



Anton Paar

L-SONIC SOUND VELOCITY SENSORS

Member of the New Generation of
Concentration Measurement

L-Sonic | Introduction



The new generation Anton Paar's process sound velocity sensors is offering two types of sensing elements – a fork type **L-Sonic 5100** and a tube type **L-Sonic 6100**.

The Sensors consist of a sensing element (fork or tube) and a temperature sensor. The sensor electronics is built into the electronics housing.

The concentration is directly calculated by the sensor electronics and can either be transferred to the new Process instrumentation Controller **Pico 3000** which can be directly installed in the electronics housing of the sensor or the **mPDS 5**.



L-Sonic 5100



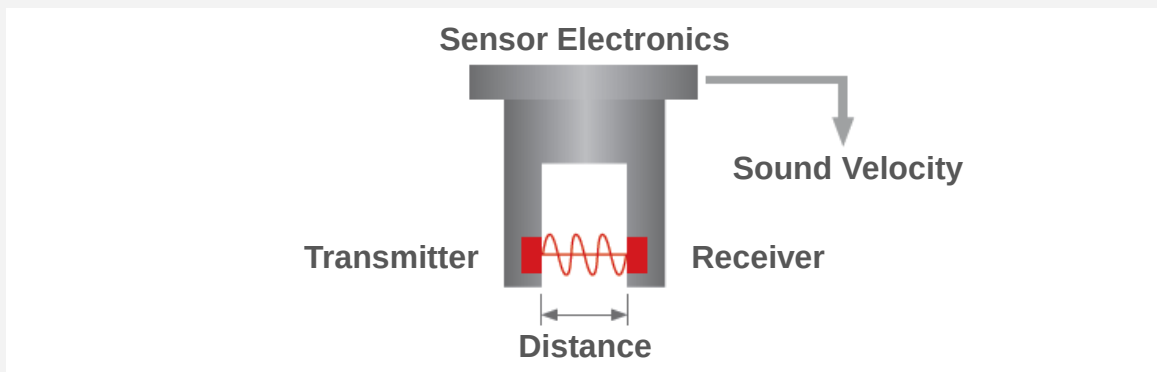
L-Sonic 6100

L-Sonic is a process measuring instrument which is used for the measurement of sound velocity values of liquids.

- The sound velocity is the speed of a sound wave travelling through the medium. The velocity of sound in a material is a material constant depending on its chemical nature.
 - For many liquid solutions and mixtures the sound velocity is directly proportional to the concentration. Therefore, sound velocity measurement is used to determine the concentration.
- The sound velocity is also a material parameter and can be used for material characterization.

Measuring Principle

L-Sonic measures the propagation speed of sound pulses in the medium between a piezoelectrically acting transmitter and a receiver.



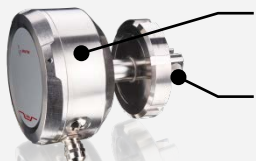
- ▶ As the geometry (distance between transmitter and receiver) is constant the propagation time is proportional to the sound velocity.
- ▶ As the sound velocity of the medium and the characteristics of the sensor change with temperature, the temperature of the sample must be considered.

New Generation | Configuration



Instrument

Sensor with Evaluation Unit



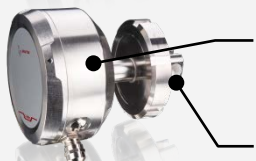
Electronics Housing +
Sensor Electronics

Sensing Element



mPDS 5
Option: Davis 5

Sensor with Transmitter



Electronics Housing +
Sensor Electronics +
Transmitter Pico 3000

Sensing Element

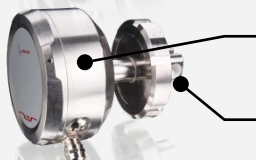
Sensor with Transmitter incl. HMI



Electronics Housing +
Sensor Electronics +
Transmitter Pico 3000 +
Human Machine Interface Pico 3000 HMI

