Twin Screw Extruder CompacTwin™.

Sales Presentation 2018.

Innovations for a **better world**.

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Twin-Screw Extruder.
CompacTwin™.

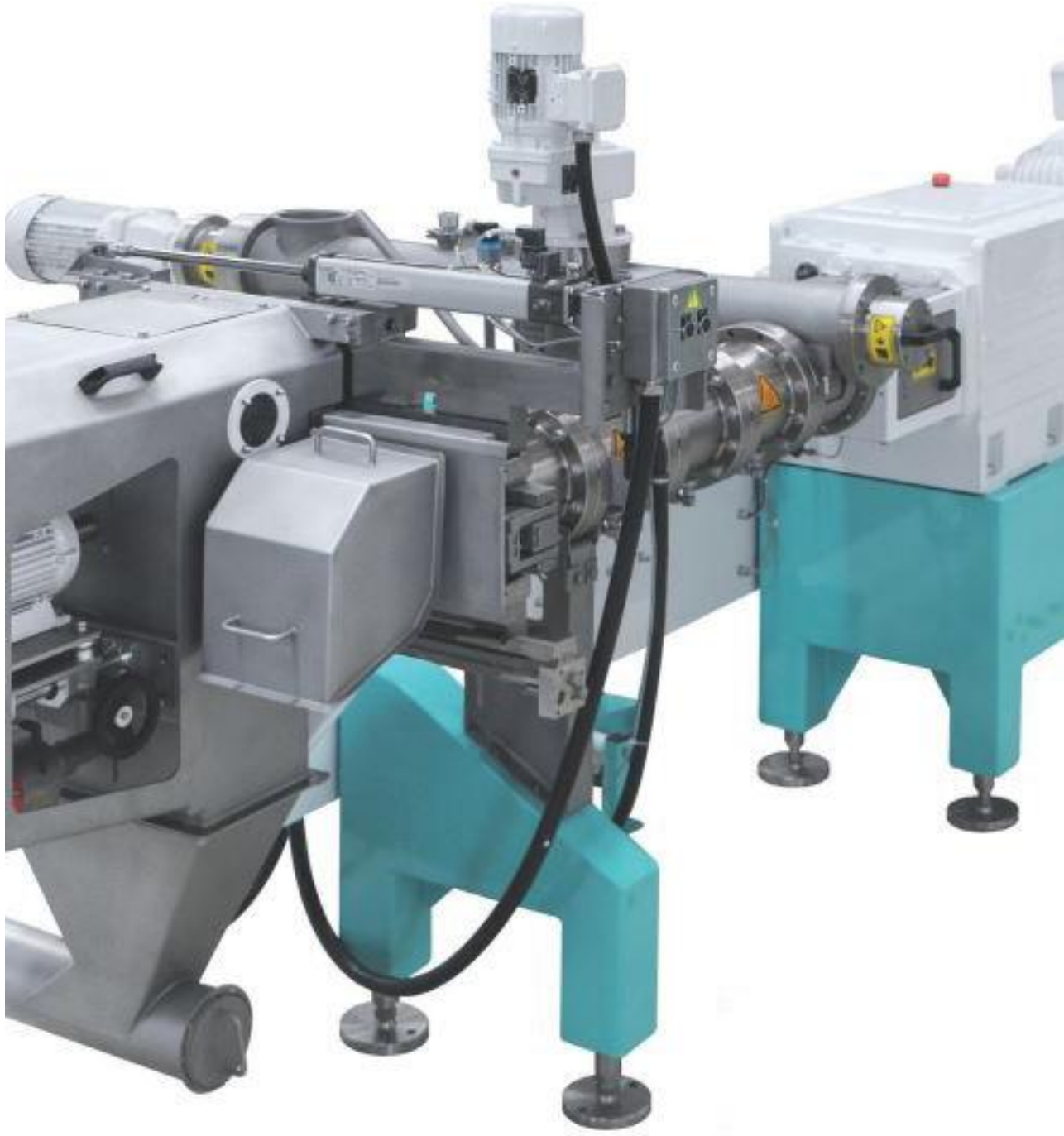
The twin-screw extruder **CompacTwin™** completely fulfills process requirements such as elevated torque, screw speeds and process pressure.

Thanks to its modular design, it can be used to process a wide variety of applications like breakfast cereals, snacks, food ingredients, texturized products, reconstituted rice, petfood and all types of aquafeed.

CompacTwin™ – a lean concept designed for a wide variety of applications.

- Separate preconditioner
- High throughput capacities – from 200 up to 8’000 kg/h – Modular design for processing many different products

