

For use in the laboratory and pilot plant

Brabender: Twin Screw Extruders



Brabender Twin Screw Extruders

Continuously operating co-rotating extruders for laboratory and pilot plant applications in modular or compact design.

The basic steps of compounding technology can be perfectly realized on the Brabender twin screw extruders. The screw and barrel modules are designed in such a way, that all process steps (feeding, conveying, plasticizing, dispersing, reacting, degassing, pressure build-up) can be carried out in the best possible way. Depending on the size, the applied material and the process task, throughputs of 0.06 kg/h to 100 kg/h can be achieved.

These extruders thus cover the entire range of applications from material development to small-scale production or use in the pilot plant.



Highlights

Flexible

- Available in compact version (with integrated drive) or as modular attachment for operation with a Brabender torque rheometer
- Wide range of applications
- Throughputs from 0.06 kg/h to 30 kg/h (laboratory extruder) or 100 kg/h (pilot plant extruder)
- Application-specific dies, screws and peripherals
- Simple variation of parameters and material mixtures

User-friendly

- Openable liner for optimal process control and cleaning*
- Easy setup via plug & play

Energy efficient

- Precise temperature distribution and control
- Powerful heating and cooling

* not applicable for the conical twin-screw extruder CTSE

Proven liner concept

A characteristic feature of Brabender twin-screw extruders* is the special liner concept in the Clam Shell design. The liner is horizontally split and can be opened on both sides, allowing easy access to the segmented screws.

The recipe and the effect of the process parameters can thus be easily observed and optimized during the process. In addition, the screws and the barrel can be easily cleaned.

* with the exception of the conical twin screw extruder CTSE

Hygienic Design

The hygiene-compliant design of many Brabender twin screw extruders is characterized above all by easy cleanability and food-grade materials

- Straight surfaces
- Stainless steel
- Removable cover (gearbox / motor)
- Openable cover for functional unit
- Hinges integrated in cover
- Low raw material usage
- Production-independent development and optimization



- Food compliant product contacting parts
- Openable liner, easy to clean
- Hygienic grip elements
- Large wheels and height-adjustable feet for easy cleaning under the extruder

Monitor and optimize your formulations and process parameters thanks to the Clam Shell design with the openable liner.



Mixing / cold forming



Gelation / Plastification



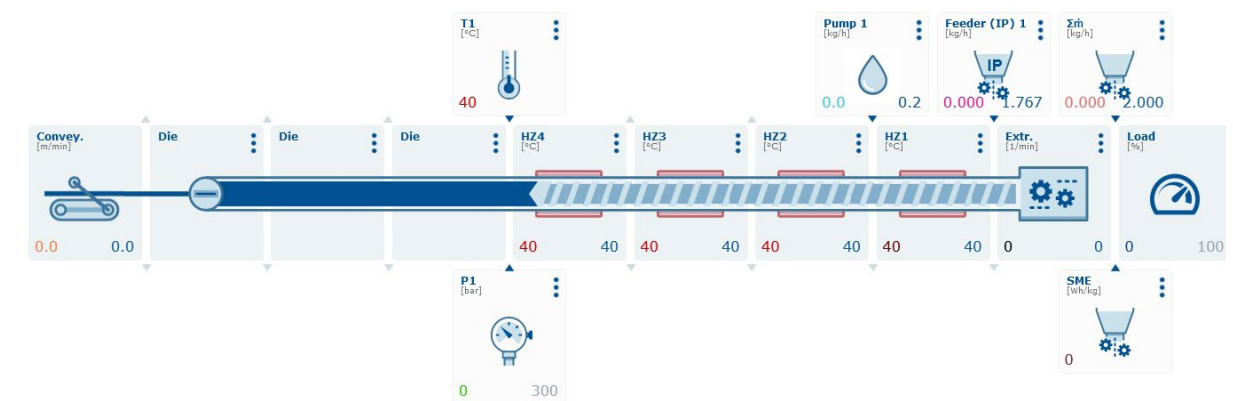
Starch retrogradation

Software

All measured values, such as torque, mass and control temperatures, as well as mass pressure are continuously recorded and clearly displayed in tables or graphs. These measured variables can be used to set the optimal process parameters for each production plant.

