Automation for a Changing World

Delta Sensorless Vector Control Compact Drive VFD-E Series

www.deltaww.com

DELTA

Smarter. Greener. Together.

Features

Modular Design

Modular structure and extension with optional cards

Standard MODBUS Protocol

Standard MODBUS protocol via RS-485

Built-in EMC Filter
(230V single-phase and 460V 3-phase)

Efficiently reduces electromagnetic interference

Compact Design

Space saving and easy DIN rail mounting with optional DIN rail adapter

Optional Fieldbus Modules

Provide connection to a variety of networks, including PROFIBUS, DeviceNet and CANopen

Flexible Extension

Via optional cards, such as I/O card, Relay card, PG (Encoder) card and USB card, to meet your application requirements

RFI Switch for IT Mains

Removable "Y" capacitor to use with IT mains supplies

Easy DC Bus Sharing

Multiple VFD-E units can be connected in parallel to share regenerative braking energy. It prevents over-voltage and stabilizes the DC bus voltage

Complete Protection Functions

High precision current detection, full overload protection (oL, oL1 and oL2), overvoltage/ overcurrent stall prevention, short circuit protection, reset after fault, speed search function and motor overheat protection by PTC

Removable Keypad

The standard keypad acts as a status monitor. More functions, including parameter modification, RUN/STOP, speed change, and status display, are available via an optional keypad

Built-in PLC Function

PLC programming and editing capability without the need of an actual PLC

Side-by-side Installation (40°C)

High-efficiency cooling and flexible spacing

Power Range

Single-phase115 V series: 0.2 ~ 0.75 kW (0.25 ~ 1 hp)
Single-phase 230 V series: 0.2 ~ 2.2 kW (0.25 ~ 3 hp)
3-phase 230 V series: 0.2 ~ 15 kW (0.25 ~ 20 hp)
3-phase 460 V series: 0.4 ~ 22 kW (0.50 ~ 30 hp)

