overload protection level 1	10~100%	orward/reverse switchable on operation	in panel)		100
010	Motor overload protection level 1	Setting	Motor type	Overload protection	OL stall	0
ULII	Wilder Overload protection characteristic selection	O	Wotor type		× (not stall)	ď
		1	Standard Motor	O (protect) O (protect) C (not protect)	○ (stall) × (not stall)	
		3		x (not protect)	O (stall)	-
		5		O (protect)	(not stall) (stall)	-
		6	VF Motor	× (not protect) × (not protect)	× (not stall) ((stall)	
d5PU	Current/voltage unit selection	0:%, 1:A (ampere	e)/V (volt)	X (not protect)	(Stail)	0
FNSL	FM terminal meter selection		equency, 1:Frequency command valu	e, 2:Output current, 3:Input voltag	e, 4:Output voltage, etc.)	0
FN	FM terminal meter adjustment	-				-
ANSL	AM terminal meter selection	0~64 (0:Output fr	equency, 1:Frequency command valu	e, 2:Output current, 3:Input voltag	e, 4:Output voltage, etc.)	2
A U	AM terminal meter adjustment	-				
[F	PWM carrier frequency	1.0~16.0kHz (larg	ge capacity model 2.5~8.0kHz)			Depends on the capacity
UuS	Auto-restart control selection	0:Deselect 1:At a	uto-restart 2:ST ON/OFF switching 3:	1+2 4:Starting		0
UuE	Regenerative power ride-through control	0:Deselect 1:Pow	er ride-through 2:Deceleration stop de	uring power failure		0
		3:Synchronized d	eceleration/acceleration (synchronize	d acceleration/deceleration signal)	
		4:Synchronized d	leceleration/acceleration (synchronize	d acceleration/deceleration signal	+power failure)	
РЬ	Dynamic braking selection		ect (braking resistance overload detec	t) 2:Select (braking resistance over	rload not detect)	0
Pbr	Dynamic braking resistance	0.5~1000Ω				Depends on the capacity
PBCP	Allowable continuous braking resistance	0.01~600.0kW				Depends on the capacity
E Y P	Factory default setting		ult setting 2:60 Hz default setting 3:Fa			0
					Cumulative fan operation time cleared	
			leceleration time setting 0.01 sec.~60			
PSEL	Parameter display selection		g mode at time of activation of motor	1:Quick mode at time of activation	of motor 2:Quick mode only	0
FI~ F9	Extended parameters	Set parameters in	n more detail.			-
Gr.U	Automatic edit function	-				-

Extended parameters

About 400 extended parameters are available. For details on extended parameters, please visit our web site (http://www.inverter.co.jp/).

Standard specifications

■ Standard specifications (200 V class - 0.4 to 45 kW, 400 V class -0.75 to 75 kW model)

200 V class

	Item							Specifi	cation						
Apı	plicable Motor (kW)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45
	Туре							VFF	'S1-						
	Form	2004PL	2007PL	2015PL	2022PL	2037PL	2055PL	2075PL	2110PM	2150PM	2185PM	2220PM	2300PM	2370PM	2450PM
D	Output Capacity (kVA) Note 1)	1.1	1.8	3.0	4.2	6.7	10	13	21	25	29	34	46	55	67
Rating	Output Current (A)	3.0	4.8	8.0	11	17.5	27.5	33	54	66	75	88	120	144	176
Œ	Note 2)	(10.5)	(16.6)	(25.0)	(33)	(49)	(64)	(66)	(75)	(88)	(120)	(140)			
	Output Voltage	utput Voltage 3-phase, 200 to 240 V (The maximum output voltage is the same as the input voltage.)													
	Overload Current Rating						120%-1	minute	135%–2	seconds					
ည်	Dynamic							D. ii	lt-in						
Electric Braking	Braking Circuit							Dui	11-111						
回应	Dynamic Breaking Resistor							Externa	options						
ver ply	Voltage/frequency						3-phase	, 200 to 2	240 V – 5	60/60 Hz					
Power Supply	Allowable Fluctuation					Volta	age +10%	% - 15% I	Note 3) Fre	equency	±5%				
Pro	tective method			IP2	20 enclos	ed type	(JEM103	0)			IP00	enclosed	I type (JE	EM1030)	Note 4)
Co	oling method							Forced a	ir cooling	1					
Co	oling fan noise (dBA)	43	43	43	55	55	56	58	60	60	60	60	64	64	64
Co	lor							RAL	7016						
Bui	ilt-in Filter			EMI no	ise filter	Note 5)					Basic	noise filte	er Note 6)		
DC	Reactor			Exte	ernal opti	ion						Built-in			

400 V class

	Item							Sp	ecificati	on							
Ap	plicable Motor (kW)	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	
	Туре								VFPS1-	-							
	Form	4007PL	4015PL	4022PL	4037PL	4055PL	4075PL	4110PL	4150PL	4185PL	4220PL	4300PL	4370PL	4450PL	4550PL	4750PL	
D	Output Capacity (kVA) Note 1)	1.8	3.1	4.4	8.0	11	13	21	25	31	37	50	60	72	88	122	
Rating	Output Current (A)	2.3	4.1	5.8	10.5	14.3	17.6	27.7	33	41	48	66	79	94	116	160	
<u> </u>	Note 2)	(2.3)	(4.0)	(5.3)	(8.6)	(13)	(17)	(25)	(32)	(37)	(38)	(53)	(60)	(75)	(93)	(120)	
	Output Voltage			3-phas	se, 380 t	o 480 V	(The ma	ximum (output vo	oltage is	the sam	e as the	input vo	oltage.)			
	Overload Current Rating						1209	%–1 min	ute 1359	%–2 sec	onds						
2 2 5	Dynamic								Built-in								
Electric Braking	Braking Circuit								Duilt-iii								
回面	Dynamic Breaking Resistor							Exte	ernal opt	ions							
wer	Voltage/frequency						3-ph	ase, 380	to 480 '	V - 50/6	0 Hz						
Sup	Voltage/frequency Allowable Fluctuation	Voltage +10% - 15% Note 3) Frequency ±5%					Voltage +10% - 15% Note 3) Frequency ±5%										
Pro	otective method			IP20 en	closed ty	ype (JEN	/1030)					IP00 er	closed t	ype (JEI	M1030) ı	Note 4)	
Со	oling method							Forc	ed air co	oling							
Со	oling fan noise (dBA)	43	43	43	55	56	56	58	60	60	60	64	64	64	64	64	
Со	lor								RAL701	6							
Bui	ilt-in Filter							EMI no	oise filte	Note 5)							
DC	Reactor				Externa	l option							Built-in				

Note 1) Capacity is calculated at 220V for the 200V models and at 440V for the 400V models.

Note 2) Rated output current when the PWM carrier frequency (parameter [F) is 4kHz or less.

The values in parentheses refer to rated output currents when set to 12kHz.

Note 3) $\pm 10\%$ when the inverter is used continuously (load of 100%)

Note 4) Inverters, 18.5kW or greater, do not have wiring port covers. They have large openings, but there is no space to bend the external cables inside the unit. If they are fitted external to the cabinet, please use an optional wiring port cover.

Note 5) Complies with the Europian EMC Directive

IEC/EN61800-3, 1st environment, category C2 or IEC/EN61800-3, 2nd environment, category C3

Note 6) Not complies with the European EMC Directive

Core and capacities with external filter (optional) : Complies with the Europien EMC Directive.

Standard specifications

■ Standard specifications (200 V class -55 to 75 kW, 400 V class -90 to 630 kW model)

	Item		Specification							
Ар	plicable Motor (kW)	55	75	90						
	Туре		VFPS1-							
	Form	2550P	2750P	2900P						
Rating	Output Capacity (kVA) Note 1)	84	109	137						
Rat	Output Current (A) Note 2)	221	285	359						
	Output Voltage	3-phase, 200 to 240 V	(The maximum output voltage is the sam	e as the input voltage.)						
	Overload Current Rating		120%-1 minute 135%-2 seconds							
. <u>p</u>	Dynamic		Built-in							
Electric Braking	Braking Circuit		Built-iii							
回面	Dynamic Breaking Resistor		External options							
Power Supply	Voltage/frequency		3-phase, 200 to 240 V - 50/60 Hz							
പ	Allowable Fluctuation	V	Voltage +10% – 15% Note 3) Frequency ±5%							
Pro	otective method		IP20 enclosed type (JEM1030) Note 4)							
Co	oling method		Forced air cooling							
Co	oling fan noise (dBA)	61	61	70						
Co	lor		RAL7016							
Bu	ilt-in Filter		External filter (optional)							
DC	Reactor		Attached DC reactor Note 5)							

400 V class

	Item					S	pecificatio	n						
Ар	plicable Motor (kW)	90	110	132	160	220	250	280	315	400	500	630		
	Туре						VFPS1-							
	Form	4900PC	4110KPC	4132KPC	4160KPC	4220KPC	4250KPC	4280KPC	4315KPC	4400KPC	4500KPC	4630KPC		
Rating	Output Capacity (kVA) Note 1)	136	164	197	239	325	367	419	469	578	717	905		
Rai	Output Current (A) Note 2)	179	215	259	314	427	481	550	616	759	941	1188		
	Output Voltage		3-ph	ase, 380 to	480 V (Th	e maximum	output volt	age is the	same as the	e input volta	age.)			
	Overload Current Rating					120%–1 mi	nute, 135%	–2 seconds	3					
. <u>.</u>	Dynamic			Built-in					Evtorno	Lontiono				
Dynamic Built-in Extern Braking Circuit							Externa	l options						
回面	Dynamic Breaking Resistor	External options												
<u></u>	Voltage/frequency	No	- 0\				3-phase,	380 to 440	9 440 V – 50 Hz					
Voltage/frequency Note 6) 3-phase, 380 to 440 V - 50 Hz 3-phase, 380 to 480 V - 60 Hz														
ω	Allowable Fluctuation				Volta	ge +10% –	15% Note 3)	Frequency	±5%					
Pro	otective method				IP	20 enclose	d type (JEN	/11030) Note	4)					
Co	oling method					For	ced air coo	ling						
Co	oling fan noise (dBA)	61	61	72	73	73	76	76	76	76	76	78		
Со	lor						RAL7016							
Bu	ilt-in Filter					EMI r	oise filter 1	Note 7)						
DC	Reactor					Attache	d DC reacto	or Note 5)						

Note 1) Capacity is calculated at 220V for the 200V models and at 440V for the 400V models.

Note 2) Indicates the value when the PWM carrier frequency (parameter $\[\mathcal{L}\]F$) is 2.5 kHz or less.

When low noise (PWM carrier frequency 8 kHz) is required at 18.5 kW or more, use an inverter of capacity one rank higher than the motor capacity.

Note 3) ±10% when the inverter is used continuously (load of 100%)

Note 4) Inverters, 18.5kW or greater, do not have wiring port covers. They have large openings, but there is no space to bend the external cables inside the unit. If they are fitted external to the cabinet, please use an optional wiring port cover.

Note 5) For 200V-55kW, 400V-90kW or larger model, be sure to install DC reactor.

However, this is unnecessary for DC input specifications.

