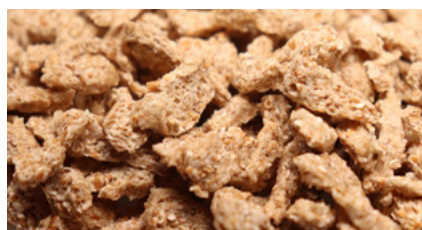
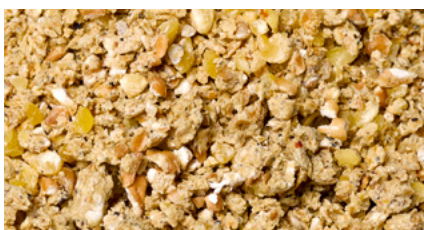
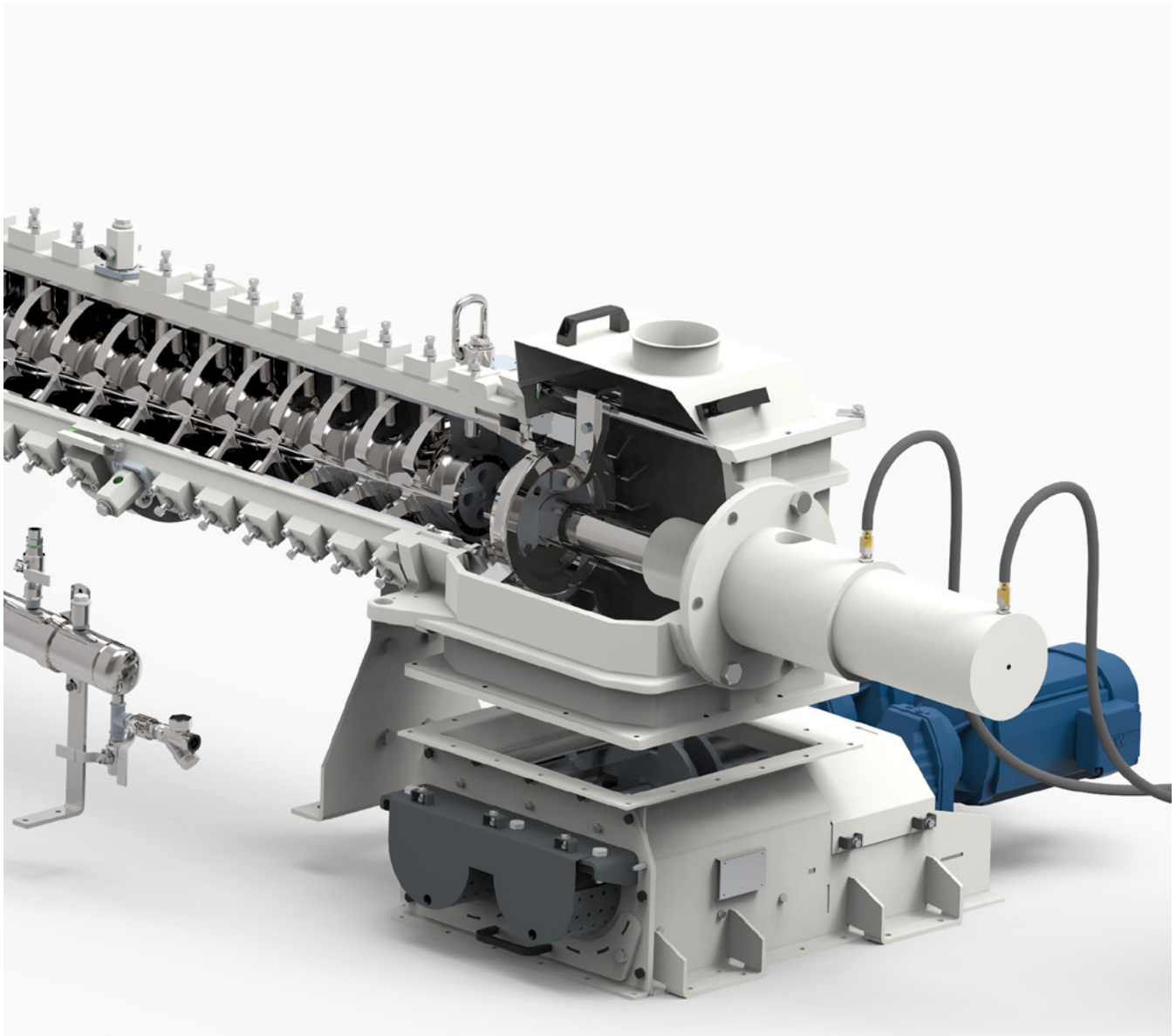


# EXPANDER

PRESSURE CONDITIONING BY AMANDUS KAHL





# AMANDUS KAHL ACCOMPANIES YOU

on your way to the right decision

AMANDUS KAHL has developed and launched the expander for the feed industry and has since been an international pioneer in design, manufacturing and distribution. The expander is an important factor for high-quality and hygienic feed production. The expander is not only used for feed mixtures, but also for the specific modification of starch and for the processing of individual components such as soya.

