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 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, Slim, Reactor
Process Connection	Threaded, Flange, Sanitary EHEDG and 3-A 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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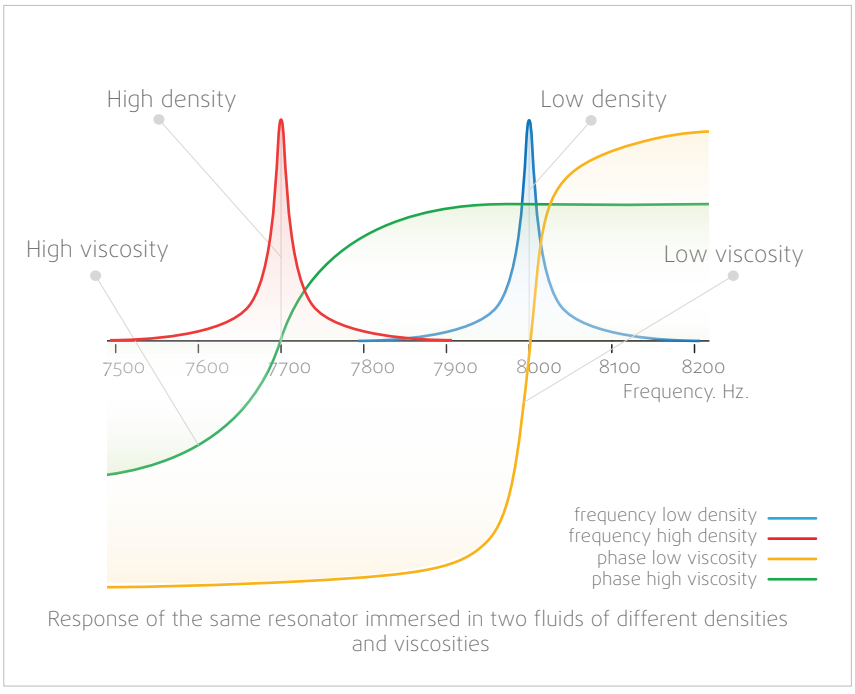
rheonics

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

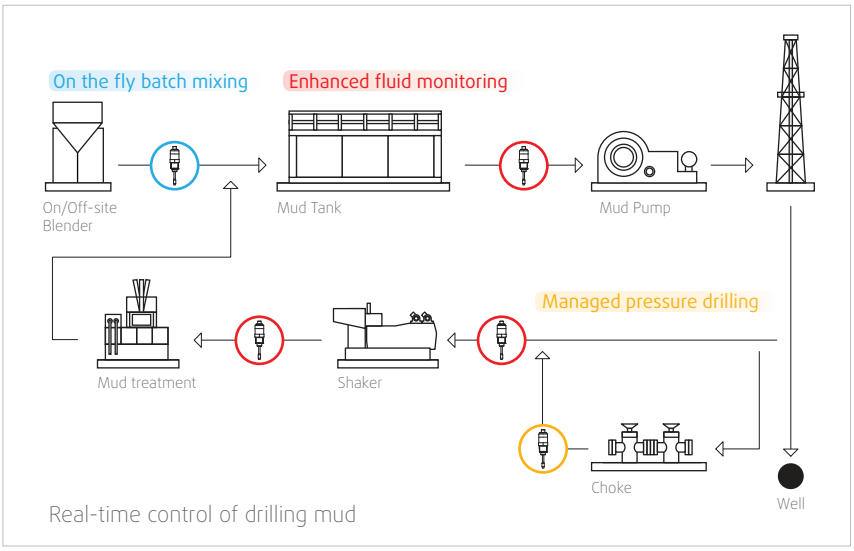
- Real-time molar ratio control in chemical reactions through continuous concentration measurement

