

SRD

INLINE PROCESS DENSITY METER AND VISCOMETER



- Online, real-time, simultaneous density, viscosity and temperature monitoring
- Repeatable measurements in both Newtonian and non-Newtonian fluids
- Hermetically sealed, available in 316L stainless steel and Hastelloy C22 wetted parts
- Available with EX certifications, Hygienic certified designs and with wide range of process connections

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
Variants	Flush, Short, Long, Slim, Reactor
Process Connection	Threaded, Flange, Sanitary <small>EHEDG and 3-A certified hygienic available</small>
Ingress Protection	IP69K <small>Limited by the M12 connector IP rating</small>
Electrical Connection	M12 (8-pin, A-coded)



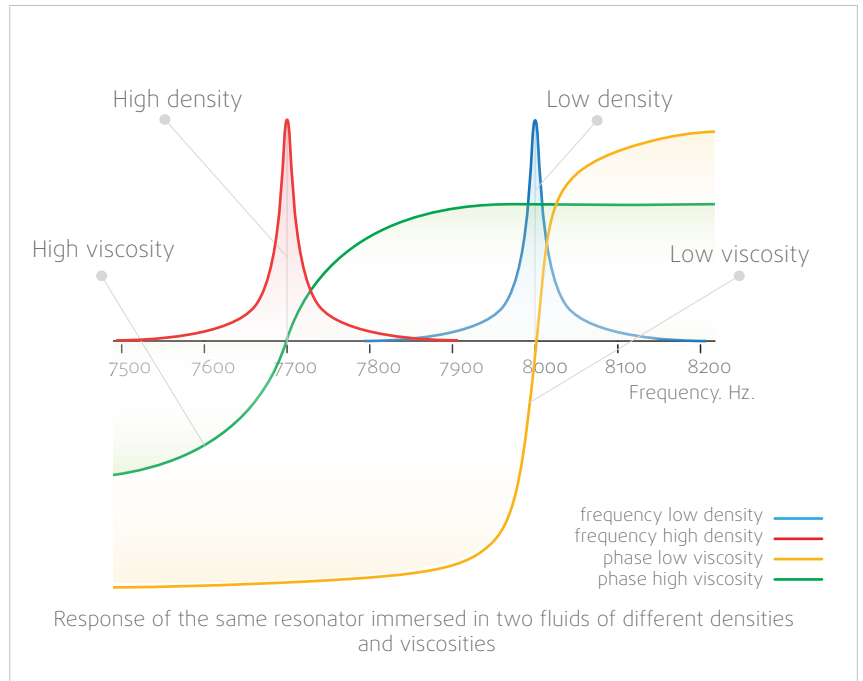
Electronics & Communication

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

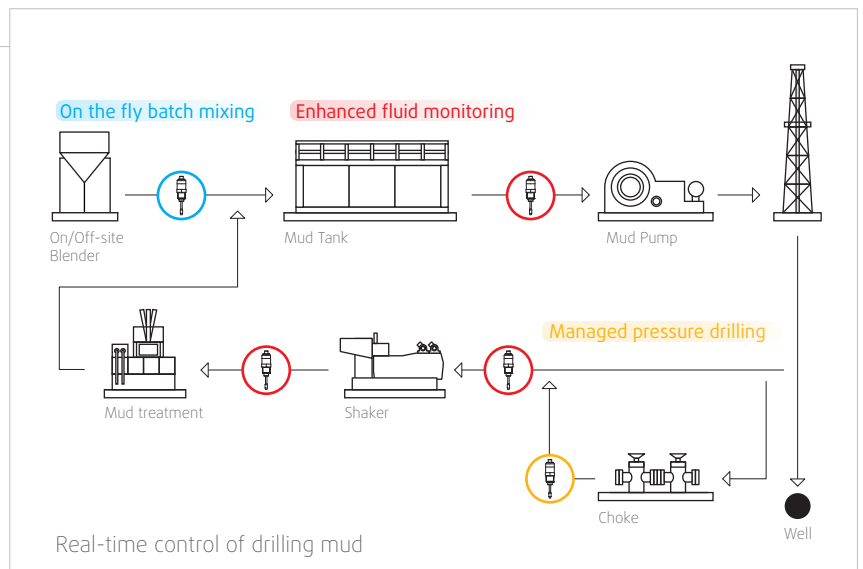
- Real-time molar ratio control in chemical reactions through continuous concentration measurement

