SPECTROCHECK

76004147



Stationary metal analyzer

Original operating instructions

07.02.2024 | Version 1.00

Table of Contents

1 Description of instrument 5
1.1 Description 5
1.2 Function 5
1.3 Overview 6
1.3.1 Instrument (front) 6
1.3.2 Instrument (back) 7
1.3.3 Spark stand 8
2 Safety 9
2.1 Symbols used 9
2.2 User information 11
2.3 Intended use 12
2.3.1 Samples 13
2.3.2 Preparing the Sample 13
2.3.3 Sample material 14
2.3.4 Sample weight 14
2.3.5 Gas cleaning cartridge 14
2.3.6 Spark stand 15
2.3.7 Sample clamp 15
2.4 Prohibited operating conditions 16
2.5 Misuse 16
2.5.1 Gas supply 16
2.6 Residual risks 17
3 Technical data 19
4 Transportation/Setting-up 20
4.1 Space requirements 22
4.2 Storage 22
4.3 Gas supply 23
5 Initial start-up 24
5.1 Preparing the instrument for use 24
6 Operation 25
6.1 Switching on the instrument 25
6.1.1 Argon saving module 26
6.2 Switching off the instrument 26
6.3 Measuring procedure 27
6.3.1 Preparing the measuring procedure 28
- iCALizing the measuring device (iCAL) 28
- Changing the base (multi-base instruments only) 29
6.3.2 Start the measurement 29
6.4 Additional functions 30

7 Maintenance 31
7.1 Maintenance Reminder 31
7.2 Maintenance schedule 32
7.3 Cleaning the spark stand 33
7.3.1 Remove the spark stand plate 34
7.3.2 Remove/replace the electrode 35
7.3.3 Removing the spark stand insert 36
7.3.4 Removing/attaching the spark stand cover 37
7.3.5 Cleaning the exhaust hose 38
7.3.6 Setting the electrode gap 39
7.3.7 Exhaust filter system - Change filter insert 40
7.3.8 Exhaust filter system - Inspecting the gas-washing bottle 42
7.4 Replacing the filter mats 43
7.5 Replacing the ICALization sample 43
8 Cleaning agents 44
9 Status messages 45
10 Troubleshooting 46
11 Spare parts and consumables 48
12 De-commissioning 49
13 Manufacturer address 50
14 EC Declaration of Conformity 51

1 Description of instrument

1.1 Description

Instrument:	SPECTROCHECK
Model:	LMM02
Type/Part No.:	76004147

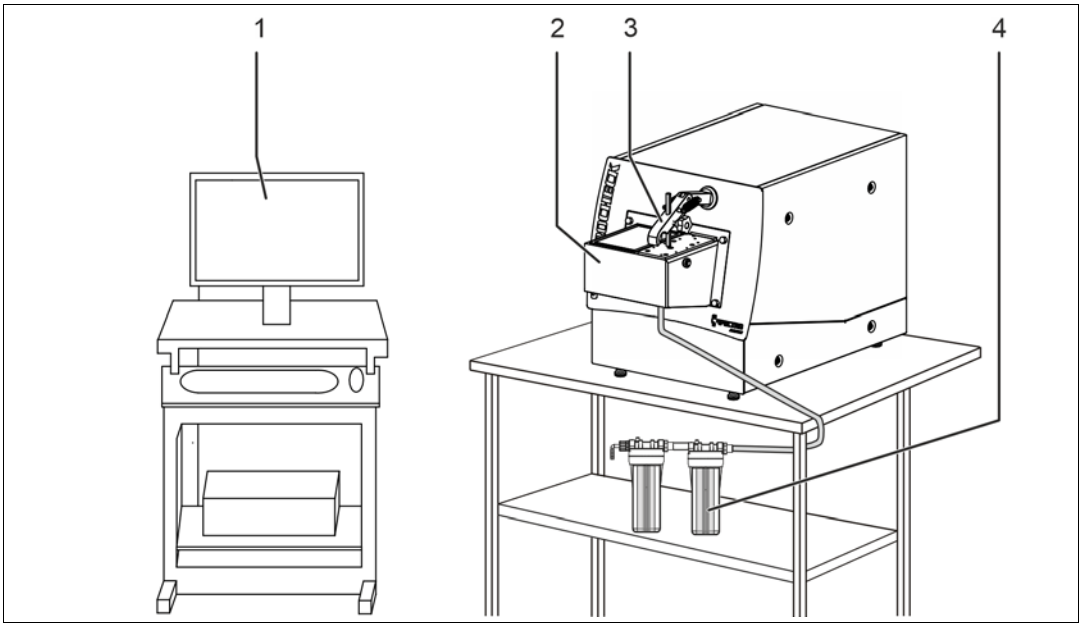
1.2 Function

Sample material is evaporated by spark discharge inside the unit. In this process, the released atoms and ions are excited and emit light. This light is directed into the optical systems and measured using sensors.

Calibration data are already stored in the unit's memory. The measured values are compared with these data. The measured values are converted into concentrations and then displayed on the screen.

1.3 Overview

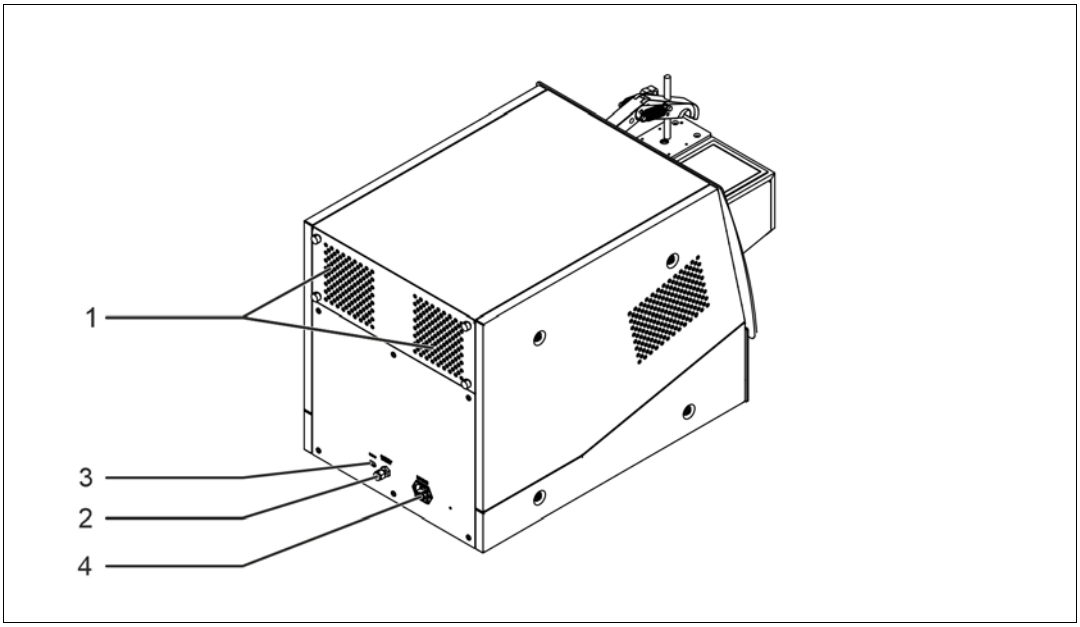
1.3.1 Instrument (front)