Easy Maintenance

Removable cooling fan for easy maintenance

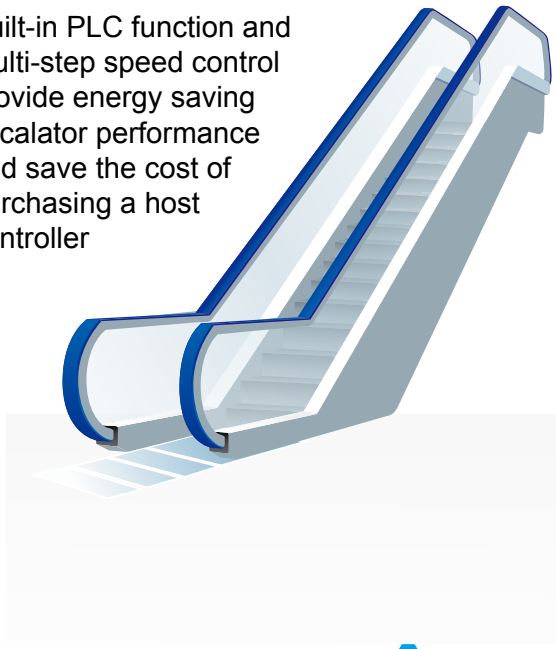
Applications

Vacuum compressor

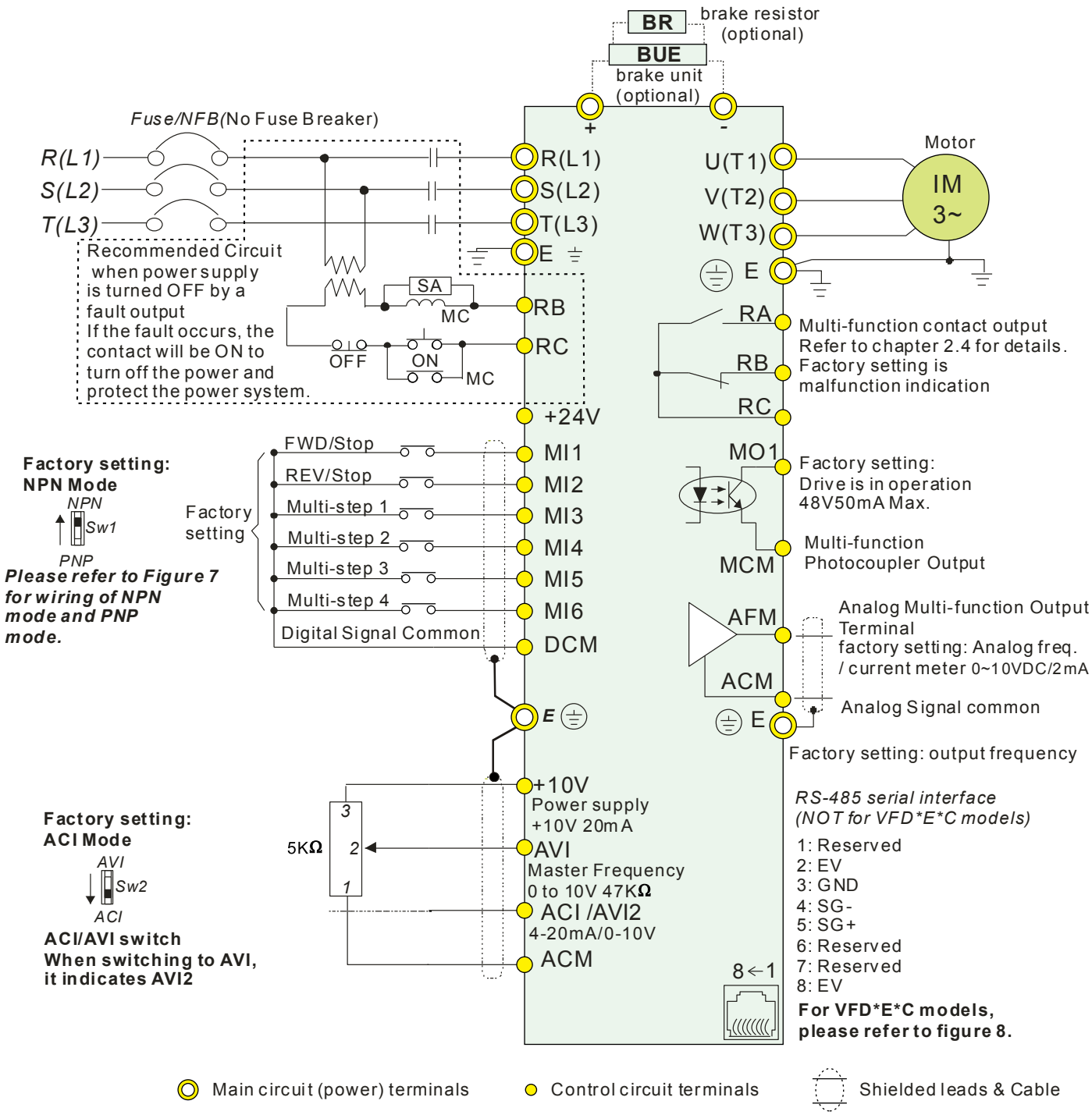
Outstanding overload capability of VFD-E reduces the impact of sudden load increase to the vacuum compressor

Escalator

Built-in PLC function and multi-step speed control provide energy saving escalator performance and save the cost of purchasing a host controller



Standard Wiring Diagram

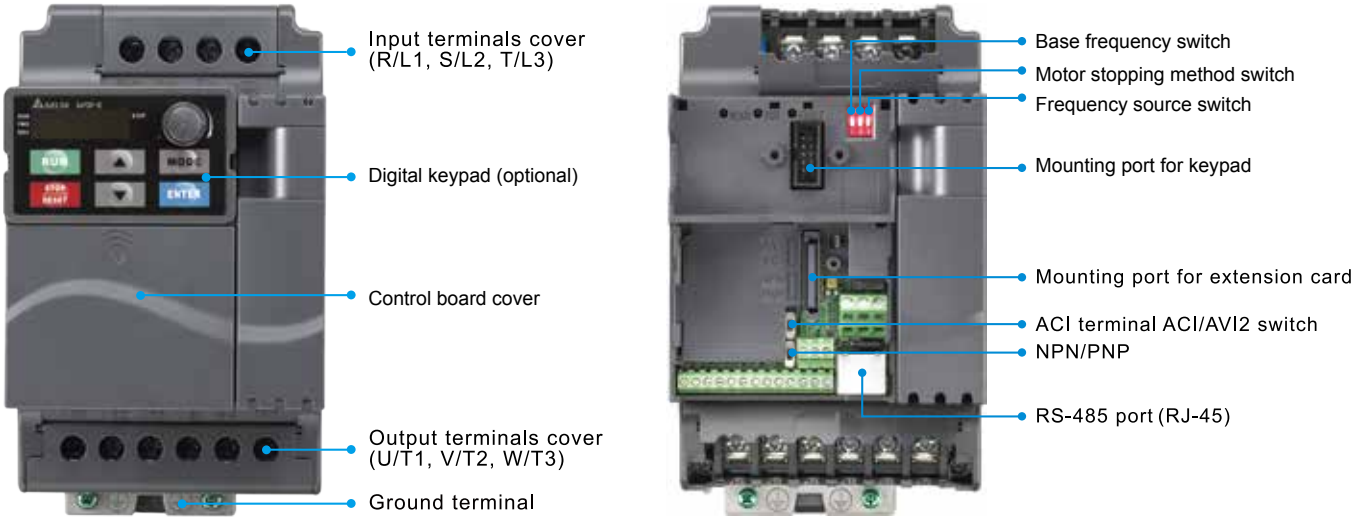


NOTE

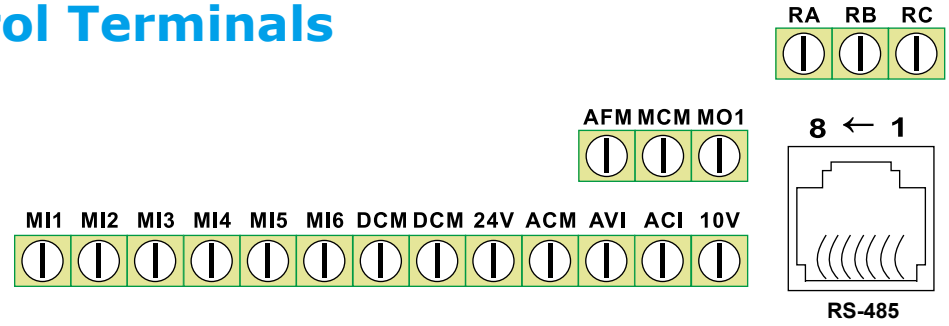
It is recommended to install a circuit breaker at the control terminal to protect the circuit from an operation abnormality or sudden power outage.

