ViscoTron VP-3000

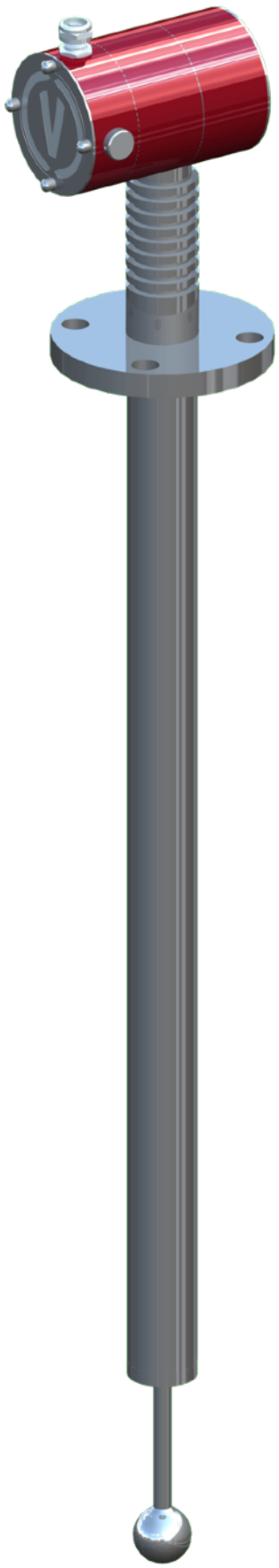
Viscosity transducers for demanding process installations

Your process viscosity measurement solution

- Proven in many applications and installations
- Torsionally vibrating sensor, no wearing parts
- Rugged, virtually no maintenance
- In-line viscosity measurement
- No cooling required

Viscotronics Co., Ltd.

VP-3000



The ViscoTron sensor series VP-3000 has been developed employing experience gained over more than 30 years of applying, developing and manufacturing torsional motion viscometers. The development has been significantly influenced by customer experience and input.

Innovative assembly allows the series VP-3000 sensor to be manufactured to match customer application requirements by using any length or shape of extension. Modern manufacturing methods like LASER welding ensure homogeneity of the material at critical junctions.

The series VP-3000 is available in versions to measure very low, low, medium, high or extra high viscosities. Sensors can be constructed for pressures up to 27 MPa (4,000 psi) and temperatures up to 450˚C (840˚F). Factory calibration with Newtonian ASTM traceable fluids over multiple decades is optional. The sensor can also be customer calibrated using the VT-IRFT transmitters.

This new generation of sensors incorporates features to make them more flexible and easier to work with during installation, start-up and operation. They are designed to be adaptable to changing customer needs, without having to re-construct the entire sensor. The sensors are gravity independent and can be mounted in any direction.

The viscometer creates a shear wave by torsionally resonating the sensor. The drag on the twisting motion is a measure of the viscosity. The system is factory checked for functionality or factory calibrated using NIST traceable fluids. Speed or direction of flow have no influence on the measurement.

The resonant frequency is dependent on the mechanical construction of the sensor and typically between 120 and 400 Hz. The resonant frequency and therefore shear rate can be manipulated at the factory to be similar for multiple sensors. The microscopic motion is fast enough to be resistant to outside mechanical vibrations, yet low enough to provide excellent sensitivity and resolution for newtonian and non-newtonian fluids.

The sensor shown in the picture on the left has been designed for high viscosities and low pressures. The length of the neck is designed to eliminate air cooling requirements of the sensor housing. Eliminating air cooling lowers operating cost and eliminates temperature variations by cooling the housing.

Using ViscoTron VT-IRFT induced resonance transmitters, the cable length between the transmitter and sensor can be changed in the field without influencing the calibration.