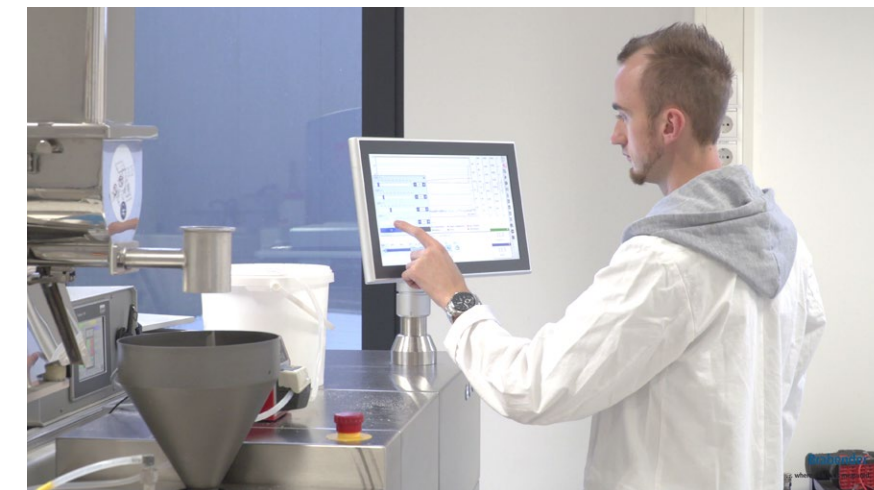
The MetaBridge device interface automatically recognizes the components and peripheral devices which significantly simplifies the setup of the extrusion line.

- Optimized for touch and drag-and-drop
- All connected components and peripherals are automatically detected, e.g. feeding and cutting units
- Configurable view
- Total mass flow balance (automatic adjustment of feeders and pumps)
- New evaluation functions, e.g. energy input (SME)



Configuration of the extrusion line with automatically identified components

The MetaBridge is available as standard software in all Brabender twin screw extruders as a compact unit or for operation with a MetaStation torque rheometer. For operation with older drives, the Plasti-Corder Lab-Station, the MetaBridge can be retrofitted on request.



Stand-alone extruders

With their compact design, the TwinLab-C 20/40 twin-screw extruders can be used in the laboratory with minimum space requirements. The B-TSE-A 30/40 with a throughput of up to 100 kg / h is designed for operation in the pilot plant and is the smallest extruder in its performance class on the market. The drive is already integrated in these systems, which simplifies the extruder setup.

In terms of application, they are nevertheless modular, thanks to the flexible use of different feeding systems and die geometries as well as the individually adaptable screw design.

Technical data	TwinLab-C 20/40	B-TSE-S 30/40
• Max. throughput (product / application-dependent):	20 kg/h	100 kg/h
• Materials:	Pellets, powders, fibre, liquids	
• Screw diameter:	20 mm	30 mm
• Barrel length:	40 D	40 D
• Screw run:	co-rotating	co-rotating
• Screw torque:	2 x 40 Nm	2 x 150 Nm
• Max. screw speed:	600 min ⁻¹ (fully tempered) / 1200 min ⁻¹ (partially tempered)	1200 min ⁻¹
• Temperature control:	fully / partially tempered	Fully tempered (both sides)
• Drive power:	3x400V: 9.5 kW (fully tempered) / 3x230V: 16 kW (partially tempered)	3x400V: 9.5 kW (fully tempered)
• Max. operating temperature:	250 °C (fully tempered) / 400 °C (partially tempered)	450 °C
• Max. pressure:	300 bar	300 bar
• Hygienic Design:	Optional	Yes
• Openable liner:	Yes	Yes
• Dimensions (W x H x D):	915 x 445 x 1565 mm	2200 x 1800 x 1320 mm
• Weight (without die head):	480 kg	850 kg



TwinLab-C 20/40



B-TSE-S 30/40

Modular twin screw extruders

In addition to compact systems, Brabender offers the greatest possible flexibility with its modular twin-screw extruders as attachments for torque rheometers. Twin screw extruders of sizes 12/36 and 20/40 can be cost-effectively connected to one and the same drive unit, as can measuring mixer or single screw extruder attachments.



