

SESOTEC



Recycling

SORTING SYSTEMS

VARISORT Family

Multisensor sorting system for the Recycling Industry

Efficient sorting of various material streams

Fluctuating material availability and the associated fluctuating material quality are among the biggest challenges facing recycling companies – and can quickly impact their profitability. Our VARISORT+ Family reliably detects and separates plastic types, colors, shapes, metals and foreign objects in various material streams. Thanks to the modular plug-and-play design, it can be integrated into any production line and can also be operated with a customer-supplied conveyor belt.

Maximum productivity

Thanks to a conveyor belt with up to 4 m/s belt speed, the VARISORT+ achieves very high throughput rates (up to 8 t/h) and at the same time convinces with a reject reliability of up to 99%, even with poor material quality.

Optimized machine design

The new and improved machine design guarantees high system availability, quick and easy cleaning, and low maintenance requirements. The modular design also allows individual customer- and application-oriented solutions.



Application areas

The application areas of the VARISORT+ family are versatile. Primarily, the devices are specialized in plastic and light packaging recycling as well as metal and electrical scrap recycling.



PET recycling – plastic bottles



Mixed plastic & household waste recycling



Plastics recycling



Metal scrap recycling



E-waste recycling



The system has the following components

- A** Metal sensor: for the detection of smallest metal impurities
- B** NIR camera: for the detection of a wide variety of materials and material combinations
- C** Color camera: for the recognition of objects and different colors
- D** Blow-out system: with various nozzles for the separation of foreign bodies with precise timing and positioning
- E** Reject systems: the three-chute design enables the sorting of three material fractions simultaneously

Flexible system configuration

- Combination of up to three sensors
- Selection of different valve bars
- Four different working widths
- Operation also possible with conveyor belt provided by plant or customer

Options for maximum efficiency

- A three-chute design allows sorting of three material fractions simultaneously
- A blow-out system with a finer valve grid enables problem-free sorting of smaller material sizes
- A conveying chute matched to the sorter ensures optimal distribution of the material and a homogeneous stock flow

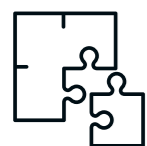
Functionality of the VARISORT+

With the flexible VARISORT+ sorting system, many different material streams can be sorted – efficiently, flexible and profitable.



Efficient

The VARISORT+ reliably detects and sorts plastic types, colors, shapes, metals and foreign objects from different material streams. It achieves a high throughput of up to 8 t/h and convinces with a reject reliability of up to 99 %.



