

# TOSHIBA

## Frequency Inverters

Leading Innovation



..... VF-nC1



..... VF-S11



..... VF-FS1



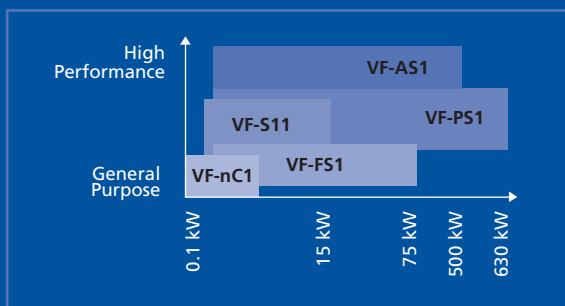
..... VF-PS1



..... VF-AS1

TOSHIBA frequency inverters are designed for the global market and are manufactured with the newest production methods. They comply with worldwide standards like CE, UL, CSA, and C-tick; they are extremely reliable and meet highest quality standards.

Sophisticated control algorithms, like sensor-less vector control for induction and permanent magnet motors or energy saving functions save resources and increase the efficiency of your drive. Innovative technologies, like reduction of input current harmonics and leakage currents secure long-term investments.



TOSHIBA frequency inverters offer a multitude of functions and are therefore easy to integrate into almost any system. From the broad product range with capacities from 0.2 to 630 KW you can always choose the right inverter for your application.

All models can be mounted side-by-side and tolerate high ambient temperatures (up to 60°C in most cases, please see the specification overview). EMC radiation filters and the operation panel are integrated as standard. Almost all models allow a quick exchange of the terminal block. Each terminal is programmable with many input or output functions.

The configuration is easily done and you can start-up your application within minimum time. All models have the same menu structure. With the software PCM001Z you can perform the programming even more comfortably.

## VF-nC1 NanoDrive – The compact class



### Machine tools Building automation Conveyors Compact machines

The VF-nC1 excels at its compactness and simple installation and start-up.

Due to its integrated high attenuation EMC filters it can be operated in any environment. Its sensor-less vector control ensures an excellent efficiency of your drive and makes it suitable also for dynamic applications.



- extremely compact
- EMC filter C1
- easy configuration
- PI control

**TOSHIBA**



## VF-S11 – The all-rounder



**Industrial applications**  
**Machine and plant building**  
**Conveyors**  
**Lifting and crane applications**

Its broad functional range allows the universal use of the VF-S11. Braking unit and EMC filter are integrated as standard. A great variety of fieldbus interfaces can be integrated into the inverter via the exchangeable terminal block.



The sensor-less vector control with diverse energy saving functions, automatic slip compensation and a high over-load capability guarantee outstanding performance and high torque over the full range of output frequencies (up to 500 Hz). For capacities up to 4 kW, the VF-S11 is also available with protection class IP54/55.

- compactness
- EMC filter C2
- braking unit
- flexible and easy to integrate
- PID control, logic functions AND, OR

## VF-FS1 – The HVAC specialist



**Building automation**  
**Pumps and fans**  
**Heating, ventilation and aircondition**

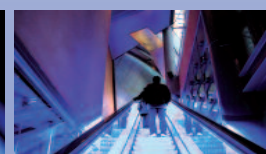
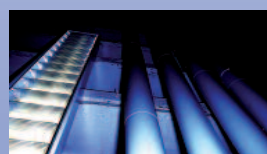
The VF-FS1 features an innovative technology to reduce input current harmonics. Although it is extremely compact, it complies with the limits defined in IEC61000-3-12 without the use of additional components.

Long-life main capacitors, automatic service messages, and easy maintenance allow an extraordinary economic and efficient system design and operation.



Over the complete capacity range up to 75 kW, these inverters are also available with protection class IP54/55. Integrated special functions for pumps and fans as well as energy saving functions are further features. Its high over-load capability for short-time ensures robustness. The exchangeable terminal block allows the integration of a great variety of fieldbus for building automation interfaces (BACnet®, Metasys® N2, APOGEE® FLN, LonWorks®) into the inverter.

- low harmonics, high power factor
- extremely compact
- EMC filter C2
- EMC filter C1 and IP55 as option
- PID control, logic functions AND, OR



## VF-PS1 – The multi-purpose drive



**Complex machines and plants**  
**Pumps and fans**  
**Conveyors**

Its powerful vector control (closed-loop as option) makes it the perfect choice for demanding applications. The newest technologies for energy saving as well as a high percentage (88%) of recyclable materials ensure an economic use of resources.



Due to its wide capacity range, numerous integration possibilities, internal fieldbus options, and great functionality – for example, certified safety stop, integrated PLC (MY FUNCTION), emergency operation (FORCE/FIRE modes) – the VF-PS1 is suitable for a multitude of application fields, not only for pumps and fans.

