Technical Specifications of Polymer Processing Facility consisting of Twin-Screw Extruder, Micro-Injection Molding and accessories (RFx No. 6100000670)

A. Parallel Twin-Screw Extruder	1 no.
1. Compact parallel co-rotating 11 mm twin screw extruder designed with unique monocoque housing. Suitable for compounding of thermoplastic polymers. Throughput up to 2.5 kg/h. Minimal required sample size of approximately 20 g. Extruder control is via an integral colored touch screen HMI. 2. Barrel construction: Nitriding steel 1.7365 (EN40B) or similar material 3. Horizontally split extruder barrel with removable top half barrel. Barrel length must be 40 L/D. The processing length of the extruder can be reduced by the optional length reduction kit. The barrel must have at least 3 multipurpose ports. 4. Water cooled primary feed port (Chiller required). Three additional closable multi function barrel ports, suitable for additional feeding or venting. 5. The barrel is split into 8 zones (5 L/D), after the initial cooled feed zone there are 7 separate (5 L/D) heating zones to facilitate temperature profiles along the barrel. 6. Die: Rod die, 1 x D: 2 mm, Strand diameter can be easily altered using optional die nozzles. 7. Catheter/Tubing die with air supply with: a. Catheter die for small scale production of catheters. b. Die with interchangeable inserts c. Air channel (avoids the collapse of tubes) d. Die pin diameter 1.5 mm e. Die ring diameter 2.0 mm f. Max. temperature 450°C g. incl. Die adaptor h. Die ring i. Band heater j. Control thermocouple with extension cord k. Tools and spares 8. Spinning die with 10x0.2mm Special die to test spinning performance of polymer melts. a. interchangeable die plate with 10 nozzles b. 200 µm diameter and an entry angle of 60° c. interchangeable breaker plate d. interchangeable sieve e. die body with 2 sensor ports (for melt temperature and melt pressure sensor) f. max. temperature 450°C g. incl. die adaptor h. die ring i. band heater (checked acc.to VDE 0700 T1) j. control thermocouple with extension cord k. 10 sieves (4 layers) l. Tools and spares Extruder must be complete with: 9. Set of configured screw shafts 10. Atmospheric venting adapter 11. Pressure transducer 12. Melt Temperature transducer 13. Operation manual <u>Technical data:</u> 1. Extruder Screw speed: 10…1000 rpm or more 2. Max. pressure: 100 bar or more 3. Max. torque: 6 Nm / Shaft 4. Power rating: 1.25 kW (Drive) 5. Temperature: RT…. 450 °C 6. Power connection: 230 V, 16 A, 50-60 Hz	
B. Small compact bench top Chiller Unit 230 V, 50 Hz	1 no.
Suitable to cool the main feeding port (mandatory) and the optional barrel cooling unit. Including tubing and connections. Ready to connect to extruder. <u>Technical data:</u>	

1. Temperature range: 10 ... 80 °C 2. Cooling capacity: 500 W 3. Heating capacity: 2 kW 4. Power requirement: 230 V, 50 Hz (single phase)	
C. Volumetric Single Screw Feeder for polymer pellets	1no.
1. Single screw feeder to feed powder or pellets (max. size 2.5 mm) into the main feeding or a secondary feeding port. 2. The feeder is designed to locate on the extruder housing and connected electrically to the extruder base. 3. Multiple feeders (maximum 3) can be daisy-chained and are all recognized and operated from the extruder HMI touch screen. 4. Different feeder screws are available to allow various feed ranges for different materials. <u>Technical data:</u> 5. Hopper volume: 1.3 l or more 6. Outlet height: 210 mm (Height 1) 7. Power supply: 230V, 50/60 Hz	
D. Feeder Screw	1no.
1. Twin Lead Feeder screw with core for minimal output. Suitable for powder materials. 2. Diameter: 11 mm 3. Helix pitch: 8 mm 4. Core: 9 mm	
E. Screw element flexibility kit	1 no.
1. Set of common screw elements to modify the screw configuration. <u>Content:</u> 2. 4 x Feed Screw, 1 L/D 3. 2 x Feed Screw, 0.5 L/D 4. 2 x Reverse Feed Screw, 0.5 L/D 5. 8 x Mixing Element 0°, 0.25 L/D 6. 8 x Mixing Element 90°, 0.25 L/D 7. Anti-Seize paste	
F. High Volume Feed Screw Kit	1 no.
1. A set of asymmetrical shaped geometry feed screws (increased free volume and special intake pockets) allows feeding commercial pellet sizes (=4 mm) into the extruder. <u>Content:</u> 2. 4 x Long Pitch Push Screw Element, 2 L/D	
G. Set of die inserts (0.5, 1.0, 1.5, 2.5, 3.0 mm)	1 no.
To allow quick change of the die diameter. Contains a set of threaded die nozzle inserts with diameters: 0.5 1.0 1.5 2.5 and 3.0 mm	
H. Secondary feeding of powders and Liquids	
1. Secondary Cooled Feed Funnel for twin screw extruder Allows the feeding of solids into a downstream feed port. To avoid material melting in the funnel the feed funnel is equipped with a cooling jacket. Secondary Feeder required.	1 no.
a. Volumetric Feeder for twin screw extruder for powders 1. Volumetric Feeder with agitator. Electrical connected to and operated by the extruder. Suitable for powders and micro pellets (max. size 1 mm). Set of screws suitable for the application have to be ordered separately. Complete with: 2. Twin screw feeder with agitator 3. Cylindrical hopper (0.6 l volume) closed by lid 4. Horizontal outlet tube 5. Feed funnel extension with lid <u>Technical data:</u> 6. Power: 230 V, 50/60 Hz	1 no.
b. Adder Secondary Feeder Usage 1. This option indicates the above ordered feeder is used as secondary feeder. Only required if the feeder	1 no.

