

TOSHIBA INVERTER INSTRUCTION MANUAL

Countermeasures for EMC directive and Low Voltage directive

Toshiba VF-A5 , VF-A5p user manual

VF-A5 **200V class**

VF-A5/A5P **400V class**

Toshiba Schneider Inverter Corporation

NOTICE

1. Make sure that this Instruction Manual is delivered to the end user of the inverter unit.
2. Read this manual before installing or operating the inverter unit, and store it in a safe place for reference.

1 . Abstract

In Europe, EMC directive is enforced starting 1st Jan. of 1996, and Low Voltage Directive starting 1st Jan. of 1997. The display of CE mark that demonstrates that products imported to European Union conform to these directives is required. Inverter itself cannot function alone, but is de-signed as a component in order to control machines or equipment which includes that inverter installed in a cubicle. Therefore the conformance to EMC directive is not required on inverter it-self. But since the object of the Low Voltage directive is equipment that is designed to be used with rated voltage of 50 to 1,000 VAC or 75 to 1,500 VDC, CE should be marked on inverter as to the Low Voltage directive.

But CE has to be marked on the final product installing inverters, that conforms to the EMC directive and the Low Voltage directive. And the product also may conform to Machine directive. The user that makes the final products have to take the responsibility for Marking of CE. For that reason, we recommend installation for Low Voltage directive and measurement for EMC directive, so that the products including our inverter should conform to the EMC and Low Voltage directive.

TOSHIBA carried out Approval testing and confirmation testing on representative models under the circumstances based on installation and measurement so that our products should conform to each directive. But we cannot confirm the conformance of the user's products to the EMC directive. Since EMC environment changes according to the const-ruction of the cubicle and the relation of other installed electric equipment and the condition of wiring and installation, please confirm the conformance to the EMC directive for the final products on your side.

2 .EMC directive

An inverter itself is not an object of CE marking.

A machine which consists of an inverter and a motor is an object of CE marking.

The EMC directive includes the emission section and the immunity section.

→ Emission: Emission of electromagnetic wave and electromagnetic interference

→ Immunity: Resistance to electromagnetic interference

<Normative standard>

Emission: EN50081-2

Immunity: EN50082-2

Table I . Relative standard of EMC directive

Noise type	Test item	Applicable standards	Measurements
Emission	Conducted Emission	EN55011 Group 1 class A	0.15 to 30 MHz. Measured in anechoic chamber
	Radiated Emission		30 to 1000 MHz Measure absolute values by Spectrum Analyzer Measure by the 30 m method
Immunity	Electrostatic Discharge	EN61000-4-2	Aerial discharge 8 kV, contact discharge 6 kV
	Radiated Electromagnetic field	ENV50140/1994	80 to 1000 MHz 1kHz 80%AM demodulation 10V/m 900MHz ±5MHz Keyed carrier 50%10V/m
	Electrical Fast Transient/Burst	EN61000-4-4	AC2kV(D) or 4kV(C), DC2kV(D) or 4kV(C) control 2kV(C) signal 1kV(C) 5/50ns 5kHz
	Surge Immunity	IEC1000-4-5	±2kV across lines, ±4 kV across line and ground

3. Countermeasures for EMC directive

We show the actual countermeasures for conformity to the EMC directive as Figures 1,2.

- 1) Please install the EMI filter to the input of the inverter. The recommended filters are shown in the following Table 2,3.

