MARIMEX

We measure Viscosity

The Company

Marimex Industries Corp. was founded in Canada in 1984. Until 1992 Marimex represented viscometers besides other process analytical instruments. 1993 Marimex started concentrating its efforts on process viscometers and expanded operations into Europe. Based on the expanding market share Marimex Industries GmbH was started in Germany in 1996.

Marimex manufactures torsional motion viscometers in Canada and Germany. This provides an optimal worldwide availability. Both production facilities follow a common quality assurance protocol.

With many successful installations in chemical, petrochemical, pharmaceutical and food applications, we have proven to be a reliable and safe partner to our customers. Many years of experience with process viscosity applications help us to analyze the most difficult and demanding applications. Together with our customers we determine the measurement requirement and work on a constructive solution for the application. The selected instrument configuration will assure quick and effective results for the project.

If process parameters change, we are ready to support our customers by reevaluating the application based on the new parameters. This enables the current installation of the instrument to be optimized.

Continually increasing requirements are used as an opportunity to improve our existing instrumentation. We are closely monitoring customer demands and consider them as part of our continuing development.

Sometimes special solutions are required for special applications. Marimex is ready to evaluate such requirements with its customers and develop solutions for such applications. Long-term requirements are met, by working with universities and research institutes.

Exclusive, local representatives in many countries provide direct sales and service support to customers in the global market.

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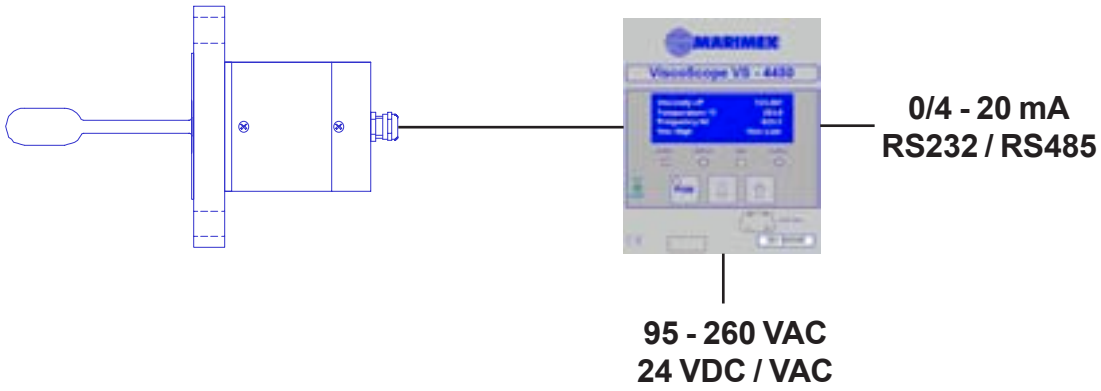
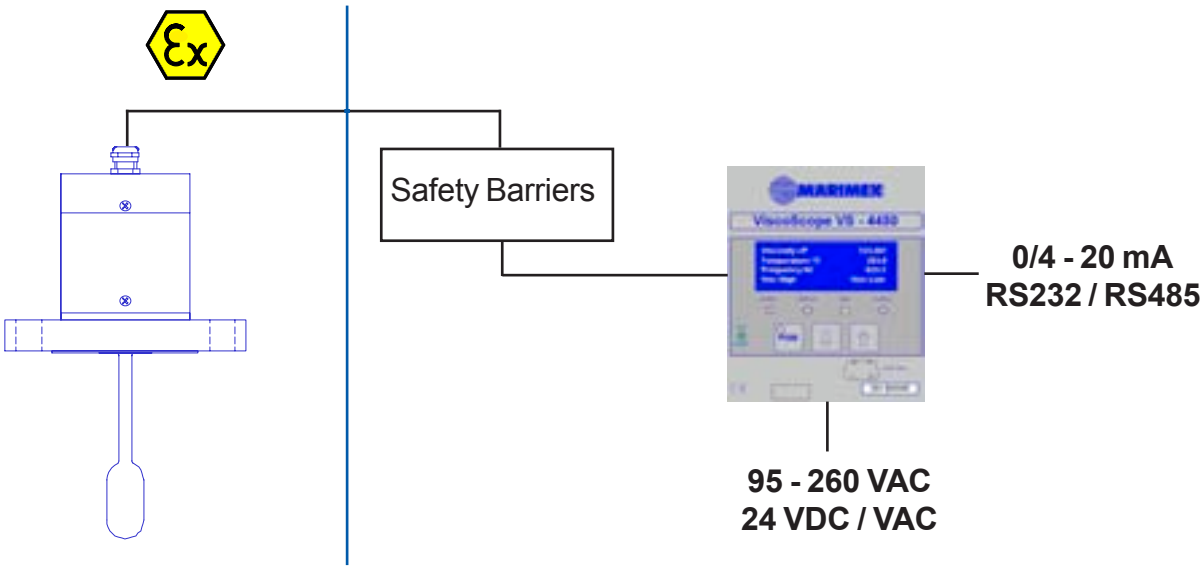
The ViscoScope - System

The ViscoScope process viscometer measures the viscosity of liquids continually and precisely in-line.