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

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



Real-time control of drilling mud

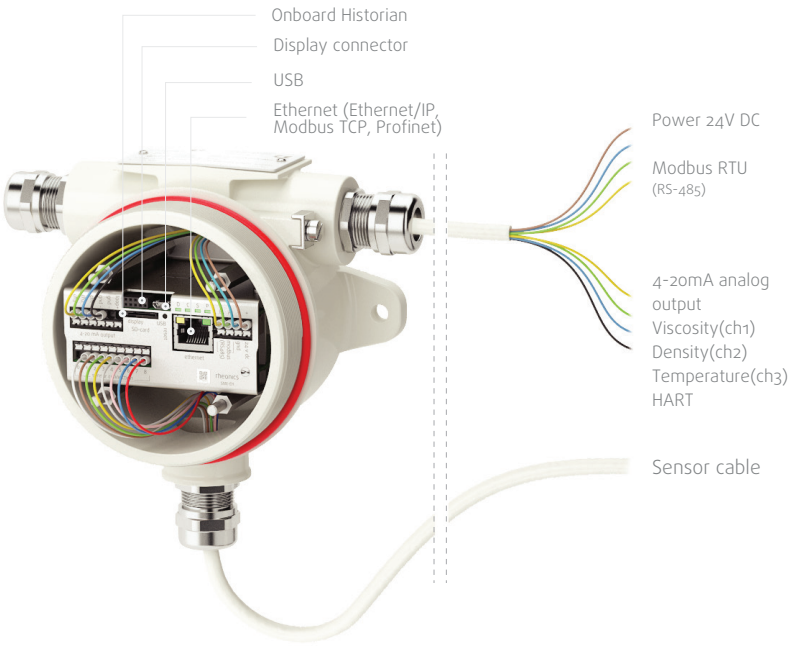
Other applications:

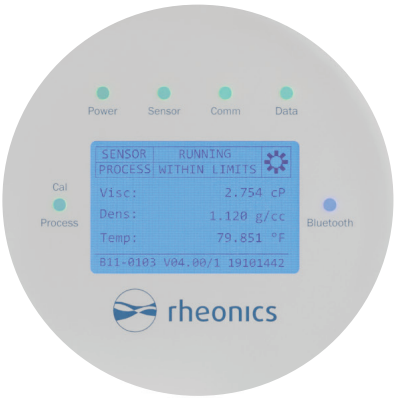
- Continuous electrolyte density check in battery
- Adapt process to variable raw material quality (eg. due to stratification in tanks) by monitoring density and viscosity of the raw material in real-time
- Measure concentration of lime slurry (calcium hydroxide)
- Ink and coating density and viscosity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

