Automation for a Changing World

Delta Fan/Pump Vector Control Drive CP2000 Series

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DELTA

Smarter. Greener. Together.

WHY CP2000?

Delta Industrial Automation Green Technology

Delta Industrial Automation introduces the CP2000 Series AC motor drive for energy-saving HVAC systems and for pump and fan applications. The CP2000 Series is equipped with special HVAC parameters and PID control functions for efficient operation, as well as multi-segment V/F control curve and soft start functions to assist frequent torque change and constant output applications with energy-saving performance.


CP2000

Water Circulation Pump Control

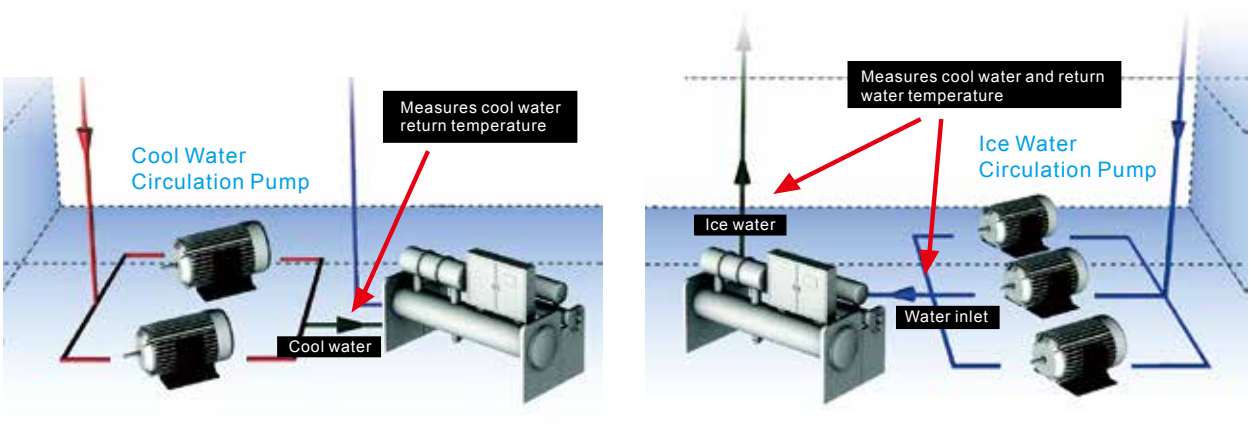


Figure1: Multi-Pumps Control

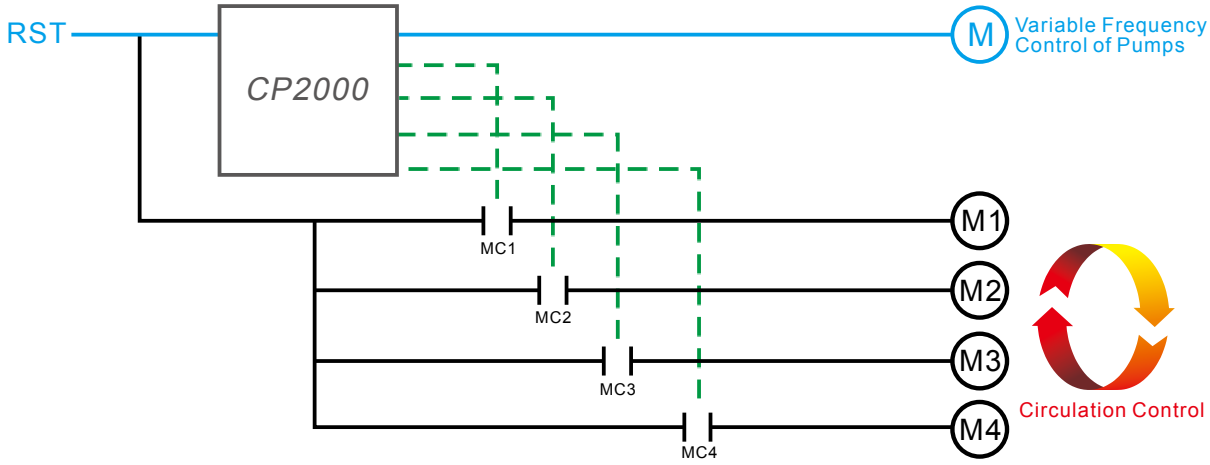


Figure 2: Fixed Amount and Circulation Control

Features

- LCD keypad - An easy-to-use text panel with TP Editor software allows users to self-define the main page screen
- Quick setting functions to support self-defined parameter groups and parameter duplication for fast and easy installation
- Modular design for flexible extension and easy maintenance
- High-speed communications include BACnet and MODBUS. Optional communication cards are available upon purchase: PROFIBUS DP, DeviceNet, MODBUS TCP, EtherNet/IP and CANopen
- Extended life cycle
- Enhanced conformal coating on PCBs for superior durability in critical environments
- Fire mode and bypass functions: continuous pressure to extract smoke when emergencies occur
- Various modes for fans/pumps applications including PID control, sleep/wake up functions, flying start and skip frequency
- Multi-pumps synchronous control of up to 8 motors at one time and provides fixed amount and fixed time circulation control
- Built-in 10K steps PLC programming capacity and Real Time Clock (RTC)

Advanced Drive Technology

High Performance Variable Frequency Drive Technology

1.Sensorless Vector Control (SVC)
2.Dual rating design
(Light duty & Normal duty)
3.Excellent variable torque control
asynchronous motors

Modular Design

1.Hot plugging LCD keypad
2.I/O extension card
3.Various communication cards
4.Removable fans

Versatile Drive Control

1.Built-in PLC function
2.Built-in brake unit*
3.Networking drive system
4.Auto energy saving

Environmental Adaptability

1.50°C operation temperature
2.Built-in DC choke*
3.Coated circuit boards
4.Built-in EMC filter*
5.International standard of safety:
CE/UL/CUL

*Note: Please refer to the Product Specification for more detail.

Standard Models

Power range: 230 V 0.75~90 kW, 460 V: 0.75~400 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		

230 V (kW)	0.75	1.5	2.2	3.7	4.0	5.5	7.5	11	15	18.5	22	30	37
230 V (HP)	1	2	3	5	5	7.5	10	15	20	25	30	40	50
Frame Size	A							B			C		

460 V (kW)	45	55	75	90	110	132	160	185	220	280	315	355	400	500
460 V (HP)	60	75	100	125	150	175	215	250	300	375	425	475	536	675
Frame Size	D0		D		E		F		G		H			

Standards

- **CE**
  Low Voltage:
  EN61800-5-1
  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
- **UL, cUL**
- **C-Tick**
- **ROHS**

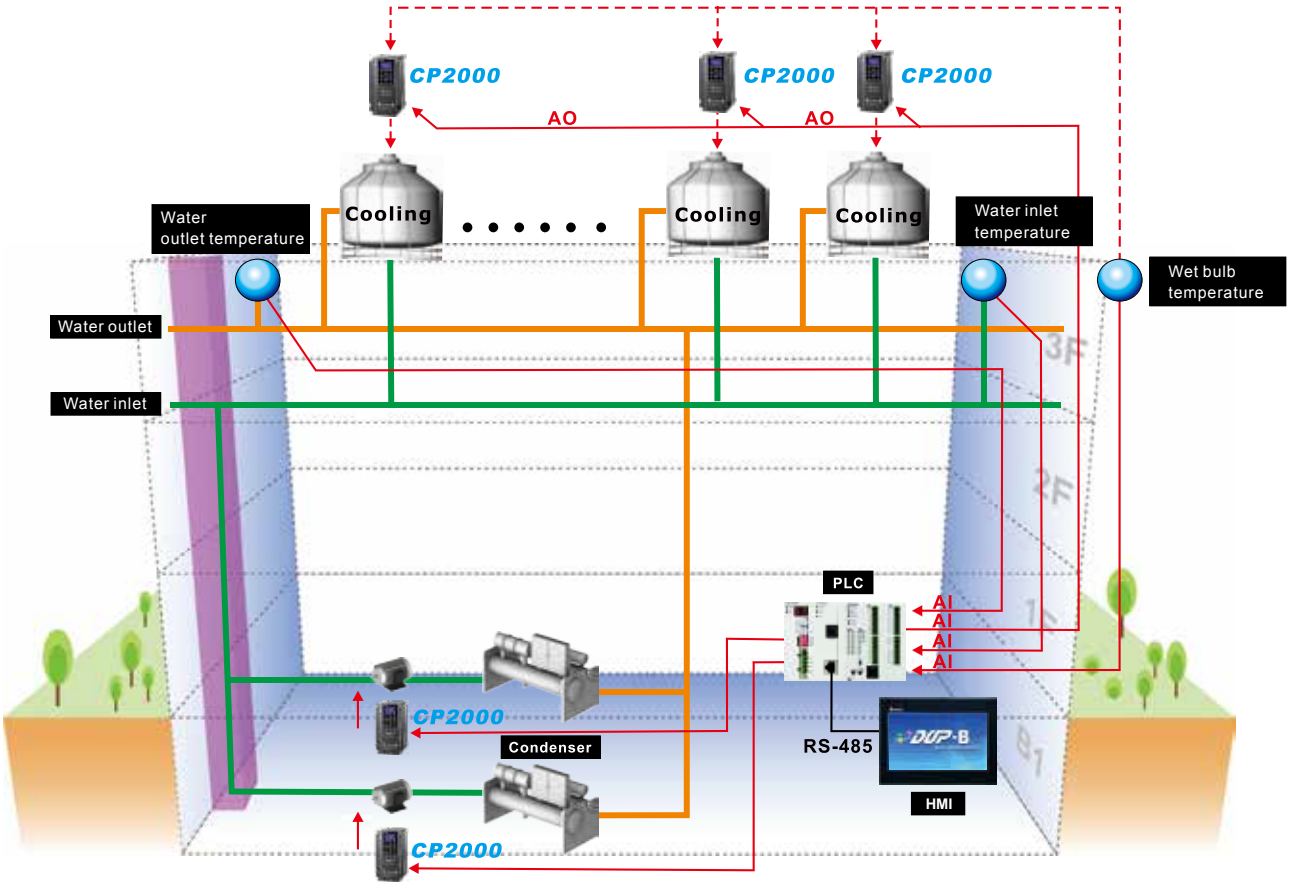
High-Speed Network

- Advanced network functions
  - Built-in RS-485 (MODBUS)
  - Built-in BACnet MS/TP
- Provides various communication cards:

PROFIBUS BACnet International **CANopen (DS402)** **DeviceNet** **EtherNet/IP** **MODBUS TCP**

