CKVJ-1301

TOSHIBA

Leading Innovation

Variable Speed Drive

TOSVERT VF-AS3

High-performance Drive

TOSVERT VF-AS3

Variable Speed Drive for Industry

Voltage class		Applicable motor capacity (kW) : Multi ratings																						
	HD	0.4	0.75	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	200	220	280
	ND	0.75	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	220	250	280	315
3ph-240V class (IP20/IP00)		A1				A2	A3			A4			A5			A6								
3ph-480V class (IP20/IP00)		A1					A2			A3			A4			A5			A6		A7	A8		
3ph-480V class (IP55)		A1E					A2E			A3E			A4E			A5E								

*A1 to A8 and A1E to A5E show frame size of the drives

Contents

Evolution to IoT-Ready drive.

The VF-AS3 is an IoT-Ready variable speed drive. Using Internet, the VF-AS3 provides various solutions to you.

Built-in Dual Ethernet Port

The VF-AS3 has an embedded Ethernet dual port adaptor that can be used in the following Modbus TCP and EtherNet/IP. The adaptor provides a set of services at the Ethernet and TCP/IP level.

The dual Ethernet port adaptor offers an embedded Web server which offers comfortable displaying and commissioning functions directly from a standard web browser.

The VF-AS3 supports the following Automatic IP address assignment via BOOTP and DHCP and Diagnostics and configuration via integrated Web server.

Remote Sensor Monitoring

The sensor which is equipped in the machine and equipment, can be connected with VF-AS3 and the status can be monitored by network communication.

Dual Ethernet Port

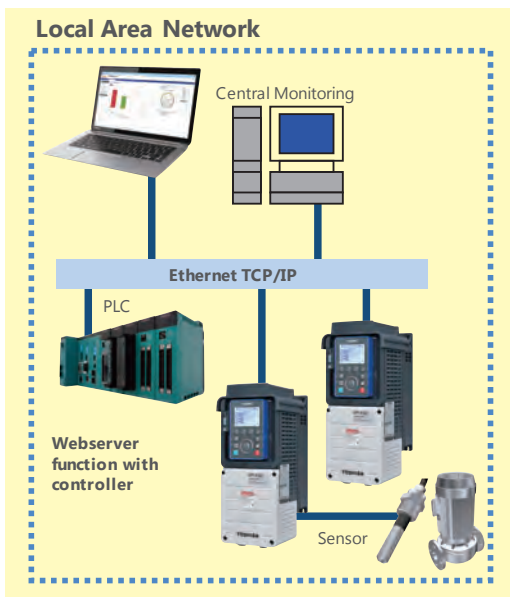
Motor & Sensor

IoT Systems Solution

-Ideal for Plant & Process Control Application

The VF-AS3 can be connected with various devices through local area network, wireless network, and the Internet. It achieves data collection to know operational status and analyze system failure.

This IoT-Ready function increase productivity and reduce total cost.



Web Server

The VF-AS3 has an embedded Web Server function, and it can be easily accessed and manage the operating condition remotely from your PC or Smart Phone/tablet devices. It can be monitored by standard web browser without any special software.

The widgets can be customized easily. The integrated web server is ideally suited for applications in which no special software or version dependencies are desired.

The product supports the following functions on Web server:

- Drive monitor
- Drive parameters read/write
- Trip history viewer
- Network parameter setting
- Administration function
- TCP/IP statistics monitor

Web Server Image

QR Code®

For the advanced information and the event of drive fault, VF-AS3 displays the QR Code®(*1), which will provide immediate access to a dedicated web link for support and maintenance.

(*1) QR Code® is registered trademarks of DENSO WAVE INCORPORATED

Video Guidance

For the installation, setup and maintenance, the video guidance is available with web support.

Video Guidance Image

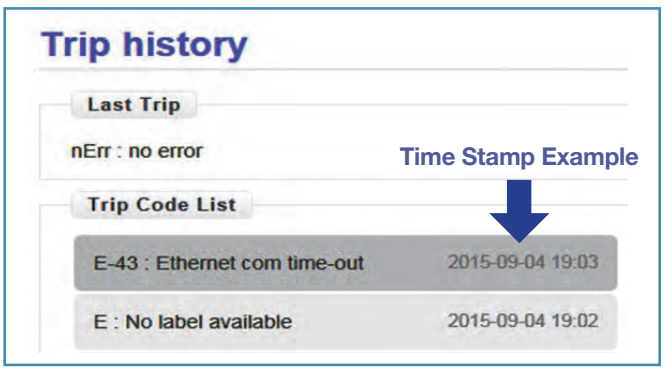
QR Code® Example

Real Time Clock - Calendar/Time Stamp function

The VF-AS3 has RTC (Real Time Clock) built-in. The calendar (work day, holiday, etc.) can be easily set by parameters.

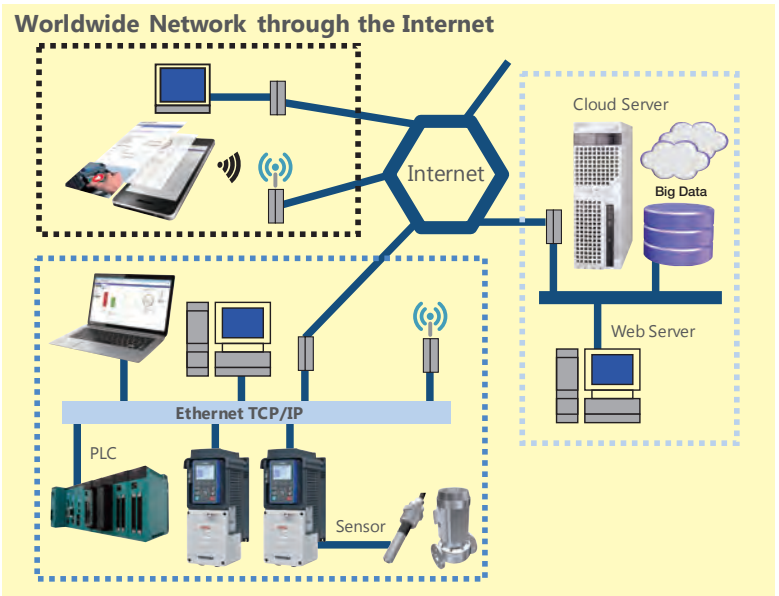
Output terminal signal is ON at the day of the week, hour and minute set as "work day-time" by parameters.

The output terminal signal can be used as machine operation, pattern operation, and my function in the drive.



Wireless Network

Worldwide Network through the Internet



Ideal for various applications.

The VF-AS3 has various functions dedicated to various applications.
The VF-AS3 will be the ideal choice for a wide variety of uses.

For Oil & Gas / Mining Industry

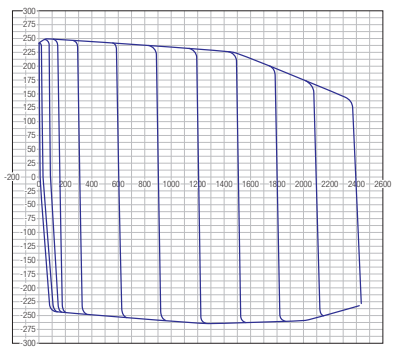
Jack pumps / Compressor / Conveyor / Crushers

Multi ratings – excellent motor control performance

The VF-AS3 has the multi ratings and can drive for various application with HD(150%-60sec) and ND(120%-60sec). It is available for both heavy-load application and light-load application.

The starting torque with sensor-less vector control is 200% with 0.3Hz or more. The VF-AS3 achieves high starting torque and high accuracy regenerative torque at low frequency.

Torque characteristics



Drive: VFAS3-4022P Motor: 480V-2.2kW-IE3

Easy to set up with Auto-tuning function

The VF-AS3 has the Auto-tuning function that automatically optimizes the drive parameters.

The moment of inertia of machine and equipment can also be set easily by Auto-tuning function.

PM motor drive

PM motor drive technology has been implemented in VF-AS3 as a standard feature. The VF-AS3 can control both induction and permanent magnetic synchronous motors with/without feedback sensor, allowing them to use for the variety of purposes.

The VF-AS3 can drive both interior permanent magnetic motor (IPM) and surface permanent magnetic motor (SPM).

PM Motor

For Conveyor / Crane Industry

Transportation machine / Conveyor / Crushers / Compressor

Embedded positioning control

VF-AS3 has sensor / sensor-less position control with point to point, Pulse input and Orientation, which is suitable for applications such as processing machine for high precision control.

Excellent flexibility by My Function (logic function)

My function adds programming capability to the drive's input/output signals without external relays or PLC (programmable logic controller). The function makes it possible to reduce the space and cost required for the system.

