DVP

ULTRA HIGH ACCURACY SIMULTANEOUS DENSITY AND VISCOSITY METERING

rheonics

inline process
density and viscosity
monitoring

- Single instrument for both density and viscosity measurement to extremely high accuracy.
- Repeatable measurements in both newtonian and non-newtonian
- Hermetically sealed, all Titanium Grade 5 wetted parts
- Built in fluid temperature measurement

Specifications

Fluid Measurements

Viscosity Range	0.2 to 300 cP
Viscosity Accuracy	0.1 cP below 1 cP
	5% of reading (standard)
	higher accuracy available
Density Range	0–1.5 g/cc
Density Accuracy	0.001 g/cc
	higher accuracy available
Reproducibility	Better than 1% of reading
Temperature	Pt1000 (class AA)

Calibrated to NIST traceable viscosity and density standards.

Operational Environment

Process Fluid Temperature	-40 up to 200 °C
Ambient Temperature	-40 up to 150 °C
Pressure Range	up to 10,000 psi

Mechanical

Material (Wetted parts)	Titanium Grade 5
Diameter x Length	ø35 x 120 mm
Process Connection	1" NPT
	Flange & sanitary connections available
Ingress Protection	IP68
Electrical Connection	M12 (8-pin, A-coded)

Electronics & Communication

Analog output	4-20 mA (3 channel) {Viscosity, Density, Temp.}
Digital output	Modbus RTU (RS-485)
	Ethernet
	USB
Wireless output	Bluetooth LE 4.0

Display (SME-TRD)	Multi-line LCD (max. 55°c)
Operational temp.	max. 55 °C
Power supply	24 V DC
SME-TR(D)	IP65/66
SME-DRM	IP40/50
Software	Data acquisition and service control panel
	iOS and Android app

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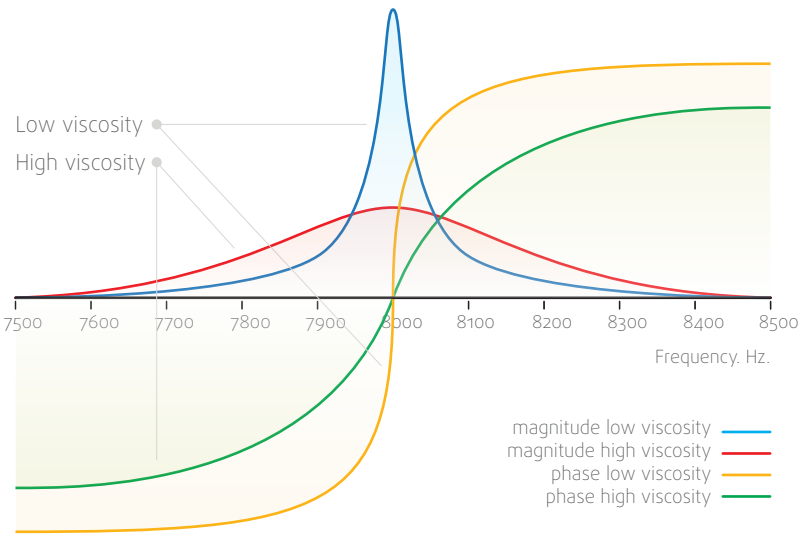
Operating principle

The rheonics DVP measures viscosity and density by means of a torsional tuning fork resonator with flattened tine ends, which is immersed in the fluid under test. The more viscous the fluid, the higher the mechanical damping of the resonator, and the denser the fluid, the lower its resonant frequency. From the damping and resonant frequency, the density and viscosity may be calculated by means of rheonics' proprietary algorithms. Thanks to rheonics' coupled torsional resonator design (US patent number 9518906), the transducer is perfectly balanced, while maintaining excellent mechanical isolation from the sensor's mounting.

Damping and resonant frequency are measured by the rheonics sensing and evaluation electronics (US patent number 8291750). Based on rheonics' proven gated phase-locked loop technology, the electronics unit offers stable and repeatable, high-accuracy readings over the full range of specified temperatures and fluid properties.



