

# Twin-Screw Extruders

**Brabender: TwinLab Series**



# Elevate Your Extrusion

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apb-twinlab](http://www.anton-paar.com/apb-twinlab)

Determining extrusion process parameters that lead to perfect results is complex. Anton Paar has the easy answer: Twinlab laboratory and pilot-scale extruders.

Our range of high-tech measuring extruders provide deep and precise insight into a broad range of process parameters that influence your material. Rapid tests of recipe and parameter adaptations get you to the desired extrusion result within hours instead of days. Smaller extruders with shorter testing times mean a dramatic decrease in expensive sample loss.

- Understand the extrusion process, linking parameters to the final product using live and historical data
- Save testing costs and sample loss by avoiding costly development and experimental testing on large production machines
- Cut expensive downtimes of production extruders to a minimum
- Go from lab to production level in no time thanks to precisely determined process parameters for scale-up
- Conduct sample and formulation testing on a small scale for subsequent investigations



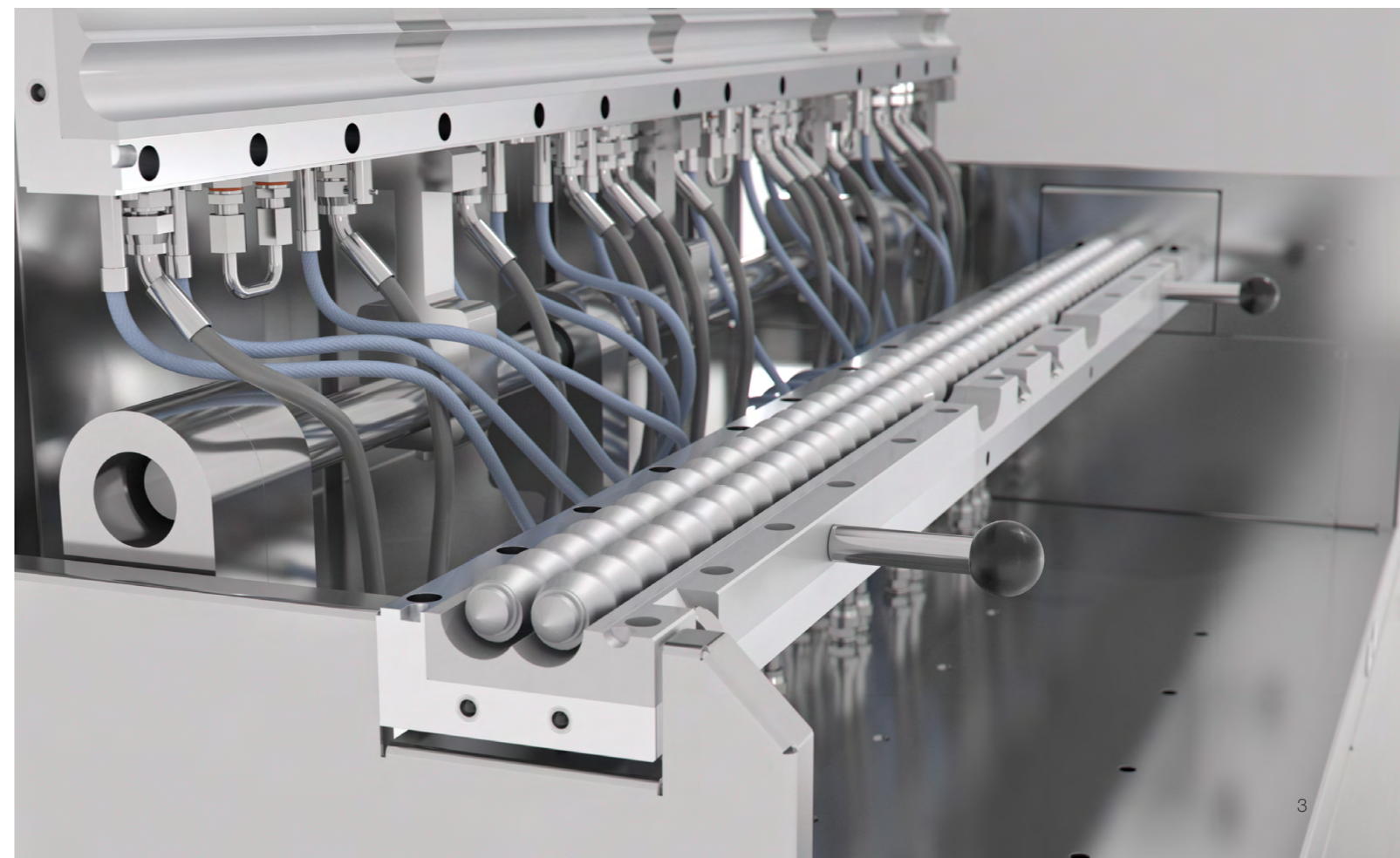
# Your Extrusion Dream Machine

Brabender Twinlab extruders are the best choice for processing polymer, food and other extrudable materials. From thermoplasts, thermosets, and additives, to food samples like snacks and meat analogues, the choice is yours.

Unleash your full scientific potential with customizable screw configurations, special barrel and screw materials like Brabender's patented Bralloy and numerous process peripherals like special dies, film inspection and pelletizing.

A wide array of steel alloys ensure durability over the whole instrument life time – even with highly corrosive and abrasive substances.

- Customize your extruder based on your requirements and material demands