My function has the relay sequence function that combines logic operation functions. The relay sequence function enables the drive to perform itself in 52 steps (4 steps x 7 units + 24 steps) without PLC. The processing speed is faster than control with PLC as the function uses internal data and signals directly.

For Water & Wastewater Industry

Fan / Pump / Centrifuges

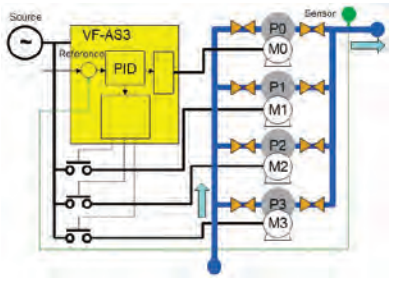
Multi pump control – maximum 10 pumps

The VF-AS3 can drive multiple pump motors (maximum ten pumps) and save the power of water pump system by controlling each pump appropriately, realizing great cost reduction.

Each pump is connected to commercial power via magnetic contactor which is controlled by relay output signal of the drive.

There are 3 relay output terminals on the drive. Furthermore, two I/O extensions can be inserted to the drive. Each I/O extension has 3 relay output terminals, and thus a maximum of 9 relay output terminals can be used.

System example of multi pump controller

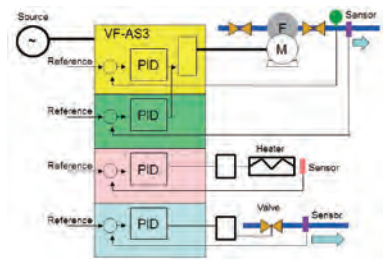


Space-saving and cost reduction by four embedded PID controllers

VF-AS3 has four built-in PID controllers: two for drives (motors) and other two for other devices including heaters and valves. The built-in PID controllers are available at the same time for many purposes. It can help reduce cost and space because it can omit additional external PID controllers.

The PID functions include temperature or pressure control of fan and pump, speed control of a winder, stop position control, etc.

Example of 4 PID applications



For Chemical / Pharmaceutical Industry

Pumps / Mixers / Compressor / Centrifuges / Fans

Enhanced environment resistance

- Comply with the chemicals (3C3)/dust (3S3) standards of IEC60721-3-3. (Frame size A6 or smaller)
- Can be used at an altitude of up to 4800 m. (Frame size A6 or smaller)
- The inverter is operable at an ambient temperature of -15 to +60°C. (Frame size A7, A8: -10 to +60°C)
- The design expectancy life time of the cooling fan, smoothing aluminum electrolytic capacitor for power circuit, and aluminum electrolytic capacitor for control circuit are ten years. (Fan of frame size A7, A8: Five years)

* Average ambient temperature 40°C, load factor 80% or less, 24-hour and 365 days operation

All-in-One. Improvement in Usability.

The VF-AS3 allows various functions without external options.
The VF-AS3 realizes improvement in usability and cost reduction.
Not necessary to prepare optional devices separately.

Reliable safety function

The VF-AS3 has STO (Safe Torque Off) function as standard and is highly reliable to cut off output in an emergency.

The STO function brings the machine safely into a no-torque state and prevents it from starting accidentally.

It complies with safety standard IEC 61800-5-2 and also achieves SIL3 level in IEC 61508 : 2010.

In addition, the following safety functions are available as options:

-SS1 (Safe Stop 1)
-SOS (Safe Operating Stop)
-SS2 (Safe Stop 2)
-SBC (Safe Brake Control)
-SLS (Safely-Limited Speed)
-SDI (Safe Direction)

Mechanisms of STO function

Harmonics reduction

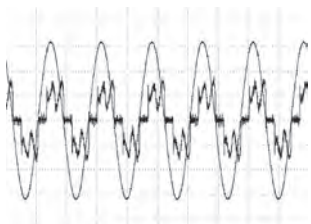
The VF-AS3 is very friendly to a power supply system and peripheral equipment. The built-in dual DC reactor(*1) suppresses harmonic current and improves power factor.

VF-AS3 complies with IEC61000-3-12 and achieves total harmonic distortion (THDi) ≦ 48% without external reactor. (480V Class only)

(*1) Frame size A7,A8: Attached DCL

Built-in DC Reactor

Example of input current/voltage waveform



High-frequency noise reduction

The built-in EMC filter suppresses high frequency noise. The filter is ideal for sites such as commercial facilities, offices and factories where attentions must be paid to peripheral devices.

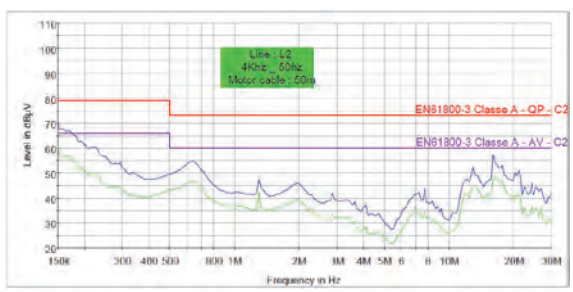
The VF-AS3 complies with EMC directive of IEC61800-3 Category C2/C3 without external filter. (480V Class only)

In addition, the VF-AS3 has built-in UL Type 1 terminal box integrated with EMC plate.

Built-in EMC Filter

Built-in UL Type1 kit

Example of generated frequency noise data



Detachable operation panel

The operation panel is detachable and easy to attach an external control console with door mounting kit. The optional panel is not required.

The protection level of the keypad is enclosed type with door mounting kit, which means dust-proof and wash-down capable.

The touch wheel has high sensitivity, which allows easy, smooth operation.

Touch wheel

Detachable operation panel

Wide, multi-language LCD screen (HMI)

The wide LCD screen (240 x 160 dots) displays multiple items at the same time, allowing easy setting of parameters.

If the VF-AS3 trips, the panel will turn red in back light color, and it's easy to recognize.

The panel can be displayed in multiple languages including German, Italian, Spanish, French, Portuguese, Russian, Chinese and Japanese as well as English.

Example of monitor mode

Example of error

Detachable control terminal block

Detachable terminal block allows you to use the current control wiring when replacing the drive. It also makes maintenance much easier.

Detachable control terminal block

Various options

If more additional options are required, cassette-type options for network, extended terminal block, sensor feedback, and safety function can be added easily.

Communication network:

PROFINET (*1), PROFIBUS-DP (*1), DeviceNet™ (*2), EtherCAT® (*3), CANopen® (*4)

(*1) PROFINET and PROFIBUS-DP are registered trademarks of PROFIBUS and PROFINET International .
(*2) DeviceNet™ is a registered trademark of ODVA.
(*3) EtherCAT® is a registered trademark of Beckhoff Automation .
(*4) CANopen® is a registered trademark of CAN in Automation.

Inputs/Outputs:

Digital & Analog I/Os: 6-Digital Input, 2-Digital Output, 2-Analog Input
Relays: 3-Relay

Safety:

Safety option (SS1, SOS, SS2, SBC, SLS, SDI)

Sensor feedback:

Digital encoder: RS422 Line receiver

Resolver

Slots for options

Cassette-type options

Standard specifications

Standard specifications

<240 V class: HD rating>

Item		Specification														
Voltage class		240 V class														
Frame size		A1				A2	A3		A4			A5			A6	
Applicable motor (kW)		0.4	0.75	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55
Applicable motor (HP)		0.5	1	2	3	5	7.5	10	15	20	25	30	40	50	60	75
Rating	Type	VFAS3-														
	Form	2004P	2007P	2015P	2022P	2037P	2055P	2075P	2110P	2150P	2185P	2220P	2300P	2370P	2450P	2550P
	Output capacity (kVA)*1	1.3	1.8	3.0	4.3	7.1	9.7	12.5	17.8	24.2	29.9	35.3	46.9	56.8	67.1	80.4
	Output current (A)*2	3.3	4.6	8.0	11.2	18.7	25.4	32.7	46.8	63.4	78.4	92.6	123	149	176	211
	Output voltage	3-phase 200 V to 240 V (The maximum output voltage is equal to the input supply voltage)														
	Overload current rating	150%-1 minute, 180%-2 s														
Elecal braking	Dynamic braking circuit	Built-in													Optional	
	Dynamic braking resistor	External braking resistor (Optional)														
Power supply	Voltage-frequency	3-phase 200 V to 240 V - 50/60 Hz														
	Allowable fluctuation	Voltage 170 V to 264 V*3, Frequency ± 5%														
	Required power supply capacity (kVA) *4	0.7	1.4	2.4	3.7	5.9	7.7	10.5	15.7	20.6	24.9	30.7	40.5	49.6	61.0	73.3
Degree of protection (IEC60529)		IP20													IP00	
Cooling method		Forced air-cooled														
Color		RAL7016 / RAL7035														
EMC filter (IEC61800-3)	Built-in filter	-														
	External filter *5	C2-50m (Carrier frequency: 4.0 kHz), C3-150m (4.0 kHz)										C2-50m (2.5 kHz), C3-150m (2.5 kHz)				
DC reactor		Built-in														
UL type1 kit		Built-in													Optional	
Harmonics THDi ≦ 48% (IEC61000-3-12)		Refer to the instruction manual for the current level														

