

L-Dens 7000 Density Sensors Series

The L-Dens 7000 density sensor series, L-Dens 7300, L-Dens 7400 and L-Dens 7500, delivers the highest accuracy density measurements, has a tube size of 7 mm and is available with different wetted materials to suit a wide range of process media and industrial applications. The sensor can be equipped with process connections for full flow, bypass, inline, or tank installation (in combination with various media pump units).



Determined parameters

- True density
- Density at reference temperature
- Density at reference temperature of petroleum products according to API
- Concentration of sugar, alcohol, and many other chemicals
- Customer-specific concentration values

Typical applications

- Online density measurement
- Online density measurement at reference temperature
- Online concentration measurement
- Determination of mass flow possible by upgrading an existing flow meter with a density sensor (mass flow = density * volume flow)
- Product detection
- Interface detection
- Product blending
- Fiscal measurement
- Suitable for continuous density measurement according to national and international standards, such as MID, OIML R117, API etc.

Liquids to be measured

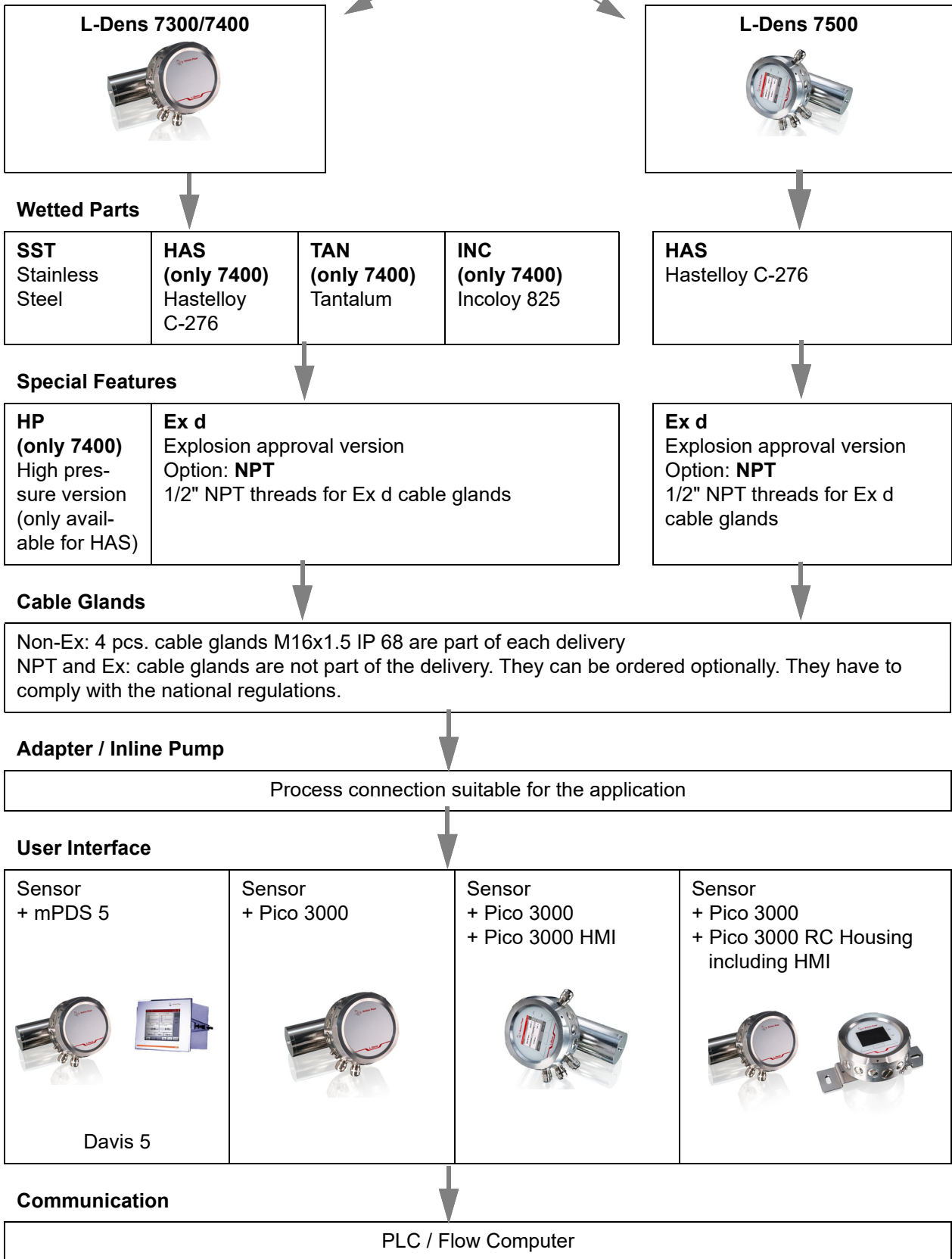
- All low-viscous liquids to which the oscillator is resistant
- Fuels (regular-grade petrol, premium, diesel, extra light heating oil, Jet-A1...)
- Other low viscous petroleum products, intermediate and end products of refineries (e.g. LPG)
- Chemicals (acetic acid, citric acid, calcium hydroxide, acetone, glycerine, ammonium nitrate, ...)
- Ethanol