Note 6) Three-phase 380~480V-50/60Hz

Note 7) Complies with the European EMC Directive

IEC/EN61800-3, 2nd environment, category C3

■ Common Specifications

	Ite	m	Specification Specification
	Control system	m	Sinusoidal PWM control
	Output voltag		Main circuit voltage feedback control. (Switchable between automatic adjustment/fix/control off)
	Output freque		Setting between 0.01 to 500Hz. Default max. frequency is set to 0.01 to 60Hz. Maximum frequency adjustment (30 to 500Hz)
	Minimum sett	ing steps of frequency	0.01Hz: operation panel input (60Hz base), 0.02Hz: analog input (60Hz base, 11 bit/0 to 10Vdc)
	Frequency ac	curacy	Within ±0.2% (25°C±10°C): analog input ±0.01% (25°C±10°C): digital input
fications	Voltage/frequ	ency characteristics	V/f constant, square reduction torque control, automatic torque boost, vector calculation control, base frequency adjustment 1 and 2 (25 to 500Hz), V/F 5-point arbitrary setting, torque boost adjustment (0 to 30%), start frequency adjustment (0 to 10Hz), stop frequency adjustment (0 to 30Hz)
Control specifications	Frequency se	etting signal	$3k\Omega$ potentiometer (possible to connect to 1 to $10k\Omega$ -rated potentiometer) 0 to $10Vdc$ (input impedance Zin: $30k\Omega$) 0 to $\pm 10Vdc$ (Zin: $22k\Omega$) 4 to $20mAdc$ (Zin: 242Ω)
	Terminal boar	rd base frequency	The characteristic can be set arbitrarily by two-point setting. Compliant with 6 types of input; analog input (RR, VI/II, RX, RX2), pulse input and binary/BCD input (*RX2, binary/BCD input: optional)
	Frequency jur	mp	3 places. Setting of jump frequency and width.
	Upper and lov	wer limit frequencies	Upper limit frequency: 0 to max. frequency, lower limit frequency: 0 to upper limit frequency
	PWM carrier	frequency	200V-45kW or less, adjustable between 1.0 to 16kHz for 400V-75kW or less200V-55kW or less, adjustable between 2.5 to 8kHz for 400V-90kW or more
	PID control		Adjustment of proportional gain, integral time, differential time and delay filter
	Acceleration/	deceleration time	0.01 to 6000 sec. Selectable from among acceleration/deceleration times 1 and 2. Automatic acceleration/deceleration function. S-pattern acceleration/deceleration 1 and 2 pattern adjustable.
	DC braking		Adjustment of braking start frequency (0 to 120Hz), braking (0 to 100%) and braking time (0 to 10 sec.). With emergency stop braking function and motor shaft fix control function.
	Forward run/r	reverse run Note 1)	With F-CC closed to forward run, with R-CC closed to reverse run, with both closed to reverse run. With ST-CC opened to coast stop. Emergency stop by panel operation or terminal board.
us.	Jog run Note	1)	Jog mode, if selected, allows jog operation from the operation panel Jog run operation by terminal board is possible by setting the parameters.
Operation specifications	Preset speed	operation Note 1)	By changing the combination of open/close between S1, S2, S3, RR/S4-CC, set frequency + 15-speed operation. Selectable between acceleration/deceleration time, torque limit and V/f by set frequency.
bed	Retry		Capable of restarting after a check of the main circuit elements in case the protective function is activated. Max. 10 times selectable arbitrarily. Waiting time adjustment (0 to 10 sec.)
S UC	Soft stall		Automatic load reduction control at overloading. (Default: OFF)
rati	Cooling fan C	N/OFF	The cooling fan will be stopped automatically to assure long life when unnecessary.
Ope	Operation par control	nel key operation ON/OFF	Key prohibition selectable between Stop key only, Mode key only, etc. All key operations can be prohibited.
	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 o	peration	Possible to restart the motor in coasting in accordance with its speed and direction. (Default: OFF)
J	Commercial is	nverter switching	Possible to switch operation by commercial power source or inverter
J	Drooping fund	ction	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 fund	tion	External input signal adjustment is possible to the operation frequency command value.
Protective function	Protective fun	nction	Stall prevention, current limit, overcurrent, overvoltage, short circuit on the load side, ground fault on the load side (Note 5), undervoltage, momentary power failure (15ms or more), non-stop control at momentary power failure, overload protection, arm overload at starting, overcurrent on the load side at starting, overcurrent and overload at dynamic braking resistance, fin overheat, emergency stop
ectiv	Electronic the	ermal characteristic	Switchable between standard motor/constant torque VF motor, adjustment of overload protection and stall prevention level.
Prot	Reset		Reset by 1a contact closed (or 1b contact opened), or by operation panel. Or power source OFF/ON. This function is also used to save and clear trip records.
		Alarms	Stall prevention during operation, overload limit, overload, undervoltage on power source side, DC circuit undervoltage, setting error, in retry, upper limit, lower limit.
		Causes of failures	Overcurrent, overvoltage, fin overheat, short circuit on the load side, ground fault on the load side, inverter overload, arm overcurrent at starting, overcurrent on the load side at start EEPROM error, RAM error, ROM error, transmission error, (dynamic braking resistor overcurrent/overload), (emergency stop), (undervoltage), (low current), (overtorque), (motor overload), (output phase failure) The items in the parentheses are selectable.
SL			
Display functions	4-digit and 7-segment LED	Monitoring function	Operation frequency, operation frequency command, forward run/reverse run, output current, DC voltage, output voltage, compensated frequency, terminal board input/output information, CPU version, control EEPROM version, past trip history, cumulative operation time, speed feedback, torque, torque command, torque current, exiting current, PID feedback value, motor overload factor, inverter overload factor, PBR overload factor, PVBR load factor, input power, output power, peak output current, peak DC voltage, Motor counter pseudo PG, position pulse, RR input, VI/II input, RX input, RX2 input, RW output, AM output, meter adjustment fix output, flash memory version, main circuit FERROM version, types of connection position, previous default setting, previous automatic control (Al.12).
Display functions	7-segment	Free unit display	information, CPU version, control EEPROM version, past trip history, cumulative operation time, speed feedback, torque, torque command, torque current, exiting current, PID feedback value, motor overload factor, inverter overload factor, PBO overload factor, PVBR load factor, input power, output power, peak output current, peak DC voltage, Motor counter pseudo PG, position pulse, RBI riput, WIII input, RX input, RX2 input, FM output, Ma output, meter adjustment fix output, flash memory version, main circuit EEPROM version, types of connection option, previous default setting, previous automatic control (AU2) Display of optional units other than output frequency (motor speed, line speed, etc.), current ampere/% switch, voltage volt/% switch
Display functions	7-segment	Free unit display Automatic edit function	information, CPU version, control EEPROM version, past trip history, cumulative operation time, speed feedback, torque, torque command, torque current, exiting current, PID feedback value, motor overload factor, inverter overload factor, PBO overload factor, PBO workload factor, PDO postup power, output power, peak output current, peak DC voltage, Motor counter pseudo PG, postition pulse, RB ripput, VIII input, RX input, FM output, Ma output, meter adjustment fix output, flash memory version, main circuit EEPROM version, types of connection option, previous default setting, previous automatic control (AU2) Display of optional units other than output frequency (motor speed, line speed, etc), current ampere/% switch, voltage volt/% switch Searches automatically parameters that are different from the standard default setting parameters. Easy to find changed parameters.
Display functions	7-segment LED	Free unit display Automatic edit function User default setting	information, CPU version, control EEPROM version, past trip history, cumulative operation time, speed feedback, torque, torque command, torque current, exiting current, PID feedback value, motor overload factor, inverter overload factor, PBN overload factor, PBN overload factor, PDN overload factor, PBN overload factor, PDN overload factor, PD
	7-segment LED	Free unit display Automatic edit function User default setting Charge display	information, CPU version, control EEPROM version, past trip history, cumulative operation time, speed feedback, torque, torque command, torque current, exiting current, PID feedback value, motor overload factor, inverter overload factor, PBR overload factor, PURB load factor, inverter overload factor, PURB overload factor, PURB load factor, inverter overload factor, inverter overload factor, PURB load factor, PURB load factor, inverter overload factor, PURB load factor, PURB
Pow	7-segment LED	Free unit display Automatic edit function User default setting Charge display fety, function	information, CPU version, control EEPRÓM version, past trip history, cumulative operation time, speed feedback, torque, torque command, torque current, exiting current, PID feedback value, motor overload factor, inverter overload factor, PBR overload factor, PVBR load factor, input power, output power, peak output current, peak DC voltage, Motor counter pseudo PG, position pulse, RR input, VI/II input, RX input, FM output, AM output, meter adjustment fix output, flash memory version, main circuit EEPROM version, types of connection option, previous default setting, previous automatic control (AU2) Display of optional units other than output frequency (motor speed, line speed, etc), current ampere/% switch, voltage volt/% switch Searches automatically parameters that are different from the standard default setting parameters. Easy to find changed parameters. User parameter settings can be saved as default settings. Allows to reset the parameters to the user-defined parameter settings. Displays main circuit capacitor charging. Built-in Power Removal safety function which complies with EN954-1 category 3 and IEC/EN61508-1 SIL2.
Pow	7-segment LED LED er Removal sa t/output termin	Free unit display Automatic edit function User default setting Charge display fety, function al input function	information, CPU version, control EEPRÓM version, past trip history, cumulative operation time, speed feedback, torque, torque command, torque current, exiting current, PID feedback value, motor overload factor, inverter overload factor, PBO overload factor, PVBR load factor, input power, peak output current, peak DC voltage, Motor counter pseudo PG, position pulse, RBI riput, WIII input, RX input, RX2 input, FM output, AM output, meter adjustment fix output, flash memory version, main circuit EEPROM version, types of connection option, previous default setting, previous automatic control (AU2) Display of optional units other than output frequency (motor speed, line speed, etc), current ampere/% switch, voltage volt/% switch Searches automatically parameters that are different from the standard default setting parameters. Easy to find changed parameters. User parameter settings can be saved as default settings. Allows to reset the parameters to the user-defined parameter settings. Displays main circuit capacitor charging. Built-in Power Removal safety function which complies with EN954-1 category 3 and IEC/EN61508-1 SIL2. Possible to select positive logic or negative logic with programmable input/output terminal function menu. Note 1: Note 2: (Default setting: positive logic)
Pow	7-segment LED LED er Removal sa t/output termin /source switch	Free unit display Automatic edit function User default setting Charge display fety, function all input function ing	information, CPU version, control EEPROM version, past trip history, cumulative operation time, speed feedback, torque, torque command, torque current, exiting current, PID feedback value, motor overload factor, inverter overload factor, PBO overload factor, PVBR load factor, injust power, output power, peak output current, peak DC voltage, Motor counter pseudo PG, position pulse, RB input, VMI injust, RX input, RX2 input, FM output, AM output, meter adjustment fix output, flash memory version, main circuit EEPROM version, types of connection option, previous default setting, previous automatic control (AU2) Display of optional units other than output frequency (motor speed, line speed, etc), current ampere/% switch, voltage volt/% switch Searches automatically parameters that are different from the standard default setting parameters. Easy to find changed parameters. User parameter settings can be saved as default settings. Allows to reset the parameters to the user-defined parameter settings. Displays main circuit capacitor charging. Built-in Power Removal safety function which complies with EN954-1 category 3 and IEC/EN61508-1 SIL2. Possible to select positive logic or negative logic with programmable input/output terminal function menu. Note 1: Note 2: (Default setting: positive logic) Possible to switch between minus common (CC) and plus common (P24) for control terminal. (Default setting: minus common (CC))
Pow Inpu Sink	7-segment LED LED er Removal sa t/output termin //source switch	Free unit display Automatic edit function User default setting Charge display fety, function lai input function ing ion signal	information, CPU version, control EEPRÓM version, past trip history, cumulative operation time, speed feedback, torque, torque command, torque current, exiting current, PID feedback value, motor overload factor, inverter overload factor, PPBR overload factor, PVBR load factor, input power, output power, peak output current, peak DC voltage, Motor counter pseudo PG, position pulse, RR input, VIVI input, RX input, FM output, Ma output, meter adjustment fix output, flash memory version, main circuit EEPROM version, types of connection option, previous default setting, previous automatic control (AU2) Display of optional units other than output frequency (motor speed, line speed, etc), current ampere/% switch, voltage volt/% switch Searches automatically parameters that are different from the standard default setting parameters. Easy to find changed parameters. User parameter settings can be saved as default settings. Allows to reset the parameters to the user-defined parameter settings. Displays main circuit capacitor charging. Built-in Power Removal safety function which complies with EN954-1 category 3 and IEC/EN61508-1 SIL2. Possible to select positive logic or negative logic with programmable input/output terminal function menu. Note 1: Note 2: (Default setting: positive logic) Possible to switch between minus common (CC) and plus common (P24) for control terminal. (Default setting: minus common (CC)) 1c contact output (250Vac-2A-cos@=1, 250Vac-1A-cos@=0.4, 30Vdc-1A)
Pow Inpu Sink	T-segment LED er Removal sa t/output termin //source switch Failure detect Low speed/spe	Free unit display Automatic edit function User default setting Charge display fety, function hal input function ing ion signal ed reach signal output Note 2)	information, CPU version, control EEPRÓM version, past trip history, cumulative operation time, speed feedback, torque, torque command, torque current, exiting current, PID feedback value, motor overload factor, inverter overload factor, PBR overload factor, PVBR load factor, input power, output power, peak output current, peak DC voltage, Motor counter pseudo PG, position pulse, RR input, VIVI input, RX input, RN2 input, FM output, AM output, meter adjustment fix output, flash memory version, main circuit EEPROM version, types of connection option, previous default setting, previous automatic control (AU2) Display of optional units other than output frequency (motor speed, line speed, etc), current ampere/% switch, voltage volt/% switch Searches automatically parameters that are different from the standard default setting parameters. Easy to find changed parameters. User parameter settings can be saved as default settings. Allows to reset the parameters to the user-defined parameter settings. Displays main circuit capacitor charging. Built-in Power Removal safety function which complies with EN954-1 category 3 and IEC/EN61508-1 SIL2. Possible to select positive logic or negative logic with programmable input/output terminal function menu. Note 1: Note 2: (Default setting: positive logic) Possible to switch between minus common (CC) and plus common (P24) for control terminal. (Default setting: minus common (CC))
Pow Inpu Sink	LED LED er Removal sa t/output termin /source switch Failure detect Low speed/spe Upper/lower lir Note 2)	Free unit display Automatic edit function User default setting Charge display fety, function all input function ing ion signal ed reach signal output Note 2) mit frequency signal output	information, CPU version, control EEPRÓM version, past trip history, cumulative operation time, speed feedback, torque, torque command, torque current, exiting current, PID feedback value, motor overload factor, inverter overload factor, PPBR overload factor, PVBR load factor, input power, output power, peak output current, peak DC voltage, Motor counter pseudo PG, position pulse, RR input, VIVI input, RX input, FM output, Ma output, meter adjustment fix output, flash memory version, main circuit EEPROM version, types of connection option, previous default setting, previous automatic control (AU2) Display of optional units other than output frequency (motor speed, line speed, etc), current ampere/% switch, voltage volt/% switch Searches automatically parameters that are different from the standard default setting parameters. Easy to find changed parameters. User parameter settings can be saved as default settings. Allows to reset the parameters to the user-defined parameter settings. Displays main circuit capacitor charging. Built-in Power Removal safety function which complies with EN954-1 category 3 and IEC/EN61508-1 SIL2. Possible to select positive logic or negative logic with programmable input/output terminal function menu. Note 1: Note 2: (Default setting: positive logic) Possible to switch between minus common (CC) and plus common (P24) for control terminal. (Default setting: minus common (CC)) 1c contact output (250Vac-2A-cos@=1, 250Vac-1A-cos@=0.4, 30Vdc-1A)
Output signal Sink	LED LED Femoval sa //output termin //source switch Failure detect Low speed/spe Upper/lower lir Note 2) Output for frequence of the speed of the	Free unit display Automatic edit function User default setting Charge display fety, function hal input function ing ion signal ed reach signal output Note 2) mit frequency signal output uency meter/output for ammeter	information, CPU version, control EEPROM version, past trip history, cumulative operation time, speed feedback, torque, torque command, torque current, exiting current, PID feedback value, motor overload factor, inverter overload factor, PVBR load factor, PVBR load factor, input power, output power, peak output current, peak DC voltage, Motor counter pseudo PG, position pulse, RR input, VVIII input, RX input, RX2 input, FM output, AM output, meter adjustment fix output, flash memory version, main circuit EEPROM version, types of connection option, previous default setting, previous automatic control (AU2) Display of optional units other than output frequency (motor speed, line speed, etc), current ampere/% switch, voltage volt/% switch Searches automatically parameters that are different from the standard default setting parameters. Easy to find changed parameters. User parameter settings can be saved as default settings. Allows to reset the parameters to the user-defined parameter settings. Displays main circuit capacitor charging. Built-in Power Removal safety function which complies with EN954-1 category 3 and IEC/EN61508-1 SIL2. Possible to select positive logic or negative logic with programmable input/output terminal function menu. Note 1: Note 2: (Default setting: positive logic) Possible to switch between minus common (CC) and plus common (P24) for control terminal. (Default setting: minus common (CC)) 1 c contact output (250Vac-24-cos0=1, 250Vac-14-cos0=0.4, 30Vdc-1A) Open collector output (24Vdc, max. 50mA, output impedance: 33Ω) Analog output. 1mAdc full-scale DC ammeter or 7.7Vdc-1mA voltmeter
Pow Inpu Sink Sink Sink Sink Sink Sink Sink Sink	LED er Removal sa t/output termin //source switch Failure detect Low speed/spe Upper/lower lir Note 2) Output for frequ Note 3) Pulse train free	Free unit display Automatic edit function User default setting Charge display fety, function final input function ing for signal ed reach signal output Note 2) mit frequency signal output function unit frequency signal output function outfut function output function outfut function outfut function outfut function out	information, CPU version, control EEPROM version, past trip history, cumulative operation time, speed feedback, torque, torque command, torque current, exiting current, PID feedback value, motor overload factor, inverter overload factor, PVBR load factor, input power, output power, peak output current, peak DC voltage, Motor counter pseudo PG, position pulse, RR input, VIVII input, RX input, FM output, AM output, meter adjustment fix output, flash memory version, main circuit EEPROM version, types of connection option, previous default setting, previous automatic control (AU2) Display of optional units other than output frequency (motor speed, line speed, etc), current ampere/% switch, voltage volt/% switch Searches automatically parameters that are different from the standard default setting parameters. Easy to find changed parameters. User parameter settings can be saved as default settings. Allows to reset the parameters to the user-defined parameter settings. Displays main circuit capacitor charging. Built-in Power Removal safety function which complies with EN954-1 category 3 and IEC/EN61508-1 SIL2. Possible to select positive logic or negative logic with programmable input/output terminal function menu. Note 1: Note 2: (Default setting: positive logic) Possible to switch between minus common (CC) and plus common (P24) for control terminal. (Default setting: minus common (CC)) To contact output (250/ac-2A-cos@=1, 250/ac-1A-cos@=0.4, 30/dc-1A) Open collector output (24Vdc, max. 50mA, output impedance: 33Ω)
Pow Input Signal Sink	LED LED Femoval sa //output termin //source switch Failure detect Low speed/spe Upper/lower lir Note 2) Output for frequence of the speed of the	Free unit display Automatic edit function User default setting Charge display fety, function final input function ing for signal ed reach signal output Note 2) mit frequency signal output function unit frequency signal output function outfut function output function outfut function outfut function outfut function out	information, CPU version, control EEPRÓM version, past trip history, cumulative operation time, speed feedback, torque, torque command, torque current, exiting current, PID feedback value, motor overload factor, inverter overload factor, PVBR load factor, iput power, output power, peak output current, peak DC voltage, Motor counter pseudo PG, position pulse, RR input, VIVI input, RX input, RM output, EM output, AM output, meter adjustment fix output, flash memory version, main circuit EEPROM version, types of connection option, previous default setting, previous automatic control (AU2) Display of optional units other than output frequency (motor speed, line speed, etc), current ampere/% switch, voltage volt/% switch Searches automatically parameters that are different from the standard default setting parameters. Easy to find changed parameters. User parameter settings can be saved as default settings. Allows to reset the parameters to the user-defined parameter settings. Displays main circuit capacitor charging. Built-in Power Removal safety function which complies with EN954-1 category 3 and IEC/EN61508-1 SIL2. Possible to select positive logic or negative logic with programmable input/output terminal function menu. Note 1: Note 2: (Default setting: positive logic) Possible to switch between minus common (CC) and plus common (P24) for control terminal. (Default setting: minus common (CC)) 1 c contact output (250Vac-2A-cos0e_1, 250Vac-1A-cos0e_0.4, 30Vdc-1A) Open collector output (24Vdc, max. 50mA, output impedance: 33Ω) Analog output. 1mAdc full-scale DC ammeter or 7.7Vdc-1mA voltmeter Open collector output (24Vdc, max. 50mA) RS-485 standard 2-channel equipped (connector: modular 8P)
Pow Input signal Sink Com	LED er Removal sa t/output termin /source switch Failure detect Low speed/spe Upper/lower lir Note 2) Output for freqi Note 3) Pulse train fre munication fun Operating env	Free unit display Automatic edit function User default setting Charge display fety, function all input function ing ion signal ed reach signal output Note 2) mit frequency signal output uency meter/output for ammeter requency output notion	information, CPU version, control EEPRÓM version, past trip history, cumulative operation time, speed feedback, torque, torque command, torque current, exiting current, PID feedback value, motor overload factor, inverter overload factor, PBO overload factor, PVBR load factor, put power, output power, peak output current, peak DC voltage, Motor counter pseudo PG, position pulse, RBI riput, WIVII input, RX input, RV2 input, FM output, AM output, meter adjustment fix output, flash memory version, main circuit EEPROM version, types of connection option, previous default setting, previous automatic control (AU2) Display of optional units other than output frequency (motor speed, line speed, etc), current ampere/% switch, voltage volt/% switch Searches automatically parameters that are different from the standard default setting parameters. Easy to find changed parameters. User parameter settings can be saved as default settings. Allows to reset the parameters to the user-defined parameter settings. Displays main circuit capacitor charging. Built-in Power Removal safety function which complies with EN954-1 category 3 and IEC/EN61508-1 SIL2. Possible to select positive logic or negative logic with programmable input/output terminal function menu. Note 1: Note 2: (Default setting: positive logic) Possible to switch between minus common (CC) and plus common (P24) for control terminal. (Default setting: minus common (CC)) 1 c contact output (26Vdc, max. 50Vac-1A-cos0=0.4, 30Vdc-1A) Open collector output (24Vdc, max. 50mA, output impedance: 33Ω) Analog output. 1mAdc full-scale DC ammeter or 7.7Vdc-1mA voltmeter Open collector output (24Vdc, max. 50mA) RS-485 standard 2-channel equipped (connector: modular 8P) Indoor use. Altitude: 3000m or less (current reduction necessary if 1000m or more.) Place not exposed to direct sunlight and free of corrosive and explosive gases.
Pow Input signal Sink Com	LED er Removal sa t/output termin /source switch Low speed/spe Upper/lower lir Note 2) Output for freq Note 3) Pulse train fre	Free unit display Automatic edit function User default setting Charge display fety, function ala input function ing ion signal ed reach signal output Note 2) mit frequency signal output uency meter/output for ammeter requency output inction irronments ierature	information, CPU version, control EEPRÓM version, past trip history, cumulative operation time, speed feedback, torque, torque command, torque current, exiting current, PID feedback value, motor overload factor, inverter overload factor, PBO overload factor, PVBR load factor, input power, output power, peak output current, peak DC voltage, Motor counter pseudo PG, position pulse, RBI riput, WIVII input, RX input, RX2 input, FM output, AM output, meter adjustment fix output, flash memory version, main circuit EEPROM version, types of connection option, previous default setting, previous automatic control (AU2) Display of optional units other than output frequency (motor speed, line speed, etc), current ampere/% switch, voltage volt/% switch Searches automatically parameters that are different from the standard default setting parameters. Easy to find changed parameters. User parameter settings can be saved as default settings. Allows to reset the parameters to the user-defined parameter settings. Displays main circuit capacitor charging. Built-in Power Removal safety function which complies with EN954-1 category 3 and IEC/EN61508-1 SIL2. Possible to select positive logic or negative logic with programmable input/output terminal function menu. Note 1: Note 2: (Default setting: positive logic) Possible to switch between minus common (CC) and plus common (P24) for control terminal. (Default setting: minus common (CC)) 1 c contact output (250Vac-2A-cos@=1, 250Vac-1A-cos@=0.4, 30Vdc-1A) Open collector output (24Vdc, max. 50mA, output impedance: 33Ω) Analog output. 1mAdc full-scale DC ammeter or 7.7Vdc-1mA voltmeter Open collector output (24Vdc, max. 50mA) RS-485 standard 2-channel equipped (connector: modular 8P)
Output signal Dink	LED LED r Removal sa t/output termin /source switch Failure detect Low speed/spe Upper/lower lir Note 2) Output for freq Note 3) Pulse train fre munication fun Operating env Ambient temp	Free unit display Automatic edit function User default setting Charge display fety, function tal input function ing ion signal ed reach signal output Note 2) mit frequency signal output usency meter/output for ammeter requency output incrition informents inform	information, CPU version, control EEPROM version, past trip history, cumulative operation time, speed feedback, torque, torque command, torque current, exiting current, PID feedback value, motor overload factor, inverter overload factor, PVBR load factor, PVBR load factor, input power, output power, peak output current, peak DC voltage, Motor counter pseudo PG, position pulse, RR input, VVII input, RX input, RX2 input, FM output, AM output, meter adjustment fix output, flash memory version, main circuit EEPROM version, types of connection option, previous default setting, previous automatic control (AU2) Display of optional units other than output frequency (motor speed, line speed, etc), current ampere/% switch, voltage volt/% switch Searches automatically parameters that are different from the standard default setting parameters. Easy to find changed parameters. User parameter settings can be saved as default settings. Allows to reset the parameters to the user-defined parameter settings. Displays main circuit capacitor charging. Built-in Power Removal safety function which complies with EN954-1 category 3 and IEC/EN61508-1 SIL2. Possible to select positive logic or negative logic with programmable input/output terminal function menu. Note 1: Note 2: (Default setting: positive logic) Possible to switch between minus common (CC) and plus common (P24) for control terminal. (Default setting: minus common (CC)) 1 c contact output (250Vac-24-cos@-1, 250Vac-14-cos@-0,4, 30Vdc-14) Open collector output (24Vdc, max. 50mA, output impedance: 33Ω) Analog output. 1mAdc full-scale DC ammeter or 7.7Vdc-1mA voltmeter Open collector output (24Vdc, max. 50mA) RS-485 standard 2-channel equipped (connector: modular 8P) Indoor use. Altitude: 3000m or less (current reduction necessary if 1000m or more.) Place not exposed to direct sunlight and free of corrosive and explosive gases. -10 to +60°C (Remove the upper cover if 40°C or more, max. 60°C) Note 4:

Note 1: 16 contact input terminals (of which 8 are options) are programmable contact input terminals, and they make it possible to arbitrarily select from 80 types of signals.

Note 2: Programmable ON/OFF output terminals make it possible to arbitrarily select from 180 types of signals.

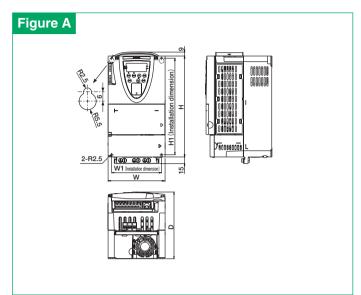
Note 3: Programmable analog output terminals make it possible to arbitrarily select from 50 types of signals.

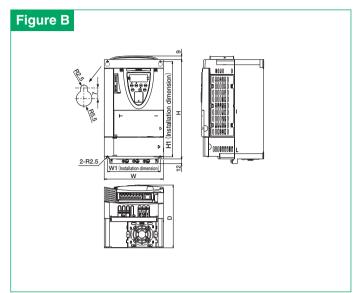
Note 4: When using inverters where the ambient temperature will rise above 50°C or 45°C, remove the upper cover and operate each inverter at a current lower than the rated one.

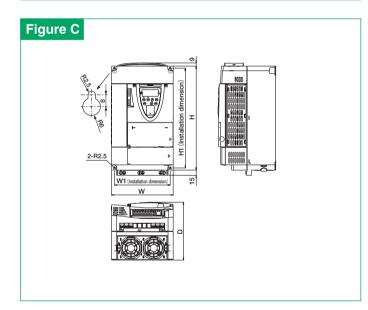
Note 5: This function protects inverters from overcurrent due to output circuit ground fault.