<240 V class: ND rating>

Item		Specification														
Voltage class		240 V class														
Frame size		A1				A2	A3		A4			A5			A6	
Applicable motor (kW)		0.75	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75
Applicable motor (HP)		1	2	3	5	7.5	10	15	20	25	30	40	50	60	75	100
Rating	Type	VFAS3-														
	Form	2004P	2007P	2015P	2022P	2037P	2055P	2075P	2110P	2150P	2185P	2220P	2300P	2370P	2450P	2550P
	Output capacity (kVA)*1	1.8	3.0	4.3	7.1	9.7	12.5	17.8	24.2	29.9	35.3	46.9	56.8	67.1	80.4	107
	Output current (A)*2	4.6	8.0	11.2	18.7	25.4	32.7	46.8	63.4	78.4	92.6	123	149	176	211	282
	Output voltage	3-phase 200 V to 240 V (The maximum output voltage is equal to the input supply voltage)														
	Overload current rating	120%-1 minute, 135%-2 s														
Electrical braking	Dynamic braking circuit	Built-in													Optional	
	Dynamic braking resistor	External braking resistor (Optional)														
Power supply	Voltage-frequency	3-phase 200 V to 240 V - 50/60 Hz														
	Allowable fluctuation	Voltage 170 V to 264 V*3, Frequency ± 5%														
	Required power supply capacity (kVA) *4	1.2	2.3	3.3	5.9	7.8	10.3	15.0	20.6	24.9	29.4	40.5	49.3	59.6	73.3	98.1
Degree of protection (IEC60529)		IP20													IP00	
Cooling method		Forced air-cooled														
Color		RAL7016 / RAL7035														
EMC filter (IEC61800-3)	Built-in filter	-														
	External filter *5	C2-50m (Carrier frequency: 4.0 kHz), C3-150m (4.0 kHz)										C2-50m (2.5 kHz), C3-150m (2.5 kHz)				
DC reactor		Built-in														
UL type1 kit		Built-in													Optional	
Harmonics THDi ≦ 48% (IEC61000-3-12)		Refer to the instruction manual for the current level														

*1: Capacity is calculated at 220 V for the 240 V class.
*2: Indicates rated output current setting when the PWM carrier frequency (parameter F300) is 4 kHz for frame size A1 to A5, 2.5 kHz for frame size A6.
*3: Lower limit of voltage for 240 V class is 180 V when the inverter is used continuously (load of 100%).
*4: Required power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and wires).
*5: Contact your Toshiba distributor for detail.

<480 V class: HD rating>

Item		Specification												
Voltage class		480 V class												
Frame size		A1					A2		A3			A4		
Applicable motor (kW)		0.4	0.75	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37
Applicable motor (HP)		0.5	1	2	3	5	7.5	10	15	20	25	30	40	50
Rating	Type	VFAS3-												
	Form	4004PC	4007PC	4015PC	4022PC	4037PC	4055PC	4075PC	4110PC	4150PC	4185PC	4220PC	4300PC	4370PC
	Output capacity (kVA)*1	1.1	1.7	3.0	4.3	7.1	9.7	12.6	17.9	24.2	29.9	35.3	46.9	56.8
	Output current (A)*2	1.5	2.2	4.0	5.6	9.3	12.7	16.5	23.5	31.7	39.2	46.3	61.5	74.5
	Output voltage	3-phase 380 V to 480 V (The maximum output voltage is equal to the input supply voltage)												
	Overload current rating	150%-1 minute, 180%-2 s												
Electrical braking	Dynamic braking circuit	Built-in												
	Dynamic braking resistor	External braking resistor (Optional)												
Power supply	Voltage-frequency	3-phase 380 V to 480 V - 50/60 Hz												
	Allowable fluctuation	Voltage 323V to 528V*3 , Frequency ± 5%												
	Required power supply capacity (kVA) *4	0.7	1.4	2.6	3.9	6.6	8.5	11.4	16.6	22.3	27.3	32.7	44.3	53.9
Degree of protection (IEC60529)		IP20												
Cooling method		Forced air-cooled												
Color		RAL7016 / RAL7035												
EMC filter (IEC61800-3)	Built-in filter	C2-50m (Carrier frequency: 4.0 kHz), C3-150m (4.0 kHz)												
	External filter *5	C2-150m (Carrier frequency: 4.0 kHz), C3-300m (4.0 kHz)												
DC reactor		Built-in												
UL type1 kit		Built-in												
Harmonics THDi ≦ 48% (IEC61000-3-12)		Refer to the instruction manual for the current level												

Item		Specification									
Voltage class		480 V class									
Frame size		A5			A6			A7	A8		
Applicable motor (kW)		45	55	75	90	110	132	160	200	220	280
Applicable motor (HP)		60	75	100	125	150	200	250	300	350	450
Rating	Type	VFAS3-									
	Form	4450PC	4550PC	4750PC	4900PC	4110KPC	4132KPC	4160KPC	4200KPC	4220KPC	4280KPC
	Output capacity (kVA)*1	67.1	80.8	111	132	161	191	239	295	325	419
	Output current (A)*2	88.0	106	145	173	211	250	314	387	427	550
	Output voltage	3-phase 380 V to 480 V (The maximum output voltage is equal to the input supply voltage)									
	Overload current rating	150%-1 minute, 180%-2 s						150%-1 minute, 165%-2 s			
Electrical braking	Dynamic braking circuit	Built-in			Optional			Built-in	Optional		
	Dynamic braking resistor	External braking resistor (Optional)									
Power supply	Voltage-frequency	3-phase 380 V to 480 V - 50/60 Hz						3-phase 380 to 440 V - 50 Hz, 3-phase 380 to 480 V - 60 Hz			
	Allowable fluctuation	Voltage 323 V to 528 V*3, Frequency ± 5%						Voltage 323 to 484 V - 50 Hz, 323 V to 528 V - 60 Hz*3, Frequency ± 5%			
	Required power supply capacity (kVA) *4	65.6	79.5	108	133	155	181	225	275	308	379
Degree of protection (IEC60529)		IP20			IP00						
Cooling method		Forced air-cooled									
Color		RAL7016 / RAL7035									
EMC filter (IEC61800-3)	Built-in filter	C3-150m (2.5 kHz)						C3-50m (2.5 kHz)			
	External filter *5	C2-150m (2.5 kHz), C3-300m (2.5 kHz)						C2-100m (2.5 kHz)			
DC reactor		Built-in						Attached			
UL type1 kit		Built-in			Optional			-			
Harmonics THDi ≦ 48% (IEC61000-3-12)		Refer to the instruction manual for the current level									

*1: Capacity is calculated at 440 V for the 480 V class.
*2: Indicates rated output current setting when the PWM carrier frequency (parameter F300) is 4 kHz for frame size A1 to A5, 2.5 kHz for frame size A6 to A8.
*3: Lower limit of voltage for 480 V class is 342 V when the inverter is used continuously (load of 100%).
*4: Required power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and wires).
*5: Contact your Toshiba distributor for detail.

