



## **Rheology Solutions**

*Rheology Solutions is the sole Australian distributor of this product range and we welcome the opportunity of discussing your application requirements.*

*We hope the information you are seeking is contained within this file.  
If you have any questions, or require further information please contact us.  
We look forward to being of further service.*

*Regards from the Team at Rheology Solutions.*

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Optical<sup>®</sup>  
Control  
Systems

The solution for the polymer industry

Size  
Length  
Date  
Type:  
X-Pos  
No.  
Product  
Time

174 [µm]  
545 [µm]  
3/10/2009  
Defect  
16375 [µm]  
1424 : #2  
2:11:50 PM

# Extrusion | Cast & Blow Film Lines | Quality Control

R & D, QC, Lab & on-line application

Size  
Length  
Date  
Type:  
X-Pos  
No.  
Product  
Time

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3/10/2009  
Defect  
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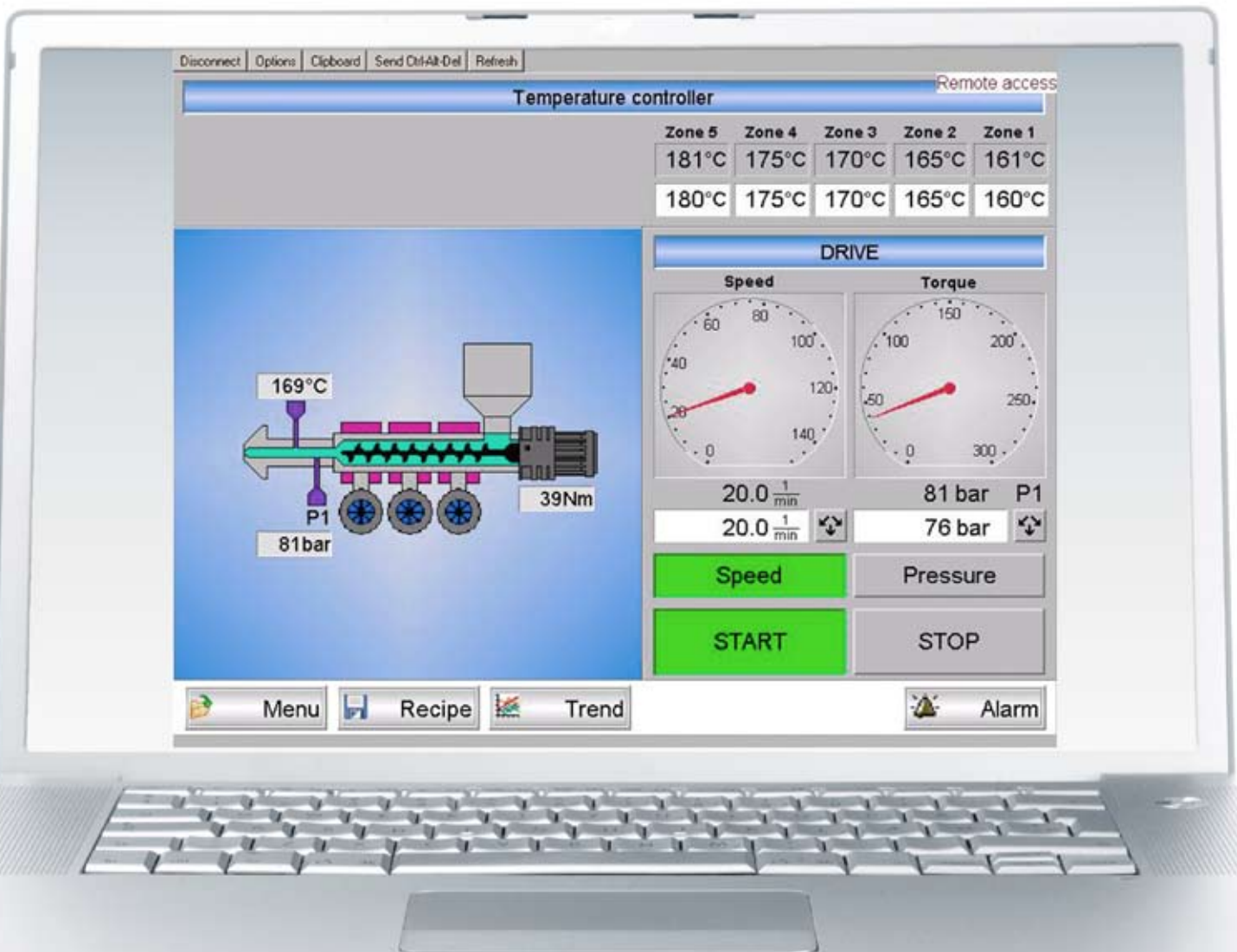
# Measuring Extruder Type ME