The protection circuit uses the multi-function output terminal of the AC motor drive for connection. When an abnormal condition (closed contact) occurs, the external power supply is disconnected to protect the power system of the AC motor drive.

External Parts



Control Terminals



Model Explanation

VFD 007 E 23 A

Product (Variable Frequency Drive)

E Series

Input Voltage

11: 115V Single-phase
21: 230V Single-phase
23: 230V 3-phase
43: 460V 3-phase

Version Type

A: Standard drive
C: CANopen
P: Cold plate drive (frame A only)
T: Frame A, built-in brake chopper

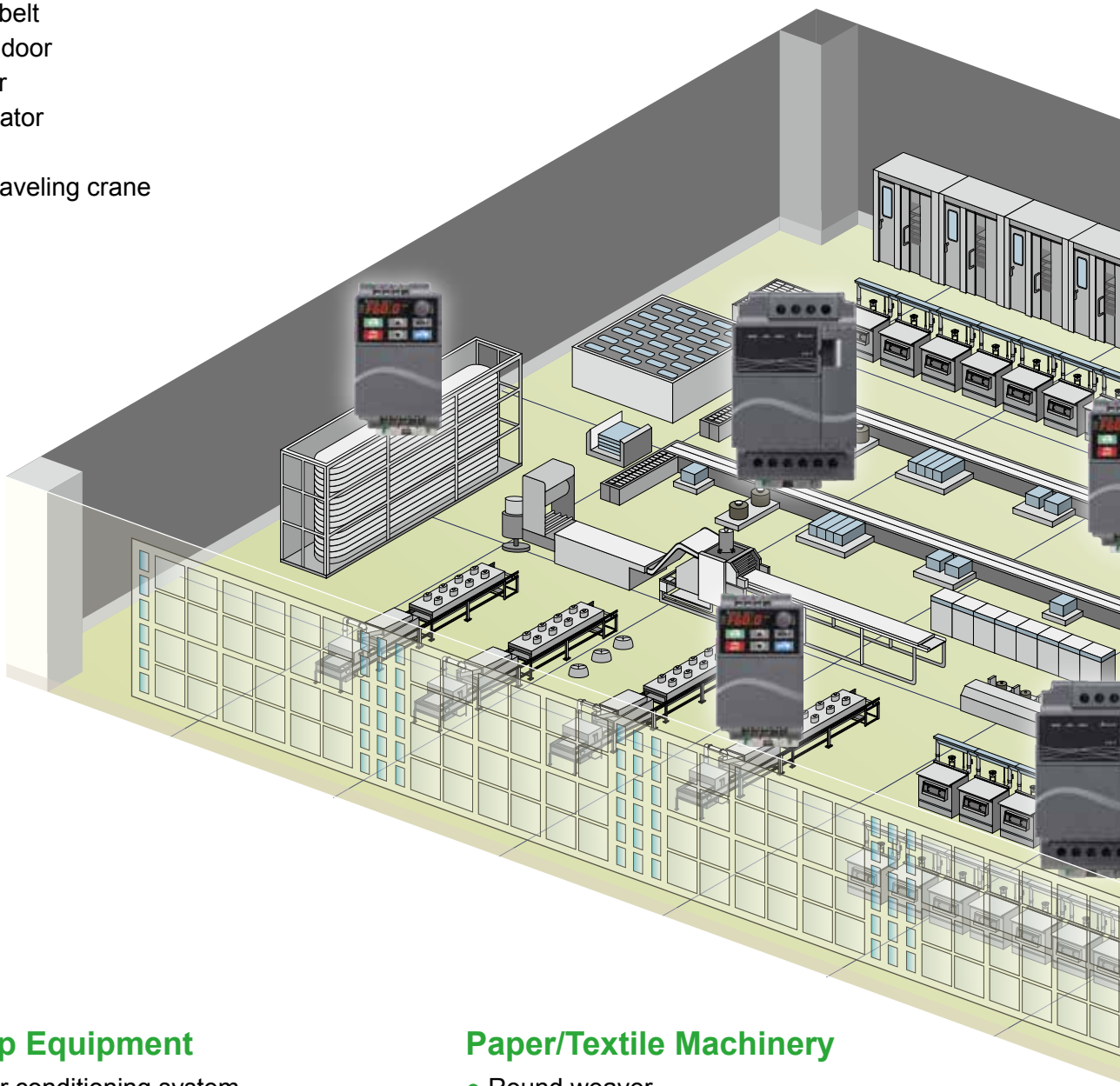
Applicable Motor Capacity

002: 0.25 HP(0.2 kW)
004: 0.5 HP(0.4 kW)
007: 1 HP(0.75 kW)
015: 2 HP(1.5 kW)
022: 3 HP(2.2 kW)
037: 5 HP(3.7 kW)
055: 7.5 HP(5.5 kW)
075: 10 HP(7.5 kW)
110: 15 HP(11 kW)
150: 20 HP(15 kW)
185: 25 HP(18.5 kW)
220: 30 HP(22 kW)

