

TOSVERT VF-AS3

DC power supply connect to inverter

TOSHIBA INDUSTRIAL PRODUCTS AND SYSTEMS CORPORATION

NOTICE



1. Read this manual before installing or operating the inverter. Keep it in a safe place for reference.
2. All information contained in this manual will be changed without notice.

Safety precautions

The items described in the instruction manual and on the inverter itself are very important so that you can use safely the inverter, prevent injury to yourself and other people around you as well as to prevent damage to property in the area. Thoroughly familiarize yourself with the symbols and indications shown below and then continue to read the manual. Make sure that you observe all warnings given.

* Read the Safety precautions of the instruction manual (CD-ROM) of VF-AS3 inverter (E6582062) for information not mentioned here.




Explanation of markings

Marking	Meaning of marking
 WARNING	Indicates that errors in operation will lead to death or serious injury.
 CAUTION	Indicates that errors in operation will lead to injury ^{*1} to people or that these errors will cause damage to physical property ^{*2} .

*1 Such things as injury, burns or electric shock that will not require hospitalization or long periods of outpatient treatment.

*2 Physical property damage refers to wide-ranging damage to assets and materials.

Meanings of symbols

Marking	Meaning of marking
	Indicates an inhibition (Don't do it). Detailed information on the inhibition is described in illustration and text in or near the symbol.
	Indicates a mandatory action that must be followed. Detailed information on the mandatory action is described in illustration and text in or near the symbol.
	Indicates a warning or caution. Detailed information on the warning or caution is described in illustration and text in or near the symbol.

1. Introduction

WARNING



Mandatory
action

- If you don't provide Pre-charge circuit, this will damage the inverter.

For some type-forms, if you want to use VF-AS3 connected on a DC power supply, you need to provide one or more pre-charge circuits on your side. (Pre-charge circuit: A circuit for suppression of inrush current to the DC BUS capacitor of the inverter at power on.)

For details on type-forms that need pre-charge circuits, please refer to the following combination chart.

- **Frame size A1, A2, A3**

No pre-charge circuits are required.

Connect a DC power supply to the DC input terminals (terminals [PA/+] and [PC/-]) of VF-AS3, and set the parameter [F640: DC supply input] to "1: Enabled".

- **Frame size A4, A5, A6, A7, A8**

Provide pre-charge circuits on your side.

For details on required pre-charge circuits, refer to Chapter 2.

- **Frame size A7, A8**

In addition to providing pre-charge circuits, you need to change power connection of inverter fans (cooling fans). Refer to Chapters 2 and 3.

The frame size A1 to A6 of VF-AS3 inverter has a built-in DC reactor as standard, and the frame size A7 and A8 attached with a DC reactor, no option is available.

■ Pre-charge circuit combination chart

Voltage class	HD/ND	Frame Size	Type-form	Pre-charge circuit	Change power supply connection for Cooling FAN
240V class	HD/ND	A1	VFAS3-2004P	No required	No required
			VFAS3-2007P		
			VFAS3-2015P		
			VFAS3-2022P		
		A2	VFAS3-2037P		
		A3	VFAS3-2055P		
			VFAS3-2075P		
		A4	VFAS3-2110P	Required	
			VFAS3-2150P		
			VFAS3-2185P		
		A5	VFAS3-2220P		
			VFAS3-2300P		
			VFAS3-2370P		
		A6	VFAS3-2450P		
VFAS3-2550P					

Voltage class	HD/ND	Frame Size	Type-form	Pre-charge circuit	Change power supply connection for Cooling FAN		
480V class	HD/ND	A1	VFAS3-4004PC	No required	No required		
			VFAS3-4007PC				
			VFAS3-4015PC				
			VFAS3-4022PC				
			VFAS3-4037PC				
		A2	VFAS3-4055PC				
			VFAS3-4075PC				
		A3	VFAS3-4110PC				
			VFAS3-4150PC				
			VFAS3-4185PC				
		A4	VFAS3-4220PC	Required	No required		
			VFAS3-4300PC				
			VFAS3-4370PC				
		A5	VFAS3-4450PC				
			VFAS3-4550PC				
			VFAS3-4750PC				
		A6	VFAS3-4900PC				
			VFAS3-4110KPC				
			VFAS3-4132KPC				
		A7	VFAS3-4160KPC				
		A8	VFAS3-4200KPC			Required	Required
			VFAS3-4220KPC				
			VFAS3-4280KPC				

Note) HD/ND

VF-AS3 inverter has multi-rating.