The measuring extruder of the type ME is intended for the production of narrow films for laboratory and small-batch production. The optimum simulation of the production process is ensured because of the flexibility and the modular concept. The same results achieved in the laboratory and on production extruders are a major contribution to quality assurance.

All components are integrated in a sturdy steel frame which is height adjustable. The control elements are ergonomically arranged at the operator's level in a swivel-type control panel. This ensures that the extrusion parameters set are always in view.

In environments where no permanent staff are employed, the optional remote control unit offers an ideal solution for monitoring and controlling the unit from a distance. In addition all parameters are stored in a protocol file which permits later analysis at any time.

When connected to a chill roll and winding system CR 9/WU9, the extruder creates a self-contained basis for connecting optical measuring equipment. Furthermore, the modular concept permits the use of different optional accessories which always ensures an easy and convenient adaptation.



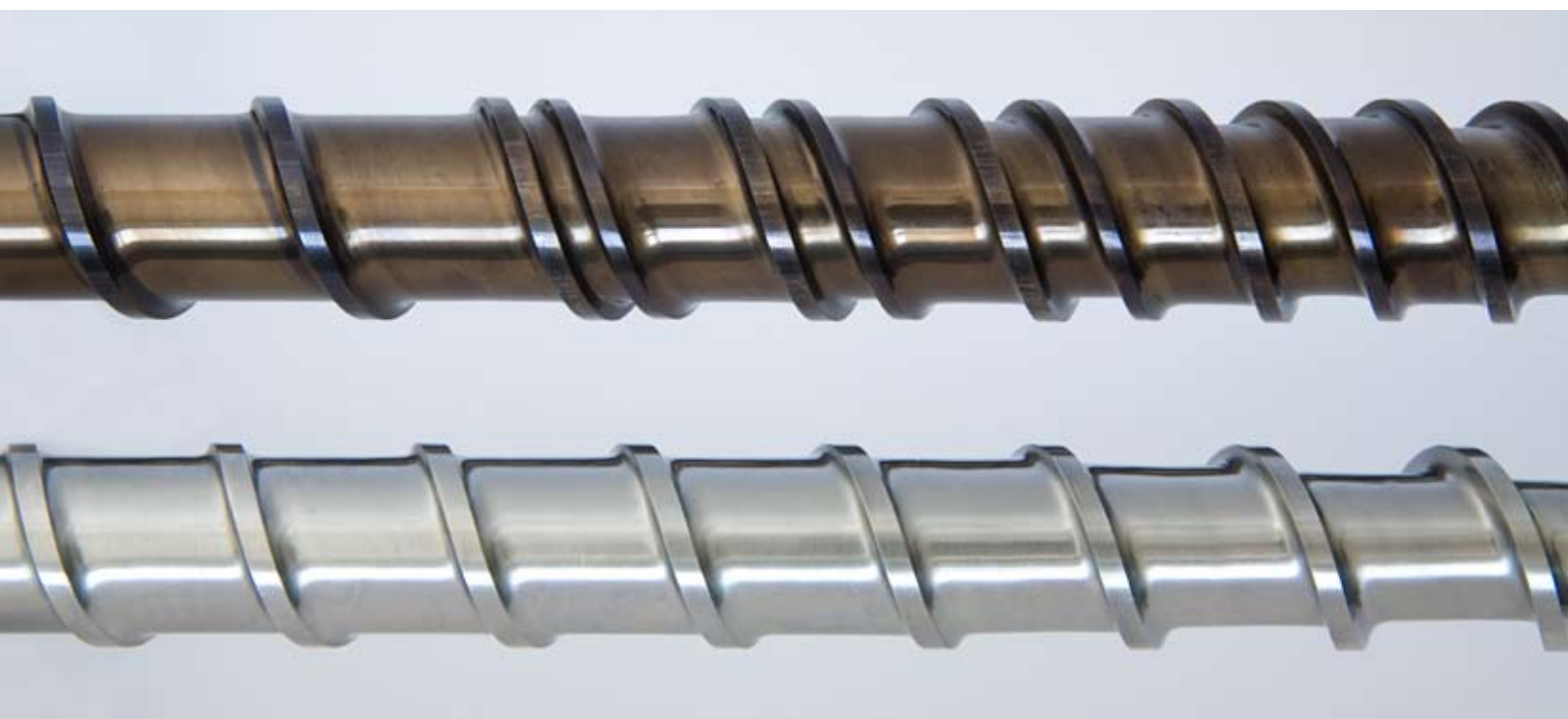
## Performance Characteristics

- **TFT Touch Panel**  
Design with visualisation of all machinery parameters
- **Modular architecture**  
Simple possibility of expansion
- **Selected use of material**  
All important contact surfaces are made of stainless steel
- **Universal die adapter**  
Use of different die heads possible
- **Robust drive technology**  
High-performance drive maintenance free, electronically and mechanically
- **Temperature zones**  
Self-optimising PID controllers, continuous display and monitoring of all temperature settings
- **Self-diagnosis**  
Continuous display and monitoring of speed, torque, melt pressure and melt temperature
- **Operation**  
Ergonomic, TFT control panel
- **Alarm functions**  
