

**Instruction Manual and Safety Information**

**L-Rix 5200**

**L-Rix 5100**

Process Refractometer

Find out more



[www.anton-paar.com](https://www.anton-paar.com)

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Address of the producer:

Anton Paar GmbH

Anton-Paar-Str. 20

A-8054 Graz / Austria

Tel: +43 (0) 316 257-0

Fax: +43 (0) 316 257-257

E-Mail: [info@anton-paar.com](mailto:info@anton-paar.com)

Web: [www.anton-paar.com](https://www.anton-paar.com)

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Original instructions

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# 1 Safety instructions

## General

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

## Liability

- This document does not claim to address all safety issues associated with the use of the product and samples. It is your responsibility to establish health and safety practices and to determine the applicability of regulatory limitations.
- Anton Paar GmbH only warrants the safe and proper functioning of the product if no modifications are made to mechanics, electronics, or software.
- Use the product only for the purpose described in the documentation. Anton Paar GmbH is not liable for damages caused by incorrect use of the product.
- The results delivered by the product depend on the correct function of the product and various other factors. We recommend that you have experts check the results (i.e., perform plausibility testing) before taking consequential actions based on the results.

## General precautions

- Observe and adhere to your national safety regulations regarding the handling of all substances associated with your measurements (e.g. use safety goggles, gloves, respiratory protection, etc.).
- Check the product for chemical resistance to the samples and cleaning agents.

## Installation

- Use only accessories, consumables, or spare parts supplied or approved by Anton Paar GmbH.

## Using the product

- Ensure that all operators have been trained beforehand to use the product safely and correctly.
- In case of damage or malfunction, stop operating the product. Do not operate the product under conditions that could result in damage to goods or injuries or loss of life.

## Precautions for flammable samples and cleaning agents

- Do not spill sample/cleaning liquids or leave their containers uncovered. Immediately remove spilled sample/cleaning liquids.
- Ensure that the setup location is sufficiently ventilated. The environment of the product must be kept free from flammable gases and vapors.
- Provide fire-extinguishing equipment.

## Operation in areas with risk of explosion

- The product is **not** explosion-proof and therefore must not be operated in areas with risk of explosion.

## Service and repairs

- Service and repair procedures may be carried out only by authorized persons or by Anton Paar GmbH.

## Disposal

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

## Special Safety Instructions

- Do not open the housing of the L-Rix inline refractometer. There are no user-serviceable parts inside.
- Check the technical data for ambient conditions.

## 1.1 Conventions of safety messages and typography

### Conventions for safety messages

The following conventions for safety messages are 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.*

**NOTICE**

Take care that the warning symbols remain clearly legible.

**Typographical conventions**

The following typographical conventions are used in this instruction manual:

Convention	Description
<i>Names for physical buttons</i>	The names and labels are written in <i>italic</i> .
<i>Labels for tabs, buttons etc. in the software</i>	
<i>Menu Level 1 &gt; Menu Level 2</i>	Menu paths are written in <i>italic</i> . The menu levels are connected using a closing angle bracket.

## 2 An overview

L-Rix 5100/5200 is an optical inline refractometer for the determination of the refractive index (RI) in liquids based on Snell's law of refraction. It can be immersed directly in the production liquid. It continuously displays the refractive index (or concentrations) at process temperature allowing 24-hour production control.

The process liquid flows past the sensor. The refractive index and temperature are measured simultaneously and displayed on the screen. The inline refractive index measurement can be used as a real-time predictive tool for the final concentration, whereby a quick and accurate response is needed to optimize production.

The robust construction of stainless steel of L-Rix 5100/5200 meets all requirements of the process environment and is fully CIP/SIP capable. L-Rix 5100/5200 has integrated self-diagnosis.



**Fig. 1:** Inline Refractometer L-Rix 5100/5200

**Features and benefits:**

- Maintenance-free
- Never requires adjustment
- Long-life LED
- Hygienic design
- Full-range sugar scale instrument
- No influence of potential stray lights
- Laboratory comparable refractive index measurement
- Full CIP/SIP capability, reactivating quickly after a brief time-out interval for cleaning
- Install-and-forget simplicity
- Compact and rugged design for industrial durability
- Longevity by hermetical sealing of optical components
- Fulfills the NAMUR recommendation NE 107 (self-monitoring and diagnosis)

### 2.1 Measuring principle

The L-Rix inline refractometer determines the refractive index of liquids based on the critical angle measurement as shown below. The refractive index is a direct measure of the concentration. The measuring prism serves as the interface between the L-Rix and the sample liquid. The light source illuminates onto the boundary layer between the prism and sample liquid. Depending on the angle, some light rays will be totally reflected, others only partially, with the majority of the light refracted into the liquid. A CMOS array detects the reflected light and measures the critical angle. This angle is used to determine the refractive index (specified as nD) and calculate the concentration.

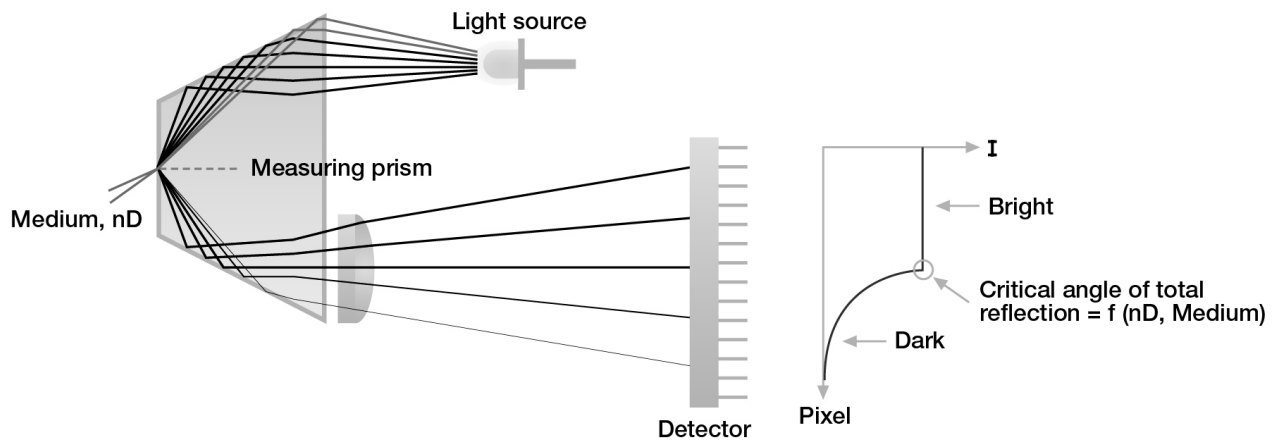


Fig. 2: Measuring principle

## 2.2 Configurations

L-Rix 5100/5200 is available in two process connection versions (Tuchenhagen VARIVENT® Type N and Tri-Clamp® 3”). There are several configurations as shown in the table below.





L-Rix 5100 is designed as full range sensor and measures Brix values from 0 to 100 °Brix with an overall accuracy of 0.1 °Brix.