VP-3000H/2-STE-D59-0N-111

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viscotron@viscotronics.com www.viscotronics.com

VP-3000 Specifications

Description	VP-3000LL	VP-3000L	VP-3000M	VP-3000H	VP-3000X
Measurement range (mPa·s x g/cm³)	**0.00 to 500**	**0.00 to 2,500**	**0.0 to 25,000**	**0 to 250,000**	**0 to 5,000,000**
	The measurement ranges indicated above are a guide only, the final range capability is dependent on pressure requirements, sensor dimensions and other design factors.				
Calibration	Functionality checks are performed at low and high end of the measurement range. Cable lengh independent factory calibration with Newtonian fluids is available for up to 4 decades within the measurement range. Thus the calibrated range can be matched to the customer requirements. See the configuration pages for more details.				
Repeatability	0.5%				
Accuracy	1% or ±1 digit, whichever is greater (factory calibrated with NIST standards)				
Resonant frequency	Typically 120 to 400 Hz (dependent on design)				
Shear rate	Typically between 750 and 2,500 sec^{-1} (dependent on design)				
Sensor length	120 to 190 mm, dependent on range and installation requirements				
Maximum process temperatures with external transmitter	MTE		< 175°C / 350°F		65 mm riser
	STE		< 350°C / 660°F		125 mm riser
	HTE		< 450°C / 840°F		225 mm riser
Maximum process temperatures with internal transmitter	LTI		< 100°C / 210°F		65 mm riser
	MTI		<175°C / 350°F		125 mm riser
	STI		< 350°C / 660°F		225 mm riser
Housing	IP65				
Wetted parts	SUS316L (1.4571) standard optionally Hastelloy, Duplex, Monel PTFE low friction or other corrosion resistant coatings up to 300°C				
Process connection	Process connections according to installation requirements (maximum pressure capability of sensor: 27 MPa / 4,000 psig)				
NAE (Non-active extension)	Extends the sensing bulb into the fluid flow of a pipe connection or a reactor Standard Ø 48 mm / 1.875”, Length = up to 500 mm, 20.0” NAE available in other diameters, lengths and special shapes (max length 1,000 mm)				
Cable length	500 meters maximum between sensor and transmitter (10 Ohm max.)				
Hazardous area approval (optional)	Intrinsically Safe IECEx, CSA, CSA / UL				
Process temperature measurement (optional)	PT1000 extending from NAE, serviceable in place, PT1000 internal to sensor Two PT1000, one inside sensor bulb plus one extending from NAE				

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VP-3000 ASME Configuration

VP-3000	ViscoTron sensor type	mPa·s x g/cm³	
VP-3000LL	Extra Low viscosity	0 to 500	Required maximum viscosity:
VP-3000L	Low viscosity	0 to 2,500	Required maximum viscosity:
VP-3000M	Medium viscosity	0 to 25,000	Required maximum viscosity:
VP-3000H	High viscosity	0 to 250,000	Required maximum viscosity:
VP-3000X	Extra high viscosity	0 to 5,000,000	Required maximum viscosity:

Code	Calibration	
0	Functionality check only, no factory calibration	
1	1 decade calibration within range capability	(example VP-3000L : 100 to 1,000 mPa.s x gr/cm³)
2	2 decade calibration within range capability	(example VP-3000L: 10.0 to 1,000 mPa.s x gr/cm³)
3	3 decade calibration within range capability	(example VP-3000H: 100 to 100,000 mPa.s x gr/cm³)
4	4 decade calibration within range capability	(example VP-3000X: 100 to 1,000,000 mPa.s x gr/cm³)

Code	Process temperature	
MTE	< 175°C / 350°F (includes 65 mm riser)	use with external transmitter
STE	< 350°C / 660°F (includes 125 mm riser)	use with external transmitter
HTE	< 450°C / 840°F (includes 225 mm riser)	use with external transmitter
LTI	< 75°C / 165°F (includes 65 mm riser)	c/w internal transmitter
STI	< 130°C / 265°F (includes 125 mm riser)	c/w internal transmitter
HTI	< 300°C / 570°F (includes 225 mm riser)	c/w internal transmitter

Code	Process connection	
A1	3" 300#	ASME Flange
A2	3" 150#	ASME Flange
A3	3" 600#	ASME Flange
A4	4" 300#	ASME Flange
A5	2" 150#	ASME Flange
T6	3"	Tri-Clamp
A7	4" 600#	ASME Flange
A9	Others on request	

