

# SMVector IP65

*frequency inverter*



Flexible, simple, economical, robust



**Lenze**

## SMVector IP65 | simple vector control

### **Simplicity**

By making Lenze products easy to install, program and commission, we can provide the ideal motor control solution for both OEM designers and electrical systems engineers. An innovative removable EPM chip feature allows instant programming of multiple drives before or after installation, and a simple intuitive front panel display also facilitates easy in-situ operation.

### **Flexibility**

The SMVector range of inverter drives offer fast dynamic torque response, sophisticated auto-tuning and impressive low speed operation from a compact, and simple to use package. The SMVector range is designed for motor applications where dynamic speed and torque control are required, ideal for conveyors, packaging lines and fan and pump systems.

### **Quality**

A firm commitment to design quality and continuous development of our products ensures both high performance and reliability. Manufacturing facilities have recently been expanded with manufacturing systems and quality control procedures also upgraded to ensure the highest possible quality product is delivered to customers worldwide.

### **Technical Support**

With a worldwide network of Lenze branches and certified distributors we have hundreds of experienced engineers on hand to help customers at all levels to solve problems and find the best solutions for their applications. End users can also be assured that Lenze is always there throughout the lifecycle of its products. Technical information, literature and guides are also available from a multi-language website.

*SMVector demonstration –  
working while frozen  
in ice at international  
launch 2007*



# SMVector IP65 | features and benefits

The SMVector IP65 continues our tradition for innovative products in the 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

## Superior Performance

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

## Flexible Power Ranges

- ▶ Voltages:
  - 120/240V, 1 $\Phi$  (up to 1.1kW)
  - 200/240V, 1/3 $\Phi$  (up to 2.2 kW)
  - 200/240V, 3 $\Phi$  (up to 15 kW)
  - 400/480V, 3 $\Phi$  (up to 22 kW)
  - 480/600V, 3 $\Phi$  (up to 22 kW)

## Simplicity

- ▶ Intuitive User Interface
- ▶ Electronic Programming Module (EPM)



*IP65 protection – for tough environment applications*



# SMVector IP65 | Electronic Programming Module (EPM)

## Electronic Programming Module (EPM)

Program the SMVector quickly and easily using the electronic programming module (EPM). The EPM stores the drive's parameter configuration and simplifies initial setup:

- ▶ Three ways to program the EPM:
  1. Use the intuitive integrated keypad
  2. Program in a Microsoft Windows™ environment with Techlink.
  3. Use the portable EPM programmer.
- ▶ The EPM saves time and money:
  1. Create your parameter profile and archive to the EPM programmer, a master EPM or your PC.
  2. Insert the EPM into the EPM programmer and copy parameters in a matter of seconds!
  3. Plug the EPM into the drive and it is fully programmed and ready to go.

- ▶ Improve efficiency:

Program the drive anytime and anywhere where it makes sense during your manufacturing or commissioning process. You can even plug in a fully programmed EPM before connecting the drive to power. Now the drive is ready and waiting for power to be connected.
- ▶ Safeguard your configuration:

When you program the EPM your parameter settings are automatically archived. This truly unique feature allows the SMVector to be reset to factory default settings or to customer settings.

The EPM. Another example of the innovative thinking that separates Lenze from other manufacturers.

Imagine programming 20 drives in less than one minute.



*EPM Programmer*

# SMVector IP65

Electronic Programming Module (EPM)



## EPM – OEM Magic!

The robust plug-in EPM chip is a fantastic feature for companies using the SMVector drive in a production line product. The EPM chip contents can also be duplicated instantly using the electronic programming module, allowing OEM builders to set-up drives on duplicate machines at the push of a button.

## Maintenance & Replacements

Contained in a small but robust 10 mm square housing the EPM can easily be posted out to customers in the field. This allows the machine manufacturer to avoid the cost of sending out an engineer to re-commission a drive.

In the unlikely event that a drive fails, a replacement can be despatched to the site and a maintenance operative or electrician can replace the drive and then simply transfer the EPM chip from the old unit to the new drive and it will be ready to run.