The measurement system consists of a sensor, transmitter and the transmission cable. Safety barriers are added, if the sensor is being used in a hazardous area.

The sensor does not employ any moving parts and is maintenance free. The viscosity is obtained with the torsional oscillation principle. The power required, to maintain the small amplitude and constant shear rate at the resonance frequency of the sensor, is a measure for the viscosity in mPa·s x gr/cm^3 (η x ρ).





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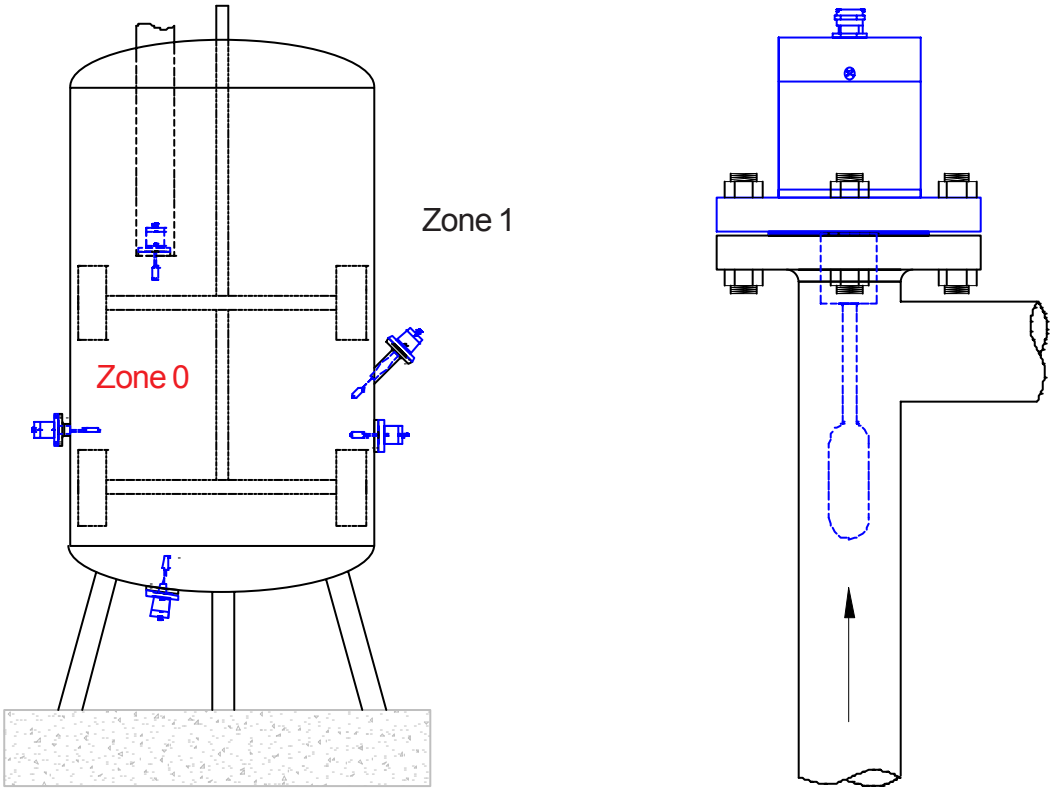
Sensor
The sensor can be mounted in any direction into a reactor, tank, pipe or sample cell. To obtain consistent results, the sensor has to be fully inserted into the liquid. Sensors are manufactured for various viscosity and temperature ranges. To bridge areas of no flow, a non-active extension can be employed. Such a non-active extension is an integral part of the sensor construction and placed between the flange and the probe.

Transmitter
The transmitter drives the sensor. A fast, closed loop PID controller maintains the small amplitude at the resonance frequency of the sensor. The transmitter is built to fit the 19“ rack standard. Many housing configurations are available for it. Standard analog and serial outputs are available to transmit the results.

Transmission cable / safety barriers
A special transmission cable connects the sensor and the transmitter. If the sensor is being mounted in a hazardous area, safety barriers are placed additionally between the transmitter and the sensor. The transmission cable and the safety barriers form part of the calibration. The distance between the transmitter and the sensor can be a maximum of 1,000 meters.



The sensor can be mounted in any direction into a reactor or pipe

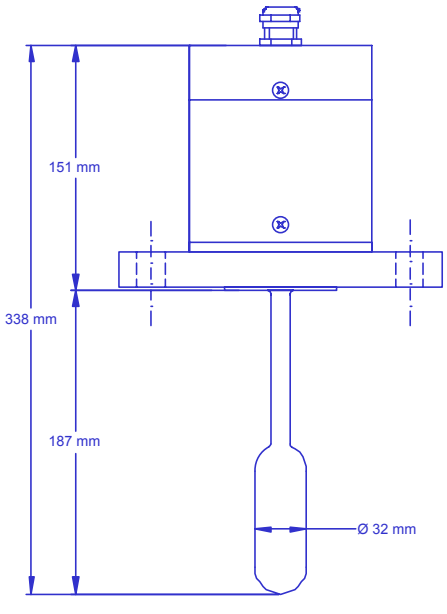
ViscoScope - Sensor VA-300L

VA-300L with DN100 PN16 flange and non-active extension

The model VA-300L (low viscosity) has been designed for very low viscosities. The sensor can be calibrated between 0.1 and 2,500 cP. Even viscosities under 1 cP are measured with high precision. Optionally all VA-300 sensors are available for process temperatures up to 450°C / 840°F.