MetaStation 4E with B-TSE-A 12/36



MetaStation 8E with B-TSE-A 20/40

Technical data	B-TSE-A 12/36	B-TSE-A 20/40
• Max. throughput (product / application-dependent):	0.06 - 5 kg/h	0.5 - 20 kg/h
• Materials:	Liquids, powders, micro and standard pellets	Pellets, powders, fibre, liquids
• Screw diameter:	12 mm	20 mm
• Barrel length:	36 D	40 D
• Screw run:	co-rotating	co-rotating
• Screw torque:	2 x 15 Nm	2 x 40 Nm
• Max. screw speed:	740 min ⁻¹	max. 200 min ⁻¹ (MetaStation 8 / 8E), with upstream gearbox max. 800 min ⁻¹ max. 400 min ⁻¹ (MetaStation 16), with upstream gearbox max. 1200min ⁻¹
• Temperature control:	fully tempered (both sides)	fully tempered (both sides)
• Max. operating temperature:	400 °C	400 °C
• Max. pressure:	150 bar	300 bar
• Hygienic Design:	Yes	Yes
• Openable liner:	Yes	Yes
• Dimensions (W x H x D):	• with support frame: 1240 mm x 600 mm x 1300 mm • without support frame: 1240 mm x 600 mm x 450 mm	1440 x 600 x 1320 mm
• Weight (without die head):	150 kg (with support frame)	330 kg

Conical twin screw extruder CTSE

The conical twin screw extruder CTSE is used for testing the extrusion behavior of products which are processed mainly in twin screw extruders in production as well. The CTSE stands out for special process technical advantages:

- good intake behavior in particular with voluminous bulk goods due to the enlarged channel volume in the feed zone
- quick compression in the feed zone through decreasing channel volume
- quick pressure build-up and rapid fusion with high circumferential speeds within this functional zone
- short processing length
- transmission of high torques due to good space conditions in the bearing area

Technical data CTSE

- Max. throughput (product / application-dependent): 0.5 - 10 kg/h
- Materials: Pellets, powders, fibre, liquids
- Screw diameter: 31.1 mm (gearbox) / 19.6 mm (discharge)
- Barrel length: 358 mm
- Screw run: counter-rotating
- Screw torque: 2 x 300 Nm
- Max. screw speed: 350 min⁻¹
- Max. operating temperature: 400 °C
- Max. pressure: 700 bar
- Hygienic Design: No
- Dimensions (W x H x D): on mobile frame: 1100 x 1600 x 670 mm, without docking station
- Weight (without die head): 75 kg (with support frame, without docking station)



CTSE

Twin Screw Compounder TSC 42/6

The Brabender Twin-Screw Compounder TSC 42/6 is used for continuous mixing and plasticizing of powder and granular thermoplastics and elastomers.

In combination with the closing adapter, this extruder can be used like a mixer for producing compounds for batches of material. After the mixing process, the product can be extruded by releasing the closing valve. Equipped with a two-strand die head with interchangeable inserts, the TSC is also applicable for continuous compounding.

It combines the advantages of the counter-rotating twin screw, i.e. high shear forces, forced conveying and self-cleaning with continuous operation, with those of a mixer, i.e. long residence times and excellent cross-flow for optimum mixing of the product.

