

Laboratory machines for the processing of polymers

Testing and Measuring Extruders

The high performance machine for plasticizing of polymers and elastomers



From polymer to information

Testing Extruder Type P

Application

Due to their flexible design, extruders made by Dr. COLLIN are suitable for a wide range of applications such as:

- **Development** of new products like polymers or extruded materials
- **Testing** of the processing potential of polymer material
- **Control** of production processes with batches or continuous feeding. The COLLIN downstream equipment enables assembly of complete lines for all processes.
- **Production** of small pipes, hoses, profiles, tubes and others

Special features

Compact design allows variable installation as a fixed or a mobile unit.

Ergonomic due to optimal design and arrangement of all units. Cable cover at the operating side of the control cabinet and telescopic cable conduct at the rear reduces loose cable ends to a minimum.

Continuous operation is guaranteed by AC servo driven forced ventilation, large gear boxes and thrust bearing

The **hopper** has three operating positions: feed – shut-off – discharge and rigidly connected with the water-cooled feed section.

Design

The **drive unit** is comprised of a motor and a gear box and is integrated into two aluminium cast housings.

The forced ventilated **AC servo motor** drives the spur gear speed reduction mechanism.

The **thrust bearing assembly** (axial roll bearing) ensures a high working life. It is flanged to the housing.



Extruder 20 mm Ø x 25 D, with control cabinet at its base

The **barrel** is made of high-quality nitrided steel. It is heated with heater bands with or without a cooling fan. A metal sheet cover prevents accidental contact with the heater bands.

The **screws** are made from nitrided or special steel.

The **dies** can be mounted easily and safely with the help of hinged or pivoted connections.

The **control panel** is swivel-mounted to the extruder and contains all units for control, operation and displays for temperature and speed.

The **control cabinet** is integrated into the mobile carriage and contains all power units as well as a downstream melt pump if required.

Special types

- Venting extruder
- Bi-metal barrels
- Barrel extension 5 D
- Divided barrel with grooved feed bush
- Melt extruder with pressure-tight screw
- High-speed extruder
- Extruder with driven feed roll for processing elastomers
- Extruder for high-temperatures up to 450 °C

Dies

Our range of dies are suitable for a wide array of processing methods.

They include the following:

- Round strand dies
- Pipe extrusion and wire covering dies
- Flat sheet dies
- Spiral mandrel blown film dies
- Coextrusion blown film dies
- Coextrusion flat sheet adapters or multi-manifold dies

Screws

Our screws are available in a wide range of geometries which are suitable for all materials:

- Screws with constantly increasing root diameter
- Three-zone screws
- Screws with mixing and shear zones
- Venting screws
- Special customised screws



Extruder 45 mm Ø, standard model with ECS control



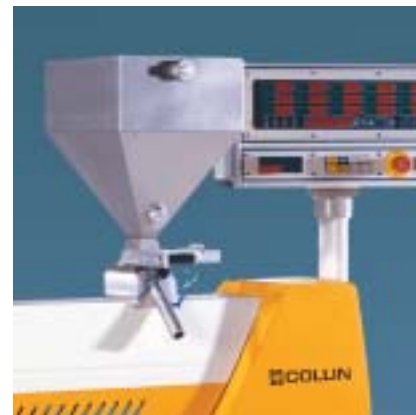
Interchangeable mixing and shear elements for extruder screws



Quick-action clamping adapter



Divided barrel with interchangeable grooved bush



Two-chamber hopper with automatic selector switch

Measuring Extruder Type M

Measuring devices

In addition to the standard measuring devices for screw speed and power consumption, **laboratory extruders made by COLLIN** can be equipped with a range of measuring devices for measuring the following:

- **Melt temperature** and
- **Melt pressure** in the barrel, across the length of the screw, in front of the screw tip or in the die
- **Screw back pressure** via ring-type force transducer,
- **Torque**, by measuring the reaction torque via force transducer,
- **Viscosity** via rheometric slot die,
- **Complete flow curves** via Bypass Online Rheometer WROR

