

MAINTENANCE INSTRUCTIONS

EN

Translation of the original instructions

ASM 310

Portable leak detector

Table of contents

1	About this manual	4
1.1	Validity	4
1.1.1	Applicable documents	4
1.2	Conventions	5
1.2.1	Safety instructions	5
1.2.2	Pictographs	6
1.2.3	Instructions/Abbreviations used	6
1.2.4	Labels	6
2	Safety and maintenance information	7
2.1	Safety precautions	7
2.2	Protective equipment	8
2.3	Maintenance preparation	8
2.4	Tools and spare parts	8
3	Maintenance intervals and responsibilities	10
3.1	Maintenance time monitoring	10
4	Calibration	11
4.1	Purpose	11
4.2	Calibration with the internal calibrated leak	11
4.2.1	Internal calibrated leak	11
4.2.2	Procedure	11
4.3	Calibration with an external calibrated leak	12
4.3.1	External calibrated leak	12
4.3.2	Adaptor for external calibrated leaks	12
4.3.3	Calibration procedure with external leak in Hard Vacuum test	13
4.3.4	Calibration procedure with external leak in sniffing test	13
4.4	Calibration on concentration	14
4.4.1	Procedure	14
4.5	Calibration with a pumping system in parallel	14
4.5.1	Purpose	14
4.5.2	Target value	14
4.5.3	Procedure	14
5	Maintenance / replacement	16
5.1	Cleaning	16
5.2	Removing of cover	16
5.2.1	Dismantling the front cover	16
5.3	Disassembly of the electronic support	16
5.4	Maintenance of the internal calibrated leak	17
5.4.1	Replacement	17
5.4.2	Recalibration	18
5.4.3	Setting	18
5.5	Analyzer cell maintenance	18
5.5.1	Dismantling	19
5.5.2	Seals replacement	19
5.5.3	Filament replacement	20
5.6	Pirani gauge maintenance	21
5.7	Maintenance fans	23
5.8	Purge filter maintenance	24
5.8.1	Localization	24
6	Decommissioning	25
6.1	Shutting down for longer periods	25
6.2	Disposal	25
6.2.1	Restriction of Hazardous Substances (R.O.H.S.)	25
6.2.2	Electric and electronic equipments (EEE)	25
7	Malfunctions	27
7.1	What happens in the event of a defect	27
7.1.1	Warning fault display	27

7.1.2	Warning / fault window	27
7.1.3	List of warnings / faults	27
7.2	Troubleshooting guide	29
7.2.1	Installation of the application	29
7.2.2	Consultation of the application	29
8	Service	31
9	Spare parts	32
9.1	Ordering information	32

1 About this manual

1.1 Validity

This maintenance manual is intended for the customers of the Pfeiffer Vacuum Company. It describes the product maintenance operations which can be performed by the user on the product concerned. **This documentation must be used with the operating manual of the product of the same name.**

The current maintenance manuals are also available on the Internet at www.pfeiffer-vacuum.com.

This manual covers products with the following part numbers:

Part number	Description
BSAA0000MM9A	ASM 310

1.1.1 Applicable documents

The document to be used in reference to this maintenance manual is:

ASM 310	Operating instructions
ASM 310 Leak Detector	P/n 114916

*also available at www.pfeiffer-vacuum.com

1.2 Conventions

1.2.1 Safety instructions

Operating manual safety instructions Pfeiffer Vacuum are based on the UL, CSA, ANSI Z-535, SEMI S2, ISO 3864 and DIN 4844 certification standards. This document describes the following information and danger levels:

DANGER
Imminent danger Indicates an imminent hazardous situation that will result in death or serious injury.
WARNING
Possibly imminent danger Indicates an imminent hazardous situation that can result in death or serious injury.
CAUTION
Possibly imminent danger Indicates an imminent hazardous situation that can result in minor or moderate injury.
NOTICE
Command or note Command to perform an action or information about properties, the disregarding of which may result in damage to the product.

1.2.2 Pictographs



Prohibition of an action to avoid any risk of accidents, the disregarding of which may result in serious accidents



Warning of a displayed source of danger in connection with operation of the unit or equipment



Command to perform an action or task associated with a source of danger, the disregarding of which may result in serious accidents



Important information about the product or this document

1.2.3 Instructions/Abbreviations used

⇒ or →	Work instruction: you must perform an operation here.
[XXXX]	You must press the XXXX key on the control panel.
I/O	Inputs/Outputs
⁴ He	Helium 4
³ He	Helium 3
H ₂	Hydrogen

1.2.4 Labels



Indicates an electrical shock hazard in case of contact:
⇒ disconnect the electrical power supply before removing the cover and working on the product.



Indicates that the operator must:
⇒ handle the product using the devices shown on this label,
⇒ comply with the rules for moving the equipment, taking weight and dimensions into account.



Locate a grounding point on the product.



Product subject to the treatment of waste electronic and electrical equipment in accordance with directive 2002/95/EC.

Other labels: see Operating Instructions.

2 Safety and maintenance information

2.1 Safety precautions



Duty to inform

Every person who is involved in maintenance and servicing work on the pump must read and follow the safety-relevant parts of all associated documents.



NOTICE

Exclusion of liability

Pfeiffer Vacuum accepts no responsibility concerning equipment damage, disrupted service or physical injury resulting from maintenance carried out by technicians who have not been trained in safety rules (EMC, electrical hazards, chemical pollution). Liability and warranty claims shall be inadmissible in this case.



WARNING

Risk of electric shock

Voltage and current can cause electric shock. Only skilled, authorized people may carry out maintenance work.

- Isolate and lock the power supply circuit by positioning the circuit breaker on **O**.
- Disconnect the power cable from all power sources before doing any work on the product and/or removing the covers.



WARNING

Other localized hazardous energies

Electrical circuit and other pressurized circuits as nitrogen are potential hazards:

- Always lock out these energy sources before working on the product.



NOTICE

Work/Handling the detector

The operator must not work on the product to move it or carry out maintenance until it has come to a complete shutdown! When the circuit breaker is set at **O**, you must:

- Unplug the power cable.
- Wait for the control panel screen to turn off completely before working on the product and/or removing the covers.

WARNING

Risk linked to installation tightness

The products are factory tested to ensure they will not leak in normal operating conditions.

- Perform a tightness test after all maintenance operations.

- Wait 5 minutes after switch-off before working on the product.
- When you order spare parts, you must mention everything featured on the product nameplate.
- Comply with all safety and risk prevention instructions in accordance with local safety standards.
- Regularly check compliance with all precautionary measures.
- Do not switch on the product if the covers are not in place.
- To return the product to one of our Pfeiffer Vacuum service centers, read the after-sales Service procedure and complete the declaration of contamination available on our website.

- Use the original packaging to return the product to a Pfeiffer Vacuum service center: the manufacturer shall not be held liable for any damage resulting from transport in unsuitable packaging.

2.2 Protective equipment

In some situations, personal protective equipment must be worn when handling the detector and its components. Customers must provide operators with the necessary equipment. This equipment must be checked regularly and used in accordance with the supplier's recommendations.



WARNING

Risk of injury due to falling objects

When transporting parts/components and during maintenance there is a danger of loads slipping and falling down.

- Carry small and medium-size parts/components with both hands.
- Carry parts/components > 20 kg with a suitable lifting device.
- Wear safety shoes with a steel toe in accordance with directive EN 347.



WARNING

Risk of injury through hot surfaces

The products are designed so as not to present a thermal risk for the operator's safety. However, specific operating conditions may exist that require extra caution from users due to the high temperatures (surfaces > 70 °C for parts inside the covers).

- Leave the part to cool before working on the product.
- If necessary wear protective gloves according to directive EN 420.

2.3 Maintenance preparation



NOTICE

Work/Handling the detector

The operator must not work on the product to move it or carry out maintenance until it has come to a complete shutdown! When the circuit breaker is set at **O**, you must:

- Unplug the power cable.
- Wait for the control panel screen to turn off completely before working on the product and/or removing the covers.
- Disconnect the detector from the part/installation to be tested: install the blanked-off flange on the detector's inlet (accessory supplied with the product or available upon request (see **Accessories** chapter of the *Operating instructions*)).
- Handle the detector so it can be moved in the maintenance area (see **Handling** chapter of the *Operating instructions*).
 - clean, dust-free and ventilated room,
 - appropriate protective equipment.

2.4 Tools and spare parts

The tools necessary for the maintenance of the detector are available in the maintenance kit supplied with the product. Depending on the maintenance operation, other tools may be needed, at the customer's expense.



Spare parts

Replacing defective components with parts that are not genuine jeopardizes the product's initial safety conditions.

- ➔ Use only spare parts available for order from Pfeiffer Vacuum Service.
- ➔ Parts numbers are available in the **Spare Parts** chapter.
- ➔ To identify the product and communicate with Pfeiffer Vacuum look at the product's nameplate.

3 Maintenance intervals and responsibilities

Maintenance operations for levels 1 and 2 of the interval table are described in this manual.

Level 3 overhaul operations require a technician from the Pfeiffer Vacuum Service network.

Component Operation	Number of hours in use				Level ⁽³⁾	Site ⁽⁴⁾
	Routine maintenance ⁽²⁾	8,600	17,200	Others		
AMD1 diaphragm pump						
Replacement of the diaphragms and controlling the valves			x		III	OS
Replacement of the AMD1 diaphragm pump				In case of failure	III	OS
AMH 020 pump						
Bearings replacement			x	Every 2 years if the pump is not used	III	WS
Pump replacement				In case of failure	III	OS
Analyzer cell						
Filament replacement				In case of failure	I	OS
Replacement of the extraction electrode				In case of failure	III	OS
Valves						
Replacement of all the valves				Every 500,000 tests	III	OS
Electronic						
Cleaning / Dusting	x				I	OS
Fan						
Fan replacement				In case of failure	II	OS
Purge filter						
Cleaning or replacement of the purge filter	x				II	OS
Pirani gauge						
Value	x			Every 4,300 hours (recommended)	I	OS
Replacement				In case of failure	II	OS
Standard Sniffer Probe						
Sintered filter replacement	x			(1)	I	OS
Calibrated leak						
Recalibration				Every 2 years	II	WS
Leak detector						
Service	x			Every 4 years (recommended)	III	OS/WS

(1) 160 h in case of severe application (with significant flow or contamination)

(3) Level:

I = Operator

II = Technical or trained operator

III = Service centre

(2) Routine maintenance: according to usage conditions

(4) Site:

OS = On site

WS = In Pfeiffer Vacuum service centre Pfeiffer Vacuum.

3.1 Maintenance time monitoring

The cycle counters on the primary pump and the turbomolecular pump alert the operator that a maintenance operation must be performed (see **Maintenance Menu of the Operating Instructions**).

4 Calibration

4.1 Purpose

Calibration helps ensure that the leak detector is correctly adjusted to detect the tracer gas selected and display the correct leak rate. A calibrated leak is used to calibrate the leak detector.

Depending on the test method, different types of calibration can be performed.

	Test method	
	Hard Vacuum	Sniffing
With the internal calibrated leak	yes	yes (*)
With an external calibrated leak	yes	yes
With the ambient air (ambient air not contaminated by the tracer gas)	no	yes

(*) in this case, the flow of the sniffer probe is not included in the leak detector calibration process.