- Collect data and gain material insights based on in-process recording of extrusion parameters
- MetaBridge software: the benchmark for real-time parameter tracking and integrated peripheral data
- Benefit from the advantages of complete solutions offered by an established single supplier
- A clamshell-inspired liner with a horizontal opening mechanism for easy access, facilitating cleaning and monitoring of the screw configuration's effectiveness



# The TwinLab Series

From laboratory scale to small series production

## TwinLab B-TSE-A 12/36

Twin-screw extruder in modular attachment design for use with the torque rheometer device MetaStation 4 in laboratory applications



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[www.anton-paar.com/apb-b-tse-a-1236](http://www.anton-paar.com/apb-b-tse-a-1236)

## TwinLab B-TSE-A 20/40

Twin-screw extruder in modular attachment design for use with the torque rheometer device MetaStation 8 in laboratory applications



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## TwinLab B-TSE-S 20/40

Standalone TwinLab design for laboratory applications



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## TwinLab B-TSE-S 30/40

Standalone TwinLab design for pilot applications and small series production



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### TwinLab B-TSE-A 12/36



### TwinLab B-TSE-A 20/40



Throughput <sup>1</sup>	0.06 kg/h to 5 kg/h	0.5 kg/h to 10 kg/h
Screw diameter D	12 mm	20 mm
Screw length	36 D	40 D
Max. screw torque	2 x 15 Nm	2 x 40 Nm
Max. screw speed	740 min <sup>-1</sup>	1,600 min <sup>-1</sup>
Max. processing pressure	150 bar	300 bar

### TwinLab B-TSE-S 20/40



### TwinLab B-TSE-S 30/40



Throughput <sup>1</sup>	1 kg/h to 20 kg/h	5 kg/h to 100 kg/h
Screw diameter D	20 mm	30 mm
Screw length	40 D	40 D
Max. screw torque	2 x 40 Nm	2 x 150 Nm
Max. screw speed	1,200 min <sup>-1</sup>	1,200 min <sup>-1</sup>
Max. processing pressure	300 bar	300 bar