Application examples

- Low viscosity resins
- FCC tower bottoms
- Pipelines
- Printing, coating and paints
- Suspensions
- Detergents
- Pharmaceutical products



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Specifications

Sensor type	**VA-300L**
Sensor dimensions	Ø = 32 mm / L = 187 mm Ø = 1.25" / L = 7.5"
Viscosity range in mPa·s x g/cm^3	0.10 to 2,500.00
Calibration	3 Decades **Optional** 4 Decades Computer assisted calibration with NIST traceable oils
Wetted parts [1]) / housing	316 (1.4571) / IP65
Process temperature [2])	LT -40° to +130°C / -40° to +270°F ST -40° to +300°C / -40° to +570°F HT -40° to +450°C / -40° to +840°F
Process connection [3])	Flange: ASME 3" 300# or DN80 PN40 std.
Resonance frequency Shear rate	~ 550 Hz ~ 3.450 sec^{-1}
Transmission cable length Sensor to transmitter	Maximum 1,000 meters / 3,333 feet (short cable length recommended for very low viscosities)
Speed of flow	Up to 10 m / sec. or 33 feet / sec. Dependent on installation
Reproducibility	± 1% of reading or ± 1 Digit **Optional** ± 0,5% of reading or ± 1 Digit
Accuracy	± 2% of reading or ± 1 Digit **Optional** ± 1% of reading or ± 1 Digit
Options	
Non-active-extension [4])	Eliminates no flow areas in a pipe connection on a reactor or in a T-piece Can also be used to bridge gaps in open channel applications Ø = 45 mm / 1.75", L = up to 100 mm / 4.0"
Hazardous area approval	ATEX: Ex II 1/2 G EEx ia IIC T3 – T6 Others on request

1) Hastelloy C22, Duplex 2205, Teflon coating and other materials on request
2) Above 175°C / 350°F coil temperature air cooling of the housing is required
3) Flanges up to PN250 und 2500# ASME on request
4) Non-active extensions are available in various diameters and up to 500 mm / 20" length

Subject to change without notice

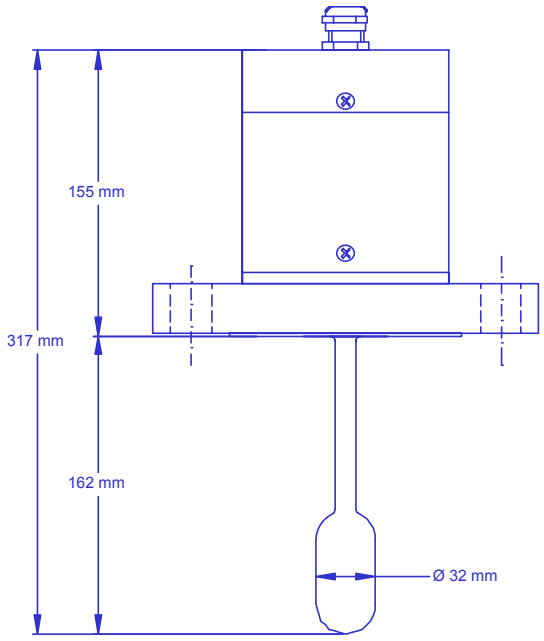
ViscoScope - Sensor VA-300M

VA-300M with DN80 PN40 flange and non-active extension

The model VA-300M (medium viscosity) has been designed for viscosities between 1 and 25,000 cP. The sensor can be used in many applications. Viscosities are being resolved up to 1 decimal. Optionally all VA-300 models can be delivered with ATEX hazardous area approval.

Application examples

- Batch resins
- Petrochemical
- Starch
- Dispersions
- Black liquor
- Ceramics
- Food industry



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Specifications

Sensor type	**VA-300M**
Sensor dimensions	Ø = 32 mm / L = 162 mm Ø = 1,25" / L = 6,5"
Viscosity range in mPa·s x g/cm^3	1.0 to 25,000.0
Calibration	3 Decades **Optional** 4 Decades Computer assisted calibration with NIST traceable oils
Wetted parts [1]) / housing	316 (1.4571) / IP65
Process temperature [2])	LT -40° to +130°C / -40° to +270°F ST -40° to +300°C / -40° to +570°F HT -40° to +450°C / -40° to +840°F
Process connection [3])	Flange: ASME 3" 300# or DN80 PN40 std.
Resonance frequency Shear rate	~ 580 Hz ~ 3.650 sec^{-1}
Transmission cable length Sensor to transmitter	Maximum 1,000 meters / 3,333 feet (short cable length recommended for very low viscosities)
Speed of flow	Up to 10 m / sec. or 33 feet / sec. Dependent on installation
Reproducibility	± 1% of reading or ± 1 Digit **Optional** ± 0,5% of reading or ± 1 Digit
Accuracy	± 2% of reading or ± 1 Digit **Optional** ± 1% of reading or ± 1 Digit
Options	
Non-active-extension [4])	Eliminates no flow areas in a pipe connection on a reactor or in a T-piece Can also be used to bridge gaps in open channel applications Ø = 45 mm / 1.75", L = up to 100 mm / 4.0"
Hazardous area approval	ATEX: Ex II 1/2 G EEx ia IIC T3 – T6 Others on request