Table2. VF-A5/A5P series

《3-phase 200V class (low-acoustic noise)》		《3-phase 400V class(Low-acoustic noise)》	
Type form	Filter type	Type form	Filter type
VFA5-2004P	FN258-7/07	—	—
VFA5-2007P	FN258-7/07	VFA5-4007P	FN258-7/07
VFA5-2015P	FN258-16/07	VFA5-4015P	FN258-7/07
VFA5-2022P	FN258-16/07	VFA5-4022P	FN258-7/07
VFA5-2037P	FN258-30/07	VFA5-4037P	FN258-16/07
VFA5-2055P	FN258-42/07	VFA5-4055P	FN258-16/07
VFA5-2075	FN258-42/07	VFA5-4075P	FN258-30/07
VFA5-2110P	FN258-75/34	VFA5-4110P	FN258-30/07
VFA5-2150P	FN258-100/35	VFA5-4150P	FN258-42/07
VFA5-2185P	FN258-100/35	VFA5/A5P-4185P	FN258-42/07
VFA5-2220P	FN258-100/35	VFA5/A5P-4220P	FN258-55/07
VFA5-2300P	FN258-130/35	VFA5/A5P-4300P	FN258-75/34
VFA5-2370P	FN258-180/07	VFA5/A5P-4370P	FN258-75/34
VFA5-2450P	FN258-100/35 × 2P	VFA5/A5P-4450P	FN258-100/35
VFA5-2550P	FN258-130/35 × 2P	VFA5/A5P-4550P	FN258-130/35
—	—	VFA5/A5P-4750P	FN258-180/07
—	—	VFA5P-4900P	FN258-130/35 × 2P

- 2) The main cables such as input to the EMI filter and output of the inverter and the signal cables should be shielded, then cable length should be wired as short as possible. The main input cable should be separated from the main output cable, and cables for control signal also should be separated from main cables, not wiring parallel and not bundling, cross the wires where necessary.
- 3) Install EMI filter and inverter on the same metal back plate. And further more the radiated noise can be reduced by installing in the cubicle made of metal. The metal back plate or the cubicle must be grounded absolutely, by using short thick wires, separated from the main cables.
- 4) Please separate input cable to EMI filter from output cable as much as possible.
- 5) Shielded cables should be grounded on the metal back plate in order to reduce the radiated noise from the other cables. It is an effective measure that shielded cables are grounded close to the inverter or/and operation panel or/and EMI filter(less than 10cm).
- 6) Installation of the zero-phase and/or the ferrite core can also effectively reduce the radiated noise further.

