μ Scientific

Bench-top Modular 16 mm twin-screw extruder

Available with version electric heating and water cooling system on all modules (except in feed module which has only water cooling)

Now available with VERY High Corrosion Resistant screws and barrels

Both version with fully segmented screws, modular clam shell barrel and screw speeds up to 800 RPM

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

The MicroScientific benh top 16 mm co-rotating twin screw extruders are made with a complete modular build up of the clam shell barrel. This twin screw extruder has 32L/D or 36 L/D length and with drive power of 2.2 KW. The modular Clam Shell Barrel is made of through hardened tool steel which has been hardened to 60 HRC and then nitrided to give a surface hardness of around 70 HRC for optimum wear resistance. Optionally screws and barrel can be made with high corrosion and wear resistant steel types.The standard extruder has a temperature range of up to 400ºC.

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.

As with our larger twin this small bench top version is also available with High Wear resistant elements and barrel made HIP steel grades from Crucible, USA. In addition we can also

from

supply these in two versions of acid resistant steels. And with this, the screw shafts as well as the die is made from same acid resistant steels and the same goes for the plugs for side feeders and vent openings on the 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.

However it is not necessary to open the clam shell to clean the screws. Instead, for fast and easy cleaning, the screws can simply be pulled out from the front with the help of a quick clamp tool supplied with the machine.

NEW OPTION HIGH EFFICIENT BARREL HEATING AND COOLING SYSTEM.

With this twin version 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 infeed 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.

A 0 to 200 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 feed screw and with a stirring arm (agitator) above the feeding screw. The hopper feeder can optionally also be equipped with twin screws.

The 32 L/D extruder is, as standard, supplied with an atmospheric venting zone on one of the barrel modules and the 40 L/D and longer versions also have an additional atmospheric vent opening 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.

The coupling in between the gearbox and the drive motor is equipped with a torque limiter which will instantly disengage the coupling in the event that the screws are overloaded. The torque limiter is also equipped with a sensor which will stop the motor and a warning lamp on the control panel will indicate that the screws have been overloaded.

Summary of standard features:

- 16 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.
- Modular clamshell barrel available with up to 60+ L/D length.Barrel with balanced hinged top part for easy access to the screws.
- Through hardened and nitrided modular clamshell barrel with a surface hardness of around 70 HRC.
- The barrel modules are also available with high wear resistant HIP steel type as well as with medium corrosion resistant SUS 440C stainless and very high corrosion resistant M390 steel.
- 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.
- All screw elements are also available with high wear-resistant HIP steel as well as the two corrosion-resistant steel types
- Electric heating and water cooling of each barrel module except in feed module which has only water cooling (option)
- Available with side feeder (option)
- High torque drives with oversized gearbox for screw speeds up to 800 RPM and motor power of 2.2 KW. With high torque screw shafts made in the same way as for our MaxiCompounder. For extruders with high corrosion resistant inserts and screw elements made from M390 steel types, the shafts are also made in a high corrosion resistant M390 steel type.
- Atmospheric venting zone with an additional venting zone on the 40 and longer L/D versions. Optional the vent can be equipped with a vacuum pump.

- Variable speed of feed screw for hopper feeder with a stirring arm over the screws. Feeder components are equipped with quick locks for easy cleaning, and the whole feeder assembly can easily be move backward for access to the extruder in-feed opening.
- Practical one-hole strand die mounted on hinged support connected to the barrel with two bolts. Also equipped with easy removable breaker plate in extruder flange, enabling production with or without a screen pack.
- For the twins supplied with any of the two corrosion-resistant steel types, the die is also made from the same types.
- 200 bar pressure transducer at screw end, also equipped with a melt temperature sensor. Additionally melt temp sensors are placed on every second module, connected to digital temperature indicators on the control panel.
- Screws protected by a new sensitive torque limiter mounted in between the motor and the gearbox.
- Water cooling of the barrel infeed section.
- Swing away control cabinet containing the following:
  - Programmable pressure controller with digital indication of the screw tip pressure.

