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Bruker Quantron

Q6 Columbus Documentation

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Introduction

Thank you for choosing Q6 Columbus !

Before starting to work with your new Q6 Columbus, please carefully read the information compiled for you in this operation manual. It will provide you with important details about the features and handling of the instrument, that enable you to make the most profitable use of the technical merits that Bruker-Quantron instruments offer. Furthermore it informs you about maintenance works that help to preserve the high analytical quality and availability of your system.

We are confident that you will enjoy working with Q6 Columbus.
Wishing you success and fun

Bruker-Quantron Team

About this Manual

This manual contains information about installation, operation, configuration and maintenance of the optical emission spectrometer Bruker-Quantron Q6 Columbus.

Great caution has been paid to write and compile this documentation. Nevertheless errors or mistakes have escaped our notice.
We welcome your comments or advice to improve the quality of this documentation.

Structure of this manual

This operation manual is divided into the following main chapters:

Overview

General view of the system design and components.

Operation

Basic operation of the instrument from switching it on over routine operation up to standardization.

Maintenance

Description of regular service and maintenance works with remarks on how-to and intervals.

Reference

The reference help for the spectrometer software QMatrix. Here you will find explanations for all software functions in detail, structured in the order of the menue system.

Appendices

The appendices will provide helpful additional information: this comprises the references of spare parts and consumables, sample suppliers, CE declaration, of conformity, trouble shooting and service and documentation of external components (e.g. vacuum pumps, etc.).

Who should read this manual

The information in this manual are not only for the operation personnel but also for those uses that are responsible for technical and/or analytical support.

The additional external documentations help the specialists, who are responsible for e.g. servicing or network integration.

A first General View

Bruker-Quantron Q6 Columbus is a spark emission spectrometer with vacuum optic. The system is designed for the determination of element concentrations in metallic, compact samples.

Setting up Q6 Columbus

This chapter contains information about the positioning of Q6 Columbus and the requirements for installation.

To ensure a seamless installation and for a successful routine operation afterwards the following aspects should be considered prior to the delivery of the system.

Delivery

The instrument will be shipped by a forwarding agent authorized by Bruker-Quantron the agreed destination (depending on the contracted Incoterms; e.g. CRF Airport).

From that point the customer has to appoint a appropriate carrier to transport the instrument to its final destination.

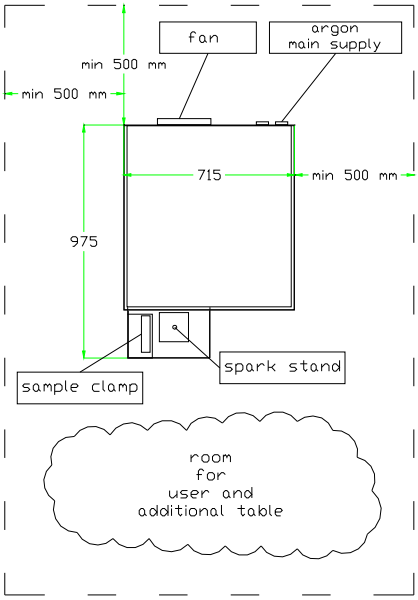
Please have suitable lifting gears and transport vehicles available.

Please check the transport way for obstacles (staircases, small gallows, corners, doors, etc.).
Please inform us about possible difficulties !

The best Place for Q6 Columbus

The required space for the system can be taken from the drawing below. To ensure an efficient maintenance of the system, the minimum distance should not be less than 500 mm, recommended are 1000 mm. Please remember, that the operator has enough space available and possibly additional room and space is required for the sample archive, documentation, argon supply etc. The instrument weighs approximately 150 kg.

required space
for Quantron Columbus



Environmental Conditions

The temperature in the instrument environment may vary between 5 and 40 degrees celsius, the humidity should be below 80% (not condensing). The instruments cabinet is resistant to dust, since the thermal conditioning is a heat exchange system and separates the instrument's interior from the outside environment. Please pay attention to the separate operation and service/maintenance instructions of the system.

Power Supply

The power cord connection is at the backside of the instrument (also see the drawing). Here you will also find the power sockets for devices like the personal computer, Printer, etc.

Voltage:	230 V -15% + 10%
Frequency:	50/60 Hz
Power:	950 W during measurement 350 W in stand-by
Fuse:	16 A slow blow

Argon Supply

The spark stand of the system needs to be flushed with argon. Your gas supplier offers different qualities. For the operation of your system you need argon quality 4.8, often referred to as spectrometer argon. Normally it comes in a 50 liter gas bottle with 200 bar pre-pressure. The pressure at the instrument must be set to 3 bar and be regulated with a pressure gauge. This is not part of the scope of supply of your instrument. The connection to the instrument can be done using the supplied 3 meter copper tube (6mm x 1 mm). The flow depends on the application and type of operation and will be between 0 and 250 l/h. Thus, a 50 liter bottle typically lasts for several thousand measurements.

We would like to make you aware that a high quality argon supply without leakages is essential for a good analysis. If the gas supplier can not ensure the purity of the gas additional cleaning devices need to be used. In this case, please consult Bruker-Quantron for advice and support.

Sample Preparation

The type of sample preparation depends on the kind of samples to be analysed. While non-iron samples are normally milled, steel samples can be grinded with 40 to 60 grade paper. Hard materials like cast iron should be prepared using a swing grinder.