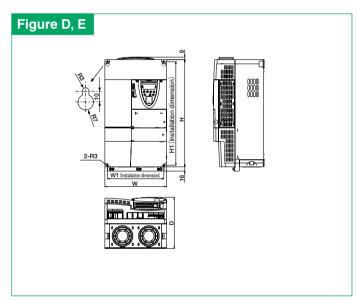
External dimensions

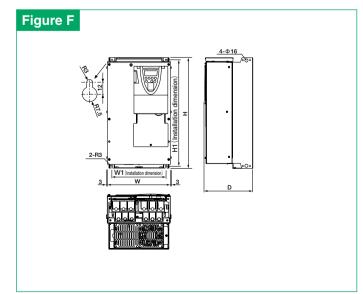
■ 200 V class -0.4 to 75 kW, 400 V class -0.75 to 110 kW model

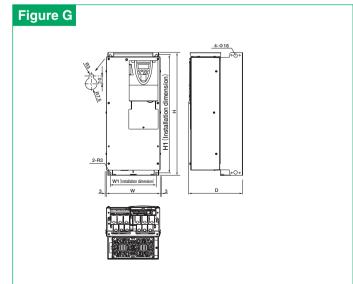


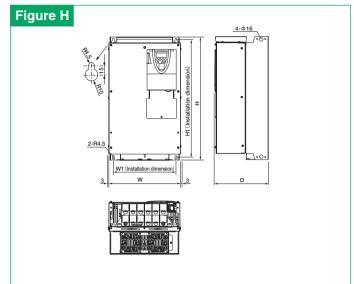


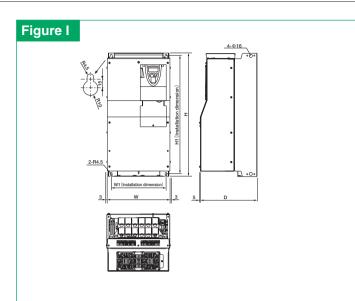


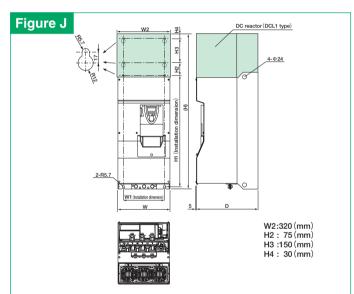










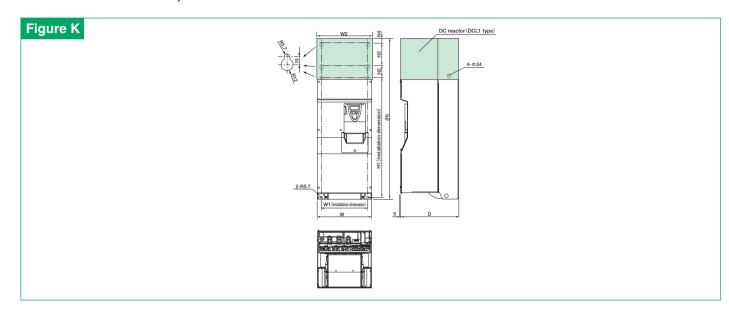


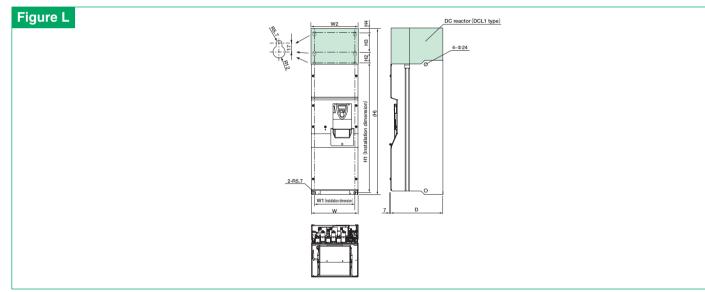
Page Class Applicable Motor Class Applicable Motor Class Applicable Applicable										
O.4	nput Voltage		Inverter Type		Dim	nensions (ı		Approx. Weight		
1.5	Class	(kW)	iliverter Type	W	Н	D	W1	H1		(kg)
1.5			VFPS1-2004PL							3
2.2 VFPS1-202PL 155 260 164 138 249 B 4 4 4 5.5 VFPS1-203PL 175 295 164 158 283 C 5.5 5.5 VFPS1-205PL 210 295 191 190 283 D 7.5 7.5 VFPS1-2110PM 230 400 191 210 386 E 14 14 15 VFPS1-2150PM 240 420 212 206 403 F 21 21 22 22 22 22 22		0.75	VFPS1-2007PL	130	230	152	114	220	Α	3
200V 15			VFPS1-2015PL							3
S.5			VFPS1-2022PL	155	260	16/	120	240	В	4
7.5			VFPS1-2037PL	133	200	104	130	249	В	
11			VFPS1-2055PL	175	295	164	158	283	С	
15			VFPS1-2075PL	210	295	191	190	283	D	7.5
15	200V	11	VFPS1-2110PM	220	400	101	210	396	_	14
22		15	VFPS1-2150PM	230	400	191	210	300	E	14
1	-	18.5	VFPS1-2185PM	240	420	010	2000	402	_	21
37			VFPS1-2220PM	240	420	212	200	403	Г	21
45 VFPS1-2450PM 55 VFPS1-2550P 310 680 (920) 370 250 650 J 59 (87) 59 (87) 75 VFPS1-4007PL 1.5 VFPS1-4015PL 1.5 VFPS1-4015PL 2.2 VFPS1-402PL 3.7 VFPS1-4037PL 5.5 VFPS1-4055PL 11 VFPS1-4055PL 11 VFPS1-4110PL 210 295 191 190 283 D 8 15 VFPS1-4110PL 210 295 191 190 283 D 8 15 VFPS1-41150PL 22 VFPS1-4150PL 22 VFPS1-4150PL 230 400 191 210 386 E 16 16 22 VFPS1-4220PL 240 420 212 206 403 F 21 30 VFPS1-4370PL 37 VFPS1-4370PL 48 55 VFPS1-4350PL 390 VFPS1-4450PL 300 VFPS1-4450PL 310 680 (920) 370 250 650 L 59 (89)			VFPS1-2300PM							41
S5		37	VFPS1-2370PM	320	550	242	280	525	Н	41
1.5			VFPS1-2450PM							41
1.5		55	VFPS1-2550P	210	680 (920)	270	250	650	1	E0 (97)
1.5			VFPS1-2750P	310		370	250	650	J	39 (67)
2.2 VFPS1-4022PL 3 3 3 3 3 3 3 3 3		0.75	VFPS1-4007PL		230				А	3
3.7		1.5	VFPS1-4015PL	130		152	114	220		3
## 155 VFPS1-4055PL 175 295 164 158 283 C 5.5		2.2	VFPS1-4022PL							3
7.5 VFPS1-4075PL 179 295 164 158 283 C 5.5 11 VFPS1-4110PL 210 295 191 190 283 D 8 15 VFPS1-4150PL 230 400 191 210 386 E 13 18.5 VFPS1-4185PL 230 400 212 206 403 F 21 30 VFPS1-4220PL 240 420 212 206 403 F 21 30 VFPS1-4300PL 240 550 242 206 529 G 29 45 VFPS1-4370PL 320 630 290 280 605 I 48 75 VFPS1-4450PL 320 630 290 280 605 I 48 90 VFPS1-4750PL 310 680 (220) 370 250 650 L 59 (80)		3.7	VFPS1-4037PL	155	260	164	138	249	В	4
7.5 VFPS1-407SPL 210 295 191 190 283 D 8 111 VFPS1-4110PL 210 295 191 190 283 D 8 115 VFPS1-4150PL 230 400 191 210 386 E 13 122 VFPS1-4220PL 240 420 212 206 403 F 21 30 VFPS1-4220PL 240 550 242 206 529 G 29 37 VFPS1-4300PL 240 550 242 206 529 G 29 45 VFPS1-4450PL 320 630 290 280 605 I 48 55 VFPS1-4450PL 320 630 290 280 605 I 48 75 VFPS1-4750PL 320 680 290 250 650 I 48 90 VFPS1-4750PL 310 680 (220) 370 250 650 I 59 (80)		5.5	VFPS1-4055PL	175	205	164	150	202	0	5.5
15 VFPS1-4150PL 230 400 191 210 386 E 13 18.5 VFPS1-4185PL 240 420 212 206 403 F 21 20 20		7.5	VFPS1-4075PL	1/3	295	104	130	203	C	5.5
18.5 VFPS1-4185PL 230 400 191 210 386 E 16		11	VFPS1-4110PL	210	295	191	190	283	D	8
400V 18.5 VFPS1-4185PL 240 420 212 206 403 F 21 29 30 VFPS1-4300PL 240 550 242 206 529 G 29 29 45 VFPS1-4450PL 320 630 290 280 605 I 48 75 VFPS1-4450PL 90 VFPS1-4900PC 310 680 (920) 370 250 650 I 59 (80)		15	VFPS1-4150PL	000	400	101	010	200	_	13
30	400V	18.5	VFPS1-4185PL	230	400	191	210	386	E	16
37 VFPS1-4370PL 240 550 242 206 529 G 29		22	VFPS1-4220PL	240	420	212	206	403	F	21
37		30	VFPS1-4300PL	040	550	040	000	500	_	29
55 VFPS1-4550PL 320 630 290 280 605 I 48 75 VFPS1-4750PL 48 90 VFPS1-4900PC 310 680 (920) 370 250 650 L 59 (80)				240	550	242	206	529	G	29
75 VFPS1-4750PL 48 90 VFPS1-4900PC 310 680 (920) 370 250 650 L 59 (80)			VFPS1-4450PL							48
90 VFPS1-4900PC 310 680 (220) 370 250 650 I 59 (80)			VFPS1-4550PL	320	630	290	280	605	1	48
		75	VFPS1-4750PL						·	48
110 VFPS1-4110KPC 310 680 (920) 370 250 650 J 59 (89)		90	VFPS1-4900PC	210	(000)	070	050	CEO	1	FO (00)
		110	VFPS1-4110KPC	310	080 (920)	3/0	250	000	J	29 (89)

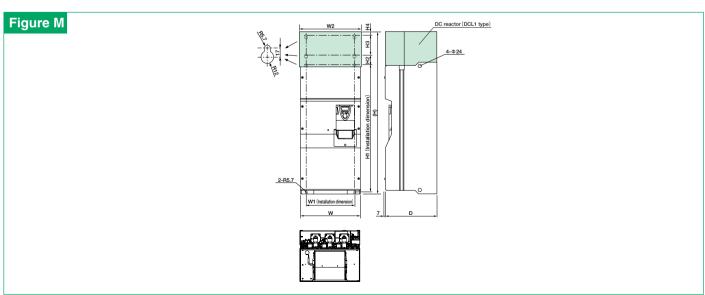
Note : Value in () includes attached DC reactor.

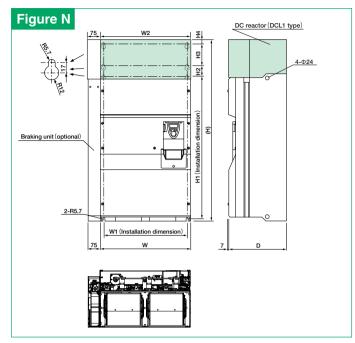
External dimensions

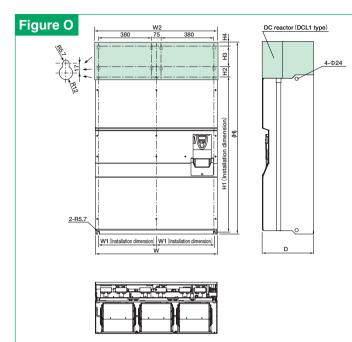
■ 200 V class -90 kW, 400 V class -132 to 630 kW model

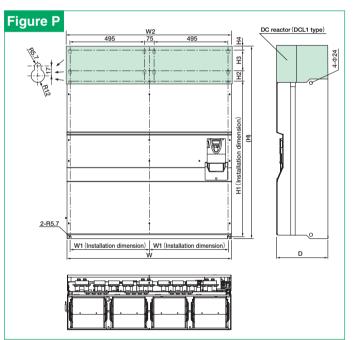












Input Voltage	Applicable Motor	Inverter Type	Dimensions (mm)									External Dimension	Approx. Weight
Class	(kW)	inverter Type	W	Н	D	W1	H1	W2	H2	H3	H4	diagram	(kg)
200V	90	VFPS1-2900P	350	782 (1022)	370	298	758	360	72	150	30	К	72 (103)
	132	VFPS1-4132KPC	350	782 (1022)	370	298	758	360	72	150	30	К	74 (108)
	160	VFPS1-4160KPC	330	950 (1190)	370	285	920	340	75	150	30	L	82 (118)
	220	VFPS1-4220KPC	430	950 (1190)	370	350	920	440	75	150	30	М	104 (161)
400V	250	VFPS1-4250KPC		950 (1190)				595	75		30	N	134 (194)
	280	VFPS1-4280KPC	585		370	540	920			150			136
	315	VFPS1-4315KPC		(1190)									(204)
_	400	VFPS1-4400KPC	880	1150	370	418	1100	890	75	150	200		215 (302)
	500	VFPS1-4500KPC	880	(1390)	370	418	1120	090	/5 _	150	30	0	225 (330)
	630	VFPS1-4630KPC	1110	1150 (1390)	370	533	1120	1120	75	150	30	Р	330 (462)

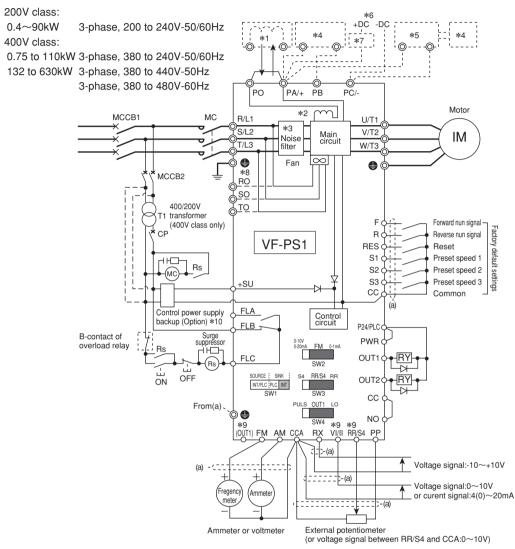
Note: The value in parentheses includes attached DC reactor.

Standard connection diagrams

Standard connection diagram : Sink logic (common : CC)

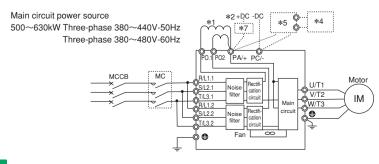
Standard connection diagram : Source logic (common: P24)

Main circuit power supply



SOURCE: SINK INT/PLC PLC INT S2 cc P24/PLC PWR (a) OUT1 OF RY OUT2 RY CC NO

- *1: The inverter is shipped with the terminals PO and PA/+ shorted with a bar (200V-45kW or amaller, 400V-75kW or smaller).
- Remove this shorting bar when installing a DC reactor (DCL). For 200V-55kW or more, and 400V-90kW or more models, be sure to install the DC rector.
- *2: The DC reactor is built in for models 200V-11kW~45kW and 400V-18.5kW~75kW.
- *3: The noise filter is built in for models 200V-45kW or smaller and all of 400V.
- *4: External braking resistor (option). Dynamic braking drive circuit built-in (GTR7)as standard for models 220kW or smaller.
- *5 : Power generation braking Unit (option), when the external braking resistor (optional) is used on 250kW or more models, the separate power braking unit (optional) is required.
- *6: To supply a DC power, connect the cables to the PA/+ and PA/- terminals.
- *7: If want to use DC power supply to operate the inverter (200V: 18.5kW or more, 400V: 22kW or more), 400V: 22kW or more), be sure to contact your supplier customer support center, because an inrush current limiting circuit is required in such a case.
- *8: For models 200V-90kW and 400V-132kW or larger, three-phase power input is necessary to drive the fan if you want to use a DC power supply.
- *9: The functions assigned to terminals OUT1. VI/II and RR/S4 can be swiched by changing parameter settings. *10: To supply control power from an external power supply for backing up the control power supplled from the inverter. an
 - optional control power backup device (CPS002Z) is required, Insuch a case, the backup device is used at the same time with the
 - internal power supply of the inverter. The optional control power backup unit can be used with both 200V and 400V models.
- *11 : The rating of 400V-500 and 630kW have the double terminals of R/L1, S/L2, T/L3 for power input, and PO for DC reactor. Please refer the following figure for the wiring.



Terminal functions

Main circuit terminal

Terminal Symbol	Terminal Function				
•	Grounding terminal for inverter casing				
R/L1, S/L2, T/L3	200V class: 0.4~90kW Three-phase 200~240V-50/60Hz 0.75~110kW Three-phase 380~480V-50/60Hz 132~630kW Three-phase 380~440V-50Hz Three-phase 380~480V-60Hz Three-phase 380~480V-60Hz				
U/T1, V/T2, W/T3	Connect to a (3-phase induction) motor.				
PA/+, PB	Connect a braking resistor. (For the optional dynamic braking unit, connect it between PA/+ and PC/) Change the parameters Pb, Pbr and PbEP if necessary. 250kW models and smaller are not equipped with terminal PB. If your are using such a model and you wish to use a braking resistor, you will need to purchase a braking unit separately.				
PC/-	This is a negative potential terminal in the internal DC main circuit. DC common power can be input across the PA/+ terminals (positive potential).				
PO, PA/+	Terminals for connecting a DC reactor (DCL: optional external device). Shorted by a short bar when shipped from the factory (200V: 45kW or smaller, 400V: 75kW or smaller). Before installing DCL, remove the short bar. (500 and 630kW have the double terminals of PO)				
RO, SO, TO	200V class: 90kW 400V class: 132kW~630kW Inverter's cooling power input terminals. When using a DC power supply, connect three-phase power cables.				

Control circuit terminal

The terminal function settings can be changed according to the application

Terminal Symbol	Input/output	Fu	nction	Electrical Specifications
F	Input	input	Shorting across F-CC causes forward rotation; open causes deceleration stop. (Across ST-CC is short state.)	Voltage free contact input 24Vdc-5mA or less
R	Input	contact	Shorting across R-CC causes reverse rotation; open causes deceleration stop. (Across ST-CC is short state.)	Lan current signal. Choose low current contacts to avoi poor attaching.
RES	Input	programmable contact input	Shorting and then opening RES-CC cancels the status held by an inverter protective function. When the inverter is operating normally, shorting and then opening RES-CC produces no effect.	*Sink/source selectable with SW1 Sink input ON: Less than DC10V OFF: DC16V or more OFF: Less than DC5V
S1	Input	rogr	Shorting across S1-CC causes preset speed operation.	Note:
S2	Input	ion	Shorting across S2-CC causes preset speed operation.	Even when an external power supply is used (in sink I
S3	Input	unct	Shorting across S3-CC causes preset speed operation.	mode, i.e., when SINK (PLC) is selected), connect reference potential-side (0V side) cable from the power st
RR/S4	Input	Multifunction	SW3: When SW4 is in the S4 position, S4 and CC are shorted and preset speed operation is selected.	to the CC terminal.
P24/PLC	Output		dc power output (when SW1 is in any position other than PLC) internal output terminal	24Vdc-200mA
. 2-1/1 20	Input	exte	W1 is turned to the PLC position, this terminal can be used as a common terminal when an rnal power supply is used.	_
CC*1	Common to input/output	_	tal signal equipotential (0V) terminal for the control circuit and equipotential (0V) terminal in optional control power supply backup.	_
PP	Output		log input setting power output	10Vdc (Permissible load current:10mAdc)
PWR*2	Input	betw This It is	24/PLC and PWR are short-circuited, the motor is put into a standby state. And if the circuit went them is opened, the motor coasts and stops. These terminals can be used for interlock. terminal is not a multifunction programmable input terminal. a terminal with the power removal safety function that complies with EN954-1 category 3 IEC/EN61508-1 SIL II.	Regardless of the setting of SW1 ON: DC17V or more OFF: Less than DC2V (OFF: Coast stop)
RR/S4	Input	Stan	3: Multifunction programmable analog input terminal when SW4 is in the RR position. hdard default setting:0~10Vdc input and 0~60Hz frequency.	10Vdc (Internal impedance:30 kΩ)
VI/I I	Input	frequ	ifunction programmable analog input.Standard default setting: 0~10Vdc input and 0~60Hz uency. This terminal can also be used as a 4-20mAdc (0-20mAdc) input terminal, if the uneter F 188 set to 1.	10Vdc (Internal impedance:30 k Ω) 4~20mA (Internal impedance:242 Ω)
RX	Input		ifunction programmable analog input. Standard default setting:0~±10Vdc input and 60Hz frequency.	10Vdc (Internal impedance:22 kΩ)
FM	Output	Con This	ifunction programmable analog output. Standard default setting: output frequency nect a 1mAdc full-scale ammeter or 7.5Vdc (10Vdc)-1mA full-scale voltmeter. etrminal can also be used as a 0-20mAdc (4-20mA) terminal, if the parameter F 58 i set to	1mA full-scale DC ammeter or 7.5Vdc-1mA full-scale DC voltmeter 0-20mA (4-20mA)
			nd the SW2 switch is set to OFF.	Full-scale DC amméter
АМ	Output	Use	ifunction programmable analog output. Standard default setting: output current this terminal to connect a 1mAdc full-scale ammeter or 7.5Vdc (10Vdc)-1mA full-scale meter.	1mA full-scale DC ammeter or 7.5Vdc-1mA full-scale DC voltmeter
OUT1	Output	outp	ifunction programmable open collector output. The default setting is to output a signal when out low speed threshold has been reached. Depending on the SW4 setting, pulses are out with frequencies of 1.00kHz to 43.20kHz. Standard default setting:3.84kHz	Open collector output 24Vdc-50mA
OUT2	Cuipui		ifunction programmable open collector output. By default, it is set to output a signal cating the completion of acceleration or deceleration.	*Sink logic/source logic switchable
NO		Digit	al output signal equipotential (0V) terminal for the control circuit. It is insulated from the CC terminal.	
CCA*1	Common to input/output	Ana	log input/output signal equipotential (0V) terminal for the control circuit.	_
+SU	Input		power input terminal for operating the control circuit. Connect a control power backup ce (optional) between +SU and CC.	Voltage:24Vdc±10% Use a power supply with a current rating of 1.1A or n
FLA FLB FLC	Output	Use	ay contact output. Contact rating d to detect the activation of the inverter's protective function. Contact across FLA-FLC is ed and FLB-FLC is opened during protection function operation.	250Vac-2A 30Vdc-1A :at resistance load 250Vac-1A :cosF=0.4

These settings put the motor into a standby state if S3 and CC are short-circuited, or coast and stop the motor if the circuit between S3 and CC is opened.

