Anton Paar

Measure
what is measurable
and make measurable
that which is not.

Galileo Galilei (1564-1642)

Instruction Manual and Safety Information

L-Sonic 5100/6100 (Ex d)

Sound Velocity Sensors

(Original Instruction)

Disclaimer

This document may contain errors and omissions. If you discover any such errors or if you would like to see more information in this document, please contact us at our address below. Anton Paar assumes no liability for any errors or omissions in this document.

Changes, copyright, trademarks etc.

This document and its contents may be changed or amended by Anton Paar at any time without prior notice.

Further information

Published and printed by Anton Paar GmbH, Austria

Address of the instrument producer:

Anton Paar GmbH
Anton-Paar-Str. 20
A-8054 Graz / Austria – Europe

Tel: +43 (0) 316 257-0
Fax: +43 (0) 316 257-257
E-Mail: info@anton-paar.com
Web: www.anton-paar.com

Date: July 2023

Document number: E05IB006EN-A

Instruction Manual and Safety Information

L-Sonic 5100/6100 (Ex d)

Sound Velocity Sensors

(Original Instruction)

Contents

1 Safety Instructions

- Read the documentation before using L-Sonic.
- Follow all hints and instructions contained in the documentation to ensure the correct use and safe functioning of L-Sonic.
- The documentation is a part of the product. Keep this document for the complete working life of the product and make sure it is easily accessible to all people involved with the product. If you receive any additions or revisions to the documentation from Anton Paar GmbH, these must be treated as part of the documentation.

1.1 General Safety Instructions

Liability

- This document does not claim to address all safety issues associated with the use of the instrument and samples. It is your responsibility to establish health and safety practices and determine the applicability of regulatory limitations.
- Anton Paar GmbH only warrants the proper functioning of L-Sonic if no adjustments have been made to the mechanics, electronics, and firmware.
- Only use L-Sonic for the purpose described in the documentation. Anton Paar GmbH is not liable for damages caused by incorrect use of L-Sonic.

Installation and use

- Comply with local workplace safety regulations.
- Attention must be paid to all parts of the instrument.
- Sensors without an Ex marking are not explosion-proof instruments and therefore must not be operated in areas with risk of explosion.
- Sensors with Ex marking are intended for use in areas with risk of explosion. Special Safety Instructions must be read and followed for installation and use (see Chapter 1.2).
- The installation procedure should only be carried out by authorized personnel who are familiar with the installation instructions.
- Do not use any accessories or spare parts other than those supplied or approved by Anton Paar GmbH.
- Make sure all operators are trained to use the instrument safely and correctly before starting any applicable operations.
- In case of damage or malfunction, do not continue operating L-Sonic. Do not operate the instrument under conditions which could result in damage to goods and/or injuries and loss of life.
- Check L-Sonic for chemical resistance to the process fluid and cleaning agents.
- Do not operate the instrument beyond its electrical, thermal and mechanical specifications.
- Do not step on the instrument.

Maintenance and service

- The results delivered by L-Sonic not only depend on the correct functioning of the instrument, but also on various other factors. We therefore recommend you have the results checked (e.g. plausibility tested) by skilled personnel before consequential actions are taken based on the results.
- Service and repair procedures may only be carried out by authorized personnel or by Anton Paar GmbH.

Disposal

- Concerning the disposal of L-Sonic, observe the legal requirements in your country.

Returns

- For repairs send the cleaned L-Sonic (instrument) to your Anton Paar representative. Only return the instrument together with the filled out RMA (Return Material Authorization) and the form "Safety Declaration for Instrument Repairs". Please download the Safety Declaration form from our website www.anton-paar.com.
- Do not return instruments which are contaminated by radioactive materials, infectious agents or other harmful substances that cause health hazards.

1.2 Special Safety Instructions

Additional safety instructions are in the documents supplied depending on the ordered sensor version and process adapter. The additional documents are part of this instruction. Always comply with the instructions in the additional documents, such as the *Installation information on process adapters*.

Operation in Hazardous Areas

This manual also provides the safety instructions and specifications of instruments designed for use in hazardous areas according to the Directive 2014/34/EU (ATEX), IECEx, FM and CSA.

Instruments approved to be installed in hazardous areas are market with an Ex sign.

DANGER

Explosion
In areas with risk of explosion only operate instruments marked with an Ex sign.

By attaching the Ex sign, Anton Paar GmbH confirms that the instruments meet the requirements of the examination certificate (see Ex certificates collected in XDPIB041EN).

It is your responsibility to ensure that the set-up, installation, commissioning, operation, maintenance and service of the measuring instrument is in full compliance with

- corporate, local and national regulations and electrical codes,
- the data on the type plate,
- the signs and Ex signs on the instrument,
- the certificates (Ex certificates collected in XDPIB041EN) and
- the instructions given in the instruction manual and supplementary documentation.

Set-up, installation, commissioning, operation, maintenance and service of the instrument must be carried out by personnel who fulfill the following requirements:

- Be qualified for these tasks
- Be trained in explosion protection
- Be familiar with federal/national regulations (e.g. IEC/EN 60079-14)
- Be authorized by the plan owner/operator

Before beginning work, the authorized person must have read and understood the instructions in the instruction manual and the supplements to the instruction manual and in the certificates (depending on the application).

Refer to the technical specifications for the relationship between the permitted process and ambient temperature depending on the temperature class.

Modifications on the instrument, repair works and/or change of components are not permitted.

In the event of potentially explosive gas/air mixtures, only operate the instrument under atmospheric conditions.

- Pressure: 80 to 110 kPa (0.8 to 1.1 bar)
- Air with normal oxygen content, usually 21% (V/V)

Integrate the instrument into the local potential equalization.

If the ground connection has been established via the pipe, it is also possible to integrate the instrument into the potential equalization system via the pipe.

Only open the electronics housing in a de-energized state (once a delay of 10 minutes has elapsed after switching off the power supply) or in environments which do not have a potentially explosive atmosphere.

Do not remove the USB port sealing plug in potentially explosive atmospheres. The USB connection must only be used in non-explosive atmospheres.

DANGER

Explosion
The plastic transport sealing plugs do not meet this requirement and must therefore be replaced during installation.

If a cable gland or conduit entry part is not used, it must be sealed by using an appropriate flameproof/explosion proof sealing plug with the plug entered to a depth of at least five threads.

If connected by a conduit entry approved for this purpose, mount the associated sealing unit directly at the housing.

Do not disconnect the electrical connections (power supply, communication) when energized in potentially explosive atmospheres.

Choose the cables' diameters to ensure optimal sealing at the cable gland.

Take mechanical stress into consideration when choosing the connecting cables. Strain relief is provided by the correct assembly of the cable gland.

The specification of the connecting cables must comply with all applicable regulations for the environment of operation and with the instructions in the appropriate instruction manuals.

Only use certified cable entries and cable glands or conduits suitable for the application. Observe selection criteria as per federal/ national regulations (e.g. IEC/EN 60079-14).

Battery Replacement (Pico 3000)

Replace the battery with same battery type:

- CR1225
- Li/MnO2 Battery 3V, 48 mAh

Marking of the instrument (Ex version)

- 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
- UKEX: Ex II 2G Ex db IIb T4/T5 Gb

1.3 Conventions for Safety Messages

The following conventions for safety messages might be used in this document:

DANGER

Description of risk.
Danger indicates a hazardous situation which, if not avoided, **will** result in death or serious injury.

WARNING

Description of risk.
Warning indicates a hazardous situation which, if not avoided, **could** result in death or serious injury.

CAUTION

Description of risk.
Caution indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE
Description of risk.
Notice indicates a situation which, if not avoided, could result in damage to property.

***TIP** Tip gives extra information about the situation at hand*.

1.4 Safety Signs on the Instrument

On **non-Ex sensors**:

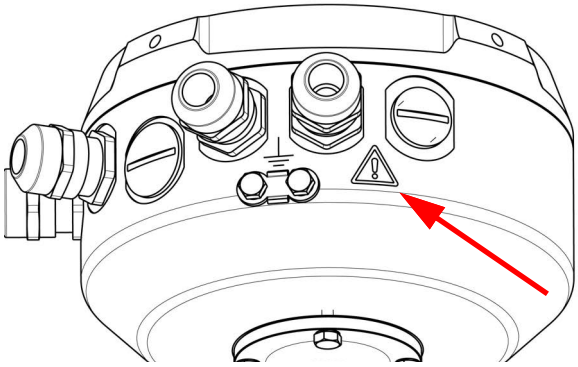


*Fig. 1: Position of the warning sign on the **non-Ex sensors***

On **Ex sensors**:

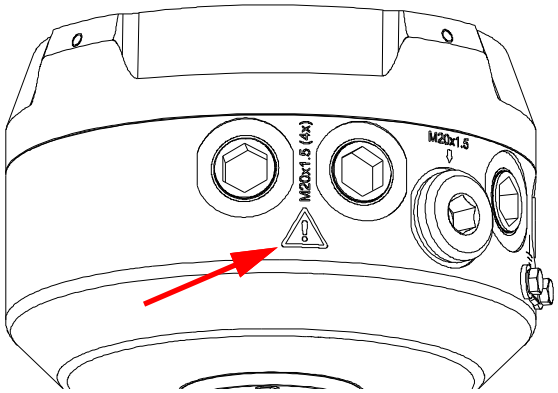


*Fig. 2: Position of the warning sign on the **Ex sensors***

WARNING

Follow all warnings and cautions listed in this instruction manual.