L-Rix 5200 is designed for beverages measuring from 0 to 65 °Brix with an overall accuracy of 0.05 °Brix.

For different applications and customer requirements there are several system configurations available:

- **L-Rix 5100/5200** with Edge 5000/7000 (optional Davis 5)
- **L-Rix 5100/5200** sensor with Pico 3000 and optional Pico 3000 HMI
- **L-Rix 5100/5200** sensor with Pico 3000 RC and optional Pico 3000 HMI

Table 1: Configurations

L-Rix 5100/5200 sensor + Pico 3000	
L-Rix 5100/5200 sensor + Pico 3000 + HMI	
L-Rix 5100/5200 sensor + Pico 3000 RC	
L-Rix 5100/5200 sensor + Edge 5000/7000	

## 2.3 Components



**Fig. 3:** Components of L-Rix Refractometer

- 1 Cable gland (or connector)
- 2 Electronics module (incl. Pico 3000)
- 3 Sensor module
- 4 Prism
- 5 Hinged clamp VARIVENT N 1.4401
- 6 Tuchenhausen VARIVENT N, DN 65

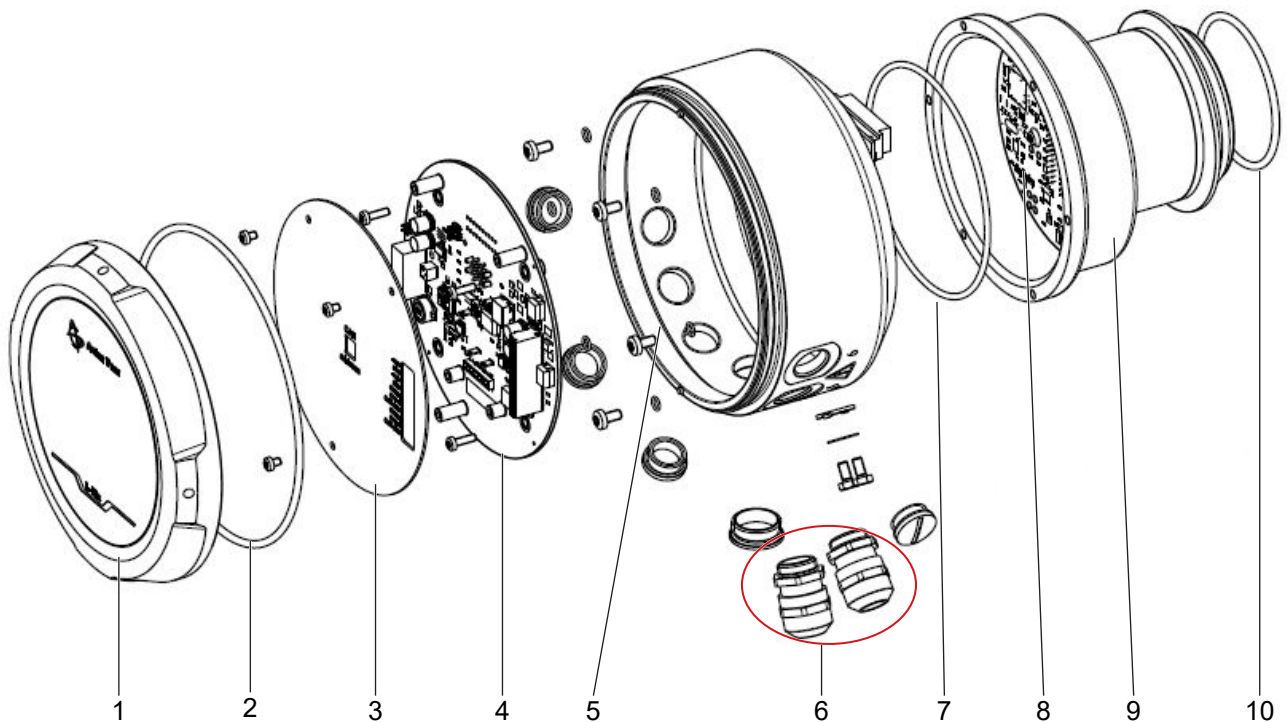
The central optical element is the prism situated in the sensor module. The connector board is integrated into the electronics module, the sensor board into the sensor module.

L-Rix 5100/5200 Sensor is available with a Tri-Clamp® 3" or 3" version PL 38 - flange (not shown in Fig. 3) or with a Tuchenhausen VARIVENT® Type N – flange.

The central optical element is the prism situated in the sensor module. The connector board and the Pico 3000 analog/digital board are integrated into the electronics module

The L-Rix 5100/5200 sensor is available with a Tri-Clamp 3" or Tri-Clamp® 3" version PL 38 -flange (not shown in the picture below) or with a flange Tuchenhausen VARIVENT® Type N.

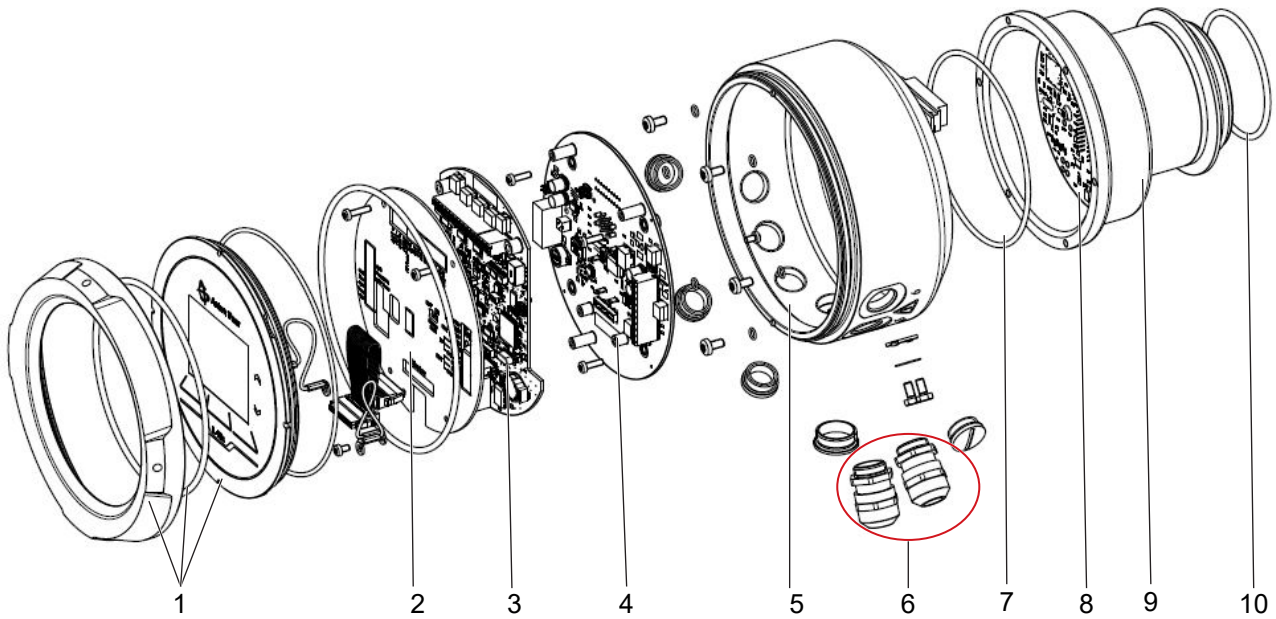
### 2.3.1 L-Rix 5100/5200 sensor without Pico



