Automation for a Changing World

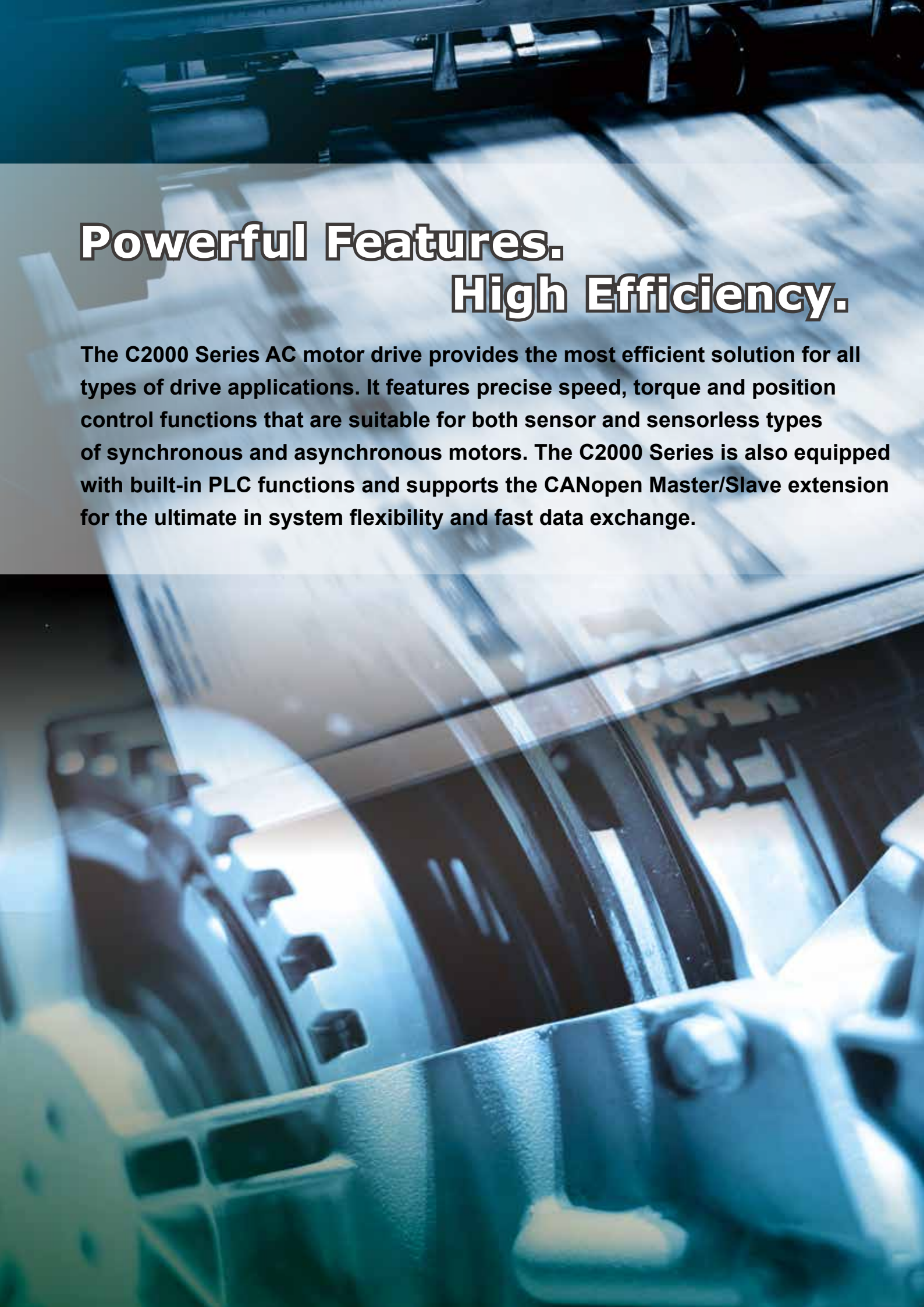
Delta Vector Control Drive C2000 Series

reddot design award
winner 2010

www.deltaww.com

DELTA

Smarter. Greener. Together.



Powerful Features. High Efficiency.

The C2000 Series AC motor drive provides the most efficient solution for all types of drive applications. It features precise speed, torque and position control functions that are suitable for both sensor and sensorless types of synchronous and asynchronous motors. The C2000 Series is also equipped with built-in PLC functions and supports the CANopen Master/Slave extension for the ultimate in system flexibility and fast data exchange.

Table of Contents

Standard Models (IP20/NEMA1)

Power range : 230 V 0.75 ~ 90 kW, 460 V 0.75 ~ 450 kW

230 V (kW)	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
230 V (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

460 V (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
460 V (HP)	1	2	3	5	5	7.5	10	15	20	25	30	40	50	60	75	100
Frame Size	A						B			C			D0		D	

Power range: 575 V 1.5~15 kW

575 V (kW)	1.5	2.2	3.7	5.5	7.5	11	15
575 V (HP)	2	3	5	7.5	10	15	20
Frame Size	A			B			

Power range: 690 V 18.5~630 kW

690 V (kW)	18.5	22	30	37	45	55	75	90	110	132	160	200	250	315	400	450
690 V (HP)	25	30	40	50	60	75	100	125	150	175	215	270	335	425	530	600
Frame Size	C				D		E				F		G			H

Advanced Drive Controls

▪ Door Width Auto-tuning

1. High bandwidth control
2. Speed / torque / position control mode
3. Dual rating design (Normal duty / heavy duty)
4. 4-quadrant torque control and limit
5. For both synchronous and asynchronous motors

▪ Environmental Adaptability

1. 50℃ operating temperature
2. Built-in DC reactor
3. Coated circuit boards
4. Built-in EMC filter
5. Global safety standards (CE/UL/cUL)

*Note: Please refer to the Product Specification

90	110	132	160	185	220	280	315	355	450
125	150	175	215	250	300	375	425	475	600
E		F		G		H			

560	630
745	840

▪ Versatile Drive Controls

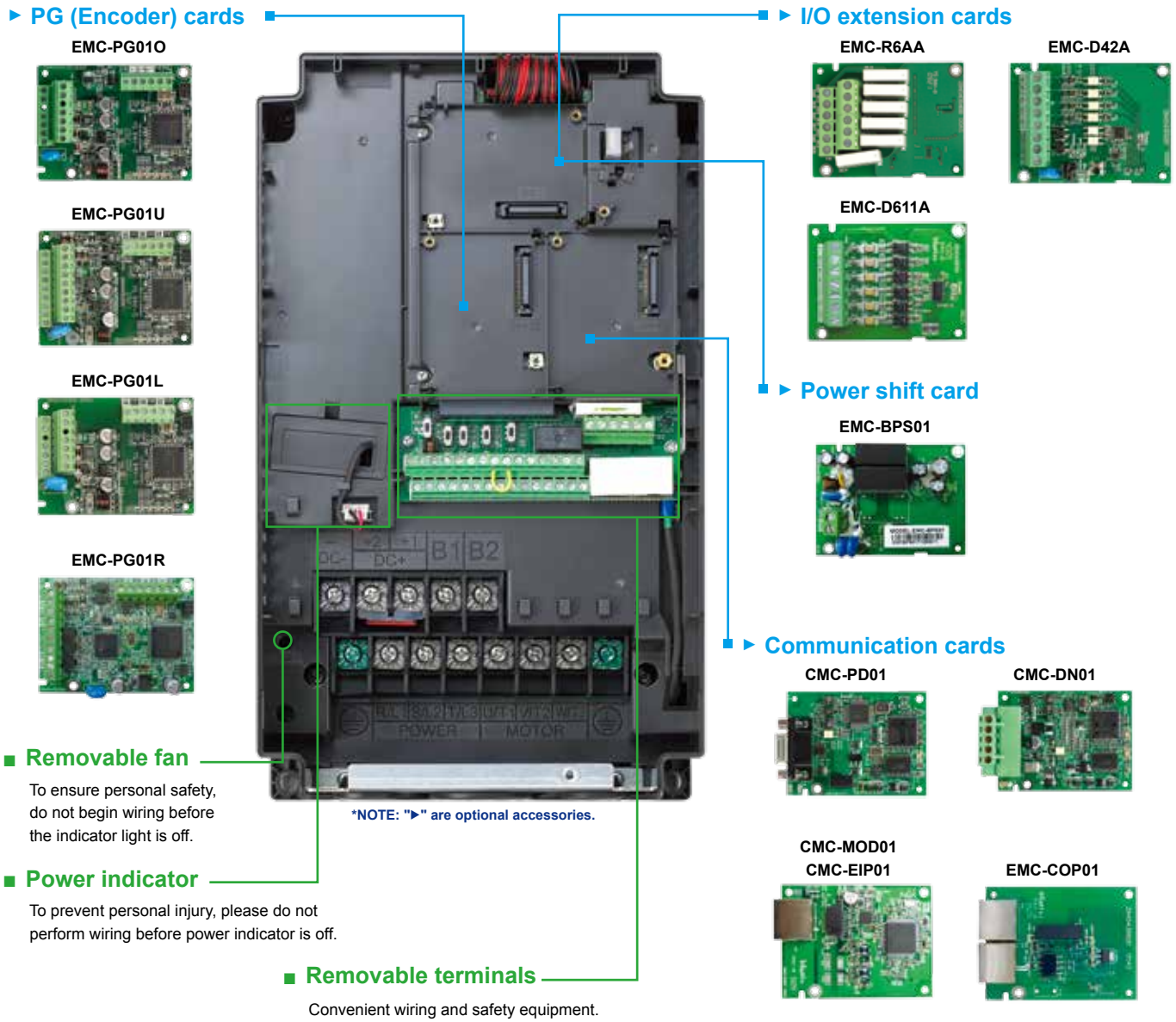
1. Built-in safe stop function
2. Built-in PLC function
3. Built-in brake unit
4. Supports various network protocols
5. Synchronous point-to-point control

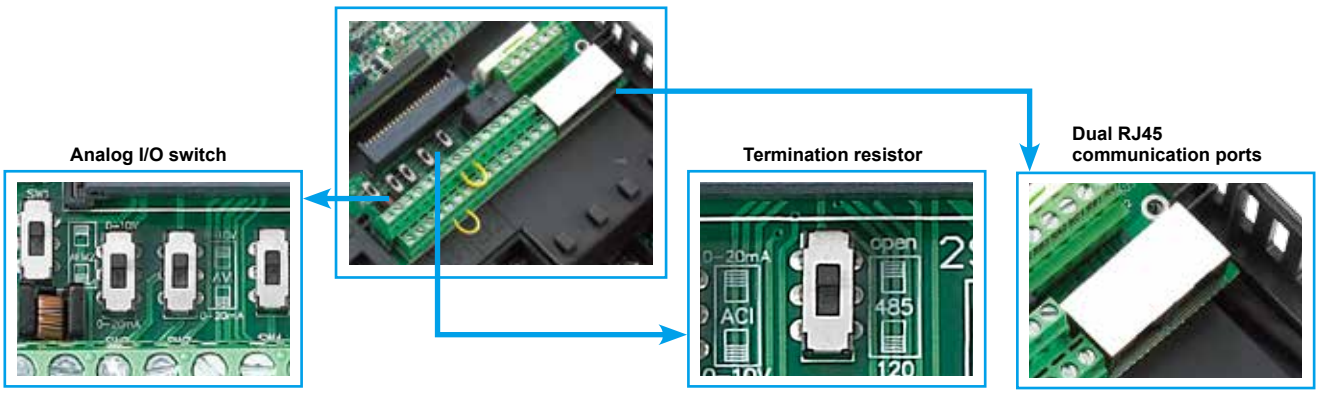
▪ Modular Design

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

Modular Design

Various accessories options, such as I/O extension cards, encoder feedback cards, communication cards, hot plug LCD keypad, removable terminals and removable fans.





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

■KPC-CC01 keypad
■Standard RJ45 network cable.
■Easy to remove with one press

■The product nameplate shows the input / output voltage, input / output current, the frequency range, and more.

■Remove the safety screws and press on two sides to remove the cover for wiring

■RFI Switch

■Modular fan design is easy to clean and replace providing longer service life.

Excellent Environment Adaptability

- Built-in DC choke to surpress harmonics*
- Built-in EMC filter to filter noise*
- Conformal coating (Class 3C2 of IEC60721-3-3 standard) ensures drive operation stability and safety in critical environments.
- The electronic components of the drive are isolated from the cooling system to reduce heat interference. Dissipated heat can be discharged by flange-mounting installation, and forced fan cooling can import cold air into the heat sink. The heat dissipation performance is optimized by these two cooling methods.

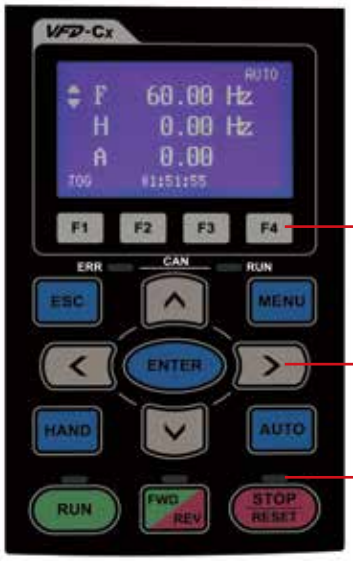
*Note: Please refer to the Product Specification

Certifications

UL, cUL	**CE**
C-Tick	Low Voltage: EN61800-5-1
ROHS	EMC: EN61000-3-12, EN61800-3, IEC61000-6-2, IEC61000-6-4, IEC61000-4-2, IEC61000-4-3, IEC61000-4-4, IEC61000-4-5, IEC61000-4-6, IEC61000-4-8,

Quick and Easy Parameters Setting via the LCD Keypad

- Multi-column display for the drive status
- Simple and intuitive operation
- User-defined parameter groups
- Real Time Clock and calendar function
- Language selection for display
- Copy function saves parameters and PLC programs to the keypad memory for later transfer to another drive
- IP66 protection level



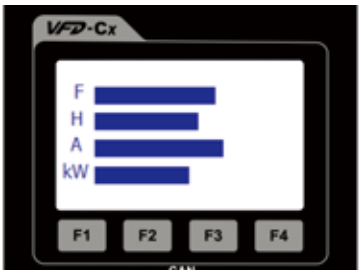
F1 to F4: User-defined function keys

Selection keys

LED displays the current drive status

Create homepage logo

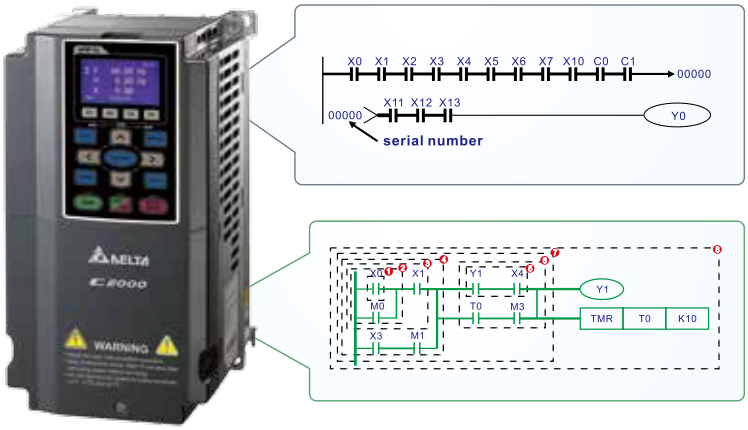
Editable message display



Editable chart display

Intelligent PLC Functions

- Built-in 10 K steps capacity of PLC functions. Distributed control and independent operation are easily achieved via network connection.
- CANopen Master protocol and PLC functions provide synchronous control and fast data exchange.



High-Speed Network

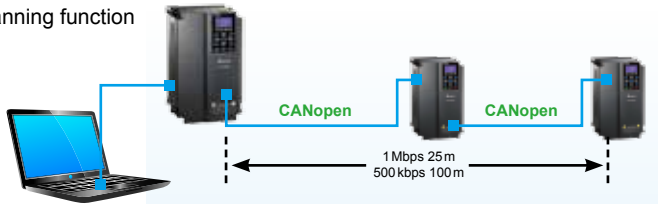
- Provides optional MODBUS RTU and various fieldbus cards for flexible applications
- Advanced network functions
- Built-in MODBUS communication

■ PROFIBUS

■ CANopen (DS402)

Ability to control up to 8 Slave drives via the CANopen Master function

- Supports all Delta industrial automation products (Built-in EDS files for all Delta industrial automation products)
- I/O data configurations for each device on the CANopen network
- Motion control planning function
- WPL Soft



- TAP-CN03 distribution box for long distances

- RJ45 cable

■ DeviceNet

Through the Delta specially designed DeviceNet Builder software, users can easily establish a standard DeviceNet control network by the parameter pre-assignment function for each equipment and remote I/O.

- Supports all Delta industrial automation products (Built-in EDS files for all Delta industrial automation products)
- I/O data configurations for each device on the DeviceNet network
- DeviceNet layout software

■ EtherNet/IP

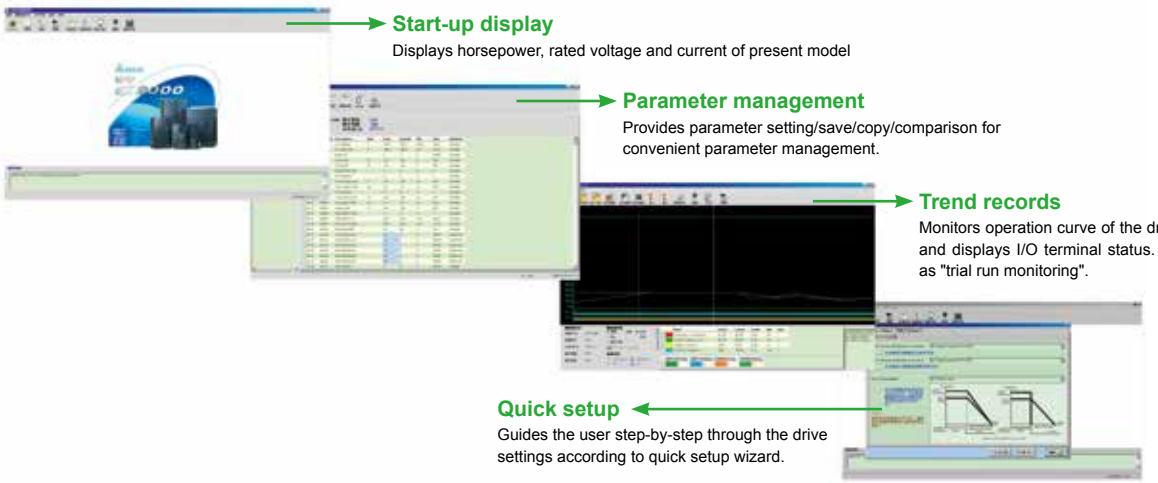
■ MODBUS TCP

Delta provides communication integrator software that offers graphic module settings and a user friendly interface to support all Ethernet products settings and online monitoring.

