

# SMVector Drive

Flexible, simple, economical



# Lenze

# SMVector | Our promise

## Commitment to Value

The finest product at the best price is serious business. It takes continuous life cycle management to achieve this goal. We are always investigating techniques to improve efficiency and take advantage of the latest microprocessor and power module technology. When we achieve efficiency gains or material cost reductions, we pass those savings on to our customers. This simple philosophy has permitted us to build and maintain a very loyal base of customers.

## Commitment to Quality

From product design to manufacture, service and training, quality is at the foundation of Lenze Americas corporate philosophy. A quality product is built of superior materials by highly skilled personnel equipped with state-of-the art instruments. And a quality product is backed by expert training, knowledgeable sales representatives and experienced repair personnel. Continuous life cycle improvement fueled by our pledge to our Customers drives our technology forward. We feel so strongly about quality that each SMVector is backed with a two-year warranty.

## Commitment to Innovation

We pride ourselves on delivering products to the market that are designed to meet specific customer needs. Our portfolio of innovative products is broad and covers very simple variable speed applications up through complex motion control. Each product, including the SMVector, is positioned so our customers pay only for the level of technology necessary for their application.

## Commitment to Simplicity

One of the cornerstones of our design philosophy is to make our products simple to use. Technology only benefits the user if it can be easily understood and applied. The SMVector's intuitive display and EPM technology dramatically simplifies installation, commissioning and operation for our customers.

## Commitment to Performance

The SMVector is in a class by itself when it comes to performance. At the heart of the SMV are sophisticated vector algorithms that achieve new heights in torque production and speed control. This technology breakthrough allows our customers to cover a full range of applications from simple speed control through advanced torque and process control with the same product.

## Our Promise

At Lenze Americas it is not good enough to deliver part of a promise. Our products deliver the entire package; Value, Quality, Innovation, Simplicity and Performance.

# Lenze



Lenze Americas N.A. Headquarters, Uxbridge, MA

# SMVector | Features and Benefits:

The SMVector continues our price leadership tradition in the highly competitive AC drive market. 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.



SMV NEMA 4X (IP65)



SMV NEMA 1 (IP31)

**Two Year Warranty**

## Superior Performance

- ▶ Modes of Operation:
  - V/Hz (Constant and Variable)
  - Enhanced V/Hz (Constant and Variable)
  - Vector Speed Control
  - Vector Torque Control
- ▶ Dynamic Torque Response
- ▶ Sophisticated Auto-tuning (Motor Calibration)
- ▶ Impressive Low Speed Operation
- ▶ Sequencer with 16 Programmable Segments

## Flexible Power Ranges

- ▶ International Voltages:
  - 120/240V, 1Ø (up to 1.5 Hp)
  - 200/240V, 1/3Ø (up to 3 Hp)
  - 200/240V, 3Ø (up to 20 Hp)
  - 400/480V, 3Ø (up to 60 Hp)
  - 480/600V, 3Ø (up to 60 Hp)

## Industrial Grade Packaging

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

## Simplicity

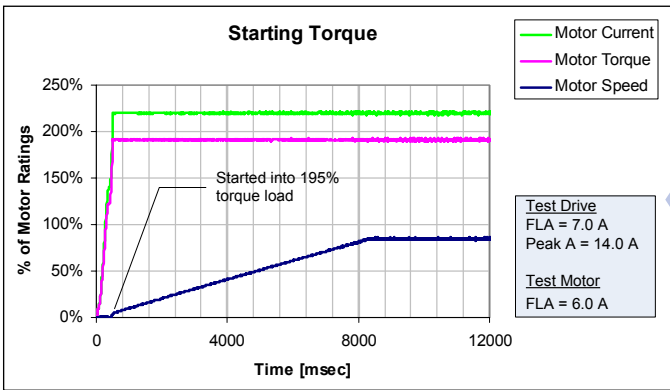
- ▶ Intuitive User Interface
- ▶ Electronic Memory Module (EPM)
- ▶ Optional Disconnect Switch (NEMA 4X only)
- ▶ Optional Potentiometer Switch (NEMA 4X only)