**Fig. 4:** L-Rix VARIVENT® N sensor (to be connected to a process controller or to without Pico 3000 RC)

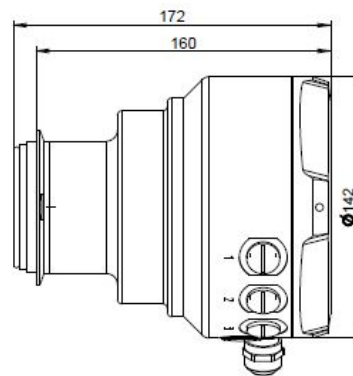
- 1 Cover
- 2 O-ring
- 3 Cover plate
- 4 Connector board
- 5 Electronics module
- 6 Cable glands (or connectors)
- 7 O-ring
- 8 Sensor board
- 9 Sensor module
- 10 Sealing ring

### 2.3.2 L-Rix 5100/5200 sensor with Pico and HMI



**Fig. 5:** L-Rix VARIVENT® N sensor with Pico 3000

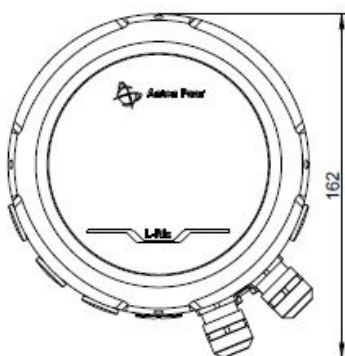
- 1 Cover ring, O-ring and HMI with capacitive keys
- 2 Cover plate
- 3 Pico 3000 transmitter (fieldbus or analog/digital)
- 4 Connector board
- 5 Electronics housing
- 6 Cable glands (or connectors)
- 7 O-ring
- 8 Sensor board
- 9 Sensor module
- 10 Sealing ring



**Fig. 7:** L-Rix 5100/5200 VARIVENT® lateral view

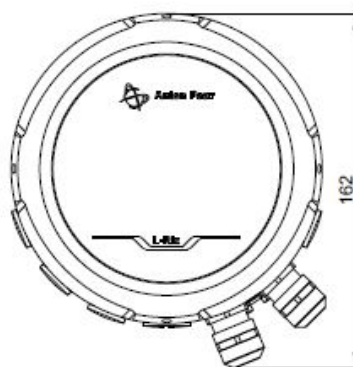
### 2.3.3 Dimensions

#### L-Rix 5100/5200 sensor VARIVENT® N

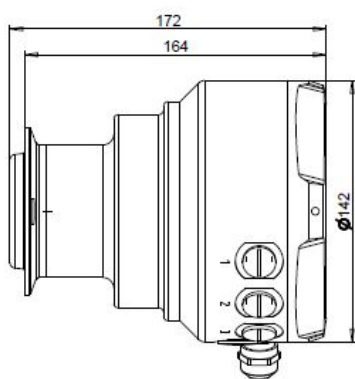


**Fig. 6:** L-Rix 5100/5200 VARIVENT® front view

#### L-Rix 5100/5200 sensor Tri-Clamp® 3"

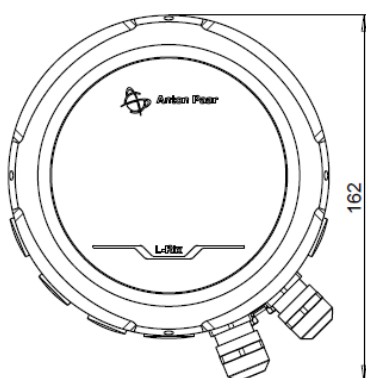


**Fig. 8:** L-Rix 5100/5200 Tri-Clamp® 3" front view

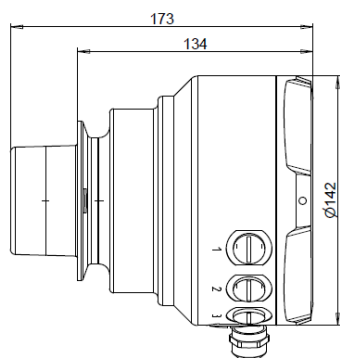


**Fig. 9:** L-Rix 5100/5200 Tri-Clamp® 3" lateral view

**L-Rix 5100/5200 sensor Tri-Clamp® 3" version PL 38**




**Fig. 10:** L-Rix 5100/5200 Tri-Clamp® 3" PL 38 front view



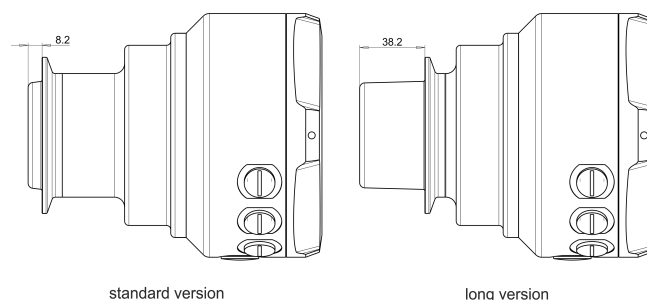
**Fig. 11:** L-Rix 5100/5200 Tri-Clamp® 3" PL 38 lateral view

**Table 2:** Supplied parts

Symbol	Pcs.	Article description	Mat. no.
	1	L-Rix 5100 Sensor VARIVENT® N or	219623
	1	L-Rix 5100 Sensor Tri- Clamp 3" or	220644
	1	L-Rix 5100 Sensor Tri- Clamp 3" version PL 38 or	252557
	1	L-Rix 5200 Sensor VARIVENT® N or	219675

**Tri-Clamp® 3" standard vs Tri-Clamp® 3" PL 38**

For cases where the L-Rix Tri-Clamp® 3" is installed in a T-Piece flange, we recommend to use the special long version of the L-Rix Tri-Clamp® 3". As shown below. The distance from the flange edge to the prism has been extended from 8.2 mm to 38.2 mm.





**Fig. 12:** Comparison of the two Tri-Clamp® 3" versions

### 3 Checking the supplied parts


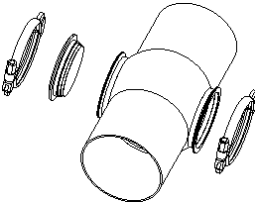
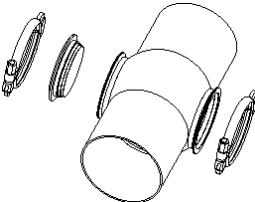
The product was tested and packed carefully before shipment. However, damage may occur during transport.