Optical and acoustic alarms
- **Interfaces for external equipment**  
Ethernet interface for external OPC server  
WEB browser for remote control
- **Data & recipe handling**  
Chart display of all extruder parameters
- **Process synchronisation**  
Linking of the measuring extruder to external measuring units such as film analyzer software
- **Open database**  
The extruder parameters can be converted into all common file formats (Access, Excel, etc.)
- **High precise servo motors**



## Technical Data

- **Drive technology**
    - Synchronous motors
    - 2.8 kW, 5.8 kW, 9.1 kW
    - Speed range 0.2 - 150 rpm
    - Max. torque 120, 300, 500 Nm
  - **Screw (individual configuration)**
    - Special steel, ionitrided
    - Single-thread
    - Feed zone
    - Compression zone
    - Metering zone
    - Compression ratio
    - Mixing part
    - Barrel Diameter 20, 25, 30 mm  
[others on request]
    - Length 10D - 35D  
[standard 25D, optional 10 - 35D]
    - Wide range of screw design
  - **Temperature zones**
    - Setting range 0 - 400 °C
    - Temperature sensors type FeCuNi, type J
    - Max. working temperature 380 °C
  - **Device interface**
    - Ethernet 10/100 M Base T
  - **Physical interfaces (datex per external server)**
    - Ethernet 10/100/1000 M Base T,
    - USB, RS 485, RS 232, digital & analogue I/O
  - **Communication protocol**
    - (datex per external server)
    - MODBUS RTU, MODBUS TCP/IP, OPC, SQL,
    - Filetransfer, PROFIBUS
    - Implementation to other Fieldbus-Systems possible
  - **Power supply**
    - 400 V, 3 phase + N + PE (5 wires)
  - **Weight**
    - Approx. 350 kg
  - **Temperature**
    - 15 - 40 °C
  - **Tool kit**
    - For maintenance and cleaning work
- Technical alterations are subject to change without prior notice



# Chill Roll & Winder Unit CR9/WU9

The Chill Roll & Winder Unit has been specially developed to meet the requirements of the polymer raw material producers.