[1]) Hastelloy C22, Duplex 2205, Teflon coating and other materials on request
[2]) Above 175°C / 350°F coil temperature air cooling of the housing is required
[3]) Flanges up to PN250 und 2500# ASME on request
[4]) Non-active extensions are available in various diameters and up to 500 mm / 20" length

Subject to change without notice

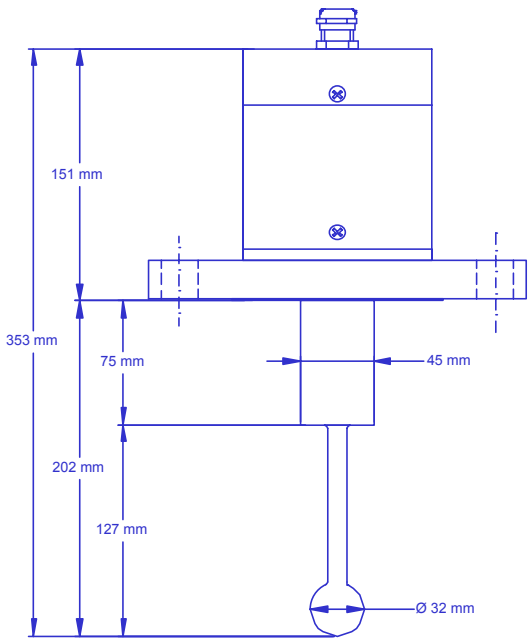
ViscoScope - Sensor VA-300H

VA-300H with DN100 PN16 flange and non-active extension

The model VA-300H (high viscosity) has been designed for viscosities between 10 and 250,000 cP. No-flow areas in a reactor connection or in a T-piece of a pipe are bridged with a non-active extension. All VA-300 models can be delivered with non-active extensions.

Application examples

- Batch resins
- Polymers
- Silicone
- Ceramics
- Additives
- Food industry



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Specifications

Sensor type	**VA-300H**
Sensor dimensions	Ø = 32 mm / L = 127 mm Ø = 1,25" / L = 5"
Viscosity range in mPa·s x g/cm^3	10 to 250,000
Calibration	3 Decades **Optional** 4 Decades Computer assisted calibration with NIST traceable oils
Wetted parts [1]) / housing	316 (1.4571) / IP65
Process temperature [2])	LT -40° to +130°C / -40° to +270°F ST -40° to +300°C / -40° to +570°F HT -40° to +450°C / -40° to +840°F
Process connection [3])	Flange: ASME 3" 300# or DN80 PN40 std.
Resonance frequency Shear rate	~ 600 Hz ~ 3.800 sec^{-1}
Transmission cable length Sensor to transmitter	Maximum 1,000 meters / 3,333 feet (short cable length recommended for very low viscosities)
Speed of flow	Up to 10 m / sec. or 33 feet / sec. Dependent on installation
Reproducibility	± 1% of reading or ± 1 Digit **Optional** ± 0,5% of reading or ± 1 Digit
Accuracy	± 2% of reading or ± 1 Digit **Optional** ± 1% of reading or ± 1 Digit
Options	
Non-active-extension [4])	Eliminates no flow areas in a pipe connection on a reactor or in a T-piece Can also be used to bridge gaps in open channel applications Ø = 45 mm / 1.75", L = up to 100 mm / 4.0"
Hazardous area approval	ATEX: Ex II 1/2 G EEx ia IIC T3 – T6 Others on request

[1]) Hastelloy C22, Duplex 2205, Teflon coating and other materials on request
[2]) Above 175°C / 350°F coil temperature air cooling of the housing is required
[3]) Flanges up to PN250 und 2500# ASME on request
[4]) Non-active extensions are available in various diameters and up to 500 mm / 20" length

Subject to change without notice

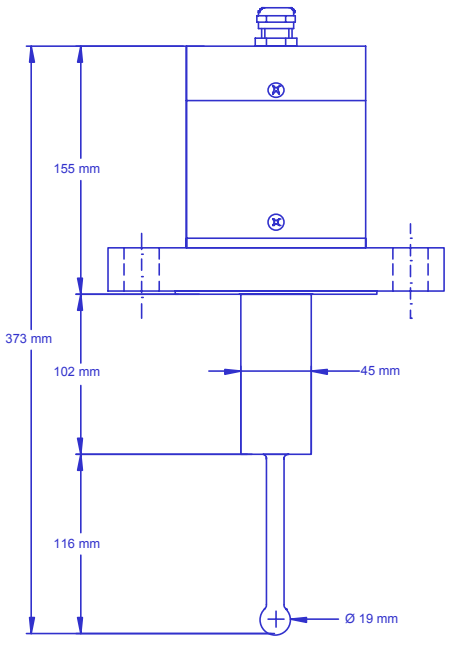
ViscoScope - Sensor VA-300X

VA-300X with 3“ 300# ASME flange and non-active extension

The model VA-300X (extra high viscosity) has been designed for viscosities between 100 und 2,500,000 cP. Applications with this sensor often require a non-active extension. Every VA-300 model can be delivered with standard flanges larger than DN50 PN16 / 2“ 150#.

