SRD

INLINE PROCESS DENSITY METER AND VISCOMETER

rheonics

inline process
density and viscosity
monitoring

- Simultaneous density and viscosity monitoring in diverse processes
- Repeatable measurements in both Newtonian and non-Newtonian
- Hermetically sealed, available in 316L stainless steel and Hastelloy C22 wetted parts
- Built in fluid temperature measurement

Specifications

Fluid Measurements

Viscosity Range	1 to 3,000 cP wider range available
Viscosity Accuracy	5% of reading (standard) 1% & higher accuracy available
Density Range	0.0 - 4.0 g/cc 0.0 - 33.4 lb/gal
Density Accuracy	0.001 g/cc 0.008 lb/gal
Reproducibility	Better than 0.1% of reading
Temperature	Pt1000 (DIN EN 60751 class B)

Calibrated to NIST traceable viscosity and density standards.

Operational Environment

Process Fluid Temperature	-40 up to 285 °C -40 up to 545 °F
Pressure Range	up to 10,000 psi up to 690 bar

Mechanical

Material (Wetted parts)	Stainless steel 316L Hastelloy C22
Variant	Flush, Short, Long insertion
Process Connection	Threaded, Flange, Sanitary EHEDG certified hygienic available
Ingress Protection	IP69K Limited by the M12 connector IP rating
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 (Ethernet/IP, Modbus TCP, Profinet) USB HART
Wireless output	Bluetooth LE 4.0

Display	Multi-line LCD (SME-TRD)
Operational temp.	-20 to 65 °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

Protected by US and International patents granted and pending

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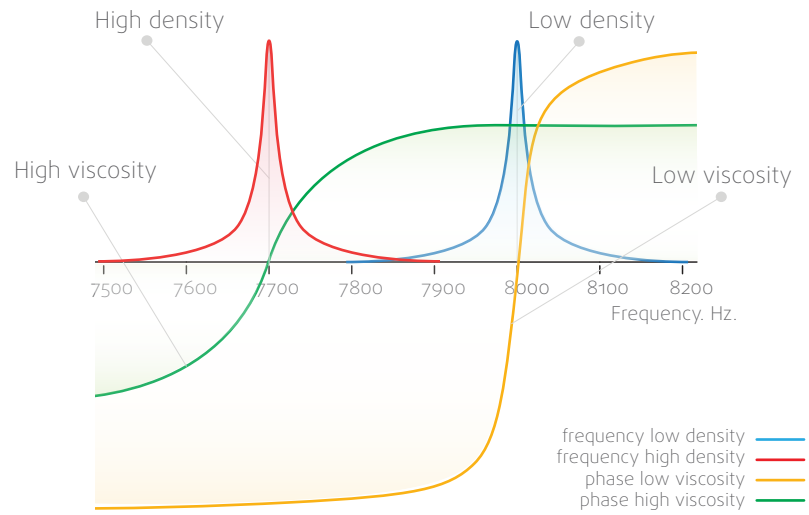
Operating principle

The rheonics SRD measures viscosity and density by means of a balanced torsional resonator, the finned end of 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' symmetric resonator design (US patent number 9267872), the transducer is isolated from the fluid in a hermetically sealed capsule, 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 densities and viscosities

Application

Battery electrode slurry mixing and coating

- Real-time monitoring of battery electrode slurry solid content
- Continuous monitoring of viscosity to ensure tight coating thickness control

Metering and Interface detection

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

Blending and Batching

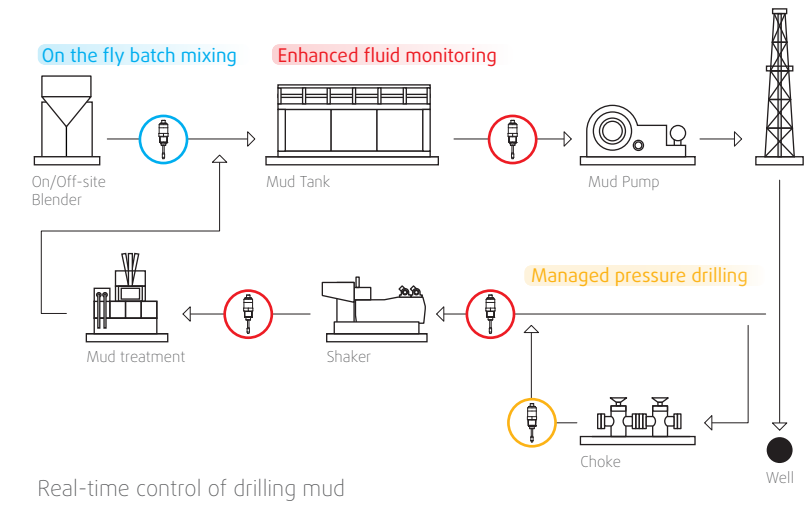
- Real-time molar ratio control in chemical reactions through continuous concentration measurement