NOTICE
Take care that the warning symbols remain clearly legible.

1.5 Special Conditions of Use

WARNING

- There is a risk of static charge of the packaging. The measuring system must not be unpacked in a hazardous area.
- Do not open the instrument when an explosive atmosphere may be present.
- Seal all conduits within 18 inches (0.46 m).
- Field wiring must be suitable for minimum 90 °C.
- For cable entrances use only already certified Ex d or Ex db cable glands suitable for application and rated for a minimum of 80 °C.
- Unused openings must be closed by use of already certified Ex d or Ex db stopping plugs (blind plugs) suitable for application and rated for a minimum of 80 °C.
- The plastic transport sealing plugs do not meet this requirement and must therefore be replaced during installation.
- The usage of all components of the instrument (sensor, adapter, etc.) must be checked according to the technical specification in the instruction manual and can only be used if all necessary requirements are approved.

1.5.1 Cable, wire entry systems and closure elements

WARNING

Explosion

- All requirements of the EN 60079-14 standard, section 9.3 must be taken into account when selecting and installing the cables.
- All requirements of the EN 60079-14 standard, section 10 must be taken into account when selecting and installing the cable, wire entry systems and closure elements.
- Cable and wire entry, must comply with one of the following:
  - a minimum length of the connected cable / wire of 3 m or
  - cable and wire glands, must be sealed with a hardening sealing compound (shut-off cable gland), and be certified according to IEC 60079-1 and be certified as a device.

2 L-Sonic - An Overview

TIP *Please find detailed information on L-Sonic 5100/6100 (Ex d) in the Reference Guide available from the USB flash drive which is part of the delivery.*

The L-Sonic represents the third generation of Anton Paar sound velocity sensors for continuous monitoring of product quality and product specifications during production.

It consists of:

- a fork or a tube including the measuring technology with a temperature sensor,
- the sensor electronics and
- the optional Process Instrumentation Controller Pico 3000 which can be built in the electronics housing of the sensor or in a separate electronics housing.
- The instrument is available with different materials of the wetted parts and flanges.

2.1 Intended Use of the Instrument

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.

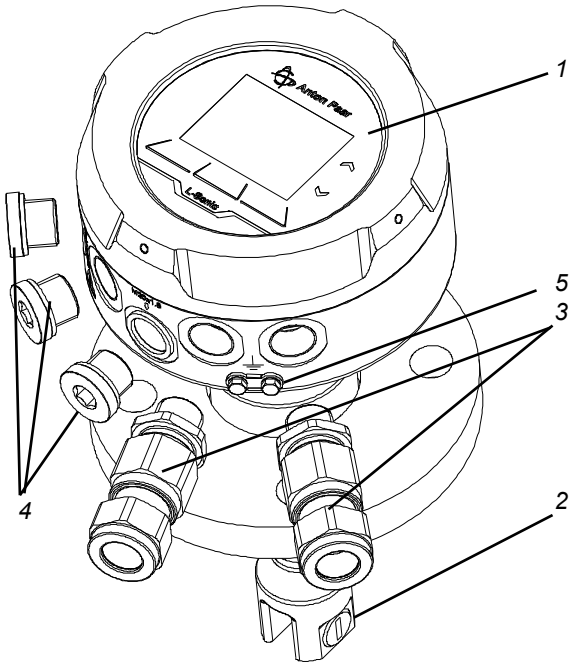
The sound velocity is also a material parameter and can be used for material characterization.

2.2 Designation of L-Sonic Sound Velocity Sensors

Example: L-Sonic 5100 Version EN SST L6 NPT Ex d

Numbers	Flange type	Material of wetted parts	Shaft length	Special feature
Sensor type **5**: Fork type **6**: Tube type Feature **1**: standard version Generation **00**: Generation 1	**Fork type flanges:** for beverage: **DN**: DIN 11851 DN65 **VN**: VARIVENT N **VG**: VARIVENT G for chemistry: **AN**: ANSI B16.5-2" RF **EN**: EN 1092-1 DN50 **CF**: customer flange **Tube type flanges:** **D1**: Tube diameter 12 mm	**SST**: Stainless steel 1.4404 (316L) **HAS**: HASTELLOY® HYBRID-BC1® **MON**: Monel 400 **ROC**: Rhodium coated **GOC**: Gold coated (only for replacement of SPRn)	**L3**: 56 mm **L6**: 125 mm **CL**: customer length	**CN**: Cleaning nozzle **LS**: Low sound speed measurement **SE**: Separated electronics **EX d**: Ex d approval **NPT**: 1/2" NPT threads for Ex d cable glands

2.3 Components



1 Electronics housing with optional transmitter Pico 3000 and HMI
2 Sensing element including temperature measurement
3 Cable glands (Ex version optional)
4 Blanking plugs (Ex version optional)
5 External ground terminal

Fig. 3: Components of the instrument

3 Installing L-Sonic

WARNING

- Installations shall comply with the intended area of use and the relevant national regulations and requirements.
- Installation, maintenance and service work must only be carried out by trained and authorized personnel.
- Personnel for set-up, installation, commissioning, operation, maintenance and service of the instrument must be trained according to the operating guideline 1999/92/EG.
- Make sure that the main line is empty and unpressurized before mounting or dismounting the sensor.
- The lines and instruments can be hot or cold. Wait until the entire process line has reached a harmless temperature.

The sensor must always be disconnected from the power supply when connecting/disconnecting wires to/from the sensor.

Verify that the technical specifications of the sensor and the process adapter are suitable for the application. For example:

- resistance of all wetted parts
- max. and min. ambient and process temperature
- max. and min. flow
- max. pressure
- hazardous area specifications
- if included in the delivery, the specification of the sealing

NOTICE

Electronics overheating due to thermal insulation! The electronics housing must be completely uninsulated.
The instrument has been designed according to EN 61000-4-3 Class 3 and can be installed in an environment with strong electromagnetic fields (nominal power of 2 W and more). The distance between instrument and transmitter must be at least 1 meter.

3.1 Mechanical Installation

The sensor operates in any mounting position or orientation and does not need a specific distance from elbows, valves or other equipment unless cavitation is caused.

All recommendations in this chapter are a summary of decades of experience in process measurement.

3.1.1 Mechanical Installation of the L-Sonic 5100

The fork-type sound velocity sensors L-Sonic 5100 are installed in a tank or the main line using a T-piece. Make sure that the head is fully immersed in the sample flow.

To prevent gas pockets from disturbing the measurement in a horizontal pipe, install the sensor at either the 3 or 9 o'clock position.

NOTICE

If a self-draining installation is required, also an installation at 6 or 12 o'clock is possible, but consider that the sound fork is fully immersed in the flow. There is always a risk of gas pockets at the top of the pipe. The 12 o'clock position is not allowed if the process temperature is above 90 °C.

3.1.2 Mechanical Installation of the L-Sonic 6100

The tube-type sound velocity sensors L-Sonic 6100 are installed in the main pipe. Consider the technical specification of the maximum and minimum flow rate of the sensor. If the flow rate of the main pipe exceeds the flow rate specification of the sensor, it must be installed in a bypass. The inner diameter of the sensor is 10 mm. The sensor can be installed in any orientation.

Use compression type fittings to install the sensor into the pipe.

4 Electrical Installation

Electrical installation and setup depends on the hardware configuration of L-Sonic. The following chapters describe the electrical wiring for installation of sensor models **without** the integrated controller Pico 3000. Installation of sensor models **with** an integrated controller is described in the instruction manual of "Pico 3000 Process Instrumentation Controller".

WARNING

- The instruments have a functional insulation. Protection against potentially hazardous touch current has to be ensured by the customer in accordance to local regulations.
- Installation, maintenance and service work must only be carried out by trained and authorized personnel.
- Installations shall comply with the intended area of use and the relevant national regulations and requirements.
- The sensor must always be disconnected from the power supply when connecting/disconnecting wires to/from the sensor.

4.1 General Information

The instrument has been designed according to EN 61000-4-3 Class 3 and can to be installed in an environment with strong electromagnetic fields (nominal power of 2 W and more). The distance between instrument and sender must be at least 1 meter.

4.1.1 Explosion Protection

The L-Sonic sound velocity sensors marked with an Ex type plate on the electronics housing are explosion-proof and flameproof instruments.

4.1.2 Grounding

The L-Sonic must be solidly grounded. If the flange is grounded, no additional grounding is necessary. If the flange is not grounded, the sensor must be connected to earth via the external or internal ground terminal (Fig. 4 and Fig. 5).

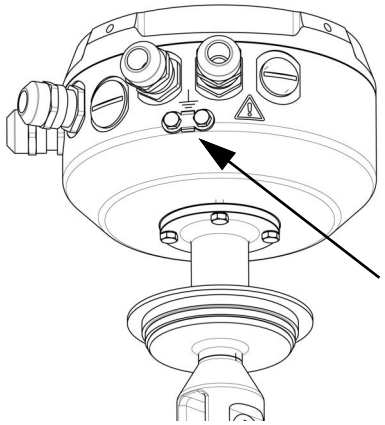


Fig. 4: External screw terminal for ground connection

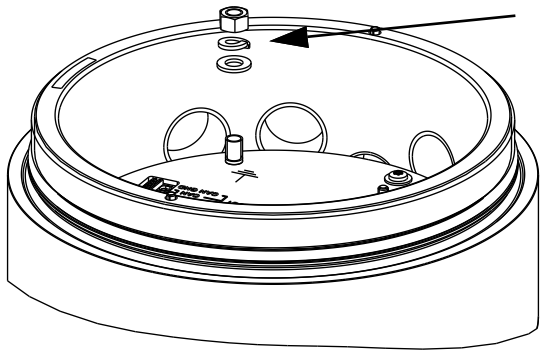


Fig. 5: Internal M5 screw terminal for ground connection

4.1.3 Power Supply

It is recommended to use an insulated high quality power supply with low ripple to supply L-Sonic.

