

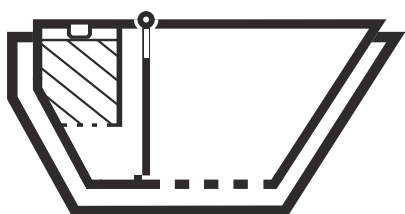


SOLID-LIQUID SEPARATION
SLUDGE THICKENING
SLUDGE DEWATERING

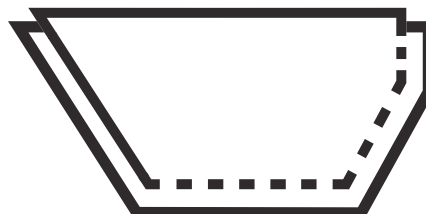


KUGLER®

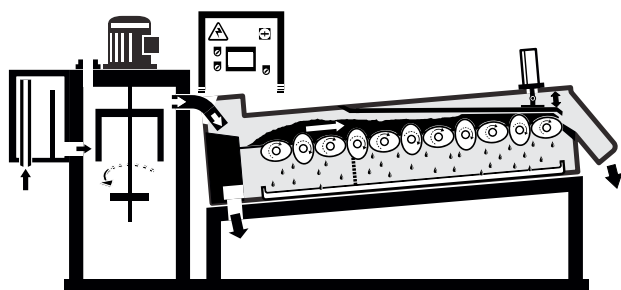
Concepts for solid-liquid separation



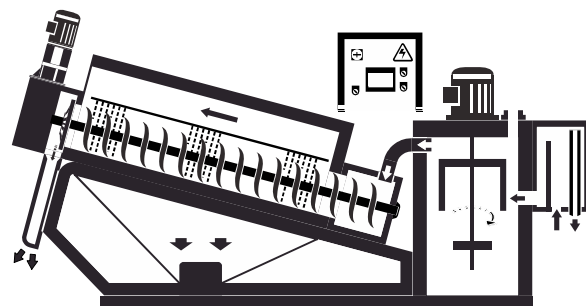
Dewatering Containers with integrated
Lamella Separator



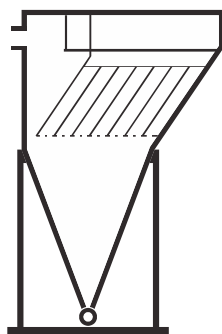
Dewatering Containers



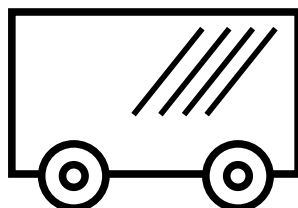
Mechanical Thickeners



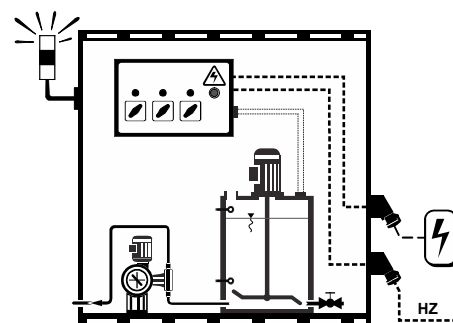
Screw Presses



Lamella Separators



Mobile Dewatering Systems



Systems and Automation for
Sludge Dewatering



Company Overview

Since 1982, Kugler has been producing low-cost but high-quality dewatering devices in Germany. We specialize in sludge dewatering as well as solids-separation from waste streams in industry, final disposal and wastewater treatment plants. Our products are effective and sustainable. As every application is unique, we design customer-specific solutions in cooperation with our clients.

Kugler is part of the Prosys Industrial Solutions Group and has offices in Southern Germany as well as in Berlin. Together with our sister companies, we execute complex projects in wastewater treatment/liquid-solid-separation throughout Germany, Europe, and the Americas.

Milestones

- | | |
|--|--|
| <p>1964 foundation of the Kugler company by Mr. Karl Kugler</p> <p>1982 the first dewatering skips in the market are being developed and marketed by KUGLER</p> <p>1992 Mr. Bizer takes over the company</p> <p>2007 Patent for dewatering skip with integrated lamella-separator</p> <p>2013 integration into the Prosys Group: gradual expansion of the product portfolio, internationalization</p> | <p>2016 market launch of self-cleaning screw press</p> <p>2017 market launch of mechanical thickener and development of mobile dewatering machines with minimal operating costs.</p> |
|--|--|



Portfolio and Fields of Applications

KUGLER® products dewater

- effectively - sound dewatering results
- easily - low operating effort
- robust - low wear
- sustainably - minimal cost of sludge-disposal, low costs for energy, Water and Polymers

KUGLER® **Dewatering skips** are ideal for mineral sludges, sewer sludge, screening and grit trap wastes and a wide range of wastewater-sludges (up to 40 m³/hour)

Our **mechanical thickeners** easily and quickly increase the solids-concentration of surplus sludge going into anaerobic digestion.

