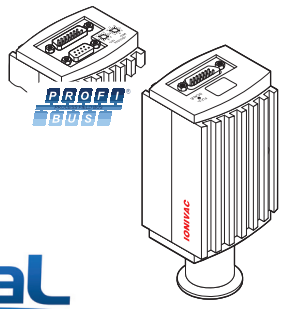
oerlikon leybold vacuum

IONIVAC

ITR 90
ITR 90 P

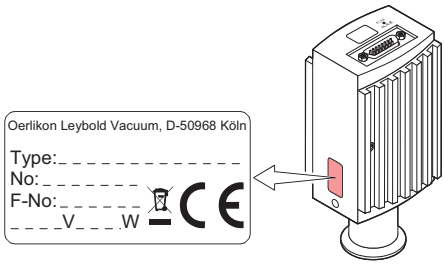
Instruction Sheet KA 09.420/3.02
Incl. Declaration of Conformity

Part Numbers
120 90
120 91
120 92
120 94
230 030
230 031



Product Identification

In all communications with Oerlikon Leybold Vacuum, please specify the information given on the product nameplate. For convenient reference transfer this information into the diagram below.



Validity

This document applies to products with the following part numbers:

ITR 90 Without display:
120 90 (DN 25 ISO-KF)
120 92 (DN 40 CF-R)

ITR 90 With display
120 91 (DN 25 ISO-KF)
120 94 (DN 40 CF-R)

ITR 90 P (with Profibus interface and switching functions)
230 030 (DN 25 ISO-KF)
230 031 (DN 40 CF-R)

The part number (No) can be taken from the product name plate.

If not indicated otherwise in the legends, the illustrations in this document correspond to the gauge with part number 120 90. They apply to the other gauges by analogy.

We reserve the right to make technical changes without prior notice.

All dimensions in mm.

Intended use

The Hot Ion Combi Gauges ITR 90 and ITR 90 P have been designed for vacuum measurement of non-flammable gases and gas mixtures in a pressure range 5×10^{-10} … 1000 mbar.

The gauges can be operated in connection with the COMBIVAC® IT23 or with another evaluation unit.

Functional Principle

Over the whole measurement range, the Hot Ion Combi Gauges have a continuous characteristic curve and its measuring signal is output as logarithm of the pressure.

The gauge functions with a Bayard Alpert hot cathode ionization measurement system (for $p < 2.0\times10^{-2}$ mbar) and a Pirani measurement system (for $p > 5.5\times10^{-3}$ mbar). In the overlapping pressure range of 2.0×10^{-2} … 5.5×10^{-3} mbar a mixed signal of the two measurement systems is output. The hot cathode is switched on by the Pirani measurement system only below the switching threshold of 2.4×10^{-2} mbar (to prevent filament burn-out). It is switched off when the pressure exceeds 3.2×10^{-2} mbar.

Trademark

COMBIVAC® Oerlikon Leybold Vacuum

Safety

Symbols Used

STOP 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.

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.

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.
- 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.

Liability and Warranty

Oerlikon Leybold Vacuum 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 changes (modifications, alterations etc.) to the product
- use the product with accessories not listed in the product documentation.

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

Transmitter failures due to contamination or wear and tear as well as expendable parts (filaments) are not covered by the warranty.

Technical Data

In some points, the technical data of ITR 90 P differ from those of ITR 90, which are given below (→ "Technical Data" in 🕮 [1] and [2]).

