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Find the *Leybold 12091* at our website: ***Click HERE***

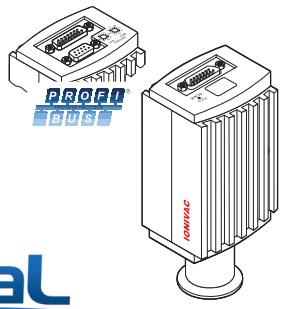
# oerlikon leybold vacuum

# IONIVAC

## ITR 90
## ITR 90 P

Instruction Sheet KA 09.420/3.02
Incl. Declaration of Conformity

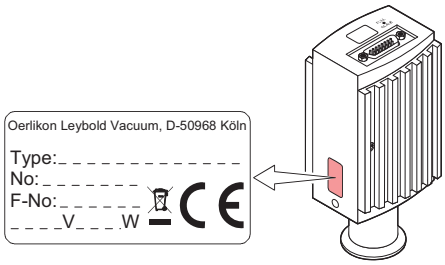
Part Numbers
120 90
120 91
120 92
120 94
230 030
230 031




Ideal vacuum products
www.idealvac.com

## 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 $5\times10^{-10}$ … 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 $2.0\times10^{-2}$ … $5.5\times10^{-3}$ 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 $2.4\times10^{-2}$ mbar (to prevent filament burn-out). It is switched off when the pressure exceeds $3.2\times10^{-2}$ 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, $N_2$) | $5\times10^{-10}$ … 1000 mbar continuous |
| Accuracy | ± 15% of reading in the range of $1\times10^{-8}$ … $10^{-2}$ mbar after 5 min. stabilization |
| Repeatability | ± 5% of reading in the range of $1\times10^{-8}$ … $10^{-2}$ mbar after 5 min. stabilization |
| **Emission** | |
| switching on threshold | $2.4\times10^{-2}$ mbar |
| switching off threshold | $3.2\times10^{-2}$ mbar |
| emission current | |
| $p \le 7.2\times10^{-6}$ mbar | 5 mA |
| $7.2\times10^{-6}$ mbar < p < $3.2\times10^{-2}$ mbar | 25 µA |
| emission current switching | |
| 25 µA ⇒ 5 mA | $7.2\times10^{-6}$ mbar |
| 5 mA ⇒ 25 µA | $3.2\times10^{-5}$ 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 ($5\times10^{-10}$ 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<br>8 data bits<br>one stop-bit<br>no parity-bit<br>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 |

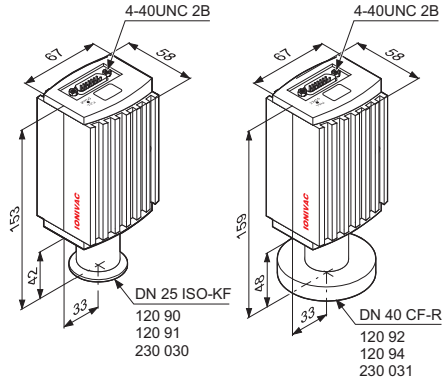
[1] Oerlikon Leybold Vacuum controllers fulfill these requirements.

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

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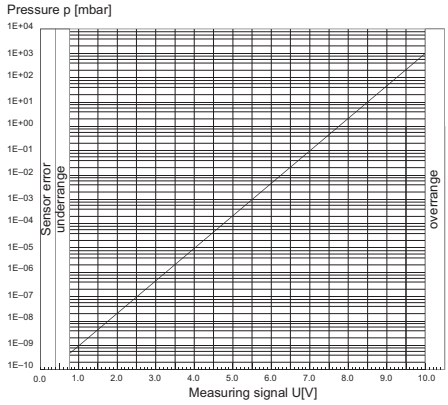
| | |
|---|---|
| Electrical connection | Connection, D Sub 15 poles, |
| Sensor cable | |
| for analog values only without degas-function | 4 poles plus screening |
| for analog values with degas-function | 5 poles plus screening |
| all functions incl. RS232C interface | 7 poles plus screening |
| Cable length (24 VDC) | ≤35 m (4/5/7x0.25 mm²)<br>≤50 m (4/5/7x0.34 mm²)<br>≤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

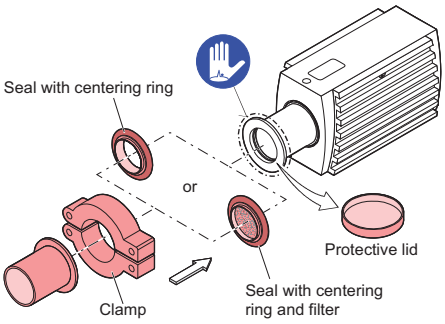
Touching the product or parts thereof with one's bare hands increases the desorption rate.