Code	Non-Active-Extension (NAE)	Required Length
0	None	
1	Ø 48 mm x 150 mm max	Length in mm:
2	Ø 48 mm x 300 mm max	Length in mm:
3	Ø 48 mm x 500 mm max	Length in mm:
9	Special shapes, lengths and sizes on request (max length 1,000 mm)	

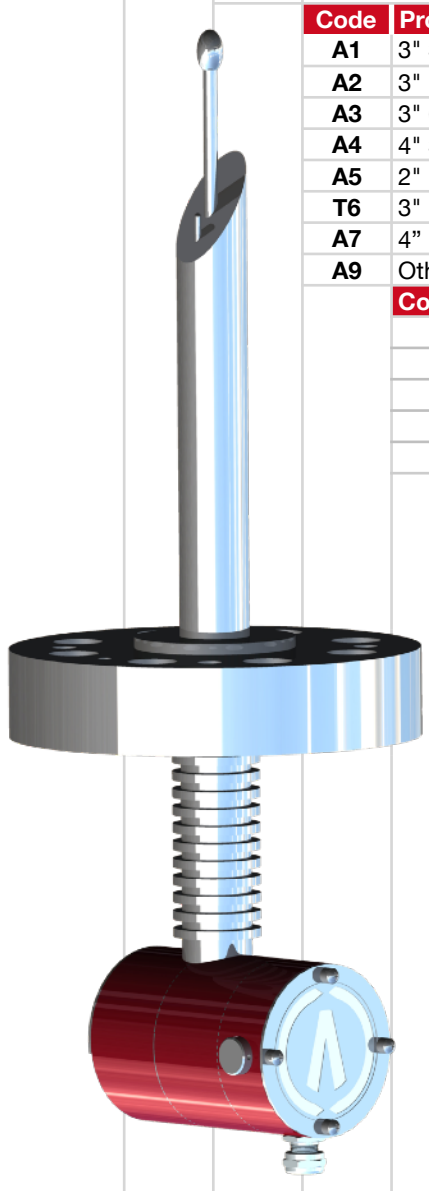
Code	Installation type	
0	General purpose	(no safety barriers)
1	Intrinsically safe sensor for viscosity	
2	Intrinsically safe sensor for viscosity and one temperature sensor	
3	Intrinsically safe sensor for viscosity and two temperature sensors	

Code	Agency approvals
N	None, for general purpose area
I	IECEx Ex ia IIB T3-T6 Ga
C	CSA / UL Class I, Div 1

Code	Coating and materials for wetted parts
1	SUS316L
2	PTFE low friction coating
3	Hastelloy C22
4	Duplex SAF 2205
9	Special sensor coating or material on request

Code	Process temperature measurement
0	No temperature measurement or PT1000 by user
1	PT1000 extending from NAE, serviceable in place
2	PT1000 internal to sensor
3	Dual PT1000's placed as in option 1 and 2
9	Others on request

Code	Housing
1	Powder coated
2	Polished Stainless Steel
3	Others on request



VP-3000X/2-STE-A99-3I-131

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VP-3000M	2	STI	A1	1	0	N	1	1	1	EXAMPLE ORDERING INFORMATION

Not all option are available for all configurations

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VP-3000 DIN Configuration

VP-3000	ViscoTron sensor	mPa·s x g/cm³	
VP-3000LL	Extra Low viscosity	0 to 500	Required maximum viscosity:
VP-3000L	Low viscosity	0 to 2,500	Required maximum viscosity:
VP-3000M	Medium viscosity	0 to 25,000	Required maximum viscosity:
VP-3000H	High viscosity	0 to 250,000	Required maximum viscosity:
VP-3000X	Extra high viscosity	0 to 5,000,000	Required maximum viscosity:

Code	Calibration	
0	Functionality check only, no factory calibration	
1	1 decade calibration within range capability	(example VP-3000L : 100 to 1,000 mPa.s x gr/cm³)
2	2 decade calibration within range capability	(example VP-3000L: 10.0 to 1,000 mPa.s x gr/cm³)
3	3 decade calibration within range capability	(example VP-3000H: 100 to 100,000 mPa.s x gr/cm³)
4	4 decade calibration within range capability	(example VP-3000X: 100 to 1,000,000 mPa.s x gr/cm³)

