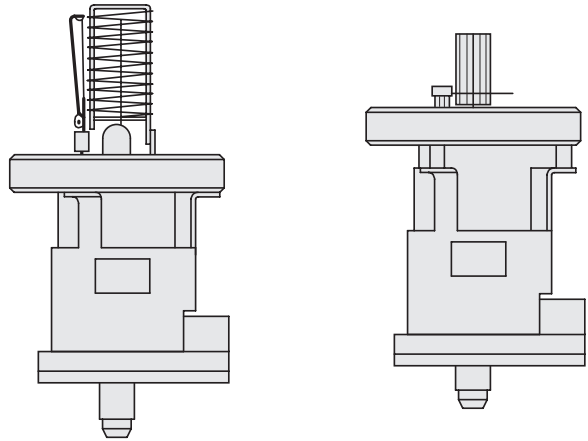
oerlikon
leybold vacuum

IONIVAC Sensors

IE 414, IE 514
and Temperature Resistant Gauge Head Cable

Operating Instructions 300265097_002_A1

Part Numbers
158 66, 158 67
158 44



Contents

Original Operating Instructions

Obligation to Provide Information
Before installing and commissioning the device, carefully read these Operating Instructions and follow the information so as to ensure optimum and safe working right from the start.

NOTICE

The Oerlikon Leybold Vacuum **IONIVAC sensors** have been designed for safe and efficient operation when used properly and in accordance with these Operating Instructions. It is the responsibility of the user to carefully read and strictly observe all safety precautions described in this section and throughout the Operating Instructions. The equipment **must only be operated in the proper condition and under the conditions described in the Operating Instructions**. It must be operated and maintained by trained personnel only. Consult local, state, and national agencies regarding specific requirements and regulations. Address any further safety, operation and/or maintenance questions to our nearest office.

DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE is used to notify users of installation, operation, programming or maintenance information that is important, but not hazard related.

We reserve the right to alter the design or any data given in these Operating Instructions. The illustrations are not binding.

Retain the Operating Instructions for further use.

Description

Described in these Operating Instructions are the UHV ionisation at measurement systems IE 414 and IE 514 as well as the temperature resistant gauge head cable.

1 Description

The IONIVAC sensor IE 414 is a Bayard-Alpert measurement system and the IE 514 is an extractor measurement system for connection to an IM 540 and IM 520 operating unit. Operation of these passive sensors is based on the hot cathode ionisation effect.

The temperature resistant gauge head cable must not be exposed to a temperature exceeding 200 °C max. (250 °C at the flange of the sensor).

1.1 Supplied Equipment

UHV ionisation measurement systems
Part numbers 158 66 or 158 67

- Installable UHV ionisation measurement system IE 414 or IE 514
- Operating Instructions

Temperature resistant gauge head cable
Part number 158 44

- Gauge head cable with plug fitted on the equipment side and with touch protection
- Housing with cover (supplied separately)
- Ion collector cable
- Mounting bolts (supplied separately)
- Operating Instructions

1.2 Ordering Information

	P/N
IONIVAC sensor IE 414	158 66
IONIVAC sensor IE 514	158 67
Temperature resistant gauge head cable 200 °C	158 44

1.3 Accessories

	P/N
Connection Accessories	
Copper gasket (set of 10 pieces) DN 40 CF	839 43
Weld-on flange, fixed DN 40 CF	835 37
Weld-on flange, rotatable DN 40 CF	835 58
Bolts, nuts, (set of 25 pieces) and accessories for CF flanges	839 01
Replacement Cathodes	
Replacement cathode for IE 413 / IE 414	158 63
Replacement cathode for IE 511 / IE 514	158 61
Gauge head cables IE 414 / IE 514	
Gauge head cable, 5 m with touch protection	158 68
Extension cable, 20 m with touch protection	158 69