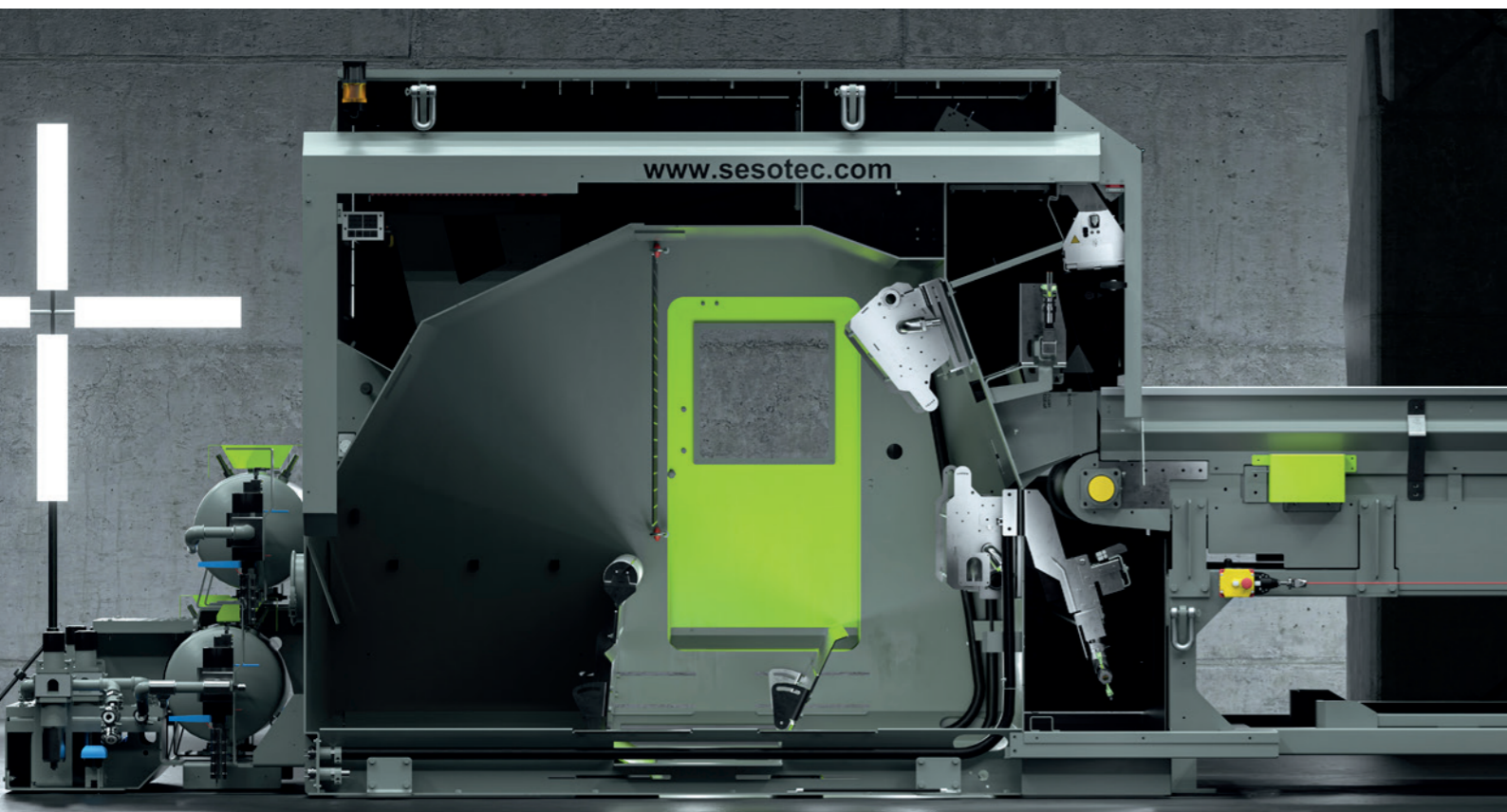
Flexible

Maximum flexibility through application-specific machine and sensor combinations. With up to three sensors and various working widths, the VARISORT+ family can be perfectly tailored to different sorting tasks and application areas.



Profitable

The VARISORT+ Family is synonymous with a profitable sorting process thanks to the best possible sorting results even with poor material quality, high system availability with low maintenance and cleaning requirements, and a flexible system configuration.

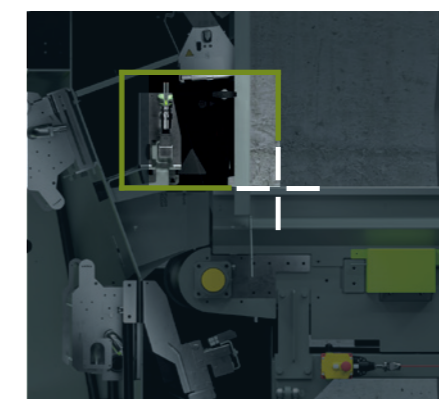


Possible configurations

C Color

High-resolution color line scan camera for approximately 17 million teachable colors combined with innovative lighting options

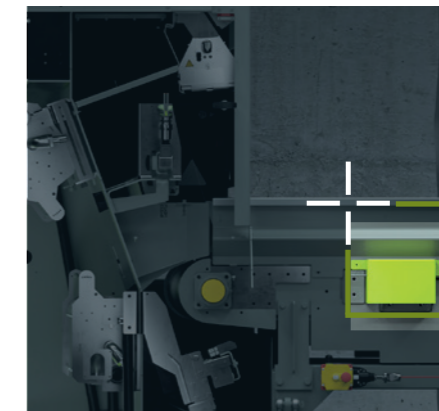
- Incident light – detection of reflection in opaque material
- Transmitted light – detection of transmission with transparent material
- Sorting by colors and shapes
- Separation of unwanted materials like e.g. silicone cartridges



M Metal

Inductive metal sensors for identification or detection of magnetic and non-magnetic metals

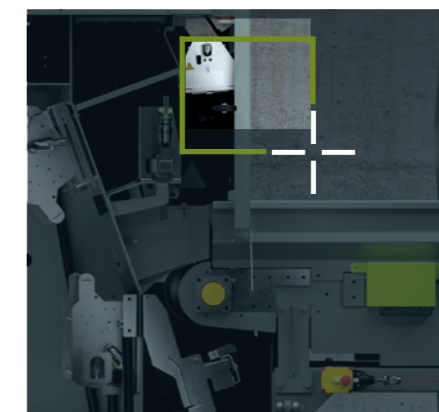
- Detection from 1 mm
- Easy to operate
- Simple sensitivity settings
- M – Detection of all metal types
- M+ – Identification of stainless steel



N NIR

Hyperspectral camera for identification of different polymer types and materials as well as for various special applications

- Detection of PET trays as well as bottle/label combinations
- Recognition of different material types (LDPE / HDPE)
- Detection of mono and multilayer materials





CASE STUDY

AI-based sorting of food-grade and non-food PET



The integration of AI in sensor-based sorting is revolutionizing the recycling industry, especially in distinguishing between food-grade and non-food-grade PET waste. The PAC2PAC project showcases the ideal recycling loop for PET packaging. In this project, Sesotec played a pivotal role in sensor-based sorting of food and non-food PET materials. High-quality food-grade PET can now be reintroduced into the cycle at a competitive price without compromising quality. The recycling loop is complete. Used packaging becomes new packaging.

Learn more here:



