

**Slicers** [Food machines]

**Features of slicers**

Slicers in food machine are cutting machines for some kind of foods.  
ex. Meat, vegetables etc.

They carry foods by conveyers, and cut them by rotary cutters.

Mainly, the capacity range of slicers is up to 2.2kW.

**Merits of inverter drives**

Slicers with inverters have the following merits:

- Tact time improving
- Freely cutting width
- Stable speed with the sensor-less vector control
- 'Emergency stop' without mechanical brakes.
- Possible to use a 3-phase motor with single-phase power supply.
- If you need enclosure models to avoid 'mist' or 'cutting rubbish', we prepare IP54(IP55) models of VF-S11.

**What is IP (Protective construction)?**

This code is a standardization by IEC (International Electrotechnical Commission).

IP[A][B]

A: Solids protection

B: Liquids protection

Usually, the general purpose inverter is IP20 or IP00



CLASS [A]	degree	CLASS [B]	degree
<b>0</b>	None	<b>0</b>	None
<b>1</b>	The hand or something of 50mm diameter don't invade the inside.	<b>1</b>	Water spray in vertical directions
<b>2</b>	Against solids over 12mm	<b>2</b>	Water spray in vertical directions (+/-15 degree)
<b>3</b>	Against solids over 2.5mm	<b>3</b>	Water spray in vertical directions (+/-60 degree)
<b>4</b>	Against solids over 1mm	<b>4</b>	Water spray in all directions

<b>5</b>	Limited dust ingress	<b>5</b>	Low pressure jets in all directions
<b>6</b>	Total dust protection	<b>6</b>	High pressure jets in all directions
		<b>7</b>	Immersion below 1m while 10 minutes
		<b>8</b>	Immersion below 1m

## Notices regarding the use of inverter drives

### - Motor rating

The capacity range of the "Slicers" is small. Sometimes, there is a 100V motor rating. In this case, please change the motor from 100V rating to 3 phase, 200V rating. (The inverter is designed for 3 phase 200V or 400V motor.)

If you have only a single phase 100V power supply, please select the VF-nC3 series that has a line-up for single phase 100V input / 3 phase 200V output.

#### Point

VFNC3S-1001P (0.1kW)  
 VFNC3S-1002P (0.2kW)  
 VFNC3S-1004P (0.4kW)  
 VFNC3S-1007P (0.75kW)

### - Deceleration time for cutter

When you stop the cutter quickly, you may need to install a braking resistor.

In this case, please select VF-S15 or VF-AS1 series.

In VF-nC3, you have to prepare also a braking module(BRMD0015Z)

### - Maximum motor speed

The maximum motor speed depends on the motor specifications.

Please confirm the specifications of the manufacturer of your motor.

The specifications of TOSHIBA motors are as follows:

Capacity [kW]	Allowable frequency [Hz]		
	2 poles	4 poles	6 poles
0.4	60	120	120
0.75			
1.5			
2.2			
3.7			
5.5	90	90	
7.5			
11			

15			
18.5			
22			
30			
37			
45			60

#### - Avoiding "Mist" and "Cutting rubbish"

Usually, slicers are used in a dusty environment. If this is the case, you have to install the inverter in a cabinet, or please select the IP54 model of VFS11.

#### - Electromagnetic noise

The inverter is generating "electromagnetic noise".

If there are some high accuracy sensors or other sensitive equipment near the inverter drive, the inverter's noise may cause some trouble or a malfunction.

Electromagnetic noise can be avoided by installing an external noise filter or using a different wiring method.

#### - Harmonics

The inverter is generating "harmonics".

These harmonics sometimes cause a malfunction in other control equipment that is connected to the same power source.

Harmonics can be avoided by installing an external "reactor".

To decrease "harmonics", we recommend to install DC reactors in all our inverter models. (NOTE: 100V input models require AC reactors.)

### Selection

In almost all cases, the capacity of the inverter is the same as the motor capacity.

However if you have a fixed acceleration/deceleration time, the inverter capacity should be larger than the motor capacity.

Please confirm your motor's rated current.

$[\text{Motor's rated current}] \times 1.05 < [\text{Inverter's rated current}]$



When you connect several motors to one inverter, please confirm the following:

$[\text{Total motor's rated current}] \times 1.1 < [\text{Inverter's rated current}]$

In this case, the electric thermal function in the inverter can't protect all motors. Please install an external thermal relay for each motor.