ECS Microprocessor control

The **control unit** is located in an ergonomic position above the extruder in a swivel-mounted cabinet. All power units and the main switch are combined in a separate control cabinet. The ECS control unit includes a ECS-T30 multi-circuit controller (inside the control cabinet) for:

- a maximum of 20 temperature control circuits
- the measurement of a maximum of 5 different melt temperatures and a maximum of 8 measuring points for
 - melt pressure,
 - screw back pressure,
 - torque,
 - melt throughput,
 - haul-off speed and customer-specific special signals
- control of a maximum of two drives (screw, melt pump)
- pressure/speed control or melt throughput control



Measuring extruder Type E30 M with measuring devices for all parameters

The ECS-A30 multi-circuit display integrated into the operator panel can be configured to meet customer requirements and is used for the following tasks:

- digital display of required values, current values, differential values and the relative duty factor on a maximum of three pages with 15 values each and circuit legend

- separate display and collective display for the tolerance band
- alarm display when values transgress the tolerance band. Alarm activation point can be adjusted to protect the machine and the screw.

All signals can be transmitted to a separate PC via a serial port.

Data acquisition and PC analysis

Visual Fecon

A technically accomplished software package allows the display of all measured data within a wide variation range.

- Collective acquisition (up to 10 machines) of all measuring signals in the system
- Data storage (1 file/day: approximately 9 MB)
- Graphic display of linear diagrams with free configuration
- Acquired data can be exported in Excel format (selection possible)
- Configuration of the connected control units and their record
- List of incidents and errors over a pre-determined period
- Optional customised process display with formulation management
- All lists and displays can be printed with a PC with WIN95/98/NT/XP and a standard serial port.

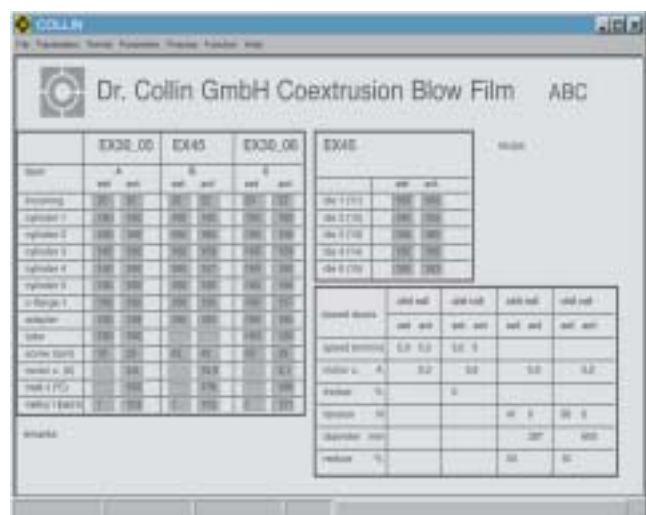
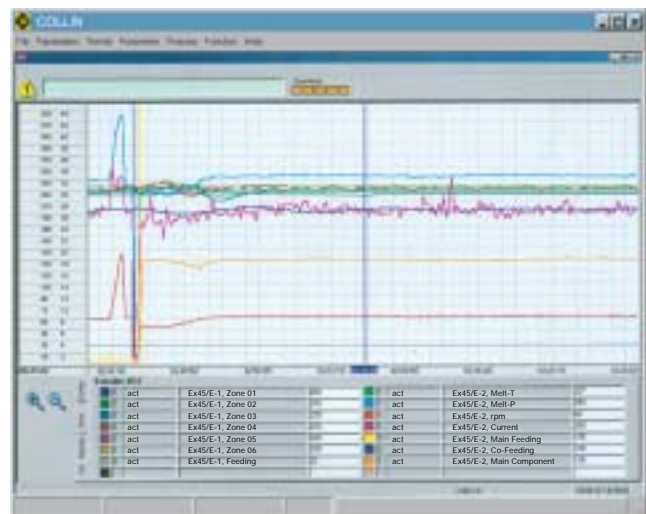
Machine networks

The ECS control's serial port permits linking several extruders to subordinate multi-machine control units. Downstream equipment such as melt pumps, calenders for sheet, blown film units or film haul-off units can be linked to a network. We can supply the required software.