Description

1.4 Technical Data

General gauge head data	IE 414	IE 514
Material of lead-in pins	NiFe	
Material of insulator	$Al_2 0_3$-ceramic, glazed	
Material of pin sealing plate	NiFe	
Material of flange	stainless steel	
Material of cathode	iridium with yttrium oxide coating	
Material of anode	Pt/Ir 90/10 a. Mo/Pt wrapped wire	Mo and CoNiCr
Material of collector	tungsten	
Material des reflector	NiFe	
Flange connection	DN 40 CF	
Electrode system configuration	Bayard-Alpert	Extractor system
Ambient temperature during operation	20 ... 80 °C	
Max. flange temp. with gauge head cable 158 44	250 °C	
Max. bake-out temperature without plug	400 °C	
Storage temperature	20 ... 50 °C	
Relative humidity Annual average On 60 days	 ≤ 65% (non-condensing) ≤ 85% (non-condensing)	
Deployment	Within indoor rooms only, altitude up to 2000 meters above sea level	
X-ray limit	$< 1 \cdot 10^{-11}$ mbar	$< 1 \cdot 10^{-12}$ mbar
Upper limit of measuring range	$1 \cdot 10^{-2}$ mbar	$1 \cdot 10^{-4}$ mbar
Lower limit of measuring range	$2 \cdot 10^{-11}$ mbar	$2 \cdot 10^{-12}$ mbar

	heat resistant gauge head cable
Max. bake-out temperature	200 °C (250 °C at the gauge head flange)
Insulation materials used	PTFE, PEEK
Length	5 m

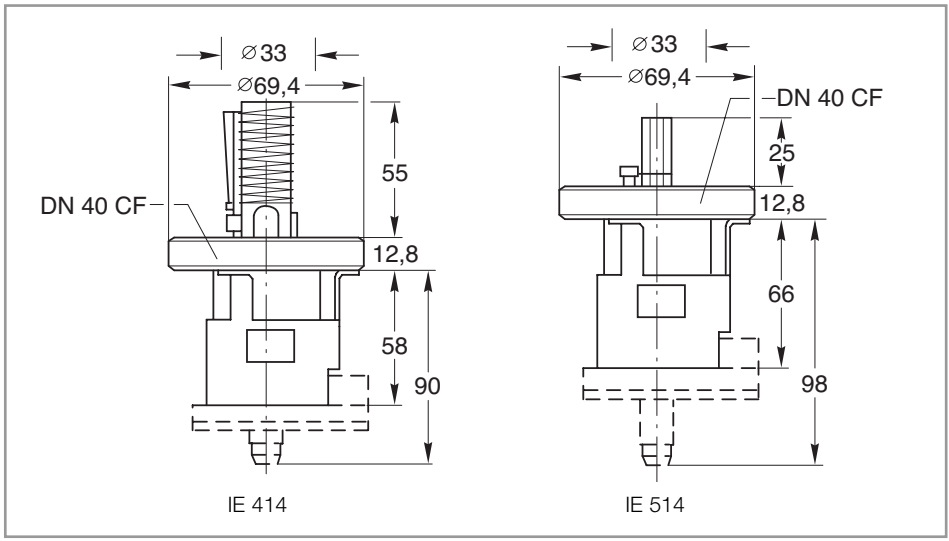


Fig. 1 Dimensions in mm

Operating characteristics when used with control unit IM 540 and IM 520

	IE 414	IE 514
Collector potential	0 V	
Cathode potential	+ 80 V	+ 100 V
Anode potential	+ 220 V	+ 220 V
Reflector potential	--	205 V
Emission current range	0.06 - 0.6 mA	1.6 mA
Cathode heater current	1.5 A (typ.)	
Cathode heater voltage	3 V (typ.)	3.7 V (typ.)
Sensitivity for nitrogen	17 mbar (typ.)	6.25 mbar (typ.)
Max. power when baking out	90 mA / 480 V	45 mA / 480 V

2 Installation

2.1 Conforming Utilization

The IONIVAC sensors may only be used for the measurement of total pressures in vacuum systems and this only in connection with the specified operating units given in Section 1.4.

2.2 Unpacking and Checking

Unpack the IONIVAC sensor immediately after delivery, even if it is to be put into operation at a later date.

Before doing so, examine the shipping container for any extenal damage.

Then remove all the packaging materials.

The shipping container and packaging materials must be kept in the event of complaints about damage.

Check for completeness and carry out a careful visual examination.

If any damage is discovered, report it immediately to the forwarding agent and insurer. If the damaged part has to be replaced, please get in touch with the orders department.

2.3 Installation

CAUTION

As a rule, all ionisation measurement systems must only be operated in connection with a properly **earthed** pump system.

Installation and mounting may only be carried out with the operating unit switched off.

When connecting the vacuum gauges to the vacuum system it must be strictly observed that during operation the gauges are not subjected to mechanical oscillations, impact or vibrations.