Make sure that the used power adapter can provide enough current to both the sensor and an optional Pico 3000.

Refer to Appendix A for the technical specifications.

4.1.4 Positioning the Electronics Housing

You can adapt the orientation of the cable glands to your installation requirements by turning the electronics housing on the sensor by ± 90°, if necessary.

If the sensor is exposed to water, e.g. due to cleaning activities or outdoor mounting, the housing must be turned to a position where the cable glands do not point upwards.

NOTICE
Rotating the housing by more than ± 90° will damage the sensor.

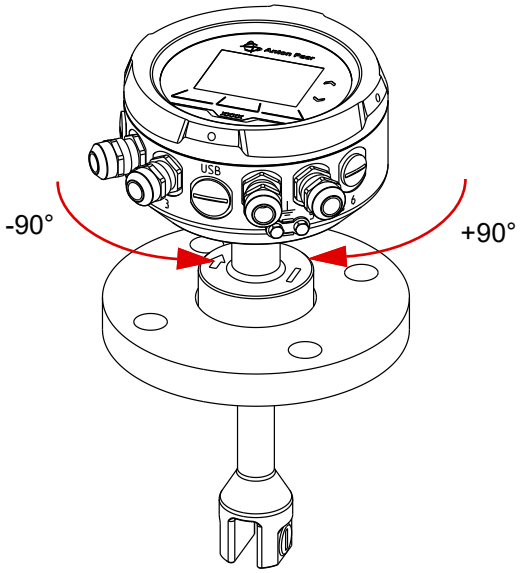


Fig. 6: Turning the electronics housing on the sensor by ±90°

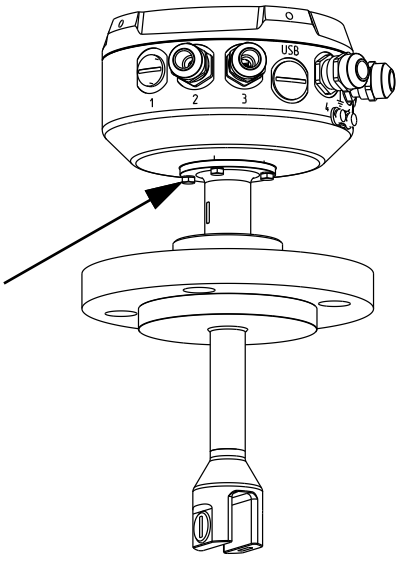


Fig. 7: Fixation screws of the electronics housing

Proceed as follows:

1. Remove the 4 screws (AF 7)
2. Turn the housing to the required position by plus or minus 90°.
3. Tighten all 4 screws crosswise with 3 Nm torque.

WARNING

- The sensor is only explosion-protected when all four screws are tightened.
- All screws must be type A4-70.

4.1.5 Electronics Housing Ex d

The cover (over ring) of the housing are parts of the explosion protection. The cover (over ring) must be locked all the way to the stop with the delivered hook spanner (Fig. 8).There must not be a gap between cover (cover ring) and housing.

- To be able to lock the ring (cover ring) completely: Make sure that the O-ring of the housing is in the intended position (Fig. 9).
- Make sure that the optional display is in the correct position (no gap between display and housing).

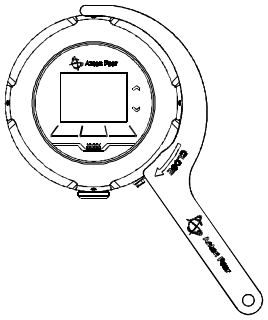


Fig. 8: Locking the cover/cover ring with the hook spanner

In addition, the cover (cover ring) must be secured with the locking screw (Fig. 10). In order for the cover (cover ring) to have an electrical connection with the lower part of the housing, the hex socket screw must be tightened with 0.8 Nm.

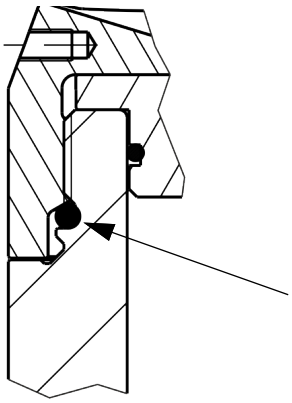


Fig. 9: Intended position of the O-ring

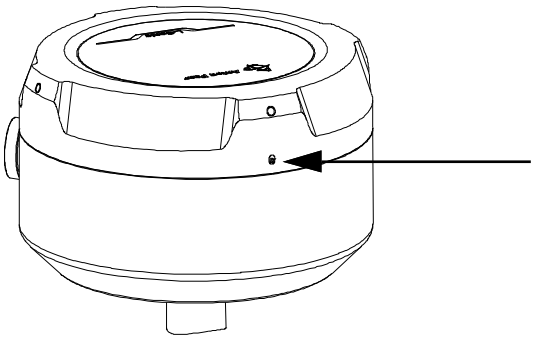


Fig. 10: Locking screw to secure the cover (cover ring)

4.1.6 Cable Gland

Mount the blind plugs and the cable glands to the position you need them.

- Make sure to position the cable glands or plugs at the bottom and tighten them properly.
- Use cable glands with shield clamping.
- Make sure the cable is mounted with a loop to avoid water ingress.

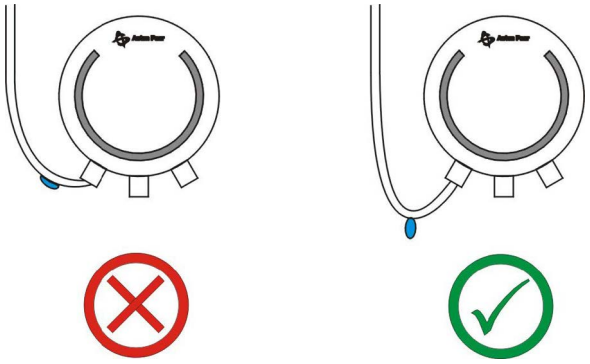


Fig. 11: Cable inlet

The central entry in the electronics housing is a port to the USB connector and cannot be used to wire the sensor.

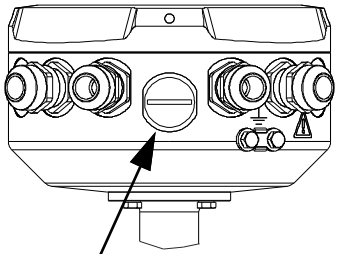


Fig. 12: USB service connector

WARNING

Explosive atmospheres

- The interface between a cable entry device and its associated enclosure will require additional sealing to achieve ingress protection (IP) ratings higher than IP54. The minimum protection level is IP54 for explosive gas atmospheres. Parallel threads require a sealing washer to maintain IP66. It is the installer's responsibility to ensure the IP rating is maintained at the interface.
- The torque for the cable gland of the central USB service connection is 10 Nm.

4.1.7 Cable Glands and Blind Plugs for Ex d Housing

The requirements given in Chapter 1.2 "Special Safety Instructions", Chapter 1.5 "Special Conditions in Use" and in Chapter 4.1.6 "Cable Glands" must also be considered.

The maximum permitted thread length L depends on the thickness (s) of the seal when mounted.

For deliveries **until** end of 2020 the maximum permitted thread length L [mm] = s [mm] + 14 for **all** cable entries and the central USB service entry.

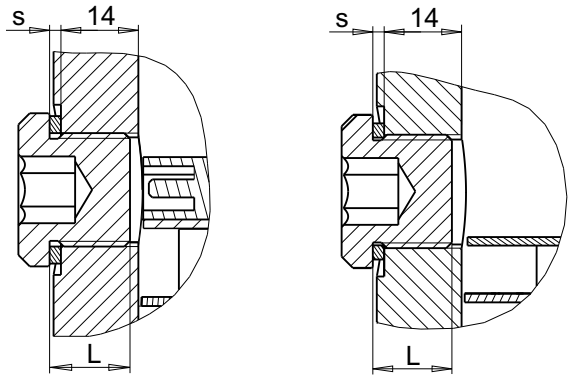


Fig. 13: Maximum permitted thread length L of all cable entries for deliveries until end of 2020 (left central USB entry, right all other ports).

For deliveries **after** 2020 the maximum permitted thread length **only** for the central USB service entry is L [mm] = s [mm] +14. All other threads can be longer.

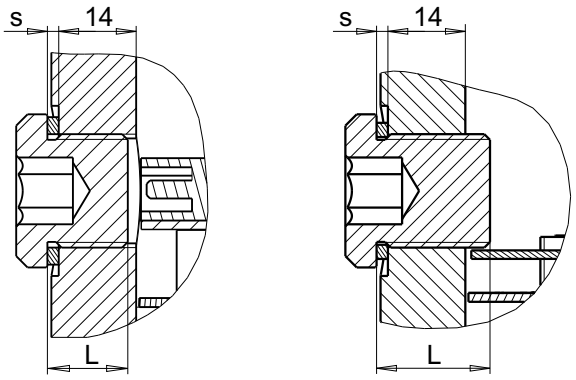


Fig. 14: Maximum permitted thread length L for deliveries after 2020 (left central USB entry, right all other ports)

4.1.8 Cables and Preparation

WARNING

- The connecting cables must correspond to the local ambient conditions and the national regulations.
- Take mechanical stress into consideration when choosing the connecting cables.
- Choose the cables' diameters to ensure optimal sealing at the cable gland.
- Strain relief is provided by the correct assembly of the cable gland.