<480 V class: ND rating>

Item		Specification												
Voltage class		480V class												
Frame size		A1					A2		A3			A4		
Applicable motor (kW)		0.75	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37	45
Applicable motor (HP)		1	2	3	5	7.5	10	15	20	25	30	40	50	60
Rating	Type	VFAS3-												
	Form	4004PC	4007PC	4015PC	4022PC	4037PC	4055PC	4075PC	4110PC	4150PC	4185PC	4220PC	4300PC	4370PC
	Output capacity (kVA)*1	1.7	3.0	4.3	7.1	9.7	12.6	17.9	24.2	29.9	35.3	46.9	56.8	67.1
	Output current (A)*2	2.2	4.0	5.6	9.3	12.7	16.5	23.5	31.7	39.2	46.3	61.5	74.5	88.0
	Output voltage	3-phase 380 V to 480 V (The maximum output voltage is equal to the input supply voltage)												
	Overload current rating	120%-1 minute, 135%-2 s												
Electrical braking	Dynamic braking circuit	Built-in												
	Dynamic braking resistor	External braking resistor (Optional)												
Power supply	Voltage-frequency	3-phase 380 V to 480 V - 50/60 Hz												
	Allowable fluctuation	Voltage 323 V to 528 V*3 , Frequency ± 5%												
	Required power supply capacity (kVA) *4	1.2	2.4	3.4	6.1	8.3	10.9	15.6	21.3	26.4	31.4	42.0	52.4	63.2
Degree of protection (IEC60529)		IP20												
Cooling method		Forced air-cooled												
Color		RAL7016 / RAL7035												
EMC filter (IEC61800-3)	Built-in filter	C2-50m (Carrier frequency: 4.0 kHz), C3-150m (4.0 kHz)												
	External filter *5	C2-150m (Carrier frequency: 4.0 kHz), C3-300m (4.0 kHz)												
DC reactor		Built-in												
UL type1 kit		Built-in												
Harmonics THDi ≦ 48% (IEC61000-3-12)		Refer to the instruction manual for the current level												

Item		Specification									
Voltage class		480 V class									
Frame size		A5			A6			A7	A8		
Applicable motor (kW)		55	75	90	110	132	160	220	250	280	315
Applicable motor (HP)		75	100	125	150	200	250	350	400	450	500
Rating	Type	VFAS3-									
	Form	4450PC	4550PC	4750PC	4900PC	4110KPC	4132KPC	4160KPC	4200KPC	4220KPC	4280KPC
	Output capacity (kVA)*1	80.8	111	132	161	191	230	325	367	419	469
	Output current (A)*2	106	145	173	211	250	302	427	481	550	616
	Output voltage	3-phase 380 V to 480 V (The maximum output voltage is equal to the input supply voltage)									
	Overload current rating	120%-1 minute, 135%-2 s									
Electrical braking	Dynamic braking circuit	Built-in			Optional			Built-in	Optional		
	Dynamic braking resistor	External braking resistor (Optional)									
Power supply	Voltage-frequency	3-phase 380 V to 480 V - 50/60 Hz						3-phase 380 to 440 V - 50 Hz, 3-phase 380 to 480 V - 60 Hz			
	Allowable fluctuation	Voltage 323 V to 528 V*3, Frequency ± 5%						Voltage 323 to 484 V - 50 Hz, 323 V to 528 V - 60 Hz*3, Frequency ± 5%			
	Required power supply capacity (kVA) *4	77.0	103	125	155	181	214	296	335	379	422
Degree of protection (IEC60529)		IP20			IP00						
Cooling method		Forced air-cooled									
Color		RAL7016 / RAL7035									
EMC filter (IEC61800-3)	Built-in filter	C3-150m (2.5 kHz)						C3-50m (2.5 kHz)			
	External filter *5	C2-150m (2.5 kHz), C3-300m (2.5 kHz)						C2-100m (2.5 kHz)			
DC reactor		Built-in						Attached			
UL type1 kit		Built-in			Optional			-			
Harmonics THDi ≦ 48% (IEC61000-3-12)		Refer to the instruction manual for the current level									

*1: Capacity is calculated at 440 V for the 480 V class.
*2: Indicates rated output current setting when the PWM carrier frequency (parameter F300) is 4 kHz for frame size A1 to A5, 2.5 kHz for frame size A6 to A8.
*3: Lower limit of voltage for 480 V class is 342 V when the inverter is used continuously (load of 100%).
*4: Required power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and wires).
*5: Contact your Toshiba distributor for detail.

Common Specifications

	Item	Specification
Control specifications	Control system	Sinusoidal PWM control
	Output voltage adjustment	Adjustable within the range of 50 - 330 V (240 V class) and 50 - 660 V (480 V class) by correcting the supply voltage
	Output frequency range	Setting between 0.01 - 590 Hz. Default max. frequency is set to 0.01 - 80 Hz. Maximum frequency adjustment (30 to 590Hz)
	Minimum setting steps of frequency	0.01 Hz: operation panel input (60 Hz base), 0.03 Hz: analog input (60 Hz base, 11 bit/0 - 10 Vdc)
	Frequency accuracy	Analog input: ±0.2% of the maximum output frequency (at 25±10°C) Digital input: ±0.01%±0.022 Hz of the output frequency
	Voltage/frequency characteristics	V/f constant, variable torque, automatic torque boost, vector control, PM motor control, base frequency adjustment 1, 2, 3, and 4 (15 - 590Hz), V/f 5-point arbitrary setting, torque boost adjustment (0 - 30%), start frequency adjustment (0 - 10 Hz), stop frequency adjustment (0 - 30 Hz)
	Frequency setting signal	3 kΩ potentiometer (possible to connect to 1 - 10 kΩ-rated potentiometer) 0 - 10Vdc (input impedance Zin: 31.5 kΩ) -10 to +10 Vdc (Zin: 31.5 kΩ) 4 - 20 mAdc (Zin: 250 Ω)
	Terminal block frequency command	The characteristic can be set arbitrarily by two-point setting. Compliant with 7 types of input; analog input (RR, RX, II, AI4, AI5), and pulse input (S4, S5)
	Frequency jump	Three frequency can be set. Setting of jump frequency and width.
	Upper and lower limit frequencies	Upper limit frequency: 0 to max. frequency, lower limit frequency: 0 to upper limit frequency
	PWM carrier frequency	Frame size A1 to A4: adjustable between 1.0 - 16 kHz Frame size A5 to A8: adjustable between 2.5 - 8 kHz
	PID control	Adjustment of proportional gain, integral time, differential time and delay filter. Multi PID and external PID control.
	Torque control	Voltage command input specification: -10 - +10 Vdc
	Real Time Clock (RTC)	Current time (year, month, date, hour, minute), Timezone, Daylight saving time, 4 work days and 20 holidays can be set by parameters
Operation specifications	Acceleration/deceleration time	0.01 - 6000 sec. Selectable from among acceleration/deceleration. times 1, 2, 3 and 4. Automatic acceleration/deceleration function. S-pattern acceleration/deceleration 1 and 2 pattern adjustable.
	DC braking	Adjustment of braking start frequency (0 - [FH]Hz), braking (0 - 100%) and braking time (0 - 25.5 sec.). With emergency off braking function and motor shaft fix control function.
	Forward run/reverse run*1	Forward run with ON of the terminal [F], Reverse run with ON of the terminal [R] (Default setting). Coast stop with OFF of the terminal assigned Stad-by function. Emergency off by panel operation or terminal.
	Jog run*1	Jog run, if selected, allows jog operation from the operation panel Jog run operation by terminal block is possible by setting the parameters.
	Preset speed operation*1	By changing the combination of the terminals [S1], [S2], [S3], [S4], [S5] set frequency + 31-speed operation. Selectable between acceleration/deceleration time, torque limit and V/f by set frequency.
	Retry	Capable of restarting after a check of the power circuit elements in case the protective function is activated. Max. 10 times selectable arbitrarily. Waiting time adjustment (0 - 10 sec.)
	Soft stall	Automatic load reduction control at overloading. (Default: OFF)
	Cooling fan ON/OFF	The cooling fan will be stopped automatically to assure long life when unnecessary.
	Lockout key operation/Password setting	Lock or unlock the key operation and parameter setting. Lock parameter setting with a password.
	Regenerative power ride-through control	Possible to keep the motor running using its regenerative energy in case of a momentary power failure. (Default: OFF)
	Auto-restart operation	Possible to restart the motor in coasting in accordance with its speed and direction. (Default: OFF)
	Simplified pattern operation	Possible to select each 8 patterns in 2 groups from 15-speed operation frequency. Max. 16 types of operation possible. Terminal operation/repeat operation possible.
	Commercial inverter switching	Possible to switch operation by commercial power supply or inverter
	Light-load high-speed operation	Increases the operating efficiency of the machine by increasing the rotational speed of the motor when it is operated under light load.
	Droop function	When two or more inverters are used to operate a single load, this function prevents load from concentrating on one inverter due to unbalance.
	Override function	External input signal adjustment is possible to the operation frequency command value.
Protective function	Protective function	Stall prevention, current limit, overcurrent, overvoltage, short circuit on the load side, ground fault on the load side*4, undervoltage, momentary power failure (15 ms or more), non-stop control at momentary power failure, overload protection, arm overload at starting, overcurrent on the load side at starting, overcurrent and overload at braking resistor, overheat, emergency off
	Electronic thermal characteristic	Switchable between standard motor/constant torque motor, adjustment of overload protection and stall prevention level.
	Reset	Reset by 1a contact closed (or 1b contact opened), or by operation panel. Or power supply OFF/ON. This function is also used to save and clear trip records.