The CR9/WU9 can contain an FTIR for on-line spectroscopy, haze- gloss- and thickness measurement and it can be used in the laboratory or online. The system consists of two chill rolls with controlled drive, several guidance rolls, haul-off station with two rubber-nip rolls followed by a central pneumatically expandable winder. The winder and nip roll are regulated via the tension control. In addition the CR9/WU9 is equipped with TFT

touch control panel for improving the visualisation of user and equipment parameters, a digital and manual rotation adjustment, film tension control and speed control. A speed indication for chill rolls and nip rolls is available and the winder is pneumatically expandable.

The CR9/WU9 are equipped with a film break sensor and a detector for film direction as an alarm function. An electrostatic discharging of the winder with ionised air is available.





## Performance Characteristics

- **Modular architecture**  
Simple possibility of expansion, easy adaptation
- **Safety clutch for all drive**  
Guarantees safe handling and protects for injuries
- **Exchangeable chill roll sleeve**  
Simplifies the maintenance and reduces costs
- **Option of following devices**  
FTIR spectrometer, TMS (thickness measurement), Gamma 12 (haze measurement), GM5 (gloss measurement)
- **Self-diagnosis**  
Constant display and monitoring of chill roll speed, tensile force setting and winder status
- **Robust drive technology**  
The high-performance drives are monitored electronically and mechanically
- **Interfaces**  
Ethernet interface for external OPC server  
WEB browser for remote control
- **Operation**  
Ergonomic, swivel-type control panel
- **Alarm functions**  
Optical and acoustic alarms
- **Mobility**  
Units are movable to assure convenient handling and maintenances
- **Use of selected material**  
All important contact surfaces are made of stainless steel
- **High precise servo motors**
- **Interfaces for external equipment**  
ACS remote control, PROFIBUS, RS485

Chill roll sleeve exchangeable  
for easy maintenance

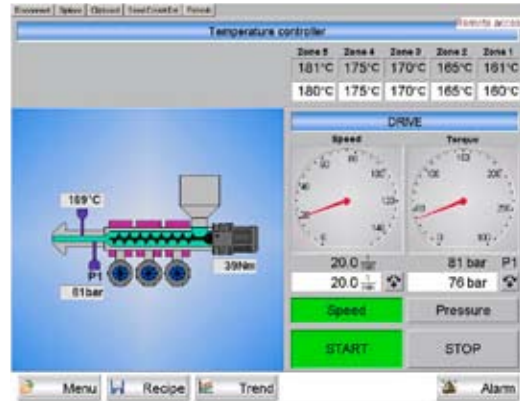
## Technical Data

- **Drive technology**  
Three asynchronous drive units  
with servo controllers  
Rating: 0.25 kW  
Production speed: up to 15 m/min  
[optional 30 m/min]
- **Chill rolls**  
Diameter: 140 mm  
Width: 200 mm or 320 mm  
Working width: 160 mm or 300 mm  
Material: stainless steel chromium-plated or  
anti-stick coating  
Temp. ranges: 5 - 85 °C (optional up to 150 °C)
- **Guide rolls**  
Diameter: 40 mm  
Working width: 160 mm or 300 mm  
Material: stainless steel  
(optional Coating-K coating)
- **Nip rolls**  
Diameter: 90 mm  
Working width: 160 mm or 300 mm  
Tension force: max. 20 N  
Material: aluminium rubber-coated
- **Winder**  
Shaft: 150 mm  
Film roll diameter: up to 600 mm  
Working with: 160 mm or 300 mm
- **Tension force: max. 20 N**
- **Device interface**  
Ethernet 10/100 M Base T
- **Physical interfaces (datex per external server)**  
Ethernet 10/100/1000 M Base T,  
USB, RS 485, RS 232, digital & analogue I/O
- **Communication protocol**  
(datex per external server)  
MODBUS RTU, MODBUS TCP/IP, OPC,  
SQL, Filetransfer, PROFIBUS  
Implementation to other  
Fieldbus-Systems possible
- **Power supply**  
400 V, 3 phase + N + PE (5 wires)
- **Size dimension**  
CR9: (l, w, h) 165 x 118 x 186 cm  
Working height 110 cm  
Weight approx. 360 kg  
FTIR: (l, w, h) 264 x 126 x 186 cm  
Weight approx. 700 kg  
CR9/G: (l, w, h) 193 x 120 x 186 cm  
Weight approx. 440 kg