4.2 Calibration with the internal calibrated leak

4.2.1 Internal calibrated leak

The internal calibrated leak is specifically designed for the leak detector. It is composed of:

- a Helium 4 reservoir (no internal calibration with the other tracer gases),
- a temperature sensor (to take into account the effect of temperature on the leak rate),
- an integrated diaphragm (to calibrate the leak rate),
- an identification label (identical to the identification label of an external calibrated leak).

The calibrated leak is supplied with a calibration certificate.

Use a calibrated leak in the range $\approx 10^{-8}$ Pa.m³/s ($\approx 10^{-7}$ mbar.l/s).

4.2.2 Procedure

When switching the leak detector on, calibration with the internal calibrated leak is automatically initiated if the calibration parameter is set on 'Start-up' and if the type of calibrated leak is set on 'Internal'.

The calibration can be launched when the detector is :

- in test mode for leak test
- in test or in Stand-by mode for sniffing test.

→ Check the leak settings (corrected leak rate to take temperature and time into account if necessary) (see **Spectro Menu of the Operating Instructions**).

→ Press **[Auto cal]** key to launch a calibration.

In the case of intensive use of the detector, a spare internal calibrated leak is recommended. If this is not possible, the detector can still be used and calibrated using an external calibrated leak.



NOTICE

Detector calibration

When switched on, the detector suggests that the operator carry out an auto-calibration (if calibration parameter = 'operator'). For the optimal use of the detector, **this auto-calibration must be performed**. In all situations, a manual or automatic calibration must be performed:

- at least once a day
- to optimise the measurement reliability for high sensitivity tests
- if it is uncertain whether the detector is working properly
- during intense and continuous operation: start an internal calibration at the beginning of each work session (e.g. work in teams, every 8 hours).

4.3 Calibration with an external calibrated leak

4.3.1 External calibrated leak

The operator must use a calibrated leak containing the tracer gas selected (⁴He, ³He or H₂). There are several types of external calibrated leaks, with or without reservoir, with or without valve, covering several leak ranges. Use calibrated leaks from the ranges indicated below.

Gas	Minimum Value	Maximum Value
⁴ He	≈ 1.10 ⁻⁹ mbar·l/s ≈ 1.10 ⁻¹⁰ Pa·m ³ /s	1·10 ⁻⁴ mbar·l/s 1·10 ⁻⁵ Pa·m ³ /s
³ He	≈ 3·10 ⁻⁷ mbar·l/s ≈ 3·10 ⁻⁸ Pa·m ³ /s	1·10 ⁻⁴ mbar·l/s 1·10 ⁻⁵ Pa·m ³ /s
H ₂	≈ 5·10 ⁻⁶ mbar·l/s ≈ 5·10 ⁻⁷ Pa·m ³ /s	1·10 ⁻⁴ mbar·l/s 1·10 ⁻⁵ Pa·m ³ /s



The choice of external calibrated leak depends on the needs of the application: use a calibrated leak from the same leak rate range as the leak to be measured.

The manufacturer does not provide calibrated leaks in ³He and H₂.

4.3.2 Adaptor for external calibrated leaks

A DN 16 ISO-KF or DN 25 ISO-KF adaptor helps calibrate the detector with an external calibrated leak in sniffing test mode (with Standard probe only).

Adaptor part numbers (see 9).

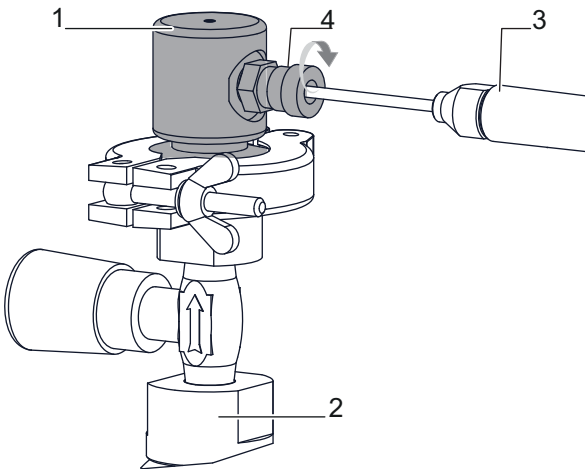


Fig. 1: Adaptor installation

➔ Attach the adaptor (1) to the external calibrated leak (2) used for the calibration with centering ring and a clamp.

- Start a calibration: press the **[Auto cal]** function key.
- Fit the sniffer probe (3) in the calibration opening.
- Tighten the fixing screw (4). Follow the calibration process indicated on the control panel.
- Loosen the fixing screw (4).
- Remove the sniffer probe from the calibration opening.
- Continue the calibration process indicated on the control panel.
- Wait 10 s (at least) before reading the leak rate.

Notes

- The displayed leak rate takes ^4He into account (if ^4He used as tracer gas).

Example:

- calibration with a leak of $2 \cdot 10^{-6} \text{ Pa} \cdot \text{m}^3/\text{s}$ ($2 \cdot 10^{-5} \text{ mbar} \cdot \text{l/s}$)
- the displayed leak rate is: $2 \cdot 10^{-6} + 5 \cdot 10^{-7} = 2.5 \cdot 10^{-6} \text{ Pa} \cdot \text{m}^3/\text{s}$ ($2 \cdot 10^{-5} + 5 \cdot 10^{-6} = 2.5 \cdot 10^{-5} \text{ mbar} \cdot \text{l/s}$)

4.3.3 Calibration procedure with external leak in Hard Vacuum test

- Allocate a function key to **[Auto.Cal]** (see **Configuration Menu** in the *Operating Instructions*).
- Configure the following settings:
 - test method = hard Vacuum (see **Test Menu**)
 - type of calibrated leak = external (see **Spectro Menu**)
 - calibration = operator (see **Advanced Menu**)
- Check the settings and value of the external calibrated leak used (see **Spectro Menu**). Correct the temperature, month and year if necessary.
- Select the tracer gas of the external calibrated leak (see **Spectro Menu**).
- Place the external calibrated leak on the detector inlet port.
- Verify that the detector is on Stand-by mode.
- Press the **[Auto.Cal]** function key to start the calibration.
- Follow the instructions provided by the leak detector: press **[Next]** to move to the next stage.

At the end of the calibration, the detector returns to Stand-by mode.



Recommended procedure when the measuring range differs from the value of the internal calibrated leak.

4.3.4 Calibration procedure with external leak in sniffing test

- Allocate a function key to **[Auto.Cal]** (see **Configuration Menu** in the *Operating Instructions*).
- Configure the following settings:
 - test method = sniffing (see **Test Menu**)
 - type of calibrated leak = external (see **Spectro Menu**)
 - calibration = operator (see **Advanced Menu**)
- Check the settings and value of the external calibrated leak used (see **Spectro Menu**). Correct the temperature, month and year if necessary.
- Select the tracer gas of the external calibrated leak (see **Spectro Menu**).
- Select the tracer gas of the concentration (see **Spectro Menu**).
- Verify that the detector is on Stand-by mode.
- Press the **[Auto.Cal]** function key to start the calibration.
- Follow the instructions provided by the leak detector: press **[Next]** to move to the next stage.

At the end of the calibration, the detector returns to Stand-by mode.

4.4 Calibration on concentration

Concentration = container at atmospheric pressure with a gas mixture of a known tracer gas concentration.



NOTICE

Before launching this function, make sure that the leak detector is in an environment free of tracer gas pollution.

4.4.1 Procedure

The calibration on concentration can be made only in sniffing test, detector in Stand-by or in test.

- Allocate a function key to **[Auto.Cal]** (see **Configuration Menu** in the *Operating Instructions*).
- Configure the following settings:
 - test method = sniffing (see **Test Menu**)
 - type of calibrated leak = concentration (see **Spectro Menu**)
 - calibration = operator (see **Advanced Menu**)
- Select the tracer gas of the concentration (see **Spectro Menu**).

The detector can be in Stand-by or in sniffing test.

- Press the **[Auto.Cal]** function key to start the calibration.
- Follow the instructions provided by the leak detector: press **[Next]** to move to the next stage.

At the end of the calibration, the detector returns to Stand-by mode.

4.5 Calibration with a pumping system in parallel

4.5.1 Purpose

When the leak detector is connected to an installation equipped with its own pumping system, only part of the leak will be measured by the leak detector. Calibration gives a direct reading of the leak rate by taking into account the loss of tracer gas of the leak pumped by the pumping unit.

Calibration is performed via the Correction function.

4.5.2 Target value

2 possible target values:

Target value =	Hard Vacuum	Sniffing
External calibrated leak value ⁽¹⁾	X	X
Known tracer gas concentration		X


(1) When an external calibrated leak is used, it is recommended to take into account the calibration date and temperature effect for calculating the target value from the calibrated leak value featured on its identification label.

- Corrected leak rate = target value = measured leak value x correction factor.

4.5.3 Procedure

Correction must be performed when the leak detector is already calibrated with its internal calibrated leak.

Note The correction must be made using the same test method as that used by the operator. If the operator works using both test methods (hard vacuum and sniffing), operator must make a correction for each method.

- ➔ Allocate a **[Correction]** function key (see **Configuration Menu** in the *Operating Manual*).
- ➔ Select the 'hard vacuum' or 'sniffing' test mode.
 - If 'Sniffing test', connect the sniffer probe to the detector: connect it to an external calibrated leak or place it in a container with a known concentration.
- ➔ Press  to start a test.
- ➔ Press the **[Correction]** function key.
 - if the value of the correction factor to be applied is known:
 - Press **[Value]** and configure the correction factor to be applied. The correction factor is the coefficient to be applied to the measured leak rate.
 - Press **[Return]** to exit the function.
 - if the value of the target leak rate is known (value of the external calibrated leak or concentration):
 - Press **[AutoCal] [Target]** and configure the target leak rate.
 - Press **[Start]** to make the correction.
 - Press **[Return]** to exit the function.
- ➔ Press **[RAZ]** to reset the correction factor to 1.

The '**COR**' indicator light (see **Standard screen** of the *Operating Manual*, Rep 9) is illuminated on the control panel as soon as the value of the correction factor is not 1.

The digital display takes into account the correction factor applied.

The bargraph display does not take into account the correction factor applied.

5 Maintenance / replacement

In the case of intensive use of the detector, a spare internal calibrated leak is recommended. If this is not possible, the detector can still be used and calibrated using an external calibrated leak (see 4.2).

5.1 Cleaning

→ Clean the cover(s) with a soft, lint-free cloth and a product that will not damage the painted surfaces or the labels.

5.2 Removing of cover

Tools • 5 mm Allen key supplied in the maintenance kit

5.2.1 Dismantling the front cover


- Shut down the detector (Position the circuit breaker  on **O**, control panel switched off and mains power cable disconnected).
- Remove the clamp on the inlet port, and the black stopgap.
- Remove the black flange (1) around the inlet port.
- Remove the 4 fixing screws (2) and their washers.
- Remove the top cover. **Take care with the control panel cable.**
- Disconnect the control panel cable (3) from the supervisor board.



