

Scientific

**Modular 26 mm co-rotating
twin-screw extruders with
segmented screws and barrel
inserts**

**Available with standard 15 KW as well as with the
Maxi26Compounder drives of 22 KW**

**With barrel lengths of up to 60 + L/D and screw RPM of
up to 1200**



**Available in High Corrosion
Resistant as well as High Wear
Resistant versions**



The



Scientific 26 mm co-rotating twin-screw extruder is made with a complete modular build-up of the clamshell barrel, where each barrel section has a length of 4 D or 104 mm. Many L/D sizes are available from 32 to 60+. The standard twin has a drive power of 15 KW, and a max screw RPM of 800, as well as a re-designed high torque gearbox comprising of additional shaft supporting gears and a direct driven gear pump for closed loop, forced oil cooling system.

The **Maxi26Compounder** is equipped with a 22 kW AC Motor drive and same high torque gearbox having an additional shaft with supporting gears, and a direct drive gear pump for closed-loop forced oil cooling system. The max screw RPM with the Maxi Compounder is 1200 RPM as opposed to our standard versions where the max RPM is 800.

As of 2014, the standard 15 kW 26 mm twin screw version is equipped as standard with High Torque screw shafts, same as we supply for the 22 kW Maxi26Compounder. The new oil heating system for our high torque gearbox utilizes a block type of heat exchanger to ensure the gearbox is kept cold at even the severest running conditions. This also ensures optimum lubrication to all gears and bearings.



The modular Clam Shell Barrel is equipped with exchangeable barrel lining inserts for optimum economy and ease of replacement. These standard inserts are made from 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. Also, our twins are now available with an insert made from High wear-resistant steel from Crucible in the USA to be used when compounding with highly abrasive components. Further, our twins can be supplied with inserts made from medium corrosion-resistant steel as well as very high corrosion resistant

inserts made from M390 steel type from Germany. This latter steel type is useful for processing, for example of Fluor plastics and other resin types which develop aggressive acids during processing.

The inserts are touching each other side by side along the barrel, but the actual body parts (barrel modules) are connected to each other with a small air gap. This gives excellent insulation between the zones, preventing that heat is conducted from one zone to another. With this, it is possible to run with a higher temperature difference between each zone, which in turn allows for much greater flexibility when running various polymers with different melting points.

The inserts also have narrow ridges on both sides which are precision ground and which acts as the sealing area when the clamshell barrel is fully closed. This ensures that there is a complete seal along the entire barrel length which, together with the extremely hard and scratch-free surface, ensures that there will be no leaks during the entire lifetime of the inserts.



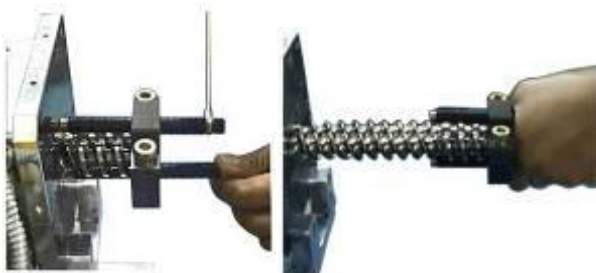
The screws are built up from single individual elements mounted on hexagonal hardened shafts. We have a large variety of screw elements, and the kneading elements are available in several configurations and can be mounted in many angles to enable optimum variations in screw configurations. The standard screw components are made from high-grade tool steel which is through-hardened and nitrided but made with a slightly softer hardness than the barrel linings to ensure optimum lifetime for both elements and barrel inserts. Also here our twin-screw extruders are now available with High Wear-resistant elements made from HIP steel grades from Crucible, USA. Also, we can offer two versions of acid-resistant elements where the highest resistant versions are made from M390 steel. Also with this latter version, the screw shafts, as well as the die, are made from M390 steel, and the same goes for plugs for side feeders and vent openings on the barrel. Further, the barrel modules on these High Acid Resistant versions are made from stainless steel.

The whole clamshell 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 barrel inserts as well as to observe the melt and compounding characteristics of the polymer being processed. The top half of the barrel is balanced, so that very little force is needed to open it up and with this, the hazard of accidental heavy closing is eliminated.