Pressure-dependent speed control

A normal extruder control unit keeps screw speed constant. The COLLIN-ECS allows switching to a pressure/speed control

- to achieve narrower measuring tolerances during profile extrusion
- to generate a constant pre-pressure in front of the melt.



The figures to the right show examples of configuration set-ups and analysis menus

Special equipment



Extruder 25 mm Ø with melt pump for the pressure filter test

Melt pump

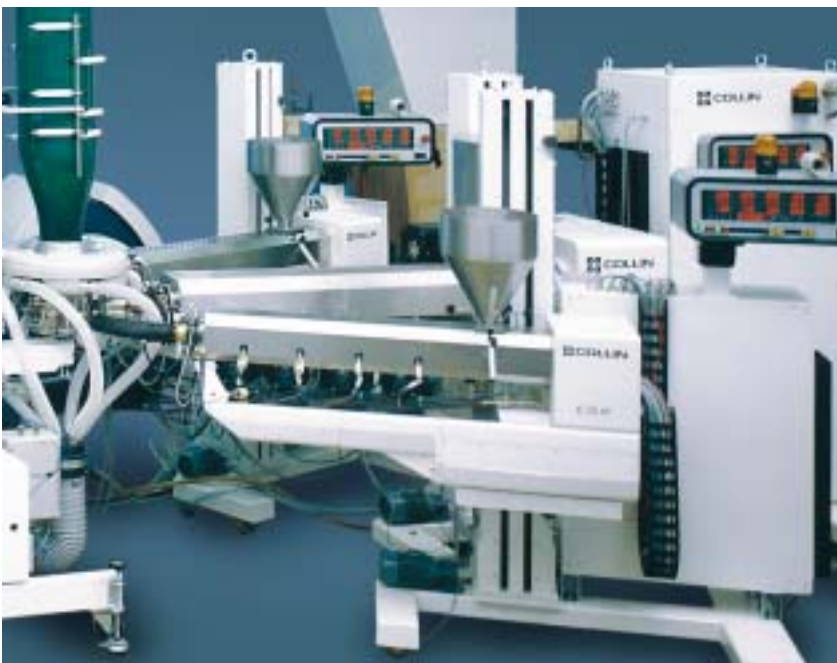
The use of a melt pump is required where a linear correlation between speed and output is needed and is therefore used in cases such as those listed below:

- for **filter pressure** tests to ensure a constant delivery despite the increasing back pressure
- in **multi-layer extrusion processes** to maintain a constant wall layer thickness, independent from rather high die pressures

Screen changer

The following screens are used for filtering gel particles, agglomerates or contaminants

- Separate screens inserted into breaker plates in the C flange.
- manually operated swivel-mounted screen changers and
- hydraulic screen changers for quasi-continuous operation



Measuring Extruder 30 mm Ø and 2 Testing Extruders 45 mm Ø mounted on motor driven lifting column for feeding a Coextrusion-blown film die

Height adjustment

The following two types are available:

• Type H150:

A system with hydraulic adjustment comprised of 4 synchronized hydraulic cylinders, allows fine-adjustment of the extruder height in relation to a fixed die.

• Type 1000:

Substantial differences in height which occur in situations such as the use of co-extrusion blown film lines or flat film lines can be corrected with the motor-driven lifting column.

Downstream equipment for extruders

COLLIN laboratory and measuring extruders can be fitted with a range of dies and downstream equipment to establish production lines.