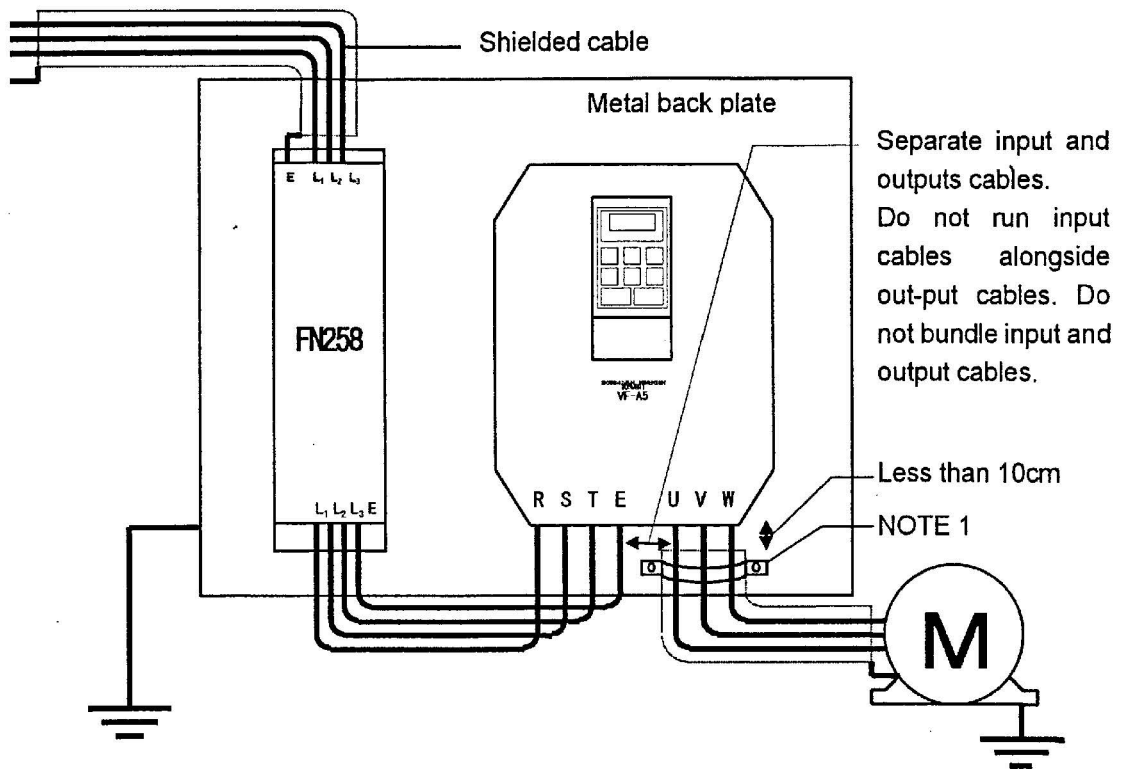


Figure 1. VFA5 series 200V class

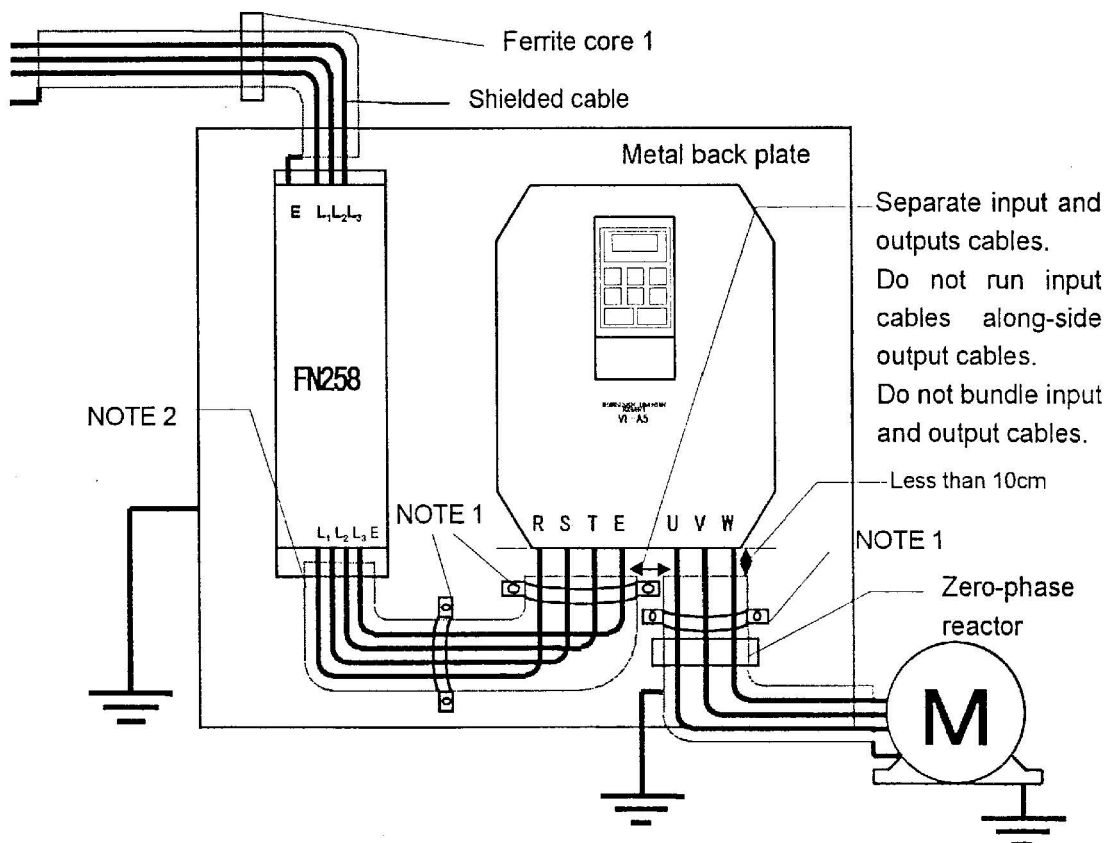


Figure 2. VFA5/A5P series 400V class

NOTE 1) Process as shown below.