You should be aware of the amount of dust created during sample preparation and consider a suitable location for this. If in doubt, we will assist you in finding the adequate method to prepare your samples since this is the basis for a successful and reliable analysis.

Calibration

The analytical programme (i.e. the calibration ranges) have been discussed and determined during placement of the order. Your instrument will be calibrated using internationally recognized and certified reference material. In case we lack appropriate material for your analytical programme, we have asked you to provide calibration samples. Should this be the case, please make these samples now available as soon as possible, so that we can include them in the calibration without any delay in shipment.

Putting into Operation

After installation and commissioning of the instrument, the spectrometer will thoroughly be checked by our engineer or international service partner. Also – if agreed – this is the time, when your personnel will be trained for the operation and maintenance of the system. If we have calibrated the instrument, the correctness of calibration will be demonstrated with selected samples. Afterwards the system will be put into routine operation and the commissioning terminates with a contract-compliant acceptance of the spectrometer.
Of course we – or our international partner – will assist you with competent answers to all your questions regarding handling, operation, or service and maintenance. And this is not limited to just the first days, but throughout the lifetime of your instrument.

System Overview

Q6 Columbus is an optical emission spectrometer with vacuum optic. It is available as Benchtop or Stand-alone Version (with a floor unit). Both cabinet types contain the same spectrometer and differ only in the height of the base.

Q6 Columbus

Fig.: Q6 Columbus Benhtop

Fig.: Q6 Columbus Stand-alone with floor unit

Front View

All components needed for routine operation can be found on the front side of the instrument.

Due to the clear and well-considered instrument design the system offers a simple and straightforward handling.

1. Spark Stand

The sample is placed on the sample plate. Here the analytical work itself takes place.

Q6 Columbus's spark stand consists of:

- Sample clamp for different sample shapes. The pin to press down the sample can be inserted in vertical or diagonal direction.
- Spark stand with plate and spark opening, below the counter electrode.
- Variable or fixed mask with shutter, depending on application.

  Also see chapter Service & Maintenance

2. Push buttons

Two operation elements are located at the front wall of the cabinet:

- Black Push button (O) to stop a measurement. This button will only rarely be used, for example when a sample is incorrectly positioned on the spark plate, an inclusion is hit and consequently a reasonable result can not be expected. After cancellation the measurement is immediately aborted and no values appear on the screen.
  The same function may again be executed using the software or F3 on the keyboard, respectively.
- White Push button to start a measurement. This white button is labelled „I".
  The same function may be executed using the software or by hitting function key 2 on the PC keyboard.

3. Optic door

The optic door is located directly behind the sample clamp.

Behind this door access to the profiling knob as well as to the optic's light path with its device to exchange the window is granted.

The door can easily be opened by first pressing the black knob, which then moves out. Secondly, a quarter turn releases the lock and the door can be pulled towards the user and be removed.

4. Spark Stand Box

The spark stand box is located directly below the spark stand.

The flap door may be opened by pulling the handle.

Access is granted to release the electrode fixing and the turning knob to release the spark plate.

To close the door again, just move it up and press until you hear it clicking into place.

CAUTION ! DANGER !
Prior opening the spark stand box, set the service switch at the backside of the instrument to position O OFF !!

Backside view

Although not needed during the routine operation of the instrument, the backside panel of the system should be accessible for servicing. Especially since the main and the service switch as well as the power sockets are located here.

Also the argon supply and exhaust pipe with wash bottle are located here and should be easily accessible.

Make sure, that enough space is left around the instrument that allow you to reach the backside easily and safe !

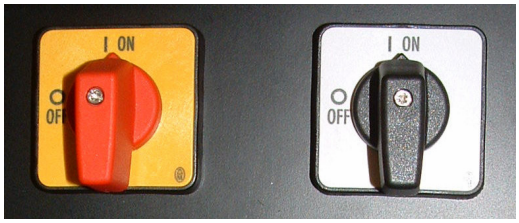
Switch

On the backside of the cabinet two switches are located, labelled „MAIN" and „SERVICE".

The **SERVICE** switch should be set to „ O OFF" for all servicing works. It will switch off the high voltage and also the spark generator (Source). Only after fastenings and closing all cabinet parts or components (e.g. spark stand), the switch should be put again on "I ON".

Analyses can only be done when both switches are in their „I ON" position !

MAIN **SERVICE**



Power Sockets

The outlets at the backside instrument serve as power supply for PC, monitor, printer or other devices to run the instrument. Each of the outlet should not be charged with more than 300 W, all four together not more than 1.000 W !

Vacuum cleaners, grinding or milling machines and other highly power consuming devices may not be connected to these outlets!

CAUTION !
Even after switching off the main switch (MAIN is set to O OFF) still the sockets supply a power of 230 volts !!

Argon Supply

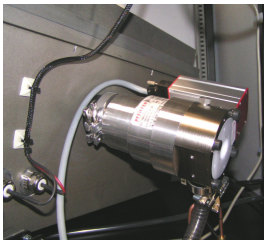
The 6 mm copper tube should be connected with the instrument preferably by a swagelok screw pipe connection. The pressure at the instrument must be set to 3 bar. Argon quality 4,8 often referred as spectrometer argon.