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.



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

The extruders are also, as standard, equipped with a four holes strand die connected to extruder flange with two hinged bolts. The die is made with short distance to screws and minimum internal volume to enable very easy and fast cleaning. The die flange contains an easily removable breaker plate which can be exchanged with a distance ring, enabling production with or without screen packs.



The strand die swings aside simply by loosening the two bolts to facilitate easy cleaning. For connection to other downstream equipment, such as flat die for a chill roll attachment, the extruder can optionally be supplied with a suitable die adaptor.

The extruders are supplied complete with a stainless steel volumetric hopper feeder with a single feed screw of spiral or solid screw types and with a stirring arm (agitator) above the feeding screw. The hopper feeder can optionally also be equipped with twin screws. The screw is driven by variable speed AC gear motor of 0.3 kW power and digital screw speed control mounted on the control cabinet. As shown to the right, the hopper feeder can easily be swung aside to enable emptying out of the batch in the hopper.



The extruders can optionally be equipped with one or more twin screw side feeders which are connected to the side of the barrel module. A special barrel module with opening as well as plug for side feeder is needed for this option, and the extruder can be supplied with several plugged side feeder modules for optimum flexibility of side feeder location. The side feeder has an infinite variable speed drive with 26 mm diameter twin screws built up from the same elements as the main screws, and with an L/D ratio of 10. The barrel of the side feeder is equipped with water cooling as standard.

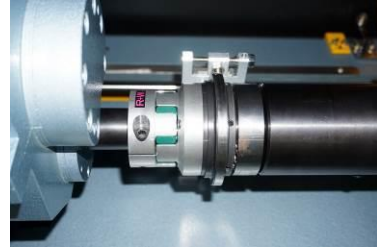
To fully utilize side feeders, it is recommended to use a system of gravimetric feeders where you can set an exact feed rate on all feeders to ensure an exact load of all ingredients. (Please see more details under the side feeder description)



The 32 L/D extruder is, as standard, supplied with a vacuum zone on one of the barrel modules and the 40 and longer L/D versions also have an additional atmospheric vent opening which can be converted to vacuum. The vacuum vent zone has a stainless steel vent port housing which is equipped with a sight glass and vacuum regulator with gauge. The housing is connected to large twin vacuum filters and a vane type vacuum pump mounted in the sub cabinet.



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.



The extruder is equipped as standard with a large, clear vision control panel with digital instruments and symbols for all functions. The optional PLC control has a large 10.4-inch touch screen, also showing all machine functions on the main screen.

Summary of standard features:

- ◆ 26 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.
- ◆ All screw elements are also available with high wear-resistant HIP steel as well as medium corrosion-resistant steel type SUS440C and with very high corrosion resistant M390 steel.
- ◆ Modular clamshell barrel available with up to 60 L/D length (longer on request) and where each module has a length of 4 D. Barrel with balanced hinged top part for easy access to the screws.
- ◆ The modular Clam Shell Barrel is equipped as standard with exchangeable barrel lining inserts made from special high-grade tool steel which has been through-hardened to over 60 Rockwell C. This special steel also allows for high-temperature extrusions of up to 400 °C.
- ◆ All inserts are also available with high wear-resistant HIP steel type as well as with medium corrosion-resistant steel type SUS440C and in Very High corrosion-resistant M390 steel.
- ◆ The standard screw and kneading elements are also made from high-grade tool steel with through hardening and with a surface hardness of slightly below the hardness of the barrel inserts. Also, the hexagonal screw shafts are made of treated tool steel for optimum stiffness and high torque applications.
- ◆ Water cooling as well as electric heating of each barrel module.
- ◆ High torque drives with a new oversized gearbox with forced and cooled oil lubrication for screw speeds up to 800 RPM and motor power of 15 kW for the standard version and 22 kW for the MaxiCompounder.
- ◆ Both 15kW and the MaxiCompounder are supplied with high torque screw shafts, and for extruders with high corrosion resistant inserts and screw elements made from M390 steel types, the shafts are also made in high corrosion resistant M390 steel type.
- ◆ Stainless steel vent housing on the barrel equipped with sight glass and vacuum gauge as well as vacuum pump protected with large dual filters coupled in series and mounted in sub-cabinet of the extruder. The 40 and longer L/D extruders are equipped with an additional zone with atmospheric vent opening.
- ◆ Variable speed single screw 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 backward for access to the extruder in-feed opening.
- ◆ Practical 4-holes strand die connected to extruder flange with two hinged bolts. The die is made with short distance to screws and minimum internal volume to enable very easy and fast cleaning, also equipped with easily removable breaker plate in extruder flange, enabling production with or without a screen pack.
- ◆ For the twins supplied with medium and high corrosion resistant steel types, the die is also made from the same steel. Further, all barrel modules are done in stainless steel where the barrel inserts and screws are made with M390 steel types.

