DELTA ELECTRONICS, INC.

VFD C2000

Classical Field Oriented Control AC Motor Drive

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VFD-C2000_C_EN_20100324

www.delta.com.tw/industrialautomation

reddot design award
winner 2010

High Reliability, Easy to Use, A Combination of Intelligence and Versatility for Ultimate Performance

Delta Electronics, a leading brand of drive technology, has officially launched the most cost-effective VFD-C2000 series, a classical field oriented control AC motor drive. With 4 good CP values (high efficiency, high performance, low cost of maintenance and long product life), customers are able to raise the competition and save cost at the same time.

Main Functions and Features

- Field oriented control with built-in PLC function
- Wide variety of applications
- Wide range of models to meet requirements
- Modular design for easy maintenance and many extensions
- High-speed communication interface with built-in CANopen and MODBUS communication (optional cards for PROFIBUS-DP, DeviceNet, MODBUS TCP and EtherNet/IP)
- Long-life design and life detection of important components
- Enhanced protections and adaptation to ambient conditions
- Complies with global safety standards, including CE, UL and cUL

Standard Models (IP20/NEMA1)
Power range: 230V 0.75~90kW, 460V 0.75~355kW

230V (kW)	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
230V (HP)	1	2	3	5	7.5	10	15	20	25	30	40	50	60	75	100	125
Frame Size	A				B		C				D		E			F*
460V (kW)	0.75	1.5	2.2	3.7	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75
460V (HP)	1	2	3	5	5	7.5	10	15	20	25	30	40	50	60	75	100
Frame Size	A						B			C			D			
460V (kW)	90	110	132	160	185	220	280	315	355							
460V (HP)	125	150	175	215	250	300	375	425	475							
Frame Size	E		F*		G*		H*									

*NOTE: Available in 2010 Q2

C2000

Leading the Future of Drive Technology

VFD-C series uses FOC control as the core technology to fulfil the demands of high starting torque, accurate speed and torque control. Suitable for many applications it offers PID adjustment, simple operation interface, flexible I/O extension, fieldbus modules, wide power range, complete protection, adaptation to harsh ambient conditions, long-life design, compliance with global safety standards (CE/UL/cUL), competitive market price, easy maintenance, low malfunction rate and self diagnosis.

High-performance Variable-frequency Technology

1. Control bandwidth up to 600Hz
2. Speed/torque/position control mode
3. Dual rating design (Normal duty/heavy duty)
4. Outstanding 4-quadrant torque control/limit
5. 2 in 1 (induction motor and synchronous motor)*

*NOTE: Available in 2010 Q1

Versatile Driving Controls

1. Built-in safe stop function
2. Built-in PLC function
3. Built-in brake unit
4. Support various network protocols
5. Synchronous position control

Modular Design

1. Hot-plugging digital keypad
2. I/O extension cards
3. Various PG (encoder) feedback cards
4. Network cards for fieldbus modules
5. Removable fan

Environmental Adaptability

1. 50°C operation temperature
2. Built-in DC reactor
3. Coated circuit boards
4. RFI filter
5. Global safety standards (CE/UL/cUL)

Enhanced Motor Efficiency in General Applications

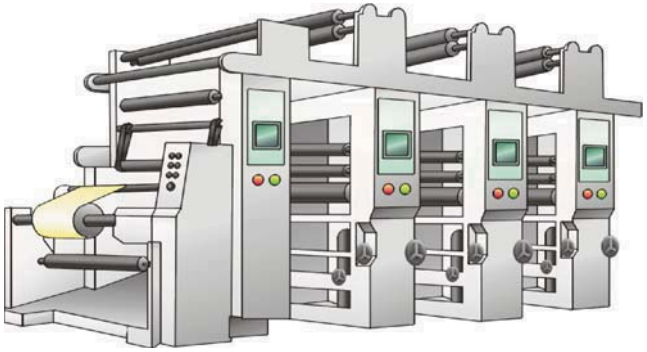
- Improved sensorless vector control (SVC) response and torque control in, for example, crane applications.

Safe Stop Function

- VFD-C2000 series complies with safe stop standards, including EN954-1, EN60204-1 and IEC61508, to prevent personal injury from accidental start-up.

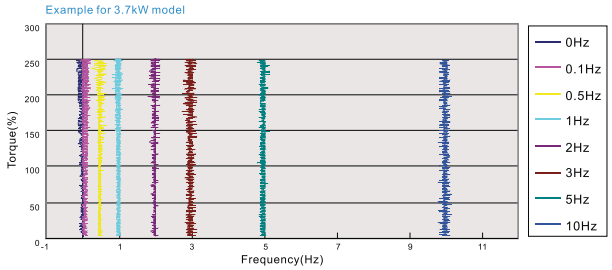
High-performance Field Oriented Control

- The best choice for high precision control of position and speed, such as the control of printing machines.



High-performance Field Oriented Control

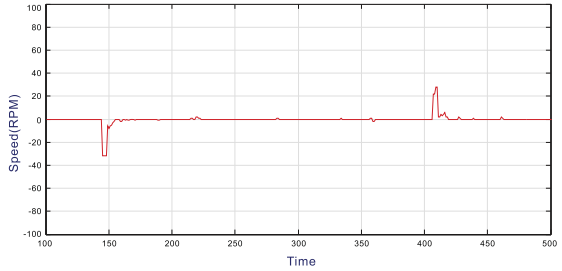
- In FOC+PG control mode it can produce 200% start-up torque at extremely low speeds, resulting in more stable speed control.



Improved Load Impact

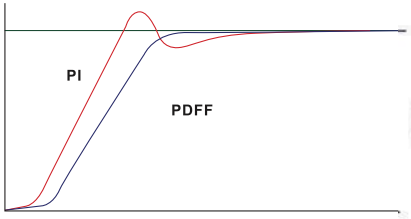
- At load changes, VFD-C2000 will provide the best torque response by FOC to reduce motor speed changes to a minimum to prevent vibration.


Press machine



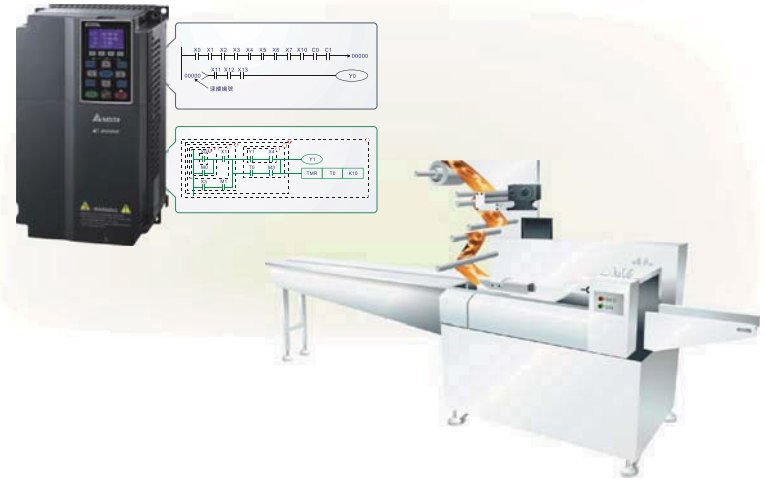
Innovative PID Technology

- Apart from traditional PI control, VFD-C2000 also provides PDFF control in speed regulation to eliminate overshoot and increase response time.