Select rating with the parameter [AUL: Multi-rating select] according to the characteristics of the load to be applied.

[AUL]="2: ND rating (120%-60s) (0 after execution)"

- Select it to apply equipment with variable torque characteristic.
- Example) Fans, pumps, blowers, etc.



[AUL]="3: HD rating (150%-60s) (0 after execution)"

- Select it to apply equipment with constant torque characteristic.
- Example) Conveyors, load transporting machinery, cranes, mixers, compressors, making machines, machine tools, etc.

For details, refer to the instruction manual of VF-AS3 inverter.

2. Connection of Pre-charge circuit

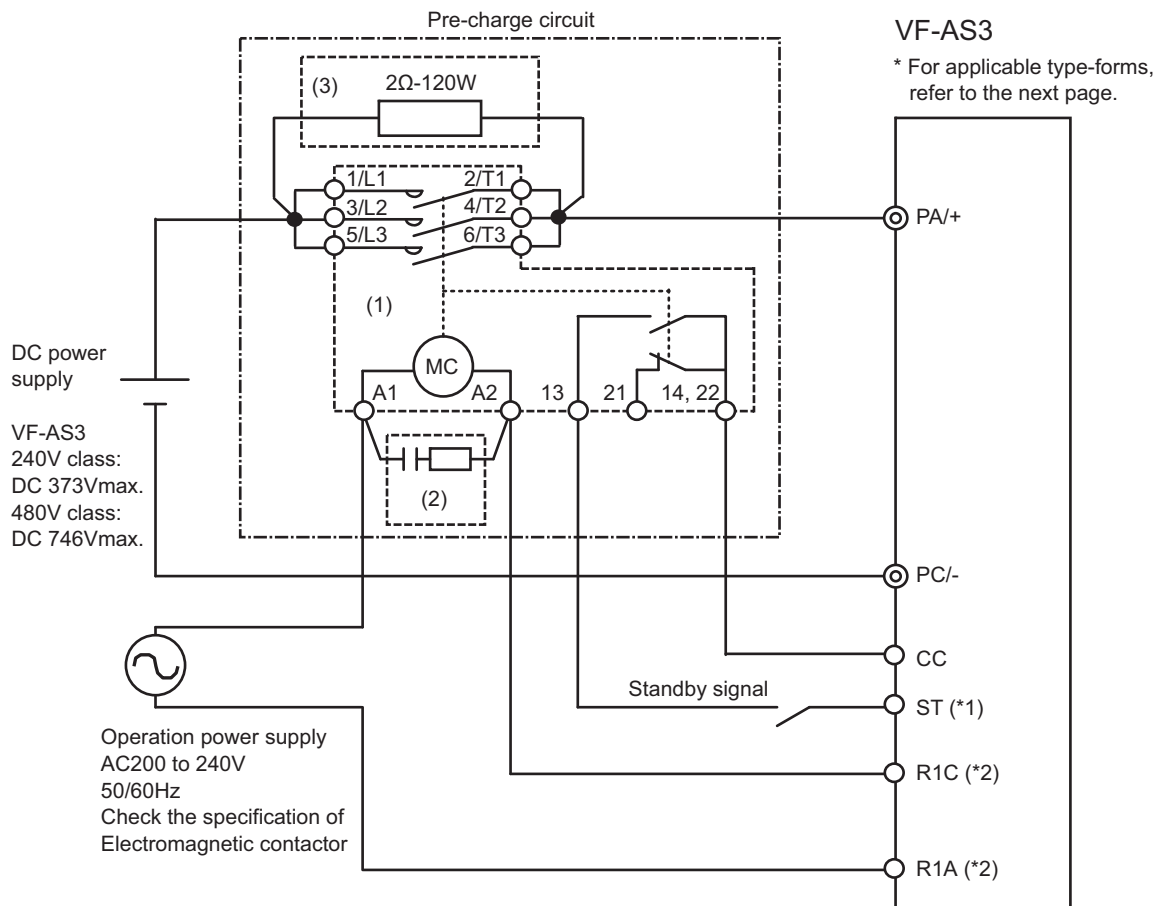
⚠ WARNING

 Prohibited	<ul style="list-style-type: none"> Do not connect AC power supply to the DC terminals, PA/+ and PC/-, of inverter. That can cause a fire.
 Mandatory action	<ul style="list-style-type: none"> Connect correctly the DC terminals, DC power supply + to the DC terminals PA/+ of inverter with the same polarity. If the polarity is incorrect, it will destroy both the inverter and the option, and may result in fire. Connect the output signal of standby, to the inverter's control system. If inverter drives in case of the output signal of standby OFF, this may result in fire.

This chapter applies to frame sizes A4, A5, A6, A7, and A8.

This chapter describes the configuration of a pre-charge circuit, along with examples of compatible parts. When selecting parts according to the following examples of compatible parts, note that some type-forms of frame size A6 and all type-forms of frame sizes A7 and A8 require parallel connection of multiple pre-charge circuits. For details, refer to the subsequent pages.