- Keep the packaging material (box, foam piece, transport protection) for possible returns and further questions from the transport and insurance company.
- Check the delivery for completeness by comparing the supplied parts to those noted in the table(s) below.
- If a part is missing, contact your Anton Paar representative.
- If a part is damaged, contact the transport company and your Anton Paar representative.


Symbol	Pcs.	Article description	Mat. no.
	1	L-Rix 5200 Sensor Tri-Clamp 3" or	220645
	1	L-Rix 5200 Sensor Tri- Clamp 3" version PL 38	252568
	1	Instruction Manual	
	2	Cable gland	90711
	4	Dummy plug	92575

**NOTICE**

For details on Edge 5000/7000 and Pico 3000, refer to the respective instruction manuals.

Symbol	Qty.	Description	Mat. No.
<b>OPTIONS ACCORDING TO INDIVIDUAL ORDER</b>			
Installation options			
	1	Power supply DC 24 V, 2.5 A	18479
	1	VARINLINE® Access unit set 2.5" OD max. 16 bar	130305
		VARINLINE® Access unit set 2" OD max. 16 bar	89898
		VARINLINE® Access unit set 2" IPS max. 16 bar	156966
		VARINLINE® Access unit set 3" OD max. 10 bar	17287
		VARINLINE® Access unit set 3" IPS max. 10 bar	97652
		VARINLINE® Access unit set 4" IPS max. 10 bar	17480
		VARINLINE® Access unit set 4" IPS max. 10 bar	97653
		VARINLINE® Access unit set 6" IPS max. 10 bar	155212
	1	VARINLINE® Access unit set 1.5" OD max. 16 bar	101119
		VARINLINE® Access unit set 2.5" OD max. 16 bar	101116
		VARINLINE® Access unit set 2" OD max. 16 bar	14872
		VARINLINE® Access unit set	14874
		VARINLINE® Access unit set	14875
		VARINLINE® Access unit set	18317
		VARINLINE® Access unit set	101045

Symbol	Qty.	Description	Mat. No.
	1	Inline VARIVENT® Adapter DN 25	185900
		Inline Tri-Clamp Adapter G1/2" <sup>a</sup>	186577
		Inline Tri-Clamp Adapter G1" <sup>a</sup>	186551
	1	Housing connection flange Tuchenhagen 10 bar	21331
	1	VARINLINE® Connection flange 90° bend 16 bar	154765
	1	Tri-Clamp housing connection flange max. 16 bar	145823
	1	VARINLINE® Prism Wash System DN 50/2" max. 10 bar	195567
		VARINLINE® Prism Wash System DN 65/2.5" max. 10 bar	158794
		VARINLINE® Prism Wash System DN 80/3" max. 10 bar	158795
		VARINLINE® Prism Wash System DN 100/4" max. 10 bar	158797
		VARINLINE® Prism Wash System DN 150/OD 6	223504
		VARINLINE® Prism Wash System DN IPS 6"	223509
VARINLINE® Deflectors			
	1	VARINLINE® Deflector DN 40	186588
		VARINLINE® Deflector DN 50	189443
		VARINLINE® Deflector DN 65	185877
		VARINLINE® Deflector DN 80	185898
		VARINLINE® Deflector DN 100	185899
		VARINLINE® Deflector DN 150	226701
VARINLINE® Deflectors for cleaning during production			

Symbol	Qty.	Description	Mat. No.
	1	VARINLINE® Deflector DN 40 with cleaning nozzle	242282
		VARINLINE® Deflector DN 50 with cleaning nozzle	242283
		VARINLINE® Deflector DN 65 with cleaning nozzle	242284
		VARINLINE® Deflector DN 80 with cleaning nozzle	242285
		VARINLINE® Deflector DN 100 with cleaning nozzle	242286
		VARINLINE® Deflector DN 150 with cleaning nozzle	242287

<sup>a</sup> only in combination with sensors Mat. no. 220644 or 220645

Symbol	Qty.	Description	Mat. No.
<b>OPTIONS ACCORDING TO INDIVIDUAL ORDER</b>			
Installation options			
	1	Power supply DC 24 V, 2.5 A	18479
	1	VARINLINE® Access unit set 2.5" OD max. 16 bar	130305
		VARINLINE® Access unit set 2" OD max. 16 bar	89898
		VARINLINE® Access unit set 2" IPS max. 16 bar	156966
		VARINLINE® Access unit set 3" OD max. 10 bar	17287
		VARINLINE® Access unit set 3" IPS max. 10 bar	97652
		VARINLINE® Access unit set 4" IPS max. 10 bar	17480
		VARINLINE® Access unit set 4" IPS max. 10 bar	97653
		VARINLINE® Access unit set 6" IPS max. 10 bar	155212
	1	VARINLINE® Access unit set 1.5" OD max. 16 bar	101119
		VARINLINE® Access unit set 2.5" OD max. 16 bar	101116
		VARINLINE® Access unit set 2" OD max. 16 bar	14872
		VARINLINE® Access unit set	14874
		VARINLINE® Access unit set	14875
		VARINLINE® Access unit set	18317
		VARINLINE® Access unit set	101045
	1	Inline VARIVENT® Adapter DN 25	185900
		Inline Tri-Clamp Adapter G1/2" <sup>a</sup>	186577
		Inline Tri-Clamp Adapter G1" <sup>a</sup>	186551
	1	Housing connection flange Tuchenhagen 10 bar	21331

Symbol	Qty.	Description	Mat. No.
	1	VARINLINE® Connection flange 90° bend 16 bar	154765
	1	Tri-Clamp housing connection flange max. 16 bar	145823
	1	VARINLINE® Prism Wash System DN 50/2" max. 10 bar	195567
		VARINLINE® Prism Wash System DN 65/2.5" max. 10 bar	158794
		VARINLINE® Prism Wash System DN 80/3" max. 10 bar	158795
		VARINLINE® Prism Wash System DN 100/4" max. 10 bar	158797
		VARINLINE® Prism Wash System DN 150/OD 6	223504
		VARINLINE® Prism Wash System DN IPS 6"	223509
VARINLINE® Deflectors			
	1	VARINLINE® Deflector DN 40	186588
		VARINLINE® Deflector DN 50	189443
		VARINLINE® Deflector DN 65	185877
		VARINLINE® Deflector DN 80	185898
		VARINLINE® Deflector DN 100	185899
		VARINLINE® Deflector DN 150	226701
VARINLINE® Deflectors for cleaning during production			
	1	VARINLINE® Deflector DN 40 with cleaning nozzle	242282
		VARINLINE® Deflector DN 50 with cleaning nozzle	242283
		VARINLINE® Deflector DN 65 with cleaning nozzle	242284
		VARINLINE® Deflector DN 80 with cleaning nozzle	242285
		VARINLINE® Deflector DN 100 with cleaning nozzle	242286
		VARINLINE® Deflector DN 150 with cleaning nozzle	242287

<sup>a</sup> only in combination with sensors Mat. no. 220644 or 220645

## 4 Installation



### WARNING

- Installation, putting into operation, maintenance and service work should only be carried out by trained and authorized personnel.
- Observe the permissible operating and ambient conditions for the instrument (see appendix)
- Do not exceed the defined maximum pressure, maximum sample temperature and maximum CIP/SIP temperature for the instrument.
- Before you start to install the instrument, make sure that the main line is empty, unpressurized and has reached ambient temperature.