Intelligent Programmable Logical Controller

- In network systems, distributed control and independent operation can easily be achieved with the built-in Delta PLC.



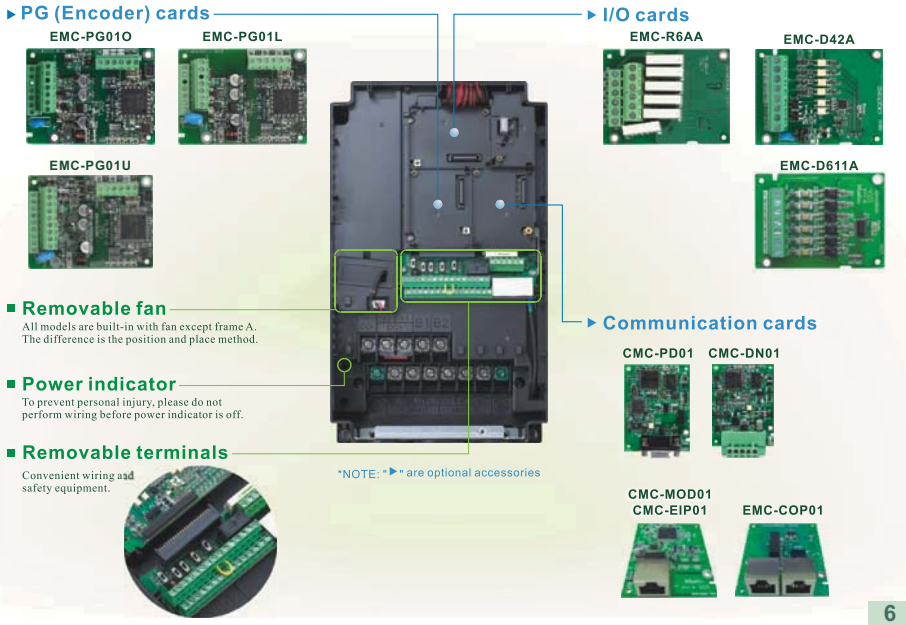
Able to Drive Permanent Magnet(PM) Motor

- VFD-C2000 series offers 2-in-1 function for induction motors and permanent magnet motors to precisely control position, speed and torque by dynamic response of permanent magnet motors. (available in 2010 Q1)

Modular Design

- The modular design fulfils the needs of system applications and equipment maintenance.

- Provides various accessories, including I/O extension cards, encoder feedback cards, communication cards, hot-plugging LCM keypad, removable terminals and removable fan.



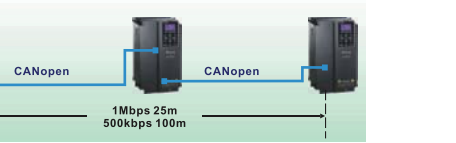
High-speed Network Building

- **Provides various communication network cards and fieldbus cards**
- **Built-in RS-485 international standard communication interface**
- **Advanced network functions**
- PROFIBUS

- CANopen (DS402), built-in

Delta develops the software CANopen Builder exclusively designed for CANopen communication. It provides users with a more convenient interface for motion control and greatly increases productivity.

- Supports all Delta industrial automation products (all EDS files of Delta industrial automation products are built-in)
- I/O data layout of each equipment on the CANopen network
- Planning function for motion control
- WPL Soft
- TAP-CN03 distribution box for long distances



- DeviceNet

Delta DeviceNet Builder software is particularly designed for DeviceNet communication. With this software, it is easy to plan DeviceNet equipment and remote I/O via parameters to build a standard DeviceNet monitoring structure.

- DeviceNet layout software
- Supports all Delta industrial automation products (all EDS files of Delta industrial automation products are built-in)
- I/O data layout of each equipment in DeviceNet network

- EtherNet/IP
- **MODBUS TCP**

Delta's communication integrator software not only provides graphic module setting and human interface design but also supports settings and online monitoring for all Ethernet products

- Delta software for Ethernet/MODBUS TCP products
- Graphic module setting and human interface design
- Auto search function
- Setting interface for virtual COM port

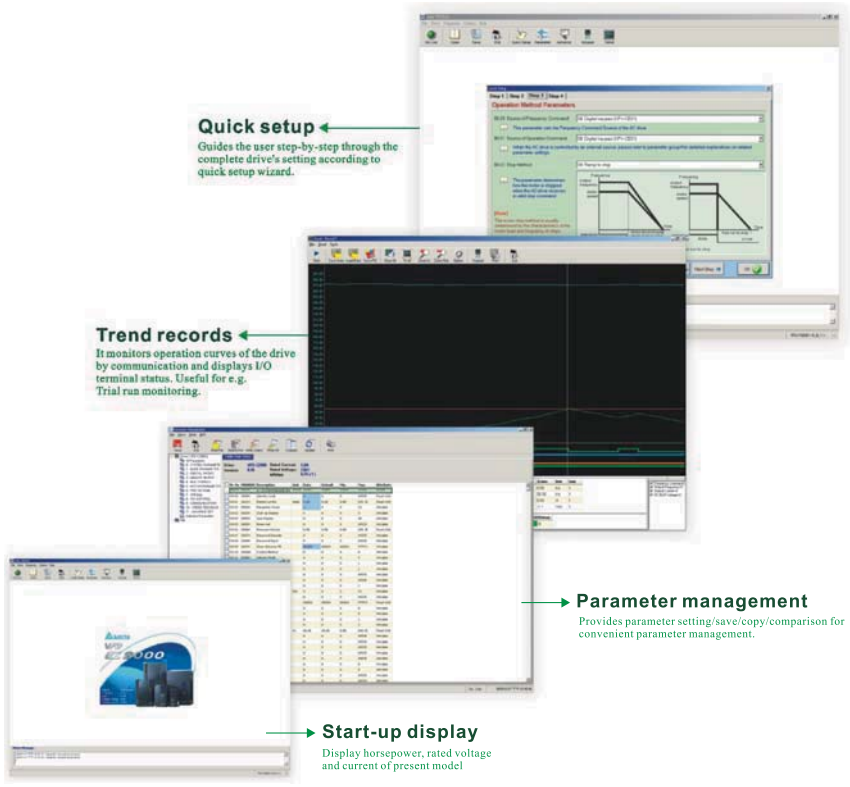
*NOTE: please download the software above at Delta website

Environmental Adaptability Design

- Those models which have built-in with DC reactor and RFI filter comply with IEC/EN61000-3-2, 61000-3-12 and 61800-3 standards.
- Reduces harmonics and noise interference effectively
- Strong coating to ensure safe operation in harsh environments
- Heatsink and electronics components are completely isolated from each other. With the following two heatsink designs, the best cooling according to requirements is achieved:
  (1) Flange mounting: Heat from the drive can be dissipated out of the cabinet
  (2) Forced fan cooling: Blow cool air into aluminum heatsink.

Convenient Operation Platform for Drive System Management

- Provides a complete operation platform for users' easy control and monitoring via PC, including parameters save/setting, real-time wave monitor, quick setup, support multiple languages and compatible multi-language operation systems.

