

### REAL TIME. ON-LINE. IN-LINE.



## Description

The ViSmart® VS-2000 and VS-2500 series viscosity sensors measure the viscosity of a wide range of fluids including printing inks and a variety of industrial lubricants. The sensors make use of state of the art Acoustic Wave Technology to provide real-time, continuous monitoring of viscosity.

## Key Features

- Continuous real-time, in-process relative viscosity measurement
- Unaffected by shock or vibration
- Industrial grade reliability
- Hazardous location approval for VS-2511

## Applications

- Printing:
  - Water Based Inks
  - Solvent Based Inks
- Industrial lubricants

## Performance Specifications

Parameter	VS-20XX	VS-25XX
<b>Physical</b>		
Viscosity Range (AV) <sup>1</sup> (cSt) <sup>2</sup>	1 to 400 (0.4 to 140) <sup>3</sup>	1 to 400 (0.4 to 140) <sup>3</sup>
Viscosity Repeatability % of Reading	± 10%	± 10%
Sensor Head Pressure Rating [Gauge Pressure] PSIG (bar)	30 (2.07 bar) cabled Quick Disconnect	60 (4.14 bar)
	60 (4.14 bar) connectorized	
Burst Pressure Rating [Gauge Pressure] PSIG (bar)	90 (6.00 bar)	90 (6.00 bar)
Measurement rate (Reading/second)	1 / second	1 / second
Sampling Rate (Reading/second)	1 / second	1 / second
Interface	Proprietary SPI	Proprietary SPI
<b>Electrical Data</b>		
Power Supply Voltage (Vdc)	5 to 10	5 to 10
Power Supply Current (mA)	<35	<35
Power Consumption (mW)	<175 @ 5V	<175 @ 5V
<b>Approvals</b>		
EMC Immunity/Emission	EN 55000, EN 61000-6-2, EN 61000-6-3, EN 61000-6-6	
<b>Environmental</b>		
Fluid Operating Temperature (°C)	-15 to 105	0 to 60
Ambient Operating Temperature (°C)	0 to 70	0 to 60
Storage Temperature (°C)	-40 to 80	-40 to 80

# Performance Specifications

Parameter	VS-20XX	VS-25XX
<b>Mechanical</b>		
ViSmart™ Sensor (inches)	Φ1.00 x L 3.40	Φ1.00 x L 4.23
ViSmart™ Sensor (mm)	Φ25.40 x L 86.36	Φ25.40 x L 107.42
Sensor Connector (inches)	2.12 H x 2.07 W x 0.67 L	M12 x 1 Circular Connector
Sensor Connector (mm)	53.85 H x 52.58 W x 17.02 L	
Weight (approximate) (oz) (g)	12 (344 g)	5 (153 g)
Ingress Protection Rating of ViSmart™ Sensor	IP67 <sup>4</sup>	IP67 <sup>5</sup>
Ingress Protection Rating of Sensor Connector	IP30	n/a
Connector Type	DB25 female D-Sub connector	M12x1, 8 pin male
Maximum allowable Torque for NPT thread engagement (N-m)	100	100
Vibration <sup>6</sup>	+/-20g (5-2000 Hz)	+/-20g (5-2000 Hz)
Shock <sup>7</sup>	100g (6ms)	100g (6ms)

## Notes:

- All viscosity measurements are shear rate and material dependent. Variations in material properties and homogeneity could result in varied interpretations of acoustic viscosity by the sensor.
- The general relationship between acoustic viscosity and kinematic viscosity is: Acoustic viscosity (AV) = kinematic viscosity x density<sup>2</sup> (cSt x (g/cm<sup>3</sup>)<sup>2</sup>).
- cSt value based on use of calibration fluid with typical density value of 1.7 g/cm<sup>3</sup>. Actual cSt range greater for lower density fluids. Correlation functions between acoustic viscosity and dynamic/kinematic viscosity should be constructed in consultation with SenGenuity. Attempts at using the above mentioned formulae in isolation will most likely result in poor results.
- Sensor Head is rated IP67
- When mated with IP67/IP68 rated connector and cordset
- Per Mil-Std-810C, Figure 514.2-2
- Per Mil-Std-202G, Method 213B

## Wetted Material:

When completely immersed, the following materials are exposed to fluid media:

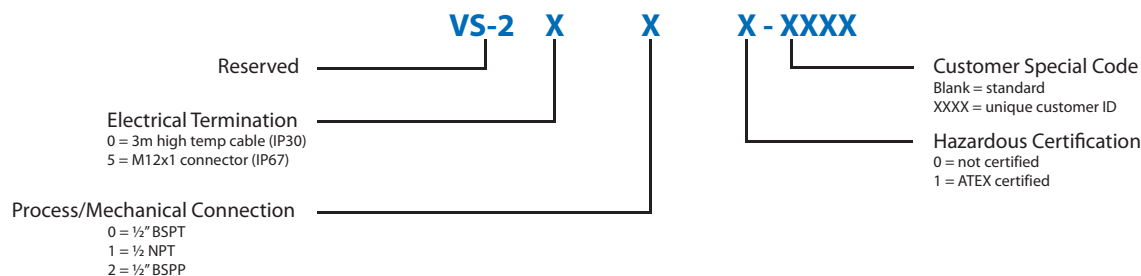
- AISI 304 Stainless Steel
- Loctite FP 4470
- Diamond like carbon
- Nickel Plated Kovar

