

Density and temperature sensor

For real-time monitoring of fuels

Model DTL-30

WIKA data sheet SP 89.01



MesoScale®

Applications

- Fuel identification in storage tanks
- Fuel identification in tanker vehicles
- Fuel quality monitoring in process
- Volume to mass conversion

Special features

- Compact design for easy integration
- Innovative MesoScale® technology
- Real-time measurement with high repeatability
- Low maintenance and robust design



Density sensor with DIN EN 175301-803 C connector , model DTL-30

Description

The model DTL-30 measures, continuously and in real time, the key basic properties of fuels: density and temperature. This allows fuel identification and quality monitoring, detection of contamination, monitoring of additives blending and volume to mass flow conversion.

Compact design for easy integration

Designed for easy integration, the DTL-30 can be seamlessly embedded into diverse applications. Its compact design makes it optimally suited for OEM solutions, industrial environments and vehicles such as fuel trucks.

Innovative MesoScale® technology

The DTL-30 is based on the innovative MesoScale® technology. The patented microresonator-based technology enables precise measurements in liquid fuels, in a flow loop or in a static tank. In addition, the sensor calculates confidence factors in real time, providing information about the quality and validity of the measurements.

Real-time measurement with high repeatability

Thanks to its high processing performance, the instrument outputs measurement results at a frequency of 1 Hz with a fast reaction time. Moreover, the instrument offers high repeatability. Density readings are consistent, ensuring that tiny changes or trends can be distinguished from noise.

Low maintenance and robust design

The robust construction combined with 316L stainless steel wetted parts ensures high resistance under harsh operating conditions. Thanks to its embedded technology with extremely low drift and no moving parts, the sensor delivers long-term stability without regular calibration. This allows for a low total cost of ownership.

The DTL-30 is approved for use in hazardous areas in accordance with ATEX, IECEx and FM.

Specifications

Accuracy specifications	
Accuracy	
Density	±4.75 kg/m ³ ±3 kg/m ³ (increased accuracy in the range from 650 to 850 kg/m ³)
Temperature	±0.5 °C
Non-repeatability	
Density	1.5 kg/m ³
Temperature	0.1 °C
Measuring rate	1/s

Measuring range	
Density	650 ... 1,150 kg/m³ 450 ... 650 kg/m³, for liquefied petroleum gas (LPG)
Temperature	0 ... 85 °C [32 ... 185 °F] -20 ... +65 °C [-4 ... +149 °F]

Process connection	
Thread size	- Base plate (flow through): ¼ NPT - Base plate (flow through): ½ NPT - Screw adapter: 1 NPT

Other process connections on request.

Output signal	
Signal type	
Analogue	4 ... 20 mA
Digital	Modbus®-RTU (RS-485)
Settings of available outputs	
5	→ See "Pin assignment" for information about outputs
7	→ See "Pin assignment" for information about outputs
Voltage supply	
Supply voltage	DC 12 ... 24 V
Power consumption	< 600 mW
Dynamic behaviour	
Switch-on time	≤ 3 s

Electrical connection	
Connection type	- Angular connector, DIN EN 175301-803 C, 4-pin - Circular connector M12 x 1, IEC-61076-2-101, 5-pin - Circular connector, DBPLU 104 Z066-130VGF, 8-pin, 2 m [6.56 ft] cable length - Circular connector, DBPLU 104 Z066-130VGF, 8-pin, 5 m [16.40 ft] cable length - Circular connector, DBPLU 104 Z066-130VGF, 8-pin, 10 m [32.81 ft] cable length
Ingress protection (IP code) per IEC 60529	IP65 → The stated IP codes only apply when plugged in using mating connectors that have the appropriate IP code.

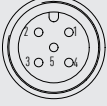
Pin assignment

Angular connector, 4-pin	Pin	Name	Signal type: RS-485	Signal type: 4 ... 20 mA
	1	PVIN+	Power supply terminal	Power supply terminal
	2	A / A1+	RS-485-A (N1) ^{1) 2)}	4 ... 20 mA, temperature (A1)
	3	B / A2+	RS-485-B (N2) ^{1) 2)}	4 ... 20 mA, output 2 (A2) ³⁾
	4/GDS	0 V	Ground	Ground

1) Outputs available for RS-485, setting 5: temperature, density, temperature-compensated density at 15 °C [59 °F]