KUGLER® **Screw Presses** reliably dewater all types of sludge in municipal WWTP (primary sludge, waste activated sludge, digested sludge, mixed sludges) as well as waste streams and sludge coming from industrial plants

Our products are employed in the following:

- dewatering services
- WWTP and Water treatment plants
- sewerage service companies
- steel industry and metal works
- paper industry
- natural stone producers
- tanneries
- construction companies
- concrete industry
- automotive industry
- car and truck washing installations
- chemical and plastics industries
- beverage industry
- fresh produce works

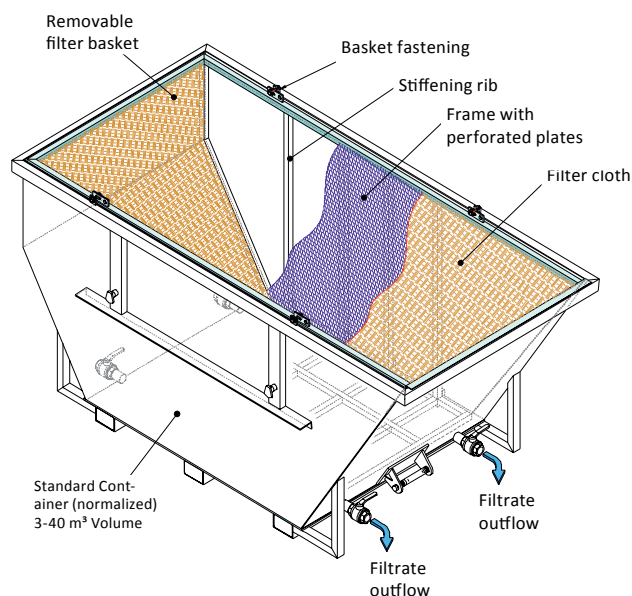
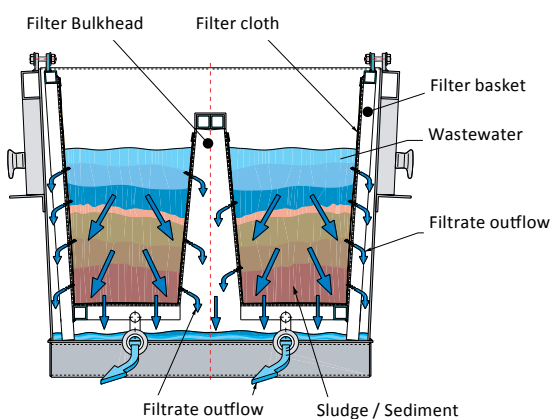
Dewatering Containers - overview

in 1982, specialists of KUGLER invented the dewatering skip which has been developed and improved further ever since. Dewatering skips are

standard containers which are adapted for dewatering sludges of all sorts.

Working principle

the heart of the container with the exchangeable filtration basket which consists of a steel frame with perforated plates and a robust filtration fabric fixed over the basket. Valves located on the bottom ensure continuous drainage of the filtered water.



Advantages

- ✓ low cost investment, long life
- ✓ dewatered sludge in a short period of time
- ✓ low maintenance or energy costs
- ✓ transportation with standard vehicles, easy emptying
- ✓ up to 70% lower transport and disposal costs due to volume reduction



Dewatering Containers – models

skips
contents 3-12m³

roll-offs
5-40m³

options: lid, additional filter wall, internal weir for continuous operation, galvanized or stainless steel

We offer the following special models:

vibrating- dewatering containers

a special motor vibrates the inner basket and thus improves the dewaterability of the sludge.

heated dewatering containers

an electrical heating unit keeps the sludge from freezing

Aircon/Sandy (for FOG and grit traps)

by means of compressed air bubbles, organic particles like FOG are being washed off and returned. Only less dense, non-smelling and well dewatered sludge stays in the container.

We also offer the following smaller container models

self dumping dewatering containers

suitable for transport within your facilities by fork lift;
available container volumes range from 0,3m³ to 5m³

Regufil and Regufett (for small FOG and grit trap applications)

Container built according to DIN 20700 for easy dewatering and emptying by garbage trucks (sand) or vacuum suction trucks (FOG)