The mounting position of the gauge heads has no influence on proper operation. It is not permissible to install a venting valve in the immediate vicinity. The then suddenly occurring air flow may result in mechanical damage to the sensitive cathode.

When installing several gauge heads at **one** common component (T-piece or cross for example) an optical separation is required. The gauge heads may not directly “see” each other. Interactions may cause incorrect measurements.

NOTICE

Humidity at the insulators (2/14) caused by condensing water for example , can give rise to incorrect measurements due to leakage currents.

Connecting the gauge head cable and the extension cable

Do not use force to connect the plug. When plugging in make sure first that all pins are lined up in parallel and are straight. Otherwise the current feedthrough can suffer damage.

DANGER

Live Voltages

If during operation the IM 540 suffers a malfunction then a live voltage may be present at the gauge head cable connection (CH 1, CH 2).

Affix the touch protection component at the IM 540 (BNC plug). The touch protection component is supplied together with the gauge head cable.

2.4 Connecting the Temperature Resistant Gauge Head Cable

CAUTION

Switch the IONIVAC off first before working at the gauge cable. After switching off, wait for at least 15 seconds.

Disassembling the gauge head for connecting the temperature resistant gauge head cable

Remove the plug guide (2/4) by unscrewing the cylinder head screws (2/5 and 2/6) from the gauge head (2/1).

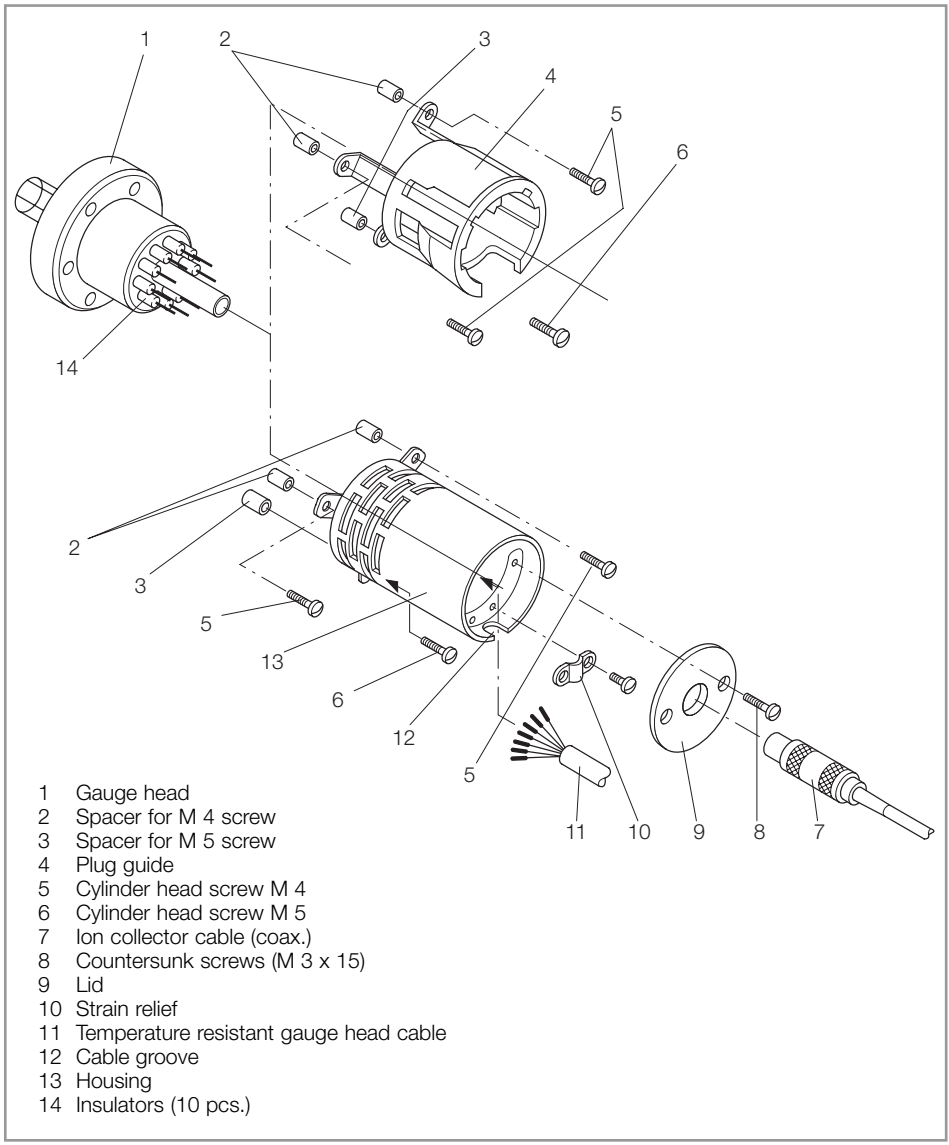
The gauge head IE 514 has been designed in accordance with the VDE regulations with a greater distance between gauge head flange (2/1) and plug guide (2/4).