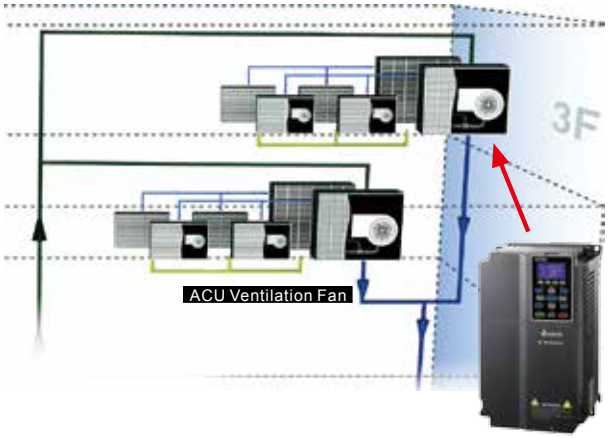
Building Automation Applications

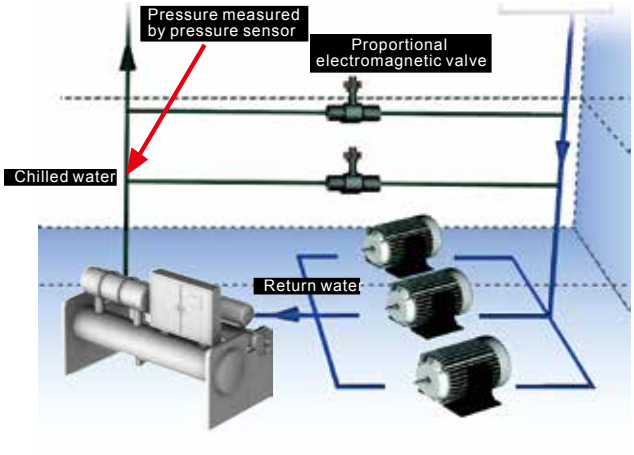
- 4-points adjustable V/F control - Real-time adjustment of input voltage under variable torque load environments, especially for pump and fan applications.
- Flying start and auto restart after momentary power loss functions, suitable for fans application.
- Skip frequency function avoids mechanical resonance and protects the equipment.
- Low-current protection function prevents free load operation.
- Built-in BACnet communication protocol, saves on the wiring for building automation application.



Improves Motor Performance

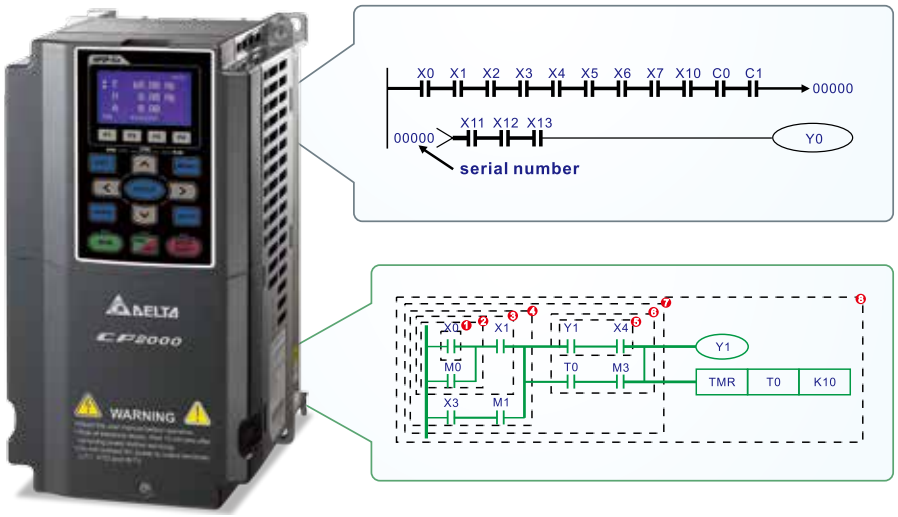
- Sensorless Vector Control (SVC) and auto-tuning functions to improve motor performance for variable torque load applications.
- Deceleration Energy Backup (DEB) function decelerates motor to a stop when sudden power failure occurs to protect the equipment from damage.
- Auto adjusting acceleration/deceleration speed, reduces mechanical vibration when activating and stopping the equipment and provides smooth operation.
- Energy saving control functions include PID control, sleep/wakeup mode and auto-energy saving mode.





Built-in PLC Function

- Built-in 10 K steps PLC function supports independent and distributed control when connecting to a network system for high operation flexibility.
- Real Time Clock (RTC) function facilitates the PLC program writing process for ON/OFF chronology, daylight saving operation and many other settings.



Modular Design

Powerful motor drive control functions. The modular design satisfies various system applications with higher flexibility and is easy to maintain. Accessories include input/output extension cards, communication cards, hot plugging LCD keypad, removable terminal blocks and removable fans.

- KPC-CC01 keypad
- Standard RJ45 cable for distanced operation.
- Easy to install and remove with one press.

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

- Removes the safety screws on the top cover. Press on two sides to remove the cover.

- RFI Switch

- Modular fan design, easy to replace and clean, extends product life.

High Adaptability to Environment

- Built-in DC choke to supress harmonics*
- Built-in EMC filter for noise suppression*
- Enhanced conformal coating on PCBs for superior durability 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 for more detail

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/cm^2 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 at non-condensation, non-frost, non-conductive environment.	
	Rated Humidity	Operation	Max. 95%
		Storage/Transportation	Max. 95%
		Only allowed at 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 at non-condensation, non-frost, non-conductive environment.	
	Altitude	Operation	If the AC motor drive is installed at altitude 0 ~ 1000 m, follow normal operation restrictions. If it is installed at altitude 1000 ~ 3000 m, decrease 1% of rated current or lower 0.5°C of temperature for every 100m 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)	

Specification for Operation Temperature and Protection Level

Model	Frame	Top Cover	Conduit Box	Protection Level	OperationTemperature
VFDxxxxCPxxx-21	Frame A ~ C 230 V: 0.75 ~ 30 kW 460 V: 0.75 ~ 37 kW	Remove top cover	Standard conduit plate	IP20/UL Open Type	ND: -10°C ~ 50°C LD: -10°C ~ 40°C
		Standard with top cover		IP20/UL Type1/NEMA1	ND: -10°C ~ 40°C LD: -10°C ~ 40°C
	Frame D ~ H 230 V: > 37 kW 460 V: > 45 kW	N/A	Conduit box	IP20/UL Type1/NEMA1	ND: -10°C ~ 40°C LD: -10°C ~ 40°C
VFDxxxxCPxxx-00	Frame D ~ H 230 V: >37 kW 460 V: >45 kW	N/A	No conduit box	IP00 IP20/UL Open Type  This circled part is IP00, other area are IP20	ND: -10°C ~ 50°C LD: -10°C ~ 40°C (ND = Normal Duty LD = Light Duty)

Specifications

230 V

Frame Size			A					B			C			D		E		
Model VFD-□□□□CP23□-□□			007	015	022	037	055	075	110	150	185	220	300	370	450	550	750	900
Output Rating	NORMAL DUTY	**Rated Output Capacity (kVA)**	2.0	3.0	4.0	6.0	8.4	12	18	24	30	36	42	58	72	86	110	128
		Rated Output Current (A)	5	7.5	10	15	21	31	46	61	75	90	105	146	180	215	276	322
		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
		Overload Tolerance	120% of rated current for 1 minute during every 5 minutes															
	HEAVY DUTY	**Rated Output Capacity (kVA)**	1.2	2.0	3.2	4.4	6.8	10	13	20	26	30	36	48	58	72	86	102
		Rated Output Current (A)	3	5	8	11	17	25	33	49	65	75	90	120	146	180	215	255
		Applicable Motor Output (kW)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75
		Applicable Motor Output (HP)	0.5	1	2	3	5	7.5	10	15	20	25	30	40	50	60	75	100
		Overload Tolerance	120% of rated current for 1 minute during every 5 minutes; 160% of rated current for 3 seconds during every 25 seconds															
Input Rating		**Max. Output Frequency (Hz)**	599.00 Hz													400.00 Hz		
		Carrier Frequency (kHz)	2 ~ 15 kHz (8 kHz)								2 ~ 10 kHz (6 kHz)					2 ~ 9 kHz (4 kHz)		
		Input Current (A) Light Duty	6.4	9.6	15	22	25	35	50	65	83	100	116	146	180	215	276	322
		Input Current (A) Normal Duty	3.9	6.4	12	16	20	28	36	52	72	83	99	124	143	171	206	245
		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															
Cooling Method			Natural cooling	Fan Cooling														
Braking Chopper			Frame A, B, C, Build-in											Frame D and above: Optional				
DC Choke			Frame A, B, C, Optional											Frame D and above: Build-in 3%				
EMC Filter			Optional															

460 V

Frame Size			A							B			C		
Models VFD-□□□□CP43□-□□ VFD-□□□□CP4E□-□□			007	015	022	037	040	055	075	110	150	185	220	300	370
Output Rating	NORMAL DUTY	**Rated Output Capacity (kVA)**	2.4	3.3	4.4	6.8	8.4	10.4	14.3	19	25	30	36	48	58
		Rated Output Current (A)	3	4.2*	5.5*	8.5*	10.5	13*	18*	24*	32*	38*	45	60*	73*
		Applicable Motor Output (kW)	0.75	1.5	2.2	3.7	4.0	5.5	7.5	11	15	18.5	22	30	37
		Applicable Motor Output (HP)	1	2	3	5	5	7.5	10	15	20	25	30	40	50
		Overload Tolerance	120% of rated current for 1 minute during every 5 minutes												
	HEAVY DUTY	**Rated Output Capacity (kVA)**	2.2	2.4	3.2	4.8	7.2	8.4	10	14	19	25	30	36	48
		Rated Output Current (A)	1.7	3.0	4.0	6.0	9.0	10.5	12	18	24	32	38	45	60
		Applicable Motor Output (kW)	0.4	0.75	1.5	2.2	3.7	4.0	5.5	7.5	11	15	18.5	22	30
		Applicable Motor Output (HP)	0.5	1	2	3	5	5	7.5	10	15	20	25	30	40
		Overload Tolerance	120% of rated current for 1 minute during every 5 minutes; 160% of rated current for 3 seconds during every 25 seconds												
Input Rating		**Max. Output Frequency (Hz)**	599.00 Hz												
		Carrier Frequency (kHz)	2 ~ 15 kHz (8 kHz)										2 ~ 10 kHz (6 kHz)		
		Input Current (A) Light Duty	4.3	6.0	8.1	12.4	16	20	22	26	35	42	50	66	80
		Input Current (A) Normal Duty	3.5	4.3	5.9	8.7	14	15.5	17	20	26	35	40	47	63
		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												
Cooling Method			Natural cooling			Fan cooling									
Braking Chopper			Frame A, B, C, Build-in												
DC Choke			Frame A, B, C, Optional												
EMC Filter			Frame A, B, C of VFD____CP4E_-__; EMC filter Built-in Frame A, B, C of VFD____CP43_-__; N/A												