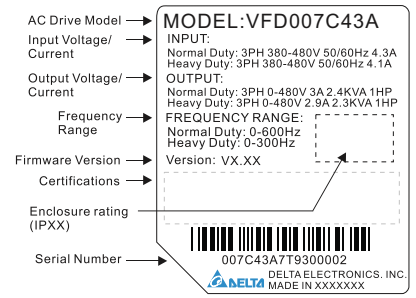


Ordering information

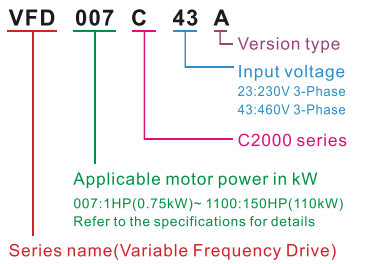
Frame A 	**230V:** 0.75~3.7kW (1~5HP) **460V:** 0.75~5.5kW (1~7.5HP)	VFD007C23A/E VFD037C23A/E VFD007C43A/E VFD015C43A/E VFD037C43A/E VFD040C43A/E VFD055C43A/E VFD015C23A/E VFD022C23A/E VFD022C43A/E	▶ Flange mounting kit 『MKC-AFM』 ▶ Flange mounting kit 『MKC-AFM1』
Frame B 	**230V:** 5.5~11kW (7.5~15HP) **460V:** 7.5~15 kW (10~20HP)	VFD055C23A/E VFD075C23A/E VFD110C23A/E VFD075C43A/E VFD110C43A/E VFD150C43A/E	▶ Flange mounting kit 『MKC-BFM』
Frame C 	**230V:** 15~22 kW (20~30HP) **460V:** 18.5~30 kW (25~40HP)	VFD150C23A/E VFD185C23A/E VFD220C23A/E VFD185C43A/E VFD220C43A/E VFD300C43A/E	▶ Flange mounting kit 『MKC-CFM』
Frame D 	**230V:** 30~37 kW (40~50HP) **460V:** 37~75 kW (50~100HP)	VFD300C23A VFD370C23A VFD370C43A VFD450C43A VFD550C43A VFD750C43A VFD300C23E VFD370C23E VFD370C43E VFD450C43E VFD550C43E VFD750C43E	▶ Conduit box kit 『MKC-DN1CB』
Frame E 	**230V:** 45~55 kW（60~75HP） **460V:** 90~110 kW（125~150HP）	VFD450C23A/E VFD550C23A/E VFD900C43A/E VFD1100C43A/E VFD750C23E	▶ Conduit box kit 『MKC-EN1CB』
Frame F 	**230V:** 75~90 kW（100~125HP） **460V:** 132~160 kW（175~215HP）	VFD750C23A VFD900C23A/E VFD1320C43A/E VFD1600C43A/E	available in 2010 Q2
Frame G 	**460V:** 185~220 kW (250~300HP)	VFD1850C43A/E VFD2200C43A/E	available in 2010 Q2
Frame H 	**460V:** 280~355 kW (375~475HP)	VFD2800C43A/E VFD3150C43A/E VFD3550C43A/E	available in 2010 Q2