^{*2:} The PWR terminal is not the same as the ST (standby signal input) terminal provided for conventional models. To use the ST function, assign it to a multifunction terminal (F, R, RES or S1 to S4) that is not currently in use.

Example: When assigning the ST function to the S3 terminal.

Set ELID to D and Set ELID to E

For inverter users

When studying how to use our inverters

Notes

Leakage current

This inverter uses high-speed switching devices for PWM control.

When a relatively long cable is used for power supply to an inverter, current may leak from the cable or the motor to the ground because of its capacitance, adversely affecting peripheral equipment. The intensity of such a leakage current depends on the PWM carrier frequency, the lengths of the input and output cables, etc., of the inverter. To prevent current leakage, it is recommended to take the following measures.

[Effects of leakage current]

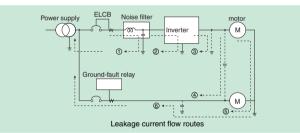
Leakage current which increases when an inverter is used may pass through the following routes:

- Route (1) ... Leakage due to the capacitance between the ground and the noise filter Route (2) ... Leakage due to the capacitance between the ground and the inverter
- Route (3) ... Leakage due to the capacitance between ground and the cable connecting the inverter and the motor
- Route (4) ... Leakage due to the capacitance of the cable connecting the motor and an inverter in another power distribution line

Route (5) ... Leakage through the grounding line common to motors

Route (6) ... Leakage to another line because of the capacitance of the ground Leakage current which passes through the above routes may cause the following trouble.

- Malfunction of a leakage circuit breaker in the same or another power distribution line
- Malfunction of a ground-relay installed in the same or another power distribution line
- Noise produced at the output of an electronic device in another power distribution line
- Activation of an external thermal relay installed between the inverter and the motor, at a current below the rate current



[Measures against effects of leakage current]

The measures against the effects of leakage current are as follows:

1) Measures to prevent the malfunction of leakage circuit breakers

- (1) Decrease the PWM carrier frequency of the inverter. Note)
- (2) Use radio-frequency interference-proof ELCBs (manufactured by Toshiba Schneider Inverter Corporation) as ground-fault interrupters in not only the system into which the inverter is incorporated but also other systems. When ELCBs are used, the PWM carrier frequency needs to be increased to operate the inverter.
- (3) When connecting multiple inverters to a single ELCB, use an ELCB with a high current sensitivity or reduce the number of inverters connected to the
- 2) Measures against malfunction of ground-fault relay:
- (1) Decrease the PWM carrier frequency of the inverter. Note)
- (2) Install ground-fault relays with a high-frequency protective function (e.g., Toshiba CCR12 type of relays) in both the same and other lines. When ELCBs are used, the PWM carrier frequency needs to be increased to operate the inverter
- 3) Measures against noise produced by other electric and electronic systems:
- (1) Separate the grounding line of the inverter from that of the affected electric and electronic systems.
- (2) Decrease the PWM carrier frequency of the inverter. Note)
- 4) Measures against malfunction of external thermal relays:
- (1) Remove the external thermal relay and use the electronic thermal function of the inverter instead of it. (Unapplicable to cases where a single inverter is used to drive more than one motor. Refer to the instruction manual for measures to be taken when thermal relays cannot be removed.)
- (2) Decrease the PWM carrier frequency of the inverter. Note)
- 5) Measures by means of wiring and grounding
- (1) Use a grounding wire as large as possible
- (2) Separate the inverter's grounding wire from that of other systems or install the grounding wire of each system separately to the grounding point.
- (3) Ground (shield) the main circuit wires with metallic conduits

- (4) Use the shortest possible cables to connect the inverter to the motor.
- (5) If the inverter has a high-attenuation EMI filter, turn off the grounding capacitor detachment switch to reduce the leakage current. Note that doing so leads to a reduction in the noise attenuating effect.
- Note) In the case of this inverter, the PWM carrier frequency can be decreased to 1.0kHz or 2.5kHz. However, that it should not be set to less than 2.0kHz during vector control.
- Decreasing the carrier frequency results in an increase in electromagnetic noise from the motor

Ground faul

Before begining operation, thoroughly check the wiring between the motor and the inverter for incorrect wiring or short circuits. Do not ground the neutral point of any star-connected motor.

Radio interference

[Noise produced by inverters]

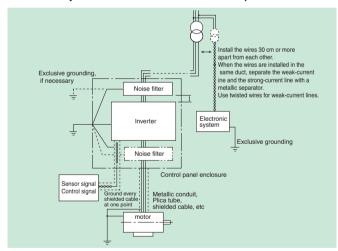
Since this inverter performs PWM control, it produces noise and sometimes affects nearby instrumental devices, electrical and electronic systems, etc. The effects of noise greatly vary with the noise resistance of each individual device, its wiring condition, the distance between it and the inverter, etc.

[Measures against noises]

According to the route through which noise is transmitted, the noises produced by an inverter are classified into transmission noise, induction noise and radiation noise. **[Examples of protective measures]**

- Separate the power line from other lines, such as weak-current lines and signal lines, and install them apart from each other.
- Install a noise filter in each inverter. It is effective for noise prevention to install noise filters in other devices and systems, as well.
- Shield cables and wires with grounded metallic conduits, and cover electronic systems with grounded metallic cases.
- Separate the power distribution line of the inverter from that of other devices and systems.
- Install the input and output cables of the inverter apart from each other
- Use shielded twisted pair wires for wiring of the weak-current and signal circuits, and always ground one of each pair of wires.
- Ground the inverter with grounding wires as large and short as possible separately from other devices and systems.

On 200V 0.4 to 7.5kW and 400V 0.75 to 75kW models, noise can be greatly reduced as they have a built-in EMI noise filter on their input side.



Power factor improvement capacitors

Do not install a power factor improvement capacitors on the input or output side of the inverter.

Installing a power factor improvement capacitor on the input or output side causes current containing harmonic components to flow into the capacitor, adversely affecting the capacitor itself or causing the inverter to trip. To improve the power factor, install an input AC reactor or a DC reactor (optional) on the primary side of the inverter.

Installation of input AC rectors

These devices are used to improve the input power factor and suppress high harmonic currents and surges. Install an input AC reactor when using this inverter under the following conditions:

- (1) When the power source capacity is 500kVA or more, and when it is 10 times or more greater than the inverter capacity.
- (2) When the inverter is connected the same power distribution system as a thyristor-committed control equipment.
- (3) When the inverter is connected to the same power distribution system as that of distorted wave-producing systems, such as arc furnaces and large-capacity inverters.

When wiring the inverter

(Wiring precautions)

Installing a molded-case circuit breaker [MCCB]

- Install a molded-case circuit breaker (MCCB) on the inverter's power supply input to protect the wiring.
- (2) Avoid turning the molded-case circuit breaker on and off frequently to turn on/off the motor.
- (3) To turn on/off the motor frequently, close/break the control terminals F (or R)-

Installing a magnetic contactor [MC] [primary side]

- (1) To prevent an automatic restart after the power interruption or overload relay has tripped, or actuation of the protective circuit, install an electro-magnetic contact in the power supply.
- (2) The inverter is provided with a failure detection relay (FL), so that, if its contacts are connected to the operation circuit of the magnetic contactor on the primary side, the magnetic contactor will be opened when the protective circuit of the inverter is activated.
- (3) The inverter can be used without a magnetic contactor. In this case, use an MCCB (equipped with a voltage tripping device) for opening the primary circuit when the inverter protective circuit is activated.
- (4) Avoid turning the magnetic contactor on and off frequently to turn on/off the motor
- (5) To turn on/off the motor frequently, close/break the control terminals F (or R)- CC

Installing a magnetic contactor [MC] [secondary side]

- (1) As a rule, if a magnetic contactor is installed between the inverter and the motor, do not turn of ON/OFF while running. (If the secondary-side contactor is turned of ON/OFF while running, a large current may flow in the inverter, causing inverter damage and failure.)
- (2) A magnetic contactor may be installed to change the motor or change to the commercial power source when the inverter is stopped. Always use an interlock with the magnetic contactor in this situation so that the commercial power supply is not applied to the inverter's output terminals.

External signal

- (1) Use a relay rated for low currents. Mount a surge suppressor on the excitation coil of the relay.
- (2) When wiring the control circuit, use shielded wires or twisted pair cables.
- (3) Because all of the control terminals except FLA, FLB and FLC are connected to electronic circuits, insulate these terminals to prevent them from coming into contact with the main circuit.

Installing an overload relav

- (1) The VF-S11 inverter has an electronic-thermal overload protective function. However, in the following cases, the thermal relay operation level must be adjusted or an overload relay matching the motor's characteristics must be installed between the inverter and the motor.
- (a) When using a motor having a rated current value different from that of the equivalent.
- (b) When driving several motors simultaneously.
- (2) When using the inverter to control the operation of a constant-torque motor (VF motor), change the protective characteristic of the electronic thermal relay according to the setting of the VF motor.
- (3) In order to adequately protect a motor used for low-speed operation, we recommend the use of a motor equipped with a embedded thermal relay.

When changing the motor speed

Application to standard motors

Vibration

When a motor is operated with an industrial inverter, it experiences more vibrations than when it is operated by the commercial power supply. The vibration can be reduced to a negligible level by securing the motor and machine to the base firmly. If the base is weak, however, the vibration may increase at a light load due to resonance with the mechanical system

Reduction gear, belt, chain

Note that the lubrication capability of a reducer or a converter used as the interface of the motor and the load machine may affected at low speeds.

When operating at a frequencies exceeding 60 Hz or higher, power transmission mechanisms such as reduction gear, belts and chains, may cause problems such as production of noise, a reduction in strength, or shortening of service life.

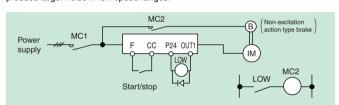
Frequency

Before setting the maximum frequency to 60 Hz or higher, confirm that this operating range is acceptable for the motor.

Application to special motors

Braking motor

When using a braking motor, if the braking circuit is directly connected to the inverters's output terminals, the brake cannot be released because of the lowered starting voltage. Therefore, when using a braking motor, connect the braking circuit to the inverter's power supply side, as shown on the below. Usually, braking motors produce larger noise in low speed ranges.



Gear motor

When using an industrial inverter to drive a gear motor, inquire of the motor manufacturer about its continuous operation range, since low-speed operation of a gear motor may cause insufficient lubrication.

Toshiba Gold Motor (High-efficiency power-saving motor)

Inverter-driven operation of Toshiba Gold Motors is the best solution for saving energy. This is because these motors have improved efficiency, power factor, and noise/vibration reduction characteristics when compared to standard motors.

Pole-changing motor

Pole-changing motors can be driven by this inverter. Before changing poles, however, be sure to let the motor come to a complete stop.

Hight-pole-count motors

Note that hight-pole count motors(8 or more poles), which may be used for fans,etc., have higher rated current than 4-pole moters.

The current ratings of multipole motors are relatively high. So, when selecting an inverter, you must pay special attention to its current rating so that the current rating of the motor is below that of the inverter.

Single-phase motor

Because single-phase motors are equipped with a centrifugal switch and capacitors for starting, they cannot be driven by an inverter. If only a single-phase, power system is availabls a 3-phase motor can be driven by using a single-phase input interter to convert it into a 3-phase 200V output. (A special inverter and a 3-phase motor are required.)

For inverter users

Selecting peripheral and wiring sizes devices

Voltage	Applicable		Input cu	rrent (A)	Molded-ca breaker Note	(MCCB)	contac Note 1	netic tor (MC)),3),4),5)					Wire Note	size 6),7)					Scre	Terminal w Size te 8)
Class	Motor (kW)	Inverter model		inent (A)	Rated (A		curre	ational ent (A) .C1		Main erminal S, T)	Circuit Output t (U, V	erminal (, W)	DC te	rminal	Braking Braking uni Not	t (optional)	Groun	d lead	Main Circuit	GND
			Without Reactor	With Reactor	Without Reactor	With Reactor	Without Reactor	With Reactor	AWG	mm²	AWG	mm ²	AWG	mm²	AWG	mm²	AWG	mm²	Terminal	Termina
	0.4	VFPS1-2004PL	3.5	2.1	5	5	25	25	14	1.5	14	1.5	14	1.5	14	1.5	14	2.5		
	0.75	VFPS1-2007PL	6.1	3.2	10	5	25	25	14	1.5	14	1.5	14	1.5	14	1.5	14	2.5	M4	
	1.5	VFPS1-2015PL	11.5	6.4	15	10	25	25	14	1.5	14	1.5	12	1.5	14	1.5	14	2.5		
	2.2	VFPS1-2022PL	15	9.3	20	15	25	25	12	1.5	12	1.5	10	2.5	14	1.5	14	2.5	1	
	3.7/4.0	VFPS1-2037PL	26	15.5	30	30	32	25	10	4	10	4	8	6	14	1.5	12	4		
	5.5	VFPS1-2055PL	35	22.5	50	40	40	25	8	6	8	6	6	10	14	1.5	10	6		1
	7.5	VFPS1-2075PL	45	34.5	60	40	50	40	8	10	8	10	4	16	12	2.5	10	10	M5	M5
	11	VFPS1-2110PM	-	53.5	-	75	-	80	4	16	4	16	3	16	10	4	10	16		1
200V	15	VFPS1-2150PM	-	72	-	100	-	80	4	25	4	25	1	25	8	6	10	16	M6	
	18.5	VFPS1-2185PM	-	77	-	100	-	80	3	25	3	25	1/0	35	8	10	8	16		1
	22	VFPS1-2220PM	-	88	-	125	-	125	2	25	2	25	2/0	35	6	16	8	16	M8	
	30	VFPS1-2300PM	-	125	-	150	-	125	2/0	50	2/0	50	4/0	70	4	25	6	25		
	37	VFPS1-2370PM	-	140	-	175	-	250	3/0	70	3/0	70	250MCM	95	3	35	6	35	M12	M8
	45	VFPS1-2450PM	-	165	-	200	-	250	4/0	70	4/0	70	300MCM	95	2	50	6	35	1	
	55	VFPS1-2550P	-	200	-	250	-	275	3/0×2	70×2	3/0×2	120	4/0×2	95×2	1/0	50	1/0	70		
	75	VFPS1-2750P	-	270	-	350	-	350	4/0×2	95×2	4/0×2	70×2	3/0×2	95×2	1/0	35×2	1/0	95	M10	M10
	90	VFPS1-2900P	-	336	-	500	-	500	250MCM×2	120×2	250MCM×2	95×2	300MCM×2	120×2	1/0	50×2	1/0	120		
	0.75	VFPS1-4007PL	3.7	2.1	5	4	25	25	14	1.5	14	1.5	14	1.5	14	1.5	14	2.5		
	1.5	VFPS1-4015PL	5.8	3.8	10	6.3	25	25	14	1.5	14	1.5	14	1.5	14	1.5	14	2.5	M4 M5	
	2.2	VFPS1-4022PL	8.2	5.7	14	10	25	25	14	1.5	14	1.5	14	1.5	14	1.5	14	2.5		
	3.7/4.0	VFPS1-4037PL	14	8.7	18	14	25	25	12	1.5	12	1.5	10	2.5	14	1.5	14	2.5		
	5.5	VFPS1-4055PL	20.5	12.7	32	25	25	25	10	2.5	10	2.5	8	4	14	1.5	12	2.5		1
	7.5	VFPS1-4075PL	27	16.3	32	25	32	25	10	4	10	4	8	6	14	1.5	12	4		
	11	VFPS1-4110PL	36.5	21.5	50	30	40	32	8	6	8	6	6	10	14	1.5	10	6		M5
	15	VFPS1-4150PL	48	33.5	60	40	50	40	6	10	6	10	4	16	12	2.5	10	10		1
	18.5	VFPS1-4185PL	-	45.5	-	60	-	50	6	10	6	10	4	16	10	2.5	10	10	M6	
	22	VFPS1-4220PL	-	50	-	60	-	50	6	10	6	10	4	16	10	4	10	8		1
	30	VFPS1-4300PL	-	66	-	100	-	80	4	16	4	16	2	25	8	6	10	16	1	
	37	VFPS1-4370PL	-	84	-	100	-	125	3	25	3	25	1	35	8	10	8	16	M8	
	45	VFPS1-4450PL	-	105	-	125	-	125	1	35	1	35	2/0	50	6	16	8	16	1	
	55	VFPS1-4550PL	-	120	-	150	-	125	1/0	50	1/0	50	3/0	70	6	16	6	25		M8
400)/	75	VFPS1-4750PL	-	165	-	200	-	250	3/0	70	3/0	70	250MCM	95	3	35	6	35	M12	
400V	90	VFPS1-4900PC	-	170	-	200	-	250	1/0×2	70×2	1/0×2	95	1/0×2	95×2	1/0	35	2	70		
	110	VFPS1-4110KPC	-	200	-	250	-	275	2/0×2	95×2	2/0×2	120	2/0×2	95×2	1/0	35	2	95	1	
	132	VFPS1-4132KPC	-	240	-	300	-	315	4/0×2	95×2	4/0×2	70×2	4/0×2	120×2	1/0	50	1	95	M10	M10
	160	VFPS1-4160KPC	-	290	-	350	-	350	250MCM×2	120×2	250MCM×2	95×2	4/0×2	120×2	4/0	70	1	120	1	
	220	VFPS1-4220KPC	-	395	-	500	-	500	350MCM×2	150×2	350MCM×2	150×2	350MCM×2	150×2	4/0	95	2/0	150		
	250	VFPS1-4250KPC	-	444	-	700	-	700	250MCM×3	150×2	250MCM×3	150×2	4/0×3	185×2	300MCM	150	2/0	150	1	
	280	VFPS1-4280KPC	-	495	-	700	-	700	300MCM×3	150×3	300MCM×3	120×3	300MCM×3	150×3	300MCM	150	3/0	120×2	1	
	315	VFPS1-4315KPC	-	555	-	700	-	1000	350MCM×3	150×3	350MCM×3	150×3	350MCM×3	150×3	300MCM	150	3/0	120×2	1	
	400	VFPS1-4400KPC	-	709	-	1000	-	1000	350MCM×4	150×4	350MCM×4	120×4	500MCM×3	150×4	300MCM×2	150×2	4/0	150×2	1	
	500	VFPS1-4500KPC	-	876	-	1200	-	1600	500MCM ×2×2 Note 12)	150×2×2 Note 12)	500MCM ×4	185×4	500MCM ×4	185×4 Note 11)	300MCM×2	150×2	250MCM	150×2	M12	M12
	630	VFPS1-4630KPC	-	1091	-	1600	-	1600	500MCM ×3×2 Note 12)	150×3×2 Note 12)	500MCM ×5	185×5	500MCM ×4	185×4 Note 11)	300MCM×2	150×2	250MCM	185×2		

Note 12)

Note 12)

Note 12)

Note 1) Selections for use of the Toshiba 4-pole standard motor with power supply voltage of 200V/400V-50Hz.

Note 2) Choose the MCCB according to the power supply yotagacity.

For comply with UL and CSA standard, use the fuse certified by UL and CSA.

Note 3) When the motor is driven by commercial power supply switching, for example, use an electromagnetic contactor that is matched to AC-3 class motor rated current.

Note 4) Attach surge killers to the magnetic contactor and exciting coil of the relay.

Note 5) In the case the magnetic contactor (MC) with 2a-type auxiliary contacts is used for the control circuit, raise the reliability of the contact by using 2a-type contacts in parallel connection.

Note 6) The recommended cable isze is that of the cable (e.g. 600V class, HIV cable) with continuous maximum permissible temperature of 75°C. Ambient temperature is 40°C or less and the wiring distance is 30m or less.