### Application samples

In case of "Slicer", it is usually installed following operation method:

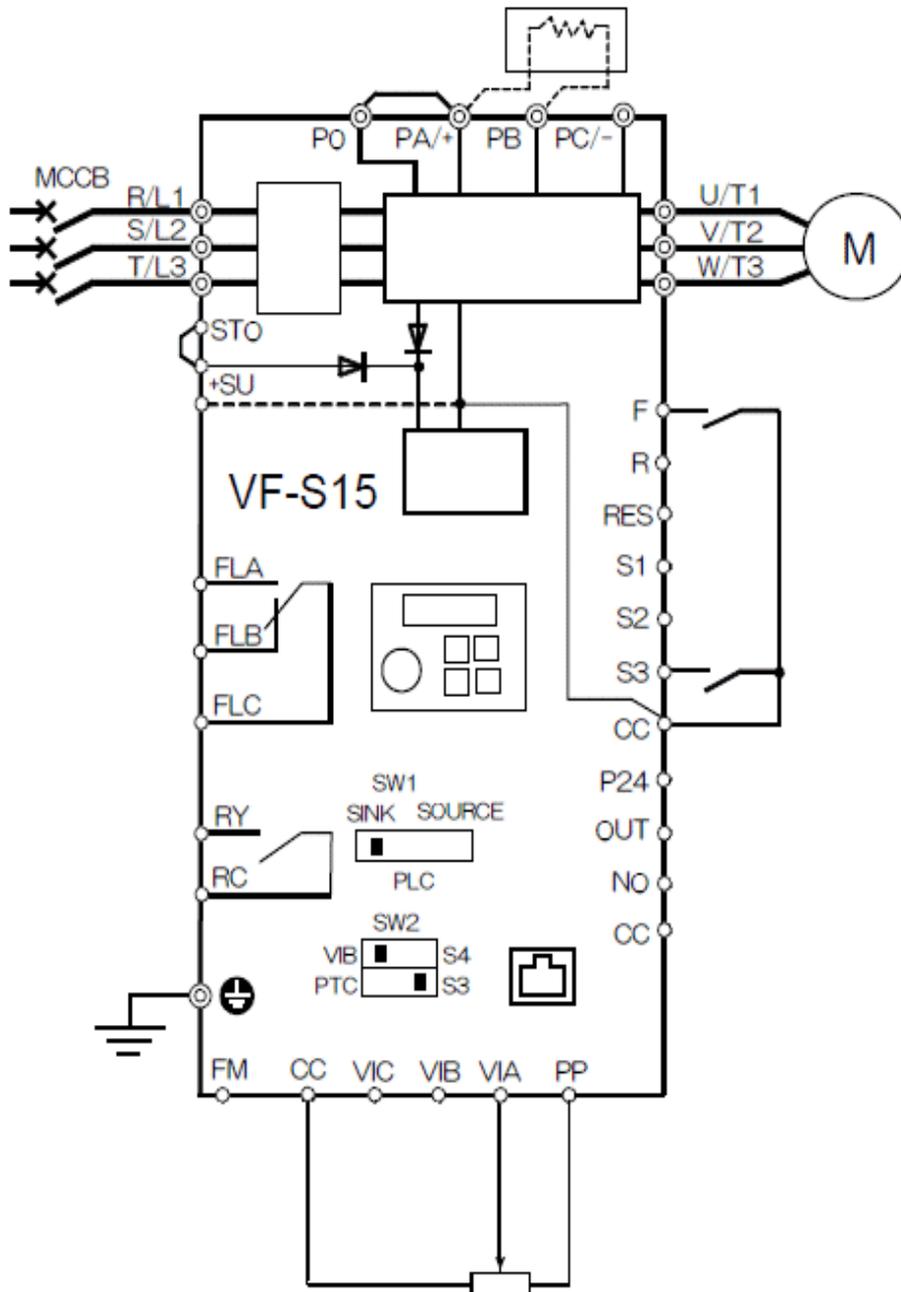
- RUN and STOP by remote control.
- Speed adjustment by analog input(0-10V)
- Stable speed by sensor-less vector control

- Emergency stop

### Connection of inverters

In a cutter part, please install a braking resistor for emergency stop.

### Connection diagram of inverters (VF-S15)



### Setting table for inverters (VF-S15)

You have to set the motor parameter with sensor-less vector control.

1. Parameter setting

Title	Function	Setting range	Recommended setting
C0 00	Command mode selection	0: Remote, 1: Local, etc.	0
F0 00	Frequency setting mode selection	0: Built-in potentiometer, 1: VIA, 2: VIB, etc.	1
AC 2	Acceleration time 1	0.0 ~ 3600 sec	depends on your system
DE 2	Deceleration time 1	0.0 ~ 3600 sec	depends on your system
F1 16	Input terminal function (S3)	0 to 203	20
F3 04	Dynamic braking	0: Disabled, 1: Enabled, etc.	1
F6 03	Selection of emergency stop	0: Coast stop, 1: Deceleration stop, 2: Injection brake	2

## 2. Parameter setting for sensor-less vector control

Title	Function
UL	Base frequency [Hz]
ULU	Voltage at base frequency [V]
F405	Motor rated capacity [kW]
F415	Motor rated current [A]
F417	Motor rated rotation [ $\text{min}^{-1}$ ]

3. Execute "AU2(Automatic torque-up function) = 2"

This function automatically executes "Pt" and "F400".

Pt(V/f control selection) = 3(Sensor-less vector control)

F400(Auto-tuning) = 2(Enabled)

The auto-tuning is enabled at the first operation command. please be careful of your rotating motor shaft.