COLLIN

LAB & PILOT SOLUTIONS

POLYTEST LINE

- Online-Viscometer
- Rheometer
- Manual Pressure Filter Test
- Automated Pressure Filter Test
- Automated Pressure Filter Test with Autosampler
- Multi-Inspection
- Film-Inspection
- Test Laboratory

NGA

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Online Viscometer

Compact, convenient & high degree of automation

MOV

The Collin online viscometer is used for continuous monitoring of the melt viscosity at a production extruder.

Two melt pumps with only one drive ensure a permanent melt flow.
The Collin Polytest Line measuring device has a compact design. Furthermore, it is characterized by the flexibility and the closed material circulation. There is no waste.

Your advantages

- **Low cost.** Cost-effective, since there is only one drive motor for two pumps.
- **Clear.** Simple and clear display of the viscosity value.
- **Space-saving.** Low space requirement.
- **Flexible.** Connection to any extruder, compounder and production extruder is possible.
- **Permanent.** 24-hour use is possible.

Technical description

The online viscometer consists of:

- A heated viscometer block
- A heatable bypass adapter with melt return
- A capillary, which can easily be replaced
- A temperature sensor for measuring the melt temperature in front of the die
- Control and display in a compact switch cabinet
- Two melt pumps, integrated in the block
- Two pressure sensors up to 350 bar
- Two separate temperature sensors, one for temperature control at the adapter one at the viscometer.
- Drive motor
- Evaluation software

The bypass adapter removes melt out of the production extruder and guides it over a capillary. Along this capillary, the loss of pressure is measured. After that, the melt is returned into the extruder. Via the differential pressure, rheological characteristics of the material (e. g. iV value, MFR) can be determined. For a constant melt throughput, in front of and behind the capillary, a melt pump with a common drive is provided.

For the viscosity, besides the pressure, also the melt temperature is essential. Therefore, the viscometer is controlled relating to the set temperature and in addition, the melt temperature is measured in front of the capillary.

Software setting options

- Measuring temperature
- Adapter temperature (optional, depending on the version)
- Setback temperature (standby)
- Max. pressure
- Pump speed
- Recipes

The display is effected via an overview screen with setting parameters, operating status and viscosity value. Alternatively, the measure value trend can be displayed as graphics. In intuitively branched submenus, the system settings as well as the recipes can be defined.

Technical data

Online viscometer:

- W x D x H: 120 x 193 x 540 mm
- Measuring capillary: Ø 2 x 60 mm (standard), different capillary types available
- Max. pressure build-up in front of the capillary: 350 bar
- Max. temperature: 300°C
- Melt pump throughput: 0.45 cm³/U
- Pump speed: 1 - 60 U/min

Operating panel with switch cabinet:

- W x D x H: 600 x 510 x 1165 mm
- Touch panel
- Ethernet connection for the integration in the production extruder

Rheometer

Comprehensive 24-hour measurement of melt viscosity

MOR, WROR

WROR

The Mono Online Rheometer MOR is used for measuring a viscosity curve of polymers.

Here, the viscosity is measured in a melt flow, which flows through a round capillary. The melt is either directly removed or removed out of the extruder as side flow.

The Wide Range Online-Rheometer WROR measures the viscosity of molten plastic with three capillary geometries.

Because of the 3-capillary concept of Collin, the range of shear rates is very wide. Thus, the viscosity curve can quickly and online be measured at several points. Moreover, a triple spinning distributor pump guarantees a continuous melt distribution to three capillaries.

Your advantages

- **Online.** Quick creation of viscosity curves.
- **Significant.** Quick determination of the viscosity curve and calculation of the melt index (MFR/MVR).
- **Continuous.** 24-hour operation is possible.

Technical description

With the WROR, several points of the viscosity curve are measured online. By an open bypass system, which connects the WROR with the extruder, a side flow is branched off from the main flow of the polymer melt and is guided into the WROR. Via a melt pump, the throughput of the flow can be adjusted.

The Collin 3-die concept, consisting of 3 round capillaries with different diameters, allows the deflection of the melt into three different channels. In this way, at different capillaries, the pressure decrease can simultaneously be measured and thus, the rheological properties of the polymer melt in different shear rate ranges can be recorded.

