

The viscosity analyser catalogue



On-line viscosity measurement solutions

As a highly sensitive indicator of change in product quality, viscosity is increasingly recognised as one of the most important industrial process measurement parameters.

Recognised as specialists in the manufacture of process viscosity transmitters and complete viscosity control systems (skids), Solartron products are now used in applications where previously only laboratory measurements could be made. These products are now replacing many existing technologies such as:

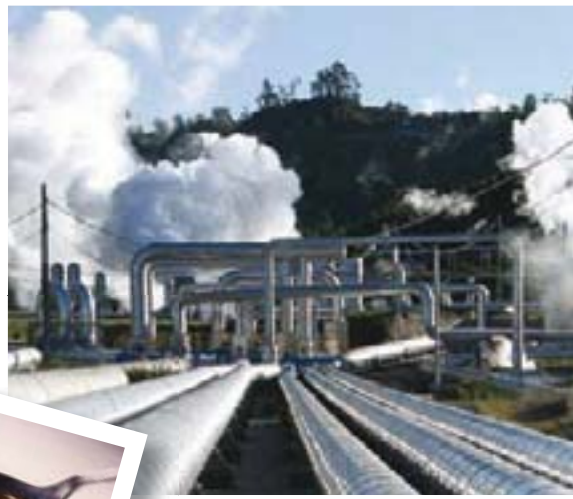
- Process capillary
- Falling ball
- Orifice
- Vibrational sensors

The Solartron viscosity analyser range incorporates both vibrational and rotational techniques so that most process fluids can be measured, even under difficult conditions such as marine environments. These measurement technologies are generally used for quality and process control applications in production environments such as blending, coating and spraying.

The concept of viscosity

The concept of viscosity can be simply defined as a fluid's resistance to an applied shear force, ie its resistance to flow. When this resistance is a constant irrespective of the shear force (under constant temperature and pressure conditions), then this type of fluid is called 'a Newtonian fluid' – an example being water. Fluids that change their resistance to flow when having a shear force applied to them are defined as being 'a non-Newtonian fluid' – an example being tomato ketchup. Understanding the difference between these two is a critical factor in determining the correct viscosity measurement technology for a given application.

Viscosity can be measured in two forms; dynamic or kinematic. Dynamic (or absolute) viscosity is generally measured in milli-Pascal seconds (mPas) or centi-Poise (cP), whilst kinematic viscosity is measured in centi-Stokes (cSt). The decision of which one to be used is usually made according to industry, with an example being in the hydrocarbon market where kinematic viscosity is considered to be the more complete process control parameter as it encompasses the measurement of the fluid's viscosity and density.



...for hydrocarbon & process applications

7827 digital viscometer

A unique digital process analyser for applications requiring continuous online liquid viscosity measurement in pipelines or static tanks. In addition to viscosity, the 7827 digital viscometer is able to measure density and temperature simultaneously, giving further advanced viscosity calculations.

- Dynamic and kinematic viscosity
- Referred viscosity and density measurements
- More reliable: no moving parts or seals
- Can be inserted into pipes or tanks
- More resistant to clogging and debris
- Ideal for Newtonian fluids
- Good repeatability
- EExd approval
- HFO, fuel oil, blending, turbine correction

Covimat rotational viscometer

Our range of Covimat rotational viscometers are variable speed and offer advantages where the fluid to be measured exhibits non-Newtonian characteristics, and where absolute accuracy is required. The Covimat measuring head is explosion proof, and is magnetically coupled to the measurement cell.

- Integral 4-20mA output
- Referred viscosity measurement (when used with a Solartron 795x series signal converter)
- Magnetic coupling: No moving seals
- Can be inserted into pipes and tanks
- Ideal for non-Newtonian fluids
- Good repeatability
- Printing inks, paint, coatings, pharmaceutical

7829 Visconic industrial viscosity transmitter

The Solartron 7829 Visconic viscosity transmitter is used for the measurement and control of on-line process viscosity. It simultaneously measures real-time viscosity, density and temperature and its head mounted electronics can be custom configured. Designed for industrial, non OEM applications, Visconic serves all major markets.