No.	Component
1	Monitor
2	Spark stand

No.	Component
3	Sample clamp
4	Gas-washing bottle and filter bottle

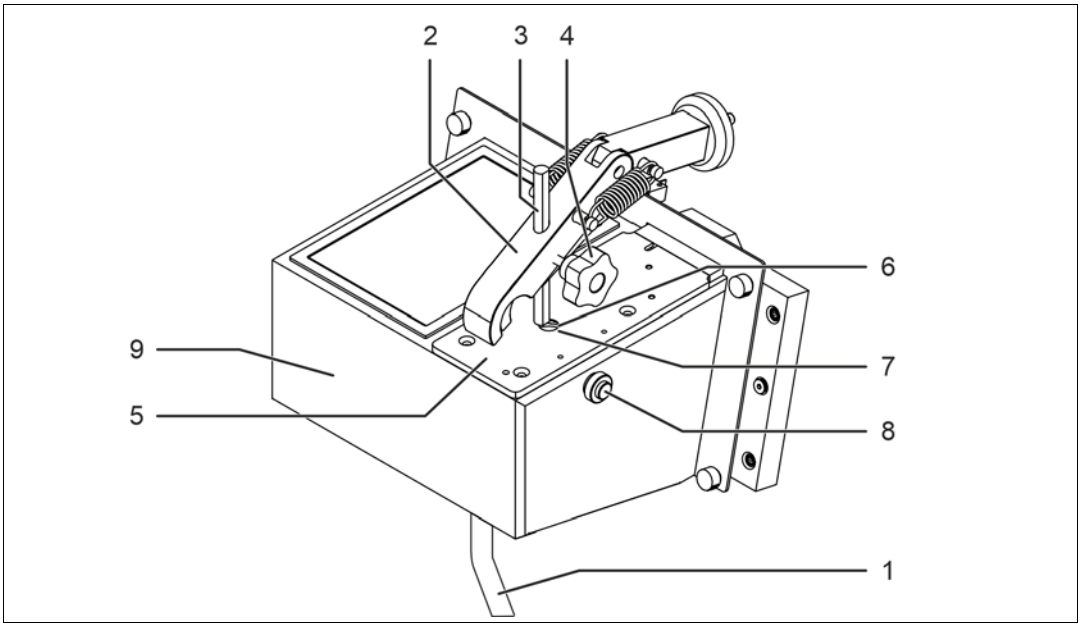
1.3.2 Instrument (back)



No.	Component
1	Air filter housing
2	Argon connection

No.	Component
3	PC data transmission connection
4	Power connection

1.3.3 Spark stand



No.	Component
1	Outlet to filter system
2	Sample clamp
3	Contact (movable)
4	Locking wheel for contact

No.	Component
5	Spark stand plate
6	Spark stand orifice
7	Electrode (underneath spark stand plate)
8	Spacer
9	Spark stand cover

2 Safety

Every user of the instrument must have read and understood these operating instructions. This applies in particular to the safety instructions.

2.1 Symbols used

The following symbols are used in these abbreviated operating instructions and/or on the instrument.

If required, additional important information is available in connection with these symbols.



General warning sign



Warning! High voltage!



Warning! Flammable substances!



Warning! Hot surface!



Warning! Toxic substances!



Warning! Optical radiation!



Warning! Risk of hand injury!



Warning! Risk of laceration!



Warning! Risk of suffocation!



Caution!

This sign warns of activities or conditions that may adversely affect the function of the instrument.



Information

Displays information that is important for the correct and safe use of the instrument.

2.2 User information

- Non-compliance with the operating and safety instructions may lead to injuries and can cause a health hazard.
- Carefully read the manual and always comply with the safety instructions.
- If the instrument is located on an incline and equipped with castors, it can roll away during operation. Secure the instrument for operation.
- Only service personnel authorized by the manufacturer are permitted to unpack, install, set up, and connect the instrument.
- The instrument must only be connected to the power supply with a protective grounding conductor.
- The instrument must be operated only in a dry environment (protection class IP 20, DIN 60529).
- Disconnect the power plug before opening the instrument. The instrument is only completely disconnected from power if the power plug is removed.
- Never tamper with the safety devices! If it is suspected that a safety device does not work properly, shut down the instrument immediately. Please contact your Service Center.
- Compliance with the information labels on the instrument is mandatory.
- While operating and maintaining the instrument, compliance with all safety instructions and accident prevention regulations is mandatory.
- Observe the relevant safety regulations when using the auxiliary aids and operating resources.
- If applicable, personal protective equipment (protective gloves, goggles, etc.) must be worn.
- Carry out only those maintenance tasks that are described in the chapter “Maintenance” of the operating instructions. The operating personnel are not permitted to perform any other maintenance work. Any further maintenance work (e.g. technical maintenance) or repairs must only be performed by service personnel authorized by the instrument manufacturer.
- Check the protective measures after every technical maintenance or repair activity. The checking procedure is carried out in accordance with DGUV V3 or an equivalent national regulation.
- Compliance with the maintenance schedule specified by the manufacturer is mandatory. All maintenance activities must be recorded. This helps maintain the operational safety of the instrument.
- Only genuine spare parts must be used when repairing the instrument. If using components other than OME parts, the CE Declaration of Conformity shall be null and void.

2.3 Intended use

This instrument analyzes and identifies metals. Only such metals may be analyzed for which the instrument has been calibrated by the manufacturer or by qualified technical personnel.

Only the original accessories supplied with the instrument must be used and shall only be used indoors (laboratory environment).

The instrument is intended for use in the industrial sector. Electromagnetic interference may occur during the operation of the instrument. In this case, the manufacturer must be contacted.

Comply with the applicable occupational health and safety regulations relevant to the workplace and the samples used (hazardous substances).

- The instrument must only be operated in compliance with the defined time operating limits (operating time, shift sequence, maintenance & servicing specifications).
- The instrument is a stationary analyzer and it must not be moved during operation.
- During the operation of the instrument, compliance with the ambient conditions according to the technical specification is mandatory.
- During the operation, adequate air extraction and ventilation of the operating room must be ensured.
- The instrument must only be operated with the specified operating media at the max. specified pressures.
- Never attempt to disable safety devices.
- The instrument may only be operated with the front protective cover and the spark stand plate in place.
- Cleaning (decontamination) may only be performed with a cleaning agent specified by the manufacturer.
- Before using any cleaning or decontamination procedure other than the procedure specified by the manufacturer, the operating company of the instrument must check with the manufacturer that the intended method will not damage the instrument.

2.3.1 Samples

Only dry metal samples must be measured.



Warning! Risk of injury and health hazard!

Risk of injury and health hazard due to pressurized or combustible samples.

- Pressurized or flammable samples must not be measured.

2.3.2 Preparing the Sample





Warning! Harmful and toxic substances!

During the preparation of samples, e.g. during the grinding process, toxic vapors and toxic clouds of dusts may be generated, depending on the sample material.

- When disposing of these dusts, compliance with legal regulations and fire prevention instructions is mandatory.
- The operating company of the spectrometer shall be responsible for compliance with the limit values of the maximum permissible pollutant concentrations in the breathing air.
- During the preparation, compliance with the safety instructions provided by the manufacturer of the sample preparation machine is mandatory. Personal protective equipment must be worn.
  When preparing samples that could potentially release toxic substances, wearing protective goggles and the use of appropriate respiratory protection equipment is mandatory.

2.3.3 Sample material



Warning! Toxic substances!

- The sparking process produces a black precipitate (metal condensate). The condensate could be toxic or flammable, depending on the sample material. Metal vapors may be generated by sparks of the sample material. Depending on the sample material, these vapors may be toxic, e.g. if using heavy metals or other hazardous metals during the test.
  - ➔ Protective gloves and safety goggles must always be worn when cleaning the spark stand and when cleaning the gas-washing bottle or the filter bottle. This also applies when replacing the filter insert. If metals with toxic components have been sparked off, wearing a breathing mask to prevent the inhalation of condensate particles is mandatory.
  - ➔ When disposing of the condensate, compliance with legal regulations and fire prevention instructions is mandatory.
  - ➔ If the samples contain toxic substances, an extraction system must be installed at the spark stand.
  - ➔ In this case, the gas escaping from the spectrometer's exhaust pipe must be channeled to the outside of the building.
  - ➔ The installation of an extraction system and the discharge of the exhaust gas into the open air makes it easier to comply with the maximum permissible pollutant concentrations in the breathing air below the applicable limit values, MAK values (Maximale Arbeitsplatzkonzentration: maximum workplace concentration) or comparable national regulations. Compliance with these limits is the sole responsibility of the owner of the spectrometer. If samples with toxic components must be measured, further protective actions such as wearing breathing protection may be necessary.

2.3.4 Sample weight

The weight of the sample to be measured must not exceed 15 kg (33 lbs.).

