Miltenyi Biotec

MACSQuant® Instrument

User manual

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User manual

Original instructions

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Content

EN

Important safety information

Read the user manual first

⚠ WARNING

Before using the MACSQuant Instrument (MACSQuant Analyzer 10, VYB, or Analyzer 16), read the chapter **Important safety information** and all other information contained in this user manual, including any safety and operating instructions. Pay special attention to all warnings displayed on the instrument. Failure to read and follow these guidelines could lead to improper or incorrect usage and result in damage to the instrument. Improper usage could also cause severe personal injury, death, unpredictable results, instrument malfunction, and premature wear to components shortening the lifetime of the instrument. Such actions may void your warranty. Keep the user manual and any other safety and operating instructions provided with the instrument in a safe place accessible to all users for future reference.

If you have a serious concern regarding the safe use of your instrument, contact your authorized Miltenyi Biotec service provider or call Miltenyi Biotec Technical Support.

General safety instructions

THIS CHAPTER DESCRIBES POTENTIALLY HAZARDOUS SITUATIONS ASSOCIATED WITH THIS INSTRUMENT AND PROVIDES IMPORTANT SAFETY INFORMATION TO MINIMIZE THE RISKS AND PROTECT YOURSELF AND OTHERS.

This chapter provides important information for your personal safety and the correct use of the instrument. Read and observe all instructions carefully before proceeding with the installation and use of the instrument. Observe general safety practices in addition to this user manual.

- Use this instrument only as indicated in this user manual to avoid personal injury and property damage.
- Observe local working area safety instructions and laboratory policies, as well as standards for health, safety, and prevention of accidents.
- Keep this user manual in a place that is always accessible to all users.
- In case of severe accidents, damages to the instrument, or if smoke or flames appear, cut the power supply immediately.
- To entirely disconnect the instrument from the power supply, unplug the power cable.
- Ensure that the power switch and the plug of the power cable of the instrument are easily accessible.

Hazard levels

Signal words are used to warn against hazardous situations and property damages. The following signal words are used in this user manual.

⚠ WARNING or WARNING! indicates a hazardous situation that, if not avoided, could result in death or serious injury.

⚠ CAUTION or CAUTION! indicates a hazardous situation that, if not avoided, could result in minor or moderate injury. It is also used to warn against unsafe practices.

NOTICE or NOTICE indicates information considered important but not hazard related (e.g. messages relating to property damage).

Symbols


SAFETY WARNING: THE DOCUMENTATION MUST BE CONSULTED IN ALL CASES WHERE THIS SAFETY SYMBOL IS USED ON THE INSTRUMENT


ELECTRICAL HAZARD


MOVING PARTS


OPTICAL RADIATION


LASER RADIATION HAZARD


BIOLOGICAL HAZARD


ERGONOMIC HAZARD


PERSONS WEARING A PACEMAKER OR OTHER ELECTRONIC IMPLANTS MUST MAINTAIN DISTANCE


TWO PEOPLE LIFT REQUIRED

ON (POWER ON)


OFF (POWER OFF)


READ THE USER MANUAL BEFORE USING THE INSTRUMENT

FUSE

WEEE (WASTE OF ELECTRICAL AND ELECTRONIC EQUIPMENT)

REF ORDER NUMBER

SN SERIAL NUMBER

TYP TYPE NUMBER

MANUFACTURER

EUROPEAN CONFORMITY MARKING

NRTL CERTIFICATION MARK: PRODUCT MEETS CONSENSUS-BASED STANDARDS OF SAFETY, REQUIRED BY THE OCCUPATIONAL SAFETY/HEALTH ADMINISTRATION (OSHA), DETERMINED BY THE NATIONALLY RECOGNIZED TESTING LABORATORIES (NRTL) TÜV SÜD

UNITED KINGDOM CONFORMITY ASSESSED MARKING

Safety labels

Notice the hazard points and safety symbols of the instrument.

- Keep safety labels and safety markings clean and legible.
- Inspect the safety labels and safety markings regularly and replace them if they are not legible or identifiable from a safe viewing distance.
- Contact Miltenyi Biotec for replacement labels.