# EPM | Just think of it as ... 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.

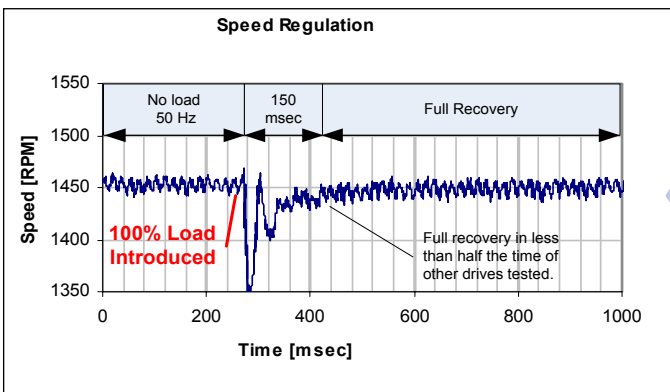
When drive reset is necessary, reset to factory default or customer settings in seconds with the EPM. When the EPM equipped drive is used on a line containing multiple drives with the identical setup, it takes just minutes to program the entire line. And EPMs can be replaced with or without power connected. 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.



## Exceptional Starting Torque

Overpower demanding applications

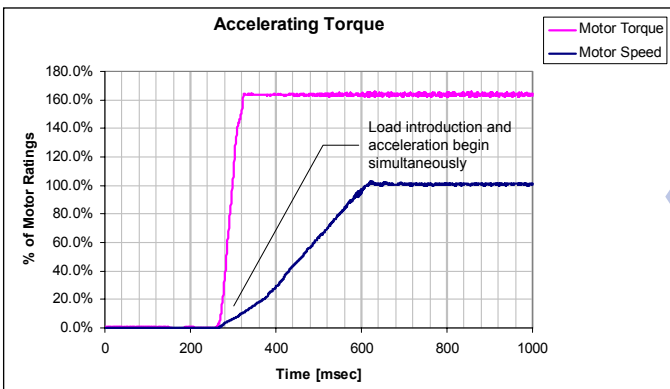
The SMVector is peerless in controlling the motor's ability to convert current into torque. In this example, the SMVector is started into a stiff 195% torque load. Not only does the motor start the load, but it also delivers a full 195% torque while accelerating to 50 Hz in 8 seconds.



## 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.



## 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.

## 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

- 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

## Simple Six Button Programming

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

## Informative LED Display

### Vivid Illumination

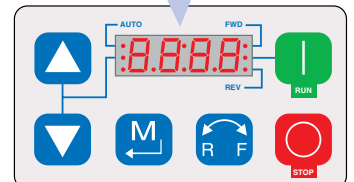
- Easily Read from a Distance

### Five Status LEDs

- Run
- Automatic Speed mode
- Manual Speed Mode
- Forward Rotation
- Reverse Rotation