*Ideal for identical repeat applications.*

# SMVector IP65 | For tough Environment Applications

## The SMVector is built for Harsh Environments

### IP65 Water Protected

This allows for operation in environments with high humidity, frequent wash downs from low pressure water jets (246 Litres/minute from a 2.5 cm nozzle at 3 m) and general outdoor conditions. This reduces the amount of space required by the drive in wet conditions as it removes the need and associated cost of a control cabinet in many applications.

### Lock Off Mains Isolator

The mains isolator meets IEC 60947-3 standard and is available on all sizes and all variations. Convenient for safe maintenance in wet environments it gives a clear visual indication of the drives live state for added safety. The feature is also desirable in some applications where panel mounting in higher rated control cabinets is required for security or additional environmental protection.

### UV Protection

In order to provide added U.V. protection for outdoor applications the SMVector is now available with the option of a polycarbonate enclosure. Development of the polycarbonate extension to the SMVector range was driven by a demand for a product that was more resistant to long term UV exposure. This, combined with its high ingress protection, ensures a prolonged operating life in outdoor applications.

- ▶ Dust tight
- ▶ Safe with low pressure water jets
- ▶ UV resistant
- ▶ Safety isolating
- ▶ Corrosion resistant (NEMA 4x)
- ▶ Remove the need for cabinets
- ▶ Wall or machine mounting



*Water Protected*



*Protected from dirty environments*



*UV Protected*

# SMVector IP65 | specifications

## World Class Control

### Modes of Operation

- ▶ Open Loop Flux Vector Speed or Torque Control
- ▶ V/Hz (Constant or Variable)
- ▶ Enhanced V/Hz with Auto-tuning

### Performance

- ▶ 150% overload for 60 sec's
  - 200% overload for 15 sec's (up to 7.5kW)
  - 180% overload for 15 sec's (11 kW to 22 kW)

### Acceleration/Deceleration Profiles

- ▶ Two Independent Accel Ramps
- ▶ Two Independent Decel Ramps
- ▶ Linear
- ▶ S-Type
- ▶ Auxiliary Ramp-to-Stop

### Output Frequency

- ▶ 500 Hz Standard
- ▶ 1,000 Hz Optional

### Switching Frequency

- ▶ 4, 6, 8, 10 (kHz) (Optional 16 kHz)

### Universal Logic Assertion (Selectable)

- ▶ Positive Logic Input
- ▶ Negative Logic Input

### Braking Functions

- ▶ DC Injection Braking
- ▶ Optional dynamic Braking
- ▶ Motor Flux braking

### Speed/Torque Control

- ▶ Keypad
- ▶ Jog
- ▶ Floating Point Control
- ▶ Voltage: Scalable 0 –10 VDC
- ▶ Current: Scalable 4 – 20 mA
- ▶ Potentiometer
- ▶ Fieldbus
- ▶ 8 Preset Speeds
- ▶ Flying start

### Process Control

- ▶ PID Modes: Direct and Reverse Acting
- ▶ PID Sleep Mode
- ▶ User defined units
- ▶ Sequencer
- ▶ Pump-Rinse Mode

## Vigilant System Protection

### Voltage Monitoring

- ▶ Low DC Bus V Protection
- ▶ High DC Bus V Protection
- ▶ Low Line V Compensation
- ▶ Phase Loss Protection

### Current Monitoring

- ▶ Motor Overload Protection
- ▶ Current Limiting Safeguard
- ▶ Ground Fault
- ▶ Short Circuit Protection

### Loss of Follower Management

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

### Over Temperature Protection

## Comprehensive Diagnostic Tools

### Real Time Monitoring

- ▶ 8 Register Fault History
- ▶ Software Version
- ▶ DC Bus Voltage (V)
- ▶ Motor Voltage (V)
- ▶ Output Current (%)
- ▶ Motor Current (A)
- ▶ Motor Torque (%)
- ▶ Output Frequency/ RPM
- ▶ Power (kW)
- ▶ Energy Consumption (kWh)
- ▶ Heatsink Temperature (°C)
- ▶ 0 – 10 VDC Input (User Defined)
- ▶ 4 – 20 mA Input (User Defined)
- ▶ PID Feedback (User Defined)
- ▶ Analog Output (Speed, Load, Torque, kW)
- ▶ Terminal Status
- ▶ Keypad Status
- ▶ Elapsed Run Time (Hours)
- ▶ Elapsed Power on Time (Hours)

### Status Outputs

- ▶ Programmable Form "A" Relay Output
- ▶ Programmable Open Collector Output
- ▶ Scalable 0-10 VDC / 2-10 VDC Analog Output

## Environmental Capabilities

### Ambient Temperature

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

### EMC Conformance

- ▶ CE EMC Directive (EN61800-3) with optional internal EMC filter (First and second environment, category C1 and C2).