### NOTICE

- Read this manual carefully before installing the instrument. Incorrect operation can result in damage to the sensor.
- Mechanical knocks and vibrations may damage the instrument. Work with care.
- We recommend to switch off the instrument when the line is stopped for a longer period of time.

## 4.1 Installation requirements

Concerning the process conditions, please refer to the technical specifications.

### NOTICE

#### Damage to detectors

CIP/SIP temperature >145 C° (293 °F) can damage the detectors!

CIP/SIP duration >30 minutes can damage the detectors!

For the process conditions, please refer to the Technical specifications [▶ 19].

## 4.2 Mounting position of the refractometer

The L-Rix inline refractometer can be installed in a horizontal or vertical pipe or at a pipe bend of 90°. The flow direction makes no difference in all installation options. Optionally, a deflector or prism wash system can be installed.

### NOTICE

#### Installation position

It is not recommended to install the L-Rix 5100/5200 with Pico 3000 HMI downwards or upwards. Choose the 3 or 9 o'clock position in any horizontal line.

### 4.2.1 Installation sequence

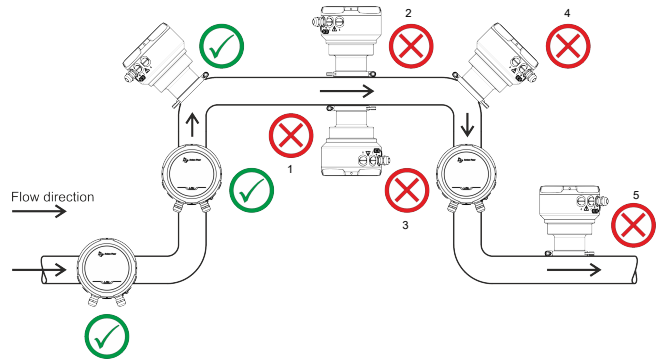


Fig. 13: L-Rix 5100/5200 within a pipework

These are recommendations for best installation positions. In case the customer already has a flange (VARIVENT or Tri-Clamp) or problems as described below are not to be expected, almost any position may be acceptable.

A sensor should not be installed in

- position 1 if there is the risk of residual product coating on the sapphire (drifting signal).
- position 2 because if the pressure is low or the line is not filled properly, the sensor may not be inserted into the liquid to be measured.
- position 3 because there is a risk of bubbles at the top part of a downstream pipe.
- position 4 because cavitation may occur damaging the sensor.
- position 5 in the 12 o'clock position because there is the risk of bubbles or that the line is not filled properly.

#### Installation in a horizontal pipe

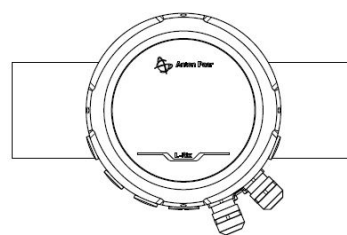


Fig. 14: Installation in a horizontal pipe (front view)

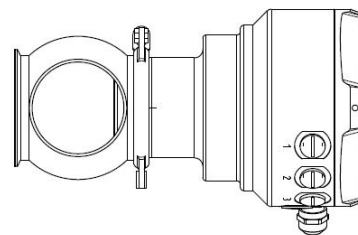


Fig. 15: Installation in a horizontal pipe (side view)

### Installation in a vertical pipe



Fig. 16: Installation in a vertical pipe (front view)

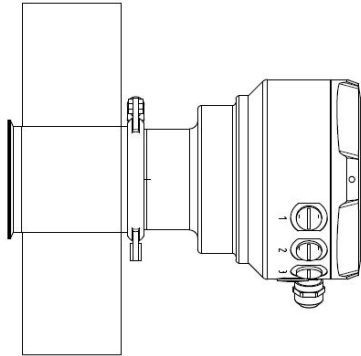


Fig. 17: Installation in a vertical pipe (side view)

### Installation at a bend of 90°

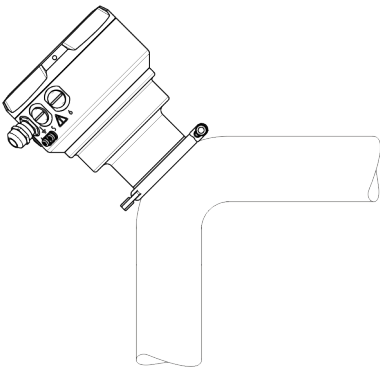


Fig. 18: Installation at a bend

## 4.2.2 Prism wash system

The product is appropriate for standard cleaning procedure according to the specifications.

### NOTICE

#### CIP/SIP temperature

CIP/SIP temperature > 145 °C (293 °F) can damage the detectors.

SIP at 145 °C (293 °F) for a duration > 30 minutes can damage the detectors.

In case the refractometer is installed in process flows without any regular cleaning procedures, deposits can build-up on the prism surface and disturb the measurement (abnormal high concentrations and upward concentration drift). The prism wash system is an accessory to solve the coating problem.

For a perfect cleaning the distance between the wash nozzle and the prism must be correct. Therefore, several different standard systems are available according to the pipe diameter (see chapter *Checking the supplied parts*).

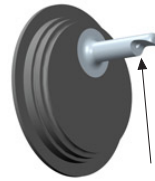


Fig. 19: Prism wash system (VARIVENT flange) with cleaning nozzle

### Mounting the prism wash system

The prism wash system must be mounted in the line opposite the refractometer. It can be used with cold or warm water under a pressure of max. 10 bar when the line is empty. For optimal results wash for 30 seconds or more!

**TIP:** It is recommended to wash the prism once a week when the pipe is empty.

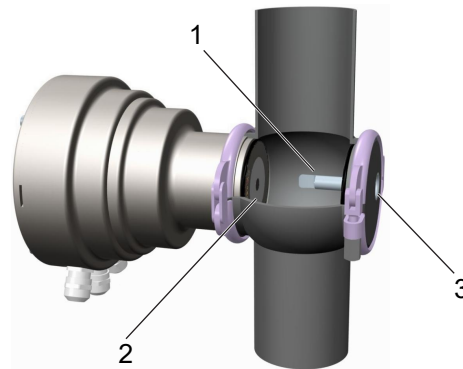


Fig. 20: Position of prism wash system

- 1 Prism
- 2 Cleaning nozzle
- 3 G 3/8" thread for washing liquid

### NOTICE

The prism wash system is delivered without cut-off valve.

## 4.2.3 Deflector

For application with a very strong building up of impurities (e.g. baby food), we also recommend deflectors with integrated cleaning nozzles for cleaning the prism during production. Several different standard systems are available according to the pipe diameter (refer to Section 3 [▶ 9]).

