# 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, single- and multi-phase fluids
- Hermetically sealed, all 316L stainless steel wetted parts
- Built in fluid temperature measurement

## Specifications

### Fluid Measurements

| | |
|---|---|
| Viscosity Range | 1 to 3,000 cP<br>wider range available |
| Viscosity Accuracy | 5% of reading (standard)<br>1% & higher accuracy available |
| Density Range | 0.4 - 4.0 g/cc |
| Density Accuracy | 0.01 g/cc<br>0.001 g/cc & higher accuracy available |
| Reproducibility | Better than 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 200 °C |
| Ambient Temperature | -40 up to 150 °C |
| Pressure Range | up to 5,000 psi |

### Mechanical

| | |
|---|---|
| Material (Wetted parts) | 316L Stainless Steel |
| Diameter x Length | ø35 x 140 mm |
| Process Connection | 3/4" NPT<br>Flange & sanitary connections available |
| Ingress Protection | IP68 |
| Electrical Connection | M12 (8-pin, A-coded) |

## Electronics & Communication

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

| | |
|---|---|
| Display<br>(SME-TRD) | Multi-line LCD<br>(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<br>iOS and Android app |

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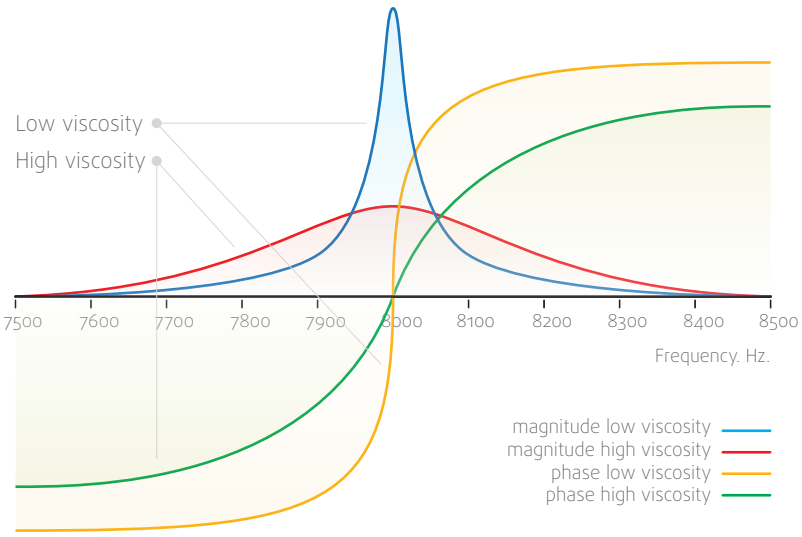
## Operating principle

The rheonics SRD measures viscosity and density by means of a 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 viscosities

## Application

### Metering and Interface detection

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

### Blending and Batching

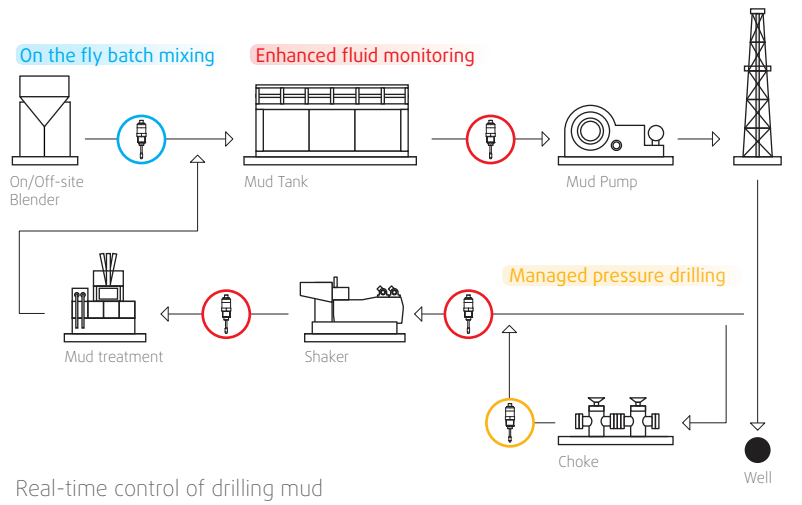
- Real-time molar ratio control in chemical reactions through continuous concentration measurement