Fig. 2: Removing of cover

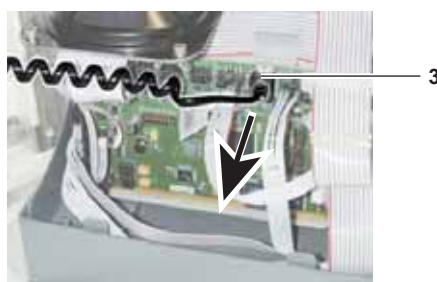

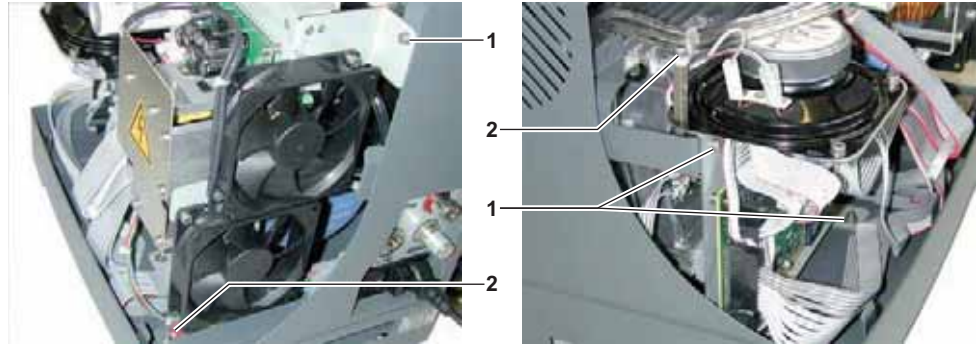


Fig. 3: Disconnection of the control panel cable

5.3 Disassembly of the electronic support

Tools • 5 mm Allen key supplied in the maintenance kit

- Procedure**
- Shut down the detector (Position the circuit breaker  on **O**, control panel switched off and mains power cable disconnected).
 - Remove the 3 fixing screws (1) from the electronic support.
 - Remove the 2 fixing screws (2) from the ground wire and the AMD1 port.



- Remove the whole electronic support.
- Lie it on the table.



5.4 Maintenance of the internal calibrated leak

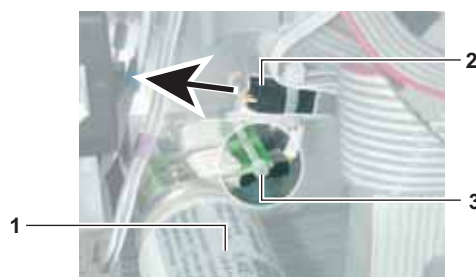
5.4.1 Replacement

- Tools/Spare parts**
- Internal calibrated leak (see 9)

NOTICE

Change the internal calibrated leak if it has significant impact marks.

- Procedure**
- Remove the front cover (see 5.2.1).
 - Disconnect the temperature sensor (3) from the calibrated leak. **Never separate the temperature sensor from the calibrated leak.**
 - Tighten the clips (4) of the calibrated leak (1) between fingers and free the leak.
 - Replace the leak (1).
 - Connect the temperature sensor (3).
 - Update the settings of the internal calibrated leak (see **Spectro Menu of the Operating Instructions**).



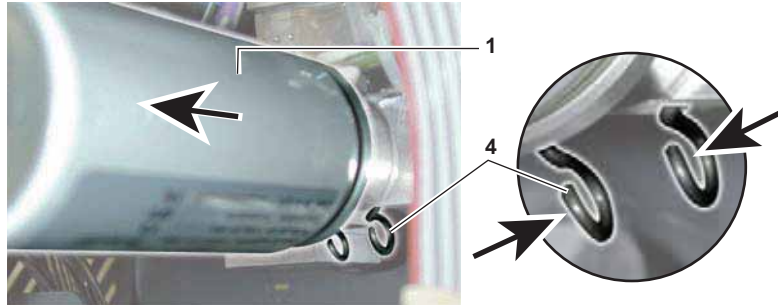


Fig. 4: Removing the leak

5.4.2 Recalibration

Most calibrated leaks can be used for many years (≈ 6 years) even though the tracer gas is permanently escaping (the leak rate is very low compared with the amount of tracer gas contained in the reservoir: annual loss is indicated on the calibrated leak identification label).

However, to guarantee the reliability of the test, we recommend that you regularly recalibrate (2 years maximum) every leak with reservoir to check its leak rate: this applies to both internal and external calibrated leaks.

Return the leak to your Pfeiffer Vacuum service center for recalibration purposes.

5.4.3 Setting

→ The setting of the calibrated leak must be updated every time a calibrated leak (internal or external) is replaced or after a recalibration (see **Spectro Menu in the Operating Instructions**).

This operation can be carried out with the information featured on the calibrated leak identification label or the certificate supplied with the calibrated leak.

- If type = 'internal' is set for the calibrated leak, the internal calibrated leak parameters are displayed in the menu.
- If type = 'external' is set for the calibrated leak, the external calibrated leak parameters are displayed in the menu.

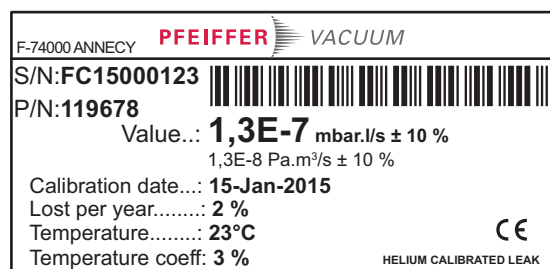


Fig. 5: Example of identification label

5.5 Analyzer cell maintenance



NOTICE

Cleanliness guarantee

During vacuum component maintenance operations, avoid any contamination which could subsequently result in the degassing of the parts. To avoid this:

- perform the maintenance in an appropriate area (clear, dust-free and ventilated)
- use non-woven materials
- dust the parts with filtered dry air
- wear unpowdered vinyl gloves (clean room gloves)

5.5.1 Dismantling

- Tools**
- Torx screwdriver® supplied in the maintenance kit


Procedure



WARNING

Risk of burning associated with hot surfaces

When in operation, certain mechanical parts can reach high temperatures. If the detector was used recently:

- Let it cool down for at least 15 minutes before working on the analyzer cell.
- When relevant, use protective gloves in accordance with the EN 420 standard.
- Shut down the detector (Position the circuit breaker  on **O**, control panel switched off and mains power cable disconnected).
- Remove the front cover (see 5.2.1).
- Disconnect the harness connector (1) from the cell.
- Loosen the 6 fixing screws (2) of the cell and their washers.
- Free the analyzer cell manually and vertically

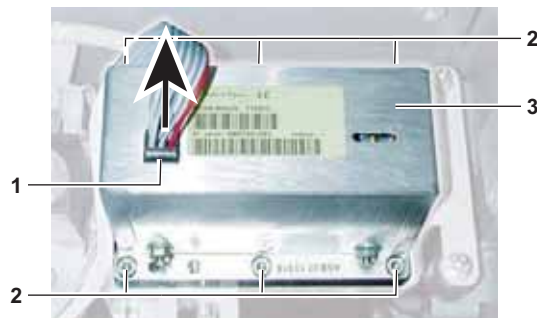


Fig. 6: Analyzer cell dismantling

5.5.2 Seals replacement

Check the condition of the seals every time you work on the analyzer cell (filament replacement for example): change them if necessary.

- Spare parts**
- 2 seals (see 9)

Seal is consumables. As such, it is not covered by the warranty.

Procedure

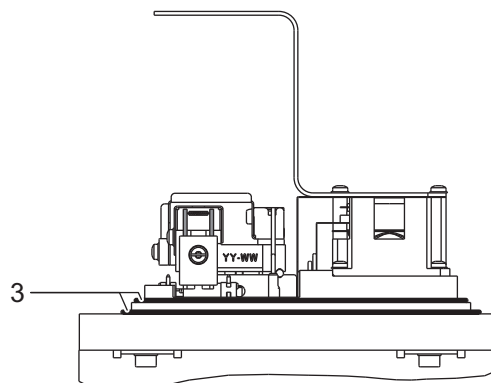


Fig. 7: Replacement of the seals

- Remove the analyzer cell from the detector (see 5.5.1).
- Replace the 2 seals (3). **Never lubricate the seals.**

5.5.3 Filament replacement

Tools/ Consumables

- Torx screwdriver® supplied in the maintenance kit
- Flat pliers
- Filament (see 9)

Filament is consumables. As such, it is not covered by the warranty.

Procedure



The oxidation of the iridium filament is normal: do not touch the filament with your fingers.

- Remove the analyzer cell from the detector (see 5.5.1).
- Remove the fixing screw (4) and the washer of the defective filament.
- Remove the 2 fastening clips (5) using flat pliers (2 new clips are supplied with the spare filament).
- Replace the filament.
- Reset the counter of the new filament (see **Maintenance Menu** in the Operating instructions).

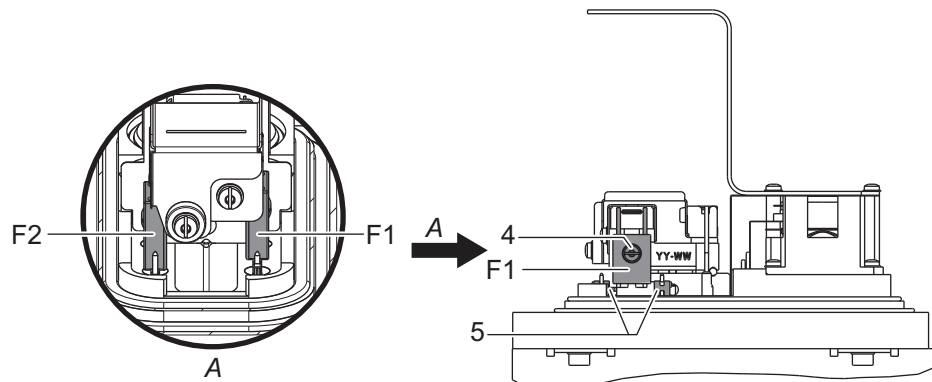


Fig. 8: Dismantling the filament

F1	Filament 1 in the menu
F2	Filament 2 in the menu

- Make sure that the filament connectors (6) are perpendicular to the supporting surface and parallel to each other.

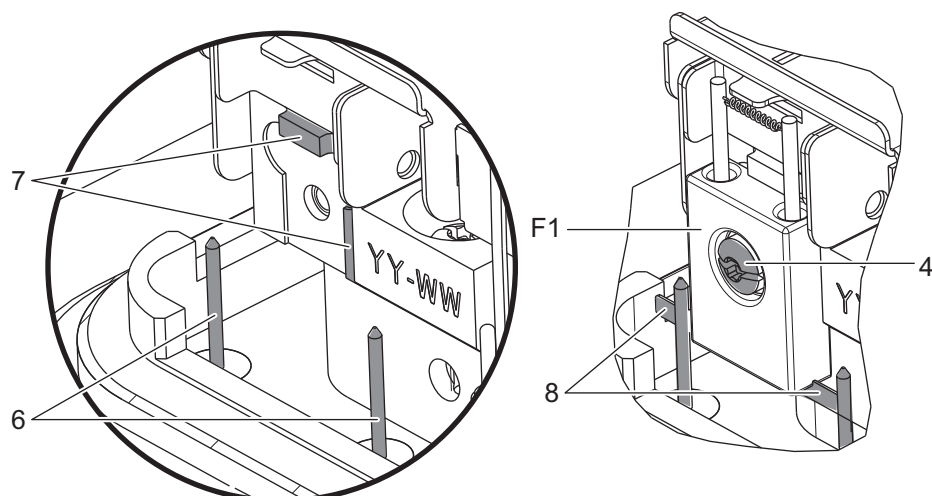


Fig. 9: Positioning the filament

- Fit the new filament in its housing against the 2 centring stops (7). Attach it with the screw (4) and washer supplied with the filament, using the Torx® screwdriver.