*Rated current for B type model (e.g. VFD015CP43B-21)

460 V															
Frame Size			D0		D		E		F		G		H			
Model VFD-□□□□CP43□-□□			450	550	750	900	1100	1320	1600	1850	2200	2800	3150	3550	4000	5000
Output Rating	NORMAL DUTY	Rated Output Capacity (kVA)	73	88	120	143	175	207	247	295	367	422	491	544	613	773
		Rated Output Current (A)	91	110	150*	180	220	260*	310	370*	460	530	616	683	770	930
		Applicable Motor Output (kW)	45	55	75	90	110	132	160	185	220	280	315	355	400	500
		Applicable Motor Output (HP)	60	75	100	125	150	175	215	250	300	375	425	475	536	675
		Overload Tolerance	120% of rated current for 1 minute during every 5 minutes													
	HEAVY 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
		Applicable Motor Output (kW)	37	45	55	75	90	110	132	160	185	220	280	315	355	450
		Applicable Motor Output (HP)	53	60	75	100	125	150	175	215	250	300	375	425	475	600
		Overload Tolerance	120% of rated current for 1 minute during every 5 minutes; 160% of rated current for 3 seconds during every 25 seconds													
Input Rating	Max. Output Frequency (Hz)		599.00 Hz				400.00 Hz									
	Carrier Frequency (kHz)		2 ~ 10 kHz (6 kHz)				2 ~ 9 kHz (4 kHz)									
	Input Current (A) Light Duty		91	110	150	180	220	260	310	370	460	530	616	683	770	930
	Input Current (A) Normal Duty		74	101	114	157	167	207	240	300	380	400	494	555	625	866
	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													
Cooling Method			Fan cooling													
Braking Chopper			Frame D and above: Optional													
DC Choke			Frame D and above: Build-in 3%													
EMC Filter			Frame D and above: Optional													

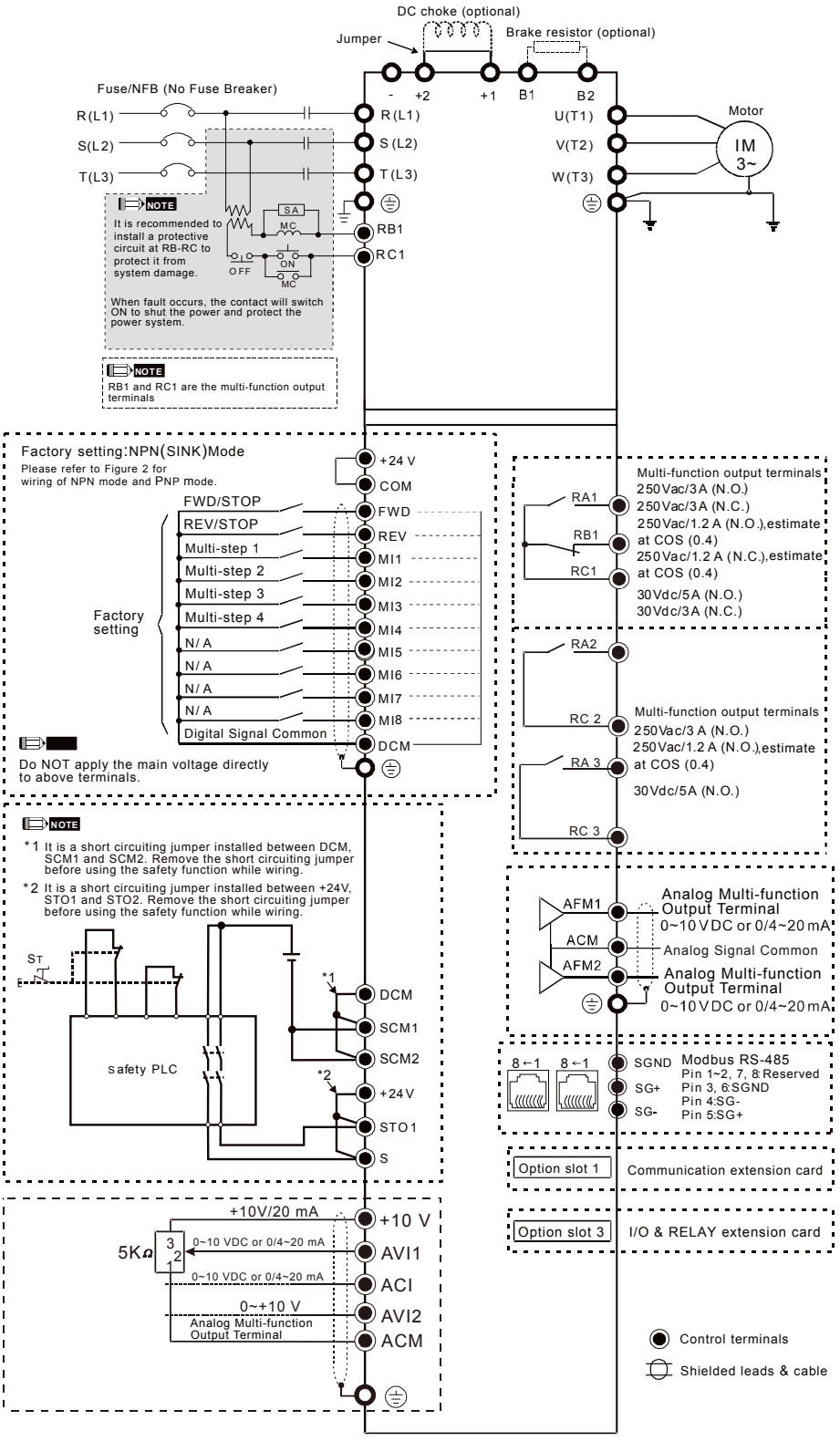
General Specifications

Control Characteristics	Control Method	Pulse Width Modulated (PWM)				
	Control Mode	1: V/F (V/F control), 2: SVC (Sensorless Vector Control)				
	Starting Torque	Reach up to 160% or above at 0.5 Hz				
	V/F Curve	4 point adjustable V/F curve and square curve				
	Speed Response Ability	5 Hz				
	Torque Limit	Light Duty: Max. 130% torque current; Normal Duty: Max. 175% torque current				
	Torque Accuracy	±5%				
	Max. Output Frequency (Hz)	230 V series: 599.00 Hz (55 kW and above: 400.00 Hz) / 460 V series: 599.00 Hz (90 kW and above: 400.00 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: Max. output frequency x 0.03/60 Hz (±11 bit)				
	Overload Tolerance	Light duty: 120% of rated current for 1 minute Normal duty: 120% of rated current for 1 minute;160% of rated current for 3 seconds				
	Frequency Setting Signal	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	Fault restart	Torque limit	Smart stall	Dwell	3-wire sequence
		Speed search	Parameter copy	JOG frequency	Slip compensation	Torque compensation
		S-curve accel/decel	Energy saving control	Accel/Decel. Time switch	Frequency/lower limit settings	Momentary power loss ride thru
		PID control (with sleep function)	Auto-Tuning (rotational, stationary)	DC injection braking at start/stop	BACnet Communication	16-step speed (max.)
		Over-torque detection		MODBUS communication (RS-485 RJ45, Max. 115.2 kbps)		
	Fan Control	230 V series: Model with spec higher than VFD185CP23 (included) are PWM control; Model with spec lower than VFD150CP23 (not included) are on/off switch control. 460 V series: Model with spec higher than VFD220CP43 (included) are PWM control; Model with spec lower than VFD185CP43 (not included) are on/off switch control.				
Protection Characteristics	Motor Protection	Electronic thermal relay protection				
	Over-Current Protection	Light duty: Over-current protection for 200% rated current, Normal duty: Over-current protection for 240% rated current, Current clamp (Light duty: 130 ~ 135%) (Normal duty: 170 ~ 175%)				
	Over-Voltage Protection	230: drive will stop when DC-BUS voltage exceeds 410 V / 460: drive will stop when DC-BUS voltage exceeds 820 V				
	Over-Temperature Protection	Build-in temperature sensor				
	Stall Prevention	Stall prevention during acceleration, deceleration and running indepenently				
	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 GB 12668.3 EAC				