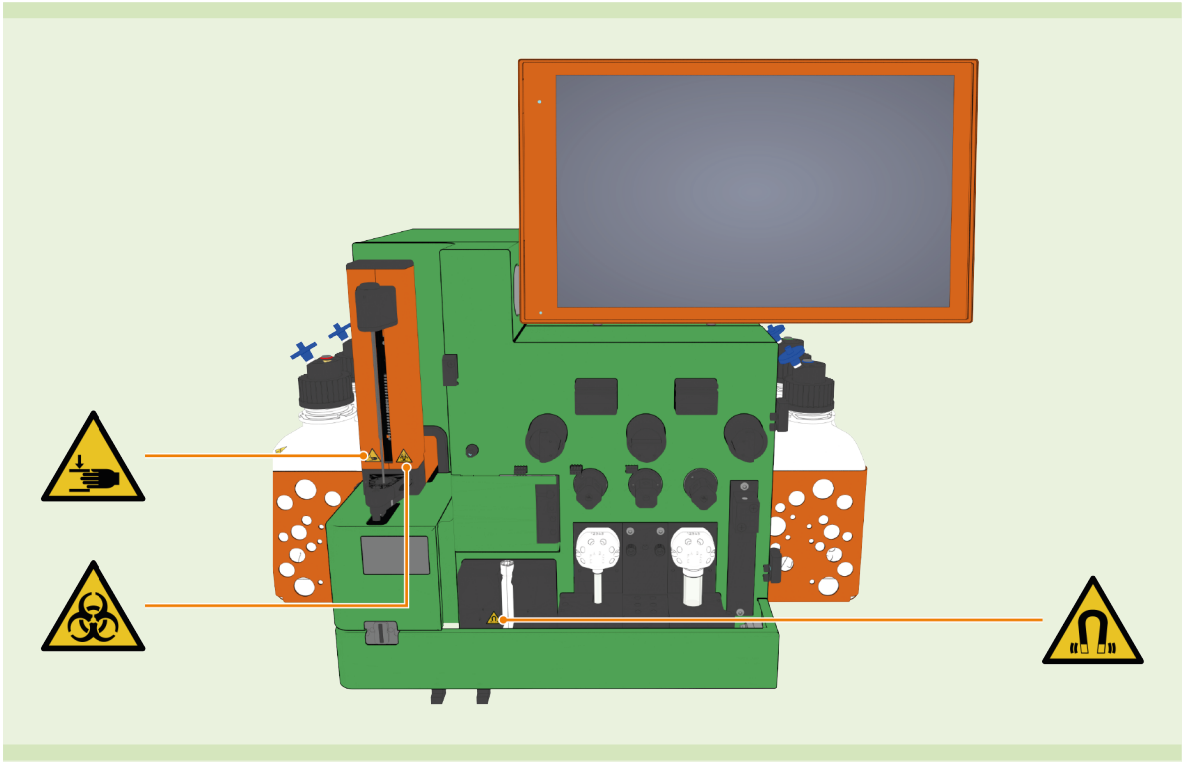


Figure 1: Hazard areas and safety symbols on the front side of the instrument

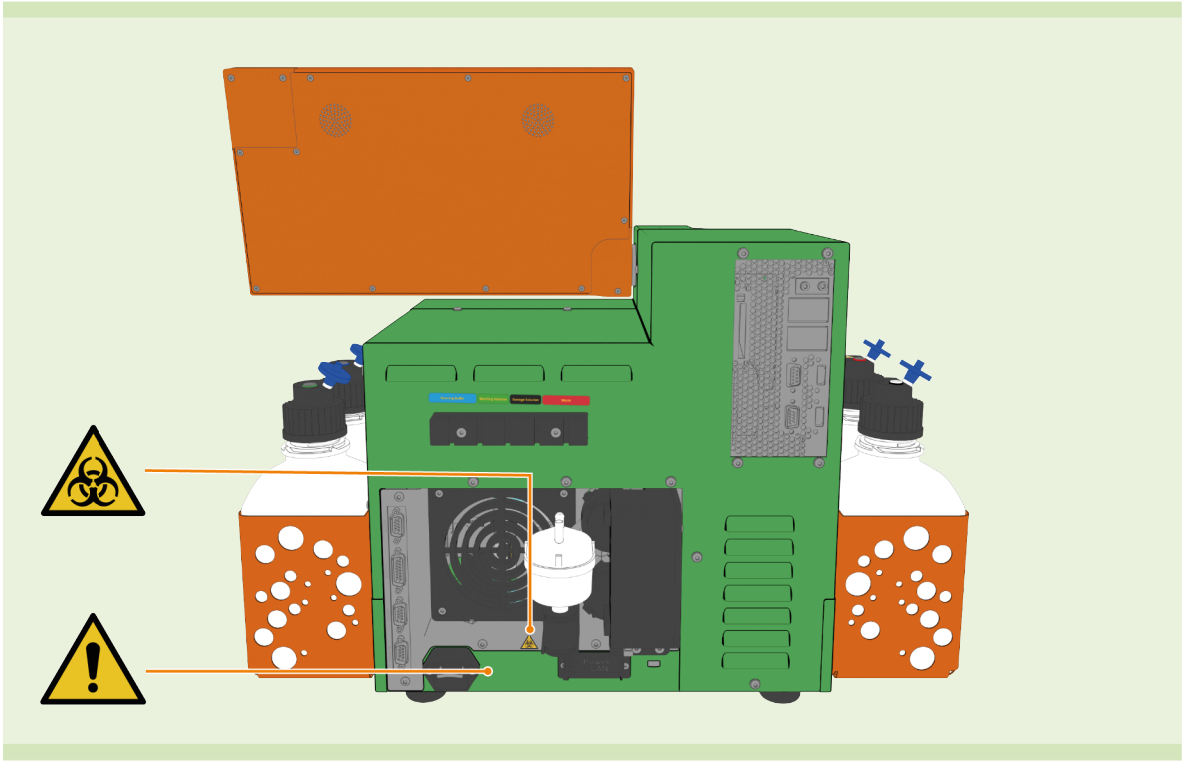


Figure 2: Hazard areas and safety symbols on the rear side of the instrument

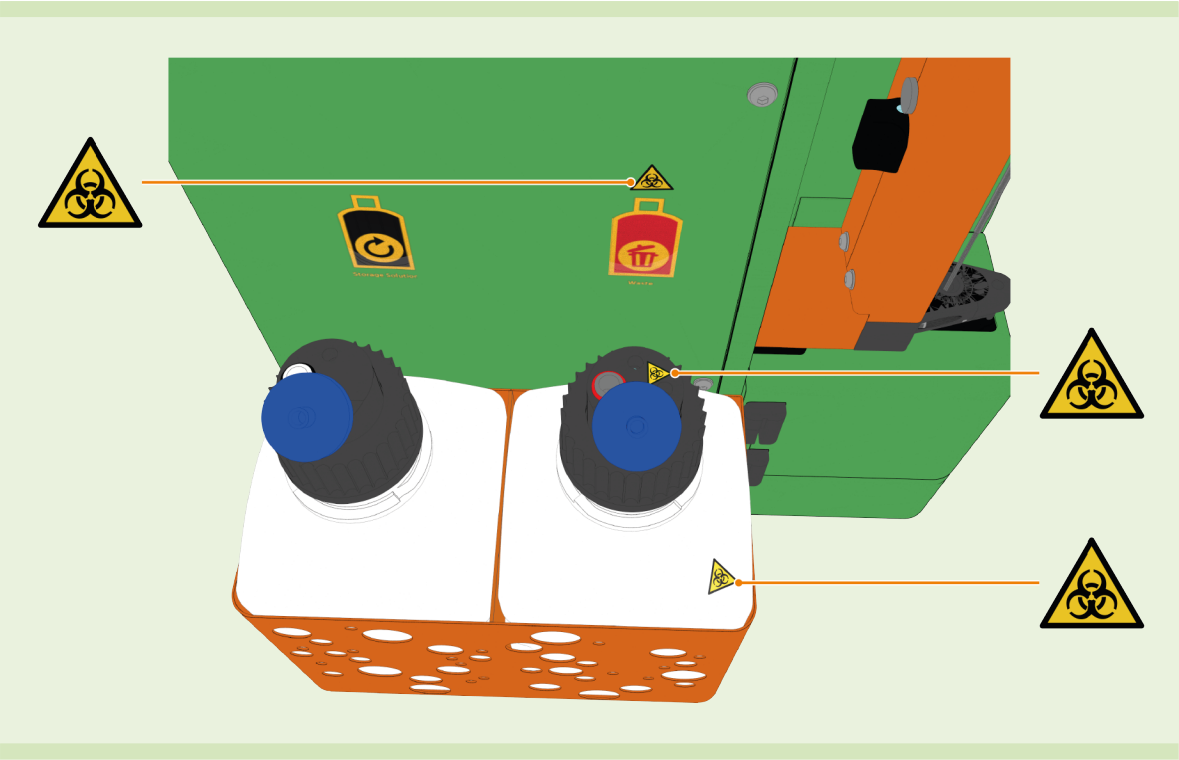


Figure 3: Hazard areas and safety symbols on the left side of the instrument

Electrical and thermal hazards

⚠ WARNING

Electric shock, short circuit, overheating, fire, and explosion could result in death or serious injury. This may lead to burns, severe personal injury, or death.

Protective housing

The housing of the instrument reduces the risk of an electric shock and short circuits. A short circuit can be caused by disassembled parts or objects that have been dropped into the instrument. Emitted sparks, caused by a short circuit, might ignite combustible vapors or material. The protective housing prevents the spread of fire. Do not use the instrument in areas classified as hazardous, for example oxygen-laden environments.

- Do not remove or penetrate any cover of the housing except for the front access covers.
- Only Miltenyi Biotec service personnel are allowed to remove any other cover of the instrument.
- Do not use the instrument if it is opened or disassembled.
- Do not use the instrument if it has been dropped or is damaged.
- Do not use the instrument if an object entered the inside of the instrument.

Overheating and fire hazards

Protect the instrument from overheating.

- Leave enough space around the instrument (at least 15 cm on all sides).
- Do not place the instrument next to heat sources, for example heaters.
- Do not cover the ventilation slots and openings of the instrument.
- Ensure adequate air circulation during operation.

Liquids inside the instrument

Liquids inside the instrument can cause short circuits.

- Protect the instrument against spilled liquids.
- Clean up spilled liquids immediately.
- Do not use the instrument if liquids have entered the inside of the instrument.
- Unplug the instrument before cleaning it.
- Use only small amounts of cleaning agents on a soft cloth to wipe the instrument. Do not spray or pour liquid cleaning agents onto or into the instrument.

Humid and dusty environments

Humid and dusty environments can cause short circuits.

- Do not use the instrument in a wet location or areas with high humidity or condensation.
- After moving the instrument from a cold environment to room temperature, wait for the instrument to dehumidify before using it.

Cables and power supplies

Using the instrument with other than the supplied cables is potentially hazardous. The instrument has a three-wire electrical grounding plug with a third pin for grounding. This is a safety feature.

- Only insert the plug into a grounded electrical outlet. Do not try to insert the plug into a non-grounded electrical outlet.
- Do not use the instrument if the power cable is damaged.
- Only use the included power cable.
- Do not use extension cables or power strips.
- Do not overload an electrical outlet.

Biological hazards

⚠ WARNING

Contamination or infection could result in death or serious injury depending on the material used.

Biological material

All biological material must be considered potentially infectious.

- Do not open the front access covers while the instrument is in operation. Exceptions are maintenance procedures that are explicitly described in this manual.
- Keep away from the robotic needle arm while the instrument is in operation.
- Wear personal protective equipment (such as gloves, safety glasses, etc.) as indicated in the safety data sheet for the particular substance.
- Droplets might leak from the system. Operate the instrument in a biological safety cabinet suitable for the used specimen if hazardous or potentially infectious materials are processed.
- Decontaminate the instrument after processing hazardous or potentially infectious material.
- If hazardous or potentially infectious material has been spilled or leaked from the system, decontaminate the affected area.
- Do not continue to use contaminated accessories or parts of the instrument.
- Run the **Clean** program first before maintenance work on any part of the fluidic system.

- Do not load or unload samples or racks while the instrument is in motion.
- Leave enough space around the MACS MiniSampler Plus (at least 15 cm on the left and right side).

Waste

All liquid and solid waste must be considered hazardous.

- Prefill the empty waste bottle with an appropriate disinfectant according to the specification of the manufacturer.
- Immediately replace the waste bottle after unmounting and fasten the bottle closure to the new bottle.
- Always have an empty waste bottle available.
- To avoid spillages, install only one bottle at a time.
- Autoclave or alternatively decontaminate waste with an appropriate disinfectant.
- Follow the general laboratory safety regulations when handling liquid and solid waste.
- Observe local regulations regarding waste disposal.

Equipment damage

Defective or inadequate equipment can cause a biological hazard.

- Always inspect the fluidic system and check for leakages before using the instrument.
- Exchange hydrophobic air filters once a year to avoid clogging through dust deposits.
- Exchange hydrophobic air filters if they came into direct contact with any liquid to avoid clogging of the filters and to prevent contamination of liquids.

Chemical hazards

⚠ WARNING

Substances and reagents can be hazardous.

- All safety measures in section **Biological hazards** also apply to any hazardous substances and reagents that may be present in the sample.
- Operate the instrument in a fume hood if hazardous substances and reagents are processed.
- Use any substances and reagents only as stated in the respective safety data sheet.

Magnetic field hazards

⚠ WARNING

The instrument has a powerful magnet.
Strong magnetic fields can influence the functioning of pacemakers or electronic medical implants.

If wearing pacemakers or electronic medical implants, keep a distance of at least 30 cm from the instrument.

⚠ CAUTION

The instrument has a powerful magnet.
Magnetizable objects can suddenly move towards the magnet.

- Keep all magnetic storage devices, electronic equipment, and magnetizable objects at a distance of at least 30 cm from the instrument.

Mechanical hazards

⚠ CAUTION

Moving parts.

Risk of crushing or cutting.

Robotic needle arm

The robotic needle arm moves while the instrument is in operation.

- Do not operate the instrument without the needle guard.
- Keep away from the robotic needle arm while the instrument is in operation.
- Do not obstruct the movement of the robotic needle arm.

MiniSampler

The carriage of the MiniSampler moves.

- Keep away from the MiniSampler while the instrument is in operation.
- Always stop or abort a process before handling accessory hardware or consumables.
- Do not load or unload samples or racks while the instrument is in motion.

Fluidic system

Syringe pumps are a part of the fluidic system. They move while the instrument is in operation.

- Keep away from the fluidic system while the instrument is in operation.
- Do not open the front access covers while the instrument is in operation.

Optical radiation hazards

⚠ CAUTION

Exposure to optical radiation could result in eye injury.

Bottle illumination

Powerful LEDs are used to illuminate the bottles. Radiation of disassembled units may lead to eye injury. According to the international standard IEC 62471, this lamp system is in excess of the Exempt Risk Group and there are risks dependent on the use of the instrument. The exposure hazard value (EHV) measured at a distance of 20 cm from the bottle holders is 0.91, the hazard distance is 19 cm for Risk Group 1.

- Do not look directly at LED radiation.
- Do not disassemble, modify, or remove the installed LED radiation sources or their mounting rackets. LED radiation sources do not automatically stop emitting when disassembled.
- Do not remove the bottle holders unless integrating the instrument into a liquid handling system.

Laser radiation hazards

⚠ CAUTION

Direct exposure to laser beam could result in eye injury.

Rack detection

The instrument has four vertical cavity surface emitting lasers (VCSEL) for automated rack detection (Class 1M). The radiation is not visible.