Application examples

- Melt-flow lines
- PIB-extruder
- PET-production
- Polymers
- Silicone
- Bitumen



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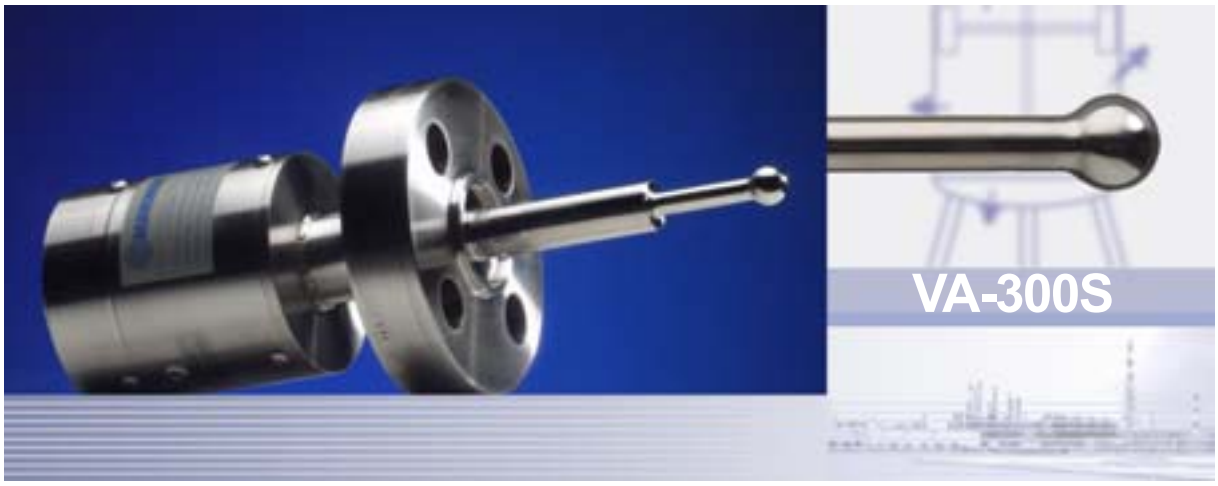
Specifications

Sensor type	**VA-300X**
Sensor dimensions	Ø = 32 mm / L = 113 mm Ø = 1,25" / L = 4.5"
Viscosity range in mPa·s x g/cm^3	100 to 2,500,000
Calibration	3 Decades **Optional** 4 Decades Computer assisted calibration with NIST traceable oils
Wetted parts [1]) / housing	316 (1.4571) / IP65
Process temperature [2])	LT -40° to +130°C / -40° to +270°F ST -40° to +300°C / -40° to +570°F HT -40° to +450°C / -40° to +840°F
Process connection [3])	Flange: ASME 3" 300# or DN80 PN40 std.
Resonance frequency Shear rate	~ 635 Hz ~ 4.000 sec^{-1}
Transmission cable length Sensor to transmitter	Maximum 1,000 meters / 3,333 feet (short cable length recommended for very low viscosities)
Speed of flow	Up to 10 m / sec. or 33 feet / sec. Dependent on installation
Reproducibility	± 1% of reading or ± 1 Digit **Optional** ± 0,5% of reading or ± 1 Digit
Accuracy	± 2% of reading or ± 1 Digit **Optional** ± 1% of reading or ± 1 Digit
Options	
Non-active-extension [4])	Eliminates no flow areas in a pipe connection on a reactor or in a T-piece Can also be used to bridge gaps in open channel applications Ø = 45 mm / 1.75", L = up to 100 mm / 4.0"
Hazardous area approval	ATEX: Ex II 1/2 G EEx ia IIC T3 – T6 Others on request

[1]) Hastelloy C22, Duplex 2205, Teflon coating and other materials on request
[2]) Above 175°C / 350°F coil temperature air cooling of the housing is required
[3]) Flanges up to PN250 und 2500# ASME on request
[4]) Non-active extensions are available in various diameters and up to 500 mm / 20" length

