Automation for a Changing World

**Delta Sensorless Vector Control Compact Drive VFD-E Series**

[Image of Delta Sensorless Vector Control Compact Drive VFD-E Series]

[Website Link: www.deltaww.com]
Features

- **Modular Design**
  Modular structure and extension with optional cards

- **Standard MODBUS Protocol**
  Standard MODBUS protocol via RS-485

- **RFI Switch for IT Mains**
  Removable "Y" capacitor to use with IT mains supplies

- **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

- **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

- **Optional Fieldbus Modules**
  Provide connection to a variety of networks, including PROFIBUS, DeviceNet and CANopen

- **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

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

- **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-phase 115 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.
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

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

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

E Series

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

Product (Variable Frequency Drive)
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

<table>
<thead>
<tr>
<th>Voltage Class</th>
<th>115V</th>
<th>230V</th>
<th>460V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Number VFD-__ E</td>
<td>002 004 007</td>
<td>002 004 007 015 022 037 055 075 110 150</td>
<td>004 007 015 022 037 055 075 110 150 185 220</td>
</tr>
<tr>
<td>Max. Applicable Motor Output (kW)</td>
<td>0.2 0.4 0.75</td>
<td>0.2 0.4 0.75 1.5 2.2 3.7 5.5 7.5 11 15</td>
<td>0.4 0.75 1.5 2.2 3.7 5.5 7.5 11 15 18.5 22</td>
</tr>
<tr>
<td>Max. Applicable Motor Output (hp)</td>
<td>0.25 0.5 1.0</td>
<td>0.25 0.5 1.0 2.0 3.0 5.0 7.5 10 15 20</td>
<td>0.5 1.0 2.0 3.0 5.0 7.5 10 15 20 25 30</td>
</tr>
<tr>
<td>Rated Output Capacity (kVA)</td>
<td>0.6 1.0 1.6</td>
<td>0.6 1.0 1.6 2.9 4.2 6.5 9.5 12.5 17.1 25</td>
<td>1.2 2.5 4.2 7.5 11 17 25 33 45 65 70</td>
</tr>
<tr>
<td>Maximum Output Voltage (V)</td>
<td>3-phase proportional to twice the input voltage</td>
<td>3-phase proportional to twice the input voltage</td>
<td>3-phase proportional to input voltage</td>
</tr>
<tr>
<td>Output Frequency (Hz)</td>
<td></td>
<td></td>
<td>0.1 ~ 599 Hz</td>
</tr>
<tr>
<td>Carrier Frequency (kHz)</td>
<td></td>
<td></td>
<td>1 - 15</td>
</tr>
<tr>
<td>Rated Input Current (A)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated Voltage/Frequency</td>
<td></td>
<td></td>
<td>3-phase, 200-240V, 50/60Hz</td>
</tr>
<tr>
<td>Voltage Tolerance</td>
<td>±10% (90-132V)</td>
<td>±5% (47-63Hz)</td>
<td>±10% (180-264V)</td>
</tr>
<tr>
<td>Frequency Tolerance</td>
<td>±5% (47-63Hz)</td>
<td></td>
<td>±5% (47-63Hz)</td>
</tr>
<tr>
<td>Cooling Method</td>
<td>Natural cooling</td>
<td>Natural cooling</td>
<td>Natural cooling</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>1.2 1.2 1.2</td>
<td>1.1 1.1 1.1</td>
<td>1.2 1.2 1.2</td>
</tr>
</tbody>
</table>