- ◆ Optionally the die flange can be equipped with an oval opening as well as oval-shaped breaker plate which allows for easier removal of the screws from the front, without removing the die flange.
- ◆ 300 bar pressure transducer at screw end, also equipped with a 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 new sensitive torque limiter mounted in between the motor and gearbox.
- ◆ Modern design with a sturdy sub-cabinet containing all electric and electronic components in compartments completely separated from the vacuum pump assembly.
- ◆ Large clear vision control panel, mounted on a swing arm on the rear of the extruder and containing the following:



- ◆ One 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.
- ◆ 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 5 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 individually set max pressure)
 - ◆ Cooling water pressure too low
 - ◆ Clamshell open
 - ◆ Motor overload
 - ◆ Torque limiter overload
 - ◆ Feeder overload
 - ◆ Temperature not reached set value on any of the controllers due for instance broken heating element

The **Maxi26Compounder** with High Drive Power of 22 kW:

Our **Maxi26Compounder** has, as of 2014, been used by many customers around the world for more than two years and it has a very good acceptance with efficient small and medium scale productions. This new **Maxi26Compounder** utilizes a 22 kW AC motor drive which has a considerable increase in maximum screw RPM of up to 1,200. The all-new screw drive system also has a re-designed high torque gearbox and it is equipped with an oil circulating pump and a water heat exchanger of plate type for oil cooling.

This new **Maxi26Compounder** enables up to 30% higher output compared to our 15 kW version, and it is available for the 26 mm twins with L/D ratios from 36 to 60+.

NEW features

- ◆ Our standard twins are now all supplied with High Torque screw shafts of the same type as is supplied with the **MaxiCompounder**.
- ◆ The standard 26 mm twin is also equipped with a new gearbox which has cooled and forced oil circulations from a gear pump.

Further, we have added new options as following:

- ◆ High wear-resistant screws and barrel insert 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 inserts to be used with low corrosion resin types such as PVC. Here the screw elements and barrel inserts will be made in a stainless steel type SUS 440C
- ◆ Very 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 Fluor plastics and other high corrosive plastics. The M390 steel type offers a significant improvement in hardness and thus also wear resistance compared with earlier Inconel types.

Maximum Production Output with our Maxi26Compounder Co-Rotating 26 mm twin-screw extruder type LTE26-48, with 48 L/D length equipped with 22 kW motor drive and 1200 screw RPM.

Including output data on the 26 mm standard twin with 15 kW drive

POLYMER TYPE (Regular pellets)	Melt flow Index (g/10 min)	Maximum Output with the MaxiCompounder		% of Maximum Motor Power	Screw (rpm)	Barrel temperature range ° C (starting from in feed zone)	Maximum output with the 15 KW version	Output increase with the MaxiCompounder
		lb/hr	kg/hr				Kg/hr	%
LDPE	20	176	80	69	1200	150 - 180	64	25
HDPE	15	198	90	94	1200	180 - 200	65	38
PET *	-	132	60	94	1200	280 - 300	50	20
ABS*	18	176	80	95	1200	220 - 240	63	27
GPPS	8	264	110	93	1200	220 - 240	82	34
HIPS	8	264	120	95	1200	210 - 230	95	26
PP	11	178	81	74	1200	220 - 240	64	27