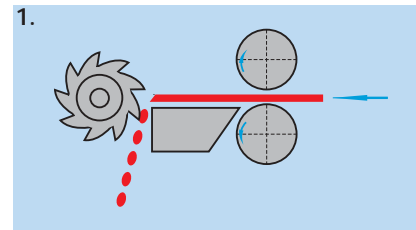
They have a wide range of application in areas such as

- Product development
- Production control
- Small scale production

The following downstream equipment is available:

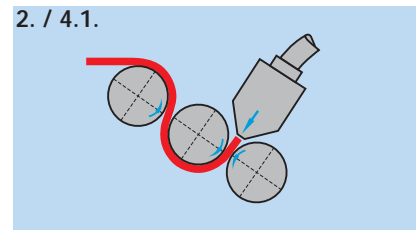
1. Pelletizers

- Strand pelletizer with water bath
- Hot die face cutters



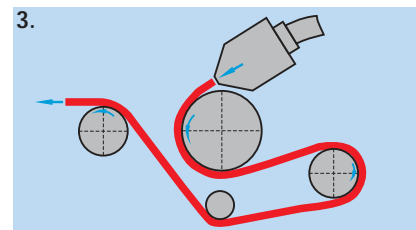
2. Mono- or coextrusion sheet lines

- Flat sheet lines
- Polishing/smoothing calenders



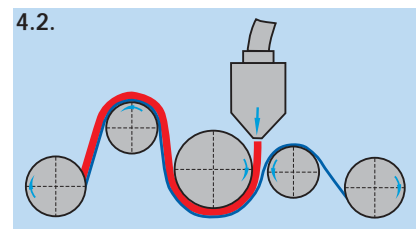
3. Mono- or coextrusion flat film lines

1 to 7 layers



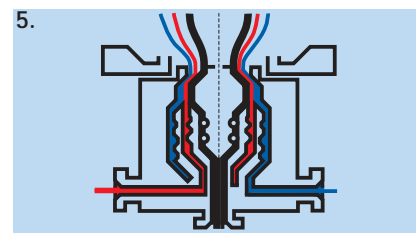
4. Modular system for flat film lines

- 4.1. Flat film line
- 4.2. Laminating and coating line
- 4.3. Polishing/smoothing calenders



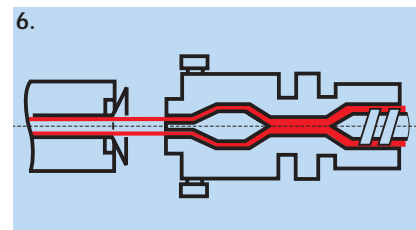
5. Mono- or coextrusion blown film lines

- 1 to 9 layers
- Blown film line with air cooling
- Blown film lines with water cooling (Quenching)
- Line for medical engineering



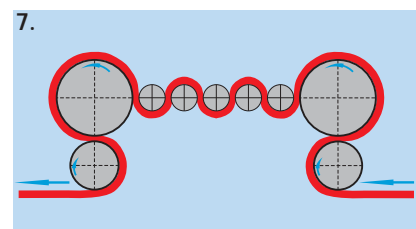
6. Mono- or coextrusion pipe or tube lines

- 1 to 5 layers
- Calibrating unit and haul-offs for pipes and hoses
- Film bubble line for medical applications



7. Stretching lines for

- Strap or monofilament
- Flat film
- Blown film



Technical data					
	Type	20	25	30	45
Screw diameter	(mm)	20	25	30	45
L/D ratio		20-30	20-30	20-30	20-30
Driving power	(kW)	1,9/2,1	5,8/8,8	8,8-10	18/26
Screw speed	(1/min)	180/200	170/240	160/240	140/240
Barrel heating zones		2-3	3-4	3-4	4-5
Cooling	Water	feeding zone			
	Air	barrel (option)			
Throughput approx. (LDPE)	(kg/h)	4	6/9	12/18	35/60
Weight approx.	(kg)	200	260	350	700
Dimensions approx.	L (mm)	1.400	1.620	1.750	1.950
	B (mm)	500	500	500	900
	H (mm)	1.700	1.700	1.700	1.700

Technical modifications reserved Issued 07/02

Our product range also covers:

- Two-Roll Mills and Calenders
- Platen Presses
- TEACH-LINE®
- Twin-Screw Kneaders
- Downstream Equipment for Extrusion
- Testing Units

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