### 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




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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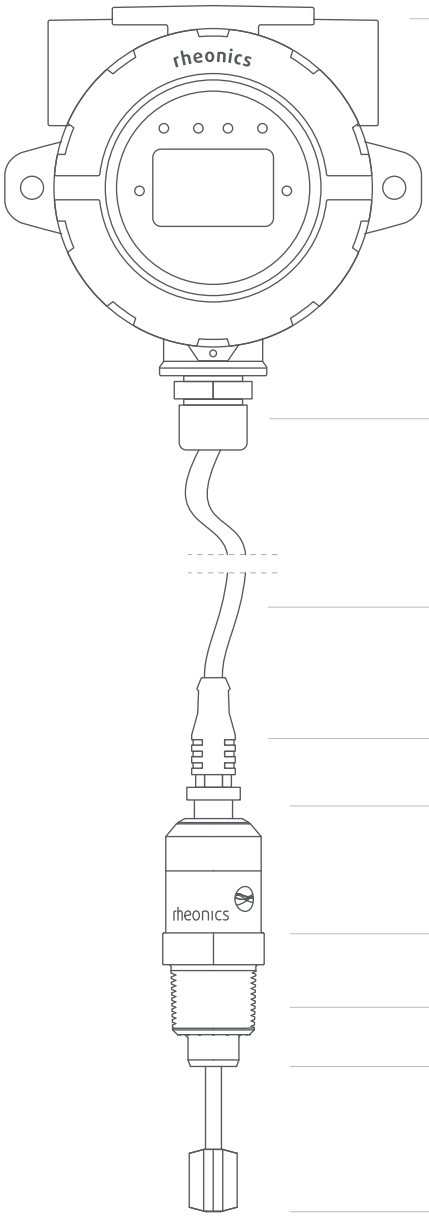
## Mechanical & Electrical




### Cable Gland
- Standard
- Ex Rated

### Sensor Cable
- Up to 30m

### M12 connector
- (IP67 | IP68 | IP69)

Ø35mm

45.7mm

## 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

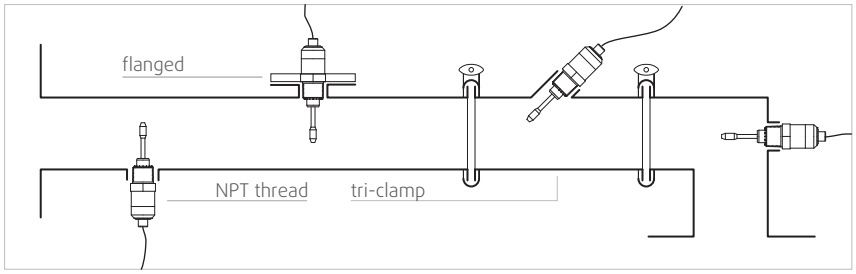
- 316L stainless steel (standard)
- Available with custom coatings
- Long insertion adapters for installation in larger pipes and tanks

## Process connection

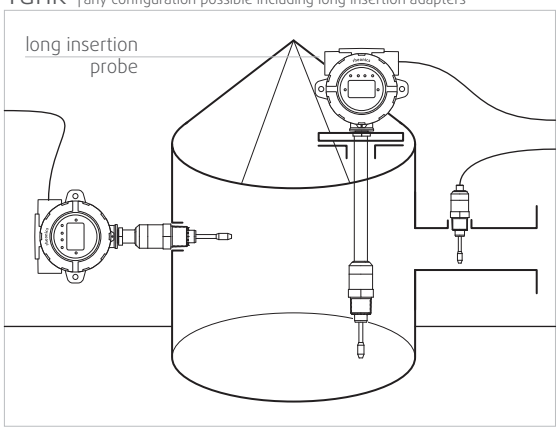
- 3/4" NPT (standard)
- Adapters available for Flange and Tri-clamp
- Sanitary fittings optional