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

Drilling Mud

- Drilling fluid's density and viscosity inline readings
- Measure fluid's carrying capacity and gel development
- Keep drilling rate constant with density monitoring



Other applications:

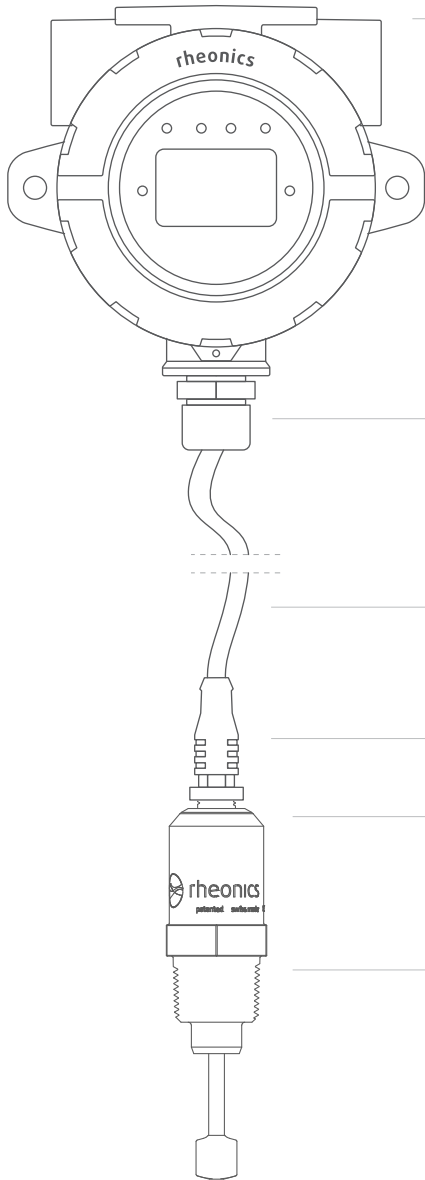
- Continuous electrolyte density check in battery
- Adapt process to variable raw material quality (eg. due to stratification in tanks) by monitoring density and viscosity of the raw material in real-time
- Measure concentration of lime slurry (calcium hydroxide)
- Ink and coating density and viscosity monitoring for equipment control and QA
- Lubricant density and viscosity monitoring
- Fuel consumption (density) and quality (density, viscosity) monitoring
- Beverage and dairy (sugar concentration in fermentation, wort beer brewing, etc.)

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Mechanical & Electrical



Cable Gland

- Standard

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

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

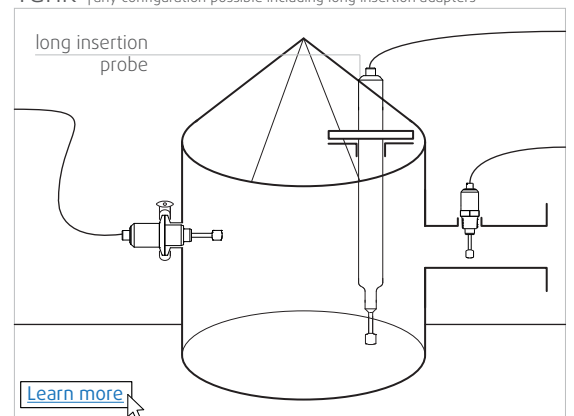
Process connection

- Flush, Short and Long insertion, slimline, reactor probes
- Threaded, Flange, Tri-clamp, Varinline, Ingold, API, 6A
- EHEDG and 3-A certified hygienic version

Ex Certified sensors

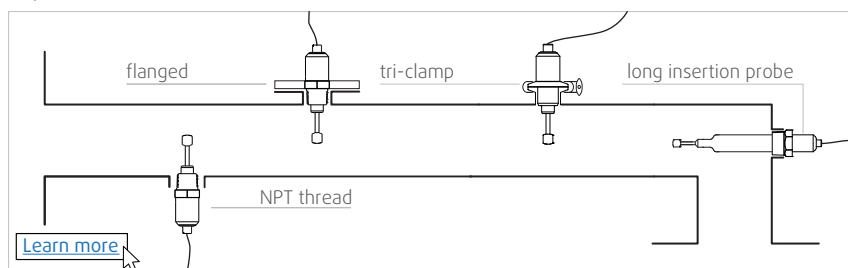
- Intrinsically safe
- Covers full Ex temperature range
- IECEx, ATEX, JPEX, others