Response of the same resonator immersed in two fluids of different viscosities

Application

Metering and Interface detection

- Highly accurate and reliable density measurement
- Interface detection to recognize product change

Blending and Batching

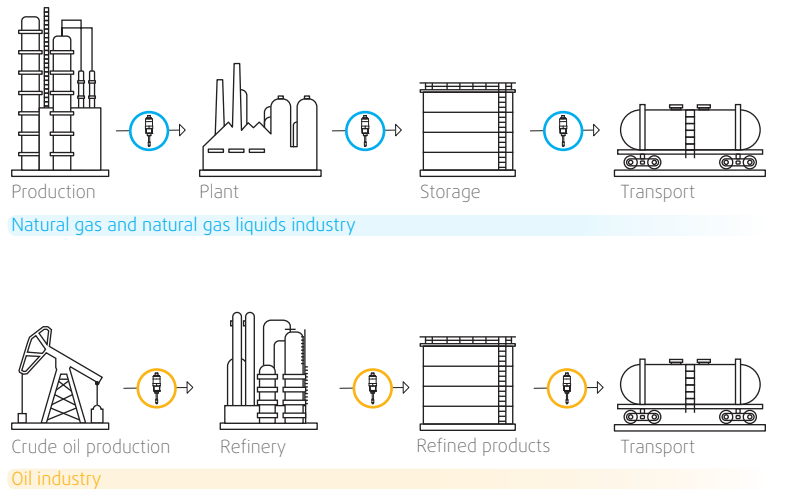
- Real-time molar ratio control in chemical reactions through continuous concentration measurement

Biofuels and Petroleum

- In Biofuel production monitor density to distinguish between raw materials and separated products
- In refinery distillation column, differentiate fractions based on density and viscosity - between gasoline, diesel, lubricant and marine fuel
- Continuous measurement - eliminate manual sampling and laboratory time
- Inspect quality of end product at refinery, gas station, in aeroplane and on ship
- Small form factor for direct installation in flow lines

Beverages and Dairy

- Concentration monitoring in soft drink blending
- Continuous sugar concentration read-out in fermentation
- Measure wort density in beer brewing
- Density monitoring across the dairy production process



Other applications:

- Continuous electrolyte density check in battery
- Adapt process to variable raw material quality (eg. due to stratification in tanks) by monitoring density and viscosity of the raw material in realtime
- Measure concentration of lime slurry (calcium hydroxide)
- Ink and coating density and viscosity monitoring for equipment control and QA
- Lubricant density and viscosity monitoring
- Fuel consumption (density) and quality (density, viscosity) monitoring

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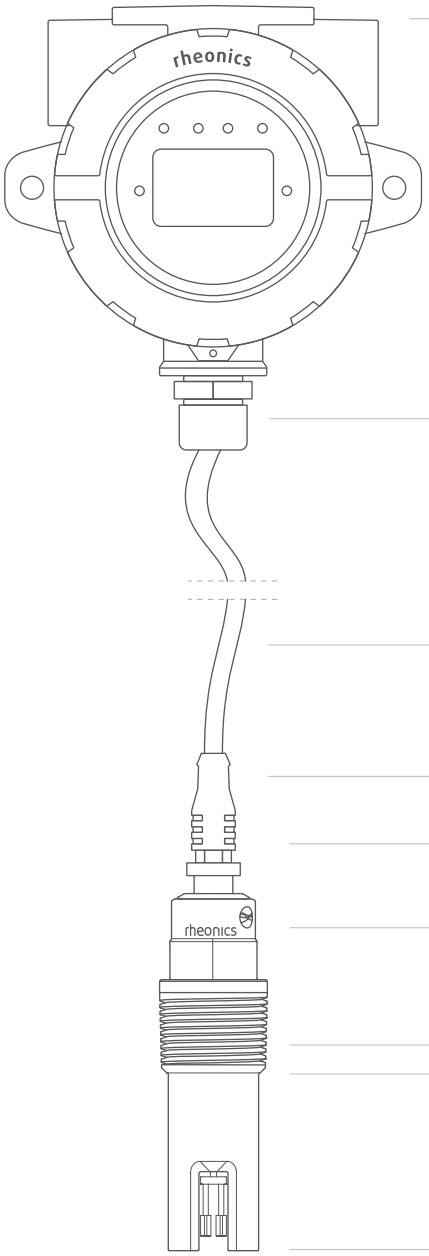
Mechanical & Electrical



Cable Gland
- Standard
- Ex Rated

Sensor Cable
- Up to 30m

M12 connector
- (IP67 | IP68 | IP69)

Ø26mm

Electronics (select between)

SME-TRD

SME-TR

- Transmitter housing (IP66)
- Onsite and remote installation of electronics head
- Available with and without rugged display for field use

SME-DRM

- DIN rail mount
- Extra-small form factor for easy installation
- Ethernet connection
- External adapters for wifi