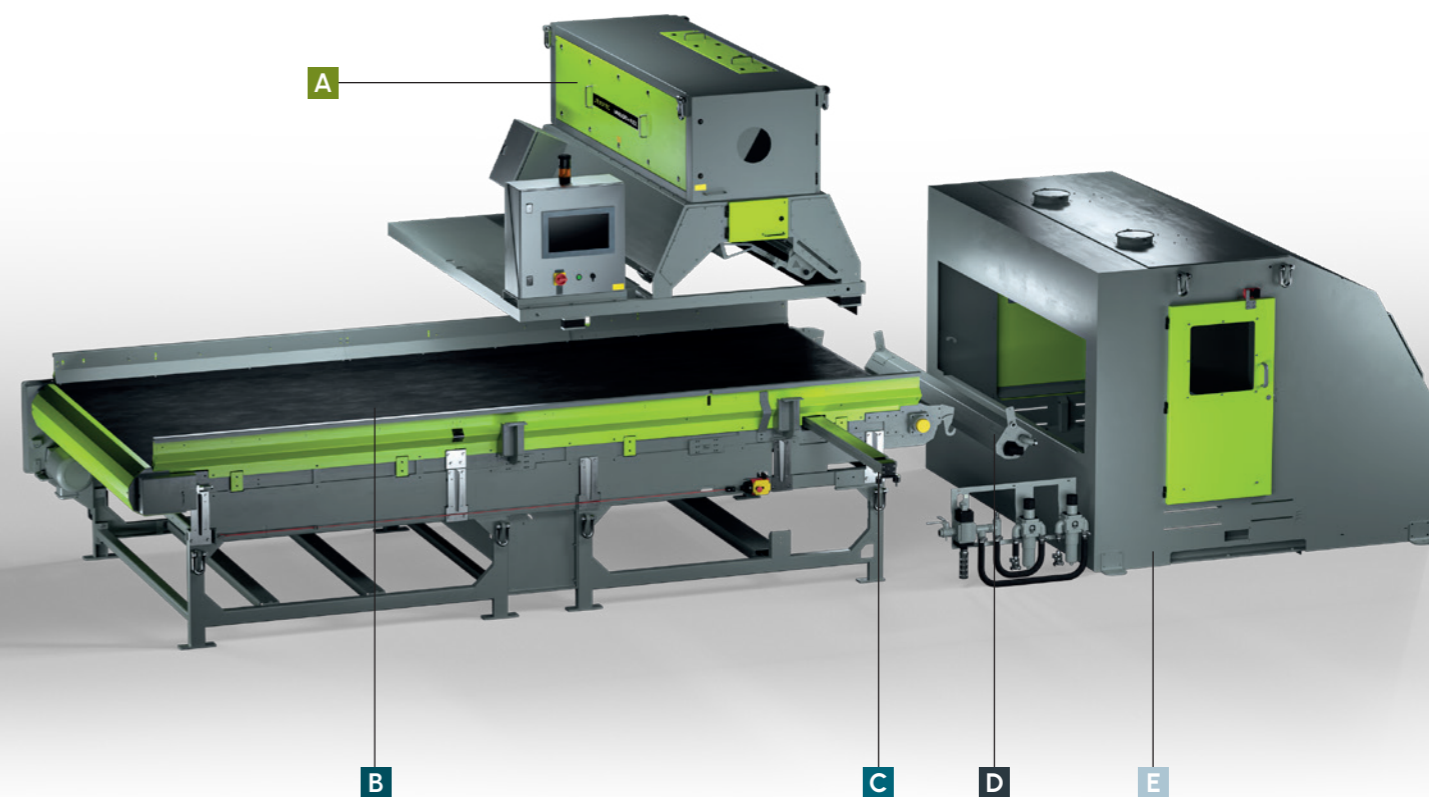
Honors to our project partners of



FLEXIBLE STRUCTURE WITH THE VARISORT+ FLEX

Integration of the sensors into existing plants

Depending on requirements, the VARISORT+ FLEX can be configured either as a complete solution with rejector housing and conveyor belt or as individual components. The VARISORT+ FLEX is particularly suitable for integration into existing plants as a renewal or upgrade and for suppliers of complete solutions in the recycling sector.



- A** Ai-assisted color, shape and NIR camera for detecting objects of a wide range of colors, shapes and materials
- B** High speed conveyor belt
- C** Metal sensor: for the detection of smallest metal impurities
- D** Blow-out system: with various nozzles for the separation of foreign bodies with precise timing and positioning
- E** Rejector housing



Driving the AiVOLUTION

ARTIFICIAL INTELLIGENCE FOR MAXIMUM SORTING PERFORMANCE

NIR-Ai: Making the invisible visible



Typical application areas

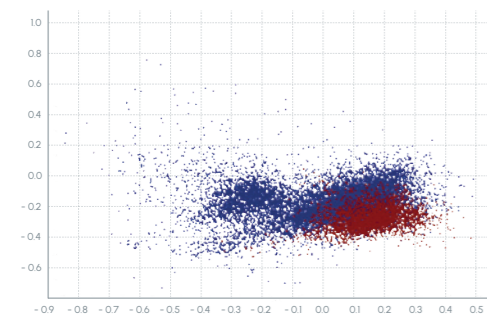
- Differentiation between PET monolayer and multilayer (tray and bottle)
- Detection of PE multilayers
- Differentiation between HDPE bottles and foamed PE
- Improved differentiation between PET and PETG (bottles and flakes)
- Recognition of various bottle-label combinations



Note:
The list of use cases can be expanded according to customer-specific requirements.

The issue:

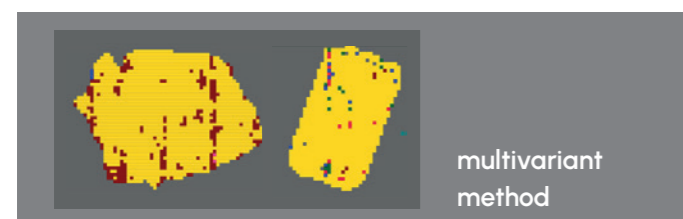
Multivariant methods reach their limits of detection accuracy when dealing with optically similar products, resulting in valuable materials being sorted out 'just to be safe'.



The point-clouds defined by the spectral analysis of the near-infrared camera must be clearly distinguishable from each other for reliable differentiation. Once strong overlaps occur, as indicated in the lefthand image, the risk of false detection increases. Valuable resources for feeding into the material cycle are lost. A typical application scenario with limits for NIR sensor technology: Monolayer and multilayer PET.