## Mounting

### Pipe †any configuration possible




### Tank †any configuration possible including long insertion adapters



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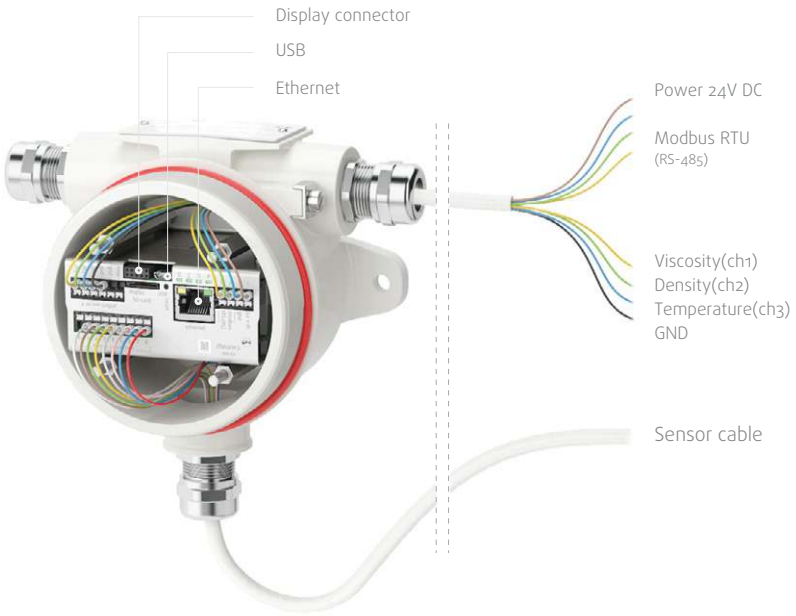
## Electronics installation