  Available in three sizes



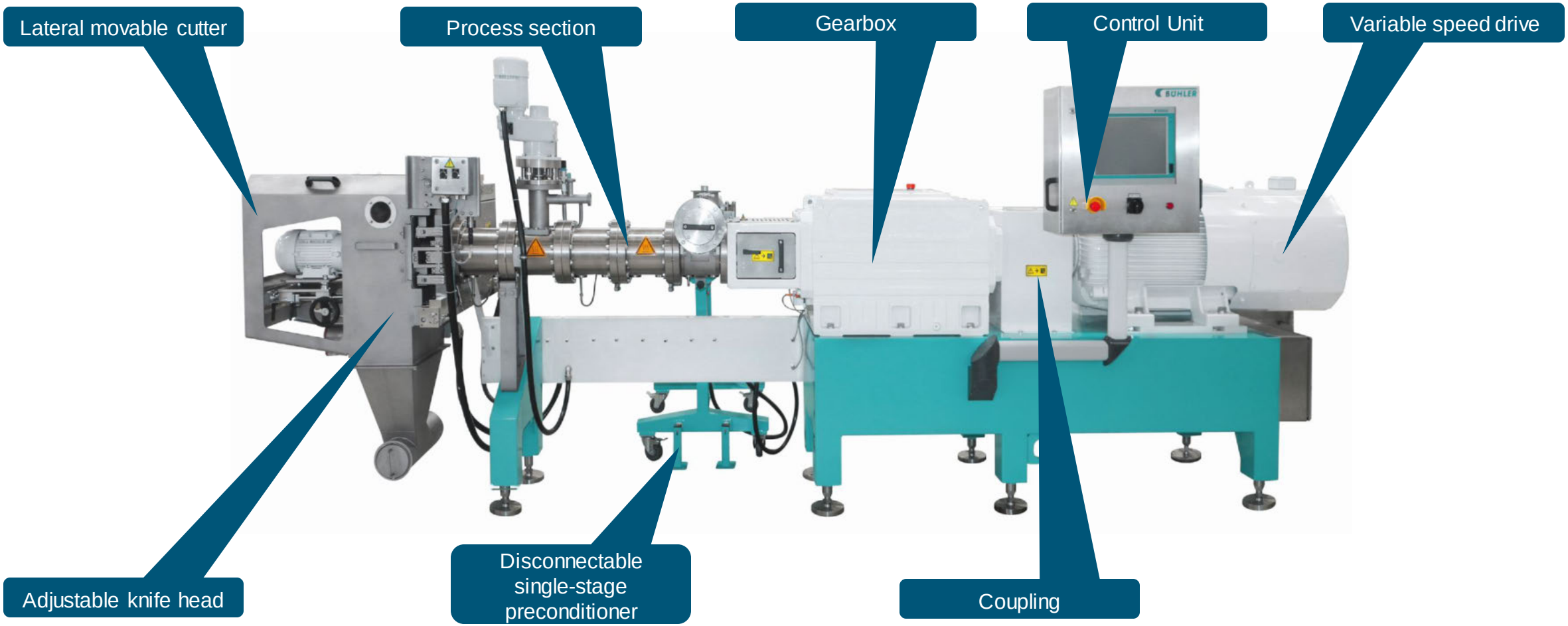
Wide variety of applications.

CompacTwin™ fits into Bühler's process portfolio.

Ready-to-eat **RTE**	Food ingredients **STI**	Indian snacks **SNA**
▪ Direct expanded cereals ▪ Indirect expanded flakes	▪ Modified flours and starches ▪ Breadcrumbs ▪ Texturized proteins ▪ Reconstituted rice ▪ Fortified rice	▪ 2D Snack pellets ▪ Direct expanded Snacks

Pet Food **PET**	Aquafeed **AQU**
▪ Direct-expanded kibbles ▪ Semi-moist pet food ▪ Foods for small pets ▪ Multicolor	▪ Micropellets ▪ Floating feeds ▪ Sinking feeds ▪ Shrimp pellets

Flexible and lean design.
CompacTwin™ setup.



Optimized pressure limits & specific torque on a small foot print.

Core element CompacTwin™ gearbox

- High quality **gearbox** standard for high torque.
- Two gearbox supplier selectable:
  - Chengbrand (China)
  - Eisenbeiss (Europe).
- Compact design due to optimized limits of pressure & specific torque
  > **max. 150bar; max. 250°C; max. 5.1 Nm/cm³**
- Unit for gearbox oil cooling mounted on gearbox
- Torque limiter: European supplier Mönninghoff

Compact design of gear box (here: Chengbrand)

Compact design of gear box (here: Eisenbeiss)

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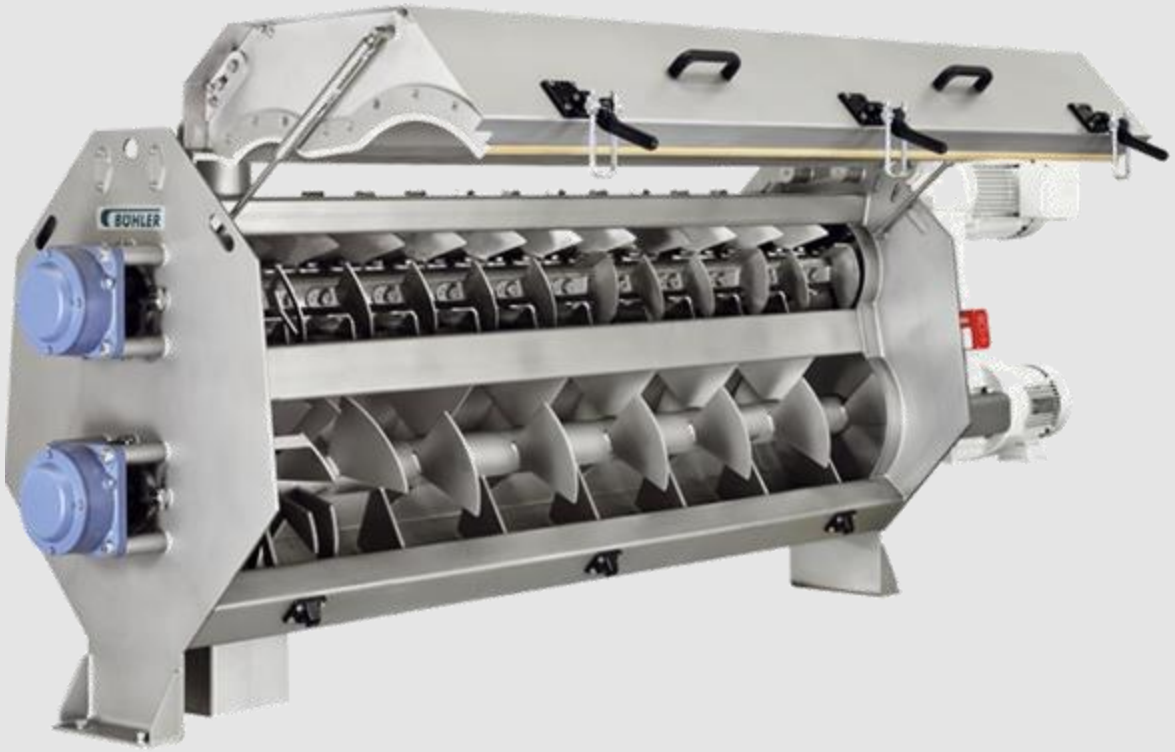
Optimal mixing and gentle retention for high product quality.