■ Pre-charge circuit configuration (Sample circuit)



Examples of compatible parts for the pre-charge circuit

No.	Part name	Example of compatible parts	
		Type-form	Manufacturer
(1)	Electromagnetic contactor	SC-N3/SE (SC65BAS-222)	Fuji Electric
(2)	Surge absorber	- (*3)	- (*3)
(3)	Rush current protective resistor	120W-2ohm	MICRON

(*1) Set parameter [F110] to "0", and assign and use ST (Standby) terminal (Function number 6) for an unused digital input terminal.

(*2) Set the terminal [R1A]-[R1C] of the inverter (parameter [F133]) or the terminal [R2A]-[R2C] (Parameter [F134]) to "114: For external relay of rush current suppression".

The figure indicates the case of using the terminal [R1A]-[R1C].

Note) Set [F640: DC supply input]= "1: Enabled".

(*3) For SC-N3/SE, Surge absorber is no required. But if other Electromagnetic contactor is used, check the specification. And connect Surge absorber if needed.

- Refer to the instruction manual of VF-AS3 inverter for wire size of the DC section.
- For the control circuit, use shielded wires whose size is 0.75mm^2 or more, and for the operation power supply, use the electric wires whose size is 2.0mm^2 or more.

When the pre-charge circuit of sample is used, some type-forms of frame size A6 and all type-forms of frame sizes A7 and A8 require parallel connection of multiple pre-charge circuits. For details on the numbers and wiring of connected pre-charge circuits, refer to the following.