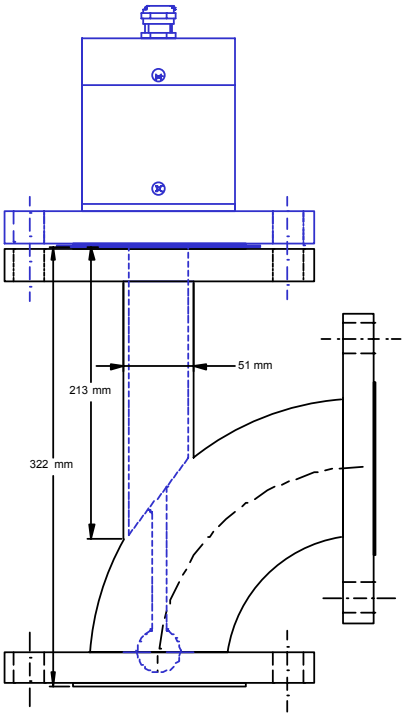
Subject to change without notice

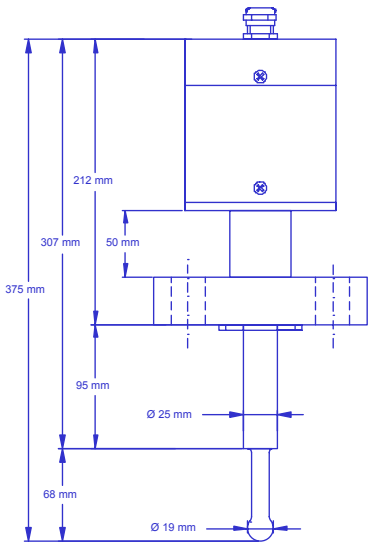
ViscoScope - Sensor VA-300S



VA-300S with 1“ 2500# MFF ASME flange and non-active extension

Processes, applications and local conditions sometimes require a special construction of the sensor. The model VA-300S (special) has been designed for such requirements. Whatever is possible with our torsional oscillation technology, can be accommodated with this sensor.





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Specifications

Sensor type	**VA-300S**
Sensor dimensions	Dependent on construction
Viscosity range in mPa·s x g/cm^3	0.10 to 2,500,000
Calibration	3 decades **Optional** 4 decades Computer assisted calibration with NIST traceable oils
Wetted parts [1]) / housing	316 (1.4571) / IP65
Process temperature [2])	LT -40° to +130°C / -40° to +270°F ST -40° to +300°C / -40° to +570°F HT -40° to +450°C / -40° to +840°F XT -40° to +1,500°C / -40° to +2,750°F
Process connection [3])	Flange: ASME 3" 300# or DN80 PN40 std.
Resonance frequency Shear rate	Dependent on construction Dependent on construction
Transmission cable length Sensor to transmitter	Maximum 1,000 meters / 3,333 feet (short cable length recommended for very low viscosities)
Speed of flow	Up to 10 m / sec. or 33 feet / sec. Dependent on installation
Reproducibility	± 1% of reading or ± 1 Digit **Optional** ± 0,5% of reading or ± 1 Digit
Accuracy	± 2% of reading or ± 1 Digit **Optional** ± 1% of reading or ± 1 Digit
Options	
Non-active-extension [4])	Eliminates no-flow areas in a pipe connection on a reactor or in a T-piece Can also be used to bridge gaps in open channel applications Ø = 45 mm / 1.75", L = up to 100 mm / 4.0"
Hazardous area approval	ATEX: Ex II 1/2 G EEx ia IIC T3 – T6 Others on request

[1]) Hastelloy C22, Duplex 2205, Teflon coating and other materials on request
[2]) Above 175°C / 350°F coil temperature air cooling of the housing is required
[3]) Flanges up to PN250 und 2500# ASME on request
[4]) Non-active extensions are available in various diameters and up to 500 mm / 20" length

Subject to change without notice

ViscoScope - Transmitter VS-4450 / VS-B450

VS-4450 with display and VS-B450 without display in a 19“ Rack 3HE 84TE

The transmitter VS-4450 has an alphanumeric display, alarm LED‘s and push buttons for configuration. The model VS-B450 has the same functionality as the VS-4450 but only has a single LED indicator. Both transmitters can be configured with a Palm, Pocket-PC or PC connected to the DB9 plug on the front panel. For transmission of the measured parameters standard analog and/or serial outputs are available.