Double Stage Preconditioner



Double Stage Preconditioner PolyTherm™

- Separation of the mixing zone from the retention zone for optimal, intensive mixing at high screw speeds and gentle retention across a wide time range at a low screw speed.
- Beside allowing a very narrow retention (dwell) time range, it also enables complete emptying of the pre-conditioner after production.
- A large number of connections for supplying steam and adding liquids are available in the mixing zone for addition of steam, liquids, meat or fish slurries; these are automatically monitored.
- With the difference in retention time and the best first in first out principle in the market a sufficient kill step for today's requirement's in food/feed safety can be assured.
- It is the right solution if starch shall be gelatinized and for raw materials with a bigger particle size – e.g.: Extruded Corn flakes, Reconstituted Rice, Pet and Aqua feed, some modified flours

Reduced down-time and higher sanitation.

Single Stage Preconditioner CompacTherm™

- Ideal solution for fast and efficient moistening and heating of raw material which needs no long retention times.
- Easy disconnection of preconditioner thanks to simple mounting concept and mobile base frame
- Position of preconditioner direct on the extruder
  → no transition spout, no scrapers needed
- Four ports for the addition of liquids or steam.
- Connected to control system and power supply through a plug-in coupling.
- Hygienic design: screw can be easily removed to be cleaned; minimal dead spot due to 90° offset to the extruder
- It is the right solution for wet and dry TVP, Snack pellets, breadcrumbs.

Single Stage Preconditioner CompacTherm™

High process flexibility and quality of extruded products.
CompacTwin™ barrel concept.

- Two piece barrel **with tempering bores**:

  1) Wear resistant AND wear and corrosion resistant inserts
  2) Outer shell with cooling bores provides stability

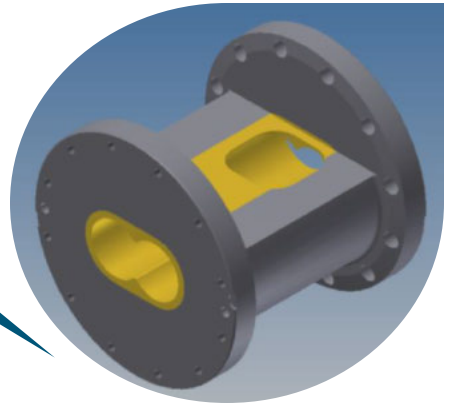
- **Two ports** for liquid addition (water, steam) or sensor attachment (temperature, pressure) in the process section

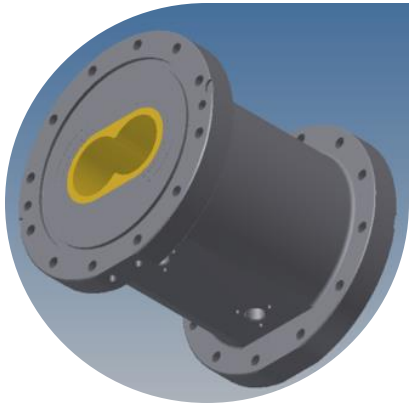
- Tempering is done by an **external tempering unit**

- The addition of water and steam in the process section is controlled by local closed **control circuits.**

- **Nickel plated housing**

Barrel design





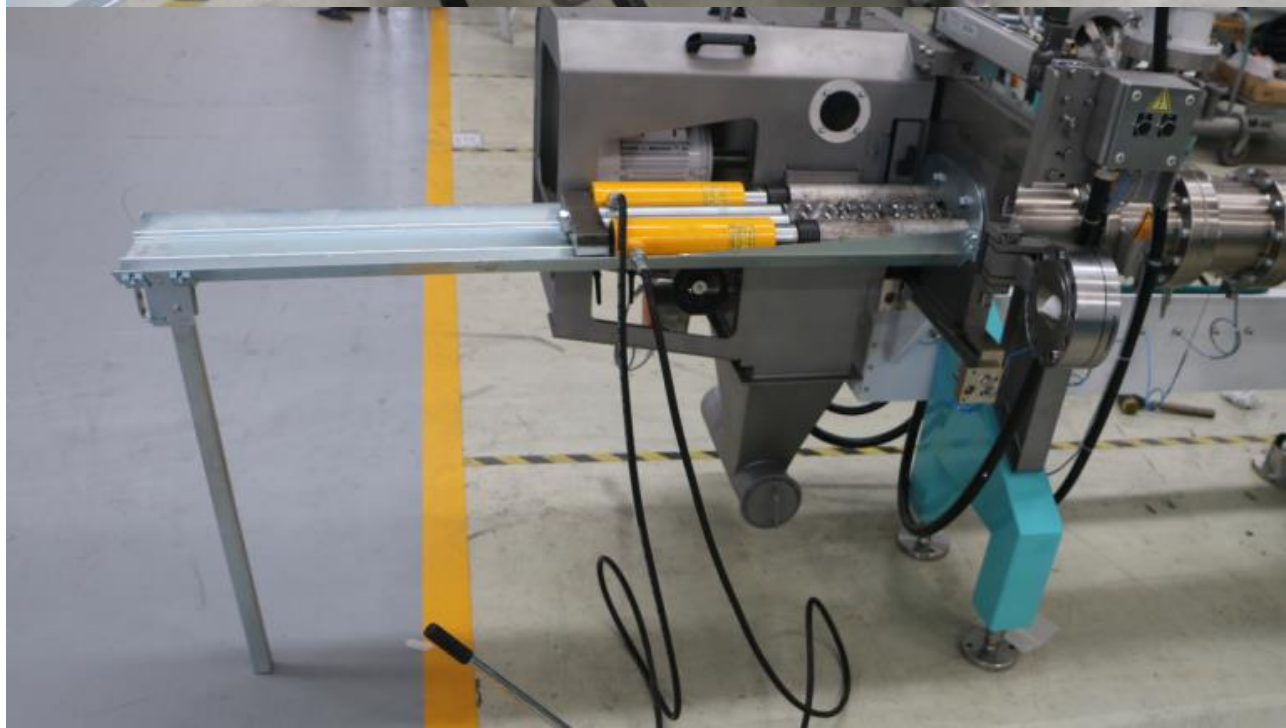
High operational dependability thanks to useful features.

