

DVP

IN-LINE HPHT DENSITY AND VISCOSITY SENSOR FOR GAS OR LIQUID



- Single HTHP instrument for both density and viscosity measurement.
- Repeatable measurements in single phase fluids, liquids or gases.
- Hermetically sealed, all Titanium Grade 5 wetted parts.
- Built in fluid temperature measurement.

Specifications

Fluid Measurements

Viscosity Range	0 to 100 cP
Viscosity Accuracy	5% of reading
	0.1 cP below 1 cP
Density Range	0 – 1.5 g/cc
Density Accuracy	0.001 g/cc
	gas calibration 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
Lower temperature rating available	(-40 °F up to 400 °F)
Ambient Temperature	
Pressure Range	up to 15,000 psi
	(≈ 1,000 bar)

Mechanical

Material (Wetted parts)	Titanium Grade 5
Diameter x Length	ø35 x 120 mm
Process Connection	1" NPT

Ingress Protection	IP68
Electrical Connection	M12 (8-pin, A-coded)



Electronics & Communication

Analog output	4-20 mA (3 channel) {Viscosity, Density, Temp.}	Display	Multi-line LCD (SME-TRD)
Digital output	Modbus RTU (RS-485) Ethernet (Ethernet/IP, Modbus TCP, Profinet) USB HART	Operational temp.	max. 20° to 65° C
Wireless output	Bluetooth LE 4.0	Power supply	24 V DC
		SME-TR(D)	IP66
		SME-DRM	IP20
		Software	Data acquisition and service control panel iOS and Android app

Protected by US and International patents granted and pending

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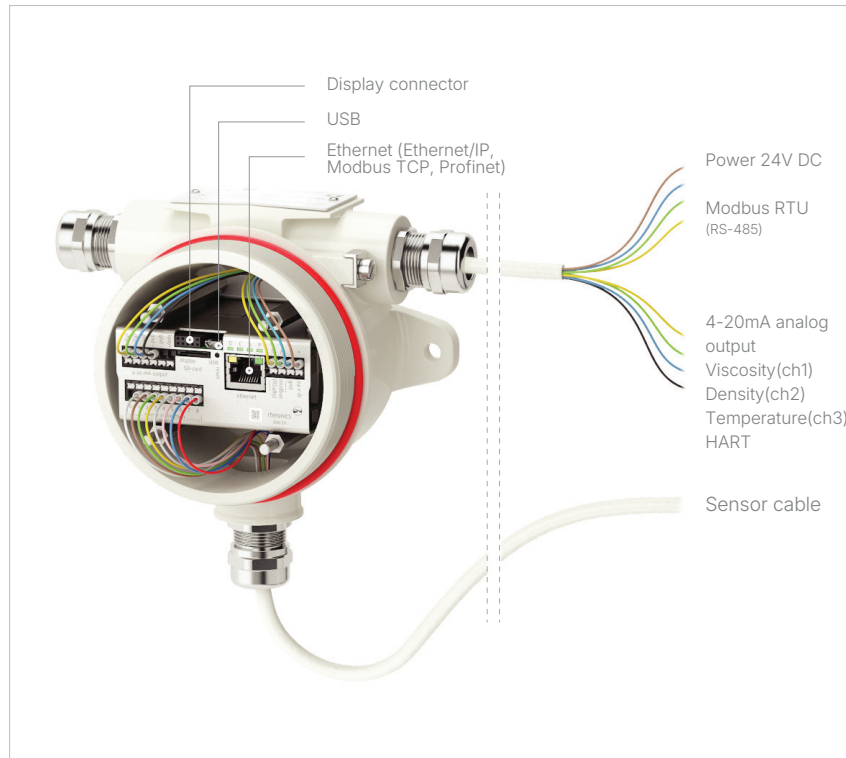
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DVP-DS-2607-EN