Mechanical

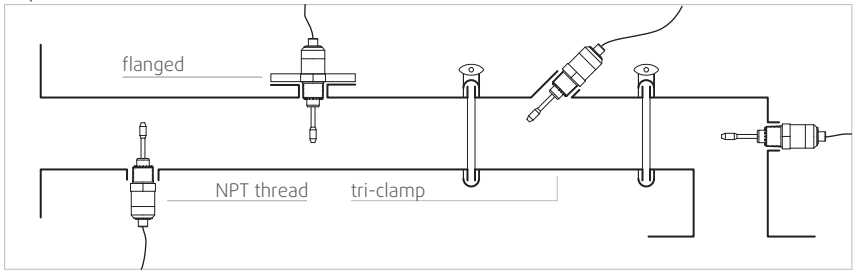
- Titanium Grade 5
- Available with custom coatings
- Long insertion adapters for installation in larger pipes and tanks

Process connection

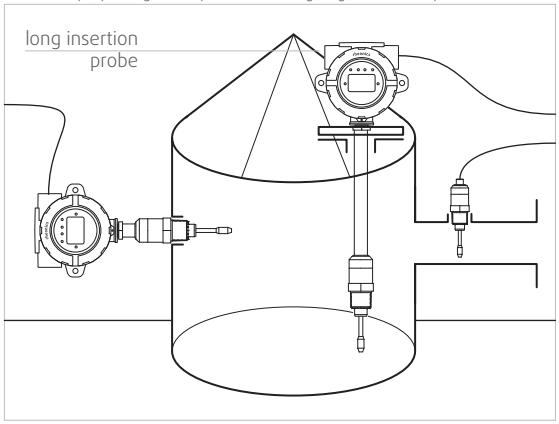
- 1" NPT (standard)
- Adapters available for Flange and Tri-clamp
- Sanitary fittings optional

Mounting

Pipe †any configuration possible



Tank †any configuration possible including long insertion adapters



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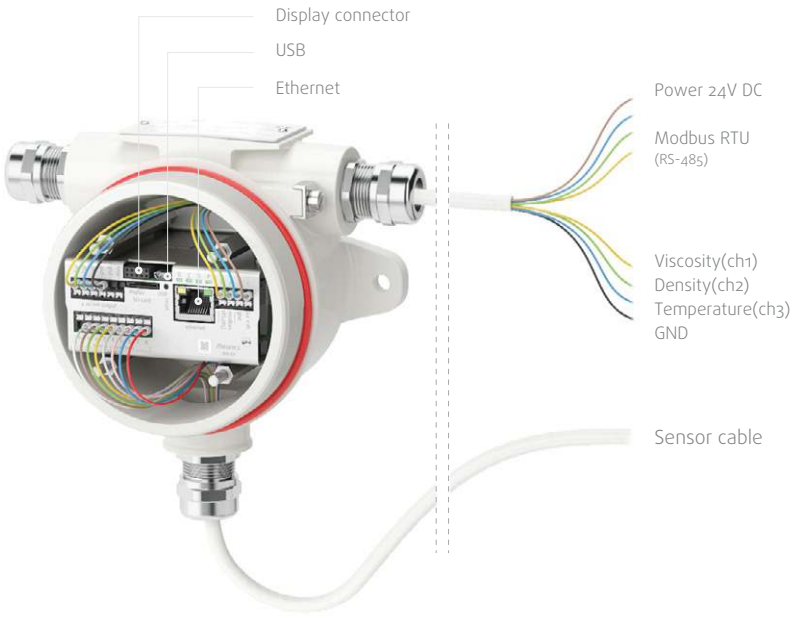
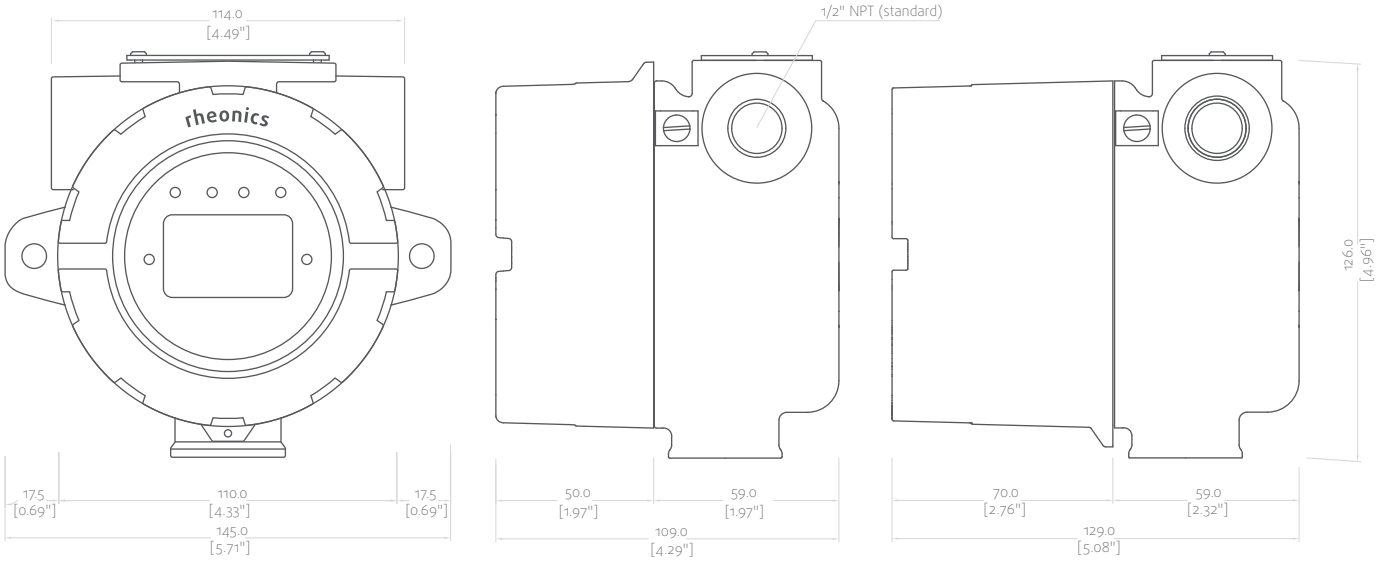
Electronics installation