- Delta software for Ethernet/MODBUS TCP products
- Graphic module settings and a user friendly interface
- Auto search function
- Supports Virtual COM settings

Convenient Drive System Management Platform

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



Start-up display
Displays horsepower, rated voltage and current of present model

Parameter management
Provides parameter setting/save/copy/comparison for convenient parameter management.

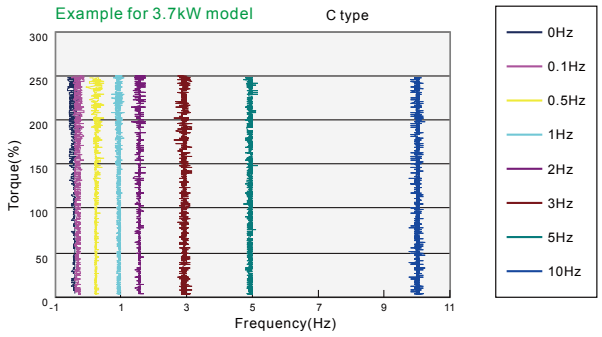
Trend records
Monitors operation curve of the drive by communication and displays I/O terminal status. Useful for tasks such as "trial run monitoring".

Quick setup
Guides the user step-by-step through the drive settings according to quick setup wizard.

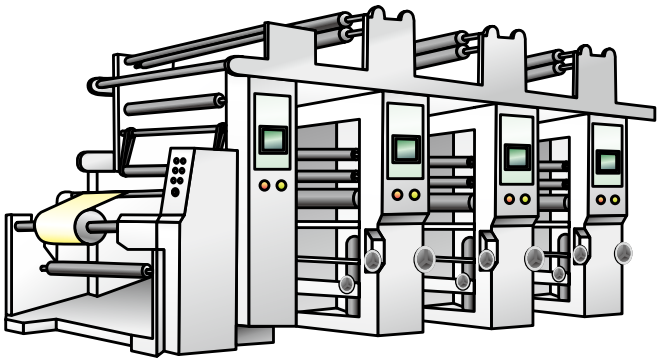
*NOTE: Please download the software above from the Delta website

High-Performance Field Oriented Control

The FOC+PG mode of C2000 Series can output 150% of starting torque at extremely low speeds for precise and stable speed control.

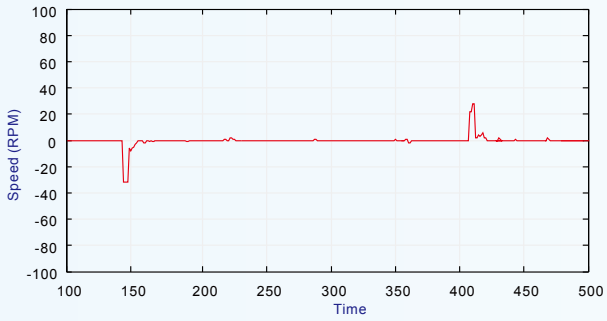


Precise position and speed control ideal for printing machine applications.



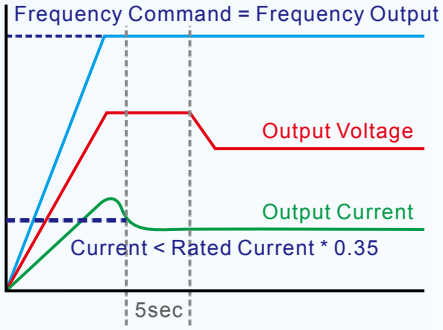
Fast Response to Impact Load

During load changes, the C2000 Series calculates the required torque response and minimizes the vibration caused by load impact using FOC.



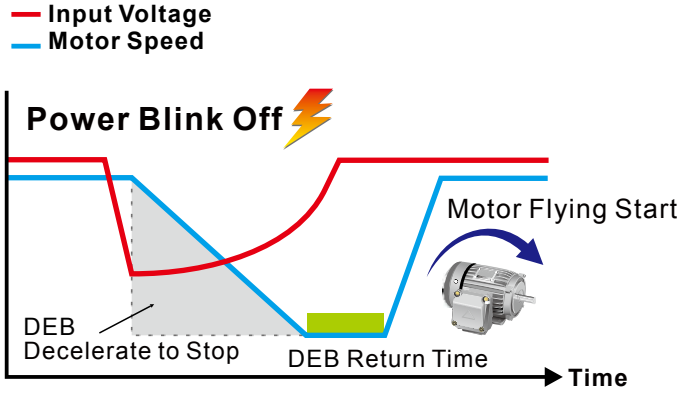
Auto Energy-Saving Operation

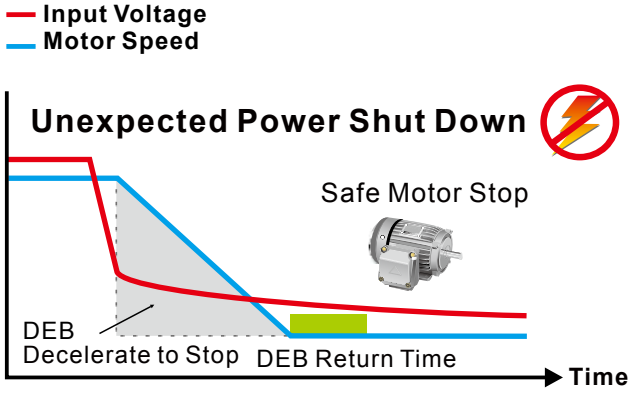
During constant speed operation, this function auto-calculates the best voltage value by the load power for the load.



Deceleration Energy Backup (DEB)

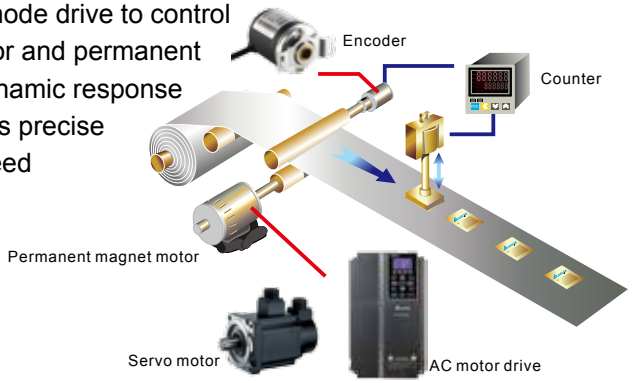
This function controls the motor deceleration for stopping when an unexpected power shut down occurs to prevent mechanical damage. When power resumes, the motor will return to its previous speed.





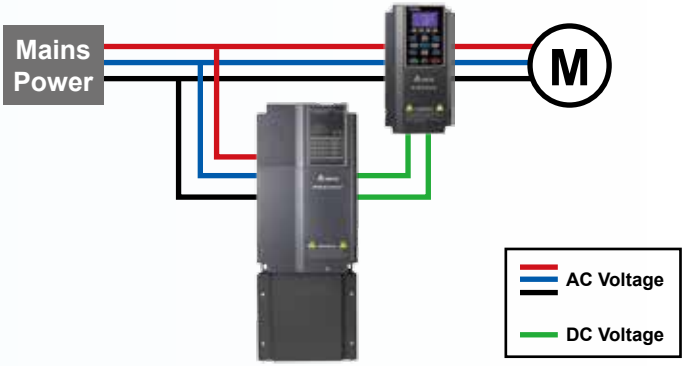
A Drive for Permanent Magnet (PM) Motors

The C2000 is a dual mode drive to control both an induction motor and permanent magnet motor. The dynamic response of a PM motor provides precise control of position, speed and torque.



Delta REG2000 Series for Power Regeneration

Using the REG2000 with the C2000 in a crane and hoist application provides the user with a four-quadrant operation and energy saving results.



Delta AFE2000 Series for Power Regeneration and Power Quality Improvement

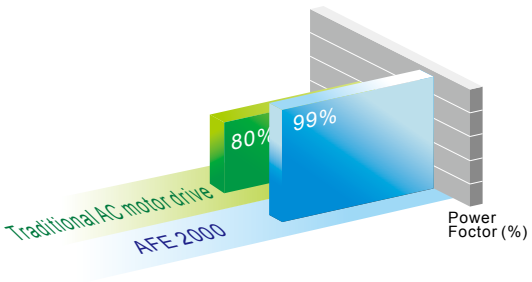
The Active Front End Unit (AFE2000) helps to reduce torque ripple and harmonics with a higher power factor to provide excellent production quality and outstanding energy saving results.

Delta Active Front End AFE2000 Series

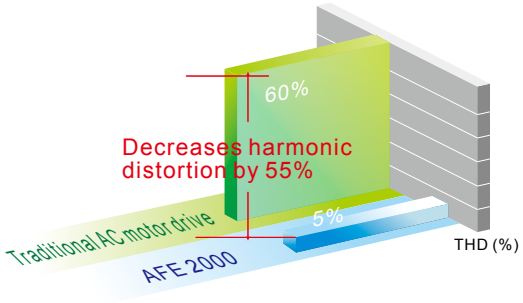
Features

- Replaces traditional brake resistor to reduce heat generation.
- Clear energy savings: more than 95% of the regenerative energy is converted into electricity and supplied back to the mains.
- Full-load operation: input-side current THD lower than 5% and improves power factor up to 99%.
- AC motor drives with AFE2000: supports 4-quadrant operation with variable frequencies and adjustable system.
- Constant DC bus voltage: unaffected by mains voltage fluctuations.

Improves power factor and decreases harmonic distortion.
THD<=5%, power factor > 99%

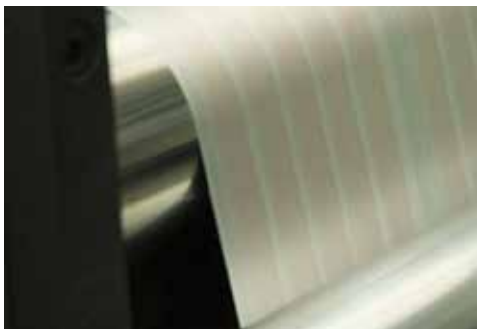


Improves power factor by 20%



Applications

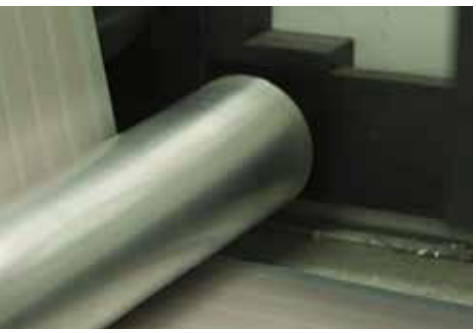
- Large-inertia loads, such as centrifuge equipment, dewatering machines and roving machines
- 4-quadrant loads including elevators, cranes and pumpjacks (oil extraction machines)
- Quick braking, such as machine tools, bag making machines, auto storage and retrieval systems, and lathes
- Long-term energy feedback, such as wind power, water power, steel printing and paper making machinery (winding equipment)
- Improves power quality for industries such as semiconductor and panel industries



Operation Temperature and Protection Level

Model	Frame	Top Cover	Conduit Box	Protection Level	OperationTemperature
VFDxxxCxxA **VFDxxxCxxS**	Frame A ~ C 230 V: 0.75 ~ 22 kW 460 V: 0.75 ~ 30 kW	Remove top cover	Standard conduit plate	IP20 / UL Open Type	-10 °C ~ 50 °C
		Standard with top cover		IP20 / UL Type1 / NEMA1	-10 °C ~ 40 °C
	Frame D ~ H 230 V: > 22 kW 460 V: > 30 kW	N / A	No conduit box	 This circled part is IP00, other areas are IP20	-10 °C ~ 50 °C
VFDxxxCxxE **VFDxxxCxxU**	Frame A ~ C 460 V: 0.75 ~ 30 kW	Remove top cover	Standard conduit plate	IP20 / UL Open Type	-10 °C ~ 50 °C
		Standard with top cover		IP20 / UL Type1 / NEMA1	-10 °C ~ 40 °C
	Frame D ~ H 230 V: > 22 kW 460 V: > 30 kW	N / A	Standard conduit box	IP20 / UL Type1 / NEMA1	-10 °C ~ 40 °C
VFDxxxC53A-21 **VFDxxxC63B-21**	Frame A ~ C 1.5 ~ 37 kW	Remove top cover	Standard conduit plate	IP20 / UL Open Type	-10 °C ~ 50 °C
		Standard with top cover		IP20 / UL Type1 / NEMA1	-10 °C ~ 40 °C
VFDxxxC63B-21	Frame D ~ H > 45 kW	N / A	Standard conduit box	IP20 / UL Type1 / NEMA1	-10 °C ~ 40 °C
VFDxxxC63B-00	Frame D ~ H > 45 kW	N / A	No conduit box	 This circled part is IP00, other areas are IP20	-10 °C ~ 50 °C

*Note: HD= Heavy duty; ND= Normal duty; LD =Light duty



Environment for Operation, Storage and Transportation

DO NOT expose the AC motor drive to harsh environments, such as dust, direct sunlight, corrosive/inflammable gasses, humidity, liquid or vibrations. The salts in the air must be less than 0.01 mg/cm² every year.

Environment	Installation Location	IEC60364-1/IEC60664-1 Pollution degree 2, indoor use only	
	Surrounding Temperature	Storage/Transportation	-25 °C ~ +70 °C
		Only allowed in non-condensation, non-frost, non-conductive environment.	
	Rated Humidity	Operation	Max. 95%
		Storage/Transportation	Max. 95%
		Only allowed in non-condensation, non-frost, non-conductive environment.	
	Air Pressure	Operation/Storage	86 to 106 kPa
		Transportation	70 to 106 kPa
	Pollution Level	IEC60721-3-3	
		Operation	Class 3C2; Class 3S2
		Storage	Class 1C2; Class 1S2
		Transportation	Class 2C2; Class 2S2
		Only allowed in non-condensation, non-frost, non-conductive environment.	
	Altitude	Operation	If the AC motor drive is installed at altitude 0 ~ 1000 m, follow normal operation restriction. If it is installed at altitude 1000 ~ 3000 m, decrease 1% of rated current or lower 0.5 °C of temperature for every 100 m increase in altitude. Maximum altitude for Corner Grounded is 2000 m.
Package Drop		Storage/Transportation	ISTA procedure 1A (according to weight) IEC60068-2-31
Vibration		1.0 mm, peak to peak value range from 2 Hz to 13.2 Hz; 0.7 G ~ 1.0 G range from 13.2 Hz to 55 Hz; 1.0 G range from 55 Hz to 512 Hz. Comply with IEC 60068-2-6.	
Impact		IEC/EN 60068-2-27	
Operation Position		Max. allowed offset angle ±10 °C (under normal installation position)	

Specifications

230 V																	
Frame Size		A				B			C			D		E			F
Model VFD- □□□C□□		007	015	022	037	055	075	110	150	185	220	300	370	450	550	750	900
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
Applicable Motor Output (HP)		1	2	3	5	7.5	10	15	20	25	30	40	50	60	75	100	125
Output Rating	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* Overload Capacity	120% of rated current: 1 minute every 5 minutes; 160% of rated current: 3 seconds every 30 seconds															
	NORMAL DUTY* Max. Output Frequency (Hz)	0.00 ~ 599.00 Hz															
	NORMAL DUTY* Carrier Frequency (kHz)	2 ~ 15 kHz (8 kHz)							2 ~ 10 kHz (6 kHz)					2 ~ 9 kHz (4 kHz)			
	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 Overload Capacity	150% of rated current: 1 minute every 5 minutes; 180% of rated current: 3 seconds every 30 seconds															
	HEAVY DUTY Max. Output Frequency (Hz)	0.00 ~ 300.00 Hz															
	HEAVY DUTY Carrier Frequency (kHz)	2 ~ 6 kHz (2 kHz)															
Input Rating	Input Current (A) Normal Duty	6.4	12	16	20	28	36	52	72	83	99	124	143	171	206	245	331
	Input Current (A) Heavy Duty	6.1	11	15	18.5	26	34	50	68	78	95	118	136	162	196	233	315
	Rated Voltage/Frequency	3-phase AC 200 V ~ 240 V (-15% ~ +10%), 50/60 Hz															
	Operating Voltage Range	170 ~ 265 V_{ac}															
	Frequency Tolerance	47 ~ 63 Hz															
Drive Weight		2.6 ± 0.3 Kg				5.4 ± 1 Kg			9.8 ± 1.5 Kg			38.5 ± 1.5 Kg		64.8 ± 1.5 Kg			86.5± 1.5 Kg
Efficiency (%)		97.8															
Power Factor		> 0.98															
Cooling Method		Natural cooling	Fan cooling														
Braking Chopper		Frame A, B, C: built-in										Frame D and above: optional					
DC Choke		Frame A, B, C: optional										Frame D and above: built-in					
EMC Filter		Optional external EMC filter is available upon purchase															
EMC-COP01		Optional															