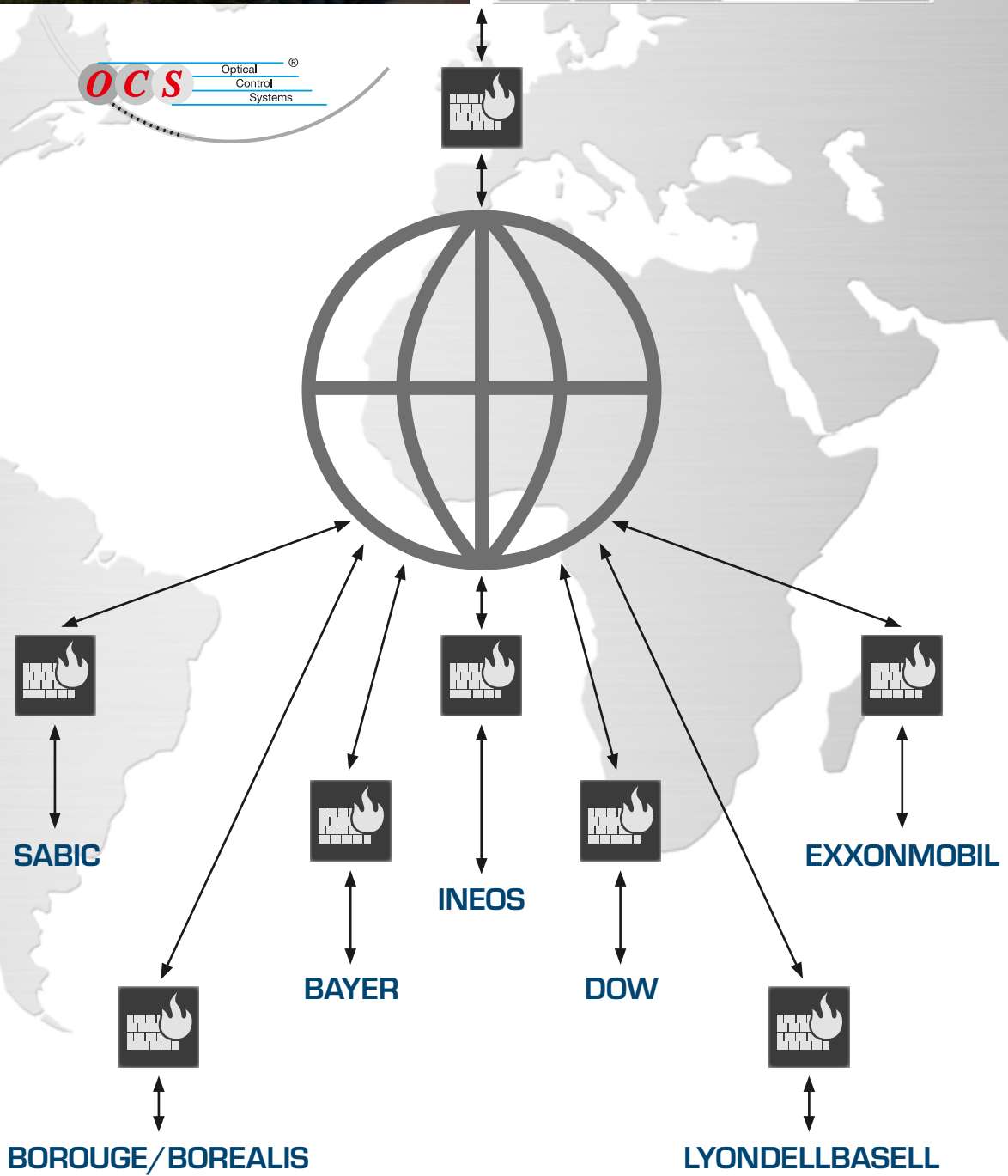
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without prior notice



# Remote Control Function



**OCS** Optical  
Control  
Systems



# Cast Film Lines



They are used to produce high-quality flat film to carry out optical and physical measurements, all settings and parameters, e.g. extruder speed, temperature, film tension, winding force, winder diameter, etc. are stored by a touch panel control system, which guarantees, that the film quality can be reproduced at any time- an important parameter for optical & physical on-/off-line measurements, for example detecting gels, contaminations, degradations and other impurities as well as haze, gloss, density and additive measurement.