VS-2511 Hazardous Certification Information				
Parameter	Value			
<b>Electrical Data</b>				
Intrinsic	Ui	Li	Pi	Ci
	8.6V	200mA	411mW	1uF
<b>Conformity, Approvals, and Installations</b>				
Examination Certificate Number	TÜV 12 ATEX 091790 X			
Group, Category, Type of Protections, Temperature Classification	II 2 G Ex ib IIB T4 Gb			
QAN Certificate Number	ITS12ATEXQ7518			
Directive Conformity	EN 60079-0, EN 60079-11			



## Ordering Information

Model Number	Description
VS-2010	1/2" NPT Thread Process Head with permanently affixed cable
VS-2510	1/2" NPT Thread Process Head with M12X1, 8 pin male connector for detachable cable
VS-2025	1/2" NPT Thread Process Head with Quick Disconnect
VS-2 viscometer series	See Configurable Scheme below for Customized Product



## Special Order Options:

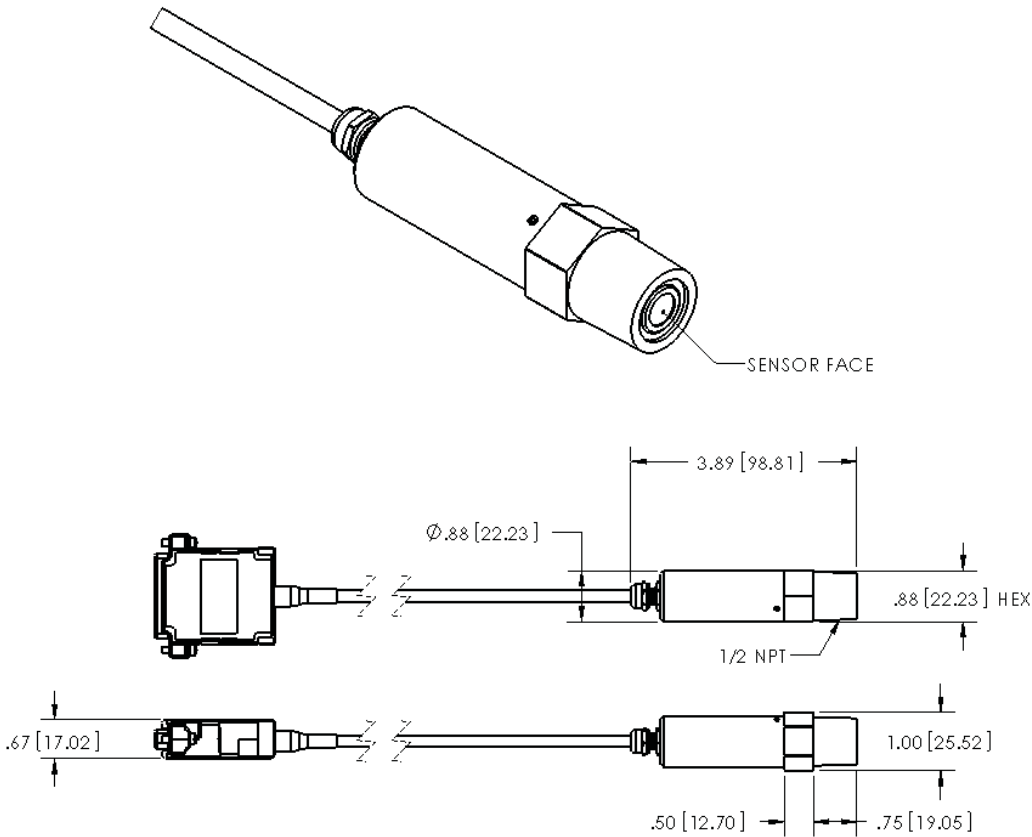
VS-2000 Series: 1/2" BSPT Thread; Quick Disconnect; Viscosity sensor with pigtail, and Non-Standard Cable Lengths.

VS-2500 Series: Cable to connect sensor to VisConnect™ VC-1000 series Communication Modules, standard cable lengths: 2m, 4m, 5m and 10m.

Please contact SenGenuity at [sensors@sengenuity.com](mailto:sensors@sengenuity.com) for further details.