(Continued overleaf)

(Continued)

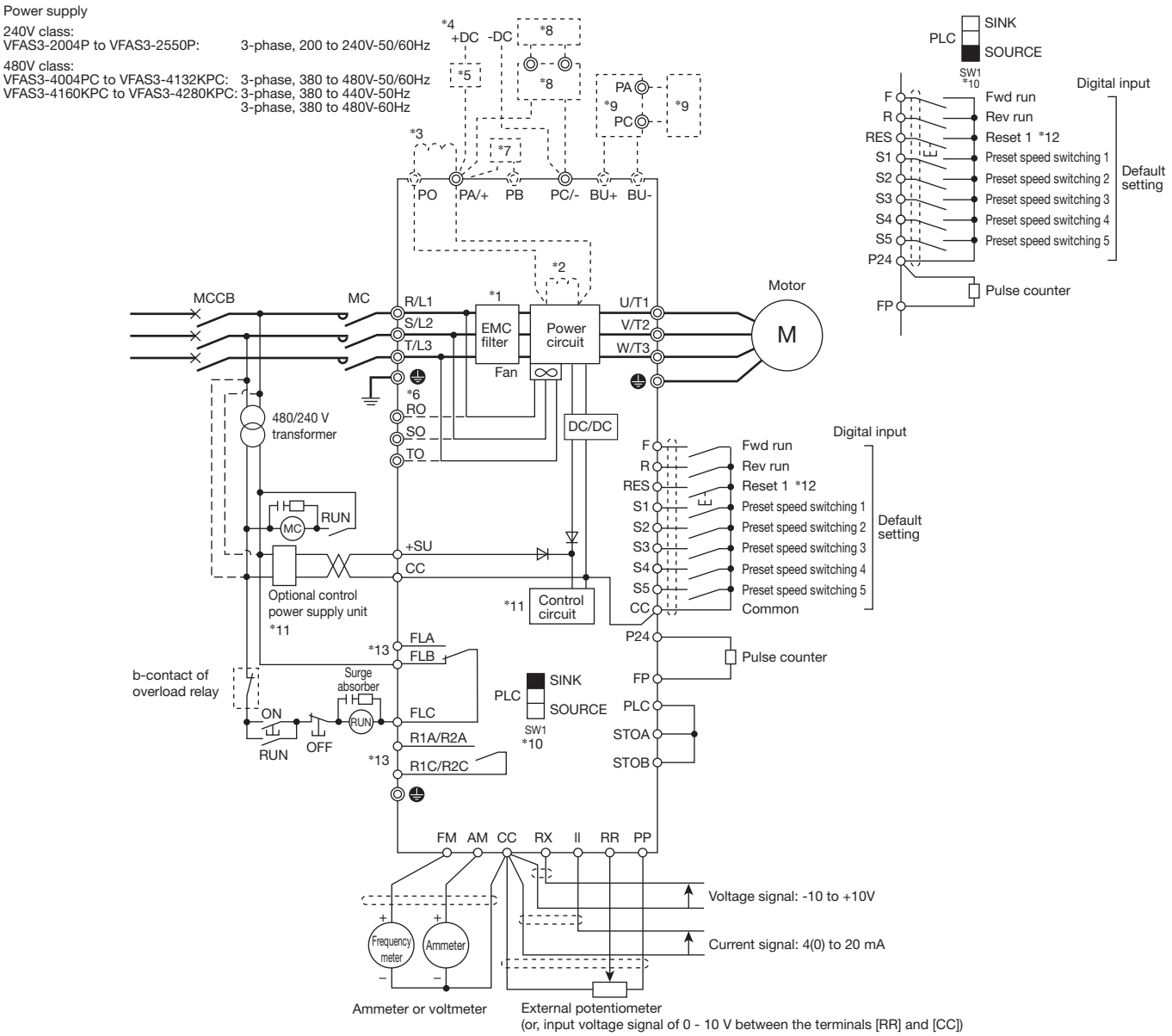
Item			Specification
Display function	Screen of LCD	Alarms	Stall prevention during run, overload limit, overload, undervoltage on power supply side, DC circuit undervoltage, setting error, in retry, upper limit, lower limit.
		Causes of failures	Overcurrent, overvoltage, overheat, short circuit on the load side, ground fault on the load side, inverter overload, arm overcurrent at starting, overcurrent on the load side at starting, Cooling fan fault, CPU fault, EEPROM fault, RAM fault, ROM fault, communication error, (braking resistor overcurrent/overload), (emergency off), (undervoltage), (undercurrent), (overtorque), (motor overload), (input phase failure), (output phase failure) The items in the parentheses are selectable.
		Monitoring function	Output frequency, frequency command, forward run/reverse run, output current, DC voltage, output voltage, compensated frequency, terminal input/output information, CPU version, past trip history, cumulative operation time, feedback frequency, torque, torque command, torque current, exiting current, PID feedback value, motor overload factor, inverter overload factor, PBR overload factor, PBR load factor, input power, output power, peak output current, peak DC voltage, RR input, II input, RX input, AI4 input, AI5 input, FM output, AM output, expansion I/O card option CPU version, integral input power, integral output power, communication option reception counter, communication option abnormal counter.
		Free unit display	Display of optional units other than output frequency (motor speed, line speed, etc), current ampere/% switch, voltage volt/% switch
		Automatic edit function	Searches automatically parameters that are different from the default setting parameters. Easy to find changed parameters.
		User default setting	User parameter settings can be saved as default settings. Allows to reset the parameters to the user-defined parameter settings.
	LED	Charge display	Displays power circuit capacitor charging.
Input/output terminal logic function			Possible to select positive logic or negative logic with programmable input/output terminal function menu. 2 or 3 function can be assigned for some terminals. *1 *2 (Default setting: positive logic)
Sink/source switching			Possible to switch between minus common (CC) and plus common (P24) for digital input terminal. (Default setting: external power supply)
output signal	Failure detection signal		1c contact output (250Vac-2A (cosΦ=1), 30Vac-2A (Resistive), 250Vac=1A (cosΦ=0.4), 30Vdc=1A (L/R=7ms))
	Relay output		2×1a contact output (250Vac-2A (cosΦ=1), 30Vac-2A (Resistive), 250Vac=1A (cosΦ=0.4), 30Vdc=1A (L/R=7ms))
	Low speed, Acc/Dec completed signal output *2		Digital output (24 Vdc, max. 50 mA)
	Output for frequency meter/Output for ammeter *3		Analog output for meter: 1 mA dc full-scale dc ammeter 0 - 20 mA (4 - 20 mA) output: DC ammeter (allowable load resistance: 500 Ω or less) 0 - 10 V output: DC voltmeter (allowable load resistance: 1 kΩ or more)
	Pulse train frequency output		Pulse train output (Up to 30 kpps, duty 50%)
Communication function			Ethernet standard 2-channel equipped (connector: RJ45) IEEE802.3/IEEE802.3u (Fast Ethernet) (10/100Mbps: Auto negotiation) RS485 standard 2-channel equipped (connector: RJ45) PROFINET, DeviceNet, PROFIBUS-DP, EtherCAT are optional.
Environments	Use environments		Indoor use. Altitude: 4800m or less for frame size A1 to A6, 3000m or less for frame size A7 and A8 (current reduction necessary when above 1000 m *6). Place not exposed to direct sunlight and free of corrosive and explosive gases.
	Ambient temperature		-15 to +60°C *5 Frame size A1 to A5: Current reduction, remove the top cover when above 50°C; Frame size A6: Current reduction when above 50°C; Frame size A7 and A8: Current reduction when above 50°C (HD), above 45°C (ND)
	Storage temperature		-25 to + 70°C *7
	Relative humidity		5 to 95% (free from condensation)
	Vibration		Frame size A1 to A5: 5.9 m/s^2{0.6G} or less (10 - 55 Hz), Frame size A6 to A8: 2.9 m/s^2{0.3G} or less (10 - 55 Hz)

*1: 14 digital input terminals (of which 6 are options) are programmable digital input terminals, and they make it possible to arbitrarily select from 178 types of signals.
*2: Programmable ON/OFF output terminals make it possible to arbitrarily select from 256 types of signals.
*3: Programmable analog output terminals make it possible to arbitrarily select from 54 types of signals.
*4: This function protects inverters from overcurrent due to output circuit ground fault.
*5: -10 to 60°C for frame size A7 and A8. Remove operation panel of the inverter when above 50°C.
*6: Current must be reduced by 1% for each 100m over 1000m. e.g. 90% at 2000m, 80% at 3000m
*7: Temperature applicable for a short term. e.g. during transportation