- Dynamic and kinematic viscosity
- Line and referred density measurements
- No moving parts or seals
- Can be inserted into pipes or tanks
- More resistant to clogging and debris
- Ideal for Newtonian fluids
- Good repeatability
- User configurable 4-20mA output
- MODBUS output of all parameters
- Material options & process connections
- PC-based configuration tool

7829 Viscomaster industrial viscosity transmitter

7829 Viscomaster series viscosity transmitters are used for the measurement and control of heavy fuel oil (HFO) in marine and power industry applications.

In similar fashion to the 7829 Visconic viscosity transmitter, the Viscomaster incorporates a stand-alone electronics module with Modbus RS485 communications and two configurable analog outputs.

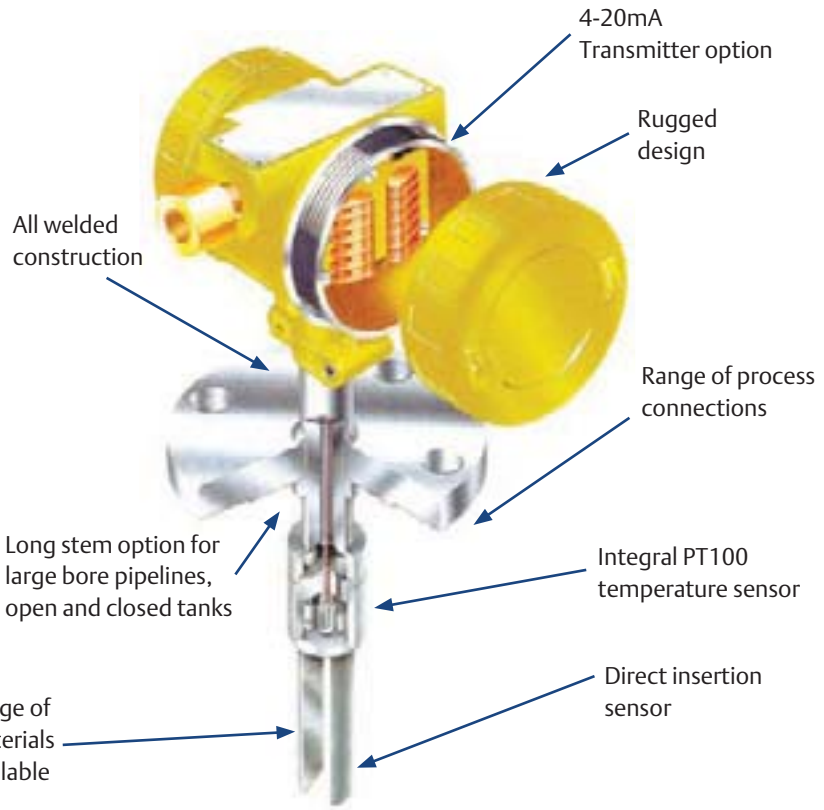
- Dynamic and kinematic viscosity
- Accurate line and referred viscosity measurement
- No moving parts or seals
- Can be inserted into in-line or capillary viscometer installations
- More resistant to clogging and debris
- Good repeatability
- Fuel booster modules
- Turbine oil viscosity control
- Retro-fit of existing technology

Typical applications

- Cellulose acetate coating
- Vinyl coating solvent addition
- Crude oil viscosity control
- Turbine flowmeter correction
- Evaporator control in fish oil processing
- HFO heater control to burners and engines
- Interface detection of chemical batch production



