

# SMVector IP65 Drive

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 HVAC systems.

### Performance

Initially available in the power range 0.37kW to 2.2kW for single-phase supplies and up to 7.5kW for 3 phase supplies. Operating modes include standard and enhanced V/Hz (constant and variable Torque) operation, vector speed control and vector torque control. Motor calibration is via an auto-tune function and a range of communication options are available including DeviceNet, Modbus-RTU, LECOM, CANopen, EtherNet/IP and Profibus-DP with further options introduced progressively.

### 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 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 or the worldwide network of Lenze branches and certified distributors.



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 7.5kW)
  - 400/480V, 3 $\Phi$  (up to 7.5kW)
  - 480/600V, 3 $\Phi$  (up to 7.5kW)

### Simplicity

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

### Electronic Programming Module (EPM)

Every drive is supplied with a plug-in EPM chip. Contained in a small but tough 10mm square housing, the EPM stores the drive's parameter configuration and simplifies initial setup.

An SMVector is up and running instantly with the pre-programmed chip installed. Adding new programs to the chip is also made easy by using the hand-held EPM Programmer to interface with a PC.

The EPM chip contents can also be duplicated instantly using the EPM Programmer, allowing OEM builders to set-up drives on duplicate machines at the push of a button.



# SMVector IP65 | for tough environment applications



True IP65 protection

## 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 2.5cm nozzle at 3m) 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 (up to 7.5kW) 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 | 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. Imagine programming 20 drives in less than one minute.
- ▶ 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.



EPM Programmer



## EPM - OEM Magic!

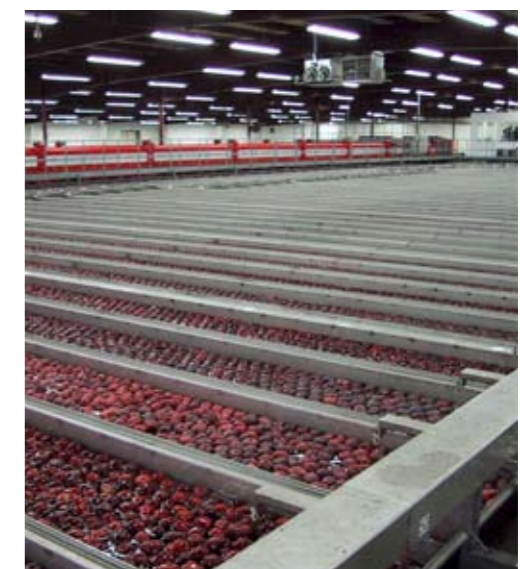
The robust plug-in EPM chip is a fantastic feature for companies using the SMVector drive in a production line product.

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 10mm 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 | specifications

## World Class Control

### Modes of Operation

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

### Performance

- ▶ 150% overload for 60 sec's  
(200% for 15 sec's)

### 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)
- ▶ Universal Logic Assertion (Selectable)  
Positive Logic Input  
Negative Logic Input

### Braking Functions

- ▶ DC Injection Braking
- ▶ Optional Dynamic Braking

### Speed Commands

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

### Process Control

- ▶ PID Modes: Direct and Reverse Acting
- ▶ PID Sleep Mode

## Vigilant System Protection

### Voltage Monitoring

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

### Current Monitoring

- ▶ Motor Overload Protection
- ▶ Current Limiting Safeguard
- ▶ Phase Loss Protection
- ▶ 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 ID
- ▶ 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)
- ▶ Analogue Output (Speed, Load, Torque, kW)
- ▶ Network Speed (Baud Rate)
- ▶ Terminal Status
- ▶ Keypad Status
- ▶ Elapsed Run Time (Hours)
- ▶ Elapsed Power ON Time (Hours)

## Environmental Capabilities

### Ambient Temperature

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

### EMC Conformance

CE EMC Directive (EN61800-3) with integral EMC filter  
(First and Second environment, category C1 and C2)

## 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 (North America)

### cUL (Canada)

CE Low Voltage Directive (EN61800-5-1) (Europe)

