New

LAB TECH ENGINEERING COMPANY LTD

μ Compounder

Modular 12 mm twin-screw extruders types LTE 12-36 with segmented screws and screw speeds up to 800 RPM

Available both in manual as well as fully computerized version with LCD touch screen controls

The New MicroCompounder 12 mm co-rotating twin screw extruders is made with a complete modular build up of the clam shell barrel, where each barrel section have a length of 9D or 108 mm. The length is available with 36 L/D and with drive power of 2.2 KW.

Suitable for highly efficient compounding of very small batch sizes down to 20 gram or even less.

This twin is designed to be used with polymers in powder or micro pellets form with an approximate maximum granule diameter of 1.5 mm. It is suitable for processing of minute polymer quantities for research applications but it can also produce larger quantities having a maximum output of around 4 kg/hr. The amount of resin remaining in the screws is only around 10 grams so if the batch size is for instance 50 gram, the amount of polymer which is compounded and exits through the die is 40 gram.

The Clam Shell Barrel is equipped with exchangeable barrel lining inserts for optimum economy and ease of replacement. These standard inserts are made from a very high grade tool steel which is through hardened to over 60 RC and which can withstand high processing temperatures of up to 400 °C. This unique barrel insert system was designed by us in 2003 and has proven during the years to be a very good feature.

The screws are built up from individual single elements mounted on hexagonal hardened shafts. Each individual kneading elements is supplied in many angles to enable optimum variations in screw configurations. The screw components are made from high grade tool steel which is through hardened but made with a slightly softer hardness than the barrel to ensure optimum life time for both elements and barrel.

The whole clam shell barrel assembly is split in the center and can be easily swung open after loosening the barrel bolts. This gives easy access to the screws for cleaning or changing of screw elements and/or barrel inserts as well as to observe the melt and compounding characteristics of the polymer being processed.

Each barrel zone is equipped with both water cooling and electric cartridge heating. This allows for complete process control at each zone of the barrel and the water cooling coupled with the high wattage heating enables fast temperature changes of each zone when changing processing conditions from one compound to another. The water cooling is done from fine channels inside each barrel module and regulated with individual solenoid valves from its designated temperature controller. The in feed section of the barrel is equipped only with water cooling and no heating.

The extruders are, as standard, equipped with a one hole (3 mm) strand die with a very short distance from strand hole entry to screw tips for easy cleaning. The die is of swing open type fastened with two bolts to the barrel and it is equipped with a breaker plate.

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A 0 to 100 bar melt pressure transducer with melt temperature sensing is mounted at the die end and connected to a pressure controller on the control panel.

The extruders are supplied complete with a stainless steel volumetric hopper feeder with a “spiral type” screw and with a stirring arm (agitator) above the feeding screw. The hopper feeder can optionally also be equipped with twin screws.

The 36 L/D extruder is, as standard, supplied with an atmospheric venting zone on one of the barrel modules which can be converted to vacuum. The standard atmospheric vent opening can optionally be equipped with a vacuum housing made from stainless steel with sight glass and vacuum manometer which in turn is connected to a vacuum pump and a large stainless steel filter to protect the pump.

Summary of standard features:

- 12 mm co-rotating segmented screws where each segment can be placed anywhere on the hexagonal screw core shaft for optimum flexibility of screw configurations. The kneading elements are supplied as single sectors which can be placed against each other in various angles enabling numerous kneading and shearing functions.
- The clam shell barrel is with 36 L/D and each module has a length of 9D. Barrel with balanced hinged top part for easy opening and access to the screws.
- Screws can also easily be pulled out at the front without opening of the clam shell barrel.
- The modular Clam Shell Barrel is equipped with exchangeable barrel lining inserts made from a special high grade tool steel which have been through hardened to over 60 Rockwell C. This special steel also allows for high temperature extrusions of up to 400 °C
- The screw and kneading elements are made from high grade tool steel with through hardening and with a surface hardness of slightly below the hardness of the barrel. Also the hexagonal screw shafts are made of treated tool steel for optimum stiffness and high torque applications.
- Variable screw speeds with RPM from 0 to 800 controlled via an AC frequency inverter.
- Electric cartridge heating of each barrel module.
- Water cooling as well as electric heating of each barrel module.
- Atmospheric venting zone. Optionally the vent can be equipped with vent housing and vacuum pump system with vacuum gauge and bypass valve..
- Variable speed single screw (spiral type) hopper feeder with stirring arm over the screws. Feeder components are equipped with quick locks for easy cleaning and the whole feeder assembly can easily be slid backwards for access to the extruder in-feed opening.
- Practical one-hole strand die mounted on hinged a support connected to barrel with two bolts. Also equipped with easy removable breaker plate in extruder flange, enabling production with or without a screen pack.
- 100 bar pressure transducer at screw end, also equipped with melt temperature sensor. Additionally melt sensors are placed on every second module, connected to digital temperature indicators on the control panel.
- Screws protected by a torque limiter mounted in between motor and gear box.
- Modern design with a sturdy sub cabinet containing all electric and electronic components in compartments completely separated from the vacuum pump assembly.
- Control panel mounted on the body of the extruder and containing the following:
    - Programmable pressure controller with digital indication of the screw tip pressure.
    - Digital RPM indicators for main screws speed as well as feeder screws speed with UP/DOWN scroll buttons to regulate speeds.
    - Digital ampere meter showing load in percent of max load of drive motor

- Clear warning lamps for:
  - Over pressure at screw tip (depending on your individual set max pressure)
  - Clam shell open
  - Motor overload
  - Torque limiter overload
  - Feeder overload
  - Temperature not reached set value on any of the controllers

