

Instruction Manual

Centrifuge LC 24

with horizontal rotor 6 x

SARSTEDT No.: 90.184.700



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1. Device data

(to be completed by customer)

Type: _____

Serial no.: _____

Place of installation: _____

Date of installation: _____

Inventory no.: _____

2. Manufacturer's address

SARSTEDT AG & Co.
Postfach 1220
D-51582 Nümbrecht

Phone: +49 (0) 22 93 / 305 0
Fax: +49 (0) 22 93 / 305 282
E-Mail: info@sarstedt.com

3. Important notes

**Read the safety instructions in this manual
before putting the device into operation!**

A sound knowledge of the contents of these operating instructions is a basic requirement to ensure correct use and trouble-free operation of the device.

Please keep these instructions in a safe place for future reference.

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SARSTEDT AG & Co.

Explanation of symbols

These operating instructions contain important symbols to indicate dangers and possible operating errors.



The "Caution" symbol means that in this section:

- Important information is given.
- An immediate or possible risk of danger to life and limb of persons is described.
- A note on dangerous situations is given.

Non-observance of these symbols can lead to minor, serious, or even life-threatening injuries as well as to material damage.



Warning of hazardous electrical voltage!



Warning against harmful or irritating substances!

- Failure to observe this symbol can result in severe harm to health.
- Always comply with the applicable accident prevention regulations (APR) when handling these substances.



This "Info" symbol refers to notes regarding proper use of the device or to general, explanatory information. Non-observance of these notes or information can lead to the device being operated incorrectly or even becoming damaged.

Additional symbols contain notes on the topic displayed in the symbol, for example accident prevention regulations, supply voltage, maintenance, or disposal.

Device-specific safety notes



This device has been built according to the latest state of the art and the accepted principles of safety engineering.

All relevant safety information and guidelines, as well as regulations for safety at work and accident prevention regulations for laboratory use must be observed.

Nonetheless, danger can arise for the user or third parties during operation, as well as damage to the device or other material assets.

The device may only be used:

- for the intended purpose
- in technically safe and perfect condition.
- in adherence with the current accident prevention regulations.
- for the separation of materials of varying density or particle size suspended in a fluid.
- with a maximum sample density of 1.15 g/cm³.



The device may not be used:

- in explosion-hazarded areas.
- with flammable or explosive materials or substances that may precipitate strong reactions with one another.
- for centrifugation of toxic or radioactive materials and pathogenic micro-organisms without appropriate safety systems.

During the warranty period, the device may only be repaired by SARSTEDT AG & Co. or by persons authorized by SARSTEDT AG & Co.
In case of improper use or repair, the warranty will be void.
The device is a piece of laboratory equipment and complies with the international standard EN 61010 (safety requirements for laboratory equipment).



The device is operated with a mains voltage of 230 V/50-60 Hz. Therefore, the following notes must be observed:

- No water or other liquids may be permitted to enter the device.
- The device may only be connected to the mains supply by means of a suitable power cord supplied.
- Before operating the device, check the power cord for signs of damage.
- Damaged power cords must not be used under any circumstances.
- The device must only be connected to the mains voltage specified on the type label.
- A damaged device must not be operated.
- Never open housing parts that are fixed with screws.
- Remove the plug from the wall outlet, if the device is not used for a prolonged period or time if it is to be cleaned.



The device must only be used with the accessories described in these operating instructions.

Responsibilities of the owner

The device owner is responsible for ensuring that only such persons are allowed to operate the device, who have read these instructions and understand them. This should be confirmed by the person's signature.

Moreover, the observance of safety regulations by personnel should be checked at regular intervals.

Responsibilities of operating personnel

Before working with the device for the first time, the operator must:

- read these operating instructions.
- observe the applicable rules and the regulations for accident prevention.

4. Other information

Guarantee and liability

The “*Delivery and Payment Conditions*” of SARSTEDT AG & Co. always apply. These are printed on the reverse side of the invoice.

Guarantee and liability claims are excluded, if they are based on one or more of the following causes:

- use of the device for other than the intended purpose.
- improper installation, commissioning, operation, or maintenance of the device.
- operation of the device with defective safety fittings or incorrectly attached or non-functional safety or protective equipment.
- non-observance of the notes in these operating instructions regarding transport, storage, installation, commissioning, operation, maintenance, setting up, or disposal.
- unauthorized modifications to the device.
- catastrophic failure due to external cause and/or force majeure.
- incorrect repairs.

