



TOSHIBA

Leading Innovation >>>

Frequency Inverter



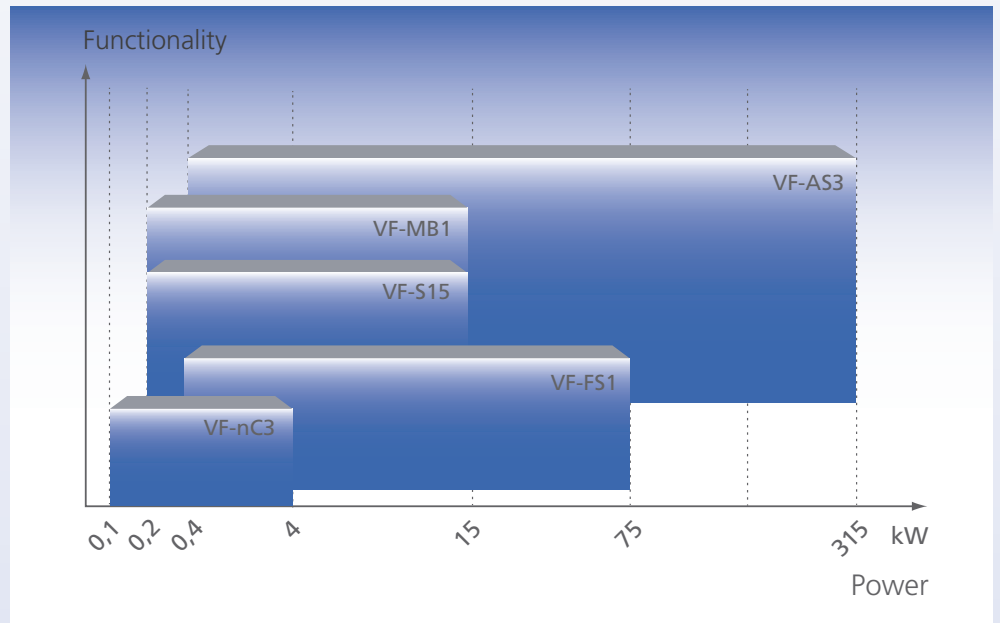
Frequency inverters overview

Frequency inverters of TOSHIBA convince plant manufacturers and machine operators worldwide due to high reliability in operation and flexibility in application. With their wide product range, the practice oriented functions and the various interface options are those TOSHIBA frequency inverters the first choice for demanding as well as standard applications.

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

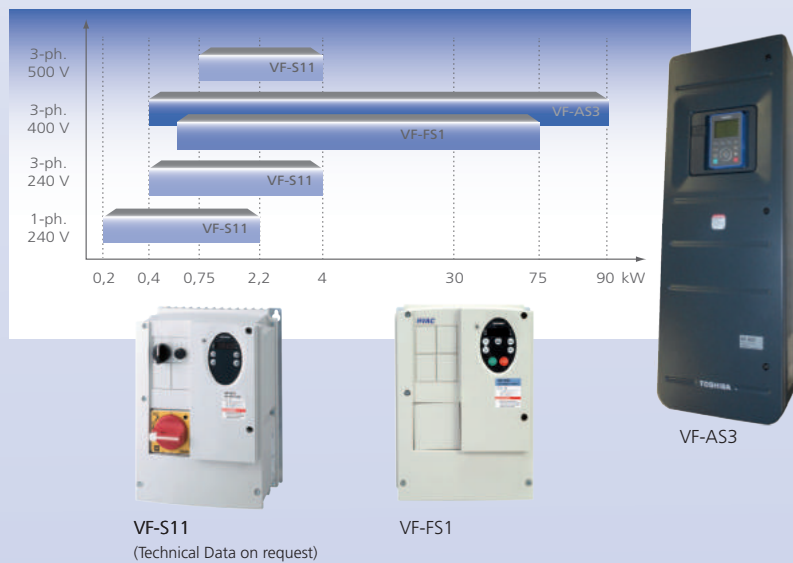
Sophisticated control algorithms, like sensor-less vector control for induction and permanent magnet motors or energy saving functions save resources and increase the efficiency of your drive. Innovative technologies, like reduction of input current harmonics and leakage currents secure long-term investments.