NOTICE

- Only use shielded cables.
- If connectors/plugs are used instead of cables glands, make sure that the connectors including cable are rated IP 67.

For cable specifications refer to Appendix A "Technical Specifications".

Cable preparation (non Ex version):

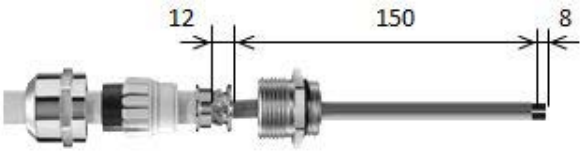


Fig. 15: Cable preparation

4.2 Wiring

In order to get access to the terminals it is necessary to remove the cover from the sensor.

Proceed as follows:

1. The electronics housing of the Ex version has a cover locking screw. Make sure this cover locking screw is not tightened.
2. Unscrew the cover and remove it.
3. In case an HMI is installed, lift it gently to get access to the controller cover. You do not need to remove the HMI cable.

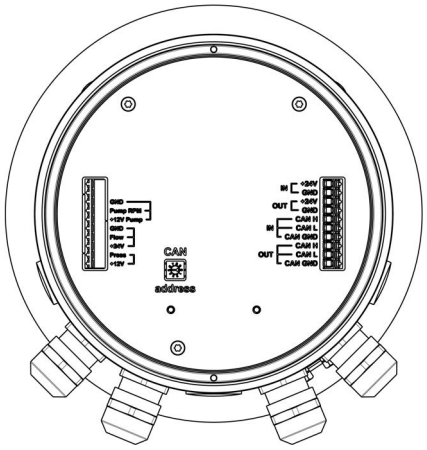


Fig. 16: Terminals of L-Sonic (without Pico 3000)

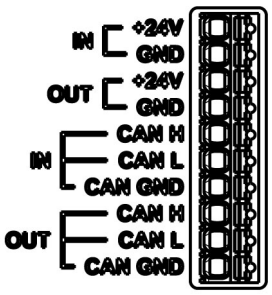


Fig. 17: Detailed view of the terminals of L-Sonic (without Pico 3000)

These terminals are used to connect the power supply and the CAN bus to the sensor.

Terminal	
Type	Push-in spring connection
Wire cross section	0.2 to 1.5 mm² / AWG 24 to 16 (with ferrules without plastic sleeve)
Stripping length	8 mm / 0.3 inch

Proceed as follows to **connect** wires to the terminal:

- Push in the white spring with a small screw driver (size 3.5 mm / 1/8").
- Insert the wire into the correct pin and release the spring.

Proceed as follows to **disconnect** wires from the terminal:

- Push in the white spring with a small screw driver (size 3.5 mm / 1/8").
- Pull out the wire and release the spring.

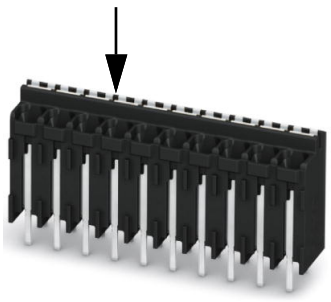


Fig. 18: Clamping terminal with springs

NOTICE
Damage of electronics board
Pushing the connector spring with excessive force may damage the electronics board.

4.2.1 Shielding

Shield the cables on both sides. The connection of the shielding at the cable gland are shown in Fig. 15.

4.2.2 Wiring the Sensor and mPDS 5 or Pico 3000 RC

All sensors communicate with the mPDS 5 or Pico 3000 RC via a CANopen bus network. The mPDS 5 or Pico 3000 RC is the CAN-master, all sensors are slaves.

All sensors have CAN IN and CAN OUT terminals. A CAN network wiring of more than one sensor can be done simply without cable stubs.

The CAN bus needs a 120 Ω termination at each end. The sensor is delivered with a 120 (Ohm-Zeichen) terminating resistor at CAN OUT. To build up a network with more sensors, the terminating resistor at CAN OUTmust be removed so that the next sensor can be connected at CAN out.

If several sensors of the same sensor board are connected together, the CAN address must be set on each sensor board of the same type to be unique in the network.

For installations with more than one sensor the power supply is looped through from "Power IN" to "Power OUT".

CAN-cable assignment for CAN-cable (mat.no. 94268) if a separate power cable is used:

	Wire color
CAN H	Yellow (#1)
CAN L	Green (#2)
CAN GND	Brown (#3)
Not used	White (#4)

CAN-cable assignment for CAN (mat. no. 184415) cable with power supply:

	Wire color
CAN H	Yellow (#1)
CAN L	Green (#2)
CAN GND	Brown (#3)
+24 V	White (#4)

4.2.2.1 Wiring with mPDS 5

For details of connecting the sensor to mPDS 5, also refer to the instruction manual and/or reference manual for mPDS 5.

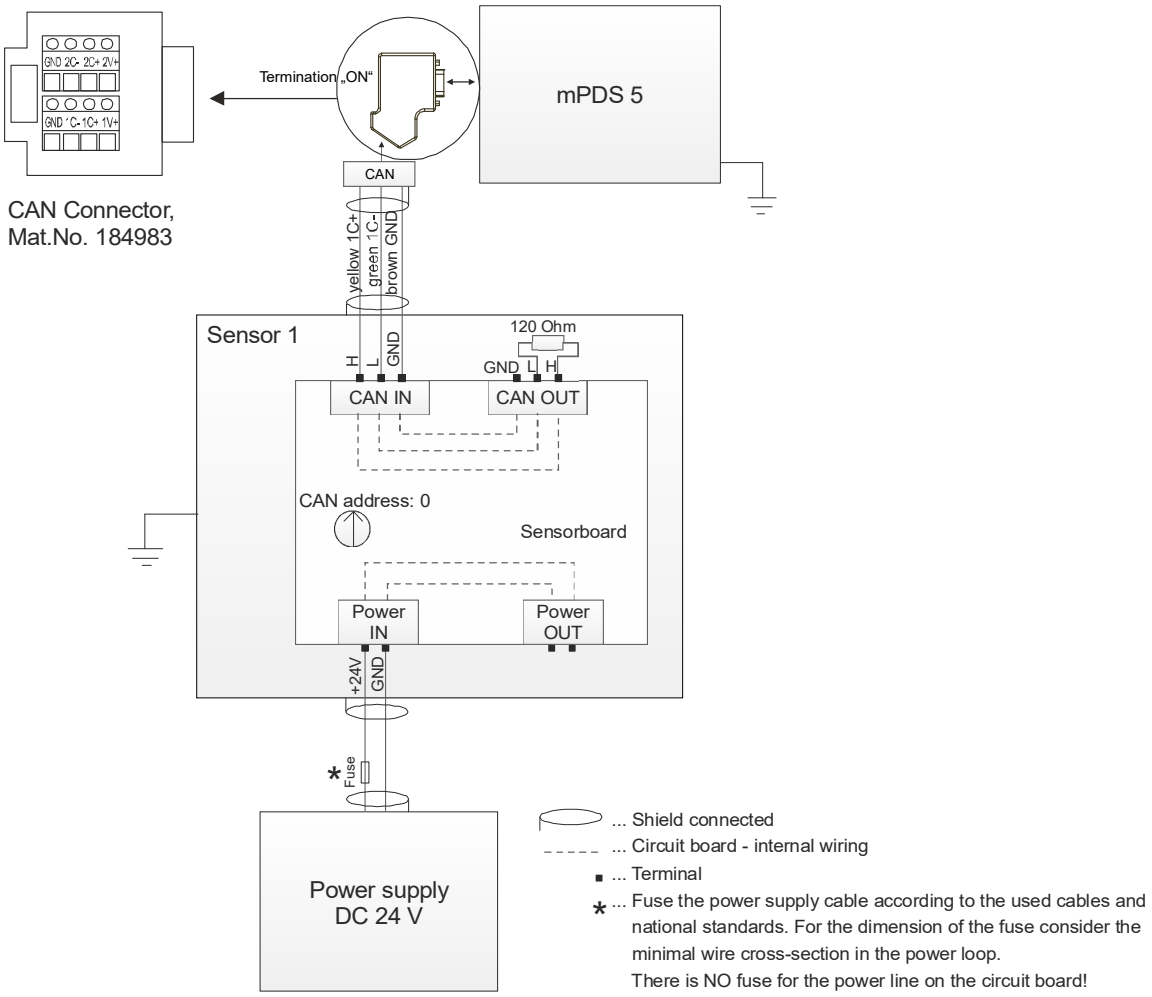


Fig. 19: Wiring mPDS 5 and a sensor with separate CANopen and power supply cables