Measurement range (air, O_2, CO, N_2)	5×10^{-10} … 1000 mbar continuous
Accuracy	± 15% of reading in the range of 1×10^{-8} … 10^{-2} mbar after 5 min. stabilization
Repeatability	± 5% of reading in the range of 1×10^{-8} … 10^{-2} mbar after 5 min. stabilization
Emission	
switching on threshold	2.4×10^{-2} mbar
switching off threshold	3.2×10^{-2} mbar
emission current	
$p \le 7.2\times10^{-6}$ mbar	5 mA
7.2×10^{-6} mbar < p < 3.2×10^{-2} mbar	25 µA
emission current switching	
25 µA ⇒ 5 mA	7.2×10^{-6} mbar
5 mA ⇒ 25 µA	3.2×10^{-5} mbar
Degas	
current ($p < 7.2\times10^{-6}$ mbar)	≈16 mA / ≈4.0 W
control input signal	0 V / 24 V, PLC level, high active
duration	<3 min, followed by automatic stop
In degas mode, the ITR 90 keeps supplying measurement values the tolerances of which can be higher than during normal operation.	
Output signal (measuring signal)	0 … 10 V
Measuring range	0.774 V … 10 V (5×10^{-10} mbar … 1000 mbar)
Relationship voltage-pressure	logarithmic, 0.75 V / decade
Error signal	<0.3 V / 0.5 V
Minimum loaded impedance	10 kΩ
Gauge identification	42 kΩ between Pin 10 and Pin 5 (gauge cable)
RS232C interface	
baud rate	9600 baud
data format	binary data set 8 data bits one stop-bit no parity-bit no handshake
signal level	≈± 8 V
connector	→ Power connection
Further information on the RS232C interface → 🕮 [1]	
Display	
panel	LCD matrix, 32×16 pixels, with background illumination
dimensions	16.0 mm × 11.2 mm
measurement units	mbar (default), Torr, Pa
Choosing the measurement unit → 🕮 [1]	

Supply

STOP DANGER

The gauge may only be connected to supply and evaluation units that conform to the requirements of a grounded protective extra-low voltage (SELV-E according to EN 61010). The connection to the gauge has to be fused [1].

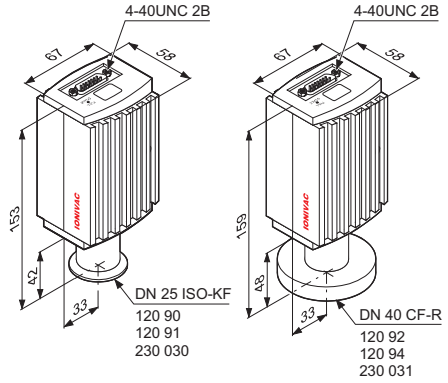
Voltage at gauge	24 VDC (20 … 28 VDC) (≤ripple 2 V_{pp}) [2]
Power consumption	
standard	≤0.5 A
degas	≤0.8 A
emissions start (200 ms)	≤1.4 A
Power consumption	≤16 W
Fuse necessary [1]	≤1.25 AT

[1] Oerlikon Leybold Vacuum controllers fulfill these requirements.

[2] The minimum voltage of the power supply must be increased proportionally to the length of the measuring cable.

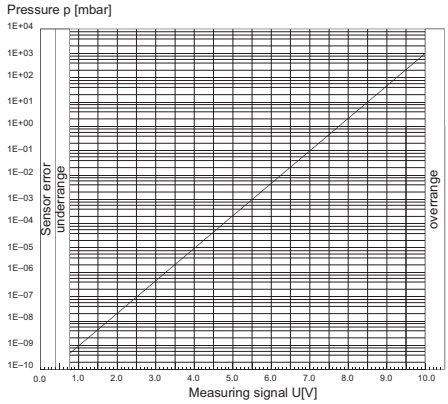
Electrical connection	Connection, D Sub 15 poles,
Sensor cable	
for analog values only without degas-function	4 poles plus screening
for analog values with degas-function	5 poles plus screening
all functions incl. RS232C interface	7 poles plus screening
Cable length (24 VDC)	≤35 m (4/5/7x0.25 mm²) ≤50 m (4/5/7x0.34 mm²) ≤100 m (4/5/7x1.0 mm²)
For operation with RS232C interface	≤30 m
Materials on the vacuum side	
housing, supports, screens	stainless steel
feedthrough	NiFe nickel plated
isolator	glass
cathode	Ir,Y_2O_3
cathode holder	Mo
Pirani element	W, Cu
Internal volume	
120 90, 120 91, 230030	≈24 cm^3
120 92, 120 94, 230031	≈34 cm^3
Pressure	≤2 bar (absolute)
Admissible temperatures	
storage	–20 … +70 °C
operation	0 … +50 °C
bake out	150 °C (without electronics unit)
Relative humidity	
year's mean	≤65% (no condensation)
during 60 days	≤85% (no condensation)
Use	indoors only atitude up to 2000 m
Type of protection	IP 30