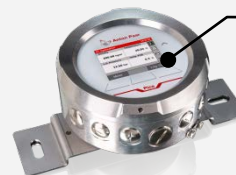
Sensing Element

Sensor with Remote Control incl. Transmitter and HMI



Electronics Housing +
Sensor Electronics

Sensing Element



Remote Control:
Transmitter Pico 3000 +
Pico 3000 RC Housing
incl. Pico 3000 HMI

L-Sonic | Designation



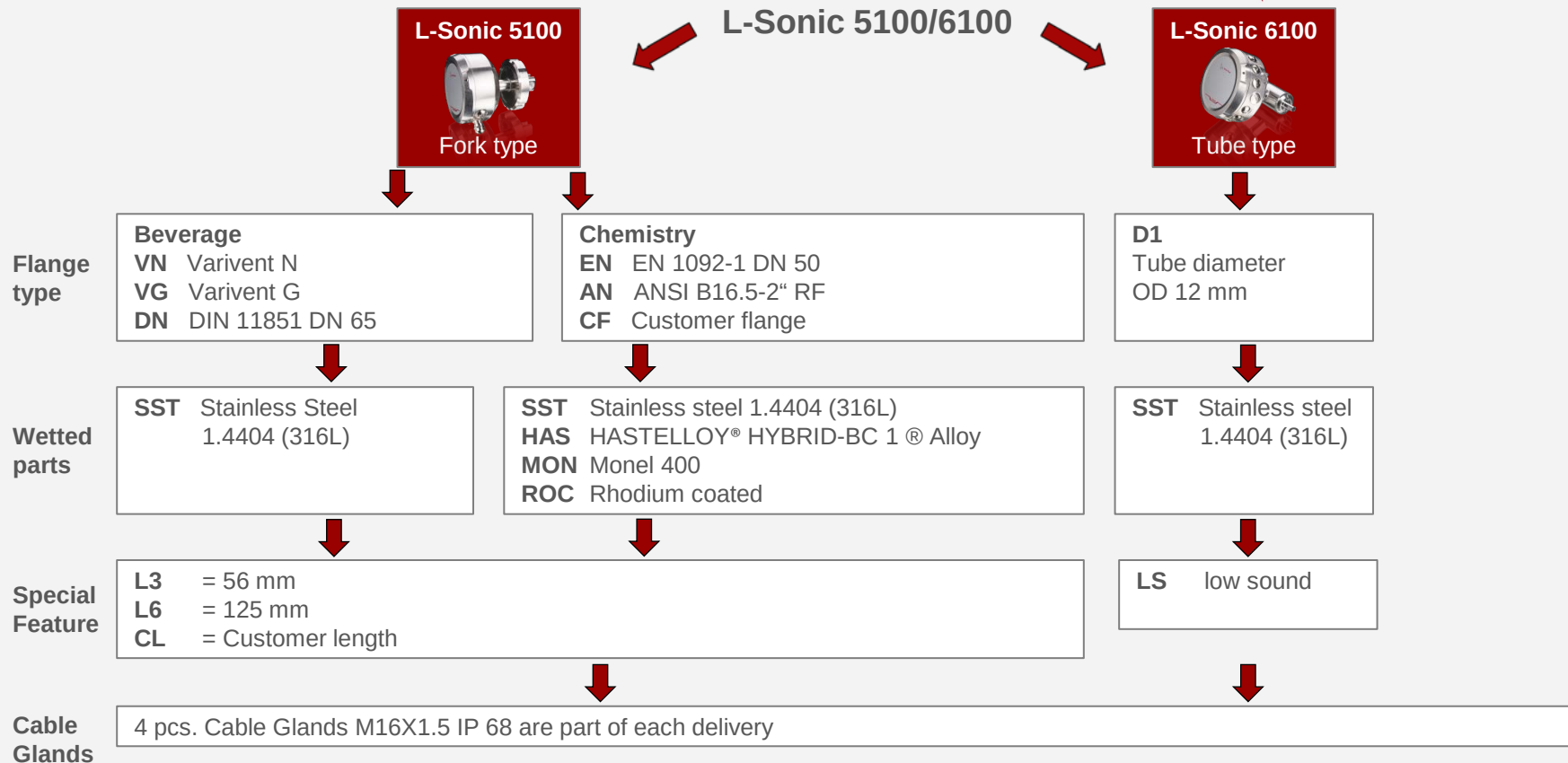
L-Sonic	
5	Fork type
6	Tube type
Feature	
1	Standard version
Generation	
00	Generation 1

Versions			
Fork type flanges		Material of the wetted parts	
VN	Varivent N	SST	Stainless steel 1.4404 (316L)
VG	Varivent G	HAS	HASTELLOY® HYBRID-BC 1® Alloy
DN	DIN 11851 DN65	MON	Monel 400
EN	EN 1092-1 DN50	ROC	Rhodium coated
AN	ANSI B16.5-2" RF	Shaft length	
CF	Customer Flange	L3	56 mm
Tube type flanges		L6	125 mm
D1	Tube diameter 12 mm	CL	Customer length
Special feature			
		CN	Cleaning nozzle
		LS	Low sound measurement