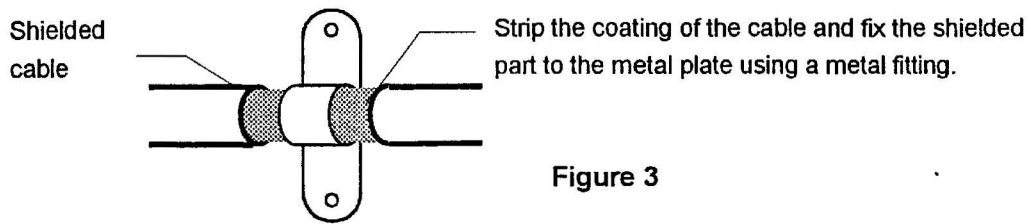


Figure 3

[Operating with external signals]

To operate with external signals, process as following figures.

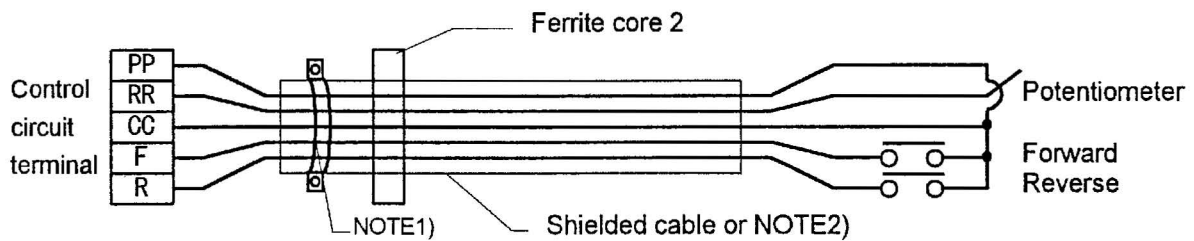


Figure 4

[Accessories]

- Zero-phase reactor : SOSHIN ELECTRONIC COMPONENT
Type form/RC5078 or RC9129
- Ferrite core1 : NEOSID
Type form/28-043-38
(or TOKIN co. ltd. Type form/ ESD-R-47D-1)
- Ferrite core2 : Chomerics
Type form/HBFE-1004-AS
(or TDK co. ltd. Type form/ ZCAT3035-1330)
- NOTE2) Shield : SUMITOMO 3M
Type form/DS-5,7,10,14
- EMI filter : SCHAFFNER ELEKTRONIK AG
Type form/FN258, FN2070M

5.Countermeasures for Low Voltage Directive

Please carry out the below mentioned countermeasures for the Low Voltage Directive in case of using VF-A5/A5P as components of your products.

- 1) Inverter should be installed in a cubicle. Pay attention to wiring openings, so that it should prevent someone from touching live parts through the opening in case of a maintenance.
- 2) No more than 1 cable should be connected to one earth terminal of the main terminal board. In this case, other cables for earth should be grounded on the metal back plate and/or in the cubicle(Refer to Figure5). The cross-sectional area of earth cable shall be, in any case, not less than;