* Default as Normal Duty mode

460V

Frame Size			A						B			C		
Model VFD-□□□C□□			007	015	022	037	040	055	075	110	150	185	220	300
Applicable Motor Output (kW)			0.75	1.5	2.2	3.7	4.0	5.5	7.5	11	15	18.5	22	30
Applicable Motor Output (HP)			1	2	3	5	5	7.5	10	15	20	25	30	40
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
		Overload Capacity	120% of rated current: 1 minute every 5 minutes; 160% of rated current: 3 seconds every 30 seconds											
		Max. Output Frequency (Hz)	0.00 ~ 599.00 Hz											
		Carrier Frequency (kHz)	2 ~ 15 kHz (8 kHz)							2 ~ 10 kHz (6k Hz)				
	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
		Overload Capacity	150% of rated current: 1 minute every 5 minutes; 180% of rated current: 3 seconds every 30 seconds											
		Max. Output Frequency (Hz)	0.00 ~ 300.00 Hz											
		Carrier Frequency (kHz)	2 ~ 6 kHz (2 kHz)											
Input Rating	Input Current (A) Normal Duty		4.3	5.9	8.7	14	15.5	17	20	26	35	40	47	63
	Input Current (A) Heavy Duty		4.1	5.6	8.3	13	14.5	16	19	25	33	38	45	60
	Rated Voltage/Frequency		3-phase AC 380 V ~ 480 V (-15% ~ +10%), 50/60 Hz											
	Operating Voltage Range		323 ~ 528 V_{AC}											
	Frequency Tolerance		47 ~ 63 Hz											
Drive Weight			2.6 ± 0.3 Kg						5.4 ± 1 Kg			9.8 ± 1.5 Kg		
Efficiency (%)			97.8											
Power Factor			> 0.98											
Cooling Method			Natural cooling	Fan cooling										
Braking Chopper			Frame A, B, C: built-in; Frame D and above: optional											
DC Choke			Frame A, B, C: optional; Frame D and above: built-in											
EMC Filter			Frame A, B, C VFDXXXC43E: built-in EMC filter Frame A, B, C VFDXXXC43A: no EMC filter (Optional external EMC filter is available upon purchase), VFDXXXC43E: built-in											
EMC-COP01			VFDXXXC43A: optional; VFDXXC43E: built-in											

460V

Frame Size			D0		D		E		F		G		H			
Model VFD-□□□C□□			370	450	550	750	900	1100	1320	1600	1850	2200	2800	3150	3550	4500
Applicable Motor Output (kW)			37	45	55	75	90	110	132	160	185	220	280	315	355	450
Applicable Motor Output (HP)			50	60	75	100	125	150	175	215	250	300	375	425	475	600
Output Rating	NORMAL DUTY*	Rated Output Capacity (kVA)	58	73	88	120	143	175	207	247	295	367	438	491	544	720
		Rated Output Current (A)	73	91	110	150	180	220	260	310	370	460	550	616	683	866
		Overload Capacity	120% of rated current: 1 minute every 5 minutes; 160% of rated current: 3 seconds every 30 seconds													
		Max. Output Frequency (Hz)	0.00 ~ 599.00 Hz													
		Carrier Frequency (kHz)	2 ~ 10 kHz (6 kHz)				2 ~ 9 kHz (4 kHz)									
	HEAVY DUTY	Rated Output Capacity (kVA)	55	69	84	114	136	167	197	235	280	348	417	466	517	677
		Rated Output Current (A)	69	86	105	143	171	209	247	295	352	437	523	585	649	815
		Overload Capacity	150% of rated current: 1 minute every 5 minutes; 180% of rated current: 3 seconds every 30 seconds													
		Max. Output Frequency (Hz)	0.00 ~ 300.00 Hz													
		Carrier Frequency (kHz)	2 ~ 6 kHz (2 kHz)													
Input Rating	Input Current (A) Normal Duty		74	101	114	157	167	207	240	300	380	400	494	555	625	866
	Input Current (A) Heavy Duty		70	96	108	149	159	197	228	285	361	380	469	527	594	815
	Rated Voltage/Frequency		3 - phase AC 380 V ~ 480 V (-15% ~ +10%), 50/60 Hz													
	Operating Voltage Range		323 ~ 528 V_{AC}													
	Frequency Tolerance		47 ~ 63 Hz													
Drive Weight			38.5 ± 1.5 Kg				64.8 ± 1.5 Kg		86.5 ± 1.5 Kg		134 ± 4 Kg		228 Kg			
Efficiency (%)			97.8				98.2									
Power Factor			> 0.98													
Cooling Method			Fan cooling													
Braking Chopper			Frame A, B, C: built-in; Frame D and above: optional													
DC Choke			Frame A, B, C: optional; Frame D and above: built-in													
EMC Filter			Optional external EMC filter is available upon purchase													
EMC-COP01			VFDXXXC43A: optional; VFDXXC43E: built-in													

*** Default as Normal Duty mode**

NOTES:

1) The carrier frequency is default. Increasing the carrier frequency requires a reduction in current. please refer to Pr. 06-55 Derating Protection drawing.
2) The AC motor drive should operate in derating current when its control method is set to FOC Sensorless, TQC+PG, TQC sensorless. PM+PG, PM sensorless.
3) Select the AC motor drive with capacity one grade larger for the impact load application.
4) For Frame A, B and C, Model VFDXXXC43A is under IP20/NEMA1/UL TYPE1 protection level.
5) For Frame D and above, if the last character of the model is A then it is under IP20 protection level but the wiring terminal is under IP00 protection level;
6) if the last character of the model is E, it is under IP20/NEMA1/UL TYPE1 protection level.

Specifications

575V

Frame Size			A			B			
Model VFD-□□□C53A-21			015	022	037	055	075	110	150
Applicable Motor Output (HP)			2	3	5	7.5	10	15	20
Output*	Light Duty	Rated Output Capacity (kVA)	3	4.3	6.7	9.9	12.1	18.6	24.1
		Rated Output Current (A)	3	4.3	6.7	9.9	12.1	18.6	24.1
		Applicable Motor Output (kW)	1.5	2.2	3.7	5.5	7.5	11	15
		Applicable Motor Output (HP)	2	3	5	7.5	10	15	20
	Normal Duty	Rated Output Capacity (kVA)	2.5	3.6	5.5	8.2	10	15.4	19.9
		Rated Output Current (A)	2.5	3.6	5.5	8.2	10	15.5	20
		Applicable Motor Output (kW)	0.75	1.5	2.2	3.7	5.5	7.5	11
		Applicable Motor Output (HP)	1	2	3	5	7.5	10	15
	Heavy Duty	Rated Output Capacity (kVA)	2.1	3	4.6	6.9	8.3	12.9	16.7
		Rated Output Current (A)	2.1	3	4.6	6.9	8.3	13	16.8
		Applicable Motor Output (kW)	0.75	1.5	2.2	3.7	3.7	7.5	7.5
		Applicable Motor Output (HP)	1	2	3	5	5	10	10
	Efficiency (%)		97			98			
	Power Factor		>0.98						
	Carrier Frequency (kHz)		2~15kHz (4kHz)						
Input	Input Current (A) Light Duty		3.8	5.4	10.4	14.9	16.9	21.3	26.3
	Input Current (A) Normal Duty		3.1	4.5	7.2	12.3	15	18	22.8
	Input Current (A) Heavy Duty		2.6	3.8	5.8	10.7	12.5	16.9	19.7
	Rated Voltage/Frequency		3-Phase 525 V_{AC}~600 V_{AC} (-15%~+10%), 50/60 Hz						
	Operating Voltage Range		446~660 V_{AC}						
	Frequency Tolerance		47~63 Hz						
AC Drive Weight			3±0.3Kg			4.8±1Kg			
Cooling Method			Natural cooling		Fan cooling				
Braking Chopper			Built-in						
DC Choke			Optional						

690V

Frame Size			C				D		E			
Model VFD-□□□C63B-00 / -21			185	220	300	370	450	550	750	900	1100	1320
Output*	Light Duty	Rated Output Capacity (kVA)	27.6	34.5	41.4	51.5	62.1	77	98.9	119.6	143.7	172.5
		Applicable Motor Output (690V, kW)	18.5	22	30	37	45	55	75	90	110	132
		Applicable Motor Output (690V, HP)	25	30	40	50	60	75	100	125	150	175
		Applicable Motor Output (575V, HP)	20	25	30	40	50	60	75	100	125	150
		Rated Output Current (A)	24	30	36	45	54	67	86	104	125	150
	Normal Duty	Rated Output Capacity (kVA)	23	27.6	34.5	41.4	51.5	62.1	77	98.9	119.6	143.7
		Applicable Motor Output (690V kW)	15	18.5	22	30	37	45	55	75	90	110
		Applicable Motor Output (690V, HP)	20	25	30	40	50	60	75	100	125	150
		Applicable Motor Output (575V, HP)	15	20	25	30	40	50	60	75	100	125
		Rated Output Current (A)	20	24	30	36	45	54	67	86	104	125
	Heavy Duty	Rated Output Capacity (kVA)	16.1	23	27.6	34.5	41.4	51.5	62.1	77	98.9	119.6
		Applicable Motor Output (690V kW)	11	15	18.5	22	30	37	45	55	75	90
		Applicable Motor Output (690V, HP)	15	20	25	30	40	50	60	75	100	125
		Applicable Motor Output (575V, HP)	10	15	20	25	30	40	50	60	75	100
		Rated Output Current (A)	14	20	24	30	36	45	54	67	86	104
	Efficiency (%)		97									
	Power Factor		>0.98									
	Carrier Frequency (kHz)		2~9kHz (4kHz)									
Input	Input Current (A) Light Duty		29	36	43	54	65	81	84	102	122	147
	Input Current (A) Normal Duty		24	29	36	43	54	65	66	84	102	122
	Input Current (A) Heavy Duty		20	24	29	36	43	54	53	66	84	102
	Rated Voltage/Frequency		3-Phase 525 V_{AC}~690 V_{AC} (-15%~+10%), 50/60 Hz									
	Operating Voltage Range		446~759 V_{AC}									
	Frequency Tolerance		47~63Hz									
AC Drive Weight			10±1.5Kg				39±1.5Kg		61±1.5Kg			
Cooling Method			Fan cooling									
Braking Chopper			Frame C (built-in)				Frame D and above (optional)					
DC Choke			Frame C (optional)				Frame D and above (built-in)					

* Parameter 00-16; available load modes: Light Duty (LD), Normal Duty (ND) and Heavy Duty (HD); default as LD mode

690 V									
Frame Size			F		G		H			
Model VFD-□□□C63B-00 / -21			1600	2000	2500	3150	4000	4500	5600	6300
Output*	Light Duty	Rated Output Capacity (kVA)	207	253	333.5	402.5	494.5	534.7	678.5	776
		Applicable Motor Output (690V, kW)	160	200	250	315	400	450	560	630
		Applicable Motor Output (690V, HP)	215	270	335	425	530	600	745	850
		Applicable Motor Output (575V, HP)	150	200	250	350	400	450	500	675
		Rated Output Current (A)	180	220	290	350	430	465	590	675
	Normal Duty	Rated Output Capacity (kVA)	172.5	207	253	333.5	402.5	442.7	534.7	776
		Applicable Motor Output (690V kW)	132	160	200	250	315	355	450	630
		Applicable Motor Output (690V, HP)	175	215	270	335	425	475	600	850
		Applicable Motor Output (575V, HP)	150	150	200	250	350	400	450	500
		Rated Output Current (A)	150	180	220	290	350	385	465	675
	Heavy Duty	Rated Output Capacity (kVA)	143.7	172.5	207	253	333.5	356.5	483	776
		Applicable Motor Output (690V kW)	110	132	160	200	250	280	400	630
		Applicable Motor Output (690V, HP)	150	175	215	270	335	375	530	850
		Applicable Motor Output (575V, HP)	125	150	150	200	250	350	450	500
		Rated Output Current (A)	125	150	180	220	290	310	420	675
	Efficiency (%)		97		98					
	Power Factor		>0.98							
	Carrier Frequency (kHz)		2~9kHz (4kHz)							
Input	Input Current (A) Light Duty		178	217	292	353	454	469	595	681
	Input Current (A) Normal Duty		148	178	222	292	353	388	504	681
	Input Current (A) Heavy Duty		123	148	181	222	292	313	423	681
	Rated Voltage/Frequency		3-Phase 525 V_{AC}~690 V_{AC} (-15%~+10%), 50/60Hz							
	Operating Voltage Range		446~759 V_{AC}							
	Frequency Tolerance		47~63Hz							
AC Drive Weight			88±1.5Kg		135±4Kg		243±5Kg			
Cooling Method			Fan cooling							
Braking Chopper			Frame D and above (optional)							
DC Choke			Frame D and above (built-in)							

* Parameter 00-16; available load modes: Light Duty (LD), Normal Duty (ND) and Heavy Duty (HD); default as LD mode

General Specifications

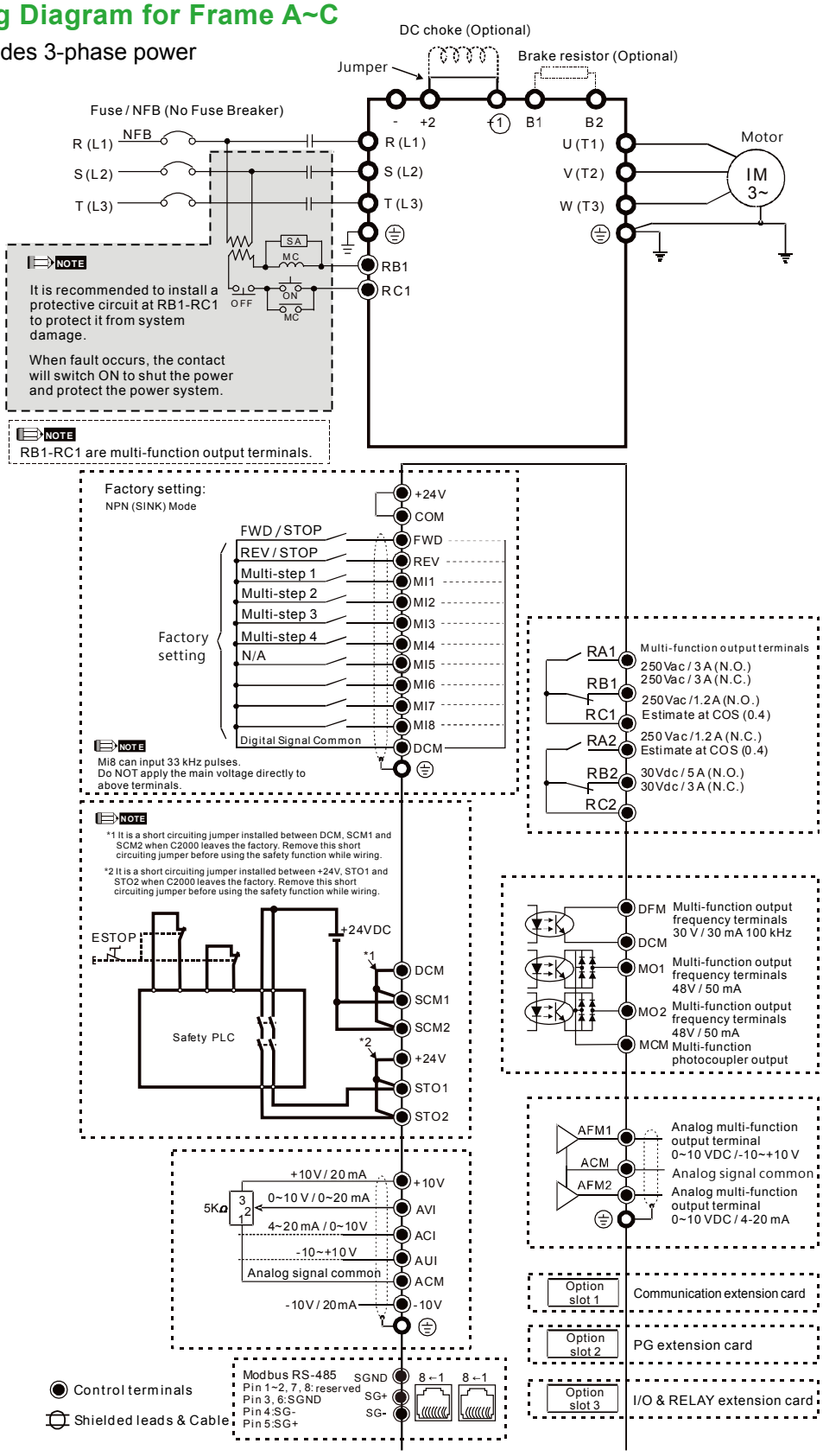
Control Characteristics	**Control Method**	Pulse Width Modulated (PWM)
	Control Mode	230 V / 460 V model: 1: V / F · 2: SVC · 3: VF+PG · 4: FOC+PG · 5: TQC+PG · 6: PM+PG · 7: FOC sensorless · 8: TQC sensorless · 9: PM sensorless
		575 V / 690 V model: 1: V / F · 2: V / F+PG · 3: SVC
	Starting Torque	Reach up to 150% or above at 0.5 Hz. Under FOC+PG mode, starting torque can reach 150% at 0 Hz
	V / F Curve	4-point adjustable V / F curve and square curve
	Speed Response Ability	5 Hz (vector control can reach up to 40 Hz)
	Torque Limit	230 V / 460 V model: Normal duty 160%, heavy duty 180% of torque current ; 575 V / 690 V model: Maximum 200% of torque current
	Torque Accuracy	±5%
	Max. Output Frequency (Hz)	Light Duty / Normal duty: 0.01 ~ 599.00 Hz; Heavy duty: 0.00 ~ 300.00 Hz
	Frequency Output Accuracy	Digital command: ±0.01%, -10 ° C ~ +40 ° C, Analog command: ±0.1%, 25 ±10 ° C
	Output Frequency Resolution	Digital command: 0.01 Hz, Analog command: 0.03 * max. output frequency / 60 Hz (±11 bit)
	Overload Capacity	230 V / 460 V model: Normal duty: 120%, 1 minute every 5 minutes; 160%, 3 seconds every 30 seconds Heavy duty: 150%, 1 minute every 5 minutes; 180%, 3 seconds every 30 seconds
		575 V / 690 V model: Light duty: rated output current is 120% for 60 seconds Normal duty: rated output current is 120% for 60 seconds; 150% for 3 seconds Heavy duty: rated output current is 150% for 60 seconds; 180% for 3 seconds
	Frequency Setting Signal	+10 V ~ -10, 0 ~ +10 V, 4 ~ 20 mA, 0 ~ 20 mA, pulse input
	Accel. / decel. Time	0.00 ~ 600.00 / 0.0 ~ 6000.0 Seconds
	Main Control Function	Torque control, Droop control, Speed / torque control switching, Feed forward control, Zero-servo control, Momentary power loss ride thru, Speed search, Over-torque detection, Torque Limit, 17-step speed (Max.), Accel / decel time switch, S-curve accel / decel, 3-wire sequence, Auto-Tuning (rotational, stationary), Dwell, Cooling fan on / off switch, Slip compensation, Torque compensation, JOG frequency, Fault restart, Frequency upper / lower limit settings, DC injection braking at start / stop, High slip braking, Parameter copy PID control (with sleep function), Energy saving control, MODOBUS communication (RS-485 RJ45, Max. 115.2 kbps)
	Fan Control	230 V model: VFD150C23A (include) and series above: PMW control; VFD110C23A and series below: on / off switch control 460 V model: VFD185C43A (include) and series above: PMW control; VFD150C43A and series below: on / off switch control 575 V / 690 V model: PWM control
Protection Characteristics	**Motor Protection**	Electronic thermal relay protection
	Over-current Protection	230 V / 460 V model: Over-current protection for 240% of rated current Current clamp (Normal duty: around 170 ~ 175%); (Heavy duty: around 180 ~ 185%)
		575 V / 690 V model: Over-current protection for 225% rated current Current clamp (Light duty: around 128 ~ 141%) ; (Normal duty: around 170 ~ 175%) ; (Heavy duty: around 202% ~ 210%)
	Over-Voltage Protection	The C2000 Series will shut down under below conditions: 230 V: DC bus over 410 V ; 460 V: DC bus over 820 V ; 575 V / 690 V: DC bus over 1189 V
	Over-Temperature Protection	Built-in temperature sensor
	Stall Prevention	Stall prevention during acceleration, deceleration and running independently
	Restart after Instantaneous Power Failure	Parameter setting up to 20 seconds
	Grounding Leakage Current Protection	Leakage current is higher than 50% of rated current of the AC motor drive
International Certifications		CE UL EAC