Wash Bottle

The wash bottle is located at the backside of the instrument near the ground. The exhaust pipe of the argon supply ends in the wash bottle to prevent oxygen and nitrogen diffusions into the system. The bottle should be filled to approx. ¾ with water. The water level should be inspected from time to time. In longer intervals the water should be exchanged.

Vacuum pump

Q6 Columbus standard is provided with a powerful rotary vane pump. Optional it could be delivered with an oil free combination of a turbo-molecular-pump directly at the vacuum chamber and a pre-vacuum-pump.



Turbo-molecular-pump *Pre-vacuum-pump* *Rotary vane pump*

The modern vacuum pumps are almost maintenance free. See the operation manual (included into the instrument documentation) of the pump for the regularly necessary maintenance work.

The maintenance work should be done by experienced personnel or the Bruker-Quantron-Service.

Ventilator

The ventilator at the backside of the instrument is running permanently. The filter pads have to be replaced from time to time.

Caution Danger !
Never open cabinet parts of Q6 Columbus without having set the instrument voltage-free. Simple maintenance work could be carried out after having put the service switch to OFF (position „O") before, or having disconnected the power supply, respectively!
In any case you should read the corresponding chapters of this manual carefully and only

perform operations that you have been trained on, and that you feel save to do.
In other cases contact the local service!

Safety Instructions

For save operation of the spectrometer follow the safety instructions:

Make sure, that enough space is left around the instrument that allow you to reach the backside easily and safe !

Run the spectrometer only with power systems with PE-ground wire!

Caution!

For all service and maintenance work the **service** switch at the backside of the instrument has to be switched OFF (position "O") ! Otherwise there is danger of life because of high voltage !

Do not touch the sample during sparking !

Before you start maintenance work you should read the corresponding chapters of this manual carefully and only perform operations that you have been trained on, and that you feel save to do. In other cases contact the local service !

CAUTION ! DANGER !
Prior opening the spark stand box, set the service switch at the backside of the instrument to position O OFF !!

CAUTION ! DANGER !
Never open cabinet parts of Q6 Columbus without having set the service switch to OFF (position „O") before, or having disconnected the power supply, respectively!

CAUTION !
Even after switching off the main switch (MAIN is set to O OFF) still the sockets supply a power of 230 volts !!

Vacuum cleaners, grinding or milling machines and other highly power consuming devices may not be connected to these outlets!

Do not set safety facilities out of operation during operation or repairing of the instrument!

Follow the decal information fixed at the instrument. Do not remove them!

Use only Bruker-Quantron spare parts !

A regular check of the spectrometer by qualified service personnel increases the instrument safety, reliability and life cycle!

Carry out data storage on a regular base ! (See chapter "Service and Maintenance")

Operation

Prepare the Instrument

Check Argon Supply and Pressure

For daily use it must be ensured that the spectrometer has sufficient argon supply. The ingoing argon pressure must be set to three 3 bars.

If the instrument is supplied by an argon bottle, it must be ensured that the bottle pressure is higher than 10 bars. If the pressure drops below 10 bars you have to replace the bottle (see chapter "Service and Maintenance").

Wash Bottle

The bottle should be ¾ filled with water.

Switching on the Instrument

Switch the switches **Main** and **Service** at the backside of the instrument to position "**I ON**". Now the power outlets, argon flow, vacuum pump and aircon are switched on and the instrument is ready for operation.

For all service and maintenance work the **Service** switch has to be set into position **0 OFF**. After finishing the work switch it back to **I ON** again.

Even if the instrument is not used for a longer time (over night) keep the **Main** switch **I ON**. We just recommend to minimize the argon flow. Therefore see QMatrix program "Extras" and change it via dialog "Options".

Only for longer downtime periods as holidays it is recommended to switch the **Main** switch **0 OFF**.

Run QMatrix-Software

Start the the PC and then QMatrix by the correspondent icon. The last used method is loaded automatically.

Setting up the Software

See QMatrix Manual

Perform an analysis

First, put the instrument in an operational status (see previous chapter).

After that perform the following steps.

- **To perform a measurement:**

1. Place a prepared sample onto the spark stand plate, and ensure that the opening in the spark stand is fully covered. The sample should go at least 1 mm over the opening's edge. Ideally the spark spots are placed near the outer edge of the sample surface..
2. Switch the sample clamp down to fix the sample and close the safety circuit. Check the positioning of the sample again.

3. Press the Start button to initiate the measurement. Alternatively this can also be done by using the function key 2 on the computer keyboard or click on the green start icon of the QMatrix software.
4. You hear the sound of the sparking process of the different sequences.
5. Now its time to enter the sample identification.
6. Immediately after the measurement is finished the results appear on the screen..
7. Operate the sample clamp to move it up, lift the sample from the spark plate and clean the electrode with the metal brush.
8. Place the sample again onto the spark plate. This time a different position should face the electrode, thus making sure that you don't spark into the same spot as before.
9. After finishing the second measurement, compare the results with the first sparking. If reproducibility is not satisfactory you should perform a third measurement. Else finalise the analysis with the blue icon in the icon bar or with the F4 key.
10. Depending on the current setup the results will be stored, printed or exported. Afterwards the screen will be cleared or the values may remain.

If the sparking sound is very loud and/or light can be seen between the surface of the spark plate and the sample, abort the process with the Stopp key. Check the sample surface or correct the position of the sample. Try again and ensure not to spark into the same spot again.