Standard connection diagrams

Standard connection diagram : Sink logic (common : CC)

Standard connection diagram : Source logic (common : P24)



*1: EMC filter is built in 480 V class.
*2: The DC reactor is built in for models VFAS3-2004P to 2550P and VFAS3-4004PC to 4132KPC.
*3: Be sure to mount the DC reactor for models VFAS3-4160KPC to 4280KPC. A circuit between the terminals [PA/+] and [PO] is not short circuited (at the time of shipping).
*4: To input DC power, connect the inverter between the terminals [PA/+] and [PC/-]. It is not used in conjunction with the attached DC reactor for VFAS3-4160KPC to 4280KPC.
*5: For models of VFAS3-2110P to 2550P and VFAS3-4220PC to 4280KPC, a rush current suppression circuit (optional) is required and please contact your Toshiba distributor for information.
*6: When the inverter is used with a DC power supply, three-phase power input for cooling fan driving is required separately for models VFAS3-4160KPC to 4280KPC.
*7: External braking resistor (optional) for models VFAS3-2004P to 2370P and VFAS3-4004PC to 4750PC, VFAS3-4160KPC.
*8: When a braking resistor (optional) is mounted, a braking unit (optional) is also required. for models VFAS3-2450P, 2550P and VFAS3-4900PC to 4132KPC.
*9: When a braking resistor (optional) is mounted, a braking unit (optional) is also required. for models VFAS3-4200KPC to 4280KPC.
*10: With the slide switch [SW1] of the control terminal block, the setting of sink logic, source logic and external power supply sink logic of the digital input terminals [F], [R], [RES], and [S1] - [S5] is switched. [SW1] is set to the PLC side in the default setting. This is the setting when the inverter external power supply is used.
*11: To supply control power from an external power supply for backing up the control power supplied from the inverter, an optional control power supply unit (CPS002Z) is required. In this case, it is used in conjunction with the inverter internal power supply.
Set [F647: Control power option failure detection] to back up the control power supply.
*12: The reset signal is activated by ON → OFF trigger input.
*13: Connect to power to comply with OVC2 (Over Voltage Category 2). Isolation transformer is necessary when connecting to power supply (OVC3).

Terminal functions

Power terminal

Terminal symbol	Function	Applicable frame size
⏚	Grounding terminal for inverter case.	All frame sizes
[PE]	Grounding terminal.	Frame size A4, A5, and A6
[R/L1] [S/L2] [T/L3]	Connected to an AC power supply. 240 V class: Three-phase 200 - 240 V-50/60 Hz 480 V class: VFAS3-4004PC to 4132KPC:Three-phase 380 - 480 V-50/60 Hz VFAS3-4160KPC to 4280KPC:Three-phase 380 - 440 V- 50 Hz Three-phase 380 - 480 V- 60 Hz	All frame sizes
[U/T1] [V/T2] [W/T3]	Connected to a three-phase motor.	All frame sizes
[PA/+] [PB]	Connected to a braking resistor. Change the parameters [F304: Dynamic braking, OLr trip], [F308: Braking resistance], and [F309: Braking resistor capacity] if necessary.	Frame size A1, A2, A3, A4, A5, and A7
[BU+] [BU-]	Inside the inverter. Connected to a braking unit (optional). Braking resistor (optional) is connected to a braking unit terminals [PA] and [PB].	Frame size A8
[PA/+] [PC/-]	A DC power can be input. For models of VFAS3-2110P to 2550P and VFAS3-4220PC to 4280KPC, a rush current suppression circuit (optional) is required. Connected to a braking unit (Optional) for frame size A6.	All frame sizes
[PA/+] [P0]	Be sure to connect the attached DC reactor.	Frame size A7 and A8
[RO] [SO] [TO]	Inverter's cooling power input terminals. When using a DC power supply, connect three-phase power wires.	Frame size A7 and A8

Control terminal

Terminal symbol	Input/output	Function	Electrical specifications
F	Input	Multifunction programmable digital input. In the default setting, forward run is performed with ON and deceleration stop with OFF.	Digital input. •24 Vdc-5 mA or less Compliant with IEC61131-2 logic type 1 •Sink logic:ON < 10 V, 16 V < OFF •Source logic:OFF < 5 V, 11 V < ON Sink logic and source logic can be switched with the slide switch [SW1]
R	Input	Multifunction programmable digital input. In the default setting, reverse run is performed with ON and deceleration stop with OFF.	
RES	Input	Multifunction programmable digital input. In the default setting, this inverter protective function is reset by ON → OFF. It has no effect when the inverter is in a normal condition.	
S1	Input	Multifunction programmable digital input. In the default setting, preset speed operation is performed with ON	
S2	Input	Multifunction programmable digital input. In the default setting, preset speed operation is performed with ON	
S3	Input	Multifunction programmable digital input. In the default setting, preset speed operation is performed with ON	
S4	Input	Multifunction programmable digital input. In the default setting, preset speed operation is performed with ON. With [F146:Terminal S4 input select], digital input, pulse train input, and PG input can be switched.	Digital input. •24 Vdc-5 mA or less Compliant with IEC61131-2 logic type 1 •Sink logic:ON < 10 V, 16 V < OFF •Source logic:OFF < 5 V, 11 V <ON Sink logic and source logic can be switched with the slide switch [SW1] Pulse train input •Up to 30 kpps (duty 50%)
S5	Input	Multifunction programmable digital input. In the default setting, preset speed operation is performed with ON. With [F147: Terminal S5 input select], digital input, pulse train input, and PG input can be switched.	
CC	Common to input/output	An equipotential terminal of the control circuit. It is allocated in three positions.	-
PP	Output	10 Vdc power output for analog input setting.	10 Vdc (allowable load current: 10 mAdc)
FP	Output	Multifunction programmable digital/pulse train output. With [F669: Terminal FP switching], digital output and pulse train output can be switched.	Digital output •24 Vdc-50 mA Pulse train output •Up to 30 kpps (duty 50%)
RR	Input	Analog input with 0 - 10 Vdc. It can be switched to PTC input, etc. with [F108: Terminal RR input select].	0 - 10 Vdc (input impedance: 31.5 kΩ)
RX	Input	Analog input with -10 to +10 Vdc. With [F107: Terminal RX input voltage select], it can be swtiched to 0 - 10 Vdc.	-10 to +10 Vdc (input impedance: 31.5 kΩ)
II	Input	Analog current input with 0 - 20 mAdc. The current can be changed to 4 - 20 mA, etc. with setting of the parameter.	0 - 20 mAdc (input impedance: 250 Ω)
FM	Output	Multifunction programmable analog output. 0 - 10 Vdc output with default setting. With [F681:Terminal FM switching], meter option (0 - 1 mA), current (0 - 20 mA) output, and voltage (0 - 10 V) output can be switched.	0 - 10 Vdc (allowable load resistance: 1 kΩ or more) 4 - 20 mAdc (0 - 20 mAdc) (allowable load resistance: 500 Ω or less)
AM	Output	Multifunction programmable analog output. 0 - 20 mAdc output with default setting. With [F686: Terminal AM switching], meter option (0 - 1 mA), current (0 - 20 mA) output, and voltage (0 - 10 V) output can be switched.	
PLC	Output	When the slide switch [SW1] is set to the sink side or source side, it can be used as 24 Vdc power output.	24 Vdc-200 mA (200 mA in total with P24) Compliant with IEC61131-2
	Input	When the slide switch [SW1] is set to the PLC side, it can be used as a common terminal for digital input terminal.	-
P24	Output	24 Vdc power output.	24 Vdc-200 mA (200 mA in total with PLC) Compliant with IEC61131-2
+SU	Input	DC power input to operate the control circuit. Connect a control power supply option or 24 Vdc power supply between [+SU] and [CC].	24 Vdc- current 1A or more
STOA	Input	At the time of shipping, the terminals [STOA]-[STOB]-[PLC] are shorted by the shorting bar. This is a terminal with STO function that complies with the safety standard IEC61800-5-2. For details, refer to Safety Function Manual. This terminal is not programmable digital input.	Refer to Safety Function Manual. Compliant with IEC61131-2 logic type 1 • Activate < 5 V, 11 V < Deactivate Not coast stop
STOB	Input		
FLA	Output	Multifunction programmable relay contact output. Operation of the protection function of the inverter is detected in the default setting. The contact across [FLA]-[FLC] is closed and [FLB]-[FLC] is opened during protection function operation.	Maximum contact capacity •250 Vac-2 A(cosϕ=1) •30 Vdc-2 A (at resistive load) •250 Vac-1 A (cosϕ=0.4) •30 Vdc-1A (L/R=7 ms) Minimum contact capacity •24 Vdc-5 mA Life •100000 times
FLB			
FLC			
R1A	Output	Multifunction programmable relay contact output. A low-speed signal is output in the default setting.	
R1C			
R2A	Output	Multifunction programmable relay contact output. It is not assigned in the default setting. The function can be set with [F134: Terminal R2 function].	
R2C			

Insert type options

This drive is equipped with two optin slots (A, B) as standard. The option adaptor (option) can be mounted.