### Output Rating

<table>
<thead>
<tr>
<th>Output Rating</th>
<th>Input Rating</th>
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<tbody>
<tr>
<td>Voltage Class</td>
<td>115V</td>
</tr>
<tr>
<td>Model Number VFD-__ E</td>
<td>002 004 007</td>
</tr>
<tr>
<td>Max. Applicable Motor Output (kW)</td>
<td>0.2 0.4 0.75</td>
</tr>
<tr>
<td>Max. Applicable Motor Output (hp)</td>
<td>0.25 0.5 1.0</td>
</tr>
<tr>
<td>Rated Output Capacity (kVA)</td>
<td>0.6 1.0 1.6</td>
</tr>
<tr>
<td>Maximum Output Voltage (V)</td>
<td>3-phase proportional to twice the input voltage</td>
</tr>
<tr>
<td>Output Frequency (Hz)</td>
<td></td>
</tr>
<tr>
<td>Carrier Frequency (kHz)</td>
<td></td>
</tr>
<tr>
<td>Rated Input Current (A)</td>
<td></td>
</tr>
<tr>
<td>Rated Voltage/Frequency</td>
<td></td>
</tr>
<tr>
<td>Voltage Tolerance</td>
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</tr>
<tr>
<td>Frequency Tolerance</td>
<td></td>
</tr>
<tr>
<td>Cooling Method</td>
<td>Natural cooling</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>1.2 1.2 1.2</td>
</tr>
<tr>
<td>Control Characteristics</td>
<td>SPWM (Sinusoidal Pulse Width Modulation) Control (V/F or sensorless vector control)</td>
</tr>
<tr>
<td>-------------------------</td>
<td>---------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Frequency Setting Resolution</td>
<td>0.01Hz</td>
</tr>
<tr>
<td>Output Frequency Resolution</td>
<td>0.01Hz</td>
</tr>
<tr>
<td>Torque Characteristics</td>
<td>Including the auto-torque/auto-slip compensation; starting torque can be 150% at 3.0Hz</td>
</tr>
<tr>
<td>Overload Endurance</td>
<td>150% of rated current for 1 minute</td>
</tr>
<tr>
<td>Skip Frequency</td>
<td>Three zones, setting range 0.1~599 Hz</td>
</tr>
<tr>
<td>Accel/Decel Time</td>
<td>0.1 to 600 seconds (2 Independent setting of Accel/Decel time)</td>
</tr>
<tr>
<td>Stall Prevention Level</td>
<td>Setting 20 to 250% of rated current</td>
</tr>
<tr>
<td>DC Braking</td>
<td>Operation frequency 0.1<del>599.0 Hz, output 0</del>100% rated current Start time 0<del>60 seconds, stop time 0</del>60 seconds</td>
</tr>
<tr>
<td>Regenerated Braking Torque</td>
<td>Approx. 20% (up to 125% possible with optional brake resistor or externally mounted brake unit, 1-15hp models (built-in brake chopper)) Adjustable V/F pattern</td>
</tr>
<tr>
<td>V/F Pattern</td>
<td>Setting by ▲▼ Potentiometer 5 kΩ/0.5 W, 0 to +10Vdc, 4 to 20mA, RS-485 interface; Multi-function Inputs 3 to 9 (15 steps, Jog, up/down)</td>
</tr>
<tr>
<td>Operating Characteristics</td>
<td>Set by RUN and STOP 2 wires/3 wires (MI1, MI2, MI3), JOG operation, RS-485 serial interface (MODBUS), programmable logic controller</td>
</tr>
<tr>
<td>Multi-function Input Signal</td>
<td>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</td>
</tr>
<tr>
<td>Multi-function Output Indication</td>
<td>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)</td>
</tr>
<tr>
<td>Analog Output Signal</td>
<td>Output frequency/current Contact will be On when drive malfunctions (1 Form C/change-over contact or 1 open collector output)</td>
</tr>
<tr>
<td>Operation Functions</td>
<td>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</td>
</tr>
<tr>
<td>Protection Functions</td>
<td>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)</td>
</tr>
<tr>
<td>Display Keypad</td>
<td>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</td>
</tr>
<tr>
<td>Built-in EMC Filter</td>
<td>For 230V 1-phase and 460V 3-phase models</td>
</tr>
<tr>
<td>Enclosure Rating</td>
<td>IP20</td>
</tr>
<tr>
<td>Pollution Degree</td>
<td>2</td>
</tr>
<tr>
<td>Installation Location</td>
<td>Altitude 1,000 m or lower, keep from corrosive gasses, liquid and dust</td>
</tr>
<tr>
<td>Ambient Temperature</td>
<td>-10°C to + 50°C (40°C for side-by-side mounting) Non-Condensing and not frozen</td>
</tr>
<tr>
<td>Storage/Transportation Temperature</td>
<td>-20°C to 60°C</td>
</tr>
<tr>
<td>Ambient Humidity</td>
<td>Below 90% RH (non-condensing)</td>
</tr>
<tr>
<td>Vibration</td>
<td>10 Hz ±5 Hz ±0.075 mm ±0.075 Hz ±150 Hz ±1G (According to IEC 60068-2-6)</td>
</tr>
<tr>
<td>Certifications</td>
<td>[Certification Logos]</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Frame</th>
<th>W</th>
<th>W1</th>
<th>H</th>
<th>H1</th>
<th>D</th>
<th>D1</th>
<th>D2</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>mm</td>
<td>72.0</td>
<td>60.0</td>
<td>142.0</td>
<td>120.0</td>
<td>152.0</td>
<td>50.0</td>
<td>4.5</td>
<td>5.2</td>
</tr>
<tr>
<td></td>
<td>inch</td>
<td>2.83</td>
<td>2.36</td>
<td>5.59</td>
<td>4.72</td>
<td>5.98</td>
<td>1.97</td>
<td>0.18</td>
<td>0.20</td>
</tr>
</tbody>
</table>