Cutter knives and head; die design

- **Cutter knives** are adjustable during ongoing production. This prevents undesirable deformations of the extruded products as a result of inaccurately regulated knives.
- The entire **knife head** can be exchanged during production; this leads to a better product quality and reduced downtime for adjustment and exchange of cutter knives.
- The **die design** allows the use of different die plates or insert plates with steel or PEEK inserts for a higher flexibility and variability of different high-quality products.

Reduced service hours and downtime for screw pull out.

- **Screw pull out** device which can be attached to the extruder.
- Screw extraction requires little effort.
- Screws are extracted by manual operated hydraulic pump.
- Semi-automatic pull-out device available.

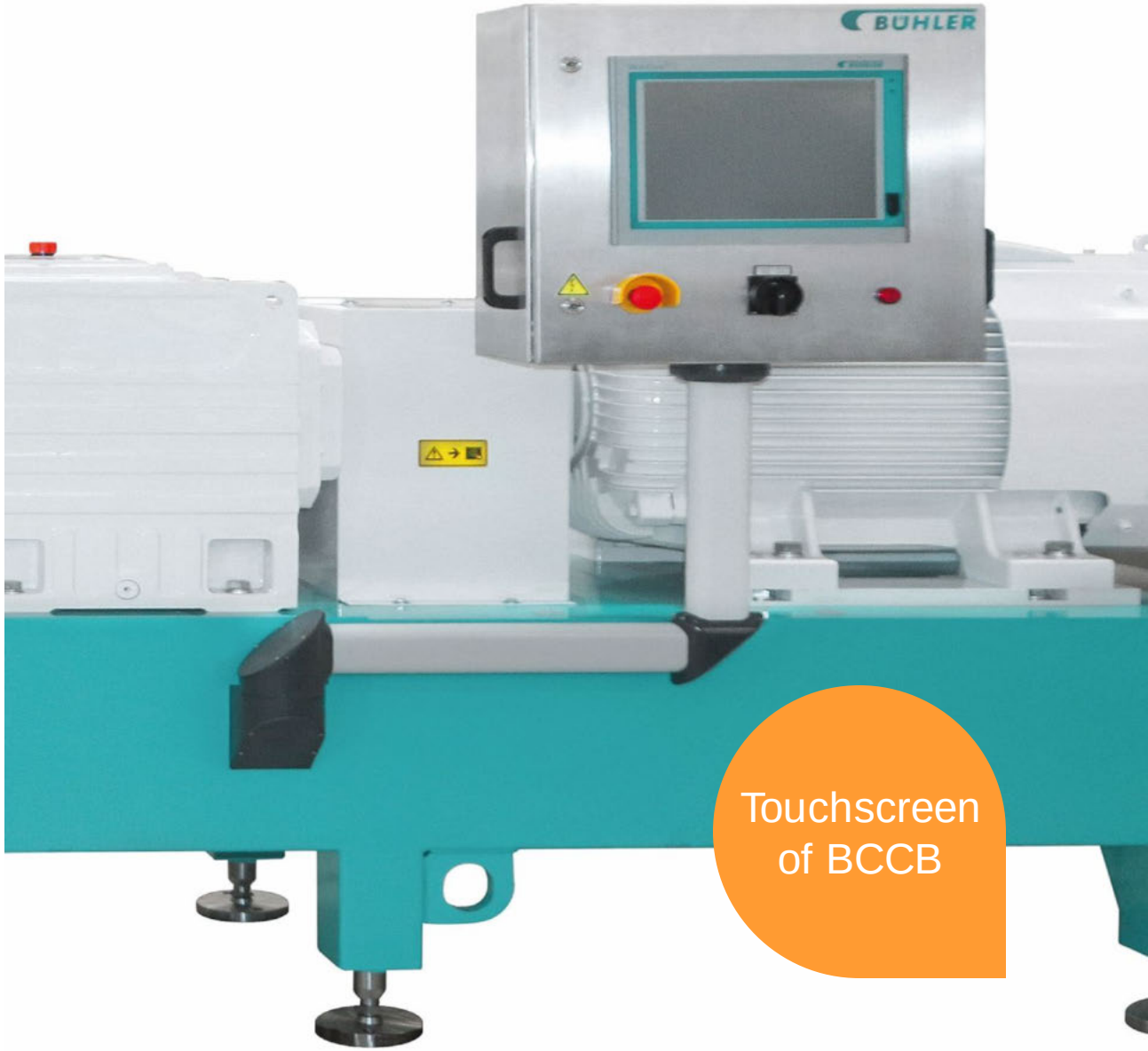


Quick & easy operation of extruder:
Automatically Control unit BCCB.