Application Fields

Conveyor and Transportation Machinery

- Conveyor belt
- Automatic door
- Roller door
- Small elevator
- Escalator
- X-Y axis traveling crane



Fan/Pump Equipment

- Building air conditioning system
- Wastewater processing system
- Constant pressure water treatment system
- Water treatment pump
- Agricultural pump
- Temperature control of mid and larger oven
- Air compressor
- Heat exchange fan
- Building water dispenser system
- Dryer's windmill

Paper/Textile Machinery

- Round weaver
- Cross weaver
- Ribbon weaver
- Printing press
- Industrial sewing machine
- Knitting machine

Food Processing

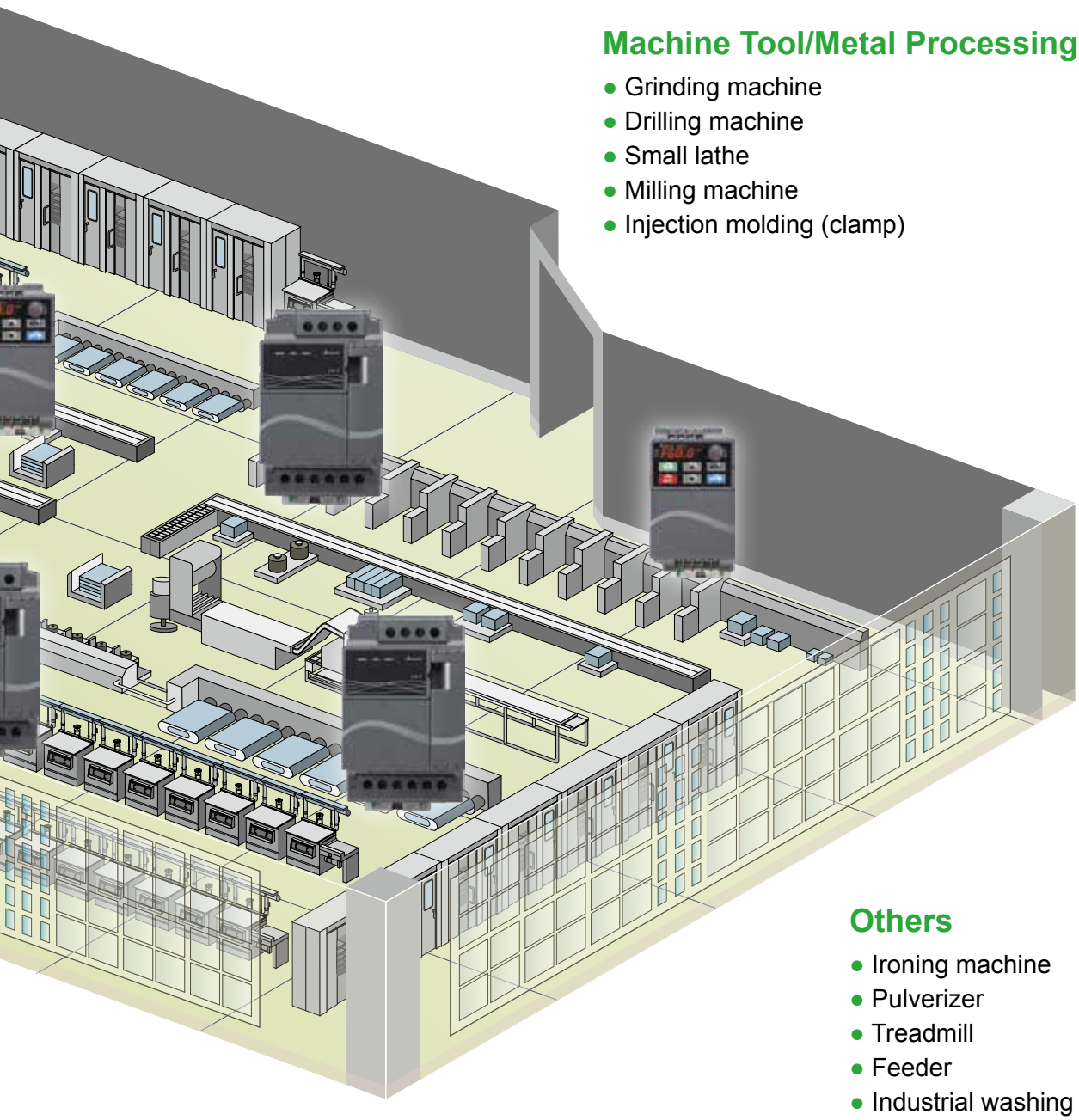
- Dumpling making machine
- Food mixer
- Noodle making machine

Wood Working Machinery

- 4 side planer
- Wood carving machine
- Woodworking machine
- Simple cutting machine for wood working
- Spraying machine

Machine Tool/Metal Processing Machinery

- Grinding machine
- Drilling machine
- Small lathe
- Milling machine
- Injection molding (clamp)