- ➔ Take a fastening clip (5) with the flat pliers: this clip will ensure electrical contact between the filament and the cell (see figure: Fitting the fastening clip, index A).
- ➔ Fit the clip on the connector (6) and the strip of the filament (8) (see figure: Fitting the fastening clip, index B).
- ➔ Push in the clip (5) with the pliers until it stops (see figure: Fitting the fastening clip, index C).
- ➔ Repeat the last 3 operations for the second connector.
- ➔ Reset the counter of the new filament (see **Maintenance Menu** in the *Operating instructions*).

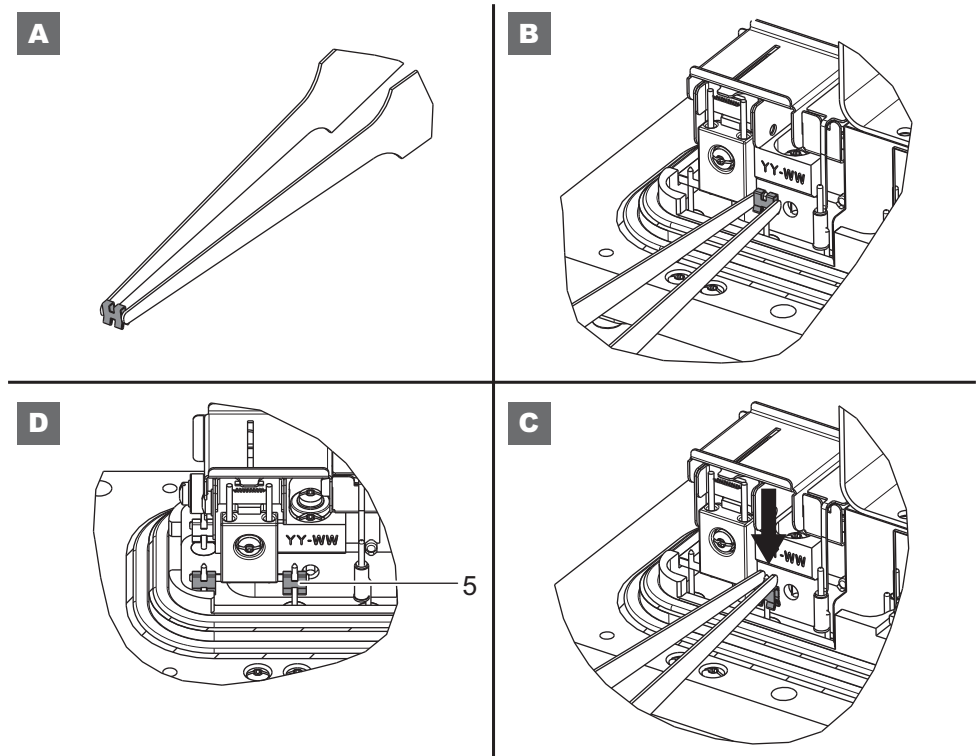


Fig. 10: Fitting of the fastening clip

5.6 Pirani gauge maintenance

Tools/Spare parts

- CHc M4 x 80 screw supplied in the maintenance kit
- 5mm Allen key supplied in the maintenance kit
- Gauge (see 9)

Procedure

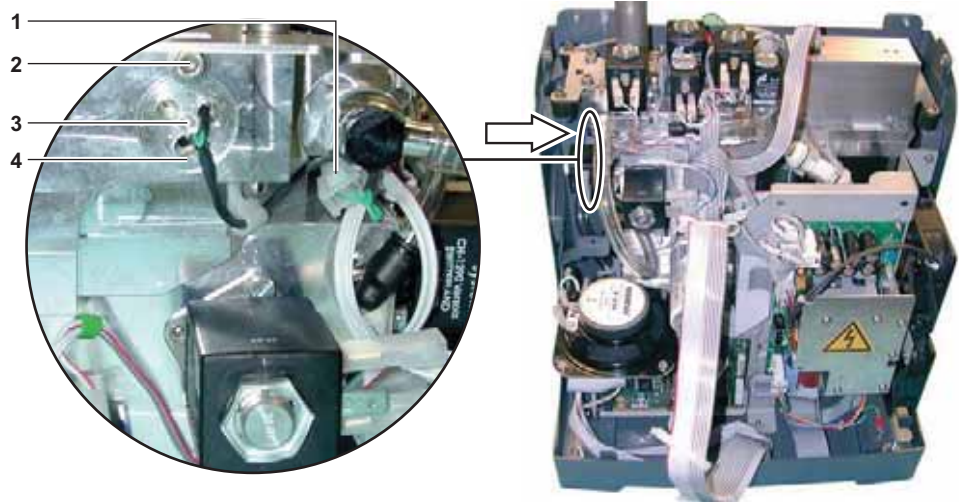


Fig. 11: Gauge maintenance

- Shut down the detector (Position the circuit breaker **MS** on **O**, control panel switched off and mains power cable disconnected).
- Remove the front cover (see 5.2.1).
- Disconnect the wiring harness (3) from the gauge.
- Loosen the retainer screw (2).
- Tighten the CHc screw (3) in the centre of the gauge.
- Pull on the CHc screw (3) to free the gauge.
- Position the new gauge (4).
- Tighten the retainer screw (2).
- Connect the gauge wiring harness (3).
- Set the gauge: see chapter **Calibration of the internal Pirani gauge** of the Operating Instructions.

5.7 Maintenance fans

- Tools/Spare parts**
- Philips screwdriver
 - Fans (see 9)

Procedure

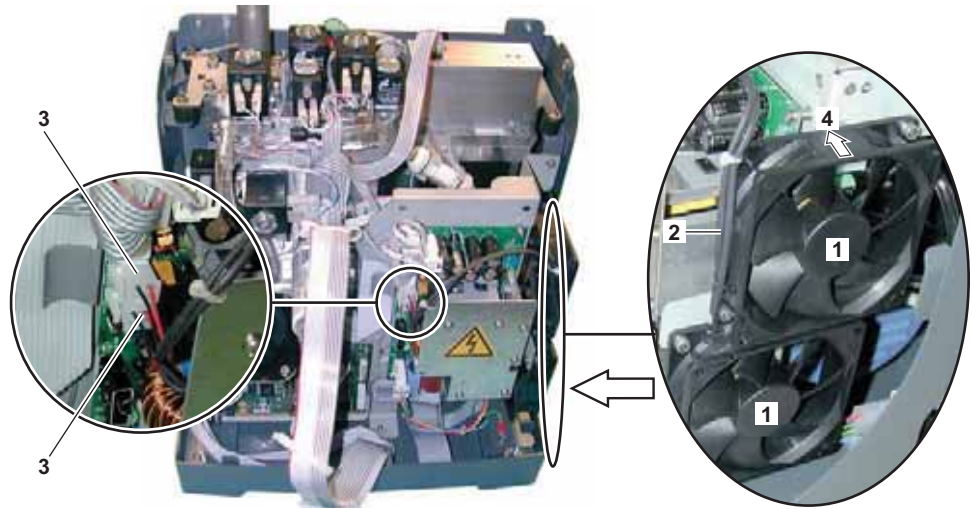



Fig. 12: Fan maintenance

- Shut down the detector (Position the circuit breaker  on **O**, control panel switched off and mains power cable disconnected).
- Remove the front cover (see 5.2.1).
- To change the lower fan, the electronic support must be removed (see 5.3).
- Disconnect the harness (3) of the fan (1).
- Remove the 2 fixing screws from the fan (1).
- Remove the fan.
- Position the new fan: ensure that the fan is properly oriented (4) as shown in the image.
- Screw in the 2 fixing screws of the fan.
- Remove the wires (2) as shown in the image.
- Connect the fan harness (3).

5.8 Purge filter maintenance

5.8.1 Localization

Tools/Spare parts

- Purge filter (see 9)

Procedure

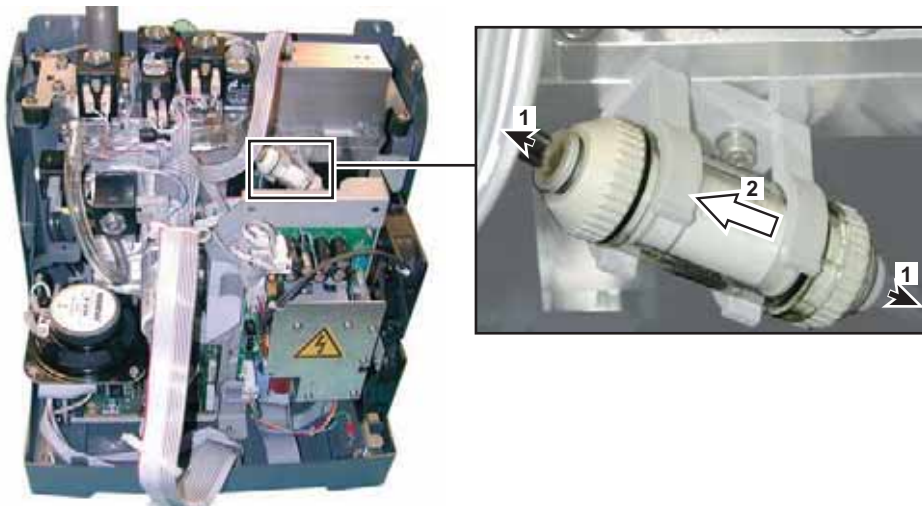


Fig. 13: Purge filter maintenance

- Shut down the detector (Position the circuit breaker **MS** on **O**, control panel switched off and mains power cable disconnected).
- Remove the front cover (see 5.2.1).
- Disconnect the filter (1) and remove it.
- Position the new one, ensuring it is properly oriented (2).
- Reconnect the filter.

6 Decommissioning

6.1 Shutting down for longer periods

If the detector must be shut down for an extended period of time, after use it is recommended that you:

- apply the prolonged downtime procedure described in the **Prolonged storage** chapter of the *Operating Instructions*.
- keep the detector in its original packaging or under its protective cover in a dust-free environment.
- for the start-up procedure, see **Operation** of the *Operating Instructions*. If a problem occurs, contact your Pfeiffer Vacuum service center.

6.2 Disposal



WARNING

Environmental protection

The product or its components must be disposed of in accordance with the applicable regulations relating to environmental protection and human health, with a view to reducing natural resource waste and preventing pollution.

Directive 2011/65/EC establishes the regulations on the restriction of the use of hazardous substances in electrical and electronic equipment (EEE) to contribute to the protection of human health and the environment, including the environmentally sound recovery and disposal of EEE waste.

The manufacturer shall ensure that the EEE placed on the market (including cables and spare parts intended for repair, reuse, updating or capacity enhancement) that contain hazardous substances are subject to restriction within the authorised limits.

Our products contain different materials which must be recycled: iron, steel, stainless steel, cast iron, brass, aluminium, nickel, copper, PTFE, FEP.

Special precautions must be taken for components in contact with the products resulting from potentially contaminated processes.

Before you return a product, please familiarise yourself with the after-sales service procedure, and complete the declaration of contamination available on our website.

For any question, contact the Support Customer service: support.service@pfeiffer-vacuum.fr.

6.2.1 Restriction of Hazardous Substances (R.O.H.S.)

Directive 2011/65/EC establishes the regulations on the restriction of the use of hazardous substances in electrical and electronic equipment (EEE) to contribute to the protection of human health and the environment, including the environmentally sound recovery and disposal of EEE waste.

The manufacturer shall ensure that the EEE placed on the market (including cables and spare parts intended for repair, reuse, updating or capacity enhancement) that contain hazardous substances are subject to restriction within the authorised limits.