With a constantly adjusted volume flow and corresponding choice of capillary diameter, the MFR value can be determined.

If the process control allows a variation of the bypass flow, in online operation, up to 12 points can be acquired and evaluated.

Technical data

- Melt pump speed: 0 - 40 U/min
- Melt pump throughput: 3 x 0.66 cm^3/U
- Temperature range of application: 60 - 300°C
- Pressure resolution: 0.1 bar
- Used pressure measuring zones: 100 bar, 350 bar, 500 bar

Manual Pressure Filter Test

Easy and safe material control without extruder stop

FT MP

The manual Collin pressure filter test is used for determining quality differences in a polymer caused by agglomerates, insufficiently dispersed fillers resp. contaminations.

A filter cassette in preheating position allows a quick, clean and manual filter change without extruder stop. During the filter change, the melt is deflected via a by-pass valve in front of the filter. Additionally, an optionally available double-chamber hopper facilitates the test execution and saves working time.

Your advantages

- **User-friendly.** Easy and safe handling.
- **Measurable.** Improved reproducibility by double chamber hopper.
- **Time-saving.** Low idling times during screen change due to cassette system.
- **Sophisticated.** Filter change without extruder stop.

For example, the pressure filter test can be used in the field of product development for optimizing color masterbatches, for quality control or for incoming and outgoing inspection of masterbatches, compounds or polymers.

The material to be tested is molten and homogenized in an extruder and, via a melt pump, discharged through a screen with a defined and constant volume flow. Particles of a certain size clog the screen and thus the open area of the screen is reduced. This results in an increasing pressure in front of the screen which is measured by a sensor.

Extra options pressure filter test at the test extruder

- For testing larger quantities of polymer, which require higher throughputs, the measuring head is mounted on an extruder with a screw diameter of 25 mm or 30 mm.
- The filter test is mounted on a movable unit, that increases the flexibility.
- A PC, connected with the line, measures the melt pressure in front of the filter, the melt temperature and the melt pump speed.

Test standards

- EN 13900-5/Pigments and extenders – Methods of dispersion and assessment of dispersibility in plastics – Part 5: Determination by filter pressure value test.
- EN 15348 standard specification for polyolefin mono-filaments, Chapter 17: Polyolefin material cleanliness.

Automated Pressure Filter Test

Fully-automatic, standardized quality control of polymers

AFT MP

The automated pressure filter test is used for determining quality differences in a polymer by agglomerates, insufficiently dispersed fillers resp. contaminations also in the bypass directly at the production extruder. With this version, the screen change is effected automatically.

The molten thermoplastic polymer flows through a filter screen. Agglomerates, contaminations and other particles, which cannot easily be dispersed resp. unmolten particles cause an increasing clogging of the filter screen - consequently, there is an increase of the pressure in the measuring chamber. The pressure transmitter registers the pressure increase in front of the screen and documents it via the measuring course. Thus, the pressure curve shows the quality of the melt and allows a valid statement about the quality of the recycled material, compound or masterbatch on the basis of valid data.

During the filter change, the extruder and melt pump keep running. A filter magazine for up to 20 filter cassettes ensures the continuous operation of the pressure filter test.

Used for polyolefins, PET, PA, PC or other technical polymers as well as recycled material.

Your advantages

- **Efficient.** Low idle times and personnel costs compared to manual screen change.
- **On time.** Quick quality control at the production line.
- **Flexible.** Connection to any extruder, production extruder or compounder also in bypass mode is possible.
- **Space-saving.** Compact design.
- **State of the art.** Fully automated system.
- **Package.** No additional laboratory analysis.

The automated pressure filter test can be used for standardized pressure filter tests or for quality control in the recycling sector.

The filter change only takes a few seconds. A bypass system deflects the melt flow in front of the filter, without having to stop the extruder or melt pump. The next filter comes into a preheating position in order to position it in the actual test position immediately, without the need of any waiting times.

Features & extras

- Measuring unit – with melt pressure sensor with CANopen interface and automatic melt diverter as well as integrated automatic screen changer
- Melt pump – for transporting a defined, constant melt flow irrespective of the self-adjusting counter pressure
- Filter cassettes – removable magazine for 20 filter cassettes
- Screen filter – with different fineness
- Control – separate control cabinet with useful control panel

- Protocol – representation of the pressure increase over test time
- Combinable with any extruder
- The automated pressure filter test can be operated as plug & play solution with its own control cabinet and control panel on any extruder via a bypass adapter and is used for online process control.