Small containers

volumes of less than 1m³, also available in stainless steel



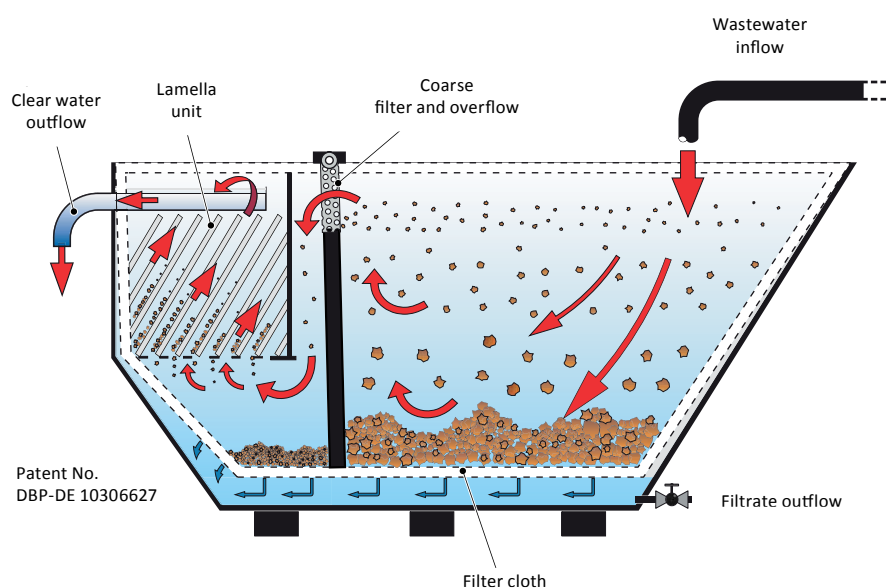
Dewatering container with integrated lamella separator

Our patented dewatering containers with integrated lamella separator are suitable for separating solids from a wastestream and simultaneous dewatering of the sludge.

Working principle

from the outside, the lamella dewatering container is a regular skip or roll-off container. Besides the standard filter basket, the unit boasts a filtration fabric and a lamella separator. Larger solids sink to the bottom and are being separated from the

water by the filter fabric. The fine solids are being separated by the lamella separator. All of the solids that are being withheld will be collected and dewatered within the dewatering container.



Advantages

- ✓ continuous operation in waste streams up to 40m³/hour
- ✓ filtered water can be reused in the production process
- ✓ low investment costs, long life
- ✓ well dewatered sludge in a short time period
- ✓ no maintenance or energy costs
- ✓ low space requirements

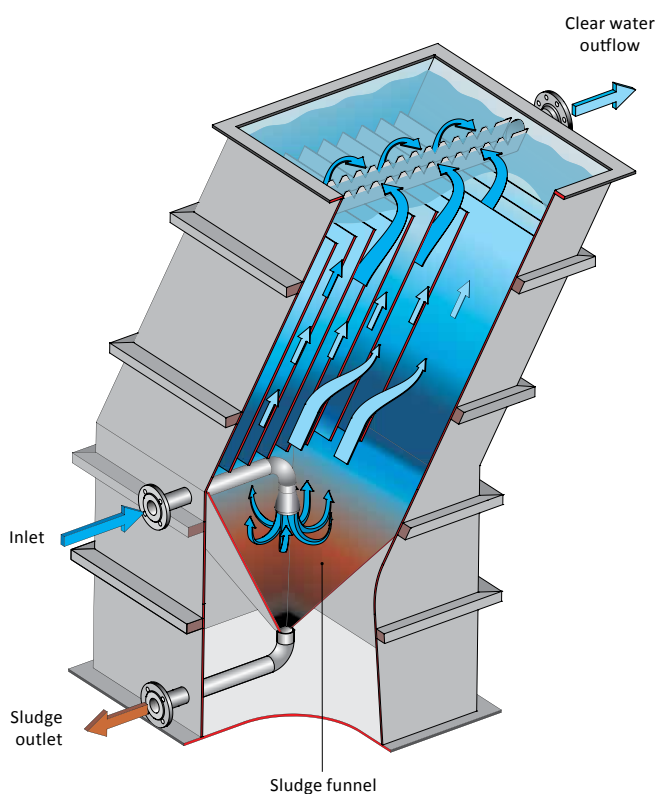
KUGLER® Lamella Separators

Our lamella separators reduce the filtration area needed for separation of solids by up to 90%. The units are designed and produced especially for each application. Flow rates from 1 to 150m³/hour are possible.

Working principle

The solids settle on the inclined lamella sheets and the clear water moves upwards into a weir. The settled solids slide downwards into a sludge cone,

the clear water can be re-used immediately as process water.



Advantages

- ✓ low space demand
- ✓ low execution costs - delivered ready for installation
- ✓ no mechanical wear
- ✓ low operating costs

Models

available materials are steel with corrosion protection, stainless steel, PE or PP

Optional:

- fully automatic mixing device
- enhanced sludge deposit
- Polymer preparation units if applicable
- integrated clear water deposit

Depending on the application, our static thickener EASY can be offered as an alternative to our lamella separators.