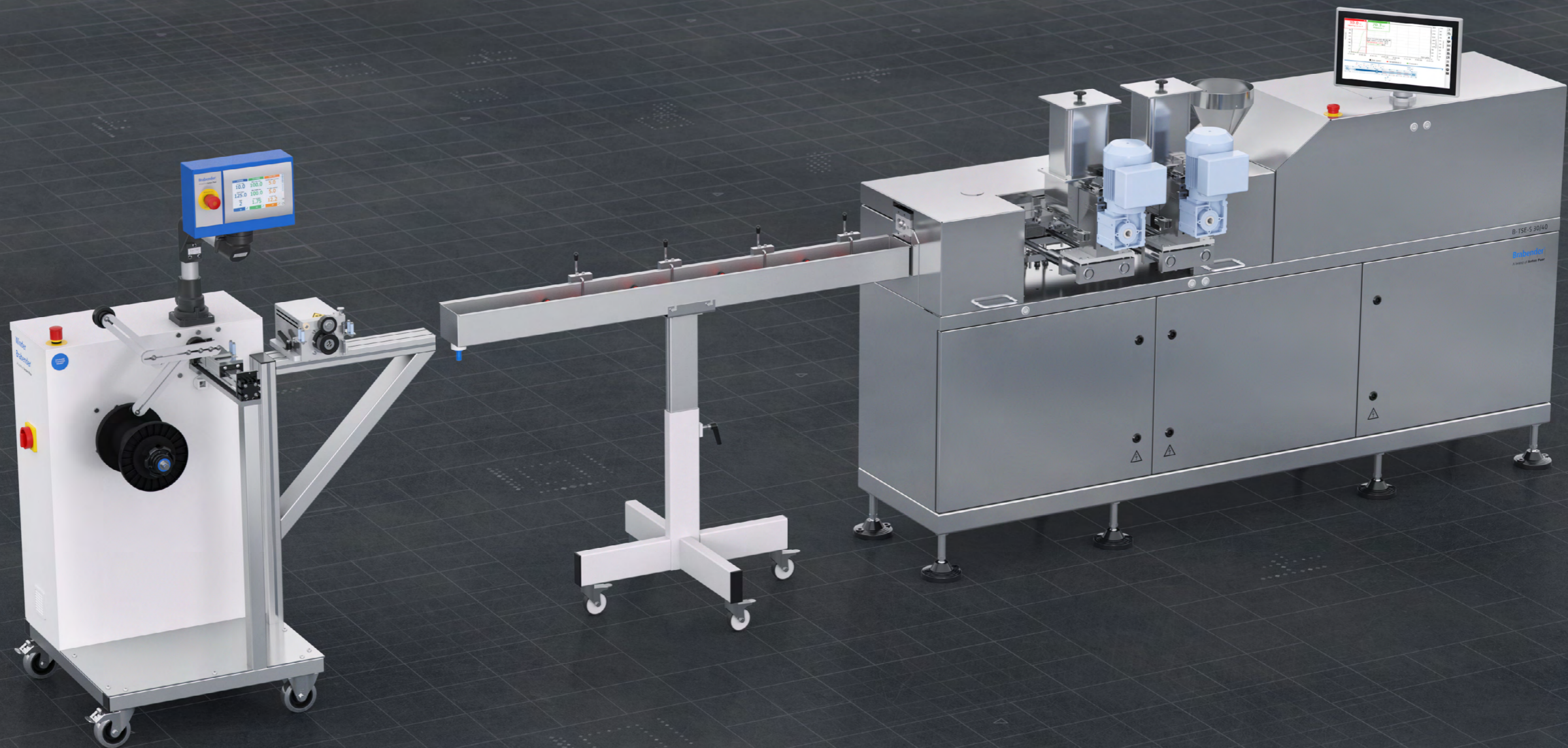
<sup>1</sup> Guide value – The real throughput is a material and process-specific variable and can be higher or lower

# Get Modular Solutions from a Single Supplier

The TwinLab series integrates the hardware and software of all peripherals and downstream devices into a coherent system with seamless data streams. We configure the twin-screw extrusion setup to your individual requirements and applications.

Get the most complete extrusion line on the market from a single supplier, and have it set up by local experts so it runs for decades to come.