■ Number of connected pre-charge circuits - HD rating

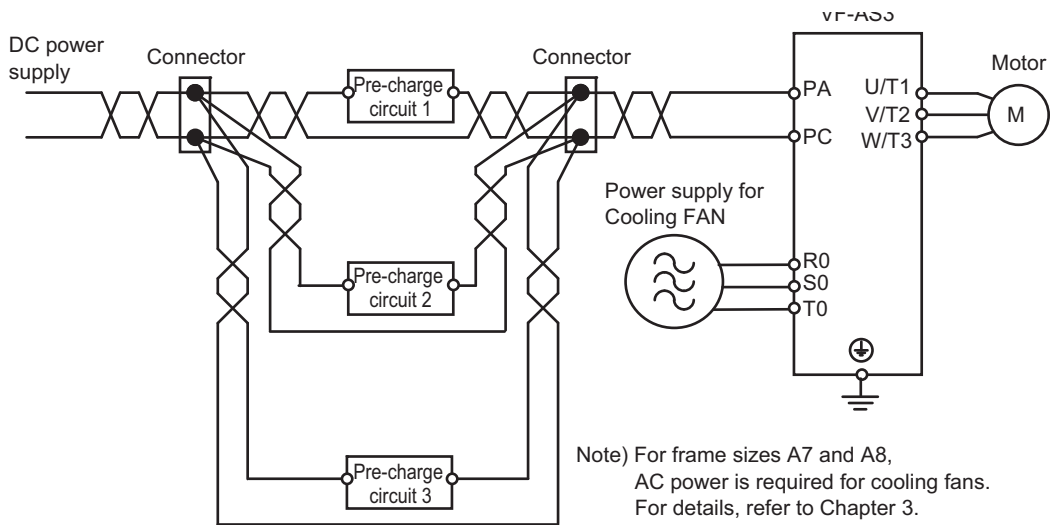
Voltage class	HD/ND	Frame Size	Type-form	Applicable motor (kW)	DC current (A)	Pre-charge circuit
240V class	HD	A4	VFAS3-2110P	11	49	Pre-charge circuit x 1
			VFAS3-2150P	15	65	
			VFAS3-2185P	18.5	80	
		A5	VFAS3-2220P	22	96	
			VFAS3-2300P	30	129	
			VFAS3-2370P	37	158	
		A6	VFAS3-2450P	45	193	
			VFAS3-2550P	55	234	
480V class	HD	A4	VFAS3-4220PC	22	52	Pre-charge circuit x 1
			VFAS3-4300PC	30	70	
			VFAS3-4370PC	37	86	
		A5	VFAS3-4450PC	45	104	
			VFAS3-4550PC	55	127	
			VFAS3-4750PC	75	172	
		A6	VFAS3-4900PC	90	209	
			VFAS3-4110KPC	110	250	
			VFAS3-4132KPC	132	296	
		A7	VFAS3-4160KPC	160	363	Pre-charge circuit x 2 (parallel)
		A8	VFAS3-4200KPC	200	449	
			VFAS3-4220KPC	220	499	
			VFAS3-4280KPC	280	625	Pre-charge circuit x 3 (parallel)

■ Number of connected pre-charge circuits - ND rating

Voltage class	HD/ND	Frame Size	Inverter model	Applicable motor (kW)	DC current (A)	Pre-charge circuit
240V class	ND	A4	VFAS3-2110P	15	65	Pre-charge circuit x 1
			VFAS3-2150P	18.5	80	
			VFAS3-2185P	22	94	
		A5	VFAS3-2220P	30	129	
			VFAS3-2300P	37	158	
			VFAS3-2370P	45	191	
		A6	VFAS3-2450P	55	234	Pre-charge circuit x 2 (parallel)
			VFAS3-2550P	75	320	
480V class	ND	A4	VFAS3-4220PC	30	68	Pre-charge circuit x 1
			VFAS3-4300PC	37	85	
			VFAS3-4370PC	45	102	
		A5	VFAS3-4450PC	55	125	
			VFAS3-4550PC	75	169	
			VFAS3-4750PC	90	203	
		A6	VFAS3-4900PC	110	250	Pre-charge circuit x 2 (parallel)
			VFAS3-4110KPC	132	296	
			VFAS3-4132KPC	160	353	
		A7	VFAS3-4160KPC	220	489	Pre-charge circuit x 3 (parallel)
		A8	VFAS3-4200KPC	250	554	
			VFAS3-4220KPC	280	625	
			VFAS3-4280KPC	315	700	

■ **Parallel connection of pre-charge circuits (Sample circuit)**

1) Power circuit



2) Control circuit

- (*1) Set parameter [F110] to "0", and assign and use ST (Standby) terminal (Function number 6) for an unused digital input terminal.
 - (*2) Set the terminal [R1A]-[R1C] of the inverter (parameter [F133]) or the terminal [R2A]-[R2C] (Parameter [F134]) to "114: For external relay of rush current suppression".
The figure indicates the case of using the terminal [R1A]-[R1C].
Note) Set [F640: DC supply input]= "1: Enabled".
- Refer to the instruction manual of the main inverter unit for wire size of the DC section.
 - For the control circuit, use shielded wires whose size is 0.75mm² or more, and for the operation power supply, use the electric wires whose size is 2.0mm² or more.