The deflector will be installed opposite the refractometer and will deflect the flow towards the prism for a self-cleaning effect.

For a perfect cleaning, the distance between the deflector and the prism must be correct.

## 4.3 Electrical wiring

### WARNING

The instruction given in this chapter must be followed precisely. Installation and service work are only allowed to be performed by trained and authorized personnel.

#### Recommendations:

- Only use shielded cables with double insulation. Ground the shield of the CAN cable on both sides (mPDS 5/Pico 3000 RC and sensor side) and make sure that there is no potential difference between the sensor and the evaluation unit.
- Check the polarity when lengthening the cable.
- Use a screwdriver (0.4 x 2.5 mm) to install the cables in the plugs.

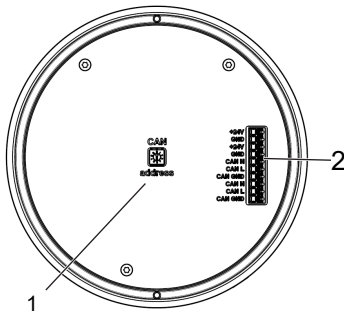
### 4.3.1 Interface overview

**Table 3:** Interface overview

DC 24 V	Power supply
CAN H/L/ GND	Anton Paar CANopen for communication between sensor and process controller or Pico 3000 RC.

### NOTICE

The CAN address must be set if several sensors are connected.



**Fig. 21:** L-Rix sensor interfaces wiring

- 1 CAN address selector (default=0)
- 2 Terminal block for power supply and CAN connection

### 4.3.2 Wiring the CAN-sensor with a process controller or Pico 3000

For details on wiring the sensor and the process controller or Pico 3000 RC, refer to the instruction manual and/or the reference manual tailored to your specific process controller or to the process instrumentation controller (Pico 3000).

### 4.3.3 Power supply

The instrument must be supplied with SELV DC 24 V. The wires must be connected according to the label on the cover plate.

### WARNING

The connection cables must comply with local regulations and must be adapted to the local ambient conditions. It is necessary to take special account of the mechanical load.

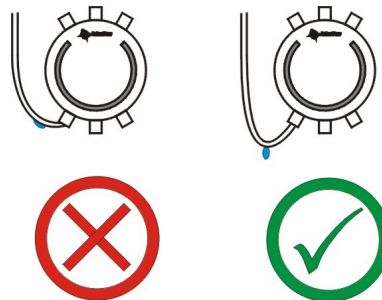
#### Recommended cable for the power supply

Conductor cross section	max. 1.5 mm <sup>2</sup>
Suggested cable type.	LiYCY Shielded 2 pole cable, double insulation. Ground the shield at power adapter side and sensor end.
Wire cross section	min. 0.34 mm <sup>2</sup> , max. 1.5 mm <sup>2</sup> without wire end ferrule; max.0.75 mm <sup>2</sup> with wire end ferrule
Diameter of cables	4.5 to 10 mm to ensure optimal sealing against the cable gland

#### CANopen

Cable type	CANopen/DeviceNet cable 120 Ω shielded twisted pair
Wire cross section	Min. 0.25 mm <sup>2</sup> , max. 1.5 mm <sup>2</sup> without wire end ferrule max. 0.75 mm <sup>2</sup> with wire end ferrule
Diameter	4.5 to 10 mm to ensure optimal sealing against the cable gland
Max. length	250 m

### 4.3.4 Cable glands and connectors



**Fig. 22:** Cable inlet

**NOTICE**

Make sure that the cable is mounted with a loop to avoid water ingress.

Make sure to position the cable glands or connectors at the bottom and tighten them correctly.

## 4.3.4.1 Shielding

For a professional shielding at the cable glands, connect the cable shield at the instrument as shown below:



Fig. 23: Connection and position of the cable shield

**NOTICE****Grounding**

The shield must be grounded on the sensor side and on the evaluation side. There must not be a potential difference between sensor and process controller.

## 4.3.4.2 Connector set

Optionally, it is possible to order the connector set 4-pole (material number 94633). Anton Paar specifies the following cable preparation, installation and pin assignment for this connector set.

Refer to Connector set 4-pole for the technical data in detail.

## 4.3.5 Anton Paar CANopen

The inline refatometer can either be connected to a process controller or to Pico 3000 RC. The process controller communicates with one or more sensors. Pico 3000 RC can communicate with one sensor only.

Optionally, it is possible to order the connector set CAN (material number 96554) for a sensor. See “Connector set CAN” in the appendix for the specifications.

**NOTICE****Sensor with Pico 3000 RC or process controller**

For all details about the installation of a sensor, please refer to the reference guides of Pico 3000 or the process controller, respectively.

## 5 Start-up and operation

For the details about putting the instrument into operation with a process controller or with an integrated process controller, please refer to the relevant reference guides.

## 6 Troubleshooting

Information on problems with the measurement and error messages are given in the instruction manuals and reference guides of the process integration controller (Pico 3000) or the process controller Edge 5000/7000.

## 7 Upkeep and cleaning

The instrument is maintenance-free. However, for reliable and trouble-free operation, it is essential to periodically check the readings on the display of the instrument with the process controller or the integrated process controller.

The following checks are recommended:

- Check the status messages. If the message *Maintenance request* is displayed, contact your Anton Paar representative for the replacement of the desiccant cartridge.
- Process instruments like the instrument at hand are often exposed to extreme operating conditions such as pressure shocks, sudden temperature changes, aggressive samples, etc. Although readjustments of the instrument are not necessary, we recommend performing regular comparison of the measured results with reference values and readjusting if required.
- Check the displayed product temperature.
- Check the prism for contamination (see Prism wash system [▶ 15]).

### 7.1 Cleaning in place (CIP) / Steaming in place (SIP)

The instrument is suitable for CIP/SIP with max. 145 °C for 30 min (see Technical data). The instrument is cleaned during the CIP/SIP procedure in the main line.

**NOTICE**

Use only approved cleaning agents. Follow the manufacturer's instructions for dosing and do not overdose for environmental reasons. Do not exceed the manufacturer's recommendations for cleaning temperatures (typ. 50 °C to 70 °C).

## 7.2 Wetted parts

Material	Part
Stainless steel 1.4404	Sensor module (including sensor head)
PEEK	Flat seal between prism and sensor head
Sapphire Al <sub>2</sub> O <sub>3</sub> – 99.997 %	Prism
EPDM 70	O-ring 60x3 (VARIVENT®, sealing ring)

## 7.3 Storing and transporting

1. Only use the original packaging for the storage and transportation.
2. Do not store outdoors and avoid direct sunlight. Store the instrument in a dry, clean place. Remove transportation protection not until installation. Consider national regulations regarding the weight and lifting the instrument.
3. The storage temperature is between -20 °C and 60 °C.