Shutdown / Disposal



- If the device is to be scrapped, it must be handled and disposed of in accordance with the applicable laws and regulations.
- All substances used in connection with the device must be handled and disposed of in accordance with the applicable laws and regulations.



These operating instructions consist of the following materials:
Back binder and protective cover are of PVC – the rest is paper.
Remove the paper by tearing off the back binder.

5. Description of the centrifuge

The centrifuge LC 24 is a table-top centrifuge with horizontal rotor designed for continuous operation. The horizontal rotor included in the standard supply schedule along with the tube holders can accept up to 24 sample tubes. With the LC 24, almost every operating parameter from the acceleration and braking rate to the time and speed settings can be changed. The high speeds and centrifugal forces produce plasma low in thrombocytes to plasma entirely free of thrombocytes, and reduce processing times to a very great extent. The special horizontal rotor allows fast and simple loading of samples along with completely horizontal separation. You can save your settings in one of the 10 memory locations and call them up at the touch of a button

A cover safety switch prevents the centrifuge from operating when the cover is open. The yellow "LOCK" display at the front of the centrifuge lights up as soon as the cover has been correctly locked. In addition to the cover safety switch, the LC 24 is equipped with a "0 rpm" cover locking system. This safety system keeps the cover closed at all times (even in the event of a power failure) and ensures that the cover can be unlocked only when the rotor has come to a standstill.

6. Transport, Installation and Connection

Delivery Schedule

Standard delivery schedule

- 1 x Centrifuge LC 24 horizontal rotor 6 x, SARSTEDT No. 90.184.700
- 6 x Tube holder, 4x 100 mm
- 6 x Caps for tube holders
- 1 x Power cord
- 1 x Operating instructions

Accessories

- 92.184.751 Tube holder, 4x for 100 ml
- 92.184.752 Tube holder, 1x for 50 ml
- 92.184.753 1.0 inch rubber adapter (recommended for glass and flat bottom tubes)
- 92.184.754 0.25 inch rubber adapter (recommended for glass and flat bottom tubes)
- 92.184.755 Caps for tube holders

If you have any questions concerning other SARSTEDT products or the SARSTEDT product range, please contact:

SARSTEDT AG & Co.
Postfach 1220
D-51582 Nümbrecht

Phone: +49 (0) 22 93 / 305 0
Fax: +49 (0) 22 93 / 305 282

or contact your local SARSTEDT sales office.

Unpacking



- Check that the packaging shows no signs of damage.
- In case of transport damage, please contact the shipping agent immediately. Observe the notification periods of the different freight carriers (railway, mail, parcel service, trucking company, etc.). It can be as short as 24 hours.
- Check the scope of delivery for completeness.
- Defects and damage must be notified immediately to SARSTEDT AG & Co.

Technical Data

Machine data

Machine:	Centrifuge LC 24
Order No.:	SARSTEDT No. 90.184.700
Centrifuge motor:	HP brushless induction motor
Timer:	electronic, continuous operation or 1-99 minutes +/- 1%
Speed:	max. 3,500 rpm
RCF:	max. 2,500 x g

Supply

Electrical connection:	230 V ~, ±10 %, 50-60 Hz
Power consumption:	200 Watt
Fuses:	4.0 A, can be reset

Ambient conditions

Permissible ambient temperature:	+2 °C to +40 °C
Maximum relative humidity:	90 %, non-condensing

Dimensions

Width x Depth x Height:	370 x 430 x 230 mm
Weight:	approx. 18 kg

Rotor loading

Max. tube size	Number of tubes
17 mm x 100 mm	24
17 mm x 125 mm	12
34 mm x 115 mm	6

Installation



- Position the centrifuge on a firm, vibration-free and flat surface.
- Maintain a safety zone around the centrifuge of at least 30 cm.
- During centrifuging, no person or dangerous substance must come within the safety zone.
- During operation, no contact must occur with other equipment or objects.
- Do not place vibration-sensitive objects or samples on the installation surface.
- There must be sufficient space above the installation surface to open the centrifuge cover.
- Ensure that there is adequate air circulation to prevent the samples and the centrifuge from overheating.
- The installation location must always be well ventilated.

Commencing Operation



Caution before first use!