SRD

INLINE PROCESS DENSITY METER AND VISCOMETER

Electronics installation



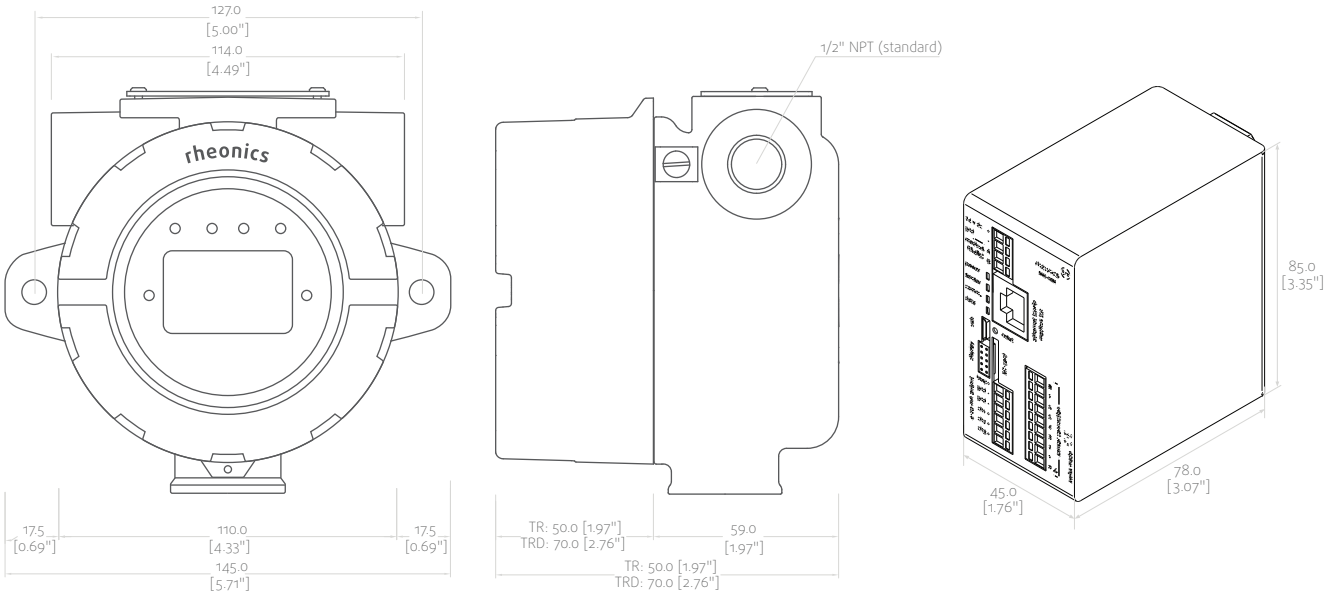


Industrial high-contrast LCD

Bluetooth LE 4.0

Status LED

Dimensions



SME-TR / SME-TRD

SME-DRM

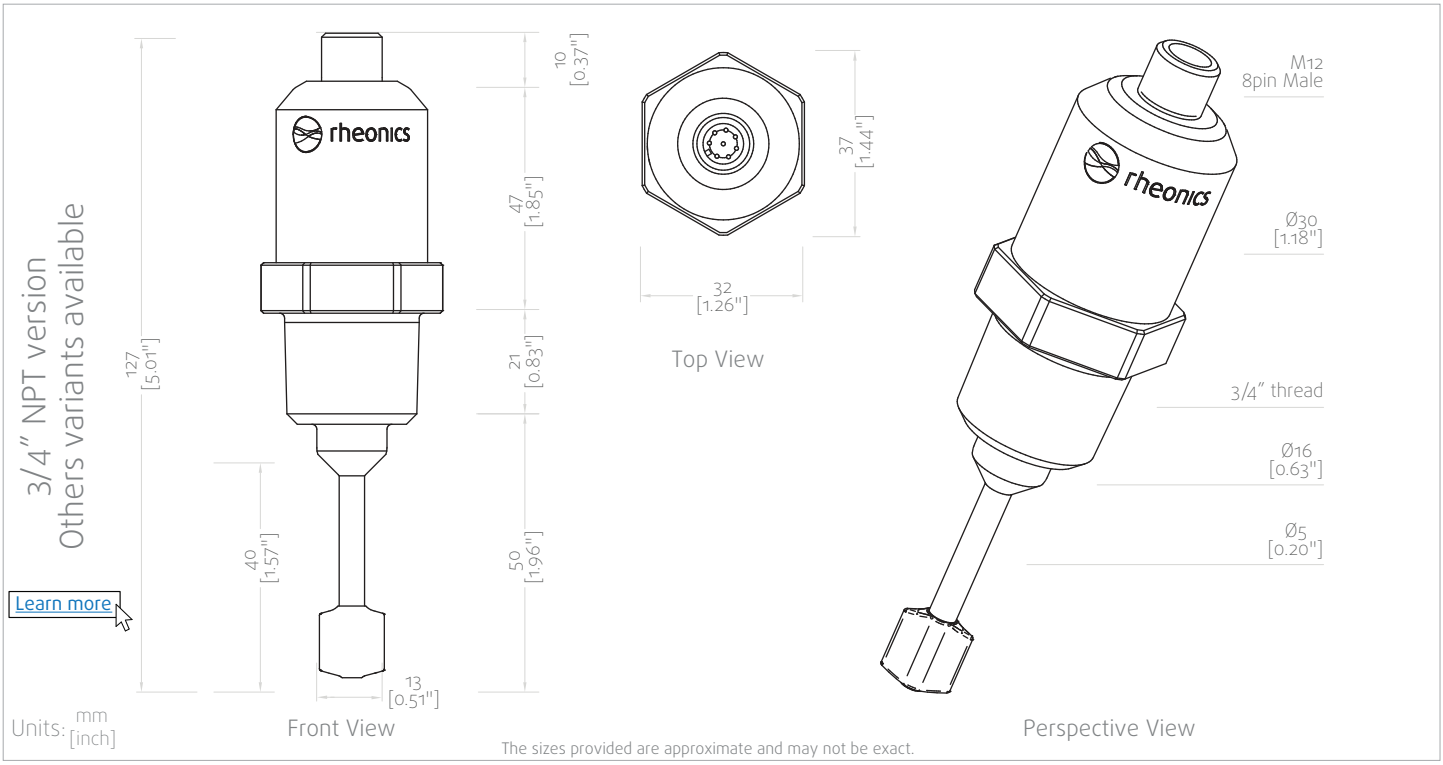
Units: mm [inch]

The sizes provided are approximate and may not be exact.