NOTES: EAC Certification for only 230 V and 460 V models

Wiring

Wiring Diagram for Frame A~C

*It provides 3-phase power

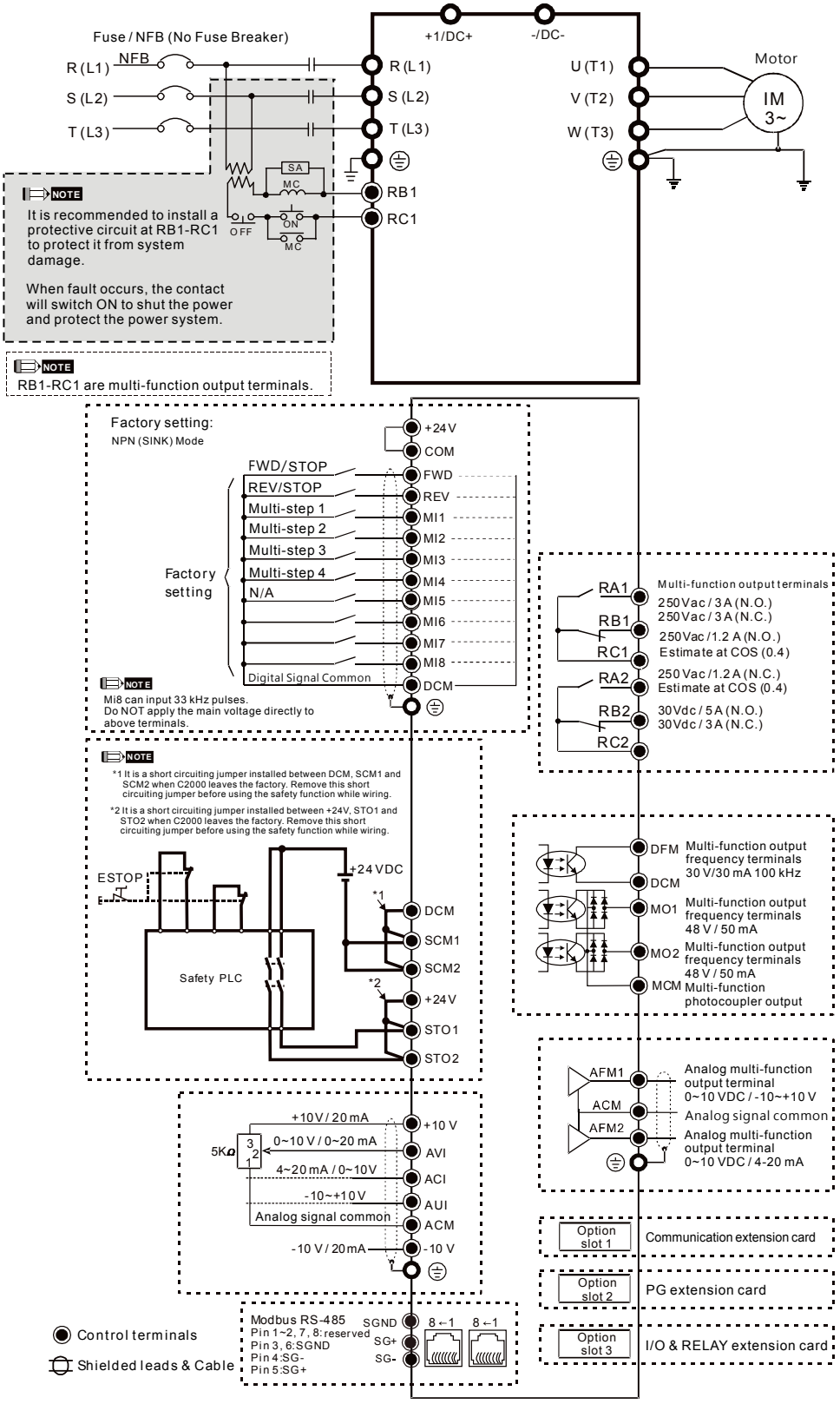


Note: It is not recommended to use a power capacitor or automatic power factor regulator (APFR) at the power input side. If the system requires such a device, please make sure a reactor is installed between the drive and the power capacitor or APFR.

Wiring

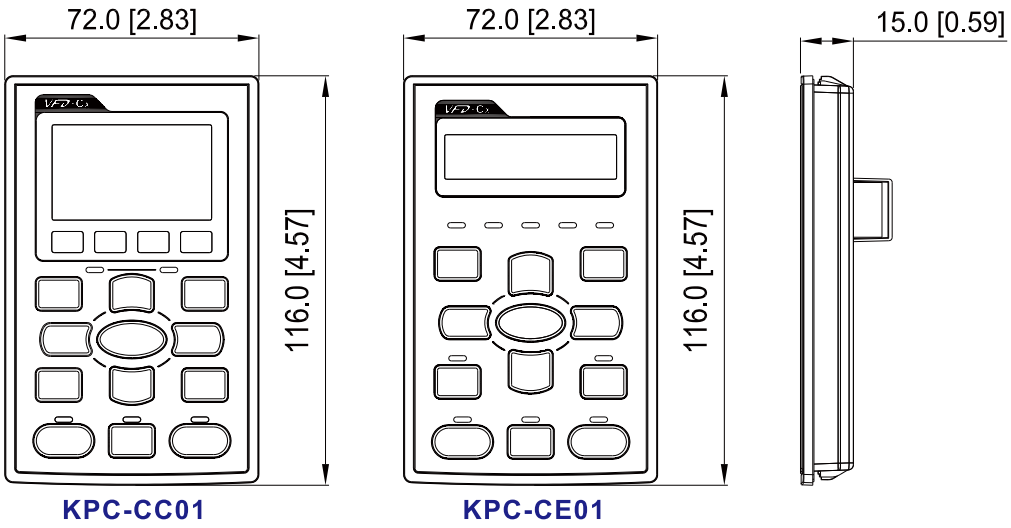
Wiring Diagram for Frame D and Frames Above

*It provides 3-phase power

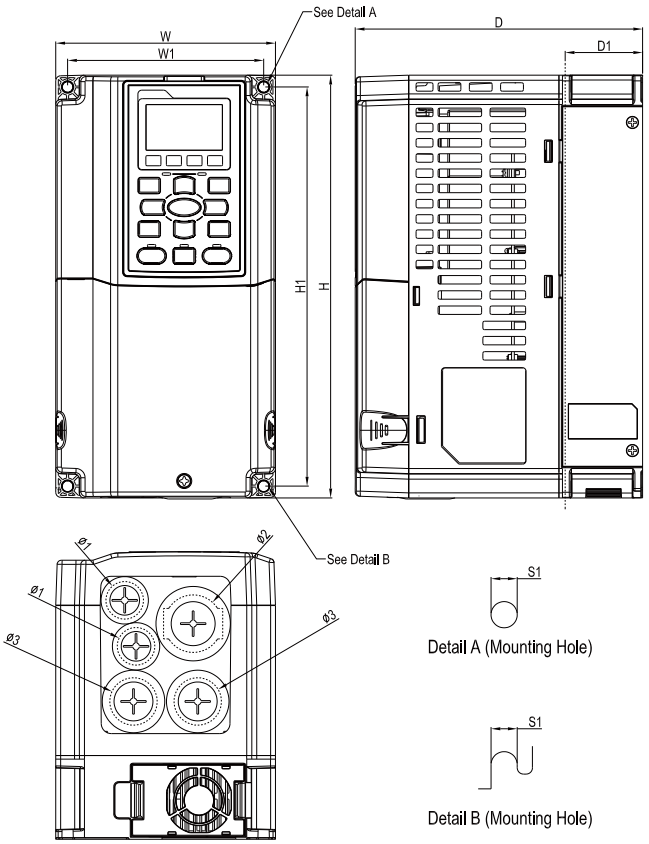


Dimensions

Digital Keypad



Frame A



MODEL FRAME_A
VFD007C23A
VFD015C23A
VFD022C23A
VFD037C23A
VFD007C43A / 43E
VFD015C43A / 43E
VFD022C43A / 43E
VFD037C43A / 43E
VFD040C43A / 43E
VFD055C43A / 43E
VFD015C53A-21
VFD022C53A-21
VFD037C53A-21

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

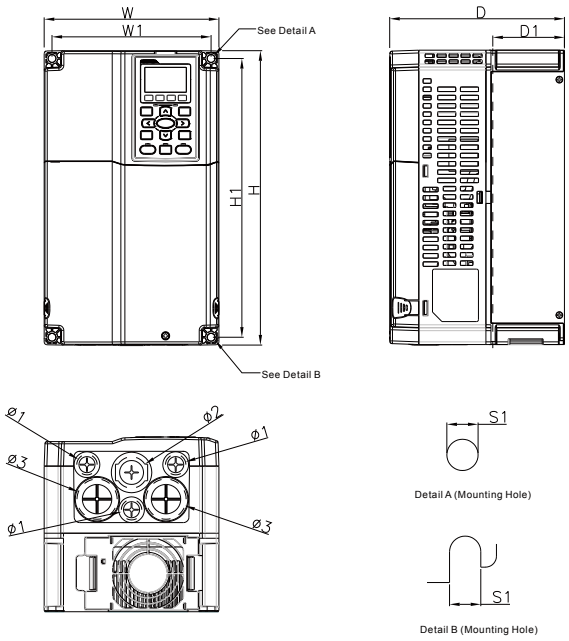
*D1: Flange mount.

Dimensions

Frame B

MODEL

VFD055C23A
VFD075C23A
VFD110C23A
VFD075C43A / 43E
VFD110C43A / 43E
VFD150C43A / 43E
VFD055C53A-21
VFD075C53A-21
VFD110C53A-21
VFD150C53A-21



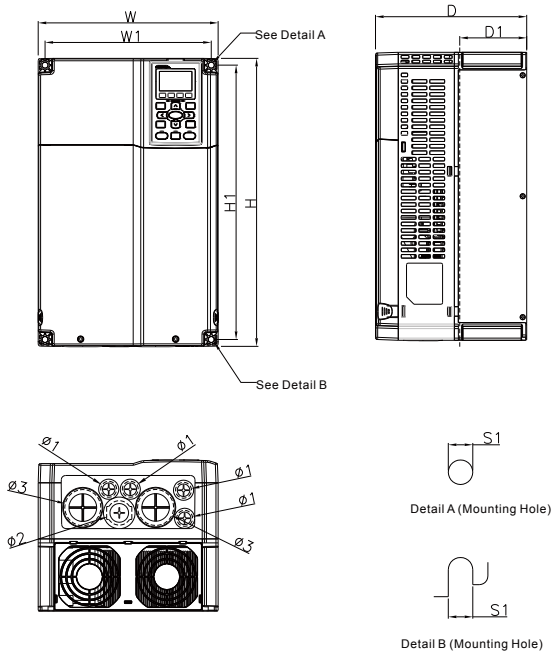
Frame		W	H	D	W1	H1	D1*	S1	Ø1	Ø2	Ø3
B1	mm	190.0	320.0	190.0	173.0	303.0	77.9	8.5	22.2	34.0	28.0
	inch	7.48	12.60	7.48	6.81	11.93	3.07	0.33	0.87	1.34	1.10

*D1: Flange mount.

Frame C

MODEL

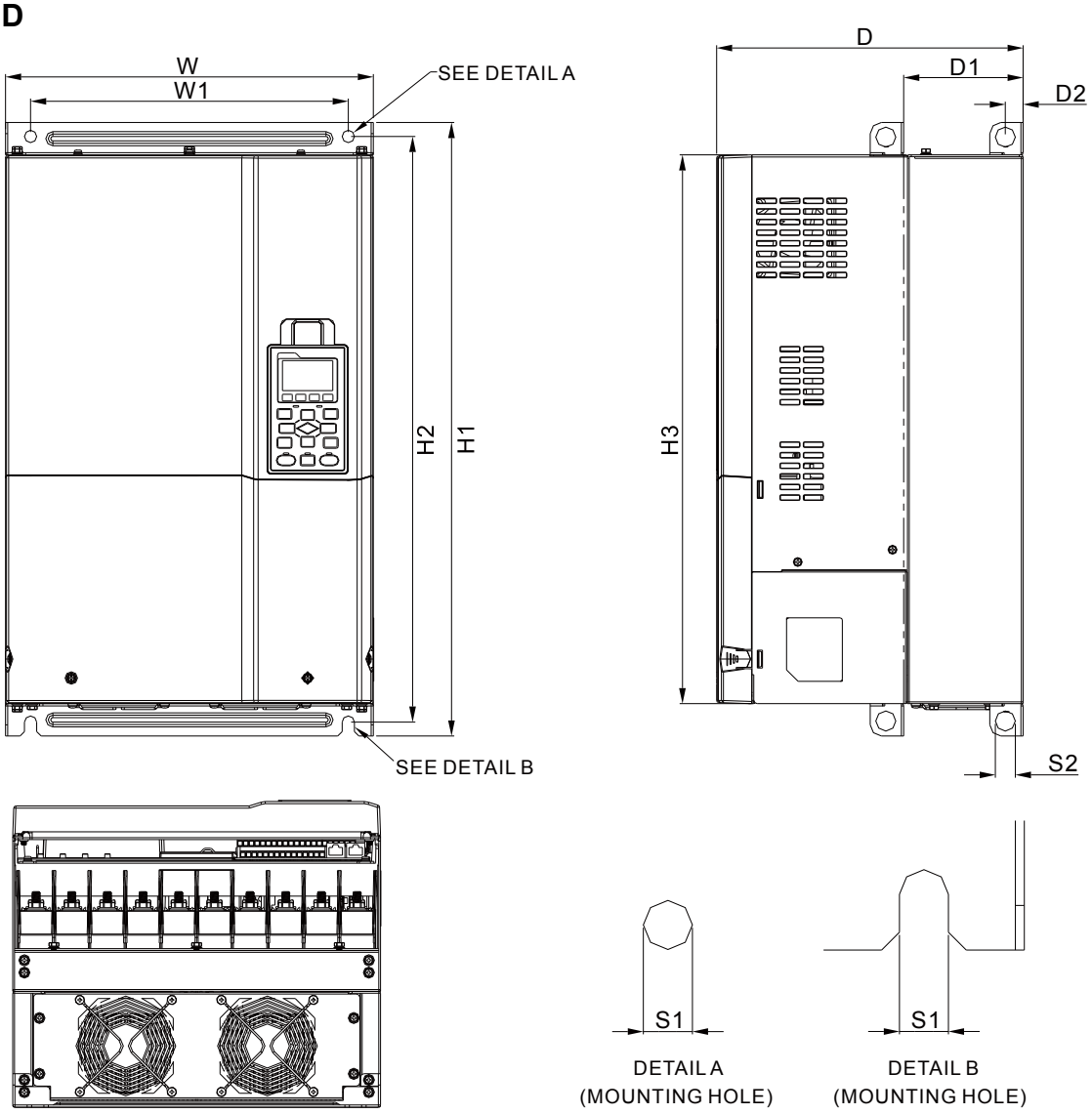
VFD150C23A
VFD185C23A
VFD220C23A
VFD185C43A / 43E
VFD220C43A / 43E
VFD300C43A / 43E
VFD185C63B-21
VFD220C63B-21
VFD300C63B-21
VFD370C63B-21



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

*D1: Flange mount.