*NOTE: "▶" are optional accessories

Nameplate



Model name

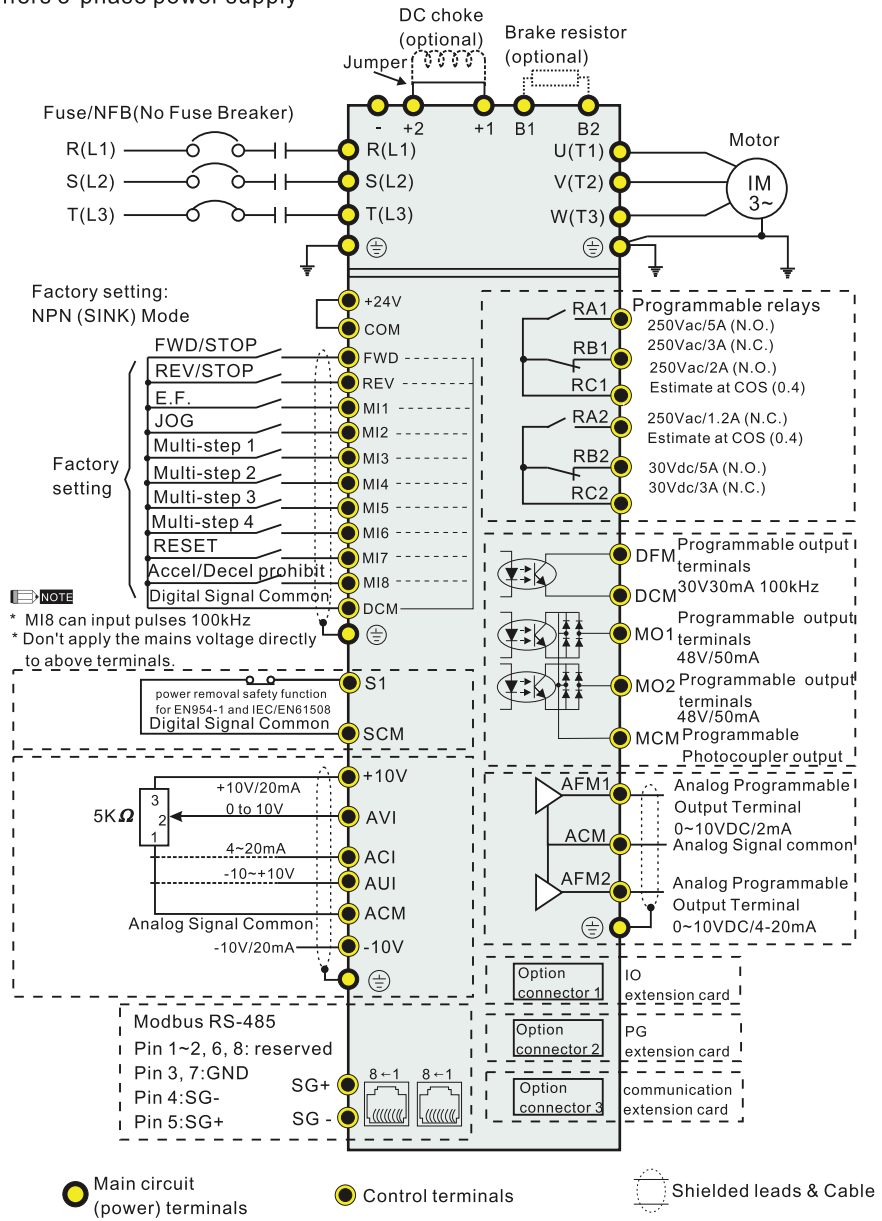


Optional Accessories

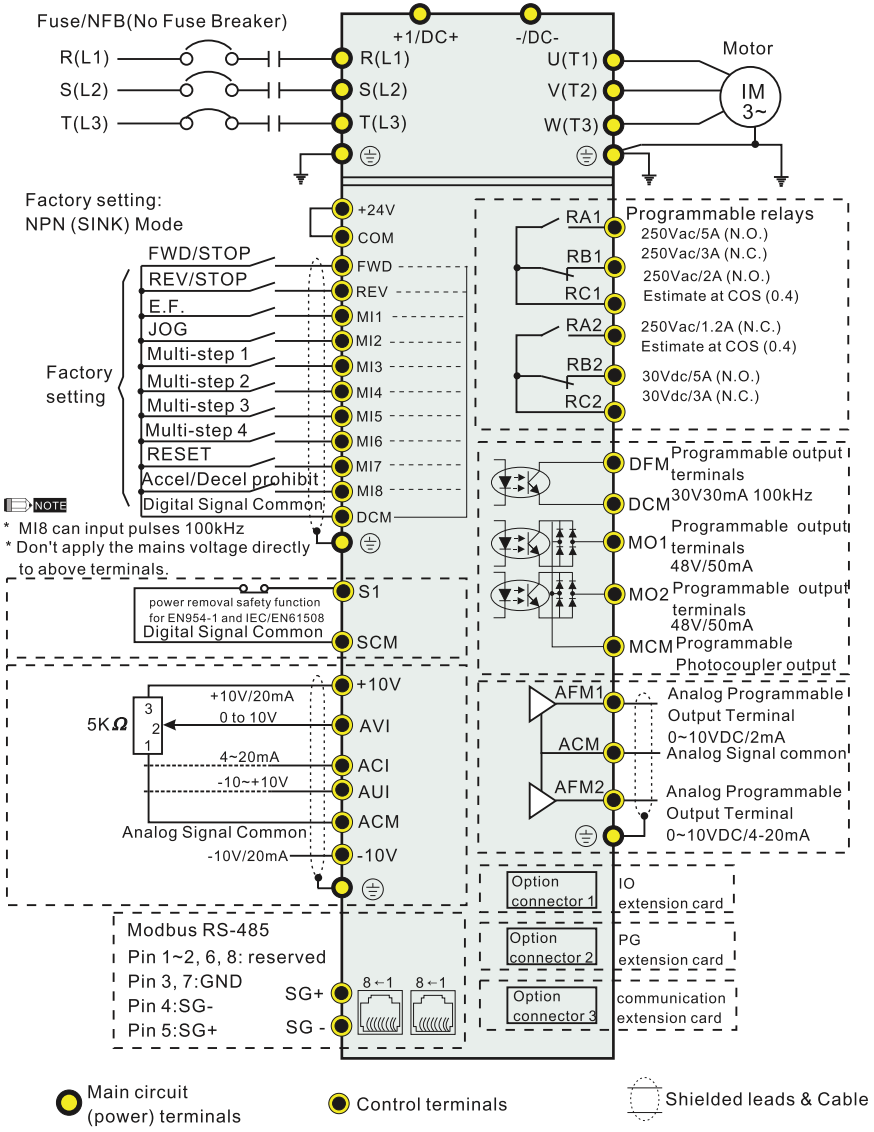
Communication card	**CMC-EIP01** **CMC-MOD01**		**EtherNet/IP (CMC-EIP01)** **MODBUS TCP (CMC-MOD01)** 10/100 Mbps Auto-Detect
	CMC-PD01		**PROFIBUS-DP** Supports 9.6kbps, 19.2kbps, 96.75kbps, 187.5kbps, 500kbps, 1.5Mbps, 3Mbps, 6Mbps and 12Mbps
	CMC-DN01		**DeviceNet** 125kbps, 250kbps, 500kbps and extenable serial transmission speed
	CMC-COP01		**CANopen** 1M 500k 250k 125k 100k 50k
Converter	**IFD6530**		USB-to-RS-485 converter Provides 9V power supply for VFD-C2000 keypad (KPC-CC01) to save parameters and edit pages Communication speed up to 1,152kbps No need to have external power supply and auto-detect the direction of data flow USB plug-and-play function
I/O card	**EMC-R6AA**		Relay card (6 relays)
	EMC-D42A		I/O extension card (4 digital inputs and 2 digital outputs)
	EMC-D611A		Input extension card (6 inputs)
PG (encoder) card	**EMC-PG01O**		PG output signal with frequency division function: Open collector output signal. It requires a pull-up resistor to external power V+ (such as PLC power) to prevent noise interference. Max. output frequency: 300kPulse/Sec
	EMC-PG01L		PG output signal with frequency division function (1-255 times) Max. output voltage of line driver: 5VDC Max. output current: 50mA Max. output frequency: 300kPulse/Sec Open collector output signal and needs to add a pull-up resistor to prevent noise interference.
	EMC-PG01U		PG output signal with frequency division function (1-255 times) Max. output voltage of line driver: 5VDC Max. output current: 50mA Max. output frequency: 300kPulse/Sec Two modes: 1. standard UVW output encoder, 2. Delta wiring-saving encoder (ABZ)
	EMC-PG01R		PG output signal with frequency division function (1-255 times) Max. output voltage of line driver: 5VDC Max. output current: 50mA Max. output frequency: 300kPulse/Sec
Digital keypad	**KPC-CE01**		7-segment display with menu function:easy, convenient operation, multi-function keys, warning indicators and fault code display Panel mounting **(MKC-KPPK)** IP56 protection level, can be mounted flat on the surface of a cabinet and the front cover is waterproof.Two ways of panel mounting: wall mounting and embedded mounting. Customers are able to install as required.