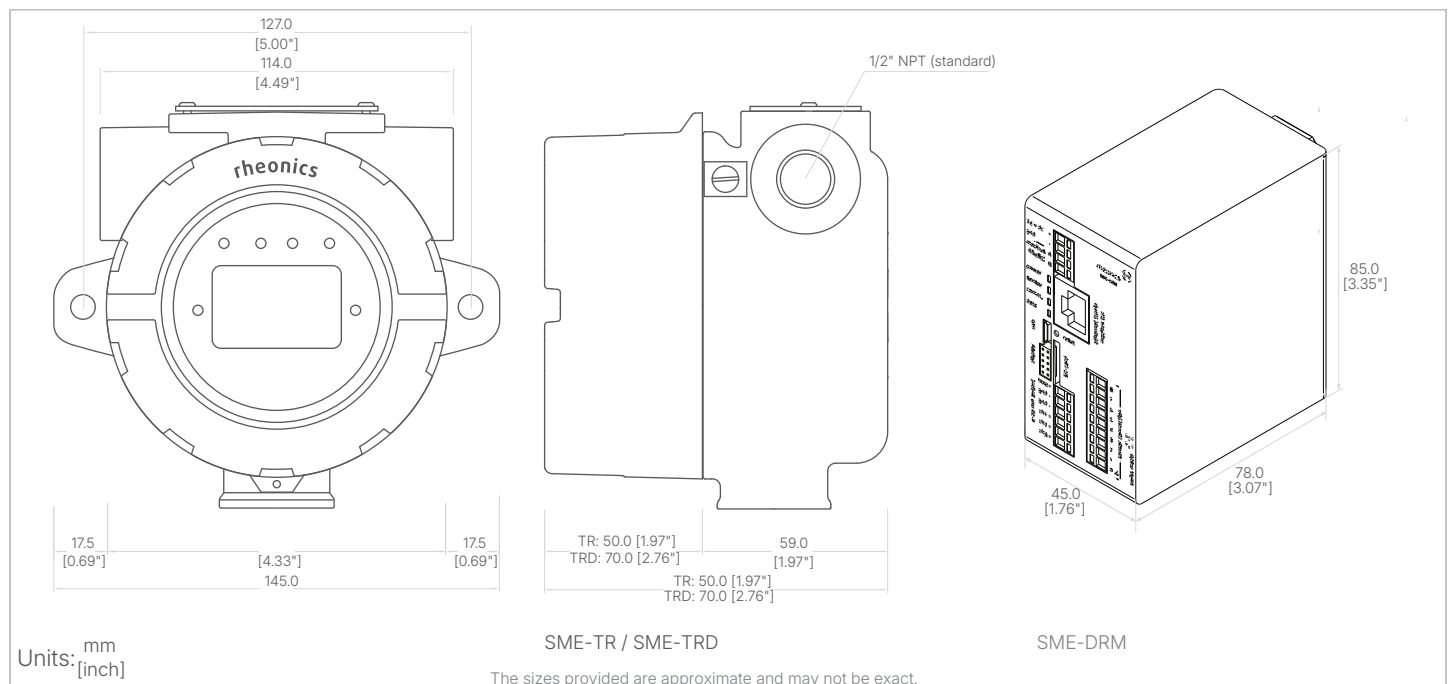
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Electronics installation