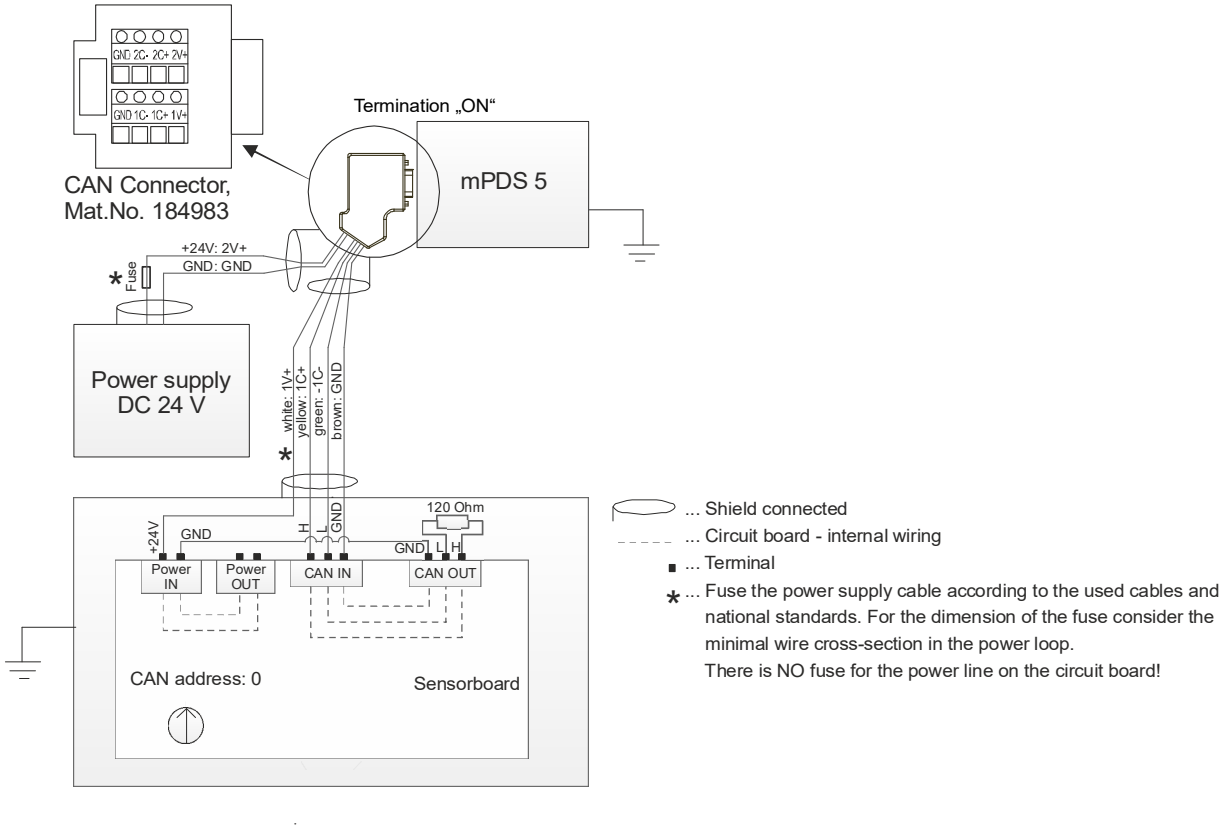


Fig. 20: Wiring mPDS 5 and a sensor with a combined CANopen and power supply cable

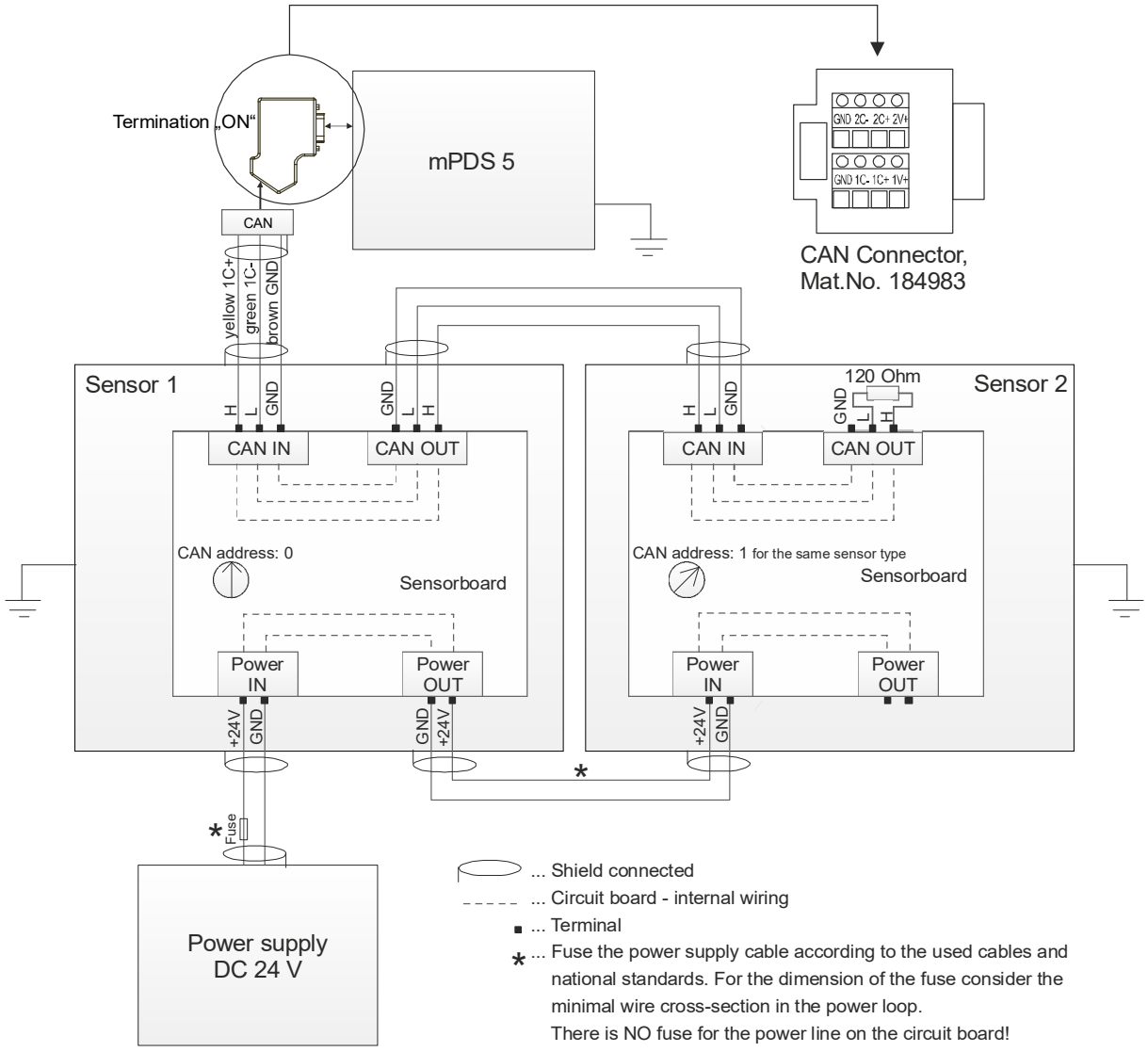


Fig. 21: Wiring mPDS 5 with two sensors with separate CANopen and power supply cables

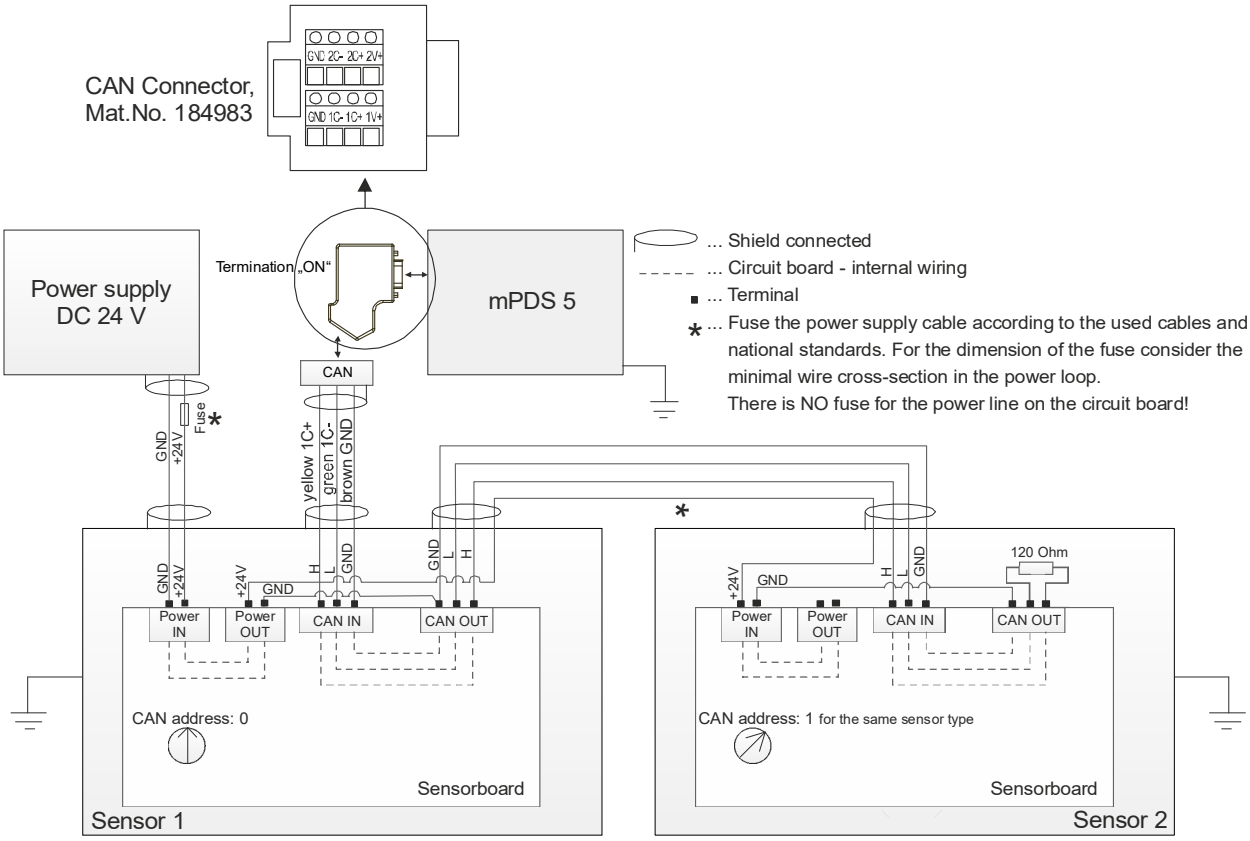


Fig. 22: Wiring mPDS 5 with separate CANopen and power supply cables, the following sensors with one single cable