## Physical Dimensions (VS-2000 Series)

Dimensions in inches (mm)



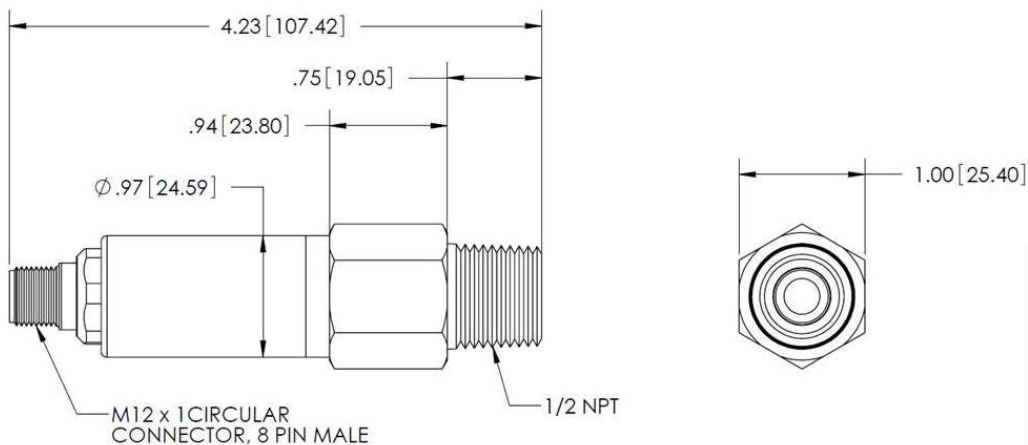
## DB-25 D-Sub Pinout

J1 SSI Connector: 25D connector - Female

Pin #	Name	Description
1	GND	Supply Voltage Return
2	NC	No Connection
3	NC	No Connection
4	NC	No Connection
5	NC	No Connection
6	NC	No Connection
7	NC	No Connection
8	NC	No Connection
9	NC	No Connection
10	NC	No Connection
11	NC	No Connection
12	NC	No Connection
13	NC	No Connection
14	V+	5-10Vdc Supply Input Voltage
15	NC	No Connection
16	NC	No Connection
17	A1	Chip Select Decode 1
18	NC	No Connection
19	NC	No Connection
20	NC	No Connection
21	NC	No Connection
22	SCK	Serial Clock
23	MOSI	Master Out/Slave In
24	A0	Chip Select Decode 0
25	MISO	Master In/Slave Out

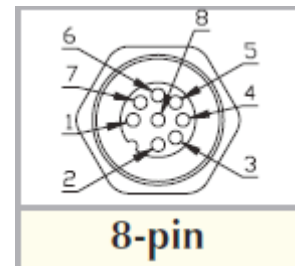
## Physical Dimensions (VS-2500 Series)

Dimensions in inches (mm)



## M12x1 Connector Pinout

Pin #	Name	Description
1	A1	Chip Select Decode 1
2	A0	Chip Select Decode 0
3	MISO	Master In/Slave Out
4	SCK	Serial Clock
5	GND	Supply Voltage Return
6	NC	No Connect
7	MOSI	Master Out/Slave in
8	V+	Supply Voltage Input



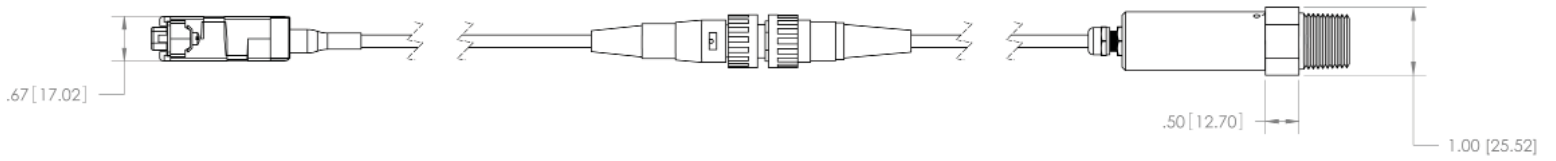
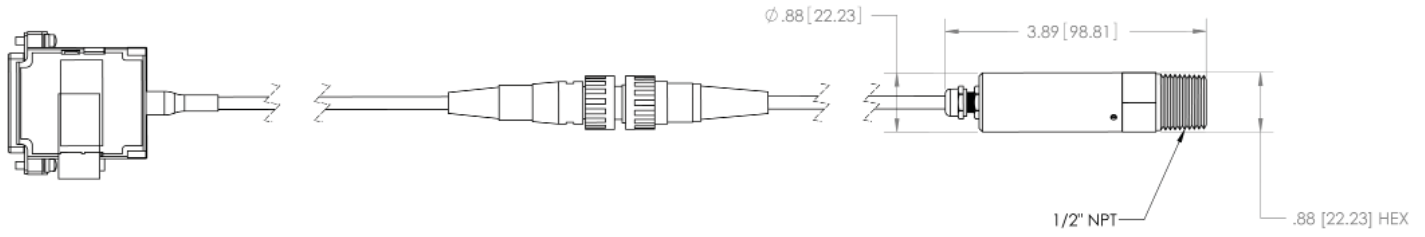
Product status and specifications are subject to change.

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# Quick Disconnect (VS-2025 Series)

Dimensions in inches (mm)



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