Frame D



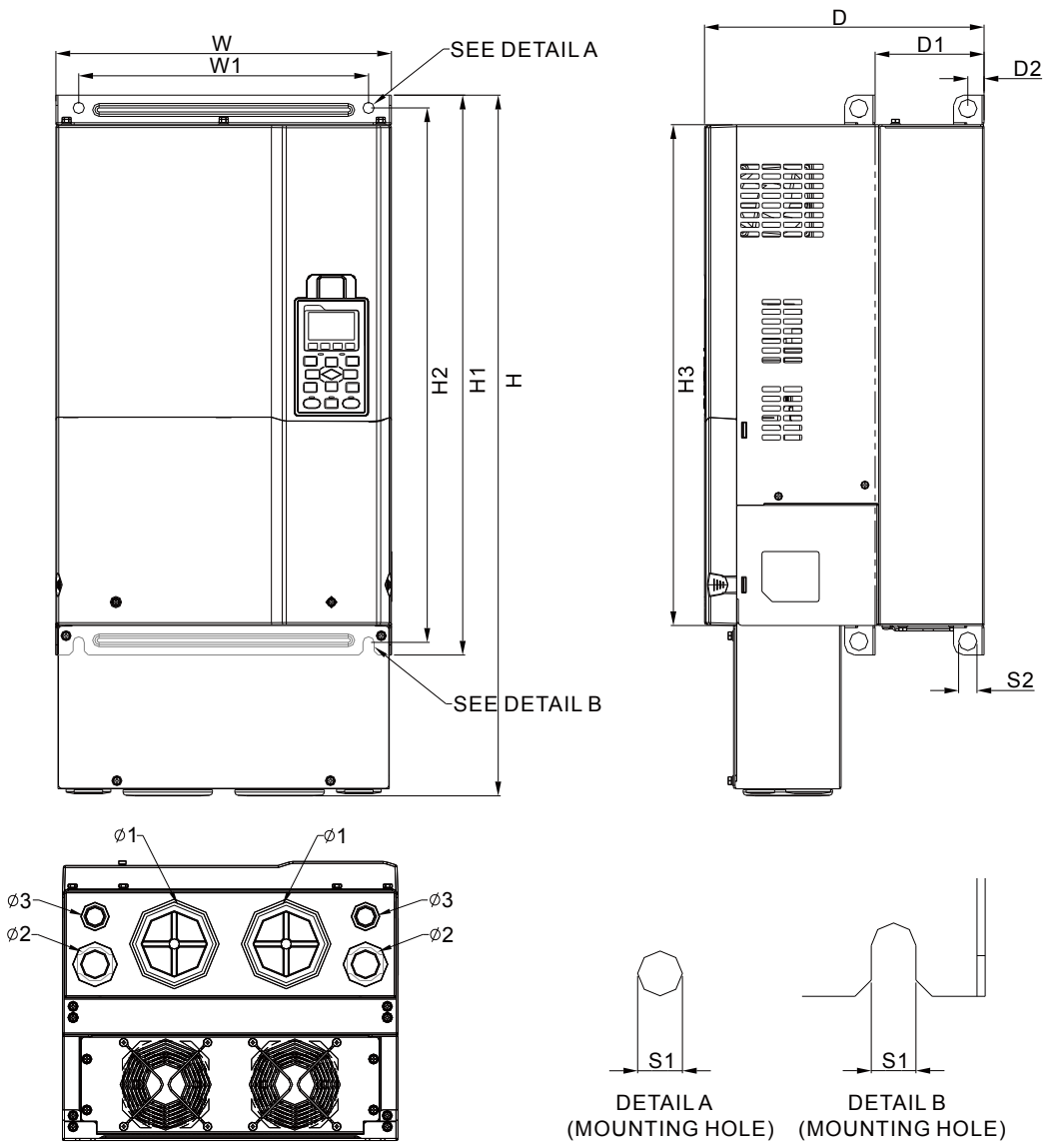
MODEL FRAME_D1	FRAME_D0-1
VFD300C23A VFD370C23A VFD550C43A VFD750C43A VFD450C63B-00 VFD550C63B-00	VFD370C43S VFD450C43S

Frame		W	H	D	W1	H1	H2	H3	D1*	D2	S1	S2	Ø1	Ø2	Ø3
D1	mm	330.0	-	275.0	285.0	550.0	525.0	492.0	107.2	16.0	11.0	18.0	-	-	-
	inch	12.99	-	10.83	11.22	21.65	20.67	19.37	4.22	0.63	0.43	0.71	-	-	-
Frame		W	H	D	W1	H1	H2	H3	D1*	D2	S1	S2			
D0-1	mm	280.0	-	255.0	235.0	500.0	475.0	442.0	94.2	16.0	11.0	18.0			
	inch	11.02	-	10.04	9.25	19.69	18.70	17.40	3.71	0.63	0.43	0.71			

*D1: Flange mount.

Dimensions

Frame D

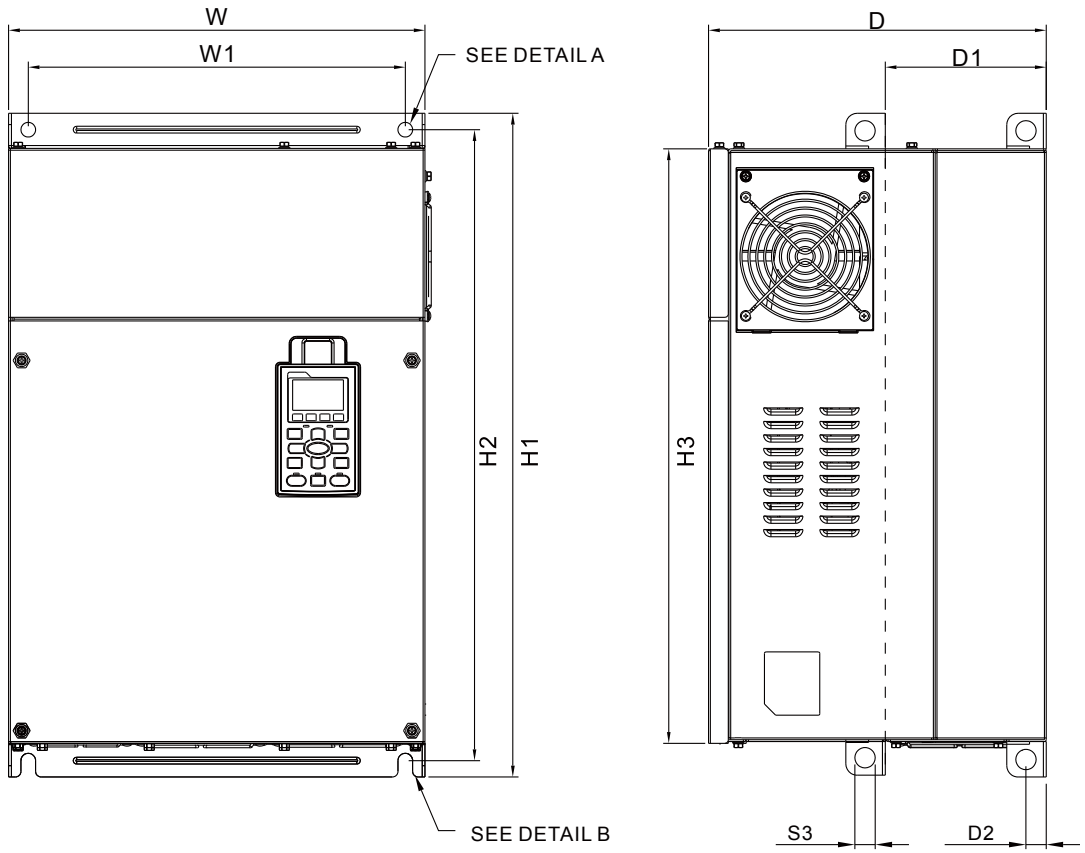


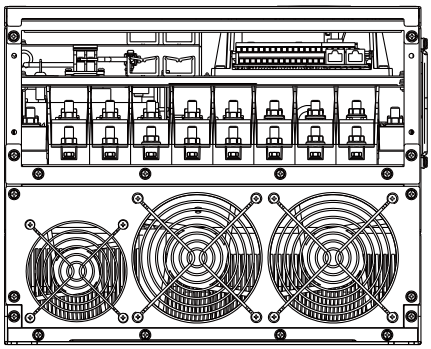
MODEL FRAME_D2	FRAME_D0-2
VFD300C23E	VFD370C43U
VFD370C23E	VFD450C43U
VFD550C43E	
VFD750C43E	
VFD450C63B-21	
VFD550C63B-21	

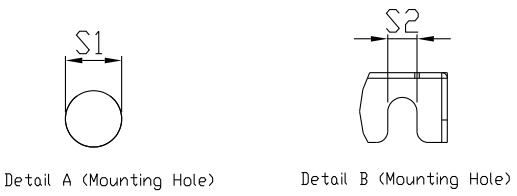
Frame		W	H	D	W1	H1	H2	H3	D1*	D2	S1	S2	Ø1	Ø2	Ø3
D2	mm	330.0	688.3	275.0	285.0	550.0	525.0	492.0	107.2	16.0	11.0	18.0	76.2	34.0	22.0
	inch	12.99	27.10	10.83	11.22	21.65	20.67	19.37	4.22	0.63	0.43	0.71	3.00	1.34	0.87
Frame		W	H	D	W1	H1	H2	H3	D1*	D2	S1	S2	Ø1	Ø2	Ø3
D0-2	mm	280.0	614.4	255.0	235.0	500.0	475.0	442.0	94.2	16.0	11.0	18.0	62.7	34.0	22.0
	inch	11.02	21.19	10.04	9.25	19.69	18.70	17.40	3.71	0.63	0.43	0.71	2.47	1.34	0.87

*D1: Flange mount.

Frame E







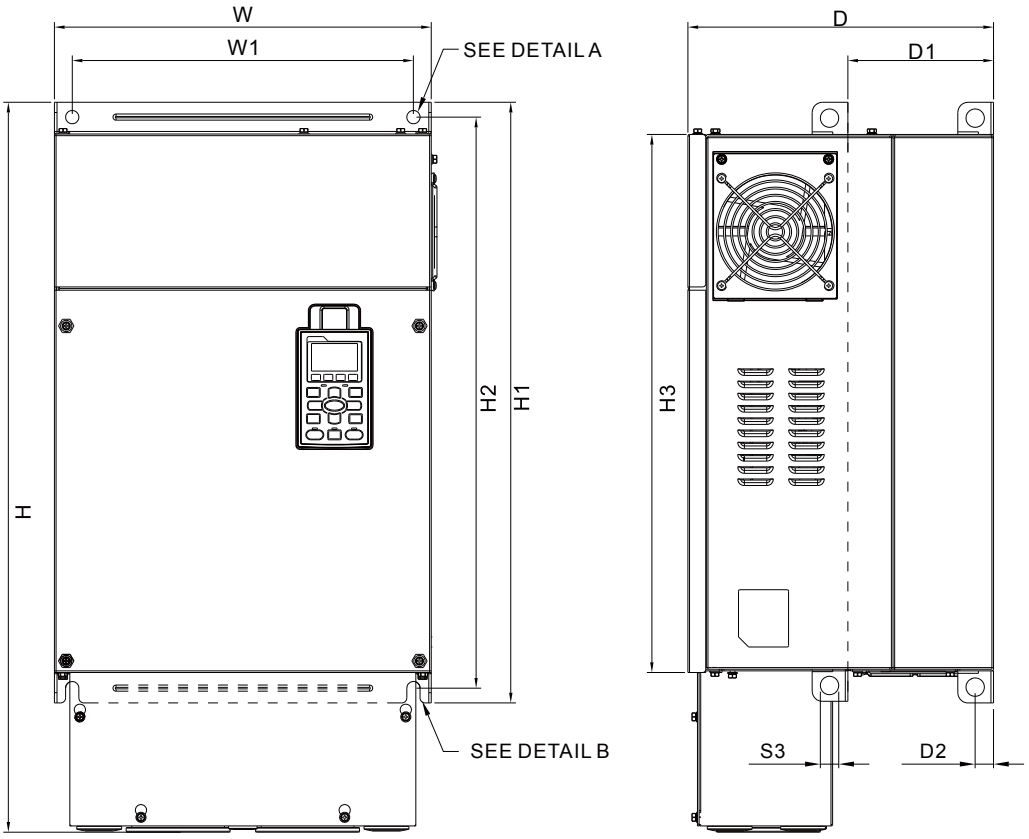
MODEL FRAME_E1	
VFD450C23A	VFD750C63B-00
VFD550C23A	VFD900C63B-00
VFD750C23A	VFD1100C63B-00
VFD900C43A	VFD1320C63B-00
VFD1100C43A	

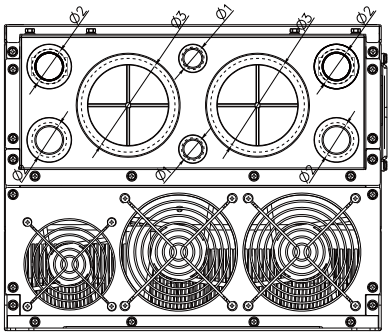
Frame		W	H	D	W1	H1	H2	H3	D1*	D2	S1	S2	S3	Ø1	Ø2	Ø3
E1	mm	370.0	-	300.0	335.0	589	560.0	528.0	143.0	18.0	13.0	13.0	18.0	-	-	-
	inch	14.57	-	11.81	13.19	23.19	22.05	20.80	5.63	0.71	0.51	0.51	0.71	-	-	-

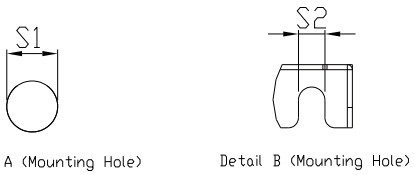
*D1: Flange mount.

Dimensions

Frame E





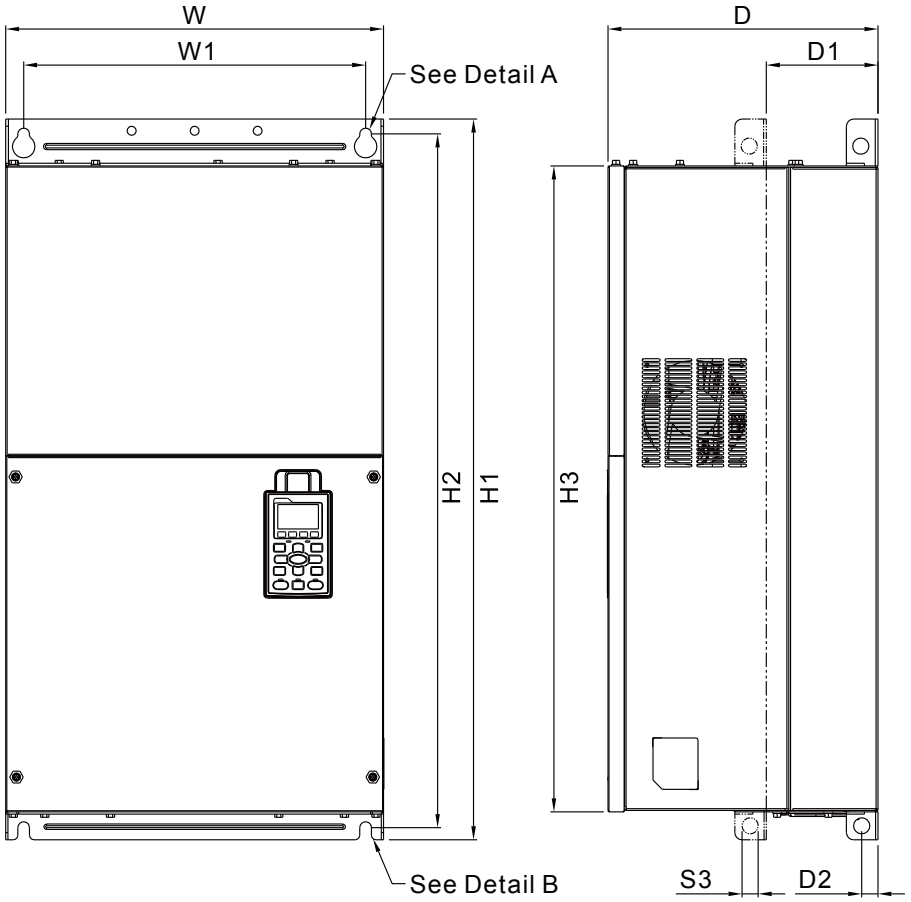


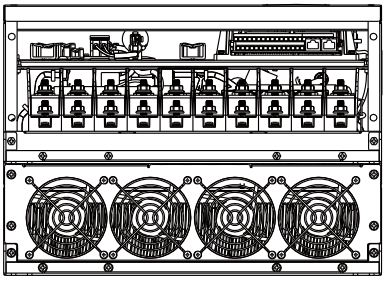
MODEL FRAME_E2	
VFD450C23E	VFD750C63B-21
VFD550C23E	VFD900C63B-21
VFD750C23E	VFD1100C63B-21
VFD900C43E	VFD1320C63B-21
VFD1100C43E	

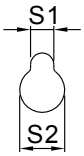
Frame		W	H	D	W1	H1	H2	H3	D1*	D2	S1	S2	S3	Ø1	Ø2	Ø3
E2	mm	370.0	715.8	300.0	335.0	589.0	560.0	528.0	143.0	18.0	13.0	13.0	18.0	22.0	34.0	92.0
	inch	14.57	28.18	11.81	13.19	23.19	22.05	20.80	5.63	0.71	0.51	0.51	0.71	0.87	1.34	3.62

*D1: Flange mount.