2.3.5 Gas cleaning cartridge

The instrument contains a gas cleaning cartridge.

Only a qualified technician shall be permitted to change the gas cleaning cartridge.

2.3.6 Spark stand

The opening of the spark stand plate must be completely covered by the sample or the respective adapter.



Warning! Optical radiation!

The plasma in the spark stand generates UV radiation. UV radiation may cause damage to the eyes or skin.

- For samples that do not completely cover the spark stand opening, use the respective sample adapters in such a way that the opening is completely closed.
- Take appropriate protective measures (e.g. wear safety goggles) when the spark stand opening is not fully covered.

When maintaining the spark stand, compliance with the following information is mandatory:



Warning! Flammable substances!

- Do not vacuum the spark stand. The condensate could ignite an unsuitable vacuum cleaner.
- The exhaust filter of the vacuum cleaner may not be suitable for the pore size of the condensate.

2.3.7 Sample clamp

The sample clamp must have contact with the sample (the function circuit of the spark stand is closed).



Warning! High voltage!

The sample clamp provides the contact between the sample and the spark stand. There is a risk of suffering an electric shock when handling the sample clamp.

- Never tamper with the sample clamp.



Warning! Risk of hand injury!

Springs are used to keep the sample clamp in position. However, the clamp may fold down unexpectedly. If your hand is caught underneath the clamp, this may cause injuries.

- Never place your hand under the sample clamp.

2.4 Prohibited operating conditions

Do not operate the instrument if one of the following conditions exists:

- If the instrument is faulty or damaged.
- If the ambient conditions do not comply with the specification.
- If the area where the instrument is used is not a commercial/industrial premise.

2.5 Misuse

Operating the instrument with components, accessories, parameters, materials, and operating resources other than those specified by the manufacturer is considered misuse of the instrument. Other cases of misuse are:

- Unauthorized modification or conversion of the instrument and its safety devices without complying with the applicable rules and regulations.
- Bypassing or deactivating safety and protective devices.
- Improper use of accessories or peripheral devices linked to the instrument.
- Replacing the detachable power cables with inadequately dimensioned power cables.

2.5.1 Gas supply



Information! Measurement errors!

Impurities in the argon supply cause measuring errors.

- Ensure that the installation of the argon supply line is free of oil and grease.

Only argon must be used when operating the instrument.

Argon quality (min.)	4.8 (99.998 % Ar) with O_2<3 ppm, N_2<10 ppm, H_2O<5 ppm, KW<1 ppm

The spectrometer requires an argon supply line.

A suitable pressure reducer is required for the argon supply (bottles or liquid gas tank).

- Adjustable output pressure 0-10 bar
- The argon inlet pressure at the instrument is 4.8-5.0 bar (69.6-72.5 psi)

2.6 Residual risks

This instrument has been manufactured in accordance with the latest state-of-the-art technology. However, residual risks cannot be excluded entirely.



General warning sign!

- The instrument is operated with argon. Argon is heavier than air. It can accumulate in a closed room, especially on the floor or lower-lying areas.
  - ➔ Ensure that adequate ventilation is provided. If necessary, oxygen sensors must be installed.



Warning! High voltage!

When the instrument is switched on, there is a danger of an electric shock when the electrode is touched or when the sample is removed during a measurement.

- Never touch the sample while a measurement is in progress.
- Avoid any contact with the electrode when the instrument is switched on.
- Higher electrical voltages occur inside the spectrometer
  - ➔ Shut down the instrument when working on the spark stand.
- Shut down the instrument immediately if it is damaged.
  - ➔ Never tamper with the safety devices! If it is suspected that a safety device does not work properly, shut down the instrument immediately!



Warning! Hot surface!

- Contacting the electrode increases the risk of burn injuries. During normal operation, the electrode will heat up to several hundred degrees.
  - ➔ Never touch the electrode with your bare hands, even after shutting down the spectrometer. Always use pliers.
- A sample can get hot if it is measured several times.
  - ➔ Touch the sample only after it has sufficiently cooled.



Warning! Risk of laceration!

- There are sharp edges on the spark stand cover which may cause injuries. The cover is electrically connected to the entire housing. This EMC contact has sharp edges.
  - ➔ Use protective gloves to avoid cuts.



Warning! Risk of suffocation!

- The instrument is operated with argon. Argon is heavier than air. It can accumulate in a closed room, especially on the floor or lower-lying areas.
  - ➔ Ensure that adequate ventilation is provided. If necessary, oxygen sensors must be installed.

Information

- Compliance with the applicable occupational health and safety regulations at the workplace and the samples used (hazardous substances) is mandatory.
- Compliance with the safety data sheets for the hazardous substances is mandatory.

Information

In order to ensure the availability and operational safety of the equipment, we recommend having the system checked for correct operation and performance at least once a year by specialized technicians. Addresses of service organizations authorized by SPECTRO can be found at www.spectro.com.

Information

A high-voltage pulse ignites the plasma. Subsequently, the burning voltage is applied to the electrode.

When the instrument is switched on, there is an inherent danger of an electrical emission during a spark test, especially if the sample is removed during the measuring process.

- For a healthy person, this electrical transmission is of no concern. These are electromagnetic fields of low intensity. Due to this transmission, the electromagnetic characteristics of the instrument may be outside the limits of EN61326-1 in some areas. As a result, interferences of radio transmissions can occur in the immediate (close) range of the spectrometer. This means, for example, interference during the reception of radio transmissions is possible (crackling, image disturbances).
- Users of life-sustaining or supporting medical devices (e.g., insulin pumps, pacemakers, defibrillators, EEG, ECG devices, etc.) should not be affected by CE-compliant instruments. For this group of operators, however, it is strongly recommended to contact the manufacturer of the instrument before using the spectrometer!

3 Technical data

Description	Value
Instrument height	480 mm; 18.9"
Instrument width	456 mm; 18.0"
Instrument depth	764 mm; 30.5"
Instrument width (footprint)	416 mm; 16.4"
Instrument depth (footprint)	606 mm; 23.9"
Instrument weight	approx. 55 kg; 121 lbs
Power supply	95-253 VAC, 50/60 Hz
Power during measurement	400 VA
Power connection socket	5 A (slow-blow)
Power during stand-by	200 VA
Supply voltage fuse	16 A (slow-blow)
Operating range (permissible ambient temperature)	10-30 °C; 50-86 °F
Recommended temperature range to achieve the specified performance	18-28 °C; 64-82 °F
Place of installation	Inside of dry, dust-free rooms up to an altitude of 2000 m above sea level, vibration-free (not subject to impact or vibration load conditions)
Air humidity range	20-80 %, not condensing
Sound pressure level	55 dB(A)
Argon inlet pressure on the instrument	4.8-5.0 bar (69.6-72.5 psi)
Argon quality (min.)	4.8 (99.998 % Ar) with O_2<3 ppm, N_2<10 ppm, H_2O<5 ppm, hydrocarbons <1 ppm
Argon flow rates	Constant flow: 12 ± 2 l/hr Analytic flow: 120 ± 13 l/hr
Storage conditions	(Ambient temperature -15 to 45 °C, 5-113 °F
Protection class/ contamination class	IP 20 (DIN 60529), contamination class II (laboratory environment)
EMC environment	Industrial environment/laboratory environment

4 Transportation/Setting-up

Caution! Damage to the instrument!

Improper transport may cause damage to the instrument or to other property within the surroundings.

- Only specifically trained personnel shall be permitted to transport the instrument in its transport packaging.
  - ➔ The properly trained employees have the corresponding instructions at their disposal.
  - ➔ If the usage site must be changed, please contact our Service Center.
- Consider the dimensions and the weight of the instrument.
  - ➔ Ensure that the transportation route is free of obstacles and bottlenecks are avoided.
  - ➔ Since the instrument weighs (approx. 55 kg), the structural properties of the transportation route and the load capacity of the place of installation must be considered.
- Only service personnel authorized by the manufacturer are permitted to unpack, install, set up, and connect the instrument.