Others

- Ironing machine
- Pulverizer
- Treadmill
- Feeder
- Industrial washing machine
- Car washing machine
- Packing machine
- Centrifuge
- Liquid mixing machine

Specifications

115V	Voltage Class	115V		
	Model Number VFD-___ E	002	004	007
	Max. Applicable Motor Output (kW)	0.2	0.4	0.75
	Max. Applicable Motor Output (hp)	0.25	0.5	1.0
Output Rating	Rated Output Capacity (kVA)	0.6	1.0	1.6
	Rated Output Current (A)	1.6	2.5	4.2
	Maximum Output Voltage (V)	3-phase proportional to twice the input voltage		
	Output Frequency (Hz)	0.1~599Hz		
	Carrier Frequency (kHz)	1-15		
Input Rating	Rated Input Current (A)	Single-phase		
		6	9	18
	Rated Voltage/Frequency	Single-phase 100-120V, 50/60Hz		
	Voltage Tolerance	±10% (90-132V)		
	Frequency Tolerance	±5% (47-63Hz)		
	Cooling Method	Natural cooling		Fan cooling
	Weight (kg)	1.2	1.2	1.2

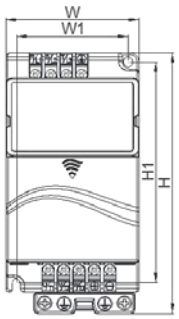
230V	Voltage Class	230V								
	Model Number VFD-___ E	002	004	007	015	022	037	055	075	110	150
	Max. Applicable Motor Output (kW)	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
	Max. Applicable Motor Output (hp)	0.25	0.5	1.0	2.0	3.0	5.0	7.5	10	15	20
Output Rating	Rated Output Capacity (kVA)	0.6	1.0	1.6	2.9	4.2	6.5	9.5	12.5	17.1	25
	Rated Output Current (A)	1.6	2.5	4.2	7.5	11	17	25	33	45	65
	Maximum Output Voltage (V)	3-phase proportional to twice the input voltage									
	Output Frequency (Hz)	0.1~599Hz									
	Carrier Frequency (kHz)	1-15									
Input Rating	Rated Input Current (A)	Single/3-phase					3-phase				
		4.9/1.9	6.5/2.7	9.7/5.1	15.7/9	24/15	20.6	26	34	48	70
	Rated Voltage/Frequency	Single/3-phase, 200-240V, 50/60Hz					3-phase, 200-240V, 50/60Hz				
	Voltage Tolerance	±10% (180-264V)									
	Frequency Tolerance	±5% (47-63Hz)									
	Cooling Method	Natural cooling			Fan cooling						
	Weight (kg)	1.1	1.1	1.1	1.9	1.9	1.9	3.5	3.5	3.57	6.6

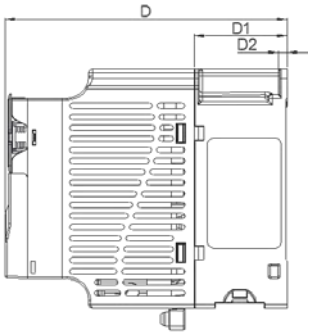
460V	Voltage Class	460V										
	Model Number VFD-___ E	004	007	015	022	037	055	075	110	150	185	220
	Max. Applicable Motor Output (kW)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22
	Max. Applicable Motor Output (hp)	0.5	1.0	2.0	3.0	5.0	7.5	10	15	20	25	30
Output Rating	Rated Output Capacity (kVA)	1.2	2.0	3.3	4.4	6.8	9.9	13.7	18.3	24	29	34
	Rated Output Current (A)	1.5	2.5	4.2	5.5	8.5	13	18	24	32	38	45
	Maximum Output Voltage (V)	3-phase proportional to input voltage										
	Output Frequency (Hz)	0.1~599Hz										
	Carrier Frequency (kHz)	1-15										
Input Rating	Rated Input Current (A)	3-phase										
		1.9	3.2	4.3	7.1	11.2	14	19	26	35	41	49
	Rated Voltage/Frequency	3-phase, 380-480V, 50/60Hz										
	Voltage Tolerance	±10% (342-528V)										
	Frequency Tolerance	±5% (47-63Hz)										
	Cooling Method	Natural cooling	Fan cooling									
	Weight (kg)	1.2	1.2	1.2	1.9	1.9	4.2	4.2	4.2	7.47	7.47	7.47