- ✓ Easily integrate feeders, pumps, granulators, take-off units, etc. into the extruder control system
- ✓ Control the extruder peripherals and time-resolved recording of the peripheral process variables via MetaBridge software
- ✓ Leverage the application and process know-how of in-house experts at Anton Paar
- ✓ Benefit from Anton Paar's global service and support network for the entire extrusion line



# Meet MetaBridge. Meet the Benchmark.

MetaBridge operating software is your gateway to critical process data that determines your sample's properties. MetaBridge is designed to provide deep analytical insight and powerful reporting features on an intuitive interface.

Connect multiple instruments and access data from an instrument, a PC, or a mobile device. MetaBridge is the extrusion software built around user demands.



## MetaBridge connect

- Easy access to your measurement data via a web browser within the company network
- Automatic detection of the complete extruder periphery



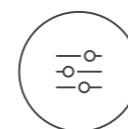
## Data sharing

- Standard data exports in typical formats such as Excel, CSV, PDF
- Built-in mailing function for quick measuring result checks with colleagues and customers
- Support of third-party systems (e.g., LIMS, ERP) via Brabender WebAPI, shared network folders, or OPC UA



## Process editor

- Functionality to define and automate the complete extrusion process
- Complete control of feeder, pumps, temperature, screw speed, etc.
- No human error means increased reproducibility
- Can be easily combined with alarm profiles that automatically monitor the process and trigger an alarm in the unlikely event of an error



## Smart logs

- Logs parameter and sensor values of the complete extrusion process in a table
- Shows only the information you're interested in
- Keep a better overview: Information will be hidden without significant changes to the previous value
- Lets you create your own formula to be logged (e.g., temperature difference between first and last sensor)



## Specific mechanical energy

- The specific mechanical energy is a device-independent process characteristic
- Automatic calculation of the SME within the MetaBridge environment supports you in investigations with the intention of process scale-up



## Correlation

- Compare a multitude of measurements with the correlations add-on feature to obtain an optimal understanding of your materials
- MetaBridge automatically creates smart correlations in the background and sends monthly email reports for quality control

# Get Full Control of Your Extrusion Process

With the TwinLab series, you get time-resolved recording of process variables for your entire extrusion process. Our extruder isn't just for laboratory or pilot-scale processing, it's also a powerful measuring device. Gain unparalleled insights into your processes, surpassing what's achievable with standard production machines.

Measured variables such as pressure and temperature can be determined in the extrusion dies as well as along the extruder barrel and are visualized in the extruder software to evaluate the plasticizing and mixing behavior.

Comprehensive overview across the development of an extrusion process



## Drive and extrusion parameters

- Screw speed
- Load capacity of the drive
- Current torque (for modular design using a MetaStation torque rheometer)
- Throughputs of feeders and pumps

## Process visualization of parameters for downstream peripherals

- Take-off speeds
- Volume flow (when using a downstream melt pump)

## Measuring dies and devices

- Measurement of dispersibility in thermoplastic compounds according to DIN EN ISO 23900-5
- Inline-viscosity measurement
- Results of the optical quality analysis on extruded films
- Dimensions of the extrudate
- Dies and devices for polymer, food, pharma and battery applications



# Customize Your Screw Configuration

The Brabender TwinLab series offers a wide selection of customizable screw configurations depending on your specific requirements.

## Challenges associated with screw configurations



### Diversity of materials

Compounding covers the processing with a wide variety of materials, from liquids and polymers to pasty masses with highly abrasive ceramic particles.

### Shear stress input

The screw geometry influences the shear stress applied to the material. In extrusion, you have the option of adjusting the shear input for specific applications, both with the purpose of increasing but also decreasing it for shear-sensitive formulations.

### Conveying characteristics

When creating a screw configuration, you need to consider the used feeding zones and the properties of the added substances. This means that it must be possible to influence the pressure profile as well as the conveying behavior or the residence times along the extrusion screws.

