

# Flexible, simple, economical, robust.



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## SMVector Drives

.33...60 Hp

.25...45 kW

The SMV range of IP31 (NEMA 1) and IP65 (NEMA 4/NEMA 4X) inverter drives offer sophisticated auto-tuning, fast dynamic torque response with impressive low-speed operation all from a compact and simple to use package.

The SMV range is designed for motor applications where dynamic speed and torque control is demanded, making the units ideal for conveyors, food production lines, packaging equipment plus fan & pump systems.

## Features and Benefits

The SMVector continues our price leadership tradition in the highly competitive AC drive market. With the benefit of a two year warranty, its performance and flexibility make it an attractive solution for a broad range of applications including:

- Food processing machinery
- Packaging machinery
- Material handling/conveying systems
- HVAC systems

The SMVector makes good its promise of price leadership in delivering unparalleled performance and simplicity. The SMVector is the right choice when you need it all – performance, power, packaging and intuitive programming.

# SMVector

## Features and Benefits

### Superior Performance

- Modes of Operation:
  - V/Hz (Constant and Variable)
  - Enhanced V/Hz (Constant and Variable)
  - Vector Speed Control with 60:1 Speed Range
  - Vector Torque Control
- Dynamic Torque Response
- Sophisticated Auto-tuning (Motor Calibration)
- Impressive Low Speed Operation
- Sequencer with 16 Programmable segments, Delayed start/stop, Over 65K repeat cycles

### Flexible Power Ranges

International Voltages:

- 120/240V, 1 $\Phi$  (up to 1.5 Hp)
- 200/240V, 1/3 $\Phi$  (up to 3 Hp)
- 200/240V, 3 $\Phi$  (up to 20 Hp)
- 400/480V, 3 $\Phi$  (up to 60 Hp)
- 480/600V, 3 $\Phi$  (up to 60 Hp)

### Industrial Grade Packaging

- NEMA Type 1 (IP31) Enclosure
- NEMA 4X (IP65) Indoor Only
- NEMA 4X (IP65) Indoor/Outdoor

### Simplicity

- Intuitive User Interface
- Electronic Memory Module (EPM)
- Optional Disconnect Switch (NEMA 4X only)
- Optional Potentiometer Switch (NEMA 4X only)
- Optional EMC Filter (NEMA 4X)
- Dynamic Brake Modules
- Remote Keypad
- Additional I/O

### EPM is your Ever Present Memory

When you need to program or replace a drive, whether it is 1 or 100 drives, the Electronic Programming Module (EPM) gets it done simply, quickly and most important, accurately. There is no hassle of reconfiguring each parameter or resetting the drive to factory or user default settings.

When drive reset is necessary, reset to factory default or customer settings in seconds with the EPM. When the EPM equipped drive is used on a line containing multiple drives with the identical setup, it takes just minutes to program the entire line. And EPMs can be replaced with or without power connected. When a drive must be replaced, the parameter configuration is not lost, simply plug in the pre-programmed EPM. You are good to go with Ever Present Memory.



SMV NEMA 4X (IP65)



SMV NEMA 1 (IP31)



