AQUAMETRO
OIL & MARINE

VISCOSITY CONTROL SYSTEM (VCS)

Viscosity Measurement & Management

Viscosity Control System

Viscosity Systems

Onboard ships, the importance of viscosity measurement cannot be overstated as viscosity plays a crucial role in various aspects of ship operations, safety, and efficiency.

Viscosity measurement is vital in the monitoring and maintenance of fuel quality. Ships rely on different types of fuels to power their engines. The viscosity of these fuels directly affects their combustion efficiency, performance, and emissions.

Overall, onboard viscosity measurement is a critical tool for ship operators. By continuously monitoring the viscosity of the fuel, ship operators can ensure that the fuel being used is within the recommended range.

It enables them to make informed decisions regarding fuel blending, preheating, and treatment processes to ensure smooth engine operation and prevent issues like clogging or incomplete combustion and thus excessive fuel consumption, and environmental pollution.

The Aquametro Viscosity Control System (VCS) is a system for new buildings or retrofit projects in marine applications and stationary energy plants. It is suitable for standard as well as for alternative fuel applications. Different communication interfaces to external systems, such as ship automation systems, are available.

System Overview

The Aquametro Viscosity Control System (VCS) consists of a Viscomaster viscosity / temperature sensor, a VCS pipe adapter, a viscosity controller and a VCS motor control valve.

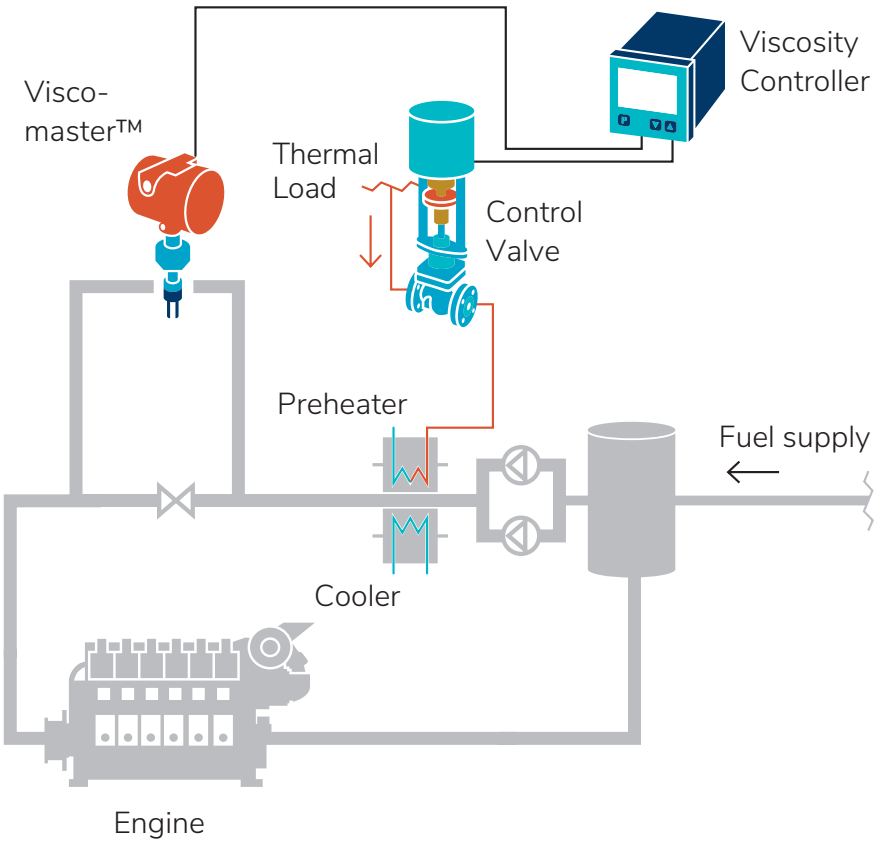
The Viscomaster reliably measures the main viscosity, the temperature and optionally the density. The viscosity controller controls the setting of the thermal control valve depending on process or setting values of the viscosity or temperature of the fuel. The electrical actuator of the thermal control valve regulates the thermal load for the pre-heating process of the fuel used.