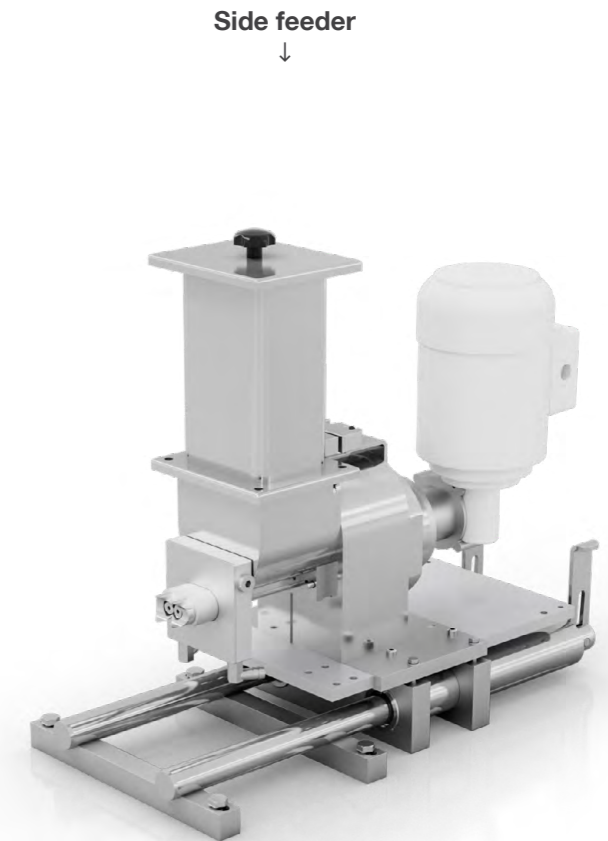
## Key features of the TwinLab screw assembly

- Segmented screws for use in co-rotating and counter-rotating extrusion processes
- Possibility of adapting the screw element arrangement to the requirements for each application
- Also available with special resistance to corrosive and abrasive acting compounds
- Wide selection of screw elements to optimize the conveying, mixing, and dispersion process
- Possibility of shortening the screw length to reduce the residence time due to flexible use of several feeding zones
- The lengthwise separation of the TwinLab series barrels lets the unit be opened to, if needed, evaluate and adjust the screw setup for the conveying and mixing behavior

# Dosing Systems for a Range of Applications

The feedstock supply to the twin-screw extruders takes place continuously via dosing units, which are fully integrated into the hardware and software of the TwinLab system.

The dosing systems in different configurations are adapted to the application-specific challenges of the desired compounding process. This is based on the expected throughputs and the physical properties like flowability or bulk density of the conveyed material.



## Powder and pellet feeders

Pellet and powder dosing systems are most commonly used in compounding and can be operated in volumetric and gravimetric mode. With a gravimetric feeder, you know throughput over time. It also enables precise development of recipes and guarantees stable mixing ratios in the production of final compounds. Depending on the size and shape of the granulates and powders, the combination of conveying pipe and conveying screw is adapted to the application in terms of dimensions and design.

## Fiber feeders

The stable dosing of fibers is especially challenging in compounding on a laboratory scale. In addition to free-fall pellet and powder feeders, specific fiber feeders can also be used as part of the TwinLab series.

## Dosing systems for liquids and pastes

The TwinLab series offers special dosing systems for liquid and pasty substances. The portfolio includes piston and eccentric pumps in various sizes for low-viscosity, as well as high-viscosity liquids.

## Vertical forced feeder

Vertical forced dosing is a dosing system designed specifically for powdery and gritty materials in food and feed applications. However, vertical forced feeding can also be used in non-food applications for raw materials with low flowability and low bulk density. A vertically arranged screw in the hopper conveys the material into the extruder. A simultaneously rotating agitator supports the transportation of the material.