6.2.2 Electric and electronic equipments (EEE)

Decontamination and recycling of Electrical and Electronic Equipment (EEE) containing polluting materials (electronic cards, battery cells, batteries, screens, capacitors, mercury, etc.) enables the preservation of natural resources, particularly strategic raw materials.



This product carries the identification logo, as it is subject to regulations regarding the management of waste from EEE.

The manufacturer's obligation to recover EEE applies only to "Adixen" or "Pfeiffer Vacuum" branded products sold by Pfeiffer Vacuum:

- EEE is subject to the regulations in force as regards the recycling of end-of-life products
- complete EEE that has been neither modified nor retrofitted, and has used only spare parts from Pfeiffer Vacuum, including their assemblies and sub-assemblies, but excluding the batteries.

Product sold outside French territory

In the absence of any specific contract, and according to the Directive 2012/19/UE concerning the waste treatment stemming from EEE, in the case of a sale by Pfeiffer Vacuum outside France (European Union and third country) of EEE subject to applicable regulations, the owner of EEE will undertake full responsibility of organizing and financing the pickup and treatment of waste of EEE sold by Pfeiffer Vacuum.

The owner will undertake full responsibility namely the collection (gathering, sorting and storage of wastes for the purpose of transportation to a processing installation), recycling, recovery and/or disposal, except in the case of contrary overriding legislative provisions in the country where the owner is located, which must be brought to the attention of Pfeiffer Vacuum by the owner.

7 Malfunctions

7.1 What happens in the event of a defect

The leak detector can display warnings or faults on screen at any time

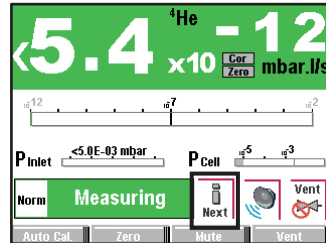


Fig. 14: Standard screen with warning [i Next]

7.1.1 Warning fault display

Press the key to display the fault.

1	Level 1: Warning Press the [i Next] key to display the maintenance information		
2	Level 2: Major fault: erroneous measurement Press the [i Next] or [!] key to display the fault.		
3	Level 3: Critical fault: test impossible Press the [i Next] or [!] key to display the fault.		
4	Level 4: Service fault: temporary fault Fault only registered in the fault history: no display on the screen		
5	Level 5: Warning The detector is not in normal operating condition. Press the [i Next] or [i] key to display the fault.		

7.1.2 Warning / fault window

Description

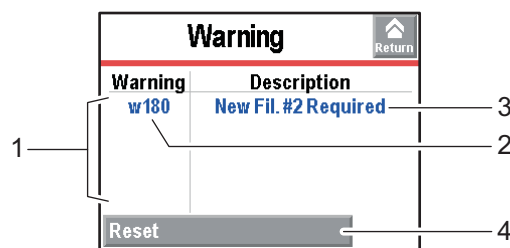


Fig. 15: Warning window

1	Fault list: 5 maxi.
2	RS-232 fault code.
3	Fault description.
4	Warning and faults deletion: faults requiring the operator's intervention remain displayed as long as the cause of the fault has not been corrected.

7.1.3 List of warnings / faults

Description of the levels 1 to 5 (see 7.1.1)

Level	RS command	RS-232 Code	Information
1	?ER	e59	loss of cal test mode
	?ER	e93	Dynamic calib. failure
	?WA	w60	Sensor Type/Connector
	?WA	w145	maintenance requested
	?WA	w150	primary pump service
	?WA	w160	secondary pump service
	?WA	w180	2A wire change
	?WA	w181	1A wire change
	?WA	w182	No output on wire 2
	?WA	w183	No output on wire 1
	?WA	w211	Select manual calib.
	?WA	w235	Autocal request
	?WA	w240	Autocal Request
	?WA	w242	Internal Pirani to set
	?WA	w245	Temp. too high
2	?ER	e50	zero cell. unstable
	?ER	e56	residual problem
	?ER	e57	sensitivity low
	?ER	e58	sensitivity too high
	?ER	e65	residual too high
	?ER	e70	poor PIC
	?ER	e80	calibrated leak year Er.
	?ER	e85	Temp. too high
	?ER	e89	loss of power
	?ER	e95	cell zero limits
	?ER	e96	Fault in Autocal +2 nd code
	?ER	e97	temperature too high
	?ER	e98	temperature too low
	?ER	e160	LDS probe clogged
	?WA	w220	Filament not active
3	?WA	w215	Background too high for test
	?WA	w241	Autocal requested
	?WA	w244	VHS not calibrated
	?ER	e188	speed cell pump
	?ER	e192	power fault wire
	?ER	e194	short-circuit wire 2
	?ER	e195	short-circuit wire 1
	?ER	e205	fault primary pump
	?ER	e206	ACP temp. too high
	?ER	e210	primary pump fault
	?ER	e220	no V AC power
	?ER	e224	- 15V cell problems
	?ER	e230	HS filaments
	?ER	e231	No output on wire 1 and 2
	?ER	e235	cell pressure > 1e-03 Mbar
	?ER	e238	No cell com.
	?ER	e239	no pump cell com.
	?ER	e241	cell own speed
	?ER	e243	EEPROM fault
	?ER	e245	cell pump fault
	?ER	e247	Check ATH connection
	?ER	e248	Check MDP connection
	?ER	e251	+15V cell problems
	?ER	e252	24V cell problems
	?ER	e253	ram timekeeper hs
	?ER	e255	Critical fault +2 nd code
4	?ER	e180	no electrical current;
	?ER	e185	triode SECU active
	?ER	e248	Check MDP connection
	?ER	e75	PIC not found
	?ER	e99	24 V DC problems
	?WA	w203	calibrated leak External
5	?WA	w205	shutdown of Autocal
	?WA	W97	temperature too high
	?WA	W98	temperature too low
	?WA	W230	Autocal request
	?WA	W255	Outside start-up conditions

7.2 Troubleshooting guide

The troubleshooting guide helps correct the malfunctions reported on the detector's control panel or affecting the detector.

It can be consulted from an interactive application specifically developed for the technical documentation.

7.2.1 Installation of the application

- Insert the Operating manual CDRom into the CD/DVD player of the computer.
- Launch the "ASMxxx" or "ASlxx" application.
- Select the language.
- Select the interactive application "**Troubleshooting**".
- Install the application on your computer.



Fig. 16: Example: ASM 340 - Selection of the interactive application

7.2.2 Consultation of the application



Create a shortcut on the computer desktop for direct access to the "Troubleshooting" application.

- Launch the "**Troubleshooting**" application.
- Select the navigation language (1).
- Select the product and the appropriate key word (2).
- Launch the search (3).
- Select a symptom (4): the origin and diagnosis of this symptom are displayed (5).

PFLEIFER VACUUM

Default searching

Service center

Product

AGR 240

Keyword

Background

Search

1

2

3

4

5

Troubleshooting

Symptoms

Background mistake

High background

Low background

High background

Origin / Diagnosis	Solution	Sheet
11. Dry model: Purge valve closed	Open the purge valve.	7.3.3
12. Integrable model: leak in the customer installation.	Check the installation tightness.	
13. Integrable model: switch of the customer primary pump on OFF.	Place switch ON.	

Print

Default not solved? Contact your service center: info@pfeiffer-vacuum.de

8 Service

Pfeiffer Vacuum offers first-class customer service!

- On-Site maintenance for many products
- Overhaul/repair at the nearby Service Location
- Fast replacement with refurbished exchange products in mint condition
- Advice on the most cost-efficient and quickest solution

Detailed information, addresses and forms at: **www.pfeiffer-vacuum.com (Service)**.

Overhaul and repair at the Pfeiffer Vacuum Service Center

The following general recommendations will ensure a fast, smooth servicing process:

- ➔ Fill out the "Service Request/Product Return" form and send it to your local Pfeiffer Vacuum Service contact.
- ➔ Include the confirmation on the service request from Pfeiffer Vacuum with your shipment.
- ➔ Fill out the declaration of contamination and include it in the shipment (mandatory!). The Declaration of contamination is valid for any product/device including a part exposed to vacuum.
- ➔ Dismantle all accessories and keep them.
- ➔ Close all the flange opening ports by using the original protective covers or metallic airtight blank flanges for contaminated devices.
- ➔ If possible, send the pump or unit in its original packaging.

Sending contaminated pumps or devices

No devices will be accepted if they are contaminated with micro-biological, explosive, or radioactive substances. "Hazardous substances" are substances and compounds in accordance with the hazardous goods regulations (current version).

- ➔ Neutralize the pump by flushing it with nitrogen or dry air.
- ➔ Close all openings airtight.
- ➔ Seal the pump or device in suitable protective film.
- ➔ Return the pump/device only in a suitable and sturdy transport container and send it in while following applicable transport conditions.

Pump or device returned without declaration of contamination form fully completed and/or not secured in suitable packaging will be decontaminated and/or returned at the shipper's expense.

Exchange or repair

The factory operating parameters are always pre-set with exchange or repaired devices. If you use specific parameters for your application, you have to set these again.

Service orders

All service orders are carried out exclusively according to our general terms and conditions for the repair and maintenance, available on our website.

9 Spare parts

9.1 Ordering information

Spare parts available for sales, classified by functions are listed in this chapter.

Function	See following pages
Tool	F100
Monitoring and Display	F200
Power and electrical supply	F300
Automatic control system and electronic circuits	F400
Measurement	F500
Pumping	F600
Vacuum block	F700
Pipes - Connections - Seals	F800
Cover	F900
Specific accessories	F1000

Tools



Ref	Description	P/N	Qty	Remarks
A006	DN16KF Calibrated Leak Adaptator Kit	110715	1	
A007	DN25KF Calibrated Leak Adaptator Kit	110716	1	
A010	DN16KF Needle Valve	*	1	
A013	Tee, Reducing - DN25/25/16KF	068269	1	
A016	Calib. Leak With Valve 1-3.10-6 DN25KF	FV4610	1	
A020	Clamp DN20/25KF	083264	1	
A024	Centering Ring SS/Per DN25KF	068189	1	
A027	Vacuum Silicon Grease (100 g Box)	064600	1	
A029	Housing Kit Insertable - ATH / AMH	*	1	
A030	Cell, Analyzer ; Packaging	*	1	
A036	3G Cell, Analyzer Chamber Transport	114386	1	
A040	"Brucelles" Tweezers	115396	1	
A041	SD Card With Detection Softwares	*	1	
A045	3G Cell 3 Wedges Kit - Service	*	1	