The cast film line consists of:

- Extruder with a diameter of 20, 25 or 30 mm, length 10D - 35D
- Cast film die with a width of 20, 50, 100, 150, 300 mm, fix or flexible gap
- Chill Roll & Winding system
- Other sizes for extruders and dies are available on request



## Blow Film Lines

The blow film lines are used to produce high-quality blown films to carry out optical and physical measurements, all parameters of the system, e.g. extruder speed, temperature, haul-off speed, film width, film bubble ratio, etc. are stored at the touch panel control system, which guarantees the reproducibility of the film quality at any time- as the frost line can be kept in the same position, this is an important parameter for optical & physical on-/off-line measurements, for example detecting gels, contaminations, fibres and other impurities as well as haze, gloss, density and additive measurement. An optical device measures the width of the flattened film and controls the diameter of the film bubble. In this way, the desired film width is recorded. The tower height is electrically driven, freely adjustable and can therefore be set optimally for any extruded materials.

The take-off nip rolls are driven pneumatically and their temperature is optionally controlled.

The film bubble can be stabilised with additional guiding rolls, adjustable wooden grids and Teflon-coated rolls lead the film bubble into a flat layer film, some guiding rolls are specially designed to prevent wrinkles.

The complete operation is visualised on the touch screen.

The blow film line consists of:

- Extruder with a diameter of 20, 25 or 30 mm
- Blow film die with a diameter 30/50/75 mm
- Haul-off tower and winding system
- Other sizes for extruders and dies are available on request



## Performance Characteristics

- Cooling ring with large sized air distribution chamber
- Labyrinth styled for air flow and uniform pressure
- Adjustable cooling ring gap
- The tower is electrically driven
- Automatic bubble diameter control according to the set ratio
- Electronic width measurement of the flattened film
- Pneumatic drive for rubber and chrome nip rolls
- Automatic nip rolls open/close
- Spiral (mandrel) melt distributor including three heating zones

## Technical Data

- Die diameter 30/50/75 mm
- Die gap 0,5/0,8/1,2 mm
- 8 channel melt distribution
- Blown-up film diameter max. 180/240 mm
- Flattened film width max. 280/380 mm
- Haul-off speed 0 - 15 m/min (optional 30 m/min)
- Haul-off force 0 - 20 N
- Total height 220 - 320 cm
- Power supply 400 V, 3 phase + N + PE (5 wires)
- Weight Approx. 500 kg

Technical alterations are subject to change without prior notice



# Pelletizer

The Pelletizer is used to change the quality characteristics, different formulations such as additives matrixes and master batch compounds, sizes/shapes for R&D as well as recycling studies of polymers.

After compounding and mixing the new material with the base material in the extruder, a strand passes through a water bath for cooling, air blower for drying and finally into the pelletizer to produce pellets with the new properties.

A complete lab scale strand solution with a Pelletizer enfolded: Extruder, strands die, water bath and strand pelletizer with adjustable speed.

The pelletizer system consists of:

- Extruder with 20, 25 or 30 mm diameter depending on the requirement
- Screw with option of different compression ratios and mixing zones
- Strand die plate with 1 or 2 outputs and a diameter of 3, 4, 5 mm, etc.
- Stainless steel water bath with air blower die
- Pelletizer unit with adjustable speed and pellet collector



# Calender/ Tape Test equipment



The tape testing equipment is used specially for the wire & cable application.

When the extruded tape passes through the special chill roll unit, it will be pressed and cooled from both sides using three chill rolls which are placed on top of each other with a defined gap as per the standard requirement (0,5 mm). Metals, gels, black specs, degradations and other contaminations can be inspected using a high resolution digital CCD-line scan camera with a high speed image processing system. Defined contaminations can be marked showing their position, size, shape etc. using the marking device, the cutter is responsible for chopping the tape in stripes and separate the contaminated and non-contaminated in different bins for further analysis.