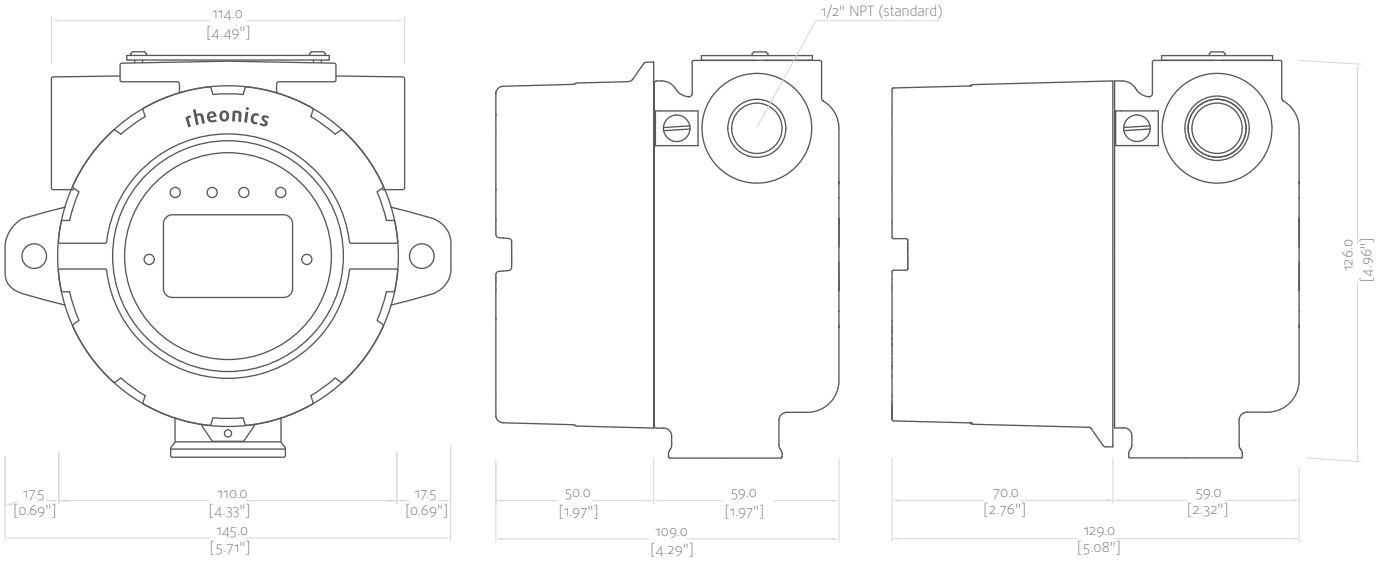


Industrial high-contrast LCD

Bluetooth LE 4.0

Status LED

## Dimensions




SME-TR

SME-TRD

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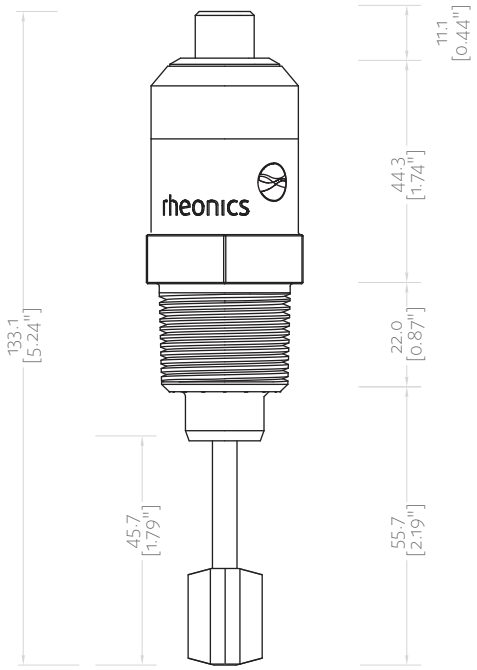
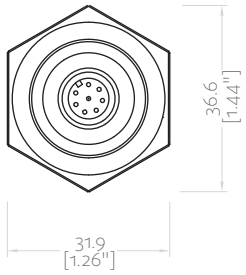
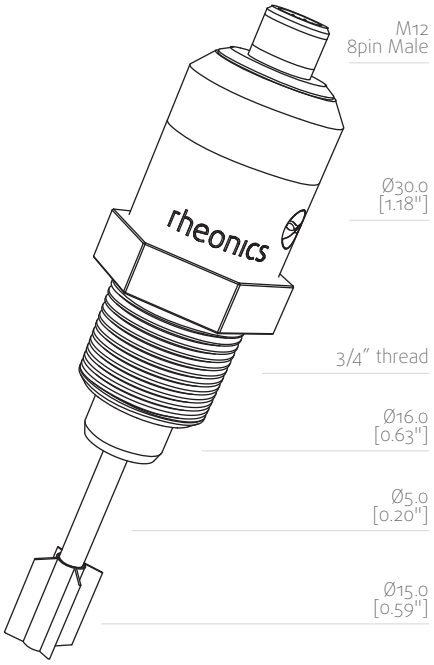
## SRD dimensions




Front View



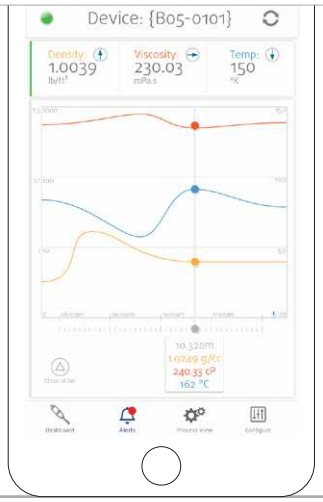

Top View




Perspective View

## 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

| 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 all)** | | |
| V1 | 1 - 3000 cP | Standard calibrated range |
| V2 | custom | Customer specified calibration range (max. 10,000 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 | 0.4 - 1.5 g/cc | Standard range |
| D2 | custom | Customer specified range (max. 4 g/cc) |
| **Density Calibration (select all)** | | |
| 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 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 | 200 °C | Sensor rated for operation in process fluids up to 200 °C (400 °F) |
| T4 | > 200 °C | Sensor rated for operation in process fluids above 200 °C (>400 °F) |
| **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) |
| **Process Connection (select one)** | | |
| X1 | 3/4" 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 |

## Contact Information


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