## Global Standards

- ▶ UL, cUL
- ▶ CE Low Voltage Directive (EN61800-5-1) (Europe)
- ▶ GOST (Russia/Ukraine)
- ▶ C-Tick (Australia/New Zealand)
- ▶ RoHS
- ▶ ECA listed (UK- Enhanced Capital Allowance Scheme)

# SMVector IP65 | user interface

## Simple Six Button Programming

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



Keypad (up to 7.5 kW)

## 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

## Additional CTRL Button

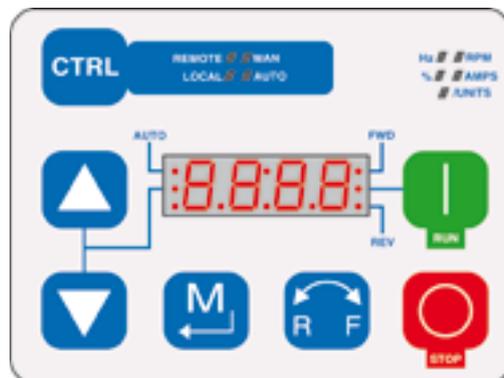
Switch between control modes

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

## Additional LED Indicators

Define the units being displayed

- ▶ Hz
- ▶ RPM
- ▶ %
- ▶ Amps
- ▶ Units



Keypad (11-22 kW)

# SMVector IP65 | 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.

Setting up a drive in a network has never been so simple. If the SMVector is already installed it can be easily upgraded in the field.



# SMVector IP65 | specifications

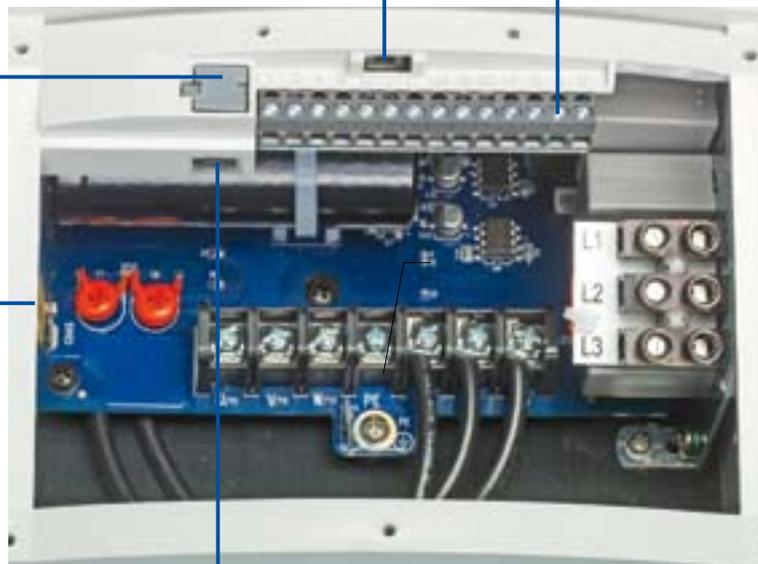
## Control Terminals (up to 7.5 kW)

Selector switch for negative or positive logic.

### EPM

(Electronic Programming Module)

External Dynamic Braking connection



Communication module inter-connection

### Control Terminals

#### Digital Inputs

- ▶ Dedicated Start/Stop
- ▶ (3) Programmable

#### Digital Outputs

- ▶ Form "A" Relay
- ▶ Open Collector

#### Analogue Inputs

- ▶ 0 - 10 VDC
- ▶ 4 - 20 mA

#### Analogue Outputs

- ▶ 0 - 10 VDC/2 - 10 VDC

#### Power Supplies

- ▶ 10 VDC  
Potentiometer Ref
- ▶ 12 VDC  
20 mA Digital Input  
Ref or 0 VDC Common
- ▶ 12 VDC  
50 mA Supply Common