Table3. Earth cable

Inverter model	Size of earth cable	Inverter model	Size of earth cable
200V class		400V class	
VFA5-2004P	3.5 mm ²	—	—
VFA5-2007P	3.5 mm ²	VFA5-4007P	3.5 mm ²
VFA5-2015P	3.5 mm ²	VFA5-4015P	3.5 mm ²
VFA5-2022P	3.5 mm ²	VFA5-4022P	3.5 mm ²
VFA5-2037P	3.5 mm ²	VFA5-4037P	3.5 mm ²
VFA5-2055P	8 mm ²	VFA5-4055P	3.5 mm ²
VFA5-2075P	14 mm ²	VFA5-4075P	5.5 mm ²
VFA5-2110P	14 mm ²	VFA5-4110P	8 mm ²
VFA5-2150P	16 mm ²	VFA5-4150P	8 mm ²
VFA5-2185P	19 mm ²	VFA5/A5P-4185P	14 mm ²
VFA5-2220P	19 mm ²	VFA5/A5P-4220P	16 mm ²
VFA5-2300P	30 mm ²	VFA5/A5P-4300P	19 mm ²
VFA5-2370P	50 mm ²	VFA5/A5P-4370P	19 mm ²
VFA5-2450P	50 mm ²	VFA5/A5P-4450P	19 mm ²
VFA5-2550P	50 mm ²	VFA5/A5P-4550P	30 mm ²
—	—	VFA5/A5P-4750P	50 mm ²
—	—	VFA5P-4900P	50 mm ²

- 3) Since cables of the control signals are exposed outside the cubicle according to the input, so the isolation between control terminals or cables outside the cubicle and inside should be reinforced such as through the relay. In the case of :

Controller or the operating panel is installed in the cubicle. (Figure 6)

Controller or the operating panel is installed on the surface of the cubicle. (Figure 6)

Controller or the operating panel is installed separately from the cubicle. (Figure 7)

- 4) No-fuse breaker should be connected to the input side of the EMI filter.