Technical data TSC 42/6

- Max. throughput (product / application-dependent): 6 kg/h
- Materials: All flowable materials
- Screw diameter: 42 mm
- Barrel length: 6 D
- Screw run: counter-rotating
- Screw torque: 2 x 150 Nm
- Max. screw speed: 150 min⁻¹
- Max. operating temperature: 350 °C
- Max. pressure: 300 bar
- Hygienic Design: No
- Dimensions (W x H x D): ca. 700 x 420 x 360 mm (incl. hopper, without docking station)
- Weight (without die head): ca. 54 kg (without docking station)



TSC 42/6

Drive units for modular TSE

Brabender MetaStations are the latest generation of Brabender torque rheometers. Compared to their predecessors Plastograph and Plasti-Corder Lab-Station, they score with an even wider range of applications as well as higher user-friendliness. The MetaStation 4E, the smaller version for the lab bench, can be connected to mixers and single-screw extruders as well as to the B-TSE-A 12/36 and the conical twin-screw extruder. The MetaStation 8 and MetaStation 16 stationary drives are used for applications requiring higher torques and speeds. The B-TSE-A 20/40 twin-screw extruder attachment is operated with these control units.



Tabletop drive MetaStation 4E:
Successor of the Brabender Plastograph



Stand drives MetaStation 8 (E) and 16:
Successors of the Brabender Plasti-Corder
Lab-Station

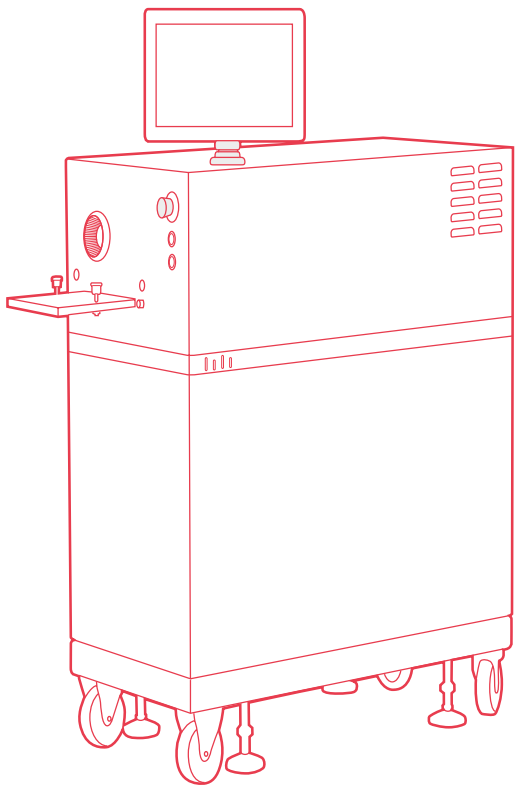
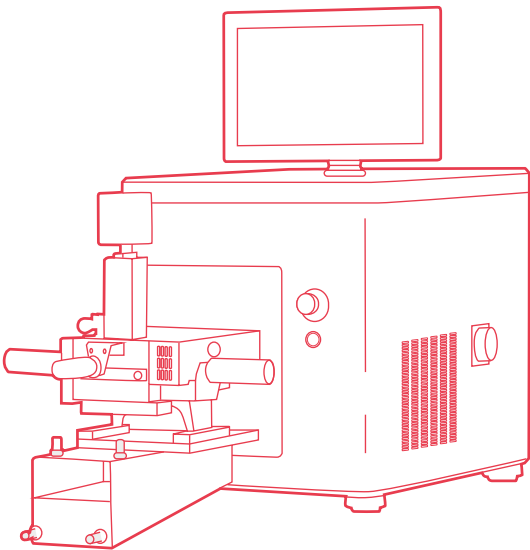
Technical data

MetaStation 4E

MetaStation 8(E)

