



rheonics

inline process
density and viscosity
monitoring

SRD

INLINE PROCESS DENSITY METER AND VISCOMETER

- 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 <small>wider range available</small> |
| Viscosity Accuracy | 5% of reading (standard) <small>1% & higher accuracy available</small> |
| Density Range | 0.0 - 4.0 g/cc <small>0.0 - 33.4 lb/gal</small> |
| Density Accuracy | 0.001 g/cc <small>0.008 lb/gal</small> |
| 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 <small>-40 up to 545 °F</small> |
| Pressure Range | up to 10,000 psi <small>up to 690 bar</small> |

Mechanical

| | |
|-------------------------|---|
| Material (Wetted parts) | Stainless steel 316L Hastelloy C22 |
| Variant | Flush, Short, Long insertion |
| Process Connection | Threaded, Flange, Sanitary <small>EHEDG certified hygienic available</small> |
| Ingress Protection | IP69K <small>Limited by the M12 connector IP rating</small> |
| Electrical Connection | M12 (8-pin, A-coded) |



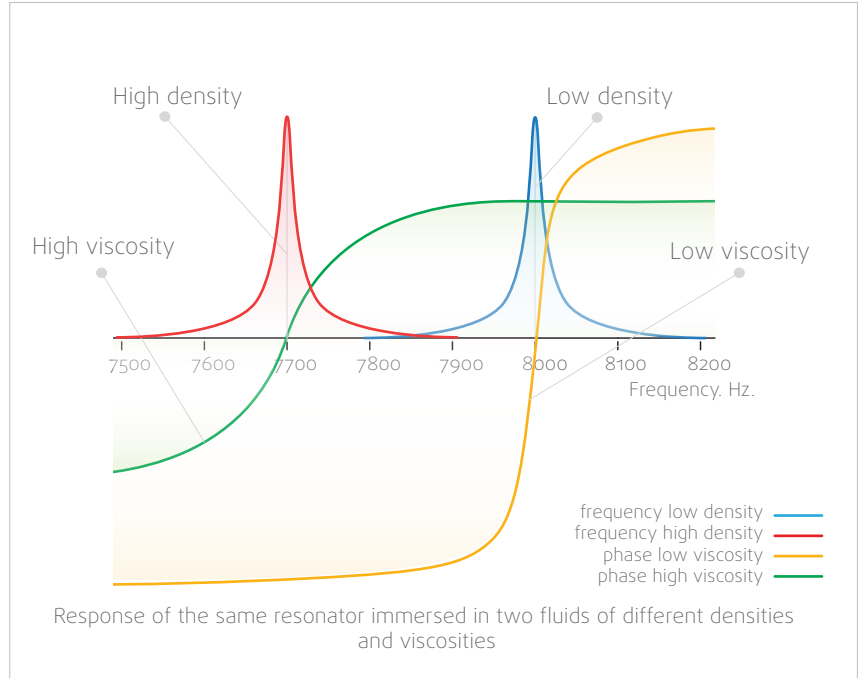
Electronics & Communication

| | | | |
|-----------------|---|-------------------|---|
| Analog output | 4-20 mA (3 channel) <small>{Viscosity, Density, Temp.}</small> | Display | Multi-line LCD <small>(SME-TRD)</small> |
| Digital output | Modbus RTU (RS-485) Ethernet (Ethernet/IP, Modbus TCP, Profinet) USB HART | Operational temp. | -20 to 65 °C |
| Wireless output | Bluetooth LE 4.0 | 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

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.