C-Tick (Australia/New Zealand)

GOST (Russia/Ukraine)

RoHS

# SMVector IP65 | specifications

## 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

## Benefits over a drive without an isolator are:

- ▶ Local mains power Isolator - Provides the ability to isolate the motor for maintenance and servicing.
- ▶ Isolator meets IEC 60947-3 (Low-voltage switchgear and control gear)
- ▶ Ability to “Lock-off” isolator

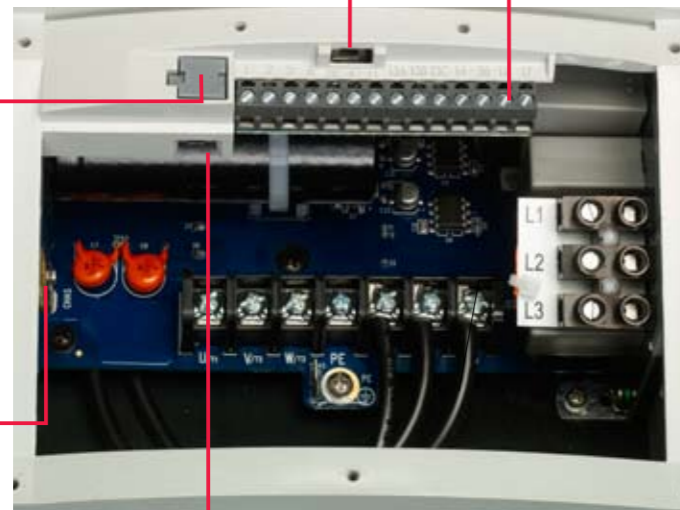


# SMVector IP65 | specifications

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

### Power Supplies

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

Removable terminal cover and steel conduit plate (not shown).  
Easy access for control and power wiring.



# 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 | ratings & dimensions

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

Model Number	Output Current	Power	Size (No integrated mains disconnect)	Size (integrated mains disconnect)
	I <sub>N</sub> [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 <sub>N</sub> [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 <sub>N</sub> [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

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

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”

## 600VAC - 3Ø Input (3Ø Output)

Model Number	Output Current	Power	Size (No integrated mains disconnect)	Size (integrated mains disconnect)
	I <sub>N</sub> [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

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.

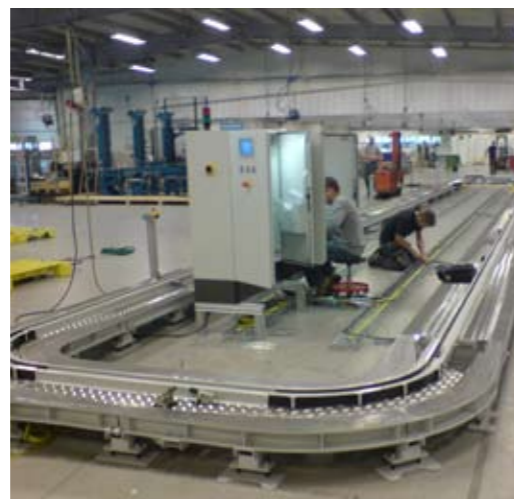
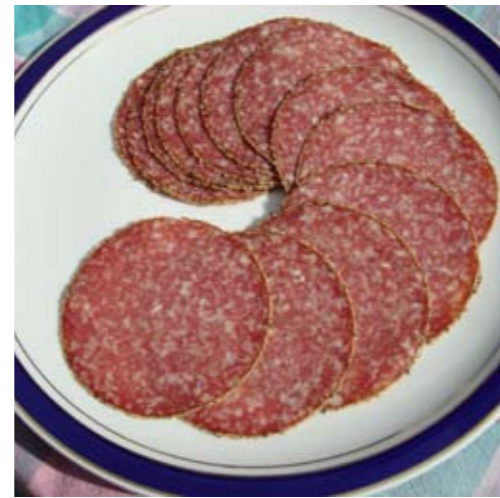
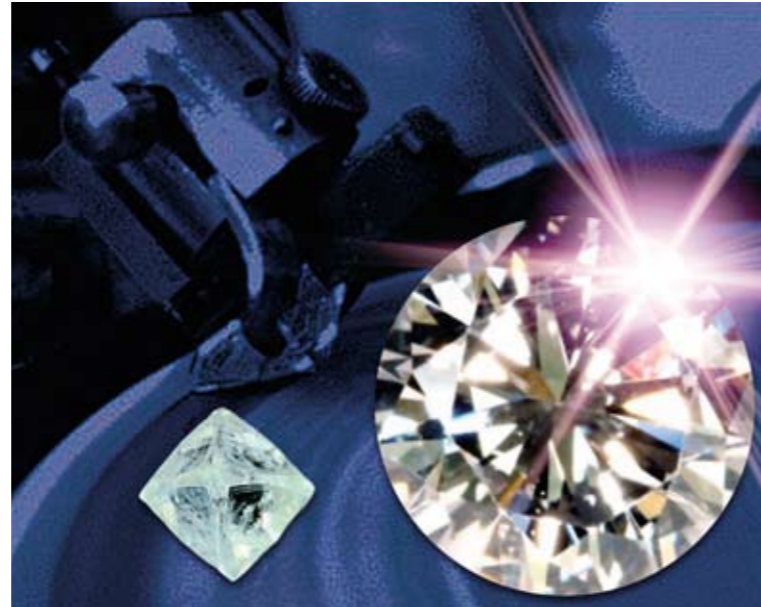
Example Part Number: **ESV371N04TXE = 0.37 kW, 400/480V, No Filter, Type E Enclosure.**