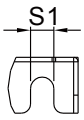
Frame F







Detail A (Mounting Hole)



Detail B (Mounting Hole)

MODEL
FRAME_F1

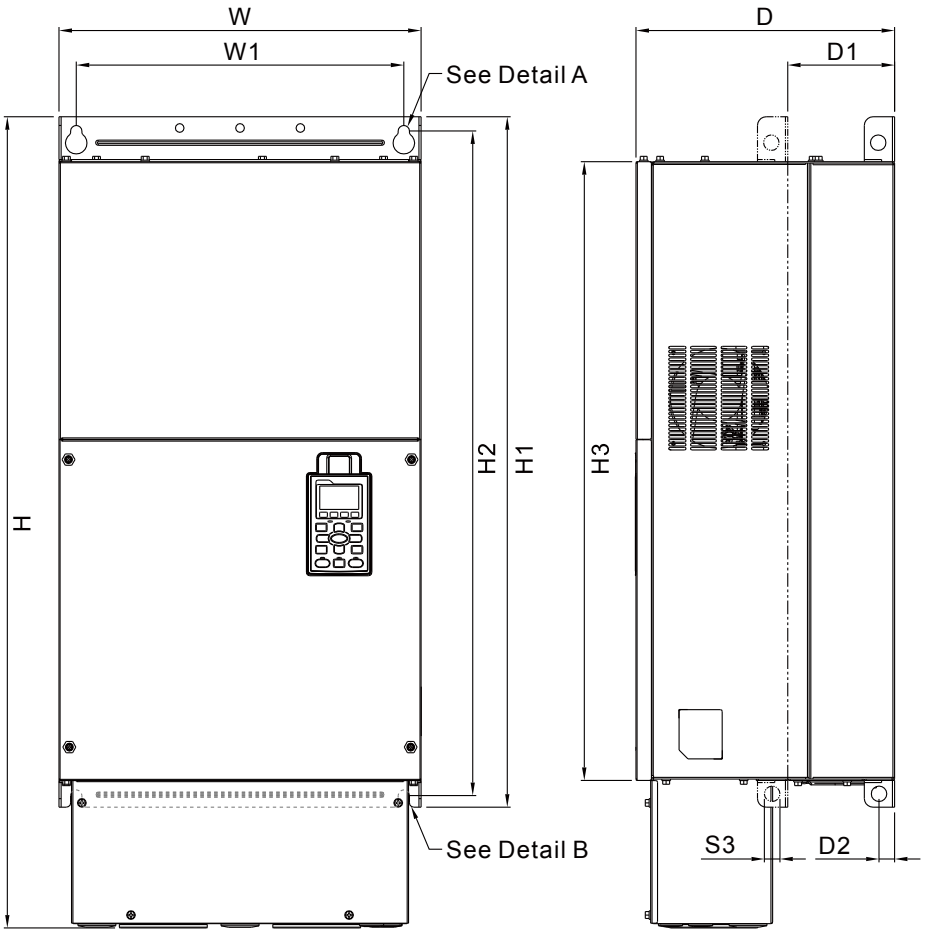
VFD900C23A
VFD1320C43A
VFD1600C43A
VFD1600C63B-00
VFD2000C63B-00

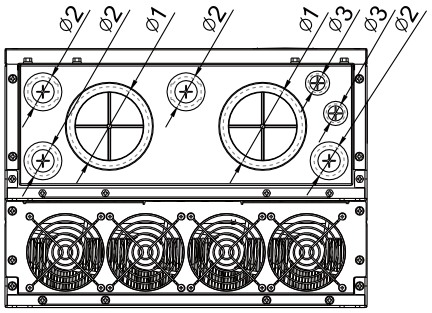
Frame		W	H	D	W1	H1	H2	H3	D1*	D2	S1	S2	S3	Ø1	Ø2	Ø3
F1	mm	420.0	-	300.0	380.0	800.0	770.0	717.0	124.0	18.0	13.0	25.0	18.0	92.0	35.0	22.0
	inch	16.54	-	11.81	14.96	31.50	30.32	28.23	4.88	0.71	0.51	0.98	0.71	3.62	1.38	0.87

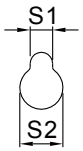
*D1: Flange mount.

Dimensions

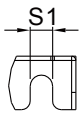
Frame F







Detail A (Mounting Hole)



Detail B (Mounting Hole)

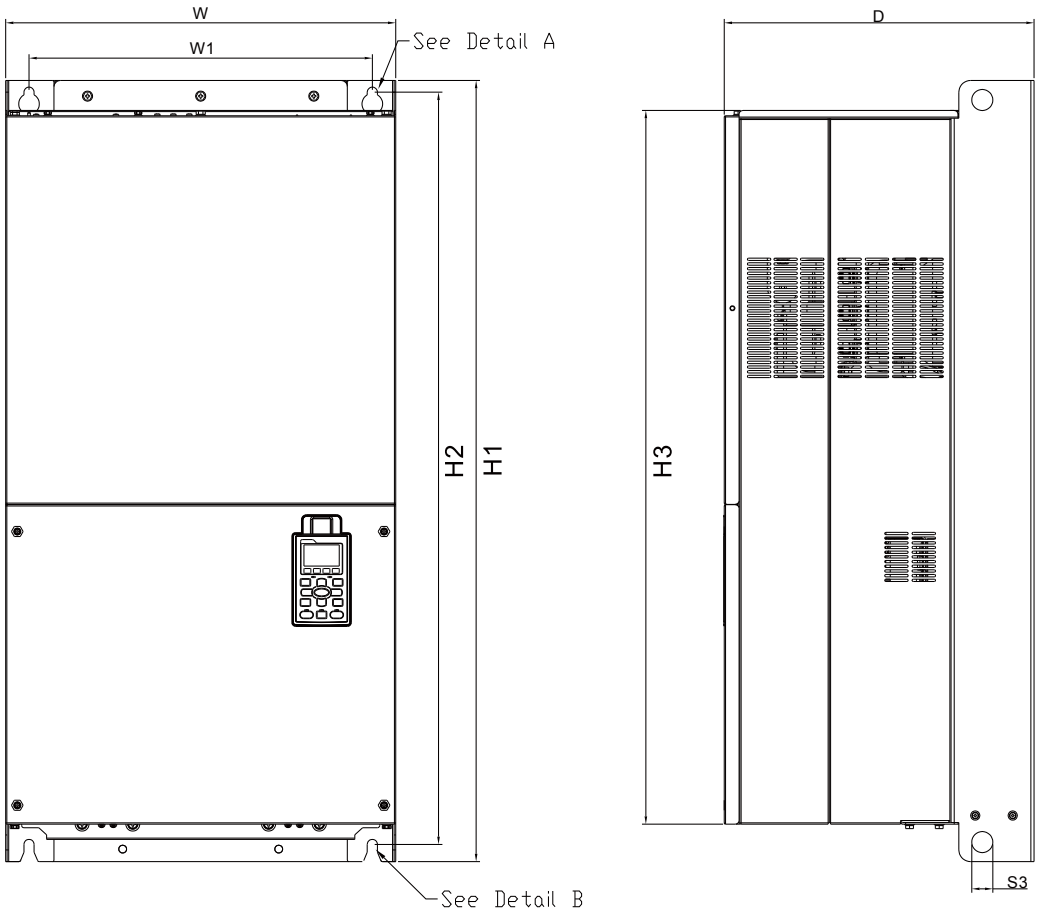
MODEL
FRAME_F2

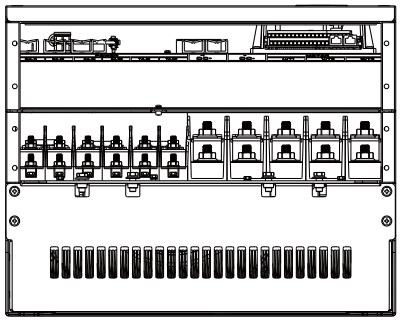
VFD900C23E
VFD1320C43E
VFD1600C43E
VFD1600C63B-21
VFD2000C63B-21

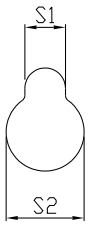
Frame		W	H	D	W1	H1	H2	H3	D1*	D2	S1	S2	S3	Ø1	Ø2	Ø3
F2	mm	420.0	940.0	300.0	380.0	800.0	770.0	717.0	124.0	18.0	13.0	25.0	18.0	92.0	35.0	22.0
	inch	16.54	37.00	11.81	14.96	31.50	30.32	28.23	4.88	0.71	0.51	0.98	0.71	3.62	1.38	0.87

*D1: Flange mount.

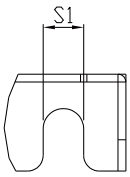
Frame G







Detail A (Mounting Hole)



Detail B (Mounting Hole)

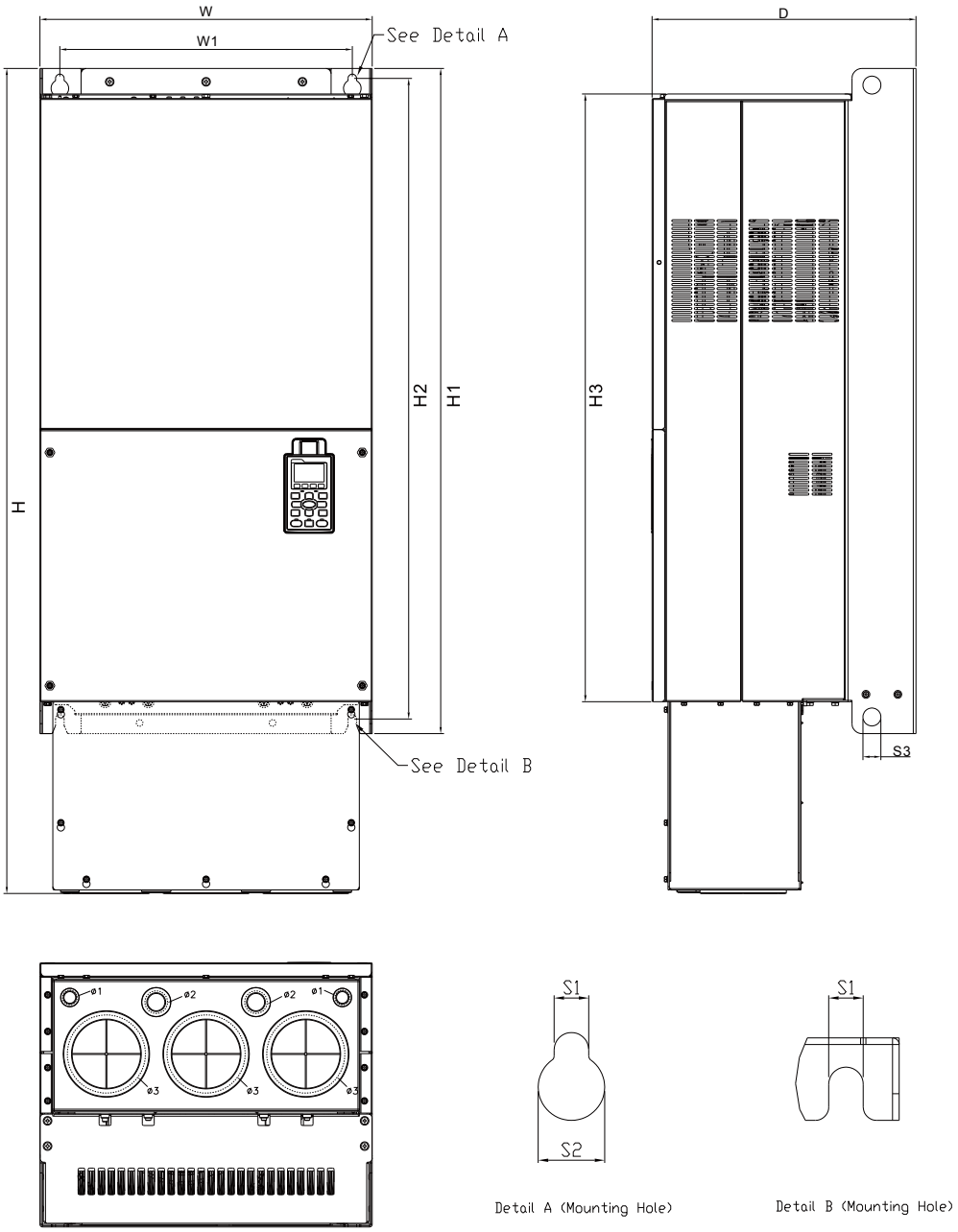
MODEL
FRAME_G1

VFD1850C43A
VFD2200C43A
VFD2500C63B-00
VFD3150C63B-00

Frame		W	H	D	W1	H1	H2	H3	S1	S2	S3	Ø1	Ø2	Ø3
G1	mm	500.0	-	397.0	440.0	1000.0	963.0	913.6	13.0	26.5	27.0	-	-	-
	inch	19.69	-	15.63	217.32	39.37	37.91	35.97	0.51	1.04	1.06	-	-	-

Dimensions

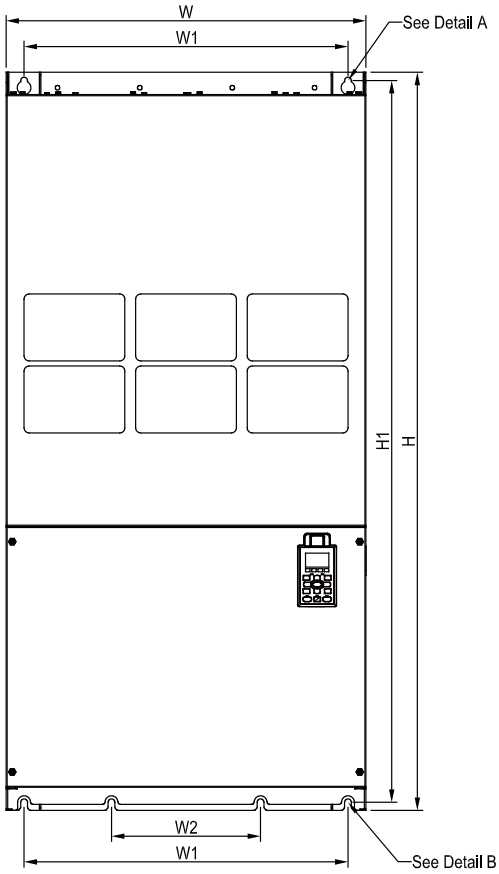
Frame G

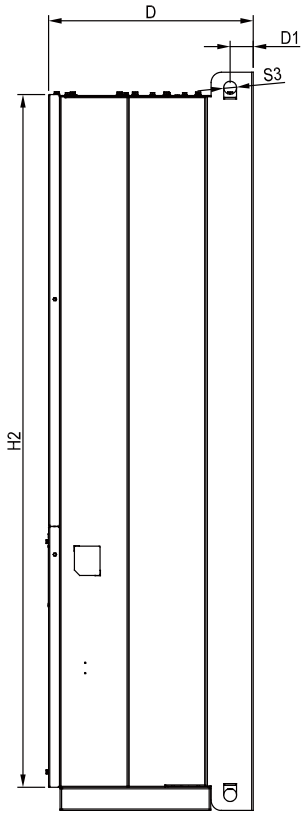


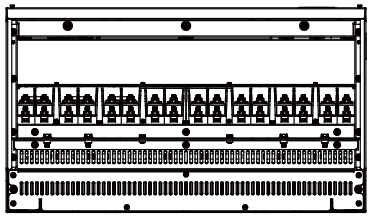
MODEL FRAME_G2
VFD1850C43E
VFD2200C43E
VFD2500C63B-21
VFD3150C63B-21

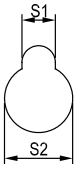
Frame		W	H	D	W1	H1	H2	H3	S1	S2	S3	Ø1	Ø2	Ø3
G2	mm	500.0	1240.2	397.0	440.0	1000.0	963.0	913.6	13.0	26.5	27.0	22.0	34.0	117.5
	inch	19.69	48.83	15.63	217.32	39.37	37.91	35.97	0.51	1.04	1.06	0.87	1.34	4.63

Frame H1

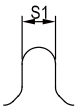








See Detail A (Mounting Hole)



See Detail B (Mounting Hole)

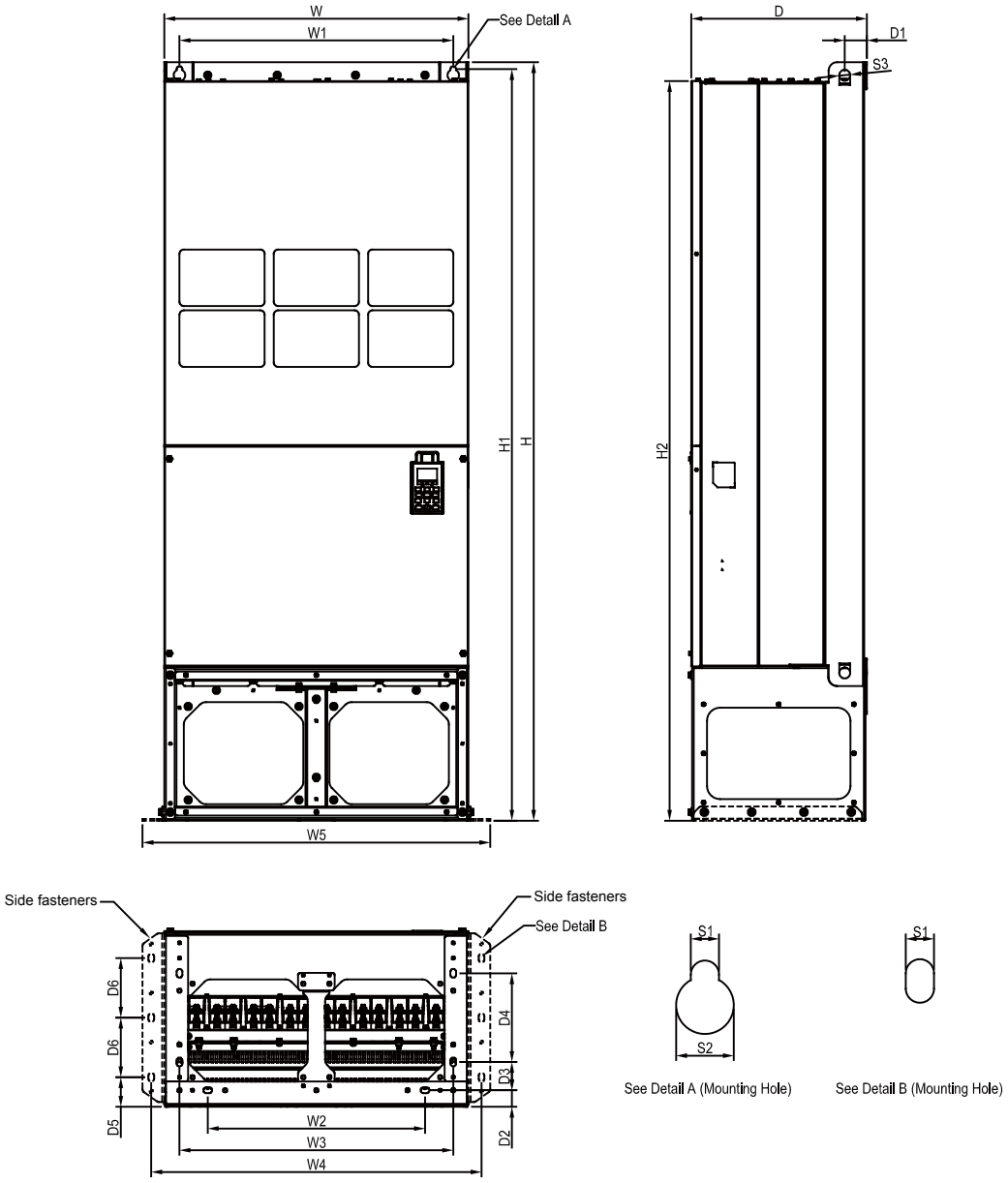
MODEL
FRAME_H1

VFD2800C43A
VFD3150C43A
VFD3550C43A
VFD4500C43A

Frame		W	H	D	W1	W2	W3	W4	W5	W6	H1	H2	H3	H4
H1	mm	700.0	1435.0	398.0	630.0	290.0	-	-	-	-	1403.0	1346.6	-	-
	inch	27.56	56.50	15.67	24.80	11.42	-	-	-	-	55.24	53.02	-	-
Frame		**H5**	**D1**	**D2**	**D3**	**D4**	**D5**	**D6**	**S1**	**S2**	**S3**	**Ø1**	**Ø2**	**Ø3**
H1	mm	-	45.0	-	-	-	-	-	13.0	26.5	25.0	-	-	-
	inch	-	1.77	-	-	-	-	-	0.51	1.04	0.98	-	-	-