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

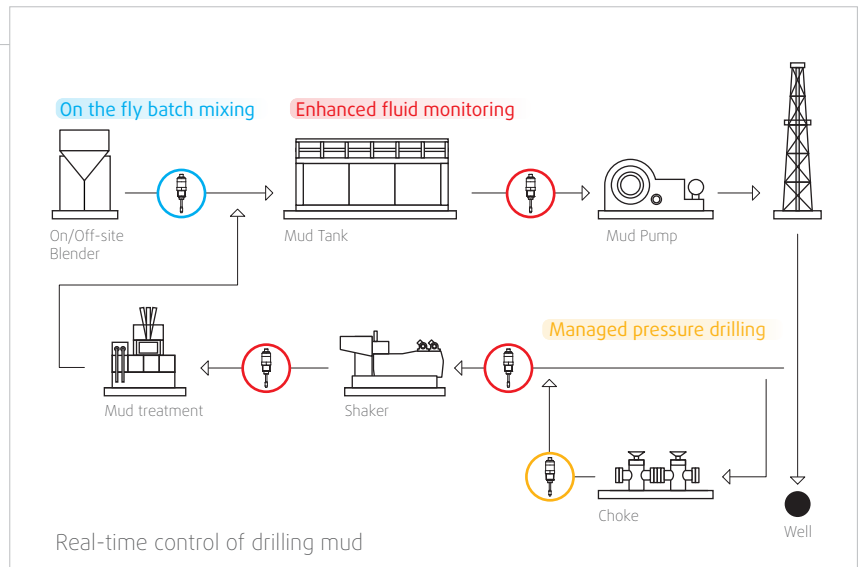
- Real-time molar ratio control in chemical reactions through continuous concentration measurement

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

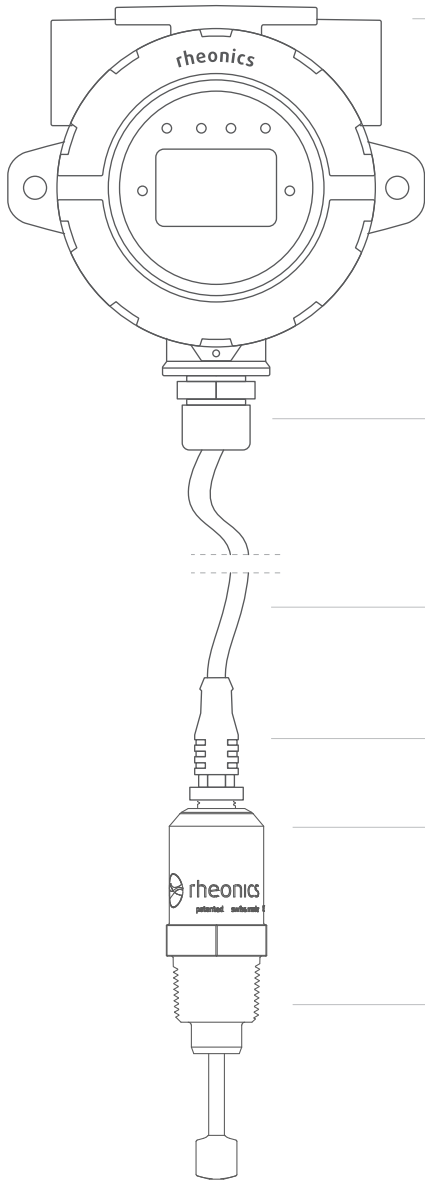
- Continuous sugar concentration read-out in fermentation
- Measure wort density in beer brewing
- Density monitoring across the dairy production process



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

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

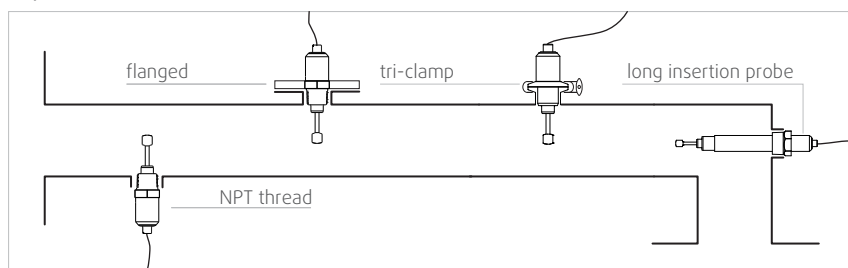
- 316L stainless steel (standard)
- Available with custom coatings, Hastelloy C22

Process connection

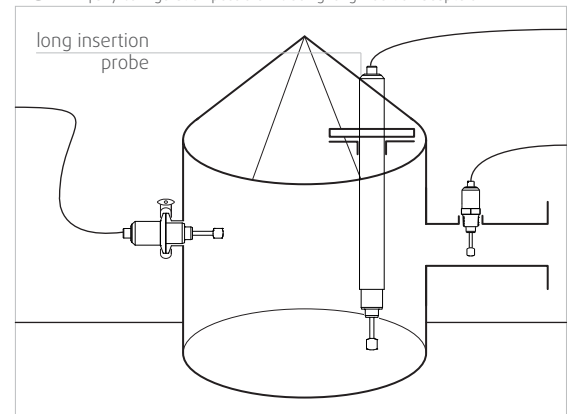
- Flush, Short and Long insertion probes
- Threaded, Flange, Tri-clamp, Varinline, Ingold, API, 6A
- EHEDG certified hygienic version