SRD

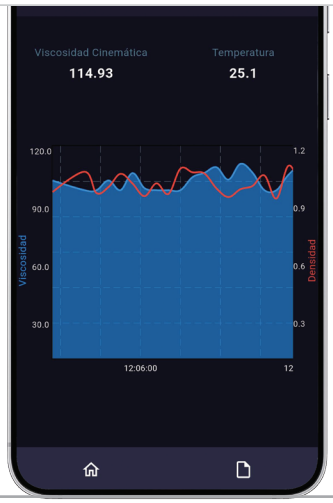
INLINE PROCESS DENSITY METER AND VISCOMETER

SRD dimensions



Software

rheonics Application



Connect using:

- Bluetooth
- Cloud

- Real-time data
- Process view
- Alerts
- Configure

- Android
- IOS

PC Data Acquisition & Analysis

Connect over:

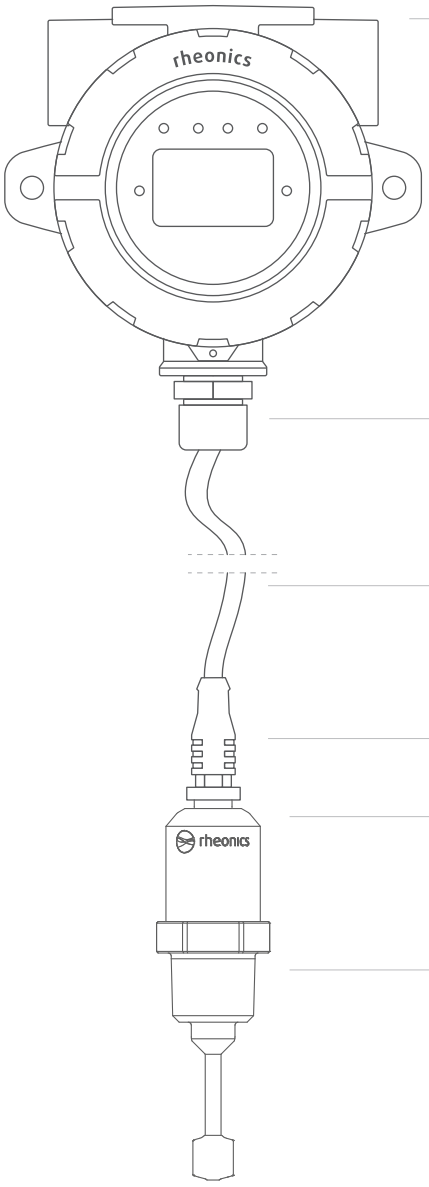
- USB
- Ethernet

- Bluetooth
- Cloud
- Configure sensor
- Check calibration
- Firmware upgrade

SRD

INLINE PROCESS DENSITY METER AND VISCOMETER

Mechanical & Electrical



Cable Gland
- Stainless Steel

Sensor Cable
- Up to 1,500m (4,921 ft.)
- Standard
- Ex Rated

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

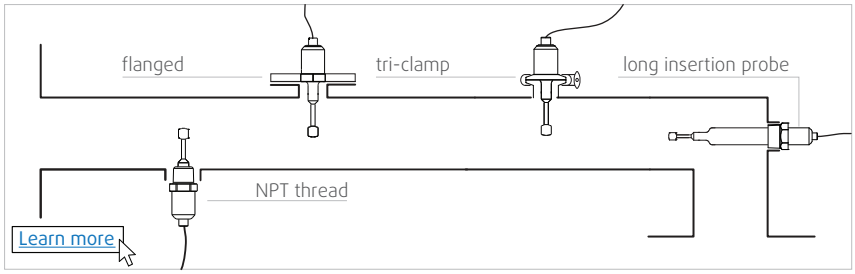
Process fluid wetted materials
- 316L stainless steel (standard)
- Available with Hastelloy C22
- Available with custom coatings

