Density and temperature sensor For real-time monitoring of fuels Model DTL-30

MesoScale®

Applications

- Fuel identification in storage tanks
- Fuel identification in tanker vehicles
- Fuel quality monitoring in process
- Conversion of volume flow to mass flow

Special features

- Compact design for easy integration
- Wetted parts made of 316L stainless steel
- Suitable for hazardous areas, ATEX/IECEx-certified (zone 0) and FM-certified Class I Div I
- Patented design allowing fast response time and high repeatability

Density sensor with DIN EN 175301-803 C connection, 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, detection of contamination, monitoring of additives and volume to mass flow conversion.

The temperature-compensated density (in accordance with ASTM D1250, base temperature: 15 °C [59 °F]) can be output depending on the selected settings, the electrical connection and the signal type.

In addition, the sensor calculates confidence factors in real time. These factors give insight into the quality and validity of the measurements. On request, a direct output by the sensor of the calculated variables is also possible.

The DTL-30 is based on an innovative microresonator technology originating from the microsystems industry. This principle provides accurate measuring results in a wide range of liquids and operating conditions.
Due to its high computational power, the measuring results can be output with a frequency of 1 Hz.

The compact sensor housing makes it easy to integrate, and the robust design, with no moving parts, makes it resistant to harsh conditions. Due to its approval for use in hazardous areas, the model DTL-30 is ideally suited for embedding in OEM applications or for large-scale deployments in industrial and field environments.

Smart in sensing

Data sheets showing similar products:
Viscosity, temperature and density sensor; model VTL-30; see data sheet SP 89.02
Gas density and temperature sensor; model DTG-30; see data sheet SP 89.03

Specifications

Accuracy specifications	
Accuracy	
Density	±4.75 kg/m³
	±3 kg/m³ (increased accuracy only in the range from 750 to 850 kg/m³)
Temperature	±0.5 °C
Non-repeatability	
Density	1.5 kg/m³
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 ■ 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.

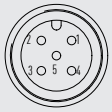
Pin assignment

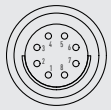
Angular connector, 4-pin	Pin	Name	Signal type: RS-485, settings: 5 [1] and 7 [2]	Signal type: 4 ... 20 mA, settings: 5 and 7
	1	PVIN+	Power supply terminal	Power supply terminal
	2	A / A1+	RS-485-A	4 ... 20 mA, temperature
	3	B / A2+	RS-485-B	4 ... 20 mA, density
	4/GDS	0 V	Ground	Ground

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

Circular connector M12 x 1, 5-pin	Pin	Name	Signal type: RS-485, settings: 5 [1] and 7 [2]
	1	0 V	Ground
	2	PVIN+	Power supply terminal
	3	0 V	Ground
	4	A	RS-485-A
	5	B	RS-485-B

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, settings: 5	Signal type: 4 ... 20 mA, settings: 7
	1	PVIN+	Power supply terminal	
	2	A1+	4 ... 20 mA, temperature	
	3	A2+	4 ... 20 mA, density	
	4	A3+	4...20 mA, temperature-compensated density at 15 °C [59 °F]	4 ... 20 mA, no additional output available
	5	0 V	Ground	

Circular connector, 8-pin	Pin	Name	Function RS-485, settings: 5 [1] and 7 [2]	Function 4 ... 20 mA, settings 5 and 7
	1	A	RS-485-A	Must be disconnected
	2	A1+	Must be disconnected	4 ... 20 mA, temperature
	3	0V	Ground	Ground
	4	PVIN+	Power supply terminal	Power supply terminal
	5	0 V	Ground	Ground
	6	A3+	Must be disconnected	4 ... 20 mA [3]
	7	B	RS-485-B	Must be disconnected
	8	A2+	Must be disconnected	4 ... 20 mA, density

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

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) → Respect flow direction signaled on the sensor → 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. If you have any questions, please contact our application consultant.