Note 7) For the control circuit, use shielded wires whose size (cross-section) is 0.75 mm2 or more.

Note 8) The screw size of the control terminals is M3.

Note 9) Choose the wiring size according to the braking resistor value.

Note 10) On 200 V class 55 kW or more, and 400 V class 90 kW or more models, be sure to install the DC reactor.

Note 11) The recommended cable is 600V class HIV cable with permissible temperature of 90°C.

Note 12) The number refers to a cable composition. For example, in the case of "150 × 2 × 2". 150 × 2 ×

 Number of cables connected in parallel on the terminal board Number of cables connected to each terminal board

Selecting the Capacity (model) of the Inverter

selection

Capacity
Refer to the applicable motor capacities listed in the standard specifications.
When driving a high-pole motor, special motor, or multiple motors in parallel, select such an inverter that the sum of the motor rated current multiplied by 1.05 to 1.1 is less than the inverter's rated output

Acceleration/deceleration times

The actual acceleration and deceleration times of a motor driven by an inverter are determined by the torque and moment of inertia2 of the load, and can be calculated by the following equations.

The acceleration and deceleration times of an inverter can be set individually. In any case, however, they should be set longer than their respective values determined by the following equations.

Acceleration time	$ta = \frac{(JM+JL) \times \Delta N}{9.56 \times (TM-TL)} \text{ (sec.)}$
Deceleration time	$ta = \frac{(JM + JL) \times \Delta N}{9.56 \times (TB + TL)} \text{ (sec.)}$
Conditions	J.M.: Moment of inertia of motor (kg.m²) J.L.: Moment of inertia of load (kg.m²) (converted into value on motor shaft) ΔN.: Difference in rotating speed between before and after acc. or dce. (min. ¬¹) T.L.: Load lorque (N.m) T.M.: Motor rated torque x 1.1 (N.m) V/f control : Motor rated torque x 1.2 (N.m) Vector operation control T.B.: Motor rated torque x 0.2 (N.m) (When a braking resistor or a braking resistor unit is used:) (Motor rated torque x 0.8-1.0 (N.m)

Allowable torque characteristics
When a standard motor is combined with an inverter to perform variable speed operation, the motor temperature rises slightly higher than it normally does during commercial power supply operation. This is because the inverter output voltage has a sinusoidal (approximate) PWM waveform. In addition, the cooling becomes less effective at low speed, so the torque must be reduced according to the traquency.

When constant-torque operation must be performed at low speeds, use a Toshiba VF motor designed specifically for use with inverters.

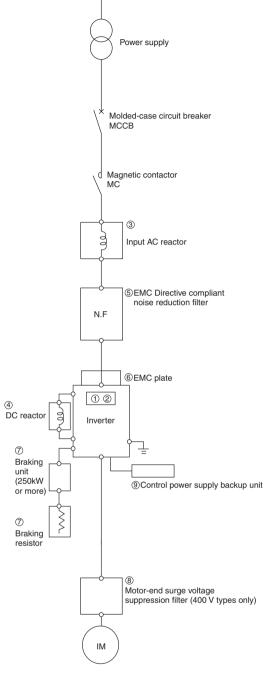
- Wire size 150mm²

Starting characteristics
When a motor is driven by an inverter, its operation is restricted by the inverter's overload current rating, so the starting characteristic is different from those obtained from commercial power supply

operation.

Although the starting torque is smaller with an inverter than with the commercial power supply, a high starting torque can be produced at low speeds by adjusting the V/f pattern torque boost amount or by employing vector control. When a larger starting torque is necessary, select an inverter with a larger capacity and examine the possibility of increasing the motor capacity.

Peripheral devices



■ Built-in options

No.	Name	Function/Purpose, etc.	Refer to
	Expanded terminal block card	This option is convenient for adding on special functions. (Type : ETB003Z, ETB004Z)	
	CC-Link communications card	This option enables CC-Link communications with a host controller or other PLC. (Type : CCL001Z)	
	DeviceNet communications card	This option enables DeviceNet communications with a host controller or other PLC. (Type :DEV002Z)	
	PROFIBUS communications card	This option enables PROFIBUS communications with a host controller or other PLC. (Type : PDP002Z)	
1	LONWORKS® communications card	This option enables LonWorks® communications with a host controller or other PLC. (Type : LIU006Z)	P23
	BACnet® communications card	This option enables BACnet [®] communications with a host controller or other PLC. (Type : BCN001Z)	P23
	Metasys [®] N2 communications card	This option enables Metasys® communications with a host controller or other PLC. (Type : MT001Z)	
	APOGEE® FLN communications card	This option enables APOGEE® FLN communications with a host controller or other PLC. (Type : APG001Z)	
2	PG feedback card (complimentary output/line driver output)	Higher performance operation is possible by combining with a motor equipped with a sensor. (Type: VEC004Z, VEC005Z, VEC007Z)	

■ External ontions

No.	Name			Function/Purpos	e, etc.		Refer t	
3	Input AC reactor	This is used to improve the input power factor of the inverter power supply, reduce harmonics or suppress external surges. Install this option when the power supply capacity is 500 kVA or more and the power supply capacity is 10 times or more than that of the inverter's capacity, or when a distortion-generating source such as a thyristor or a large-capacity inverter is connected to the same wring leads. The effect of this option changes according to the impedance of the reactor. Consult us separately for details.						
		Reactor		Effect				
			Improved Power Factor	Harmonics	External Surge Suppression			
		Input AC Reactor	0	0	0	overy: very effective		
4	DC reactor	DC Reactor	Overy	○very	×	X: ineffective	P26	
		recommend joi		t reactor, that is e	ffective in suppres	the power factor. We ssing external surges,		
⑤	EMC Directive compliant noise reduction filter (for European market)		that mounting on t			s a system (foot mount rate-standing for large-	P27-2	
6	EMC plate		A steel plate used to connect shielded earth wires from inverter's power cables or to connect earth wires from external devices. Some models have it as a standard attachment or as an potion.					
7	Braking resistor Braking unit	This operation is used when sudden deceleration or stops are frequently performed, or when the deceleration time must be shortened on loads having a large inertia. This resistor is for taking up energy during power generation braking. For 250kW or more inverter, it requires the braking unit.					P29-3	
8	Motor-end surge voltage suppression filter (400 V types only)	using ultra high length, cable I insulation of the voltage are pe	On systems that run 400 V class general-purpose motors by voltage-type PWM system inverters using ultra high-speed switching devices (e.g. IGBT), surge voltage, that is dependent on cable length, cable laying methods, cable constants, and other factors, sometimes causes the insulation of the motor winding to deteriorate. For this reason, measures for suppressing surge voltage are performed by installing a DC reactor or surge suppression filter on the inverter output end where the insulation-reinforced motor is used.					
9	Control power supply backup unit	main circuit por Use this option	wer supply. when backing up	only by the contro	ol power supply wh	n the inverter from the nen the main circuit is s. (Model : CPS001Z)	P32	
0	USB communications conversion unit	the connector of	This unit is connected to a PLC or a computer to enable data communications. By connecting the connector cable, parameters can be easily adjusted, and data easily saved and written. Command function					
1	Communications cable	Connector cab CAB0013, CAB		rsion unit and LEI	remote keypad.	(Model : CAB0011,	P32	
12	LCD remote keypad (installable on body)	"hiragana" and	eypad is for extension Kanji display facil is required for cont	litates parameter s	etup. The dedicate	ts 11-character, 8-line ed cable for the LCD 004Z)	P33	
13	LCD cable	Connector cabl	e for LCD remote k	eypad (Model : CA	B0071, CAB0073, 0	CAB0075, CAB00710)	P33	
(1)	LED remote keypad (w/ parameter writer function)	LED remote keypad is for extension. It is provided with an LED display, RUN/STOP key, UP/DOWN key, monitor key, and enter key. Setup parameters for three inverters can be stored to this unit. (Model: RKP002Z)					P33	
13	Heat sink outside protrusion option	This allows hea	at generated inside	panels to be reduc	ed.		P34	
(fi)	Operation panel	Has a built-in frequ	ency type, frequency set	tter and RUN-STOP (for	ward run, reverse run) s	witch. (Model : CBVR-7B1)	P36	

Harmonic current and influence to power supply

Harmonics are defined as sinusoidal waves that is multiple frequency of commercial power (base frequency: 50Hz or 60Hz). Commercial power including harmonics has a distorted waveform.

Some electrical and electronic devices produce distorted waves in their rectifying and smoothing circuits on the input side. Harmonics produced by a device influence other electrical equipment and facilities in some cases (for example, overheating of phase advancing capacitors and reactors).

Measures for suppressing higher harmonics

No	Measures	Description
1	Connecting a reactor	The leakage of a harmonic current from an inverter can be restricted by connecting an input AC reactor (ACL) on the input side of the inverter or a DC reactor (DCL) to the DC section of the inverter.
2	Connecting a higher harmonic suppressing unit (SC7)	A PWM converter that shapes the waveform of an input current into a substantially sinusoidal waveform. The leakage of a harmonic current from a power supply can be restricted by connecting a harmonic suppressing unit.
3	Connecting a higher harmonic suppressing phase advancing capacitor	A harmonic current can be absorbed by the use of a phase advancing capacitor unit composed of a phase advancing capacitor and a DC reactor.
4	Multi-pulse operation of transformation	For delta-delta connection and delta-Y connection transformers, the effect of 12 pulses can be obtained by distributing the load evenly, and thus currents containing fifth-order and seventh-order harmonics can be suppressed.
5	Other measures	Harmonic currents can also be suppressed by the use of passive (AC) and active filters.

Built-in options

Here are the internal devices optionally available. There are two types of optional devices: Add-on type and Plug-in type.

■ Table of optional devices

Optio	on name	Function, purpose	Model	Type of installation
Expansion terminal function	Expansion I/O card1	Used to extend input and output terminals.	ETB003Z	Add-on
Expansion terminal function	Expansion I/O card2	Osea to exteria input and output terminals.	ETB004Z	Add-on
	CC-Link communication card	Used to connect to a CC-Link network for control.	CCL001Z	Add-on
	DeviceNet communication card	Used to connect to a DeviceNet network for control.	DEV002Z	Add-on
	PROFIBUS-DP communication card	Used to connect to a PROFIBUS-DP network for control.	PDP002Z	Add-on
Communication function	LONWORKS communication card	Used to connect to a LONWORKS network for control.	LIU006Z	Add-on
	BAC net communication card	Used to connect to a BAC net network for control.	BCN001Z	Add-on
	Metasys N2 communication card	Used to connect to a Metasys N2 network for control.	MTS001Z	Add-on
	APOGEE FLN communication card	Used to connect to a APOGEE FLN network for control.	APG001Z	Add-on
	Push-pull 12V	Lload to issue motor nules train rate commands or used for some	VEC004Z	Plug-in
PG feedback	Push-pull 15V	Used to issue motor pulse train rate commands or used for sensor	VEC005Z	Plug-in
	RS422-5V	vector control.	VEC007Z	Plug-in

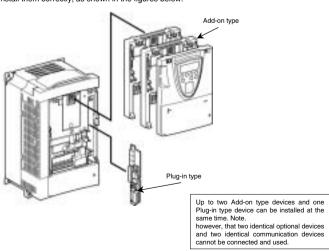
Up to two Add-on type devices and one Plug-in type device can be installed at the same time. Note, however, that two identical optional devices and two identical optional communication devices cannot be connected and used.

Function of Expansion I/O card

I dilotioi	. O. Exp	ansion i/o dara				
Model	ETB003Z	ETB004Z				
Multifunction programmable contact input	No-voltage cont Sink logic input ON: Less than	Multifunction programmable contact input : 4 points No-voltage contact input (24Vdc-5mA or less) Sink logic input (at a common voltage of 24V) Source logic input ON: Less than 10Vdc ON: 11Vdc or more OFF: 16Vdc or more OFF: Less than 5Vdc				
Multifunction programmable open collector output	Driving current: Max. 20mA whe	Multifunction programmable open collector output : 2 points Driving current: Max. 50mA when an external power source is used Max. 20mA when the internal power source is used Driving voltage: 12V (min) to 30V (max)				
Multifunction programmable relay contact output	1C contact configuration 250Vac-2A (cosφ=1), 250Vac-1A (cosφ=0.4), 30Vdc-1A					
Differential current input	Disable	Current input: 20mA or less Voltage input: Differential voltages 5V or less, -10V or more, +10V or less				
Analog input	Disable	Current input: 20mA or less Voltage input: 0V to 10V				
Monitor output	Disable	Voltage output: -10V to 10V, 0V to 10V Current output: 0mA to 20mA				
Pulse train input	Disable	Input pulse specifications Voltage: Max. 5V Current: Max. 15mA Frequency: Max. 30kHz Duty: 50±10%				
External thermal trip input	Resistance between TH+ and TH- Error: Approx. 70Ω or less or approx. $3k\Omega$ or more Recovery from error: Approx. $1.6k\Omega$					
24V power output	24Vdc - 60mA r	max				
-10V power output	-10Vdc -10mA					
Contact input common terminal	Common termin	nals for contact input				

How to install

Add-on type devices and insertion type devices are installed in different ways. Install them correctly, as shown in the figures below.



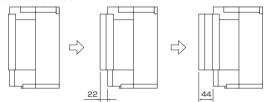
Function of PG feedback card

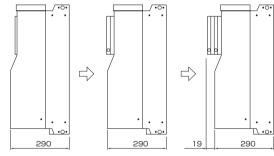
Model	VEC004Z, VEC005Z	VEC007Z			
Sensor vector control operation	Speed control operation: Zero-speed - Speed control range: Zero-speed - 1:1000 (1000p				
PG method	Complementary method, open collector method	Line drive method			
PG cable length	Max. 100m (complementary method)	Max. 30m			
PG supply power	VEC004Z: 12V-160mA VEC005Z: 15V-150mA	5V-160mA			
Maximum pulse input frequency	300kHz or less * If a two-phase open collector is used, a study needs to be made to determin derating factor. For details, refer to the operating manual for the optional dev Pulse duty: 50±10%				
Pulse input voltage	12Vdc~24Vdc	Line driver (LTC485 or equivalent)			

■ Dimension of depth that installed option

Depending on the capacity, the installation of an Add-on type device may increase the depth of the inverter.

200V 0.4 to 45kW/400V 0.75 to 37kW

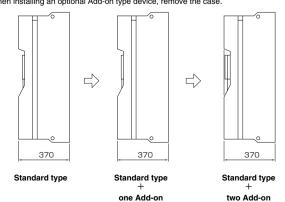




200V 55 to 90kW/400V 90 to 630kW

Note: The inverters of these capacities come equipped with an Add-on type option case as standard.

When installing an optional Add-on type device, remove the case.



External options

Voltage class	Applicable motor (kW)	Inverter model	Input AC reactor (ACL)	DC reactor (DCL) Note 4)	EMC Directive compliant noise reduction filter	Braking resistor Note 1), 2)	Motor end sur voltage suppression fil		
	0.4	VFPS1-2004PL	PFL-2005S	DCL-2007		PBR-2007			
	0.75	VFPS1-2007PL	11 L-20033	DGL-2007		1 011-2007			
	1.5	VFPS1-2015PL	PFL-2011S	DCL-2022		PBR-2022			
	2.2	VFPS1-2022PL	11120113	DOL-EUEE	Built-in	I DIT-EOEE			
	3.7	VFPS1-2037PL	PFL-2018S	DCL-2037		PBR-2037			
	5.5	VFPS1-2055PL	PFL-2025S	DCL-2055		PBR3-2055			
	7.5	VFPS1-2075PL	PFL-2050S	DCL-2110		PBR3-2075			
	11	VFPS1-2110PM	FFL-20303		EMF3-4072E	PBR3-2110			
0001/	15	VFPS1-2150PM			EIVII 3-40722	PBR3-2150			
200V class	18.5	VFPS1-2185PM	PFL-2100S		EMF3-4090F	FBN3-2130	_		
Oldoo	22	VFPS1-2220PM		Built-in	EWF3-4090F	PBR3-2220			
	30	VFPS1-2300PM	DEL OTEOC			PBR3-2220			
	37	VFPS1-2370PM	PFL-2150S		EMF3-4180H				
	45	VFPS1-2450PM	PFL-2200S			PBR-222W002			
	55	VFPS1-2550P	PFL-2300S						
			DEL 0.4000		EMF3-4300I				
	75	VFPS1-2750P	PFL-2400S	Attached as standard		DGP600W-B1			
			DEL 00000	Standard	51450 4000 I	[DGP600W-C1]			
	90	VFPS1-2900P	PFL-2600S		EMF3-4600J				
	0.75	VFPS1-4007PL		DCL-2007					
	1.5	VFPS1-4015PL	1	Note 3)		PBR-2007	MSF-4015		
	2.2	VFPS1-4022PL	PFL-4012S	DCL-2022					
	3.7	VFPS1-4037PL	1	Note 3)		PBR-4037	MSF-4037		
	5.5	VFPS1-4055PL				PBR3-4055			
	7.5	VFPS1-4075PL	PFL-4025S	DCL-4110		PBR3-4075	MSF-4075		
	11	VFPS1-4110PL				PBR3-4110			
	15	VFPS1-4150PL		DCL-4220			MSF-4150		
	18.5	VFPS1-4185PL	PFL-4050S			PBR3-4150			
	22	VFPS1-4220PL	1				MSF-4220		
	30	VFPS1-4300PL				PBR3-4220			
	37	VFPS1-4370PL	PFL-4100S	L-4100S Built-in			MSF-4370		
	45	VFPS1-4450PL	1.12.1.000	24					
	55	VFPS1-4550PL				PBR-417W008	MSF-4550		
	75	VFPS1-4750PL	PFL-4150S				MSF-4750		
400V	90	VFPS1-4900PC					11101 1700		
class	110	VFPS1-4110KPC	PFL-4300S		Built-in	DGP600W-B2	MSL-4215		
	132	VFPS1-4132KPC				[DGP600W-62]			
	160	VFPS1-4160KPC	PFL-4400S				MSL-4314		
	220	VFPS1-4220KPC	PFL-4600S					DGP600W-B3 [DGP600W-C3]	MSL-4481
	250	VFPS1-4250KPC				DB7 4000K Nata 0	1		
	280	VFPS1-4280KPC	1			PB7-4200K Note 2) DGP600W-B4			
	315	VFPS1-4315KPC	1	Attached as		[DGP600W-C4]			
	400	VFPS1-4400KPC	PFL-4800S	standard		PB7-4400K Note 2) DGP600W-B3 ×2 (parallel) [DGP600W-C3 ×2 (parallel)]	MSL-4759		
	500	VFPS1-4500KPC	PFL-4450S ×2 (parallel)			PB7-4400K Note 2) DGP600W-B4 ×2 (parallel)	MSL-4118		
	630	VFPS1-4630KPC	PFL-4613S ×2 (parallel)			[DGP600W-C4 ×2 (parallel)]			

Note 1) Model in square brackets is fitted with top cover.

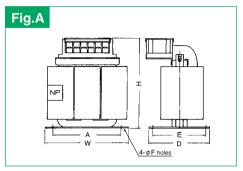
Note 2) To use a 400V/250kW inverter or larger in combination with an external braking resistor (DGP600 series), a braking unit (PB7) is also needed.

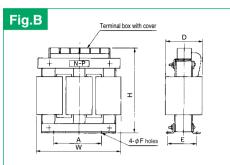
Note 3) These reactors are usable for each of 200V class and 400V class.

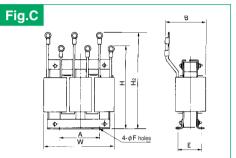
Note 4) Be sure to connect DC reactor to 200V-55kW or more and 400V-90kW or more inverter. (Not necessary for DC power input.)