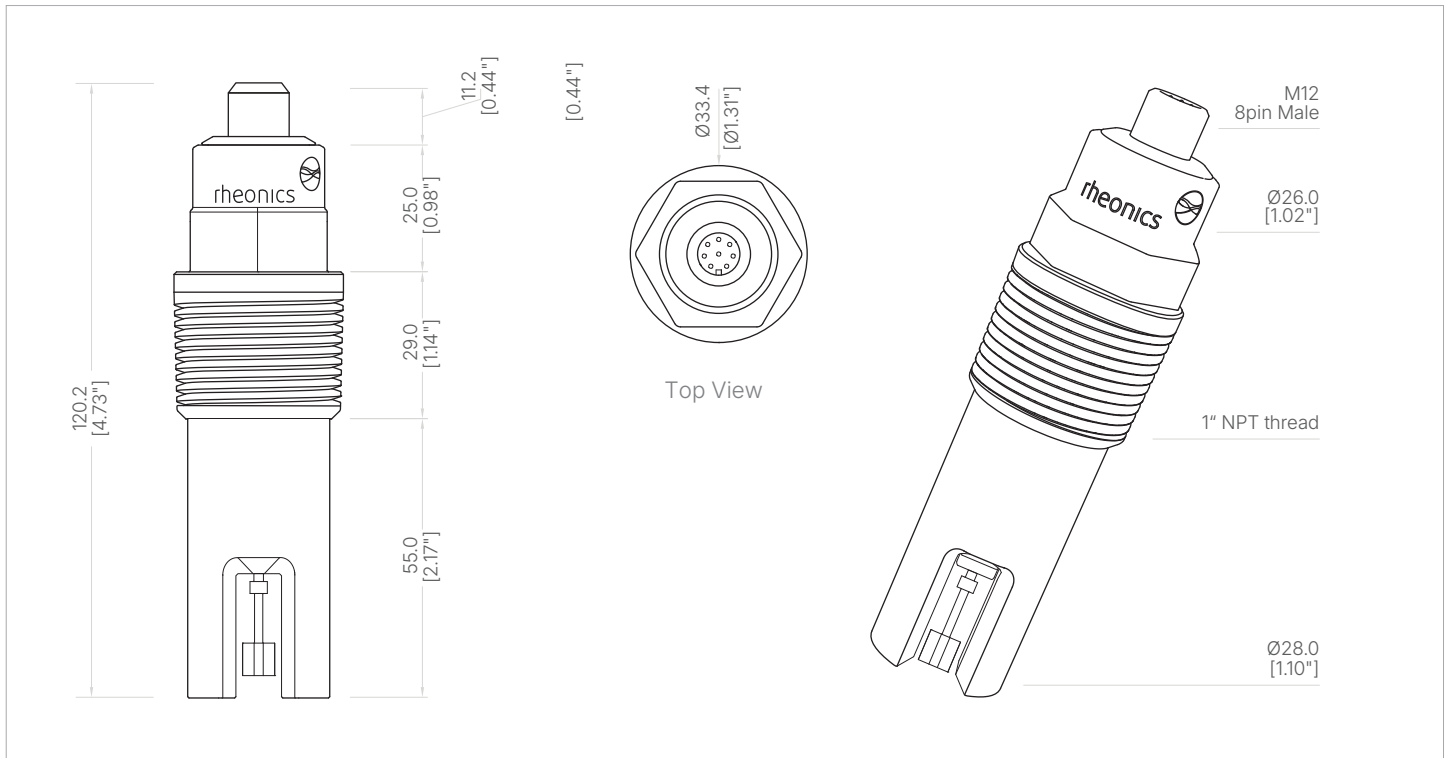
Dimensions



DVP

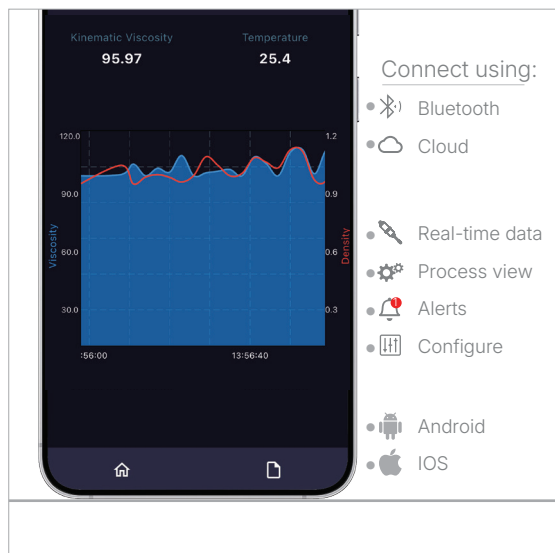
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DVP dimensions