Mechanical Thickener KUGLER® Series E-OP

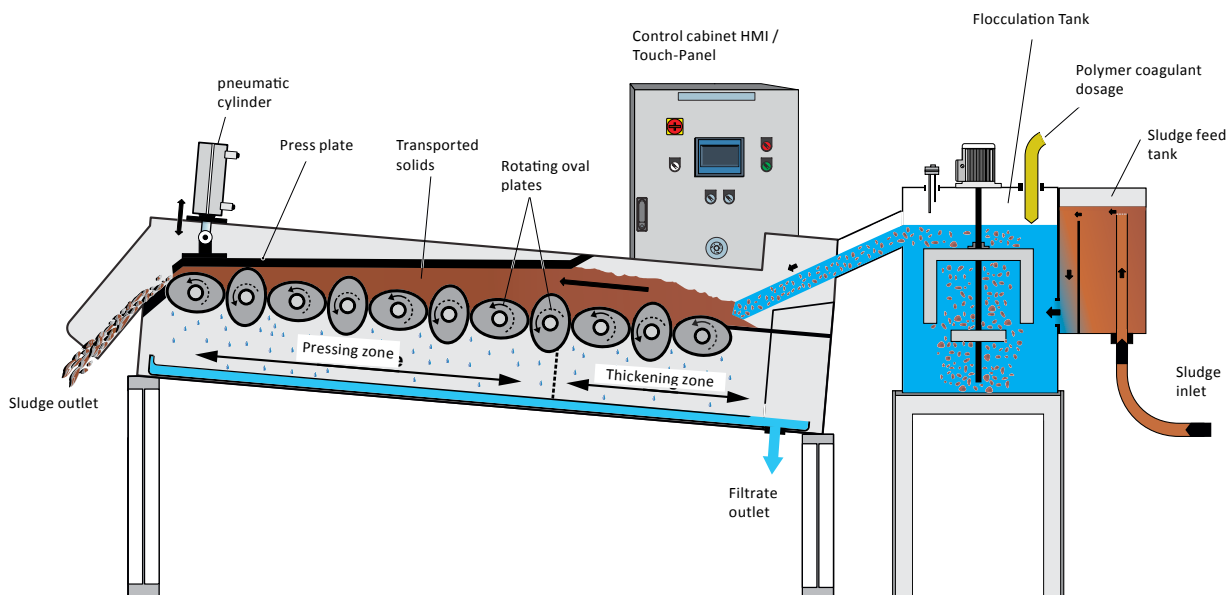


Our mechanical thickeners with oval plates (Series E-OP) are ideal for thickening of primary sludge, waste activated sludge or a mixture thereof before entering anaerobic digestion. The machine is ideally suited to dewater digestate and manure, it is used for compacting screening residue and has an outstanding performance in separating solids smaller 1mm in industry and final disposal.

Working principle

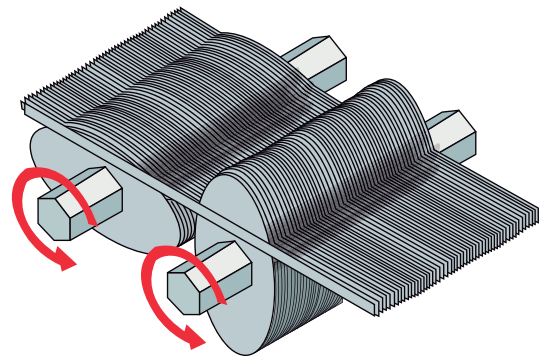
the heart of the machine is made up by a series parallel mounted, slowly rotating oval plates. The oval plates are rotating within a static grid with a 1mm space between the bars. The rotating plates transport the solids over the grid while the liquid phase rinses downwards. The oval shape of the

plates results in a wave-like movement by which the sludge is dewatered well while the plates are being self-cleaned (no rinsing or flushing necessary).



Advantages

- ✓ robust and stable operation – no blocking possible
- ✓ higher throughput and better dewatering results compared to static thickeners
- ✓ energy-saving, low noise and low vibration
- ✓ self-cleaning – no backwashing necessary
- ✓ low maintenance



Mechanical Thickeners KUGLER®

Models without Press Plate	Troughput (DS inlet)		Dimensions	Weight	Power Supply
	0,2%	1,0%	L x B x H (m)		
E-OP 12-30	24 m³/h 49 kg TS/h	4,9 m³/h 49 kg TS/h	2,3 x 1,1 x 1,4	110 kg	0,2 kW
E-OP 12-40	34 m³/h 67 kg TS/h	6,7 m³/h 67 kg TS/h	2,3 x 1,2 x 1,5	200 kg	0,2 kW
E-OP 12-60	50 m³/h 100 kg TS/h	10 m³/h 100 kg TS/h	2,4 x 1,4 x 1,5	230 kg	0,4 kW
E-OP 12-80	92 m³/h 185 kg TS/h	18 m³/h 185 kg TS/h	2,5 x 1,7 x 1,5	410 kg	0,75 kW
E-OP 12-100	115 m³/h 230 kg TS/h	23 m³/h 230 kg TS/h	2,8 x 1,9 x 1,5	470 kg	0,75 kW
E-OP 12-120	140 m³/h 280 kg TS/h	28 m³/h 280 kg TS/h	2,9 x 2,1 x 1,5	600 kg	1,5 kW
E-OP 16-120	185 m³/h 370 kg TS/h	37 m³/h 370 kg TS/h	3,5 x 2,1 x 2,0	1300 kg	1,5 kW