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

Beverages and Dairy

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



Real-time control of drilling mud

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 real-time
- 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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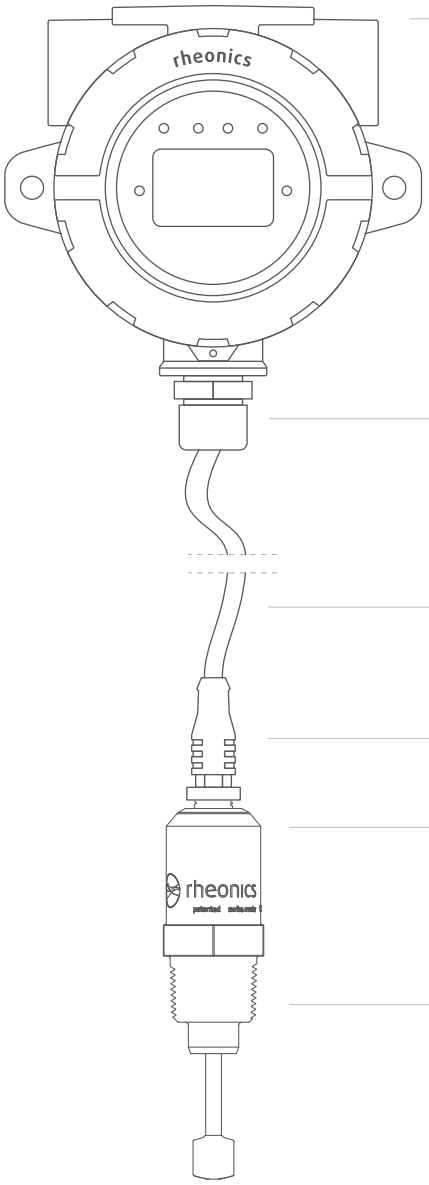
Mechanical & Electrical



Cable Gland
- Standard
- Ex Rated

Sensor Cable
- Up to 1500m (4921 ft.)

M12 connector
- IP67 | IP68 | IP69K

Electronics (select between)

SME-TRD

SME-TR

- IP66 enclosures
- Onsite and remote installation of electronics head
- Available with and without display for field use

SME-DRM

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

Process fluid wetted materials available

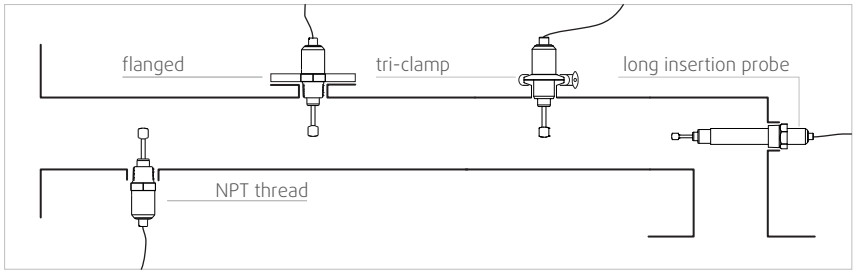
- 316L stainless steel (standard)
- Available with custom coatings, Hastelloy C22

Process connection

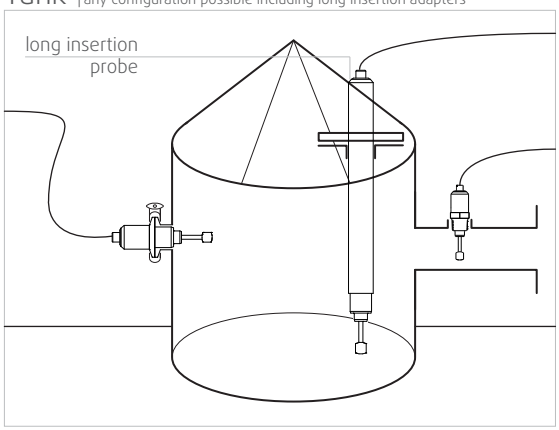
- Flush, Short and Long insertion probes
- Threaded, Flange, Tri-clamp, Varinline, Ingold, API, 6A
- EHEDG certified hygienic version