Wiring

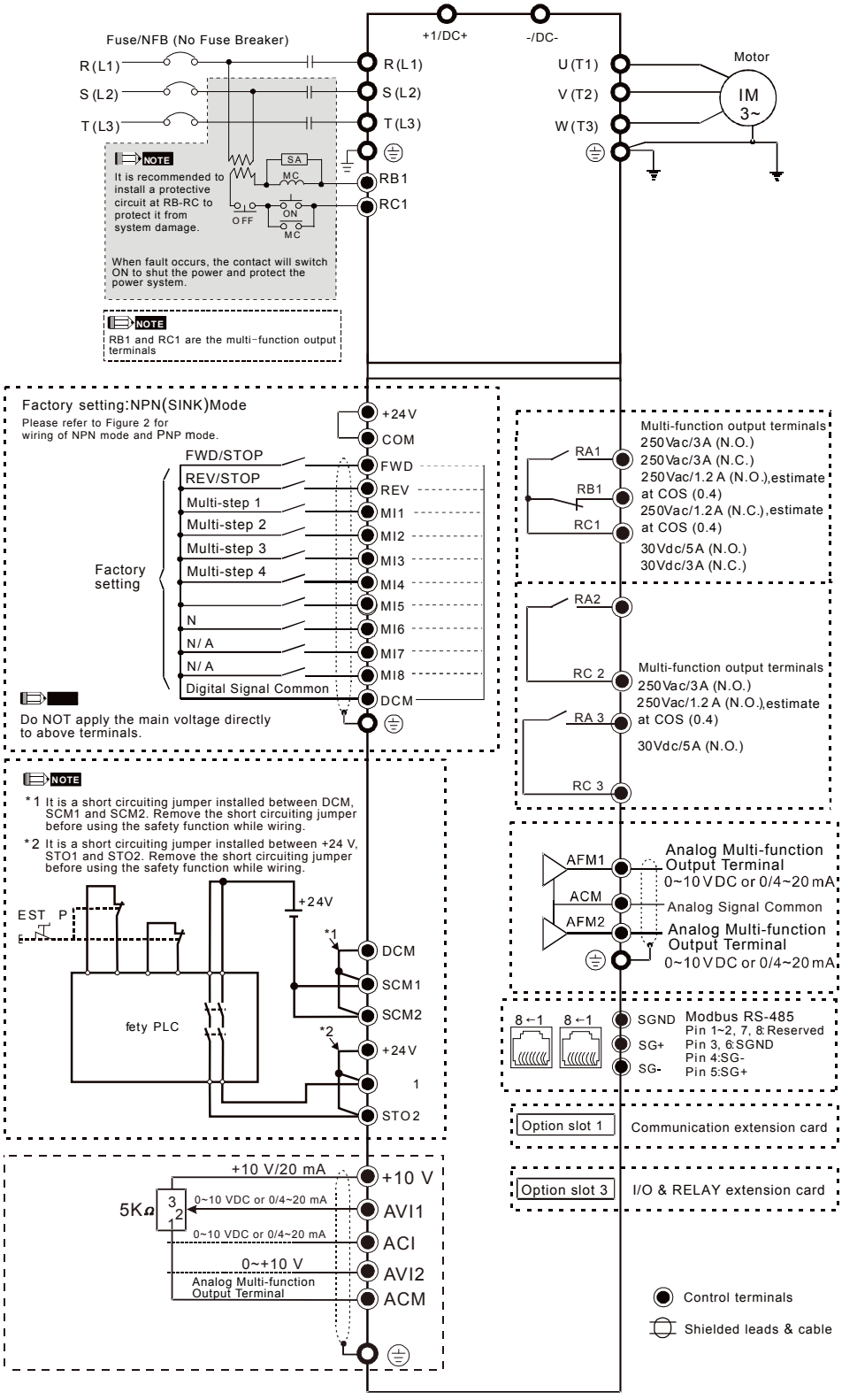
Wiring Diagram for Frame A ~ C

*It provides 3-phase power



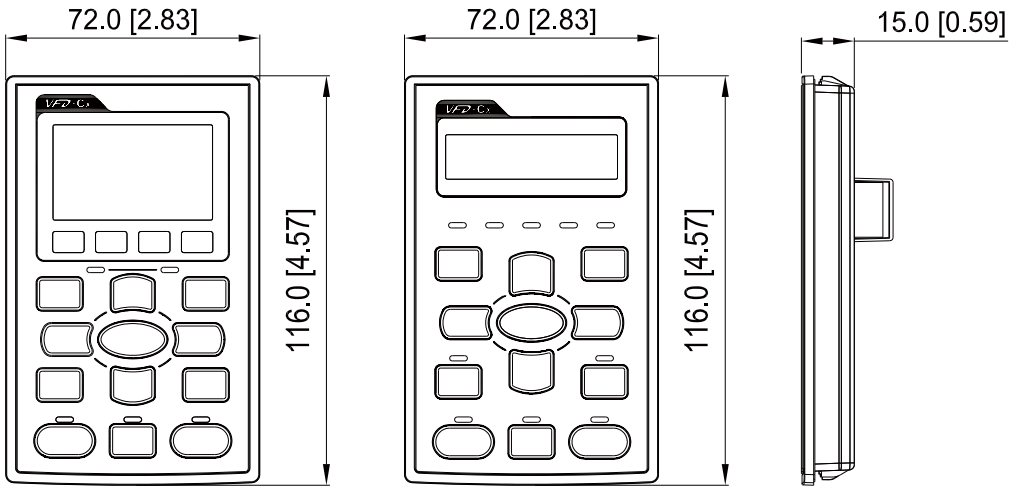
Wiring Diagram for Frame D0 and above

*It provides 3-phase power



Dimensions

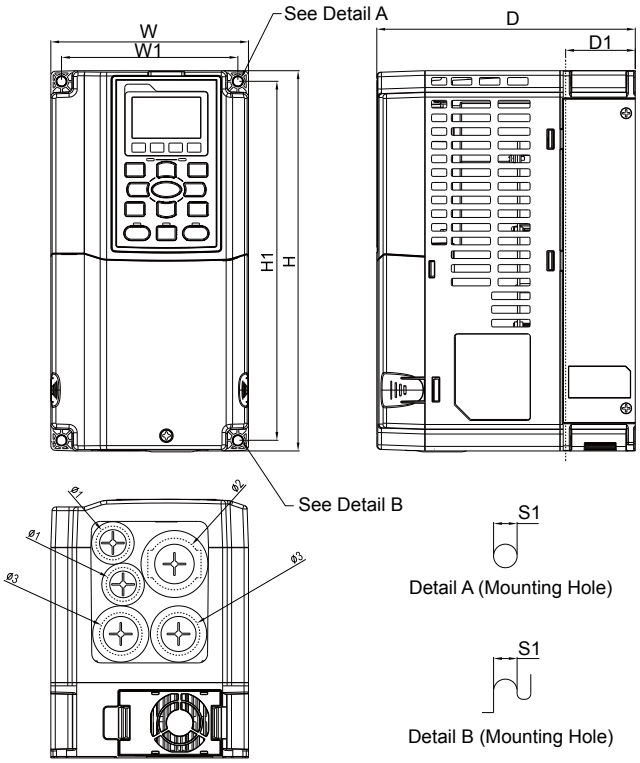
Digital Keypad



Standard LCD keypad

Optional selection: LED keypad

Frame A

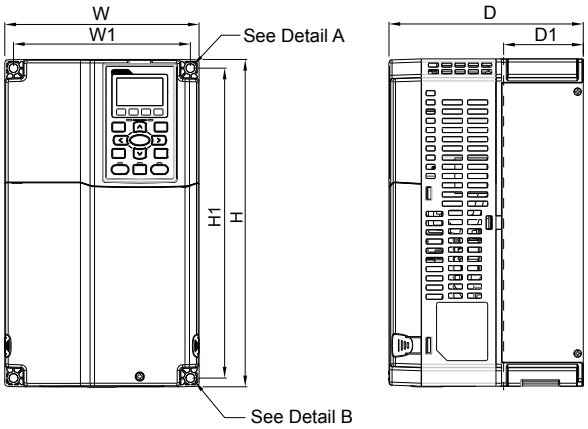


MODEL	
VFD007CP23A-21	VFD055CP43B-21
VFD015CP23A-21	VFD075CP43B-21
VFD022CP23A-21	VFD007CP4EA-21
VFD037CP23A-21	VFD015CP4EB-21
VFD055CP23A-21	VFD022CP4EB-21
VFD007CP43A-21	VFD037CP4EB-21
VFD015CP43B-21	VFD040CP4EA-21
VFD022CP43B-21	VFD055CP4EB-21
VFD037CP43B-21	VFD075CP4EB-21
VFD040CP43A-21	

Frame		W	H	D	W1	H1	D1*	Ø	Ø1	Ø2	Ø3
A	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

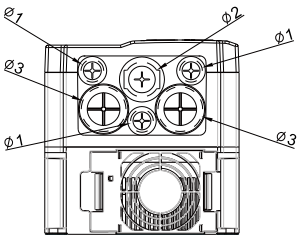
*D1: Flange mount.

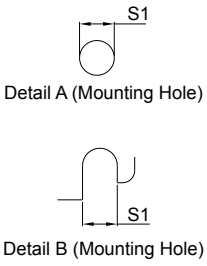
Frame B



MODEL

VFD075CP23A-21
VFD110CP23A-21
VFD150CP23A-21
VFD110CP43B-21
VFD150CP43B-21
VFD185CP43B-21
VFD110CP4EB-21
VFD150CP4EB-21
VFD185CP4EB-21

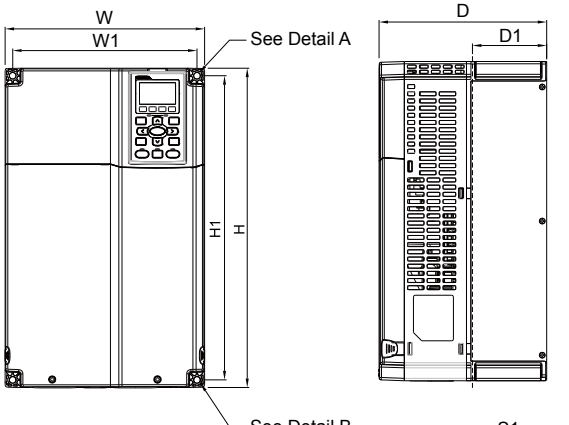




Frame		W	H	D	W1	H1	D1*	S1	Ø1	Ø2	Ø3
B1	mm	190.0	320.0	190.0	173.0	303.0	77.9	8.5	22.2	34.0	43.8
	inch	7.48	12.60	7.48	6.81	11.93	3.07	0.33	0.87	1.34	1.72

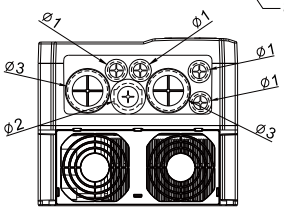
*D1: Flange mount.

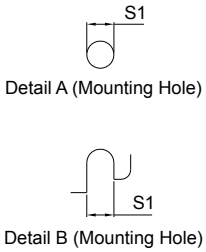
Frame C



MODEL

VFD185CP23A-21
VFD220CP23A-21
VFD300CP23A-21
VFD220CP43A-21
VFD300CP43B-21
VFD370CP43B-21
VFD220CP4EA-21
VFD300CP4EB-21
VFD370CP4EB-21



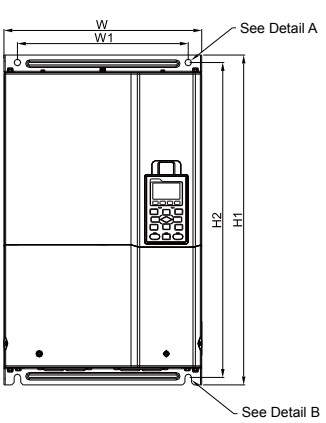


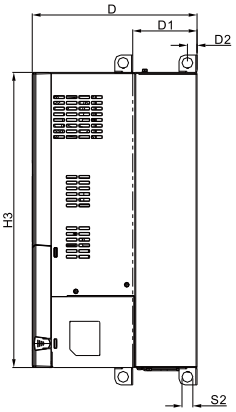
Frame		W	H	D	W1	H1	D1*	S1	Ø1	Ø2	Ø3
C1	mm	250.0	400.0	210.0	231.0	381.0	92.9	8.5	22.2	34.0	50.0
	inch	9.84	15.75	8.27	9.09	15.00	3.66	0.33	0.87	1.34	1.97

*D1: Flange mount.