4.2.2.2 Wiring with Pico 3000 RC

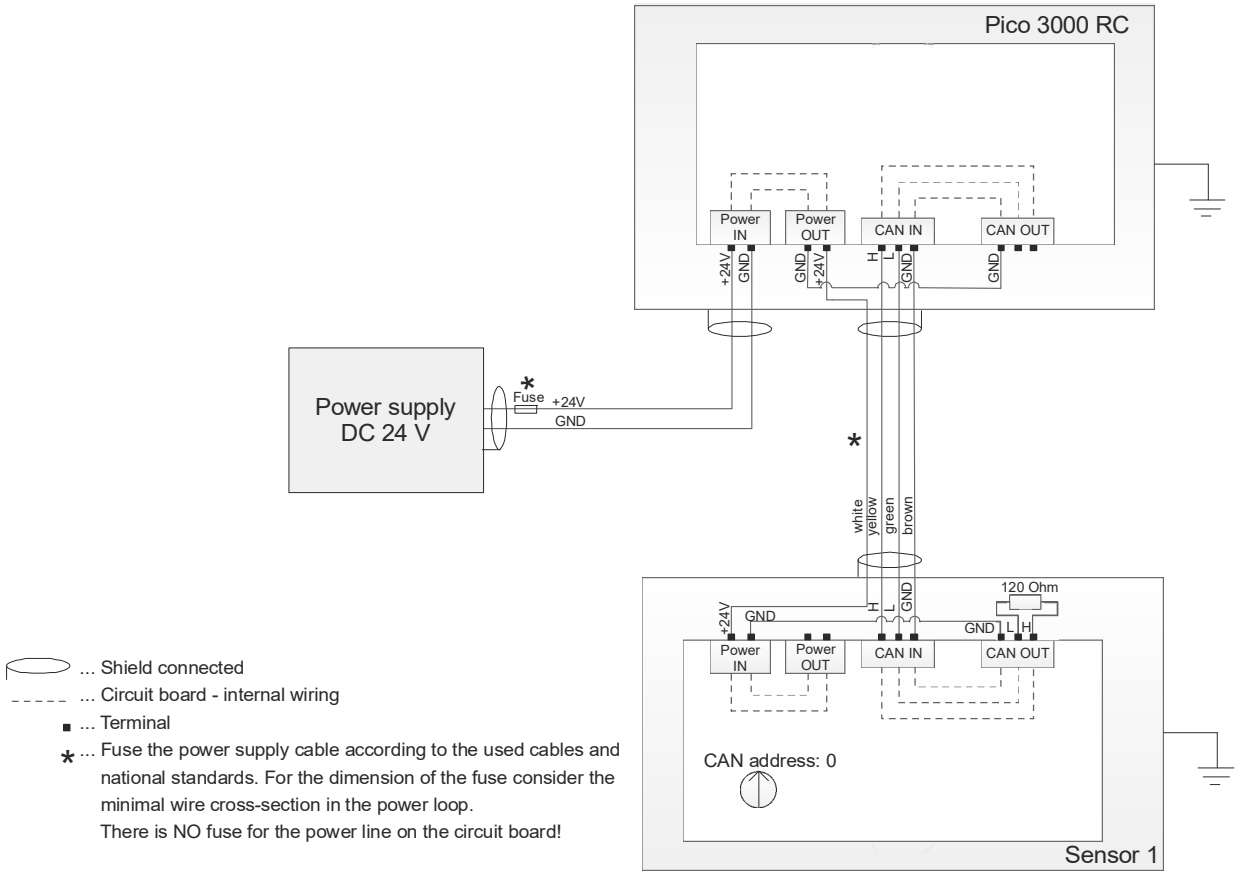


Fig. 23: Wiring with Pico 3000 RC

5 Start-up and Use of L-Sonic

5.1 Standard Operating Procedure

Please refer to the reference manual of

- mPDS 5 Evaluation Unit chapters "Checklist for Quick Start-up" and "Daily Routine Operations"

or to the instruction manual of

- Pico 3000 Process Instrumentation Controller chapter "Start-up and Use of Pico 3000).

for the standard operating procedure.

6 Upkeep and Cleaning

To ensure trouble-free operation and operational safety, the sensor must be checked and cleaned regularly. We recommend the following intervals, however, these have to be adapted to existing process conditions

Daily

- Check the instrument, the evaluation unit or PLC for error messages.

Once a week

- Check the sensor and all associated fittings or connections for leaks
- Optical check for damages
- Optical check for corrosion

Once a year

- Change the wetted O-rings and/or gaskets.

Customer specified intervals

- In general we recommend to exchange the sealing once a year. Under certain process conditions (aggressive fluids, temperature, pressure, ...) the exchange interval has to be adapted depending on the sealing material and the process conditions.
- Verify the validity of the measurement results in order to identify any malfunction or deterioration in sensor performance.
- If a deviation is detected, flush the sensor with a cleaning liquid and perform a calibration and adjust the sensor as needed.
- Only use cleaning agents to which the wetted materials are resistant.

Procedure

- Any work at the sensor in an Ex zone must be carried out in accordance to the operating guideline 1999/92/EC (e.g. only use non-sparking tools).
- Wear appropriate personal protective equipment.
- Make sure that there is no risk of a spark caused by a potential difference for example due to missing grounding or electrostatic charge.

6.1 Software Administration

NOTICE
The sensor does not need to be updated. We recommend an update only after written demand from your Anton Paar representative.

If a sensor is installed in combination with a Pico 3000, the sensor firmware can be updated with the Pico 3000 Software.

If the sensor is connected to an mPDS 5 you need an mPDS 5 update package from your Anton Paar representative.

6.2 Cleaning

- Clean the sensor to prevent contamination or buildup of deposits.
- Clean the sensor housing avoiding chemicals that could corrode or damage the housing or the seals (e.g. warm water).
- If a high-pressure washer or steam is used, do not aim the seams, gaskets, electronics housing or HMI.

6.3 Wetted Parts

Please see Appendix A for the wetted parts of the sensors and process adapters.

6.4 Removing the Instrument from the Line

WARNING

- Beware of hazardous process conditions like temperature, pressure or aggressive fluids.
- Beware of the heavy weight of the instrument.
- Follow the safety instructions.

- Wear protective equipment.
- Switch off the instrument (power supply, communication, ...).
- If the sensor is in a bypass system, close the bypass valves and lock the bypass valves if required.
- The lines and instruments can be hot or cold. Wait until the entire process line has reached a harmless temperature.
- Ensure the line is empty and unpressurized before removing the sensor! For example: if the sensor is in a bypass system, open the sample valve and make sure no pressure remains in the bypass.
- Disassemble the sensor.

7 Maintenance Work and Repair

WARNING

Maintenance and service work must only be carried out by trained and authorized service engineers.

7.1 Maintenance Performed by an Authorized Anton Paar Service Engineer

The instrument does not require any regular maintenance performed by an authorizes Anton Paar Service Engineer.

Following parts are generally excluded from the warranty (wear and tear parts):

- O-rings
- Seals and gaskets

7.2 Repair Performed by an Authorized Anton Paar Representative

In case your instrument needs repair, contact your local Anton Paar representative, who will take care of the necessary steps. If your instrument needs to be returned, request an RMA (Return Material Authorization Number). It must not be sent without the RMA and the filled “Safety Declaration for Instrument Repairs”. Please make sure it is cleaned before return.

TIP: *Find the contact data of your local Anton Paar representative on the Anton Paar website (http://www.anton-paar.com) under “Contact”.*

Appendix A: Technical Data

Appendix A.1: Technical Specifications

DANGER

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

NOTICE

"AAA" stands for the material options SST, HAS, MON or ROC.
"BB" stands for the beverage flange options VN or DN
"CC" stands for the chemical flange options EN or AN

The minimum and maximum ambient and process temperature is listed in the following tables. The maximum process temperature depends on the temperature classification.