Dimensions

Frame H2



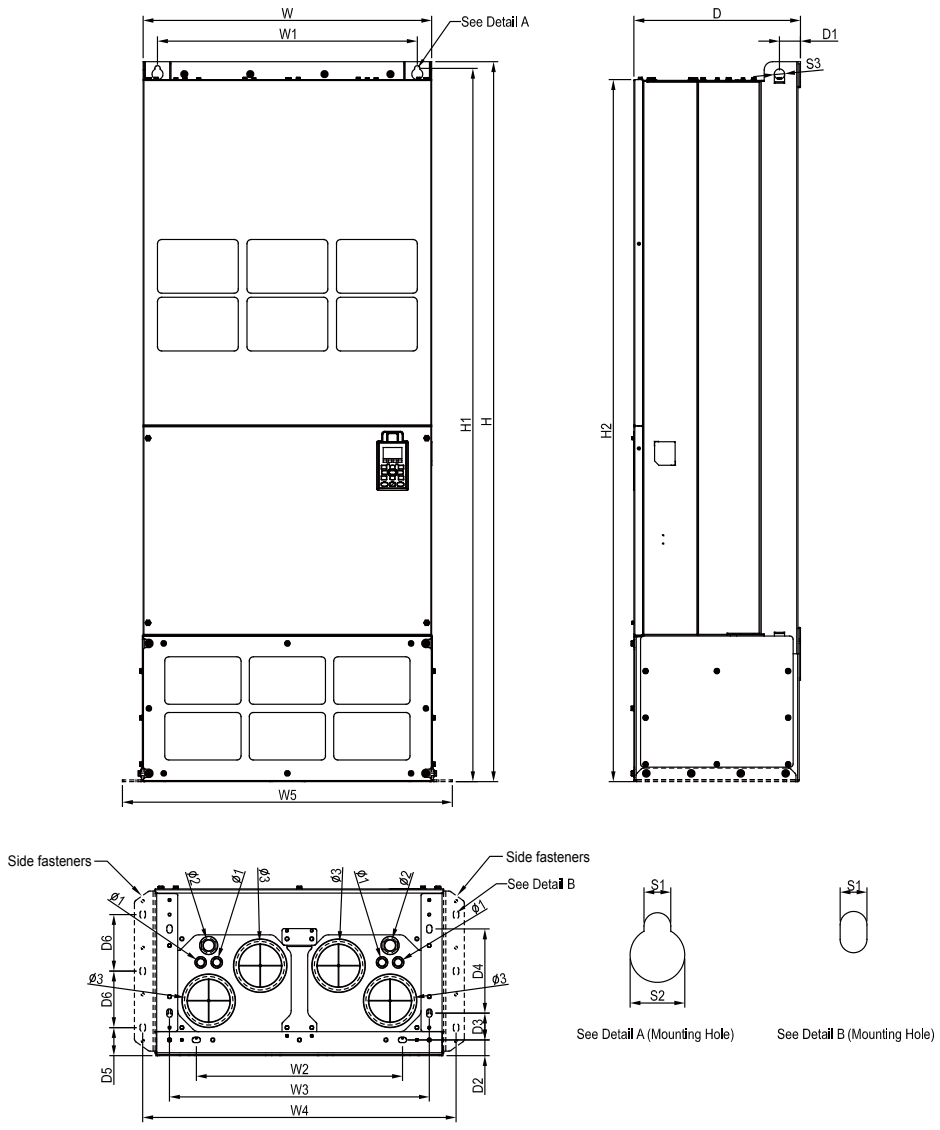
MODEL
FRAME_H2

VFD2800C43E-1
VFD3150C43E-1
VFD3550C43E-1
VFD4500C43E-1

Frame		W	H	D	W1	W2	W3	W4	W5	W6	H1	H2	H3	H4
H2	mm	700.0	1745.0	404.0	630.0	500.0	630.0	760.0	800.0	-	1729.0	1701.6	-	-
	inch	27.56	68.70	15.9	24.80	19.69	24.80	29.92	31.50	-	68.07	66.99	-	-

Frame		H5	D1	D2	D3	D4	D5	D6	S1	S2	S3	Ø1	Ø2	Ø3
H2	mm	-	51.0	38.0	65.0	204.0	68.0	137.0	13.0	26.5	25.0	-	-	-
	inch	-	2.0	1.50	2.56	8.03	2.68	5.4	0.51	1.04	0.98	-	-	-

Frame H3



MODEL
FRAME_H3

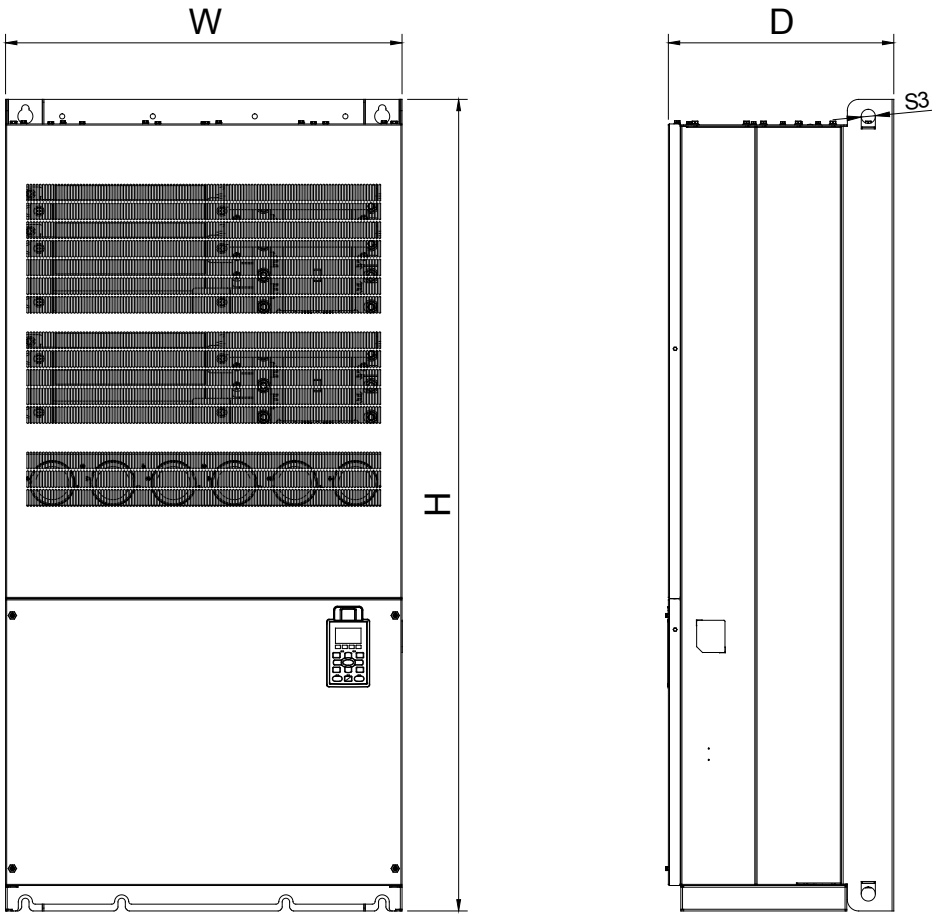
VFD2800C43E
VFD3150C43E
VFD3550C43E
VFD4500C43E

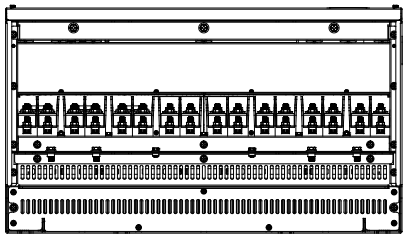
Frame		W	H	D	W1	W2	W3	W4	W5	W6	H1	H2	H3	H4
H3	mm	700.0	1745.0	404.0	630.0	500.0	630.0	760.0	800.0	-	1729.0	1701.6	-	-
	inch	27.56	68.70	15.9	24.80	19.69	24.80	29.92	31.50	-	68.07	66.99	-	-

Frame		H5	D1	D2	D3	D4	D5	D6	S1	S2	S3	Ø1	Ø2	Ø3
H3	mm	-	51.0	38.0	65.0	204.0	68.0	137.0	13.0	26.5	25.0	22.0	34.0	117.5
	inch	-	2.0	1.50	2.56	8.03	2.68	5.4	0.51	1.04	0.98	0.87	1.34	4.63

Dimensions

690 V Frame H1

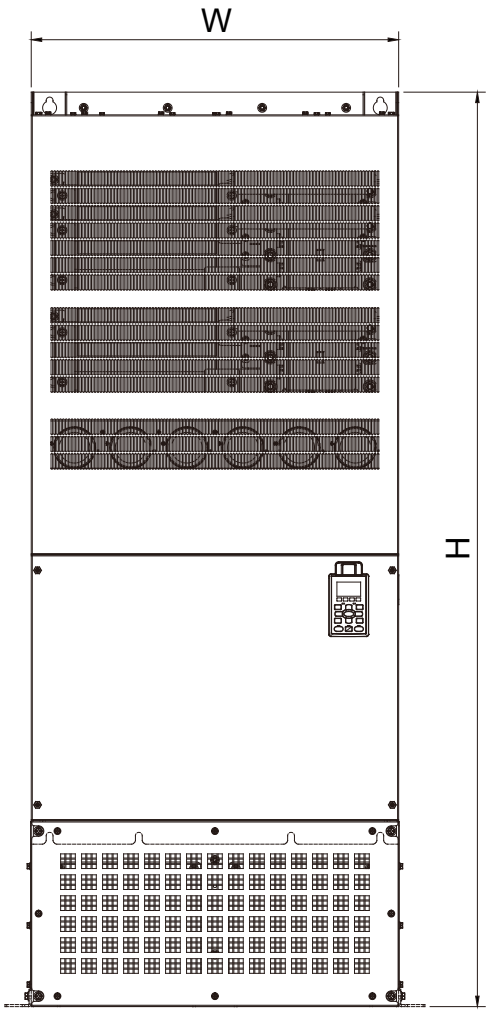


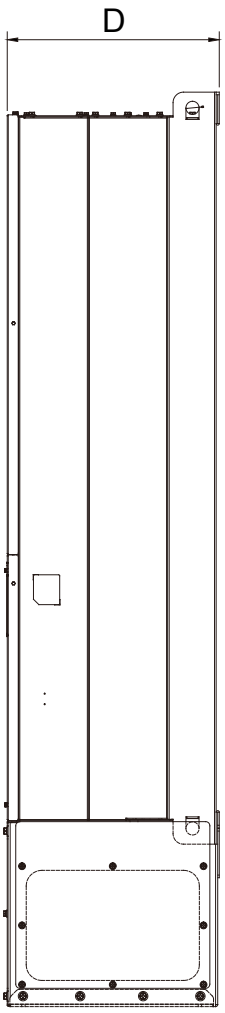


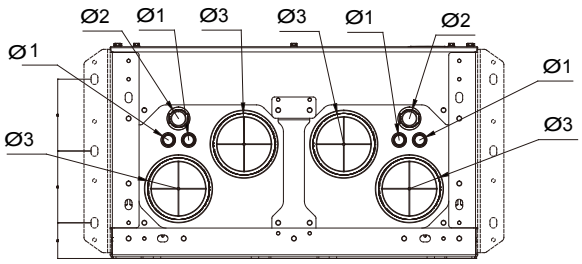
MODEL 690V FRAME_H1
VFD4000C63B-00
VFD4500C63B-00
VFD5600C63B-00
VFD6300C63B-00

Frame		W	H	D
H1	mm	700.0	1435.0	398.0
	inch	27.56	56.50	15.67

690 V Frame H2







MODEL 690V FRAME_H2
VFD4000C63B-21
VFD4500C63B-21
VFD5600C63B-21
VFD6300C63B-21

Frame		W	H	D	Ø1	Ø2	Ø3
H2	mm	700.0	1745.0	404.0	22.0	34.0	117.5
	inch	27.56	68.70	15.91	0.87	1.34	4.63

Accessories

▪ EMC-PG01L

Set by
Pr.10-00 ~ 10-02

Terminals		Descriptions
PG1	VP	Output voltage for power: +5 V / +12 V ± 5% (use FSW3 to switch +5 V / +12 V) Max. output current: 200 mA
	DCM	Common for power and signal
	A1, /A1, B1, /B1, Z1, /Z1	Encoder input signal (Line Driver) 1-phase or 2-phase input; Max. input frequency: 300 kP / sec
PG2	A2, /A2, B2, /B2	Pulse input signal (Line Driver or Open Collector) Open collector input: +5 V / +12 V (Note1) 1-phase or 2-phase input; Max. input frequency: 300 kP / sec.
PG OUT	AO, /AO, BO, /BO, ZO, /ZO, SG	PG card output signals. Division frequency function: 1 ~ 255 times Max. output voltage for Line driver: 5 V_{DC} Max. output current: 50 mA; Max. output frequency: 300 kP / sec SG: The GND of PG card is the same as the host controller or PLC, so a common output signal is attained.

▪ EMC-PG01O

Set by
Pr.10-00 ~ 10-02

Terminals		Descriptions
PG1	VP	Output voltage for power: +5 V / +12 V ± 5% (use FSW3 to switch +5 V / +12 V) Max. output current: 200 mA
	DCM	Common for power and signal
	A1, /A1 ,B1, /B1, Z1, /Z1	Encoder input signal (Line Driver or Open Collector) Open collector input: +5 V / +12 V (Note1) 1-phase or 2-phase input; Max. input frequency: 300 kP / sec
PG2	A2, /A2, B2, /B2	Pulse input signal (Line Driver or Open Collector) Open collector input: +5 V / +12 V (Note1) 1-phase or 2-phase input; Max. input frequency: 300 kP / sec.
PG OUT	V+, /V-	Needs external power source for PG OUT circuit. Input voltage of power:+12 V ~ +24 V
	V-	Negative power supply input
	A/O, B/O, ZO,	PG card output signals. Division frequency function: 1 ~ 255 times Add a pull-up resistor to the open collector output signals to avoid signal interferences. [Three pull-up resistors are included in the package (1.8 KΩ / 1 W)] Max. Output current: 20 mA; Max output frequency: 300 KP / sec

▪ EMC-PG01R

Set by
Pr.10-00 ~ 10-02

Terminals		Descriptions
PG1	R1- R2	Resolver output power 7 Vrms, 10 kHz
	S1,S2, S3, S4 S4,	Resolver input signal 3.5 ± 0.175 Vrms, 10 kHz
PG2	A2, /A2, B2, /B2	Pulse input signal (Line Driver or Open Collector) Open collector input: +5 V / +12 V (Note1) 1-phase or 2-phase input; Max. input frequency: 300 kP / sec.
PG OUT	AO, /AO, BO, /BO, ZO, /ZO, SG	PG card output signals. Division frequency function: 1 ~ 255 times Max. output voltage for Line driver: 5 V_{DC} Max. output current: 50 mA Max. output frequency: 300 kP / sec SG: The GND of PG card is the same as the host controller or PLC, so a common output signal is attained.

▪ EMC-PG01U

FJMP1 Ⓢ: Standard UVW Output Encoder; Ⓓ: Delta Encoder

Set by
Pr.10-00 ~ 10-02

Terminals		Descriptions
PG1	VP	Output voltage for power: +5 V / +12 V ± 5% (use FSW3 to switch +5 V / +12 V) Max. output current: 200 mA
	DCM	Common for power and signal
	A1, /A1 ,B1, /B1, Z1, /Z1	Encoder input signal (Line Driver) 1-phase or 2-phase input. Max. input frequency: 300 kP / sec
	U1, /U1, V1, /V1, W1, /W1	Encoder input signal
PG2	A2, /A2, B2, /B2	Pulse input signal Open collector input: +5 V / +12 V (Note1) 1-phase or 2-phase input; Max. input frequency: 300 kP / sec.
PG OUT	AO, /AO, BO, /BO, ZO, /ZO, SG	PG card output signals. Division frequency function: 1 ~ 255 times Max. output voltage for Line driver: 5 V_{DC} Max. output current: 50 mA Max. output frequency: 300 kP / sec SG: The GND of PG card is the same as the host controller or PLC, so a common output signal is attained.