- CompacTwin™ is equipped with **PLC** including touch screen (CCC)

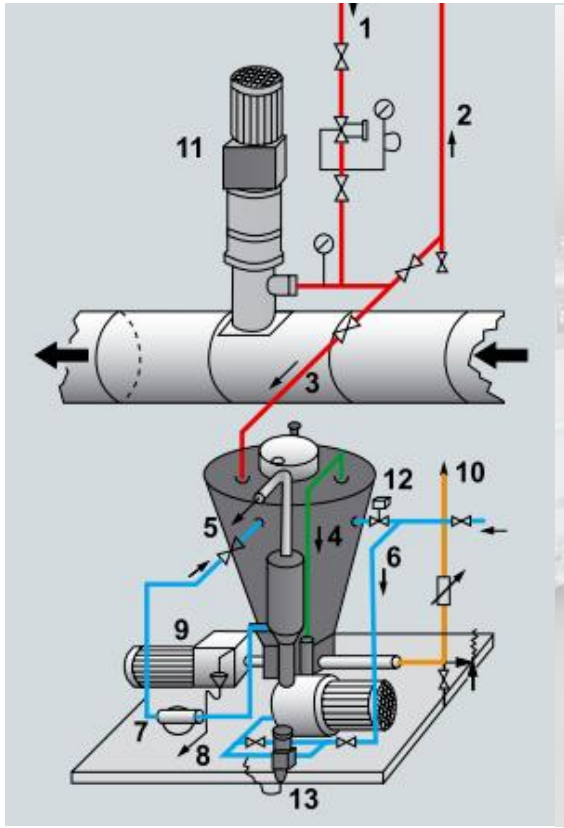
- Control unit allows a dependable production and fast selection of recipes or processing parameters for feeder, pre-conditioner and extruder and leads to constant and reproducible quality of the end products.

- Software: CompacControl (based on PolyControl™)
- Touch screen: Kupiter (Taiwan)
- PLC: Chinese PLC
- Frequency converter: Schneider
- Melt pressure sensor: Gefran performance level C (Europe)



Change over from sinking to floating fishfeed in short time.
Density control system.

- Density control system is especially suited for aquafeed applications.
- It allows the production of the desired end product with the correct and constant sinking speed, depending on the species sinking or floating.
- Product changes can be done in a very short time without changing screws on the extruder.
- The density control system is optionally available with vacuum pump even for high dense shrimp pellets.



Twin-Screw Extruder CompacTwin™. Summary of Customer benefits.

- Flexible and lean design for trouble-free production of different products at high capacities
- Single and double stage pre-conditioner available
- Single stage pre-conditioner can be quickly detached and rolled away from the extruder
- New one-stage feeding design: the product is fed to the extruder without requiring any scrapers
- Lateral movable cutter-head; cutter knives can be adjusted during production
- Screw extraction requires little effort

The solution for trouble-free production of high volumes.
Capacities of CompacTwin™ (1/2).

RTE Breakfast Cereals			Capacity finished product in kg/h		
Type	**Plant Description**	**Product**	**BCCG 62**	**BCCF 93**	**BCCH 125**
DEE	Extrusion line for the production of **direct expanden cereals**	Direx plain	800	1500	2400
CFE	Extrusion line for the production of **indirect expanded cereal flakes**	Flakes plain	250	600	850
KE	Extrusion line for the production of **breakfast cereals**	Direx plain Flakes plain	800 250	1500 600	2400 850

STI Standard Ingredients			Capacity finished product in kg/h		
Type	**Plant Description**	**Product**	**BCCG 62**	**BCCF 93**	**BCCH 125**
PME	Extrusion line for the production of **breadcrumbs**	ABC (not toasted)	650	1800	3000
QME	Extrusion line for the production of **modified flours**	Modified Florus	650	1800	3000
TVPE	Extrusion line for the production of **textured soy proteins (dry)**	Mince & Chunks	800	2000	3000
FFRE	Extrusion line for the production of **reconstituted rice**	Recon Rice	200	500	800

The lean design of the CompacTwin™ is especially suitable for trouble-free production of high volumes of a given product and product formula and enables particularly easy operation and maintenance.

The solution for trouble-free production of high volumes.
Capacities of CompacTwin™ (2/2).

SNA Snacks		Capacity finished product in kg/h		
Product	**Product**	**BCCG 62**	**BCCF 93**	**BCCH 125**
Extrusion line for the production of **direct expanded savory snacks**	Direx plain	800	1500	2400
Extrusion line for the production of **2D snack pellets**	2D Pellets	500	1000	To be defined

PET Petfood			Capacity finished product in kg/h		
Type	**Plant Description**	**Product**	**BCCG 62**	**BCCF 93**	**BCCH 125**
DPE	Extrusion line for the production of **dry petfood & semi moist kibbles**	Dry petfood & semi moist kiblles	800	2800	8000

AQU Aquafeed		Capacity finished product in kg/h		
Product	**Die Hole**	**BCCG 62**	**BCCF 93**	**BCCH 125**
Salmon/Yellow Tail, Marine Feed, sinking	10 mm die	1000	3500	8000
Tilapia/Carp, Fresh Water Feed, floating	4.0 mm die	1000	3500	8000
Shrimp, sinking feed Small pellets, floating Small pellets, floating	2.3 mm die 2.0 mm die 1.4 mm die	600 700 300	3000 3000 1200	6000 7000 3000
Small pellets, floating	1.0 mm die	200	600	1500

Interface preconditioner / extruder.

Simple system to detach the CompacTherm™ by

> opening two bolts,

> using a simple lever to lift the mixer out of interface and disconnecting a plug.