AMANDUS KAHL expanders have been used successfully for decades. This is due in particular to the use of tools tailored to requirements, effective hygienisation and optimum control of the annular gap. The decision to invest in an expander is also a decision in favour of quality, economic efficiency and an improvement of the nutritional value.

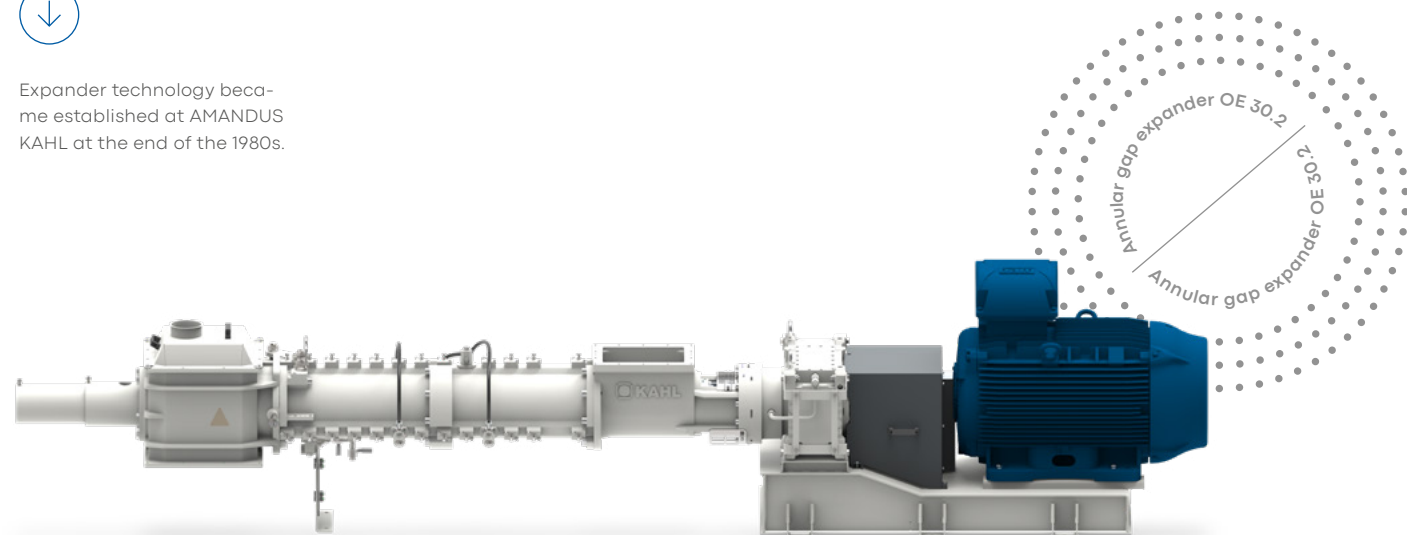
AMANDUS KAHL has been active in mechanical and plant engineering for more than 140 years. The focus is on machines for the production of feedstuff, for processing biomasses and conditioning recycling products.

Founded in 1876, AMANDUS KAHL supplies key machines such as pellet mills, expanders, extruders or crushing roller mills that take feed quality to a whole new level.

At our site in Reinbek in northern Germany, we not only design and manufacture, but also conduct research and development as well as product tests in our own pilot plant.



Expander technology became established at AMANDUS KAHL at the end of the 1980s.



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# EXPANDER

The expander technology is one of the best and most comprehensive conditioning methods for compound feed and monocomponents



↑ Expanded product

The KAHL expander plays a key role in the production of high-quality feed. Expanding the feed mixture prior to pelleting increases the efficiency of the pellet mill and the pellet quality. Pathogenic germs, such as salmonellae or moulds, are eliminated by the treatment in the expander. The precisely controllable process ensures gentle treatment of value-determining ingredients such as proteins, vitamins or enzymes. Furthermore, high quantities of liquids such as fat, molasses and vinasse can be added to the process.

The expander also shows its strengths in the processing of monocomponents. Variable pressure and temperature settings enable specific treatment, e.g. with regard to starch modification and the reduction of inhibitors.