Table 1: Permitted temperatures for the Ex versions of L-Sonic 5100/6100

	Ambient Temp.	Process Temperature	
		Temp. Class T4	Temp. Class T5
L-Sonic 5100 Version BB SST L3 Ex d L-Sonic 5100 Version BB SST L3 NPT Ex d L-Sonic 5100 Version CC AAA L6 Ex d L-Sonic 5100 Version CC AAA L6 NPT Ex d L-Sonic 5100 Version DN 40 GOC Ex d L-Sonic 5100 Version DN 40 GOC NPT Ex d L-Sonic 5100 Version CF CL Ex d L-Sonic 5100 Version CF CL NPT Ex d L-Sonic 6100 Version D1 SST LS Ex d L-Sonic 6100 Version D1 SST LS NPT Ex d	-25 to 65 °C	-25 to 125 °C	-25 to 95 °C
L-Sonic 5100 Version BB SST L3 Ex d with Pico 3000 L-Sonic 5100 Version BB SST L3 NPT Ex d with Pico 3000 L-Sonic 5100 Version CC AAA L6 Ex d with Pico 3000 L-Sonic 5100 Version CC AAA L6 NPT Ex d with Pico 3000 L-Sonic 5100 Version DN 40 GOC Ex d with Pico 3000 L-Sonic 5100 Version DN 40 GOC NPT Ex d with Pico 3000 L-Sonic 5100 Version CF CL Ex d with Pico 3000 L-Sonic 5100 Version CF CL NPT Ex d with Pico 3000 L-Sonic 6100 Version D1 SST LS Ex d with Pico 3000 L-Sonic 6100 Version D1 SST LS NPT Ex d with Pico 3000	-25 to 55 °C	-25 to 125 °C	-25 to 95 °C

Table 1: Permitted temperatures for the Ex versions of L-Sonic 5100/6100

	Ambient Temp.	Process Temperature	
		Temp. Class T4	Temp. Class T5
L-Sonic 5100 Version BB SST L3 Ex d with Pico 3000 and HMI L-Sonic 5100 Version BB SST L3 NPT Ex d with Pico 3000 and HMI L-Sonic 5100 Version CC AAA L6 Ex d with Pico 3000 and HMI L-Sonic 5100 Version CC AAA L6 NPT Ex d with Pico 3000 and HMI L-Sonic 5100 Version DN 40 GOC Ex d with Pico 3000 and HMI L-Sonic 5100 Version DN 40 GOC NPT Ex d with Pico 3000 and HMI L-Sonic 5100 Version CF CL Ex d with Pico 3000 and HMI L-Sonic 5100 Version CF CL NPT Ex d with Pico 3000 and HMI L-Sonic 6100 Version D1 SST LS Ex d with Pico 3000 and HMI L-Sonic 6100 Version D1 SST LS NPT Ex d with Pico 3000 and HMI	-20 to 55 °C	-25 to 125 °C	-25 to 95 °C

Table 2: General specifications

Operating conditions	
Measuring range L-Sonic 5100	800 to 2500 m/s
Measuring range L-Sonic 6100 LS	200 to 1560 m/s
Process temperature non Ex versions	- 25 to 125 °C
SIP temperature and duration non Ex versions	145 °C for max. 30 min.
Process pressure	see Table 3
Recommended flow rate pipe installation* **The measuring principle can also measure without flow. The recommended minimum flow rate ensures stable temperature conditions.*	L-Sonic 5100: >0 to 6 m/s L-Sonic 6100: 50 to 700 L/h
Ambient conditions	
Temperature non Ex versions	- 25 to 65 °C without Pico 3000, - 25 to 55 °C* with Pico 3000 - 20 to 55 °C* with Pico 3000 and HMI **Pico 3000 Version PROFINET IO, EhterNet/IP, Modbus TCP max. 50 °C*
Humidity	0 to 95 % (relative humidity non-condensing)

Table 2: General specifications

Degree of protection	IP 66 / 67 / NEMA 4X (Ex version: IP66 / NEMA 4X)
Metrological data All specifications are valid for correct installation, constant measuring conditions and vibration levels < $1e^{-3}$ $(m/s^2)^2/Hz$ in the adjusted range.	
Repeatability sound velocity Accuracy temperature	L-Sonic 5100: 0.005 m/s L-Sonic 6100: 0.01 m/s 0.1 °C
Materials	
Housing material Non Ex version Ex version HMI	 Stainless steel Hard anodized aluminium Glass
Wetted parts - L-Sonic 5100 Version SST - L-Sonic 5100 Version HAS - L-Sonic 5100 Version MON - L-Sonic 5100 Version ROC - L-Sonic 5100 Version GOC - L-Sonic 6100 Version SST - O-ring 60x3 (VARIVENT® N) - O-ring DN 65 (DIN 11851)	 Stainless steel 1.4404 HASTELLOY® HYBRID-BC 1® Monel 400 Rhodium coated Gold coated Stainless steel 1.4404 EPDM Nitril 80
Electrical data	
Supply voltage	SELV/PELV DC 24 V ± 20%
Power consumption	max. 4 W (max. 7 W with Pico 3000)
Connection terminals	Push-in spring connection 0.2 to 1.5 mm² / AWG 24 to 16 (with ferrules without plastic sleeve) Stripping length 8 mm / 0.3 inch
Cable gland type (non Ex version)	Max. 6 pcs. M16x1.5 EMC, earthing cones acc. to DIN 89345, brass nickel-plated for cable OD 4.5 to 10 mm
Cable gland type (Ex version supplied optionally)	Max. 4 pcs M 20x1.5, shielded Optional: Max. 4 pcs 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	
Power supply	<u>Suggested cable type:</u> LiYCY, shielded 2 pole cable <u>Wire cross section:</u> min. 0.34 mm², max. 1.5 mm² without wire end ferrule; max. 0.75 mm² with wire end ferrule <u>Diameter of cables:</u> 4.5 to 10 mm to ensure optimal sealing against the cable gland

Table 2: General specifications

CANopen	Cable type: CANopen/DeviceNet cable, 120 Ω shielded twisted pair Wire cross section: min 0.20 mm², max. 1.5 mm² without wire end ferrule; max. 0.75 mm² with wire end ferrule Diameter of cables: 4.5 to 10 mm to ensure optimal sealing against the cable gland Max. length: 250 m

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 V + 20 % = 28.8 V and a maximum current I_{max} = 0.75 A

.

Table 3: Instruments - max. pressure and weight

Instrument	Max. pressure	Weight [kg]
L-Sonic 5100 Version VN L3 (1)	16 bar	3.4
L-Sonic 5100 Version VN L3 Ex d (1)	16 bar	3.1
L-Sonic 5100 Version DN L3 (1)	16 bar	3.5
L-Sonic 5100 Version DN L3 Ex d (1)	16 bar	3.2
L-Sonic 5100 Version VG L6 CN(1)	10 bar	5.1
L-Sonic 5100 Version EN L6 (3)(1)	acc. to flange specification; all sensors have a stainless steel lapped flange; max. pressure rating SST, HAS, ROC = PN 100; MON = PN 63	7.1 (PN 16)
L-Sonic 5100 Version AN L6 (3)(1)	acc. to flange specification; all sensors have a stainless steel lapped flange; max. pressure rating SST, HAS, ROC = Class 600; MON = Class 300	6.5 (Class 150)
L-Sonic 5100 Version EN L6 Ex d (3)(1)	acc. to flange specification; all sensors have a stainless steel lapped flange; max. pressure rating SST, HAS, ROC = PN 100; MON: PN 63	7.1 (PN 16)
L-Sonic 5100 Version AN L6 Ex d (3)(1)	acc. to flange specification; all sensors have a stainless steel lapped flange; max. pressure rating SST, HAS, ROC = Class 600; MON = Class 300	6.5 (Class 150)
L-Sonic 5100 Version DN 40 GOC (1)	PN 16	5.4
L-Sonic 5100 Version DN 40 GOC Ex d (1)	PN 16	5.4
L-Sonic 6100 Version D1 LS (2)	70 bar (max. 125 °C) 100 bar (max. 50 °C)	3.5
L-Sonic 6100 Version D1 LS Ex d (2)	70 bar (max. 125 °C); 100 bar (max. 50 °C)	3.2
L-Sonic 6100 Version D1 LS SE (2)	70 bar (max. 125 °C); 100 bar (max. 50 °C)	3.9

(1) These sensors are not pressure equipment according to the Pressure Equipment Directive 2014/68/EU, however, they may be components of a pressure equipment. According to Article 4, paragraph 3, these products must be designed and manufactured in accordance with good engineering practice in force in a member state to ensure that they can be used safely. If documentation or testing is required for installation in category 1 or 2 pressure equipment, this must be ordered separately.

(2) According to Pressure Equipment Directive (PED) 2014/68/EU Article 4 paragraph 3 these sensors are designed and manufactured in accordance with good engineering practice in force in a member state to ensure that they can be used safely.

(3) These sensors have a lapped flange made of stainless steel.