Dimensions



Weight	
120 90, 120 91	285 g
120 92, 120 94	550 g
230030	430 g
230031	695 g

Measuring signal vs. pressure



$$p = 10^{(U-7.75)/0.75+c}$$

U	p	c
[V]	[mbar]	0
[V]	[Pa]	2
[V]	[Torr]	-0.125

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

Gas type dependence

For gases other than air, the pressure in the indication range $p < 10^{-3}$ mbar can be determined by a simple conversion:

$$p_{eff} = K \times \text{pressure indicated}$$

Gas type	Calibration factor C	Gas type	Calibration factor C
He	5.9	air, O_2, CO, N_2	1.0
Ne	4.1	H_2	2.4
Kr	0.5	Xe	0.4
Ar	0.8		

Installation

Vacuum Connection

DANGER

Caution: 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 clamps which are suited to overpressure.

DANGER

Caution: protective ground

Incorrectly grounded products 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:

- CF connection fulfill this requirement
- For gauges with a KF flange, use a conductive metallic clamping ring

Caution

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

Caution: dirt sensitive area

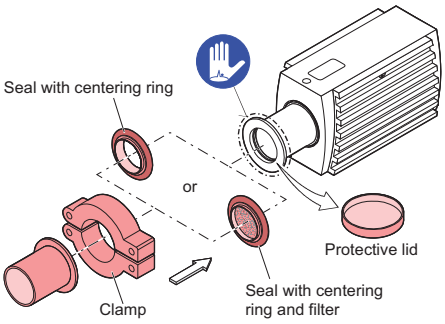
Touching the product or parts thereof with one's bare hands increases the desorption rate.

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.

The gauge is supplied with a built in grid. For potentially contaminating applications and to protect the electrodes against light and fast particles, installation of the optional baffle is recommended (→ 🕮 [1]).

Remove the protective lid and install the product at the vacuum system.



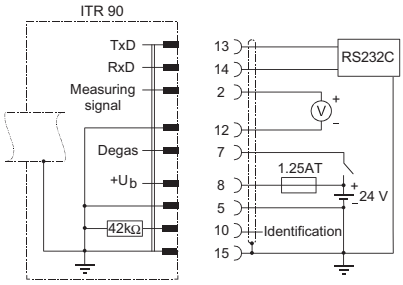
Keep the lid.

Power connection

The following information on the electrical connection as well as the wiring diagram applies to ITR 90 only (→ 🕮 [1] and [2] for details on the electrical connection and additional functions of ITR 90 P).

Make sure the vacuum connection is properly made (→ "Vacuum Connection").

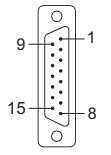
❶ If no connection cable is available, make one according to the following diagram.



Electrical connection

Pin 2	Signal output (measuring signal)	0 … +10 V
Pin 5	Supply common, GND	
Pin 7	Degas on, active high	+24 VDC
Pin 8	Supply	+24 VDC
Pin 10	Gauge identification	
Pin 12	Signal common, GND	
Pin 13	RS232C, TxD	
Pin 14	RS232C, RxD	
Pin 15	Shielding, housing, GND	

Pins 1, 3, 4, 6, 9 and 11 are not connected internally.

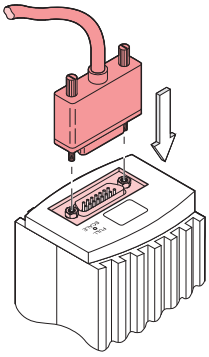


D-Sub, 15 pins female, soldering side

ka09. 420/ 3. 02 (2008-01)

Original: German KA 09.420/3.01 (2008-01)

❷ Connect the sensor cable to the gauge.



❸ Secure the cable socket with the lock screws.

❹ Connect the sensor cable to the controller.

Operation

When the voltage is supplied, the measuring signal is available between pins 2 and 12. (Relationship between measuring signal and pressure → "Technical Data").

ITR 90 P can also be operated via the corresponding fieldbus interface (→ 🕮 [1] and [2] for further details and functions).