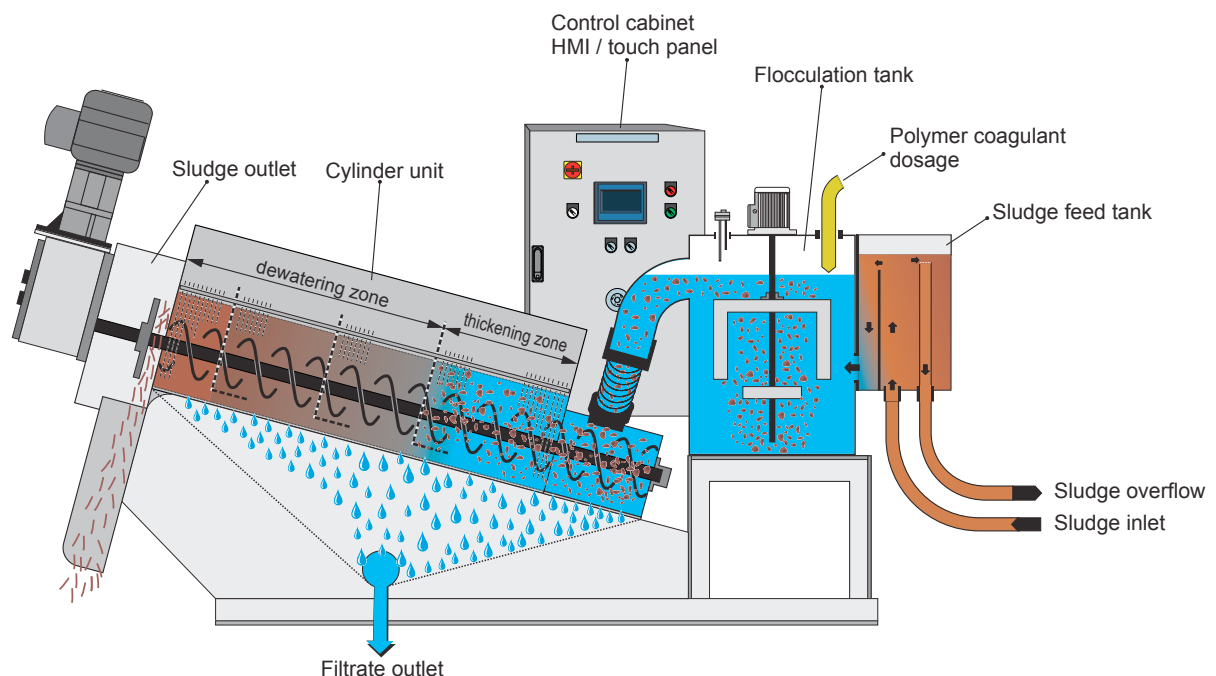
Models with Press Plate	Troughput (DS inlet)		Dimensions	Weight	Power Supply
	1,0%	2,0%	L x B x H (m)		
E-OP 11-30 PP	4,0 m³/h 40 kg TS/h	2,0 m³/h 40 kg TS/h	2,3 x 1,1 x 1,4	120 kg	0,4 kW
E-OP 11-40 PP	6,0 m³/h 60 kg TS/h	3,0 m³/h 60 kg TS/h	2,3 x 1,2 x 1,5	200 kg	0,4 kW
E-OP 11-60 PP	8,0 m³/h 80 kg TS/h	4,0 m³/h 80 kg TS/h	2,4 x 1,4 x 1,5	230 kg	0,4 kW
E-OP 11-80 PP	12 m³/h 120 kg TS/h	6,0 m³/h 120 kg TS/h	2,5 x 1,7 x 1,5	410 kg	0,75 kW
E-OP 11-100 PP	14 m³/h 140 kg TS/h	7,0 m³/h 140 kg TS/h	2,8 x 1,9 x 1,5	570 kg	1,5 kW
E-OP 11-120 PP	16 m³/h 160 kg TS/h	8,0 m³/h 160 kg TS/h	2,9 x 2,1 x 1,5	750 kg	1,5 kW
E-OP 24-120 PP	20 m³/h 200 kg TS/h	10 m³/h 200 kg TS/h	4,6 x 2,1 x 2,0	1670 kg	2,2 kW

Screw Presses are effective, economical and ecological. Kugler has extensive experience using plate filter presses, belt filter presses and centrifuges. However, we are convinced that for a majority of applications a screw press is the superior technology. Modern screw presses are well suited for large WWTP larger than 100.000 PE as their throughput per machine is up to 100m³ / hour.