2) Outputs available for RS-485, setting 7: temperature, density

3) Outputs available for 4 ... 20 mA, settings 5 and 7: density

Circular connector M12 x 1, 5-pin	Pin	Name	Signal type: RS-485
	1	0 V	Ground
	2	PVIN+	Power supply terminal
	3	0 V	Ground
	4	A	RS-485-A (N1) ^{1) 2)}
	5	B	RS-485-B (N2) ^{1) 2)}

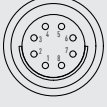
1) Outputs available for RS-485, setting 5: temperature, density, temperature-compensated density at 15 °C [59 °F]

2) Outputs available for RS-485, setting 7: temperature, density

Circular connector M12 x 1, 5-pin	Pin	Name	Signal type: 4 ... 20 mA
	1	PVIN+	Power supply terminal
	2	A1+	4 ... 20 mA, temperature (A1)
	3	A2+	4 ... 20 mA, output 2 (A2) ¹⁾
	4	A3+	4 ... 20 mA, output 3 (A3) ²⁾
	5	0 V	Ground

1) Outputs available for 4 ... 20 mA, setting 5 and 7: density

2) Outputs available for 4 ... 20 mA, setting 5: temperature-compensated density at 15°C [59°F], setting 7: no additional output

Circular connector, 8-pin	Pin	Name	Signal type: RS-485	Signal type: 4 ... 20 mA	Wiring
	1	A	RS-485-A (N1) ^{1) 2)}	Must be disconnected	Purple
	2	A1+	Not connected ⁵⁾	4 ... 20 mA, temperature (A1)	Orange
	3	0V	Ground	Ground	Black
	4	PVIN+	Power supply terminal	Power supply terminal	Red
	5	0 V	Ground	Ground	Brown
	6	A3+	Not connected ⁵⁾	4 ... 20 mA, output 3 (A3) ³⁾	Green
	7	B	RS-485-B (N2) ^{1) 2)}	Must be disconnected	Blue
	8	A2+	Not connected ⁵⁾	4 ... 20 mA, output 2 (A2) ⁴⁾	Yellow

1) Outputs available for RS-485, setting 5: temperature, density, temperature-compensated density at 15 °C [59 °F]

2) Outputs available for RS-485, setting 7: temperature, density

3) Outputs available for 4 ... 20 mA, setting 5: temperature-compensated density at 15 °C [59 °F], setting 7: no additional output

4) Outputs available for 4 ... 20 mA, settings 5 and 7: density

5) Can be connected to Ground

Material	
Material (wetted)	Stainless steel 316L
Material (in contact with the environment)	
Seal	FPM/FKM FFKM

Operating conditions		
Medium temperature limit	■ -40 ... +105 °C [-40 ... +221 °F] ■ -40 ... +85 °C [-40 ... +185 °F] for instruments with explosion protection	
Ambient temperature limit	■ -40 ... +105 °C [-40 ... +221 °F] ■ -40 ... +85 °C [-40 ... +185 °F] for instruments with explosion protection	
Max. operating pressure	25 bar [360 psi]	
Dynamic viscosity	0.3 ... 10 cP	
Flow velocity	< 0.5 m/s recommended	
Recommended mounting position ¹⁾	Vertical (sensor element upward to avoid trapped bubbles) → The flow specified on the sensor must be observed. → Inserted in a straight section of the fluid line or in a bypass line	
Vibration resistance	2g per IEC 60068-2-6	
	0.1 ... 5.8g per IEC 60068-2-64	
Shock resistance per IEC 60068-2-27	40g	
EMC tests	In addition, observe the installation instructions of the operating instructions	
Immunity per IEC 61000-4-3	At 80 MHz to 1.4 GHz	10 V/m
	At 1.4 GHz to 6 GHz	3 V/m
Burst per IEC 61000-4-4	1 kV	
Surge immunity per IEC 61000-4-5	2 kV/1kV common mode	
ESD per IEC 61000-4-2	4 kV/8 kV, contact/air	
High-frequency fields per IEC 61000-4-6	3 V	

1) Other factors such as the presence of bubbles, particles, risk of contamination, cavitation, turbulence, etc. must be taken into account to determine the best mounting position.