Allow for a stabilizing time of ≈10 minutes. Once the gauge has been switched on, permanently leave it on irrespective of the pressure.

Gas type dependence

The measurement value is gas dependent. The display applies to dry air, O_2, CO, and N_2. For other gases, it has to be converted (→ "Technical data").

Adjusting the gauge

The adjustment of ITR 90 P (→ 🕮 [1] and [2]) is slightly different from the procedure for ITR 90, which is described below.

The gauge is factory calibrated. If used under different climatic conditions or in a different position, through ageing or contamination and after exchanging the sensor, the characteristic curve can be offset and readjustment can become necessary. Only the Pirani element can be adjusted and only at atmosphere.

Readjustment becomes necessary if

- at atmosphere the output voltage is <10 V or the display reading is <atmosphere
- when ventilating the vacuum system, the output voltage reaches 10 V before the measured pressure has reached atmosphere. (Gauges with display will show the error "5" at atmosphere (Pirani sensor warning).

❶ If you are using a seal with centering ring and filter, check that they are clean or replace them if necessary.

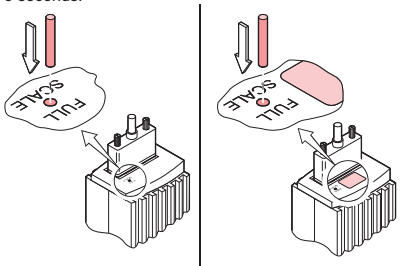
❷ Activate the gauge.

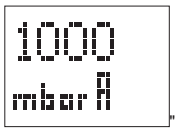
Operate the gauge for 10 minutes at atmospheric pressure. If the gauge was operated within Ioni range, a cooling-down time of approx. 30 minutes is to be expected (gauge temperature = environmental temperature).

❸ Adjusting the gauge

ITR 90 Without display 120 90 120 91	ITR 90 With display 120 92 120 94

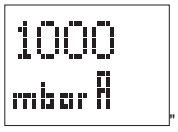
Insert a pin (≈ø1.3×50mm) through the opening marked <FULL SCALE> and push the button inside for at least 5 seconds.





≈4 s

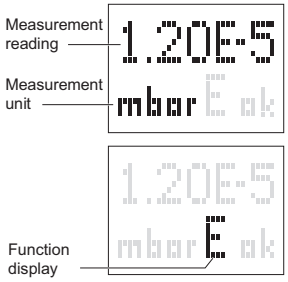
Adjustment proceeds automatically



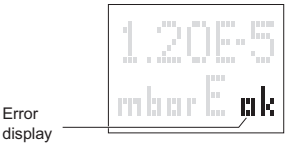
✓ Adjustment terminated

Display

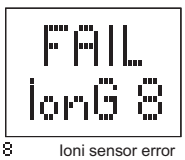
(Part numbers 120 91 and 120 94)



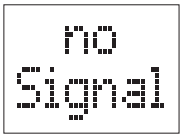
(none)	Pirani operation
E	Emission 25 µA
E.	Emission 5 mA
d	Degas
A	1000 mbar adjustment (Pirani)



ok	no error (green background illumination)
5	Pirani sensor warning (red background illumination)
9	Pirani sensor error (red background illumination)



8 Ioni sensor error
(red background illumination)



Internal data connection failure
(red background illumination)

Deinstallation

DANGER

Caution: 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

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

Caution: dirt sensitive area

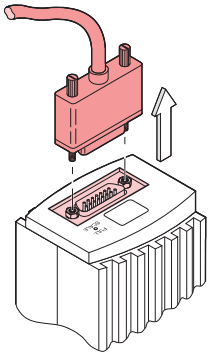
Touching the product or parts thereof with one's bare hands increases the desorption rate.

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

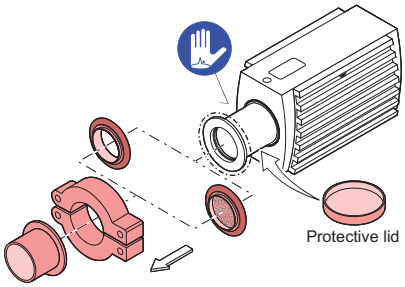
❶ Vent the vacuum system.