Wiring

Frame A~C
Offers 3-phase power supply

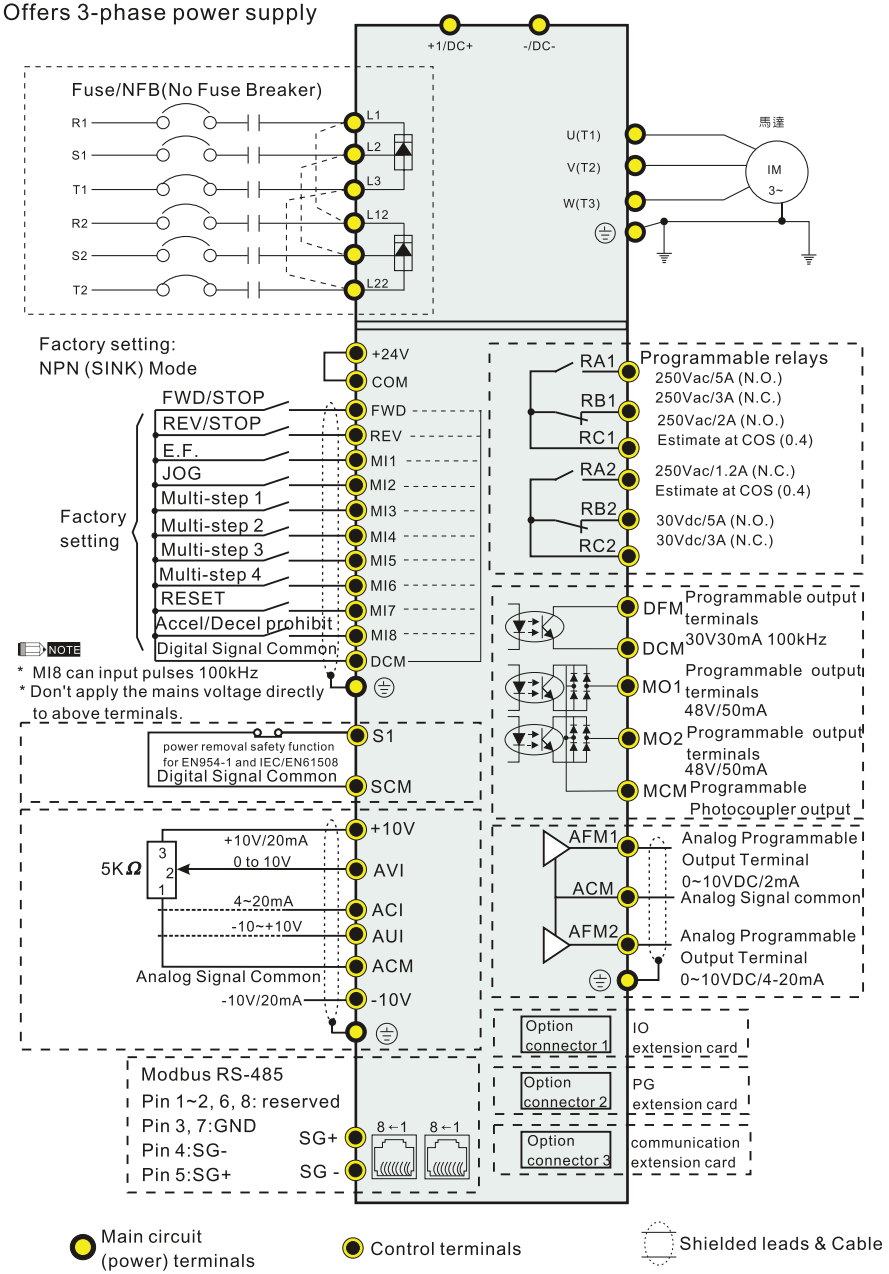


Frame D and above
Offers 3-phase power supply



Wiring

Frame G&H
Offers 3-phase power supply



Specifications

230V	Frame Size	A				B			C			D		E			F
	Model Number VFD-__C__	007	015	022	037	055	075	110	150	185	220	300	370	450	550	750	900
	Max. Applicable Motor Output (kW)	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
	Max. Applicable Motor Output (hp)	1	2	3	5	7.5	10	15	20	25	30	40	50	60	75	100	125
Output Rating	HEAVY DUTY Rated Output Capacity (kVA)	1.9	2.8	4.0	6.4	9.6	12	19	25	28	34	45	55	68	81	96	131
	HEAVY DUTY Rated Output Current (A)	4.8	7.1	10	16	24	31	47	62	71	86	114	139	171	204	242	329
	HEAVY DUTY Carrier Frequency (kHz)	2~15kHz							2~10kHz					2~9kHz			
	NORMAL DUTY Rated Output Capacity (kVA)	2.0	3.2	4.4	6.8	10	13	20	26	30	36	48	58	72	86	102	138
	NORMAL DUTY Rated Output Current (A)	5	8	11	17	25	33	49	65	75	90	120	146	180	215	255	346
	NORMAL DUTY Carrier Frequency (kHz)	2~15kHz							2~10kHz					2~9kHz			
Input Rating	Input Current (A) Heavy Duty	6.1	11	15	18.5	26	34	50	68	78	95	118	136	162	196	233	315
	Input Current (A) Normal Duty	6.4	12	16	20	28	36	52	72	83	99	124	143	171	206	245	331
	Rated Voltage/Frequency	3-phase AC 200V~240V (-15%~+10%), 50/60Hz															
	Operating Voltage Range	170~265Vac															
	Frequency Tolerance	47~63Hz															
	Cooling Method	Natural	Fan cooling														
	Braking Chopper	Built-in										Option					
	DC Reactor	Option										Built-in					
	EMI Filter	Option															

General Specifications

Control Characteristics	Control Method	1: V/F, 2: SVC, 3: VF+PG, 4: FOC+PG
	Starting Torque	up to 150% or above at 0.5Hz; up to 150% at 0Hz for 1 minute
	V/f Curve	4-point adjustable V/f curve & square curve
	Speed Response Bandwidth	5Hz (vector control can be up to 40Hz)
	Torque Limit	Max. 200% torque current
	Torque Accuracy	±5%
	Max. Output Frequency (Hz)	Normal duty:0.01~600.00Hz; Heavy duty: 0.00 ~ 300.00 Hz
	Frequency Output Accuracy	Digital command: ±0.01%, -10℃ ~+40℃, Analog command: ±0.1%, 25 ±10℃
	Frequency Setting Resolution	Digital command: 0.01Hz, Analog command: 0.03/60 Hz (±11 bits)
	Overload Tolerance	Normal duty: 120% of rated output current for 1 min. Heavy duty: 150% of rated output current for 1 min.
	Frequency Setting Signal	+10V~-10,0~+10V,4~20mA,0~20mA,Pulse input
	Accel./decel. Time	0.00~600.00/0.0~6000.0 Seconds
	Main Control Function	Torque control, Speed/torque control switching, Feed forward control, Zero-servo control, Momentary power loss ridethru, Speed search, Over-torque detection, Torque limit, 16-step speed (including master speed), Accel/decel time switch, S-curve accel/decel, 3-wire sequence, Auto-Tuning (rotational, stationary), Dwell, Slip compensation, Torque compensation, Skip frequency, Frequency upper/lower limit settings, DC injection braking at start/stop, High slip braking, PID control (with sleep function), Energy saving control, MODBUS communication (RS-485 RJ45) max. 115.2 kbps), Fault restart and Parameter copy
	Fan Control	Frame B and below: ON/OFF switch; frame C and above: PWM control
Protection Characteristics	Motor Protection	Electronic thermal relay protection
	Over-current Protection	The current forces 240% of the over-current protection Current clamp: normal duty: 170~175%; heavy duty: 180~185%
	Over-voltage Protection	230: drive will stop when DC-BUS voltage exceeds 410V 460: drive will stop when DC-BUS voltage exceeds 820V
	Over-temperature Protection	Built-in temperature sensor
	Stall Prevention	Stall prevention during acceleration, deceleration and running independently.
	Re-start after Momentary Power Off	Parameter setting can be up to 20 seconds
	Ground Current Protection	Ground current protection level is 50% of rated current of the AC motor drive

Specifications

460V	Frame Size	A						B			C		
	Model Number VFD-__C__	007	015	022	037	040	055	075	110	150	185	220	300
	Max. Applicable Motor Output (kW)	0.75	1.5	2.2	3.7	4.0	5.5	7.5	11	15	18.5	22	30
	Max. Applicable Motor Output (hp)	1	2	3	5	5	7.5	10	15	20	25	30	40
Output Rating HEAVY DUTY	Rated Output Capacity (kVA)	2.3	3.0	4.5	6.5	7.6	9.6	14	18	24	29	34	45
	Rated Output Current (A)	2.9	3.8	5.7	8.1	9.5	11	17	23	30	36	43	57
	Carrier Frequency (kHz)	2~15kHz									2~10kHz		
Output Rating NORMAL DUTY	Rated Output Capacity (kVA)	2.4	3.2	4.8	7.2	8.4	10	14	19	25	30	36	48
	Rated Output Current (A)	3.0	4.0	6.0	9.0	10.5	12	18	24	32	38	45	60
	Carrier Frequency (kHz)	2~15kHz									2~10kHz		
Input Rating	Input Current (A) Heavy Duty	4.1	5.6	8.3	13	14.5	16	19	25	33	38	45	60
	Input Current (A) Normal Duty	4.3	5.9	8.7	14	15.5	17	20	26	35	40	47	63
	Rated Voltage/Frequency	3-phase AC 380V~480V (-15%~+10%), 50/60Hz											
	Operating Voltage Range	323~528Vac											
	Frequency Tolerance	47~63Hz											
	Cooling Method	Natural	Fan cooling										
	Braking Chopper	Built-in											
	DC Reactor	Option											
	EMI Filter	VFDXXXC43A: without EMI filter VFDXXXC43E: built-in EMI filter											