The Solution: NIR-Ai Application

Example: monolayer vs. multilayer PET trays



Thanks to Artificial Intelligence for the near infrared camera spectral analysis optically similar products can be clearly distinguished from each other. For better sorting results. For higher profitability.

Devices with NIR-Ai



NIR-Ai is available and retrofitable on all models of the VARISORT+ family

Your benefits

- Efficiency: Consistently high results in standard applications
- Quality: Differentiation of very similar polymer structures possible
- Flexibility: Retrofitting possible on all Sesotec sorting devices
- Innovation: Solution already addressing tomorrow's challenges (tray sorting, multilayer juice bottles, ...)



Driving the AiVOLUTION

ARTIFICIAL INTELLIGENCE FOR MAXIMUM SORTING PERFORMANCE

Object-Ai: Optical Sorting Perfection



The issue:

What may seem easy to recognize for the human eye pushes machine sorting of heterogeneous material streams to its limits in detecting contaminants.

The solution: OBJECT-Ai

Thanks to Artificial Intelligence specific properties are assigned to each object during color and shape analysis by the color camera. This ensures a clear classification and differentiation of good material and foreign matter based on shape, color, and texture (bounding boxes).



Legend:

- HDPE_Bottle_Labeled_Food
- Mixed_Bottle_Colored_Food
- HDPE_Bottle_White_Food
- PET_Bottle_Colored_Food
- HDPE_Bottle_White_nonFood
- Silicon_Cartridge_White_nonFood
- HDPE_Canister_Colored_nonFood
- HDPE_Cap_Colored_unknown
- Silicon_Cartridge_Black_nonFood
- Mixed_Bottle_White_Food
- PET_Bottle_Clear_Food
- Silicon_Cap_White_NonFood
- HDPE_Bottle_Colored_nonFood

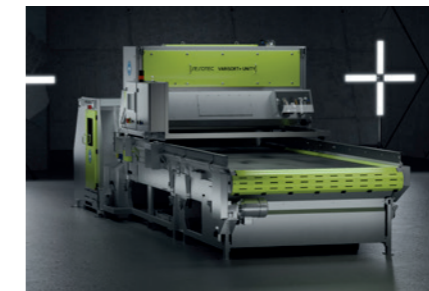
Typical application areas

- Silicone Cartridges out of PE / PP
 - Films
 - Circuit boards from WEEE/ASR materials
 - Food vs. Non-Food in various forms
- Examples of food-grade materials:
Juice and milk bottles, HDPE packaging, Squeeze bottles (butter, oil, syrup, ...), Bottle caps
- Examples of non-food materials:
Cleaning and cosmetic containers, Oil canisters, Pipes or cable casings



Note:
The list of use cases can be expanded according to customer-specific requirements.

Devices with Object-Ai



VARISORT+ UNITY



VARISORT+ FILM

Your benefits

- Efficiency: Consistently high results in standard applications
- New possibilities: Sorting of food and non-food materials
- Flexibility: Retrofitting possible on all Sesotec sorting devices
- Innovation: Solution already addressing tomorrow's challenges (tray sorting, multilayer juice bottles, ...)

PLEASED TO MEET YOU

The new VARISORT+ Family



VARISORT+

The high-end sorting system for plastic and packaging recycling

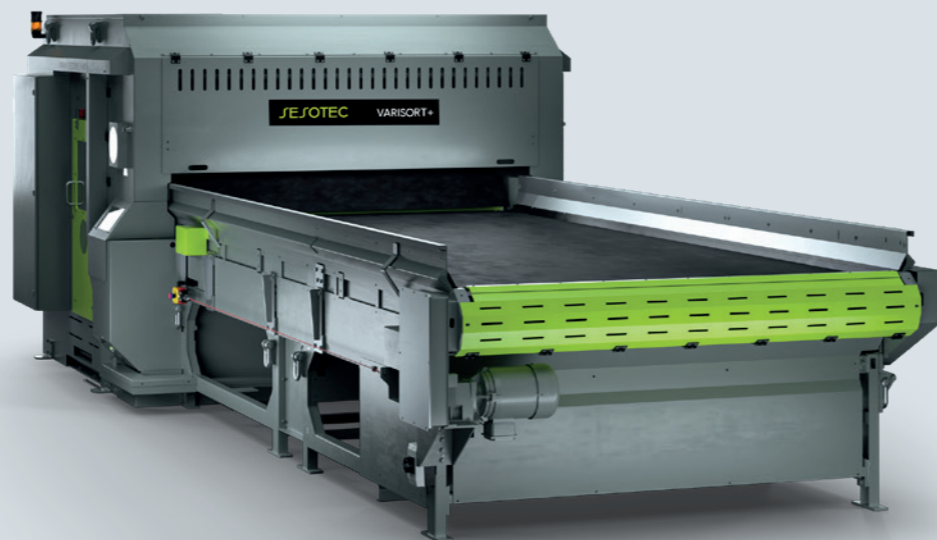
CMN	4	350 mm
Sensors	Work widths	Grain size

FLASH-Technology

Color and shape recognition in free fall:
For highest demands in color sorting and detection of transparent and non transparent material. Best material and color detection (light, white, silver, black, etc.) through the combination of signals

Optional 3-chute system

The integration of a third discharge chute facilitates the division into three distinct material streams, ensuring optimal productivity.