- Check that the actual supply voltage corresponds with the stated supply voltage.
- Comply with the permitted ambient conditions for the machine.
- In the cold season, after delivery and unpacking, wait approx. 1 hour until the centrifuge has reached ambient temperature (18 °C to 23 °C).
- The control elements are shown in Section 7.



For safety reasons, the locking system is always activated.

- The user can switch it off for approx. 15 seconds by briefly pressing the “OPEN / STOP” button. This is possible only with the centrifuge switched on and the rotor at a standstill.
- At the end of a centrifugation, the cover is automatically unlocked for approx. 60 seconds.

In order to exclude transport damage and to check correct installation, carry out a test run when starting up the centrifuge.

Procedure:

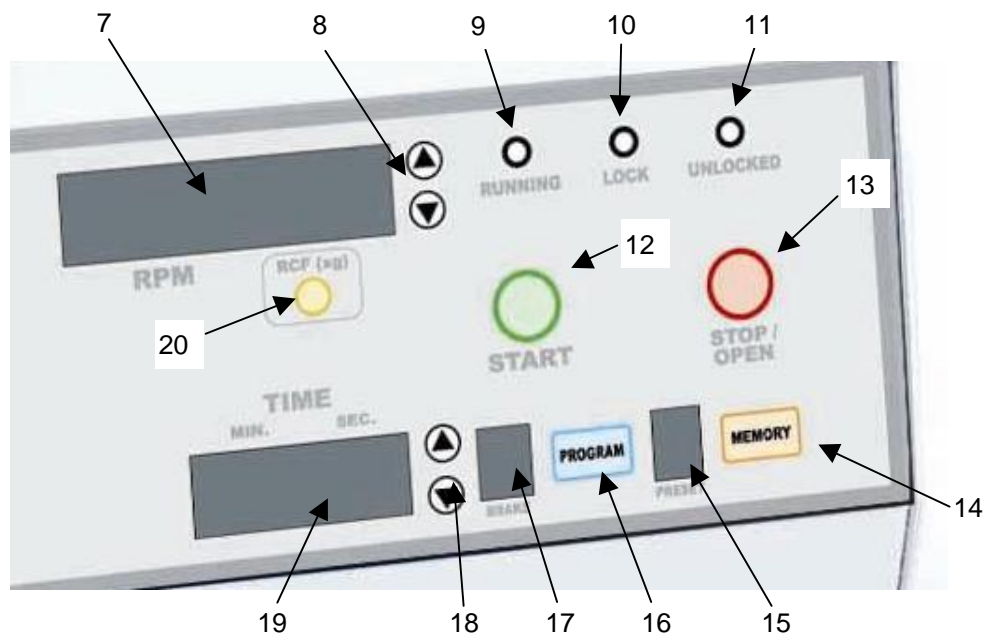
- Connect the centrifuge to the power supply with the power cord.
- Switch on the centrifuge at the main switch.
- The main switch lights up.
- Press “OPEN / STOP” button.
- “UNLOCKED” display lights up.
- Turn the cover knob counter-clockwise and open the cover.
- There must be no foreign bodies in the rotor chamber.
- Turn the rotor by hand checking that it is running freely and horizontally, and that the screw in the middle of the rotor is tight. If this is not the case, do not start up the centrifuge!
- Insert the tube holders without any load and check that they are properly seated.
- The rotor must be evenly loaded.
- Close the cover and turn the cover knob fully clockwise.
- “LOCK” display lights up.
- The centrifuge will start running only when the cover is properly locked!
- Select the maximum speed of 3,500 rpm with the “Arrow buttons [A]”.
- Press the “START” button and carry out a test run.
- The “RUNNING” display lights up.
- The centrifuge accelerates to the correct speed. The tube holders slide into a horizontal position.
- Check the centrifuge for running noises! A soft humming noise should be heard. In the event of loud or unusual noises, stop the centrifuge immediately by pressing the “OPEN/STOP” button and then check the previous points once more.
- Press the “OPEN/STOP” button.
- The test run comes to an end and the rotor is braked to a standstill.
- The centrifuge is now ready to operate.