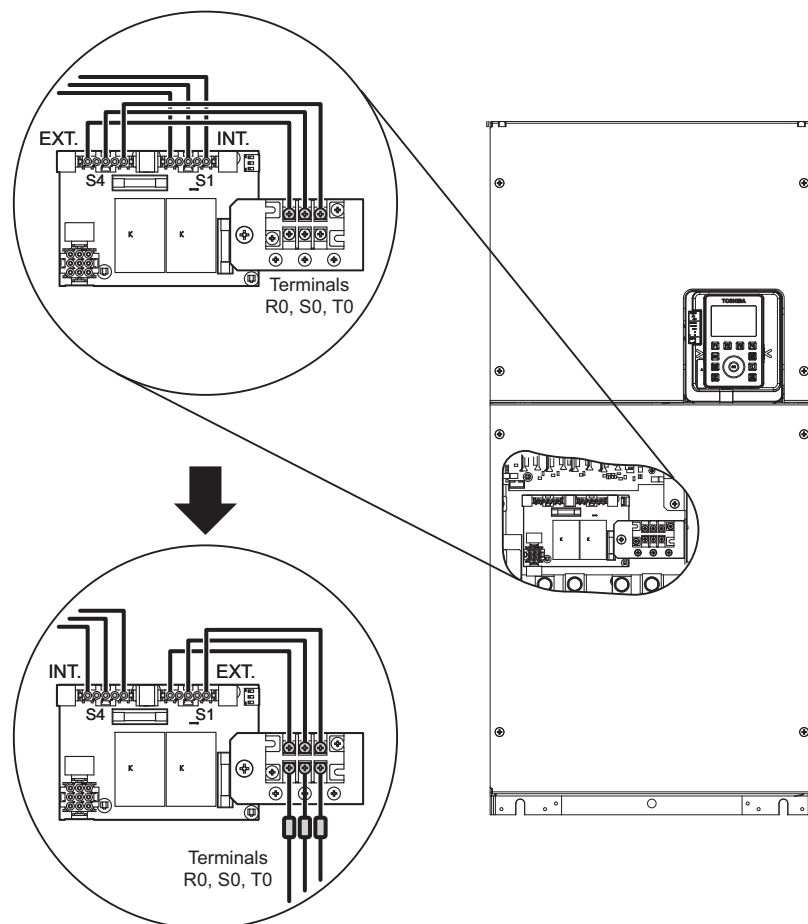
3. Power supply connection for inverter's Cooling FAN

This chapter applies to frame sizes A7 and A8.

For frame sizes A7 and A8, three-phase AC power supply is required for cooling fans of the inverter. Refer to the following to change power connection of the fans.

- On the board in the inverter shown in the figure below, exchange the wires connected to connectors at S1 with the wires connected to connectors at S4. This allows for supplying three-phase power from terminals [R0], [S0], and [T0] shown in the figure to the cooling fans.
- Connect a three-phase power supply shown in the table below to terminals [R0], [S0], and [T0].

Factory-set wiring: fans powered internally by R/L1, S/L2 and T/L3.



Modification for fans powered externally by R0, S0 and T0.

Frame Size	Inverter Type-form	Fan power supply voltage [R0], [S0], [T0]	Consumed power of Cooling FAN
A7	VFAS3-4160KPC	3-phase 380 to 440V-50Hz or 3-phase 380 to 480V-60Hz	700 VA
A8	VFAS3-4200KPC		1300 VA
	VFAS3-4220KPC		
	VFAS3-4280KPC		