Optimized machine concept

The entire machine concept has been optimized once again - for highest throughputs and purities as well as the reliable ejection of black materials. The integration of the sensor system and blow-out unit into the separator housing also makes the VARISORT+ particularly compact



Application in plastic recycling

Free consultation

<https://www.sesotec.com/contact>



Application areas

The VARISORT+ FLASH sets new standards in PET bottle recycling where maximum color purity is essential. Designed for use at the end of the bottle sorting line, its unique FLASH sensor technology enables exceptionally precise differentiation between transparent and non-transparent PET bottles. Unlike conventional systems, VARISORT+ FLASH reliably detects special colors such as silver and gold, which are often difficult to identify.

This high level of accuracy ensures high-purity PET fractions, minimizes contamination, and makes the VARISORT+ FLASH the ideal solution for recyclers aiming for premium-quality output and maximum process reliability.

Technical data

Working width [mm]	1024	1536	1920	2816
Throughput up to [t/h]	3	4.5	6	8
Number of valves	64/40	96/60	120/75	160/110
Valve pitch [mm]	16/25.6	16/25.6	16/25.6	17.6/25.6
Suitable grain sizes [mm]	15-350			
Power [max. KVA]	2-4			
Temperature range	+5 °C up to +40 °C			
Protection class	IP54			

Options

Conveyor belt length	3 m, 4.4 m or 6.2 m conveyor belt with a speed of up to 4 m/s for optimum distribution and separation of the elements in the material flow to increase throughput
Three-chute version	Additional third chute and second valve bar for sorting the material flow into three fractions
Valve grid	Alternative valve pitch possible for certain sorting applications
Sensor upgrade	Pre-wiring for possible sensor upgrade
M+: selective metal sensor	Selective inductive multi-channel detection coil for detection of stainless steel, steel and non-ferrous metal
Vibratory feeder chute	Vibratory feeder for optimal distribution and separation of the elements of the material flow
Cooling system	Vortex cooling for use in environments with high temperatures
Roll vertex	Roll vertex on the separator plate to avoid material accumulation
Belt cleaner	Rotating brush under the conveyor belt for cleaning the belt
Device division	For parallel sorting of two different material streams or for 2-stage sorting

VARISORT+ WEEE

The high-end sorting system for metal & electrical scrap recycling

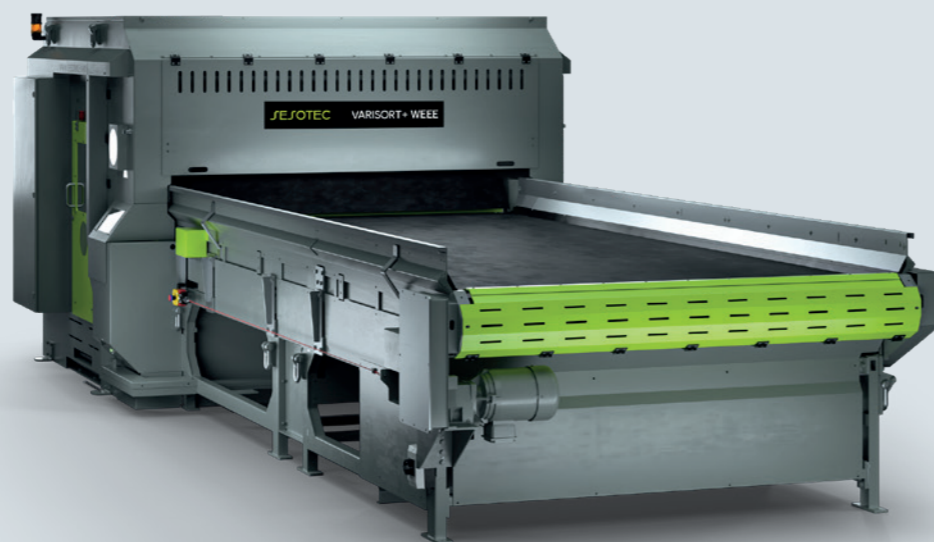
CMN	4	250 mm
Sensors	Work widths	Grain size

Inverse sorting technology

One of the special features of the VARISORT+ WEEE is the inverse sorting. The combination of camera and metal sensors enables very high degrees of purity in the sorting of electronic scrap while optimizing the consumption of energy and compressed air

M+ coil

A multi-channel inductive stainless steel detection coil enables the highly precise detection of stainless steel materials (16 mmx30 mm)



Flexible sensor combination

All existing sorting sensors can be combined within one machine, depending on the sorting requirement: a color camera for detecting different types of material by color, shape or size, a NIR camera for distinguishing the different polymers and an inductive metal sensor for detecting all types of metal



Sorting system for metal & electric scrap recycling

Free consultation

<https://www.sesotec.com/contact>



Application areas

Sensor combination/application	M	M+	C	CM(+)	CN	CM(+N)
Metal detection	+++	+++	+	+++	+	+++
Non-metal detection				+++	+	+++
Cable detection	+	+	++	+++	++	+++
Stainless steel detection		+++		(+++)		(+++)
Copper-aluminium distinction			++	+++	++	+++
Circuit board detection		+		++		++
Zorba factions upgrade			+	+++	+	+++
Processing of engineering plastics				+	++	+++

Technical data

Working width [mm]	1024	1536	1920	2816
Throughput up to [t/h]	3	4.5	6	8
Number of valves	128	192	240	320
Valve pitch [mm]	8	8	8	8.8
Suitable grain sizes [mm]	10–250			
Power [max. KVA]	4–8			
Temperature range	+5 °C up to +40 °C			
Protection class	IP54			