## 7.4 Packing the instrument for returns

- Clean all parts of the instrument before packaging. Make sure no sample residues or spills remain on the instrument.
- Do not return instruments that are contaminated by radioactive materials, infectious agents or other harmful substances that cause health hazards.
- Return the instrument in the original packaging material (box, foam piece, transport protection).

# 8 Maintenance and repair



## WARNING

### Risk of health

Maintenance and repair shall only be carried out by trained and authorized Anton Paar service engineers.

## 8.1 Maintenance performed by an authorized Anton Paar service engineer

The product does not require a periodic maintenance by an authorized Anton Paar representative to retain warranty coverage.

**Following parts are generally excluded from the warranty (wear and tear parts) footnote general terms of delivery**

- Desiccant cartridge

- O-rings

## 8.2 Repair performed by an authorized Anton Paar representative

In case your product needs repair, contact your local Anton Paar representative, who will take care of the necessary steps. If your product 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. Do not return products that are contaminated by radioactive materials, infectious agents or other substances that cause health hazards.

**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

	L-Rix 5100	L-Rix 5200
Refractive index: Range	1.3100 to 1.5400 (equivalent to 0 % to 100 % mass)	1.3100 to 1.46 (equivalent to 0% to 65% mass)
Refractive index: Accuracy	nD $\pm$ 0.0002 (equivalent to $\pm$ 0.1 % mass)	nD $\pm$ 0.0001 (equivalent to $\pm$ 0.05% mass) (valid for process temperature 3 °C to 24 °C) <i>Valid for process temperatures between 3 °C and 25 °C</i>
Refractive index: Repeatability	nD $\pm$ 0.0001 (equivalent to $\pm$ 0.05 % mass)	nD $\pm$ 0.00005 (equivalent to $\pm$ 0.025% mass) (valid for process temperature 3 °C to 24 °C) <i>Valid for process temperatures between 3 °C and 25 °C</i>
Calibration	Anton Paar's proprietary calibration routine using high purity water and commercial nD-references	
Optical material	Sapphire	
Detector	CMOS line sensor, 2048 elements	
Light source	LED 589 nm	
Temperature control method	Automatic Temperature Compensation; Integrated Pt-100 Class A, Linearized according to IEC 751	
Ambient temperature (without Pico 3000)	-20 °C to 60 °C	
Ambient temperature (with Pico 3000 and Pico 3000 HMI)	-20 °C to 55 °C (Pico 3000 version PROFINET IO max. 50 °C)	
Ambient temperature for Tri-Clamp version PL 38	-20 °C to 50 °C	
Humidity	0 - 95 % (rel. humidity, non-condensing)	
Process temperature	-20 °C to 120 °C except Tri-Clamp version PL 38: -20 °C to 100 °C	0 °C to 105 °C except Tri-Clamp version PL 38: 0 °C to 100 °C
CIP/SIP temperature	Up to 145 °C (293 °F) for 30 min	
Pressure range absolute	0.1 bar to 16 bar (10 bar @ >120 °C)	
Weight	approx. 7 kg	
Wetted parts – standard material	Stainless steel 1.4404, PEEK Sapphire (Al <sub>2</sub> O <sub>3</sub> – 99.997%), O-ring 60x3 (VARIVENT® N) EPDM 70	
Degree of protection	IP65; IP67 / NEMA 6P	
Pressure Equipment Directive (2014/68/EU)	The L-Rix sensors are excluded from the Pressure Equipment Directive (2014/68/EU) according to Art. 1 Para. 2 of this directive.	

### Electrical connections

Power supply	SELV/PELV DC 24 V (range 20 ... 28)
Power consumption	max. 2 W (max. 5 W with Pico 3000 and HMI)
Cable gland	Max. 6 pcs. M16x1.5 EMC, earthing cones acc. to DIN 89345, brass nickel-plated for cable OD 4.5 to 10 mm
Connection terminals	Push-in spring connection 0.2 to 1.5 mm <sup>2</sup> / AWG 24 to 16

### Cables

Cables must comply with the intended area of use, the cable gland type, and the relevant national regulations and requirements

Power supply	<p><u>Suggested cable type:</u> LiYCY Shielded 2 pole cable, double insulation. Ground the shield at power adapter side and sensor end.</p> <p><u>Wire cross section:</u> min. 0.34 mm<sup>2</sup>, max. 1.5 mm<sup>2</sup> without wire end ferrule; max.0.75 mm<sup>2</sup> with wire end ferrule</p> <p><u>Diameters of cables:</u> 4.5 to 10 mm to ensure optimal sealing against the cable gland</p>
CANopen	<p><u>Cable type:</u> CANopen/DeviceNet cable, 120 Ω shielded twisted pair</p> <p><u>Wire cross section:</u> min 0.20 mm<sup>2</sup>, max. 1.5 mm<sup>2</sup> without wire end ferrule; max. 0.75 mm<sup>2</sup> with wire end ferrule.</p> <p><u>Diameter of cables:</u> 4.5 to 10 mm to ensure optimal sealing against the cable gland</p> <p><u>Max. length:</u> 250 m (with Pico); 50 m (with mPDS 5)</p>
<b>Communication</b>	Several fieldbuses and analog interfaces are available depending on the used version. Please see the instruction manuals of the process controller and the Pico 3000).
Integrated display	Optional (Pico HMI)
Process connections	Tuchenhagen VARIVENT® Type N Tri-Clamp® 3"

All inputs and outputs (including relay outputs) connected to the Anton Paar process controller or Pico 3000 RC 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  $I_{\max} = 0.75 \text{ A}$ .

## Appendix B Connector set 4-pole

Mat. no. 94633

Connector set 4-pole, recommended cable wiring, assembly and pin assignment

### Strip measures male cable connector

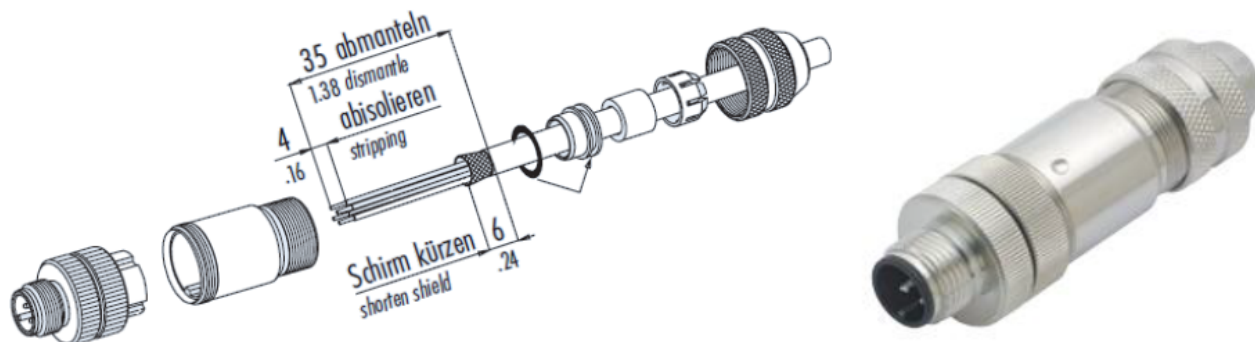
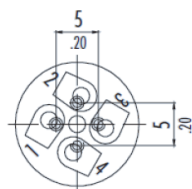
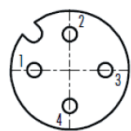


