



LINXON



Operating Manual
Incl. EU Declaration of Conformity

LSP500

LINXON Standard Pirani

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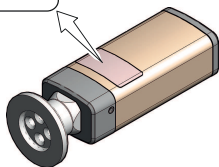
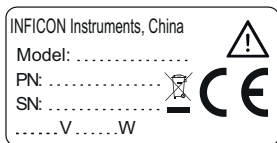
Symbol for cross-references within this document:

→  XY

1 General

1.1 Product Identification

In all communications with LINUXON, please specify the information on the product nameplate.



1.2 Validity

This document applies to products with the following part number:

L21-000 (DN 16 ISO-KF, W filament)

The part number (PN) can be taken from the product nameplate. We reserve the right to make technical changes without prior notice.

All dimensions in mm.

1.3 Intended Use

The LINXON Standard Pirani LSP500 has been designed for vacuum measurement of gases in the pressure range of $5 \times 10^4 \dots 1000$ mbar.

The gauge must not be used for measuring flammable or combustible gases in mixtures containing oxidants (e.g. atmospheric oxygen) within the explosion range.

It can be operated with a customer-specific control unit.

2 Safety

2.1 Symbols Used



DANGER

Information on preventing any kind of physical injury.



WARNING

Information on preventing extensive equipment and environmental damage.



Caution

Information on correct handling or use. Disregard can lead to malfunctions or minor equipment damage.

2.2 Personnel Qualifications



Skilled personnel

All work described in this document may only be carried out by persons who have suitable technical training and the necessary experience or who have been instructed by the end-user of the product.

2.3 General Safety Instructions

- Adhere to the applicable regulations and take the necessary precautions for the process media used.

Consider possible reactions with the product materials.

Consider possible reactions (e.g. explosion) of the process media due to the heat generated by the product (Pirani filament 110 °C).

- Adhere to the applicable regulations and take the necessary precautions for all work you are going to do and consider the safety instructions in this document.
- Before beginning to work, find out whether any vacuum components are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

Communicate the safety instructions to all other users.

2.4 Liability and Warranty

LINXON assumes no liability and the warranty becomes null and void if the end-user or third parties

- disregard the information in this document
- use the product in a non-conforming manner

- make any kind of interventions (modifications, alterations etc.) on the product
- use the product with accessories not listed in the corresponding product documentation.

The end-user assumes the responsibility in conjunction with the process media used.

Gauge failures due to contamination or wear and tear, as well as expendable parts (e.g. Pirani filament) are not covered by the warranty.

3 Technical Data

Measurement principle	thermal conductance acc. to Pirani
Measurement range (air, O ₂ , CO, N ₂)	5×10 ⁻⁴ ... 1000 mbar
Accuracy (N ₂)	
1×10 ⁻³ ... 100 mbar	±15% of reading
5×10 ⁻⁴ ... 1×10 ⁻³ mbar	±50% of reading
100 ... 1000 mbar	±50% of reading
Resolution	1% of reading
Repeatability	
1×10 ⁻³ ... 100 mbar	2% of reading
Output signal (measurement signal)	
Voltage range	0 ... +10.3 V (dc)
Measurement range	+1.9 ... +10.0 V (dc)
Voltage vs. pressure	1.286 V/decade, logarithmic
Error signal	0 ... +0.5 V
Filament rupture	+0.1 V
Output impedance	2×4.7 Ω
Minimum loaded impedance	10 kΩ, short-circuit proof

Response time	80 ms
Gauge identification	27.0 k Ω , referenced to supply common
Voltage at pin 4	≤ 5 V
Adjustment	one tactile switch for ATM and HV adjustment

Supply



DANGER

The gauge may only be connected to power supplies, instruments or control devices that conform to the requirements of a grounded protective extra-low voltage and limited power source (LPS), Class 2. The connection to the gauge has to be fused.