- Do not look at the VCSEL port through optical instruments such as lenses, magnifying glasses, etc.

- Keep a distance of 10 cm from the VCSEL port.
- Avoid that the path of the light beam is at the same height as the human eye during operation.

Laser

The instrument has three Continous-Wave Lasers. The lasers are classified as laser class 3B. The lasers are secured by a protective housing.

- Do not remove the protective housing.

	Output power	Pulse time	Wavelength
MACSQuant Analyzer 10			
rack detection	3.3 mW	215 µs	850 nm
internal laser 1	40 mW	continuous	405 nm
internal laser 2	30 mW	continuous	488 nm
internal laser 3	20 mW	continuous	640 nm
MACSQuant VYB			
rack detection	3.3 mW	215 µs	850 nm
internal laser 1	40 mW	continuous	405 nm
internal laser 2	50 mW	continuous	488 nm
internal laser 3	100 mW	continuous	561 nm
MACSQuant Analyzer 16			
rack detection	3.3 mW	215 µs	850 nm
internal laser 1	65 mW	continuous	405 nm
internal laser 2	50 mW	continuous	488 nm
internal laser 3	72 mW	continuous	640 nm

Table 2.1: Laser output power, pulse time, and wavelength

Ergonomic hazards

⚠ WARNING

Heavy instrument.

Risk of tearing or straining muscles.

- Two people are required to lift the instrument.
- Grip the instrument at the base of the orange bottle baskets located at both sides of the instrument.

Servicing and transportation

Servicing

Improper servicing or repair of the instrument or use of unauthorized parts can cause malfunction of or damage to the instrument. This can cause hazards to users. Unless otherwise specifically stated in this user manual or other documentation by Miltenyi Biotec, do not service the instrument yourself. Servicing and repair must be performed by Miltenyi Biotec certified and qualified service personnel. If the instrument needs servicing, decontaminate the instrument to remove any hazardous material. If you have questions regarding

proper decontamination or shipment, contact Miltenyi Biotec Technical Support for assistance. Only use accessories and upgrades recommended by Miltenyi Biotec. Inquire with your local Miltenyi Biotec representative about Miltenyi Biotec's extensive instrument service and service contracts, or refer to **www.miltenyibiotec.com/support**.

Transportation

The instrument must be transported with care in packaging specified by Miltenyi Biotec. Internal damage could occur if the instrument is subjected to excessive vibration or if it is dropped. If the instrument needs to be shipped back to the manufacturer for service, contact Miltenyi Biotec for instructions and packaging materials.

Disposal

WASTE OF ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE) CUSTOMER INFORMATION

Dispose of your end-of-life Miltenyi Biotec products in accordance with the applicable WEEE and hazardous waste disposal legislation, which may differ by country or region. Electrical equipment may contain hazardous substances that may have a serious detrimental effect on the environment and/or human health. All equipment must be specifically collected and treated by designated waste facilities and by qualified WEEE compliance schemes. By ensuring that you dispose of your unwanted electrical and electronic equipment according to the applicable WEEE and hazardous waste disposal legislation, you are helping to preserve our natural resources and protect human health. Miltenyi Biotec is committed to protecting the environment. Miltenyi Biotec offers product end-of-life return programs in many countries and partners with licensed WEEE compliance schemes throughout the world. Miltenyi Biotec takes back your end-of-life Miltenyi Biotec equipment for recycling free of charge. The terms and availability of this offer vary by geography because of differences in regulatory requirements. Note that, depending on the type and use of your equipment, additional requirements may apply. Before shipping the instrument back to the manufacturer for disposal, decontaminate the instrument to remove any hazardous material. For more information or if you wish to dispose of your end-of-life Miltenyi Biotec equipment, contact your local Miltenyi Biotec representative or Miltenyi Biotec Technical Support.

DE

Wichtige Sicherheitsinformationen

Zuerst das Benutzerhandbuch lesen

⚠ WARNUNG

Lesen Sie vor der Verwendung des MACSQuant Instrument (MACSQuant Analyzer 10, VYB, or Analyzer 16) diese **Wichtigen Sicherheitsinformationen** sowie alle anderen Informationen aus dem Benutzerhandbuch. Beachten Sie insbesondere alle auf dem Gerät angezeigten Warnhinweise. Werden diese Richtlinien nicht gelesen und befolgt, kann dies zu unsachgemäßem oder falschem Gebrauch und zu Schäden am Gerät führen. Eine unsachgemäße Verwendung kann auch zu schweren Verletzungen, Tod, unvorhersehbaren Ergebnissen, Fehlfunktionen des Gerätes und vorzeitigem Verschleiß von Komponenten führen, welche die Lebensdauer des Gerätes verkürzen. Eine solche Verwendung kann zum Erlöschen der Garantie führen. Bewahren Sie das Benutzerhandbuch und alle anderen Sicherheits- und Betriebsanweisungen, die mit dem Gerät geliefert werden, an einem sicheren Ort auf, der für alle Benutzer zum späteren Nachschlagen zugänglich ist.

Haben Sie ernsthafte Bedenken hinsichtlich der sicheren Verwendung Ihres Gerätes, wenden Sie sich an Ihren autorisierten Dienstleister von Miltenyi Biotec oder rufen Sie den Miltenyi Biotec Technical Support an.

Allgemeine Sicherheitshinweise

DIESES KAPITEL BESCHREIBT POTENZIELL GEFÄHRLICHE SITUATIONEN IM ZUSAMMENHANG MIT DIESEM GERÄT UND ENTHÄLT WICHTIGE SICHERHEITSHINWEISE, UM RISIKEN ZU MINIMIEREN UND SICH SELBST UND ANDERE ZU SCHÜTZEN.

Dieses Kapitel enthält wichtige Informationen für Ihre persönliche Sicherheit und die richtige Verwendung des Instruments. Lesen und beachten Sie alle Anweisungen sorgfältig, bevor Sie mit der Installation und Verwendung des Instruments fortfahren. Beachten Sie zusätzlich zu diesem Benutzerhandbuch die allgemeinen Sicherheitsvorschriften.

- Verwenden Sie das Gerät nur wie in diesem Benutzerhandbuch angegeben, um Personen- und Sachschäden zu vermeiden.
- Beachten Sie die lokal geltenden Arbeitsschutzvorschriften und Laborrichtlinien sowie die gesetzlich geregelten Maßnahmen zu Sicherheit, Gesundheitsschutz und Unfallverhütung.
- Bewahren Sie dieses Benutzerhandbuch an einem Ort auf, der jederzeit für alle Benutzer zugänglich ist.
- Bei schweren Unfällen, Beschädigungen des Gerätes, Rauch oder Flammen unterbrechen Sie sofort die Stromversorgung.
- Ziehen Sie den Netzstecker, um das Gerät vollständig von der Stromversorgung zu trennen.
- Stellen Sie sicher, dass der Hauptschalter und der Netzstecker des Gerätes leicht zugänglich sind.

Gefahrenstufen

Es werden Signalwörter verwendet, um vor Gefahrensituationen und Sachschäden zu warnen. In diesem Benutzerhandbuch werden die folgenden Signalwörter verwendet.

⚠ WARNUNG oder WARNUNG! weist auf eine Gefahrensituation hin, die, falls sie nicht vermieden wird, zum Tod oder zu schweren Verletzungen führen kann.

⚠ VORSICHT oder VORSICHT! weist auf eine Gefahrensituation hin, die, falls sie nicht vermieden wird, zu leichten oder mittelschweren Verletzungen führen kann. Dies wird auch dazu verwendet, um auf unsichere Vorgehensweisen hinzuweisen.

HINWEIS **oder HINWEIS, weist auf wichtige, jedoch nicht gefahrenbezogene Informationen hin (z. B. Hinweise in Verbindung mit Sachschäden).**

Symbole


SICHERHEITSWARNUNG: BEACHTEN SIE DIE DOKUMENTATION IMMER, WENN DIESES WARNSYMBOL AM GERÄT VERWENDET WIRD


ELEKTRISCHE GEFÄHRDUNG


SICH BEWEGENDE TEILE


OPTISCHE STRAHLUNG


GEFÄHRDUNG DURCH LASERSTRAHLUNG


BIOLOGISCHE GEFAHR


ERGONOMISCHE GEFAHR


PERSONEN, DIE EINEN HERZSCHRITTMACHER ODER ANDERE ELEKTRONISCHE IMPLANTATE TRAGEN, MÜSSEN ABSTAND HALTEN


NUR MIT ZWEI PERSONEN HEBEN

EIN (EINGESCHALTET)


AUS (AUSGESCHALTET)

LESEN SIE DAS BENUTZERHANDBUCH VOR VERWENDUNG DES GERÄTES

SICHERUNG

WEEE

REF BESTELLNUMMER

SN SERIENNUMMER

TYP MODELLNUMMER

HERSTELLER

EUROPÄISCHE KONFORMITÄTSKENNZEICHNUNG

NRTL-PRÜFZEICHEN: DAS PRODUKT ENTSPRICHT DEN IM KONSENSVERFAHREN ERARBEITETEN SICHERHEITSANFORDERUNGEN, WELCHE VON DER OCCUPATIONAL SAFETY/HEALTH ADMINISTRATION (OSHA) GEFORDERT UND VON DER STAATLICH ANERKANNTEN PRÜFSTELLE (NATIONALLY RECOGNIZED TESTING LABORATORIES (NRTL)) TÜV SÜD GEPRÜFT WURDEN

UK CA BRITISCHE PRODUKTKENNZEICHNUNG

Sicherheitskennzeichnungen

Beachten Sie die Gefahrenhinweise und Sicherheitssymbole des Gerätes.

