

Hybrid laboratory extruder

Twin screw extruder, co-rotating

ZE 5 / 9 / 12 HMI



APPLICATION

During formulation development, often only small and often expensive amounts of active ingredients are available. On the other hand, many formulation trials are necessary to find an optimal formulation. These prerequisites require extrusion capabilities on a resource-saving miniature scale. For this purpose, Three-Tec has developed the Hybrid laboratory extruder.

The Hybrid laboratory extruder is built in the same housing as our proven standard extruders as a table-top execution. As a combination unit, however, it also offers the choice between two different extruder sizes. Three variations are available, each with two selectable screw diameters (5, 9 or 12 mm).

CONTROL

The extruder control is based on the latest PLC technology from Siemens. It can be operated via touch panel, includes extensive software functions and enables the recording of process-relevant data. Customer-specific adaptations to the software and various communication protocols enable additional functions and the integration of the control into higher-level systems and plants.



MATERIAL

Parts in contact with the product	Stainless steel
Barrel, extrusion tools	various stainless steels hardened, adapted to the customer application
Seals	PTFE, silicone (up to 230 °C), metallic up to 400 °C

FEATURES

Thanks to an empty volume of only 1.2 cm³ with a 5 mm screw diameter (L/D ratio 15:1) - the smallest of its kind worldwide - the Hybrid laboratory extruder has a very low active ingredient consumption. This makes it possible to produce very small preparations of as little as 1 gram. Since only very small residual amounts remain in the extruder, a high yield can be achieved with the available substances. The results are also ideal for reproducible scaling.

Thanks to the universal use of heating cartridges, cooling systems, die plates, pressure and temperature sensors, the unit offers the flexibility to convert from a 5 mm to a 9 or 12 mm screw diameter within a few minutes. The range of applications is thus considerably enlarged compared to conventional extruders.

ADVANTAGES

- > Flexibility
- > Multifunctional
- > Space-saving
- > Cost-optimised
- > Minimal product loss

EXTRUSION TOOLS AND EXTRUSION PERFORMANCE

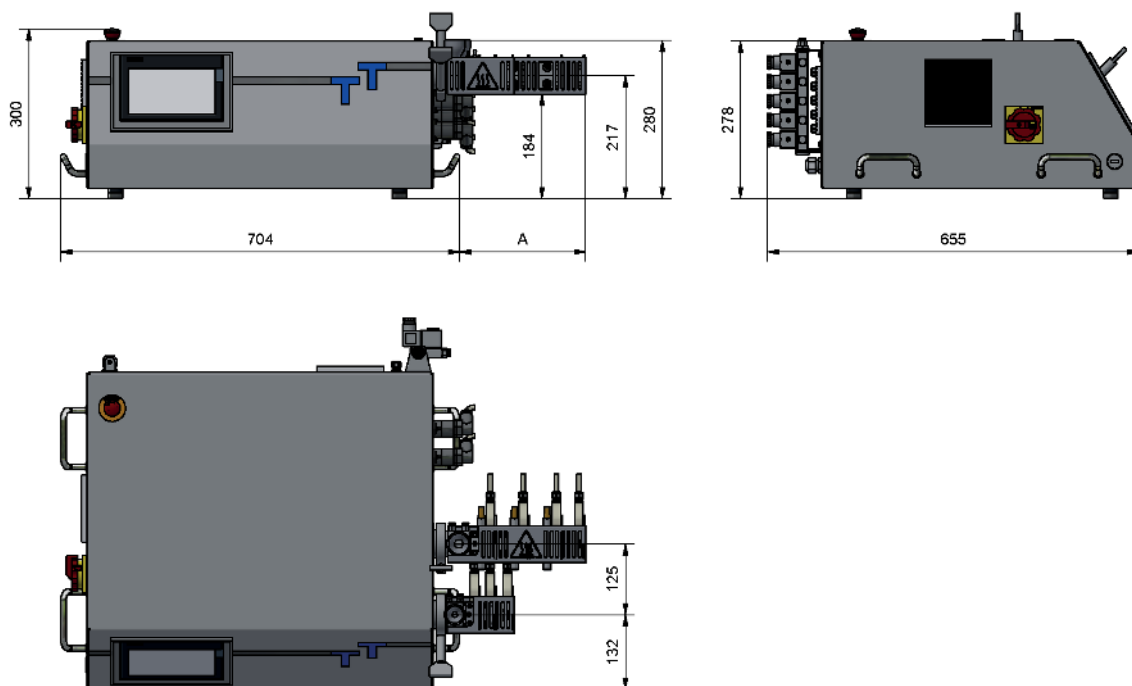
The right extrusion tool is customised to the customer's application. The throughput of the extruder depends on several factors, such as material properties, temperatures, die geometry, viscosity and configuration of the feeding tool (feeding, return, kneading and mixing segments).