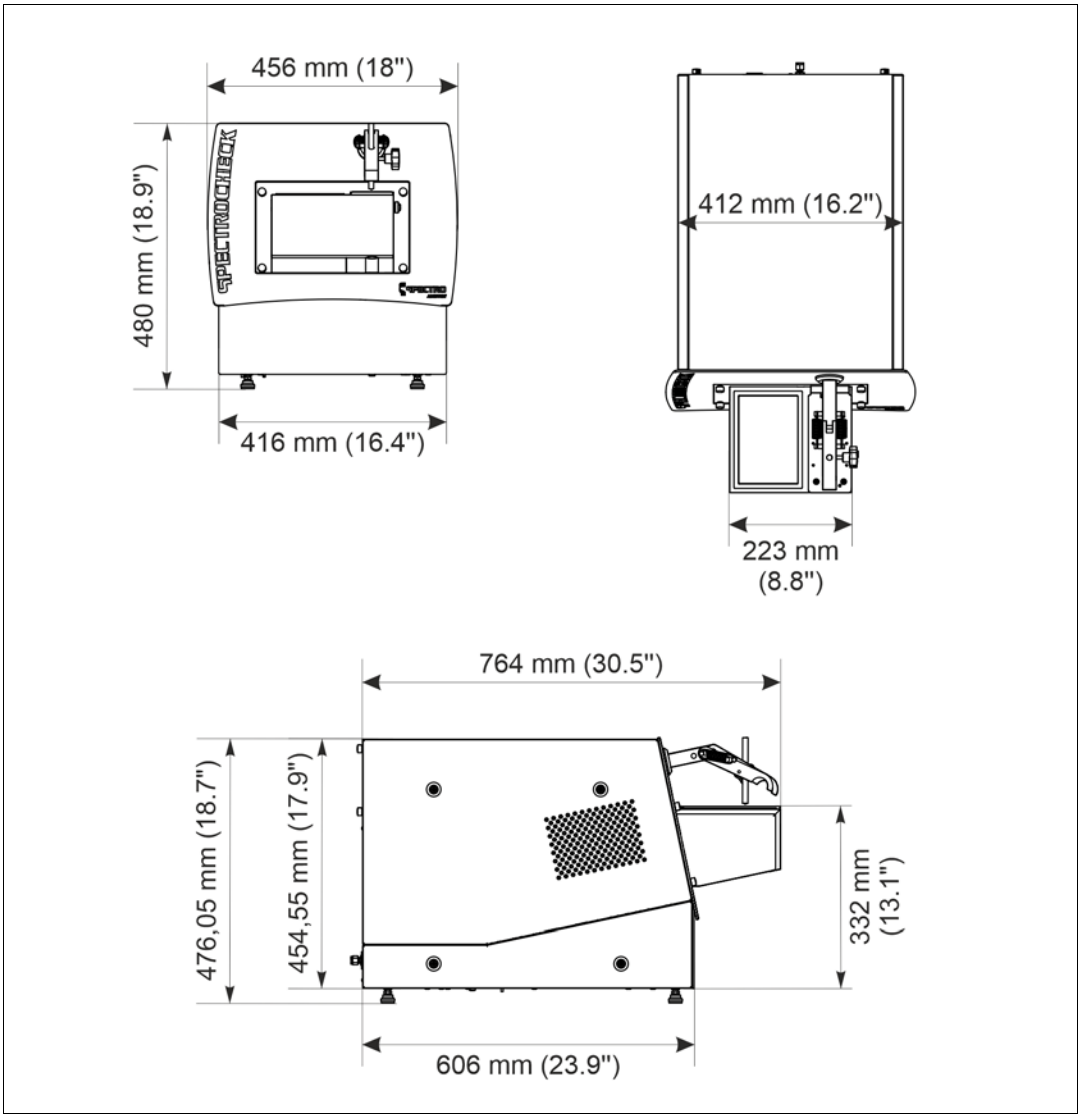
Information: Measurement errors!

- If the instrument is subject to vibrations and shocks, measurement errors may occur during the measuring process.
  - ➔ The instrument must be installed at a vibration- and shock-free location.
- Measurement errors can result from temperature differences inside the instrument.
  - ➔ The instrument must be installed at a location, where it cannot heat up or cool down on one side only.
- The instrument must be operated only in a dry environment (protection class IP 20, DIN 60529).

Observe the following information regarding the instrument's installation:

- All connections are located at the rear side.
- The instrument must be accessible from all sides for maintenance. Set up the instrument accordingly. Sufficient space should be provided for the computer workstation (keyboard, monitor, printer) and the operating personnel.
- The clearance to other objects should be at least 20 cm on all sides.
- A table of corresponding dimensions and load-carrying capacity is required, see chapter 3 „Technical data“ on page 19.
- In addition to the footprint required by the instrument, some space is needed for the gas supply, unless fixed gas connections are available.
- In order to disconnect the instrument from the power supply, access to the main switch of the instrument must be ensured at all times.

4.1 Space requirements



4.2 Storage

Storage conditions:

- The instrument must be stored in a dry place
- Room temperature -15°C – +45°C (5°F – 113°F)
- Avoid storing the instrument at very low temperatures.

4.3 Gas supply

Information: Measurement errors!

- Impurities in the argon supply cause measuring errors.
  - ➔ Ensure that the installation of the argon supply line is free of oil and grease.

The spectrometer requires an argon supply line.

A suitable pressure reducer is required for the argon supply (bottles or liquid gas tank).

- Adjustable output pressure 0-10 bar
- The argon inlet pressure at the instrument is 4.8-5 bar (69.6-72.5 psi)
- The pressure reducer must be adjusted so that the maximum permissible inlet pressure of the instrument is not exceeded.

A copper tube for the argon supply is provided with the delivery of the SPECTRO

- Diameter 6 x 1 mm, length 3 m
  - ➔ When using longer lines and/or smaller tube diameters, a possible pressure drop must be taken into account.

This supply line is screwed to the connection on the rear panel of the spectrometer. The threaded connection is included in the scope of supply.
The connection on-site is customer-specific and, therefore, not part of the delivery.

5 Initial start-up

The "SPECTROCHECK Instructions" (F1/Help) contain a detailed description on how to proceed during the initial start-up.

5.1 Preparing the instrument for use

Before switching on the instrument, proceed as follows:

1. Check the filling level of the water bottle. Fill with water if required, see page 42.
2. Set the argon pressure to 5.0 bar (72.5 psi).
   - ➔ If the argon pressure is not properly set, turbulences result in the spark stand insert. Thus, correct measuring results cannot be obtained.

✓ The instrument is ready for use.

6 Operation

6.1 Switching on the instrument



Caution! Damage to the instrument!

Only use power cables that are rated for the currents of the instrument.



Information

If possible, never shut off the power supply and keep the argon supply always open.

If the instrument was disconnected from the power supply for some time (overnight or during the weekend) and/or removed from the argon supply, the instrument must be stabilized for approx. 3 hours after switching it on.

If the instrument was disconnected from the power supply and/or removed from the argon supply for some time (due to transport/storage), stabilization may require a longer period after switching the instrument on. In this case, additional important information can be found in “SPECTROCHECK Instructions” (F1/Help).

Ensure that the operating temperature for the optical room 35 °C (95 °F) has been reached before engaging in any other tasks.

To switch on the instrument, proceed as follows:

1. Connect the instrument to the power supply.
2. Switch on the computer.
   - ➔ The operating system is booted.
   - ➔ Once the operating system is booted, the spectrometer program "Spark Analyzer Pro CHECK" starts.

✓ The instrument is switched on.

6.1.1 Argon saving module

Information

If possible, leave the instrument on all the time, this means, never shut off the power supply and keep the argon supply always open.

If the instrument was disconnected from the power supply and/or removed from the argon supply for some time (due to transport/storage), stabilization may require a longer period after switching the instrument on. In this case, additional important information can be found in “SPECTROCHECK Instructions” (F1/Help).

Oxygen and humidity inside the spark stand may result in poor burn spots (see page 46). It must be ensured that sufficient flushing time is carried out after using the argon economy module and before the next measurement.

