

# Dynisco ViscoSensor Online Rheometer

Experience the benefits of online rheology measurement

Raw Materials

Verification

$$C = \frac{(MFR)_{Lab}}{(MFR)_{VS}}$$

Viscosity

Viscosity vs. Shear rate (linear-linear)

Sustainability

Material Analysis

HEAT: 000 Main  
MOTOR: 25.0W  
RUN: MY - HIGI  
0.616 dl/g

FB Temp: 285.0 C  
MFR: 117.38 g/10 min  
Back P: 22.51 Bar  
Speed: 21.01 RPM

Log Off

Calc Coast: 1  
Capillary

PROCESS SETPOINTS

ALARM STATUS

Recipe #: 0

Profitability

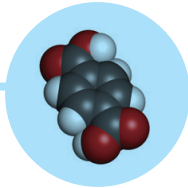
Scrap Reduction

Quality Improvement



## Polymer manufacturers need to create new materials and deliver high quality to meet ever changing end-use requirements.

Precise testing and analysis is mandatory to ensure quality and to stay competitive. Rely on Dynisco's solutions to gain a window into your process and speed up the development, production, quality testing and analysis of polymers.



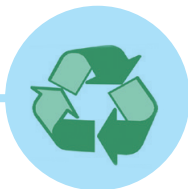
### Material Analysis

Dynisco™ analyzers, including melt flow indexers, and rheometers, are recognized for testing the physical, mechanical, and thermal properties of polymers. Offering worldwide support and innovative instruments that span the complete life cycle of a polymer, Dynisco's material analysis solutions range from the analysis of a polymer in the laboratory, to online quality control in production, to processing small quantities of special polymers or composites.



### Scrap Reduction

No matter what stage of the polymer's life cycle, eliminating waste and keeping production levels at peak capacity are crucial to ensuring profitability in today's highly competitive environment. Our goal is to provide objective measurements and high quality testing to improve and speed the development and production of polymers.



### Sustainability

Sustainability is more than just protecting the environment. We want to lead the way to the future and empower you with sensors, controls, and analytical instruments that offer maximum control, reduce downtime, minimize scrap, and promote environmental consciousness.

The ability to feed used plastic into the supply chain to manufacture new materials, with less costs and without compromises in material specifications, is the goal and has to be realized through objective measurements and analysis.



### Return on Investment (ROI)

Many polymer production processes go through numerous transitions as product grade changes are required. The ViscoSensor's rapid response time shows when a process is in transition and when a new grade has achieved stability – meaning the diversion of material can be reduced as process stability can be measured versus predicted. Traditional methods of quality assurance and process control ( i.e. obtain melt flow index data by taking pellet samples and having them analyzed in a lab) may have a leadtime of over an hour!

# Here's what you get when you go Visco

## Capillary Rheology

A capillary viscometer forces material through a small diameter capillary die creating a pressure drop across the die. By controlling the material's shear rate through the die or shear stress across the die, apparent viscosity or melt flow index is obtained. The ViscoSensor uses differential pressure across the capillary die for either a control point for melt flow index measurement or as a measurement point for apparent viscosity calculations.

A wide range of capillary dies are available along with several metering pump choices to fit specific material measurement needs. For example, large length to diameter ratio capillaries can be used to minimize entrance and exit effects of flow.

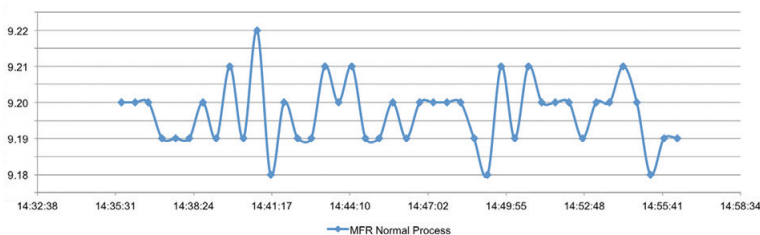


ViscoSensor Head

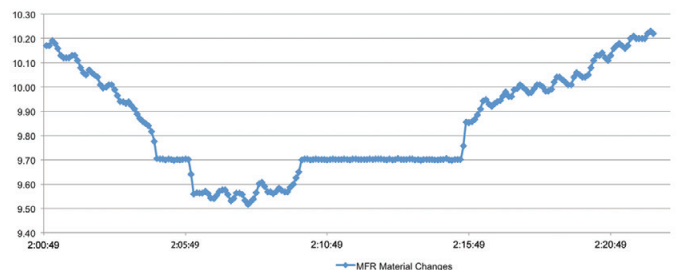
## Minimum Detection Level

Resolution or minimum detection level of a change in material or contamination is an important criteria. The ViscoSensor will detect very small changes in viscosity or melt flow rate of your material. A change of 1 Pa-s or .02 MFR can be seen in measurement data. These changes in measurement can be used to quickly adapt the parameters of your process.