❷ Turn the gauge off.

❸ Loose the lock screws and unplug the sensor cable (if you are using ITR 90 P unfasten and unplug the interface cable too (→ 🕮 [1] and [2]).



❹ Remove the gauge from the vacuum system.



Maintenance, Repair

In case of severe contamination or a malfunction, the sensor can be replaced (→ 🕮 [1]).

Transmitter failures due to contamination or wear and tear as well as expendable parts (filaments) are not covered by the warranty.

Returning the Product

WARNING

Caution: forwarding contaminated products

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

Products returned to Oerlikon Leybold Vacuum should preferably be free of harmful substances. Adhere to the forwarding regulations of all involved countries and forwarding companies and enclose a duly completed declaration of contamination

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.

Disposal

DANGER

Caution: 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

Caution: 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 recycled.

- Other components

  Such components must be separated according to their materials and recycled.

Further Information

🕮 [1] www.oerlikon.com
Operating Manual
IONIVAC ITR 90, ITR 90 P
GA 09.420/1.02
Oerlikon Leybold Vacuum GmbH, D–50968 Köln

🕮 [2] www.oerlikon.com
Instruction Sheet
IONIVAC ITR 90 P
KA 09.421/1.02
Oerlikon Leybold Vacuum GmbH, D–50968 Köln

🕮 [3] www.oerlikon.com
Interface Manual
IONIVAC
SB 09.421/1.02
Oerlikon Leybold Vacuum GmbH, D–50968 Köln

Declaration of Contamination

The service, repair, and/or disposal of vacuum equipment and components will only be carried out if a correctly completed declaration has been submitted. Non-completion will result in delay.
This declaration may only be completed (in block letters) and signed by authorized and qualified staff.

1 Description of product

Type _____
Part number _____
Serial number _____

2 Reason for return

_____
_____
_____

3 Operating fluid(s) used

(Must be drained before shipping.)

_____
_____

4 Used in copper process

no ❑ yes ❑ → Seal product in plastic bag and mark it with a corresponding label.

5 Process related contamination of product:

toxic	no ❑ 1)	yes ❑
corrosive	no ❑ 1)	yes ❑
biological hazard	no ❑	yes ❑ 2)
explosive	no ❑	yes ❑ 2)
radioactive	no ❑	yes ❑ 2)
other harmful substances	no ❑ 1)	yes ❑

1) or not containing any amount of hazardous residues that exceed the permissible exposure limits

2) Products thus contaminated will not be accepted without written evidence of decontamination.

The product is free of any substances which are damaging to health. yes ❑

6 Harmful substances, gases and/or by-products

Please list all substances, gases, and by-products which the product may have come into contact with:

Trade/product name manufacturer	Chemical name (or symbol)

Precautions associated with substance	Action if human contact

7 Legally binding declaration:

We hereby declare that the information on this form is complete and accurate and that we will assume any further costs that may arise. The contaminated product will be dispatched in accordance with the applicable regulations.

Organization/company _____
Address _____
Post code, place _____
Phone _____ Fax _____
Email _____
Name _____
Company stamp

_____

This form can be downloaded from our website.

Copies: Original for addressee
1 copy for accompanying documents
1 copy for file of sender

Declaration of Conformity

CE

We, Oerlikon Leybold Vacuum, hereby declare that the equipment mentioned below complies with the provisions of the Directive relating to electrical equipment designed for use within certain voltage limits 2006/95/EC and the Directive relating to electromagnetic compatibility 89/336/EEC.

IONIVAC
ITR 90
ITR 90 P

Part numbers

120 90
120 91
120 92
120 94
230 030
230 031

Standards

Harmonized and international/national standards and specifications:

- EN 61010 (Safety requirements for electrical equipment for measurement, control and laboratory use)
- EN 61000-6-2 (Electromagnetic compatibility generic immunity standard)
- EN 61000-6-3 (Electromagnetic compatibility generic emission standard)

Signatures

Oerlikon Leybold Vacuum GmbH, Köln

22 January 2008

Dr. Ulrich Jung
Vice President
Research & Development

22 January 2008

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