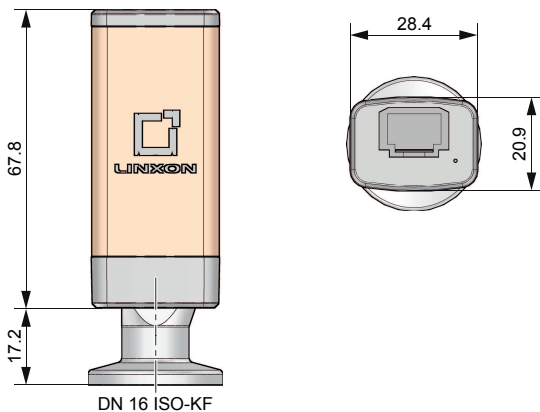
Supply voltage

At the gauge	+14 ... +30 V (dc)
Ripple	$\leq 0.5 V_{pp}$
Power consumption (max. starting current)	<200 mA
Power consumption	≤ 1 W
Fuse to be connected	1 AT (slow)
Power connection	FCC 68/RJ45, 8-pin, male
Sensor cable	8-pin, plus shielding
Cable length	≤ 100 m (8×0.14 mm ²)
Grounding concept	→ "Power Connection"
Vacuum connection–signal common	connected via 1 M Ω (voltage difference <15 V)
Supply common–signal common	conducted separately, for differential measurement

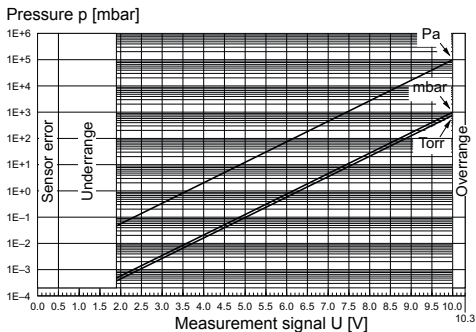
Materials exposed to vacuum	
LSP500 Filament	DIN 1.4301, glass, NiFe W
Internal volume	
DN 16 ISO-KF	≈1.5 cm ³
Admissible pressure (absolute)	10 bar, limited to inert gases
Admissible temperature	
Operation	+5 ... +60 °C
Vacuum connection	80 °C ¹⁾
Filament	110 °C
Storage	-20 ... +65 °C
Relative humidity	≤80% at temperatures ≤+31 °C, decreasing to 50% at +40 °C
Use	indoors only, altitude up to 2000 m NN
Mounting orientation	any
Pollution degree	2
Degree of protection	IP40
Weight	
DN 16 ISO-KF	≈80 g

¹⁾ In horizontal mounting orientation

Dimensions [mm]



3.1 Measurement Signal vs. Pressure



$$p = 10^{(U-c)/1.286}$$



$$U = c + 1.286 \times \log_{10} p$$

valid in the range: 5×10^{-4} mbar $< p < 1000$ mbar
 3.75×10^{-4} Torr $< p < 750$ Torr
 5×10^{-2} Pa $< p < 1 \times 10^5$ Pa

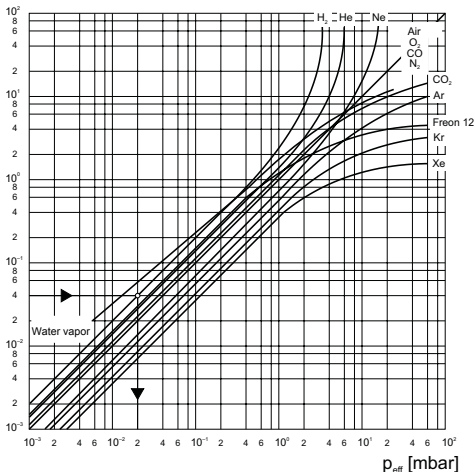
U	p	c
[V]	[mbar]	6.143
[V]	[μbar]	2.287
[V]	[Torr]	6.304
[V]	[mTorr]	2.448
[V]	[micron]	2.448
[V]	[Pa]	3.572
[V]	[kPa]	7.429

where p pressure
 U Measurement signal
 c constant (pressure unit dependent)