MetaStation 16

• Drive power:	4,2 kW	8 kW	16 kW
• Torque:	0 - 200 Nm	0 - 400 Nm	0 - 500 Nm
• Speed:	0.2 bis 185 min ⁻¹ , infinitely variable	-0.2 bis 200 ⁻¹ , infinitely variable	-0.2 bis 275 ⁻¹ , infinitely variable
• Speed deviation:	max. ± 1 % from end range through digital feedback	max. ± 1 % from end range through digital feedback	max. ± 1 % from end range through digital feedback
• Temperature control:	6 zones	8 zones	8 zones
• Power supply:	3 x 400 V; 50/60 Hz + N + PE; 32 A; optional: 3 x 200 V; 50/60 Hz + PE; 32 A, without transformer	3 x 400 V 50/60 Hz + N + PE, 62 A 3 x 230 V 50/60 Hz + PE, 62 A	3 x 400 V 50/60 Hz + N + PE, 62 A 3 x 230 V + PE, 50/60 Hz, 62 A
• Dimensions (W x H x D)	700 x 870 x 950 mm	600 x 150 x 950 mm	600 x 150 x 950 mm
• Weight:	154 kg	311 kg	311 kg
• Interfaces:	MetaBridge Connect, WebAPI, Labfolder (LIMS)	MetaBridge Connect, WebAPI, Labfolder (LIMS)	MetaBridge Connect, WebAPI, Labfolder (LIMS)
• Safety devices:	Motor emergency stop button, non-contact magnetic safety switch at the cover of the measuring system	Motor emergency stop button, non-contact magnetic safety switch at the cover of the measuring system	Motor emergency stop button, non-contact magnetic safety switch at the cover of the measuring system

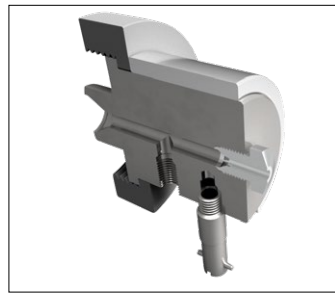


Modular design

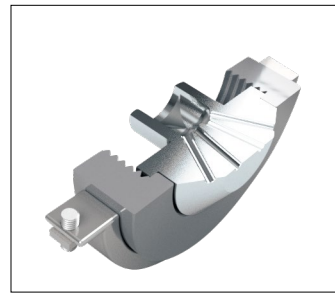
Whether compact with integrated drive or as an attachment for a Brabender torque rheometer - the Brabender twin screw extruders convince with their flexible use as a modular system. This means that complete extrusion lines can be built up modularly and expanded at any time.

Nozzle heads

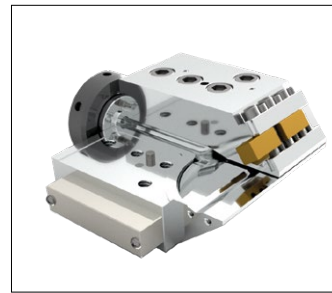
Brabender die heads are used to extrude special shapes or profiles for further investigations or to simulate production processes in order to find optimum raw material formulations and process parameters for the respective process task. The die heads are attached to the extruder barrel via a ring nut and can thus be changed quickly and easily. For further information, please refer to the brochure "Measuring and processing die heads".



Round die head



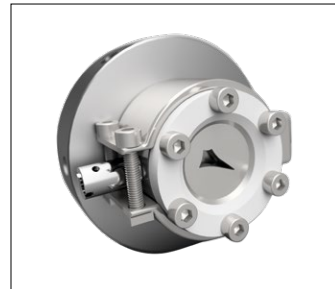
Multi-strand die head



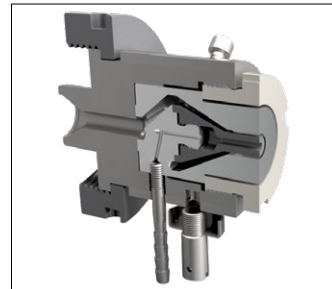
Ribbon die head



Film blowing die head



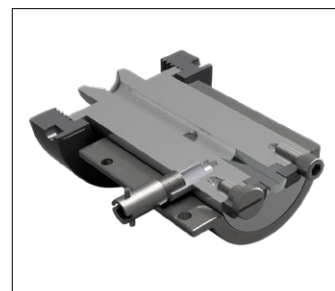
Garvey die head



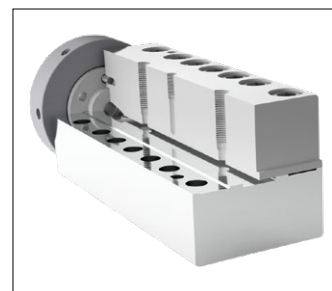
Tubing die head



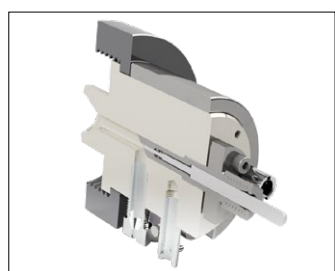
Wire coating die head



Rheometric round capillary die head



Rheometric slot capillary die head



Swelltest die head

Screws

The screw configuration is an essential part of the design of an extrusion process. It influences the process conditions and thus the product properties.