Approvals

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

Optional approvals

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

Patents, property rights

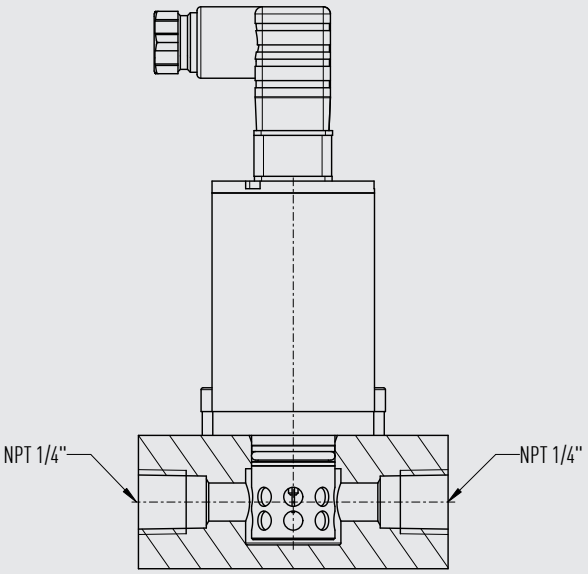
Patent number	Description
US 9.719.904	Density and viscosity sensor and method of measurement

→ For approvals and certificates, see website

Dimensions in mm [in]

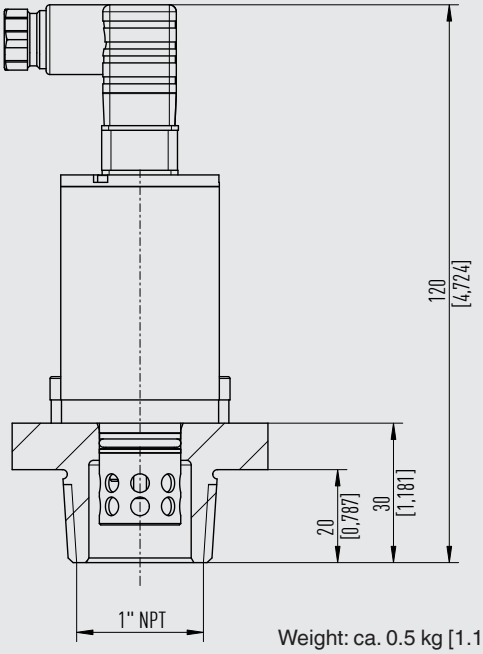
Angular connector DIN EN 175301-803 C, 4 pin

Mounted on a ¼ NPT base plate



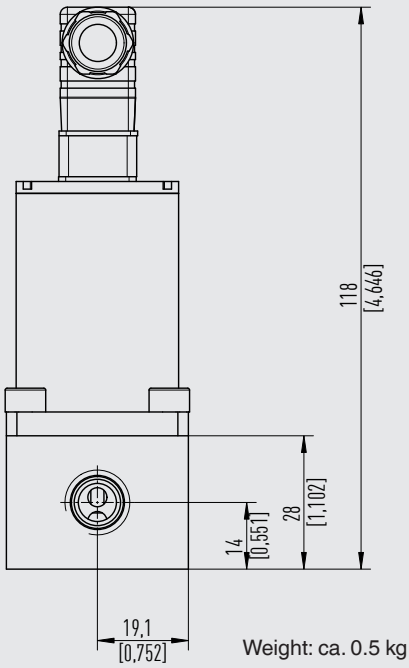
Weight: ca. 0.5 kg [1.1 lb]

Mounted on a 1 NPT screw adapter



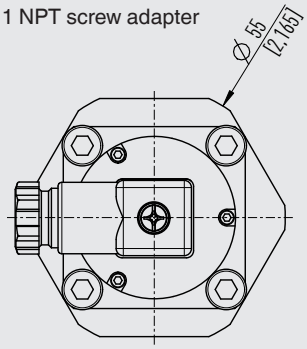
Weight: ca. 0.5 kg [1.1 lb]

Mounted on a ¼ NPT base plate

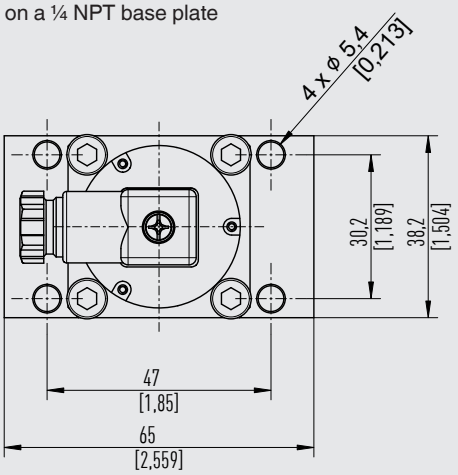


Weight: ca. 0.5 kg [1.1 lb]