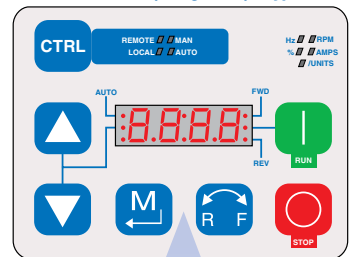
### Status Display

- Motor Status
- Fault Management
- Operational Information



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

## NEMA1 15HP (and greater) Keypad



## Additional CTRL Button

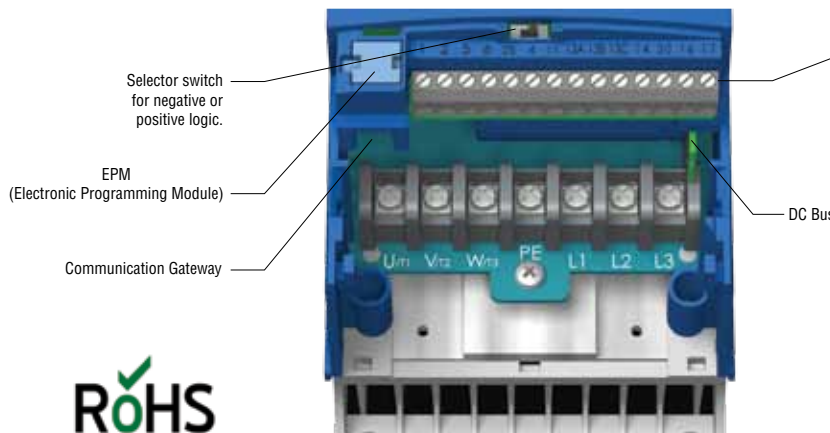
### Switch between control modes

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

## Additional LED Indicators

### Define the units being displayed

- Hz
- RPM
- %
- Amperes
- /Units



## 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

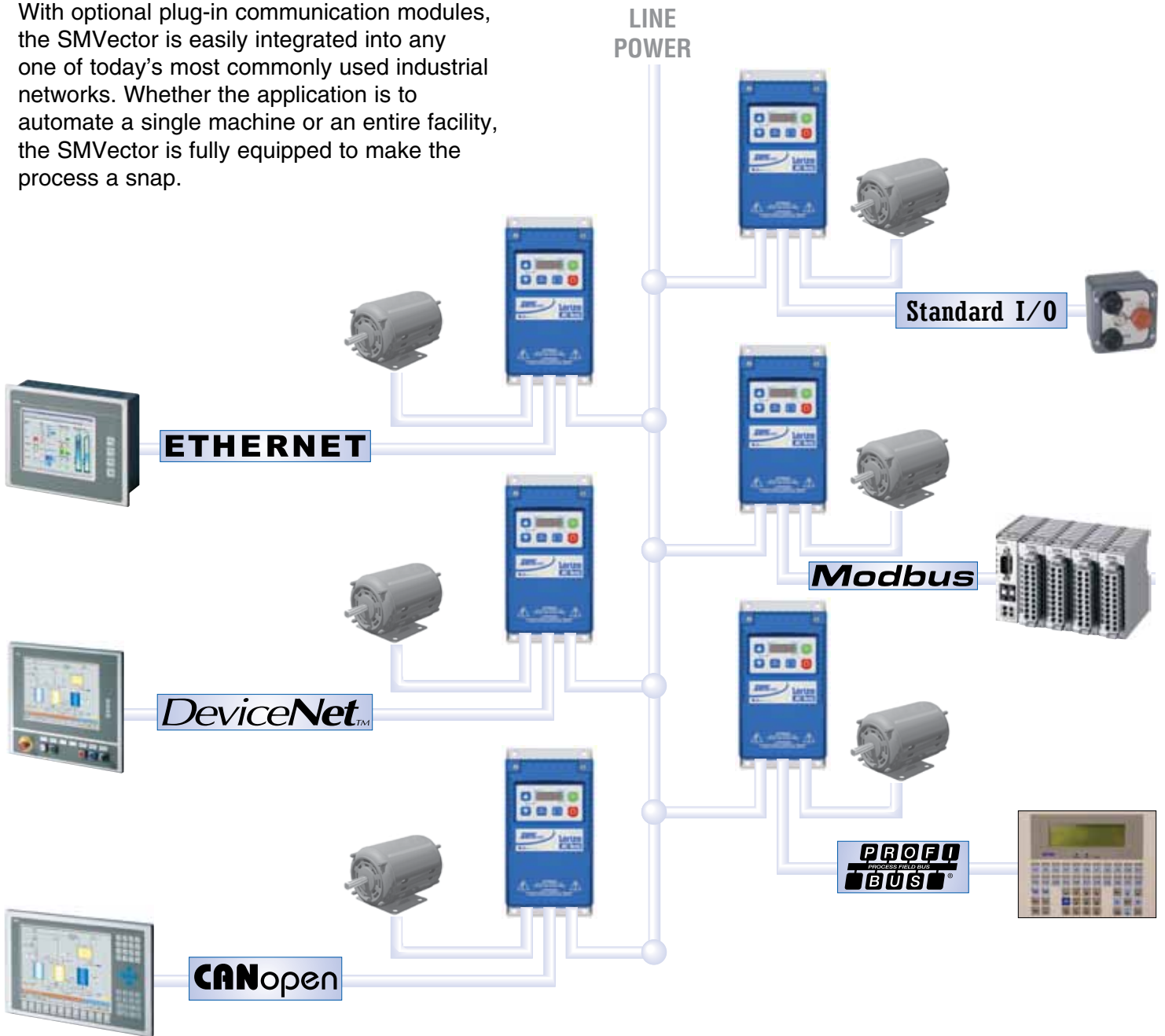
- (NEMA1, 15HP and greater models)
- 1 Programmable Digital Input
- 1 Common
- RS-485 Modbus Communications
  - TXA
  - TXB