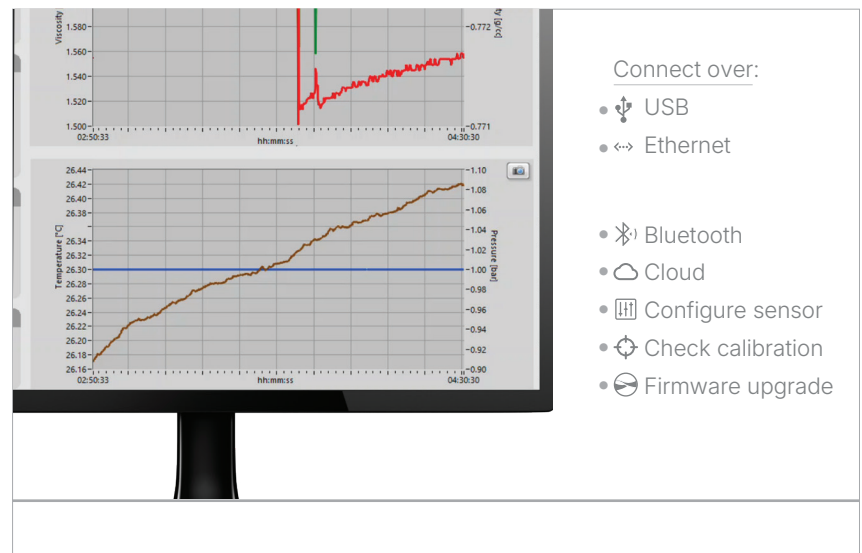


Software

Rheonics Application



PC Data Acquisition & Analysis

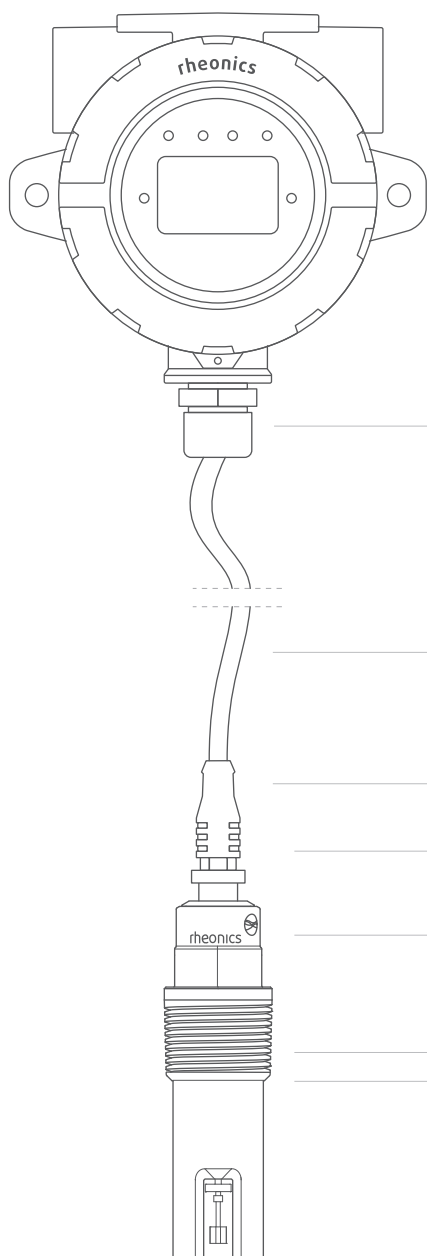


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Mechanical & Electrical



Cable Gland

- Standard
- Ex Rated

Sensor Cable

- Up to 30m

M12 connector

(IP67 | IP68 | IP69)

- Ø26mm

55.0mm

Electronics (select between)



SME-TRD



SME-TR

- Transmitter housing (IP66)
- 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