Approvals

Logo	Description	Region
	EU declaration of conformity	European Union
	EMC directive	
	EN 61326 emission (group 1, class B) and immunity (industrial environment)	
	RoHS directive	

Optional approvals

Logo	Description	Country
	EU declaration of conformity ATEX directive Hazardous areas - Ex ia Zone 0 gas II 1G Ex ia IIC T4 Ga	European Union
	IECEx Hazardous areas - Ex ia Zone 0 gas Ex ia IIC T4 Ga	International
	FM Hazardous areas CL I, Div I, GPS A, B, C, D T4	USA and Canada

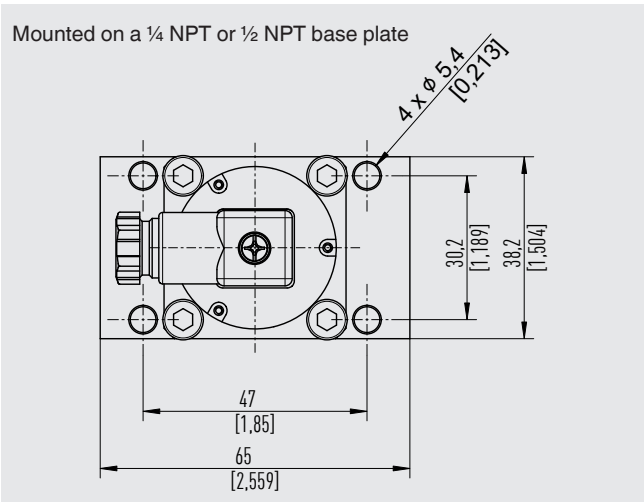
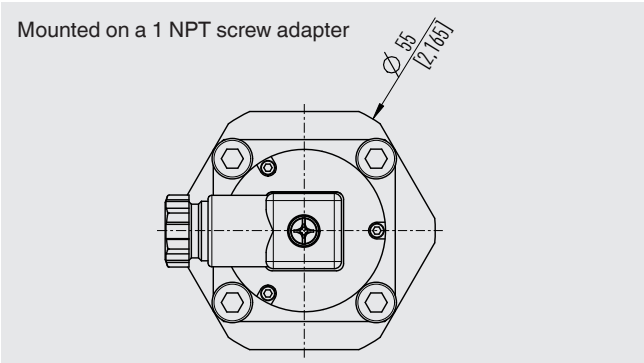
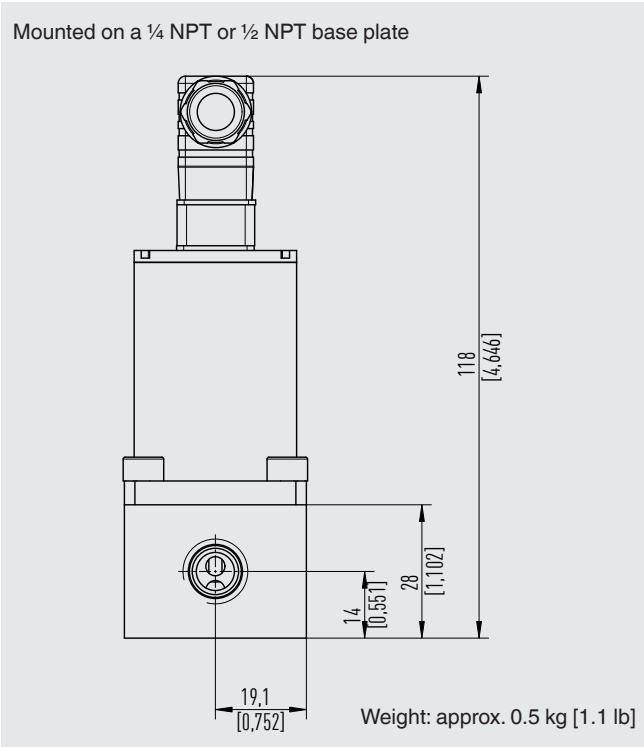
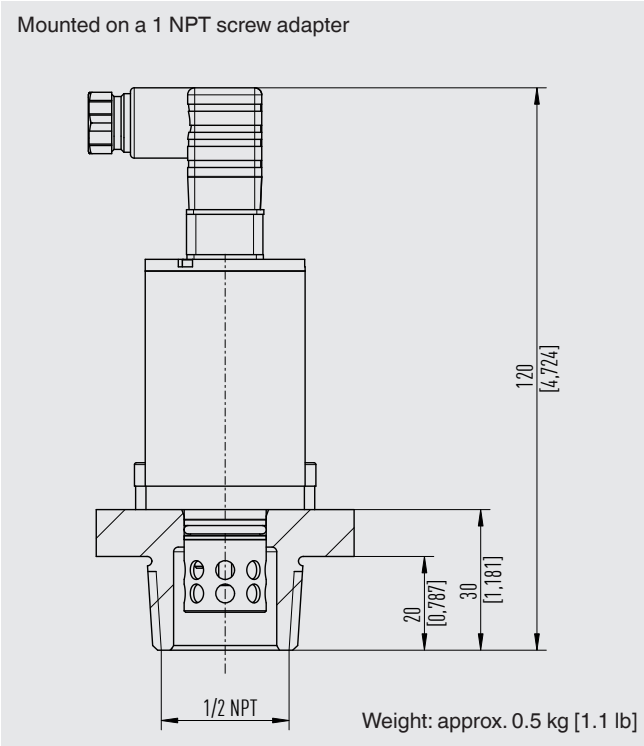
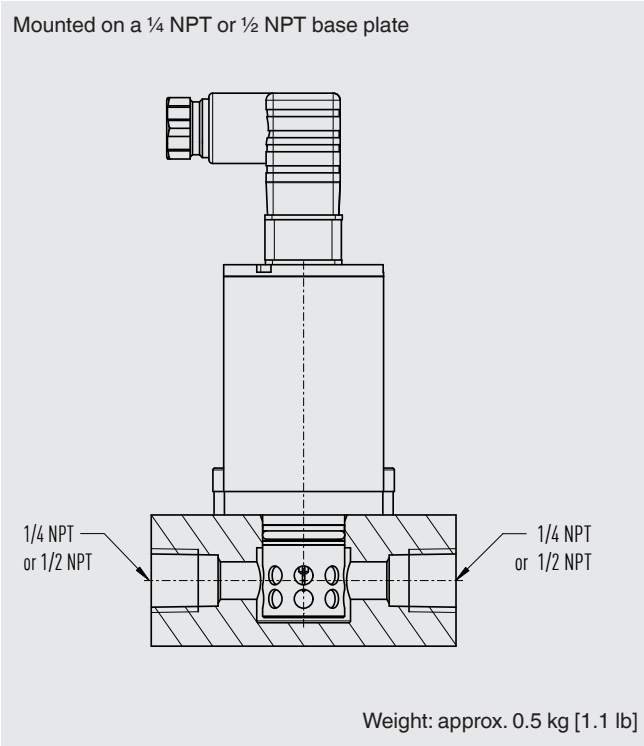
Patents, property rights