Screw Presses are ideally suited to dewater:

- Sludge produced by biological municipal and industrial wastewater treatment (activated waste sludge, primary sludge, digestate)
- Flotate sludge, from FOG removal
- divers organic and inorganic sludge/waste streams

Working principle



Advantages

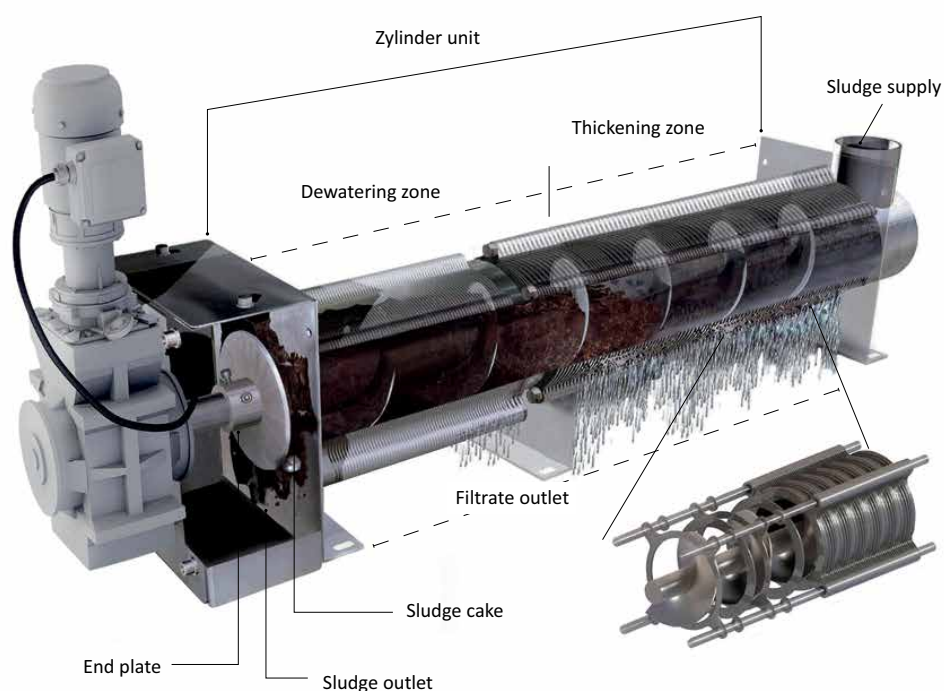
- ✓ sound dewatering results
- ✓ very low energy and water consumption, moderate consumption of polymers
- ✓ dewatering possible of sludges with 0,2% TS without prior thickening
- ✓ low wear (extended warranty possible), low maintenance, robust
- ✓ self-cleaning (24 hour operation possible), easy to operate, low noise, and no vibration
- ✓ Polymer preparation units available upon request
- ✓ throughput up to 20m³/hour digestate (5% TS), or 100m³/hour thin sludge (0,2%TS)
- ✓ makes investing into own sludge dewatering feasible – sludge can be dewatered without anaerobic thickening (NH-4 contamination)
- ✓ Kugler can offer two alternatives: screw presses with self-cleaning ring-technology; or classic screening basket – technology.



Screw Presses KUGLER® Ring-Press series

KUGLER® ring-type screw presses are equipped with a self-cleaning mechanism and do not need high-pressure water cleaning, compressed air or brushes. That means lower maintenance as well as lower energy and water demand than screw presses with screening basket have. Due to the possibility to combine various parallel working modules in one system, this system needs less space than screw presses equipped with a screening basket.

After flocculation of the sludge, it flows by gravity into the press-cylinder and is being transported by means of a screw through the filtration element which consists of moving rings.