Filter

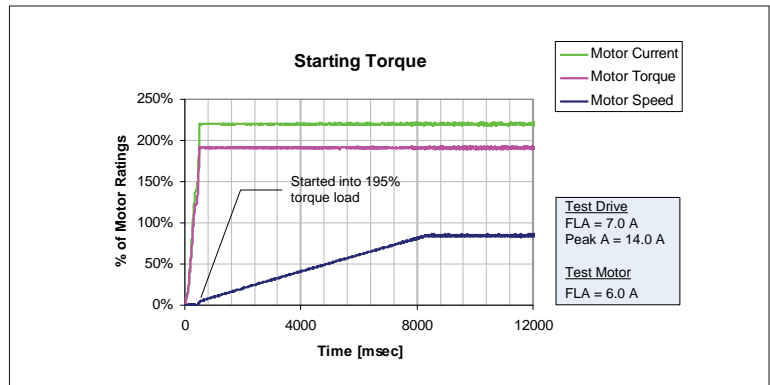
# SMVector

Performance

## Exceptional Starting Torque

### Overpower demanding applications

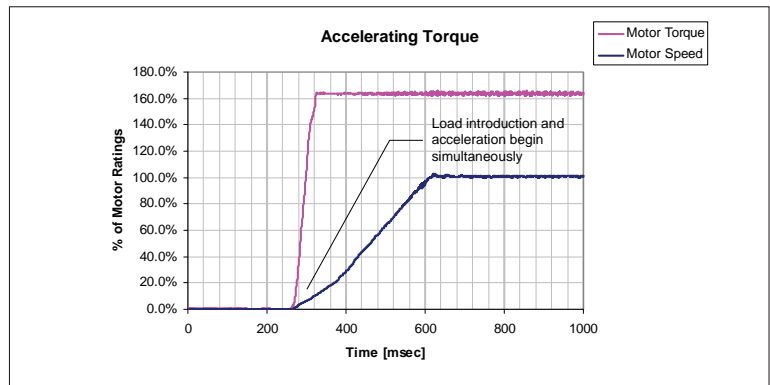
The SMVector is peerless in controlling the motor's ability to convert current into torque. In this example, the SMVector is started into a stiff 195% torque load. Not only does the motor start the load, but it also delivers a full 195% torque while accelerating to 50 Hz in 8 seconds.



## Quick Acceleration

### 0 to 100 in 0.33 seconds!

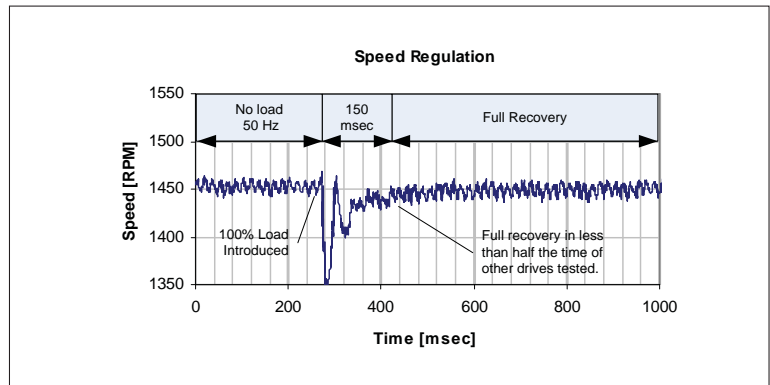
Motors controlled by the SMVector benefit from a sophisticated motor control algorithm that drives motor performance to maximum levels. In this application, the the motor is able to drive a 165% torque load while accelerating from 0 to 100% speed in an impressive 0.33 seconds.



## Dynamic Speed Regulation

### Recovery from 100% shock load in 0.15 seconds

Shock loads are no match for the SMVector. Here an instantaneous 100% load is dealt with in a mere 0.15 seconds. Remarkably, this level of speed regulation is achieved open loop without the benefit of a feedback device.



## The SMV Thrives in Harsh Environments

**Plastic Housing/Black Anodized Heatsink**

- Light weight and corrosion resistant
- Available for indoor and indoor/outdoor use

**Totally Enclosed Non-Ventilating Housing**

**Compact Enclosures**

**Optional Potentiometer**

**Optional Disconnect Switch**

Available on certain models

**High Pressure Washdown Version**

Can be ordered without keypad and display

**Optional Integrated EMC Filters**

Meets CE regulations

SMV NEMA 4X (IP65)  
With Disconnect and Potentiometer

# SMVector

## Specifications

### World Class Control

#### Modes of Operation

- Sequencer, Timing and Step Functions
- Open Loop Flux Vector, Speed or Torque Control with/without Auto Tuning
- V/Hz (Constant or Variable)
- Base Frequency Adjustable to Motor Specs
- Enhanced V/Hz with Auto-tuning

#### Acceleration/Deceleration Profiles

- Two Independent Accel Ramps
- Two Independent Decel Ramps
- Linear, S-Type
- Auxiliary Ramp(or Coast)-to-Stop

#### Fixed Accel Boost for Improved Starting

##### 500 Hz Output Frequency

##### High Carrier (PWM Sine-Coded) Frequency

4, 6, 8, 10 kHz

#### Universal Logic Assertion (Selectable)

- Positive or Negative Logic Input
- Digital Reference Available

#### Braking Functions

- DC Injection Braking
- Optional Dynamic Braking
- Flux Braking w/ Adjustable Flux Level & Decel Time