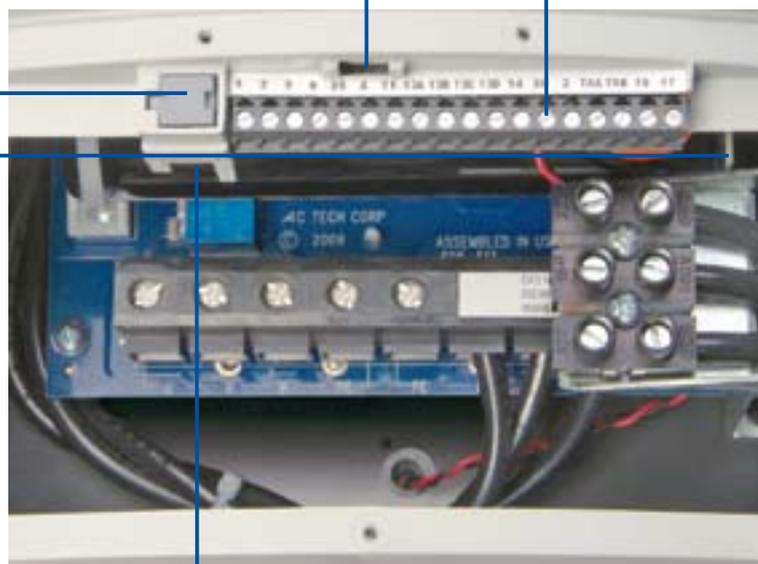
## Control Terminals (11-22 kW)

Selector switch for negative or positive logic.

### EPM

(Electronic Programming Module)

External Dynamic Braking connection



Communication module inter-connection

### Control Terminals

#### Digital Inputs

- ▶ Dedicated Start/Stop
- ▶ (4) Programmable

#### Digital Outputs

- ▶ Form "A" Relay
- ▶ Open Collector

#### Analogue Inputs

- ▶ 0 - 10 VDC
- ▶ 4 - 20 mA

#### Analogue Outputs

- ▶ 0 - 10 VDC/2 - 10 VDC

#### Power Supplies

- ▶ 10 VDC  
Potentiometer Ref
- ▶ 12 VDC  
20 mA Digital Input  
Ref or 0 VDC Common
- ▶ 12 VDC  
50 mA Supply Common

#### RS-485 Communications

- ▶ TXA
- ▶ TXB

# SMVector IP65 | options

## Optional Remote Keypad

- ▶ Allows operation of the drive from a remote location up to 30 Mtrs from the drive.
- ▶ Cubicle door mountable
- ▶ IP65 rating



**ESVZXX1**  
Remote keypad -  
For drives up to 7.5 kW



**ESVZXH0**  
Remote keypad -  
For drives 11 - 30 kW

## Extended I/O modules

- ▶ **ESVZAL0**  
Extends the standard drive with 1 extra programmable form C relay output.
- ▶ **ESVZAL1**  
Extends the standard drive with 1 extra programmable form C relay output and 2 extra programmable digital inputs.



## Potentiometer Option

- ▶ **ESVZXM1/2/3**  
The potentiometer allows the speed reference to be easily controlled from the front of the drive.



# SMVector IP65 | ratings & dimensions

## 120VAC / 240VAC - 1Ø Input (3Ø Output)

Model Number	Output Current	Power	Size (No integrated mains disconnect)	Size (integrated mains disconnect)
	$I_N$ [A]	kW		
ESV371N01S_ (C) or (E)	2.4	0.37	R1	AA1
ESV751N01S_ (C) or (E)	4.2	0.75	R1	AA1
ESV112N01S_ (C) or (E)	6.0	1.1	R2	AA2

No Filter Included.

If “\_” is M then drive has an integrated mains disconnect, If “\_” is X then the drive has no integrated mains disconnect.

Where “C” = IP65 indoor use only, enclosure material ABS plastic, convection cooled.

Where “E” = IP65 indoor / outdoor use, enclosure material polycarbonate plastic, convection cooled.

Note: Output voltage will be twice line voltage when connected to a 120V source.