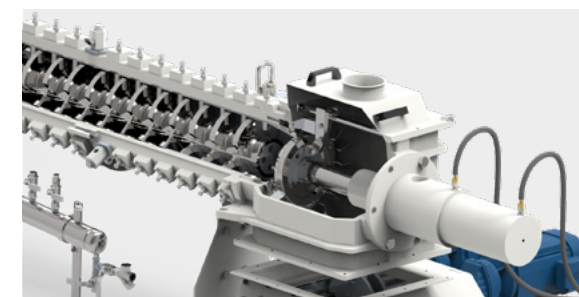
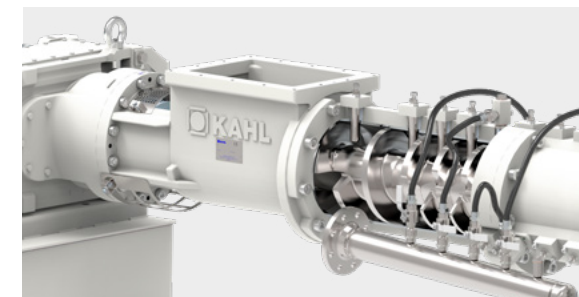
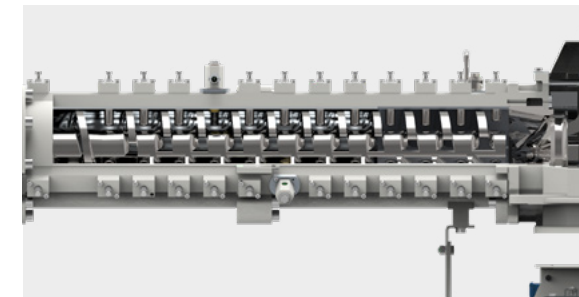
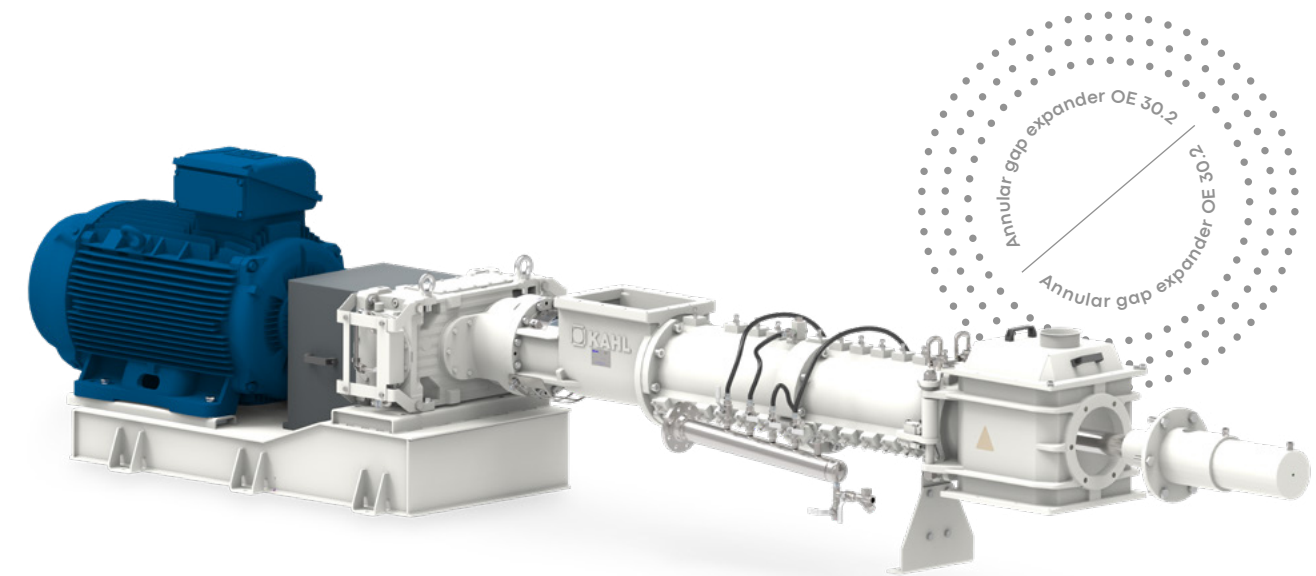
Interested parties and customers can test the expander technology in the KAHL pilot plant. A team of test engineers, nutritionists and manufacturers will share their expertise and experience with you.

## Advantages of expansion

- Improved pellet quality and higher pellet mill capacity
- Use of monocomponents which are difficult to process
- Addition of large quantities of liquids
- Inactivation of harmful substances
- Elimination of salmonellae
- Improvement of the feed value
- Production of expanded product
- Reduction of the production costs

## A significant added value for

- Animal nutrition
- Animal health
- Animal welfare
- Production process



The expander consists of a thick-walled mixing tube with replaceable liners and a cantilevered shaft which is provided with proportioning, mixing and kneading elements. The hydraulically adjustable cone at the outlet together with the outlet ring form the patented annular gap, which is why the KAHL expander is also called annular gap expander.

By adjusting the cone during operation, pressure, kneading intensity, product heating and energy consumption can be controlled and programmed continuously and instantaneously.

The usual pressure ranges from 5 to 120 bar; the usual operating temperatures at the expander outlet range from 90 to 130 °C. At the outlet, the pressure drops spontaneously, the product expands, and a part of the added water evaporates (flash evaporation).

Post-drying is not required for feed mixtures. The particle size of the expanded product can be determined by means of the downstream crushing device.