## Side feeder

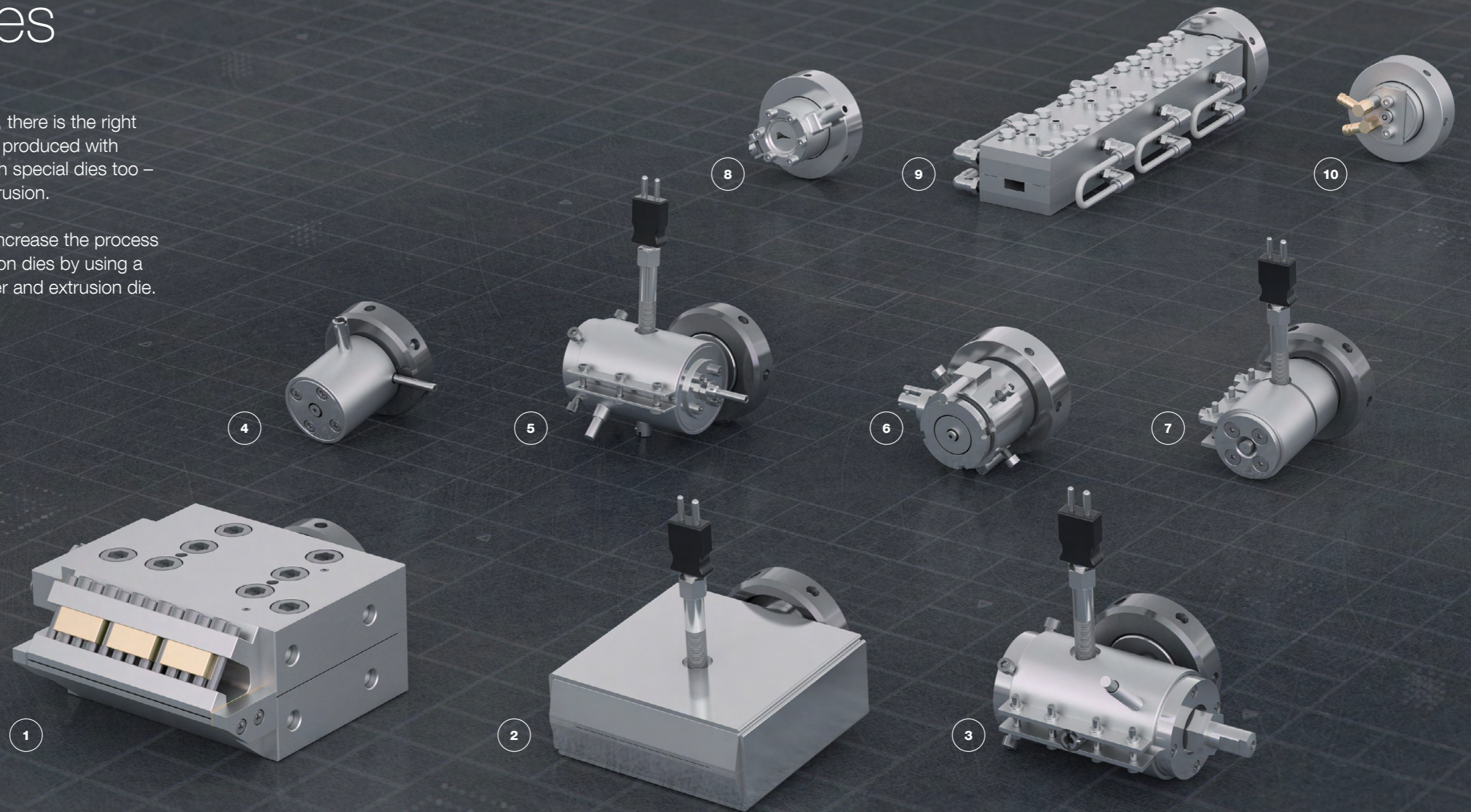
In addition to the usual material feeding via the upper cylinder opening of the extruder, the TwinLab series side feeders can be used to feed powder and fibers via side openings, which cannot be fed using the usual free-fall variant due to their material-specific properties. The materials are conveyed into the extruded compound by a pair of conveyor screws.