460V	Frame Size	D				E		*F		*G		*H		
	Model Number VFD-__C__	370	450	550	750	900	1100	1320	1600	1850	2200	2800	3150	3550
	Max. Applicable Motor Output (kW)	37	45	55	75	90	110	132	160	185	220	280	315	355
	Max. Applicable Motor Output (hp)	50	60	75	100	125	150	175	215	250	300	375	425	475
Output Rating HEAVY DUTY	Rated Output Capacity (kVA)	55	69	84	114	136	167	197	235	280	348	417	466	517
	Rated Output Current (A)	69	86	105	143	171	209	247	295	352	437	523	585	649
	Carrier Frequency (kHz)	2~10kHz				2~9kHz								
Output Rating NORMAL DUTY	Rated Output Capacity (kVA)	58	73	88	120	143	175	207	247	295	367	438	491	544
	Rated Output Current (A)	73	91	110	150	180	220	260	310	370	460	550	616	683
	Carrier Frequency (kHz)	2~10kHz				2~9kHz								
Input Rating	Input Current (A) Heavy Duty	70	96	108	149	159	197	228	285	361	380	469	527	594
	Input Current (A) Normal Duty	74	101	114	157	167	207	240	300	380	400	494	555	625
	Rated Voltage/Frequency	3-phase AC 380V~480V (-15%~+10%), 50/60Hz												
	Operating Voltage Range	323~528Vac												
	Frequency Tolerance	47~63Hz												
	Cooling Method	Fan cooling												
	Braking Chopper	Option												
	DC Reactor	Built-in												
	EMI Filter	VFDXXXC43A: without EMI filter VFDXXXC43E: built-in EMI filter				VFDXXXC43A: have to be used with conduit box kit;VFDXXX43E: NEMA1								

General Specifications

Control Characteristics	Control Method	1: V/F, 2: SVC, 3: VF+PG, 4: FOC+PG
	Starting Torque	up to 150% or above at 0.5Hz; up to 150% at 0Hz for 1 minute
	V/f Curve	4-point adjustable V/f curve & square curve
	Speed Response Bandwidth	5Hz (vector control can be up to 40Hz)
	Torque Limit	Max. 200% torque current
	Torque Accuracy	±5%
	Max. Output Frequency (Hz)	Normal duty:0.01~600.00Hz; Heavy duty: 0.00 ~ 300.00 Hz
	Frequency Output Accuracy	Digital command: ±0.01%, -10℃ ~+40℃, Analog command: ±0.1%, 25 ±10℃
	Frequency Setting Resolution	Digital command: 0.01Hz, Analog command: 0.03/60 Hz (±11 bits)
	Overload Tolerance	Normal duty: 120% of rated output current for 1 min. Heavy duty: 150% of rated output current for 1 min.
	Frequency Setting Signal	+10V~-10,0~+10V,4~20mA,0~20mA,Pulse input
	Accel./decel. Time	0.00~600.00/0.0~6000.0 Seconds
	Main Control Function	Torque control, Speed/torque control switching, Feed forward control, Zero-servo control, Momentary power loss ridethru, Speed search, Over-torque detection, Torque limit, 16-step speed (including master speed), Accel/decel time switch, S-curve accel/decel, 3-wire sequence, Auto-Tuning (rotational, stationary), Dwell, Slip compensation, Torque compensation, Skip frequency, Frequency upper/lower limit settings, DC injection braking at start/stop, High slip braking, PID control (with sleep function), Energy saving control, MODBUS communication (RS-485 RJ45) max. 115.2 kbps), Fault restart and Parameter copy
	Fan Control	Frame B and below: ON/OFF switch; frame C and above: PWM control
Protection Characteristics	Motor Protection	Electronic thermal relay protection
	Over-current Protection	The current forces 240% of the over-current protection Current clamp: normal duty: 170~175%; heavy duty: 180~185%
	Over-voltage Protection	230: drive will stop when DC-BUS voltage exceeds 410V 460: drive will stop when DC-BUS voltage exceeds 820V
	Over-temperature Protection	Built-in temperature sensor
	Stall Prevention	Stall prevention during acceleration, deceleration and running independently.
	Re-start after Momentary Power Off	Parameter setting can be up to 20 seconds
	Ground Current Protection	Ground current protection level is 50% of rated current of the AC motor drive

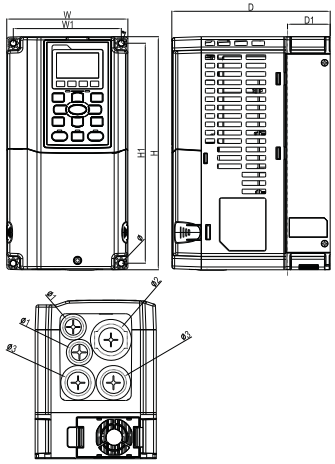
Environment for Operation, Storage and Transportation

DO NOT expose the AC motor drive to bad ambient conditions, such as dust, direct sunlight, corrosive/inflammable gasses, humidity, liquids and vibration. The salt deposit from the air must be less than 0.01mg/ cm^2 each year.

Environment	Installation location	IEC60364-1/IEC60664-1 Pollution degree 2,Indoor use only		
	Surrounding Temperature	Operation	NEMA 1/UL Type 1	When operating at rated current, the surrounding temperature must be within -10~+ 40°C.For 40°C~60 °C, please derate 2% rated current per increasing 1°C.
			UL Open Type	When operating at rated current, the surrounding temperature must be within -10~+ 50°C. For 50°C~60 °C, please derate 2% rated current per increasing 1°C.
		Storage/ Transportation		-25°C ~ +70°C
		No condensation, no frost		
	Rated Humidity	Operation		Max. 90%
		Storage/ Transportation		Max. 95%
		No condensation		
	Air Pressure	Operation/ Storage		86 to 106 kPa
		Transportation		70 to 106 kPa
	Pollution Level	IEC60721-3-3 (application is in progress)		
		Operation		Class 3C2：Class 3S2
		Storage		Class 2C2：Class 2S2
		Transportation		Class 1C2：Class 1S2
		No condensation		
	Altitude	Operation		0-1000m For 1000-3000m, please derate 2% rated current or decrease 0.5°C surrounding temperature per 100m.The corner grounded system can only be used at 2000m and below.
	Package Drop	Storage/ Transportation		ISTA procedure 1A(according to weight) IEC60068-2-31
	Vibration	1.0mm peak to peak, 2-13.2Hz. 0.7-1.0G: 13.2-55Hz; 1.0G: 55-512Hz (comply with IEC 60068-2-6)		
	Shock Resistance	Comply with IEC/EN 60068-2-27		
	Operation Position	Max. allowed offset angle ±10° (for normal installation position)		

Dimensions

Frame A



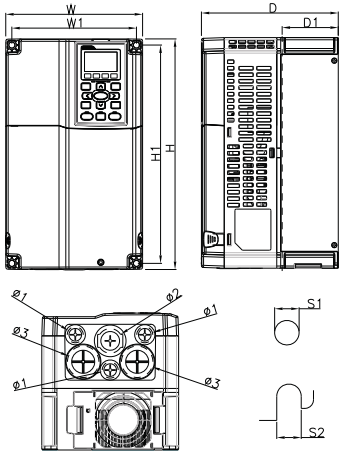
MODEL

VFD007C23A/23E
VFD007C43A/43E
VFD015C23A/23E
VFD015C43A/43E
VFD022C23A/23E
VFD022C43A/43E
VFD037C23A/23E
VFD037C43A/43E
VFD040C43A/43E
VFD055C43A/43E

Unit : mm[inch]