- Halten Sie die Warnaufkleber und Sicherheitskennzeichnungen sauber und lesbar.
- Überprüfen Sie die Warnaufkleber und Sicherheitskennzeichnungen regelmäßig und ersetzen Sie diese, wenn sie nicht mehr lesbar oder aus sicherer Entfernung nicht zu erkennen sind.
- Kontaktieren Sie Miltenyi Biotec, um Ersatzaufkleber zu erhalten.

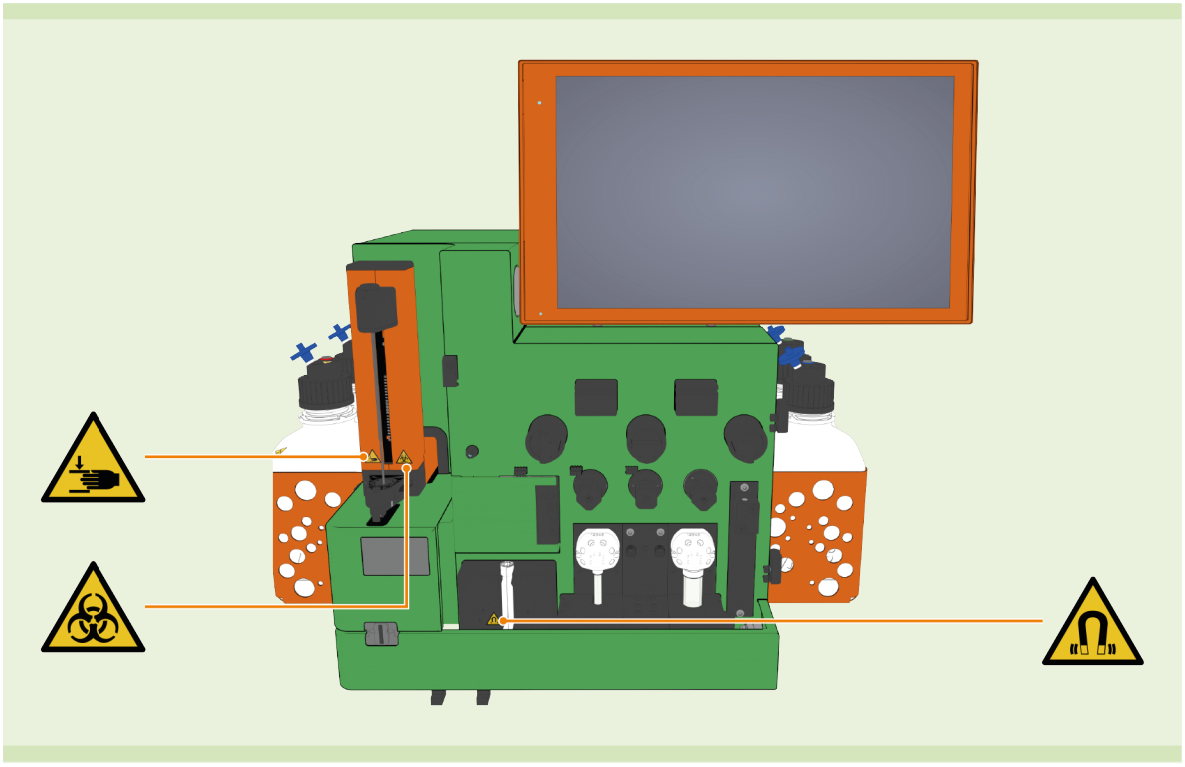


Figure 1: Gefahrenbereiche und Sicherheitssymbole auf der Vorderseite des Gerätes

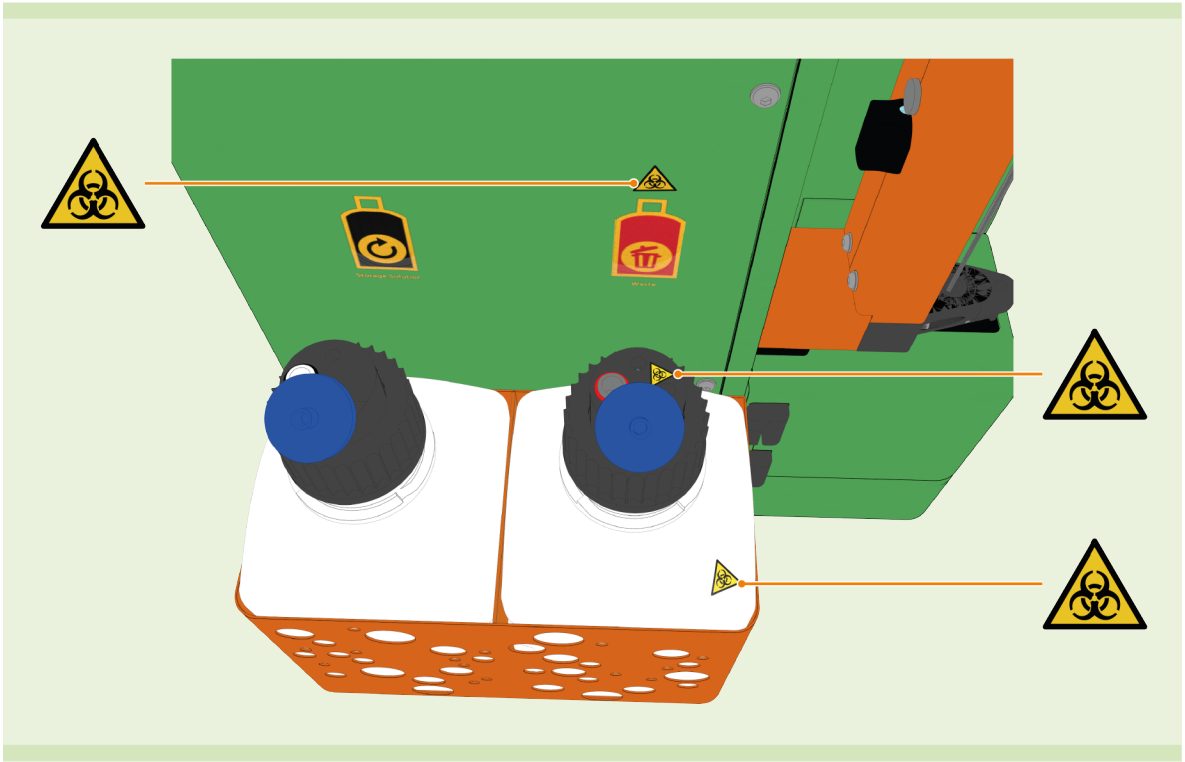


Figure 2: Gefahrenbereiche und Sicherheitssymbole auf der linken Seite des Gerätes

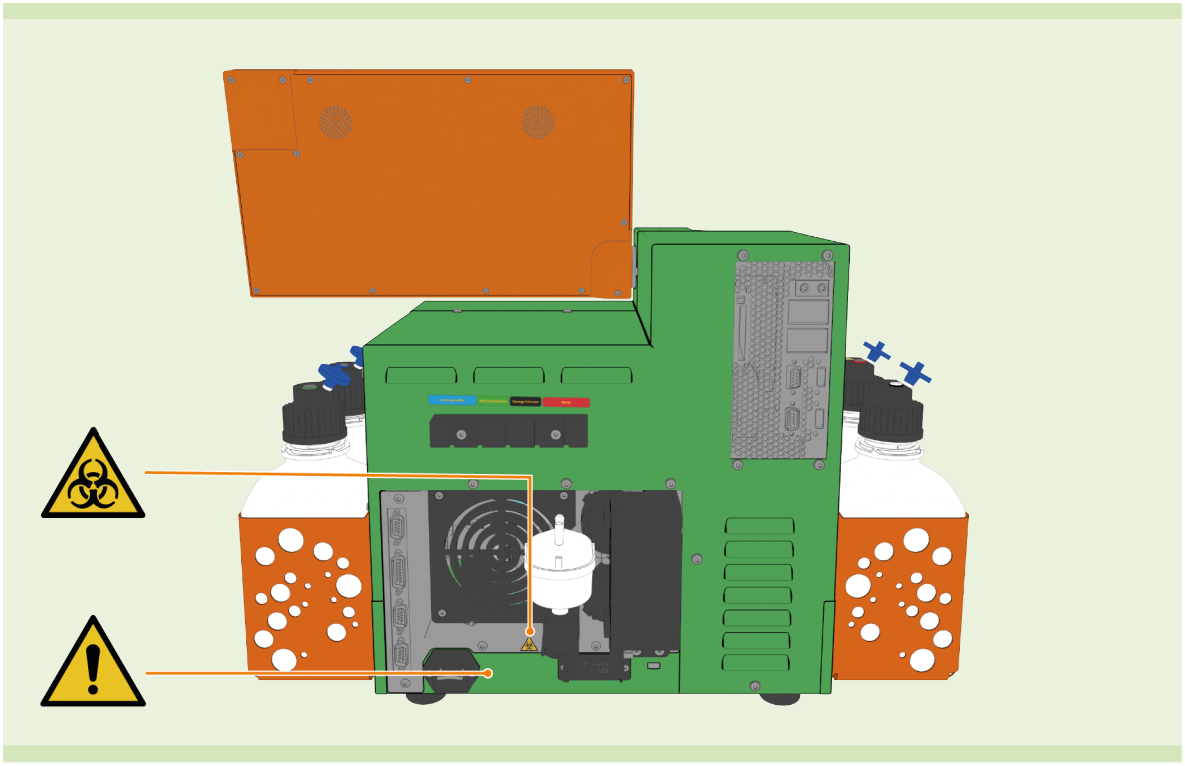


Figure 3: Gefahrenbereiche und Sicherheitssymbole auf der Rückseite des Gerätes

Elektrische und thermische Gefahren

⚠ WARNUNG

Stromschlag, Kurzschluss, Überhitzung, Feuer und Explosion können zu schweren Verletzungen oder zum Tod führen.