3.2 Gas Type Dependence

Indicated pressure (gauge calibrated for air)

p [mbar]



Correction factors for pressure range below 1 mbar

$$p_{\text{eff}} = C \times \text{pressure reading}$$

Gas type	Correction factor C	Gas type	Correction factor C
He	0.8	H ₂	0.5
Ne	1.4	air, O ₂ , CO, N ₂	1.0
Ar	1.7	CO ₂	0.9
Kr	2.4	water vapor	0.5
Xe	3.0	freon 12	0.7

4 Installation

4.1 Vacuum Connection



DANGER

Leaking process media

High-intensity mechanical, chemical or thermal impacts can cause leaks in the measuring sensor. Process media can thus leak and possibly cause hazards, if overpressure is in the vacuum system.

- Avoid high-intensity mechanical, chemical or thermal impacts and overpressure in the vacuum system.
- Take appropriate measures (e.g. shut off gas supply, extraction, leak test) to avoid hazards or damage due to leaking process media.



DANGER

Overpressure in the vacuum system >1 bar

Injury caused by released parts and harm caused by escaping process gases can result if clamps are opened while the vacuum system is pressurized.

- Do not open any clamps while the vacuum system is pressurized. Use the type of clamps which are suited to overpressure.

**DANGER**

Overpressure in the vacuum system >2.5 bar
KF flange connections with elastomer seals (e.g. O-rings) cannot withstand such pressures. Process media can thus leak and possibly damage your health.

- Use O-rings provided with an outer centering ring.

**DANGER**

Protective ground

Products that are not correctly connected to ground can be extremely hazardous in the event of a fault. The gauge must be electrically connected to the grounded vacuum chamber. This connection must conform to the requirements of a protective connection according to EN 61010:

- For gauges with a KF vacuum connection, use a conductive metallic clamping ring.

**Caution**

Vacuum component

Dirt and damages impair the function of the vacuum component.

- When handling vacuum components, take appropriate measures to ensure cleanliness and prevent damages.

**Caution**

Dirt sensitive area

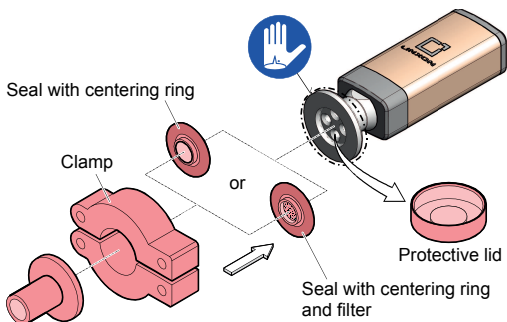
Touching the product or parts thereof with bare hands increases the desorption rate.

- Always wear clean, lint-free gloves and use clean tools when working in this area.



The gauge may be mounted in any orientation. To keep condensates and particles from getting into the measuring chamber preferably choose a horizontal to upright position and possibly use a seal with a centering ring and filter. If adjustment should be possible after the gauge has been installed, be sure to install it so that the button can be accessed with a pin.

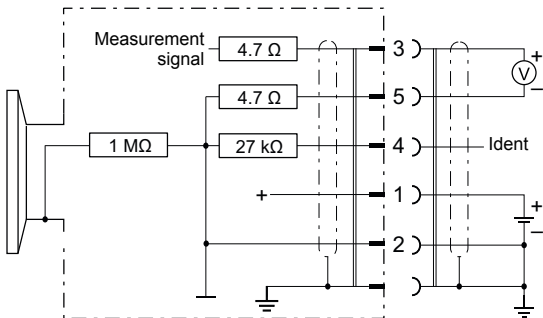
Remove the protective lid and connect the product to the vacuum system.



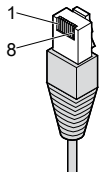
Keep the protective lid.

