Why measure viscosity in-line?

Why Measure Viscosity In-Line?

Practical application of viscosity measurement data often leads to the need for in-process control of viscosity. The installation of viscosity control equipment on a process can provide a level of control achievable by no other means. Variations in viscosity are detected and corrected instantly before they can negatively affect product quality. Real-time viscosity control can reduce downtime and material waste by ensuring that the process is operating within its specified viscosity parameters. In many cases, the savings from increased efficiency can pay back the cost of the viscometer in only a few months.

Why Choose Brookfield?

Brookfield builds its Process Control Viscometers to the same high standards of performance and value as its Laboratory Viscometers. Particular attention has been devoted to making these instruments rugged and easy to maintain for long service in demanding industrial environments. The process measurement technologies and variations available from Brookfield allow any fluid to be properly monitored to meet the customers need.

Questions to Consider

1. What is the viscosity range of your material?
2. Is your material Newtonian, Dilatant, Non-Newtonian, Thixotropic or Plastic?
3. What is the minimum, maximum and average pressure requirement of your application?
4. What is the minimum, maximum and average temperature of your application?
5. What is the minimum, maximum and average flow rate of your application?
6. Where in production would you like the viscometer: in-line, on the top of the tank or on the side of the tank?
7. What electrical code requirements do you have:
   - NEMA 12 (general purpose—indoor)
   - NEMA 4 (watertight/dust tight for indoor/outdoor use)
   - NEMA 7 (explosion proof—Class 1, Div. 1&2, Group D)
   - ATEX (explosion proof—Code: EE x d 11B T6)

The above parameters may eliminate some of the instrument models because, for example, the viscosity is higher than the range of the instrument or outside of the pressure rating of the instrument. In many cases, more than one instrument may be applicable.

Please allow us to assist you in choosing the best viscosity control system for your application.
AST-100™ Viscosity Controller
the compact AST-100 is the world’s most innovative means of viscosity control

No moving parts to wear, bind or contact process materials and no narrow gaps to trap product

Simple, clean-in-place design rugged 316 stainless steel construction

Continuous, reliable output 4-20 mA, RS232 or RS485

Saves you money while increasing your production

Optional configurations food grade and explosion-proof designs (Nema 4, Nema 7, ATEX or Sanitary Configurations)

The AST-100 is a versatile instrument that is excellent for customers who are looking for viscosity control (i.e. maintaining the viscosity of the product) in their process more than the measurement of an exact number (for example, 23.5 cP). It is easy to install, cleans-in-place, and has no moving parts, so maintenance is minimal. With available options it is suitable for explosion-proof applications or 3A food-grade applications as well.
Typical Installation: AST-100TSY (115 or 230V)

Note:
1. Power in cord may be removed and power may be brought directly into the terminal board located inside of the controller enclosure.

Typical Installation: AST-100FTSY

AST-101EXP
Explosion-Proof Unit

AST-100FTSY
Sanitary Unit
AST-100™ Optional Configurations

**Flange Mount**
Designs are available to allow direct mounting onto a process tank through a sidewall flange.

**Immersion Probe**
Allows for insertion into the tank from above.

**Standard Sensor**
Option is an economically priced, sensor transmitter design for simple equipment integration.

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**Ranges & Specifications**

**Measurement Type:** Torsionally oscillating probe

**Viscosity Range:** 1-12500 cST using an NIST traceable, Newtonian fluid measured at 25°C

**Temperature (fluid):** -20° to +200°C (-4° to 392°F)

**Pressure Range:** Vacuum to 200 psig maximum,

**Repeatability and Stability:** ±1% of the Reading

**Power Requirements:** 115 or 230VAC (auto set), 50 or 60Hz

**Connections:**
- AST-100TSY: 1” male NPT standard (1½” tri-clamp or 3A design, optional)
- AST-100FTSY: 2½” tri-clamp 3A design inlet, 2” tri-clamp outlet

**Wetted Surfaces:** 316L stainless steel

**Sensor O-Ring:** Isolast for probe, Viton for chamber housing (EDPM or Kalrez®, optional on AST-100TSY)

**Optional Specifications:**
- Sanitary 3A design
- Explosion-proof design Class 1, Division 1 Groups C&D FM and ATEX Approved
- pH control
- Probe or flange mounting
- 24V DC power
- >200 psi pressure design
AST-100™ Controllers

AST-310SY Process Viscosity Controller

The AST-310SY is designed for use with the Brookfield AST-100TSY system to control viscosity and temperature, interlock with other process devices, and accurately control fluid viscosity in a variety of industrial applications.