Code	Process temperature	
MTE	< 175°C / 350°F (includes 65 mm riser)	use with external transmitter
STE	< 350°C / 660°F (includes 125 mm riser)	use with external transmitter
HTE	< 450°C / 840°F (includes 225 mm riser)	use with external transmitter
LTI	< 75°C / 165°F (includes 65 mm riser)	c/w internal transmitter
STI	< 130°C / 265°F (includes 125 mm riser)	c/w internal transmitter
HTI	< 300°C / 570°F (includes 225 mm riser)	c/w internal transmitter

Code	Process connection	
D1	DN80 PN25/40	DIN Flange
D2	DN80 PN16	DIN Flange
D3	DN80 PN64	DIN Flange
D4	DN100 PN25/40	DIN Flange
D5	DN50 PN16	DIN Flange
D6	DN80	Varivent Flange
D7	DN100 PN64	DIN Flange
D9	Others on request	

Code	Non-Active-Extension (NAE)	Required Length
0	None	
1	Ø 48 mm x 150 mm max	Length in mm:
2	Ø 48 mm x 300 mm max	Length in mm:
3	Ø 48 mm x 500 mm max	Length in mm:
9	Special shapes, lengths and sizes on request (max length 1,000 mm)	

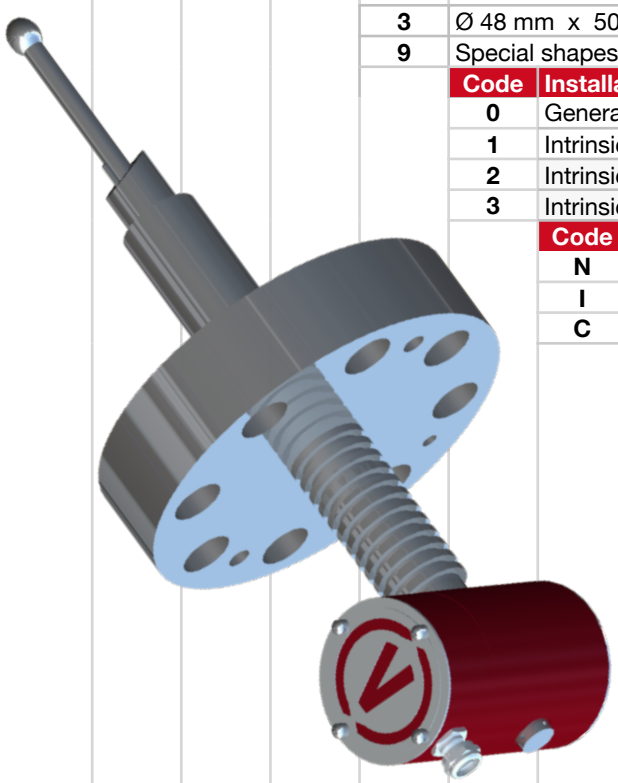
Code	Installation type	
0	General purpose	(no safety barriers)
1	Intrinsically safe sensor for viscosity	
2	Intrinsically safe sensor for viscosity and one temperature sensor	
3	Intrinsically safe sensor for viscosity and two temperature sensors	

Code	Agency approvals
N	None, for general purpose area
I	IECEx Ex ia IIB T3-T6 Ga
C	CSA / UL Class I, Div 1

Code	Coating and materials for wetted parts
1	SUS316L
2	PTFE low friction coating
3	Hastelloy C22
4	Duplex SAF 2205
9	Special sensor coating or material on request

Code	Process temperature measurement
0	No temperature measurement or PT1000 by user
1	PT1000 extending from NAE, serviceable in place
2	PT1000 internal to sensor
3	Dual PT1000's placed as in option 1 and 2
9	Others on request

Code	Housing
1	Powder coated
2	Polished SS
9	Others on request



VP-3000X/2-STE-A91-2I-111

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VP-3000X	3	STE	D7	9	3	C	1	3	1	EXAMPLE ORDERING INFORMATION