Mounting

Pipe †any configuration possible



Tank †any configuration possible including long insertion adapters





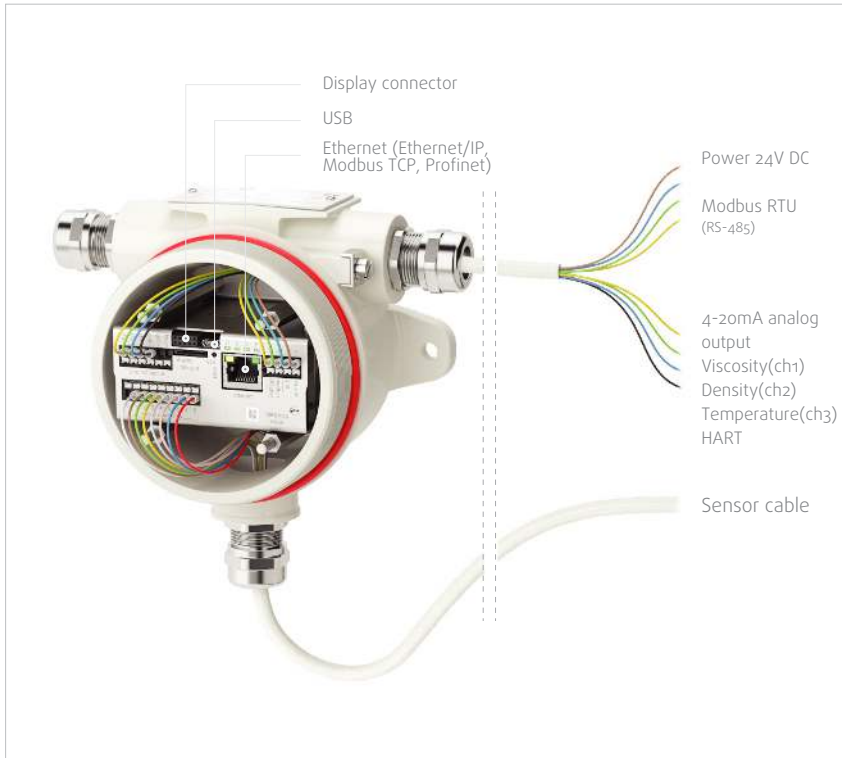
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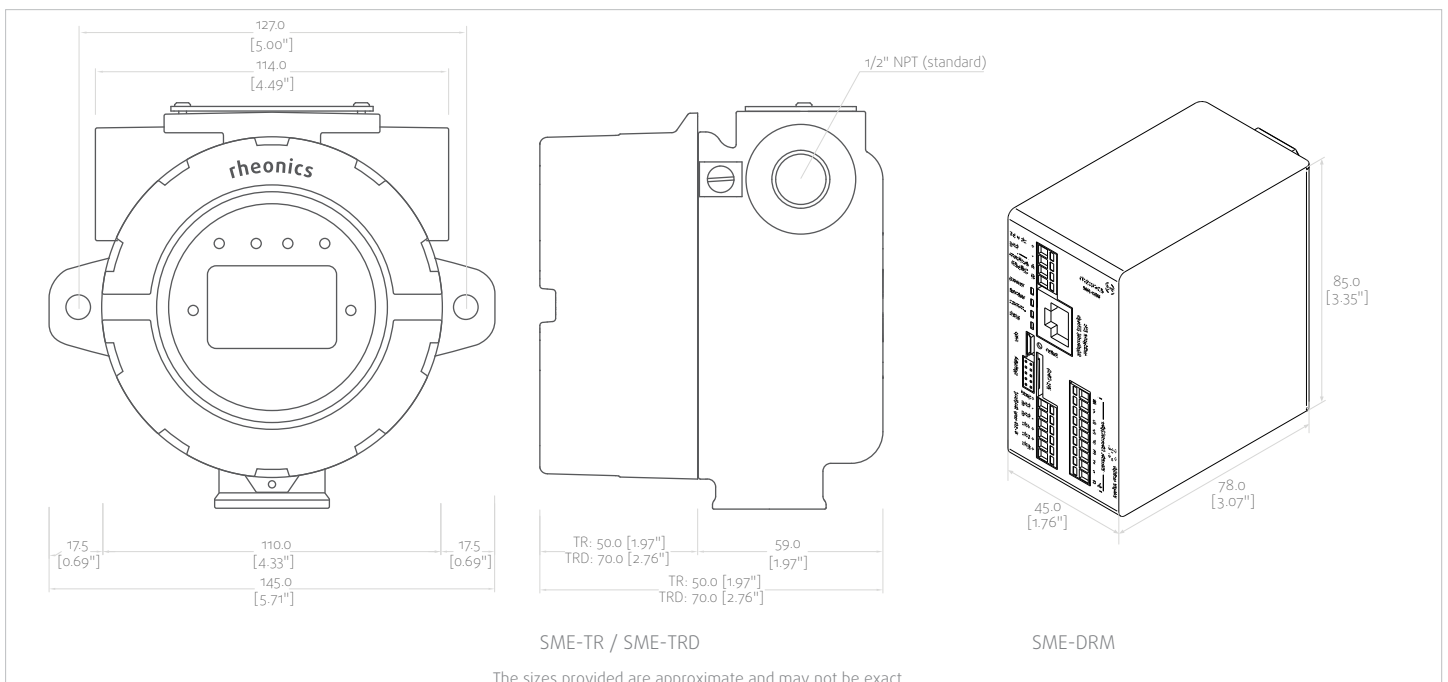
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Electronics installation