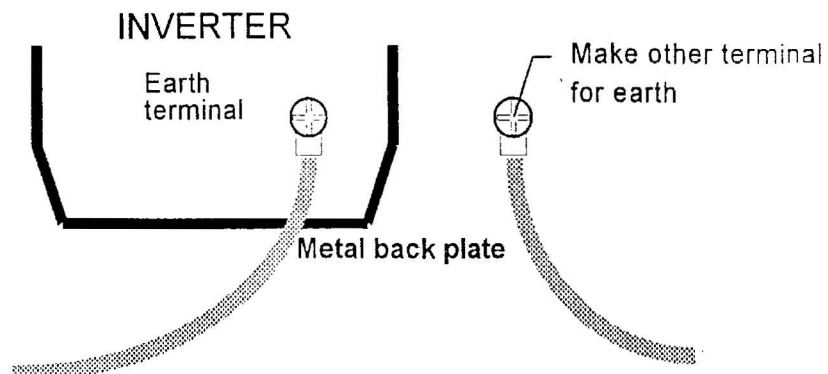


Figure 5. Grounding

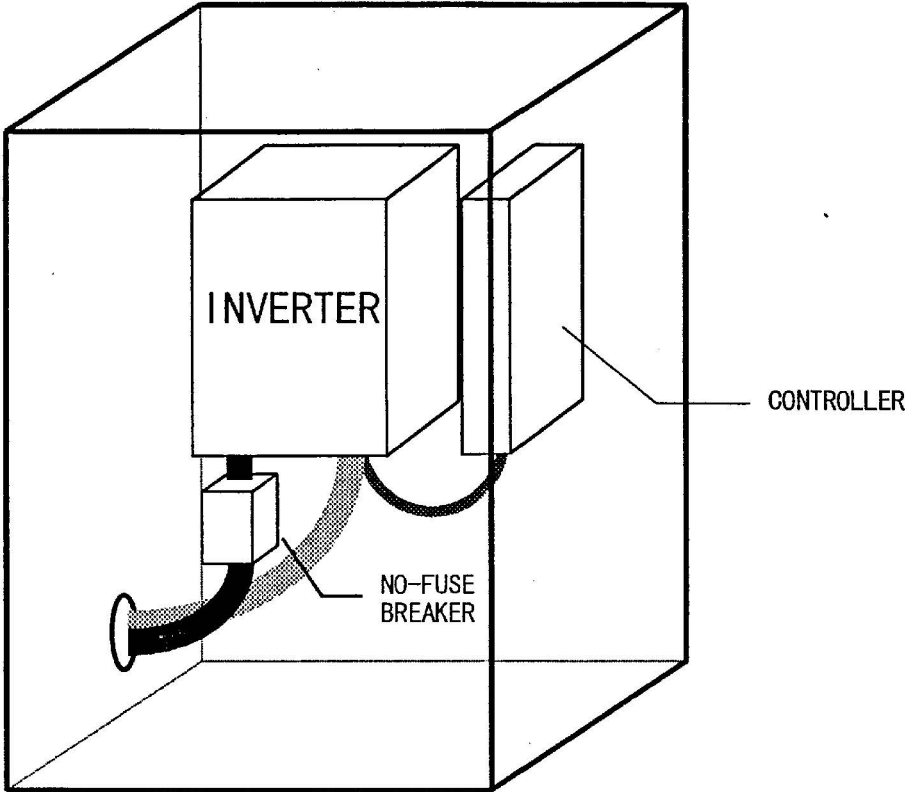


Figure 6. 1) Controller or the operating panel is installed in the cubicle
2) Controller or the operating panel is installed on the surface of the cubicle.

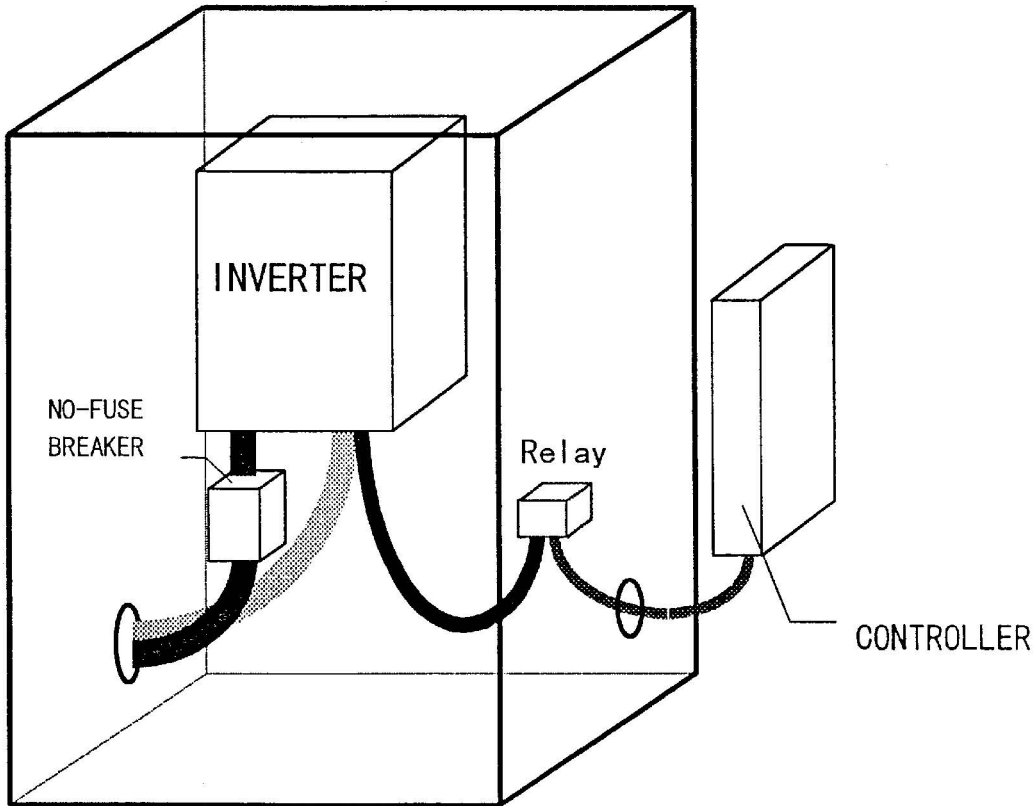


Figure 7. Controller or the operating panel is installed separately from the cubicle.