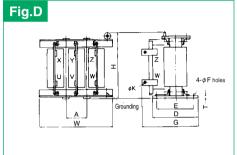
Input AC reactor

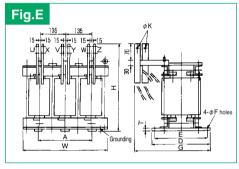
External dimensions diagram

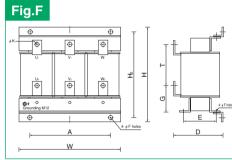




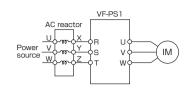


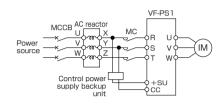




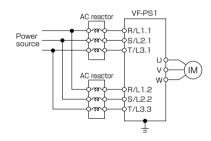


Connection diagram





In case of using control power supply backup unit (option)



For 400V class 500 to 630kW, be sure to

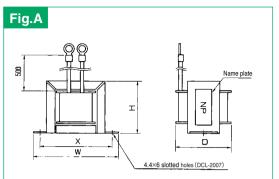
Mada	Detion	Income to the second				Dim	ensic	ons (r	nm)				External dimension	Tamainala	Approx.
Model	Rating	Inverter type	W	Н	D	H2	Α	Е	F	G	Т	K	diagram	Terminals	weight (kg)
PFL-2005S	3φ-230V-5.5A-50/60Hz	VFPS1-2004PL、2007PL	105	115	72.5	-	90	55	5	_	_	_		Terminal block M3.5	1.2
PFL-2011S	3 <i>φ-</i> 230V-11A-50/60Hz	VFPS1-2015PL、2022PL	130	140	85	_	115	60	5	_	_	_	Α		2.3
PFL-2018S	3φ-230V-18A-50/60Hz	VFPS1-2037PL	130	140	85	_	115	60	5	_	_	_		Terminal block M4	2.5
PFL-2025S	3φ-230V-25A-50/60Hz	VFPS1-2055PL	125	130	100	_	50	83	7	_	_	_			2.6
PFL-2050S	3φ-230V-50A-50/60Hz	VFPS1-2075PL~VFPS1-2110PM	155	140	115	_	50	95	7	_	_	_	В	Terminal block M6	3.4
PFL-2100S	3φ-230V-100A-50/60Hz	VFPS1-2150PM、2185PM、2220PM	230	210	150	-	60	90	8	_	_	_		Terminal block M8	8.2
PFL-2150S	3φ-230V-150A-50/60Hz	VFPS1-2300PM、2370PM	175	220	160	290	60	110	8	_	_	_		Ring terminal 60-10	11.3
PFL-2200S	3φ-230V-200A-50/60Hz	VFPS1-2450PM	195	240	170	320	65	115	10	_	_	_	С	Ring terminal 80-10	15.1
PFL-2300S	3φ-230V-300A-50/60Hz	VFPS1-2550P	235	280	200	370	75	128	10	_	_	_		Ring terminal 150-10	23.1
PFL-2400S	3φ-230V-400A-50/60Hz	VFPS1-2750P	260	330	230	_	90	200	12	300	9	13	D	φ13	30
PFL-2600S	3φ-230V-600A-50/60Hz	VFPS1-2900P	440	465	290	_	280	250	15	445	12	18	Е	φ18	50
PFL-4012S	3φ-460V-12.5A-50/60Hz	VFPS1-4007PL~VFPS1-4037PL	125	130	95	_	50	79	7	_	_	_		Terminal block M4	2.3
PFL-4025S	3φ-460V-25A-50/60Hz	VFPS1-4055PL~VFPS1-4110PL	155	155	110	_	50	94	7	_	_	_	В	Terrilliai block W4	4.9
PFL-4050S	3φ-460V-50A-50/60Hz	VFPS1-4150PL、4185PL、4220PL	155	165	140	_	50	112	7	_	_	_	В	Terminal block M6	6.6
PFL-4100S	3φ-460V-100A-50/60Hz	VFPS1-4300PL、4370PL、4450PL	235	250	170	_	75	105	10	_	_	_		Terminal block M8	17.6
PFL-4150S	3φ-460V-150A-50/60Hz	VFPS1-4550PL、4750PL	235	280	190	360	75	115	10	_	_	_	С	Ring Terminal 80-10	20.3
PFL-4300S	3φ-460V-300A-50/60Hz	VFPS1-4900KPC,4110KPC	260	380	230	_	90	200	12	280	9	13	_	φ13	38
PFL-4400S	3φ-460V-400A-50/60Hz	VFPS1-4132KPC,4160KPC	260	380	230	_	90	200	12	300	9	13	D	φ13	42
PFL-4600S	3φ-460V-600A-50/60Hz	VFPS1-4220KPC	440	465	290	_	280	250	15	445	12	18	Е	φ18	75
PFL-4800S	3φ-460V-800A-50/60Hz	VFPS1-4250KPC~VFPS1-4400KPC	440	540	290	_	280	250	15	445	12	18		φ18	90
PFL-4450S	3φ-480V-450A-50/60Hz	VFPS1-4500KPC Note 1)	320	385	250	340	225	170	11	86	150	13	F	φ13	68
PFL-4613S	3φ-480V-613A-50/60Hz	VFPS1-4630KPC Note 1)	385	440	255	400	300	165	13.5	130	190	13	F	φ13	84.5

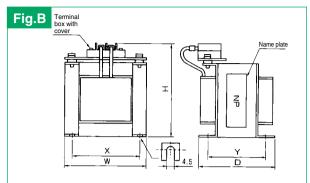
Note 1) Be sure to connect the AC reactor in parallel.

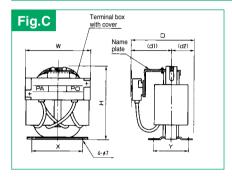
DC reactor

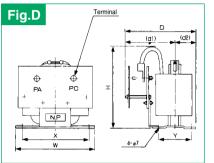
For 200V class 11 to 45kW and 400V class 18.5 to 75kW, DC reactor is built-in standard. Please use these external options when requiring the further improvement of the power factor and reducing harmonics.

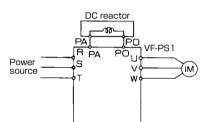
■ External dimensions diagram











Connection diagram

Model	Rated	Invertor type		Dimensions (mm)							Terminal	Applux.
Model	current	Inverter type	W	Н	D	Х	Υ	d1	d2	dimension diagram	reminal	weight (kg)
DCL-2007 Note 2)	7A	VFPS1-2004PL、2007PL	92	65	70	82		_	_	Α	Ring terminal V2-3.5	1.2
DCL-2022	14A	VFPS1-2015PL、2022PL	86	110	80	71	64	_	_	В	M4	2.2
DCL-2037	22.5A	VFPS1-2037PL	86	110	85	71	70	_	_	В	IVI4	2.5
DCL-2055	38A	VFPS1-2055PL	75	130	140	50	85	85	55		M5	1.9
DCL-2110	75A	VFPS1-2075PL~VFPS1-2110PM	100	150	150	65	85	95	55	С	М6	2.4
DCL-2220	150A	VFPS1-2150PM、2185PM、2220PM	117	170	190	90	90	130	60		M8	4.3
DCL-2370	225A	VFPS1-2300PM、2370PM	150	215	200	130	95	135	65	D	М8	5.9
DCL-2450	300A	VFPS1-2450PM	150	225	230	130	125	150	80	D	M10	7.8
DCL1-2550	316A	VFPS1-2550P、2750P Note 3)				Dofor	to ove	arnal di	imanai	on of Inverte		
DCL1-2750	382A	VFPS1-2900P Note 3)				Refer	to exte	erriai di	mensi	on or inverte	a.	
DCL-2007 Note 2)	7A	VFPS1-4007PL、4015PL Note 1)	92	65	70	82	_	_	_	Α	Ring terminal V2-3.5	1.2
DCL-2022	14A	VFPS1-4022PL、4037PL Note 1)	86	110	80	71	64	_	_	В	M4	2.2
DCL-4110	38A	VFPS1-4055PL、4075PL、4110PL	95	150	165	70	90	105	60		M5	3.0
DCL-4220	75A	VFPS1-4150PL、4185PL、4220PL	105	160	185	80	100	120	65	С	М6	3.7

Refer to external dimension of Inverter.

M8

М8

9.8

11.5

150 180 225 120 125 145 80

170 215 230 150 125 150 80

702A

150A

225A

290A

351A

486A

575A

DCL-4450

DCL1-4900

DCL1-4110K

DCL1-4132K

DCL1-4160K

DCL1-4200K

DCL1-4280K

Note 1) These reactors are usable for each of 200V class and 400V class.

Note 2) Please modify the terminal according to size of inverter main terminal.

Note 3) Be sure to connect DC reactor to 200V-55kW or more and 400V-90kW or more inverter.

VFPS1-4300PL, 4370PL, 4450PL

VFPS1-4900PC,4110KPC Note 3)

VFPS1-4280KPC、4315KPC Note 3)

VFPS1-4550PL、4750PL

VFPS1-4132KPC Note 3)

VFPS1-4160KPC Note 3)

VFPS1-4220KPC Note 3)

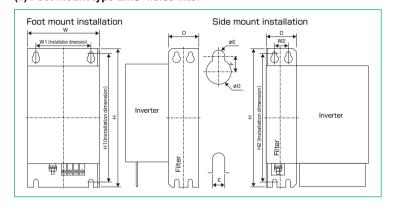
VFPS1-4250KPC Note 3)

EMC Directive compliant noise reduction filter

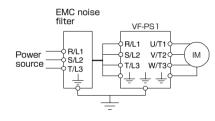
For 200V class 0.4 to 7.5kW and 400V class 0.75 to 630kW, EMC noise filter is built-in standard. Please use these external options depended on the length of the cable between inverter and motor.

	Requir	ements				
Inverter type	PWM carrier frequency (kHz)	Length of motor connecting cable(m)	Conducted noise IEC61800-3 category C2 (EN55011 classA Group1)	Conducted noise IEC61800-3 category C3 (EN55011 classA Group2)		
VFPS1-2004PL-2022PL	4	10	Built-in filter			
VFPS1-4007PL-4037PL	16	5	Duiit-iii iiitei			
VFPS1-2037PL-2075PL	4	10				
VFPS1-4055PL-4150PL	16	5				
VFPS1-4185PL-4750PL	2.5	25	_	Built-in filter		
VFP31-4165FL-4750FL	16	25		Duilt-iii liitei		
VFPS1-4900PC-4630KPC	2.5	50				

(1) Foot mount type EMC noise filter



Connection diagram



EMC noise filter can be foot mounted and side mounted.

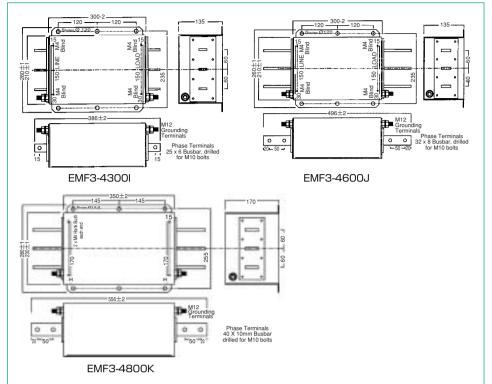
Model	Rated current	Investor time				[Dimen	sions	s (mm))			Approx. leak (mA) N	age current Note 1)	Approx. weight
Model	(A)	Inverter type	W	Н	D	W1	H1	W2	H2	Е	F	G	Power source A	Power source B	(kg)
EMF3-4012A	12	VFPS1-2004PL~2015PL	130	290	39	105	275		275	4.5	11	10	5	35	2.5
ENIF3-4012A	12	VFPS1-4007PL~4022PL	130	290	39	105	2/5	_	2/5	4.5	11	10	9	70	2.5
EMF3-4026B	26	VFPS1-2022PL~2037PL	155	324	49	130	309		309	4 E	11	10	6	42	3.5
EIVIF3-4026B	20	VFPS1-4037PL	155	324	49	130	309	_	309	4.5	11	10	11	83	3.5
EMEO 400E0	0.5	VFPS1-2055PL	175	070		150	055		٥٥٠				4	25	
EMF3-4035C	35	VFPS1-4055PL, 4075PL	175	370	59	150	355	_	355	5.5	11	11	6	44	5.0
EMEO 4040D	40	VFPS1-2075PL	010	200		100	005		005				12	91	0.0
EMF3-4046D	46	VFPS1-4110PL	210	380	59	190	365	_	365	5.5	11	11	24	183	6.0
EMEO 4070E	70	VFPS1-2110PM,2150PM	000	400 5	-00	100	400		470 5		11	10	25	195	
EMF3-4072E	72	VFPS1-4150PL, 4185PL	230	498.5	62	190	460	_	479.5	6.6	11	12	52	390	11
EMEO 4000E	00	VFPS1-2185PM,2220PM	040	E01 E	70	000	-00 F	40	F00 F	0.0		10	36	268	15
EMF3-4090F	90	VFPS1-4220PL	240	521.5	79	200	502.5	40	502.5	6.6	11	12	70	535	15
EMF3-4092G	92	VFPS1-4300PL,4370PL	240	650	79	200	631	40	631	6.6	11	12	70	535	16
EMEO 4100U	100	VFPS1-2300PM~2450PM	200	750	110	000	705	00	705	0	10	10	70	537	40
EMF3-4180H	180	VFPS1-4450PL~4750PL	320	750 119	119	280	30 725 8	80 72	725	9	18	18	142	1075	40

Note 1) These values are referential ones of single piece of EMC noise filter. For 200V class, 200V-60Hz power source. For 400V class, 400V-60Hz power source.

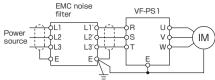
Power source A	Power source B
	- W-

(2) EMC noise filter

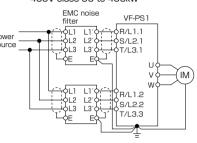
External dimensions diagram

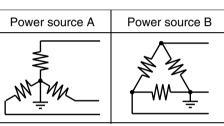


Connection diagram



For 200V class 55 to 75kW, 400V class 90 to 400kW





Model	Rated	Inverter type	Term	inal	Approx.	Approx. leakage current(mA) Note 2)		
Model	current (A)	inverter type	Main circuit	Grounding	weight (kg)	Power source A	Power source B	
EMF3-4300I	300 VFPS1-2550P, 2750P		Busbar 25 * 6	M12	13.2	3	180	
EIVIF3-43001	300	VFPS1-4900PC~4132KPC	M10	IVITE	10.2	5	350	
EMF3-4600J	580	VFPS1-2900P, 4160KPC~4280KPC, 4315KPC 4500KPC Note 1), 4630KPC Note 1)	Busbar 32*8 M10	M12	15	5	350	
EMF3-4800K	740	VFPS1-4400KPC	Busbar 40 * 10 M10	M12	25	5	350	

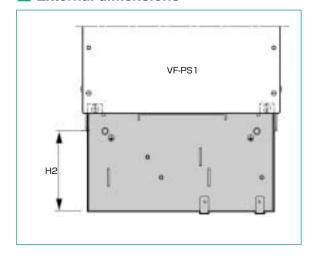
Note 1) Be sure to connect the EMC noise filter in parallel.

Note 2) These values are referential ones of single piece of EMC noise filter. For 200V class, 200V-60Hz power source. For 400V class, 400V-60Hz power source.

EMC plate

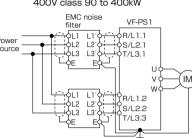
EMC plate is attached in standard for 400V class of WP type up to 18.5kW.

External dimensions

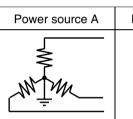


Model	Inverter type	Dimension (mm)
EMP101Z	VFPS1-2004~2015PL	
	VFPS1-4007~4022PL	55
EMP102Z	VFPS1-2022~2037PL	33
EWII TOLL	VFPS1-4037PL	
EMP103Z	VFPS1-2055PL, 2075PL	
LIVII 1002	VFPS1-4055~4110PL	65
EMP104Z	VFPS1-2110,2150PM	05
EWII 10-12	VFPS1-4150, 4185PL	
EMP105Z	VFPS1-2185,2220PM	
LIVIF 1032	VFPS1-4220PL	
EMP106Z	VFPS1-4300,4370PL	120
EMP107Z	VFPS1-2300~2450PM	
EMP108Z	VFPS1-4450~4750PL	

The wire clamps and screws are attached to the EMC plate for fixing the shielded cables on the EMC plate.

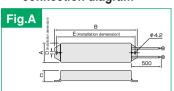


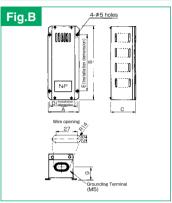
For 400V class 500 to 630kW

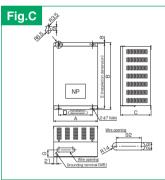


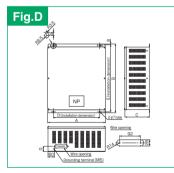
Braking resistor

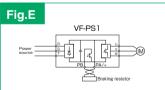
External dimensions diagram, Braking resistor (PBR) connection diagram

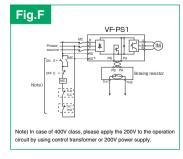












Voltage	Time	Model	Rating		Din	nensio	ons (r	nm)		External dimension	Connection	Approx
class	Type	Note 1)	Note 2), 3)	Α	В	O		Е	G	diagram	dagram	(Kg
		PBR-2007	120W-200Ω									
		PBR-2022	120W-75Ω	42	182	20	4.2	172	_	Α	Е	0.2
		PBR-2037	120W-40Ω									
		PBR3-2055	20Ω-240W (40Ω-120W×2P)		320	115			50			4
	Standard	PBR3-2075	15Ω-440W (30Ω-220W×2P)				110	230				4.5
		PBR3-2110	10Ω-660W (30Ω-220W×3P)	120	350	190	110	230	150	В		5
		PBR3-2150	7.5Ω-880W (30Ω-220W×4P)									5.5
200 V		PBR3-2220	3.3Ω-1760W (27Ω-220W×8P)	248	430	200	190	414	47	С		13
		PBR-222W002	$2\Omega\text{-}2200W(20\Omega\text{-}220W\times10P)$	297	445	200	220	429	47		F	13
	200W class	PBR-202W □□□	40Ω, 75Ω-240W	1.00	320	115	110	230	50	В	'	3
	500W class	PBR-208W □□□	15Ω, 20Ω, 40Ω, 75Ω-880W	120	350	190	110	230	150	Ь		6
	1.5kW class	PBR-217W □□□	15Ω, 20Ω, 40Ω, 75Ω-1760W	248	430	200	190	414	47			13
	2.5kW class	PBR-226W □□□	$2\Omega, 3.3\Omega, 7.5\Omega, 10\Omega, 15\Omega, 20\Omega, 40\Omega-2640W$	297	445	200	220	429	47	C		14
	3.5kW class	PBR-235W □□□	3.3 Ω , 7.5 Ω , 15 Ω , 20 Ω -3520W	397	445	200	320	429	47			19
Ī	5kW class	PBR-252W □□□	2Ω, 3.3Ω, 7.5Ω, 15Ω-5280W	520	616	220	420	600	47	D		36
		PBR-2007	120W-120Ω	42	182	20	4.2	172	_	Α	Е	0.2
		PBR-4037	120W-160Ω	42	102	20	4.2	172		^	_	0.2
		PBR3-4055	80Ω-240W (160Ω-120W×2P)		320	115			50			4
	Standard	PBR3-4075	60Ω-440W (120Ω-220W×2P)	120			110	230				4.
	Stanuaru	PBR3-4110	40Ω-660W (120Ω-220W×3P)	120	350	190	110	230	150	В		5
		PBR3-4150	30Ω-880W (120Ω-220W×4P)									5.
		PBR3-4220	15Ω-1760W (30Ω-220W×4P2S)	2/18	430	200	100	414	47	С		10
400 V		PBR-417W008	8Ω-1760W (16Ω-220W×4P2S)	240	450	200	130	414	47		_	10
	200W class	PBR-402W □□□	160Ω-240W	120	320	115	110	230	50	В	F	3
	500W class	PBR-408W □□□	40Ω, 60Ω, 80Ω, 160Ω-880W	120	350	190	110	230	150	В		6
	1.5kW class	PBR-417W □□□	30Ω, 40Ω, 60Ω, 80Ω-1760W	248	430	200	190	414	47			13
	2.5kW class	PBR-426W □□□	8Ω, 15Ω, 30Ω, 40Ω-2640W	297	445	200	220	429	47	C		14
	3.5kW class	PBR-435W □□□	15Ω, 30Ω, 40Ω-3520W	397	445	200	320	429	47			19
	5kW class	PBR-452W □□□	8Ω, 15Ω, 30Ω, 40Ω-5280W	520					47	l D l		36

Note 1) — in the type-form are numeric character. Please refer the "Selection of braking resistor" in the next page.

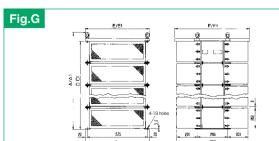
Note 2) The rating shows the synthetic resistor value (Ohm) and the synthetic resistor power (Wait). The word in the parentheses shows the composition of resistor elements.

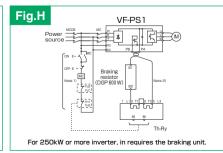
Note 3) The allowable continuous regenerative power differs on the resistor value or power tolerance. Please refer the "Selection of braking resistor" in the next page.