The tape test equipment consists of:

- Extruder type ME 25/25DV3
- Flat film die, 50 mm width / 1 mm gap
- Special chill roll & winding system
- High resolution contamination detecting system
- Contamination marking device
- Tape cutter

**Defined contaminations can be marked showing their position, shape, size, etc. using the labelprinter**



## Performance Characteristics

- Touch screen controlled
- Back-gearred servomotor driven chill rolls
- Height adjustable (customised)
- Manual calender interlock
- Manual adjusting film thickness
- Film break sensor (optional)
- Exchangeable chill roll sleeve  
Simplifies the maintenance and reduces costs



Film-Test-Line with an edge-slitter-winder (optional)

## Technical Data

- Drive technology
  - Three asynchronous drive units with servo controllers
  - Production speed: up to 10 m/min
- Gap size adjusting 0,3 - 1 mm
- Chill/Calender rolls
  - Diameter: 140 mm
  - Width: 130 mm
  - Working width: 100 mm
  - Material: stainless steel, chromium-plated or anti-stick coating
  - Temperature: 5 - 85 °C (optional up to 150 °C)
- Nip rolls
  - Diameter: 90 mm
  - Width: 160 mm
  - Working width: 100 mm
  - Tension force: max. 20 N
  - Material: rubber coated
- Guide rolls
  - Diameter: 40 mm
  - Width: 190 mm
  - Material: stainless steel
- Winder
  - Shaft diameter: 150 mm (optional 100 mm)
  - Film roll diameter: up to 600 mm
  - Edge-slitter-winder [optional]
- Cutter module
  - Working width: up to 100 mm
  - Material thickness: max. 0,3 - 0,7 mm
- Device interface
  - Ethernet 10/100 M Base T
- Physical interfaces (datex per external server)
  - Ethernet 10/100/1000 M Base T, USB, RS 485, RS 232, digital & analogue I/O
- Communication protocol (datex per external server)
  - MODBUS RTU, MODBUS TCP/IP, OPC, SQL, Filetransfer, PROFIBUS
  - Implementation to other Fieldbus-Systems possible
- Weight
  - Approx. 510 kg
- Power supply
  - 400 V, 3 phase + N + PE (5 wires)
- Temperature 15 - 40 °C

Technical alterations are subject to change without prior notice



# Filter Test

## ME FT20, ME FT25

The Filter Test System works according to the standard DIN EN 13900-5 to determine the Filter Pressure Value (FPV).

The system consists of a 20, 25 or 30 mm extruder, a screen changer which can receive different filter packages with different sizes, a strand die and optionally a gear pump for more constant melt feeding. The screen pressure test serves to recognize quality differences in a polymer. The screen pressure test can be used, for example:

- In the field of product development to optimize the colour approach
- In the field of quality control

The measurement principle of the FPV is to measure the pressure increase before the screen

filter by time. This is an indication of the melt purity. Following operations are possible:

- The extruder is feeding the screen changer directly with the melt
- The extruder works with constant rotation without gear pumps
- Pressure monitoring before the sieve package and automatic determination of the pressure increase by time
- The extruder is feeding a gear pump with constant pressure and the gear pump is feeding the screen changer
- The extruder with constant pressure before the gear pump and gear pump work with constant rotation
- Continuous monitoring and full automatic measurement to determine the Filter Pressure Volume (FPV)

The material to be tested is molten and homogenized in an extruder and is delivered via a melt pump with a defined and constant volume flow to the filter. Particles of a certain size clog the filter and so reduce the free penetration surface of the screen. Consequently, with a constant volume flow in front of the screen, the pressure does increase and is recorded by a sensor and can be used to define the quality of the material tested.

By using a by-pass valve, the melt flow can be by-passed in front of the screen. This enables an interruption of the melt flow without having to stop the extruder or the melt pump. A change of the screen can easily be done while purging both, the extruder and melt pump.