Industrial high-contrast LCD
Bluetooth LE 4.0
Status LED

Dimensions



SME-TR SME-TRD

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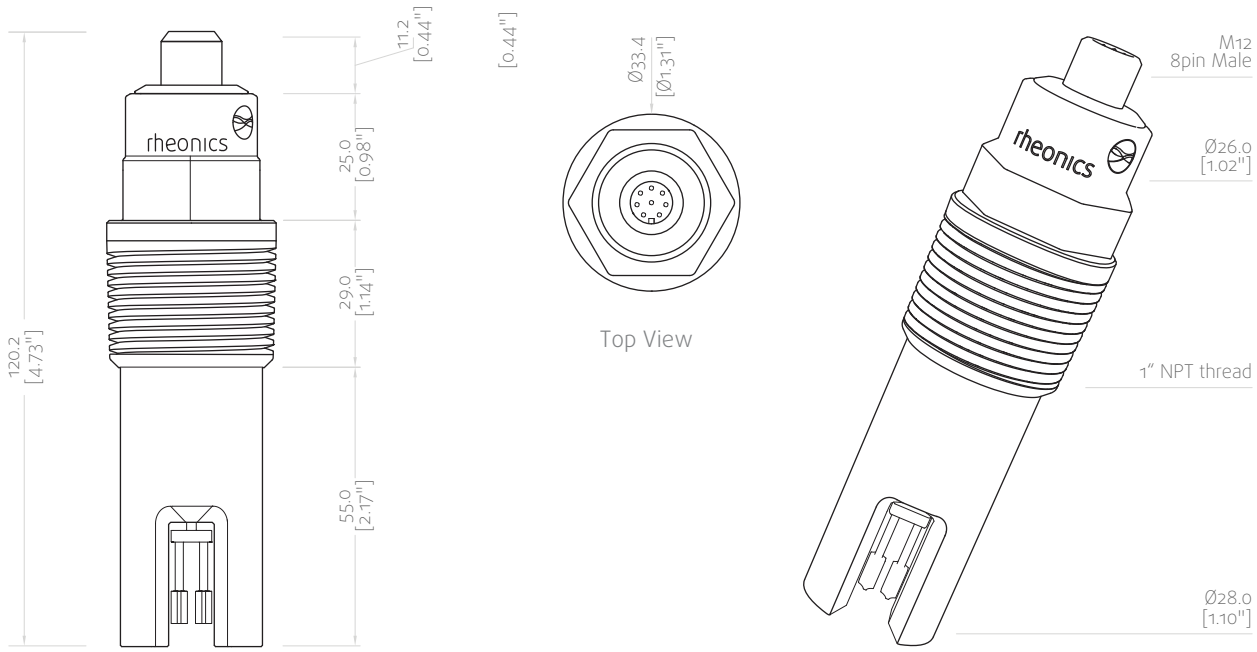
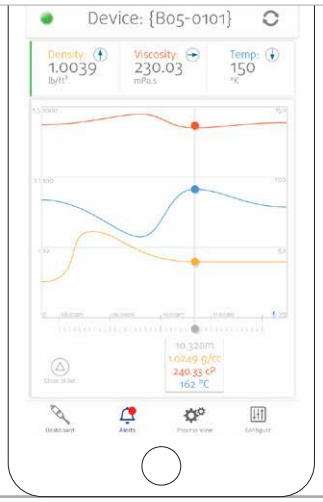
DVP dimensions