Options

Device division	For parallel sorting of two different material streams or for 2-stage sorting
Conveyor belt length	4.4 m or 6.2 m conveyor belt with a speed of up to 4 m/s for optimum distribution and separation of the elements in the material flow to increase throughput
Valve grid	Alternative valve pitch possible for certain sorting applications
Sensor upgrade	Pre-wiring for possible sensor upgrade
M+: selective metal sensor	Selective inductive multi-channel detection coil for detection of stainless steel, steel and non-ferrous metal
Vibratory feeder chute	Vibratory feeder for optimal distribution and separation of the elements of the material flow
Cooling system	Vortex cooling for use in environments with high temperatures
Roll vertex	Roll vertex on the separator plate to avoid material accumulation
Film chute	Foil chute between conveyor belt and separator housing for separation of light material
Belt cleaner	Rotating brush under the conveyor belt for cleaning the belt

VARISORT+ UNITY

The versatile sorting system for recycling plastic packaging and MSW applications

CMN	4	350 mm
Sensors	Work widths	Grain size

Modular concept

Depending on the sorting task and requirements, the VARISORT+ UNITY is available as a complete solution with separator housing and conveyor belt, or as VARISORT+ FLEX, a separate sensor attachment for existing sorting lines



Ai with added value

Previously unidentified or difficult-to-identify contaminants are reliably detected within the material stream, depending on the application, thanks to Sesotec Object-Ai and/or NIR-Ai, and sorted by the air blast nozzles

Optimized hardware design

By the optional three chute design and second blasting bar the material flow can be divided into three separate streams with just one device, thereby increasing productivity



Flexible sensor technology for plastic and rigid packaging recycling

Free consultation
<https://www.sesotec.com/contact>



Application areas

Sensor combination/application	C	CN	CM	CMN	N	MN
Bottle recycling	+	+++	+	+++	++	++
Mixed plastics (PS/PE/PP)	+	+++	+	+++	++	++
MSW	+	+++	+	+++	++	++
Color sorting	+++	+++	+++	+++		
Metal detection					Option (M): Metal sensor	

Technical data

Working width [mm]	1024	1536	1920	2816
Throughput up to [t/h]	3	4.5	6	8
Number of valves	64/40	96/60	120/75	160/110
Valve pitch [mm]	16/25.6	16/25.6	16/25.6	17.6/25.6
Suitable grain sizes [mm]	15-350	15-350	15-350	15-350
Power [max. KVA]	3.5	3.65	3.8	4.5
Temperature range	+5 °C up to +40 °C			
Protection class	IP54			

Options

Split machine	Splitting of the sorting machine for sorting two different material streams in parallel or for 2-step-sorting
3rd chute	Additional 3rd chute and 2nd valve bar for sorting the input material into 3 fractions
Valve grid	Other valve grids possible depending on type of sorting application
Sensor upgrade	Pre-wiring for future integration of additional sensors
M+: Selective metal sensor	Selective, inductive multi-channel detection coil for detection of stainless steel, steel and non-ferrous metal
Roller splitter	Roll vertex on the separator plate to avoid material accumulation
Cooling system	Vortex cooling for use in environments with high temperatures
VISUDESK system visualization software	Web-based visualization of sorting systems using OPC UA
Belt scraper	Rotating brush below the conveyor belt to keep the belt clean
Vibratory feeder	Additional vibratory feeder for the sorting device for optimum distribution and separation of the elements in the material flow

VARISORT+ FILM

The efficient sorting system for film and light packaging recycling

CMN	4	400 mm
Sensors	Work widths	Grain size

Optimal material conveyance

Flexible packaging and films are stabilized by a device generated laminar air-flow, allowing for both reliable detection and sorting. At the same time, throughput can be significantly increased compared to sorting on conventional sorting machines



Maximum efficiency

Air turbulence within the ejection unit is a thing of the past thanks to the aerodynamic ejection unit design of the VARISORT+ FILM

Safe and proven

The VARISORT+ FILM is based on the extensively deployed and reliable Sesotec sensors. These ensure low-maintenance and error-free production around the clock