The AST-310SY is a precise, programmable controller with timed dosing intervals. Its intuitive screen layout allows for quick selection of setup and menu items. At a glance, set point and alarm status are displayed as are viscosity in cP, mPa•s, cSt or cup-seconds, current pH value and temperature in °C or °F.

ADDITIONAL FEATURES INCLUDE:

- Touch Screen Convenience
- Viscosity and pH data trending
- pH and pump interlock
- Multi-level password protection
- Viscosity high/low alarms
- Control of viscosity set point
- Ethernet output

AST-400SY Process Viscosity Controller

The AST-400SY is designed for use with the Brookfield AST-100TSY system to monitor viscosity, display temperature, interlock with other process devices, and accurately control fluid viscosity in a variety of industrial applications.

The AST-400SY is a precise, 8-station programmable controller with individual station timed dosing intervals. Its intuitive main screen layout allows for quick individual station selection of setup and menu items. At a glance, set point and alarm status are displayed as are viscosity in cP, mPa•s, cSt or cup-seconds, current pH value, and temperature in °C or °F for all stations.

ADDITIONAL FEATURES INCLUDE:

- Touch Screen Convenience
- Viscosity and pH data trending
- pH and pump interlock
- Multi-level password protection
- Viscosity high/low alarms
- Main screen job run display
- Standby All/Auto toggle button
- Job Recipe/Auto/Load/Save selection button
- Unit-to-unit toggle button to access specific unit detail screen
- Ethernet output
TT-100™ Viscometer
for in-line systems applications

Continuous linear output signal
(4-20 mA)

Concentric cylinder geometry for
viscosity values at defined shear
rates using couette rheology

Capable of a wide range of
pressures, temperatures,
viscosities, flow and shear rates

Can be operated at shear rates of
511 sec⁻¹ for American Petroleum
Institute (TT-100)

Easy to check and maintain
calibration

The TT-100 series is the perfect system for
defined shear in-line measurement systems.
With a variety of configurations available, it
is adaptable for multiple applications and
meets many industry standards due to its
highly scientific measurement technique.
**Typical Installation**

**Notes:**
1. Install viscometer in clean, vibration free, readily accessible area. To avoid air or gas entrapment, preferred installation is vertical bypass line. Allow specified clearance for removal of viscometer endcaps.
2. Provide a minimum of 4-feet of straight pipe to viscometer inlet to minimize turbulent flow caused by elbow.

**Optional Configurations**

Optional configurations include 500 psi, 500°F construction, ATEX, NEMA 7 explosion-proof (FM approved), 1", 1½", 2" threaded or flanged inlet and outlet fittings, special viscosity ranges or shear rates, 24V DC operations, readout indicator and variable speed motor.

**TT-100VS™**

Optional variable speed instrument for multiple shear rates

**STT-100VS™**

Sanitary Viscometer
Conforms to 3-A sanitary conditions and has clean-in-place (CIP) technology (STT-100)
3" or 4" tri-clamp connections
Other options available

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**Ranges & Specifications**

**Measurement Type:** Concentric Cylinder

**Viscosity Range:**
- TT-100: 10 to 500,000 cP
- STT-100: 350 to 250,000 cP

**Shear Rates:**
- TT-100: 10 to 1,000 sec\(^{-1}\)
- STT-100: 7.5 to 225 sec\(^{-1}\)

**Temperature (fluid):**
- TT-100: -40° to +300°F (options to 500°F)

**Pressure Range:** 200 psig (maximum) (options to 1000 psig)

**Repeatability:** ±0.5% of span, ±1° Full Scale

**Power Requirements:** 115/230VAC, 50 or 60Hz, 100W

**Maximum Flow Rate:** TT-100: 20 gpm (maximum)

**Wetted Surfaces:** 316L stainless steel

**Output Signal:** 4-20 mA

**Process Connections:** STT-100: 3-inch, 4-inch Tri Clamp

**Electrical Code:** NEMA 4, NEMA 7 or ATEX option