should be retro fitted to an extruder and used as secondary feeder (Feeder 2).	
c. Set of *concave screws* 1. Set of screws for very low throughputs. 2. Outer diameter: 12 mm 3. Helix pitch: 4 mm 4. Core diameter: 8 mm	1 no.
d. Set of spiral screws 1. Geometry: Spiral Screw 2. Outer diameter: 11 mm 3. Pitch: 11 mm 4. Inner diameter: 7 mm	1 no.
e. Liquid System complete for extruder 1. Complete solution to feed liquids into the twin screw extruder barrel. 2. The feeding pump is digitally controlled at the pumps user interface and interlocked into the twin screw extruder start/stop signals. <u>Content:</u> 3. Peristaltic feeding pump 4. Liquid Feeding Plug 5. 2 m feeding tube	1 no.
I. Bench top Water Bath	1 no.
1. Suitable to cool the polymer strand before it is feed into the pelletizer. Includes two rolls to guide the strand within the bath. An included air ring blows off remaining water from the strand. <u>Technical data:</u> 2. Connection: Quick coupling (self closing) for 8 mm tube 3. Capacity: 5 l	
J. Pelletizer for extruder	1 no.
1. Strand Cutting Variable Length Pelletizer; with variable speed drive and adjustable pellet length. With opening panel for easy-cleaning access, fully safety-interlocked and complete with electrical controls. <u>Technical data:</u> 2. Line speed: 3 … 25 m/min 3. Pellet length: 0.5 … 2.0 mm (step: 0.5 mm) 4. Power connection: 230 V 50/60 Hz	
K. Micro injection molding machine with vertical piston design and compatible with the twin screw extruder to make it work in tandem with Extruder.	1 no.
1. Micro Injection molding machine to produce test specimen with a minimum amount of sample material (3.5 g and maximum volume 12.5 cc). The manufacturing process is completely numerically controlled. Ten different sets of parameters can be stored in the machine. 2. Advanced machine with vertical piston design and compatible with the twin screw extruder to make it work in tandem with the Extruder, suitable to produce specimen with maximum 150 mm length (ISO 527 Tensile bar). 3. Air compressor suitable for simultaneous use of extruder and injection moulding with regulator and drier 4. Vacuum system complete with pump and adapter suitable to be attached to the system <u>Technical data:</u> 5. Max. melt temperature: 450°C 6. Max. mold temperature: 250°C 7. Max. Injection pressure: 1100 bar 8. Weight: 60 kg 9. Electrical power: 230/110 V, ±10%, 3.15 A, 50/60 Hz 10. The requirement for compressed air supply should not be more than 10 bars	
11. Mold for Tensile bar ISO527-2-1BA	1 no.
12. Mold for Tensile bar type 3	1 no.
13. Mold for disc diameter 20 mm, height 1.5 mm	1 no.
14. Mold for disc diameter 25 mm, height 1.5 mm	1 no.
15. Mold for disc diameter 35 mm, height 1.5 mm	1 no.

16. Mold for Tensile bar ISO527-2-5A	1 no.
17. Mold for bar 80x10x4 mm Izod ISO180, Charpy ISO179-1	1 no.
18. Mold for DMA test bar L = 60, w = 10, h = 1 mm	1 no.
19. Blank injection molds	2 nos.
L. Sheet Die for Twin Screw Extruder	1 no.
1. Horizontal 30 mm wide sheet die with adjustable slit height 0.1 .... 1.1 mm. 2. Max. temperature: 350 °C. Temperature is controlled via separate controller. Complete with: 3. - Flexible lip with adjustment screws 4. - Fishtail flow channel 5. - 1/2" UNF Measurement port 6. - Die heater 7. - Temperature controller	
M. Modification of slit height for flexible sheet die	1 no.
1. Adjusting range: 1 mm. 2. Maximum possible slit height: 3 mm	
N. Sheet Take Off for Twin Screw Extruder	1 no.
1. To smooth and take off extruded sheet and ribbon samples in a defined manner. Easy handling due to cantilever mounted rolls. 2. Two driven chill rolls (water cooled) take the sheet from the die. 3. Two rubber stretching rolls. Speed of the rubber rolls can be controlled separately within 0-10 %. 4. Wind Off roll with interchangeable rolls with self-adjusting speed to compensate increasing roll diameter.	
O. Filament set up	1 no.
1. Melt Pump for pulsation-free metering. 2. Pump head volume:0.6 cm^3/rev 3. Pump speed: 0.1 ... 60 rpm 4. Heating zones: 1 (1 internal / 1 external) 5. Temperature: RT ... 400 °C 6. Maximum pressure:500 bar	
P. Precision laser-based OD unit for vacuum sizing after die swell with	1 no.
1. Diameter Monitor, LASER incl software Laser based diameter measuring device. 2. Including mounting assembly for 3D filament spooler. 3. Diameter data are recorded and displayed vs. time on a PC Software. 4. Measuring window: 6 mm 5. Resolution: 1 µm	
Q. Filament Spooler for winding 3D filaments Suitable for spooling filaments	1 no.
1. Adjustable line speed with self-adjusting compensation for spool diameter increase while spooling. Adjustable filament distribution traverse. 2. Including 1 spool hub. 3. Line speed: 0.5 to 15 m/min 4. Filament diameter: 1 to 3 mm 5. Center line height: 270 mm	
R. Warranty	1 no.
1. Comprehensive warranty for three years (36 months) after installation 2. Installation and training F.O.C. at site 3. Performance security 3% of value valid for 60 days beyond warranty	