Steam dosing for CompacTwin™.

- Only temperature controlled steam dosing
- Mounted to extruder
- Dosing range < 300 kg/h (alt. < 140 kg/h)
- Poly steam dosing with or without flow meter (on a separate rack) (optionally available):
  - 3-50 kg/h
  - 30-300 kg/h
  - 90-900 kg/h

Water dosing for CompacTwin™.

- Water dosing with flowmeter
- Mounted to extruder
- Optionally available:
  - Water dosing system with control valve
    - 10-100l/h
    - 40-400l/h
    - 200-2000 l/h
    - Combinations with 2 liquids
  - Water metering system with pump
    - 0.42-21.4 l/h
    - 4.68-234 l/h
    - Combinations with 2 liquids

Technical data.
CompacTwin™.

Feature	BCCG 62	BCCF 93	BCCH 125
Screw outside diameter [mm]	62	93	125
Pressure [bar]	150		
Temperature [°C]	250		
Max. Throughput Food [kg/h]	200 to 8’000 kg/h (see for details slide 4 and 5)		
Max. Throughput Feed [kg/h]			
Certification	CCC		
Max. motor power [kW], IE2 or IE3	132	250	450
Gear ration / Drive speed [rpm]	1.875 / 800 3 / 500	1.5 / 1’000 3 / 500	1.5 / 1‘000 3 / 500 5 / 300
Max. torque per screw [Nm]	630	2’500	5‘332
Spec. torque per screw [Nm/cm^3]	5.1	5.1	5.2
Oil cooling	Side of gearbox		

Standard Configuration

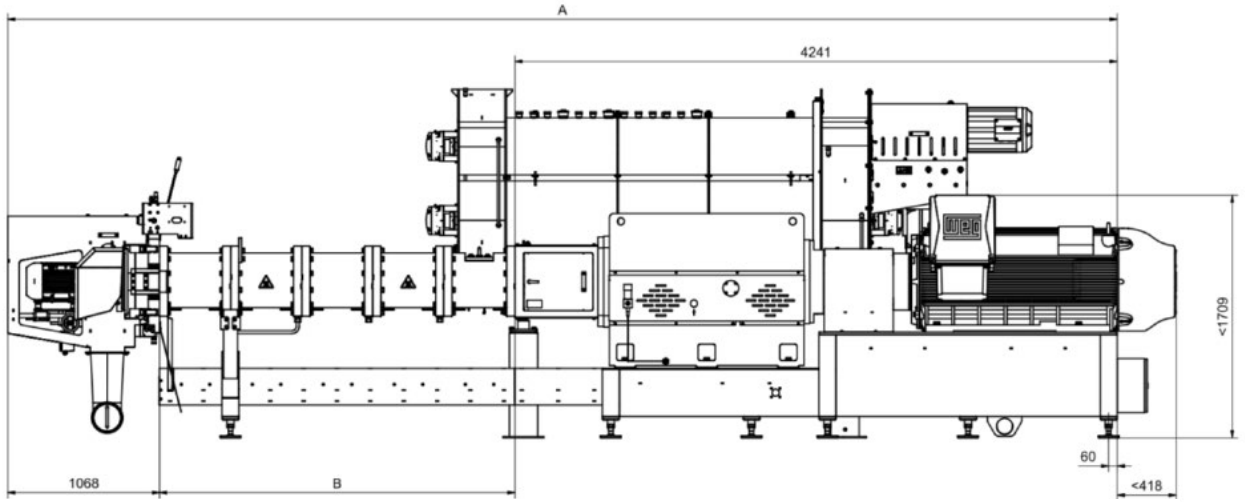
- with barrels with tempering bores, with 2 ports per barrel, abrasion resistant and nickel plated
- with abrasion resistant screw elements
- extrusion head consisting of an end plate and 1 pressure and 1 temperature sensor
- one hardened die with drilled holes
- with pneumatic lateral movable cutter
- with manual screw extraction device

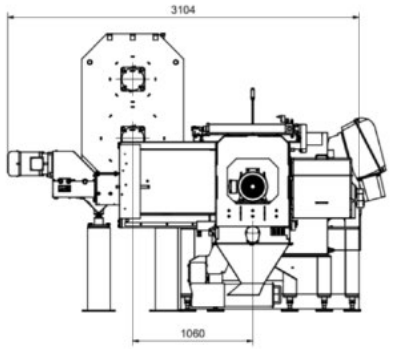
Accessories and options.
CompacTwin™.