For standard measuring in the field of master batch, small batches are used. The extruder's base group includes the electrical control for extruders and melt pump. The screen measuring equipment is a movable part of the extruder to unlock and clean the screw easily.

All results are calculated and displayed directly on the TFT touchpanel beside all extrusion parameters.



Optionally a strand die, stainless steel water bath and pelletizer unit can be combined with the Filter Test System to achieve additional configuration.

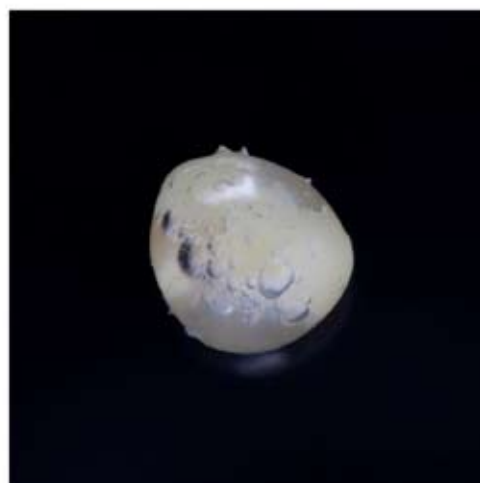
For testing larger batches of polymers which need a larger throughput, a larger size extruder with a diameter of (25 mm or 30 mm) can be used. This combination allows throughputs from 1 to 10 kg/h. Herewith, all requirements for testing polymers or compounds are fulfilled.

## Technical Data

- **Barrel**
  - 20, 25, 30 mm diameter, length 25D
  - 3 heating zones with thermocouples for barrel
  - 4 additional heating zones for melt pump and adapter
  - 3 cooling zones with low pressure blower
- **Screw: 3 zone, compression 3:1**
- **RPM: 0 - 150 rotation/min**
- **Torque: 120 Nm, 300 Nm, 500 Nm**
- **Drive technology**
  - Synchronised servo-motor
  - 2,8 kW, 5,8 kW, 9,1 kW
- **Temperature control with drive stop**
- **Automatic temperature decrease in alarm situation**
- **LCD Touch Panel**
- **User and system configurations can be saved or loaded**
- **Pressure measurement**
- **Melt temperature measurement**
- **Automatic alarm handling**
- **Interfaces**
  - Web browser interface
  - OPC Interface (optional)
- **Remote control capability**
- **Power supply**
  - 400 V, 3 phase + N + PE (5 wires)
  - 220 V plug for follow up equipments



Technical alterations are subject to change without prior notice



»*Inspired synergy*«

*OCS*



# Your advantages

- Improvement of quality  
(elimination of non-standard products)
- Competitiveness by QC-Automation
- Accurate and consistent automatic grading
- Reduction of customer returns and complaints
- Increased line speed and process throughput where manual inspection is a limiting factor – perfect for online and laboratory applications
- Efficient, objective and reproducible laboratory evaluation
- Optimised quality
- Increased competitiveness by automated quality control
- Precise and consistent quality evaluation
- Faster inspection  
Suitable for Research & Development, laboratory use and for statistical production control
- Reproducible operation settings
- Precise control of haul-off and winding motors
- Full automatic control of haul-off and winding tension
- Maintenance free
- Designed for 24/7 continuous operation

**CHINA PETROCHEMICAL**

**NOVA**

**GE PLASTICS**

**NEXANS**

**INDIAN OIL**

**BAYER**

**DOW**

**LYONDELLBASELL**

**SABIC**

**BOROUGE/BOREALIS**

**BRASKEM**

**CLARIANT**

**ARYA SASOL**

**QAPCO**

**PETROCHINA**

**DUPONT**

**EXXONMOBIL**

**TOTAL**

**BASF**

**DSM**

**ARKEMA**

**INEOS**

**REPSOL**

**CABOT**

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**MITSUBISHI**

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**JAPAN POLYETHYLENE**

**TETRA PAK**



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91 [ $\mu\text{m}$ ]

115 [ $\mu\text{m}$ ]

3/10/2009