Extruders & extras

- The Collin Pressure Filter Test with Auto Sampler is combinable with numerous Collin extruders.
- Example 1: Teach Line Extruder E 20 x 25D with melt pump
- Example 2: Lab Line E 25 P x 25D for measurements with higher throughputs

Technical data

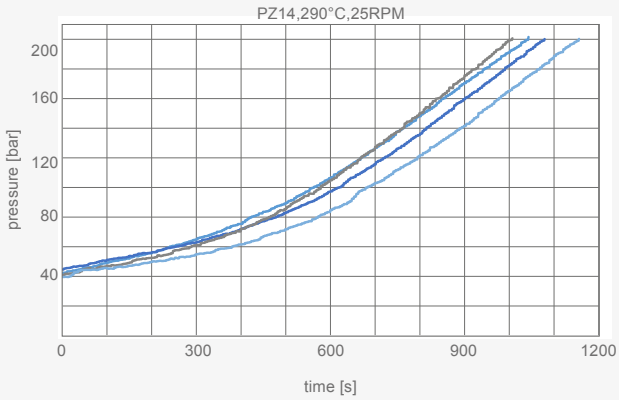
- Connection power: 4 kW, 3 x 9 A, 400 V
- Pressure sensor: 200 bar CANopen, ½'' UNF
- Volume flow: 5 - 100 ccm/min
- Overall dimension (without control cabinet and sub-construction): L x W x H = approx. 504 x 269 x 970 mm
- Dimensions control cabinet (with control panel): L x W x H = 1200 x 600 x 520 mm

Test standards

- EN 15348 / Plastics - Recycled Plastics: Characterisation of poly ethylene terephthalate (PET)-recyclates
- EN 13900-5 / Pigments and extenders: Methods of dispersion and assessment of dispersibility in plastics – Part 5: Determination by filter pressure value test

Typical measurement curve

Measurement data recording pressure filter test with dutch weave 14 µm when processing R-PET at a temperature of 290°C.



Extra options pressure filter test at the test extruder

- Via an adapter, the automated pressure filter test can be operated with any extruder with a suitable output.
- As online measuring device, the automated pressure filter test can also be used for large production extruders in the bypass.
- The filter test can be mounted on a movable unit – that increases the application possibilities.
- The evaluation of the pressure filter test is effected either as Filter Pressure Value (FPV) or as pressure increase curve.
- Depending on the design, the filter pressure test operation is integrated in the extruder operation or the filter pressure test is operated via a separate operator panel.

Pressure Filter Test with Autosampler

7 material samples + 7 filters result in 7 tests in one system run **AFT MP E 20**

With the Collin Pressure Filter Test with Autosampler, quality differences in a polymer due to agglomerates, insufficiently dispersed fillers resp. contaminations can be detected. And that septuplicate!

Because of the unique automated material and screen change system, at the moment, up to 7 material samples are processed one after another – without system stop.

Fully-automated, the Collin Autosampler enormously reduces downtimes, decreases personnel costs and allows a higher reproducibility.

Test materials

The Collin test line can be used for pellets made of polyolefins and technical polymers.

Your advantages

- **Innovative.** Fully-automated system.
- **Time-saving.** Extremely reduced downtimes.
- **Cost-cutting.** Considerable reduction of personnel costs.
- **Safe.** Extremely high reproducibility.

Extruder & extras

The Collin Pressure Filter Test with Autosampler can be combined with various Collin extruders:

- Example 1: Teach Line Extruder E 20 x 25D with melt pump
- Example 2: E 25 P x 25 D for higher throughputs

Additional features

- Material change – very quick & automated
- Filter change – also quick & automated
- Extruder purging – automated by deflecting the melt via a bypass during the filter change
- System run – automated filter change without extruder stop
- Screen pre-heating – completely integrated pre-heating
- Software – easy to use evaluation software with protocol printout
- Geometry – different screen geometries are available

Connections

1. Cooling water: 0.5 - 4 bar, consumption max. 5l/min.
2. Electrical connection: U=3 x 400/230V, F=50/60Hz, P=9 kW, I=3x16 A

Swivelling probe unit


Stack for filter cartridges


Ejection channel for used filter

Multi-Inspection

Comprehensive inspection device for testing quality AI

The Collin multi-inspection convinces with its wide range of application – depending on the customer requirement, the multi-purpose testing device measures optically, mechanically and rheologically.