Frame		W	H	D	W1	H1	D1*	Ø	Ø1	Ø2	Ø3
A1	mm	130.0	250.0	170.0	116.0	236.0	45.8	6.2	22.2	34.0	28.0
	inch	5.12	9.84	6.69	4.57	9.29	1.80	0.24	0.87	1.34	1.10

Frame B



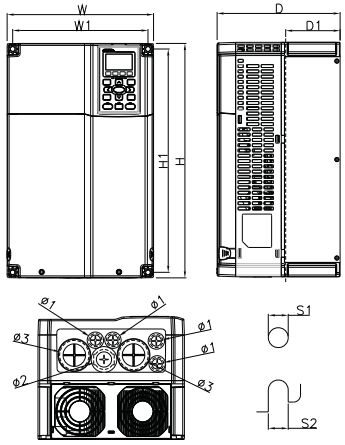
MODEL

VFD055C23A/23E
VFD075C23A/23E
VFD075C43A/43E
VFD110C23A/23E
VFD110C43A/43E
VFD150C43A/43E

Unit : mm[inch]

Frame		W	H	D	W1	H1	D1*	S1	S2	Ø1	Ø2	Ø3
B1	mm	190.0	320.0	190.0	173.0	303.0	77.9	8.5	8.5	22.2	34.0	43.8
	inch	7.48	12.60	7.48	6.81	11.93	3.07	0.33	0.33	0.87	1.34	1.72

Frame C



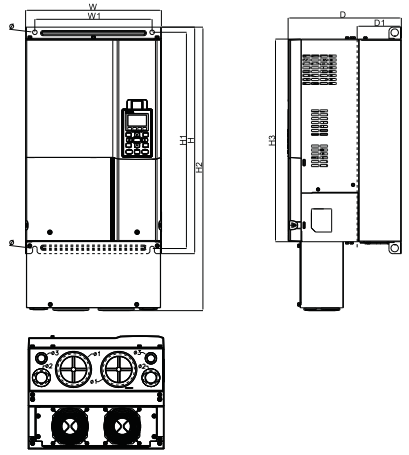
MODEL

VFD150C23A/23E
VFD185C23A/23E
VFD185C43A/43E
VFD220C23A/23E
VFD220C43A/43E
VFD300C43A/43E

Unit : mm[inch]

Frame		W	H	D	W1	H1	D1*	S1	S2	Ø1	Ø2	Ø3
C1	mm	250.0	400.0	210.0	231.0	381.0	92.9	8.5	8.5	22.2	34.0	50.0
	inch	9.84	15.75	8.27	9.09	15.00	3.66	0.33	0.33	0.87	1.34	1.97

Frame D



MODEL

FRAME_D1	FRAME_D2
VFD300C23A	VFD300C23E
VFD370C23A	VFD370C23E
VFD370C43A	VFD370C43E
VFD450C43A	VFD450C43E
VFD550C43A	VFD550C43E
VFD750C43A	VFD750C43E

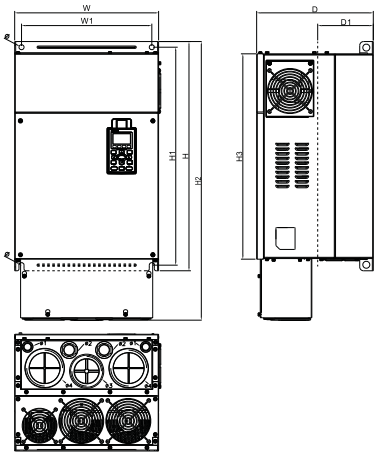
Unit : mm[inch]

Frame	W	H	D	W1	H1	H2	H3	D1*	Ø	Ø1	Ø2	Ø3
D1	330.0 [12.99]	550.0 [21.65]	275.0 [10.83]	285.0 [11.22]	525.0 [20.67]	-	492.0 [19.37]	107.2 [4.22]	11.0 [0.43]	34.0 [1.34]	22.0 [0.87]	11.0 [0.43]
D2	330.0 [12.99]	550.0 [21.65]	275.0 [10.83]	285.0 [11.22]	525.0 [20.67]	688.3 [27.10]	492.0 [19.37]	107.2 [4.22]	11.0 [0.43]	34.0 [1.34]	22.0 [0.87]	11.0 [0.43]

D1* : Flange mounting

Dimensions

Frame E



MODEL

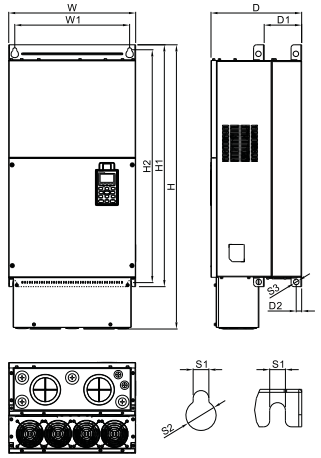
FRAME_E1	FRAME_E2
VFD450C23A	VFD450C23E
VFD550C23A	VFD550C23E
VFD900C43A	VFD900C43E
VFD1100C43A	VFD1100C43E

Unit : mm[inch]

Frame	W	H	D	W1	H1	H2	H3	D1*	Ø	Ø1	Ø2	Ø3	Ø4
E1	370.0 [14.57]	589.0 [23.19]	300.0 [11.81]	335.0 [13.19]	560.0 [22.05]	-	528.0 [20.80]	143.0 [5.63]	13.0 [0.51]	22.0 [0.87]	34.0 [1.34]	76.0 [2.99]	92.0 [3.62]
E2	370.0 [14.57]	589.0 [23.19]	300.0 [11.81]	335.0 [13.19]	560.0 [22.05]	715.8 [28.18]	528.0 [20.80]	143.0 [5.63]	13.0 [0.51]	22.0 [0.87]	34.0 [1.34]	76.0 [2.99]	92.0 [3.62]

D1* : Flange mounting

Frame F



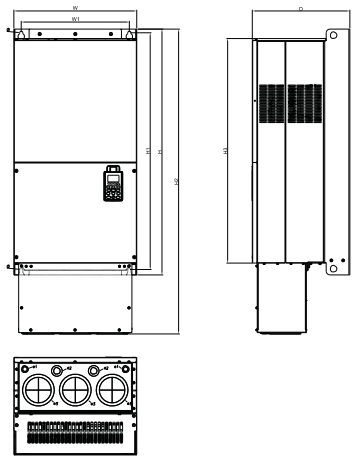
MODEL

FRAME_F1	FRAME_F2
VFD900C23A	VFD900C23E
VFD1320C23A	VFD1320C43E
VFD1600C23A	VFD1600C43E

Unit : mm[inch]

Frame	W	H	D	W1	H1	H2	D1	D2	S1	S2	S3
F1	420.0 [16.54]	-	300.0 [11.81]	380.0 [14.96]	800.0 [31.50]	770.0 [30.32]	124.0 [4.88]	18.0 [0.71]	13.0 [0.51]	25.0 [0.98]	18.0 [0.71]
F2	420.0 [16.54]	940.0 [37.00]	300.0 [11.81]	380.0 [14.96]	800.0 [31.50]	770.0 [30.32]	124.0 [4.88]	18.0 [0.71]	13.0 [0.51]	25.0 [0.98]	18.0 [0.71]