7. Operation

Control Elements



1	Cover	2	Cover knob	3	Safety lock
4	Control panel	5	Counter	6	Main switch



7	Display [A]	8	Arrow buttons [A]	9	"Running" (operating)
10	"LOCK" (cover closed)	11	"UNLOCKED"	12	"START" button
13	"STOP/OPEN" button	14	"MEMORY" button	15	Memory location
16	"PROGRAM" button	17	Braking rate	18	Arrow buttons [B]
19	Display [B]	20	Switching button RCF		

Time Setting and Continuous Running



- The running time can be set for periods of between 00:30 minutes and 99:30 minutes.
- Changes to settings can also be made during a run.

Time setting:

Enter settings by using the arrow buttons [B]. The settings are then shown in the display [B]. When the centrifuge is started with this setting, the remaining running time is shown in the display [B]. Pressing the arrow buttons once changes the set time by 30 seconds. When a button is kept depressed, each change is increased to a 1-minute step, while continuous pressure raises this to a 5-minute step.

Continuous running:

Press the arrow buttons [B] until the display [B] shows "HOLD". When the centrifuge is started with this setting, the running time appears in the display [B]. Continuous running is automatically ended after 99:30 minutes or before that by pressing the "STOP/OPEN" button. The running time then flashes in the display [B] until the operator opens the cover or unlocks it by pressing the "STOP/OPEN" button.

Speed / RCF



- Changes to settings can also be made during a run.

Enter settings by using the arrow buttons [A]. The settings are then shown in the display [A]. Pressing the arrow buttons once changes the set speed by 50 rpm. When a button is kept depressed, each change is increased to a 100-rpm step, while continuous pressure raises this to a 500-rpm step.

The current speed can be shown in g-values by pressing the "RCF" button. The speed can also be set in g-values by keeping the "RCF" button depressed when pressing the arrow buttons. The "RCF" steps then correspond to the steps selected for changes to the set speed converted to g-values.

Acceleration Rate



- Changes to settings can be made only when the centrifuge is at a standstill
- 10 stages are available from 0 (slow) to 9 (fast).

Setting:

- Press the "PROGRAM" button.
- Press "Arrow buttons [A]" until the display [A] shows "ACCEL".
- The display [B] shows the current acceleration rate.
- Make any changes with the "Arrow buttons [B]".
- Press the "PROGRAM" button to confirm the value set.

Braking Rate



- Changes to settings can be made only when the centrifuge is at a standstill
- 10 stages are available from 0 (slow) to 9 (fast).

Setting:

- Press the “PROGRAM” button.
- Press “Arrow buttons [A]” until the display [A] shows “BRAKE”.
- The “braking rate” display shows the current braking rate.
- Make any changes with the “Arrow buttons [B]”.
- Press the “PROGRAM” button to confirm the value set.

Countdown Delay



- Changes to settings can be made only when the centrifuge is at a standstill
- When the countdown delay is switched on, the timer starts to count down only when the rotor has reached the final speed set by the user. This function ensures that the samples are centrifuged at the selected speed over the entire running time.

Setting:

- Press the “PROGRAM” button.
- Press “Arrow buttons [A]” until the display [A] shows “CNTDLY”.
- The display [B] shows the current setting.
- Make any changes with the “Arrow buttons [B]”.
- Press the “PROGRAM” button to confirm the value set.

Sensitivity of the Imbalance Trip



- Changes to settings can be made only when the centrifuge is at a standstill
- This centrifuge is fitted with an imbalance sensor. This ensures that the centrifuge shuts off in the event of incorrect loading or a fault. This function is for the user’s safety and extends the life of the centrifuge. The LOW setting allows a greater imbalance before the centrifuge shuts off.
- To achieve maximum life for the centrifuge, set the imbalance trip to “HI” and centrifuge only balanced loads.

Setting:

- Press the “PROGRAM” button.
- Press “Arrow buttons [A]” until the display [A] shows “BALANC”.
- The display [B] shows the current setting (LOW or HI).
- Make any changes with the “Arrow buttons [B]”.
- Press the “PROGRAM” button to confirm the value set.

Audible Signals



- Changes to settings can be made only when the centrifuge is at a standstill
- A selection can be made from six different audible signals

Setting:

- Press the “PROGRAM” button.
- Press “Arrow buttons [A]” until the display [A] shows “BEEPER”.
- The display [B] shows the current setting
- Make any changes with the “Arrow buttons [B]”.

Setting	Beep tone when pressing a button?	Signal at the end of the running time
1	NO	NONE
2	YES	NONE
3	NO	YES, 5x BEEPS
4	YES	YES, 5x BEEPS
5	NO	YES, CONTINUOUS BEEP; user must press the “STOP/OPEN” button to stop it
6	YES	YES, CONTINUOUS BEEP; user must press the “STOP/OPEN” button to stop it

- Press the “PROGRAM” button to confirm the value set.