Software

rheonics Application



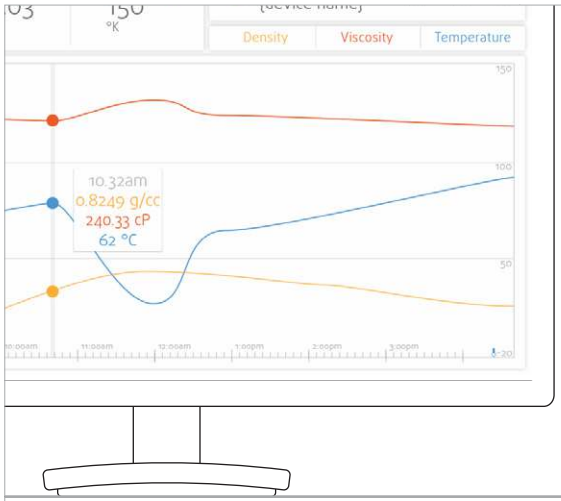
Connect using:

- Bluetooth
- Cloud

- Real-time data
- Process view
- Alerts
- Configure

- Android
- IOS

PC Data Acquisition & Analysis



Connect over:

- USB
- Ethernet

- Bluetooth
- Cloud
- Configure sensor
- Check calibration
- Firmware upgrade

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Ordering

Ordering code example

DVP	V1	STD	D1	DCAL1	E1	C1,C2	T1	P1	X1
	Viscosity range	V. Calibration	Density range	D. Calibration	Electronics	Communication	Temperature	Pressure	Process Connection

Order code	Name	Short description
Viscosity range (select all)		
V1	0.2 - 300 cP	Standard calibrated range
V2	custom	Customer specified calibration range (max. 500 cP)
Viscosity Calibration (select all)		
STD	Standard calibration	
CUS	Customer specific calibrations - specify viscosity range, accuracy required and operational conditions	
Density range (select all)		
D1	0 - 1.5 g/cc	Standard range
D2	custom	Customer specified range (max. 4 g/cc)
Density Calibration (select all)		
DCAL1	0.001 g/cc	Standard calibration accuracy
DCAL2	0.0001 g/cc or better	Customer specific calibrations - specify density range, accuracy required and operational conditions
Electronics (select one)		
E1	SME-TRD	Transmitter housing with display
E2	SME-TR	Transmitter housing with solid cover
E3	SME-DRM	DIN-rail mount housing
Communication (select all)		
C1	4-20 mA	3 channels of 4-20 mA analog signal
C2	Modbus RTU (RS-485)	Modbus RTU over RS-485
C3	USB	USB 2.0 compliant service and data acquisition port
C4	Ethernet	Ethernet TCP/IP with RJ45 connector
C5	Bluetooth LE 4.0	Bluetooth module for short range communication, only available with display module
Temperature (select one)		
T1	125 °C	Sensor rated for operation in process fluids up to 125 °C (250 °F)
T2	150 °C	Sensor rated for operation in process fluids up to 150 °C (300 °F)
T3	175 °C	Sensor rated for operation in process fluids up to 175 °C (350 °F)
T4	200 °C	Sensor rated for operation in process fluids up to 200 °C (400 °F)
Pressure (select one)		
P1	70bar (1000 psi)	Sensor rated for process fluids pressure up to 70bar (1000 psi)
P2	350bar (5000 psi)	Sensor rated for process fluids pressure up to 350bar (5000 psi)
P3	700bar (10,000 psi)	Sensor rated for process fluids pressure up to 700bar (10,000 psi)
Process Connection (select one)		
X1	1" NPT	Standard
X2	Flange	Threaded Flange adapter, specify DN/PN
X3	Tri-clamp	Threaded TC adapter, specify size

Accessories		
Sensor cable	5m, 10m, 30m	8 core cable for connecting sensor to transmitter (PUR or PEEK sheaths)
Cable gland	1/2" NPT	1/2"NPT Standard and Ex cable glands
Transmitter mounting bracket		Mounting bracket for SME-TR and SME-TRD transmitter housings

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