Example:

L-Sonic 5100 VERSION VN SST L3

L-Sonic | Overview and mechanical Configuration



L-Sonic | Communication



L-Sonic



L-Sonic 5100/6100
+ mPDS 5



Davis 5

L-Sonic 5100/6100
+ Pico 3000



L-Sonic 5100/6100
+ Pico 3000
+ Pico 3000 HMI



L-Sonic 5100/6100
+ Pico 3000
+ Pico 3000 RC Housing
incl. HMI



User Interface

Communication

PLC



L-Sonic | Features



Stable measurement by digital signal processing

- The smallest changes in the medium are recognized and calculated
- Measurements are virtually uninfluenced by changes in pressure, flow rate, and viscosity

The prevention of errors in the measurement is supported by:

- Low thermal inertia
- High tolerance to bubbles



L-Sonic stands for flexibility and efficiency in integration

- VARIVENT® or milk pipe flange connections for hygienic applications
- EN or ANSI flange connections which can be tailored to customer requirements
- Adaptable fork lengths which can be customized to existing circumstances



L-Sonic | Features



Low cost for a lean solution – L-Sonic as a complete stand-alone instrument

- Human machine interface with capacitive keys
- Common industrial fieldbus standards supported
- Backup and restore function
- Data and error log function
- USB interface at the electronics housing for configuration with a laptop





The right instrument for demanding applications

- Stainless steel 1.4404 for hygienic applications in the food and beverage industry as well as special applications in chemistry
- HASTELLOY® HYBRID-BC 1® alloy with excellent corrosion resistance for, e.g. sulfuric acid
- Rhodium coating with a scratch-resistant surface and best resistance for the measurement of extremely aggressive chemicals
- Monel 400 for strong alkaline solutions





L-Sonic | Features



Designed for a long working life and minimum of follow-up costs

L-Sonic sensors:

- ▶ have a robust electronics housing made of stainless steel
- ▶ are maintenance-free
- ▶ do not require any consumables



L-Sonic | Technical Specifications



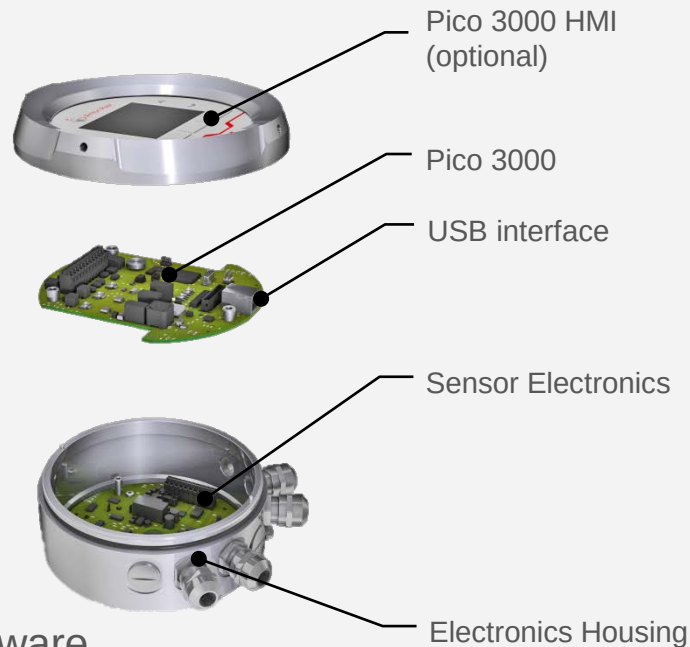
	L-Sonic 5100	L-Sonic 6100
Process sound velocity range	800 m/s to 2500 m/s	200 m/s to 1000 m/s
Material of the wetted parts	Stainless Steel 1.4404 (316L) HASTELLOY® HYBRID-BC 1 ® alloy Monel 400 Rhodium coated Fork length: 56 mm, 125 mm, Customer-specific	Stainless Steel 1.4404 (316L)
Accuracy in adjusted range:	0.1 m/s	
Reproducibility sound velocity	0.02 °C	
Reproducibility temperature		
Process temperature	-25 °C to 125 °C	
CIP/SIP temperature and duration	145 °C for max. 30 min.	
Ambient temperature	-25 °C to 65 °C without HMI	
(for non-Ex versions)	-25 °C to 55 °C with HMI	
Process pressure absolute	According to flange specification	up to 70 bar at 125 °C or 100 bar at 50 °C
Recommended flow rate	>0 m/s to 6 m/s	
Communication	Pico 3000: Analog, HART, Modbus RTU, PROFIBUS DP mPDS 5: PROFIBUS DP, PROFINET IO, Devicenet, Ethernet/IP, Modbus TCP, I/O Board	
Process connections	VARIVENT® N VARIVENT® G DIN 11851 EN 1092-1 ANSI B16.5	Tube end: OD 12 mm
Dimensions:		
Non-Ex version (L x W x H)	Depending on model	150 mm x 145 mm x 175 mm
Ex version (L x W x H)	Depending on model	160 mm x 160 mm x 190 mm
Explosion-proof versions according to ATEX / IECEx / FM		