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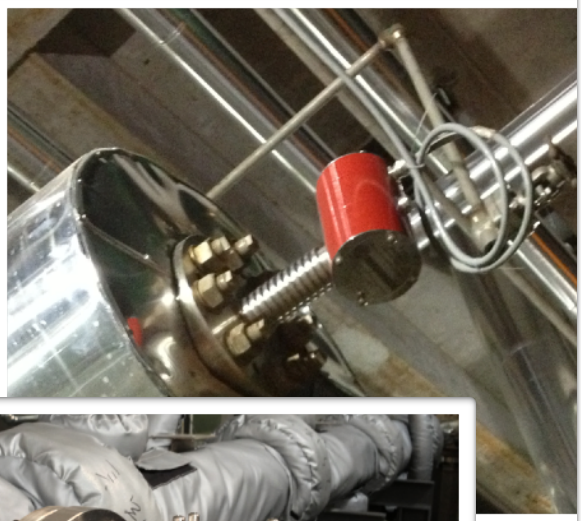
Approval and Application Examples

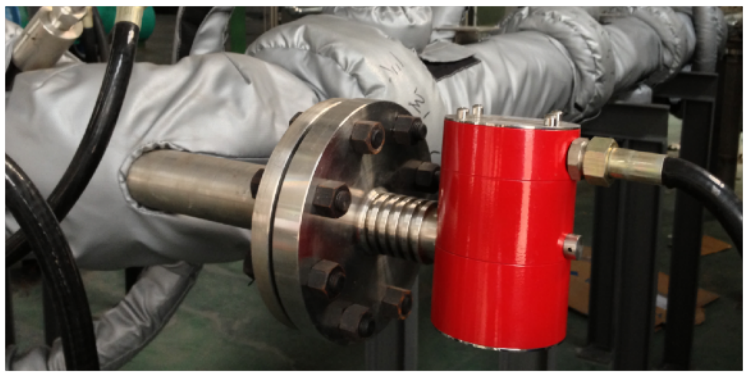
IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres

IECEx TEST REPORT COVER

< IECEx Approval for VP-1000 and VP-3000 series transducers





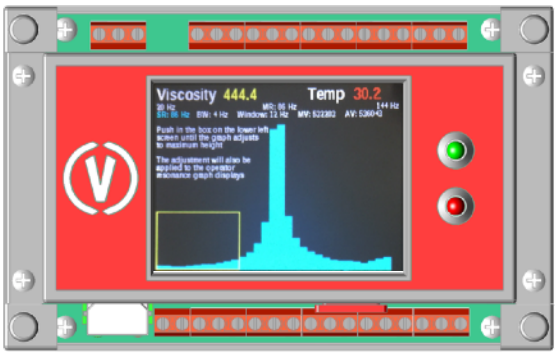
Polymers
Batch Resins
Silicone
Emulsions
Crude Oil
Blending
Black Liquor
Ceramics
Additives
Slurries
Coatings
Spray Driers
Food Industry
Creams
Cheese
Milk Powder

^ Continuous polymer production @ 280 C, no air cooling required

< Continuous polymer production

Compatible Transmitters

For more info see the transmitter brochure



ViscoTron VT-IRFTx-TFTTP
Induced Resonance FFT transmitter
(DIN Rail / Wall mount enclosure)

ViscoTron VT-IRFTi-TFTTP
Induced Resonance FFT transmitter
(Panel mount enclosure)

Represented in North America exclusively by:

Viscotronics Co., Ltd.
171/109 Moo 7, T. Chaichatan
A. Saraphi, Chiang Mai, 50140
Thailand
+66-52-005 248 / +66-61-272 1222
viscotron@viscotronics.com

PROCON SYSTEMS
CUSTOMER DRIVEN, PERFORMANCE PROVEN

Procon Systems (2013) Inc.
6025 – 99th Street NW
Edmonton, AB T6E 3P1
Canada
Toll Free: 1-877-844-6665 (ph): 780-437-0244
(fax): 780-438-2893

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