Perform a standardization

The standardization (previously know as „Recalibration") is used to bring the instrument back into the same optical conditions as during the calibration.

The required standardization samples were measured during the calibration and are supplied together with the instrument. Changes of the optical environment (e.g. by pollution of the optical light path) can later be corrected by measuring these samples.

For the 2-point standardization for every analytical channel a blank sample exists in which the analyte is not present or in very low concentration, and a high sample with a high concentration of the respective analyte.

The intensity ratios measured during the standardization are compared to those of the calibration and stored. The next analyses will then be corrected by the calculation of offset and correction factor according to the changed conditions.

From the said arises that a standardization only makes sense and is necessary if the environmental conditions have changed. When this is the case substantially depends on the extent of utilization of the instrument, the number of analyses and the matrix.

Best practice is to regularly check with a control sample, if a standardization is necessary. This will also help to save precious sample material. !

After one of the following activities a standardization is necessarily required:
- Cleaning the inside of the spark stand
- Cleaning of the quartz window
- Change of matrix
- Change of argon bottle or modification of gas flows !

For further details see the QMatrix Manual!

Service and Maintenance

Please, follow the following tips to guarantee an optimum instrument condition. With regular serve and care you do not only guarantee a high reliability and achieve low down-times, but also the analytical quality of your spectrometer is preserved.

Non-compliance of the maintenance details or improperly handling of the spectrometer could terminate the validity of guarantee!

ATTENTION!
For all maintenance and cleaning works on the instrument the service switch at the back of the cabinet must be set to position "0" ! Otherwise the applied high voltage threatens your life !

Service intervals

Check argon supply / bottle	Daily
Check burn spot	After each measurement
Brush electrode	After each burn, or depending on the application, respectively
Standardize	Depending on instrument usage
Fill up or change water in the wash bottle	Check in weekly intervals, depending on usage
Clean spark stand	Recommended weekly, but depending on matrix and usage
Change / clean electrode	recommended monthly, but depending on usage
Clean argon exhaust	recommended monthly, but depending on usage
Check / correct profile	As recommended during installation
Data Backup	Monthly or according to customer's internal recommendations
Clean / exchange entrance window	recommended semi-annually, but depending on usage
Replace filter pad of the ventilator	recommended semi-annually, but depending on usage environment situation in significant smaller intervals
Replace standardization samples	When needed
Maintenance works on external components (vacuum pump, PC, etc.)	See corresponding manufacturer manual and instructions

Maintenance Journal

We recommend to keep records of your maintenance and service works at the spectrometer in a small booklet. This "Maintenance Journal" is comparable to the service booklet of your car. The records in this book allow you to trace who did which works and when the next inspection is due. This may also be helpful in a service case.

Please record all maintenance works and the change of the argon bottle.

Check Argon Supply / Bottle

For daily use it must be ensured that the spectrometer has sufficient argon supply. The ingoing argon pressure must be set to three (3) bars.

If the instrument is supplied by an argon bottle, it must be ensured that the bottle pressure is higher than 10 bars. If the pressure drops below 10 bars you have to replace the bottle.

After connecting a new bottle, please flush the complete argon supply system for two minutes. Press key combination <Ctrl+F> in QMatrix to activate the high analytical flow. By hitting <Ctrl+F> again you switch the analytical flow off again.

Oxygen and moisture within the argon atmosphere lead to bad burn spots and also affect the analytical results !

Check Burn Spot

The appearance of the burn spot depends on the material to be analyzed and the excitation parameters. Ideally the spot has a clear diameter with clean limits (the edges are not frayed), it should have a dark metallic shine, single discharge crater can be seen.

If the burn spot looks different than during the installation of the instrument, e.g. bright, white edges, or "frayed", please check the following:

- Does the sample contain inclusions ?
- Is the argon quality okay ?
- Is the argon system gas proof ?
- Has the sample been prepared carefully ?

Brush the Electrode

It is recommended to brush the electrode after each measurement. But the cleaning also depends on the analytical method. The analysis of traces requires a cleaning after each sparking, in order to avoid contaminations.

Standardize

The standardization (formerly called "Recalibration") resets the instrument back into the state as during the calibration.

The required standardization samples were also measured during calibration and come together with the instrument. By measuring these samples changes of the environmental conditions (like soiling of the light path) can be detected and corrected.

For a two-point standardization there is a blank (null) sample for each channel, in which the analyte is not present or only in lower concentrations, and a high sample with higher contents of the respective analyte.

The intensity ratios determined during standardization are being compared with the data obtained during the calibration and stored. By calculating Offset and correction factor with this data, the following analyses can be corrected and thus, adapted to the changed conditions.

It is quite obvious, that a standardization only makes sense, when environmental conditions have changed. The point in time when this is the case depends on various factors like the frequency of usage, the number of samples, and the matrix.

Best is to regularly check the instrument by measuring a control or monitor sample. If the results of such a sample are not within a given range, a standardization is necessary. This will also help to save expensive sample material.

After these activities a standardization is definitely required:
- cleaning of the spark stand
- cleaning of the entrance window
- change of matrix
- change of argon bottle or modification of gas flows !

Please refer to the QMatrix manual on "How to Perform a Standardization" !

Refill or Change Water in the Wash Bottle

The wash bottle is located at the lower backside of the instrument. The exhaust pipe of the argon system ends here to avoid back diffusions of oxygen or nitrogen. The bottle should be ¾ filled with water. The water level should be checked from time to time. In longer intervals the water should be exchanged.