Fig. 24: Connector set 4-pole

### Contact arrangements



4 pole male cable connector  
(rear view)



4 pole female socket with wires  
(front view)

- 1 brown
- 2 white
- 3 blue
- 4 black

Fig. 25: Connector set 4-pole rear view and front view

Table 4: Pin assignment

	Power supply	AO	DI/DO
PIN 1	DC 24 V +	AO1 +	DI
PIN 2	Not used	AO1 -	DO
PIN 3	DC 24 V -	AO2 +	DIO +
PIN 4	Not used	AO2 -	DIO GND

Table 5: Specifications

	Cable connector	Socket with wires
Termination	Screw connection	Wires
Wire gauge	Max. 0.75 mm <sup>2</sup> (AWG 20)	Wires 0.25 mm <sup>2</sup> (AWG 24)
Degree of protection	IP 67	IP 68
Temperature range	-25 °C to +85 °C	
Rated voltage	250 V	
Rated current (40 °C)	4 A	
Rated impulse voltage	2950 V	2500 V
Cable outlet	6 – 8 mm	-

# Appendix C Certificates

## Appendix C.1 EU Declaration of Conformity

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### EU Declaration of Conformity (original)



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

Product designation: L-RIX 5100 SMART SENSOR VARIVENT N  
L-RIX 5200 SMART SENSOR VARIVENT N  
L-RIX 5100 SENSOR TRI-CLAMP 3"  
L-RIX 5200 SENSOR TRI-CLAMP 3"  
L-RIX 5100 SENSOR TRI-CLAMP 3" VER PL 38  
L-RIX 5200 SENSOR TRI-CLAMP 3" VER PL 38  
L-RIX 5000 TRANSMITTER VARIVENT N  
FERMENTATION MONITOR 5100  
L-RIX 4100 SMART SENSOR VARIVENT N  
FERMENTATION MONITOR 5100 TRI-CLAMP 3"

Model: **L-RIX 4100, L-RIX 5000, L-RIX 5100, L-RIX 5200**  
**L-RIX 5100 SENSOR TRI-CLAMP 3" VER PL 38**  
**L-RIX 5200 SENSOR TRI-CLAMP 3" VER PL 38**  
**FERMENTATION MONITOR 5100**  
**FERMENTATION MONITOR 5100 TRI-CLAMP 3"**

Material number: 219623, 219675, 220644, 220645, 252557, 252568, 220646, 220647, 243619, 246384

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


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

Applied standards:

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

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

Place and date of issue: Graz, 24 April 2024

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

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Dr. Christoph Ebner  
Head of Process Instrumentation  
Business Unit Solutions

## Appendix C.2 UK Declaration of Conformity

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### UK Declaration of Conformity



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

Product designation:	L-RIX 5100 SMART SENSOR VARIVENT N L-RIX 5200 SMART SENSOR VARIVENT N L-RIX 5100 SENSOR TRI-CLAMP 3" L-RIX 5200 SENSOR TRI-CLAMP 3" L-RIX 5100 SENSOR TRI-CLAMP 3" VER PL 38 L-RIX 5200 SENSOR TRI-CLAMP 3" VER PL 38 L-RIX 5000 TRANSMITTER VARIVENT N FERMENTATION MONITOR 5100 L-RIX 4100 SMART SENSOR VARIVENT N FERMENTATION MONITOR 5100 TRI-CLAMP 3"
Model:	<b>L-RIX 4100, L-RIX 5000, L-RIX 5100, L-RIX 5200</b> <b>L-RIX 5100 SENSOR TRI-CLAMP 3" VER PL 38</b> <b>L-RIX 5200 SENSOR TRI-CLAMP 3" VER PL 38</b> <b>FERMENTATION MONITOR 5100</b> <b>FERMENTATION MONITOR 5100 TRI-CLAMP 3"</b>
Material number:	219623, 219675, 220644, 220645, 252557, 252568, 220646, 220647, 243619, 246384

is in conformity with all the relevant UK legislation

**Electrical Equipment (Safety) Regulations 2016, 2016 No. 1101**

**Electromagnetic Compatibility Regulations 2016, 2016 No. 1091**

**Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012, 2012 No. 3032**

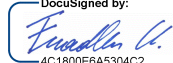
complies with the designated standards:

- EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019
- 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 0LA, United Kingdom

Place and date of issue: Graz, 24 April 2024

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

DocuSigned by:  
  
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Dr. Christoph Ebner  
Head of Prozess Instrumentation  
Business Unit Solutions

# Appendix D Confirmation of compliance

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## 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	all
Fermentation Monitor 5100	all
L-Vis 510/520/4300/5300/6300	all
Oxy 510/4100/5100 and Oxygen Monitor for Gas Purity	except Sensor cap ultra-trace range
Inline Pump 520	all
Inline Pump 300	with EPDM O-rings
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.

20-Feb-2024

DocuSigned by:

*Christoph Ebner*

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Dr. Christoph Ebner

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

**CEO / Geschäftsführer:**  
Dr. Friedrich Santner

**Chairman of the Supervisory Board /  
Aufsichtsratsvorsitzender:**  
Dr. Othmar Ederer

**Registry Court / Registergericht:**  
Landesgericht für ZRS Graz, FN 135 863 Z

**Data Protection No. / DVR-Nr.:** 0210790,  
**VAT ID No. / 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 E Document numbers

Document number	Date	Comment
D32IB002EN-A	March 2019	First release
D32IB002EN-B	July 2019	<ul style="list-style-type: none"> <li>– Confirmation of compliance (suitability for contact with food)</li> <li>– Minor changes</li> </ul>
D32IB002EN-C	November 2019	New chapters added: <ul style="list-style-type: none"> <li>– Upkeep and Cleaning</li> <li>– Maintenance and Repair</li> </ul>
D32IB002EN-D	December 2019	New list in chapter Maintenance and Repair
D32IB002EN-E	November 2020	Adaption concerning maintenance
D32IB002EN-F	April 2021	<ul style="list-style-type: none"> <li>– L-Rix 5000 removed</li> <li>– Deflectors and prism wash systems added</li> </ul>
D32IB002EN-G	August 2021	<ul style="list-style-type: none"> <li>– EU Declaration of Conformity adapted</li> <li>– Confirmation of Compliance adapted</li> <li>– Specifications of process temperature adapted</li> </ul>
D32IB002EN-H	January 2022	"Tri-Clamp 3" version PL 38" added (new material numbers)
D32IB002EN-I	October 2022	New EU certificate New UK certificate
D32IB002EN-J	May 2024	Update of EU and UK Declaration of Conformity
D32IB002EN-K	March 2025	New: Process controller Edge 5000/7000

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Specifications subject to change without notice.  
D32IB002EN-K