At the same time, the rotation of the screw moves the rings against each other. Each second ring will open a small space through which the free water drains. Because of the movement of the rings, a blocking of the filtration area is impeded and the

necessity for cleaning is minimized. The size of the openings between the rings decreases towards the press plate at the end of the screw. Thus, the inner pressure within the dewatering zone is increased (volume-compression-effect)

Advantages

- ✓ space saving
- ✓ moderate investment costs, low operating costs
- ✓ very robust – also in case of greasy sludges
- ✓ our models with integrated floc-former can increase the TS-concentration by 2-3%

As an alternative to our ring-press series, we can also offer the traditional screening basket press technology

Screw Presses KUGLER® Ring-Press Series



Models	Troughput (DS inlet)			Dimensions	Weight	water consumption	Power Supply
	0,2%	1,0%	5,0%	L x B x H (m)			
S-RS 1-5	0,3 m³/h 0,6 kg TS/h	0,1 m³/h 1,0 kg TS/h	0,07 m³/h 3,5 kg TS/h	1,10 x 0,34 x 0,64	50 kg	12 l/h	0,18 kW
S-RS 1-10	1,0 m³/h 2,0 kg TS/h	0,3 m³/h 3,0 kg TS/h	0,2 m³/h 10 kg TS/h	1,86 x 0,74 x 1,07	200 kg	24 l/h	0,24 kW
S-RS 1-13	2,0 m³/h 4,0 kg TS/h	0,6 m³/h 6 kg TS/h	0,4 m³/h 20 kg TS/h	1,86 x 0,74 x 1,07	220 kg	24 l/h	0,24 kW
S-RS 2-13	4,0 m³/h 8,0 kg TS/h	1,2 m³/h 12 kg TS/h	0,8 m³/h 40 kg TS/h	1,96 x 0,87 x 1,07	305 kg	48 l/h	0,36 kW
S-RS 2-20	8,0 m³/h 16 kg TS/h	2,4 m³/h 24 kg TS/h	1,6 m³/h 80 kg TS/h	2,65 x 0,96 x 1,37	520 kg	64 l/h	0,66 kW
S-RS 1-31	10 m³/h 20 kg TS/h	3,0 m³/h 30 kg TS/h	2,0 m³/h 100 kg TS/h	3,44 x 0,94 x 1,82	910 kg	40 l/h	0,74 kW
S-RS 2-31	20 m³/h 40 kg TS/h	6,0 m³/h 60 kg TS/h	4,0 m³/h 200 kg TS/h	3,64 x 1,26 x 1,82	1530 kg	80 l/h	1,11 kW
S-RS 3-31	30 m³/h 60 kg TS/h	9,0 m³/h 90 kg TS/h	6,0 m³/h 300 kg TS/h	3,90 x 1,62 x 1,82	2090 kg	120 l/h	1,86 kW
S-RS 2-41	40 m³/h 80 kg TS/h	12,0 m³/h 120 kg TS/h	8,0 m³/h 400 kg TS/h	4,35 x 1,55 x 2,10	2450 kg	144 l/h	3,75 kW
S-RS 3-41	60 m³/h 120 kg TS/h	18 m³/h 180 kg TS/h	12 m³/h 600 kg TS/h	4,57 x 2,10 x 2,16	3350 kg	216 l/h	6,0 kW
S-RS 2-45	70 m³/h 140 kg DS/h	21 m³/h 210 kg DS/h	14 m³/h 700 kg DS/h	3.3 x 1.7 x 2.4	3400 kg	200 l/h	4,5 kW
S-RS 3-45	100 m³/h 200 kg TS/h	30 m³/h 300 kg TS/h	20 m³/h 1000 kg TS/h	5,04 x 2,24 x 2,40	4380 kg	300 l/h	6,7 kW



DEWATERING · SEPARATION · FILTRATION · CLARIFICATION

KUGLER designs and builds complete liquid-solid-separation and sludge-dewatering-systems which are effective, economical and sustainable. Each turn-key system is designed according to the necessities and installed by specialized personnel. As Kugler selects all components and installs and starts up the system, Kugler is able to guarantee performance of the system and has qualified personnel for maintenance and optimization of its systems.

Starting with very cost effective systems integrating
dewatering containers, pumps, level-control, piping....

.. to turn-key systems including:

coarse screening, lamella separator, polymer preparation and dosing, pumps, mixers, PLC, etc.



Our sister company Prosys since 1990 is specialized in automation of complex processes in communal and industrial wastewater treatment plants.

Advantages

- ✓ decades of experience in liquid-solid-separation in countless different industries
- ✓ cost effective by using commercially available standard components
- ✓ energy efficient
- ✓ first-class automation by our own personnel

Mobile Sludge Dewatering and Containerized Solutions

KUGLER® Screw Presses, thickeners and (smaller sized) lamella clarifiers are perfectly suited for mobile use.

Service providers and final disposal companies may use MOBILE MACHINES by Kugler in order to offer their customers their services – saving up to 90% in energy and operational costs compared to using decanter centrifuges or filter presses.

Our containerized solutions can be an option when wastewater treatment plants or companies lack space and/or time in order to build a new facility for sludge dewatering.