4.2 Power Connection

If no sensor cable is available, make one according to the following diagram. Connect the sensor cable.



Pin 1	Supply
Pin 2	Supply common, GND
Pin 3	Measurement signal
Pin 4	Gauge identification
Pin 5	Signal common



FCC 68 / RJ45,
8-pin

5 Operation

When the supply voltage is applied, the measurement signal is available between pins 3 and 5 (relationship between measurement signal and pressure).

Allow a stabilization period of at least 10 minutes. Therefore it is advisable to operate the gauge continuously, irrespective of the pressure.

5.1 Gas Type Dependence

The measurement value is gas dependent. The pressure reading applies to dry air, O₂, CO and N₂. For other gases, it has to be corrected.

If the gauge is operated with a controller, a correction factor for correction of the actual reading can be applied. (→ Operating Manual of the corresponding controller).

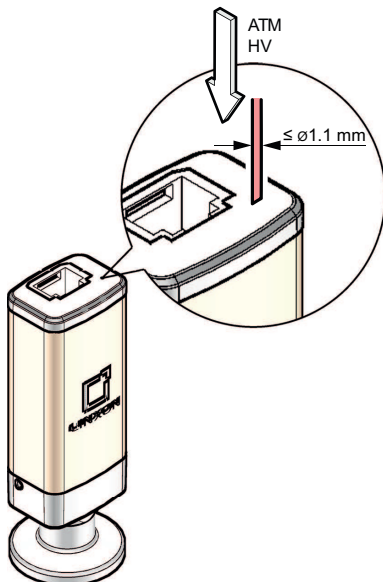
5.2 Adjusting the Gauge

The gauge is factory calibrated. Due to long time operation or contamination, a zero drift could occur. Periodically check the zero and adjust it if necessary.

For adjusting the zero, operate the gauge under the same constant ambient conditions and in the same mounting orientation as normally.

The gauge is adjusted to default values. However, it can also be adjusted to other pressure values, if the exact pressure value is known (reference measurement).

- 1 If you are using a seal with centering ring and filter, check that they are clean or replace them if necessary.
- 2 Put the gauge into operation and operate it at atmospheric pressure for at least 10 minutes.
- 3 Press the button with a pin (max. \varnothing 1.1 mm) and the ATM adjustment is carried out: The gauge is adjusted to 1000 mbar (10 V (dc)) by default. By pressing the button >5 s the pressure value is increased towards 1200 mbar (or, by pressing it again, decreased towards 500 mbar) until the button is released or the limit is reached.



- 4 Evacuate to $p \ll 10^{-4}$ mbar (recommended) or to a pressure in the range of $10^{-4} \dots 10^{-2}$ mbar and wait at least 2 minutes.
- 5 Press the button with a pin and the HV adjustment is carried out: The gauge is adjusted to 1.2×10^{-4} mbar (1.1 V (dc)) by default. By pressing the button >5 s the pressure value is increased toward 1×10^{-2} mbar until the button is released or the limit is reached.

6 Deinstallation



DANGER

Contaminated parts

Contaminated parts can be detrimental to health and environment.

- Before beginning to work, find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.



Caution

Vacuum component

Dirt and damages impair the function of the vacuum component.

- When handling vacuum components, take appropriate measures to ensure cleanliness and prevent damages.



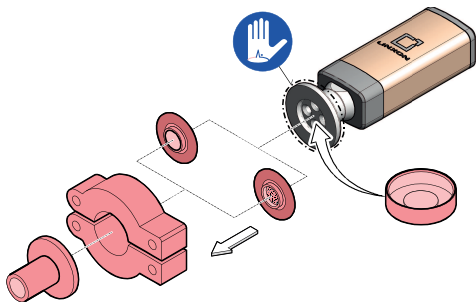
Caution

Dirt sensitive area

Touching the product or parts thereof with bare hands increases the desorption rate.