The “argon saving module” can be activated in the software. The menu is used to specify the period of time after which the argon purge switches off automatically if the instrument is not used for measuring. In addition, the length of time before the next measurement with increased argon flow can be specified.

For a detailed description, refer to the online help of the instrument.

6.2 Switching off the instrument

Information

If possible, leave the instrument on all the time, this means, never shut off the power supply and keep the argon supply always open.

If the instrument was disconnected from the power supply and/or removed from the argon supply for some time (due to transport/storage), stabilization may require a longer period after switching the instrument on. In this case, additional important information can be found in “SPECTROCHECK Instructions” (F1/Help).

To switch off the instrument, proceed as follows:

1. Exit the spectrometer program "Spark Analyzer Pro CHECK".
   ➔ The program is switched off.
2. In order to switch the instrument completely off, remove the power plug.

✓ The instrument is switched off.

6.3 Measuring procedure



Warning! Risk of hand injury!

Springs are used to keep the sample clamp in position. However, the clamp may fold down unexpectedly. If your hand is caught underneath the clamp, this may cause injuries.

- ➔ Never place your hand under the sample clamp.



Warning! High voltage!

The sample clamp provides the contact between the sample and the spark stand. There is a danger of electric shock when handling the sample clamp.

- ➔ Never tamper with the sample clamp.



Warning! Hot surface!

A sample can get hot if it is measured several times.

- ➔ Touch the sample only after it has sufficiently cooled.



Warning! Optical radiation!

The plasma in the spark stand generates UV radiation. UV radiation may cause damage to the eyes or skin.

- ➔ For samples that do not completely cover the spark stand opening, use the respective sample adapters in such a way that the opening is completely closed.
- ➔ Take appropriate protective measures (e.g. wear safety goggles) when the spark stand opening is not fully covered.



Information

A flawed initial start-up, operation or sample preparation can lead to measurement errors.

- ➔ Therefore, ensure all necessary requirements for a correct measurement are met.

6.3.1 Preparing the measuring procedure



Information

An optimum measurement requires a good argon atmosphere inside the spark stand. Therefore, the opening of the spark stand must always be covered. This will make it more difficult for ambient air to enter the spark stand. A flat sample is highly recommended.

Oxygen and humidity inside the spark stand may result in poor burn spots (see page 46). To remove oxygen from the spark stand, use the "Flush" button or the respective function key of the flush function.

Before starting the measurement, proceed as follows:

1. Ensure that
   - ➔ the operating temperature of the optical system (35 °C) was reached (see function "Maintenance Reminder"),
   - ➔ the electrode gap is correct, see page 28,
   - ➔ the instrument is iCALized, see page 28
   - ➔ the correct and base-relevant parts have been installed, see page 29.
2. Check the spark stand and the sample for any moisture.
   - ➔ It is important that no moisture is visible on the outside.
   - ➔ If necessary, dry the sample.
3. If working with toxic samples, ensure to verify the safety precautions.

✓ The measurement is now prepared.

iCALizing the measuring device (iCAL)

The iCALization procedure (standardizing using iCal) requires a reference sample. The average values of these measurement results are calculated and stored in the instrument.

In order to proceed with iCALization, follow the steps below:

1. Place a clean electrode in the spark stand, see see page 35.
2. Call up the ICAL function with the "ICAL" button or with the corresponding function key.
3. Follow the instructions on the screen and perform the necessary measurements with the reference sample.
4. Poor measurements are highlighted in the iCAL measurement window and can be deleted. Please repeat the respective measurements.

✓ The instrument is iCALized.

Changing the base (multi-base instruments only)

When changing the base, the spark stand must be cleaned in order to avoid memory effects, see see page 33.

- Clean the spark stand insert.
- Change the mica washer, the electrode, and the electrode brush.

✓ Preparation of the instrument for measuring another base is now complete.

6.3.2 Start the measurement



Information

Use the electrode brush in order clean the electrode tip after each measurement.

To measure the probe, proceed as follows:

1. After starting the spectrometer program “Spark Analyzer Pro CHECK”, select the “Analysis” function.
2. If necessary, change the method by selecting "Load Method" or pressing the respective function key.
3. Put the sample in position.
   - ➔ The sample must fully cover the opening in the spark stand plate.
   - ➔ The sample clamp must have contact with the sample (the function circuit of the spark stand is closed).
4. Use "Start" or the respective function key to start the measurement.
   - ➔ The measurement is fully automated.
   - ➔ The measurement is finished automatically.
   - ➔ The measurement results are displayed on the screen.
5. Perform further measurements as needed.
   - ➔ Use the electrode brush in order clean the electrode tip after each measurement.
   - ➔ Rotate the sample slightly for each further measurement. The respective burn spots must not overlap.
6. Use "Start" or press the respective function key to start the series of measurement.

✓ The measurement process is finished.

6.4 Additional functions

The following additional functions are available as an option for the SPECTROCHECK:

- Control samples
- Grade control
- Automatic Reproducibility Test
- Type Standardization
- Pseudo Elements
- Result Export
- Result Distribution

For additional information, please contact your responsible sales organization.

7 Maintenance

Information

In order to ensure the availability and operational safety of the equipment, we recommend having the system checked for correct operation and performance at least once per year by specialized technicians. To find contact addresses of service organizations authorized by SPECTRO go to www.spectro.com

7.1 Maintenance Reminder

The instrument is equipped with a diagnostic system that will prompt you to proceed with a variety of maintenance tasks. The intervals between the individual maintenance tasks are based on certain periods and/or the number of measurements taken during normal use of the instrument. If the instrument is used very little or intensively, the respective defaults should be adjusted accordingly. The following maintenance intervals are monitored.

- General maintenance
- iCALization
- Spark stand cleaning
- Argon exhaust service
- Air filter service

7.2 Maintenance schedule

Start of work	Tasks to be performed
1. Check the argon supply	The min. pressure in the bottle is 20 bar.
2. Diagnosis system - maintenance or check the number of measurements.	Will be specified by the diagnosis system.
3. Check the water level in the gas-washing bottle	Filling/changing, see chapter 7.3.8 „Exhaust filter system - Inspecting the gas-washing bottle“.
4. Check the burn spot	Visual inspection.

Measuring procedure	Tasks to be performed
Clean electrode (6 mm electrode only)	Use the small wire brush to clean the electrode after each spark test.

Monthly maintenance work	Tasks to be performed
Clean the filter mats and replace if necessary.	See chapter 7.4 „Replacing the filter mats“ on page 43.

As required	Tasks to be performed
iCALizing the measuring device (iCAL)	See iCALizing the measuring device (iCAL) check the exhaust hose in chapter 6.3.1 "Preparing the measuring procedure" on page 28.
Replacing the iCALization sample.	See chapter 7.5 „Replacing the ICALization sample“ on page 43.
Clean spark stand.	See chapter 7.3 „Cleaning the spark stand“ on page 33.
the connection	See chapter 7.3.5 „Cleaning the exhaust hose“ on page 38.
Clean/replace the filter insert of the filter bottle.	See chapter 7.3.7 „Exhaust filter system - Change filter insert“ on page 40.
Replace the filter bottle.	As required.

7.3 Cleaning the spark stand

Caution! Instrument damaged or malfunction!

Incorrect cleaning of the spark stand increases the risk of damage to the instrument or malfunctions during measurements.
Please observe the following rules during cleaning:

- Only use a clean, dry and soft cloth to clean the spark stand.
- To clean holes in the spark stand, also use a clean, dry and soft cloth or a bottle brush with plastic bristles.
- Do not use solvents to clean the spark stand. Solvent residues can adversely affect the function of the spectrometer.
- Do not use compressed air (or similar methods) to clean the spark stand. The use of compressed air could cause the condensate to ignite and/or spread inside the laboratory.
- Do not vacuum the spark stand. The condensate could ignite an unsuitable vacuum cleaner. The exhaust filter of the vacuum cleaner may not be suitable for the pore size of the condensate.

The sparking process soils the spark stand with a black precipitate (metal condensate). This metal condensate may create a conductive connection between the electrode and the metal structure of the spark stand wall.