The line is designed like a modular system. It consists of a chill roll unit with roll conveyor afterwards for optical and mechanical film inspection including film winder and as option, an upstream rheological measuring track.

For the inspection systems (optical, IR, color measurement, etc.), proven single components are used. The implementation into the system is effected centrally. Thus, the result is a user-friendly menu navigation, which allows a quick overview of the complete system. By means of Ethernet, the integration of the line into an existing line is possible.

Your advantages

- **Comfortable.** Quick melt and film inspection at the production line.
- **Compact.** Low space requirements due to the compact design.
- **Efficient.** Reduction of the quantity of waste in the production process.
- **Modular.** Cost-efficient components.

Closed chill roll line for multi inspection system

With the exception of the access of the film die, the complete unit is completely closed. Via the door, there is access to the roller unit and to the inspection components.

Above the slot die, there is an air suction in order to suck off evaporating gases immediately. The access to the slot die is shielded by panels for avoiding any dust on the film.

Optical film inspection

Behind the roll mill, the film is guided over the optical inspection field consisting of illumination unit and camera. New: in the direct and transmitted light area, LED strips are used.

Film inspection is effected with an area camera with 5 megapixels. The inspected area reaches a dimension of 50 x 40 mm with a pixel resolution of approx. 25µm. Other units are the color measurement system and a NIR measurement system for identifying foreign polymers.

Mechanical inspection

Via two pairs of rolls, each rotating at a different speed, along the measuring track, a defined extension of the film is realized. The traction necessary for that is measured at the rolls. Thus, a stress-strain ratio can be determined online. In order to calculate the existing stress in the film, before the mechanical test, the film is cut to a pre-defined width and the thickness of the film is measured.

Downstream equipment

For further processing of the film resp. the edge strips, several options are available:

- Film winder
- Cutting device
- Suction

Technical data

- Total length W x D x H: 1050 x 600 x 1600 mm
- Film width: max. 80 mm
- Roll tempering of 10°C up to 90°C, higher on request
- Film take-off speed: 1 - 5 m/min
- Film thickness approx. 30 µm - 100 µm
- Airknife at the chill roll
- Area camera with 5 megapixels
- Pixel resolution approx. 25µm
- Color measurement: L*a*b color space

Film-Inspection

Test system for the inline detection of optical defects in films FI

The Collin Film Inspection System is a high-quality test line, which allows a definition of up to 10 defect classes by means of 14 defect criteria.

The line detects optical defects in a running flat or blown film. Between the cooling and take-off rolls, a LED light source and a line camera are installed. Thus, not dispersed defects in the film can be detected and evaluated.

Your advantages

- **Flexible.** Used as independent system or integrated in the extrusion process.
- **Variable.** Numerous adjustment possibilities of the defect parameters.
- **Permanent.** Round-the-clock operation is possible.
- **Comprehensive.** Online result display of the running test.

Typical fields of application are the recording of

- Gel particles for quality assessment of plastics,
- Contaminations like black spots or
- The identification of pigment agglomerates in the colored film

Technical data inspection unit

- Line camera with lens
- LED light source (line arrangement)
- Current supply for camera resp. light source
- Carriage for positioning the camera distance
- PC with screen
- Number of pixels per camera: 4096
- Processing speed: 80 MHz
- Standard setting: Resolution: 15 µm x 15 µm, Inspection width: approx. 60 mm, Inspection speed: up to 15 m/min

Evaluation software

- Software package: Q-film and Filmview
- Number of defect classes: 10
- Number of defect criteria: 14
- Number of size classes: 10

Technical description

- In an extruder with a corresponding downstream equipment, the material to be tested is processed to a flat or blown film, which is continuously guided along a light source.
- Depending on the task, a camera detects the transmitted or reflected light of the film.
- An image processing system evaluates the obtained information and classifies the detected optical impressions in different, definable defect classes, which then will statistically be evaluated.
- The high-capacity software detects, processes and saves the data. For each defect, characteristics are indicated.
- Different defect types are defined, in which the detected defects are classified. The defects of a defect type are classified in size classes.
- The evaluation of the test results can statistically be made e. g. with the number of defects per squaremeter or by a single defect analysis. Additionally, there are single images of the saved defects, diagrams with defect distribution over film length / width as well as histograms, which indicate the size distribution.