- Digital melt temperature indicators showing resin temperature at the screw tip as well as at every second module. For the 32 L/D version, there are then totally four melt temperature indicators, and the 40 and 44 L/D versions have five of the same indicators.
- Digital RPM indicators for main screws speed as well as feeder screws speed with UP/DOWN scroll buttons to regulate speeds.
- Digital instrument showing screw torque in percent of max torque
- Clear warning lamps for:
  - Overpressure at screw tip (depending on your individual set max pressure)
  - Clamshell open
  - Motor overload
  - Torque limiter overload
  - Feeder overload
  - Temperature not reached set value on any of the controllers

♦ A control panel on the sub-cabinet contains a bank of digital self-tuning programmable temperature controller for each barrel module (8 units for the 32 L/D version, ten units for the 40 L/D and 11 units for the 44 L/D versions).

♦ The 16 mm twin can also be supplied in a Bench Top version where all controls are supplied in a separater cabinet.

NEW features

We have added new features and options as following:

- ♦ Our standard twins are now all supplied with High Torque screw shafts of the same type as is supplied with the **MaxiCompounder**.
- ♦ For the twin type LTEWC, each barrel module is equipped with water cooling as well as electric heating on both the upper and lower barrel modules, except for in feed section which only has water cooling. This enables a very precise temperature control of each zone and, thanks to the water cooling system, the barrel can be cooled down very rapidly. Coupled with the max barrel temperature of 400 °C (750 °F), this very precise barrel heating and cooling system makes this small 16 mm twin very suitable for producing all kind of compounds, even the most toughest engineering resins. Optionally the max barrel temperature can be as high as 450°C (840°F)
- ♦ High wear-resistant screws and barrel modules where the standard nitrided components are replaced with a high wear-resistant steel type from Crucible, USA type CPM9V, and CPM 10V. This version is recommended when the compounding is made with abrasive components such as ceramic powders etc.

- Medium Corrosion Resistant screws and barrel modules to be used with low corrosion resin types such as PVC. Here the screw elements, barrel inserts and die will be made in a stainless steel type SUS 440C
- High Corrosion Resistant screws and barrel inserts where the elements including screw shafts are made with M390 steel from Germany. This version is specifically designed for compounding of corrosive plastics.
- VERY high corrosion resistant barrel modules and screws made with Inconel steel. This version is specificly made for comp[ounding of the highly corrosive fluoroplastics but due to it's low hardness, it does not have a good wear resistance. Thus, if the application is for only occasional compounding of fluroplastics and mostly for abrasive batches with for instance glass fibers or high loading of hard additives, then we suggest to instead use the above M390 steel.
- Available as a benchtop version with a downstream benchtop water bath and pelletizer

Max output on the 16 mm twin type LTE16-40, with 40 L/D length equipped with 2.2 kW motor drive and screw RPM max 800

POLYMER TYPE (Regular pellets)	Melt flow Index (g/10 min)	Maximum Output		% of Maximum Motor Power	Screw (rpm)	Barrel temperature range ° C (starting from in feed zone)
		lb/hr	kg/hr			
LDPE	20	11.9	5.4	56	800	150 - 180
HDPE	15	18.5	8.4	61	800	180 - 200
PET *	-	15.8	7.2	90	600	280 - 300
NYLON*	-	28.4	12.9	80	800	260 - 280
ABS*	18	17.4	7.9	61	800	220 – 240
GPPS	8	20.9	9.5	52	800	220 - 240
HIPS	8	16.9	7.7	51	800	210 - 230
PP	11	9.5	4.3	48	800	220 - 240
POM	8.6	22.7	10.3	54	800	220 - 240
PC*	9.5	14.7	6.7	88	800	270 290

TECHNICAL DATA FOR LTE16 TWIN SCREW EXTRUDER

DESCRIPTION	DATA	DESCRIPTION	DATA
Available L/D Ratios	32 to 52+ L/D	Heating power for strand die	0.4 kW
Screw Speed (RPM)	0 to 800	Total max power for 40 L/D	11 kW
Motor Power (kW)	2.2 kW	Minimum water pressure and water consumption	3 bar/ 7 lt /min
Max. extrusion output pressure	200 bar	Water pump power for optional closed-looped cooling system	0.75 kW
Max. dynamic thrust bearing load	3.2 kN	Heating power for strand die	0.4 kW
Maximum torque at 600 RPM	2x18Nm	Heating power per barrel section (4 L/D)	0.8 kW
Specific Torque Nm/cm^3	9.22	Resin remaining on screw (LDPE)	15 g
Outer and inner screw diameter ratio (D/d)	1.73	Net weight (for 40 L/D)	650 kg
Max barrel temp. (standard)	400 °C	Dimensions (meters)length x height x depth (for 40 L/D)	1.60x1.60x0.57