Denotation of L-Dens 7000 Density Sensors Series


Example: L-Dens 7400 Version HAS

Numbers	Material of wetted parts	Special feature
<u>Sensor type</u> 7: 7 mm oscillating tube diameter <u>Feature/accuracy class</u> 3: $5 \times 10^{-4} \text{ g/cm}^3$ 4: $1 \times 10^{-4} \text{ g/cm}^3$ 5: $5 \times 10^{-5} \text{ g/cm}^3$ <u>Generation</u> 00: Generation 1	SST: Stainless steel 1.4404 HAS: Hastelloy C-276 INC: Incoloy 825 TAN: Tantalum	HP: High pressure version Ex d: Ex d approval NPT: 1/2" NPT threads for Ex d cable glands

Configuration of L-Dens 7000 Density Sensors Series



Technical specifications of L-Dens 7000 Density Sensors Series



DANGER

The Pico 3000 versions PROFINET IO, Ether-Net/ IP, Modbus TCP **MUST NOT** be installed in a hazardous area.

NOTICE

"AAA" stands for the material options HAS, SST, TAN or INC.

Permitted temperatures L-Dens 7000 AAA Ex d Series

	Ambient Temperature	Process Temperature Temp. Class T1 to T4	Process Temperature Temp. Class T5
L-Dens 7300 SST Petro Ex d L-Dens 7300 SST Petro NPT Ex d L-Dens 7300 SST Petro Ex d (with Pico 3000) L-Dens 7300 SST Petro NPT Ex d (with Pico 3000) L-Dens 7400 AAA Ex d L-Dens 7400 AAA NPT Ex d L-Dens 7400 AAA Ex d (with Pico 3000) L-Dens 7400 AAA NPT Ex d (with Pico 3000) L-Dens 7400 HAS HP Ex d L-Dens 7400 HAS HP NPT Ex d L-Dens 7400 HAS HP Ex d (with Pico 3000) L-Dens 7400 HAS HP NPT Ex d (with Pico 3000) L-Dens 7500 HAS Ex d L-Dens 7500 HAS NPT Ex d L-Dens 7500 HAS Ex d (with Pico 3000) L-Dens 7500 HAS NPT Ex d (with Pico 3000)	-40 to 70 °C	-40 to 125 °C	-40 to 95 °C
L-Dens 7300 SST Petro Ex d (with Pico 3000 and HMI) L-Dens 7300 SST Petro NPT Ex d (with Pico 3000 and HMI) L-Dens 7400 AAA Ex d (with Pico 3000 and HMI) L-7400 AAA NPT Ex d (with Pico 3000 and HMI) L-Dens 7400 HAS HP Ex d (with Pico 3000 and HMI) L-Dens 7400 HAS HP NPT Ex d (with Pico 3000 and HMI) L-Dens 7500 HAS Ex d (with Pico 3000 and HMI) L-Dens 7500 HAS NPT Ex d (with Pico 3000 and HMI)	-20 to 60 °C	-40 to 125 °C	-40 to 95 °C

Data Sheet

L-Dens 7000 Series

L-Dens 7000 Density Sensors Series

General technical specifications L-Dens 7000 Series (non-Ex and Ex-versions)