MFR Normal Process—20 Minutes Sample Time 1 Minute



MFR—Process During Material Properties Changes



The above graph shows process readings taken by the ViscoSensor during relatively consistent material processing. With consistent Melt Flow Ratio (MFR), one knows the material as well as molecular weight is homogeneous.

The above graph shows process readings taken by the ViscoSensor during material processing that is in flux. The stock material has fundamentally changed or a contaminant has entered the process. For example, the flux could be a result of a change in molecular weight/branching or a different material grade being mixed in. The process metric was recovered by addressing the cause of the change measured by the ViscoSensor.

## Two modes to meet your application needs

The ViscoSensor can be operated in either a shear stress control mode to monitor melt flow or in a constant shear rate mode to continuously measure apparent viscosity.

## Principals of Operation ViscoSensor system consists of two parts:

### 1. ViscoSensor Head

- Connects directly to the process and samples, conditions, and measures the properties of the resin
- Can be mounted on extruders, reactors, or molten polymer transfer lines in vertical or horizontal orientations.

### 2. ViscoSensor e-RCU and RCU Control Units

- Remotely manages test parameters and provides measured and computed material properties



**Dynisco's e-RCU Performance Simplified**  
Provides simplified rheological data for processors

or



**Dynisco's RCU Ultimate Performance**  
Combines rheological properties of a Laboratory Capillary Rheometer with MFI readings delivered by a Melt Flow Indexer

	Capability	e-RCU	RCU
ANALOG OUTPUTS: 4-20mADC Selectable Software	Melt flow Index	•	•
	Intrinsic Viscosity	•	•
	Relative Viscosity	•	•
	Apparent Viscosity	•	•
	Melt Viscosity	•	•
	Motor Speed (RPM)	–	•
	Vertex Mercury Free Pressure Sensor (2)	•	•
	Differential Pressure	–	•
	Shear Rate	–	•
	Shear Stress	–	•
	Capillary Temperature	–	•
	Valve Block Temperature	–	•
	Auxiliary Temperature	–	•
	Melt Average Temperature (Capillary + Valve Block)	–	•
Capillary Diameter	–	•	
RCU WIRED/AVAILABLE OPTIONS	Carbon Steel	•	–
	Stainless Steel	–	•
	Hazardous Location	–	•
	Non Hazardous Location	•	•
	Custom Configurations	–	•
COMMUNICATIONS	ProfiBus	–	•
	Ethernet Open TCP	•	•
	Ethernet Siemens S7	•	•
	ModBus Ethernet	•	•
	ModBus RTU / 485	–	•



Now comes standard with our Vertex™ Mercury Free Pressure Sensor





## Continuous Monitoring of Material Properties Ensures Consistent Results

### What are the benefits of online rheology measurement?

#### Maximize Extrusion Efficiency

Adjust your parameters to adapt to changing conditions while processing.

#### Decrease Scrap Rate

Process improvement begins with understanding material characteristics and adjusting accordingly.

#### Increase Regrind & Wide-Spec Raw Materials Usage

Use regrind and wide-spec materials with confidence knowing that the finished product is to specification.

Gain a “live” look into your process whether compounding, mixing or producing resin and obtain continuous measurements of melt flow rate or apparent viscosity or intrinsic viscosity directly from the manufacturing process.

Instantly know if material is within specification:

- Continuous “Real-Time” data
- Shear stress and shear rate
- Simple “In The Field” calibration
- Operational temperatures up to 350°C

With the ViscoSensor, melt properties can be measured as a function of stress, strain, time and temperature.

### Applications include:

Successfully monitor the viscosity or melt index of a wide variety of molten polymers including:

**LDPE | LLDPE HDPE | PC | PS | TPE | PET | PA6 | PA66 | PP | EVA | and silicones**

Additionally, IV (Intrinsic Viscosity) of PET in a process can be continuously monitored.

# Advanced Solutions for Plastic Extrusion and Injection

## > SENSORS



## > ANALYZERS



## > INSTRUMENTATION



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 **Dynisco**

*From lab to production, providing a window into the process*