Patent number	Description
US 9.719.904	Density and viscosity sensor and method of measurement

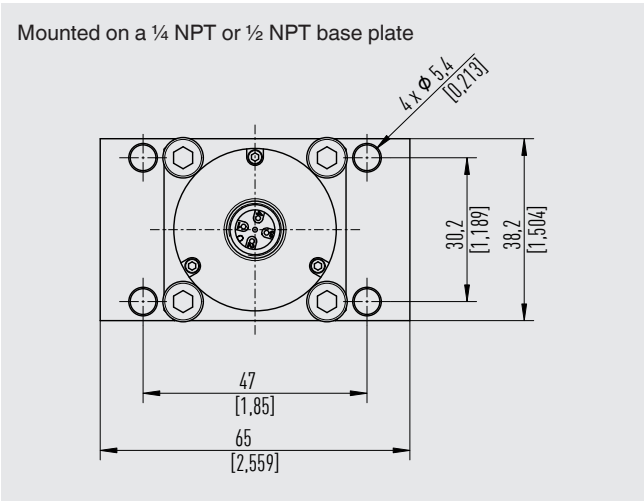
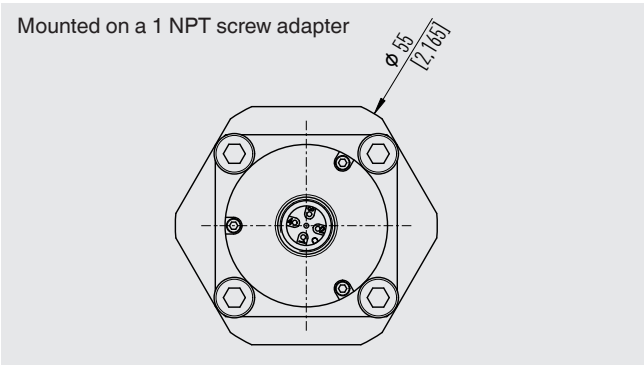
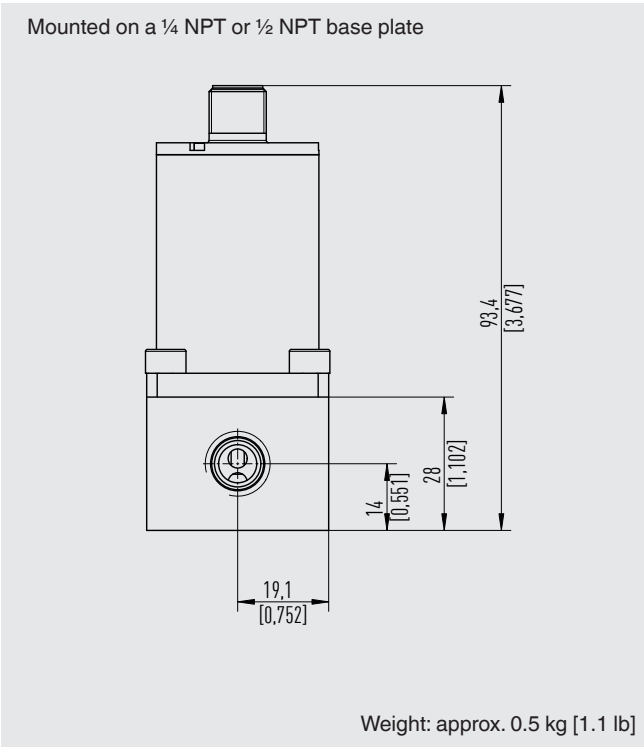
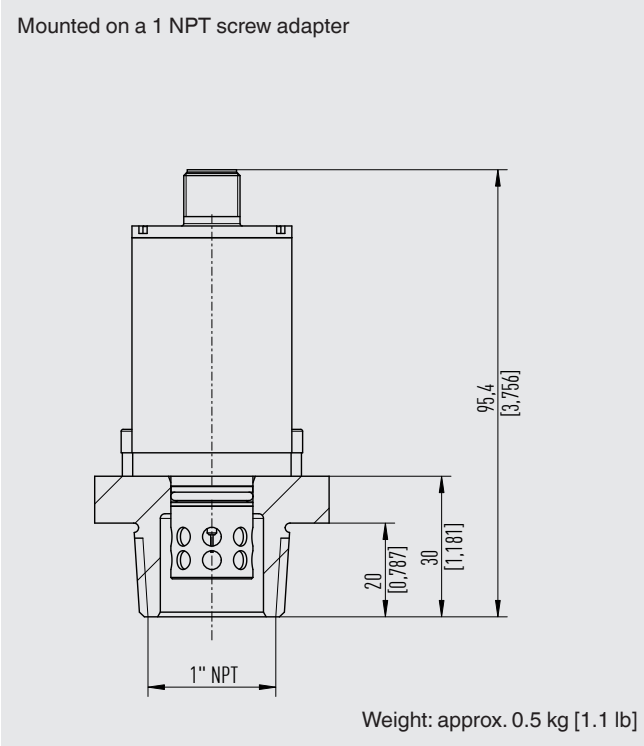
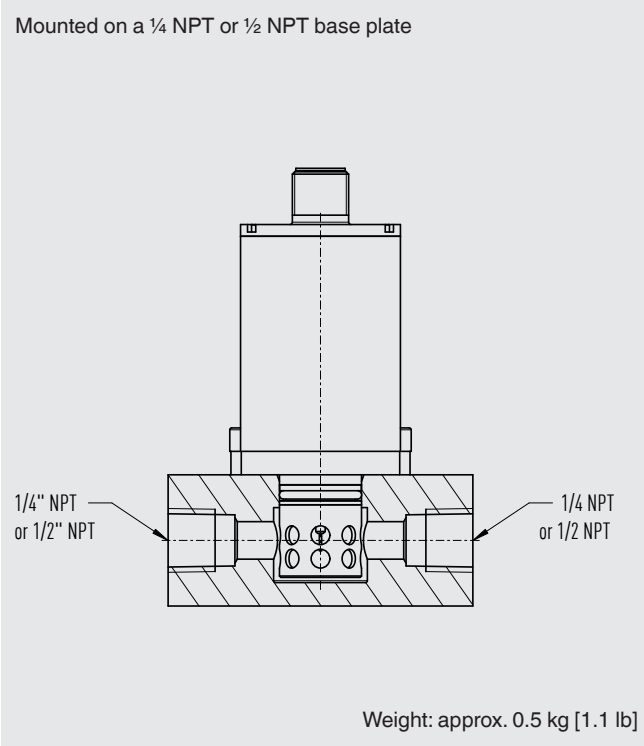
→ For approvals and certificates, see website