#### Speed Commands

- Keypad, Potentiometer
- Jog, 8 Preset Speeds
- Floating Point Control
- Sequencer, 16 Segments
- Voltage: Scalable 0 –10 VDC
- Current: Scalable 4 – 20 mA

#### Process Control

- PID Modes: Direct and Reverse Acting
- PID Sleep Mode w/ Adjustable Recovery Threshold
- Analog Output (Speed, Load, Torque, kW)
- Network Speed (Baud Rate)
- Terminal and Keypad Status
- Elapsed Run or Power On Time (Hours)

#### Status Outputs

- Programmable Form "A" Relay Output
- Programmable Open Collector Output
- Scalable 0-10 VDC / 2-10 VDC Analog Output
- 4-20mA w/500 Ohm Total Impedance

### Environment

#### Ambient Temperature

- -10 to 55°C
- Derate 2.5% per °C Above 40°C

### Comprehensive Diagnostic Tools

#### Real Time Monitoring

- 8 Register Fault History
- Software Version
- Drive Network ID
- DC Bus Voltage (V)
- Motor Voltage (V)
- Output Current (%)
- Motor Current (A)
- Motor Torque (%)
- Power (kW)
- Energy Consumption (kWh)
- Heatsink Temperature (°C)
- 0 – 10 VDC Input (User Defined)
- 4 – 20 mA Input (User Defined)
- PID Feedback (User Defined)

#### Vigilant System Protection

##### Voltage Monitoring

- Low and High DC Bus V Protection
- Low Line V Compensation

#### Current Monitoring

##### Motor Overload Protection

- Current Limiting Safeguard
- Ground Fault
- Short Circuit Protection

#### Four ReStarts

- Three Flying and One Auto
- User Enabled

#### Loss of Follower Management

- Protective Fault
- Go to Preset Speed or Preset Setpoint
- Initiate System Notification

#### Over Temperature Protection

### International Voltages

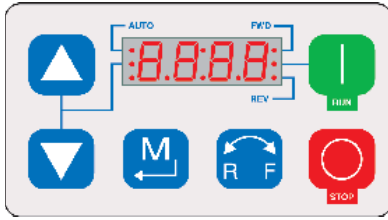
- +10/-15% Tolerance
- 120/240V, 1Ø
- 200/240V, 1 or 3Ø
- 200/240V, 3Ø
- 400/480V, 3Ø
- 480/600V, 3Ø
- 

### Global Standards

- UL GOST
- cUL C-Tick
- CE Low Voltage (EN61800-5-1)
- CE EMC (EN61800-3) with optional EMC filter

# SMVector

## Specifications



NEMA1 (Up to 10HP)  
NEMA4/4x Keypad

### Simple Six Button Programming

Start, Stop, Forward/Reverse, Scroll Up, Scroll Down, Enter/Mode

### Informative LED Display

### Vivid Illumination

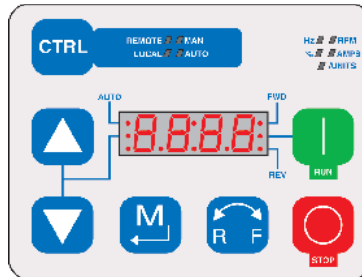
Easily Read from a Distance

### Five Status LEDs

Run, Automatic Speed Mode, Manual Speed Mode, Forward Rotation, Reverse Rotation

### Status Display

Motor Status, Fault Management, Operational Information



NEMA1 15HP (and greater),  
NEMA 4X Keypad

### Additional CTRL Button

Switch between control modes

- Local-Manual
- Local-Auto
- Remote-Manual
- Remote-Auto

### Additional LED Indicators

Define the units being displayed

- Hz
- RPM
- %
- Amps
- /Units

Selector switch for negative or positive logic

EPM (Electronic Programming Module)