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 0.1 to 630 kW you can always choose the right inverter for your application.



Protection class IP54/55

The models VF-AS3, VF-FS1 and VF-S11 are also available in IP54/55 at different power ratings.



VF-S11
(Technical Data on request)



VF-FS1



VF-AS3

VF-nC3 Nanodrive - The compact class



- Machine tools
- Building automation
- Conveyors
- Compact machines



- Extremely compact
- EMC filter C1
- Easy configuration
- PID control, logic functions AND, OR
- RS485 interface
- Quick stop

The VF-nC3 excels at its compactness, simple installation and easy start-up. Settings are easily done with the convenient jog dial.

Its sensorless vector control ensures an excellent efficiency of your drive and makes it suitable also for dynamic applications. The tolerance of the reaction time to external signals is constant and as low as ± 1 ms – the VF-nC3 controls the drive with high efficiency and repeat accuracy.

Due to its integrated high attenuation EMC filters it can be operated in any environment.

VF-MB1 - The Innovative



- Packaging machines and machine tools
- Pumps and fans
- Conveyors
- Lifting and crane applications



- Slim shape body (only 45 mm wide up to 1,5 kW)
- CANopen® and Modbus® interfaces built-in
- EMC filter C2
- Easy configuration
- PID control, PLC functions (Logic Sequence)
- STO/SS1 according to IEC/EN61800-5-2
- Dual rating (ND/HD)

The VF-MB1 is the first choice for drive solutions with high demands on the control characteristics and the integrated functions for applications in machine building industry, material handling or for pumps and fans.

The integrated PLC (Logic Sequence) allow the integration of control functions in the drive. With its broad range of field bus options, which are available as plug-in hardware modules, as well as the standard Modbus® RTU and CANopen® interfaces the VF-MB1 can be integrated in nearly every production environment.

VF-S15 - The all-rounder



- Industrial applications
- Machine and plant building
- Conveyors
- Elevators, lifting and crane applications



- Precise control by constant response time
- EMC filter C2
- Easy configuration and operation
- Optional interfaces for all major field bus protocols
- Dual rating function (ND/HD)
- Connects to PM motors
- PLC functions (Logic Sequence)
- STO/SS1 according to IEC/EN61800-5-2

The VF-S15PL-W1 is convincing in functionality and precision in the mid-range performance class. With its constant response time, the dual rating operation and many functions for easy operation and configuration the VF-S15PL-W1 becomes the first choice in most applications within the power range from 0.25 kW up to 15 kW. Many common field bus interfaces are available as plug-in hardware modules.

This premium equipment of the VF-S15PL-W1 enhances the application range to demanding applications with respect to safety functions, energy efficiency and drive control. It includes a safety function STO, integrated PLC functions (Logic Sequence), servo lock, PM motor drive capability and an application software package for quick and easy configuration.

VF-FS1 - The HVAC specialist



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



- Low harmonics, high power factor
- Extremely compact
- EMC filter C2
- EMC filter C1 and IP55 optional
- PID control, logic functions AND, OR

The VF-FS1 features a proven technology to reduce input current harmonics. Although its extremely compact dimensions it complies with the specifications 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.

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 field-bus interfaces especially for building automation (BACnet®, Metasys® N2, APOGEE® FLN, LonWorks®) into the inverter.

Over the complete power range up to 75 kW these inverters are also available with protection class IP54/55.

