

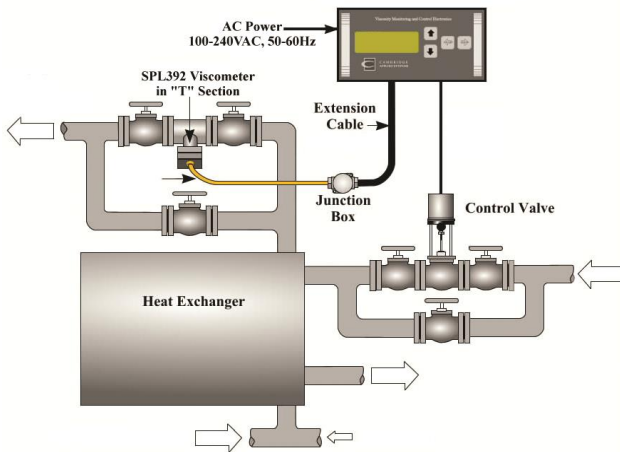
Controlling HFO Viscosity Using the VISCOpro 2000

- **Monitor viscosity and temperature of HFO**
- **Control of HFO temperature to obtain optimal viscosity for combustion**

Keywords: Viscosity, Viscosity control, HFO viscosity, Combustion Control, VISCOpro

INTRODUCTION

Cambridge Viscosity's VISCOpro2000, with HFO firmware, is the only stand-alone viscometer system designed specifically for fuel oil combustion applications. The system provides the viscosity control necessary to achieve efficient combustion of fuels such as HFO, Waste Oil, blended Natural byproducts and even Gas Turbine liquid fuel at extreme low temperatures. The VISCOpro 2000 is a rugged and reliable system that is easy to install and operate.



The VISCOpro 2000 system incorporates a rugged, all 316L stainless steel sensor and sophisticated, yet easy to use electronics to control fuel oil viscosity.

Cambridge Viscosity sensor models come in both threaded and flanged styles so the system can be adapted for use in any existing or new fuel system. The insertion point is generally located in a bypass arrangement (see Fig. 1) to facilitate ease of service. A range of "Tee" pieces (150#-600# ANSI flanges) are available for fast and low cost installation.

The VISCOpro processor can be installed local to the sensor or in a control room panel. The intuitive interface allows users to change set points, configure alarms and access diagnostic information. Analog and serial outputs provide data on alarms, viscosity, temperature and temperature compensated viscosity. A key feature for fuel systems is the "Failsafe" mode which allows the VISCOpro system to revert to temperature control in the unlikely event that the viscosity signal should fail.

Operation is straightforward and easy. The user simply sets the desired control set-point via the main menu and selects the Monitor and Control mode. The VISCOpro will take care of the rest.

How It Works

The viscometer's sensor is installed in a fuel line bypass after the heat exchanger where it monitors the viscosity of the fuel headed to the burners. Should the viscosity be too high or too low for optimal combustion, the VISCOpro 2000 will regulate the steam control valve on the heat exchanger to hit the desired viscosity target. Generally the viscometer's analog control channel is wired directly to the control valve actuator, but other solutions are available, such as an I to P transducer for areas where pneumatic actuators are used.

Testing

The graph shown is an example of real time viscosity control of #6 Fuel Oil (FO) in a steam generating system. The graph illustrates just how severely the operating temperature can be affected by varying fuel viscosity. The case in point was a result of changing over from one storage tank to another. The graph illustrates the transition from a *high* viscosity fuel to a *low* viscosity fuel can affect operating temperature. as the *high* viscosity fuel oil is burned the temperature increases to maintain the viscosity set point required. Notice that the operating temperature rose more than 30°F in order to maintain the set point of 30 cSt.

Next the fuel is changed over to the lower viscosity FO causing a drop in temperature to maintain the required set point. Notice that the operating temperature dropped more than 60°F, in less than 24 hours, in order to maintain the set point of 30 cSt. Finally, the system is burning only the *low* viscosity fuel oil, as illustrated by a stable and lower operating temperature required to maintain the set point. Note that the effect on operating temperature would have been much greater if the set point were not lowered to 26 cSt in order to prevent a temperature low enough to cause high NOX values.

Reliability

The VISCOpro 2000 system incorporates a rugged, all 316L stainless steel sensor and sophisticated, yet easy to use electronics to control fuel oil viscosity at the proper temperature for optimal combustion.



Increase Profitability

Maintaining complete combustion delivers significant cost savings throughout the plant with better fuel efficiency, reduced emissions and lower maintenance for all components in the combustion cycle (instrumentation, fire-box refractory, burner nozzles, boiler tubes and emission reduction systems.)