# Extrusion Dies

For every single one of your applications, there is the right extrusion die that's brilliantly engineered, produced with perfect quality. We have you covered with special dies too – from plant-based applications, to co-extrusion.

For use in plastics processing, you can increase the process pressure available for feeding the extrusion dies by using a melt pump installed between the extruder and extrusion die.



1

## Flat film dies

Flat film die in different sizes with adjustable flexible lip at the die outlet

2

## Rod and ribbon dies

Round and rectangular shaped dies for extrusion of semi-finished goods in small scale

3

## Wire coating dies

Coating die to cover a core material, such as metallic wires, with extruded materials

4

## Tubing dies

Extrusion die for the production of round shaped tubes with different diameters

5

## Blown film die

Preparation of blown film in combination with an appropriate blown film tower

6

## Coextrusion dies

Dies for the preparation of two or three-layer flat and blown films

7

## Rheological capillary dies

Measuring dies for continuous and in-line determination of shear rate and temperature-dependent viscosity

8

## Garvey die

Special standard-compliant solutions for characterizing extruded materials – e.g., purity (filtrate test), dimensional accuracy (Garvey)

9

## Modular cooling die

Modular die system for the production of texturized plant proteins with meat-like texture on laboratory scale

10

## Pasta die

Air or water-cooled die head for developing and processing pasta dough products

# Downstream Equipment

The TwinLab series in combination with downstream devices offer an intelligent, fully integrated, complete solution. Adjust and record the corresponding control parameters and measured variables of all peripheral devices in the software and display it in the process diagram.



1

**Conveyor belt**  
Conveying and air cooling the extrudate before winding or pelletizing

2

**Water bath**  
Cooling the extrudate before winding or pelletizing

3

**Pelletizer**  
Cutting an extruded strand of a compound into granules for subsequent further processing

4

**Winder**  
Take-off extruded strands and winding of the extrudate on a coil

5

**Flat film take-off**  
Downstream device for the take-off and winding of extruded flat films with water or oil tempered chill rolls

6

**Wire take-off**  
Take-off for coated wires produced by means of a wire coating die

7

**Blown film take-off**  
Take-off and winding of extruded blown film, equipped with an integrated monitoring system for continuous diameter control of the extruded hose

8

**Univex with film quality analyzer**  
Cast film take-off unit with downstream evaluation device for optical evaluation of the quality of an extruded flat or blown film

9

**Laser measuring device**  
Measurement of the outer dimensions of the extrudate to monitor dimensional accuracy and evaluate the stability of the extrusion process

10

**Cutting device**  
Connected directly to the extrusion die device for cutting food and feed extrudates

# Modular Design for Maximum Flexibility

Experience the versatility of the modular TwinLab series, available in system sizes 12/36D and 20/40D, paired with the MetaStation drive unit. Seamlessly switch between twin-screw extruder, single-screw extruder or mixer attachments and unlock the potential for multiple applications using just one tabletop or stand drive unit.

## Measuring mixer features

- Benefit from discontinuous production of homogeneous mixtures of polymers, elastomers, and ceramics
- Measure speed, torque, and temperature during the mixing process
- Evaluate flow behavior, heat, and shear stability or plasticizer absorption of PVC dry blends
- Conduct mixing tests according to international standards for plastics and rubber
- Learn the behavior of the material during processing (e.g., extrusion)



## Single-Screw extruder

- Process finished compounds and recipes, no need for mixing
- Measure speed, torque, and temperature during the mixing process
- Use for applications with increased pressure requirements and where there's a need for torque measurement during processing or testing
- Benefit from continuous production of test specimens in the form of strands, tapes, tubes, and films
- Perform continuous viscosity measurements on plastic compounds