A wide range of configurable screw elements is available for twin screw extruders e.g:

- Conveyor elements
- Kneading blocks
- Inverse elements
- Tooth mixing elements

The configuration of a screw is done in a user-friendly way via the MetaBridge software.



Conveying elements

Inverse elements

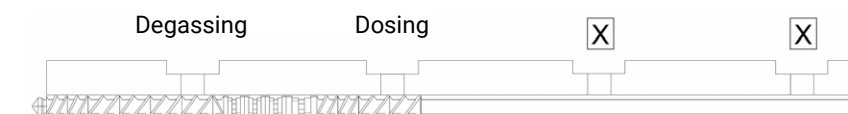


Kneading blocks

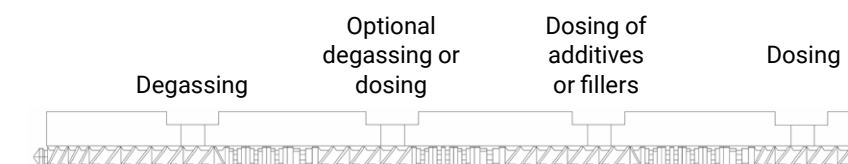
Tooth mixing elements

Application examples

B-TSE-A 20/40, shortened to 20 D, Degassing of polyethylene/polypropylene



B-TSE-A 20/40, alloying of polyphenylene oxide



Dosing systems

The product is fed to the extruder in the feed zone. Various types of dosing systems are available for this purpose, which are flange-mounted directly or mounted above the feed chute on a support frame:

- gravimetric dosing systems
- volumetric dosing systems
- side dosing systems
- vertical forced feeder
- laboratory dosing pump (e.g. perfusor)



Downstream equipment

For setting up extrusion lines on a laboratory scale, Brabender offers a range of downstream equipment.

For material conveying

- Conveyor belt



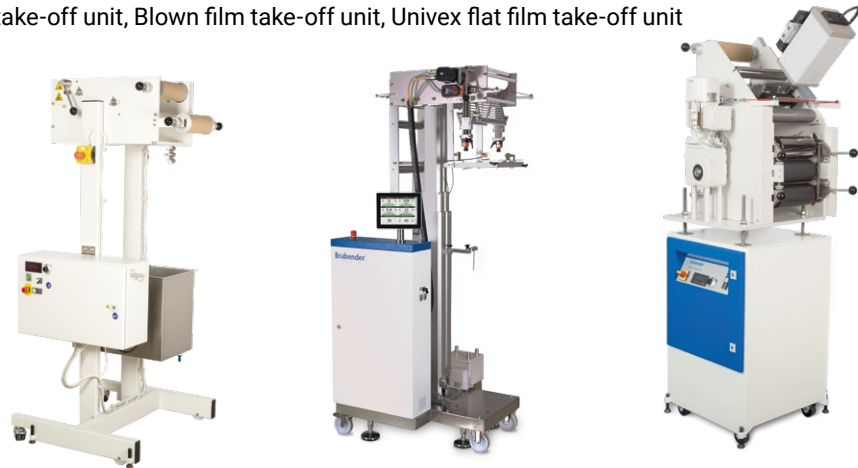
For cooling

- Water bath



For take-off

- Wire take-off unit, Blown film take-off unit, Univex flat film take-off unit



For winding up

- Winder



For dispersion testing

- Filtratest



For pelletizing

- Pelletizer, Cutting Device



Extrusion line for strand pelletizing: TwinLab-C 20/40 with water bath and pelletizer

Applications

Materials

- Thermoplastics
- Thermosets
- Elastomers
- Engineering Plastics
- Recyclates
- Biopolymers