Film-Inspection

Extrusion line with closed test room

COFICOS

The COFICOS system is used for tests under adverse conditions close to a production line or as additional particle barrier in a clean room. The flat film die together with light source and camera extends into a closed test room. Thus, no foreign particles can reach the test film.

The flat film line is suitable for an optical film inspection for standard polymers with a maximum film thickness of approx. 100 µm.

Your advantages

- **Exact.** High-quality test unit for films.
- **Dust-free.** Protected test room.
- **Variable.** Numerous adjustment possibilities of the defect parameters.
- **Comprehensive.** Manifold presentation of the results.


Additional equipment COFICOS


Optional cutting device


Optional marking system

Technical description

The line is movable and includes the film production unit (as option: with camera) and the take-off unit, depending on the order, with winder or cutting device as well as sorting unit of the marked and unmarked samples.

- **Working space.** Is protected and avoids dust.
- **Blower with filter.** Dust reduction by enclosed working space.
- **Suction.** Can be connected above the roll unit, connector with a diameter of 100 mm.
- **Roll unit.** Two fixed, single-mounted rolls made of heat treatable steel, hardened, grinded, hard-chrome plated and polished.
- **Roll heating.** Liquid tempering including two rotary feeds.
- **Take-off unit.** Roller section behind the roll unit for crease-free film guiding. Film tension by dancer roll control. The pair of take-off rolls consists of a rubber roll and a contact roll made of steel.

Technical data

- Roll diameter chill roll: 144 mm
- Roll diameter cooling roll: 72 mm
- Roll width: 150 mm
- Kind of current: 3 x 400 V/50 Hz
- Connected load COFICOS (without tempering device): approx. 2 kW
- Dimensions W x D x H: approx. 1700 x 1330 x 1620 mm
- Net weight: approx. 320 kg

Safety

In case of a breakdown, the film cracking control will activate the alarm and will stop the line.
Furthermore, there is an emergency stop button.

Technical data winder

- Bobbin core for bushes of 6“
- Max. diameter of the bobbin: 650 mm
- Movable bearing
- Motor-driven

Technical data camera

- Typical number of pixels: 4,096
- Typical max. sampling frequency: approx. 20 kHz
- Typical resolution: from 10 - 30 µm
  (Another resolution on request)
- Typical max. film speed depends on the resolution:
  from 10 - 30 m/min

Evaluation software

- Software: Q-Film and Filmview
- Number of defect classes: 10, Fuzzy-classification
- Number of size classes: 10
- Number of defect characteristics: 14

Features & extra options

- Cutting device
- Marking unit
- Additional polishing roll
- Air knife

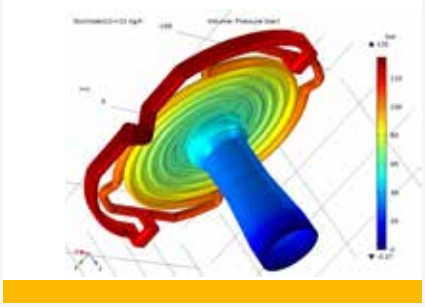
Test laboratory

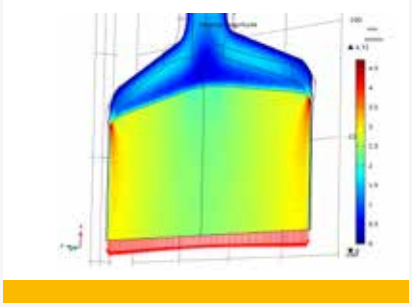
For supporting Collin customers optimally, the Polytest Line measuring devices are available for testing purposes in our laboratories.

Moreover, we offer material tests as a service:

- Viscosity measurement by WROR
- Film characterisation by COFICOS or multi-inspection
- MFR/MVR measurement
- Microscopic analysis
- Film tension test and fiber tensile test
- Moisture measurement
- Pressure filter test

Additionally, we can support our customers in product development via simulation methods (flow simulations).





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