## 240VAC - 1Ø Input (3Ø Output)

Model Number	Output Current	Power	Size (No integrated mains disconnect)	Size (integrated mains disconnect)
	$I_N$ [A]	kW		
ESV371N02S_ (C) or (E)	2.4	0.37	R1	AA1
ESV751N02S_ (C) or (E)	4.2	0.75	R1	AA1
ESV112N02S_ (C) or (E)	6.0	1.1	R2	AA2
ESV152N02S_ (C) or (E)	7.0	1.5	R2	AA2
ESV222N02S_ (C) or (E)	9.6	2.2	S1	AD1

Integrated Filter Included.

If “\_” is F then drive has integrated filter but no integrated mains disconnect and, If “\_” is L then the drive has integrated filter and integrated mains disconnect.

Where “C” = IP65 indoor use only, enclosure material ABS plastic, convection cooled.

Where “E” = IP65 indoor / outdoor use, enclosure material polycarbonate plastic, convection cooled.

## 240VAC - 1 or 3Ø Input (3Ø Output)

Model Number	Output Current	Power	Size (No integrated mains disconnect)	Size (integrated mains disconnect)
	$I_N$ [A]	kW		
ESV371N02Y_ (C) or (E)	2.4	0.37	R1	AA1
ESV751N02Y_ (C) or (E)	4.2	0.75	R1	AA1
ESV112N02Y_ (C) or (E)	6.0	1.1	R2	AA2
ESV152N02Y_ (C) or (E)	7.0	1.5	R2	AA2
ESV222N02Y_ (C) or (E)	9.6	2.2	S1	AD1

No Integrated Filter.

If “\_” is M then drive has an integrated mains disconnect, If “\_” is X then the drive has no integrated mains disconnect

Where “C” = IP65 indoor use only, enclosure material ABS plastic, convection cooled.

Where “E” = IP65 indoor / outdoor use, enclosure material polycarbonate plastic, convection cooled.

# SMVector IP65 | ratings & dimensions

## 240VAC - 3Ø Input (3Ø Output)

Model Number	Output Current	Power	Size (No integrated mains disconnect)	Size (integrated mains disconnect)
	I <sub>N</sub> [A]	kW		
ESV402N02T_ (C) or (E)	16.5	4.0	V1	AC1
ESV552N02T_ (D) or (F)	23.0	5.5	T1	AB1
ESV752N02T_ (D) or (F)	29.0	7.5	T1	AB1
ESV113N02T_ (D) or (F)	42.0	11	W1	AF1
ESV153N02T_ (D) or (F)	54.0	15	W1	AF1

No Integrated Filter.

If “\_” is M then drive has an integrated mains disconnect, if “\_” is X then the drive has no integrated mains disconnect.

Where “C” = IP65 indoor use only, enclosure material ABS plastic, convection cooled.

Where “D” = IP65 indoor use only, enclosure material ABS plastic, fan cooled.

Where “E” = IP65 indoor / outdoor use, enclosure material polycarbonate plastic, convection cooled.

Where “F” = IP65 indoor / outdoor use, enclosure material polycarbonate plastic, fan cooled.

## 400/ 480VAC - 3Ø Input (3Ø Output)

Model Number	Output Current	Power	Size (No integrated mains disconnect)	Size (integrated mains disconnect)
	I <sub>N</sub> [A]	kW		
ESV371N04T_ (C) or (E)	1.3/1.1	0.37	R1	AA1
ESV751N04T_ (C) or (E)	2.4/2.1	0.75	R1	AA1
ESV112N04T_ (C) or (E)	3.5/3.0	1.1	R2	AA2
ESV152N04T_ (C) or (E)	4.0/3.5	1.5	R2	AA2
ESV222N04T_ (C) or (E)	5.5/4.8	2.2	R2	AA2
*ESV302N04T_ (C) or (E)	7.6/6.3	3	R2	AA2
ESV402N04T_ (C) or (E)	9.4/8.2	4.0	V1	AC1
ESV552N04T_ (C) or (E)	12.6/11.0	5.5	V1	AC1
ESV752N04T_ (D) or (F)	16.1/14.0	7.5	T1	AB1
ESV113N04T_ (D) or (F)	24.0/21.0	11	W1	AE1
ESV153N04T_ (D) or (F)	31.0/27.0	15	W1	AE1
ESV183N04T_ (D) or (F)	39.0/34.0	18.5	W1	AF1
ESV223N04T_ (D) or (F)	46.0/40.0	22	X1	AF1

If “\_” is X then no Filter is included. If “\_” is F then Integrated Filter is included.