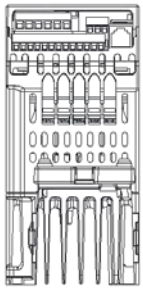
Control Characteristics	Control System		SPWM (Sinusoidal Pulse Width Modulation) Control (V/F or sensorless vector control)
	Frequency Setting Resolution		0.01 Hz
	Output Frequency Resolution		0.01 Hz
	Torque Characteristics		Including the auto-torque/auto-slip compensation; starting torque can be 150% at 3.0 Hz
	Overload Endurance		150% of rated current for 1 minute
	Skip Frequency		Three zones, setting range 0.1 ~ 599 Hz
	Accel/Decel Time		0.1 to 600 seconds (2 Independent setting of Accel/Decel time)
	Stall Prevention Level		Setting 20 to 250% of rated current
	DC Braking		Operation frequency 0.1 ~ 599.0 Hz, output 0~100% rated current Start time 0~60 seconds, stop time 0~60 seconds
	Regenerated Braking Torque		Approx. 20% (up to 125% possible with optional brake resistor or externally mounted brake unit, 1-15hp models (built-in brake chopper))
	V/F Pattem		Adjustable V/F pattern
Operating Characteristics	Frequency Setting	Keypad	Setting by ▲▼
		External Signal	Potentiometer 5 kΩ / 0.5 W, 0 to +10 V_{DC}, 4 to 20 mA,RS-485 interface; Multi-function Inputs 3 to 9 (15 steps, Jog, up/down)
	Operation Setting Signal	Keypad	Set by RUN and STOP
		External Signal	2 wires / 3 wires (MI1, MI2, MI3), JOG operation, RS-485 serial interface (MODBUS), programmable logic controller
	Multi-function Input Signal		Multi-step selection 0 to 15, Jog, accel/decel inhibit, 2 accel/decel switches, counter, external Base Block (NC, NO), auxiliary motor control is invalid, ACI / AVI / AUI selections, driver reset, UP/DOWN key settings, sink/source (=NPN / PNP) selection
	Multi-function Output Indication		AC drive operating, frequency attained, non-zero frequency, Base Block, fault indication, local/remote indication, auxiliary motor output, drive is ready, overheat alarm, emergency stop and status selections of input terminals (NC / NO)
	Analog Output Signal		Output frequency/current
	Alarm Output Contact		Contact will be On when drive malfunctions (1 Form C/change-over contact or 1 open collector output)
	Operation Functions		Built-in PLC, AVR, accel / decel S-Curve, over-voltage / over-current stall prevention, 5 fault records, reverse inhibition, momentary power loss restart, DC braking, auto torque/slip compensation, auto tuning, adjustable carrier frequency, output frequency limits, parameter lock/reset, vector control, PID control, external counter, MODBUS communication, abnormal reset, abnormal re-start, power-saving, sleep/wake function, fan control, 1st / 2nd frequency source selections, 1st / 2nd frequency source combination, NPN / PNP selection
	Protection Functions		Over voltage, over current, under voltage, under current, external fault, overload, ground fault, overheating, electronic thermal, IGBT short circuit, PTC, instantly stop and then reboot (up to 20 sec by setting parameter)
	Display Keypad		6-key, 7-segment LED with 4-digit, 5 status LED, master frequency, output frequency, output current, custom units, parameter values for setup and lock, faults, RUN, STOP, RESET, FWD / REV
	Built-in EMC Filter		For 230 V 1-phase and 460 V 3-phase models
Environmental Conditions	Enclosure Rating		IP20
	Pollution Degree		2
	Installation Location		Altitude 1,000 m or lower, keep from corrosive gasses, liquid and dust
	Ambient Temperature		-10 °C to + 50 °C (40 °C for side-by-side mounting) Non-Condensing and not frozen
	Storage/Transportation Temperature		-20 °C to 60 °C
	Ambient Humidity		Below 90% RH (non-condensing)
	Vibration		10 Hz≤ f≤ 57 Hz Fix Amplitude: 0.075 mm, 57 Hz≤ f≤ 150 Hz Fix Acceleration: 1 G (According to IEC 60068-2-6)
	Certifications		

Dimensions

Frame A1







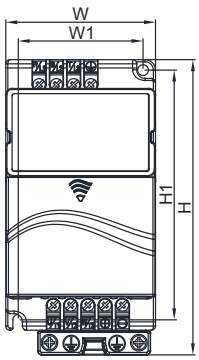
MODEL

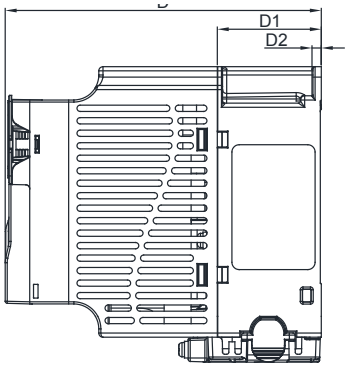
VFD002E11A/11C/11T
VFD002E21A/21C/21T
VFD002E23A/23C/23T
VFD004E11A/11C/11T
VFD004E21A/21C/21T
VFD004E23A/23C/23T
VFD004E43A/43C/43T
VFD007E23A/23C/23T
VFD007E43A/43C/43T

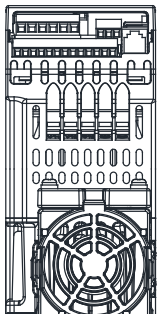
Unit: mm[inch]

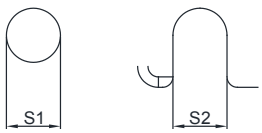
Frame		W	W1	H	H1	D	D1	D2	S1	S2
A1	mm	72.0	60.0	142.0	120.0	152.0	50.0	4.5	5.2	5.2
	inch	2.83	2.36	5.59	4.72	5.98	1.97	0.18	0.20	0.20