Mounted on a 1 NPT screw adapter

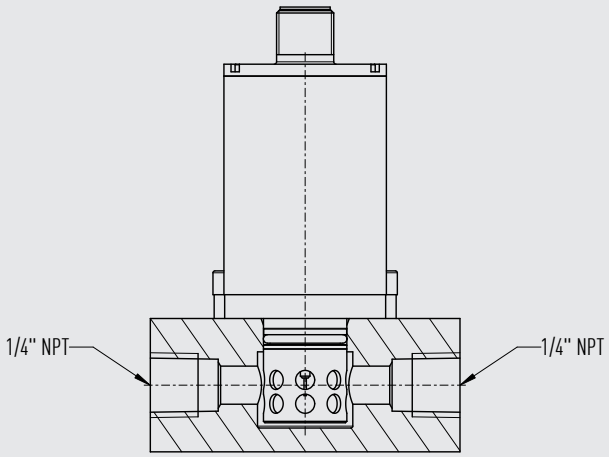


Mounted on a ¼ NPT base plate



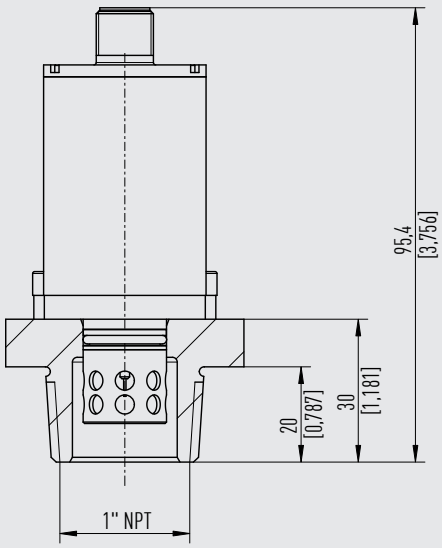
Circular connector M12 x 1 IEC-61076-2-101, 5 pin

Mounted on a ¼ NPT base plate



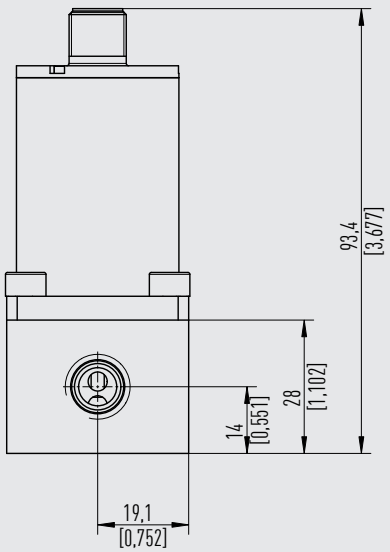
Weight: ca. 0.5 kg [1.1 lb]

Mounted on a 1 NPT screw adapter

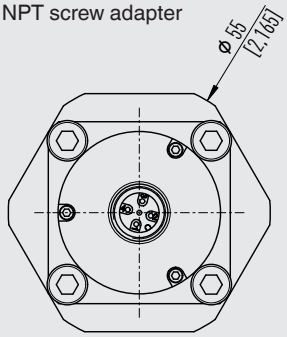


Weight: ca. 0.5 kg [1.1 lb]