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.



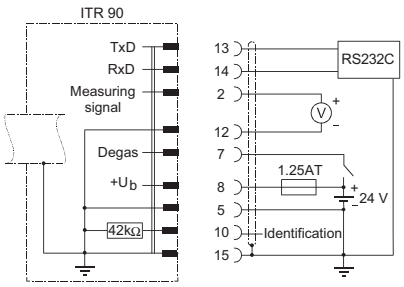

Keep the lid.

## 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").

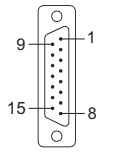
❶ If no connection cable is available, make one according to the following diagram.




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.

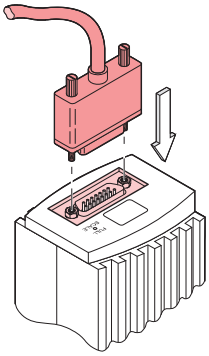



D-Sub, 15 pins female, soldering side

ka09. 420/ 3. 02 (2008-01)
Original: German KA 09.420/3.01 (2008-01)

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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.

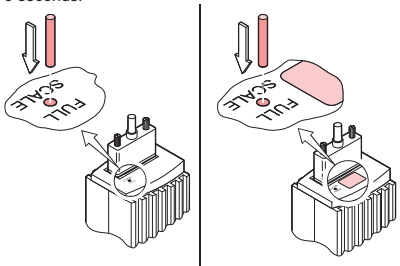
❷ Activate the gauge.

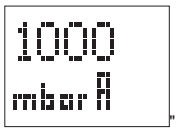
Operate the gauge for 10 minutes at atmospheric pressure. If the gauge was operated within Ioni range, a cooling-down time of approx. 30 minutes is to be expected (gauge temperature = environmental temperature).

❸ Adjusting the gauge

| ITR 90 Without display<br>120 90 120 91 | ITR 90 With display<br>120 92 120 94 |
|---|---|

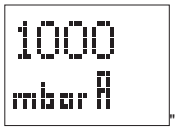
Insert a pin (≈ø1.3×50mm) through the opening marked <FULL SCALE> and push the button inside for at least 5 seconds.




≈4 s

Adjustment proceeds automatically

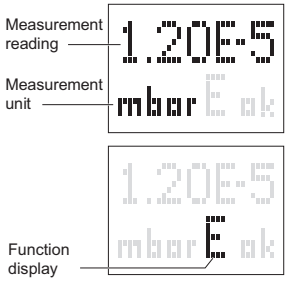



Adjustment terminated

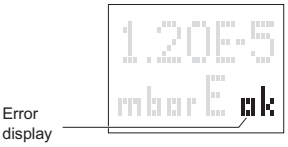



### Display

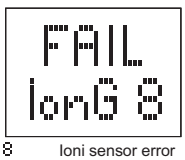
(Part numbers 120 91 and 120 94)



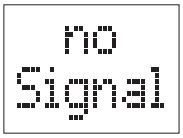

(none) Pirani operation
E Emission 25 µA
E. Emission 5 mA
D Degas
A 1000 mbar adjustment (Pirani)




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

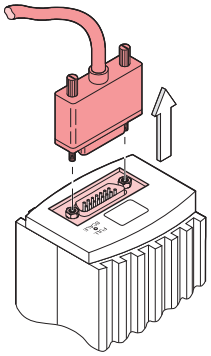
Touching the product or parts thereof with one's bare hands increases the desorption rate.

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

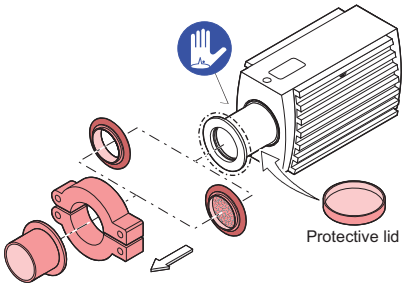
❶ Vent the vacuum system.

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.




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## 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
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22 January 2008
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