Dimensions in mm [in]

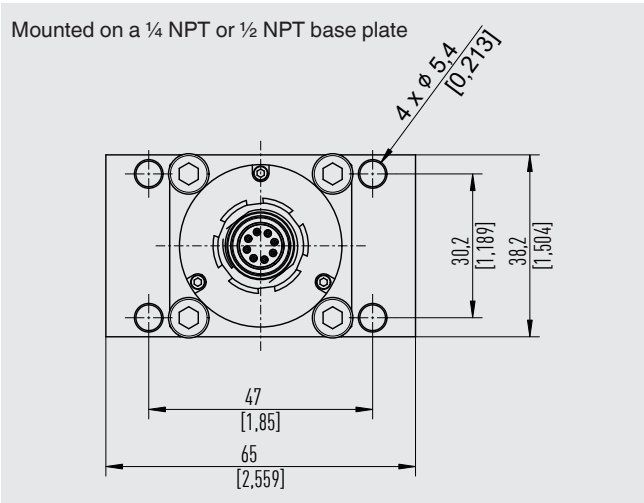
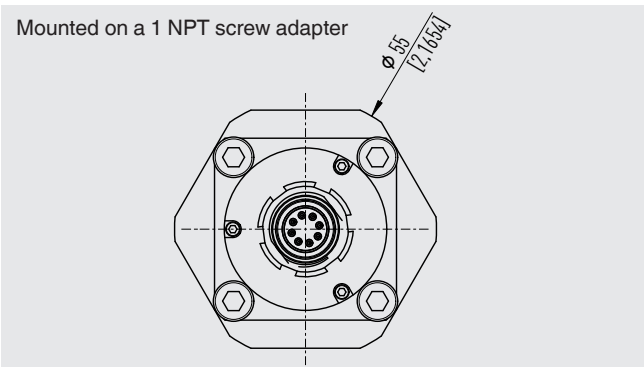
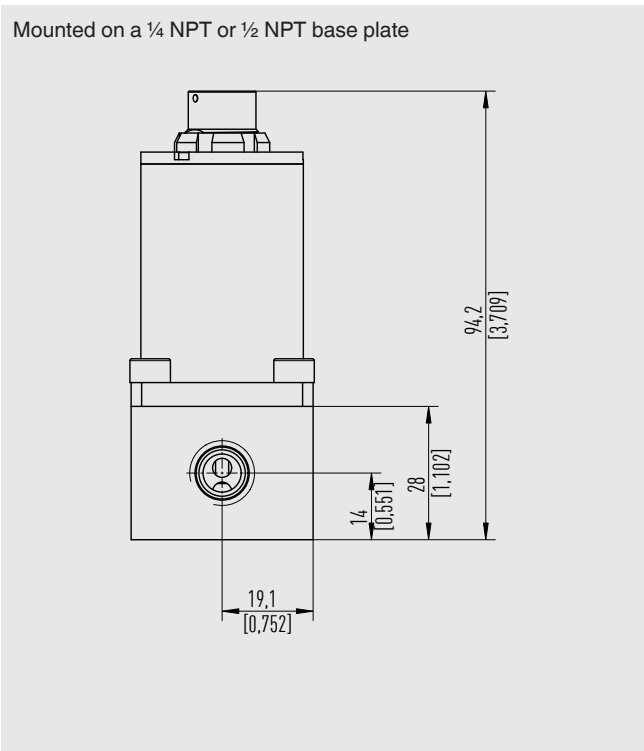
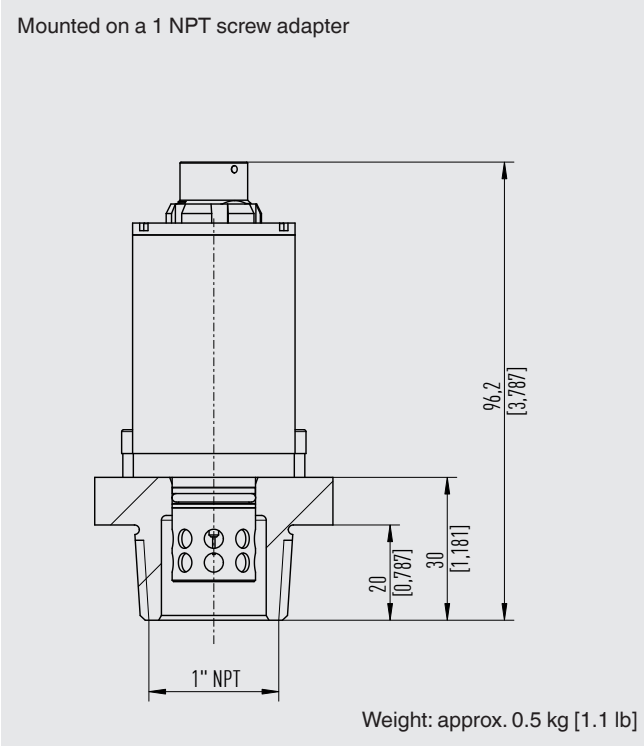
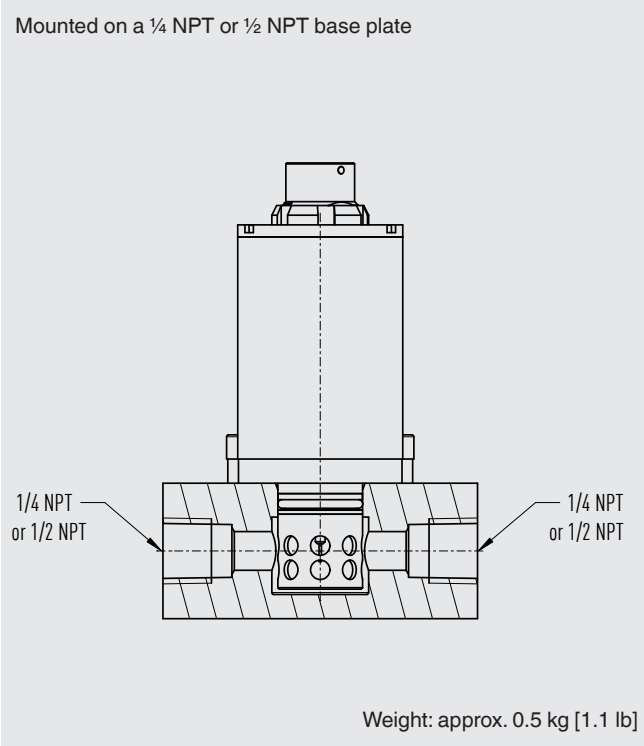
Angular connector DIN EN 175301-803 C, 4 pin