**TwinLab B-TSE-A 12/36**

**TwinLab B-TSE-A 20/40**



**MODULAR**

<b>Throughput<sup>1</sup></b>	0.06 kg/h to 5 kg/h	0.55 kg/h to 10 kg/h
<b>Screw diameter D</b>	12 mm	20 mm
<b>Screw length</b>	36 D	40 D
<b>Diameter ration D<sub>o</sub>/D<sub>i</sub></b>	1.43	1.60
<b>Max. screw torque</b>	2 x 15 Nm	2 x 40 Nm
<b>Torque density / specific torque</b>		
<b>Max. screw speed</b>	740 min <sup>-1</sup>	1,600 min <sup>-1</sup>
<b>Max. processing pressure</b>	150 bar	300 bar
<b>Max. processing temperature<sup>2</sup></b>	450 °C	450 °C
<b>Top openings</b>	0 D   10 D   27 D	0 D   10 D   20 D   30 D
<b>Side openings</b>	12 D	12 D   22 D
<b>Power supply<sup>3</sup></b>	3 x 230 V   50/60 Hz   32 A   PE 3 x 400 V   50/60 Hz   32 A   N + PE	3 x 230 V   50/60 Hz   63 A   PE 3 x 400 V   50/60 Hz   63 A   N + PE
<b>Dimensions and weight</b>		
<b>Dimensions<sup>4</sup> (L x W x H)</b>	2,190 mm x 950 mm x 1,652 mm	1,350 mm x 730 mm x 1,160 mm
<b>Weight</b>	175 kg	323 kg

<sup>1</sup> Guide value – The real throughput is a material and process-specific variable and can be higher or lower

<sup>2</sup> Depending on the selected cylinder and screw alloy

<sup>3</sup> Specifications for: B-TSE-A 12/36 with MetaStation 4 drive unit | B-TSE-A 20/40 with MetaStation 8

<sup>4</sup> Specifications for: B-TSE-A 12/36 with MetaStation 4 drive unit and mobile frame | B-TSE-A 20/40 with MetaStation 8

**TwinLab B-TSE-S 20/40**

**TwinLab B-TSE-S 30/40**

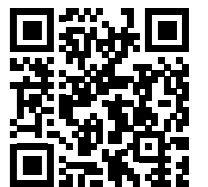


**STANDALONE**

<b>Throughput<sup>1</sup></b>	1 kg/h to 20 kg/h	5 kg/h to 100 kg/h
<b>Screw diameter D</b>	20 mm	30 mm
<b>Screw length</b>	40 D	40 D
<b>Diameter ration D<sub>o</sub>/D<sub>i</sub></b>	1.60	1.54
<b>Max. screw torque</b>	2 x 40 Nm	2 x 150 Nm
<b>Torque density / specific torque</b>		
<b>Max. screw speed</b>	1,200 min <sup>-1</sup>	1,200 min <sup>-1</sup>
<b>Max. processing pressure</b>	300 bar	300 bar
<b>Max. processing temperature<sup>2</sup></b>	450 °C	450 °C
<b>Top openings</b>	0 D   10 D   20 D   30 D	0 D   10 D   20 D   30 D
<b>Side openings</b>	12 D   22 D	12 D   22 D
<b>Power supply<sup>3</sup></b>	3 x 230 V   50/60 Hz   76 A   PE 3 x 400 V   50/60 Hz   63 A   N + PE	3 x 400 V   50/60 Hz   160 A   N + PE
<b>Dimensions and weight</b>		
<b>Dimensions<sup>4</sup> (L x W x H)</b>	1,915 mm x 445 mm x 1,565 mm	2,200 mm x 1,800 mm x 1,320 mm
<b>Weight</b>	490 kg	850 kg

Reliable.  
Compliant.  
**Qualified.**

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Our well-trained and certified technicians are ready to keep your instrument running smoothly.



Maximum uptime



Warranty program



Short response times



A global service network