Products

- Round strands
- Tubes
- Hoses
- Cables
- Ribbons
- Rods
- Flat films
- Blown films
- Profiles
- Filaments
- Plates



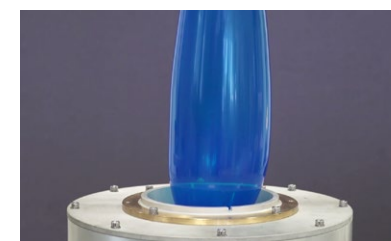
Round strands



Ribbons



Filaments



Blown films



Flat films



Profiles

Technical Data - Overview

	B-TSE-A 12/36	TwinLab-C 20/40	B-TSE-A 20/40	B-TSE-S 30/40	KDSE	DSK 42/6
Max. throughput (product / application-dependent)	0.06 - 5 kg/h	0.5 - 20 kg/h	0.5 - 20 kg/h	100 kg/h	0.5 - 10 kg/h	6 kg/h
Materials	Liquids, powders, micro and standard pellets	Pellets, powders, fibre, liquids	Pellets, powders, fibre, liquids	Pellets, powders, fibre, liquids	Pellets, powders, fibre, liquids	All flowable materials
Screw diameter	12 mm	20 mm	20 mm	30 mm	31.1 mm (gearbox) / 19.6 mm (discharge)	42 mm
Barrel length	36 D	40 D	40 D	40 D	358 mm	6 D
Screw run	co-rotating	co-rotating	co-rotating	co-rotating	counter-rotating	counter-rotating
Screw torque	2 x 15 Nm	2 x 40 Nm	2 x 40 Nm	2 x 150 Nm	2 x 300 Nm	2 x 150 Nm
Max. screw speed	740 min ⁻¹	600 min ⁻¹ (fully tempered) 1200 min ⁻¹ (partially tempered)	max. 200 min ⁻¹ (MetaStation 8 / 8E), incl. upstream gearbox max. 800 min ⁻¹ (MetaStation 16), incl. upstream gearbox max. 1200min ⁻¹	1200 min ⁻¹	350 min ⁻¹	150 min ⁻¹
Temperature control	Fully tempered (both sides)	Fully / partially tempered	Fully tempered (both sides)	Fully tempered (both sides)		
Drive unit	MetaStation 4E, 8(E), 16	Integrated	MetaStation 8(E), 16	Integrated	MetaStation 4E, 8(E), 16	MetaStation 4E, 8(E), 16
Antriebsleistung		3x400V: 9.5 kW (fully tempered) 3x230V: 16 kW (partially tempered)		3x400V: 39 kW	7 kW	
Max. operating temperature	400 °C	250 °C (fully tempered) 400 °C (partially tempered)	400 °C	450 °C	400 °C	350 °C
Max. pressure	150 bar	300 bar	300 bar	300 bar	700 bar	300 bar
Hygienic Design	Yes	No	Yes	Yes	No	No
Openable liner	Yes	Yes	Yes	Yes	No	No
Dimensions (W x H x D)	• with support frame: 1240 mm x 600 mm x 1300 mm • without support frame: 1240 mm x 600 mm x 450 mm	1915 x 445 x 1565 mm	1440 x 600 x 1320 mm	2200 x 1800 x 1320 mm	on mobile frame: 1100 x 1600 x 670 mm, without docking station	ca. 700 x 420 x 360 mm (incl. hopper, without docking station)
Weight (without die head)	150 kg (mit Untersatz)	480 kg	330 kg	850 kg	75 kg (with frame, without docking station)	ca. 54 kg (without docking station)
Mains connection	1 x 240 V, 50/60 Hz + N + PE, 32 A	3 x 400 V, 50/60 Hz + N + PE, 63 A; 3 x 230 V, 50/60 Hz + PE, 76 A	3 x 400 V, 50/60 Hz + N + PE, 32 A	3 x 400 V, 50/60 Hz + N + PE, 32 A	1 x 230 V, 50/60 Hz + PE, 32 A	1 *x240 V, 50/60 Hz + N + PE, 32 A