Tools

1

2

3

4

5

6

7

8

9

10

11

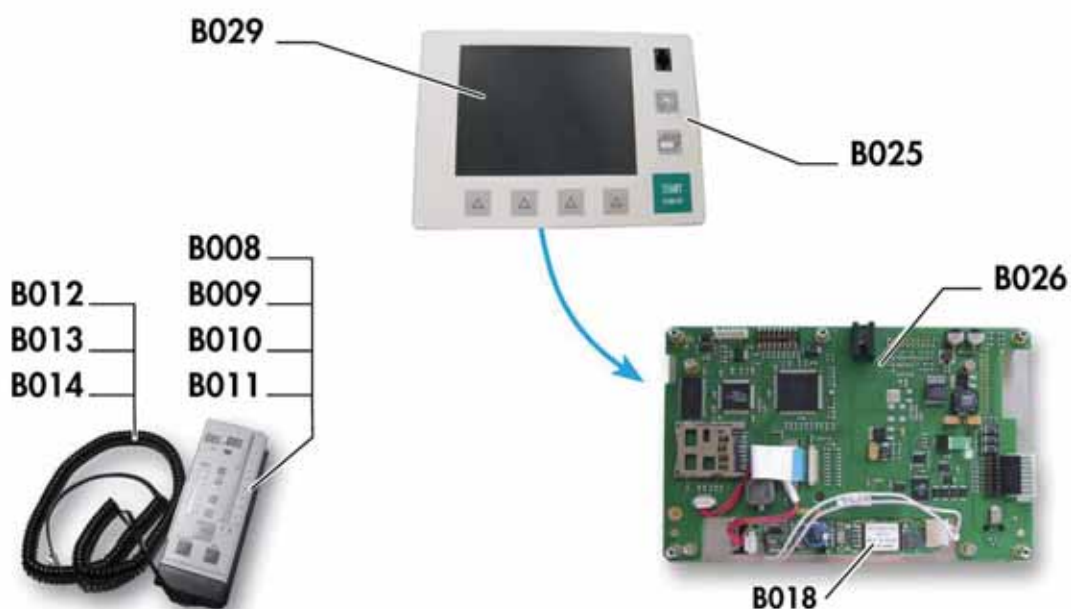
12

A037

Rep. Ref. Teil	Qty Menge	Désignation Designation Beschreibung
1	1	Clé emmanchée Box-shank nut spinner Rohrsteckschlüssel mit Heft
2	1	Tournevis pour vis TORX® 6x35 Screwdriver for TORX® screw 6x35 Handschruben für TORX® Schrauben 6x35
3	1	Vis CHc M 4x80 Screw CHc M 4x80 Innensechskantschraube CHc M 4x80
4	4	Vis CHc M 3x6 Screw CHc M 3x6 Innensechskantschraube CHc M 3x6
5	4	Rondelle Washer Unterlegscheibe
6	3	Vis CHc M 4x12 Screw CHc M 4x12 Innensechskantschraube CHc M 4x12
7	3	Rondelle Washer Unterlegscheibe
8	1	Fusible 5 x 20 F1 6,3 A Fuse 5 x 20 F1 6,3 A Sicherung 5 x 20 F1 6,3 A
9	1	Clé six pans mâle de 2,5 mm ø 2.5 Allen wrench Innensechskantschlüssel 2,5 mm
10	1	Clé six pans mâle de 3 mm ø 3 Allen wrench Innensechskantschlüssel 3 mm
11	1	Clé six pans mâle de 5 mm ø 5 Allen wrench Innensechskantschlüssel 5 mm
12	2	Joint cellule d'analyse 3G 3G Analyser cell O'ring 3G Zelle Dichtung

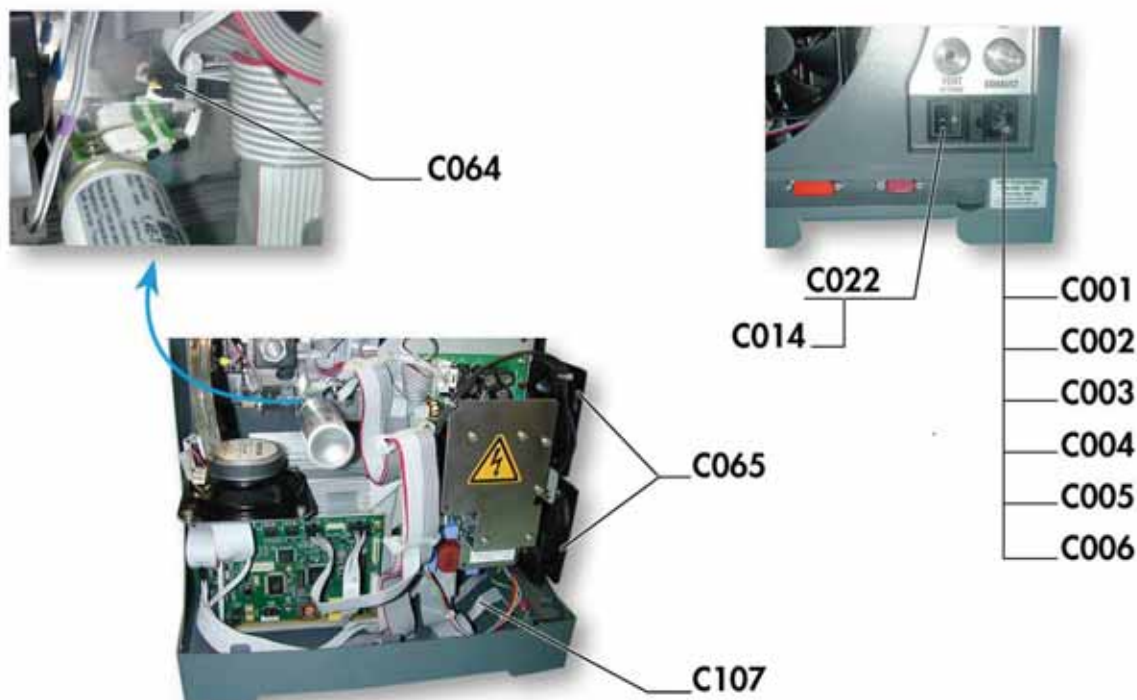
Ref	Description	P/N	Qty	Remarks
A037	3G Detection maintenance Kit	114718	1	

Monitoring and display



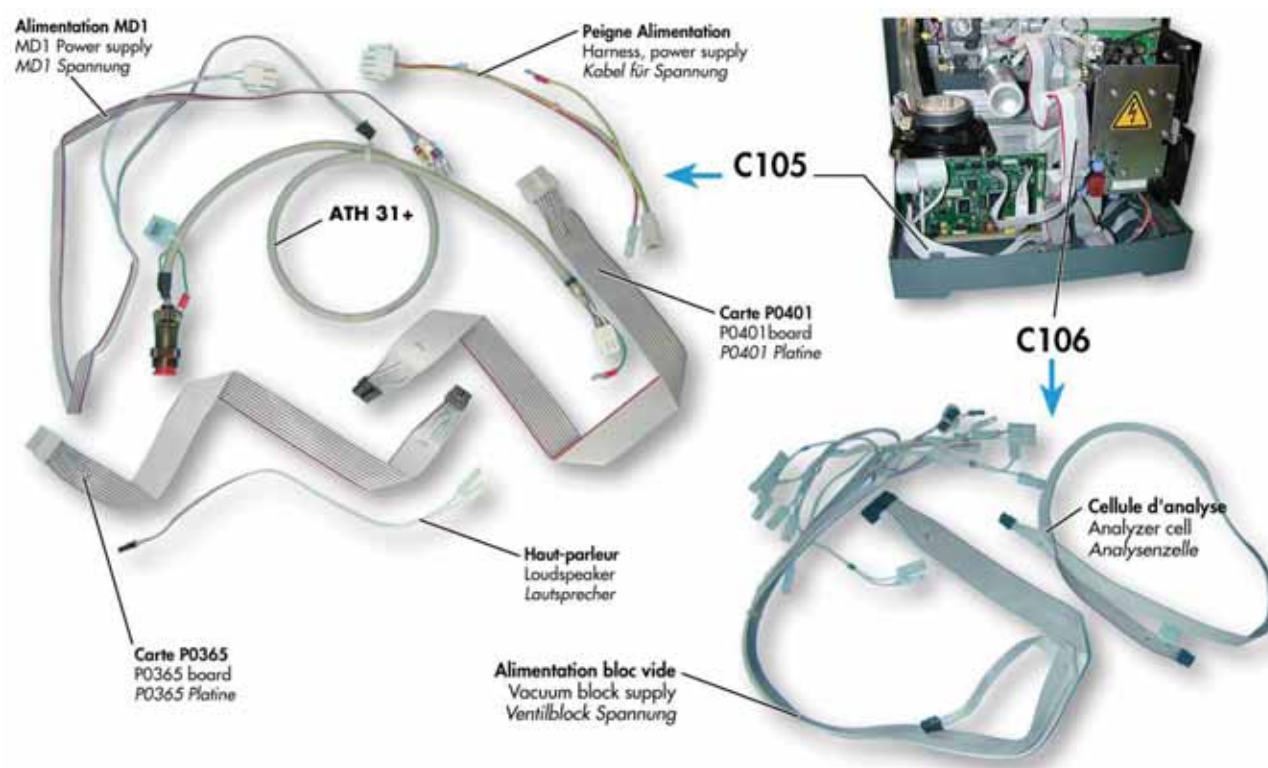
Ref	Description	P/N	Qty	Remarks
B008	Remote Control 2G - mbar.l/s	106688	1	
B009	Remote Control 2G - Torr.l/s	108881	1	
B010	Remote Control 2G - Pa.m3/s	108880	1	
B011	Remote Control 2G - Pa.m3/s - Japan	106690	1	
B012	Cable for Remote Control 2G, 5 m	A458735	1	
B013	Cable for Remote Control 2G, 10 m	110881	1	
B014	Cable for Remote Control 2G, 15 m	110882	1	
B025	3G Control Panel - Service	113010S	1	SD card delivered with the panel
B026	P0395E1 3G Control Panel Board	*	1	
B029	3G Touch Screen Display	*	1	

Power and electrical supply



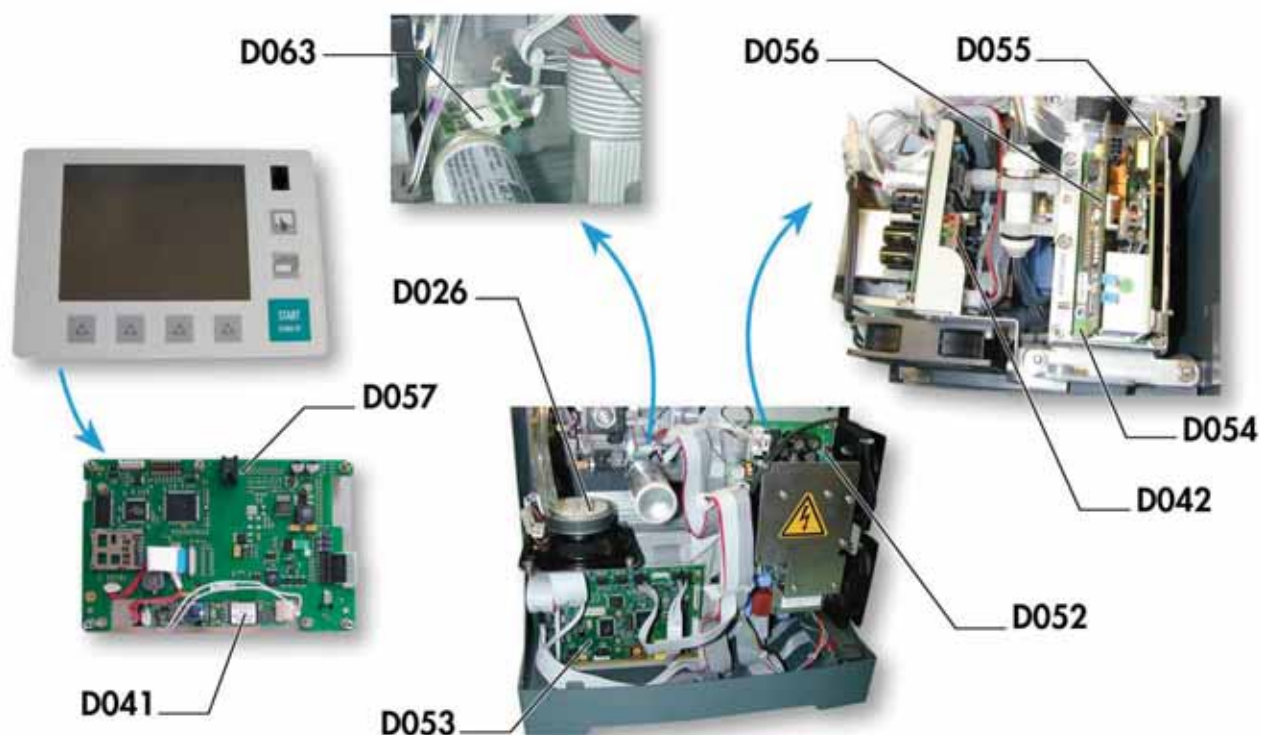
Ref	Description	P/N	Qty	Remarks
C001	Cable, Main Power; 2 m - Without Plug	104559	1	
C002	Cable, Main Power; 2 m - Italy	104758	1	
C003	Cable, Main Power; 2 m - Switzerland	103718	1	
C004	Cable, Main Power; 2 m - UK	104411	1	
C005	Cable, Main Power; 2 m - USA	103567	1	
C006	Cable, Main Power; 2 m - France/Germany	103566	1	
C014	Fuse 5 x 20 Temp. 6.3 A	*	1	
C022	Plug, Main Power	*	1	
C065	Fan - 142/102S/122D/310	A459291	1	
C107	Harness, Sub-D/P0411 Wiring - 310	*	1	