For this reason three spacers have been fitted between gauge head flange (2/1) and the plug guide (2/4). Positioning of the plug guide is defined through the different bolt diameters on the gauge head (2/1).

Notice: the temperature resistant gauge head cable may also be connected after the gauge head has already been installed.

Connecting the temperature resistant gauge head cable to the flange on the gauge head

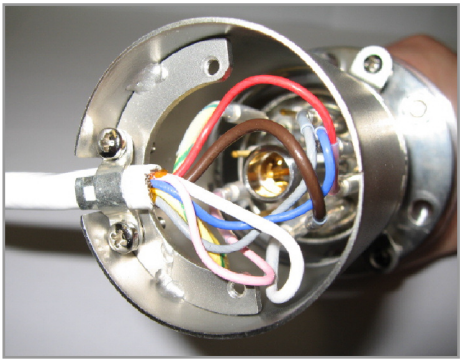
- Via the high-temperature cable pull the housing (2/13) over the connection plugs so that these may thereafter be screwed back onto the gauge head flange (2/1).



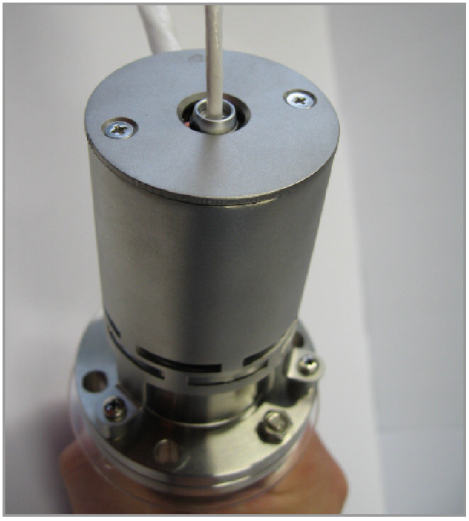
1 Gauge head
2 Spacer for M 4 screw
3 Spacer for M 5 screw
4 Plug guide
5 Cylinder head screw M 4
6 Cylinder head screw M 5
7 Ion collector cable (coax.)
8 Countersunk screws (M 3 x 15)
9 Lid
10 Strain relief
11 Temperature resistant gauge head cable
12 Cable groove
13 Housing
14 Insulators (10 pcs.)

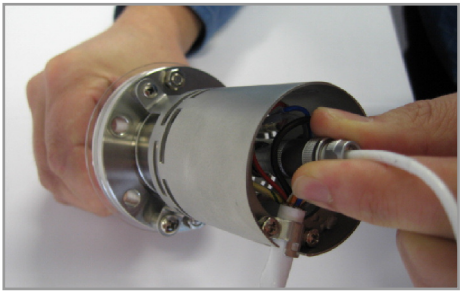
Fig. 2 Connection of the gauge head

Installation



- Connect the temperature resistant gauge head cable to the gauge head as depicted in fig. 3. The individual wires of the gauge head cable are colour-coded.
- Bolt the housing (2/13) onto the gauge head flange (2/1) again with the bolts (2/5 and 2/6) and the 3 spacers. Secure the entire cable with the strain relief (2/10).





- Now the ion collector cable (2/7) can be inserted at the centre of the gauge head.
- Secure the cover (2/9) with the bolts (2/8).

Fitting the gauge head including the temperature resistant gauge head cable

- The gauge head including the temperature resistant gauge head cable can be now inserted into the vacuum chamber and bolted on.

Before connecting, we recommend to pump down the system and if possible run a vacuum test or a direct leak search.

For removing or replacing the gauge head proceed in the reverse order. The plug must be unlocked in the gauge head housing, and for this reason unscrew the cover (2/9) first.