- Always wear clean, lint-free gloves and use clean tools when working in this area.

- 1 Vent the vacuum system.
- 2 Put the gauge out of operation.
- 3 Unplug the sensor cable.
- 4 Remove the gauge from the vacuum system and install the protective lid.



7 Maintenance, Repair

In case of severe contamination or a malfunction, the sensor can be replaced.



Gauge failures due to contamination or wear and tear, as well as expendable parts (e.g. Pirani filament) are not covered by the warranty.

LINXON assumes no liability and the warranty becomes null and void if any repair work is carried out by the end-user or third parties.

7.1 Replace the Sensor

Precondition

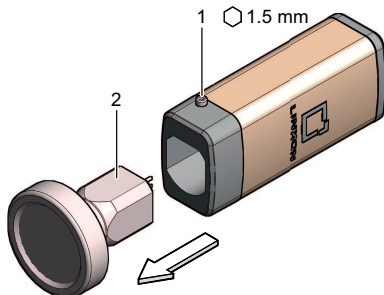
Gauge deinstalled.

Required tools / material

- Allen wrench, AF 1.5

- Spare sensor

- 1 Loosen the hexagon socket set screw (1) (AF 1.5) and remove the sensor.



- 2 Place the new sensor without twisting it and lock it with the screws.

8 Spare Parts

When ordering spare parts, always indicate:

- all information on the product nameplate
- description and ordering number according to the spare parts list

Sensor	for gauge	Ordering no.
	L21-000	L21-001

9 Returning the Product



WARNING

Forwarding contaminated products

Contaminated products (e.g. radioactive, toxic, caustic or biological hazard) can be detrimental to health and environment.

- Products returned should preferably be free of harmful substances. Adhere to the forwarding regulations of all involved countries and forwarding companies. Enclose a duly completed declaration of contamination (form under www.infi-con.com).

Products that are not clearly declared as "free of harmful substances" are decontaminated at the expense of the customer.

Products not accompanied by a duly completed declaration of contamination are returned to the sender at his own expense.

10 Disposal



DANGER

Contaminated parts

Contaminated parts can be detrimental to health and environment.

- Before beginning to work, find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

**WARNING**

Substances detrimental to the environment
Products or parts thereof (mechanical and electric components, operating fluids etc.) can be detrimental to the environment.

- Dispose of such substances in accordance with the relevant local regulations.

Separating the components

After disassembling the product, separate its components according to the following criteria:

- Contaminated components
Contaminated components (radioactive, toxic, caustic or biological hazard etc.) must be decontaminated in accordance with the relevant national regulations, separated according to their materials, and disposed of.
- Other components
Such components must be separated according to their materials and recycled.

CE EU Declaration of Conformity

Manufacturer: IINFICON Instruments (Shanghai) Co.,Ltd.
Section A, Building 6, 108 Shuya Road
Shanghai 201611, P.R.China

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

Product: LSP500

The product of the declaration described above is in conformity with following Union harmonization legislation:

- 2014/30/EU, OJ L 96/79, 29.3.2014
(EMC Directive; Directive relating to electromagnetic compatibility)
- 2011/65/EU, OJ L 174/88, 1.7.2011
(RoHS Directive; Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment)

Harmonized and international/national standards and specifications:

- EN 61000-6-2:2005
(EMC: generic immunity standard for industrial environments)
- EN 61000-6-3:2007 + A1:2011
(EMC: generic emission standard for residential and commercial environments)
- EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019
(Safety requirements for electrical equipment for measurement, control and laboratory use)
- EN 61326-1:2013; Group 1, Class B
(EMC requirements for electrical equipment for measurement, control and laboratory use)
- EN IEC 63000:2018
(RoHS: technical documentation)

Signed for and on behalf of: INFICON AG, Alte Landstraße 6, LI-9496 Balzers

Balzers, 2024-06-19

Balzers, 2024-06-19



William Opie
Managing Director



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Product Manager



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TLNA44E1