Frame A2









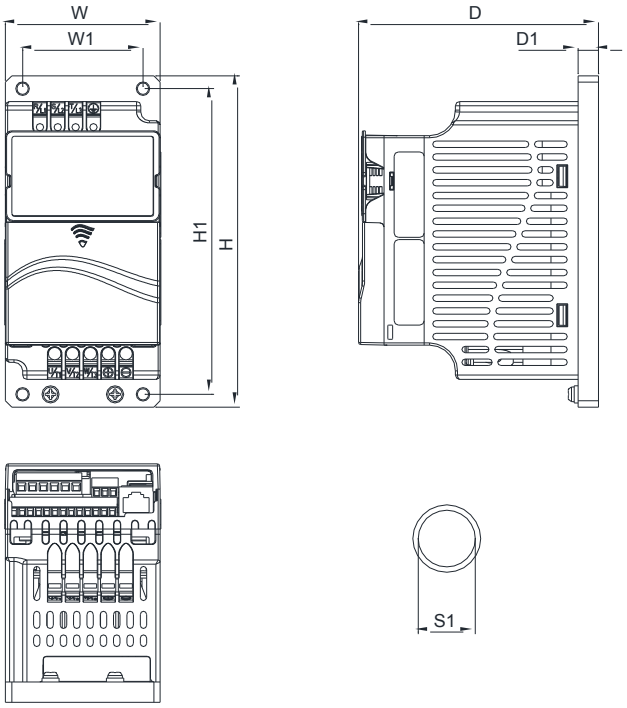
MODEL

VFD015E23A/23C/23T
VFD015E43A/43C/43T

Unit: mm[inch]

Frame		W	W1	H	H1	D	D1	D2	S1	S2
A2	mm	72.0	60.0	142.0	120.0	152.0	50.0	4.5	5.2	5.2
	inch	2.83	2.36	5.59	4.72	5.98	1.97	0.18	0.20	0.20

Frame A3



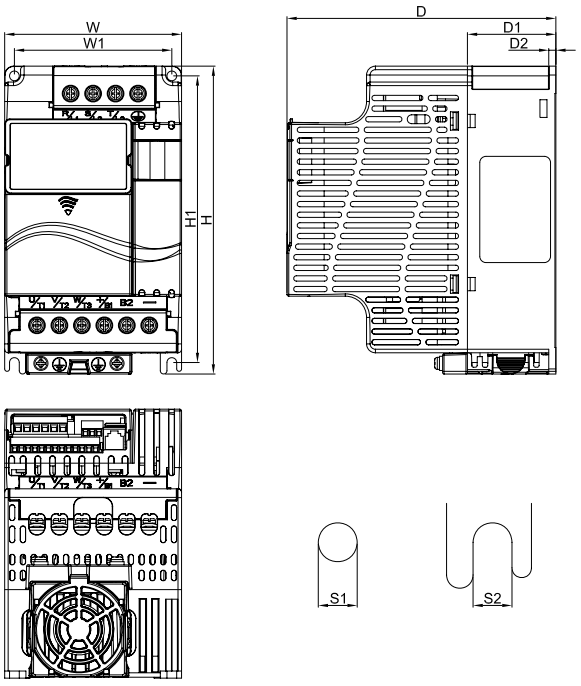
MODEL

VFD002E11P/21P/23P
VFD004E11P/21P/23P/43P
VFD007E21P/23P/43P
VFD015E23P/43P

Unit: mm[inch]

Frame		W	W1	H	H1	D	D1	S1
A3	mm	72.0	56.0	155.0	143.0	111.5	9.5	5.3
	inch	2.83	2.20	6.10	5.63	4.39	0.37	0.21

Frame B



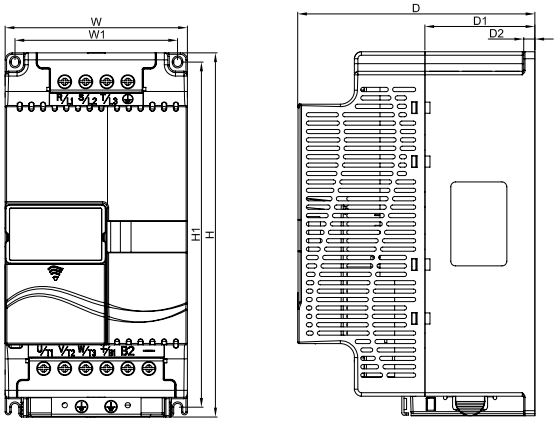
MODEL

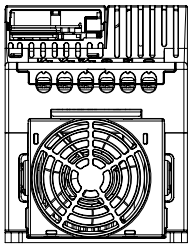
VFD007E11A/11C
VFD015E21A/21C
VFD022E21A/21C
VFD022E23A/23C
VFD022E43A/43C
VFD037E23A/23C
VFD037E43A/43C

Unit: mm[inch]

Frame		W	H	D	W1	H1	D1	D2	S1	S2
B	mm	100.0	174.0	152.0	89.0	162.0	50.0	4.0	5.5	5.5
	inch	3.94	6.86	5.98	3.50	6.86	1.97	0.16	0.22	0.22