Table of optional devices

Name	Specification	Type-form	Slot avaiability
I/O extension 1	6x digital input 2x digital output 2x analog input	ETB013Z	A, B, C
I/O extension 2	3x 1a relay	ETB014Z	A, B ,C
Digital encoder	RS422 Line receiver	VEC008Z	B
Resolver	Resolver	VEC010Z	B
Safety option	SS1, SS2, SOS, SBC, SLS, SDI	SFT001Z	C
PROFINET	PROFINET interface	PNE001Z	A
EtherCAT	EtherCAT interface	IPE003Z	A
PROFIBUS-DP	PROFIBUS-DP interface	PDP003Z	A
DeviceNet	DeviceNet interface	DEV003Z	A
CANopen	CANopen interface : RJ45 : D-sub : Open style	CAN001Z CAN002Z CAN003Z	A

Function of I/O extension

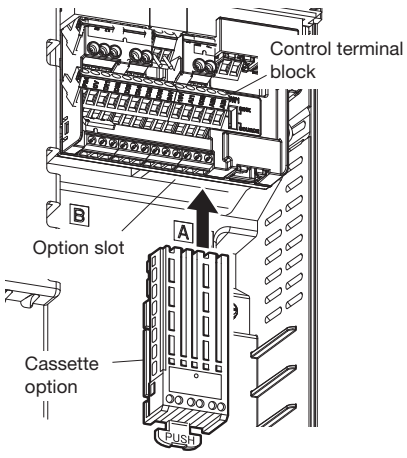
Type-form	ETB013Z	ETB014Z
Multifunction programmable contact input	Multifunction programmable contact input : 6 points Logic type selected by DICC wiring. Sink logic:ON<10V, 16V<OFF Source logic:OFF<5V, 11V<ON	Disable
Multifunction programmable open collector output	Multifunction programmable open collector output : 2 points Logic Type selected by DQCC wiring Max. switching voltage<= 30V Max. switching current<= 100mA Voltage drop at 100mA load <= 3V	Disable
Multifunction programmable relay contact output	Disable	Multifunction programmable relay contact output: 3 relay(1a) 250 Vac-2A(cos ϕ =1), 30 Vdc-2A (at resistive load) 250 Vac-1A(cos ϕ =0.4), 30 Vdc-1A (L/R=7 ms)
Analog input	Differential analog input: 2 points Voltage input: -10Vdc to +10Vdc Impedance: 20kohm Current input: 0 to 20mA Impedance: 250ohm	Disable

Function sensor feedback

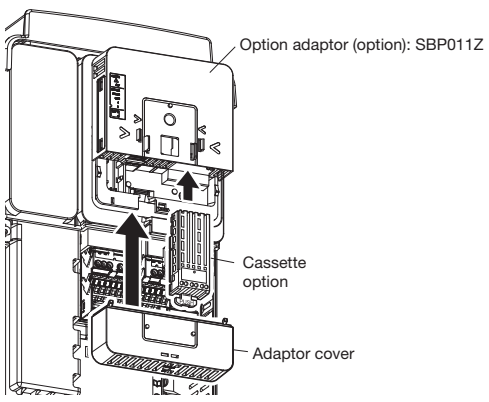
Type-form	VEC008Z	VEC010Z
Sensor type	Incremental rotary encoder	Resolver
Specification	Signal interface: differential line driver (TIA/EIA RS422) Pulse frequency: 300kHz or less (Duty: 50% ±10%) Maximum load of power supply for encoder: 24V 100mA, 12V 100mA, 5V 250mA	Signal interface:Ref+, Cos-, Sin+, Cos+, Sin-, Ref- Excitation Carrier:3 to 12kHz Pole pairs number = 1 Transformation ratio = 0.5 Reference (Excitation voltage): 7Vrms
Connector	D subminiature connector (DE-15 / HD15)	D subminiature connector (DE-9)

How to install

Option slot A, B



Option Slot C



Note) The depth of the drive increases about 44mm when the option is mounted.

Selection of braking resistor

This is used for the quick deceleration, the frequent deceleration stop or shortening the deceleration time at the large inertia load. This resistor consumes the regenerative energy when regenerative braking operation.
In case of over 3% ED, please select the allowable continuous regenerative power (Watt) in the following table.
1) The continuous regenerative load likes an elevator
2) Deceleration stops at large inertia machine
3) Frequent deceleration stop by using braking resistors

HD rating

Voltage class	Applicable motor (kW)	Drive type-form	Minimum allowable resistance (Ω)	Model						
				PBR	DGP600	High frequency type				
						800W class	1.5kW class	3.5kW class	5kW class	10kW class
240V	0.4	VFAS3-2004P	7.9	PBR-2007 (90W-200Ω)	-	PBR7-008W060 (270W-60Ω)	-	-	-	-
	0.75	VFAS3-2007P	7.9		-		PBR7-017W060 (540W-60Ω)	-	-	-
	1.5	VFAS3-2015P	7.9	PBR-2022 (90W-75Ω)	-			PBR7-035W060 (1080W-60Ω)	-	-
	2.2	VFAS3-2022P	7.9		-	PBR7-008W030 (270W-30Ω)	PBR7-017W030 (540W-30Ω)	PBR7-035W030 (1080W-30Ω)	PBR7-052W015 (1620W-15Ω)	-
	4.0	VFAS3-2037P	7.9	PBR-2037 (90W-40Ω)	-					-
	5.5	VFAS3-2055P	5.3	PBR7-004W015 (130W-15Ω)	-	PBR7-008W015 (270W-15Ω)	PBR7-017W015 (540W-15Ω)	PBR7-035W015 (1080W-15Ω)		-
	7.5	VFAS3-2075P	5.3		-					-
	11	VFAS3-2110P	5	PBR7-008W7R5 (270W-7.5Ω)	-	-	PBR7-017W7R5 (540W-7.5Ω)	PBR7-035W7R5 (1080W-7.5Ω)	PBR7-052W7R5 (1620W-7.5Ω)	-
	15	VFAS3-2150P	5		-	-				-
	18.5	VFAS3-2185P	4.5		-	-				-
	22	VFAS3-2220P	1	PBR7-017W3R7 (540W-3.75Ω)	-	-	-	PBR7-035W3R7 (1080W -3.75Ω)	PBR7-052W3R7 (1620W-3.75Ω)	-
	30	VFAS3-2300P	1		-	-	-			-
	37	VFAS3-2370P	1	PBR7-035W1R8 (1080W-1.87Ω)	-	-	-	-	PBR7-052W1R8 (1620W-1.87Ω)	DGP600W-B4M/C4M (10kW-1.7Ω)
	45	VFAS3-2450P	1		-	-	-	-		
	55	VFAS3-2550P	1		-	-	-	-		
480V	0.4	VFAS3-4004PC	78	PBR-2007 (90W-200Ω)	-	PBR7-008W060 (270W-60Ω)	-	-	-	-
	0.75	VFAS3-4007PC	78		-		PBR7-017W060 (540W-60Ω)	-	-	-
	1.5	VFAS3-4015PC	78		-			PBR7-035W060 (1080W-60Ω)	-	-
	2.2	VFAS3-4022PC	31.2		-				PBR7-052W060 (1620W-60Ω)	-
	4.0	VFAS3-4037PC	31.2	PBR-4037 (90W-160Ω)	-					-
	5.5	VFAS3-4055PC	22.3	PBR7-004W060 (130W-60Ω)	-					-
	7.5	VFAS3-4075PC	22.3		-					-
	11	VFAS3-4110PC	15.6	PBR7-008W030 (270W-30Ω)	-	-	PBR7-017W030 (540W-30Ω)	PBR7-035W030 (1080W-30Ω)	PBR7-052W030 (1620W-30Ω)	-
	15	VFAS3-4150PC	15.6		-	-				-
	18.5	VFAS3-4185PC	15.6		-	-				-
	22	VFAS3-4220PC	12	PBR7-017W015 (540W-15Ω)	-	-	-	PBR7-035W015 (1080W-15Ω)	PBR7-052W015 (1620W-15Ω)	-
	30	VFAS3-4300PC	12		-	-	-			-
	37	VFAS3-4370PC	7.9	PBR7-017W010 (540W-10Ω)	-	-	-	PBR7-035W010 (1080W-10Ω)	PBR7-052W010 (1620W-10Ω)	-
	45	VFAS3-4450PC	2.5	PBR7-017W7R5 (540W-7.5Ω)	-	-	-	PBR7-035W7R5 (1080W-7.5Ω)	PBR7-052W7R5 (1620W-7.5Ω)	DGP600W-B3M/C3M (10kW-5Ω)
	55	VFAS3-4550PC	2.5		-	-	-			
	75	VFAS3-4750PC	2.5	PBR7-017W3R7 (540W-3.75Ω)	-	-	-	PBR7-035W3R7 (1080W-3.75Ω)	PBR7-052W3R7 (1620W-3.75Ω)	
	90	VFAS3-4900PC	1.9	-	DGP600W-B2M/C2M (7.4kW-3.7Ω)	-	-	-	-	DGP600W-B3M/C3M (10.5kW-2.5Ω)
	110	VFAS3-4110KPC	1.9	-		-	-	-	-	
	132	VFAS3-4132KPC	1.9	-		-	-	-	-	
	160	VFAS3-4160KPC	1.9	-		-	-	-	-	
	200	VFAS3-4200KPC	1	-	DGP600W-B3M/C3M (8.7kW-1.9Ω)	-	-	-	-	DGP600W-B4M/C4M (10kW-1.7Ω)
	220	VFAS3-4220KPC	1	-		-	-	-	-	
	280	VFAS3-4280KPC	1	-	DGP600W-B4M/C4M (14kW-1.4Ω)	-	-	-	-	-