# CROWN EXPANDER

Expansion and agglomeration of your products  
in just one machine

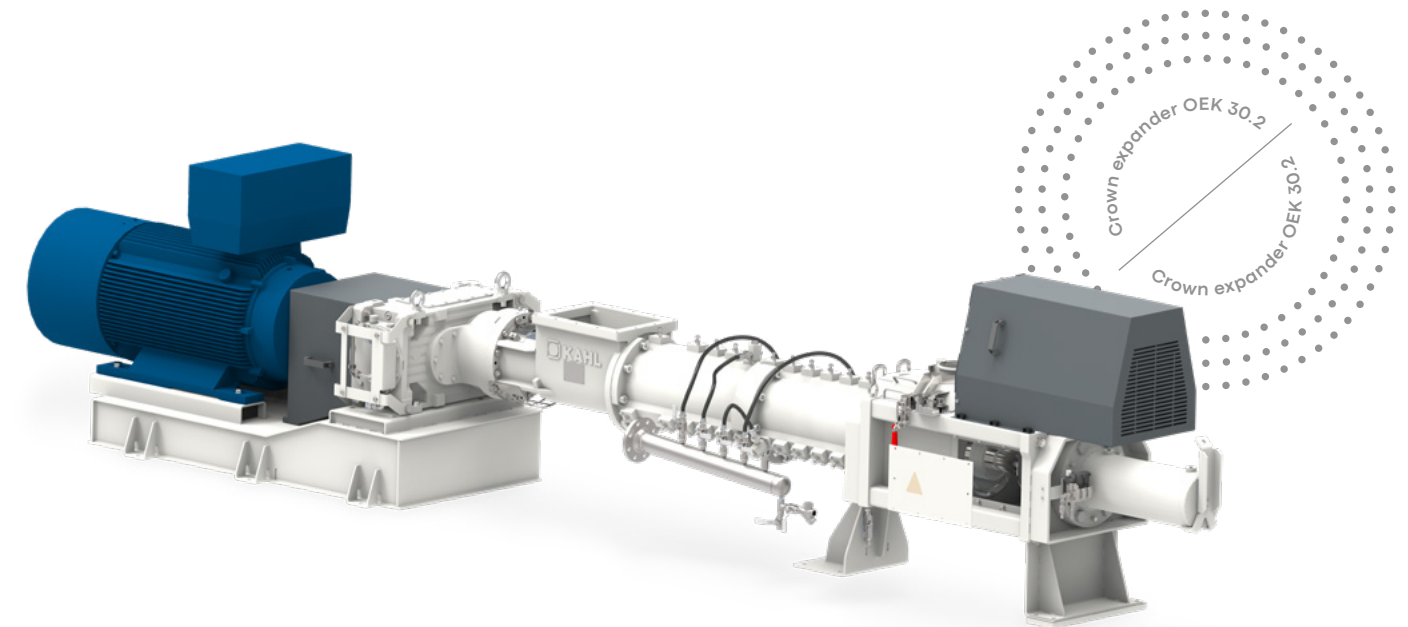


↑ Expanded product from the KAHL crown expander

The technical design of the crown expander is identical to that of a conventional expander, with one exception: there is a crown at the outlet of the machine through which the product to be expanded is pressed. The product is then cut off directly. The crown expander technology increases the product quality, the economic efficiency in compound feed production and the variability of the treatment of monocomponents.

## Advantages of the crown

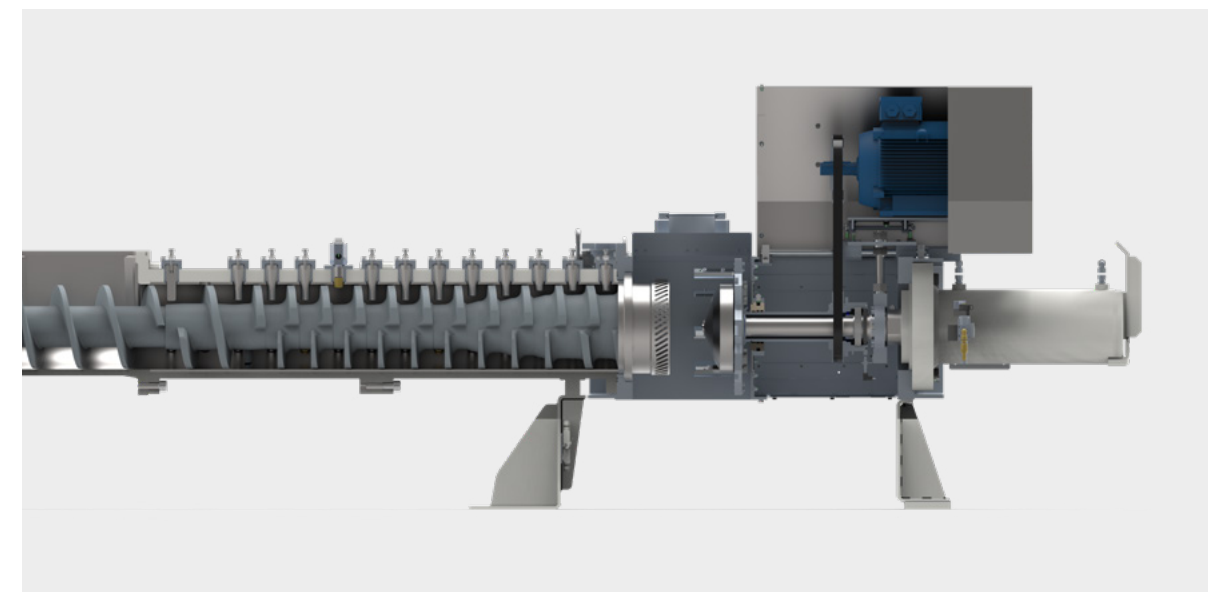
- 3 in 1: expansion, agglomeration and cutting off
- Significant improvement of the flexibility of expansion (SME control with hydraulically adjustable cone)
- Existing expanders can be modified to crown expanders
- Coarse particles remain coarse
- Control of the cone position
- Variable adjustment of knives and knife speed