Schützendes Gehäuse

Das Gehäuse des Gerätes reduziert das Risiko eines Stromschlags und von Kurzschlüssen. Ein Kurzschluss kann durch zerlegte Teile verursacht werden oder Gegenstände, die in das Gerät gefallen sind. Funken, die bei einem Kurzschluss entstehen können, können brennbare Dämpfe oder Materialien entzünden. Das schützende Gehäuse verhindert die Ausbreitung eines Brands. Betreiben Sie das Instrument nicht in Bereichen, die als gefährlich eingestuft sind, zum Beispiel in Sauerstoff angereicherter Umgebung.

- Entfernen oder öffnen Sie niemals Teile des Gehäuses mit Ausnahme der vorderen Tür.
- Nur das Miltenyi Biotec Servicepersonal ist berechtigt, alle sonstigen Abdeckungen des Gerätes zu entfernen.
- Verwenden Sie das Gerät nicht, wenn es geöffnet oder demontiert ist.
- Verwenden Sie das Gerät nicht, wenn es heruntergefallen oder beschädigt ist.
- Verwenden Sie das Gerät nicht, wenn ein Objekt hineingefallen ist.

Gefahren durch Überhitzung und Brand

Schützen Sie das Gerät gegen Überhitzung.

- Lassen Sie um das Gerät herum genügend Platz (mindestens 15 cm auf allen Seiten).
- Stellen Sie das Gerät nicht in der Nähe von Wärmequellen, wie zum Beispiel Heizgeräten, auf.
- Lassen Sie die Lüftungsschlitze und Öffnungen des Gerätes frei.
- Sorgen Sie während des Betriebs für ausreichende Luftzirkulation.

Flüssigkeiten im Inneren des Gerätes

Flüssigkeiten im Gerät können Kurzschlüsse verursachen.

- Schützen Sie das Gerät gegen verschüttete Flüssigkeiten.
- Nehmen Sie verschüttete Flüssigkeiten sofort auf.
- Verwenden Sie das Gerät nicht, wenn Flüssigkeiten in das Innere eingedrungen sind.
- Trennen Sie das Gerät vor der Reinigung von der Stromversorgung.
- Verwenden Sie nur geringe Mengen an Reinigungsmittel auf einem weichen Tuch, um das Gerät abzuwischen. Sprühen oder gießen Sie keine flüssigen Reinigungsmittel auf oder in das Gerät.

Feuchte und staubige Umgebungen

Feuchte und staubige Umgebungen können Kurzschlüsse verursachen.

- Betreiben Sie das Gerät nicht an einem feuchten Ort oder in Bereichen mit hoher Luftfeuchtigkeit oder Kondensation.
- Wird das Gerät von einer kalten Umgebung in einen Bereich mit Raumtemperatur gebracht, lassen Sie es vor der Verwendung erst trocknen.

Kabel und Stromversorgung

Die Verwendung des Gerätes mit anderen als den mitgelieferten Kabeln ist potenziell gefährlich. Das Gerät verfügt über einen dreiadrigen elektrischen Erdungsstecker mit einem dritten Stift zur Erdung. Dies ist eine Sicherheitseinrichtung.

- Stecken Sie den Stecker nur in eine geerdete Steckdose. Versuchen Sie nicht, den Stecker an eine nicht geerdete Steckdose anzuschließen.
- Verwenden Sie das Gerät nicht, wenn das Netzkabel beschädigt ist.
- Verwenden Sie nur das mitgelieferte Netzkabel.
- Verwenden Sie keine Verlängerungskabel oder Mehrfachsteckdosen.
- Schließen Sie nicht zu viele Verbraucher an denselben Stromkreis an.

Biologische Gefahren

⚠ WARNUNG

Kontamination oder Infektion kann je nach verwendetem Material zu schweren Verletzungen oder zum Tod führen.

Biologisches Material

Alle biologischen Materialien müssen als potenziell infektiös eingestuft werden.

- Öffnen Sie niemals während des Betriebs die Frontabdeckungen des Gerätes. Ausnahmen hiervon sind ausdrücklich in diesem Handbuch beschriebene Wartungsvorgänge.
- Halten Sie während des Betriebs Abstand zum Roboter-Nadelarm.
- Tragen Sie persönliche Schutzausrüstung (wie Handschuhe, Schutzbrille, etc.), wie im Sicherheitsdatenblatt zum jeweiligen Material angegeben.
- Aus dem System können Tröpfchen austreten. Betreiben Sie das Instrument in einer biologischen Sicherheitswerkbank, die für die Probe geeignet ist, wenn Sie gefährliche oder potenziell infektiöse Materialien verarbeiten.
- Dekontaminieren Sie das Gerät nach der Arbeit mit gefährlichen oder potenziell infektiösen Materialien.

- Wenn gefährliche oder potenziell infektiöse Materialien verschüttet wurden oder aus dem System ausgetreten sind, dekontaminieren Sie den betroffenen Bereich.
- Verwenden Sie kontaminiertes Zubehör oder kontaminierte Teile des Gerätes nicht weiter.
- Führen Sie zunächst das Programm **Clean** aus, bevor Sie Wartungsarbeiten an Teilen des Flüssigkeitssystems vornehmen.
- Wechseln Sie keine Racks oder Proben, während das Gerät in Bewegung ist.
- Lassen Sie um den MACS MiniSampler Plus herum genügend Freiraum (mindestens 15 cm links und rechts).

Abfall

Alle flüssigen und festen Abfälle müssen als gefährlich eingestuft werden.

- Befüllen Sie die leere Abfallflasche mit einem geeigneten Desinfektionsmittel gemäß Herstellerspezifikation vor.
- Tauschen Sie die Abfallflasche nach dem Ausbau umgehend aus und befestigen Sie den Flaschenverschluss auf der neuen Flasche.
- Halten Sie stets eine leere Abfallflasche bereit.
- Installieren Sie eine Flasche nach der anderen, um das Verschütten von Flüssigkeiten zu vermeiden.
- Autoklavieren oder dekontaminieren Sie Abfall mit einem geeigneten Desinfektionsmittel.
- Beachten Sie die allgemeinen Laborsicherheitsvorschriften beim Umgang mit flüssigen und festen Abfällen.
- Beachten Sie die örtlichen Vorschriften zur Abfallentsorgung.

Geräteschäden

Defekte oder mangelhafte Geräte können eine biologische Gefahr darstellen.

- Kontrollieren Sie immer das Fluidiksystem und prüfen Sie auf Undichtigkeiten vor Verwendung des Gerätes.
- Tauschen Sie hydrophobe Luftfilter ein Mal pro Jahr aus, damit diese sich nicht durch Staubablagerungen zusetzen.
- Tauschen Sie hydrophobe Luftfilter aus, wenn diese im direkten Kontakt mit Flüssigkeit waren, damit die Filter sich nicht zusetzen und die Flüssigkeiten nicht verunreinigt werden.

Chemische Gefahren

⚠ WARNUNG

Stoffe und Reagenzien können gefährlich sein.

- Alle im Abschnitt **Biologische Gefahren** genannten Sicherheitsvorkehrungen gelten auch für gefährliche Stoffe und Reagenzien, die gegebenenfalls in der Probe enthalten sind.
- Betreiben Sie das Gerät unter einer Abzugshaube, wenn gefährliche Stoffe und Reagenzien verarbeitet werden.
- Verwenden Sie Stoffe und Reagenzien ausschließlich wie im dazugehörigen Sicherheitsdatenblatt angegeben.

Gefahr durch Magnetfelder

⚠ WARNUNG

Das Gerät enthält einen starken Magneten.
Starke Magnetfelder können die Funktion von Herzschrittmachern oder elektronischen medizinischen Implantaten beeinträchtigen.

Personen, die Herzschrittmacher oder andere elektronische medizinische Implantate tragen, müssen einen Sicherheitsabstand von mindestens 30 cm zum Gerät halten.

⚠ VORSICHT

Das Gerät enthält einen starken Magneten.
Magnetisierbare Objekte können sich plötzlich in Richtung des Magneten bewegen.

- Halten Sie magnetische Speichermedien, elektrische Geräte und andere magnetisierbare Gegenstände in einem Sicherheitsabstand von mindestens 30 cm zum Gerät.

Mechanische Gefahren

⚠ VORSICHT

Sich bewegende Teile.
Gefahr von Quetsch- oder Schnittverletzungen.

Roboter-Nadelarm

Der Roboter-Nadelarm bewegt sich beim Betrieb des Gerätes.

- Betreiben Sie das Gerät nur mit Nadelschutz.
- Halten Sie während des Betriebs Abstand zum Roboter-Nadelarm.
- Behindern Sie nicht die Bewegung des Roboter-Nadelarms.

MiniSampler

Das Tablett des MiniSamplers bewegt sich.

- Halten Sie während des Betriebs Abstand zum MiniSampler.
- Halten Sie laufende Prozesse an oder brechen sie ab, bevor Sie Zubehörteile oder Verbrauchsmaterialien handhaben.
- Wechseln Sie keine Racks oder Proben, während das Gerät in Bewegung ist.

Fluidiksystem

Zum Fluidiksystem gehören Spritzenpumpen. Diese bewegen sich, wenn das Gerät in Betrieb ist.

- Halten Sie während des Betriebs Abstand zum Fluidiksystem.
- Öffnen Sie niemals während des Betriebs die Frontabdeckungen des Gerätes.

Gefahren durch optische Strahlung

⚠ VORSICHT

Wenn das Auge optischer Strahlung ausgesetzt wird, kann dies zu Verletzungen führen.

Flaschenbeleuchtung

Für die Beleuchtung der Flaschen werden leistungsstarke LEDs eingesetzt. Die Strahlung ausgebauter

Einheiten kann zu Augenverletzungen führen. Gemäß der internationalen Norm IEC 62471 übersteigt dieses Lampensystem die Wertstufe der risikofreien Gruppe und es bestehen Risiken, die von der Verwendung des Geräts abhängen. Das in einem Abstand von 20 cm zu den Fläschchenhaltern gemessene Risk Ratio (RR) beträgt 0,91, sodass der Gefahrenabstand sich bei 19 cm für die Risikogruppe 1 beläuft.