For a realistic statement on the achievable throughput, we recommend carrying out tests with original products in our test laboratory.

	Throughput (kg/h)	Free internal volume L/D 15 Barrel with pitch Ø x 1.0 (cm ³)
ZE 5	0.4	1.2
ZE 9	1.2	6
ZE 12	2.5	14

L/D = Ratio of screw length to screw diameter

DIMENSIONS



Dimension «A» depending on the barrel selected, see table below.

LENGTH BARREL

L/D ▶	15	20	25	30	40
ZE 5	75	100	125	150	-
ZE 9	135	180	225	270	360
ZE 12	180	240	300	360	480

Other dimensions on request. Figures in mm.

TECHNICAL DATA

	ZE 5	ZE 9	ZE 12
Max. pressure (bar)	200	200	250
Max. torque (Nm)	2.5	14.5	20
Max. temperature (°C)	230 (optional 400)		
Cooling	Water / Air		
Rotational speed (rpm)	0.1–300, optional 1-1000		
L/D	15, 20, 25, 30, 40, 50, 60		
Weight (kg) *	≈ 85		

* The specifications are variable depending on additional equipment

HEATING ZONES (MAXIMUM NUMBER)

L/D ►	15	20	25	30	40
ZE 5	2	3	4	5	-
ZE 9	3	3	4	5	6
ZE 12	3	4	5	6	7

SUITABLE FEEDING DEVICES

Feeding devices ►	ZD 5 FB	ZD 9 FB	ZD 12 B / ZD 12 FB	ED 20 / ED 20 B
ZE 5	x	-	-	-
ZE 9	x	x	-	-
ZE 12	x	x	x	x

FB = Flat-tray, B = with discharge aid/bridge breaker, () = without discharge aid/bridge breaker

OPTIONS

- Optical temperature and pressure sensor on the die
- Cooling connections for water or air cooling
- Melt temperature sensor
- Pressure sensor
- Barrel in one piece
- Dispensing tools in one piece (monobloc)
- PTFE seal with purge gas connection
- Special materials on request
- Double barrel in one device (hybrid extruder)

ATEX (EXPLOSION PROTECTION)

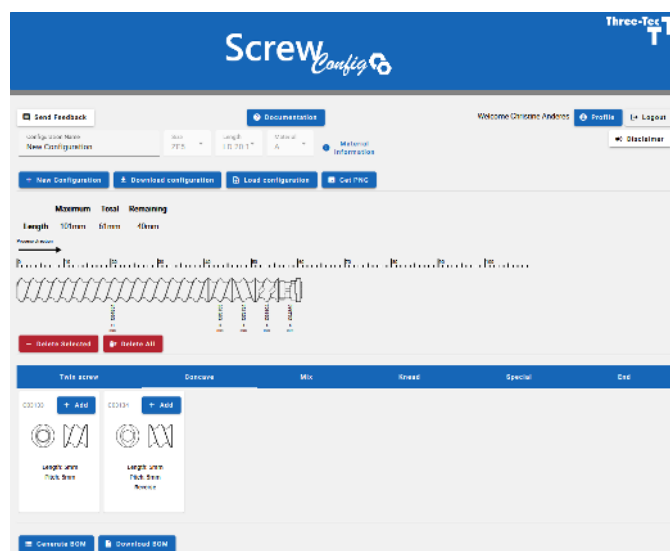
Our equipment can be certified for all categories according to customer requirements in compliance with the ATEX Directive 2014/34/EC.

FDA

All plastic parts and seals in contact with the product that we use for our devices meet the requirements of the Food and Drug Administration (FDA) and are therefore FDA-compliant. The greases and lubricants used are certified according to NSF-H1.

QUALITY AND DOCUMENTATION

- Risk analysis
- GMP documentation
- Material and surface certificates
- Welding certificate and welding seam documentation



SCREW CONFIGURATOR

With our configurator, you can assemble extrusion tools from different segments to exactly match your application purposes. The configuration can be saved to a file that can be loaded, visualised and adjusted from any device. The drag-and-drop functionality makes it easy to change the configuration. Once completed, a material list can be automatically generated, which can be used as a basis for ordering new extrusion tools.

Contact us at info@three-tec.ch to get a login to the screw configurator.

AVAILABLE ACCESSORIES

- Volumetric / gravimetric feeding
- Die with shaping according to customer requirements
- Pelletizer
- Hot cutter
- Spheronizer
- Conveyor belt / cooling conveyor belt
- Cooling bath
- Film roller
- Filament winder
- Calender
- Isolator (High Containment)
- Stuffing feeding device
- Side feeding device