- EMC filter, DC-reactor, braking unit
- EN954-1 certified safety stop
- PLC (MY FUNCTION)
- closed-loop vector control

## VF-AS1 – The top class



**Complex machines and plants**  
**Lifting and crane applications**  
**Textile machines**  
**Pattern sequence control**

Performance, precision, and easy configuration make the VF-AS1 the top model of the TOSHIBA frequency inverters. Outstanding dynamic, powerful vector control, high starting torque and high overload capability as well as its vast functionality make it the first choice for highly demanding applications. With MY FUNCTION you can relocate typical PLC tasks into the inverter.



Further features are: safety stop, special functions for lifting applications and textile machines, torque reference and tension control, programmable pattern sequence control, online autotuning, simple positioning, teaching modes, internal fieldbus options, and many more.

- EMC filter, DC-reactor, braking unit
- EN954-1 certified safety stop
- output frequencies up to 1000Hz
- PLC (MY FUNCTION)
- functionalities for special applications
- closed-loop vector control



Specifications	VF-nC1	VF-S11	VF-FS1	VF-PS1	VF-AS1
Main power supply <sup>1)</sup>					
1ph. 100...115V	0.1...0.75kW	-	-	-	-
1ph. 200...240V	0.2...2.2kW	0.2...2.2kW	-	-	-
3ph. 200...240V	0.1...2.2kW	0.2...15kW	0.4...30kW	0.4...90kW	0.4...75kW
3ph. 380...480V	-	-	0.4...75kW	0.75...630kW	0.75...500kW
3ph. 380...500V	-	0.4...15kW	-	-	-
3ph. 525...600V	-	0.75...15kW	-	-	-
3ph. 500...690V	-	-	-	in preparation	in preparation
Maximum output frequency	200Hz	500Hz	200Hz	500Hz	500/1000Hz <sup>2)</sup>
Over-load capability for 60s short-time	150%	150% 200% (0.5s)	110% 180% (2s)	120% 135% (2s)	150% 165% (2s)
Max. ambient temperature <sup>3)</sup>	-10...50°C	-10...40/60°C	-10...50/60°C	-10...60°C	-10...60°C
Integrated EMC filter EN61800-3 category EN55011 class	C1 B group 1	C2 A group 1	C1/C2 <sup>4)</sup> B/A group 1 <sup>4)</sup>	C1/C2/C3 <sup>4,5)</sup> B/A group 1/2 <sup>4,5)</sup>	C2/C3 <sup>5)</sup> A group 1/2 <sup>5)</sup>
Integrated DC reactor	-	-	- (not required)	18.5...630kW	18.5...500kW
Integrated braking unit	-	•	-	0.4...220kW	0.4...160kW
Protection class IP20	•	•	• <sup>6)</sup>	• <sup>6)</sup>	• <sup>6)</sup>
IP54 (1ph. 200V-class)	-	0.4...2.2kW	-	-	-
IP54 (3ph. 200V-class)	-	0.4...4kW	-	-	-
IP54 (3ph. 400V-class)	-	0.75...4kW (500V)	0.4...75kW	0.75...90kW	-
Terminalblock, exchangeable	-	•	•	•	•
Digital inputs	5	8	4	7+4+4 <sup>7)</sup>	7+4+4 <sup>7)</sup>
Digital outputs	1	1	-	2+2+2	2+2+2
Relais	1	2	2	1+1+1	1+1+1
Analog outputs	1	2	2	3+1+1	3+1+1
with PTC evaluation	•	1	1	1+1+1	1+1+1
Analog outputs	1	1	1	2+2	2+2
Pulse input	-	as option	as option	as option	as option
Pulse output	-	0.5...1.6 kHz	-	1...43.2 kHz	1...43.2 kHz
V/f control methods					
Constant torque (linear)	•	•	•	•	•
Variable torque (square)	-	•	•	•	•
7 points selectable	-	-	-	•	•
Automatic torque boost	-	•	•	•	•
Sensor-less vector control without speed feedback	•	•	•	•	•
Closed-loop vector control with speed feedback	-	as option	-	as option	as option
Energy saving functions	-	•	•	•	-
PM- (Servo-) motors	-	•	•	•	•
Torque limit	-	-	-	•	•
Torque control with reference	-	-	-	-	•
Function examples					
Fixed speeds	15	15	8	15	15
Speed up/down	-	•	•	•	•
3-wire operation	-	•	•	•	•
Logic functions	-	AND+OR	AND+OR	MY FUNCTION	MY FUNCTION
DC braking	•	•	•	•	•
Catch on the fly	•	•	•	•	•
Controlled deceleration after power black-out	•	•	-	•	•
Acceleration/Dec. ramps	2	3	2	2	4
PID control	PI	•	•	•	•
Autom. suspend at low reference	•	after 0...600s	after 0...600s	after 0...600s	after 0...600s
Emergency operation (FIRE/FORCE modes)	-	•	•	•	•
Special functions for textile machines	-	-	-	-	•
Special functions for lifting applications	-	•	-	-	•
Maintain position	-	-	-	-	•
Safety stop (EN954-1 cert.)	-	-	-	•	•

1) Voltage tolerance -15...+10%

2) VF-AS1 4xxx PLY-A2 up to 37kW have 1000Hz maximum output frequency.