# SMVector IP65 applications

## Applications:

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

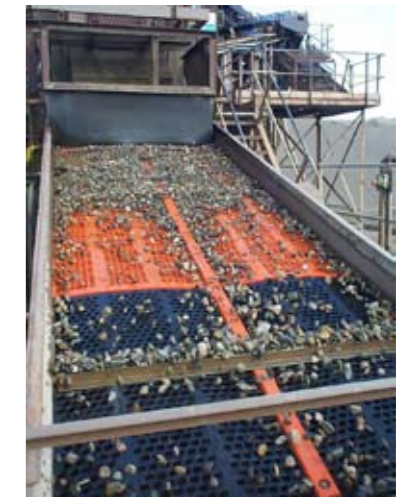


SMVector Range up to 7.5kW

# SMVector IP65 | industries

## Industries:

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



# Service | you can trust

For us, service is more than just supporting the use of our drives. Lenze offers practical application advice and shared experience.

We can help test your ideas and check any integration issues you have in order to help you reach the perfect drive solution. Lenze also offers comprehensive training, commissioning, maintenance and repairs. Our service is always at your disposal.

## Available around the world

Expert advice is available for all your technical queries from your local Lenze service support centre or Lenze distribution partner.

Our products are also available for speedy delivery worldwide. Lenze companies, Lenze factories and sales agencies are based in major countries around the world.

You can contact us and our distribution partners around the world through our website at [www.Lenze.com](http://www.Lenze.com).

The website also gives you 24-hour access to technical instructions and product manuals.

# Lenze

[www.Lenze.com](http://www.Lenze.com)

Worldwide  
Algeria  
Argentina  
Australia  
Austria  
Belgium  
Bosnia-Herzegovina  
Brazil  
Bulgaria  
Canada  
Chile  
China  
Colombia  
Croatia  
Cyprus  
Czech Republic  
Denmark  
Egypt  
Estonia

Finland  
France  
Germany  
Greece  
Hungary  
Iceland  
India  
Indonesia  
Israel  
Italy  
Japan  
Latvia  
Lebanon

Lithuania  
Luxembourg  
Macedonia  
Malaysia  
Malta  
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  
Taiwan  
Thailand  
Tunisia  
Turkey  
United Arab Emirates  
Ukraine  
United Kingdom/Eire  
USA