Cleaning the Spark Stand

The spark stand should be cleaned from time to time to remove condensate that has not been blown out of the chamber by the argon flow.

The cleaning interval strongly depends on the usage level of the instrument (number of sparkings) and the matrix. For heavy usage a weekly cleaning is recommended, for average usage it should not be necessary more than once a month.

➢ **To clean the spark stand:**

- **Remove the hose from the wash bottle !**
- Set service switch to "O" (Off) at backside of the instrument
- Lift up sample clamp
- Eventually remove sample from spark stand
- Open spark box front door
- Turn the knurled-head screws approximately one-quarter. The spark stand plate jumps about one centimetre up.
- Lift up and remove spark stand plate
- Turn electrode handle in spark stand box the release electrode. Careful: electrode may jump up. Best is to press finger onto the spark opening to secure the electrode.
- Take off the o-ring and clean with a dry cloth
- Remove and clean glas inlays

- Remove remaining condensate from the spark chamber with a small vacuum cleaner

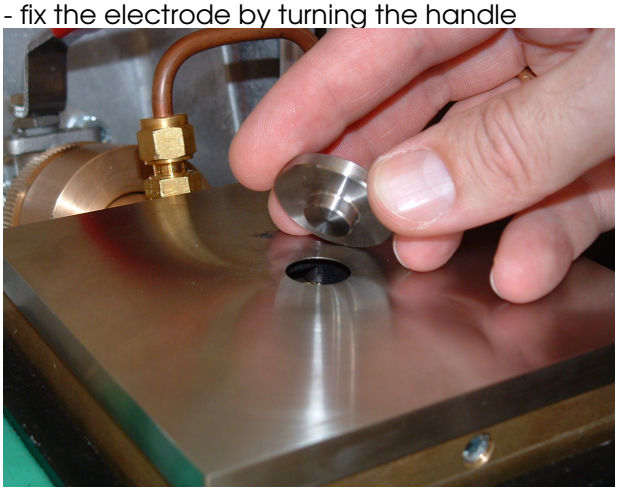
Attention: do not place the vacuum cleaner directly into the exhaust pipe. This could suck water into the spark stand !
In no case the spark stand should be cleaned with a vacuum cleaner through the spark plate opening !

➢ Clean the variable mask or shutter:

- Set the variable mask or shutter into upper position
- Clean the hole (at the backside part of the spark stand) carefully with the vacuum cleaner and make sure that no impurity is left

Attention: In no case disassemble the shutter or variable mask!
This is only allowed to Bruker-Quantron-Service!

- After cleaning replace the spark plate, press down and fix it again by turning the knurled-head screws.
- Replace glas inlay and electrode. Press electrode in and temporarily fix it by turning the electrode handle in the box below.
- Check and adjust the electrode position (spark gap):
  - place spacer above the spark stand opening
  - release the electrode handle and let the spring press the electrode against the spacer.
  - fix the electrode by turning the handle



- close spark stand box
- Replace hose back into the wash bottle !
- After cleaning the spark stand switch argon to analytical flow for about two minutes by pressing key combination <Ctrl+F>. Switch off by again pressing <Ctrl+F> !

Change Electrode

The electrode can be used on both sides. If the tip is rounded, the electrode can be "sharpened" again by grinding at 45°.

To replace an electrode please order this spare only from the manufacturer!

Clean Argon Exit

Depending on the usage level of the instrument, condensate may collect inside the the argon exhaust pipe. This should be removed in regular intervals.

In order to clean the argon exhaust pipe, remove the hose from the wash bottle. A second person should seal the spark stand by pressing the thumb onto the spark stand opening. Closing the pipe at the end builds up a pressure and releasing the pipe again blows out the condensate. Be careful, you may get dirty. Also the hose may then be cleaned with a vacuum cleaner.

Place back the hose into the wash bottle. Then set the argon to analytical flow for two minutes (by pressing <Ctrl+F>). Press <Ctrl+F> again to swith the high flow off after the two minutes.

Check / Correct Profile

The optical system is thermo-stabilized. Consequently the system is resistant to temperature changes.

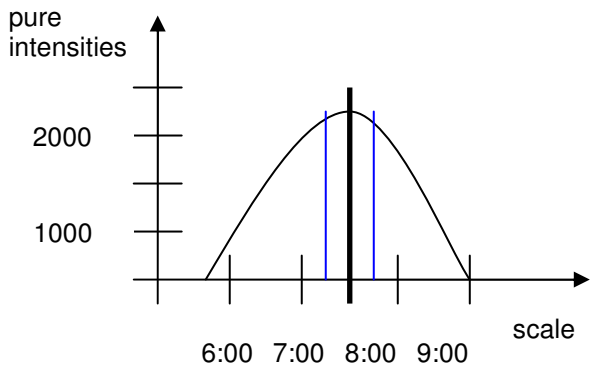
Still checking the profile of the optic from time to time makes sense to exclude profile drifts.

It is recommended to perform this check after the first installation of the instrument weekly (remember to record this in your maintenance journal) ! if no change is detected you may extend the interval to once a month, then every quarter, etc.