Features:

- On-line real-time kinematic viscosity
- Monitor and control fuel viscosity
- Minimum maintenance
- High accuracy
- Simple to use
- Plug & play installation

Benefits:

- Optimize combustion efficiency, fuel consumption
- Precalibrated, preconfigured system
- No calibration in operation process needed
- Optimum combustion efficiency
- Optimal fuel consumption
- Reduced maintenance required
- Prevention of engine damage



System Components

Viscosity Sensor

The Aquametro Oil & Marine Viscomaster™ Dynamic transmitter is a major innovation in the measurement of all types of fuel oils that supply engines, turbines and burners. An optional display is able to show the measured values viscosity, temperature and optional density.

Viscomaster™ Dynamic
2 x 4-20 mA analog outputs: » Dynamic/kinematic viscosity » Temperature » Density measurement (optional) » No need for external 4-20 mA interface box » Simple wiring » Installed in different customized inline adapter pipes
Modbus output: » For all parameters, including calculated density at operating temperature and calculated kinematic viscosity at operating temperature
Stable and accurate in-line measurement: » True measurement enables the correct calculation of fuel mass » True kinematic viscosity measurement
Robust design for marine environments: » Unaffected by vibration » No moving parts » Maintenance free - low cost of ownership » Dirt/Asphaltene resistant - DLC coated tines for asphaltene-rich fuels » 316L Stainless steel wetted parts » 1.5” Cone seat fitting, leak-tight metal to metal seal
Simple Installation: » Compact design » Standard & customer specific installations available
Vibrating fork principle: » Proven design » Many years of experience in viscosity measurement » Reliable, stable & accurate » Factory calibrated
Internal PT100: » No need for external temperature sensor
Retrofit kits available: » Easy replacement of existing viscometer technologies » No need to change pipework/system design

Viscosity Controller

Viscosity Controller VC312	Viscosity Controller VC322	Viscosity Controller VC622
» Control function: - Three-point-step control	» Control function: - Three-point-step control	» Control function: - Three-point-step control - Continuous control
» Relay outputs: - 2 x step control - 1 x alarm relay (common alarm)	» Relay outputs: - 2 x step control - 1 x alarm relay (viscosity limit) - 1 x alarm relay (temperature limit)	» Relay outputs: - 2 x step control - 1 x alarm relay (viscosity limit) - 1 x alarm relay (temperature limit)
» Analogue outputs: - 2 (viscosity / temperature)	» Analogue outputs: - 2 (viscosity / temperature)	» Analogue outputs - 2 (viscosity / temperature) - 1 (continuous control)
» Switchable control parameter (viscosity / temperature)	» Switchable control parameter (viscosity / temperature)	» Switchable control parameter (viscosity / temperature)
» Displayed values: viscosity / temperature	» Displayed values: viscosity / temperature	» Displayed values: viscosity / temperature, feedback position
		» Measured values can be displayed as diagram
		» 24 h intern logging; external logging via USB drive

VCS Motor Control Valve

VCS Motor Control Valve

Available versions:
- Three-point-step control valve
- Continuous position control valve (optional)

Flange size:
- DN 15 to 50 (K_{vs} value: DN15: 1.6 m^3/h / DN50: 40 m^3/h)
- JIS 15 to 50

Nominal pressure:
- PN16 - PN40

Positioning ratio:
- 50:1

Leakage:
- < 0.01% of K_{vs} value

Media temperature:
- up to 450 °C

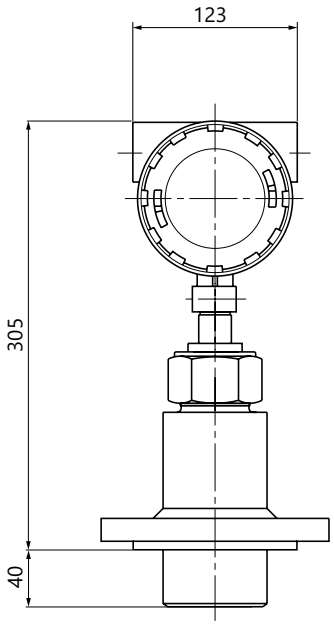
Spindle sealing:
- spring-loaded PTFE-V-ring unit for media temperatures up to 250°C (optional graphite-packing sealing)

Electrical actuator:
- With manual emergency control
- Thrust: 2000 N
- Optional: 4000 N