Saving and Retrieving Settings

This centrifuge can save up to 10 user-defined pre-settings. These programs contain all parameters necessary for determining the conditions for a specific operation (running time, speed, acceleration rate, braking rate etc.). The user can use the program memory locations to configure the centrifuge as quickly as possible to a specific type, and to ensure that centrifuging is carried out under identical conditions by selecting the same program each time.

Saving a setting:

- Set all parameters (speed, time, acceleration rate etc.), which are to be saved.
- Press the “PROGRAM” button until the “memory location” display starts to flash.
- Select the desired memory location with the “Memory” button
- Press the “PROGRAM” button to save this configuration in the memory location displayed.

Retrieving the setting from the memory:

- Press the “Memory” button repeatedly until the desired memory location appears in the “memory location” display.
- As you go through the set parameters, the parameters set with this program appear in the relevant displays.
- When you have found the desired memory program (0-9), wait a short time until the memory display flashes. The configuration, which was saved is now loaded.



- Once loaded, a configuration remains active until a change is made on the control panel.
- Memory locations can be overwritten, by making a selection during the storage process.

Counter

This centrifuge is designed for monitoring of device use and routine maintenance oversight by means of a mechanical counter. The counter is located on the front of the device.

Access to the Rotor Chamber during a Power Failure

If a power failure occurs, it may be impossible to unlock the cover in the usual manner. If this happens, you can gain access to the rotor chamber by removing the label in front of the cover lock and manually deactivating the locking mechanism with a pen (see illustration). Pull the mechanism in the direction of the control panel, unlock it and open the cover. Then re-stick the label in position.



If the centrifuge is damaged, have it checked by a technician before further use!

Loading the Rotor

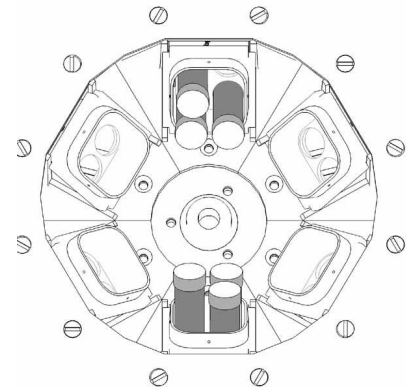


- The centrifuge must be evenly loaded for it to function properly.
- For spinning glass- or flat bottom tubes, we recommend, to insert rubber adapters in the holder base. Otherwise the sample tubes could be damaged.

To ensure even loading, comply with the following rules when loading the horizontal rotor for six tube holders:

1. Opposite-located tube holders must be identical.
2. Opposite-located tube holders must either be empty or loaded with the same number of samples of the same weight.
3. When centrifuging an uneven number of samples, insert a tube filled with water as a counterbalance.
4. (Only for 4x tube holders): When loading tubes in opposite locations, a counterbalance is achieved by arranging the tubes diagonally (not opposite one another).

Example: Loading six tubes in two carriers. In each carrier, two tubes are placed on the base and one tube at top left. See illustration on the right.



If the tubes are longer than 100 mm (15 ml), do not insert more than (2) tubes per carrier. Load all these tubes on the same side. For example, to centrifuge twelve (12) 15 ml tubes, place two tubes on the right-hand side of each carrier.

Centrifuging



- If a problem occurs during a run, which makes it necessary to shut off the centrifuge, press the “OPEN/STOP” button immediately.

Procedure:

- Switch on the centrifuge with the main switch.
- The main switch lights up.
- Press the “OPEN/STOP” button to unlock the cover and open the cover.
- Insert sample tubes in the tube holder. Comply with the rules for even loading!
- Close the cover and turn the cover knob fully clockwise. The “LOCK” display lights up to indicate correct locking.
If the cover knob does not fully engage, the “LOCK” display will not light up and the centrifuge will not operate.
- Select the settings desired or load a stored setting.
- Press the “START” button.
- The rotor starts to rotate. The “RUNNING” display lights up.
- At the end of the running time, the “RUNNING” display goes out and the rotor is braked to a complete stop.
- The “UNLOCKED” display lights up, the locking mechanism is deactivated, thereby allowing access to the rotor chamber. After the automatic unlocking time has elapsed and with the rotor at a standstill, the cover can be unlocked with the “OPEN/STOP” button.
- Turn the cover knob anticlockwise and open the cover.
- Remove the samples.
- The centrifuge can be started up again immediately.