- Schauen Sie nicht direkt in die LED-Strahlung.
- Bauen Sie nicht die installierten LED-Strahlungsquellen oder deren Halterung aus und zerlegen oder modifizieren Sie diese nicht. LED-Strahlungsquellen hören nicht automatisch auf zu leuchten, wenn sie zerlegt werden.
- Entfernen Sie nicht die Flaschenkörbe, es sei denn, das Instrument wird in ein Liquid Handling System integriert.

Gefährdung durch Laserstrahlung

⚠ VORSICHT

Werden die Augen dem Laserstrahl direkt ausgesetzt, kann dies zu Verletzungen führen.

Rack Detektion

Das Gerät verfügt über vier Oberflächenemitter (vertical cavity surface emitting lasers - VCSEL) zur automatisierten Rack Detektion (Klasse 1M). Die Strahlung ist nicht sichtbar.

- Schauen Sie nicht durch optische Instrumente wie Linsen, Lupen, etc. in den VCSEL-Port.
- Halten Sie einen Abstand von 10 cm zum VCSEL-Port ein.
- Der Weg des Lichtstrahls sollte sich im Betrieb nicht auf der gleichen Höhe wie das menschliche Auge befinden.

Laser

Das Instrument verfügt über drei Dauerstrichlaser. Die Laser sind in die Laserklasse 3B klassifiziert. Die Laser sind durch ein Schutzgehäuse gesichert.

- Das Schutzgehäuse nicht entfernen.

	Output power	Pulse time	Wavelength
MACSQuant Analyzer 10			
Rack Detektion	3.3 mW	215 µs	850 nm
Interner Laser 1	40 mW	Dauerstrich	405 nm
Interner Laser 2	30 mW	Dauerstrich	488 nm
Interner Laser 3	20 mW	Dauerstrich	640 nm
MACSQuant VYB			
Rack Detektion	3.3 mW	215 µs	850 nm
Interner Laser 1	40 mW	Dauerstrich	405 nm
Interner Laser 2	50 mW	Dauerstrich	488 nm
Interner Laser 3	100 mW	Dauerstrich	561 nm
MACSQuant Analyzer 16			
Rack Detektion	3.3 mW	215 µs	850 nm
Interner Laser 1	65 mW	Dauerstrich	405 nm
Interner Laser 2	50 mW	Dauerstrich	488 nm
Interner Laser 3	72 mW	Dauerstrich	640 nm

Table 3.1: Laserausgangsleistung, Impulszeit und Wellenlänge

Ergonomische Gefahren

⚠ WARNUNG

Schweres Gerät.

Gefahr von Zerrungen und Muskelrissen.

- Das Anheben des Gerätes muss durch zwei Personen erfolgen.
- Halten Sie das Gerät dabei unten an den orangefarbenen Flaschenkörben an beiden Seiten des Gerätes fest.

Wartung und Transport

Wartung

Unsachgemäße Wartung oder Reparatur des Gerätes oder die Verwendung von nicht zugelassenen Teilen kann zu Fehlfunktionen oder Schäden am Gerät führen. Dies kann zu Gefahren für den Benutzer führen. Soweit nicht ausdrücklich in diesem Handbuch oder anderen Unterlagen von Miltenyi Biotec erwähnt, darf das Gerät nicht vom Benutzer selbst gewartet oder repariert werden. Wartungs- und Reparaturarbeiten dürfen nur von Personen durchgeführt werden, die von Miltenyi Biotec zertifiziert und entsprechend qualifiziert sind. Vor der Wartung muss das Gerät dekontaminiert werden, um gefährliche Stoffe zu entfernen. Wenn Sie Fragen zur ordnungsgemäßen Dekontamination und dem Versand haben, kontaktieren Sie Miltenyi Biotec Technical Support. Verwenden Sie nur von Miltenyi Biotec empfohlene Zubehörteile und Upgrades. Wenn Sie mehr über das umfangreiche Serviceangebot und die Wartungsverträge in Verbindung mit den Geräten von Miltenyi Biotec erfahren möchten, wenden Sie sich an Ihren regionalen Miltenyi Biotec Vertreter oder besuchen Sie **www.miltenyibiotec.com/support**.

Transport

Das Gerät sollte immer vorsichtig und nur in der von Miltenyi Biotec vorgegebenen Verpackung transportiert werden. Interne Beschädigungen können auftreten, wenn das Instrument übermäßigen Vibrationen ausgesetzt wird oder wenn es herunterfällt. Muss das Gerät zur Wartung zurück an den Hersteller geschickt werden, so nehmen Sie bezüglich weiterer Anweisungen und der Verpackung Kontakt mit Miltenyi Biotec auf.

Entsorgung

KUNDENINFORMATION ZUR ENTSORGUNG VON ELEKTRO- UND ELEKTRONIK-ALTGERÄTEN (WASTE OF ELECTRICAL AND ELECTRONIC EQUIPMENT, WEEE)

Entsorgen Sie Ihre Altgeräte von Miltenyi Biotec unter Einhaltung der jeweils geltenden Vorschriften für die Erfassung und Behandlung von Elektronik-Altgeräten und die Entsorgung von Gefahrstoffen, die je nach Land oder Region unterschiedlich sein können. Elektrische Geräte können gefährliche Stoffe enthalten, welche die Umwelt erheblich belasten und/oder die Gesundheit gefährden. Sämtliche Altgeräte müssen gesondert gesammelt und von ausgewiesenen Abfallentsorgungseinrichtungen im Rahmen der hierfür vorgesehenen Entsorgungssysteme fachgerecht behandelt werden. Indem Sie sicherstellen, dass ihr Altgerät gemäß den geltenden Vorschriften zur Behandlung von Elektro- und Elektronik-Altgeräten sowie von Gefahrstoffen entsorgt wird, tragen Sie zum Erhalt unserer natürlichen Ressourcen und zum Schutz der menschlichen Gesundheit bei. Miltenyi Biotec hat sich dem Schutz der Umwelt verpflichtet. Miltenyi Biotec bietet in zahlreichen Ländern Rücknahmeprogramme für Altgeräte an und arbeitet weltweit mit lizensierten Partnern zusammen, die an bestehende Recycling- und Entsorgungssysteme angeschlossen sind. Miltenyi Biotec ermöglicht Ihnen ein kostenloses Recycling Ihres Altgerätes. Die Bedingungen und die Verfügbarkeit dieses Angebots unterscheiden sich geographisch aufgrund unterschiedlicher regulatorischer Anforderungen. Beachten Sie, dass je nach Art und Nutzung Ihres Gerätes zusätzliche Anforderungen gelten können. Bevor Sie das Altgerät an den Hersteller zur Entsorgung zurücksenden, dekontaminieren Sie es, um sämtliche gefährlichen Stoffe zu entfernen. Für weitere Informationen oder wenn Sie Altgeräte von Miltenyi Biotec entsorgen möchten, wenden Sie sich an Ihren lokalen Vertreter von Miltenyi Biotec oder an den Miltenyi Biotec Technical Support.

ES
Información importante de seguridad

Lea primero el manual de uso

⚠ ADVERTENCIA

Antes de usar el MACSQuant Instrument (MACSQuant Analyzer 10, VYB, or Analyzer 16), lea esta **Información importante de seguridad** y toda la otra información que contiene el manual de uso. Preste especial atención a todas las advertencias que aparecen en el instrumento. Si no se leen y siguen estas pautas, podría utilizarse de forma inadecuada o incorrecta y podrían producirse daños en el instrumento. El uso inadecuado también puede causar graves lesiones personales, muerte, resultados impredecibles, mal funcionamiento del instrumento y un desgaste prematuro de los componentes que acortara la vida útil del instrumento. Estas acciones pueden anular su garantía. Para consultas futuras, mantenga en un lugar seguro y accesible para todos los usuarios el manual de uso y cualquier otra instrucción de manejo y seguridad suministrada con el instrumento.

Si le preocupa seriamente el uso seguro de su instrumento, contacte con su proveedor de servicios autorizado de Miltenyi Biotec o llame al Miltenyi Biotec Technical Support.

Instrucciones generales de seguridad

EN ESTE CAPÍTULO SE DESCRIBEN SITUACIONES POTENCIALMENTE PELIGROSAS ASOCIADAS CON ESTE INSTRUMENTO Y SE PROPORCIONA INFORMACIÓN IMPORTANTE SOBRE SEGURIDAD PARA MINIMIZAR LOS RIESGOS Y PROTEGERSE A SÍ MISMO Y A LOS DEMÁS.

Este capítulo ofrece información importante para su seguridad personal y el correcto uso del instrumento. Lea y siga todas las instrucciones atentamente antes de la instalación y el uso del instrumento. Siga las prácticas de seguridad generales además de este manual de uso.

- Use este instrumento solo como se indica en este manual de uso para evitar lesiones personales y daños materiales.
- Observe las instrucciones de seguridad de la zona de trabajo local y las políticas de laboratorio, así como las normas de salud, seguridad y prevención de accidentes.
- Guarde este manual de uso en un lugar que siempre esté accesible para todos los usuarios.
- En caso de accidentes graves, daños en el instrumento o si aparece humo o llamas, corte de inmediato el suministro de la corriente eléctrica.
- Para desconectar completamente el instrumento del suministro de la corriente eléctrica, desenchufe el cable de alimentación.
- Asegúrese de que se pueda acceder fácilmente al interruptor de corriente y al enchufe del cable de alimentación del instrumento.

Niveles de riesgo

Las palabras de advertencia se utilizan para advertir contra situaciones peligrosas y daños materiales. En este manual de uso se utilizan las siguientes palabras de advertencia.

⚠ ADVERTENCIA o ¡ADVERTENCIA! indica una situación peligrosa que, de no evitarse, podría conllevar la muerte o lesiones graves.