➢ **To check the profile:**

- Open the door behind the spark stand
- Take note of the current profile position
- Open the method "Profile" from your analytical programmes (this method has been created by the manufacturer with one or two elements).
- Change mode to raw intensities
- Measure given standardization sample
- Now move the profile knob 300 scale steps left (to smaller numbers) (about three rotations)
- Spark sample
- Turn profile knob 50 scale steps to the right (to bigger numbers) and spark sample
- Continue in 50 scale steps to the right and measure the sample. The intensities should rise again.
- Continue until position is about 300 steps higher than the formerly fixed profile position. Do the last measurement.

- Evaluate the intensity results: at which position die you achieve the highest intensity? The course of intensities should look similar to this graph:



- The highest intensities are between 7:25 and 7:75, so the profile knob has to be set to position 7:50.
- Again make a measurement at this position. The values should be similar to the first measurement (at the old profile position).
- Enter the current value into the maintenance journal.
- Close optic door
- If the profile remains stable over a longer period, a monthly or quarterly check is sufficient.

Data Backup

A regular data backup should be part of every routine maintenance. It should cover both the analytical data as well as the data of the analyses management system (DIA). Please consider eventual internal regulations for data backup practice.

➢ **To create a backup of the DIA database:**

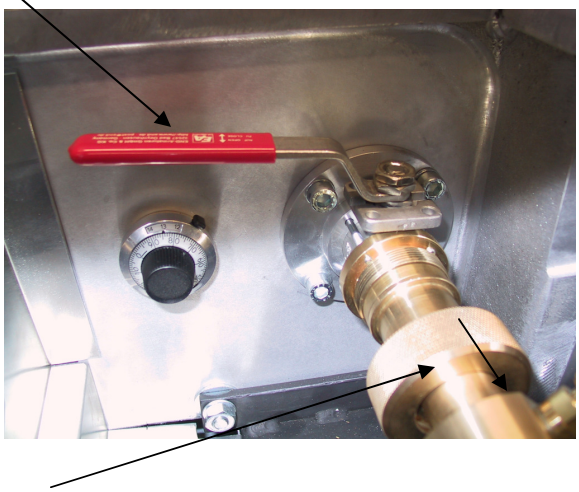
- Open the DIA program group
- Select DIABackup
- Run master backup: click on button <Backup>
- Run DIA backupg: click on button <Backup>
- With Windows Explorer you will find the backup folder in the Bruker-Quantron directory
- Now copy the complete "Bruker-Quantron" folder to CD:
  - insert CD
  - select Bruker-Quantron folder within Windows Explorer
  - Click right mouse key
  - select "Send to"
  - select CD drive (D:)
  - data are being copied to CD

Cleaning the Entrance Window

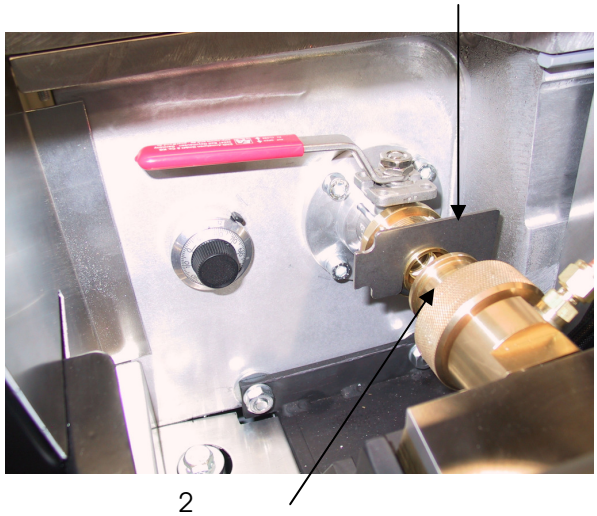
In order to clean the entrance window into the optical system, please follow these steps:

- **Remove hose from wash bottle**
- Set service switch at the backside of the instrument to "O" (Off)
- Open door above spark stand

- Turn the red ball cock to the left to the position shown below



- Turn brass ring to left in order to release and pull it towards yourself
- Pull back light tube towards yourself with the special removal tool (see fig.)



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- Remove Window with the special removal tool as shown above
- Clean Window:

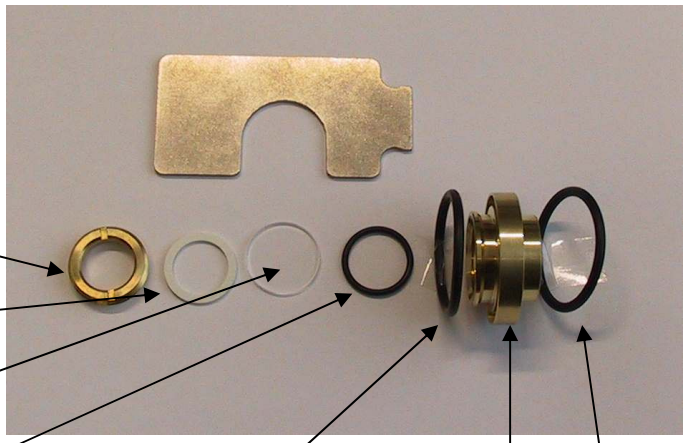
  To clean the entrance window remove it from the window holder with the removal tool (2). To clean the entrance window we recommend to use isopropanol, independent of the window type. Use a clean cloth free of rotgut, best would be microfibre or optic paper (photo shop) and clean with isopropanol alcohol.

