ViscoSensor

On-Line Rheological Measurement

Features

- Attaches to process using a single M18
- Cost effective solution for on-line viscosity or melt index monitoring
- No waste stream, tested sample is returned to process
- On-line ASTM D1238 melt flow rate
- On-line apparent viscosities
- Replaceable capillary
- Compact measuring head for close extruder connection: 8” diameter by 17” length
- Robust and precise pressure transducer for high accuracy
- Simple “in the field” calibration
- Platinum RTD melt temperature sensor immersed in molten stream for accurate test temperature measurement

Description

Specifically designed for the thermoplastics resin industry, the ViscoSensor provides continuous measurements of the melt flow rate or apparent viscosity directly on the manufacturing process. The ViscoSensor system consists of two parts: a Viscosensor, connected directly to the process, which samples, conditions, and measures the melt flow of the resin, and a VCU (ViscoSensor Control Unit) that controls the Viscosensor test parameters (temperature, pressure, rate), provides outputs of computed results, and provides communications to an external distributed control system when required.

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The ViscoSensor

The ViscoSensor employs a stacked pair of metering pumps to isolate it from the process, to direct the molten polymer across a removable capillary, and to pump the molten polymer back into the process. A three wire platinum RTD is used to control and measure the temperature of the molten polymer. Two pressure transducers, mounted directly before and after the die, are used to capture the pressure drop across the capillary. A variable speed servomotor controls polymer flow rate. All sensor signals are collected and transmitted to the VCU. A unique annular transfer line conveys the test sample to and from the instrument.. This transfer design enables the ViscoSensor to be mounted to an existing single pressure port (M18 or equivalent) to simplify the installation process.

ViscoSensor Control Unit

The ViscoSensor Control Unit consists of a CPU, display with keypad, motor speed controller, power supplies and isolated I/O required to control all functions of the ViscoSensor. These electronics are housed in a NEMA 4X enclosure.

Specifications

Performance Characteristics

Melt Flow Index	0.1 – 1500 g/10 min.
Viscosity Range	10 – 10^5 Pa.s
Shear Stress	3 – 800 KPa
Shear Rate	0.1 – 4000 s^{-1} (standard die)
Dies	1 – 11mm 10 to 40:1 L/D
Temp. Range	40 – 350°C
Pressure Range	2 x 105 – 3.5 x 107 Pa
Metering Pump	0.30 cm^3 / RPM (standard)
Pump Speed	3 – 75 RPM, servo motor, vector controlled

Analog Outputs: (4 – 20 mA Standard)

Optional

- Melt Temperature
- Delta-Pressure
- Melt Flow Index
- Apparent Viscosity

Interface Requirements

- Single standard M18 pressure port required
- Other configurations possible
- Minimum polymer supply pressure of 1000 psi for 1.0 MFI material

Measurement and Control Functions

Test Modes

Shear Stress Mode:

Set point: Pressure
Measurement: Melt Flow Index

Shear Rate Mode:

Set point: Pump Speed
Measurement: Apparent Viscosity

Electrical Specification

System Voltage	230 VAC 50/60 Hz
Power	1500 W

ViscoSensor Mechanical Specifications

Weight	35 lbs.
Height	43cm (17 in.)
Diameter	20cm (8 in.)
Mounting Configuration	Vertical (Stand for horizontal)

VCU Specifications

Electrical Cabinet	NEMA 12 (IP 54)
CPU 80188	E-PROM Embedded Application Program
Operator Interface	LCD Display

All dimensions are in centimeters (inches), unless noted otherwise.

Refer to www.dynisco.com for access to Operator Manual and other support documentation.
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