To clean the spark stand, proceed as follows:

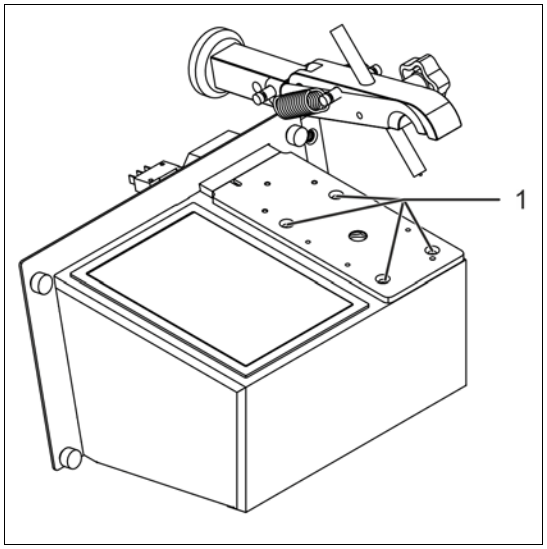
1. Remove the spark stand plate, see chapter 7.3.1 „Remove the spark stand plate“ on page 34.
2. Remove the spacer, see chapter 7.3.2 „Remove/replace the electrode“ on page 35.
3. Remove the electrode, see chapter 7.3.2 „Remove/replace the electrode“ on page 35.
4. Remove the spark stand cover, see chapter 7.3.4 „Removing/attaching the spark stand cover“ on page 37.
5. Remove and clean the spark stand insert, the mica washer, etc., see chapter 7.3.3 „Removing the spark stand insert“ on page 36.
6. Clean the exhaust hose, see chapter 7.3.5 „Cleaning the exhaust hose“ on page 38.
7. Reinstall the components.
8. Use the spacer to set the gap of the electrode, see chapter 7.3.6 „Setting the electrode gap“ on page 39.

✓ The spark stand is now cleaned.

7.3.1 Remove the spark stand plate

To remove and clean the spark stand plate, proceed as follows:

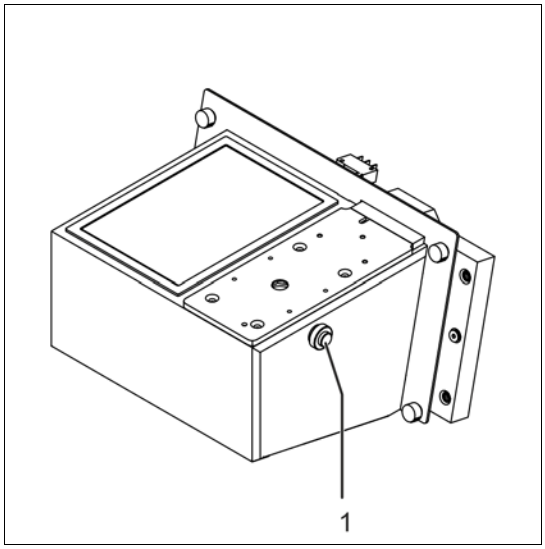
1. Unscrew the four fasteners (1) and remove the spark stand plate.
2. Use a dry grease-free cloth to clean both sides of the spark stand plate.
3. Remove and clean the O-ring located underneath the spark stand plate.



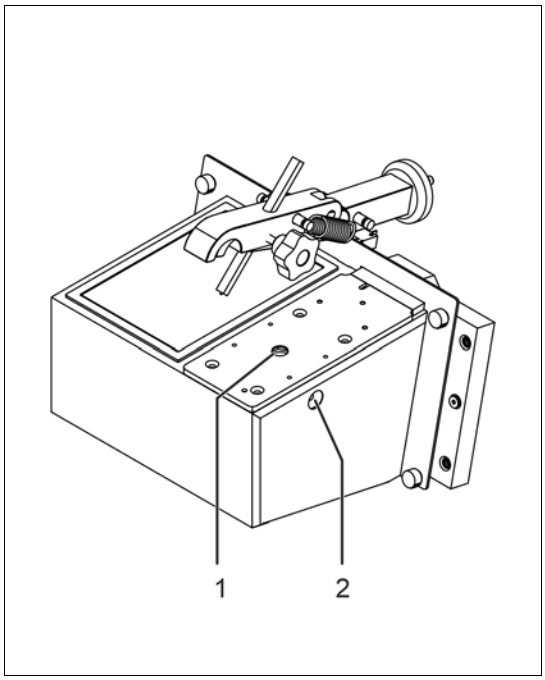
7.3.2 Remove/replace the electrode

To remove/replace the electrode, proceed as follows:

1. Remove the spacer (1) from the spark stand.



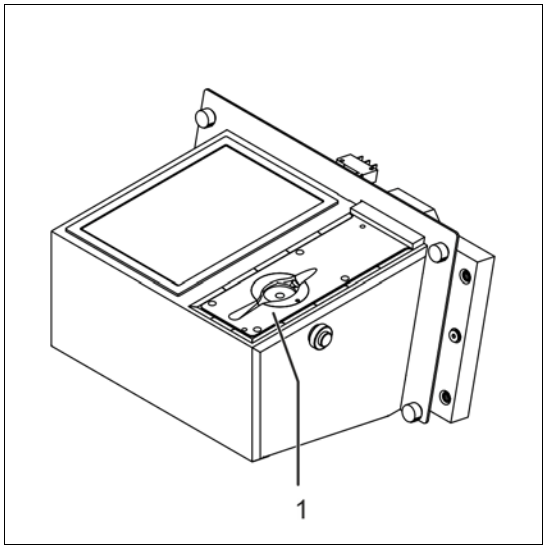
2. Loosen the socket head screw (2), using the provided screwdriver.
   - ➔ A spring is located underneath the electrode (1). In order to prevent the spring from pushing out the electrode and preventing the spring itself from popping out, carefully hold the spacer above the electrode.
3. Pull out the electrode.
4. Insert a new or cleaned electrode.
5. Set the electrode gap as described below, see page 39



7.3.3 Removing the spark stand insert

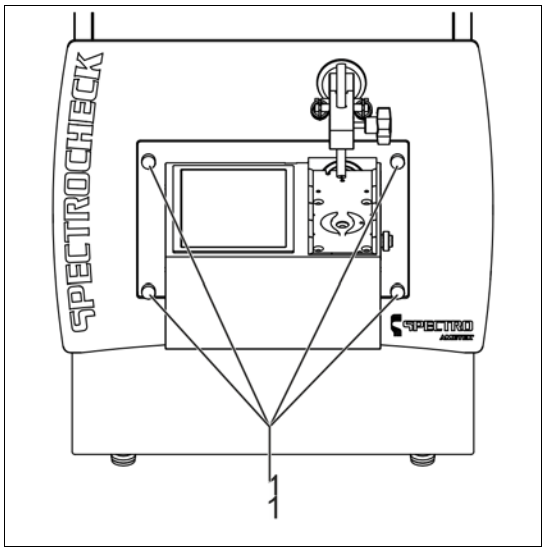
To remove and clean the spark stand insert, proceed as follows:

1. Remove the spark stand plate.
2. Remove the screw from the accessories.
3. Screw it into the spark stand insert (1).
4. Lift the insert and pull it out.
5. Use a dry grease-free cloth to clean the spark stand insert, the mica washer, and the spark stand body.