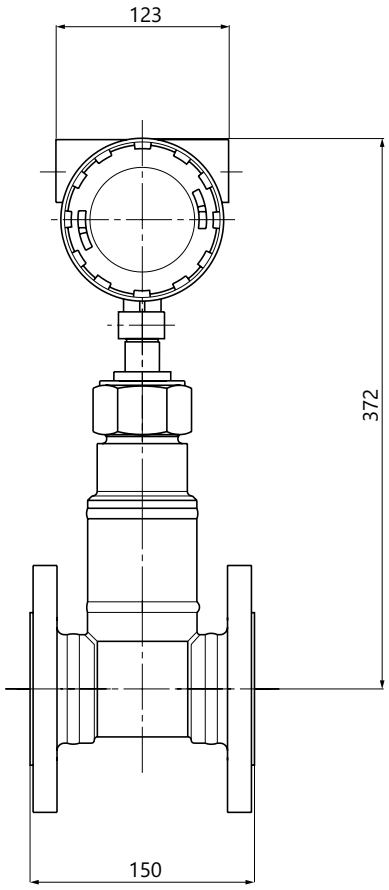
Power supply:
- 230 VAC / 50 to 60 Hz
- Optional: 24 VDC

Dimensions

Viscomaster™ in capillary adapter

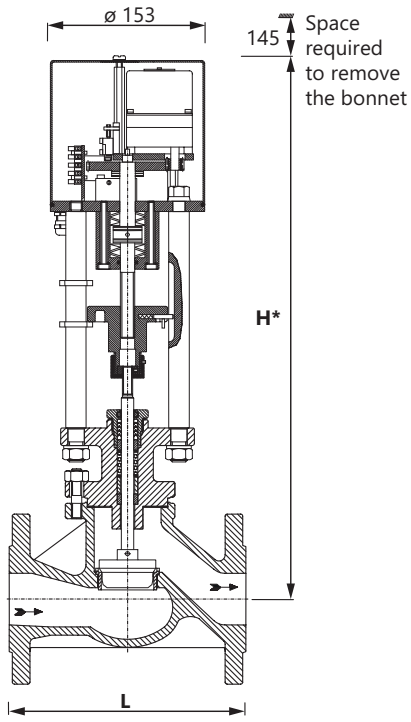


Viscomaster™ in In-line adapter



All dimensions in mm

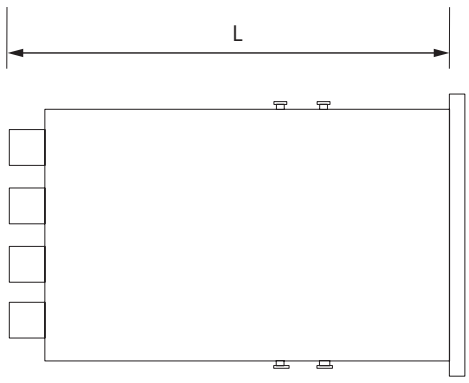
Thermal control valve

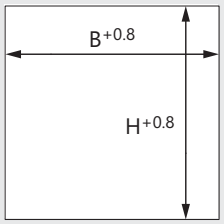


DN	15	20	25	32	40	50
Height H*	491	505	499	506	511	513
Length L	130	150	160	180	200	230
Weight kg	14	15	16	18	19	21