Remark: Depending on the application, different entrance windows (Quartz-Window or Lens, MgF_2-Window or Lens) are being used. If required, please contact your local Bruker-Quantron service partner.

- Insert cleaned or new window. Please follow the correct order (seen from the spark stand):

Removal Tool

Spark stand side



1 *Pressure Screw*

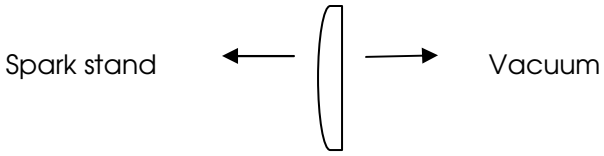
2 *Sealring Window G3/8*

3 *Entrance Window*

4 *O-Ring Window 18x2*

5 *O-Ring Window Set 31x3* **6** *Window Holder* **7** *as 5*

Ad 3. Please ensure the correct positioning of the window: If the entrance window is a lens, the flat side has to face the vacuum (looking into the tank) !



Furthermore, please ensure that:

- That all O-rings are applied to their correct positions
- All sealing surfaces are clean

A closed, proof window is of utmost important to avoid the pump sucking water from the wash bottle up into the spark stand. Cleanliness is important since contaminations will cause longer pump times and possibly affect light intensities.

Attention: To check, if all parts are connected properly, we recommend to shake the window holder carefully. If there are noises to hear, there are loose parts in the window holder and it should not be mounted. It has to be assembled very carefully again!

- Mount back window holder (watch out for correct sides)
- Open red ball cock
- Wait for approx. two minutes, then set service switch to „I" (ON) again
- Spark a sample. If no error message appears, place back the hose into the wash bottle.
- If the error message „Reference intensities too low", this points to a leakage. Do not put the hose into the wash bottle ! Check the mounting of the window. Carefully ensure that all screws and O-rings are tight and proof. Spark sample again. Only if there is no more error message, place back the hose into the wash bottle.
- Standardize

Replace Filter Pad of the Ventilator

At the instrument backside is a ventilator for cooling the instrument. The ventilator is running permanently. The filter pad has to be replaced from time to time.

Replace Standardization Samples

If regularly used, the standardization samples provided with the instruments will be used up after some time. The samples should not be used anymore, when their height is less than one centimetre since then homogeneity of the sample is not ensured. An information about suppliers of standardization samples can be found in the appendix "Spares and Consumables" of this manual.

Using new samples requires to perform a certain setup routine. Please follow these steps:

- For security reasons a backup is recommended (see above)
- Carefully perform a complete, global standardization
- Select method (recommended: Global standardization), in which the sample/s to be replaced are measured. Tip: the sample/s will automatically be modified in all methods that are being globally standardized.
- Select menue option <Standardization>
- Select <Replace Sample>
- Enter the new sample name in column <new sample>. Attention: use the same preceeding number of the old sample, in order to maintain the same sparking order. This should not be changed)
- Click on <Replace>
- The menue <Measuring sequence Global Standardization> opens. The following order should appear here:

  QF…

  QP…

  QI…
- In case you see a different order, mark it and move it with the cursor keys to the correct position
- Confirm with „ok"
- The list with the new sample/s appears
- Measure the marked sample

Now proceed as with a conventional standardization.

After terminating the standardization, the new data (for the new sample/s) will automatically be introduced to all analytical methods that are being globally standardized.

Maintenance Work at external Components (Vacuum pump, PC, etc.)

To service external components please refer to the corresponding operation manual provided by the original manufacturer.

The maintenance work should be done by experienced personnel or the Bruker-Quantron-Service.

Attention:

Before separation of the pump from the instrument the vacuum at the vacuum chamber has to be let off (ventilation screw).

Never open the connection hose at the vacuum tank, only at the pump side!

We necessarily recommend that the maintenance work is done by experienced personnel or the Bruker-Quantron-Service!

Appendix 1: Technical Data

Optical System

Set-up
Paschen Runge / 750 mm

Wavelength range
133 nm – 615 nm

Dispersion
1st order 0,95 nm/mm

2nd order 0,47 nm/mm

Detectors
Channeltron photomultipliers

Highest anode sensitivity

Very stable and low dark current

Up to 32 analytical channels

Vacuum system
High-vacuum system

Spark Stand

Support
Easy change, self-centering

Wear-resistant with special surface

Argon flow
Minimised through standby mode and argon-stop

Light path
Exchangeable window with vacuum lock

Sample holder
Optimised for easy handling

Designed to accommodate large samples

Read-out system

Single Spark Evaluation
Simultaneous acquisition of each single spark in real-time

Hardware
Microprocessor controlled read-out system, easy adaptable to changing requirements

Use of modern and programmable electronics for time-critical jobs

Integrators matched to detector characteristics

High-quality PCI data recording board with sampling rate up to 250 kHz

Instrument control

Communication

Use of Ethernet and TCP/IP between PC and instrument

Use of bus systems for die internal communication

Instrument management

Microprocessor with multitasking operation system to control and monitor all instrument parameters.