VF-AS3 - The revolution



- Dual Rating (Normal Duty, Heavy Duty)
- Lifting and craine applications
- Textile machines
- Pattern sequence control
- Complex machines and plants
- Pumps and fans
- Conveyors
- Centrifugals



- IoT / Industry 4.0 Ready
- Integrated EMC filter
- Integrated Breaking unit (up to 90 kW (ND) & at 220 kW (ND))
- PLC functions (Logic Sequence)
- 2x STO acc. to IEC/EN61800-5-2
- Optional SS1, SOS, SS2, SBC, SLS and SDI
- 2x DC-Reactor (up to 220 kW add-on module)
- NEMA Type 1 (up to 90 kW optional)
- Certifications CE, UL, CSA, TÜV
- Real Time Clock - Calendar/Time Stamp function
- Access to Web Server via QR-Code®
- Controlled deceleration after power failure
- Terminal block removable
- Four built-in PID controllers
- Embedded positioning control
- Integrated multi pump control for up to ten pumps
- Opt. interfaces: DeviceNet®, Profinet®, ModbusTCP/IP®, PROFIBUS®DP, EtherNet/IP®, EtherCAT®, CANopen®

The high-performance TOSHIBA VF-AS3 achieves high speed/real time network communication via embedded Ethernet without any optional devices, ready to meet the requirement of modern automation with IoT and Industry 4.0.

Also, VF-AS3 with TOSHIBA excellent motor control technology and hardware design helps for all your applications and is available in the power range from 0,4 kW to 315 kW.

The TOSHIBA VF-AS3 improve effectivity and productivity of plant and machinery. The high torque-precision and the excellent dynamic, both with and without speed feedback, effect a superior motor control performance, associated with substantially less energy consumption and extended life cycle of the plant. Furthermore, diverse safety functions are modular realisable.

The safety standard with STO (Safe Torque Off) function,

2-channel and other safety functions optional, ensures the reliable cut-off in emergency situations according to IEC61800-5-2.

The integrated Web-Server enable the user a system-independent access to all data and parameters of the application and provide in addition the complete possibility for optimisation and fault analysis.

The built-in dual DC reactor suppresses harmonic current and improves power factor. VF-AS3 complies with IEC61000-3-12 and achieves total harmonic distortion (THDi) \leq 48% without external reactor (480V Class only).

The integrated EMC filter is designed according to IEC61800-3 category C2 / C3 (400V-class).

Over the complete power range up to 90 kW these inverters are also available with protection class IP54/55.