## Monocomponents

With the crown expander, expansion of monocomponents with low to medium moisture is possible. Moreover, the use of a crown expander ensures high quality processing of the monocomponents and their adaptation to the animals' needs. A high degree of variability can be achieved without changing tools thanks to the flexible and adjustable crown gap. Furthermore, it is possible to process different products one after the other without interruption.

Specific results can be obtained regarding starch modification in maize, the reduction of trypsin inhibitors in full-fat soy and much more. This is enabled by the precise control of the expansion intensity. The particle size of the expanded product can be directly influenced by the number of knives and the speed of the cutting device.



↑ Cross section of the crown expander



# OIL MILL EXPANDER

Efficient, controllable and highly economical



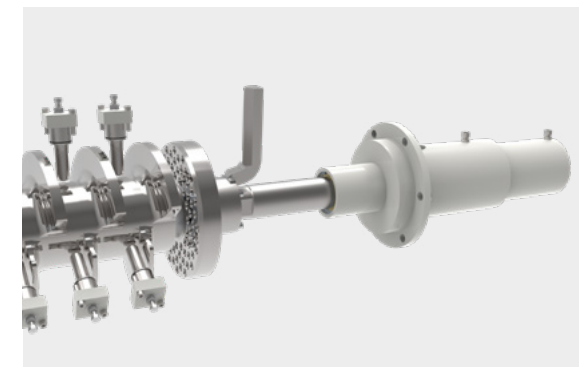
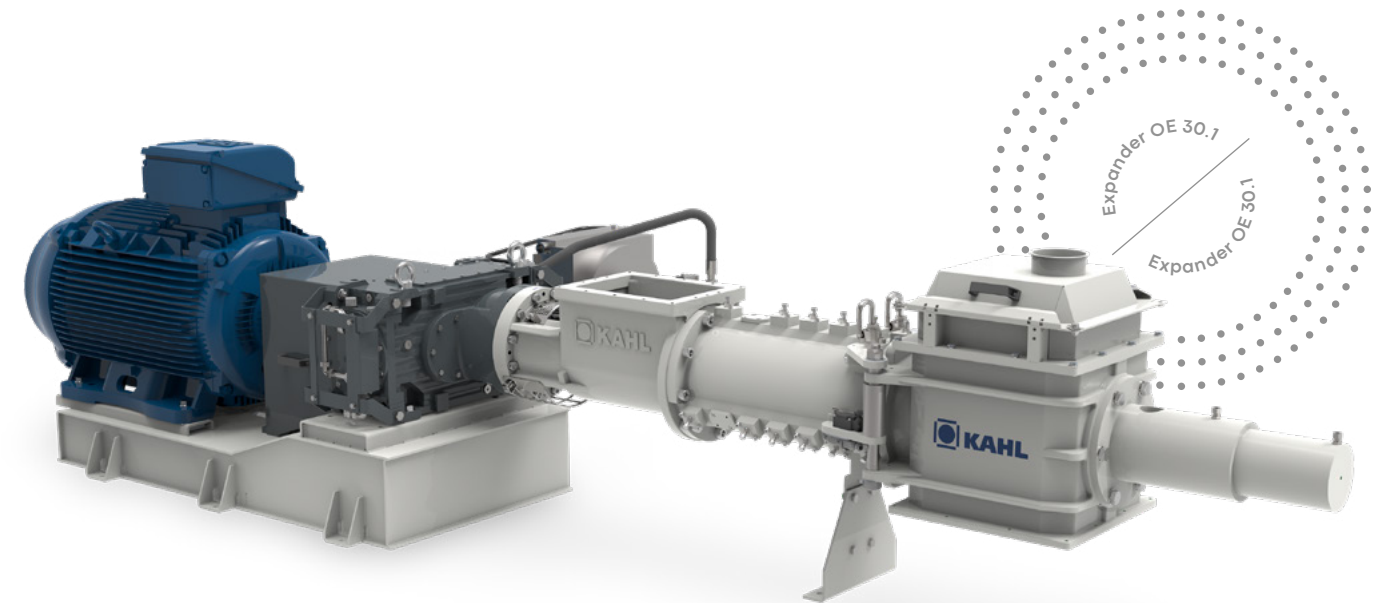
↑ Soy flakes

With the Kahl expander, oil mills can either increase the extraction capacity without increasing the size of the existing units, or improve the efficiency with an unchanged plant capacity.