Integrated web server for monitoring the instrument condition with a web browser

Source

Control

Digital generation of any discharge current curve through programmable logic modules

Integrated emergency stop

Ignition

Maintenance-free, inductive ignition

Data

Discharge time 10 µs to 2 ms

max. 100 (200) A peak current

max. 1000 Hz spark sequence

Software

Analysis

Analysis software QMatrix with integrated single spark evaluation

Alloy grade monitoring with dynamic internal and external limit check

Material identification of unknown samples

Analysis management

Integrated analysis management using an SQL database

Storage, sorting, filtering, display, searching, printing, archival

Comprehensive statistical evaluation

Certificate writing

Optional SPC charts

Reporting

Email supported reporting system

Diagnosis

Integrated systems for diagnosis and maintenance via internet or telephone

Providing efficient service from remote locations

Evaluation computer

Instrument PC

State-of-the-art PC

Monitor

15" TFT flat screen

Printer

State-of-the-art colour ink-jet printer

Operating system

Microsoft Windows XP Professional*

)* Windows XP Professional is a registered trademark of MICROSOFT Corp.)

Instrument data

Table version

Depth: 750 mm / 29"

Height: 600 mm / 24"

Width : 720 mm / 28"

Support Cabinet (Optional)

Depth: 750 mm / 29"

Height: 330 mm / 13"

Width : 720 mm / 28"

Weight

Approx. 150 kg / 330 lbs

Electrical data

230V -15% / +10% or 115V – 15% + 10%

50/60 Hz

950 W during measurement

350 W standby

16 A slow blow fuse or 25 A slow blow fuse

Appendix 2:
Spare Parts & Consumables

The design of the emission spectrometer Q6 Columbus is user-friendly. For a continuous operation of the instrument only few spare parts and consumables are needed. One set under spare part No. 100425 is shipped together with the instrument.

If in addition parts are required contact the Bruker-Quantron-Service. The service will provide current lists of spare parts and consumables and make sure that you receive the correspondent parts for your spectrometer.

Appendix 3: Sample Suppliers

Following you find some suppliers (we can not guarantee completeness) of standardization and calibration samples (we do not guarantee that this list is complete):

Different Matrices:

- BAM, Unter den Eichen 87, D-12205 Berlin
- BCR Community Bureau of Reference, Rue de la Loi 200, 1040 Brüssel, Belgien
- Brammer Standard Company Inc., 14603 Benfer Road, Houston Texas, USA
- Breitländer GmbH, Postfach 8046, D-59077 Hamm
- CKD Technical Laboratories A.S., Na Harfe7, Praha 9
- MBH Analytical Ltd., Holland House, Queens Road, Barnet, Herts. EN 5 4 DJ, GB
- National Insitute of Standards and Technology, Gaithersburg, Maryland 20899, USA
- SUS Ulrich Nell, Sigmundstr. 8, D-46149 Oberhausen

Fe-Metals:

- BAS Newham Hall, Newby, Middlesborough, Teeside TS8 9EA, BG
- CTIF, 12 Av. Raphael, 75016 Parsi, F
- IRSID, 185 rue President Roosevelt, 78014 Saint Germain-en-Laye 78, F
- SUS Ulrich Nell, Sigmundstr. 8, D-46149 Oberhausen

Non-Ferrous Metals:

- Alcan Ltd., P.O. Box 250, Arvida, Quebec, CDN
- Alcoa International Inc., P.O. Box 2970, Pittsburg, PA, 15230, USA
- Alusuisse –Lonza Services AG, Postfach 428, 8212 Neuhausen a. Rheinfall, CH
- BNF-Fulmer, Denchworth Road, Wantage, Oxfordshire, OX12 9BJ, GB
- Pechiney, 23 Rue Balzac, Paris 8ieme, F
- SUS Ulrich Nell, Sigmundstr. 8, D-46149 Oberhausen
- VAW AG, Postfach 2468, D-53117 Bonn

Appendix 4:
CE – Declaration of Conformity

The optical emission spectrometer Bruker-Quantron Q6 Columbus complies to the requirements of the Council of the European Communities:

- EMV directive 89/336/EWG
- Low Voltage Directive 73/23/EWG

Bruker-Quantron Q6 Columbus has been tested and approved for the use in industrial environments. However, during the measurement procedure (i.e. while sparking) the electro-magnetic radiation may interfere with electronic equipment located nearby the instrument. This especially applies to instruments that do not comply with the minimum protection requirements as requested in the EU directive for industrial environments

Furthermore the following national regulations are fulfilled:

- Instrument Savety Act GSG
- UVV-Regulations BGV A2 (VBG 4)

It is the obligation of the operator to check the instrument condition for safety regularly.

Appendix 5:
Trouble Shooting & Service

For trouble-shooting and service please contact your local service organisation, provided by our appointed partners in your country.

The service partners can also be found in the internet under

www.bruker-quantron.com

Telephone	**+49 (0) 28 24 / 97 65 0-0**
Telefax	**+49 (0) 28 24 / 97 65 0-10**
Email	**service@bruker-quantron.com**

But we will not only support you in trouble-situation. Bruker-Quantron offers comprehensive services for your spectrometer system. Examples are:

- Regular, preventive system check-ups
- Maintenance
- Calibration Check-up Service
- Training

Please contact us or our local partner. We will be glad to provide you with further information about our service contracts.

Appendix 6:
External Documentations

The scope of supply of Q6 Columbus contains certain system components that are described in their own documentation.

These operation manuals are attached in this appendix.

In detail these are:

- QMatrix User Manual
- DIA 2000 – SQL-analyses database
- Documentation of the Personal Computer supplied
- Documentation of the printer supplied
- Documentation of the vacuum pumps