Tank †any configuration possible including long insertion adapters



Mounting

Pipe †any configuration possible

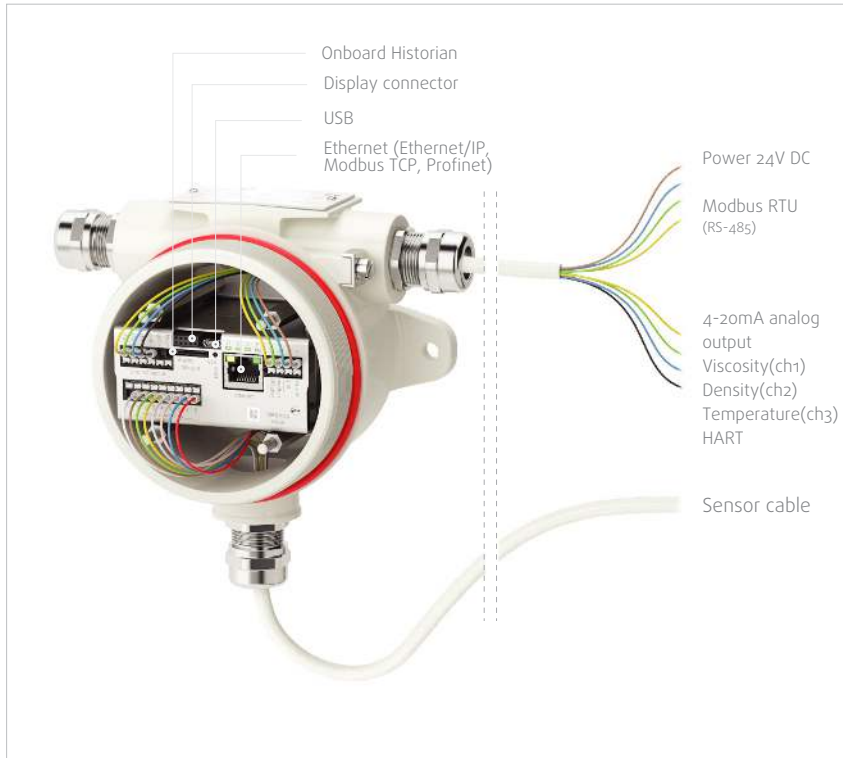


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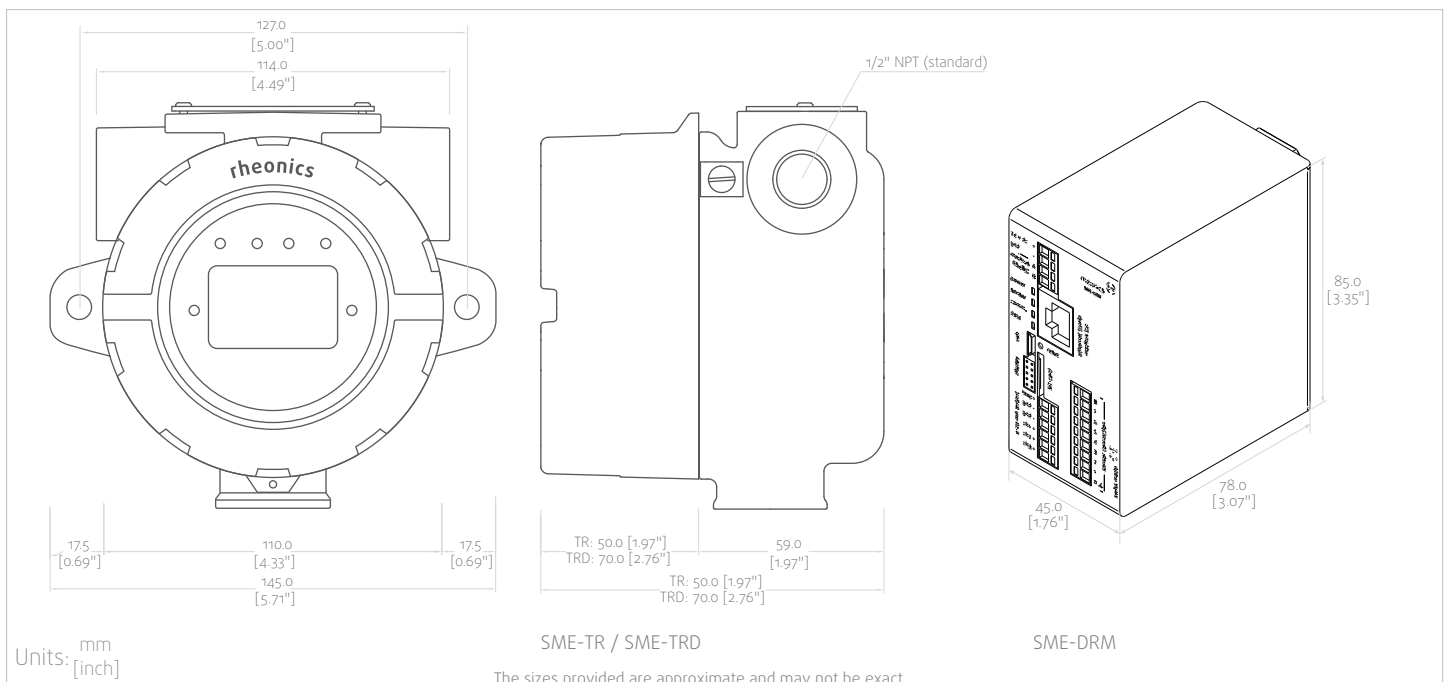
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Electronics installation