Sensor	L-Dens 7300 only Ex-version available	L-Dens 7400	L-Dens 7500
Operating conditions			
Sample types	Liquids, liquefied gases		
Process density	max. 1500 kg/m ³	max. 3000 kg/m ³	max. 2000 kg/m ³
Standard adjustment range	600 to 1200 kg/m ³		
Process temperature for non Ex-versions*	-40 to 125 °C		
CIP/SIP temperature and duration non-Ex versions	145 °C for max. 30 min.		
Process pressure* absolute	max. 50 bar		
Process pressure* absolute <i>High Pressure Sensor (HP)</i>	---	max. 180 bar (T _{process} ≤ 70 °C) max. 140 bar (T _{process} ≤ 145 °C) CRN: max. 170 bar	---
Recommended flow rate**	100 to 500 L/h		
* also consider the process connection specifications ** The recommended minimum flow rate ensures a high accurate density measurement even with big differences between ambient and process temperature. The U-tube measuring principle can also measure without flow. The recommended upper flow rate is to avoid possible cavitation within the U-tube.			
Ambient conditions			
Temperature non-Ex versions	-40 to 70 °C without Pico 3000 -40 to 70 °C * with Pico 3000 -20 to 60 °C with Pico 3000 and Pico 3000 HMI * Pico 3000 version PROFINET IO, EtherNET/IP, Modbus TCP: max. 60°C		
Humidity	0 to 90 % (relative humidity non-condensing)		
Degree of protection	IP66/67 / NEMA 4X (Ex-version: IP66 / NEMA 4X)		
Installation and use in hazardous areas	acc. to Ex-marking		
For hazardous areas	ATEX: Ex II 2G Ex db IIB T4/T5 Gb IECEx: Ex db IIB T4/T5 Gb CSA/UL/FM: Class I Division 1 Gr CD T4/T5 Ex db IIB T4/T5 Gb Class I Zone 1, AEx db IIB T4/T5 Gb		
Accuracy in adjusted range			
All specifications are valid for correct installation, constant measuring conditions and vibration levels < 1e ⁻³ (m/s ²)/Hz			
Density			
Repeatability	0.2 kg/m ³	0.02 kg/m ³ ***	0.01 kg/m ³
Measurement uncertainty	0.5 kg/m ³	0.1 kg/m ³ ****	0.05 kg/m ³
Temperature			
Measurement uncertainty	0.1 °C	0.1 °C	0.1 °C
*** Tantalum 0.05 kg/m ³ (5x10 ⁻⁵ g/cm ³), **** Tantalum 0.5 kg/m ³ (5x10 ⁻⁴ g/cm ³)			

Data Sheet

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Materials			
Housing materials	Stainless steel		
Sensor housing	Stainless steel		
Electronics housing non Ex-version	Hard anodized aluminum		
Electronics housing Ex-version	Glass		
HMI	Nickel-plated		
Standard cable glands M16x1.5 (for non-Ex electronics housing)			
Wetted parts depending on sensor	Stainless steel 1.4404	Stainless steel 1.4404 Hastelloy C-276 Tantalum Incoloy 825	Hastelloy C-276
Dimensions	6.3 mm		
Inner diameter of oscillator			
Electrical data			
Supply voltage	SELV DC 24 V ±20%		
Power consumption	max. 2 W without Pico 3000 max. 5 W with Pico 3000		
Power consumption of the optional Integrated Sample Pump (optional)	max. 10.5 W		
CAN interface	acc. to ISO 11898		
Analog input for optional pressure	4 to 20 mA with auxiliary voltage DC 12 V		
Digital input (optional)	for flow monitor (Mat. no. 235819)		
Pump input (optional)	for Anton Paar Inline Pump 300		
Connection terminals	Push-in spring connection 0.2 to 1.5 mm ² / AWG 24 to 16		
Cable gland type (non Ex-version)	M16x1.5 EMC, metric, earthing cones acc. to DIN 89345, brass nickel-plated for cable OD 4.5 to 10 mm		
Cable gland type (Ex-version supplied optionally)	M20x1.5, shielded or 1/2" - 14 NPT, shielded		
Cables			
Cables must comply with the intended area of use, the cable gland type and the relevant national regulations and requirements			
Voltage supply cable	LiYCY, shielded 2 pole		
Suggested cable type	min. 0.34 mm ² , max. 1.5 mm ² without wire end ferrule;		
Wire cross section	max. 0.75 mm ² with wire end ferrule		
Diameter of cables	OD 4.5 to 10 mm to ensure optimal sealing against the cable gland		
CANopen cable	CANopen/DeviceNet cable 120 Ω, shielded twisted pair		
Cable type	min. 0.20 mm ² , max. 1.5 mm ² without wire end ferrule;		
Wire cross section	max. 0.75 mm ² with wire end ferrule		
Diameter of cables	OD 4.5 to 10 mm to ensure optimal sealing against the cable gland		