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.



Communication Module

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.



# 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)

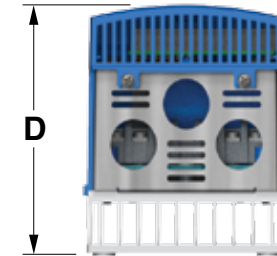
Power		NEMA1		NEMA4X - Indoor [C or D]/Outdoor[E or F]*		NEMA4X w/Disconnect - Indoor**	
Hp	KW	Model	Size	Model	Size	Model	Size
0.5	0.37	ESV371N04TXB	G1	ESV371N04TX[C] or [E]	R1	ESV371N04TMC	AA1
1	0.75	ESV751N04TXB	G1	ESV751N04TX[C] or [E]	R1	ESV751N04TMC	AA1
1.5	1.1	ESV112N04TXB	G2	ESV112N04TX[C] or [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".

## 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			

SMV NEMA 1 (IP31)



Bottom Entry with NEMA 1 Steel Conduit Plate



Bottom Entry with IP31 Finger Guard

## Dimensions

	H		W		D	
	in.	mm	in.	mm	in.	mm
<b>G1</b>	7.50	190	3.90	99	4.40	111
<b>G2</b>	7.60	191	3.90	99	5.50	138
<b>G3</b>	7.60	191	3.90	99	5.80	147
<b>H1</b>	9.90	250	5.20	130	6.30	160
<b>J1</b>	12.50	318	7.00	176	8.10	205
<b>K1</b>	14.19	360	8.72	221	10.07	256
<b>K2</b>	17.19	436	8.72	221	10.07	256
<b>K3</b>	20.19	513	8.72	221	10.07	256
<b>R1</b>	8.00	203	6.30	160	4.50	114
<b>R2</b>	8.00	203	6.30	160	6.30	160
<b>S1</b>	8.00	203	7.10	181	6.80	172
<b>T1</b>	10.00	254	8.10	204	8.00	203
<b>V1</b>	10.00	254	9.00	228	8.00	203
<b>W1</b>	14.40	366	9.40	240	9.50	241
<b>X1</b>	18.50	470	9.40	240	9.50	241
<b>AA1</b>	11.00	279	6.30	160	5.40	136
<b>AA2</b>	11.00	279	6.30	160	7.20	182
<b>AB1</b>	13.00	330	8.10	204	8.90	225
<b>AC1</b>	13.00	330	9.00	228	9.00	226
<b>AD1</b>	11.00	279	7.10	181	7.70	194
<b>AE1</b>	14.40	366	9.40	240	10.30	261
<b>AF1</b>	18.50	470	9.40	240	11.20	285

**The best machines and production facilities  
around the world use Lenze.**



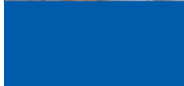
*Positioning our Customers for Success. We take our Customer's requirements seriously. A new application is an opportunity to test, prove and expand our drive's capabilities while solving our Customer's motion control needs.*



*Customer Service has always been and will always be our number one commitment. Our success depends on it.*



*Driving design technology forward means we never stop thinking about process improvements. Did we deliver a quality product to market that meets the Customer's needs? That is the key.*



*Innovation takes art and skill to combine what's new and what's proven to produce a product with exceptional form, fit and function.*

**Lenze**

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