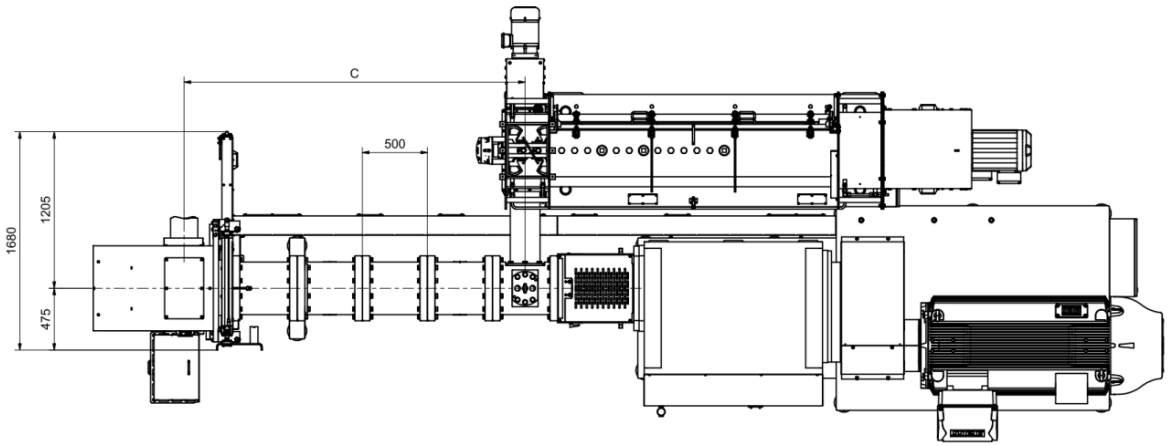
Feature	BCCG 62	BCCF 93	BCCH 125
Gearbox supplier	Chengbrand (China) or Eisenbeiss (Europe)		
Barrels: Length options [L/D]	12 – 40		
Single Stage Preconditioner* BCCC	CompacTherm D170	CompacTherm D250	
Double Stage Preconditioner* a)BCCC with Side Feeder (ex BCHA) b)BCTC with Scraper (ex BUZ)	PolyTherm BCTC 10 & 22	PolyTherm BCTC 22 & 48	CompacTherm BCCC 100 (Feed) PolyTherm BCTC 48 (Food)
Tempering unit for heating & cooling of barrels		X	
Control System BCCB2 (touch control)		X	
Steamdosing in preconditioner with or without flowmeter	X		X
PrioSteamdosing without flowmeter	X		-
Waterdosing with control valve or pump	X		X
PrioWaterdosing with control valve	X		-
Density Control with Vacuum System and Hold Down Mechanism		X	

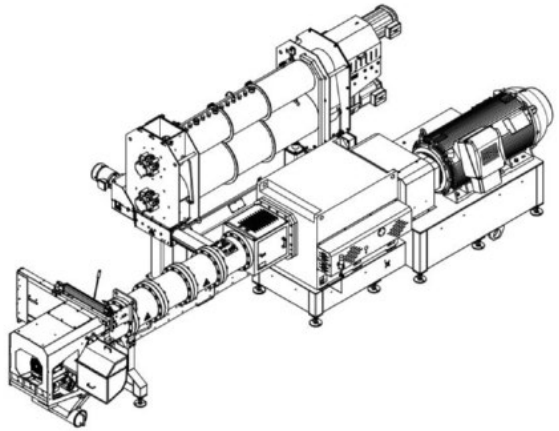
Additional accessories like oil addition systems, forced feeding, venting spouts and slurry are available.

Dimensions (1/2).