■ Braking resistor (DGP600)

Mo	del		Dim	ensions ((mm) no	te 2)	External	0	Thermal relay(Th-Ry)	Approx.
Standard	With cover Note 1)	Rating	A/A1	D/D1	E/E1	F/F1	dimension diagram	Connection diagram	Setting value(A)	weight (kg)
DGP600W-B1	DGP600W-C1	1.7Ω-3.4kW	283/303	207/192	620/700	725/780			46	50
DGP600W-B2	DGP600W-C2	3.7Ω-7.4kW	493/513	417/402	620/700	725/780			44	100
		1.9Ω-8.7kW						н	71	150
DGP600W-B3	DGP600W-C3	2.5Ω-10.5kW	703/723	627/612	620/700	725/780	G		65	150
		5Ω-10kW							45	150
DCD600W-R4	DGP600W-C4	1.4Ω-14kW	913/933	837/822	620/700	725/780			110	200
DOF-000W-B4	DOF 000W-04	1.7Ω-10kW	010/000	007/022	020/700	/ 20/ / 00			77	200

Note 1) The braking resistors are designed for indoor type. Please use them with drip cover in case of water drop. But please note it is not for water proof protection type. Note 2) A,D,E,F are the dimensions of standard type. A1,D1,E1,F1 are the dimensions of those with drip cover type.





Note 1) In case of 400V class, please apply the 200V to the operation circuit by using control transformer or 200V power supply.

Note 2) Please twist the wire by 10 cm pitch. The distance between resistor power wiring and the control wiring should be over 20 cm.

Note 3) In case of TOSHIBA thermal relay, please make a short circuit with 8 mm2 wire between the 2/T1 and 6/T3 of the thermal relay.

Selection of braking resistor

This is used for the quick deceleration, the frequent deceleration stop or shortening the deceleration time at the large inertia load. This resistor consumes the regenerative energy when regenerative braking operation. In case of over 3% ED, please select the allowable continuous regenerative power (Watt) in the following table.

The continuous regenerative load likes an elevator
 Deceleration stops at large inertia machine

Frequent deceleration stop by using braking resistors

	Applicable						Model				
/oltage	motor	Inverter type		Standard type				High frequenc	y type Note 2)		
class	(kW)	Note 1)	PBR	DGP600	Note 4)			PBR			DGP600
			Note 3)	Standard	With cover Note 5)	500W class	1.5kW class	2.5kW class	3.5kW class	5kW class	10kW class(Note 4
	0.4	VFPS1-2004PL	PBR-2007		-	PBR-208W075	_	-	=	_	-
	0.75	VFPS1-2007PL	(200Ω-90W)	_	_	(75Ω-540W)	PBR-217W075 (75Ω-1200W)	_	-	_	-
	1.5	VFPS1-2015PL	PBR-2022	_	_				_	_	-
	2.2	VFPS1-2022PL	(75Ω-90W)	_	_	PBR-208W040 (40Ω-570W)	PBR-217W040 (40Ω-1160W)	PBR-226W040 (40Ω-1630W)	_	_	_
	3.7	VFPS1-2037PL	PBR-2037 (40Ω-90W)	-	-	(4012 070 00)	(4012 1 100W)	(4012-1000W)	-	-	-
	5.5	VFPS1-2055PL	PBR3-2055 (20Ω-96W)		_	PBR-208W020 (20Ω-270W)	PBR-217W020 (20Ω-950W)	PBR-226W020 (20Ω-1580W)	PBR-235W020 (20Ω-2330W)	_	_
	7.5	VFPS1-2075PL	PBR3-2075 (15Ω-130W)	_	_	-	PBR-217W015 (15Ω-840W)	PBR-226W015 (15Ω-1350W)	PBR-235W015 (15Ω-2080W)	PBR-252W015 (15Ω-3330W)	-
	11	VFPS1-2110PM	PBR3-2110 (10Ω-200W)	_	_	-	PBR-217W010 (10Ω-470W)	PBR-226W010 (10Ω-1250W)	PBR-235W010 (10Ω-1960W)	PBR-252W010 (10Ω-3200W)	=
200V	15	VFPS1-2150PM	PBR3-2150	_	_	_		PBR-226W7R5	PBR-235W7R5	PBR-252W7R5	-
	18.5	VFPS1-2185PM	(7.5Ω-270W)	_	_	_	_	(7.5Ω-870W)	(7.5Ω-1380W)	(7.5Ω-3210W)	_
	22	VFPS1-2220PM	PBR3-2220	_	_	_	_	_	_	PBR-252W3R3	_
	30	VFPS1-2300PM	(3.3Ω-610W)	_	_	_	_	_	_	(3.3Ω-1760W)	_
	37	VFPS1-2370PM		_	_	_	_	_	_		
	45	VFPS1-2450PM	PBR-222W002	_	_	_	_	_	_	PBR-226W7R5 ×3 (parallel)	
	55	VFPS1-2550P	(2Ω-1000W)	_	_	_	_	_	_	(2.5Ω-2610W)	DGP600W-B4/C
	75	VFPS1-2750P	_	D0D000W D1	B0B000W 01	_	_	_	_	_	(1.7Ω-10kW)
	90	VFPS1-2900P	_	DGP600W-B1 (1.7Ω-3.4kW)	DGP600W-C1 (1.7Ω-3.4kW)	_	_	_	_	_	+
				_	_		_	_	_	_	_
	0.75	VFPS1-4007PL	PBR-2007		_	PBR-408W160 (160Ω-570W)		_	_	_	_
	1.5	VFPS1-4015PL	(200Ω-90W)			(10012-370W)		_		_	
	2.2	VFPS1-4022PL	PBB-4037	_	_	PBR-408W080	PBR-417W080 (80Ω-1090W)	_		_	_
	3.7	VFPS1-4037PL	PBR-4037 (160Ω-90W) PBR3-4055		-	(80Ω-270W)	PBR-417W060				_
	5.5	VFPS1-4055PL	(80Ω-96W) PBR3-4075		_		(60Ω-1000W)	PBR-426W040		PBR-452W040 (40Ω-2250W)	_
	7.5	VFPS1-4075PL	(60Ω-130W)		-	-	555 4174040	(40Ω-1250W)	(40Ω-1900W)		_
	11	VFPS1-4110PL	(40Ω-190W)		_	_	PBR-417W040 (40Ω-490W)				_
	15	VFPS1-4150PL	PBR3-4150		_	_	_	PBR-426W030	PBR-435W030	PBR-452W030	_
	18.5	VFPS1-4185PL	(30Ω-270W)	-	-	_	-	(30Ω-870W)	(30Ω-1680W)	(30Ω-2700W)	_
	22	VFPS1-4220PL	PBR3-4220	_	-	_	_	-	-	PBR-452W015	_
	30	VFPS1-4300PL	(15Ω-540W)	-	-	-	-	-	-	(15Ω-1740W)	-
	37	VFPS1-4370PL		_	-	-	-	-	-		_
	45	VFPS1-4450PL	PBR-417W008	-	_	_	_	_	_	PBR-426W030 ×3 (parallel)	_
400V	55	VFPS1-4550PL	(8Ω-1000W)	_	_	_	-	_	_	(10Ω-2610W)	DGP600W-B3/C
4000	75	VFPS1-4750PL		-	-	_	-	-	_		(5Ω-10kW)
	90	VFPS1-4900PC	-			_	-	-	_	_	
	110	VFPS1-4110KPC	_	DGP600W-B2	DGP600W-C2	-	-	-	-	-	DGP600W-B3/C3
	132	VFPS1-4132KPC	_	(3.7Ω-7.4kW)	(3.7Ω-7.4kW)	-	-	-	_	_	(2.5Ω-10.5kW)
	160	VFPS1-4160KPC	_			-	-	-	-	_	1
	220	VFPS1-4220KPC	-	DGP600W-B3 (1.9Ω-8.7kW)	DGP600W-C3 (1.9Ω-8.7kW)	-	-	-	-	-	-
	250	VFPS1-4250KPC	_			_	_	_	_	_	_
	280	VFPS1-4280KPC	_	PB7-4200K DGP600W-B4	PB7-4200K DGP600W-C4	_	_	_	_	_	-
	315	VFPS1-4315KPC	_	(1.4Ω-14kW)	(1.4Ω-14kW)	-	-	_	_	_	
	400	VFPS1-4400KPC	_	PB7-4400K DGP600W-B3 ×2 (parallel)	PB7-4400K DGP600W-C3 ×2 (parallel)	-	_	_	_	-	-
	500	VFPS1-4500KPC	_	PB7-4400K	PB7-4400K	-	-	_	_	_	_
	630	VFPS1-4630KPC	_	DGP600W-B4 ×2 (parallel)	DGP600W-C4 ×2 (parallel)	_	_	_	_	_	_

Note 1) For 250kW or more inverter, it requires the braking unit.

Note 2) The figures in the parentheses show the synthetic resistor value (Ohm) and the allowable continuous regenerative power (Wait).

Note 3) The guideline of the maximum braking at the standard type.

Note 4) The necessary power in case of deceleration from 60Hz at one time per 120 seconds periods at 30 seconds deceleration time for the 10 times of the motor inertia, please contact our agency when large inertia or quick deceleration.

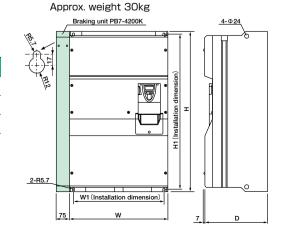
Note 5) The braking resistors are designed for indoor type. Please use them with drip cover in case of water drop. But please note it is not for water proof protection type.

Applicable motor (kW)	Maximum braking power	Braking time
0.4~1.5	150%	6
2.2	100%	6
3.7~55	100%	3
75	100%	2

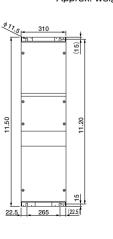
Braking unit

Model	PB7-4200K	PB7-4400K
Threshold voltage	785V	±1%
Maximum DC voltage	85	OV
Maximum braking power at 785VDC	420kW	750kW

External dimensions PB7-4200K is mechanically mounted on the left-hand side of the inverter.

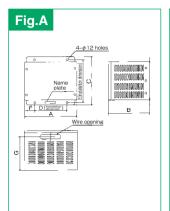


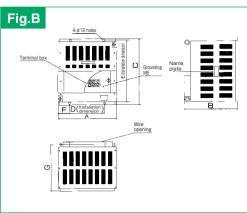
PB7-4400K Approx. weight 80kg

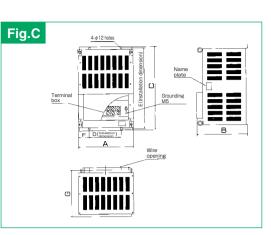


Motor end surge voltage suppression filter (Only 400V class)

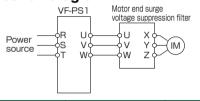
External dimensions diagram







Connection diagram



■ Countermeasure of motor end surge voltage

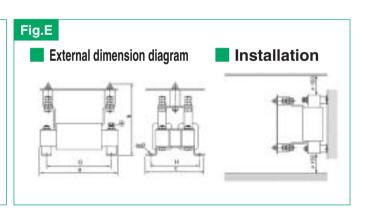
At the system of operation of the 400V class motor by the voltage type PWM inverter with using super high-speed switching device(ex.IGBT). the degradation of insulation of motor wiring may be occurred by the length conditions of the cable, laid down of the cable and the constants of the cable.

In this case, the following countermeasures are suggested.

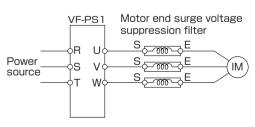
- 1) Use of the enhanced insulation type of motor
- 2) Suppress the surge voltage by AC reactors in the load side or surge suppression filter.

Model	Applicable motor			Dime	ensions (mm)			External dimension	Terminal screw	Approx. weight
Model	(kW)	Α	В	С	D	E	F	G	diagram	Terminal Screw	(kg)
MSF-4015Z	0.4、0.75、1.5	310	255	300	200	270	55	189		M4	12
MSF-4037Z	2.2、3.7	310	255	300	200	270	55	209		M4	20
MSF-4075Z	5.5、7.5	310	315	350	200	320	55	249	Α	M5	30
MSF-4150Z	11, 15	330	350	400	200	370	65	289		M5	40
MSF-4220Z	18.5、22	330	400	400	200	370	65	279		M6	52
MSF-4370Z	30、37	426	375	512	260	490	83	350	В	M8	75
MSF-4550Z	45、55	450	395	632	260	610	95	365	С	M10	110
MSF-4750Z	75	450	415	700	260	678	95	385		M10	120

External dimension diagram Installation



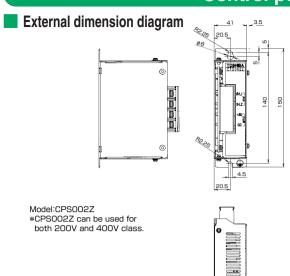
■ Connection diagram



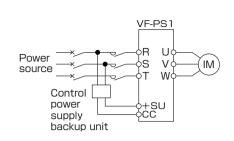
Model	Inverter type		Dim	ensi	ons (mm)		External	Terminals	Approx. weight
Model	inverter type	а	b	С	G	Η	φ	diagram		(kg) Note)
MSL-4215T	VFPS1-4900C,4110KPC	170	235	100	140	75	R4.5- 20	D	Ring Terminal 10-10	17
MSL-4314T	VFPS1-4132KPC,4160KPC	210	250	110	170	75	R4.5- 13	D	Ring Terminal 10-10	30
MSL-4481T	VFPS1-4220KPC,4250KPC	245	250	200	225	175	9	Е	М10	44
MSL-4759T	VFPS1-4280KPC,4315KPC, 4400KPC	305	250	220	265	200	9	Е	M12	65
MSL-41188T	VFPS1-4500KPC,4630KPC	364	250	230	325	200	9	Е	M12	99

Note) The filter is used for each phase, so 3 filter for one inverter. The type-form of this filter is 3 pieces set. The approx. weight in the above table shows the total weight of 3 pieces.

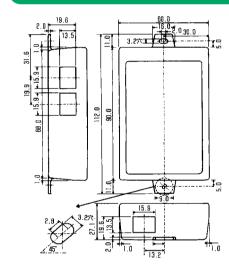
Control power supply backup unit

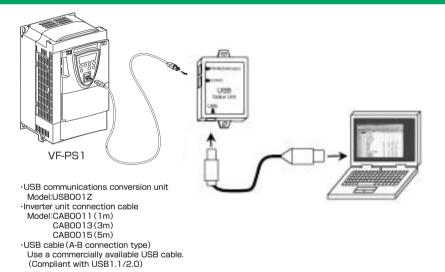


Connection diagram



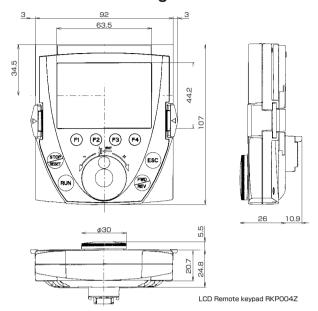
USB communications conversion unit



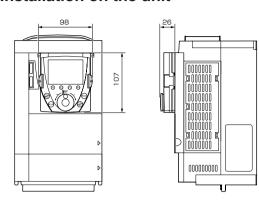


LCD Remote Keypad

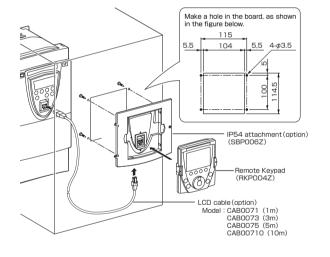
External dimension diagram



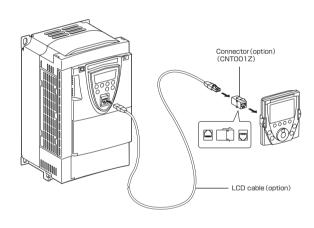
Installation on the unit



Installation on the panel

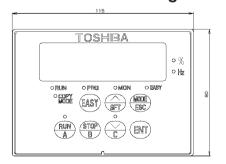


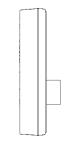
Palm top operation



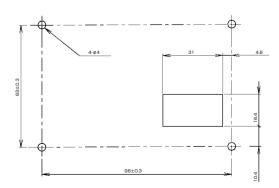
LED Remote Keypad

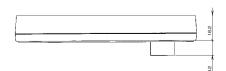
External dimension diagram





Panel cutout dimension

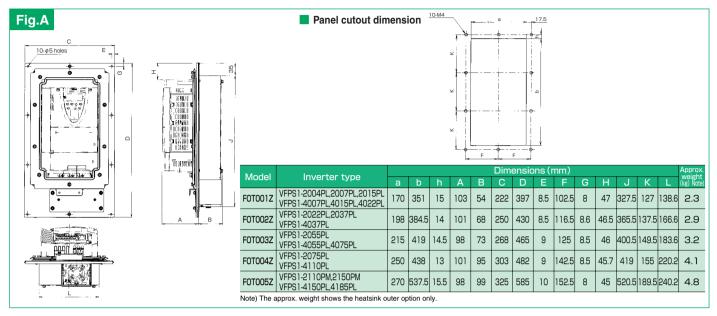


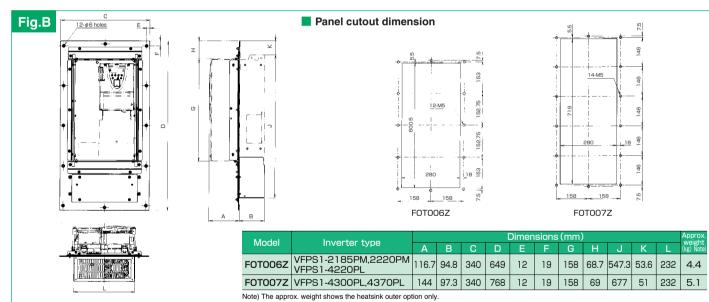


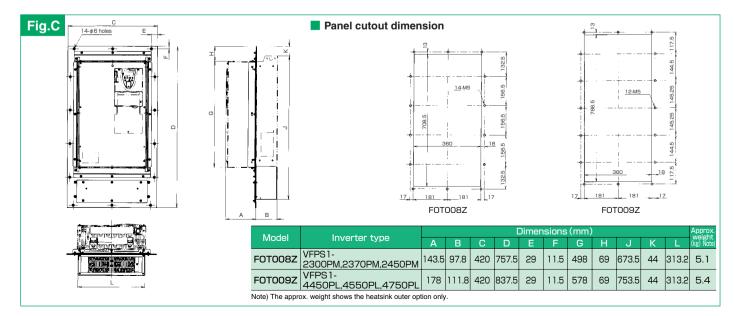
·LED Remote Keypad:RKP002Z ·Communication cable (option) Model:CAB0011(1m) CAB0013(3m) CAB0015(5m)

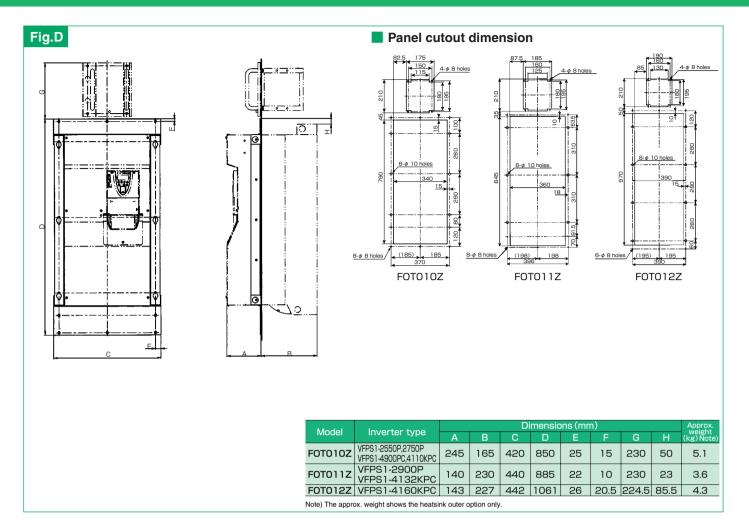
Heatsink outer option

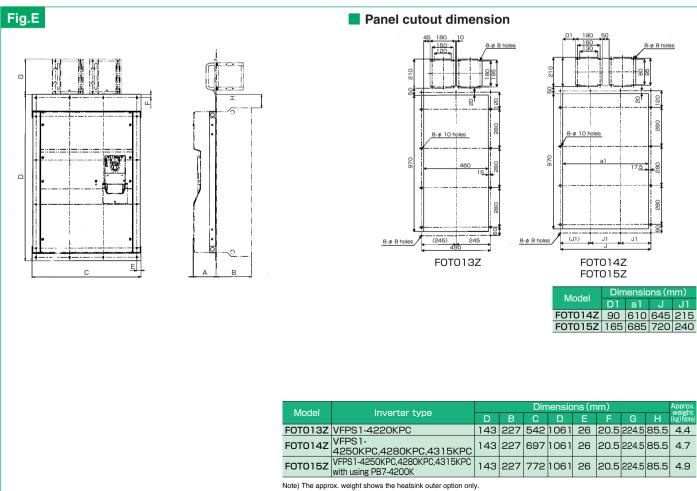
This options enable the heatsink parts of the backside of inverter that generate much heat to be located at the outside of the panel. This is effective for the small sizing of the totally-enclosed box by reducing the heat values inside the box.