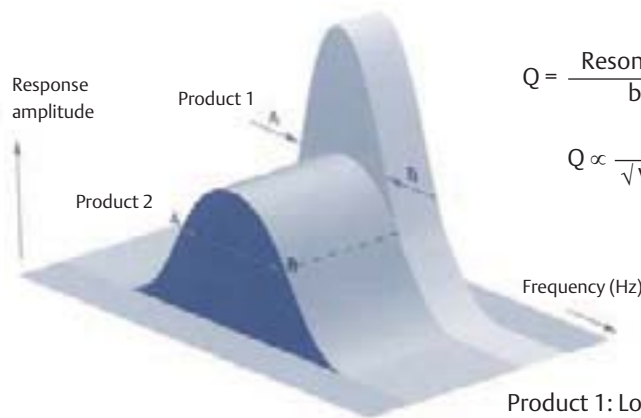
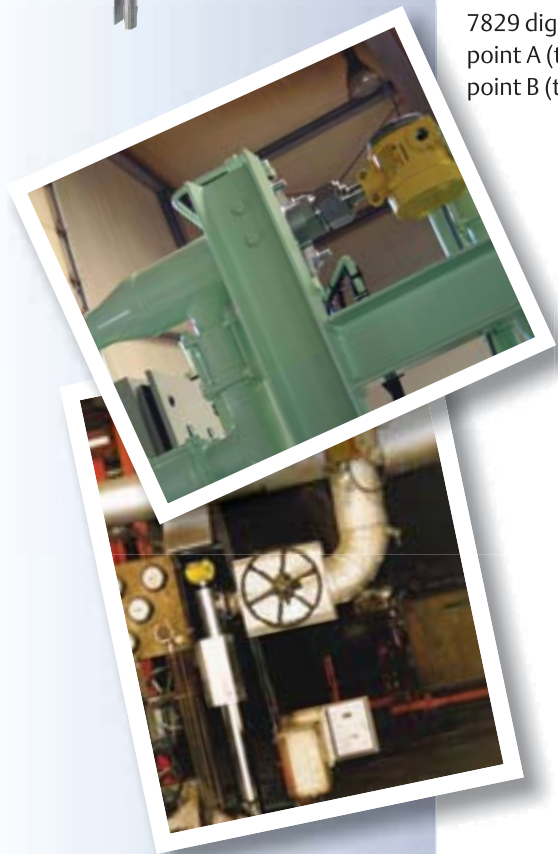
Principle of operation Fork viscometers



The sensor is a simple tuning fork maintained in vibration electronically. The density is a function of the resonant frequency, the viscosity is a function of the bandwidth.

7829 digitally measures the frequency at a point A (the lower -3db point) and then at point B (the upper -3db point) - see diagram.

From these two measurements the 7829 can calculate the bandwidth (B-A), resonant frequency $((A+B)/2)$ and hence the quality factor (resonant frequency/bandwidth), to give digitally determined values of the density and viscosity for the fluid.



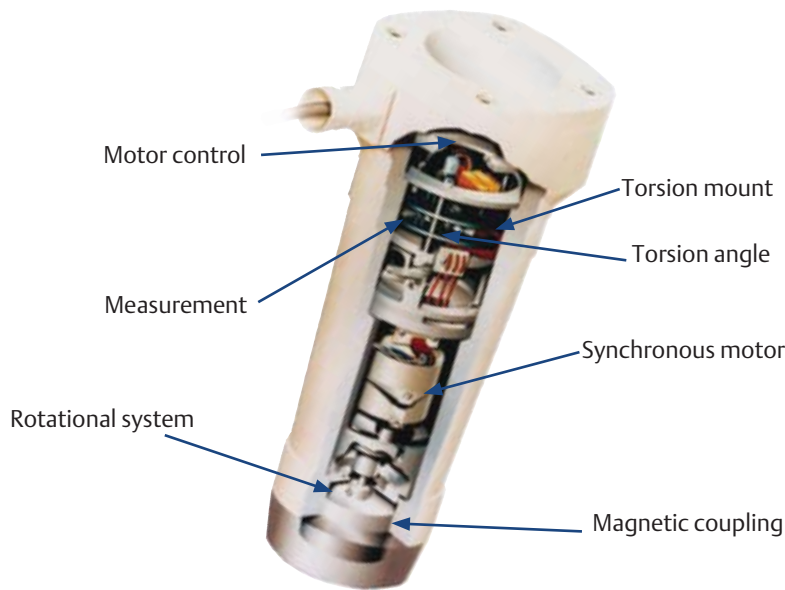
$$Q = \frac{\text{Resonant frequency}}{\text{bandwidth}}$$