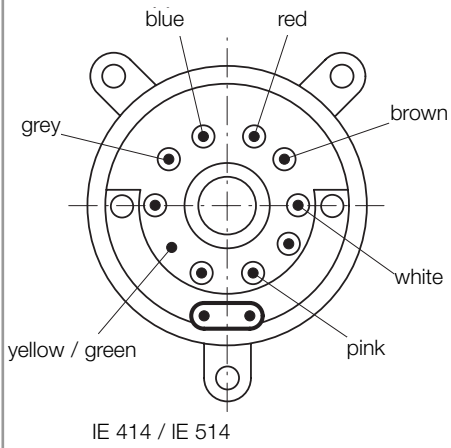
NOTICE

Especially note the pin assignment. Provide the connection with great care. Do not subject the pin contacts to any bending forces! (Risk: damaging of the current feedthrough/leak)

DANGER

Live Voltages

If during operation the IM 540 suffers a malfunction then a live voltage may be present at the gauge head cable connection (CH 1, CH 2).
Affix the touch protection component to the IM 540 (BNC plug). The touch protection component is supplied together with the gauge head cable.



IE 414 / IE 514

Color	IE 514	IE 414
ye / green	LP[2)]	LP[2)]
grey	jumper	–[1)]
blue	reflector	–[1)]
red	anode	anode
brown	cathode	cathode
white	cathode	cathode
pink	jumper	–[1)]

1) Function not available for IE 414 but must be connected

2) LP (longest pin) = protective earth conductor (for facilitating installation)

Abb. 3 View onto the gauge head

3 Operation

Calibration

Each IE 414 / IE 514 gauge head has been individually calibrated in the course of final factory testing. This ensures a high accuracy of the pressure readout.

In order to calibrate making use of the calibration factor given on the sticker in the Operating Instructions, it is required to set the IM 540 operating unit to “CAL”. The calibration process is described in Operating Instructions GA09419 for the IM 540.

Operation

NOTICE

In the presence of halogen gases like fluorine, chlorine, bromine and iodine and their compounds, the yttrium oxide coating will suffer rapid wear. As a result of this, the cathodes will burn out.

Humidity at the insulators (2/14) caused by condensing water for example , can give rise to incorrect measurements due to leakage currents.

NOTICE

4 Maintenance

4.1 Exchanging the Cathode

NOTICE

The cathode is supplied on a plate under a cover. The cathode must only be exchanged in a room which is free of dust. Wearing of clean gloves is mandatory.

Preparation

- Switch off the operating unit.
- Detach the gauge head cable from the gauge head.
- Remove the gauge head from the vacuum system.
- After loosening the hex screws at both terminals remove the faulty cathode.
- Open the transport packaging, remove the replacement cathode in the same way and install it in the place of the old cathode.

The required 0.89 mm screwdriver is included with the replacement cathode.

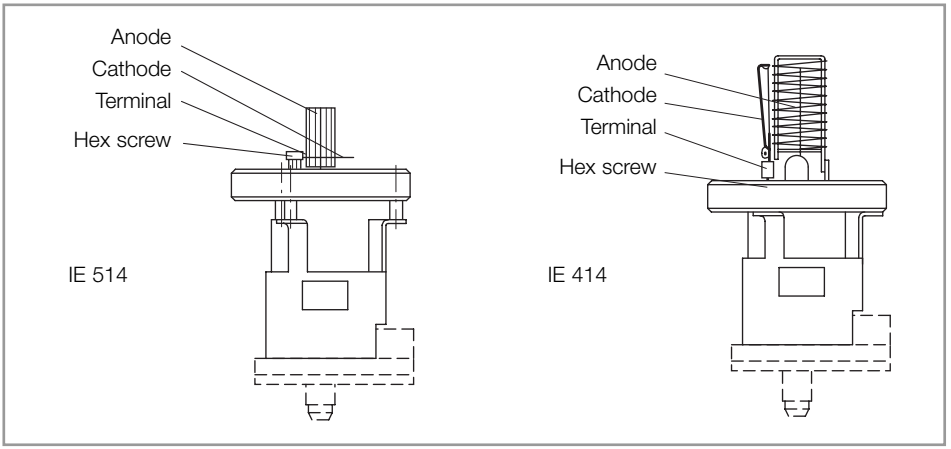


Fig. 4 View onto the gauge head

The cathode should be positioned as parallel as possible with respect to the anode. The initially applicable calibration values do not apply any longer after exchanging the cathode. Deviations up to 15 % may occur.