Frame C





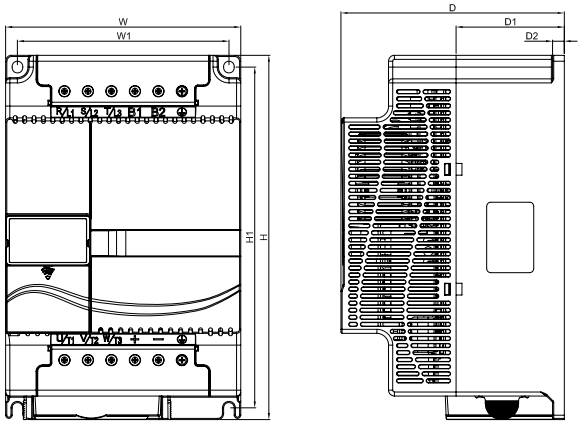
MODEL

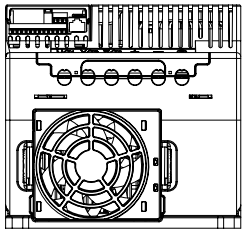
VFD055E23A/23C
VFD055E43A/43C
VFD075E23A/23C
VFD075E43A/43C
VFD110E23A/23C
VFD110E43A/43C

Unit: mm[inch]

Frame		W	H	D	W1	H1	D1	D2	S1	S2
C	mm	130.0	260.0	169.2	116.0	246.5	78.5	8.0	6.5	5.5
	inch	5.12	10.24	6.66	4.57	9.70	3.09	0.31	0.26	0.22

Frame D





MODEL

VFD150E23A/23C
VFD150E43A/43C
VFD185E43A/43C
VFD220E43A/43C

Unit: mm[inch]

Frame		W	H	D	W1	H1	D1	D2	S1	S2
D	mm	200.0	310.0	190.0	180.0	290.0	92.0	10.0	10.0	9.0
	inch	7.87	12.20	7.48	7.09	11.42	3.62	0.39	0.39	0.35

Accessories

Option Cards

- **EME-R3AA**
  Relay card
  (3 form A/ NO contacts)

- **EME-R2CA**
  Relay card
  (2 form C/Change-over contacts)

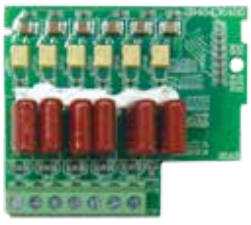
- **EME-A1D3A**
  Anglog I/O Card (12 bits)

- **EME-A22A**
  Anglog I/O Card (12 bits)

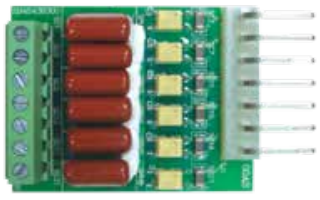
- **EME-PG01**
  PG card

- **CME-USB01**
  Second communication card
  (USB1.1)

- **EME-D33A**
  I/O card
  (photocoupler 3in + 3out)



- **EME-D611A**
  Multi-function Input
  Terminal MI1~MI6-COM Card
  (For Internal Installation)



- **EME-D611B**
  Multi-function Input Terminal
  MI1~MI6-COM Card
  (For External Installation)

Accessories

Fieldbus Modules

- **DeviceNet**
  CME-DN01

- **PROFIBUS**
  CME-PD01

- **CANopen**
  CME-COP01

Others

- **Brake Unit**
  BUE-20015 BUE-40015
  BUE-20037 BUE-40037

- **Keypad for Communication**
  VFD-PU06 / KPC-CC01

- **DIN Rail (Width 35mm)**
  MKE-DRA MKE-DRB

- **Brake Resistor**

- **Zero Phase Reactor**
  RF220X00A

- **Grounding Plate**
  MKE-EP

- **Digital Keypad**

Ordering Information

VFD-E Series

Frame Size		Power Range	Models
Frame A1~A3		115V: 0.2kW ~ 0.4kW 230V: 0.2kW ~ 1.5kW 460V: 0.4kW ~ 1.5kW	Frame A1: VFD002E11A/11C/11T VFD002E21A/21C/21T VFD002E23A/23C/23T VFD004E11A/11C/11T VFD004E21A/21C/21T VFD004E23A/23C/23T VFD004E43A/43C/43T VFD007E23A/23C/23T VFD007E43A/43C/43T
			Frame A2: VFD015E23A/23C/23T VFD015E43A/43C/43T
			Frame A3: VFD002E11P/21P/23P VFD004E11P/21P/23P/43P VFD007E21P/23P/43P VFD015E23P/43P
Frame B		115V: 0.75kW 230V: 1.5kW ~ 3.7kW 460V: 2.2kW ~ 3.7kW	VFD007E11A/11C VFD015E21A/21C VFD022E21A/21C VFD022E23A/23C VFD022E43A/43C VFD037E23A/23C VFD037E43A/43C
Frame C		230V: 5.5kW ~ 11kW 460V: 5.5kW ~ 11kW	VFD055E23A/23C VFD055E43A/43C VFD075E23A/23C VFD075E43A/43C VFD110E23A/23C VFD110E43A/43C
Frame D		230V: 15kW 460V: 15kW ~ 22kW	VFD150E23A/23C VFD150E43A/43C VFD185E43A/43C VFD220E43A/43C

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