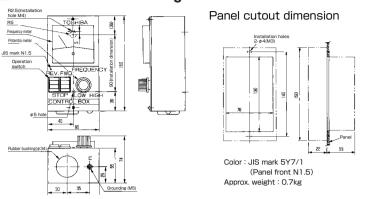




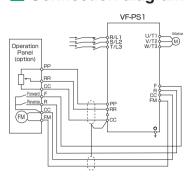


Operation panel (Model: CBVR-7B1)

External dimension diagram

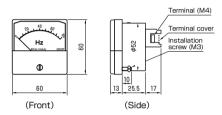


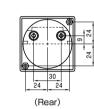
Connection diagram

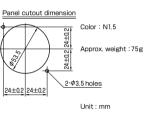


Note) The wire length should be 30m or less the inverter and the operation panel.

Frequency meter (QS-60T (80Hz-1mAdc))





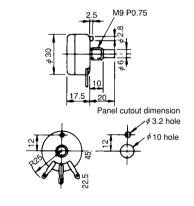


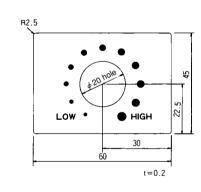
FRH-KIT

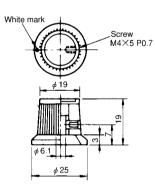
Potentiometer (RV30YN-20S-B302)

Potentiometer panel

Potentiometer knob (K-3)







Planning

Totally enclosed box type for IP54/UL type 12



Line-up

Valle and the second	Applicable Motor Output (kW)																
Voltage class	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
3-phase 400V class (IP54)																	

point

Totally enclosed box type for IP54/UL type 12

• IP54 protection for direct mounting on a wall



High-frequency noise reduction

• IP54 product with EN 55011 class A or class B (IEC/EN 61800-3) built-in EMC filters



Harmonics reduction

• New types of compact and space-saving DC reactor is built-in for all models



_CD keypad as standard

Possible for palm top operation

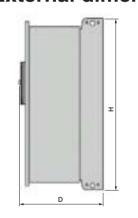
■ Standard specifications

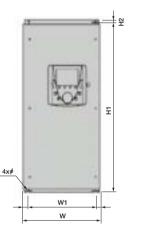
Item		Specific	ation														
Applica	able motor (kW)	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
	Туре	VFPS1															
Model	Form		4015PLE 4015PDE				4075PLE 4075PDE		4150PLE 4150PDE						4550PLE 4550PDE		
Rating Capacity(KVA)Note 1)		1.8	3.1	3.9	6.9	9.1	12.0	17.0	23.0	28.0	33.0	45.0	54.0	65.0	78.0	104.0	124.0
nailing	Output current(A) Note 2)	2.3	4.1	5.1	9.1	12	16	22.5	30.5	37	43.5	58.5	71.5	85	103	137	163
Power	Voltage/frequency	3-phase 380 to 480V, 50/60 Hz															
supply	Tolerance	Voltage	Voltage +10%, -15% (±10% during continuous 100% load) Frequency ±5%														
Rated	output voltage	3 phase 380 to 480V : 400V class (The maximum output voltage is same as the input source voltage)															
Output	frequency range	0.01 to 500 Hz (Default setting 0.01 to 80.0 Hz)															
Overloa	ad current rating	110%-60 seconds (Anti-time limit characteristic)															
Dynam	ic breaking circuit	Built-in dynamic breaking circuit															
Dynam	ic breaking resistor	External option															
Main fu	unctions	Parameter setup quick mode, Local/remote operation, Automatic energy saving mode,															
iviaiii iu	andions	program	mable I/0) termina	l block, m	ulti-PID c	ontrol, Fir	e control	enables f	orced ope	eration, M	y function	n"				
Ambier	nt temperature	-10 to 5	0°C (curr	ent decrea	ases whe	n over 40	°C)/5 to 9	5% (no c	ondensat	ion or ste	am allowe	ed)					
/Relativ	ve humidity																
Protect	tive method	IP54/UL	type 12														
Cooling method		Forced	air coolin	g													
Built-in	Built-in filter		EN55011 class A, EN61800-3 category C2 or C3 compliant (built-in EMI noise filter) :PLE type														
		EN55011 class B, EN61800-3 category C1 compliant (built-in EMI noise filter) :PDE type " Built-in DC reactor															
Reacto	or	Built-in	DC reacto	or													

Note 1) Capacity is calculated at 440V

Note 2) Rated output current when the PWM carrier frequency(parameter CF) is 8kHz or less.

■ External dimensions





Input voltage	Applicable	Inverter model			Di	imensions (m	ım)			Approximate Weight(kg)
Class	motor (kW)	Note 1	W	Н	D	W1	H1	H2	Ø	Note 1
	0.75	VFPS1-4007PLE(PDE)								
	1.5	VFPS1-4015PLE(PDE)	240	490	272	200	476	6	6	12(14)
	2.2	VFPS1-4022PLE(PDE)								
	3.7	VFPS1-4037PLE(PDE)	240	490	286	200	476	6	6	13(15)
	5.5	VFPS1-4055PLE(PDE)	240	490	200	200	470	0	0	13(13)
	7.5	VFPS1-4075PLE(PDE)	260	525	286	220	511	6	6	16(19)
	11	VFPS1-4110PLE(PDE)	200	525	200	220	311	0	0	10(19)
3-phase	15	VFPS1-4150PLE(PDE)	295	560	315	250	544	8	6	21(25)
400 V	18.5	VFPS1-4185PLE(PDE)	315	665	315	270	647	10	6	21/26)
	22	VFPS1-4220PLE(PDE)	315	665	315	270	647	10	б	31(36)
	30	VFPS1-4300PLE(PDE)	285	720	315	245	700	10	7	34(39)
	37	VFPS1-4370PLE(PDE)	005	000	040	045	000	10	7	40/40)
	45	VFPS1-4450PLE(PDE)	285	880	343	245	860	10	/	43(49)
	55	VFPS1-4550PLE(PDE)								
	75	VFPS1-4750PLE(PDE)	362	1000	364	300	975	10	9	69(80)
	90	VFPS1-4900PLE(PDE)								

Note 1) The values in parentheses refer to PDE type,

VFPS1-****PLE:Built-in class A EMC filter, VFPS1-****PDE:Built-in class B EMC filter



■ Selection peripheral and wiring sizes devices

							W	ire size Note	6),7)		
Voltogo	Annlinable			Molded-case circuit breaker (MCCB)	Magnetic contactor (MC)		Main	circuit			
Voltage Class	Applicable motor (kW)	Inverter model	Input current[A]	Note 1),2) Rated current	Note 1),3),4),5) Operational current(A)	Input ter (R, S,		Output ter (U, V,		Groun	d lead
				[A]	AC1	AWG	mm ²	AWG	mm2	AWG	mm ²
	0.75	VFPS1-4007PLE(PDE)	1.	4	25	14	1.5	14	1.5	14	2.5
	1.5	VFPS1-4015PLE(PDE)	3.5	6.3	25	14	1.5	14	1.5	14	2.5
	2.2	VFPS1-4022PLE(PDE)	5	10	25	14	1.5	14	1.5	14	2.5
	3.7	VFPS1-4037PLE(PDE)	8.8	14	25	12	1.5	12	1.5	14	2.5
	5.5	VFPS1-4055PLE(PDE)	11.4	25	25	10	2.5	10	2.5	12	2.5
	7.5	VFPS1-4075PLE(PDE)	15.8	25	25	10	4	10	4	12	4
	11	VFPS1-4110PLE(PDE)	21.9	30	32	8	6	8	6	10	6
400 V	15	VFPS1-4150PLE(PDE)	30.5	40	40	6	10	6	10	10	10
class	18.5	VFPS1-4185PLE(PDE)	37.5	60	50	6	10	6	10	10	10
	22	VFPS1-4220PLE(PDE)	43.6	60	50	6	10	6	10	10	8
	30	VFPS1-4300PLE(PDE)	56.7	100	80	4	16	4	16	10	16
	37	VFPS1-4370PLE(PDE)	69.5	100	125	3	25	3	25	8	16
	45	VFPS1-4450PLE(PDE)	85.1	125	125	1	35	1	35	8	16
	55	VFPS1-4550PLE(PDE)	104.8	150	125	1/0	50	1/0	50	6	25
	75	VFPS1-4750PLE(PDE)	140.3	200	250	3/0	70	3/0	70	6	35
	90	VFPS1-4900PLE(PDE)	171.8	200	250	250MCM	120	250MCM	120	2	70

Note 1) Selections for use of the Toshiba 4-pole standard motor with power supply voltage of 400V-50Hz.

Note 2) Choose the MCCB according to the power supply capacity.

For comply with UL and CSA standard, use the fuse certified by UL and CSA.

Note 3) When the motor is driven by commercial power supply switching, for example, use an electromagnetic contactor that is matched to AC-3 class motor rated current.

Note 4) Attach surge killers to the magnetic contactor and exciting coil of the relay.

Note 5) In the case the magnetic contactor (MC) with 2a-type auxiliary contacts is used for the control circuit, raise the reliability of the contact by using 2a-type contacts in parallel connection.

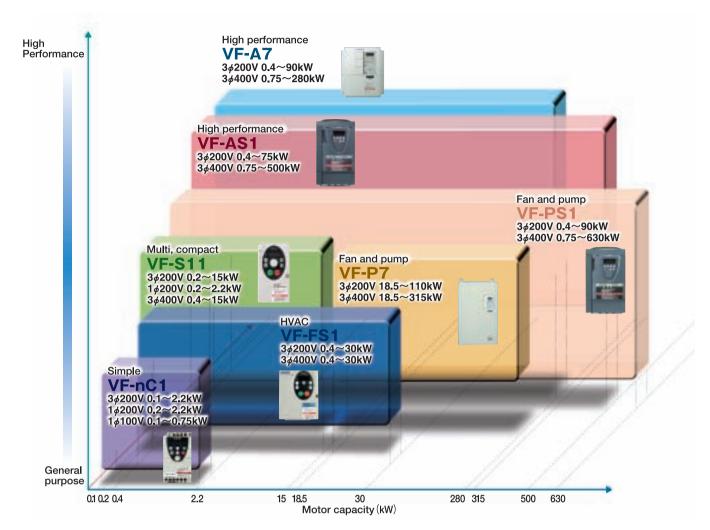
Note 6) The recommended cable size is that of the cable (e.g. 600V class, HIV cable) with continuous maximum permissible temperature of 75°C. Ambient temperature is 40°C or less and the wiring distance is 30m or less.

Note 7) For the control circuit, use shielded wires whose size (cross-section) is 0.75 mm2 or more.

Note 8) The screw size of the control terminals is M3.

TOSHIBA Inverter lineup

The abundant variations of simple variable speed to vector control



■ Functions of lineup

				Auto funct	matic tions		Contro	ol specific	ations				Fund	tions			
Model	Voltage class	Applicable motor	Overload current rating	Automatic acceleration / deceleration	Automatic torque boost	V/F constant	Automatic torque boost control	Energy-saving	Sensorless vector control	PG feedback vector control	Torque limit	Torque control	Positioning	Local/Remote	Fire control enables forced operation	LCD keypad option	
	3ø200V	0.1 to 2.2kW															
VF-nC1	1ø200V	0.2 to 2.2kW	150%-1 minute	No	No	Yes	No	No	Yes	No	No	No	No	No	No	No	
	1ø100V	0.1 to 0.75kW															
	3ø200V	0.2 to 15kW	1500/ 1														
VF-S11	1ø200V	0.2 to 2.2kW	150%-1 minute	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	
	3ø400V	0.4 to 15kW															
VF-AS1	3ø200V	0.4 to 75kW	150%-1	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	No	No	Yes	
	3ø400V	0.75 to 500kW	minute							Note 1)						Note 1)	
VF-A7	3ø200V	0.4 to 90kW	150%-2 minute	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	
	3ø400V	0.75 to 280kW	Note 2							Note 1)			Note 1)				
VF-FS1	3ø200V	0.4 to 30kW	110%-1		Yes	No	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	No
	3ø400V	0.4 to 30kW	minute														
VF-PS1	3ø200V	0.4 to 90kW	120%-1	Yes	No	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	
7	3ø400V	0.75 to 630kW	minute													Note 1)	
VF-P7	3ø200V	0.4 to 110kW	120%-1	Yes	No	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	
,	3ø400V	0.75 to 315kW	minute	. 30	. 70	. 50	. 30	. 30	. 50			. 10	. , ,	. 10			

Note 1) Option

Note 2) For 200V-75kW or more and 400V-110kW or more, 150%-1 minute overload current rating

Inverter dedicated to fan and pump for HVAC

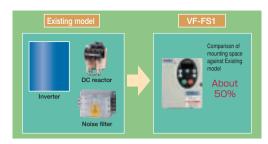












Half installation space and less wiring Reduce 50% of installation space, Built- in filter

Reactor- less harmonic reduction
Toshiba unique technologies suppress harmonics Power factor improvement

Totally enclosed box type for IP54

Long life and easy maintenance
15 years lift designed main capacitors

Special softwares for fan and pump application are built-in Local/ Remote key, Fire control enables forced operation

More energy saving and easier operation
The advanced energy- saving mode, Quick setting wizard

Optional filed buses for LONWORKS®, BACnet®, Metasys® N2 and APOGEE® FLN as built in option.

■Standard specifications

Ite	em						Specif	ication					
Applic	cable motor (kW)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30
	Input voltage class Model						VF	FS1					
Machine type	3-phase 200V class VFFS1-	2004PM	2007PM	2015PM	2022PM	2037PM	2055PM	2075PM	2110PM	2150PM	2185PM	2220PM	2300PM
Lypo	3-phase 400V class VFFS 1-	4004PL	4007PL	4015PL	4022PL	4037PL	4055PL	4075PL	4110PL	4150PL	4185PL	4220PL	4300PL
	Capacity (kVA) 200V class/400V class	1.1	1.8/1.6	2.9/2.8	4.0/3.9	6.7/6.9	9.2/9.1	12.2	17.6/17.1	23.2	28.5/28.2	33.5/33.2	44.6
Rating	Output current (A) 3-phase 200V class	2.8	4.6	7.5	10.6	17.5	24.2	32	46.2	61	74.8 (67.3)	88 (79.2)	117.0 (105.3)
	3-phase 400V class	1.4	2.2	3.7	5.1	9.1	12	16	22.5	30.5	37(33.3)	43.5 (39.2)	58.5 (52.7)
Power	Voltage/frequency	200V class	: 200V to 24	OV - 50/60H	z, 400V class	s: 3-phase 38	0 to 480V - !	50/60Hz					
supply	Tolerance	Voltage +1	0%15% (±	10% when th	ne inverter is	used continuo	ously (load of	100%)					
Outpu	it voltage adjustment	Adjustable wi	thin a range of	the corrected	supply voltage	50 to 660V (L	Inadjustable to	any voltage hi	gher than the i	nput voltage).			
Outpu	ıt frequency range	0.5 to 200.0	0.5 to 200.0Hz (default setting 0.5 to 80.0Hz)										
Volta	ge/frequency characteristics	V/f constant,	variable torque	e, automatic to	rque boost, vec	ctor control, au	omatic energy	conservation, I	PM motor cont	rol, auto-tuning	function		
Overlo	oad current rating	60 seconds a	at 110%, 2 sec	conds at 180%	(Anti-time limi	t characteristic	:)						
Main	functions	Wizard, Local	Remote chang	ge-over, Bumple	ss operation, F	orced fire-spee	d control, PTC	thermal protec	tion, Programn	nable I/O termi	nal block, Auto	-restart	
Ambie	ent temperature/Relative humidity	-10 to 60℃ (0	Current decrea:	se when over 4	0°C) /20 to 93	% free from co	ndensation and	d vapor					
Prote	ctive method	0.4 to 18.5k\	W: IP20 enclos	sed type(JEM1)	030), 22kW an	d over : IP00 t	/pe(JEM1030)						
Coolir	ng method	Forced air cod	oling										
Built-i	n filter	3-phase 200V	class: basic nois	e filter, 400V cla	ass:EMI noise filt	er (IEC/EN6180)	0-3, 1st Environn	nent,C2 or IEC/EI	N61800-3, 2nd	Environment,C3)			

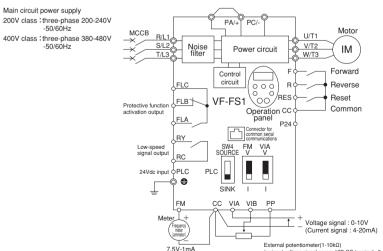
The rated output current in the parenthesis is at 12kHz of PWM carrier frequency(F300)setting.

■Exterior dimensions and weight

Input voltage	Applicable		Dillie	311510115	(111111)	Approximate
Class	motor(kW)	Inverter model	Width	Height	Depth	weight(kg)
3-phase	0.4	VFFS1-2004PM	107	130	150	1.2
200V (IP20/IP00)	0.75	VFFS1-2007PM	107	130	150	1.2
(IP2U/IPUU)	1.5	VFFS1-2015PM	107	130	150	1.2
	2.2	VFFS1-2022PM	107	130	150	1.2
	3.7	VFFS1-2037PM	142	170	150	2.1
	5.5	VFFS1-2055PM	180	220	170	4.3
	7.5	VFFS1-2075PM	180	220	170	4.3
	11	VFFS1-2110PM	245	310	190	8.6
	15	VFFS1-2150PM	245	310	190	8.6
	18.5	VFFS1-2185PM	245	310	190	8.9
	22	VFFS1-2220PM	240	420	214	16.4
	30	VFFS1-2300PM	320	630	290	38
3-phase	0.4	VFFS1-4004PL	107	130	150	1.4
400V (IP20/IP00)	0.75	VFFS1-4007PL	107	130	150	1.4
(IP20/IP00)	1.5	VFFS1-4015PL	107	130	150	1.4
	2.2	VFFS1-4022PL	107	130	150	1.4
	3.7	VFFS1-4037PL	142	170	150	2.4
	5.5	VFFS1-4055PL	142	170	150	2.4
	7.5	VFFS1-4075PL	180	220	170	4.7
	11	VFFS1-4110PL	180	220	170	4.7
	15	VFFS1-4150PL	245	310	190	9
	18.5	VFFS1-4185PL	245	310	190	9
	22	VFFS1-4220PL	240	420	214	15.4
	30	VFFS1-4300PL	240	420	214	15.4

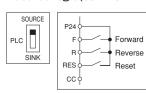
■Standard connection diagram

: Sink logic(common : cc)



■Standard connection diagram

: Source logic(common : P24)





To users of our inverters: Our inverters are designed to control the speeds of three-phase induction motors for general industry.

A Precautions

- * Read the instruction manual before installing or operating the inverter unit and store it in a safe place for reference.
- * When using our inverters for equipment such as nuclear power control, aviation and space flight control, traffic, and safety, and there is a risk that any failure or malfunction of the inverter could directly endanger human life or cause injury, please contact our headquarters, branch, or office printed on the front and back covers of this catalogue. Special precautions must be taken and such applications must be studied carefully.
- * When using our inverters for critical equipment, even though the inverters are manufactured under strict quality control always fit your equipment with safety devices to prevent serious accident or loss should the inverter fail (such as issuing an inverter failure signal).
- * Do not use our inverters for any load other than three-phase induction motors.
- * None of Toshiba, its subsidiaries, affiliates or agents, shall be liable for any physical damages, including, without limitation, malfunction, anomaly, breakdown or any other problem that may occur to any apparatus in which the Toshiba inverter is incorporated or to any equipment that is used in combination with the Toshiba inverter. Nor shall Toshiba, its subsidiaries, affiliates or agents be liable for any compensatory damages resulting from such utilization, including compensation for special, indirect, incidental, consequential, punitive or exemplary damages, or for loss of profit, income or data, even if the user has been advised or apprised of the likelihood of the occurrence of such loss or damages.

For further information, please contact your nearest Toshiba Representative or International Operations-Producer Goods.

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