Mounting

Pipe †any configuration possible



Tank †any configuration possible including long insertion adapters



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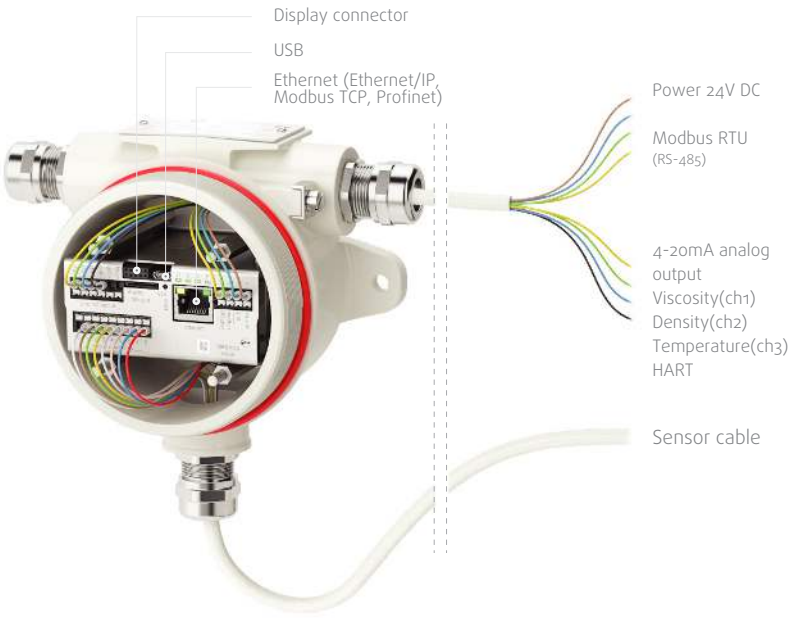
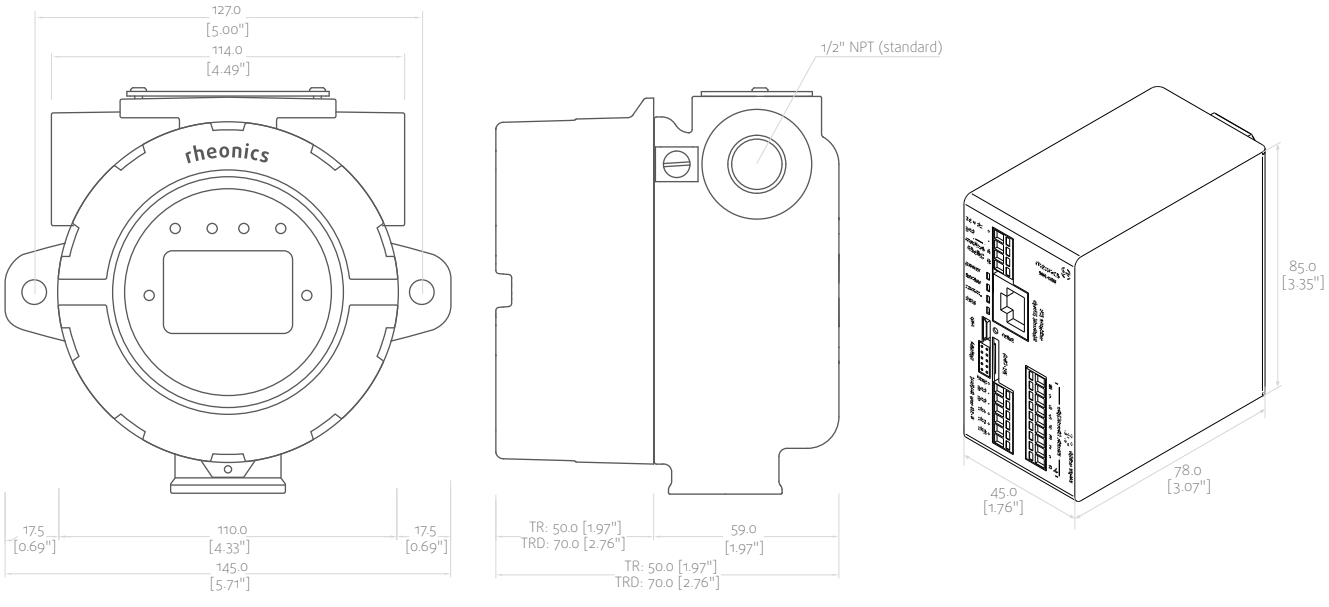
Electronics installation



Industrial high-contrast LCD
Bluetooth LE 4.0
Status LED

Dimensions



Units: mm [inch]

SME-TR / SME-TRD

SME-DRM

The sizes provided are approximate and may not be exact.