- **ERROR / BALANC**
In the event of an imbalance, the centrifuge will end its current operation and brake to a complete stop. After the rotor has stopped, open the cover to cancel the error signal, adjust an even load and start a new run. Alternatively, the error signal can be cancelled by pressing the "OPEN/STOP" button.
- **ERROR / SPEED**
The centrifuge cannot run at maximum speed if there is a rotor problem, inadequate power supply or other electrical problems. Press the “OPEN/STOP” button to cancel the error signal and then check the rotor and the power supply.

8. Maintenance and servicing

Service address

Should you have questions or problems concerning the device, please contact the customer service department of DESAGA GmbH / SARSTEDT-GRUPPE in Wiesloch or your local SARSTEDT sales office. Remember to specify the Serial no. of the device.



DESAGA GmbH / SARSTEDT-GRUPPE

Serviceabteilung

In den Ziegelwiesen 1-7

D-69168 Wiesloch

Phone: +49 (0) 62 22 / 92 88 65

Fax: +49 (0) 62 22 / 92 88 60



- Fill in the Contamination Questionnaire (Page 18) and ship it together with the device, a copy of the delivery note, and a short description of the problem.
- Always ship the device in the original packaging.
- The Contamination Questionnaire serves to protect our service personnel. Therefore, please fill it in carefully and completely.

Cleaning



Potential danger of contamination



The regulations for cleaning the device must be observed. Inattentive cleaning or non-observance of the regulations can cause malfunctions!

- Disconnect the device from the mains supply before cleaning.
- Disinfect the device before cleaning.
- No liquid may be permitted to enter the device during cleaning.
- Clean the housing surfaces with a slightly damp cloth. A soap solution may be used. Carefully dry the device after cleaning.
- Do not use scouring agents or aggressive cleaning liquids or solutions (except alcohol) under any circumstances.
- Isopropanol may be used in case of severe soiling.
- Fully/partially halogenated hydrocarbons, ketones, esters, and other chemical not specified by the manufacturer may damage the rotor and tube holders and may not be used.



Example for a disinfectant:

The following aqueous solution can be used as a disinfectant:

25 g ethanol 96 %, 35 g 1-propanol, 0,1 g glyoxal ad 100 g aqua dest.

Apply the solution, and allow it to react for a few minutes, depending on the contamination. If necessary, repeat the application of disinfectant.

Tubeholder:

Small glass particles from a tube breakage remaining in the tube holder can stick to the next sample tube inserted in this holder. When handling this tube, the broken glass can penetrate protective gloves and cause injury from cuts to the user's fingers or hand. Broken glass remaining can result in stress points with subsequent tubes causing further breakage. If a tube breaks, remove it carefully from the tube holder. Dispose of the sample and tube fragments correctly, and clean both the inside and outside of the tube holder. If necessary, use a new rubber adapter and reinsert the tube holder in the rotor.

Regular Maintenance

It is recommended, depending on the amount of use and the external conditions, that the rated speed and the electrical safety be checked every 1-2 years to ensure continuing safe operation.

It is advisable to exchange the tube holders after 24 months of use.

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**Contamination questionnaire
for repair orders**

Dear Customer,

Please complete the contamination questionnaire before you return the instrument to the service department of DESAGA GmbH / SARSTEDT-GRUPPE or to your local SARSTEDT sales representative for maintenance or repair.

Firm:		Department:	
Town:		Street:	
Name:		Phone No.:	
Name of Instrument/Artikel:		SN:	

- The instrument is free from dangerous substances
- The instrument came into contact with the following dangerous substances

	Groups of substances	Substance name
<input type="checkbox"/>	toxic	
<input type="checkbox"/>	acidly	
<input type="checkbox"/>	explosive	
<input type="checkbox"/>	radio-active	
<input type="checkbox"/>	contagiously danger substances	
<input type="checkbox"/>	biol. hazardous subst.	
<input type="checkbox"/>	Other hazardous subst.	
<input type="checkbox"/>	The instrument has been decontaminated according to the legal regulations.	

(Please cross off if applicable!)

Description of the decontamination:

Date:	Signature:
-------	------------