If “\_” is M then drive has an integrated mains disconnect but no integrated filter.

If “\_” is L then drive has an integrated mains disconnect and integrated filter.

Where “C” = IP65 indoor use only, enclosure material ABS plastic, convection cooled.

Where “D” = IP65 indoor use only, enclosure material ABS plastic, fan cooled.

Where “E” = IP65 indoor / outdoor use, enclosure material polycarbonate plastic, convection cooled.

Where “F” = IP65 indoor / outdoor use, enclosure material polycarbonate plastic, fan cooled.

\*Only available with “\_” = “F” or “L”

# SMVector IP65 | ratings & dimensions

## 600VAC - 3Ø Input (3Ø Output)

Model Number	Output Current	Power	Size (No integrated mains disconnect)	Size (integrated mains disconnect)
	$I_N$ [A]	kW		
ESV751N06T_ (C) or (E)	1.7	0.75	R1	AA1
ESV152N06T_ (C) or (E)	2.7	1.5	R2	AA2
ESV222N06T_ (C) or (E)	3.9	2.2	R2	AA2
ESV402N06T_ (C) or (E)	6.1	4.0	V1	AC1
ESV552N06T_ (C) or (E)	9.0	5.5	V1	AC1
ESV752N06T_ (D) or (F)	11.0	7.5	T1	AB1
ESV113N06T_ (D) or (F)	17.0	11	W1	AE1
ESV153N06T_ (D) or (F)	22.0	15	W1	AE1
ESV183N06T_ (D) or (F)	27.0	18.5	W1	AF1
ESV223N06T_ (D) or (F)	32.0	22	X1	AF1

No Integrated Filter.

If “\_” is M then drive has an integrated mains disconnect, If “\_” is X then the drive has no integrated mains disconnect.

Where “C” = IP65 indoor use only, enclosure material ABS plastic, convection cooled.

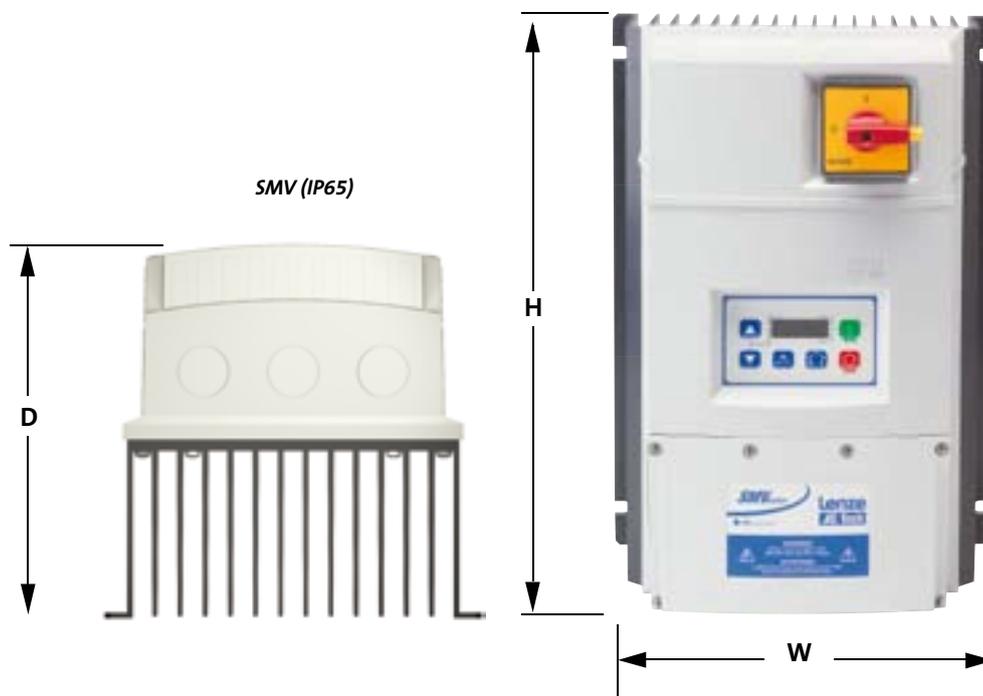
Where “D” = IP65 indoor use only, enclosure material ABS plastic, fan cooled.