Dimensions

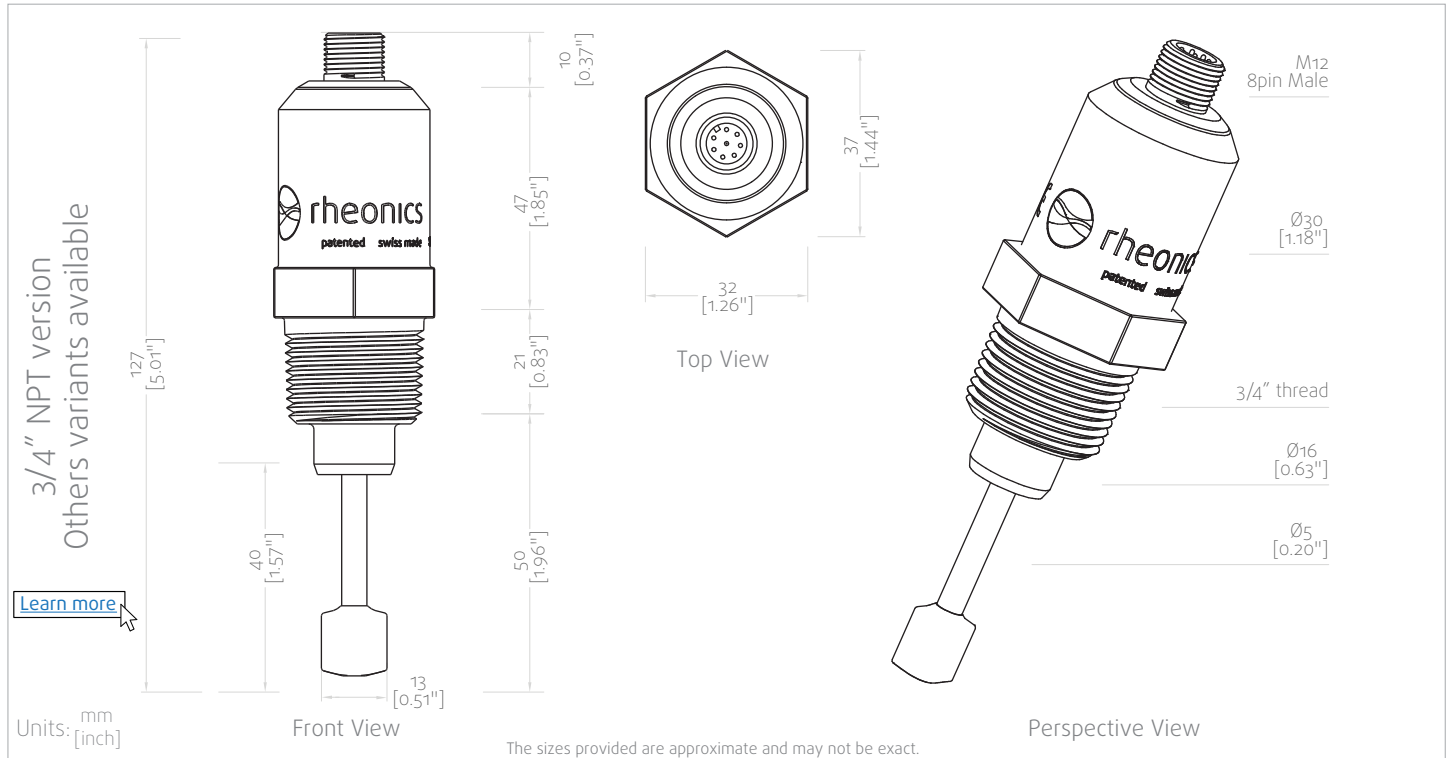


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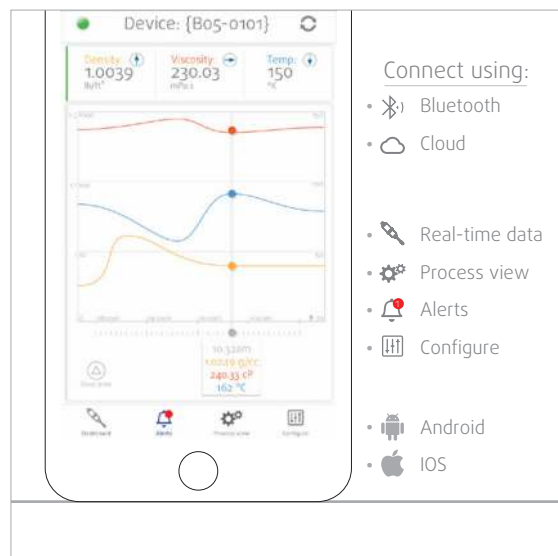


SRD dimensions

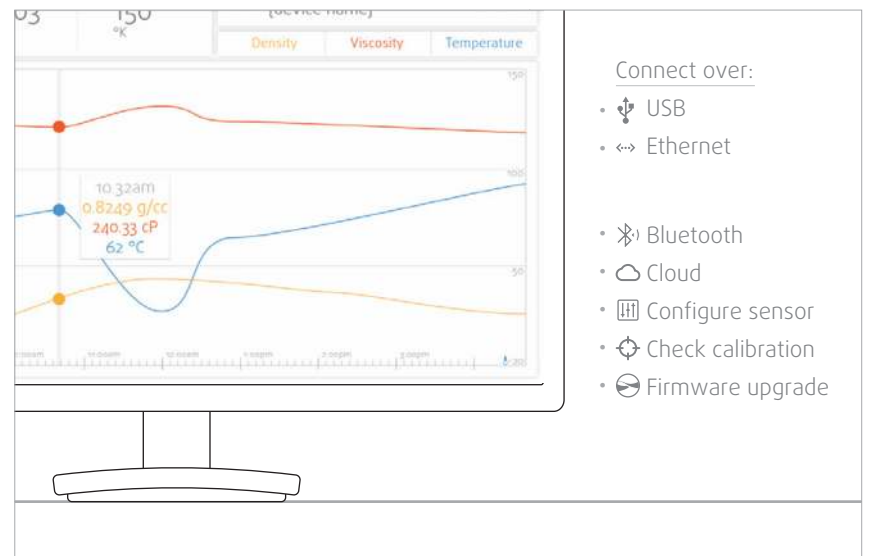


Software

rheonics Application



PC Data Acquisition & Analysis



Ordering

We recommend using the online RFQ form: <https://rheonics.com/request-for-quotation/>
Ordering code example

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

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

Order code	Name	Short description
Density Range (select one)		
D1	0.0 - 1.5 g/cc	Standard range (0-1500 kg/m ³ 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 (Calibrated range: 0.4-1.5 g/cc)
DCAL2	0.001 g/cc	Higher density accuracy - specify density range and operational conditions
Viscosity Range (select one)		
V1	0 - 3000 cP	Standard calibrated range
V2	custom	Customer specified calibration range (max. 7,500 cP)
Viscosity Calibration (select one)		
STD	Standard calibration (Calibrated range: 3 - 3000 cP)	
CUS	Customer specific calibrations - specify viscosity range and accuracy required	
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 or 3-A certified version available
X3	Tri-clamp	Tri-clamp flange, specify size - Hygienic EHEDG or 3-A certified version available
X4	Flush variant	Flush probe, specify flange - Hygienic EHEDG or 3-A certified version available
X5	Long insertion variant	Long insertion probe, specify insertion length and flange - Hygienic EHEDG or 3-A certified version available
X6	Slimline probe	Slimline long probe, specify insertion length and flange - Hygienic 3-A certified version available
X7	Reactor probe	Reactor probe, specify length and compression fitting
X8	Teletube	Versatile probe with compatible extension tubes, specify insertion length and flange

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