Communication Gateway

**Control Terminals**

- Digital Inputs
- Dedicated Start/Stop
- (3) Programmable
- Digital Outputs
- Form "A" Relay
- Open Collector
- Analog Inputs
- 0 - 10 VDC
- 4 - 20 mA
- Analog Outputs
- 0 - 10 VDC/2 - 10 VDC
- Power Supplies
- 10 VDC Potentiometer Ref
- 12 VDC, 20 mA Digital Input Ref or 0VDC Common
- 12 VDC, 50 mA Supply Common

**Additional Control Terminals (NEMA1, 15HP and greater models)**

- 1 Programmable Digital Input
- 1 Common
- RS-485 Modbus Communications
- TXA
- TXB

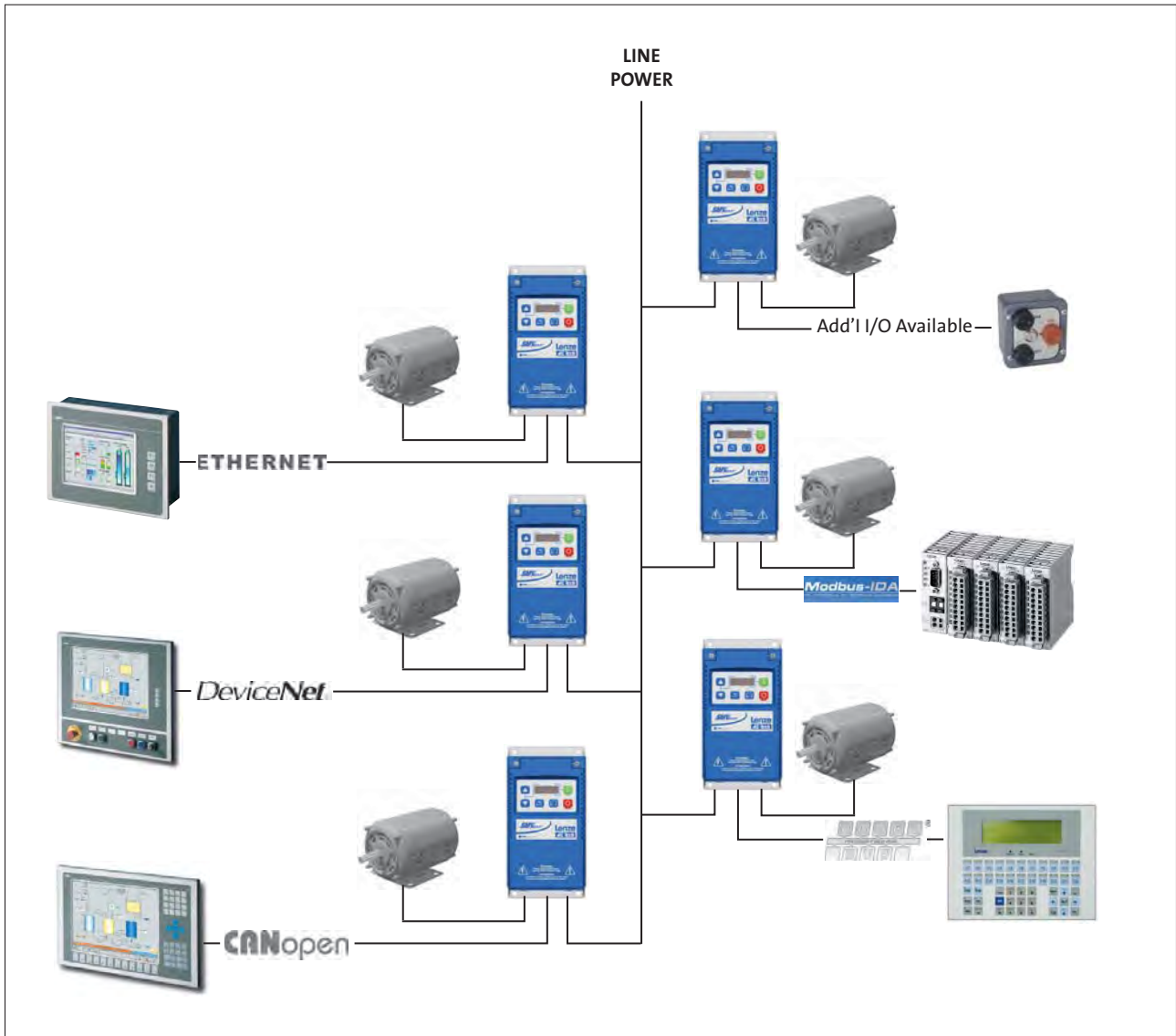
Removable terminal cover and steel conduit plate (not shown). Easy access for control & power wiring. An extra IP21 finger guard ships with every drive.