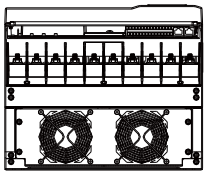
Dimensions

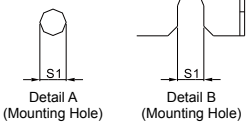
Frame D1 / D0-1





MODEL FRAME_D1	FRAME_D0-1
VFD370CP23A-00	VFD450CP43S-00
VFD450CP23A-00	VFD550CP43S-00
VFD750CP43B-00	
VFD900CP43A-00	

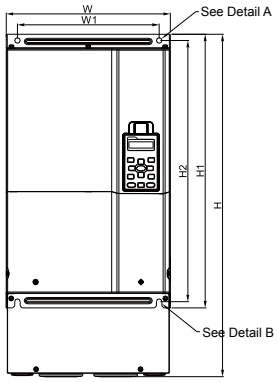


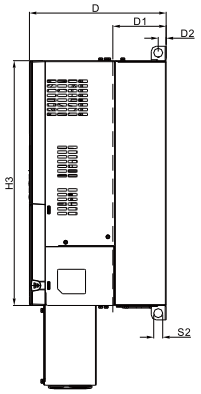


Frame		W	H	D	W1	H1	H2	H3	D1*	D2	S1	S2	Ø1	Ø2	Ø3
D1	mm	330.0	-	275.0	285.0	550.0	525.0	492.0	107.2	16.0	11.0	18.0	-	-	-
	inch	12.99	-	10.83	11.22	21.65	20.67	19.37	4.22	0.63	0.43	0.71	-	-	-
Frame		W	H	D	W1	H1	H2	H3	D1*	D2	S1	S2			
D0-1	mm	280.0	-	255.0	235.0	500.0	475.0	442.0	94.2	16.0	11.0	18.0			
	inch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

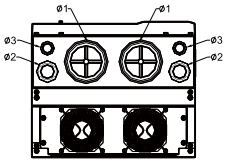
*D1: Flange mount.

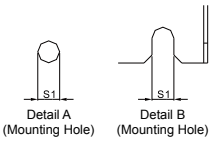
Frame D2 / D0-2





MODEL FRAME_D2	FRAME_D0-2
VFD370CP23A-21	VFD450CP43S-21
VFD450CP23A-21	VFD550CP43S-21
VFD750CP43B-21	
VFD900CP43A-21	

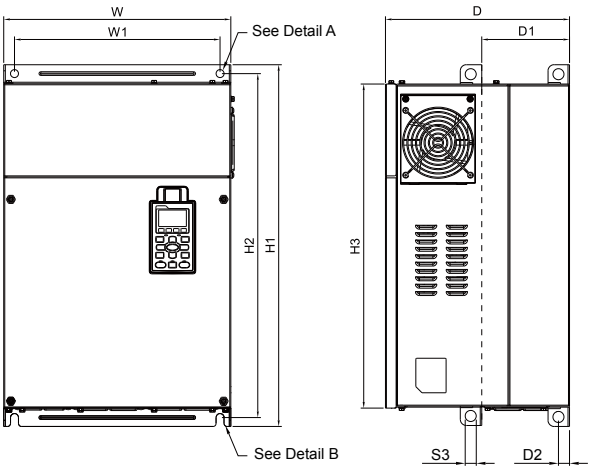




Frame		W	H	D	W1	H1	H2	H3	D1*	D2	S1	S2	Ø1	Ø2	Ø3
D2	mm	330.0	688.3	275.0	285.0	550.0	525.0	492.0	107.2	16.0	11.0	18.0	76.2	34.0	22.0
	inch	12.99	27.10	10.83	11.22	21.65	20.67	19.37	4.22	0.63	0.43	0.71	3.00	1.34	0.87
Frame		W	H	D	W1	H1	H2	H3	D1*	D2	S1	S2	Ø1	Ø2	Ø3
D0-2	mm	280.0	614.4	255.0	235.0	500.0	475.0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

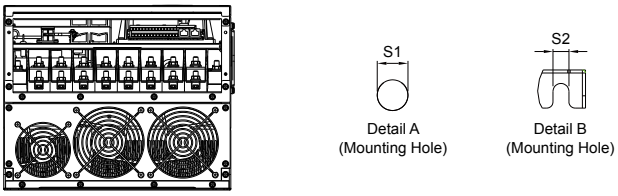
*D1: Flange mount.

Frame E1



MODEL

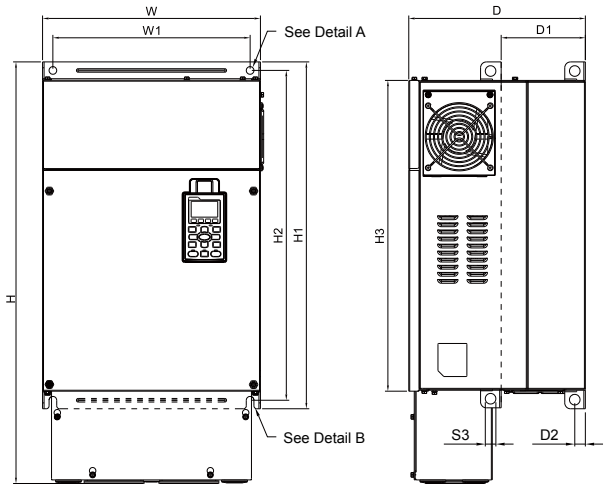
VFD550CP23A-00
VFD750CP23A-00
VFD900CP23A-00
VFD1100CP43A-00
VFD1320CP43B-00



Frame		W	H	D	W1	H1	H2	H3	D1*	D2	S1	S2	S3	Ø1	Ø2	Ø3
E1	mm	370.0	-	300.0	335.0	589.0	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	-	-	-

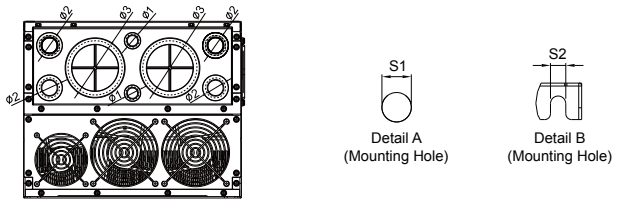
*D1: Flange mount.

Frame E2



MODEL

VFD550CP23A-21
VFD750CP23A-21
VFD900CP23A-21
VFD1100CP43A-21
VFD1320CP43B-21

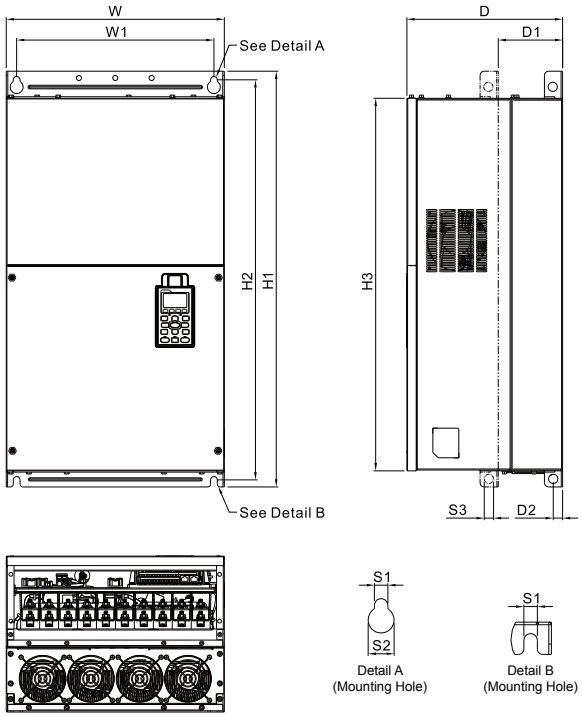


Frame		W	H	D	W1	H1	H2	H3	D1*	D2	S1	S2	S3	Ø1	Ø2	Ø3
E2	mm	370.0	715.8	300.0	335.0	589.0	560.0	528.0	143.0	18.0	13.0	13.0	18.0	22.0	34.0	92.0
	inch	14.57	28.18	11.81	13.19	23.19	22.05	20.80	5.63	0.71	0.51	0.51	0.71	0.87	1.34	3.62

*D1: Flange mount.

Dimensions

Frame F1



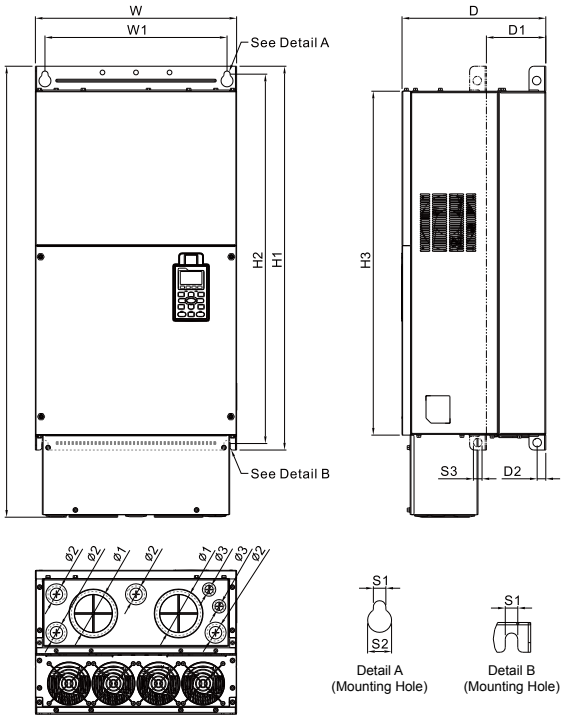
MODEL

VFD1600CP43A-00
VFD1850CP43B-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	-	-	-
	inch	16.54	-	11.81	14.96	31.50	30.32	28.23	4.88	0.71	0.51	0.98	0.71	-	-	-

*D1: Flange mount.

