

CMR Series

Continuous Melt Rheometer



Features

- On-line melt flow rate correlated to ASTM D1238
- On-line apparent viscosities
- Data exchange by analog and digital input/outputs
- Customer specified solutions
- Systems for hazardous locations
- Compact measuring head for close extruder connection
- Robust and precise pressure transducer for high accuracy
- A range of metering pump sizes for specific applications
- Simple “in the field” calibration
- Alarm system for malfunctions
- Rugged industrial design

Description

Specifically designed for the thermoplastics resin industry, the Dynisco CMR series can be configured to measure melt flow rate, high/low load melt flow rate, apparent viscosities, or to perform other customer defined tests.

The CMR system consists of two parts: a rheometer head connected directly to the process which samples, conditions, and measures the melt flow of the resin, and an RCU (Rheometer Control Unit) that controls the CMR test parameters (temperature, pressure, rate), and provides outputs of computed results, and communications to an external distributed control system when required.

The Continuous Melt Rheometer

The rheometer samples molten polymer from the process through a heated transfer line. A metering pump then drives the polymer melt through a capillary die of accurate diameter and L/D ratio, at a precisely controlled rate. The pressure drop across the die is measured by a high temperature pressure transducer.

When the system is run at constant pressure (shear stress) and the flow rate is determined, a continuous measurement of the MFR is obtained. A wide range of accurate inter-changeable capillaries provide the system with high resolution and a broad range of capabilities.

Specifications

Performance Characteristics

Melt Flow Index	0.02 – 5000 g/10 min.
Viscosity Range	10 – 10 ⁵ Pas
Shear Stress	150 – 1.5 x10 ⁵ Pa
Shear Rate	1 – 7500 s ⁻¹ (standard die) max. 50,000 s ⁻¹ (special die)
Dies	
Viscosity:	1 – 5mm, 10 to 30:1 L/D
Melt Flow Index:	3.8182:1 L/D
Special Dies:	Upon request
Temp. Range	40 – 350°C
Pressure Range	3 x 10 ⁵ – 3.5 x 10 ⁷ Pa
Metering Pump	0.16 cm ³ / RPM (standard) 0.297 cm ³ / RPM (option) 0.584 cm ³ / RPM (option)
Pump Speed	3 – 75 RPM
Polymer Flow	225 g/hour (average)

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

Temperature control:	3 Heating Zones
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Rheometer Control Unit

The Rheometer Control Unit is contained in a NEMA 4 (IP 54) cabinet that may be located in the control room or on the process floor. Programming of the control functions and output displays are achieved via a local color display with a touch screen interface. The RCU can communicate with a DCS through its analog and serial outputs. The RCU operates independently and will continue its control and analysis functions in the event of a DCS failure.

Options

- PIV process isolation valve
- Stand for RCU
- Heated transfer section
- Modbus, TCP or RS585
- Hazardous location
- Additional I/O
- NEMA 4X

RCU Specifications

Electrical Cabinet	NEMA 4 (IP 54)
CPU	S7-300
Operator Interface	LCD Display

Analog Outputs: (4 – 20 mA Standard)

Melt Flow Index
Apparent Viscosity
Melt temperature
Melt pressure
Pump speed
Temp. pump zone
Temp. die zone

Digital Inputs: (NO/NC dry contacts)

Remote Test ON / OFF (Motor Start / Stop)

Digital Outputs: (NO/NC)

Fault	Shuts down analyzer and requires manual restart
Warning	Information / Deviation alarms, analyzer continues operation

Electrical Specification

System Voltage	220-240V Single Phase 50/60 Hz
Power	2000 W (max)