Circular connector M12 x 1 IEC-61076-2-101, 5 pin



Circular connector DBPLU 104 Z066-130VGF, 8 pin



Accessories and spare parts

Model	Description
Cable	
For circular connector M12 x 1, IEC-61076-2-101, 5-pin, analog	■ 2 m [6.56 ft] ■ 5 m [16.40 ft] ■ 10 m [32.81 ft] ■ 2 m [6.56 ft], right angle ■ 5 m [16.40 ft], right angle ■ 10 m [32.81 ft], right angle
For circular connector M12 x 1, IEC-61076-2-101, 5-pin, digital	■ 2 m [6.56 ft] ■ 5 m [16.40 ft] ■ 10 m [32.81 ft] ■ 2 m [6.56 ft], right angle ■ 5 m [16.40 ft], right angle ■ 10 m [32.81 ft], right angle
For circular connector, DBPLU 104 Z066-130VGF, 8-pin	■ 2 m [6.56 ft] ■ 5 m [16.40 ft] ■ 10 m [32.81 ft]
Ex protection	→ For a detailed description of the appropriate Ex protection, see the additional operating instructions of the product.
Intrinsically safe isolated barrier	For the power supply, applications in hazardous areas
	For 4 ... 20mA analog outputs, applications in hazardous areas
	For RS-485 digital outputs, applications in hazardous areas

Ordering information

Model / Ex-Approvals / Output Signal / Process connection / Electrical connection / Seal / Measuring range temperature / Measuring range density / Accuracy density / Settings / Cable length / Approvals

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