3) Depending on inverter rated capacity and protection class, as well as selected PWM switching frequency and installation, please see manuals for details.

4) Inverters VF-FS1 and VF-PS1 with IP54 protection have integrated EMC filters category C1, class B group 1.

5) VF-PS1 and VF-AS1 0.75...4kW (400V-class) have EMC-filters category C2, class A group 1; 5.5...630kW (400V-class) category C3, class A group 2.

6) VF-FS1, VF-PS1 and VF-AS1 from 22kW in metal housing: IP20 with optional terminal cover.

7) Integrated options ETB003Z and ETB004Z with 4 additional digital inputs each, please see options list on the next page.

Options	VF-nC1	VF-S11	VF-FS1	VF-AS1/-PS1
<b>Internal fieldbus communication interfaces</b>				
TOSHIBA TTL	standard	standard	TB-PWB-S11	-
Modbus® RS485	-	RS4003Z	standard	standard
DeviceNet®	-	DEV001Z	-	DEV002Z
Profibus® DP	-	-	-	PDP002Z
CC-link®	-	CCL002Z	-	CCL001Z
LonWorks®	-	LIU005Z	LIU007Z	LIU006Z
BACnet®	-	-	BCN002Z	BCN001Z
Metasys® N2	-	-	MTS002Z	MTS001Z
APOGEE® FLN	-	-	APG002Z	APG001Z
<b>External fieldbus communication gateways</b>				
RS485 4-wire	RTS400TB	RTS400TB	standard	standard
CANopen®	TOSS7CAN	TOSS7CAN	TOSS7CAN	in preparation
Profibus® DP to TTL	TOSS7PB	TOSS7PB	-	-
to RS485	-	TOSPBDP	TOSPBDP	TOSPBDP
Interbus® S	TOSS7IBS	TOSS7IBS	TOSS7IBS	-
<b>Internal connector for incremental encoders for closed-loop vector control</b>				
	-	<20kHz	-	<120kHz
<b>Additional internal PTC connector</b>				
	-	PTCS11, PTC-RS4003Z	PTC-RS4003Z	ETB003Z, ETB004Z
<b>Terminal extensions</b>				
-10...+10V analog input	-	MITOS-DIC	MITOS-DIC	standard, ETB004Z
Pulse input	-	MITOS-PIC	MITOS-PIC	ETB004Z
ETB003Z 4x LI; 2x LO	-	-	-	•
1x Relais	-	-	-	-
1x PTC	-	-	-	-
1x -10V supply	-	-	-	-
ETB004Z 4x LI; 2x LO	-	-	-	•
1x Relais	-	-	-	-
1x PTC	-	-	-	-
2x AI	-	-	-	-
2x AO	-	-	-	-
1x -10V supply	-	-	-	-
Terminal cover IP20	- (not needed)	- (not needed)	from 22kW	from 22kW
<b>External operation panels</b>				
Hakko touch panel	•	•	•	•
LED numerical display	MITOS-VT5	MITOS-VT5	RKP002Z	RKP002Z
LCD text display	MITOS-VT6	MITOS-VT6	MITOS-VT6	MITOS-VT6, RKP004Z
<b>Parameter copy device</b>				
	PWU001Z	PWU001Z	PWU001Z	RKP004Z
<b>EMC filters EN61800-3 category C1, EN55011 class B group 1</b>				
	TOS-NF	TOS-FPF	TOS-FPF, TOSNF	TOS-NF
<b>Input reactors</b>				
1ph. series WSN	•	•	-	-
3ph. series DWSN	-	•	- (not needed)	•
Motor reactors series DWSM	•	•	•	•
dV/dt motor filters series ULC	•	•	•	•
Sinus filters series UAF	•	•	•	•
<b>PC-programming cable</b>				
for COM-Port: RS232KON	•	•	-	-
for USB: USB001Z	•	•	•	•
<b>Residual current circuit breakers series RCCB</b>				
	•	•	•	•
<b>Motor over-load protection switches series MSM</b>				
	•	•	•	•
<b>Braking resistors</b>				
Braking units up to 375kW peak power	•	- (standard)	-	• (standard)
Regenerative power feedback units	-	•	-	•

• available  
- not available