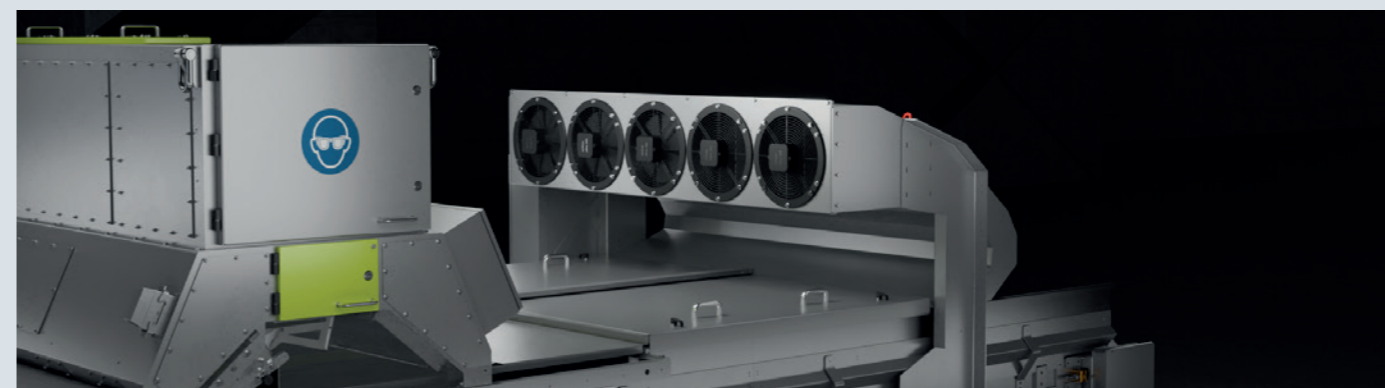


Flexible sensor technology for film and light packaging recycling

Free consultation
<https://www.sesotec.com/contact>



Detail: Unit for generating laminar air flow



Technical data

Working width [mm]	1024	1536	1920	2816
Throughput up to [t/h]	Material dependent			
Nozzle count	128	192	240	352
Nozzle grid [mm]	8	8	8	8
Suitable material sizes [mm]	100–400			
Power [max. KVA]	3.8	3.95	4.1	4.8
Temperature range	+5 °C up to +40 °C			
Protection class	IP54			

Options

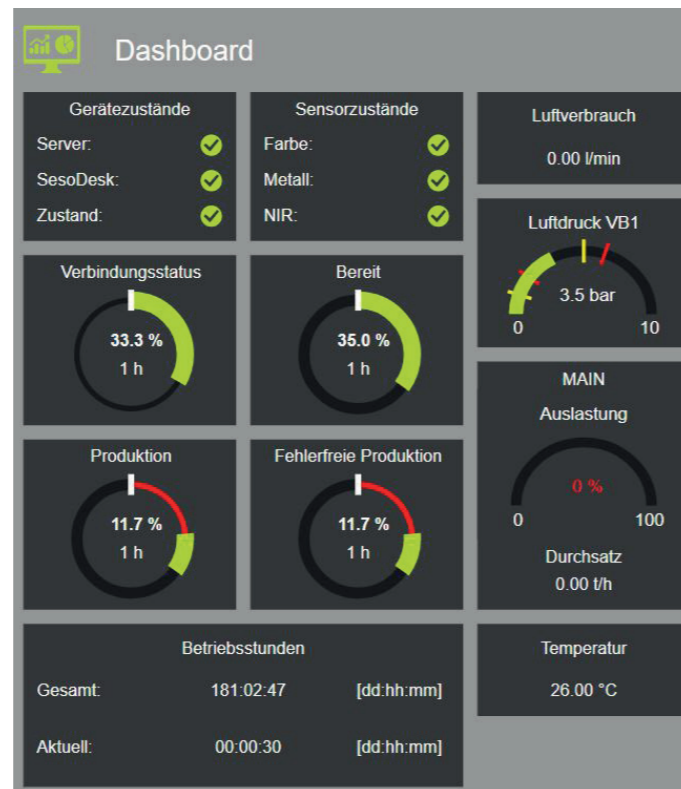
Sensor upgrade	Pre-wiring for future integration of additional sensors
M+: Selective metal sensor	Selective, inductive multi-channel detection coil for detection of stainless steel, steel and non-ferrous metal
Conveyor belt length	6 m conveyor belt
Cooling system	Vortex cooling for use in environments with high temperatures
VISUDESK system visualization software	Web-based visualization of sorting systems using OPC UA
Disk spreader	Disc spreader for optimum distribution and additional breaking up of the input flow

VISUDESK

To improve product quality and the efficiency of sorting and recycling plants, process data is essential for operators. With the VISUDESK visualization software, this data can be easily and clearly displayed on all Sesotec equipment. Based on this data, they can derive targeted measures to increase efficiency and effectiveness on the one hand and minimize downtimes on the other. The OPC UA-based machine communication model is implemented both on the devices and on a server and thus enables both stationary and mobile access to the application.

Advantages of VISUDESK

- Control of the sorting process
- Optimization of the sorting system
- Predictive maintenance
- Reduction of downtime
- Fact-based decisions

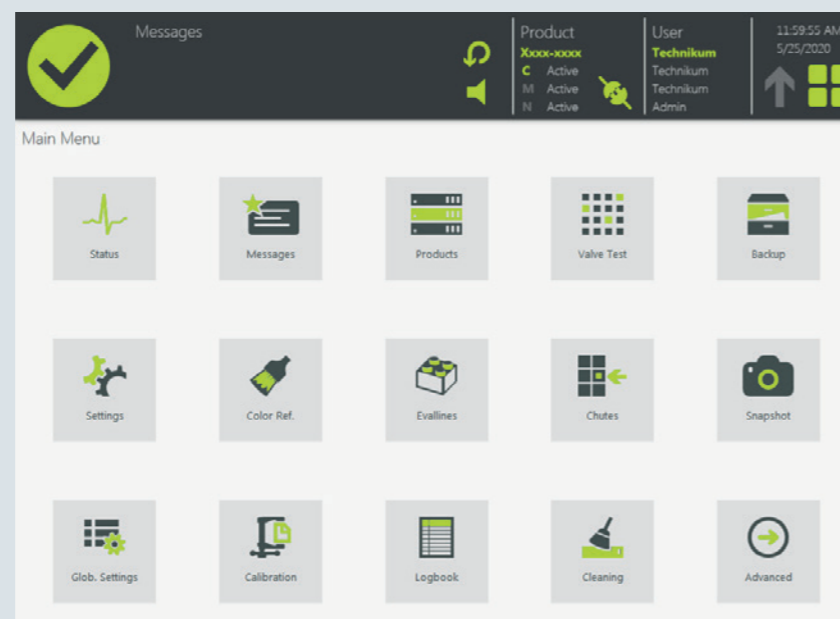


Dashboard visualization of process data, valve data, evaluation data and material data

SesoDesk

Our SesoDesk operating software allows for intuitive and fast configuration of all sorting devices for each application.