Frame A2

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

<table>
<thead>
<tr>
<th>Frame</th>
<th>W</th>
<th>W1</th>
<th>H</th>
<th>H1</th>
<th>D</th>
<th>D1</th>
<th>D2</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2</td>
<td>mm</td>
<td>72.0</td>
<td>60.0</td>
<td>142.0</td>
<td>120.0</td>
<td>152.0</td>
<td>50.0</td>
<td>4.5</td>
<td>5.2</td>
</tr>
<tr>
<td></td>
<td>inch</td>
<td>2.83</td>
<td>2.36</td>
<td>5.59</td>
<td>4.72</td>
<td>5.98</td>
<td>1.97</td>
<td>0.18</td>
<td>0.20</td>
</tr>
</tbody>
</table>
Frame A3

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

<table>
<thead>
<tr>
<th>Frame</th>
<th>W</th>
<th>W1</th>
<th>H</th>
<th>H1</th>
<th>D</th>
<th>D1</th>
<th>S1</th>
</tr>
</thead>
<tbody>
<tr>
<td>A3</td>
<td>mm</td>
<td>72.0</td>
<td>56.0</td>
<td>155.0</td>
<td>143.0</td>
<td>111.5</td>
<td>9.5</td>
</tr>
<tr>
<td></td>
<td>inch</td>
<td>2.83</td>
<td>2.20</td>
<td>6.10</td>
<td>5.63</td>
<td>4.39</td>
<td>0.37</td>
</tr>
</tbody>
</table>

Frame B

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

<table>
<thead>
<tr>
<th>Frame</th>
<th>W</th>
<th>H</th>
<th>D</th>
<th>W1</th>
<th>H1</th>
<th>D1</th>
<th>D2</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>mm</td>
<td>100.0</td>
<td>174.0</td>
<td>152.0</td>
<td>89.0</td>
<td>162.0</td>
<td>50.0</td>
<td>4.0</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td>inch</td>
<td>3.94</td>
<td>6.86</td>
<td>5.98</td>
<td>3.50</td>
<td>6.86</td>
<td>1.97</td>
<td>0.16</td>
<td>0.22</td>
</tr>
</tbody>
</table>
Accessories

Option Cards

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

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

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

▪ **EME-PG01**
  PG card

▪ **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)

▪ **CME-USB01**
  Second communication card
  (USB1.1)
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**
  RF220X00A

- **Zero Phase Reactor**

- **Grounding Plate**
  MKE-EP

- **Digital Keypad**
# Ordering Information

## VFD-E Series

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>Power Range</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frame A1~A3</strong></td>
<td>115 V: 0.2 kW ~ 0.4 kW 230 V: 0.2 kW ~ 1.5 kW 460 V: 0.4 kW ~ 1.5 kW</td>
<td>Frame A1: VFD002E11A/11C/11T VFD002E21A/21C/21T VFD002E23A/23C/23T VFD004E11A/11C/11T VFD004E21A/21C/21T</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Frame A2: VFD015E23A/23C/23T VFD015E43A/43C/43T</td>
</tr>
<tr>
<td><strong>Frame B</strong></td>
<td>115 V: 0.75 kW 230 V: 1.5 kW ~ 3.7 kW 460 V: 2.2 kW ~ 3.7 kW</td>
<td>VFD007E11A/11C VFD015E21A/21C VFD022E21A/21C VFD022E23A/23C VFD022E43A/43C VFD037E23A/23C VFD037E43A/43C</td>
</tr>
<tr>
<td><strong>Frame C</strong></td>
<td>230 V: 5.5 kW ~ 11 kW 460 V: 5.5 kW ~ 11 kW</td>
<td>VFD055E23A/23C VFD055E43A/43C VFD075E23A/23C VFD075E43A/43C VFD110E23A/23C VFD110E43A/43C</td>
</tr>
<tr>
<td><strong>Frame D</strong></td>
<td>230 V: 15 kW 460 V: 15 kW ~ 22 kW</td>
<td>VFD150E23A/23C VFD150E43A/43C VFD185E43A/43C VFD220E43A/43C</td>
</tr>
</tbody>
</table>
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Taiwan: Delta Electronics, Inc.
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