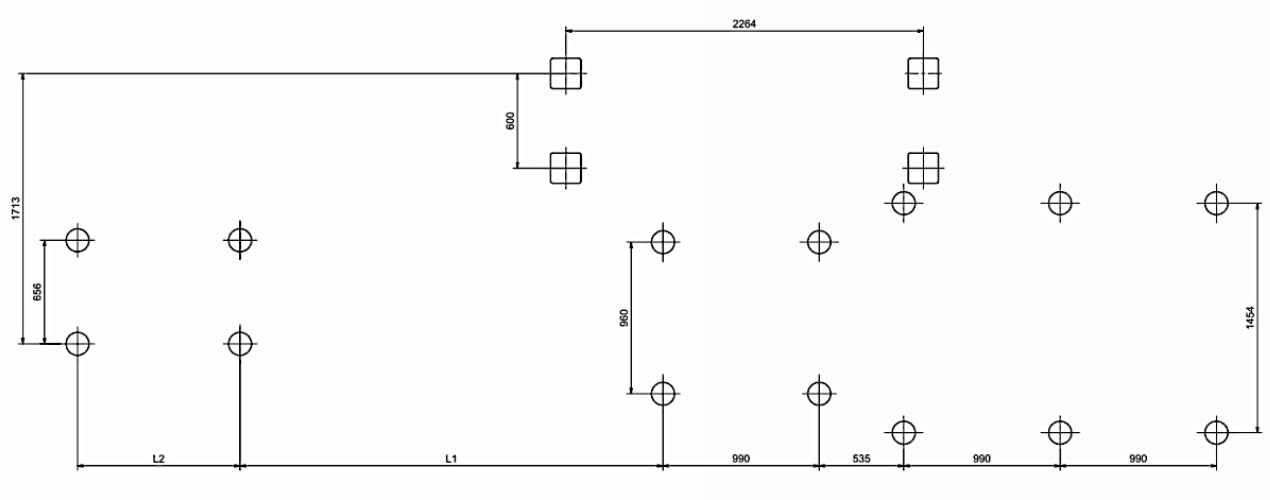






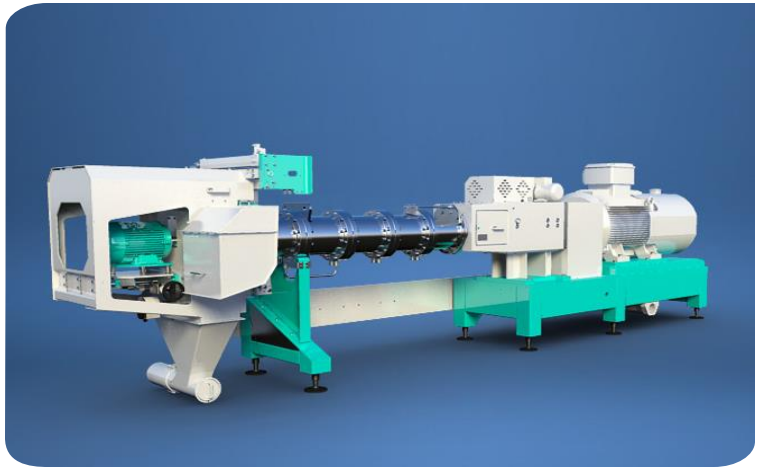


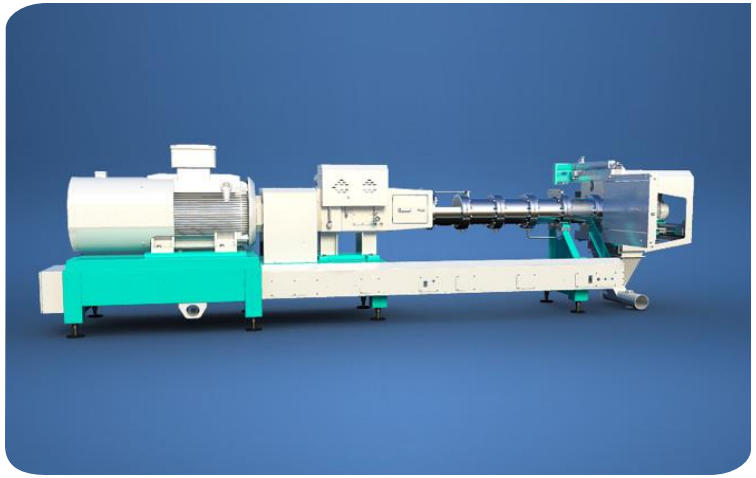
Dimensions (2/2).

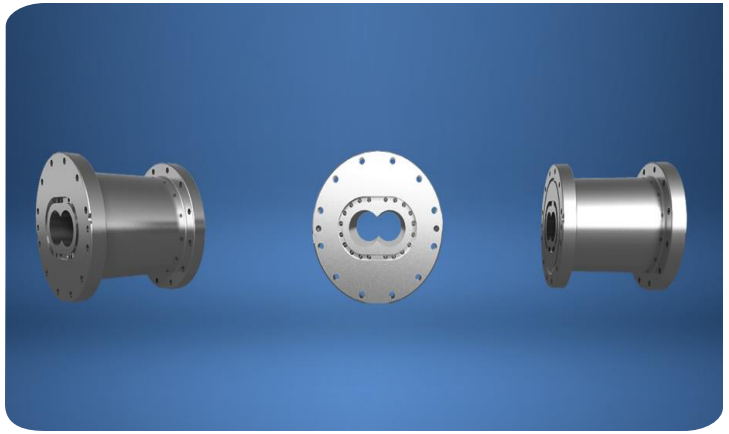


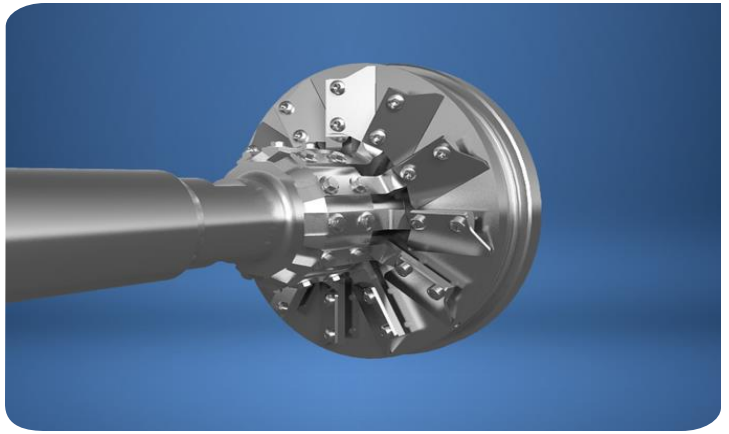
Abmessungen						
Bezeichung	Einheit	A	B	C	L1	L2
Verfahrenslänge 8D	mm	6311.6	1000,6	1121.45	-	-
Verfahrenslänge 12D	mm	6812	1501	1622	-	-
Verfahrenslänge 16D	mm	7312.2	2001,2	2122	2176	-
Verfahrenslänge 20D	mm	7812,5	2501,5	2622	2678	-
Verfahrenslänge 24D	mm	8312.8	3001,8	3123	2678	-
Verfahrenslänge 28D	mm	8813.1	3502,1	3623	2678	-
Verfahrenslänge 32D	mm	9313.4	4002,4	4123	2678	1501
Verfahrenslänge 36D	mm	9813.7	4502,7	4624	2678	2001
Verfahrenslänge 40D	mm	10314	5003	5124	2678	2001

Gewichte											
Bezeichung	Einheit	Antriebgruppe Chengbrand	Antriebsgruppe Eisenbeiss	Verfahrensteil (Gehäuse 445kg)	Extrudierkopf (Endplatte 178kg)	Schneidapparat	Schneckenpaar	Gesamtgewicht Chengbrand	Belastung pro Fuss	Gesamtgewicht Eisenbeiss	Belastung pro Fuss
Verfahrenslänge 8D	kg	8720	6650	1000	380	240	250	10590	10.4 kN	8520	8.4 kN
Verfahrenslänge 12D	kg	8720	6650	1500	380	240	290	11130	10.9 kN	9060	8.9 kN
Verfahrenslänge 16D	kg	8720	6650	2000	380	240	330	11670	9.6 kN	9600	7.9 kN
Verfahrenslänge 20D	kg	8720	6650	2500	380	240	370	12210	10,0 kN	10140	8.3 kN
Verfahrenslänge 24D	kg	8720	6650	3000	380	240	410	12750	10.5 kN	10680	8.8 kN
Verfahrenslänge 28D	kg	8720	6650	3500	380	240	450	13290	10.9 kN	11220	9.2 kN
Verfahrenslänge 32D	kg	8720	6650	4000	380	240	490	13830	9.4 kN	11760	8.3 kN
Verfahrenslänge 36D	kg	8720	6650	4500	380	240	530	14370	10.1 kN	12300	8.7 kN
Verfahrenslänge 40D	kg	8720	6650	5000	380	240	570	14910	10.5 kN	12800	9,0 kN









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