# SMVector

## Connectivity

With optional plug-in communication modules, the SMVector is easily integrated into any one of today's most commonly used industrial networks.

Whether the application is to automate a single machine or an entire facility, the SMVector is fully equipped to make the process a snap.



**NOTE:** Communication options are available in NEMA 1 (IP31) and NEMA 4X (IP65) models.

Setting up a drive in a network has never been so simple. Order the SMVector and your choice of communication module. Simply snap the communication module into the terminal cover and the drive is ready to connect to the network. Or if the SMVector is already installed it can be easily upgraded in the field.



Communication Module

# SMVector

## Ratings & Dimensions

### 120/240V\* - 1Ø Input (3Ø Output)

| Power |      | NEMA1        |      | NEMA4X - Indoor [C]/Outdoor[E] |      | NEMA4X w/Disconnect - Indoor |      |
|-------|------|--------------|------|--------------------------------|------|------------------------------|------|
| Hp    | kW   | Model        | Size | Model                          | Size | Model                        | Size |
| 0.33  | 0.25 | ESV251N01SXB | G1   | N/A                            |      |                              |      |
| 0.5   | 0.37 | ESV371N01SXB | G1   | ESV371N01SX[C] or [E]          | R1   | ESV371N01SMC                 | AA1  |
| 1     | 0.75 | ESV751N01SXB | G1   | ESV751N01SX[C] or [E]          | R1   | ESV751N01SMC                 | AA1  |
| 1.5   | 1.1  | ESV112N01SXB | G2   | ESV112N01SX[C] or [E]          | R2   | ESV112N01SMC                 | AA2  |

\*120/240V models provide 0-230V output even with 120V input applied.

### 200/240V - 1 or 3Ø Input (3Ø Output)

| Power |      | NEMA1           |      | NEMA4X - Indoor [C]/Outdoor[E]* |      | NEMA4X w/Disconnect - Indoor** |      |
|-------|------|-----------------|------|---------------------------------|------|--------------------------------|------|
| Hp    | kW   | Model           | Size | Model                           | Size | Model                          | Size |
| 0.33  | 0.25 | ESV251N02SXB*** | G1   | N/A                             |      |                                |      |
| 0.5   | 0.37 | ESV371N02YXB    | G1   | ESV371N02YX[C] or [E]           | R1   | ESV371N02YMC                   | AA1  |
| 1     | 0.75 | ESV751N02YXB    | G1   | ESV751N02YX[C] or [E]           | R1   | ESV751N02YMC                   | AA1  |
| 1.5   | 1.1  | ESV112N02YXB    | G2   | ESV112N02YX[C] or [E]           | R2   | ESV112N02YMC                   | AA2  |
| 2     | 1.5  | ESV152N02YXB    | G2   | ESV152N02YX[C] or [E]           | R2   | ESV152N02YMC                   | AA2  |
| 3     | 2.2  | ESV222N02YXB    | G2   | ESV222N02YX[C] or [E]           | S1   | ESV222N02YMC                   | AD1  |

\*Filter versions are also available in 1-phase: Replace the "YX" in the Model Part Number with an "SF".

\*\*Filter versions are also available in 1-phase: Replace the "YM" in the Model Part Number with an "SL".

\*\*\*Model ESV251N02SXB is single-phase input only.