Frame G



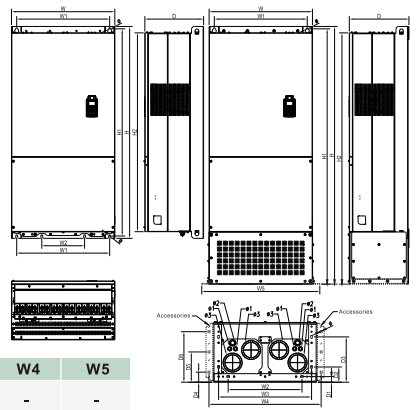
MODEL

FRAME_G1	FRAME_G2
VFD1850C43A	VFD1850C43E
VFD2200C43A	VFD2200C43E

Unit : mm[inch]

Frame	W	H	D	W1	H1	H2	H3	Ø	Ø1	Ø2	Ø3
G1	550.0 [19.69]	1000.0 [39.37]	397 [15.63]	440.0 [217.32]	963.0 [37.91]	-	913.6 [35.97]	13.0 [0.51]	-	-	-
G2	550.0 [19.69]	1000.0 [39.37]	397 [15.63]	440.0 [217.32]	963.0 [37.91]	1240.2 [48.83]	913.6 [35.97]	13.0 [0.51]	22.0 [0.87]	34.0 [1.34]	117.5 [4.63]

FrameH



MODEL

FRAME_H1	FRAME_H2
VFD2800C43A	VFD2800C43E
VFD3150C43A	VFD3150C43E
VFD3550C43A	VFD3550C43E

Frame	W	H	D	W1	W2	W3	W4	W5
H1	700.0 [27.56]	1435.0 [56.5]	398.0 [15.67]	630.0 [24.8]	290.0 [11.42]	-	-	-
H2	700.0 [27.56]	1745.0 [68.7]	404.0 [15.9]	630.0 [24.8]	500.0 [19.69]	630.0 [24.8]	760.0 [29.92]	800.0 [31.5]

Unit : mm[inch]

Frame	H1	H2	D1	D2	D3	D4	D5	D6	Ø	Ø1	Ø2	Ø3
H1	1403.0 [55.24]	1347.0 [53.03]	-	-	-	-	-	-	13.0 [0.51]	-	-	-
H2	1729.0 [68.07]	1702.0 [67.0]	38.0 [1.5]	103.0 [4.06]	307.0 [12.09]	68.0 [2.68]	205.0 [8.07]	342.0 [13.46]	13.0 [0.51]	22.0 [0.87]	34.0 [1.34]	117.5 [4.63]

Attentions

Standard Motors

- **Used with 400V Standard Motors**
  It is recommended to add an AC output reactor when using with a 400V standard motor to prevent damage to motor insulation.
- **Torque Characteristics and Temperature Rise**
  When a standard motor is drive controlled, the motor temperature will be higher than with DOL operation.
  Please reduce the motor output torque when operating at low speeds to compensate less cooling efficiency.
  For continuous constant torque at low speeds, external forced motor cooling is recommended.
- **Vibration**
  When the motor drives the machine, resonances may occur, including machine resonances. Abnormal vibration may occur when operating a 2-pole motor at 60Hz or higher.
- **Noise**
  When a standard motor is drive controlled, the motor noise will be higher than with DOL operation. To lower the noise, please increase the carrier frequency of the drive. The motor fan can be very noisy when the motor speed exceeds 60Hz.

Special Motors

- **High-speed Motor**
  To ensure safety, please try the frequency setting with another motor before operating the high-speed motor at 120Hz or higher.
- **Explosion-proof Motor**
  Please use a motor and drive that comply with explosion-proof requirements.
- **Submersible Motor & Pump**
  The rated current is higher than that of a standard motor.
  Please check before operation and select the capa city of the AC motor drive carefully.
  The motor temperature characteristics differ from a standard motor, please set the motor thermal time constant to a lower value.
- **Brake Motor**
  When the motor is equipped with a mechanical brake, the brake should be powered by the mains supply.
  Damage may occur when the brake is powered by the drive output. Please DO NOT drive the motor with the brake engaged.
- **Gear Motor**
  In gearboxes or reduction gears, lubrication may be reduced if the motor continuously is operated at low speeds. Please DO NOT operate in this way.
- **Synchronous Motor**
  These kind of motors need suitable software to control them. Please contact Delta for more information.
- **Single-phase Motor**
  Single-phase motors are not suitable for being operated by an AC Motor Drive. Please use a 3-phase motor instead when necessary.

Environmental Conditions

- **Installation Position**
  1. The drive is suitable to be installed in a place with ambient temperature from -10 to 50℃.
  2. The surface temperature of the drive and brake resistor will rise under specific operation conditions. Therefore, please install the drive on materials that are noncombustible.
  3. Ensure that the installation place complies with the ambient conditions as stated in the manual.

Wiring

- **Limit of Wiring Distance**
  For the remote operation, please use twist-shielding cable and the distance between the drive and control box should be less than 20m.
- **Maximum Motor Cable Length**
  Too long motor cables may cause overheating the drive or current peaks due to stray capacitance.
  Please ensure that the motor cable is less than 30m.
  If the cable length can't be reduced, please lower the carrier frequency or use an AC reactor.
- **Choose the Right Cable**
  Please refer to current value to choose the right cable section with enough capacity or use recommended cables.
- **Grounding**
  Please ground the drive completely by using the grounding terminal.

How to Choose the Drive Capacity

- **Standard Motor**
  Please select the drive according to applicable motor rated current listed in the drive specification.
  Please select the next higher power AC drive in case higher starting torque or quick acceleration/deceleration is needed.
- **Special Motor**
  Please select the drive according to
  Rated current of the drive > rated current of the motor

Transportation and Storage

Please transport and store the drive in the place within environment specifications.

Peripheral Equipment

- **Molded-Case Circuit Breakers (MCCB)**
  Please install the recommended MCCB or ELCB in the main circuit of the drive and make sure that the capacity of the breaker is equal to or lower than the recommended one.
- **Add a Magnetic Contactor(MC) in the Output Circuit**
  When a MC installed in the output circuit of the drive to switch the motor to commercial power or other purposes, please make sure that the drive and motor are completely stopped and remove the surge absorbers from the MC before switching it.
- **Add a Magnetic Contactor (MC) in the Input Circuit**
  Please only switch the MC ONCE per hour or it may damage the drive. Please use RUN/STOP signal to switch many times during motor operation.
- **Motor Protection**
  The thermal protection function of the drive can be used to protect the motor by setting the operation level and motor type (standard motor or variable motor).
  When using a high-speed motor or a water-cooled motor the thermal time constant should be set to a lower value.

  When using a longer cable to connect the motor thermal relay to a motor, high-frequency currents may enter via the stray capacitance. It may result in malfunctioning of the relay as the real current is lower than the setting of thermal relay. Under this condition, please lower the carrier frequency or add an AC reactor to solve this.
- **DO NOT Use Capacitors to Improve the Power Factor**
  Use a DC reactor to improve the power factor of the drive. Please DO NOT install power factor correction capacitors on the main circuit of the drive to prevent motor faults due to over current.
- **Do NOT Use Surge Absorber**
  Please DO NOT install surge absorbers on the output circuit of the drive.
- **Lower the Noise**
  To ensure compliance with EMC regulations, usually a filter and shielded wiring is used to lower the noise.
- **Method Used to Reduce the Surge Current**
  Surge currents may occur in the phase-lead capacitor of the power system, causing an overvoltage when the drive is stopped or at low loads.

  It is recommended to add a DC reactor to the drive.