Pico 3000 | Introduction



Pico 3000 – The new Transmitter for process sensors

- Pico 3000 integrated or as separate remote control unit Pico 3000 RC
- Human machine interface Pico 3000 HMI
- Common industrial fieldbus standards supported
 - Modbus RTU, HART, PROFIBUS DP
- Backup and restore function
- Data and error log function
- USB interface for configuration via Pico 3000 Software



Pico 3000 | Designation and available interfaces for L-Sonic



Pico – Transmitter Type	
3	For integration in the sensor electronics housing or remote control housing
Transmitter Type	
0	Standard Version
Generation	
00	Generation 1

Example:

Pico 3000 VERSION AO Eco

Versions (different input and output interfaces)	
AO	2 x analog out, 1 x analog in, 2 x digital in, 1 x relay
AO Eco	2 x analog out
HART	HART and 1 x analog out
Modbus RTU	Modbus RTU
PROFIBUS DP	PROFIBUS DP and 1 x relay

Pico 3000 | Software



Pico 3000 Software

- Download of Software from the Anton Paar website
- Available for all Pico 3000 versions with or without HMI

Capability of the Pico 3000 Software

- Adjustment and configuration of the instrument
- Backup and restore the configuration
- Read and export the measured data
- Read and export the logging information
- Read and export the error log
- Firmware updates



Pico 3000 | Accessories



Human Machine Interface Pico 3000 HMI

- Displays up to 4 values
- Capacitive keys
- TFT color display

No Application		14:17:03
Density	Temperature	   
896.00 kg/m³	20.03 °C	
L-D Pressure	Temp PCB	
12.50 bar	6.3 °C	
Menu		Log Out

Remote Control Pico 3000 RC

- ▶ Consisting of:
 - ▶ Pico 3000
 - ▶ Pico 3000 RC housing incl. HMI
- ▶ Options for mounting:
 - ▶ wall mounting
 - ▶ cabinet mounting



Pico 3000 RC wall mounting

L-Sonic | Applications



Industries

- Beverage
- Petroleum
- Chemical
- Pharma

Determined Parameters

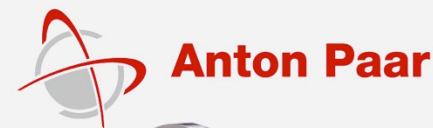
- ▶ Sound Velocity
- ▶ Temperature-compensated sound velocity
- ▶ Concentration of 2-component solutions

Typical Applications

- ▶ Product detection
- ▶ Interface detection
- ▶ Reaction control
- ▶ Oil concentration in refrigerants
- ▶ Inline concentration measurement of liquid foods
- ▶ Inline measurement of original extract in beer
- ▶ Inline measurement of media purity
- ▶ Inline detection of liquid interfaces



L-Sonic | Applications by industry, material & liquid



L-Sonic 5100



L-Sonic 6100

Industry	Beverage	Petro, Chemistry, Pharma				Refrigerant, Automotive
Material	SST Stainless Steel 1.4404	SST Stainless steel 1.4404	HAS HASTELLOY® HYBRID-BC 1® alloy*	MON Monel 400	ROC Rhodium coated**	SST Stainless steel 1.4404
Flange	VARIVENT® N VARIVENT® G DIN 11851	EN 1092-1 DN 50 ANSI B16.5-2" RF Customer flange				OD 12 mm
Example	Wort	Ammonia Acetic Acid	Sulfuric Acid	Alkaline Solutions	Hydro- chloric Acid	OCR: R1234, R404a, R134a, R410a

* HAS (HASTELLOY® HYBRID-BC 1® alloy) for L-Sonic does not equal to HAS (Hastelloy C-276) from L-Dens 7000 Series!

** Rhodium coating as succession of gold coating. → More scratch resistant and usable for same applications as gold.

→ Attention: the new rhodium coated sensor version has flange dimension DN50 the former gold DN40.

www.anton-paar.com