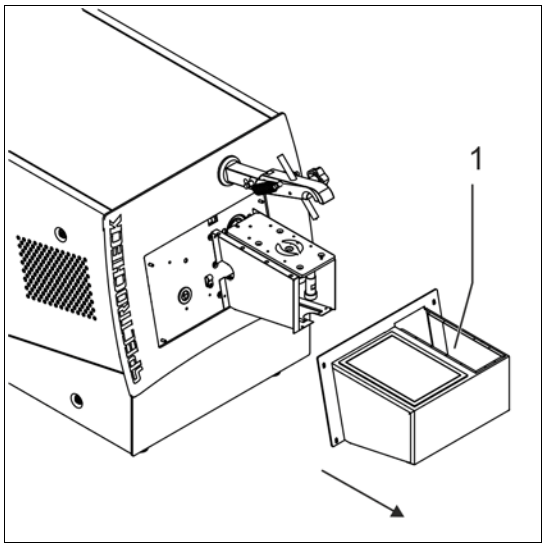


7.3.4 Removing/attaching the spark stand cover

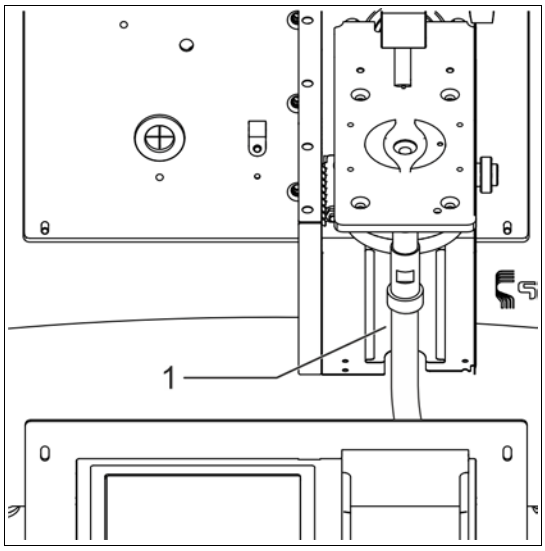
1. Remove the spark stand plate, see (see page 34).
2. Loosen the 4 retaining screws (1)



3. Remove the spark stand cover (1) by pulling it straight towards you.



4. When attaching the spark stand cover, make sure that the external cover plate (1) is inside the spark stand cover

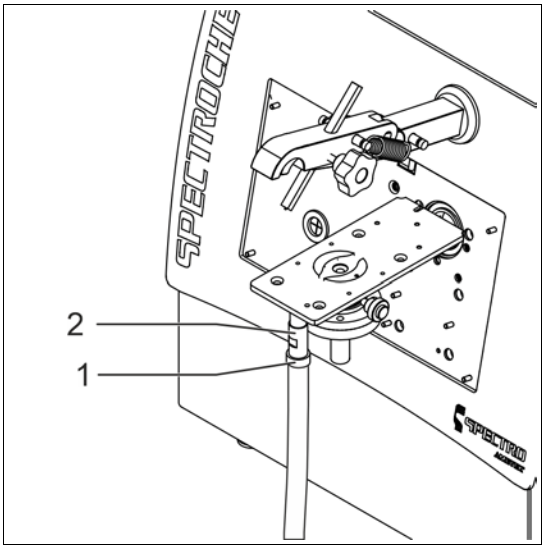


7.3.5 Cleaning the exhaust hose

To clean the exhaust hose, proceed as follows:

1. Turn the union nut (1) to remove the exhaust hose from the spark stand.

   Detach the hose from the filter bottle.
2. Use compressed air or a similar medium and carefully blow out the exhaust hose.
3. Clean the connector (2) on the spark stand.



4. Use a cloth to clean the surface of the spark stand body.
5. Reinstall the components.
   - ➔ Place the mica washer onto the insulator body. Connect the exhaust hose to the spark stand and filter unit.
   - ➔ Put the spark stand cover back on.
   - ➔ Put the spark stand plate back on.
6. Use the spacer to set the gap of the electrode, see page 39.

✓ The spark stand is now cleaned.

Warning! Toxic substances!

The sparking process produces a black precipitate (metal condensate). The condensate could be toxic or flammable, depending on the sample material.

- Check and ensure that the exhaust hose is correctly connected to the spark stand.

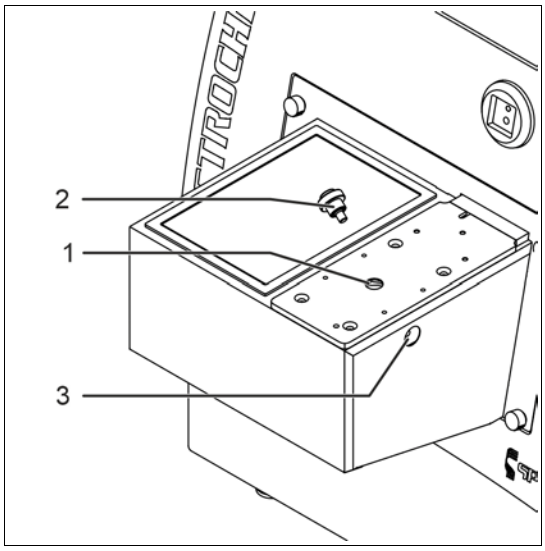
Information

After cleaning a spark stand, proceed with an iCALization.

7.3.6 Setting the electrode gap

After cleaning or replacing the electrode, the gap of the electrode must be reset. To do this, proceed with the following steps:

1. Use the spacer (2) to set the gap of the electrode.
2. Press the spacer into the opening (1) of the spark stand plate.
   ➔ The electrode is pushed to its correct position.
3. Use the supplied screwdriver to tighten the electrode on the Allen screw (3).



✓ The electrode gap is set.

Information

To remove oxygen from the spark stand, use the "Flush" button or the respective function key of the flush function.

7.3.7 Exhaust filter system - Change filter insert



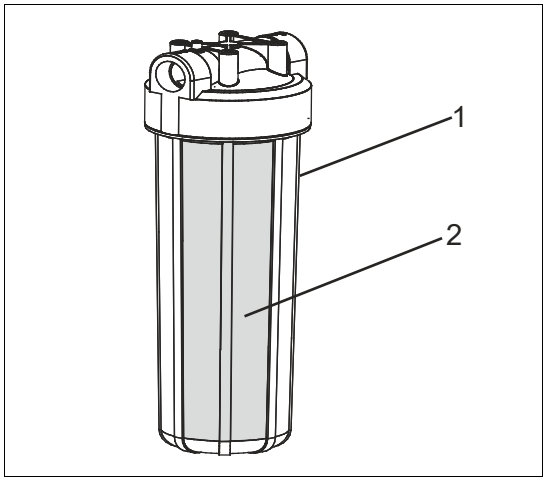


Warning! Toxic or flammable substances!

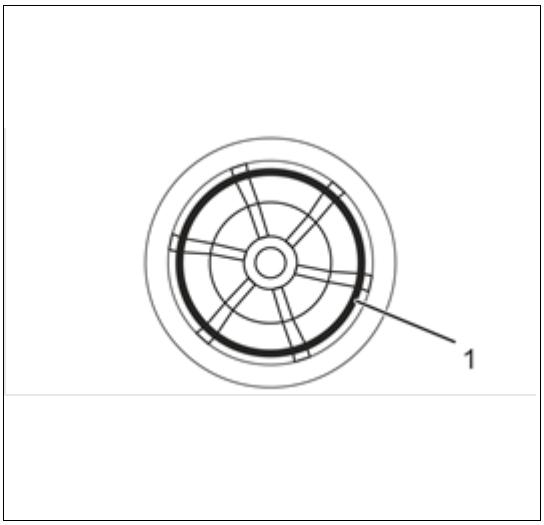
- The sparking process produces a black precipitate (metal condensate). The condensate could be toxic or flammable, depending on the sample material.
- Protective gloves and safety goggles must always be worn when cleaning the spark stand and when cleaning the gas-washing bottle or the filter bottle. This also applies when replacing the filter insert. If metals with toxic components have been sparked off, wearing a breathing mask to prevent inhalation of condensate particles is advisable.
- When disposing of the condensate and the used filters, compliance with legal regulations is mandatory.

To replace the filter cartridge, proceed as follows:

1. Hold the filter cartridge (1) with both hands and unscrew it.
2. Remove the filter insert (2) and place the new insert into the filter housing.



3. Insert the new filter and screw the filter container back into the holder.
   - ➔ Ensure that the O-ring (1) is clean and sits inside the groove. If necessary, use a clean cloth to clean the O-ring.
   - ➔ The filter container should only be tightened by hand.
   - ➔ The filter bottle screws in easily. If not, the filter insert is not positioned correctly.



✓ Now, the filter cartridge is replaced.