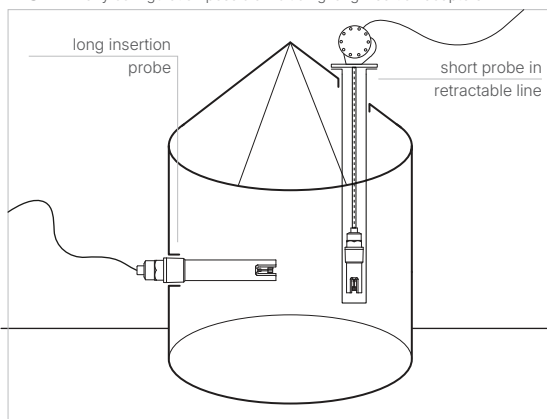
Mechanical

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

Process connection

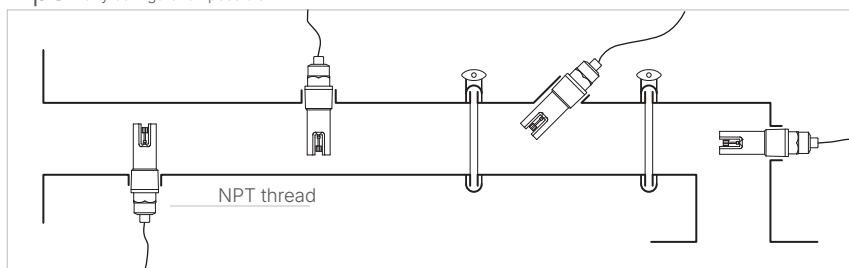
- 1" NPT (standard)
- Adapters available for Flange and Tri-clamp
- Sanitary fittings optional

Tank ^{†any configuration possible including long insertion adapters}



Mounting

Pipe ^{†any configuration possible}



DVP

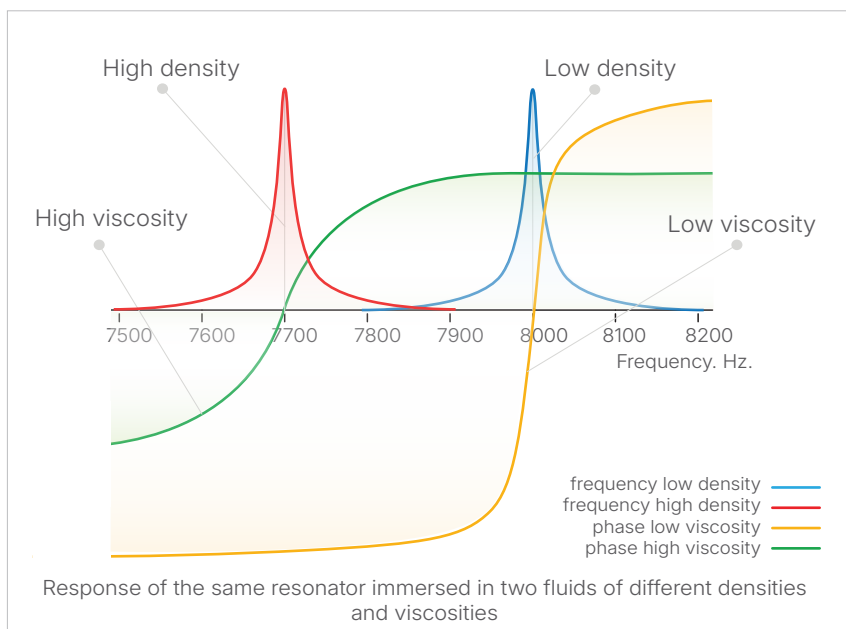
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Operating principle

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.