Frame F2



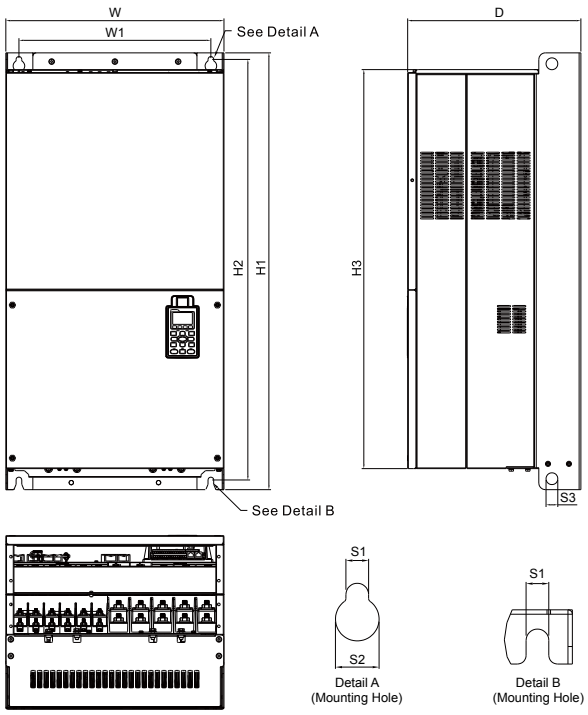
MODEL

VFD1600CP43A-21
VFD1850CP43B-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 G1

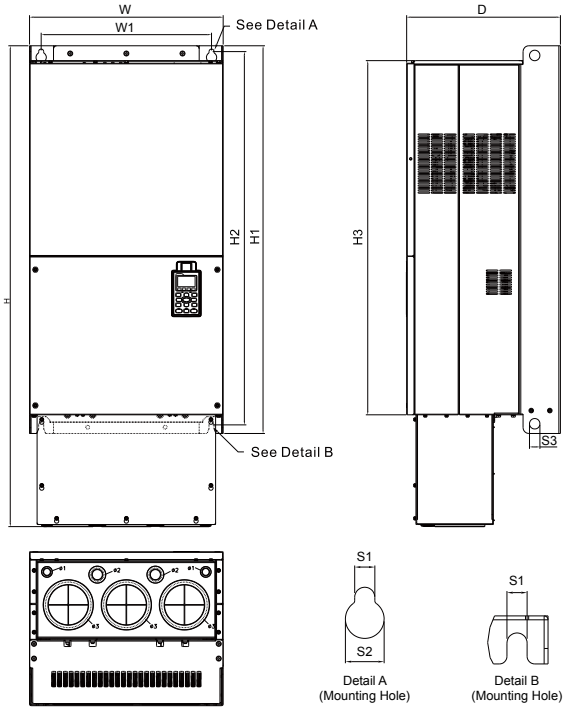


MODEL

VFD2200CP43A-00
VFD2800CP43A-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	-	-	-

Frame G2



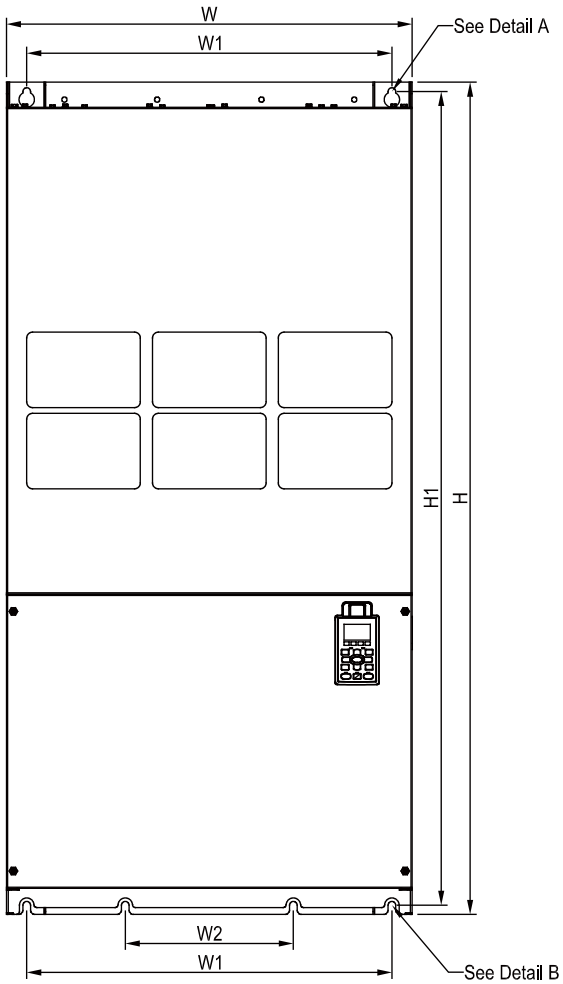
MODEL

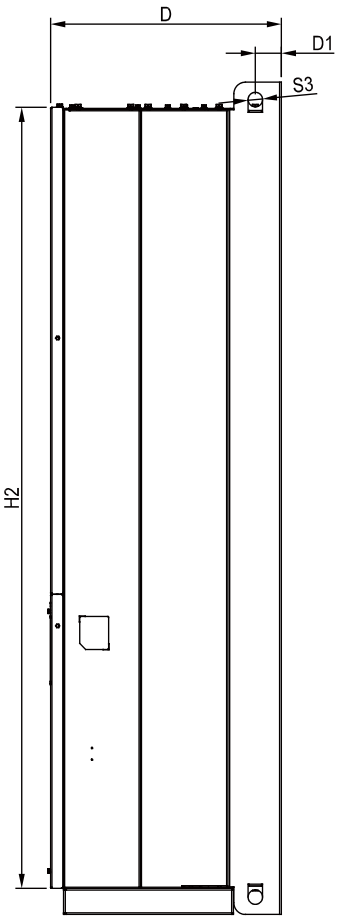
VFD2200CP43A-21
VFD2800CP43A-21

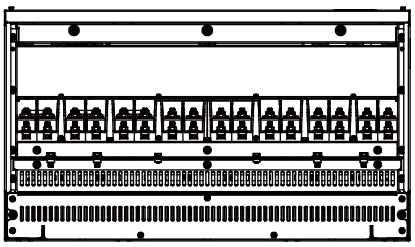
Frame		W	H	D	W1	H1	H2	H3	S1	S2	S3	Ø1	Ø2	Ø3
G2	mm	500.0	1240.2	397.0	440.0	1000.0	963.0	913.6	13.0	26.5	27.0	22.0	34.0	117.5
	inch	19.69	48.83	15.63	217.32	39.37	37.91	35.97	0.51	1.04	1.06	0.87	1.34	4.63

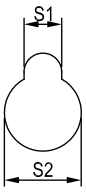
Dimensions

Frame H1

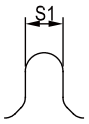








See Detail A (Mounting Hole)



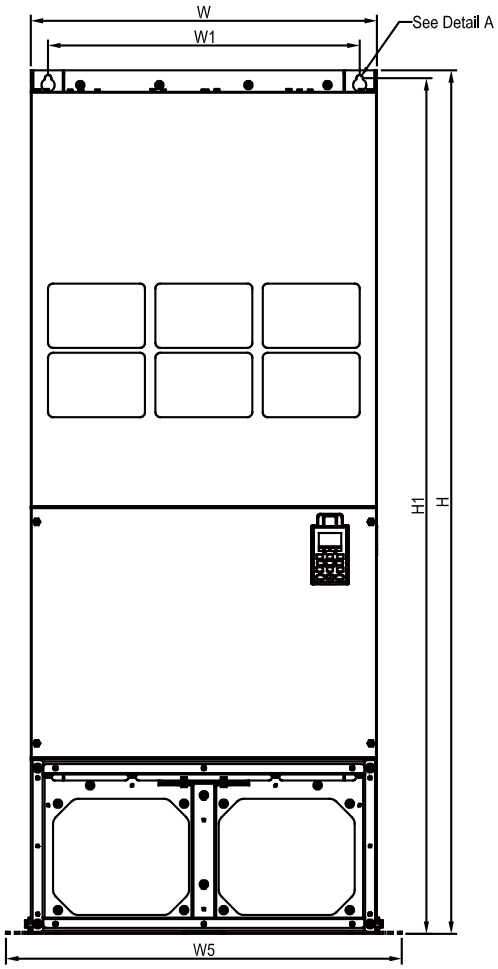
See Detail B (Mounting Hole)

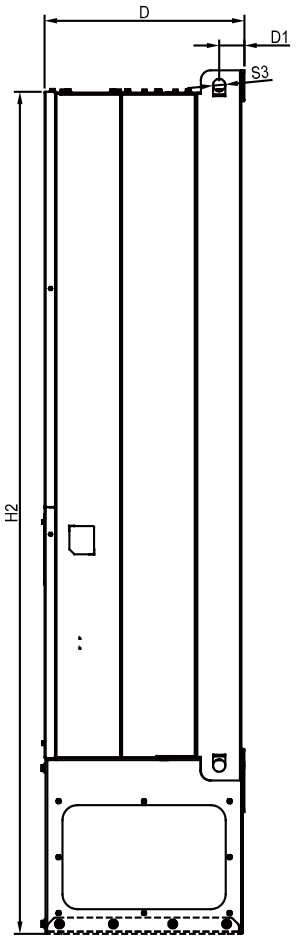
MODEL

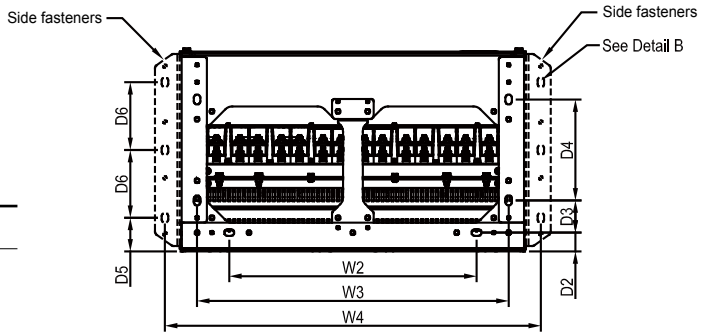
VFD3150CP43A-00
VFD3550CP43A-00
VFD4000CP43A-00
VFD5000CP43A-00

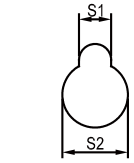
Frame		W	H	D	W1	W2	W3	W4	W5	W6	H1	H2	H3	H4
H1	mm	700.0	1435.0	398.0	630.0	290.0	-	-	-	-	1403.0	1346.6	-	-
	inch	27.56	56.5	15.67	24.80	11.42	-	-	-	-	55.24	53.02	-	-
Frame		**H5**	**D1**	**D2**	**D3**	**D4**	**D5**	**D6**	**S1**	**S2**	**S3**	**Ø1**	**Ø2**	**Ø3**
H1	mm	-	45.0	-	-	-	-	-	13.0	26.5	25.0	-	-	-
	inch	-	1.77	-	-	-	-	-	0.51	1.04	0.98	-	-	-

Frame H2









See Detail A (Mounting Hole)

See Detail B (Mounting Hole)