7.3.8 Exhaust filter system - Inspecting the gas-washing bottle





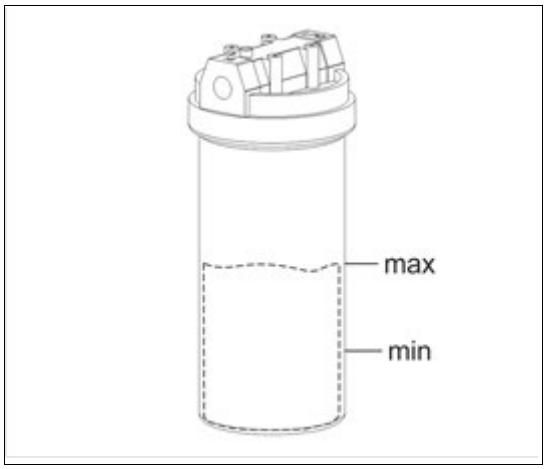
Warning! Toxic or flammable substances!

The sparking process produces a black precipitate (metal condensate). The condensate could be toxic or flammable, depending on the sample material.

- Protective gloves and safety goggles must always be worn when cleaning the spark stand and when cleaning the gas-washing bottle or the filter bottle. This also applies when replacing the filter insert.
- When disposing of the condensate and the used filters, compliance with legal regulations is mandatory.

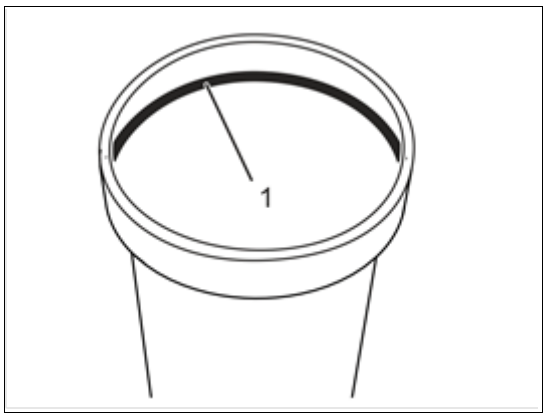
In order to inspect the gas-washing bottle, proceed as follows:

1. Check the water level inside the filter cartridge.
   - ➔ The gas-washing bottle must be filled half with water (see marking on the gas-washing bottle).
   - ➔ The water must be clean.



2. To refill, hold the filter cartridge (2) and unscrew it.
3. Refill water or change it as required.
4. Make sure that the O-ring (1) sits in the groove and is clean. If necessary, use a clean cloth to clean the O-ring.
5. Screw the filter cartridge back in by hand.

✓ The water has been checked/changed.

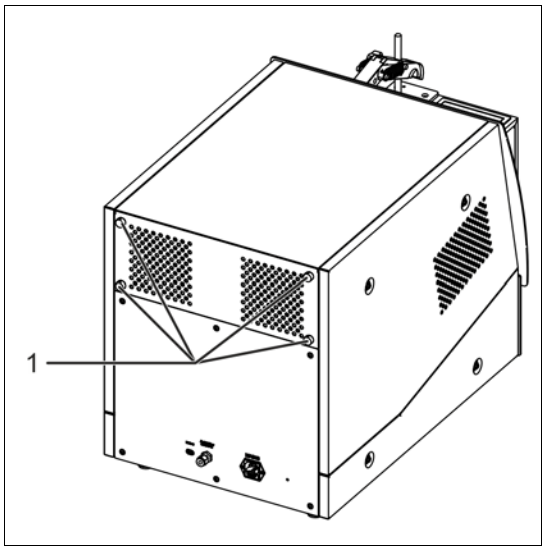


7.4 Replacing the filter mats

In order to replace the air filter, proceed as follows:

1. Loosen the four retaining screws (1).
2. Remove the metal sheet.
3. Remove the old filter.
4. Install the new filter.

✓ Now, the filters are replaced.



7.5 Replacing the ICALization sample

Whenever the iCALization sample is almost used up, a replacement must be procured.

The composition of the new iCALization sample is different from that of the original sample. The intensities of the new sample must be matched to those of the old sample.

Please contact your Service Center.

Information

Do not discard the old ICALization sample before the intensities have been matched. Matching is not possible without using the old samples.

8 Cleaning agents

Information on cleaning and decontamination

- Before using any cleaning or decontamination procedure other than the procedure specified by the manufacturer, the operating company of the instrument must check with the manufacturer that the intended method will not damage the instrument.
- The company is responsible for the proper implementation of decontamination procedure if a hazardous substance has been spilled on or into the instrument.

Unless otherwise stated in the respective instructions, the cleaning agents listed here are preferred for cleaning purposes.

Components	Cleaning agents
Housing	A damp cloth and a mild detergent, isopropanol
Spark stand	Only use a clean, dry and soft cloth to clean the spark stand.

9 Status messages

The status information is displayed in the footer of the software. These indications provide important information about the status of the instrument.

The following information is available:

Status information	Description
Ready	The instrument is ready for measurement if all specifications according to chapter 6.3.1 on page 28 have been met.
Optic room's temperature	Is shown in red as soon as the temperature of the instrument is outside the optic's room temperature range.
Sample Clamp up	The sample clamp is not folded down or a conductive contact with the sample has not been established.
Safety check required	The functional circuit between the sample and the spark stand is tested. Briefly lift sample clamp in order to interrupt the contact to the sample.

10 Troubleshooting

Malfunction	Cause	Remedy
The instrument cannot be switched on.	The power plug is not plugged in properly.	Check if the power plug was plugged in properly.
	Power is not available.	Check the power supply.
	Defective fuse.	Check the fuse inside the power connection socket. If necessary, replace the fuse.
No good burn spot and/or a bad repeatability.	Argon supply is not available or insufficient.	Check argon supply and pressure.
	Poor argon quality.	Connect new argon; specifications, see page 19
	Incorrect electrode gap.	Clean the electrode and re-adjust the gap using the spacer.
	• The samples have not been prepared properly. • The sample surface is not flat enough or has inclusions.	Prepare sample properly, (grind, turn or mill).
	The argon outlet (exhaust) is clogged with condensate.	Clean the spark stand including the argon outlet.
	The dry filter cartridge is blocked.	Replace the filter cartridge, see (see page 40).
When lifting the sample, metal condensate escapes from the spark stand orifice.	• The dry filter cartridge is blocked • The argon outlet (exhaust) is clogged with condensate.	Replace the filter cartridge, see (see page 40). Clean the spark stand including the argon outlet.
The temperature of the optic system is too high (see "Status messages").	Dirt has accumulated on the filter mat.	Replace the filter mats.
	The ambient temperature is too high.	Observe the specified operating range (permissible ambient temperature) 10 °C-35 °C; 50 °F-95 °F
Low intensities in the optical system.	Low transmission.	Use the "Flush" button or the corresponding function key to call up the flush function.

Malfunction	Cause	Remedy
ICALization failed.	Deviation of intensity.	1. Check argon 2. Incorrect sample. 3. Use the "Flush" button or the corresponding function key to call up the flush function. 4. Clean spark stand, adjust electrode. 5. ICALize the instrument. Call service if required

11 Spare parts and consumables

You can find the spare parts and consumables for this instrument under "Support - Parts Catalogue" (Service – Parts Catalogue) on our website at www.spectro.com.

Use only genuine spare parts for repairing the instrument. The use of non-genuine spare parts will make the CE Declaration of Conformity null and void. Excepted are spare parts from manufacturers approved by SPECTRO.

12 De-commissioning

Only organizations or persons authorized by the instrument manufacturer shall be permitted to de-commission the instrument. Please contact your Service Center.

13 Manufacturer address

SPECTRO Analytical Instruments GmbH

Boschstr. 10

D-47533 Kleve

Germany

Tel.: +49.2821.8 92-0

Fax: +49.2821.8 92-22 00

www.spectro.com

Your local SPECTRO Organization or representative can be found under “Contact“ at www.spectro.com

14 EC Declaration of Conformity

The EC Declaration of Conformity is enclosed with the instrument.