Specifications	VF-nC3	VF-MB1	VF-S15	VF-FS1	VF-AS3 ND*	VF-AS3 HD*
Main power supply ¹⁾ 1-ph. 100...115 V 1-ph. 200...240 V 3-ph. 200...240 V 3-ph. 380...480 V 3-ph. 380...500 V 3-ph. 525...600 V 3-ph. 500...690 V	0,1...0,75 kW 0,2...2,2 kW 0,1...4,0 kW — — — —	— 0,2 ... 2,2 kW — — 0,37 ... 15 kW — —	— 0,25...2,2 kW 0,37...15 kW — 0,37 ...15 kW — —	— — 0,37...30 kW 0,37 ... 75 kW — — —	— — 0,75 ... 75 kW 0,75 ... 315 kW — — —	— — 0,4 ... 55 kW 0,4 ... 280 kW — — —
Maximum output frequency	400 Hz	500 Hz	500 Hz	200 Hz	590 Hz	
Overload capability 60 s short time	150 % 200 % (0,5 s)	150 % ²⁾ 200 % (0,5 s)	150 % ²⁾ 200 % (0,5 s)	110 % 180 % (2 s)	120 % 135 % (2 s)	150 % 180 % (2 s) (from 160 kW 165% (2 s))
Maximum ambient temperature	-10... +50/60 °C	-10...+60 °C	-10...+60 °C	-10... +50/60 °C	-15 ... +60 °C	
Integrated EMC filter EN61800-3 category EN55011 class	C1 B Group 1	C2 A Group 1	C2 A Group 1	C1/C2 ³⁾ B/A Group 1 ³⁾	C2/C3 ³⁾ B / A Group 1 ³⁾	
Integrated DC reactor	—	—	—	—	0,75 ... 160 kW	0,4 ... 132 kW
Integrated braking unit	—	●	●	—	0,75 ... 90 kW/ 220 kW	0,4 ... 75 kW / 160 kW
Protection class IP20 IP54 (1-ph. 200 V class) IP54 (3-ph. 200 V class) IP54 (3-ph. 400 V class)	● ● — —	● — — —	● — — —	● ⁴⁾ — — 0,75...75 kW	● ⁵⁾ — — 0,75...90 kW	● ⁵⁾ — — 0,4 ... 75 kW
Terminal block exchangeable Digital inputs Digital outputs Relais Analog inputs Analog outputs PTC evaluation Pulse input Pulse output	— 5 1 1 1 1 ● 1 0,38... 1,6 kHz	— 8 1 2 3 1 ● 0,01 ... 20 kHz 0,01...2 kHz	● 8 1 2 3 1 ● 0,01 ... 20 kHz 0,01...2 kHz	● 4 — 2 2 1 Option —	● 8 1 3 3 2 ● 0,01 ... 60 kHz 0,01 ... 30 kHz	—
V/f control methods Constant torque (linear) Variable torque (square) 7 points selectable Automatic torque boost Sensorless vector control with- out speed feedback Closed loop vector control with speed feedback Energy saving control PM-(Servo-) motors Torque limit Torque control with reference	● ● — ● ● — ● — — —	● ● ● ● ● — ● ● — —	● ● ● ● ● — ● ⁵⁾ ● — —	● ● — ● — — ● ● — —	● ● ● ● ● ● — ● — —	—
Function example Fixed speeds Speed up/down 3-wire operation Logic functions DC brake Catch on the fly Controlled deceleration after power black-out Acceleration/deceleration ramps PID control Automatic suspend after low reference Emergency operation (FIRE/FORCE) Special functions for textile machines Special functions for lifting applications Maintain position STO/SS1 in acc. with IEC/EN61800-5-2 Pump cascade Positioning	15 ● ● AND + OR ● ● ● 2 ● after 0 ... 600 s — — — — — — —	15 ● ● ● ● ● ● 3 ● after 0 ... 600 s ● ● ● ● — — —	15 ● ● ● ● ● ● 3 ● after 0 ... 600 s ● ● ● ● ⁶⁾ ● ⁶⁾ — — —	8 ● ● AND + OR ● ● — 2 ● after 0 ... 600 s ● — — — — —	31 ● ● ● ● ● ● ● 4 ● after 0 ... 600 s ● ● ● ● STOA / STOB ● ●	—

*) ND= Normal Duty; HD= Heavy Duty

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

2) Dual Rating function at reduced overload capacity

3) VF-FS1 and VF-AS3 supplied in protection class IP54/55 have integrated EMC filters category C1, class B group 1

4) VF-FS1 with power rating greater 22 kW in metal housing: IP21 with optional terminal cover

5) VF-AS3 with power rating greater 110 kW (ND) with optional NEMA type 1 kit available