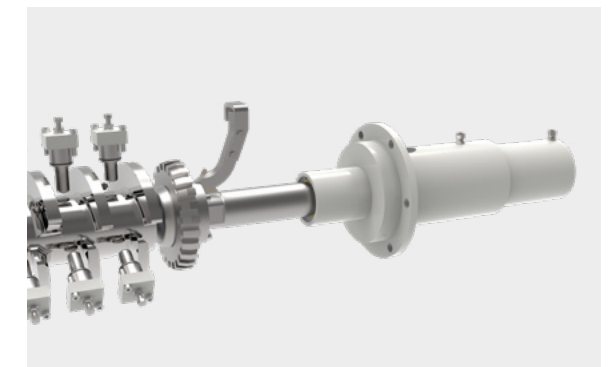
To improve the extraction results, the crushed, heated or flaked oilseeds are conditioned in the expander prior to being fed into the solvent extractor. Due to the mechanical friction in the expander, the cells are crushed, which results in a reduction of the capillary action of the seed. The capillary action prevents the exchange of hexane and oil. The product temperature is controlled by variable steam supply.

## Advantages of the oil mill expander in oil milling

- High-quality and robust machine
- Very good process control
- Adapted conditioning
- Increased extraction yield
- Reduction of solvent losses
- Reduction of the steam consumption for the hexane evaporation in the toaster
- Reduction of fines in the extractor
- Improved refining of the oil due to the reduction of mucilage
- High oil quality due to the reduced residual phosphatide content
- Operational reliability due to automatic operation and continuous adjustment of the counterpressure in the annular gap
- Higher lecithin yield of soybean oil



↑ Outlet of the expander OEO 38.3



↑ Outlet of the expander OEO 30.3

## Characteristics of the expanded product

The expansion that takes place when the product leaves the expander makes the material porous, so that a good solvent exchange takes place and thus a good extraction result is achieved. Despite the expansion, the bulk density of the press cake is higher after expander treatment than that of the flakes before. This increases the filling degree of the extractor.

A cone is pressed hydraulically into the circular outlet opening.

Depending on the preset pressure, a narrower or wider annular gap is automatically adjusted, so that the working conditions are kept constant. For easy starting and stopping, the cone is hydraulically adjustable.

This simple system makes the expander less prone to failure and permanently operational.

The machine is robust and designed for continuous 24-hour operation.



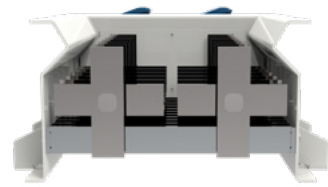


# CRUSHER

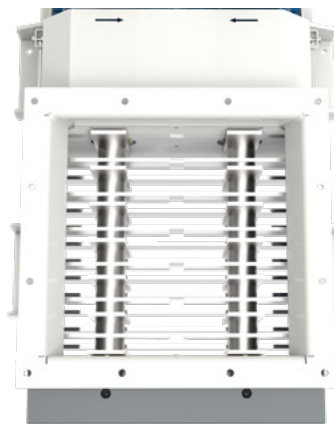
Basic crushing machine for expanded products



↑ Used for expanded products that are easy to crush



↑ Front view



↑ Top view

Type	BE 23/30	BE 30/38
Length (mm)	1260	1610
Height (mm)	350	500
Width (total) (mm)	722	1036
Width (case) (mm)	630	950
Motor (kW)	2×5.5/7.5	2×11–15
Weight (kg)	350	750

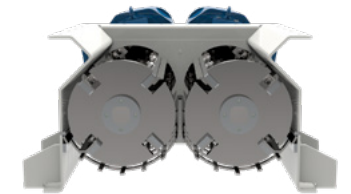


# STRUCTURIZER

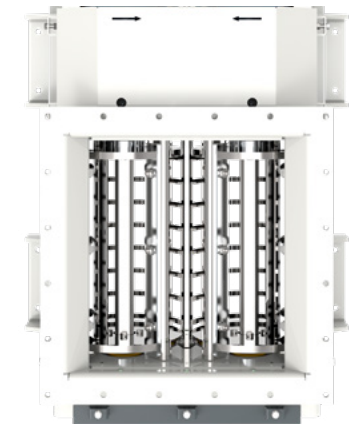
Standard crushing machine for a wide range of expander applications



↑ Used for a variety of compound feed productions. The screens ensure an adapted structure.