Panel mount housing
144 x 144 mm

Wall mount housing

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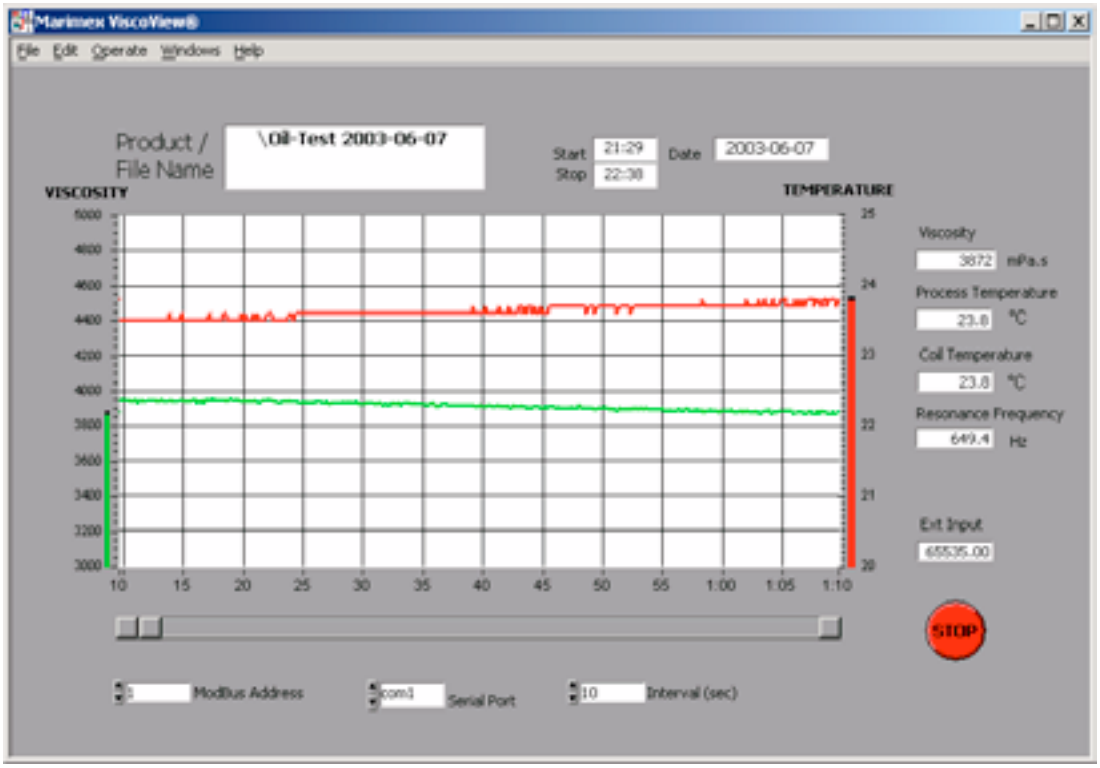
Specifications

Transmitter type	**VS-4450 and VS-B450**
Measured parameters	• Viscosity • Temperatures (0,1°C) of process, coils and microprocessor • External input • Resonance frequency for sensor diagnostics
Display **(only VS-4450)**	• 4-line alphanumeric display, divided into 2 pages, configurable for 4 parameters each
Transmitter configuration	• With a Palm, Pocket PC or PC connected to any of the serial interfaces. **VS-4450** • Additionally via push buttons on front panel
Calculated parameters	• Temperature compensation to ASTM D-341 • Equal percentage temperature compensation • Dynamic and kinematic viscosity • User viscosity via scaling factor and zero shift
Filter	• Moving average: 0 – 200 measurements
Alarm system	**VS-4450** • System function • Sensor diagnostics • Coil temperature • 2 configurable LED's (viscosity / temperature) **VS-B450** • Like VS-4450 but only one LED for function
Outputs	• 1 integrated front panel RS232 output for configuration, Modbus protocol • 4 slots for optional boards: 3 analog outputs and 1 serial output or 4 analog outputs Available cards are: • 0/4–20 mA / 0/2-10 VDC (selectable) Outputs are configurable and optically isolated • RS232 or isolated RS485, Modbus protocol • 2 SPDT Relays, configurable for all available alarm parameters. One relay can be used with the built-in time proportional control functions
External input	• 1 input 4-20 mA, i.e. for density or pressure
Dimensions	• 3HE 21TE x 180 mm
Power supply	• 95 … 260 VAC, 50 … 60 Hz, 15 Watt **Optional** • 24 VDC / VAC
Ambient temperature	• 0 to 50°C / 0 to 122°F
Housings **(optional)**	• Panel mount 144 x 144 x 218 mm, IP42 • Wall mount, IP65 • 19 " rack mount, 3HE 84TE

Subject to change without notice

ViscoView® - Software



ViscoView® software is a data collection system for ViscoScope viscometer systems.

The data is stored in a tab delimited ASCII format. The file is being closed after each data collection, this enables the file to be copied into a different directory at any time. The file can be imported into a spreadsheet like Excel, where additional calculations and graphical manipulations can be accomplished.

The following parameters are being collected:

- **Viscosity**
- **Process Temperature**
- **Coil Temperature**
- **Resonance Frequency**
- **External Input**
- **Date and Time**

The data collection rate can be adjusted between 10 and 600 seconds.