6) Depending on model

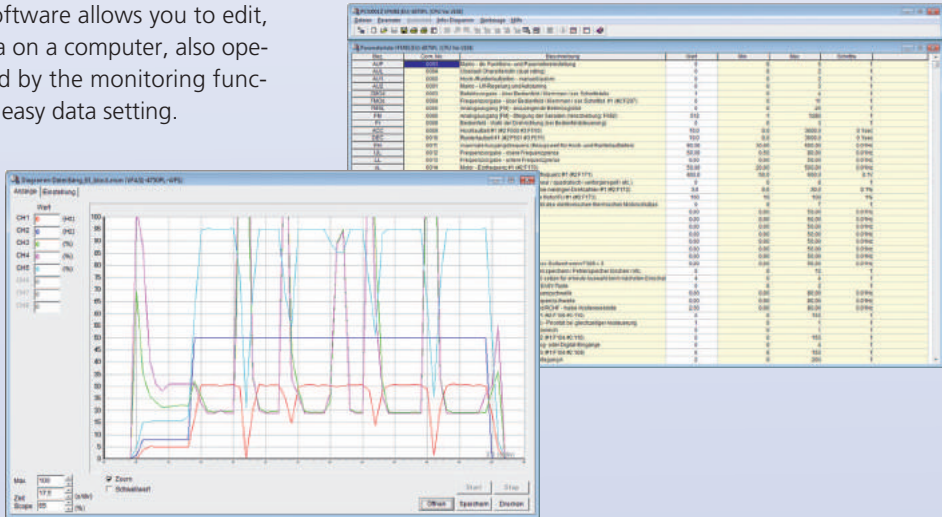
Options	VF-nC3	VF-MB1	VF-S15	VF-FS1	VF-AS3
Fieldbus communication interfaces CANopen® Profibus® DP ProfiNet® Modbus TCP/IP DeviceNet® CC-Link® LonWorks® BACnet® Metasys® N2 APOGEE® FLN EtherCAT® EtherNet/IP®	— — — — — — — — — — — —	Standard PDP003Z — IPE002Z DEV003Z — — — — — IPE003Z IPE002Z	CAN00xZ PDP003Z PNE001Z IPE002Z DEV003Z CCL003Z — — — — IPE003Z IPE002Z-1	— — — — — — LIU007Z BCN002Z MTS002Z APG002Z — —	CAN00xZ PDP003Z PNE001Z ● DEV003Z — — — — — IPE003Z Standard
Speed feedback for incremental encoders	—	—	—	—	VEC008Z
Speed feedback for resolver	—	—	—	—	VEC010Z
Terminal extensions	—	—	—	—	1
External operation terminals Hakko® Touchpanel LED numerical display LCD text display	● RKP002Z, RKP007Z MITOS-VT6	● RKP002Z, RKP007Z MITOS-VT6, RKP004Z	● RKP002Z, RKP007Z MITOS-VT6	● RKP002Z, RKP007Z MITOS-VT6	● RKP002Z, RKP007Z MITOS-VT6, RKP010Z
Parameter writer	PWU003Z, RKP002Z	RKP002Z, RKP004Z	RKP002Z	RKP002Z	RKP002Z/RKP010Z
EMC filter EN61800-3 category C1, EN55011 classe B group 1	TOS-NF	TOS-NF	TOS-FPFA	TOS-FPFA TOS-NF	TOS-NF
Input reactors 1-ph. WSN series 3-ph. DWSN series Motor reactors DWSM series dV/dt motor filter ULC series Sinus wave filters UAF series	● — ● ● ●	● ● ● ● ●	● ● ● ● ●	— not necessary ● ● ●	— ● ● ● ●
PC programming cable for USB: USB001Z	●	●	●	●	●
Braking resistors Breaking units Regenerative power feedback units	● ● —	● integrated ●	● integrated ●	— — —	● integrated ¹⁾ ●

1) VF-AS3: up to 90 kW (ND) braking unit integrated; from 110 kW up to 160 kW (ND) optional; 220 kW (ND) integrated; from 250 kW (ND) optional

Communication software PCM002Z-0 (Option)

The PCM002Z communication software allows you to edit, monitor and trace parameter data on a computer, also operation conditions can be analyzed by the monitoring function. Inverter can be managed by easy data setting.

The graphical representation of all operating data on eight channels (with trigger function) can be stored in various file formats. These data can be imported by other applications such as for example EXCEL® for analysis and further processing.



Toshiba frequency inverter product family

VF-nC3

The compact class

0,2 ... 2,2 kW



VF-MB1

The innovative

0,25 ... 15 kW



VF-S15

The allrounder

0,25 ... 15 kW



VF-FS1

The HVAC specialist

0,37 ... 75 kW



VF-AS3

The revolution

0,37 ... 315 kW



- Machine tools
- Building automation
- Conveyors
- Compact machines



- Packaging machines and machine tools
- Pumps and fans
- Conveyors
- Lifting and crane applications



- Industrial applications
- Machine and plant building
- Conveyors
- Elevators, lifting and crane applications



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



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



Alternative protection class IP54/55



Torque controlled drives



PLC functions integrated



Conveyors



Safety-related applications



IoT / Industry 4.0 Ready



Crane applications



Building automation HVAC



Pumps and fans



Machine and plant building



Networking capabilities