### 200/240V - 3Ø Input (3Ø Output)

| Power |     | NEMA1        |      | NEMA4X - Indoor [C or D]/Outdoor[E or F] |      | NEMA4X w/Disconnect - Indoor |      |
|-------|-----|--------------|------|--|------|------------------------------|------|
| Hp    | kW  | Model        | Size | Model                                    | Size | Model                        | Size |
| 1.5   | 1.1 | ESV112N02TXB | G2   | N/A                                      |      |                              |      |
| 2     | 1.5 | ESV152N02TXB | G2   | N/A                                      |      |                              |      |
| 3     | 2.2 | ESV222N02TXB | G2   | N/A                                      |      |                              |      |
| 5     | 4   | ESV402N02TXB | G3   | ESV402N02TX[C] or [E]                    | V1   | ESV402N02TMC                 | AC1  |
| 7.5   | 5.5 | ESV552N02TXB | H1   | ESV552N02TX[D] or [F]                    | T1   | ESV552N02TMD                 | AB1  |
| 10    | 7.5 | ESV752N02TXB | H1   | ESV752N02TX[D] or [F]                    | T1   | ESV752N02TMD                 | AB1  |
| 15    | 11  | ESV113N02TXB | J1   | ESV113N02TX[D] or [F]                    | W1   | ESV113N02TMD                 | AF1  |
| 20    | 15  | ESV153N02TXB | J1   | ESV153N02TX[D] or [F]                    | W1   | ESV153N02TMD                 | AF1  |

### 400/480V - 3Ø Input (3Ø Output)

| Power |      | NEMA1        |      | NEMA4X - Indoor [C or D]/Outdoor[E or F]* |      | NEMA4X w/Disconnect - Indoor** |      |
|-------|------|--------------|------|---|------|--------------------------------|------|
| Hp    | kW   | Model        | Size | Model                                     | Size | Model                          | Size |
| 0.5   | 0.37 | ESV371N04TXB | G1   | ESV371N04TX[C] or [E]                     | R1   | ESV371N04TMC                   | AA1  |
| 1     | 0.75 | ESV751N04TXB | G1   | ESV751N04TX[C] or [E]                     | R1   | ESV751N04TMC                   | AA1  |
| 1.5   | 1.1  | ESV112N04TXB | G2   | ESV112N04TX[C] or [E]                     | R2   | ESV112N04TMC                   | AA2  |
| 2     | 1.5  | ESV152N04TXB | G2   | ESV152N04TX[C] or [E]                     | R2   | ESV152N04TMC                   | AA2  |
| 3     | 2.2  | ESV222N04TXB | G2   | ESV222N04TX[C] or [E]                     | R2   | ESV222N04TMC                   | AA2  |
| 5     | 4    | ESV402N04TXB | G3   | ESV402N04TX[C] or [E]                     | V1   | ESV402N04TMC                   | AC1  |
| 7.5   | 5.5  | ESV552N04TXB | H1   | ESV552N04TX[C] or [E]                     | V1   | ESV552N04TMC                   | AC1  |
| 10    | 7.5  | ESV752N04TXB | H1   | ESV752N04TX[D] or [F]                     | T1   | ESV752N04TMD                   | AB1  |
| 15    | 11   | ESV113N04TXB | J1   | ESV113N04TX[D] or [F]                     | W1   | ESV113N04TMD                   | AE1  |
| 20    | 15   | ESV153N04TXB | J1   | ESV153N04TX[D] or [F]                     | W1   | ESV153N04TMD                   | AE1  |
| 25    | 18.5 | ESV183N04TXB | J1   | ESV183N04TX[D] or [F]                     | W1   | ESV183N04TMD                   | AF1  |
| 30    | 22   | ESV223N04TXB | J1   | ESV223N04TX[D] or [F]                     | X1   | ESV223N04TMD                   | AF1  |
| 40    | 30   | ESV303N04TXB | K1   | N/A                                       |      |                                |      |
| 50    | 37.5 | ESV373N04TXB | K2   | N/A                                       |      |                                |      |
| 60    | 45   | ESV453N04TXB | K3   | N/A                                       |      |                                |      |

\*Filter versions are also available in 1-phase: Replace the "X" in the Model Part Number with an "F".

\*\*Filter versions are also available in 1-phase: Replace the "M" in the Model Part Number with an "L".