Totally enclosed box type for IP55

IP55 protection for direct mounting on wall.

Voltage class		Applied motor capacity(kW) : Dual rating															
	HD	0.4	0.75	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75
	ND	0.75	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
3ph-480V class (IP55)																	

Standard specification

Item			Specification															
Voltage class			480 V class															
Frame size			A1E					A2E		A3E			A4E			A5E		
Applicable motor (kW)		HD	0.4	0.75	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75
		ND	0.75	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
Rating	Type		VFAS3-															
	Form		4004PCE	4007PCE	4015PCE	4022PCE	4037PCE	4055PCE	4075PCE	4110PCE	4150PCE	4185PCE	4220PCE	4300PCE	4370PCE	4450PCE	4550PCE	4750PCE
	Output capacity (kVA) *1	HD	1.1	1.7	3.0	4.3	7.1	9.7	12.6	17.9	24.2	29.9	35.3	46.9	56.8	67.1	80.8	111
		ND	1.7	3.0	4.3	7.1	9.7	12.6	17.9	24.2	29.9	35.3	46.9	56.8	67.1	80.8	111	132
	Output current (A) *2	HD	1.5	2.2	4.0	5.6	9.3	12.7	16.5	23.5	31.7	39.2	46.3	61.5	74.5	88.0	106	145
		ND	2.2	4.0	5.6	9.3	12.7	16.5	23.5	31.7	39.2	46.3	61.5	74.5	88.0	106	145	173
	Output voltage		3-phase 380V to 480V (The maximum output voltage is equal to the input supply voltage)															
	Overload current rating	HD	150%-1 minute, 180%-2 s															
		ND	120%-1 minute, 135%-2 s															
Power supply	Voltage/frequency		3-phase 380 to 480V, 50/60Hz															
	Tolerance		Voltage: 323V to 528V *3, Frequency: +/-5%															
	Required power supply capacity (kVA) *4	HD	0.7	1.4	2.6	3.7	6.6	8.5	11.4	16.6	22.3	27.3	32.7	44.3	53.9	65.6	79.5	108
		ND	1.2	2.4	3.4	6.1	8.3	10.9	15.6	21.3	26.4	31.4	42.0	52.4	63.2	77.0	103	125
Output frequency range			0.01 to 590Hz (Default setting 0.01 to 80.0Hz)															
Electrical braking	Dynamic braking circuit		Built-in															
	Dynamic braking resistor		External braking resistor (Optional)															
Degree of protection (IEC60529)			IP55															
Cooling method			Forced air-cooled															
Color			RAL7016															
EMC filter			Built-in															
DC reactor			Built-in															
Environments	Use environments		Indoor use. Place not exposed to direct sunlight and free of corrosive gas, explosive gas, flammable gas, oil mist, or dust.															
	Altitude		4800m or less (Current reduction necessary when above 1000m) *4															
	Chemical class		3C3 (IEC/EN60721)															
	Mechanical class		3S3 (IEC/EN60721)															
	Ambient temperature		-15 to +50°C (Current reduction necessary when above 40°C) *5															
	Storage temperature		-25 to +70°C *6															
	Relative humidity		5 to 95% (Free from condensation)															
	Vibration		5.9m/s^2 or less (10 - 55Hz)															

*1: Capacity is calculated at 440V for 480V class.
*2: Indicates rated output current setting when the PWM carrier frequency (parameter F300) is 4 kHz.
*3: Lower limit of voltage for 480V class is 342V when inverter is used continuously (load of 100%).
*4: Current derating by 1% for each 100m above 1000m. For example, 90% at 2000m.
*5: Required power supply capacity varies with the value of the power supply side impedance (including input reactor and cables).
*6: Temperature applicable for a short term. e.g. during transportation

External dimensions

Fig.A

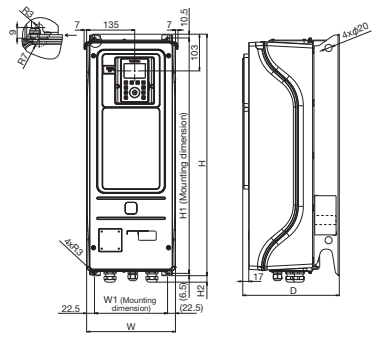
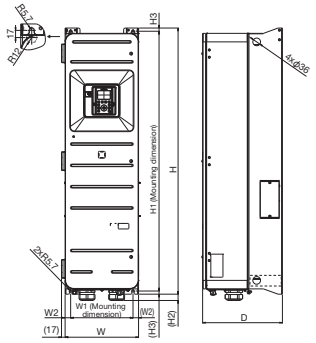


Fig.B



Input voltage class	Applicable motor (kw)		Drive type-form	Dimension (mm)								Frame Size	External dimension diagram	Approx. mass (kg)
	HD	ND		W	H	D	W1	H1	H2	H3	W2			
3-Phase 480V	0.4	0.75	VFAS3-4004PCE	250	678	271	205	661	19	-	-	A1E	A	12.1
	0.75	1.5	VFAS3-4007PCE	250	678	271	205	661	19	-	-	A1E	A	12.1
	1.5	2.2	VFAS3-4015PCE	250	678	271	205	661	19	-	-	A1E	A	12.3
	2.2	4.0	VFAS3-4022PCE	250	678	271	205	661	19	-	-	A1E	A	12.5
	4.0	5.5	VFAS3-4037PCE	250	678	271	205	661	19	-	-	A1E	A	12.6
	5.5	7.5	VFAS3-4055PCE	250	678	301	205	661	19	-	-	A2E	A	16.0
	7.5	11	VFAS3-4075PCE	250	678	301	205	661	19	-	-	A2E	A	16.3
	11	15	VFAS3-4110PCE	250	678	301	205	661	40	-	-	A3E	A	20.2
	15	18.5	VFAS3-4150PCE	250	678	301	205	661	40	-	-	A3E	A	20.7
	18.5	22	VFAS3-4185PCE	250	678	301	205	661	40	-	-	A3E	A	20.8
	22	30	VFAS3-4220PCE	290	910	340	250	888	26	10	20	A4E	B	49.5
	30	37	VFAS3-4300PCE	290	910	340	250	888	26	10	20	A4E	B	49.5
	37	45	VFAS3-4370PCE	290	910	340	250	888	26	10	20	A4E	B	50.5
	45	55	VFAS3-4450PCE	345	1250	375	293	1220	30	15	26	A5E	B	87
	55	75	VFAS3-4550PCE	345	1250	375	293	1220	30	15	26	A5E	B	89
	75	90	VFAS3-4750PCE	345	1250	375	293	1220	30	15	26	A5E	B	89

Built-in Ethernet

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Video Guidance

Remote Sensor Monitoring

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* This product is intended for general purpose uses in industrial application. It cannot be used applications where may cause big impact on public uses, such as power plant and railway, and equipment which endanger human life or injury, such as nuclear power control, aviation, space flight control, traffic, safety device, amusement, or medical.
  It may be considerable whether to apply, under the special condition or an application where strict quality control may not be required.
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