⚠ ATENCIÓN o ¡ATENCIÓN! indica una situación peligrosa que, de no evitarse, podría conllevar lesiones leves o moderadas. También sirve para advertir sobre prácticas poco seguras.

***AVISO* o AVISO indica información que se considera importante, pero no relacionada con un peligro (p. ej., mensajes relacionados con daños materiales).**

Símbolos


ADVERTENCIA DE SEGURIDAD: SE DEBE CONSULTAR LA DOCUMENTACIÓN EN TODOS LOS CASOS EN QUE SE UTILICE ESTE SÍMBOLO DE SEGURIDAD EN EL INSTRUMENTO


PELIGRO ELÉCTRICO


PIEZAS MÓVILES


RADIACIÓN ÓPTICA


PELIGRO RADIACIÓN LÁSER


PELIGRO BIOLÓGICO


RIESGOS ERGONÓMICOS


LAS PERSONAS QUE LLEVAN MARCAPASOS U OTROS IMPLANTES ELECTRÓNICOS DEBEN MANTENERSE A DISTANCIA


REQUIERE LEVANTAMIENTO CON DOS PERSONAS

ON (ENCENDIDO)


OFF (APAGADO)


LEA EL MANUAL DE USO ANTES DE USAR EL INSTRUMENTO

FUSIBLE

INFORMACIÓN AL CLIENTE SOBRE LA DIRECTIVA DE RESIDUOS DE APARATOS ELÉCTRICOS Y ELECTRÓNICOS (RAEE)

REF NÚMERO DE PEDIDO

SN NÚMERO DE SERIE

TYP NÚMERO DEL MODELO

FABRICANTE

MARCADO DE CONFORMIDAD EUROPEA

MARCA DE CERTIFICACIÓN NRTL: EL PRODUCTO CUMPLE LOS ESTÁNDARES DE SEGURIDAD CONSENSUADOS, REQUERIDOS POR LA ADMINISTRACIÓN DE SEGURIDAD Y SALUD OCUPACIONAL (OSHA), DETERMINADOS POR LOS LABORATORIOS DE ENSAYO RECONOCIDOS NACIONALMENTE (NATIONALLY RECOGNIZED TESTING LABORATORIES, NRTL) TÜV SÜD

UK CA CONFORMIDAD EVALUADA DEL REINO UNIDO

Etiqueta de seguridad

Observe los puntos de peligro y los símbolos de seguridad del instrumento.

- Mantenga las etiquetas y marcas de seguridad en un estado limpio y legible.
- Inspeccione las etiquetas y marcas de seguridad con regularidad, y reemplácelas si no son legibles o identificables desde una distancia de visualización segura.
- Póngase en contacto con Miltenyi Biotec si necesita etiquetas de recambio.

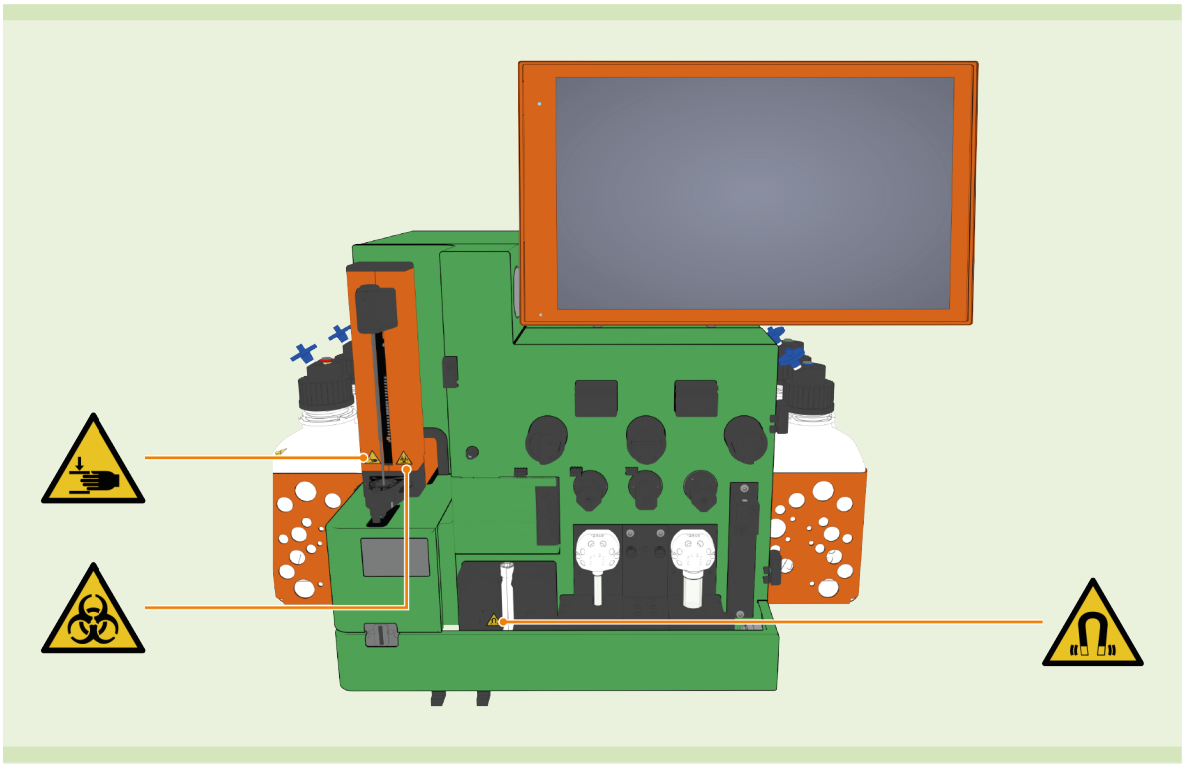


Figure 1: Áreas peligrosas y símbolos de seguridad en la parte frontal del instrumento

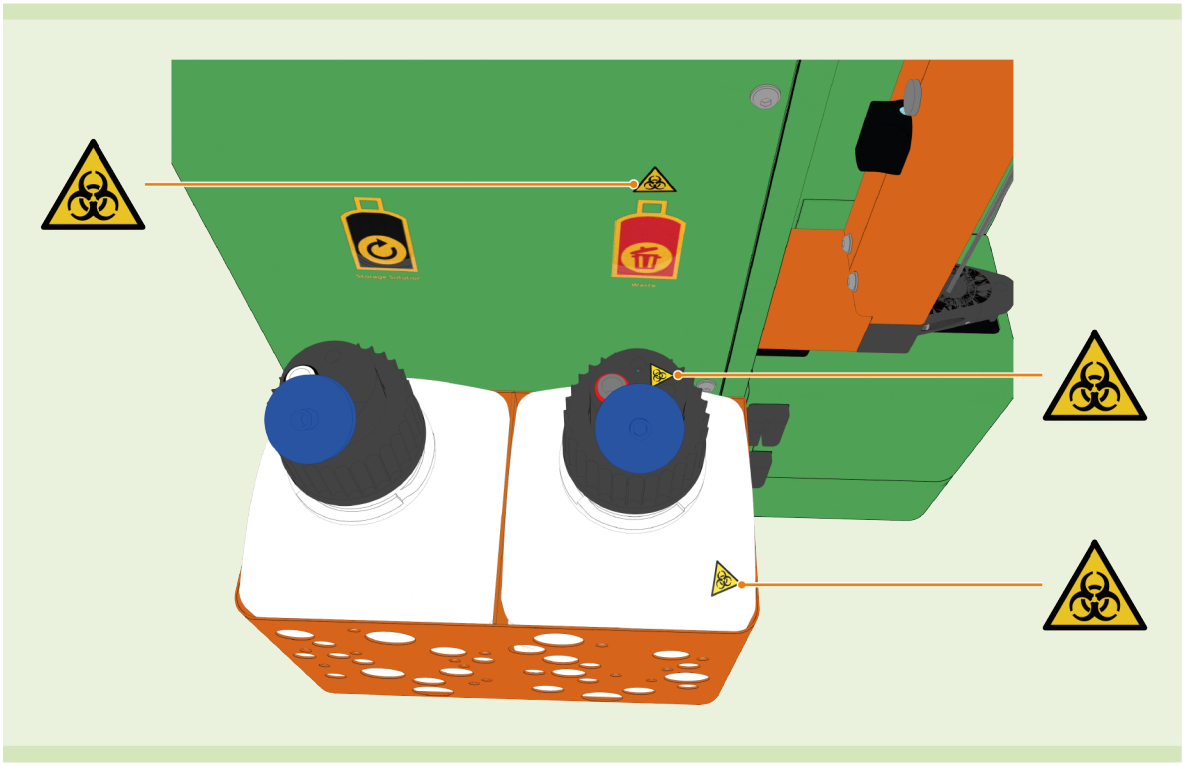


Figure 2: Áreas peligrosas y símbolos de seguridad se encuentran en el lado izquierdo del equipo