Models (examples):

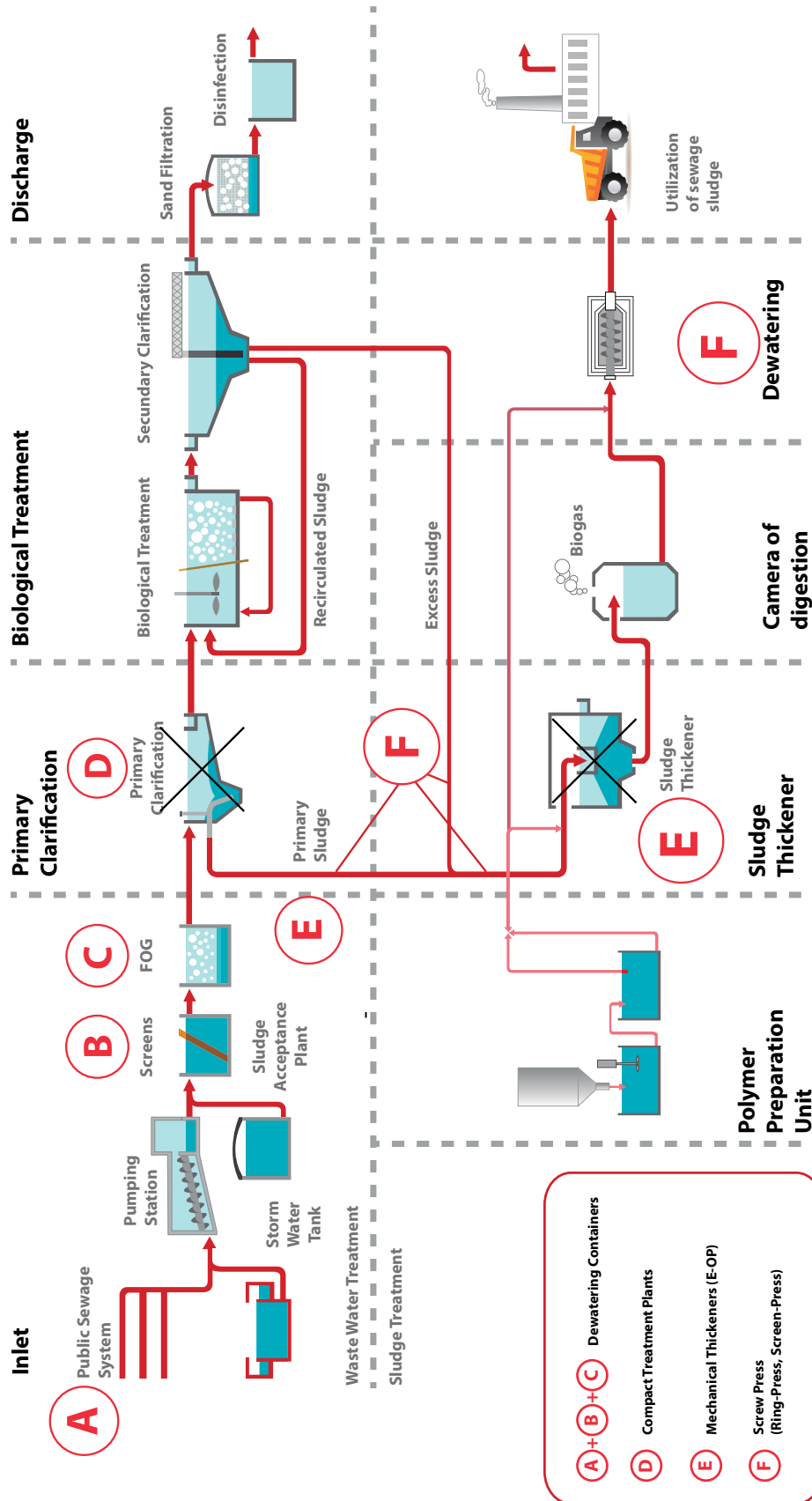
A screw press model S-RS-3-41 in a 20 or 40ft container are able to dewater up to 18m³/hour of thickened sludge (5%TS). The systems include polymer preparation, mixers, screws, pumps and control cabinet. Additional technologies for filtrate cleaning can be offered additionally.



Advantages

- ✓ low energy use – no back up generator necessary
- ✓ plug&play – solution delivered ready for start-up
- ✓ reduced space requirements
- ✓ does not take up space in existing buildings; no permits for new buildings necessary

Portfolio Wastewater Treatment Plants

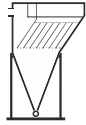




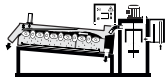
Dewatering Containers



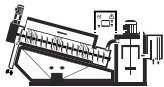
Dewatering Containers with integrated Lamella Separator



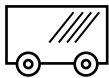
Lamella Separators



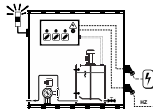
Mechanical Thickeners



Screw Presses



Mobile Dewatering Systems



Systems and Automation for Sludge Dewatering

KUGLER®

Concepts for solid-liquid separation

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