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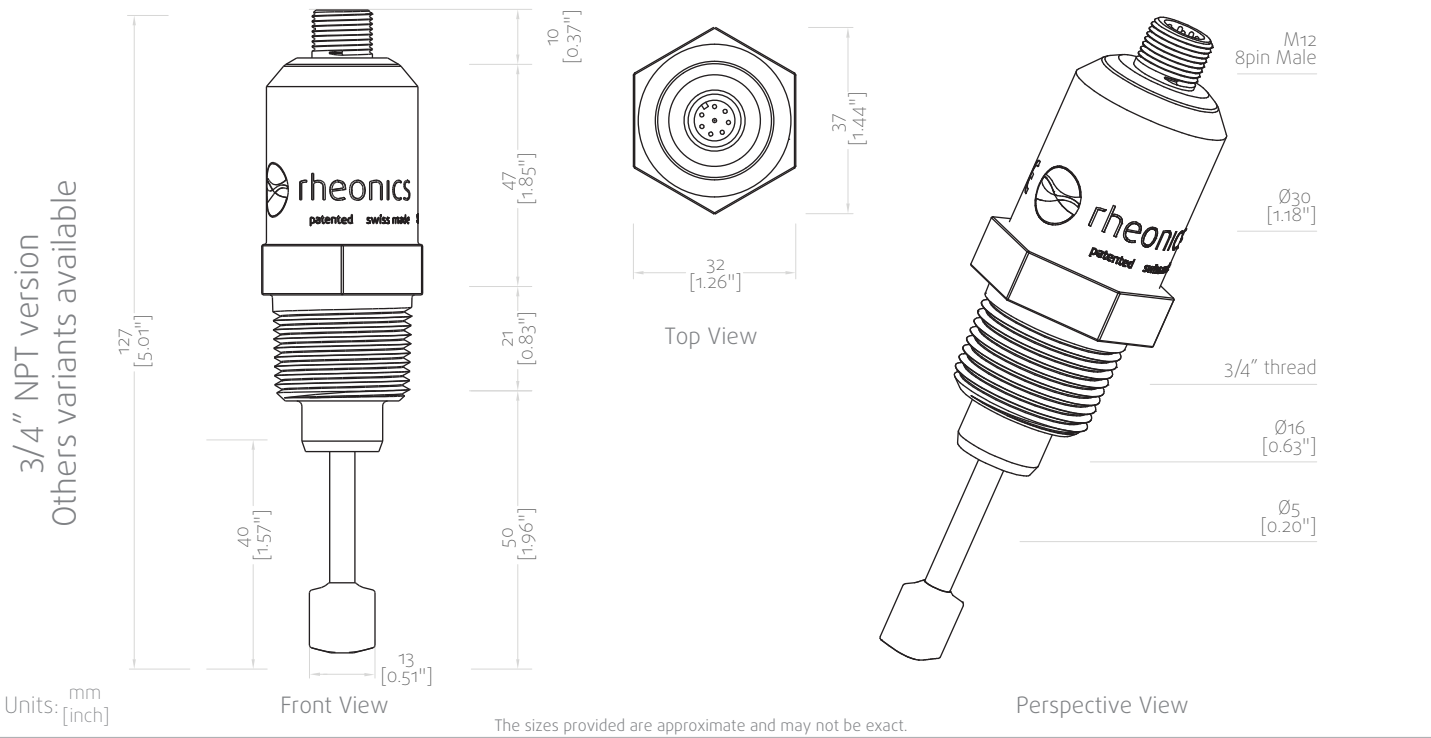
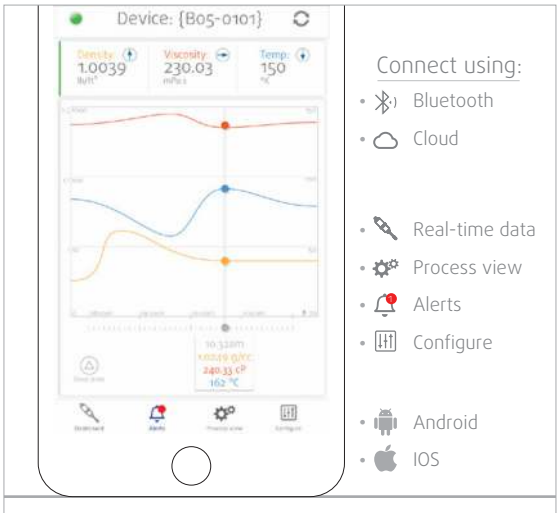
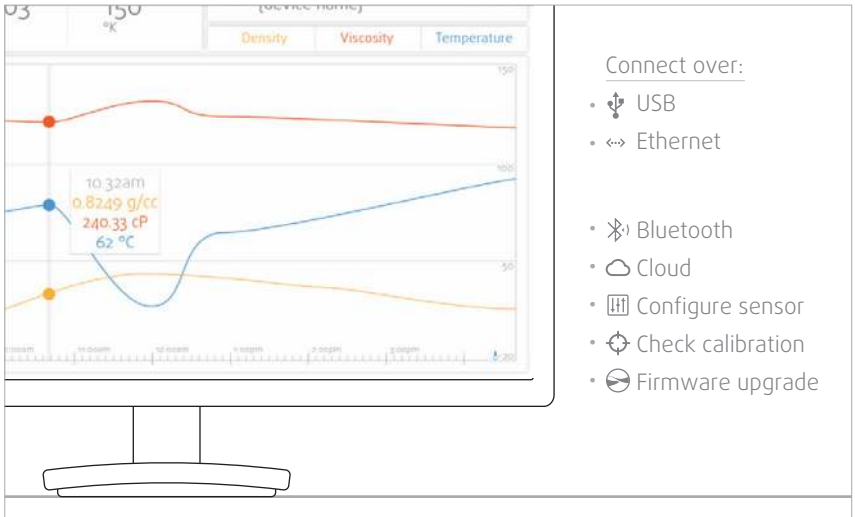