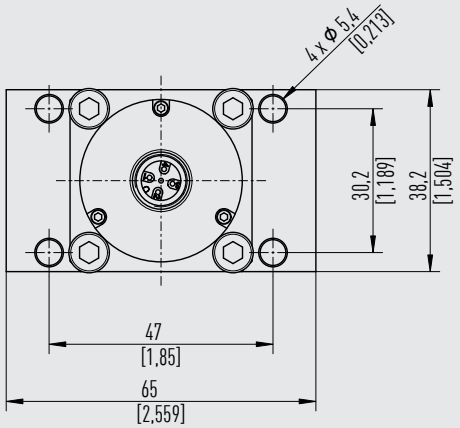
Mounted on a ¼ NPT base plate



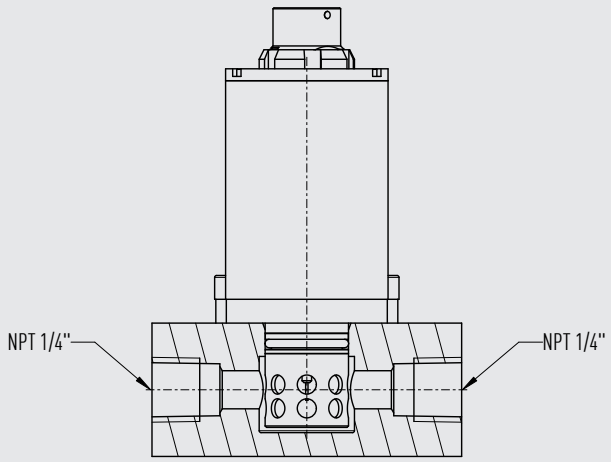
Mounted on a 1 NPT screw adapter



Mounted on a ¼ NPT base plate

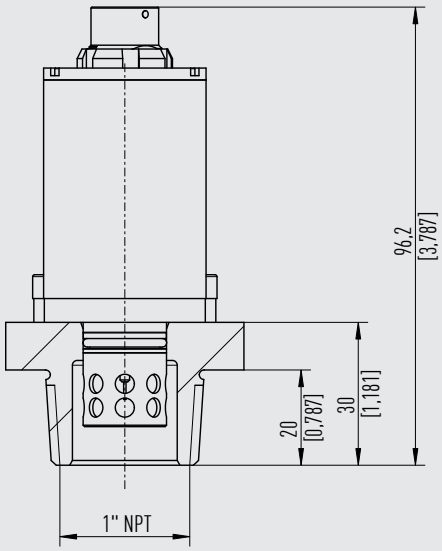


Mounted on a ¼ NPT base plate



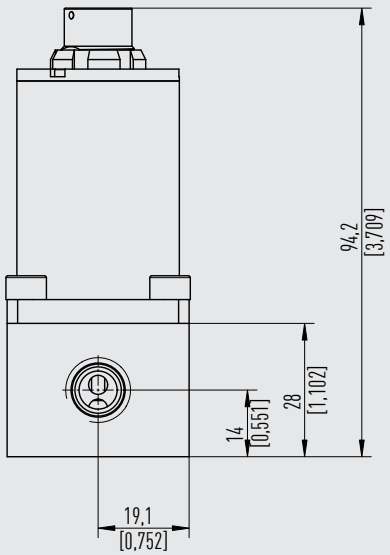
Weight: ca. 0.5 kg [1.1 lb]

Mounted on a 1 NPT screw adapter

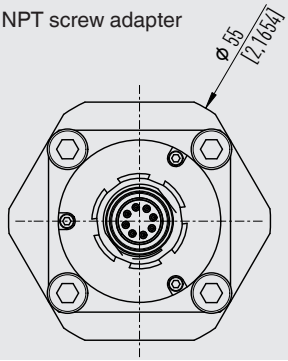


Weight: ca. 0.5 kg [1.1 lb]

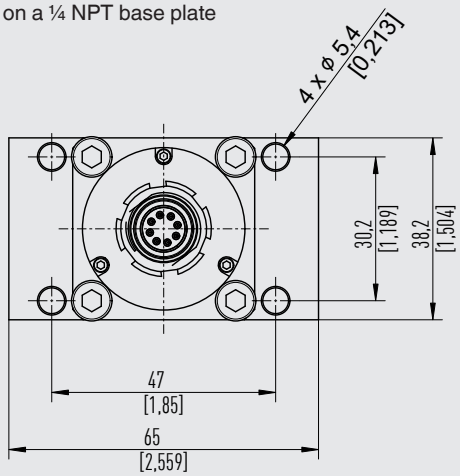
Mounted on a ¼ NPT base plate



Mounted on a 1 NPT screw adapter



Mounted on a ¼ NPT base plate



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 aditional 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 / Processs connection / Electrical connection / Seal / Measuring range temperature / Measuring range density / Accuracy density / Settings / Cable length / Approvals

MesoScale® is a trademark of WIKA Tech.

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