Dimensions





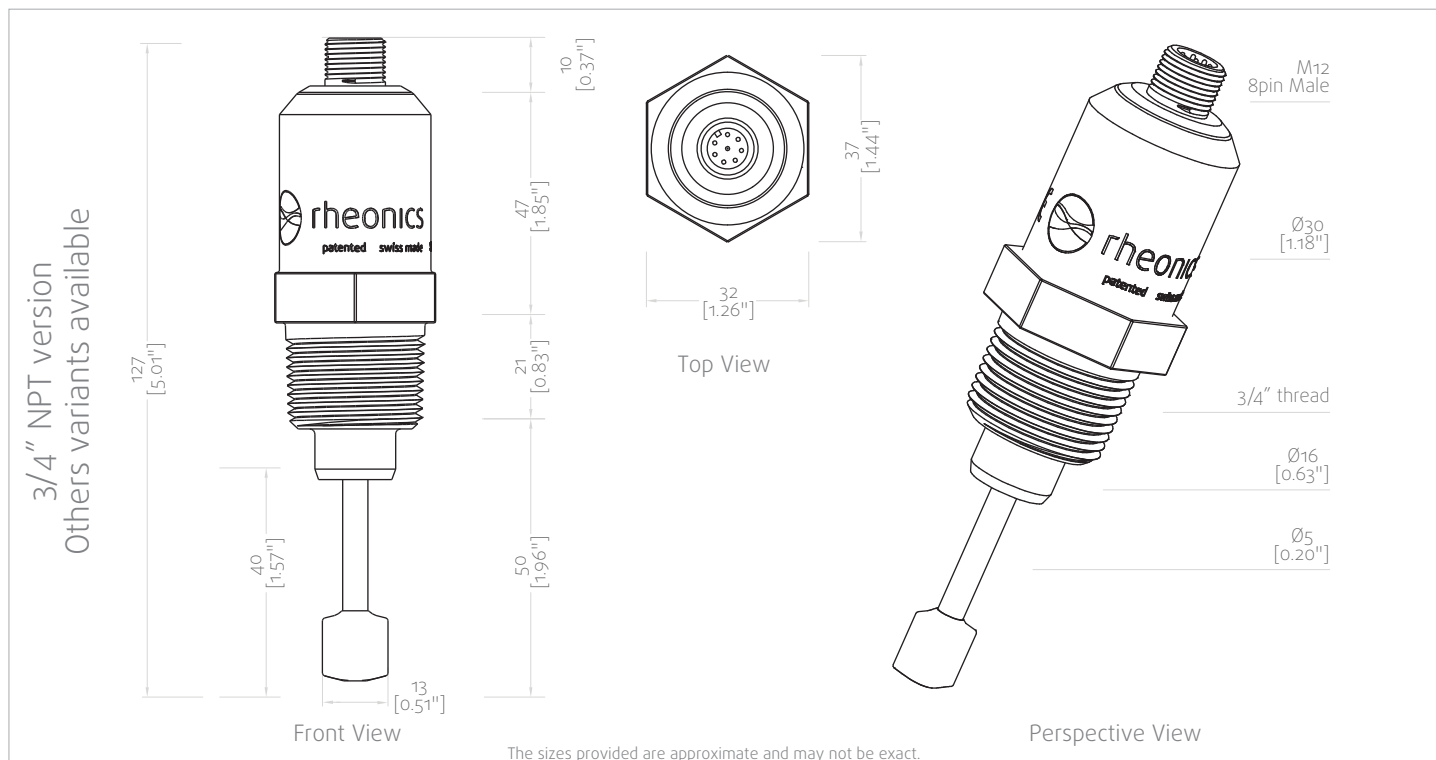
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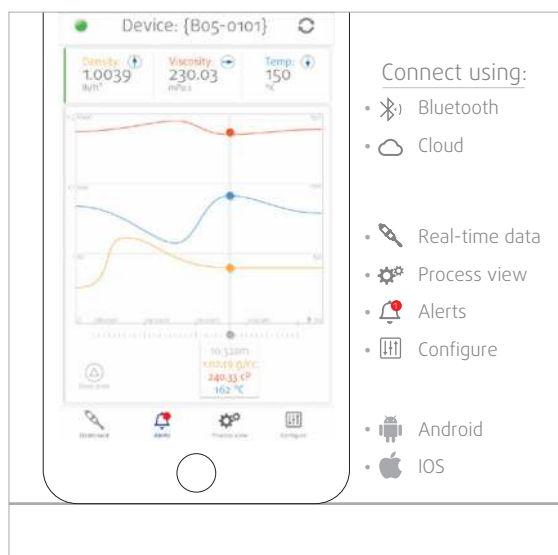
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SRD dimensions