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

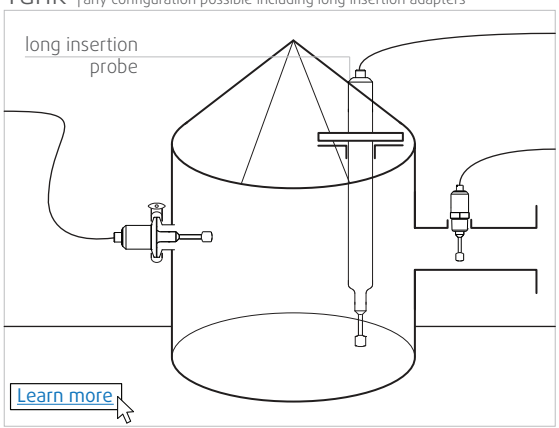
Ex Certified sensors
- Instrinsically safe
- Covers full Ex temperature range
- IECEx, ATEX, JPEx, others

Mounting

Pipe †any configuration possible



Tank †any configuration possible including long insertion adapters



Order

We recommend using the online RFQ form: https://rheonics.com/request-for-quotation/
For sensor accessories, visit: https://rheonics.com/product-accessories/

SRD Sensor Configuration: Probe + Electronics + Cable

SRD probe configuration code
SRD-[MA]-[COA]-[CERT]-[DEN RAN]-[DEN CAL]-[VIS RAN]-[VIS CAL]-[T]-[P]-[X]-[OPT]

Order code	Name
Material [MA]	
SS	316L Stainless Steel
C22	Hastelloy C22
Coating[COA] (optional)	
TF	Teflon coating for SS only
Certifications[CERT] (optional)	
EXIA	ATEX/IECEX
HSEG	EHEDG Certification
HS3A	3-A Certification
HSNC	Rheonics hygienic design without certification (all wetted surfaces below Ra 0.8)
Density Range [DEN RAN] (select one)	
D1	0.00 - 1.5 g/cc (12.5 lb/gal)
D2	Order-specific, up to 4 g/cc (33.33 lb/gal)
Density Calibration [DEN CAL] (select one)	
DCAL1	0.01 g/cc (10kg/m3 | 0.083lb/gal)
DCAL2	up to 0.001 g/cc (1kg/m3 | 0.0083lb/gal)
Viscosity Range [VIS RAN] (select one)	
V1	1 - 3,000 mPa.s
V2	1 - 10,000 mPa.s
Viscosity Calibration [VIS CAL] (select one)	
VCAL1	±5% of reading or ±0.1 mPa·s, whichever is greater
VCAL2	±1% of reading or ±0.1 mPa·s, whichever is greater
Temperature [T] (select one)	
T0	75 °C (165 °F)
T1	125 °C (250 °F)
T2	150 °C (300 °F)
T3	175 °C (350 °F)
T4	250°C (480 °F)
T5	285°C (545 °F)

Order code	Name
Pressure [P] (select one)	
P1	15 bar (200 psi)
P2	70 bar (1000 psi)
P3	200 bar (3000 psi)
P4	350 bar (5000 psi)
P5	500 bar (7500 psi)
P6	750 bar (10000 psi)
P7	1000 bar (15000 psi)
P8	1500 bar (20000 psi)
Variants [X] (select one)	
x1	Short probe, threaded connection
x2	Short probe, connection of choice (standard insertion)
x3	Short probe, Tri-Clamp flange (standard insertion length)
x4	Short probe, connection of choice (flush or minimal insertion length)
x5	Long probe, connection "B" as selected (custom insertion length "A")
x6	Slim probe, connection "B" as selected (custom insertion length "A")
x7	Slim probe, selected by total length "L", snap connector
x8	Teletube (back-threaded probe) connection of choice "B", adaptable for teletube extensione
x9	Special probe variants
Optional Features [OPT] (optional)	
FT	Rear thread for electronics mounting

Electronics Configuration

SME Electronics Configuration Code
SME-[VAR]-[EMAT]-[COM]-[ADD]

Order code	Name
Electronics [VAR] (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	Ethernet
C5	Bluetooth LE 4.0
C6	Modbus TCP
C7	Ethernet/IP
C8	HART
C9	Profinet
Add-ons [ADD]	
AP-SD0	Sand detection for SDP

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