- An additional control panel is mounted on the sub cabinet, containing all the digital self adjusting PID controllers for the barrel, one for each barrel zone and an additional controller for the die. The controllers are equipped with digital melt temperature indicators showing resin temperature at screw tip as well as at every second module. For the 36 L/D there are then totally 3 melt temperature indicators.
- Sub cabinet for the twin screw extruder, built of heavy duty steel with front doors. The sub cabinet contains all the electric and electronic components for the extruder and hopper feeder including the inverters. (Picture here shows subcabinet to extruder together with the optional subcabinet for the downstream water bath and pelletizer).
- Maximum processing temperature (standard) is 400 ºC
- Suitable for compounding of very small batch sizes
- Remaining resin in the barrel is only around 10 gram.
- Max output as high as 4 kg/hr

Optional equipment:

Vacuum pump system with large stainless steel mesh protection filter. Complete with stainless steel vacuum vent housing on the barrel which is equipped with vacuum regulating valve, dial gauge and swing open lid with sight glass. The vent housing is equipped with sight glass on the swing open lid as well as a resin trap which will prevent any resin melt to enter the vacuum pipe. The vacuum pump is of vane type with self lubricating carbon vanes. Equipped with two large see through PC filter units with stainless steel mesh and connected in series before pump. The filters can easily be removed for cleaning by unscrewing the container body half a turn. The vacuum unit is mounted in the sub cabinet of the extruder.

Computerized PLC control with 10.4 inch full color LCD touch screen

The computerized control has full visualization of all extruder parameters on the touch screen and it also offered with connection to an external PC where all data and programs can be downloaded. The high capacity PLC is supplied by B&R, Austria and the software is custom made by them

exclusively for Labtech's twin-screw extruders. The controlling functions are as following:

- Temperature controls with heating and cooling on all barrel zones
- Motor speed with drive torque and RPM registration
- Pressure control of transducer at screw tip
- Speed control of hopper feeder (as well as side feeders for the larger twin-screw versions)
- Vacuum for barrel venting
- Pelletizer speed control, also control of optional variable speed strand feeding device

Alarm functions:

- Main motor overload
- Hopper feeder overload
- Clam shell open
- Hopper feeder open
- Over pressure on die
- Low temp (on any zone) if temperature is 10% lower than set temperature
- Pelletizer overload
- Strand feeding overload
- Broken heating element and/or thermocouple

Programs:

The PLS can also store hundreds or even thousands of preset programs with pre selected running parameters of all extruder functions.

New SCADA type of software for processing data on your PC

Recording of all running parameter for a specific run can be saved and also directly download to a PC, using our new type of SCADA software. With this software it is also possible to save an unlimited amount of formulations and extruder parameters on a PC and upload these to the extruders touch screen whenever any of these programs are needed. The software will enable you to have exactly the same screens on your PC as on the extruder and you can then key in with your PC all the new extruder parameters directly on these screens. You can save them in your PC and upload them to the extruder any time needed.

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DOWNSTREAM EQUIPMENT

Sub cabinet for the water bath and the pelletizer containing also the vacuum devise for the strand suction. The cabinet is made in same level as the twin screw extruder sub cabinet to form a convenient base for the whole pelletizing line. It is built on caster so that it can conveniently be separated from the extruder.

Water bath bench top type made of stainless steel with two strand rolls equipped with quick locks mounted on one side of the water bath so that the rolls can be placed in numerous positions for optimum cooling efficiency. The water bath is equipped with strand suction for efficient removal of all water on the stands. The vacuum device is built into the lower sub cabinet.

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Bench Top Pelletizer with variable speed drive and the rotary cutting knife made of high grade carbon steel. Speed regulation with programmable inverter. With polycarbonate swing open door with double security safety locks which instantly stops the rotary knife when opened.

The lower driven in feed roller is made of grooved hardened steel and the upper following roll is made of Polyurethane and spring loaded to lower roll. Picture to the left shows the pelletizer with manual controls. The two digital instruments control the knife speed as well as the pellet length in mm with the optional variable in feed speed described below.

Optional variable speed strand feeding device driven by a separate AC gear motor with programmable frequency inverter. The in feed speed is controlled with a digital instrument, showing the pellet length in mm. With this option, it is possible to vary the pellet length from 5 mm down to micro pellet size of only 1 mm length.

BRIEF TECHNICAL DATA

Description	12 mm MicroCompounder Twin-Screw Extruder
	36 L/D
Screw RPM	0 to 800
Motor power	2.2 kW
Max. extrusion output pressure	100 bar
Max. torque at 600 RPM	2 x 12 Nm
Outer and inner screw diameter ratio (D/d)	1.5
Heating power per barrel section	1.6 kW
Heating power for strand die	0.8 kW
Total max power for 36 L/D	9.9 kW
Max. Barrel temp. Standard	400°C
Maximum pellet size, approximately	1.5 x 1.5 mm
Smallest batch size, approximately	20 gram
Amount of resin remaining in screws, based on density 1	10 gram
Min. pressure and water consumption	4 bar / 10lt / min

Two Years Warranty on all our Machines

Our machines are now warranted for two years valid from date of startup or two months after shipment date, whichever is earliest.

The two-year warranty covers all mechanical, electrical, hydraulic and pneumatic parts with a few exceptions where the warranty period is for only one year. The exceptions cover intricate parts like inverters, PLC and electronic instruments where our suppliers only warrant their parts for one year. And we warrant our heaters for one year even though they are not warranted by our supplier.

We will be pleased to give you a copy of our warranty certificates with full details for your kind information.