- Modern design
- Error/status messages
- Intuitive operation
- Logbook
- Integrated remote maintenance
- Predictive maintenance



Main menu of the SesoDesk user interface

Fast and reliable service



Phone support

Many questions and incidents can be solved by phone. Our free telephone support is available for you daily from 6 am to 8 pm, on weekends from 8 am to 5 pm.

Service Hotline Sorting
+49 (0) 8554 308-129
service.sorting@sesotec.com



Remote Access

Sesotec service technicians have direct access to your machines via Ethernet connection and can perform error analyses, optimizations and parameter settings.



Augmented Reality

In addition to telephone support and remote access, Sesotec also offers video-based support with augmented reality. This is done via the TeamViewer Pilot App.



Want to learn more about our technology for recycling industries?

Get in touch with us directly! We look forward to advising you. You can reach us at:

+49 (0) 8554 308-0 www.sesotec.com

Imprint

SESOTEC

Sesotec GmbH
Regener Strasse 130
D-94513 Schönberg

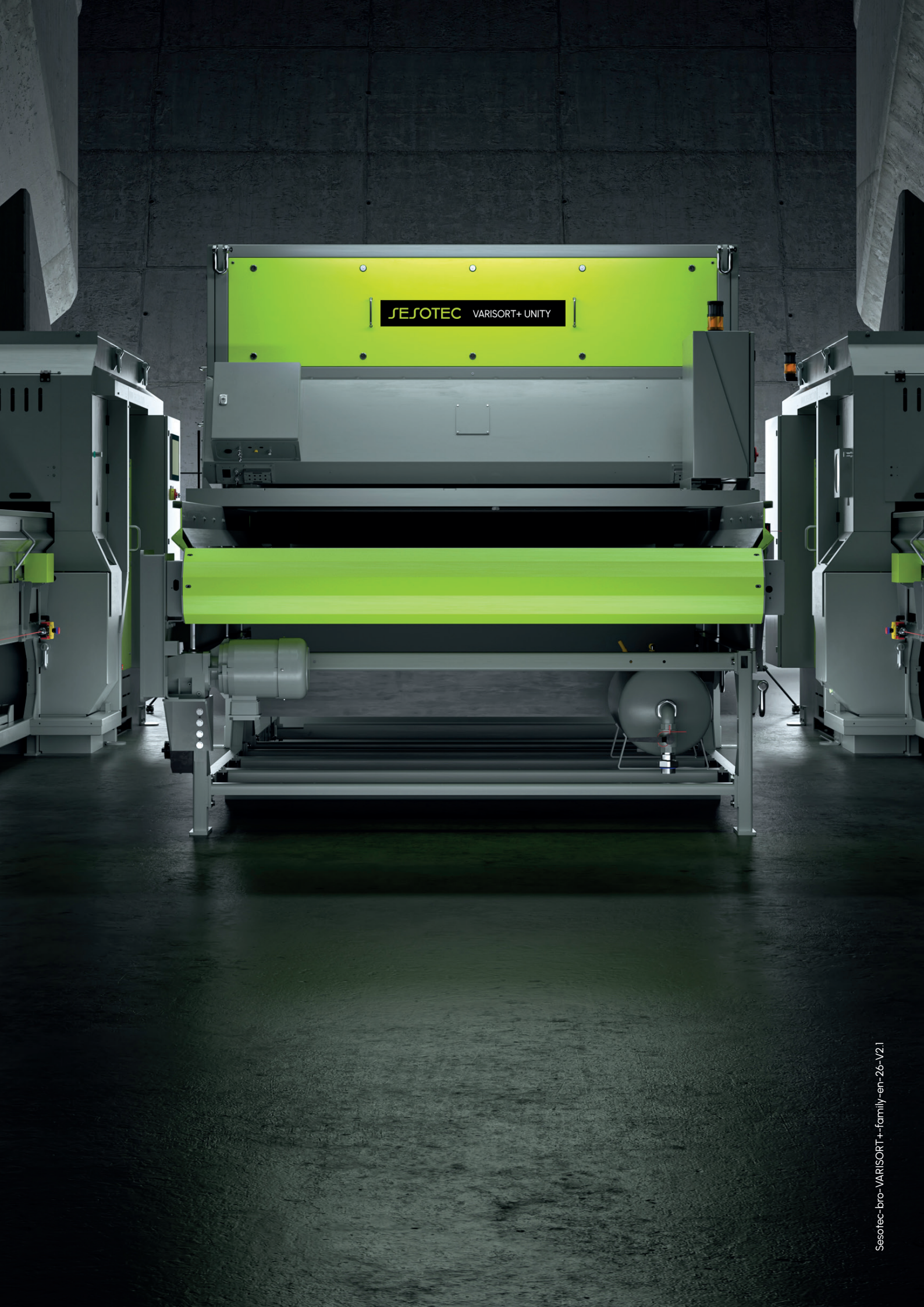
Phone: +49 (0) 8554 / 308-0
Mail: info@sesotec.com
Website: www.sesotec.com

Managing Director:
Joachim Schulz | CEO
Niklas Burkart | CFO

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SESOTEC VARISORT+ UNITY