Power and electrical supply



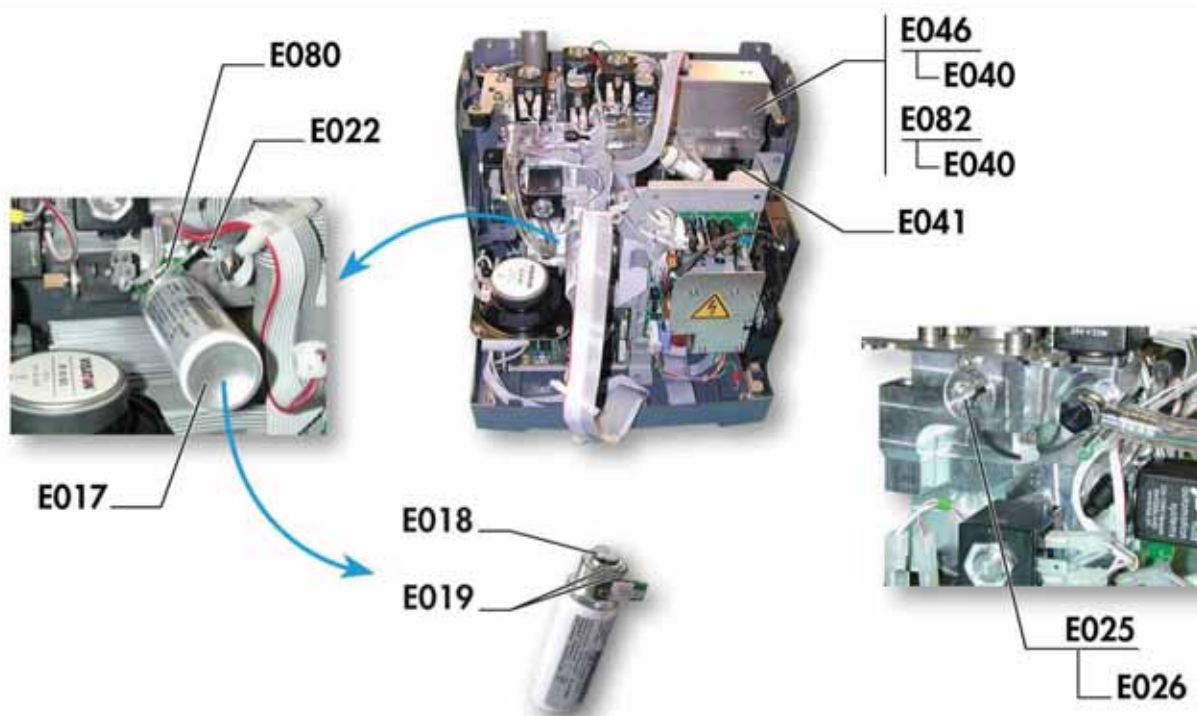
Ref	Description	P/N	Qty	Remarks
C105	Harness, Basic Wiring - 310	*	1	
C106	Harness; Block - 310	*	1	

Automatic control system and electronic circuits



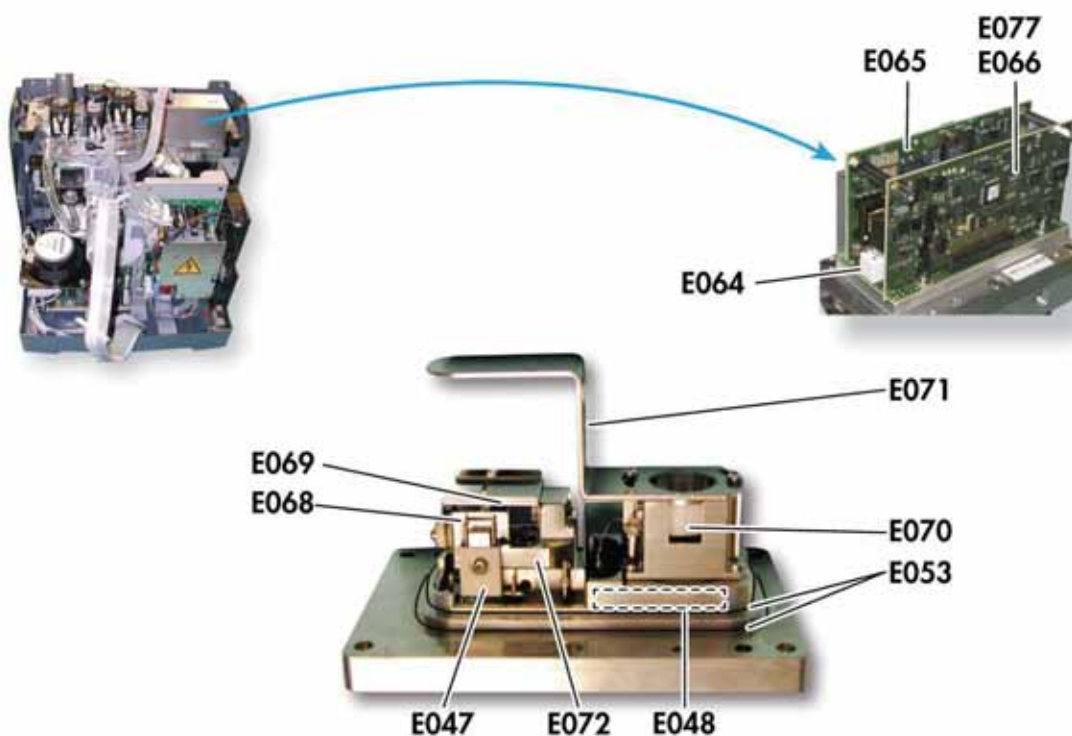
Ref	Description	P/N	Qty	Remarks
D026	Loudspeaker; 90 DB/D 10 cm	060097	1	
D042	P0365E1 Converter Board	*	1	
D052	P0401E1 Power Supply Board - 310/380	*	1	
D053	P0411E1 Main Board - 310	*	1	
D054	P0391E1 3G Cell Main Board	*	1	
D057	P0395E1 3G Control Panel Board	*	1	See sheet E 250
D063	P0488E1 Cal. Leak Temp. Sensor Board	*	1	

Measurement



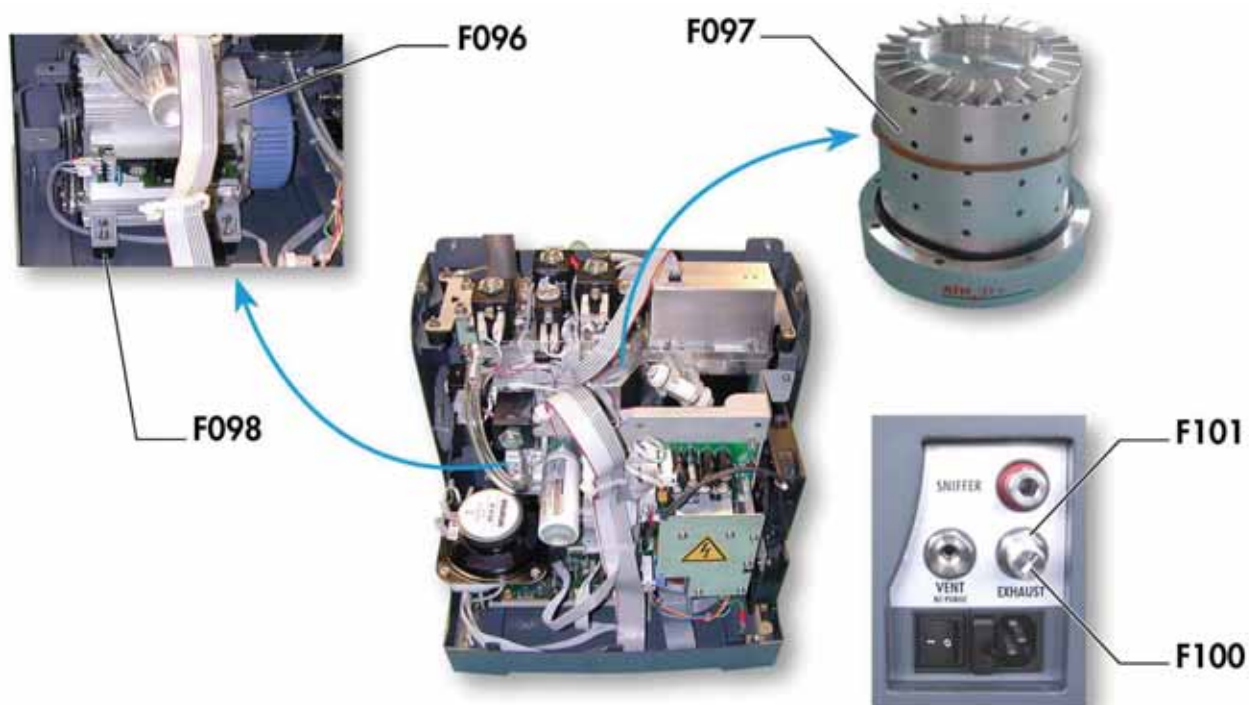
Ref	Description	P/N	Qty	Remarks
E017	Calibrated Leak, Internal; 50 cc	109241	1	
E018	O'Ring 1.78 x 12.42 NBR	050143	1	
E019	Clip for Calibrated Leak - 142/122D	A458317	1	
E025	Gauge, PI1 (Aluminium)	795706	1	
E026	Filament for PI1 Gauge	057972	1	
E040	Cell, Analyzer ; Packaging	*	1	
E041	Magnet 3 masses - Analysis Cell	*	1	
E080	P0488E1 Cal. Leak Temp. Sensor Board	*	1	
E082	Digital Cell 3G.2; Preset - HLD3G	*	1	