↑ Front view



↑ Top view

Type	SE 23/30	SE 30/38
Length (mm)	1460	1760
Height (mm)	350	500
Width (total) (mm)	702	1036
Width (case) (mm)	610	950
Motor (kW)	2×5.5/7.5	2×11–15
Weight (kg)	430	860

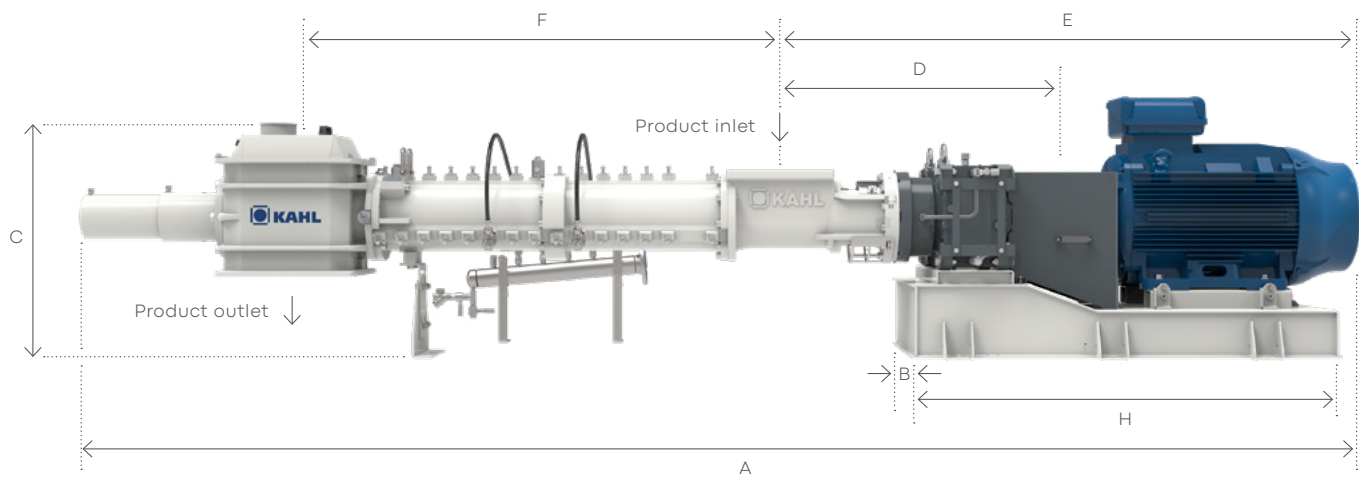


# EXPANDER

## Machine sizes

Standard Version	OE 8	OE 15.1	OE 15.2/OEK 15.2	OE 23.1
A Overall length* (mm)	2690	5065	5785/5922	4908
B Width of drive (mm)	950	690	690	1020
C Height (mm)	1930	875	875/1220	1005
D Coupling – inlet (centre) (mm)	—	1816	1816	1284
E Inlet – motor* (mm)	1334	2904	2904	2650
F Inlet – outlet (centre) (mm)	670	1254	1974/1832	1340
H Frame (mm)	1831	1400	1400	1822
Motor (kW)	15–18.5	75–110	75–110	160–200
Weight (kg)*	1050	2500	3100/3200	3400

\*Depending on the motor size

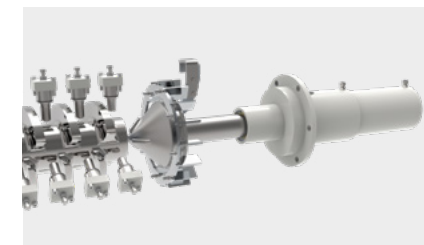


Deviations in the dimensions of the OE 8



OE 23.2/OEK 23.2	OE 30.1	OE 30.2/OEK 30.2	OE 38.1L	OE 38.2
5668/6117	5080	5850/6315	6413	6800
1020	1020	1020	1370	1370
1005/1400	1005	1005/1400	1190	1190
1284	1284	1284	1502	1502
2650	2855	2855	3540	3540
2100/1989	1388	2158/2030	1920	2310
1822	1822	1822	2155	2155
160–200	250–315	250–315	400–520	400–520
4000/4300	4550	5050/5500	8300	8500

### Standard outlet



↑ OE 30.2

### Crown outlet



↑ OEK 30.2

### Outlet of oil mill version



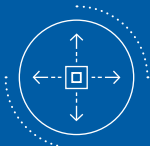
↑ OEE 30.3

# ADVANTAGES OF THE KAHL EXPANDER



## Advantages offered by the machine

- Hydraulically adjustable annular gap/crown gap
- Long service life and low wear
- High robustness
- Stop bolts and paddles for optimum mixing and kneading
- Low operating costs
- Easy handling
- Quick and easy tool change
- Low space requirement
- Different drives
- Low noise
- Large outlet area for the expanded product
- Different operating modes thanks to the KAHL control system (constant pressure, constant energy supply, position, ...)
- Low maintenance, remote diagnosis possible
- Liquids can be added during the process