# SMVector

## Ratings & Dimensions

### 600V - 3Ø Input (3Ø Output)

| Power |      | NEMA1        |      | NEMA4X - Indoor [C or D]/Outdoor[E or F] |      | NEMA4X w/Disconnect -Indoor |      |
|-------|------|--------------|------|--|------|-----------------------------|------|
| Hp    | kW   | Model        | Size | Model                                    | Size | Model                       | Size |
| 1     | 0.75 | ESV751N06TXB | G1   | ESV751N06TX[C] or [E]                    | R1   | ESV751N06TMC                | AA1  |
| 2     | 1.5  | ESV152N06TXB | G2   | ESV152N06TX[C] or [E]                    | R2   | ESV152N06TMC                | AA2  |
| 3     | 2.2  | ESV222N06TXB | G2   | ESV222N06TX[C] or [E]                    | R2   | ESV222N06TMC                | AA2  |
| 5     | 4    | ESV402N06TXB | G3   | ESV402N06TX[C] or [E]                    | V1   | ESV402N06TMC                | AC1  |
| 7.5   | 5.5  | ESV552N06TXB | H1   | ESV552N06TX[C] or [E]                    | V1   | ESV552N06TMC                | AC1  |
| 10    | 7.5  | ESV752N06TXB | H1   | ESV752N06TX[D] or [F]                    | T1   | ESV752N06TMD                | AB1  |
| 15    | 11   | ESV113N06TXB | J1   | ESV113N06TX[D] or [F]                    | W1   | ESV113N06TMD                | AE1  |
| 20    | 15   | ESV153N06TXB | J1   | ESV153N06TX[D] or [F]                    | W1   | ESV153N06TMD                | AE1  |
| 25    | 18.5 | ESV183N06TXB | J1   | ESV183N06TX[D] or [F]                    | W1   | ESV183N06TMD                | AF1  |
| 30    | 22   | ESV223N06TXB | J1   | ESV223N06TX[D] or [F]                    | X1   | ESV223N06TMD                | AF1  |
| 40    | 30   | ESV303N06TXB | K1   | N/A                                      |      |                             |      |
| 50    | 37.5 | ESV373N06TXB | K2   | N/A                                      |      |                             |      |
| 60    | 45   | ESV453N06TXB | K3   | N/A                                      |      |                             |      |

### Dimensions

|    | H     |     | W    |     | D     |     |
|----|-------|-----|------|-----|-------|-----|
|    | in.   | mm  | in.  | mm  | in.   | mm  |
| G1 | 7.50  | 190 | 3.90 | 99  | 4.40  | 111 |
| G2 | 7.60  | 191 | 3.90 | 99  | 5.50  | 138 |
| G3 | 7.60  | 191 | 3.90 | 99  | 5.80  | 147 |
| H1 | 9.90  | 250 | 5.20 | 130 | 6.30  | 160 |
| J1 | 12.50 | 318 | 7.00 | 176 | 8.10  | 205 |
| K1 | 14.19 | 360 | 8.72 | 221 | 10.07 | 256 |
| K2 | 17.19 | 436 | 8.72 | 221 | 10.07 | 256 |
| K3 | 20.19 | 513 | 8.72 | 221 | 10.07 | 256 |

|     |       |     |      |     |       |     |
|-----|-------|-----|------|-----|-------|-----|
| R1  | 8.00  | 203 | 6.30 | 160 | 4.50  | 114 |
| R2  | 8.00  | 203 | 6.30 | 160 | 6.30  | 160 |
| S1  | 8.00  | 203 | 7.10 | 181 | 6.80  | 172 |
| T1  | 10.00 | 254 | 8.10 | 204 | 8.00  | 203 |
| V1  | 10.00 | 254 | 9.00 | 228 | 8.00  | 203 |
| W1  | 14.40 | 366 | 9.40 | 240 | 9.50  | 241 |
| X1  | 18.50 | 470 | 9.40 | 240 | 9.50  | 241 |
| AA1 | 11.00 | 279 | 6.30 | 160 | 5.40  | 136 |
| AA2 | 11.00 | 279 | 6.30 | 160 | 7.20  | 182 |
| AB1 | 13.00 | 330 | 8.10 | 204 | 8.90  | 225 |
| AC1 | 13.00 | 330 | 9.00 | 228 | 9.00  | 226 |
| AD1 | 11.00 | 279 | 7.10 | 181 | 7.70  | 194 |
| AE1 | 14.40 | 366 | 9.40 | 240 | 10.20 | 259 |
| AF1 | 18.50 | 470 | 9.40 | 240 | 10.20 | 259 |