* = add. 45 mm for actuators with continuous position control

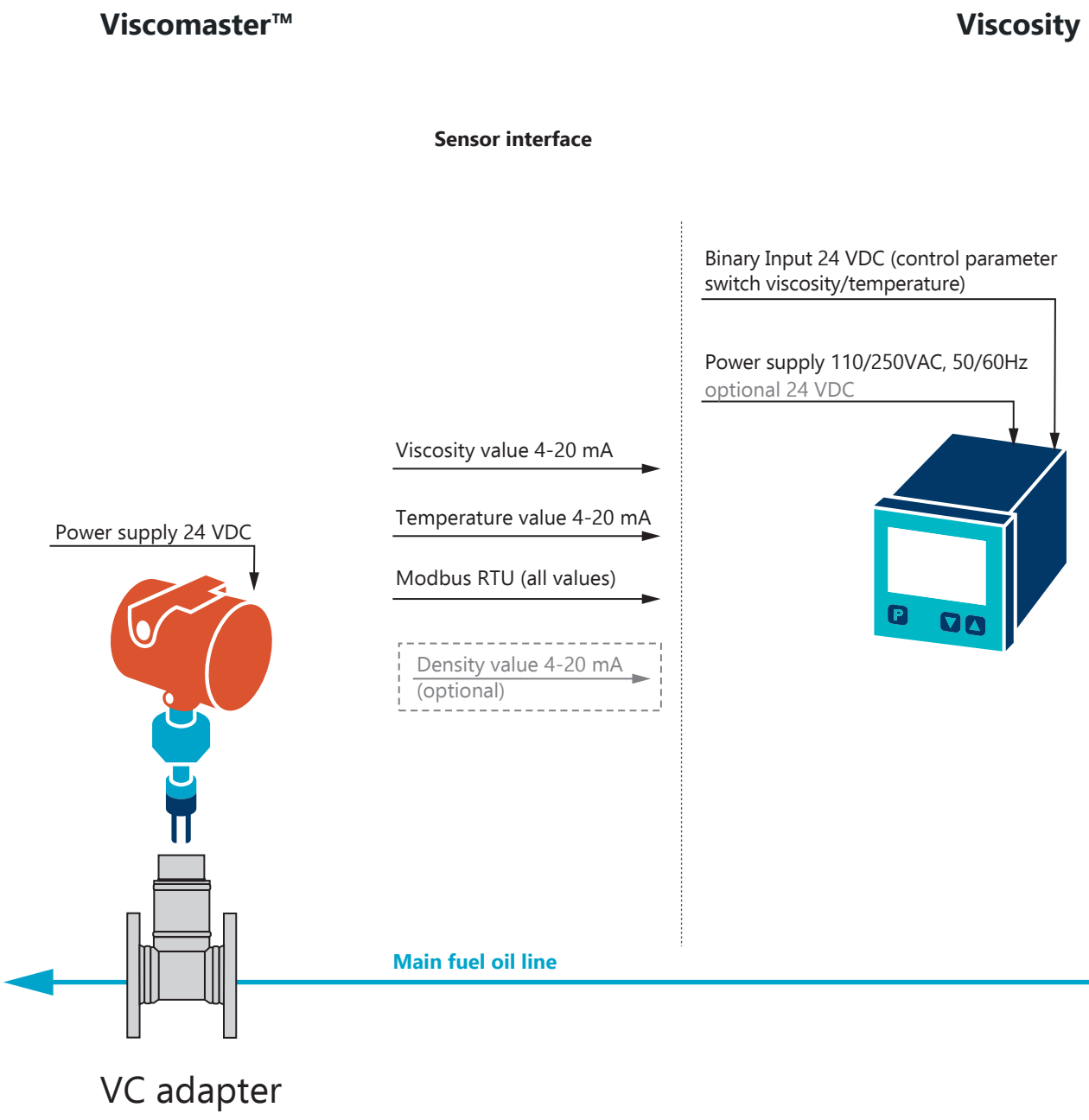
Viscosity Controller





L= 150 mm, B= 92 mm, H= 92 mm

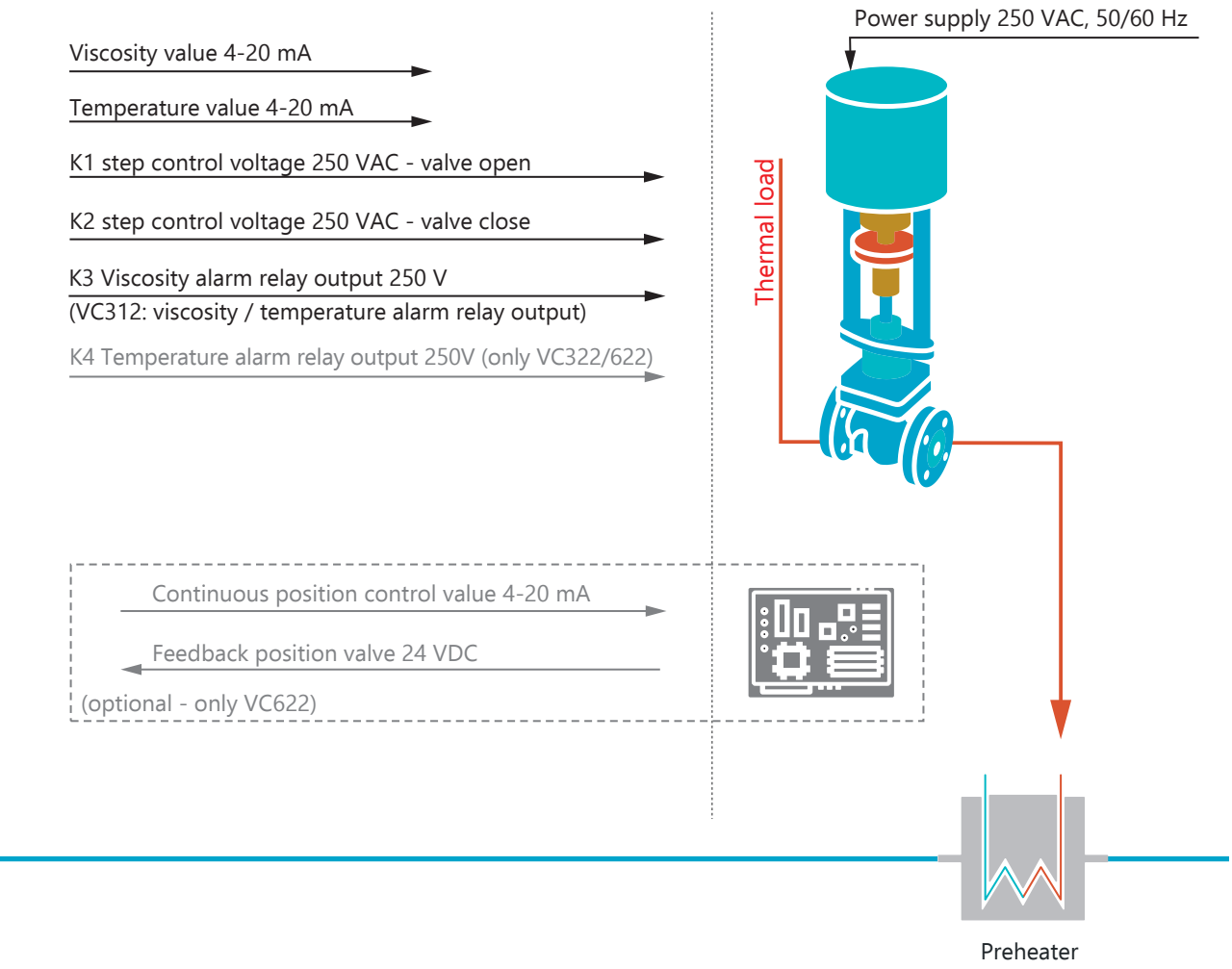