$$Q \propto \frac{1}{\sqrt{\text{Viscosity}}}$$

Product 1: Low viscosity
Product 2: High viscosity

Principle of operation

Covimat rotational viscometers

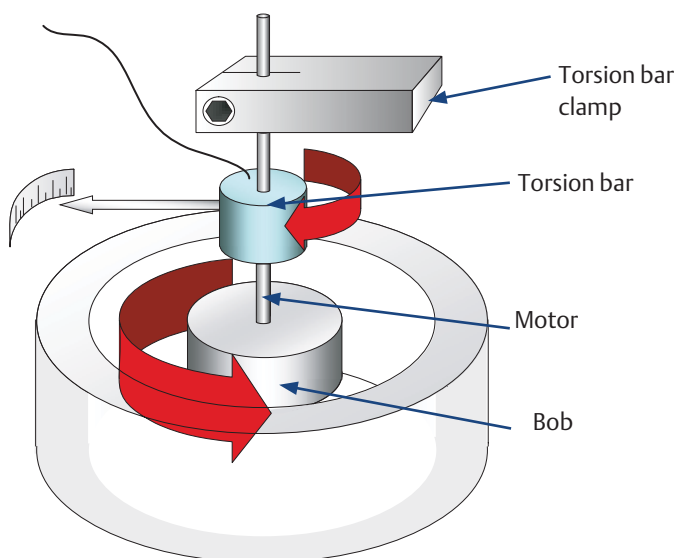


The Covimat measures viscosity by the well proven rotational principle, allowing a direct comparison with laboratory results. A rotating bob is held in a stationary measurement cell and is driven by a motor in the metering head at a constant speed. The drive is coupled in the metering head via a torsion element.

Typical instruments of this type use a mechanical coupling between the motor and the measurement bob, however, this leads to sealing problems in most on-line applications.

The Covimat uses a unique magnetic coupling between the measurement bob and the motor removing any sealing problems altogether and gives an accurate, reliable result.

The viscosity is measured by a torsion bar connected to the motor housing. As the fluid viscosity increases, the resistance to the bob's rotation increases, producing a twist on the torsion bar. This twist is then measured inductively and when combined with the rotational speed and measurement bob geometry, a value of viscosity is produced.



Viscosity product selector

the successful measurement of viscosity depends upon choosing the right technology for the fluid to be measured. The product selector chart below is designed as a guide to assist in this process.

	7827	7829 Visconic	7829 Viscomaster	7829 Viscomaster Dynamic	Covimat
Dynamic Viscosity	✓	✓	✓	✓	✓
Kinematic Viscosity	✓	✓	✓	✓	
Temperature Measurement	✓	✓	✓	✓	Option
Integrated Density Measurement	✓	✓	✓		
Referred Kinematic Viscosity	✓		✓		Option
Referred Density Measurement	✓	✓	✓		
Sensor Type	Fork	Fork	Fork	Fork	Rotational
Shear Rate	Fixed	Fixed	Fixed	Fixed	Variable
Long Stem Version	✓	✓			
Mounting Arrangement	Bypass/ Tank/Inline	Bypass/ Tank/Inline	Bypass/ Inline	Bypass/ Inline	Bypass/ Tank/Inline
Transmitter Version		✓	✓	✓	✓
Analogue Outputs	Option	2	2	2	1
Measurable Liquid Types	Refined Products & Crude Oil	Refined Products & Crude Oil	Heavy Fuel Oil	Heavy Fuel Oil	All
Principle Markets	Industrial	Industrial	Marine/Power	Marine/Power	Industrial
795x Signal Converter Required	✓				Option

Signal converters

The 795x family of signal converters are the perfect complement for all our frequency output density transducers, enabling the engineer to create highly flexible measurement systems which are accurate, easy to set up and use, and interface simply with process and plant systems.

They are easy-to-use units which will process signals from Solartron viscosity transducers along with live inputs of temperature and pressure. Calculations within the converter include transducer correction and calculation of line and referred viscosity and density as well as ignition index, molecular weight and viscosity index.

They boast a unique architecture, based on standard hardware.

Features

- High integrity and reliability
- Maximum flexibility
- Interchangeable platforms
- Greater cost efficiency
- Optimised user interface
- Easier communications

Typical 795x calculations:

- Line viscosity
- Referred viscosity
- Line density
- Referred density



ADView diagnostic tool

Windows based ADView allows the transmitter series of viscometers to be configured using the RS485 communications if desired. For example, the user can change the span and bias of the 4-20mA output.

ADView also provides full diagnostic access to all measured and calculated parameters, and allows the storage of the unique sensor configuration to disc.

ADView is installed on a PC and interacts with the density transmitters through one of the PC's standard serial (RS-232) ports.

ADView provides many useful facilities, such as:

- Setting up serial link to communicate with the density transmitter
- Configuring the density transmitter
- Displaying data in real time, or as a graph

Data logging of parameters is also possible including logging several density transmitters linked together by multi-drop communications.

Download from www.mobrey.com/downloads

- Logging data to a file
- Verifying correct operation of the system, and diagnosing faults
- Loading or storing Modbus register values
- Read/write to individual Modbus registers



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