Where “E” = IP65 indoor / outdoor use, enclosure material polycarbonate plastic, convection cooled.

Where “F” = IP65 indoor / outdoor use, enclosure material polycarbonate plastic, fan cooled.

**Example Part Number: ESV371N04TXE = 0.37 kW, 400/480V, No Filter, Type E Enclosure.**

# SMVector IP65 | ratings & dimensions



## Dimensions

	H		W		D	
	in	mm	in	mm	in	mm
R1	8.0	203.0	6.3	160.0	4.5	114.0
R2	8.0	203.0	6.3	160.0	6.3	160.0
S1	8.0	203.0	7.1	181.0	6.8	172.0
T1	10.0	254.0	8.0	204.0	8.0	203.0
V1	10.0	254.0	9.0	228.0	8.0	203.0
W1	14.5	368.0	9.42	240.0	9.45	241.0
X1	18.5	470.0	9.42	240.0	9.45	241.0
AA1	11.0	279.0	6.3	160.0	4.5	114.0
AA2	11.0	279.0	6.3	160.0	6.3	160.0
AB1	13.0	330.0	8.0	204.0	8.0	203.0
AC1	13.0	330.0	9.0	228.0	8.0	204.0
AD1	11.0	279.0	7.1	181.0	6.8	172.0
AE1	14.5	368.0	9.42	240.0	9.45	241.0
AF1	18.5	470.0	9.42	240.0	9.45	241.0

# SMVector IP65 | applications

- ▶ Conveying
- ▶ Cutting
- ▶ Outdoor Displays
- ▶ Packaging
- ▶ Production Line
- ▶ Fans
- ▶ Pumping
- ▶ Turning
- ▶ Winding
- ▶ Slicing
- ▶ Sawing
- ▶ Milling and Drilling



# SMVector IP65 | applications



# SMVector IP65 | industries

- ▶ Aggregates
- ▶ Automotive
- ▶ Brewing
- ▶ Food
- ▶ Horticulture
- ▶ HVAC
- ▶ Leisure
- ▶ Printing
- ▶ Woodworking
- ▶ Sortation warehouses
- ▶ Wine production
- ▶ Textiles
- ▶ Grinding and finishing
- ▶ Fairground rides



# SMVector IP65 | industries



# It's good to know | why we are there for you



*"Our customers come first. Customer satisfaction is what motivates us. By thinking in terms of how we can add value for our customers we can increase productivity through reliability."*



*"We will provide you with exactly what you need – perfectly co-ordinated products and solutions with the right functions for your machines and installations. That is what we mean by 'quality'."*



*"Take advantage of our wealth of expertise. For more than 60 years now we have been gathering experience in various fields and implementing it consistently and rigorously in our products, motion functions and pre-configured solutions for industry."*



*"The world is our marketplace. Wherever you are in the world, we are nearby, providing you with our drive and automation solutions."*

Algeria · Argentina · Australia · Austria · Belarus · Belgium · Bosnia-Herzegovina · Brazil · Bulgaria · Canada · Central America · Chile · China · Colombia · Croatia · Czech Republic · Denmark · Egypt · Estonia · Finland · France · Germany · Greece · Hungary · Iceland · India · Indonesia · Iran · Israel · Italy · Japan · Latvia · Lebanon · Lithuania · Luxembourg · Macedonia · Malaysia · Mauritius · Mexico · Morocco · Netherlands · New Zealand · Norway · Philippines · Poland · Portugal · Romania · Russia · Serbia-Montenegro · Singapore · Slovak Republic · Slovenia · South Africa · South Korea · Spain · Sweden · Switzerland · Syria · Taiwan · Thailand · Tunisia · Turkey · Ukraine · United Arab Emirates · United Kingdom/Eire · USA · Vietnam

**You can rely on our service. Expert advice is available 24 hours a day, 365 days a year, in more than 30 countries via our international helpline: 008000 24 Hours (008000 2446877).**