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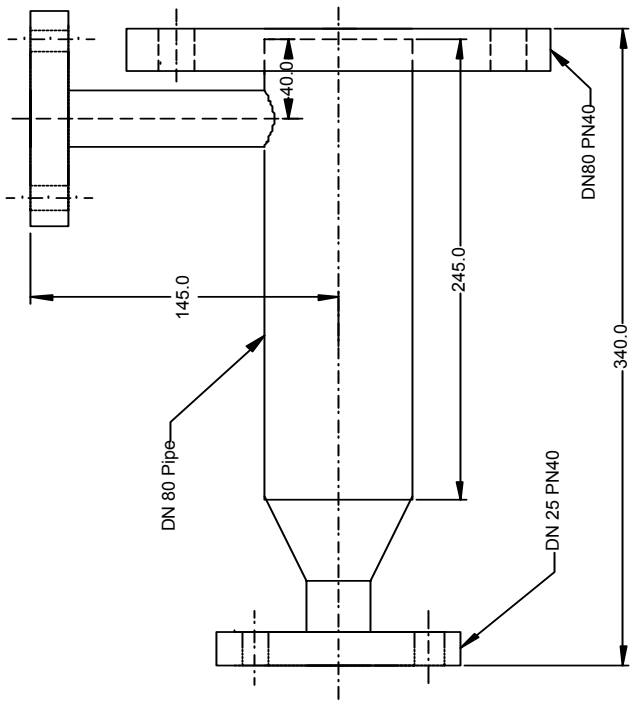
Accessories

If the pipe diameter is too small, to mount a sensor directly, a sample cell is recommended. The volume of the sample cell can be adapted to the speed of flow required by the process.

In some installations, the potential of mechanical damage to the sensor exists. In those instances it is necessary to protect the sensor. Marimex can provide drawings or can deliver complete assemblies required for sensor protection.



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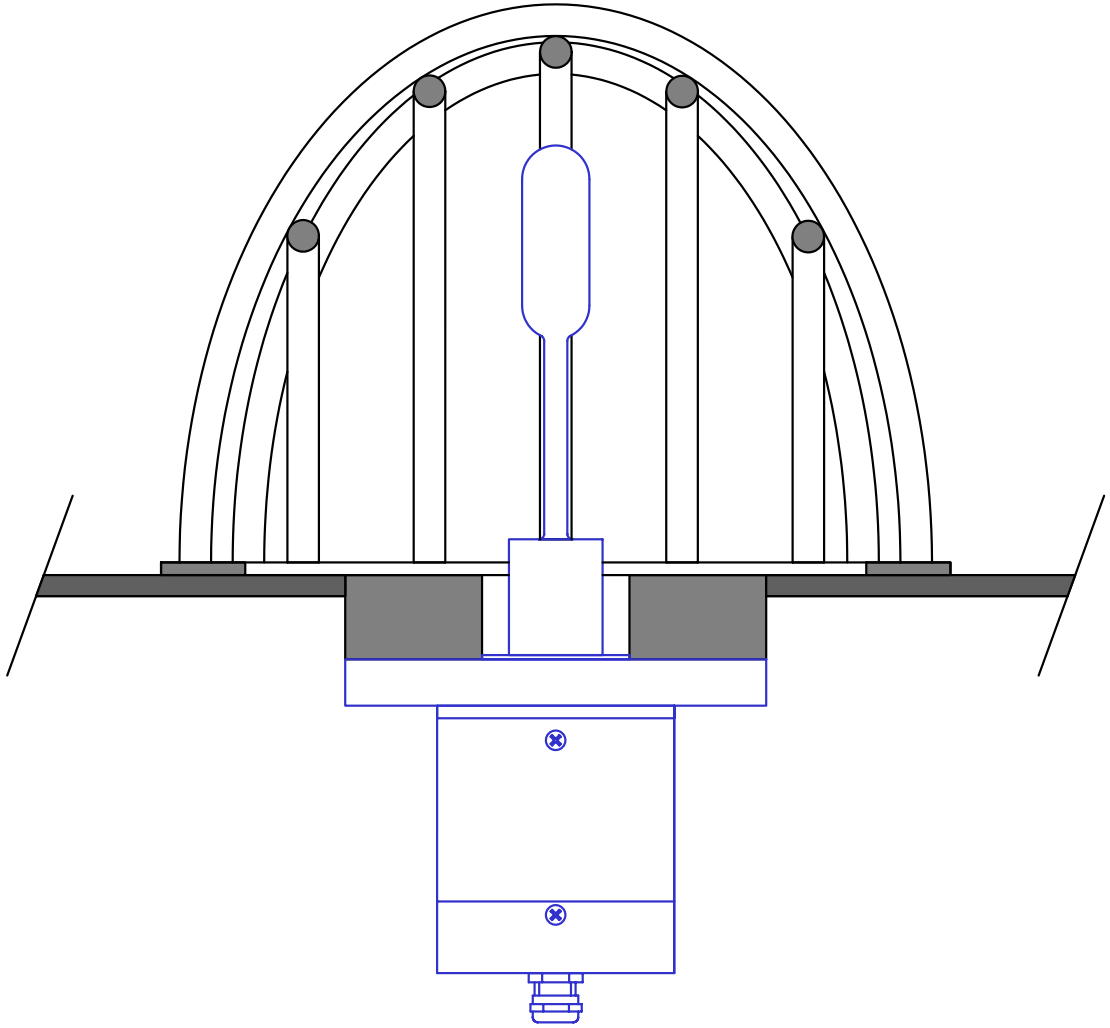
Protective cage



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Comments: Dimensions in mm (inch)	Scale: Not to Scale	
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Checked by:		
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Title: ViscoSope Protective Cage

Drawing Number: INST Protective Cage 001

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