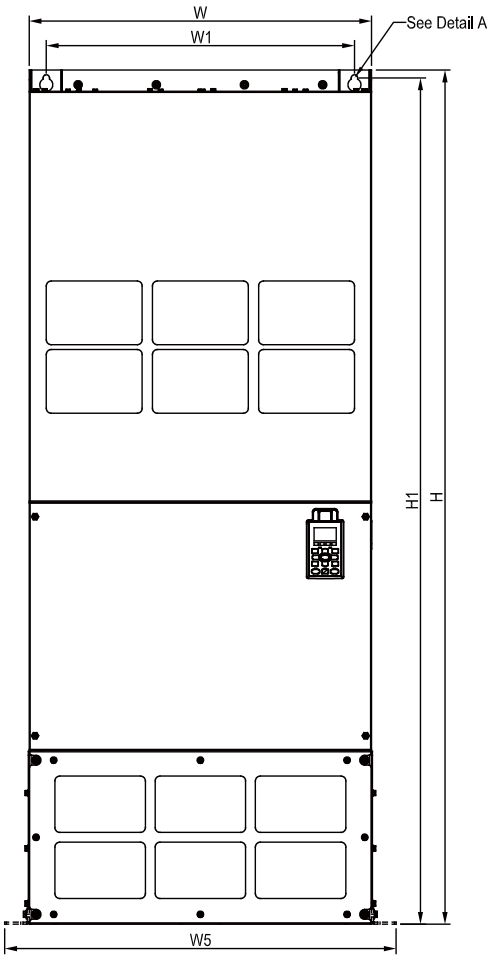
MODEL

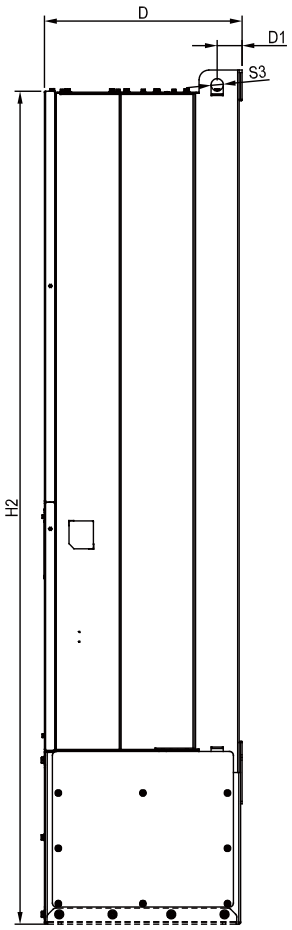
VFD3150CP43C-00
VFD3550CP43C-00
VFD4000CP43C-00
VFD5000CP43C-00

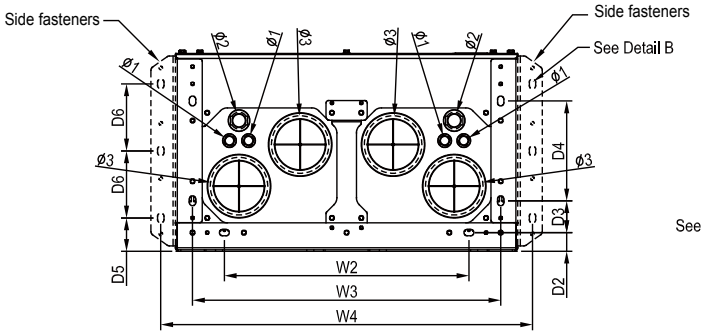
Frame		W	H	D	W1	W2	W3	W4	W5	W6	H1	H2	H3	H4
H2	mm	700.0	1745.0	404.0	630.0	500.0	630.0	760.0	800.0	-	1729.0	1701.6	-	-
	inch	27.56	68.70	15.9	24.80	19.69	24.80	29.92	31.50	-	68.07	66.99	-	-
Frame		**H5**	**D1**	**D2**	**D3**	**D4**	**D5**	**D6**	**S1**	**S2**	**S3**	**Ø1**	**Ø2**	**Ø3**
H2	mm	-	51.0	38.0	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	-	-	-

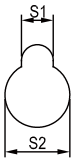
Dimensions

Frame H3









See Detail A (Mounting Hole)

See Detail B (Mounting Hole)

MODEL

VFD3150CP43C-21
VFD3550CP43C-21
VFD4000CP43C-21
VFD5000CP43C-21

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

Accessories

▪ 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 Kohm Terminal response time: ON: 10 ms; OFF: 20 ms

▪ 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

Relay
Extension 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: 0.5 A 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.

Accessories

▪ CMC-MOD01

Relay Extension Card

Features

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

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 100M		

▪ 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 100M		

▪ 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

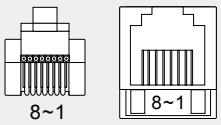
DeviceNet Connector

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-

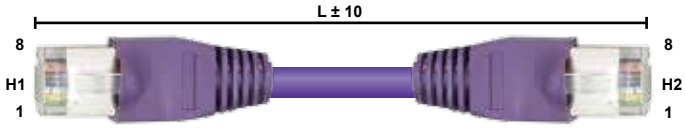
Network Interface

Interface	RJ-45
Number of ports	1 Port
Transmission method	CAN
Transmission cable	CAN standard cable
Transmission speed	1 M 500 k 250 k 125 k 100 k 50 k
Communication protocol	CANopen

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

▪ CANopen Breakout Box

Model: TAP-CN03

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

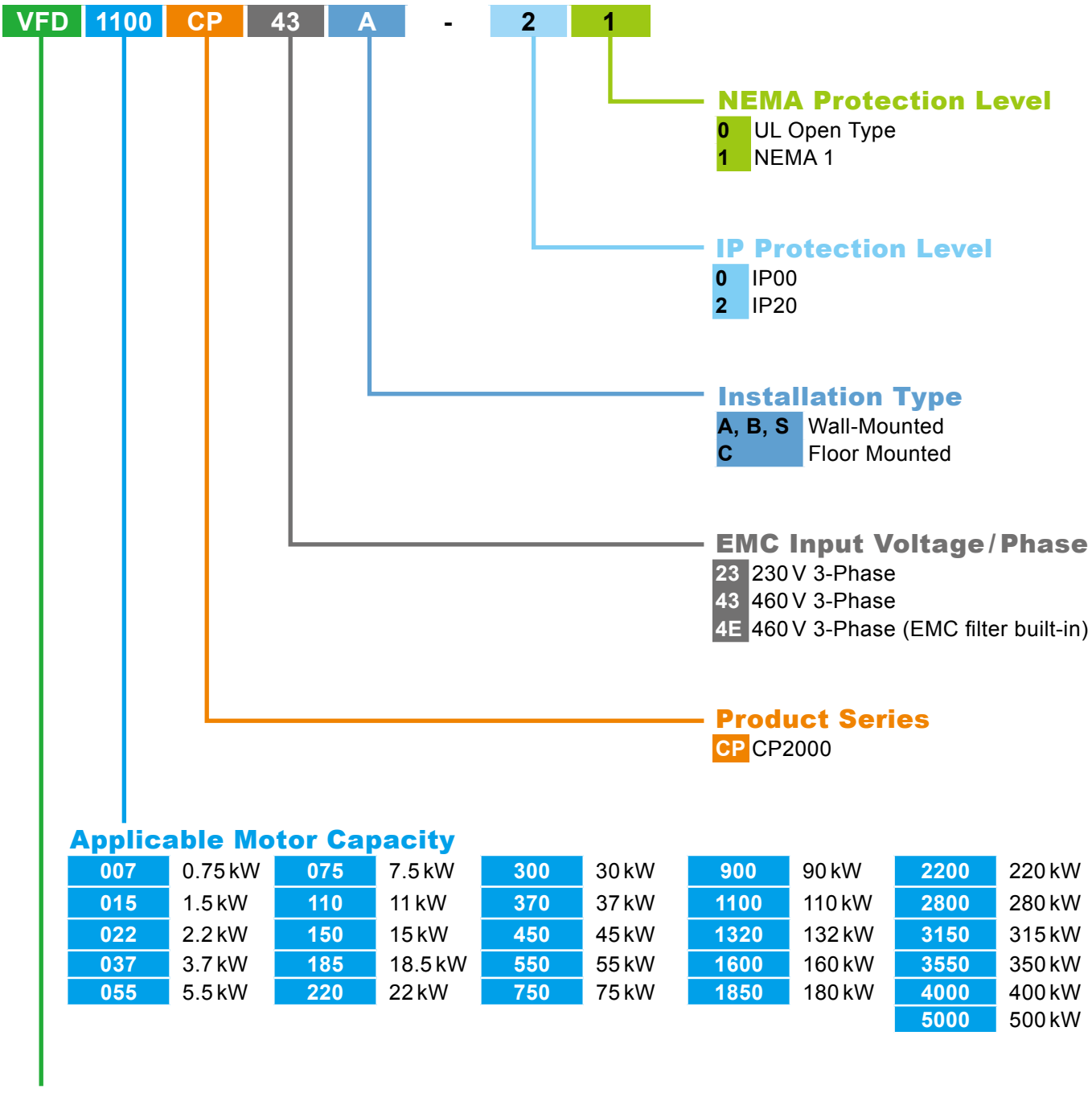
Applicable Models: CBC-K3FT, CBC-K5FT, CBC-K7FT, CBC-K10F, CBC-K16FT