4.2 Oerlikon Leybold Vacuum Service

Whenever you send us in equipment, indicate whether the equipment is contaminated or is free of substances which could pose a health hazard. If it is contaminated, specify exactly which substances are involved. You must use the form we have prepared for this purpose.

A copy of the form has been reproduced at the end of these Operating Instructions: “Declaration of Contamination for Compressors, Vacuum Pumps and Components”. Another suitable form is available from www.oerlikon.com/leyboldvacuum → Documents → Download Documents.

Attach the form to the equipment or enclose it with the equipment.

This statement detailing the type of contamination is required to satisfy legal requirements and for the protection of our employees.

We must return to the sender any equipment which is not accompanied by a contamination statement.

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CE

EC Declaration of Conformity

The manufacturer: Oerlikon Leybold Vacuum GmbH
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D-50968 Cologne, Germany
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info.vacuum@oerlikon.com

herewith declares that the products specified and listed below which we have placed on the market, comply with the applicable EC Council Directives. This declaration becomes invalid if modifications are made to the product without agreement of Oerlikon Leybold Vacuum GmbH. Compliance with the EMC Directives requires that the components are installed within a system or machine in a manner adapted to EMC requirements.

Product designation: IONIVAC Sensor and bakeable sensor cable

Type designation: IE 414, IE 514

Catalogue No.: 15866, 15867, 15844

The product complies to the following European Council Directive:

- Directive on Low Voltage (2006/95/EC)
- Directive on Electromagnetic Compatibility (2004/108/EC)
- Directive on Restriction of the use of certain Hazardous Substances – RoHS (2011/65/EU)

The following harmonised standard has been applied:

• EN 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements
• EN 61000-6-2	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
• EN 61000-6-4	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments
• EN 61326-1	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements

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Cologne, dated 2013-10-11

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Harald Udelhoven
Head of Quality Management

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Declaration of Contamination of Compressors, Vacuum Pumps and Components

The repair and / or servicing of compressors, vacuum pumps and components will be carried out only if a correctly completed declaration has been submitted. Non-completion will result in delay. The manufacturer can refuse to accept any equipment without a declaration.

A separate declaration has to be completed for each single component.

This declaration may be completed and signed only by authorized and qualified staff.

Customer/Dep./Institute :

Address :

Person to contact:

Phone : Fax:

End user :

Reason for return: ☒ applicable please mark

Repair: ☐ chargeable ☐ warranty

Exchange: ☐ chargeable ☐ warranty

☐ Exchange already arranged / received

Return only: ☐ rent ☐ loan ☐ for credit

Calibration: ☐ DKD ☐ Factory-calibr.

☐ Quality test certificate DIN 55350-18-4.2.1

A. Description of the product:

Material description :

Catalog number:

Serial number:

Type of oil (ForeVacuum-Pumps) :

Failure description:

Additional parts:

Application-Tool:

Application- Process:

B. Condition of the equipment	No[1]	Yes	No
1. Has the equipment been used	☐	☐	→
2. Drained (Product/service fluid)		☐	☐
3. All openings sealed airtight		☐	
4. Purged		☐	☐
If yes, which cleaning agent			
and which method of cleaning			

[1] If answered with "No", go to D. ←

Contamination :	No[1]	Yes
toxic	☐	☐
corrosive	☐	☐
flammable	☐	☐
explosive [2]	☐	☐
radioactive [2]	☐	☐
microbiological [2]	☐	☐
other harmful substances	☐	☐

C. Description of processed substances (Please fill in absolutely)

1. What substances have come into contact with the equipment ?

Trade name and / or chemical term of service fluids and substances processed, properties of the substances

According to safety data sheet (e.g. toxic, inflammable, corrosive, radioactive)

X	Tradename:	Chemical name:
a)		
b)		
c)		
d)		

	No	Yes
2. Are these substances harmful ?	☐	☐ ←
3. Dangerous decomposition products when heated ?	☐	☐

If yes, which ?

[2] **Components contaminated by microbiological, explosive or radioactive products/substances will not be accepted without written evidence of decontamination.**

D. Legally binding declaration

I / we hereby declare that the information supplied on this form is accurate and sufficient to judge any contamination level.

Name of authorized person (block letters) :

Date

signature of authorized person

firm stamp

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