Measurement



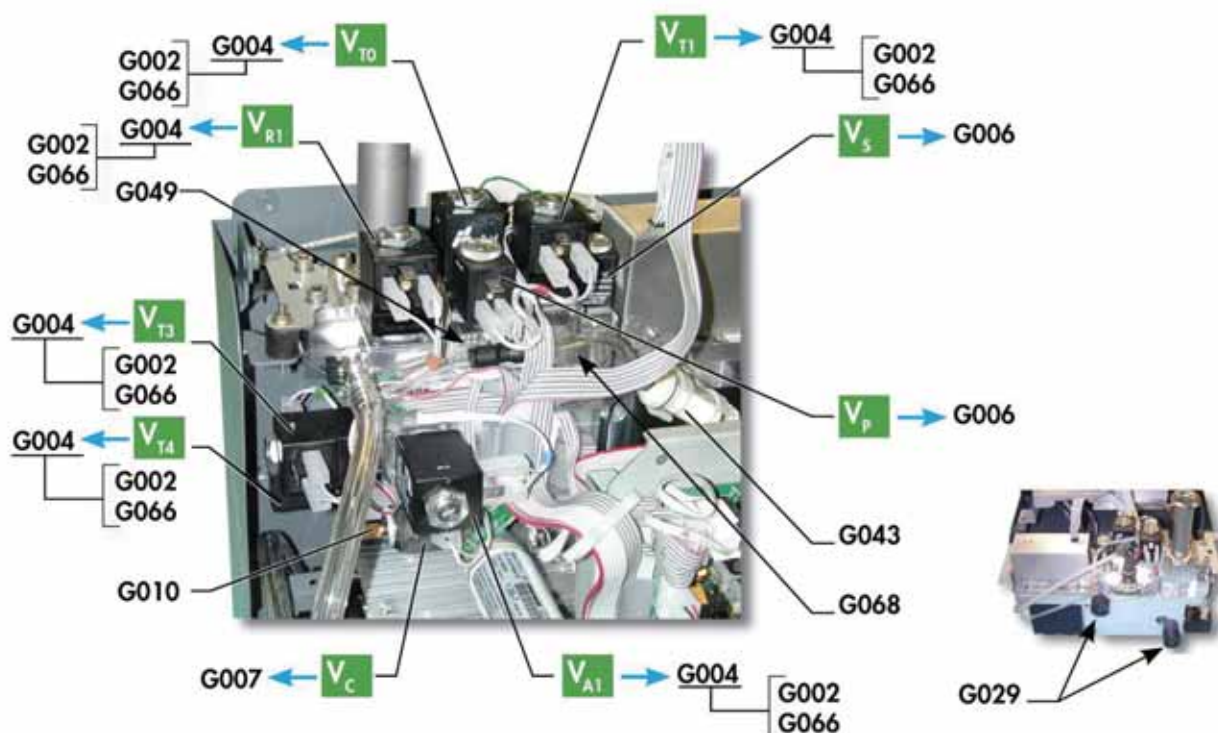
Ref	Description	P/N	Qty	Remarks
E047	Filament for 3G Analyzer Cell	114864S	1	
E048	Preamp. Target Assembly - 3G Cell	*	1	
E053	NBR Seal - 3G Cell	114346	1	Sold individually
E064	P0391E1 3G Cell Main Board	*	1	See sheet E 311
E066	P0393E1 Cell 3G Power Supply Board	*	1	See sheet E 393
E068	3G.2 Cell ExtrACTion Electrode - Service	119641	1	See sheet E 430
E069	3G.2 Cell Acceleration Electrode Service	*	1	Requires tool Ref. A044
E070	Braking module - 3G.2 Cell	*	1	See sheet E 433
E071	Mecanical Filter - 3G.2 Cell	*	1	See sheet E 433
E072	Ionisation Cage - 3G.2 Cell	*	1	See sheet E 432
E073	Accessories Kit for 3G Analyzer Cell	*	1	
E075	3G Cell 3 Wedges Kit - Service	*	1	

Pumping



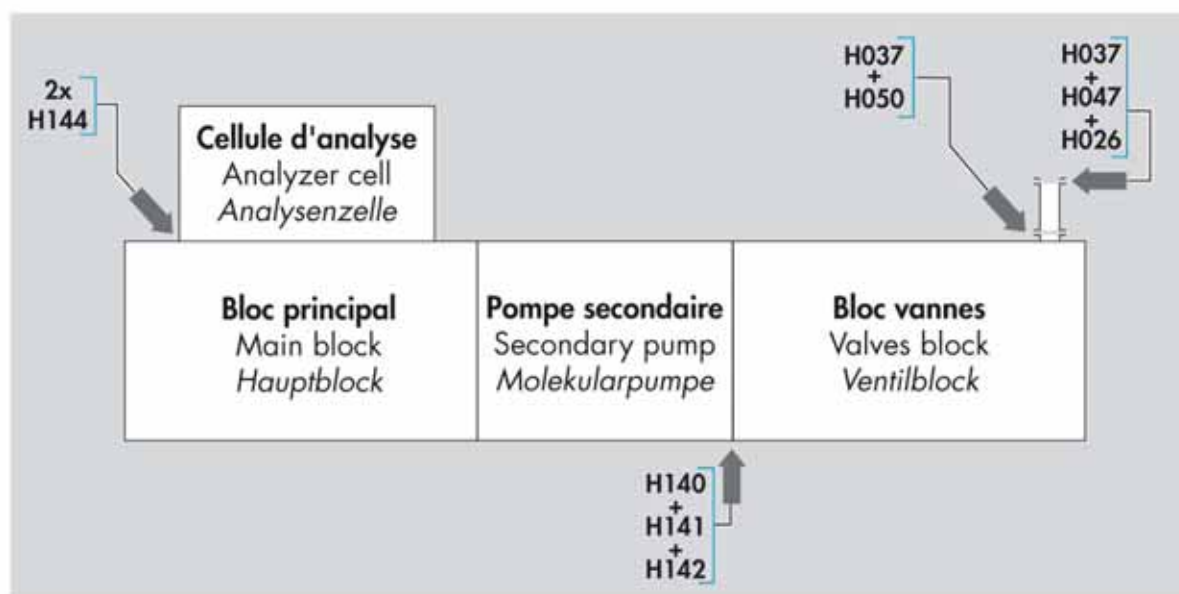
Ref	Description	P/N	Qty	Remarks
F058	Housing Kit Insertable - ATH / AMH	*	1	
F096	Pump, Equipped MD1 - 310	114513	1	
F097	AMH 020 HLD 310 - Service	RA000261	1	
F098	MD1 Shock Absorber - 310	107160	1	
F100	MD1 Silencer - 310	114494	1	
F101	MD1 Silencer Ring - 310	109528	1	

Valves



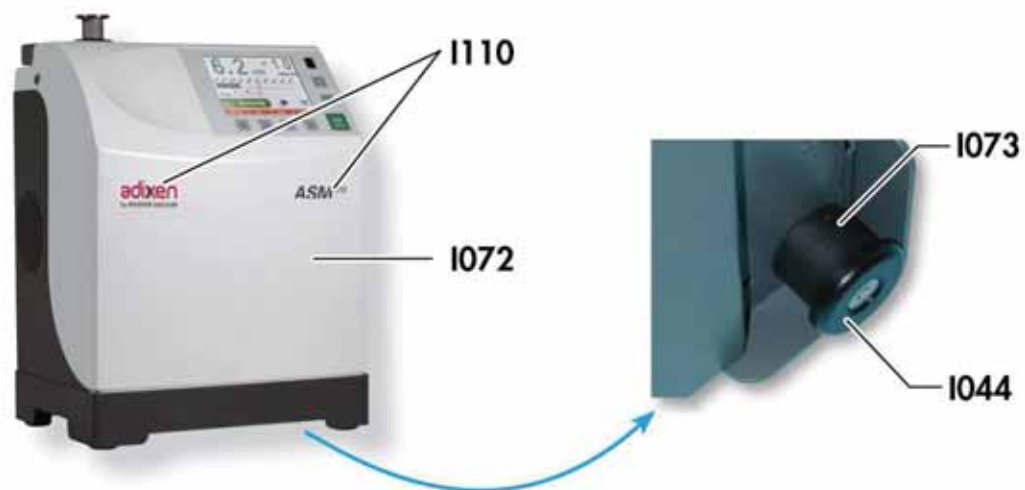
Ref	Description	P/N	Qty	Remarks
G002	Coil 24 V DC 23 W	*	1	
G004	Valve Kit, NC Bacosol (104655)	106935	1	
G006	Valve + Coil , 2/2NC Bacosol 24V DC/8W	101303	1	
G007	Valve + Coil , 3/2NC Bacosol 24V DC/8W	106009	1	
G010	Silencer, Bronze; M5	108449	1	For valve block Ref. G068
G012	Vacuum Silicon Grease (100 g Box)	064600	1	
G029	Shock Absorber - C	076112	1	
G043	Purge Filtre - 310	113079	1	
G049	Valve Block, Valves NM - 310	*	1	
G053	Male Union BSP 2.7/4 mm - M5	118726	1	For valve block Ref. G049
G066	Maintenance Kit for Bacosol P/N 106935	119082	1	See sheet E 530
G068	Valve Block, main - 310	*	1	

Pipes - Connections - Seals



Ref	Description	P/N	Qty	Remarks
H001	Tubing, PVC; D 4 x 1 mm	*	1	
H005	Connector for Plastic Tube 4 x 1	A458324	1	
H006	Body Female Connector G 1/8 RBE03.2100	082988	1	
H026	Clamp DN20/25KF	083264	1	
H027	Flange, Blank; SS DN25KF	068196	1	
H035	Male Union 2.7/4 mm - 1/8 BSPT	082775	1	
H037	O'Ring DN25KF HNBR	106022	1	
H047	Centering Ring DN25KF	068224	1	
H050	Filter, DN25KF; 70 µm	072857	1	
H114	Female Connector 1/8 BSPT - LDS Tube	067843	1	
H128	Quick Female Connector 1/8G LDS	082987	1	
H140	O'Ring 1.78 x 18.77 NBR	100513	1	
H141	O'Ring 2.5 x 25 NBR	079014	1	
H142	Purge Valve - 310	105703	1	
H143	Tubing, Crystal, D 6 x 1.5 mm	061683	1	
H144	NBR Seal - 3G Cell	114346	1	
H161	O'Ring 1.9 x 3.4 NBR	082102	1	

Cover



Ref	Description	P/N	Qty	Remarks
I044	Foot - 142/310	A459023	1	
I072	White Cover Without Logo - 310	113009	1	
I073	Shock Absorber - C	076112	1	
I110	Logo - 310	A333573	1	

Options and accessories



Ref	Description	P/N	Qty	Remarks
J075	O'Ring 5.33 x 113,67 NBR	082152	1	
J077	20 µm Poral Filter D 114 mm	105847	1	
J078	5 µm Poral Filter D 114 mm	105848	1	
J106	Cart, Transport - 310	114820	1	
J107	Case, Transport - 310	115191	1	

VACUUM SOLUTIONS FROM A SINGLE SOURCE

Pfeiffer Vacuum stands for innovative and custom vacuum solutions worldwide, technological perfection, competent advice and reliable service.

COMPLETE RANGE OF PRODUCTS

From a single component to complex systems:

We are the only supplier of vacuum technology that provides a complete product portfolio.

COMPETENCE IN THEORY AND PRACTICE

Benefit from our know-how and our portfolio of training opportunities!

We support you with your plant layout and provide first-class on-site service worldwide.

Ed07 - Date 2017/06 - P/N: 114916MEN



Are you looking for a
perfect vacuum solution?
Please contact us:

Pfeiffer Vacuum GmbH
Headquarters • Germany
T +49 6441 802-0
info@pfeiffer-vacuum.de

www.pfeiffer-vacuum.com