Application

Metering and Interface detection

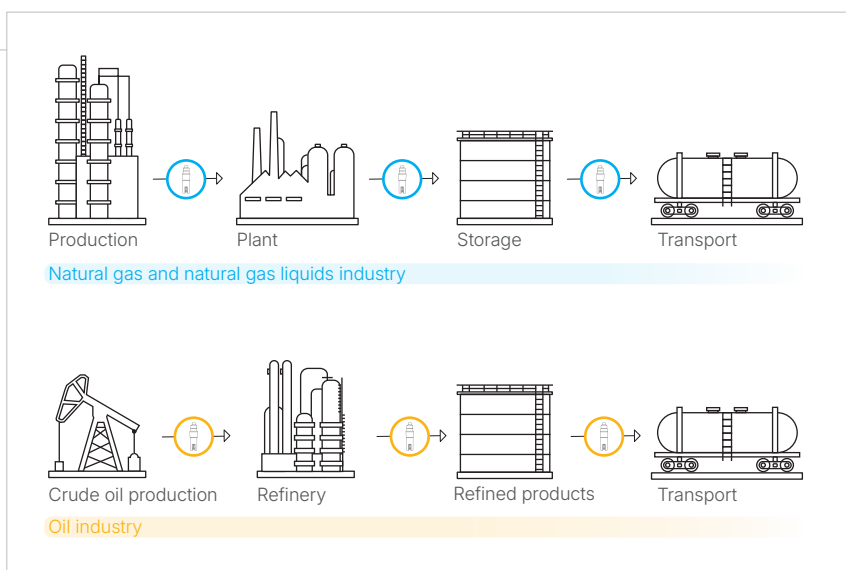
- Highly accurate and reliable density measurement
- Interface detection to recognize product change

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



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

DVP Sensor Configuration: Probe + Electronics + Cable

DVP probe configuration code

DVP-[MA]-[DEN RAN]-[DEN CAL]-[VIS RAN]-[VIS CAL]-[T]-[P]-[X]

Order code	Name
Material [MA]	
TG5	Titanium Grade 5
Density Range [DEN RAN] (select one)	
D1	0 to 1.5 g/cc
Density Calibration [DEN CAL] (select one)	
DCAL1	Standard density accuracy: $\pm 0.001\text{g/cc}$ (1kg/m^3 0.0083lb/gal)
DCALG	Gas calibration
Viscosity Range [DEN CAL] (select one)	
V1	0-30 mPa.s
V2	0-100 mPa.s
Viscosity calibration [VIS CAL] (select one)	
VCAL1	Standard: $\pm 5\%$ of reading or $\pm 0.1\text{mPa.s}$, whichever is greater

Temperature Rating [T] (select one) Optional

ULT	Ultra-low temperature (up to -200°C)
LT7	-70°C (-94°F)
LT4	-40°C (-40°F)
-20°C (-40°F) to max value by code	
T1	125°C (250°F)
T2	150°C (300°F)
T3	175°C (350°F)

Pressure rating [P] (select one)

P2	70 bar (1000 psi)
P4	350 bar (5000 psi)
P6	750 bar (10000 psi)
P7	1000 bar (15000 psi)

Process Connection (select one)

X1	Threaded connection
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Variants [X] (select one)

-X1-1N0	1" NPT
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Electronics Configuration

SME Electronics Configuration Code

SME-[EVAR]-[EMAT]-[COM]-[ADD]

Order code	Name
Electronics [EVAR] (select one)	
E1	SME-TRD (Transmitter housing with display)
E2	SME-TR (Transmitter housing with solid cover)
E3	SME-DRM (DIN-rail mount housing)
E4	SME-BOX (Desktop version with 10.4" touchscreen)
Material [EMAT]	
-	Aluminum housing (only for E1 and E2)
SS	316L stainless steel housing (only for E1 and E2)
Communication [COM] (multiple selection)	
C1	4-20 mA
C2	Modbus RTU (RS-485)
C3	USB
C4	RJ45
C5	Bluetooth LE 4.0
C6	Modbus TCP
C7	Ethernet/IP
C8	HART
C9	Profinet
C10	WirelessHART
C11	CAN
C12	IO-LINK

Cable Configuration

Cable configuration code

CAB-[CVAR]-[LXX]

Order code	Name
Cable Type [CVAR]	
STD	Standard cable
90	Cable with 90° connector
EX	EX-rated cable (explosion-proof)
HT	High-temperature cable
IP69K	Cable with IP69K protection rating
Cable Length [LXX]	
Lxx	Length: 5, 10, 30 meters (15, 30, 90 ft) or custom, limited for certain cable types

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