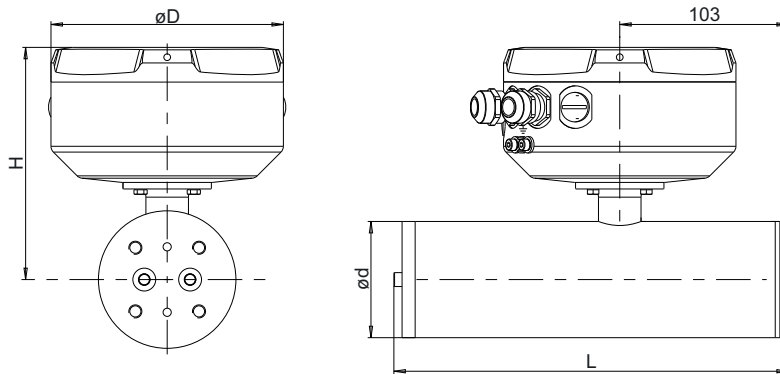
All inputs and outputs (including relay outputs) connected to mPDS 5 have to be in accordance with PELV (Protective Extra Low Voltage) of EN 61140 or with SELV specification of EN 60950, i.e. maximum voltage U_{max} must not exceed $24\text{ V} + 20\% = 28.8\text{ V}$ and a maximum current $I_{max} = 0.75\text{ A}$.

Dimensions of L-Dens 7000 Density Sensors Series

NOTICE

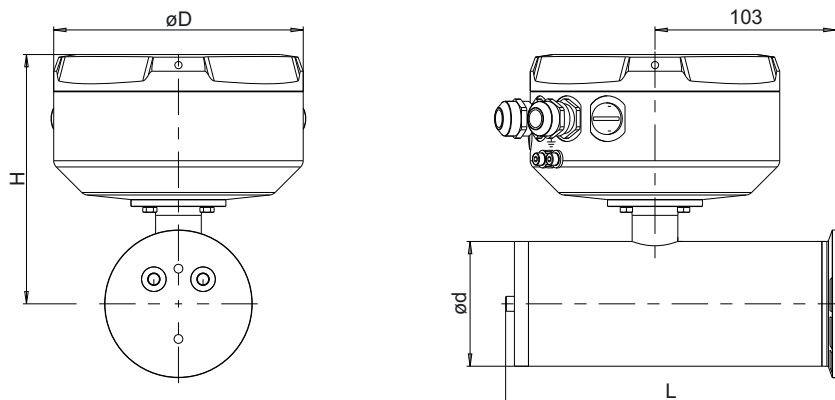
All dimensions are in [mm].

Dimensions of L-Dens 7300/7400 Density Sensors Series



Sensor	Dimensions [mm]					Weight [kg]
	H		ØD	L	Ød	
	without	with				
	Pico 3000 HMI					
L-Dens 7400	142	141	142	241	71	4.8
L-Dens 7400 HAS HP				243	75	5.8
L-Dens 7300 SST Petro Ex d	163	160	156	241	71	4.5
L-Dens 7400 Ex d				241	71	4.5
L-Dens 7400 HAS HP Ex d				243	75	5.5

Dimensions of L-Dens 7500 Density Sensors Series



Sensor	Dimensions [mm]					Weight [kg]
	H		ØD	L	Ød	
	without	with				
	Pico 3000 HMI					
L-Dens 7500 HAS	142	141	142	188	71	4.5
L-Dens 7500 HAS Ex d	163	160	156	188	71	4.2