Table 4: Process Adapters

Mat. No.	Designation	Wetted parts	Max. pressure	Temperature range
187583 (1)	L-Sonic 5100 Tri-Clamp adapter set SST, Tri-Clamp DIN 32676 A DN 25	1.4404, EPDM 70	16 bar	-25 to 145 °C
192696 (1)	L-Sonic 5100 EN/ANSI adapter set SST; EN 1092-1 DN 25 OR ANSI B16.5-1"	1.4404, 1.4571	16 bar	-25 to 145 °C
224048 (2)	L-Sonic 5100 EN/ANSI adapter set PTFE/PFA EN 1092-1 / DN 15 / PN 10 OR L-Sonic 5100 EN/ANSI adapter set PTFE/PFA ANSI 1/2" CL 150	PTFE, PFA	-10 °C to 120 °C = 10 bar >120 °C to 125 °C = 9.8 bar 14 °F to 100 °F = 285 psi >100 °F to 200 °F = 260 psi >200 °F to 257 °F = 242 psi	-10 °C to 125 °C 14 °F to 257 °F
224049 (2)	L-Sonic 5100 EN/ANSI adapter set PTFE/PFA EN 1092-1 / DN 25 / PN 10 OR L-Sonic 5100 EN/ANSI adapter set PTFE/ PFAANSI 1" CL 150	PTFE, PFA	-10 °C to 120 °C = 10 bar >120 °C to 125 °C = 9.8 bar 14 °F to 100 °F = 285 psi >100 °F to 200 °F = 260 psi >200 °F to 257 °F = 242 psi	-10 °C to 125 °C 14 °F to 257 °F
224050 (2)	L-Sonic 5100 EN/ANSI adapter set PTFE/PFA EN 1092-1 / DN 50 / PN 10 OR L-Sonic 5100 EN/ANSI adapter set PTFE/PFA ANSI 2" CL 150	PTFE, PFA	-10 °C to 120 °C = 10 bar >120 °C to 125 °C = 9.8 bar 14 °F to 100 °F = 285 psi >100 °F to 200 °F = 260 psi >200 °F to 257 °F = 242 psi	-10 °C to 125 °C 14 °F to 257 °F
194152 (1)	L-Sonic 6100 G3/4" adapter Set	1.4404	According to sensor specification	According to sensor specification
187999 (1)	L-Sonic 5100 VARIVENT N adapter set SST, for pipes DN 40/1.5" OD	1.4404, EPDM 70	16 bar	-25 to 145 °C
188000 (1)	L-Sonic 5100 VARIVENT N adapter set SST, for pipes DN 50/2"IPS/2"OD/2.5"OD	1.4404, EPDM 70	16 bar	- 25 to 145 °C

(1) According to Pressure Equipment Directive (PED) 2014/68/EU Article 4 paragraph 3 these adapters are designed and manufactured in accordance with good engineering practice in force in a member state to en-sre that they can be used safely.

(2) The EU Declaration of Conformity in accordance with Directive 2014/68/EU for pressure equipment is enclosed in the delivery.

Appendix B: Confirmation of Compliance

Anton Paar

Graz, 26th of February, 2021

Confirmation of Compliance

Herewith we, the manufacturer Anton Paar GmbH, Anton-Paar-Str. 20, 8054 Graz, Austria, confirm that the materials of the wetted parts of the below listed sensors

Name	Versions
Carbo 510/5100	all
Carbo 520/6100/6300	all
L-Rix 4100/5000/5100/5200 and Fermentation Monitor	all
L-Vis 510/520 Smart Sensor	all
Oxy 510/5100 and CO2-Purity Monitor	Except Sensor Cap Ultra Trace Range
Inline Pump 520	all
L-Dens 2300	SST and SST E versions
L-Dens 7400/7500	SST and HAS versions
L-Sonic 5100	VN, DN, VG versions
L-Com 5500	all
L-Col 6100	all
Cobrix 5500/5600	all
Beer Monitor 5500/5600	all
Wine Monitor 5500/5600	all

are suitable for the contact with food, including all additional adapters and accessories intended to come into contact with food.

We confirm the compliance of the wetted parts according to the regulations (EC) No 1935/2004, (EU) No 10/2011 (applicable for plastic materials only), GB4806.1-2016, GB4806.4-2016 (ceramic materials), GB4806.5-2016 (glass materials), GB4806.7.2016 (plastic materials), GB4806.9-2016 (metal materials) and GB4806.11-2016 (rubber materials).

Moreover, we confirm that the relevant requirements for Food Contact Materials set forth in US Regulation No. 21 CFR 117, Subpart B are met and that all O-rings, seals and diaphragms are FDA (The Food and Drug Administration) compliant.

Furthermore, we confirm fulfillment of the fundamental requirements of the regulations (EC) No 2023/2006 and GB 31603:2015 by the implemented quality management system complying with the requirements of the ISO 9001:2015 standard and the above mentioned regulations for food contact materials.

Mag.(FH), BSc Rainer Pirchegger
Head of Process Instrumentation

Anton Paar GmbH
Anton-Paar-Str. 20
8054 Graz, Austria-Europe
T: +43 316 257-0
F: +43 316 257-257
info@anton-paar.com
www.anton-paar.com

Geschäftsführer:
Dr. Friedrich Santner
Aufsichtsratsvorsitzender:
Dr. Othmar Ederer

Landesgericht für ZRS Graz, FN 135 863 Z
DVR-Nr.: 0210790, UID-Nr.: ATU39074808

UniCredit Bank Austria AG:
IBAN AT71 1100 0038 2320 7000, BIC BKAUATWW

Steiermärkische Bank und Sparkassen AG:
IBAN AT55 2081 5000 0006 6852, BIC STSPAT2G

Appendix C: Declaration of CE Conformity

DocuSign Envelope ID: BDAFE273-BBA4-4FA2-B8FC-A00774AC71AF

EU Declaration of Conformity

(original)

Anton Paar

The Manufacturer **Anton Paar GmbH,** Anton-Paar-Str. 20, A-8054 Graz, Austria – Europe hereby declares that the product listed below

Product designation:	**L-SONIC Process Sound Velocity Sensor**
Model:	L-SONIC 5100 AN HAS L6, L-SONIC 5100 AN MON L6, L-SONIC 5100 AN ROC L6 L-SONIC 5100 AN SST L6, L-SONIC 5100 CF SST CL, L-SONIC 5100 DN SST L3, L-SONIC 5100 DN 40 GOC, L-SONIC 5100 EN HAS L6, L-SONIC 5100 EN MON L6, L-SONIC 5100 EN ROC L6, L-SONIC 5100 EN SST L6, L-SONIC 5100 VG SST L6 CN, L-SONIC 5100 VN SST L3, L-SONIC 6100 D1 SST LS, L-SONIC 6100 D1 SST LS SE
Material number:	181469, 181470, 181471, 181468, 181472, 181432, 184413, 181435, 181436, 181437, 181434, 181501, 181431, 181473, 192695

is in conformity with the relevant European Union harmonisation legislation. This declaration of conformity is issued under the sole responsibility of the manufacturer.

Electromagnetic Compatibility (2014/30/EU, OJ L 96/79 of 29.3.2014)

Applied standards:

- EN 61326-1:2013 — Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements
- EN 61326-2-3:2013 — Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 2-3: Particular requirements – Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning

The product is classified as a class A equipment and is intended for the use in industrial area.

Low Voltage Directive (2014/35/EU, OJ L 96/357 of 29.3.2014)

Applied standards:

EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements
EN 61010-2-201:2013	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 2-201: Particular requirements for control equipment

RoHS Directive (2011/65/EU, OJ L 174/88 of 1.7.2011)

Place and date of issue: Graz, 2022-03-17

DocuSigned by:
4C1800E6A5304C2...

DI Dr. Christopher Fradler, MBA
Executive Director
Business Unit Solutions

DocuSigned by:
34D9DC346C704C5...

Mag.(FH), BSc. Rainer Pirchegger
Head of Process Instrumentation
Business Unit Solutions

Appendix D: UK Declaration of Conformity

DocuSign Envelope ID: BDAFE273-BBA4-4FA2-B8FC-A00774AC71AF

UK Declaration of Conformity

Anton Paar

The Manufacturer **Anton Paar GmbH,** Anton-Paar-Str. 20, A-8054 Graz, Austria – Europe hereby declares that the product listed below

Product designation:	**L-SONIC Process Sound Velocity Sensor**
Model:	L-SONIC 5100 AN HAS L6, L-SONIC 5100 AN MON L6, L-SONIC 5100 AN ROC L6, L-SONIC 5100 AN SST L6, L-SONIC 5100 CF SST CL, L-SONIC 5100 DN SST L3, L-SONIC 5100 DN 40 GOC, L-SONIC 5100 EN HAS L6, L-SONIC 5100 EN MON L6, L-SONIC 5100 EN ROC L6, L-SONIC 5100 EN SST L6, L-SONIC 5100 VG SST L6 CN, L-SONIC 5100 VN SST L3, L-SONIC 6100 D1 SST LS, L-SONIC 6100 D1 SST LS SE
Material number:	181469, 181470, 181471, 181468, 181472, 181432, 184413, 181435, 181436, 181437, 181434, 181501, 181431, 181473, 192695

is in conformity with all the relevant UK legislation

Electrical Equipment (Safety) Regulations, S.I. 2016/1101

Electromagnatic Compatibility Regulations, S.I. 2016/1091

Restriction of Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations, S.I. 2012/3032

complies with the designated standards:

- EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019
- EN 61010-2-201:2013
- EN 61326-1:2013
- EN 61326-2-3:2013

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Importer: Anton Paar Ltd., Unit F, The Courtyard, Hatfield Rd., St. Albans AL4 OLA, United Kingdom

Place and date of issue: Graz, 2022-03-17

DocuSigned by:
4C1800E6A5304C2...

DI Dr. Christopher Fradler, MBA
Executive Director
Business Unit Solutions

DocuSigned by:

Mag.(FH), BSc. Rainer Pirchegger
Head of Process Instrumentation
Business Unit Solutions

NOTICE
Please find a collection of all Ex certificates including the CE and the UKCA declarations for the Ex d version of the sensors in the document XDPIB041EN.