Note 1: For the Open Collector, set input voltage to 5 ~ 15 mA and install a pull-up resistor
[5 V] Recommend pull-up resistor: 100 ~ 220 Ω, 1 / 2 W and above
[12 V] Recommend pull-up resistor: 510 ~ 1.35 KΩ, 1 / 2 W and above
[24 V] Recommend pull-up resistor: 1.8K ~ 3.3 KΩ, 1 / 2 W and above

▪ EMC-D42A

I/O Extension Card

Terminals	Descriptions
COM	Common for multi-function input terminals Select SINK (NPN) / SOURCE (PNP) in J1 jumper / external power supply
MI10 ~ MI13	Refer to parameters 02-26 ~ 02-29 to program the multi-function inputs MI10 ~ MI13. Internal power is applied from terminal E24: +24 V_{DC} ± 5% 200 mA, 5 W External power +24 V_{DC}: max. voltage 30 V_{DC}, min. voltage 19 V_{DC}, 30 W ON: the activation current is 6.5 mA; OFF: leakage current tolerance is 10 μA
MO10 ~ MO11	Multi-function output terminals (photocoupler) Duty-cycle: 50%; Max. output frequency: 100 Hz Max. current: 50 mA; Max. voltage: 48 V_{DC}
MXM	Common for multi-function output terminals MO10, MO11 (photocoupler) Max 48 V_{DC} 50 mA

▪ EMC-D611A

I/O Extension Card

Terminals	Descriptions
AC	AC power common for multi-function input terminal (Neutral)
MI10 ~ MI15	Refer to Pr. 02.26 ~ Pr. 02.31 for multi-function input selection Input voltage: 100 ~ 130 V_{AC}; Input frequency: 57 ~ 63 Hz Input impedance: 27 KΩ Terminal response time: ON: 10 ms; OFF: 20 ms

Screw Specifications for Option Card Terminals

EMC-D42A / EMC-D611A EMC-BPS01	Wire gauge	24 ~ 12 AWG (0.205 ~ 3.31 mm^2)
	Torque	4 Kg-cm [3.47 lb-in]
EMC-R6AA	Wire gauge	24 ~ 16 AWG (0.205 ~ 1.31 mm^2)
	Torque	6 Kg-cm [5.21 lb-in]
EMC-PG01L / EMC-PG01O EMC-PG01R /	Wire gauge	30 ~ 16 AWG (0.0509 ~ 1.31 mm^2)
	Torque	2 Kg-cm [1.74 lb-in]

Accessories

▪ EMC-R6AA

Relay Extension Card

Terminals	Descriptions
RA10 ~ RA15 RC10 ~ RC15	Refer to Pr. 02.36 ~ Pr. 02.41 for multi-function input selection Resistive load: 3A (N.O.) / 250 V_{AC} 5A (N.O.) / 30 V_{DC} Inductive load (COS 0.4) 2.0A (N.O.) / 250 V_{AC} 2.0A (N.O.) / 30 V_{DC} It is used to output each monitor signal, such as for drive in operation, frequency attained or overload indication.

▪ EMC-BPS01

24V Power Shift Card

Terminals	Descriptions
24 V GND	When the AC motor drive power is off, the external power supply card provides external power to the network system, PLC function, and other functions to allow continued operations. Input power: 24 V ± 5% Maximum input current: 0.5A Note: Do not connect the control terminal +24 V (Digital control signal common: SOURCE) directly to the EMC-BPS01 input terminal 24 V. Do not connect control terminal GND directly to the EMC-BPS01 input terminal GND.

▪ CMC-MOD01

Network Interface

Features

- MDI / MDI-X auto-detect
- Supports MODBUS TCP protocol
- AC motor drive keypad / Ethernet configuration
- E-mail alarm
- Baud rate: 10 / 100 Mbps auto-detect
- Virtual serial port

Network Interface

Interface	RJ-45 with Auto MDI / MDIX	**Transmission speed**	10 / 100 Mbps Auto-Detect
Number of ports	1 Port	**Network protocol**	ICMP, IP, TCP, UDP, DHCP, SMTP, MODBUS OVER TCP / IP, Delta Configuration
Transmission method	IEEE 802.3, IEEE 802.3u		
Transmission cable	Category 5e shielding 100 M		

▪ CMC-EIP01

Network Interface

Features

- MDI / MDI-X auto-detect
- Supports MODBUS TCP and Ethernet / IP protocol
- Baud rate: 10 / 100 Mbps auto-detect
- AC motor drive keypad / Ethernet configuration
- Virtual serial port

Network Interface

Interface	RJ-45 with Auto MDI / MDIX	**Transmission speed**	10 / 100 Mbps Auto-Detect
Number of ports	1 Port	**Network protocol**	ICMP, IP, TCP, UDP, DHCP, SMTP, MODBUS OVER TCP / IP, Delta Configuration
Transmission method	IEEE 802.3, IEEE 802.3u		
Transmission cable	Category 5e shielding 100 M		

▪ CMC-PD01

Features

- Supports PZD control data exchange
- Supports PKW polling AC motor drive parameters
- Supports user diagnosis function
- Auto-detects baud rates; supports Max. 12 Mbps

PROFIBUS DP Connector

Interface	DB9 connector
Transmission method	High-speed RS-485
Transmission cable	Shielded twisted pair cable
Electrical isolation	500 V_{DC}

Communication

Message type	Cyclic data exchange
Module name	CMC-PD01
GSD document	DELA08DB.GSD
Company ID	08DB (HEX)
Serial transmission speed supported (auto-detection)	9.6 kbps; 19.2 kbps; 93.75 kbps; 187.5 kbps; 125 kbps; 250 kbps; 500 kbps; 1.5 Mbps; 3 Mbps; 6 Mbps; 12 Mbps (bits per second)

▪ CMC-DN01

Features

- Based on the high-speed communication interface of Delta HSSP protocol, able to conduct immediate control of an AC motor drive
- Supports Group 2 only connection and polling I/O data exchange
- For I/O mapping, supports Max. 32 words of input and 32 words of output
- Supports EDS file configuration in DeviceNet configuration software
- Supports all baud rates on DeviceNet bus: 125 kbps, 250 kbps, 500 kbps and extendable serial transmission speed mode
- Node address and serial transmission speed can be set up on AC motor drive
- Power supplied from AC motor drive

DeviceNet Connector

Interface	5-PIN open removable connector. Of 5.08 mm PIN interval
Transmission method	CAN
Transmission cable	Shielded twisted pair cable (with 2 power cables)
Transmission speed	125 kbps, 250 kbps, 500 kbps and extendable serial transmission speed mode
Network protocol	DeviceNet protocol

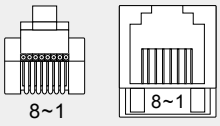
DeviceNet Connector

Interface	50 PIN communication terminal
Transmission method	SPI communication
Terminal function	1. Communicating with AC motor drive 2. Transmitting power supply from AC motor drive
Communication protocol	Delta HSSP protocol

▪ EMC-COP01

Built-in EMC-COP01 card are available for VFDXXXC23E and VFDXXXC43E

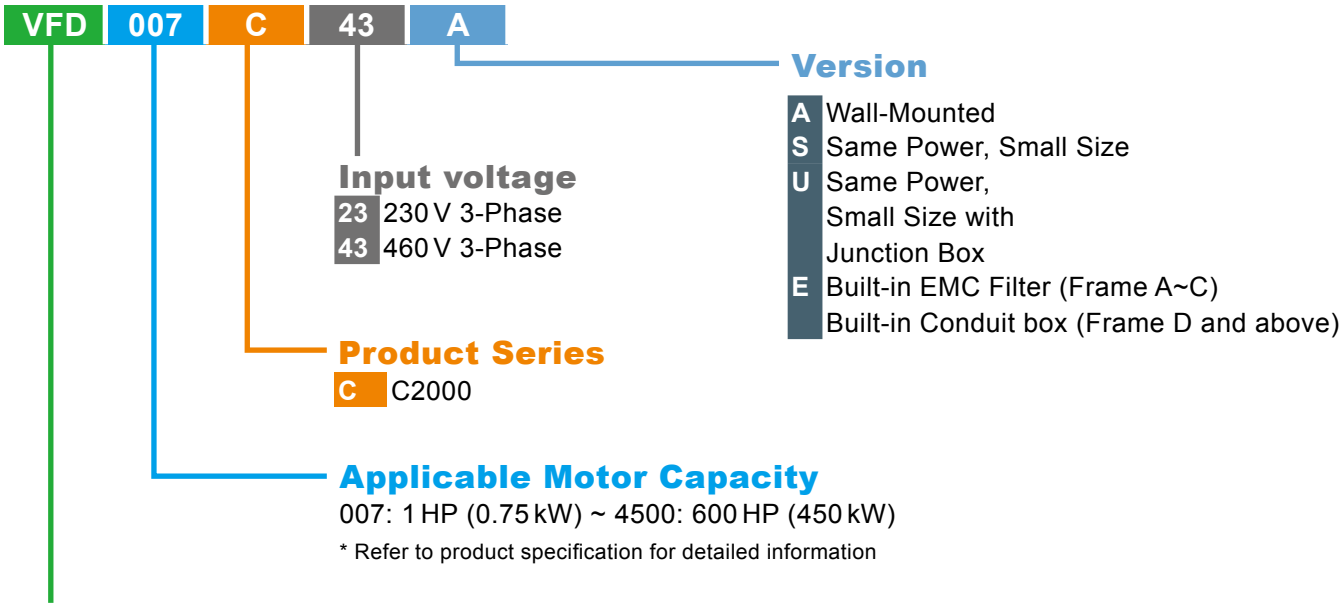
RJ-45 Pin definition



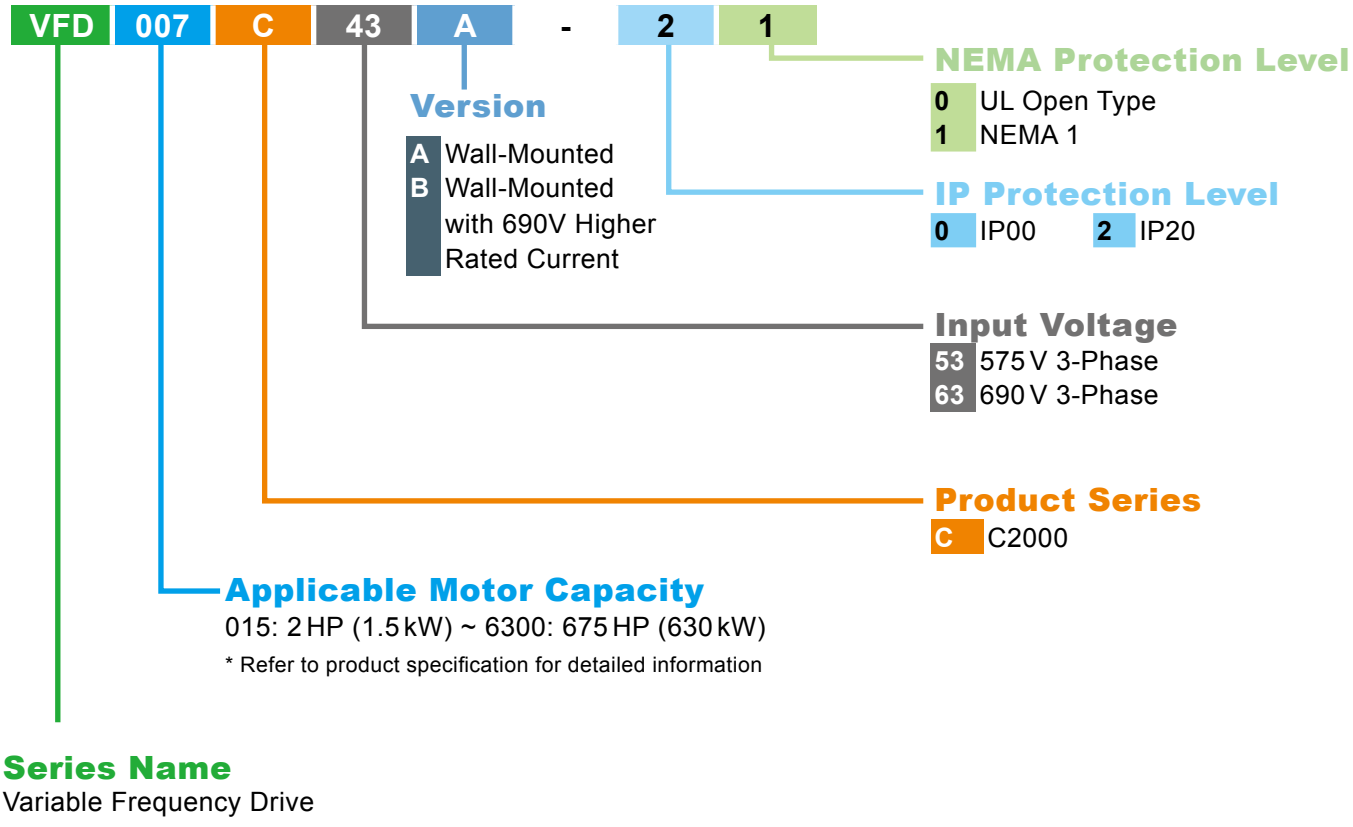
Pin	Pin name	Definition
1	CAN_H	CAN_H bus line (dominant high)
2	CAN_L	CAN_L bus line (dominant low)
3	CAN_GND	Ground / 0 V / V-
6	CAN_GND	Ground / 0 V / V-

Model Name

- **230 V / 460 V:**



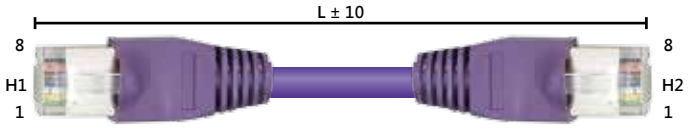
- **575 V / 690 V:**



Accessories

▪ CANopen Communication Cable

Model: TAP-CB05, TAP-CB10



Title	Part No.	L	
		mm	inch
1	UC-CMC003-01A	300	11.8
2	UC-CMC005-01A	500	19.6
3	UC-CMC010-01A	1000	39
4	UC-CMC015-01A	1500	59
5	UC-CMC020-01A	2000	78.7
6	UC-CMC030-01A	3000	118.1
7	UC-CMC050-01A	5000	196.8
8	UC-CMC100-01A	10000	393.7
9	UC-CMC200-01A	20000	787.4

▪ Digital Keypad Accessories: RJ45 Extension Leads and CMC-EIP01 Cables

Applicable Models: CBC-K3FT, CBC-K5FT, CBC-K7FT, CBC-K10F, CBC-K16FT

Title	Part No.	Explanation
1	CBC-K3FT	RJ45 extension lead, 3 feet (approximately 0.9 m)
2	CBC-K5FT	RJ45 extension lead, 5 feet (approximately 1.5 m)
3	CBC-K7FT	RJ45 extension lead, 7 feet (approximately 2.1 m)
4	CBC-K10FT	RJ45 extension lead, 10 feet (approximately 3 m)
5	CBC-K16FT	RJ45 extension lead, 16 feet (approximately 4.9 m)

Ordering Information

Frame Size		Power Range	Models			
Frame A		230 V: 0.75 ~ 3.7 kW 460 V: 0.75 ~ 5.5 kW 575 V: 1.5 ~ 3.7 kW	VFD007C 23A VFD015C 23A VFD022C 23A VFD037C 23A	VFD007C 43A VFD015C 43A VFD022C 43A VFD037C 43A VFD040C 43A VFD055C 43A	VFD007C 43E VFD015C 43E VFD022C 43E VFD037C 43E VFD040C 43E VFD055C 43E	VFD015C53A-21 VFD022C53A-21 VFD037C53A-21
Frame B		230 V: 5.5 ~ 11 kW 460 V: 7.5 ~ 15 kW 575 V: 5.5 ~ 15 kW	VFD055C 23A VFD075C 23A VFD110C 23A	VFD075C 43A VFD110C 43A VFD150C 43A	VFD075C 43E VFD110C 43E VFD150C 43E	VFD055C53A-21 VFD075C53A-21 VFD110C53A-21 VFD150C53A-21
Frame C		230 V: 15 ~ 22 kW 460 V: 18.5 ~ 30 kW 690 V: 18.5 ~ 37 kW	VFD150C 23A VFD185C 23A VFD220C 23A	VFD185C 43A VFD220C 43A VFD300C 43A	VFD185C 43E VFD220C 43E VFD300C 43E	VFD185C63B-21 VFD220C63B-21 VFD300C63B-21 VFD370C63B-21
Frame D		230 V: 30 ~ 37 kW 460 V: 37 ~ 75 kW 690 V: 55 ~ 75 kW	**Frame**_D1 VFD300C 23A VFD370C 23A VFD550C 23A VFD750C 23A VFD450C63B-00 VFD550C63B-00	**Frame**_D0-1 VFD370C 43S VFD450C 43S	**Frame**_D2 VFD300C 23E VFD370C 23E VFD550C 43E VFD750C 43E VFD450C63B-21 VFD550C63B-21	**Frame**_D0-2 VFD370C 43U VFD450C 43U

Ordering Information

Frame Size		Power Range	Models		
Frame E		230 V: 45 ~ 75 kW 460 V: 90 ~ 110 kW 690 V: 75 ~ 132 kW	**Frame**_E1 VFD450C 23A VFD550C 23A VFD750C 23A VFD900C 43A VFD1100C 43A VFD750C63B-00 VFD900C63B-00 VFD1100C63B-00 VFD1320C63B-00	**Frame**_E2 VFD450C 23E VFD550C 23E VFD750C 23E VFD900C 43E VFD1100C 43E VFD750C63B-21 VFD900C63B-21 VFD1100C63B-21 VFD1320C63B-21	
Frame F		230 V: 90 kW 460 V: 132 ~ 160 kW 690 V: 160 ~ 200 kW	**Frame**_F1 VFD900C 23A VFD1320C 43A VFD1600C 43A VFD1600C63B-00 VFD2000C63B-00	**Frame**_F2 VFD900C 23E VFD1320C 43E VFD1600C 43E VFD1600C63B-21 VFD2000C63B-21	
Frame G		460 V: 185 ~ 220 kW 690 V: 250 ~ 315 kW	**Frame**_G1 VFD1850C 43A VFD2200C 43A VFD2500C63B-00 VFD3150C63B-00	**Frame**_G2 VFD1850C 43E VFD2200C 43E VFD2500C63B-21 VFD3150C63B-21	
Frame H		460 V: 280 ~ 450 kW	**Frame**_H1 VFD2800C 43A VFD3150C 43A VFD3550C 43A VFD4500C 43A	**Frame**_H2 VFD2800C 43E-1 VFD3150C 43E-1 VFD3550C 43E-1 VFD4500C 43E-1	**Frame**_H3 VFD2800C 43E VFD3150C 43E VFD3550C 43E VFD4500C 43E
Frame H **(690 V Model)**		690 V: 400 ~ 630 kW	**Frame**_H1 VFD4000C63B-00 VFD4500C63B-00 VFD5600C63B-00 VFD6300C63B-00	**Frame**_H2 VFD4000C63B-21 VFD4500C63B-21 VFD5600C63B-21 VFD6300C63B-21	

Attention

Standard Motors

Output reactor
Please refer to manual to use the output AC reactor when the output cable is long.

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 for 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 capacity 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 is continuously operated at low speeds.
Please DO NOT operate in this way.

Synchronous Motor
These motors need suitable software for control. 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 for installation 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 site 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
Motor cables that are too long may cause overheating of 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 a place that meets 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 is 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.

Smarter. Greener. Together.

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