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 kW ~ 5.5 kW **460 V:** 0.75 kW ~ 7.5 kW	VFD007CP 23A-21 VFD015CP 23A-21 VFD022CP 23A-21 VFD037CP 23A-21 VFD055CP 23A-21	VFD007CP 43A-21 VFD015CP 43B-21 VFD022CP 43B-21 VFD037CP 43B-21 VFD040CP 43A-21 VFD055CP 43B-21 VFD075CP 43B-21	VFD007CP 4EA-21 VFD015CP 4EB-21 VFD022CP 4EB-21 VFD037CP 4EB-21 VFD040CP 4EA-21 VFD055CP 4EB-21 VFD075CP 4EB-21
Frame B		**230 V:** 7.5 kW ~ 15 kW **460 V:** 11 kW ~ 18.5 kW	VFD075CP 23A-21 VFD110CP 23A-21 VFD150CP 23A-21	VFD110CP 43B-21 VFD150CP 43B-21 VFD185CP 43B-21	VFD110CP 4EB-21 VFD150CP 4EB-21 VFD185CP 4EB-21
Frame C		**230 V:** 18.5 kW ~ 30 kW **460 V:** 22 kW ~ 37 kW	VFD185CP 23A-21 VFD220CP 23A-21 VFD300CP 23A-21	VFD220CP 43A-21 VFD300CP 43B-21 VFD370CP 43B-21	VFD220CP 4EA-21 VFD300CP 4EB-21 VFD370CP 4EB-21
Frame D		**230 V:** 37 kW ~ 45 kW **460 V:** 45 kW ~ 90 kW	**Frame D1:** VFD370CP 23A-00 VFD450CP 23A-00 VFD750CP 43B-00 VFD900CP 43A-00 **Frame D0-1:** VFD450CP 43S-00 VFD550CP 43S-00	**Frame D2:** VFD370CP 23A-21 VFD450CP 23A-21 VFD750CP 43B-21 VFD900CP 43A-21 **Frame D0-2:** VFD450CP 43S-21 VFD550CP 43S-21	
Frame E		**230 V:** 55 kW ~ 90 kW **460 V:** 110 kW ~ 132 kW	**Frame E1:** VFD550CP 23A-00 VFD750CP 23A-00 VFD900CP 23A-00 VFD1100CP 43A-00 VFD1320CP 43B-00	**Frame E2:** VFD550CP 23A-21 VFD750CP 23A-21 VFD900CP 23A-21 VFD1100CP 43A-21 VFD1320CP 43B-21	
Frame F		**460 V:** 160 kW ~ 185 kW	**Frame F1:** VFD1600CP 43A-00 VFD1850CP 43B-00	**Frame F2:** VFD1600CP 43A-21 VFD1850CP 43B-21	
Frame G		**460 V:** 220 kW ~ 280 kW	**Frame G1:** VFD2200CP 43A-00 VFD2800CP 43A-00	**Frame G2:** VFD2200CP 43A-21 VFD2800CP 43A-21	
Frame H		**460 V:** 315 kW ~ 400 kW	**Frame H1:** VFD3150CP 43A-00 VFD3550CP 43A-00 VFD4000CP 43A-00 VFD5000CP 43A-00	**Frame H2:** VFD3150CP 43C-00 VFD3550CP 43C-00 VFD4000CP 43C-00 VFD5000CP 43C-00	Frame H3: VFD3150CP 43C-21 VFD3550CP 43C-21 VFD4000CP 43C-21 VFD5000CP 43C-21

Model Name


VFD
1100
CP
43
A
-
2
1
NEMA Protection Level
0 UL Open Type
1 NEMA 1
IP Protection Level
0 IP00
2 IP20
Installation Type
A, B, S Wall-Mounted
C Floor Mounted
EMC Input Voltage / Phase
23 230 V 3-Phase
43 460 V 3-Phase
4E 460 V 3-Phase (EMC filter built-in)
Product Series
CP CP2000
Applicable Motor Capacity
007 0.75 kW
015 1.5 kW
022 2.2 kW
037 3.7 kW
055 5.5 kW
075 7.5 kW
110 11 kW
150 15 kW
185 18.5 kW
220 22 kW
300 30 kW
370 37 kW
450 45 kW
550 55 kW
750 75 kW
900 90 kW
1100 110 kW
1320 132 kW
1600 160 kW
1850 180 kW
2200 220 kW
2800 280 kW
3150 315 kW
3550 350 kW
4000 400 kW
5000 500 kW
Product
Variable Frequency Drive

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.

Global Operations

ASIA (Taiwan)

Taoyuan
Technology Center
(Green Building)

Taoyuan Plant 1

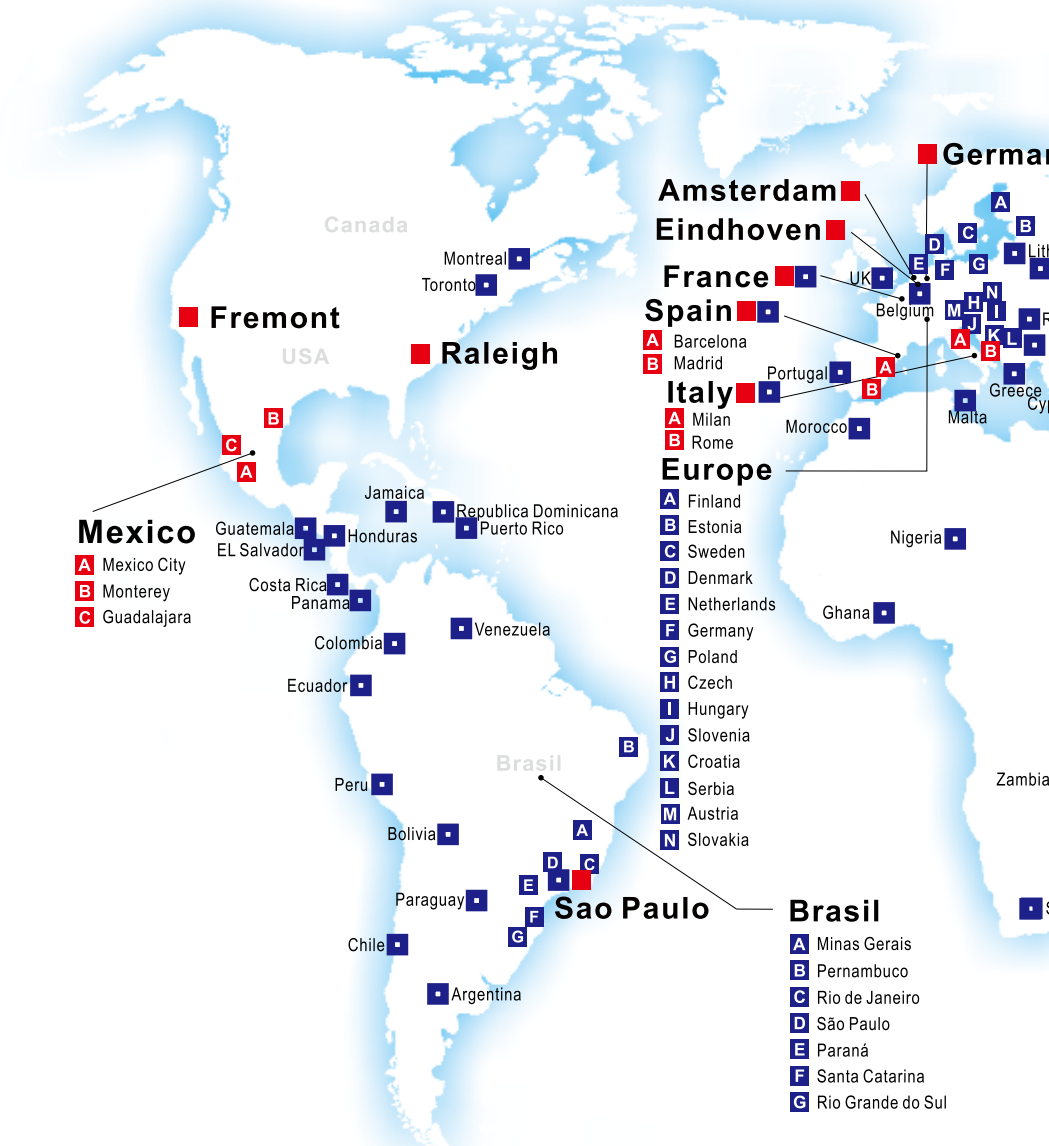
Taoyuan Plant
(Diamond-rated Green Building)

ASIA (China)

Wujiang Plant 3

Delta Electronics

Sales Channels of Delta Industrial Automation are Located Worldwide in 74 Co



ASIA (Japan)

Tokyo Office

ASIA (India)

Rudrapur Plant
(Green Building)

EUROPE

Amsterdam, Netherlands

AMERICA

Research Triangle Park

▲ Factories 4 ■ Branch Offices 71 ⊙ R&D Centers 5 ■ Distributors 711

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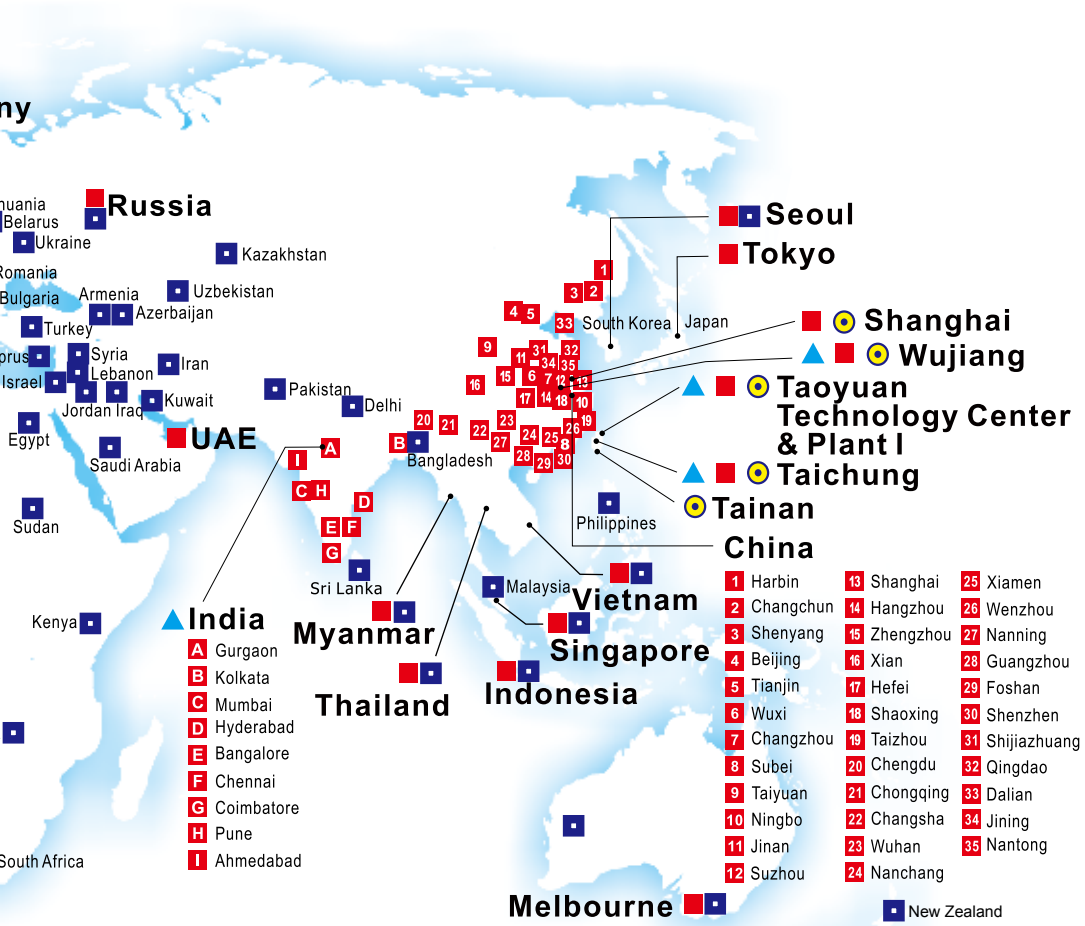

Smarter. Greener. Together.

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