## Advantages for the expanded products

- Increased pellet quality and throughput when using pellet mills
- Reduction of antinutritive factors
- Increased nutrient availability
- Improvement of nutrient utilisation (feed conversion rate)
- Feed cost savings
- Use for products that are difficult to process
- Improved hygiene
- Increase of starch modification
- Reduction of inhibitors such as trypsin inhibitors

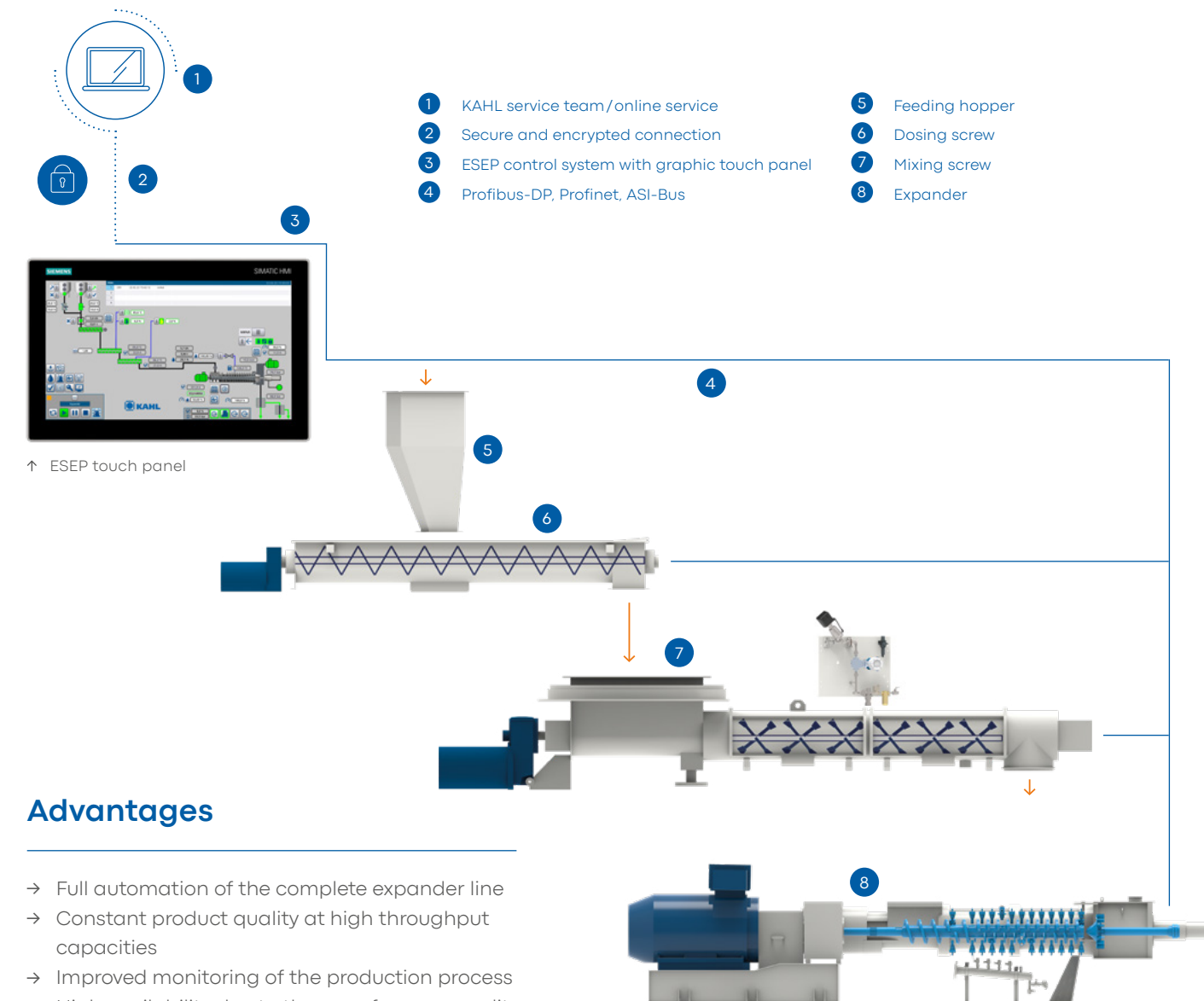


## Advantages offered by AMANDUS KAHL

- Adapted outlet technology
- Many years of experience (launch of the machine at the end of the 1980s)
- High vertical range of manufacture
- Global market leader
- Ideal solution for all animals
- Ideal solution for the treatment of monocomponents for all animal species
- Long-term service also after commissioning
- Over 12 different expander sizes

# AUTOMATION

## Electronic control system of the expander (ESEP)



## Advantages

- Full automation of the complete expander line
- Constant product quality at high throughput capacities
- Improved monitoring of the production process
- High availability due to the use of proven quality components
- Low manpower requirements

Switch and control plants for all plant sizes are programmed by AMANDUS KAHL. Our electronics engineers develop customised user software to ensure a high level of operational reliability. ESEP

is the expander control system for optimum automatic operation of KAHL expanders and extruders. It controls and regulates all relevant process parameters.





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