System Configuration

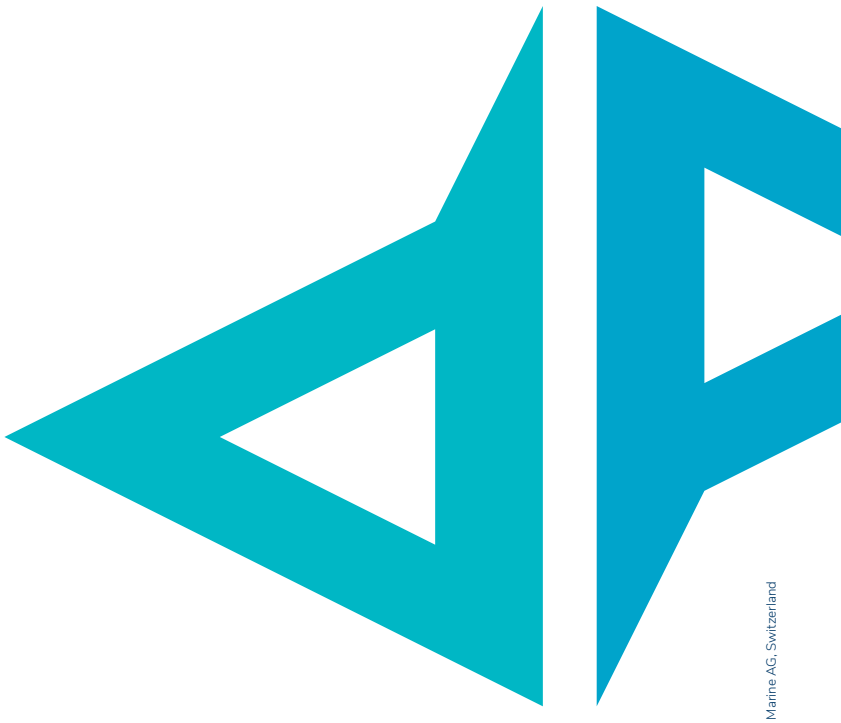


Controller

Control Valve

Controller interface





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