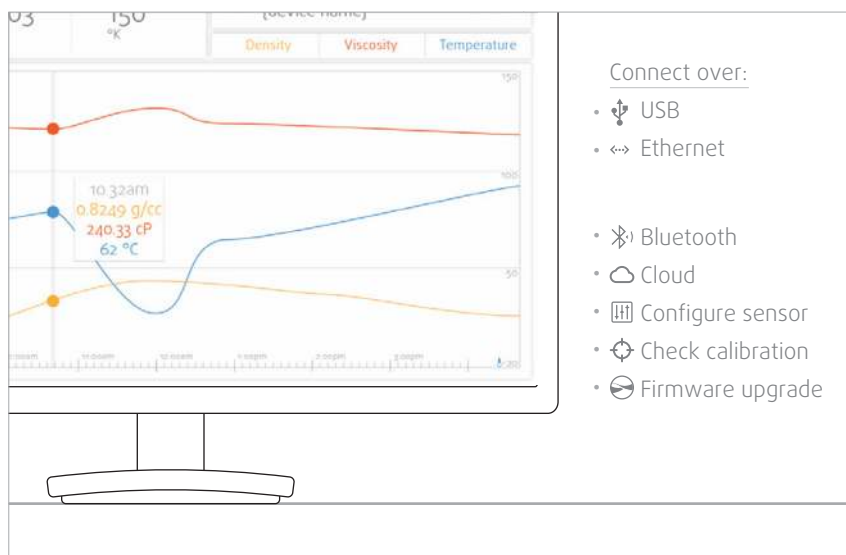


Software

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 all) | | |
| V1 | 1 - 3000 cP | Standard calibrated range |
| V2 | custom | Customer specified calibration range (max. 7,500 cP) |
| Viscosity Calibration (select all) | | |
| STD | Standard calibration | |
| CUS | Customer specific calibrations - specify viscosity range and accuracy required | |
| Density range (select all) | | |
| 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 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 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 | 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 | Hygienic | Specify Hygienic connection required |
| X5 | FPC version | Long insertion probe, specify insertion length and flange - Hygienic EHEDG certified version available |

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†subject to change without notice

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