Software

rheonics Application



PC Data Acquisition & Analysis



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Ordering

We recommend using the online RFQ form: https://rheonics.com/request-for-quotation/

For sensor accessories visit: https://rheonics.com/product-accessories/

Ordering code example

SRD	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 one)		
V1	1 - 3000 cP	Standard calibrated range
V2	custom	Customer specified calibration range (max. 7,500 cP)
Viscosity Calibration (select one)		
STD	Standard calibration	
CUS	Customer specific calibrations - specify viscosity range and accuracy required	
Density range (select one)		
D1	0.0 - 1.5 g/cc	Standard range (0.0 - 12.5 lb/gal)
D2	custom	Customer specified range (max. 4 g/cc - 4000 kg/m^3 - 33.4 lb/gal)
Density Calibration (select one)		
DCAL1	0.01 g/cc	Standard calibration accuracy
DCAL2	0.001 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 over RJ45 connector
C5	Bluetooth LE 4.0	Bluetooth module for short range wireless communication, only for E1
C6	Modbus TCP	Modbus TCP over Ethernet
C7	Ethernet/IP	Ethernet/IP protocol
C8	HART	HART over analog channels
C9	Profinet	Profinet protocol
Temperature (select one)		
T1	125 °C (250 °F)	Sensor rated for operation in process fluids up to 125 °C (250 °F)
T2	150 °C (300 °F)	Sensor rated for operation in process fluids up to 150 °C (300 °F)
T3	200 °C (400 °F)	Sensor rated for operation in process fluids up to 200 °C (400 °F)
T4	Max. operating temp.	Specify your required maximum temperature
Pressure (select one)		
P1	15 bar (200 psi)	Sensor rated for process fluids pressure up to 15 bar (200 psi)
P2	70 bar (1000 psi)	Sensor rated for process fluids pressure up to 70 bar (1000 psi)
P3	200 bar (3000 psi)	Sensor rated for process fluids pressure up to 200 bar (3000 psi)
P4	350 bar (5000 psi)	Sensor rated for process fluids pressure up to 350 bar (5000 psi)
P5	500 bar (7500 psi)	Sensor rated for process fluids pressure up to 500 bar (7500 psi)
Process Connection (select one)		
X1	Threaded	Threaded process connection - 3/4" NPT or G1/2"
X2	Custom flange	Flange adapter, specify DN/PN - Hygienic EHEDG certified version available
X3	Tri-clamp	Tri-clamp flange, specify size - Hygienic EHEDG certified version available
X4	Flush variant	Flush probe, specify flange - Hygienic EHEDG certified version available
X5	FPC variant	Long insertion probe, specify insertion length and flange - Hygienic EHEDG certified version available

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