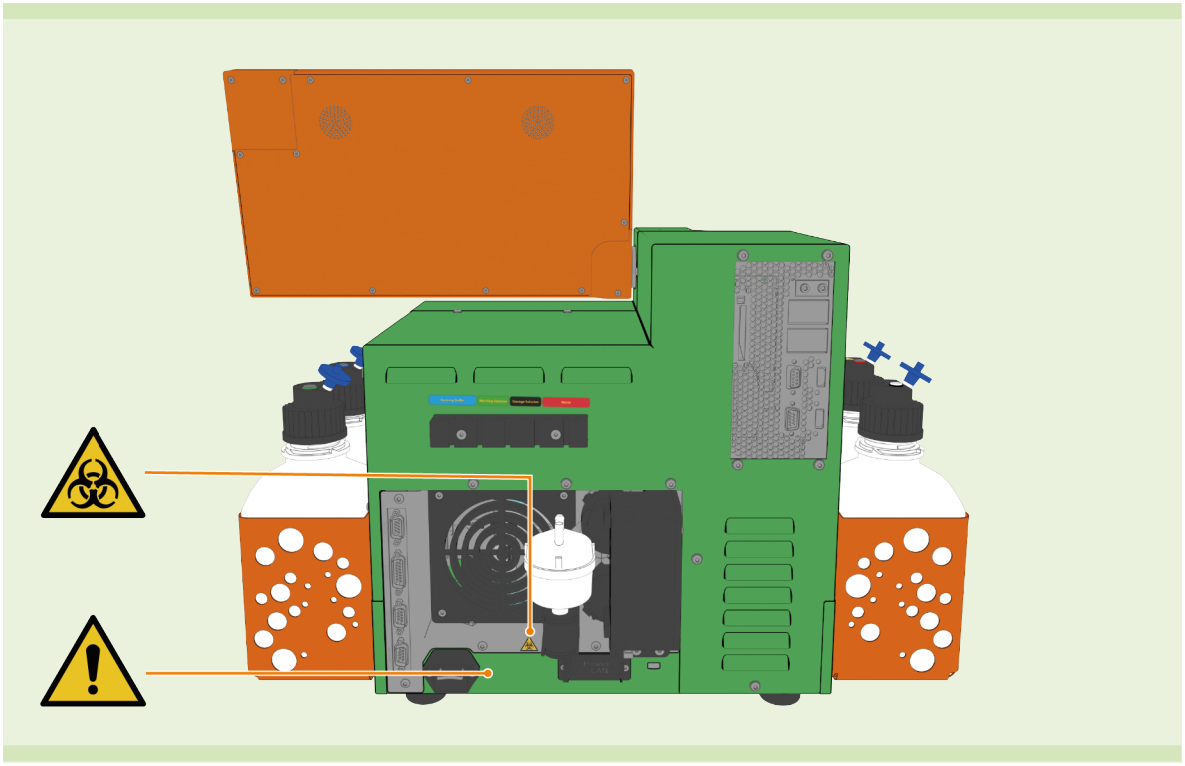


Figure 3: Áreas peligrosas y símbolos de seguridad en la parte posterior del instrumento

Peligros eléctricos y térmicos

⚠ ADVERTENCIA

Una descarga eléctrica, un cortocircuito, un sobrecalentamiento, un incendio o una explosión podría causar la muerte o lesiones graves.

Carcasa protectora

La carcasa del instrumento reduce el riesgo de un shock eléctrico y cortocircuitos. El cortocircuito puede ser causado por piezas u objetos desmontados que se hayan caído en el instrumento. Las chispas emitidas, causadas por un cortocircuito, pueden incendiar vapores o materiales combustibles. La carcasa protectora evita la propagación del fuego. No utilice el instrumento en áreas clasificadas como peligrosas; por ejemplo, en entornos cargados de oxígeno.

- No retire ni perfore ninguna cubierta de la carcasa, a excepción de las cubiertas de acceso frontal.
- Solo el Miltenyi Biotec personal de servicio puede retirar cualquier otra cubierta del instrumento.
- No utilice el instrumento si se ha abierto o desmontado.
- No utilice el instrumento si se ha caído o dañado.
- No utilice el instrumento si un objeto ha entrado en el interior del mismo.

Peligros relacionados con el sobrecalentamiento y los incendios

Proteja el instrumento contra el sobrecalentamiento.

- Deje espacio suficiente alrededor del instrumento (al menos 15 cm en todos los lados).
- No coloque el instrumento junto a fuentes de calor, por ejemplo, calentadores.
- No cubra las ranuras de ventilación ni las aberturas del instrumento.
- Asegure una adecuada circulación de aire durante el funcionamiento.

Líquidos en el interior del instrumento

Los líquidos que hay dentro del instrumento pueden provocar cortocircuitos.

- Proteja el instrumento contra líquidos derramados.
- Limpie los líquidos derramados inmediatamente.
- No utilice el instrumento si ha entrado algún líquido en el interior del instrumento.
- Desenchufe el instrumento antes de limpiarlo.
- Use solo pequeñas cantidades de productos de limpieza en un paño suave para limpiar el instrumento. No rocíe ni vierta productos de limpieza líquidos sobre o dentro del instrumento.

Entornos húmedos y polvorientos

Los ambientes húmedos y polvorientos pueden provocar cortocircuitos.

- No utilice el instrumento en un lugar húmedo, o áreas con alta humedad o condensación.
- Después de mover el instrumento de un entorno frío a temperatura ambiente, espere a que el instrumento se deshumedezca antes de usarlo.

Cables y suministros de corriente eléctrica

Usar el instrumento con otros cables que no sean los suministrados es potencialmente peligroso. El instrumento tiene un enchufe eléctrico de tres hilos con una tercera clavija para la conexión a tierra. Se trata de una característica de seguridad.

- Inserte el enchufe solo en una toma de corriente con conexión a tierra. No intente insertar el enchufe en una toma de corriente sin conexión a tierra.
- No utilice el instrumento si el cable de alimentación está dañado.
- Utilice únicamente el cable de alimentación incluido.
- No utilice cables alargadores ni ladrones.
- No sobrecargue la toma eléctrica.

Peligros biológicos

⚠ ADVERTENCIA

La contaminación o infección podría causar la muerte o lesiones graves en función del material utilizado.

Material biológico

Todo material biológico debe considerarse potencialmente infeccioso.

- No abra las cubiertas de acceso frontal mientras el instrumento está en funcionamiento. Las excepciones son los procesos de mantenimiento que se describen explícitamente en este manual.
- Manténgase alejado del brazo de aguja robótico mientras el instrumento está en funcionamiento.
- Use equipo de protección personal (como guantes, gafas de seguridad, etc.) como se indica en la hoja de datos de seguridad de la sustancia en particular.
- Pequeña gotas pueden escaparse del sistema. Si se procesa material peligroso o potencialmente infeccios, use el equipo en una campana de seguridad biológica adecuada para la muestra utilizada.
- Descontamine el instrumento después de procesar material peligroso o potencialmente infeccioso.
- Si se ha derramado o fugado del sistema un material peligroso o potencialmente infeccioso, descontamine el área afectada.

- No continúe usando piezas o accesorios contaminados del instrumento.
- Ejecute el programa **Clean** antes de hacer trabajos de mantenimiento en cualquier parte del sistema fluídico.
- No cargue ni descargue muestras o bastidores mientras el instrumento está en movimiento.
- Deje espacio suficiente alrededor del MACS MiniSampler Plus (al menos 15 cm a la derecha y a la izquierda).

Desechos

Todos los desechos líquidos y sólidos deben ser considerados peligrosos.

- Precargue el frasco de residuos vacío con un desinfectante adecuado según la especificación del fabricante.
- Cambie inmediatamente el frasco de residuos después de desmontarlo y asegure el cierre del frasco al frasco nuevo.
- Tenga siempre un frasco de residuos vacío disponible.
- Para evitar derrames, solo instale una botella a la vez.
- Ponga en autoclave o, como alternativa, descontamine los desechos con un desinfectante apropiado.
- Siga las normas generales de seguridad del laboratorio cuando maneje desechos líquidos y sólidos.
- Observe las regulaciones locales sobre la eliminación de desechos.

Daños en el equipo

Un equipo defectuoso o inadecuado puede causar un peligro biológico.

- Siempre inspeccione el sistema de líquidos y verifique que no haya fugas antes de usar el instrumento.
- Cambie los filtros de aire hidrofóbicos una vez al año para evitar obstrucciones por la acumulación de polvo.
- Cambie los filtros de aire hidrofóbicos si han entrado en contacto directo con cualquier líquido para evitar la obstrucción de los filtros y para prevenir la contaminación de los líquidos.

Peligros químicos

⚠ ADVERTENCIA

Las sustancias y los reactivos pueden ser peligrosos.

- Todas las medidas de seguridad del apartado **Peligros biológicos** se aplican también a todas las sustancias y reactivos peligrosos que puedan estar presente en la muestra.
- Utilice el instrumento en una campana para vapores si se procesan sustancias y reactivos peligrosos.
- Utilice únicamente las sustancias y reactivos que se indican en las hojas datos de seguridad correspondientes.

Peligros por campo magnético

⚠ ADVERTENCIA

El instrumento tiene un imán potente.
Los campos magnéticos fuertes podrían influenciar el funcionamiento de marcapasos o implantes médicos electrónicos.

En caso de llevar marcapasos o implantes médicos electrónicos, mantenga una distancia de al menos 30 cm del instrumento.

⚠ ATENCIÓN

El instrumento tiene un imán potente.
Los objetos magnetizables pueden moverse repentinamente hacia el imán.

- Mantenga todos los dispositivos de almacenamiento magnéticos, equipos electrónicos y objetos magnetizables a una distancia de al menos 30 cm del instrumento.

Peligros mecánicos

⚠ ATENCIÓN

Piezas móviles.

Riesgo de aplastamiento o corte.

Brazo de aguja robótico

El brazo de aguja robótico se mueve mientras el instrumento está en funcionamiento.

- No utilice el instrumento sin la protección de la aguja.
- Manténgase alejado del brazo de aguja robótico mientras el instrumento está en funcionamiento.
- No obstruya el movimiento del brazo de aguja robótico.

MiniSampler

El carro del MiniSampler se mueve.

- Manténgase alejado del MiniSampler mientras el instrumento está en funcionamiento.
- Detenga o interrumpa siempre un proceso antes de manipular accesorios o consumibles.
- No cargue ni descargue muestras o bastidores mientras el instrumento está en movimiento.

Sistema de líquidos

Las bombas de jeringa son parte del sistema de líquidos. Se mueven mientras el instrumento está en funcionamiento.

- Manténgase alejado del sistema de líquidos mientras el instrumento está en funcionamiento.
- No abra las cubiertas de acceso frontal mientras el instrumento está en funcionamiento.

Peligros de radiación óptica

⚠ ATENCIÓN

La exposición a la radiación óptica podría causar lesiones oculares.

Iluminación de botellas

Se utilizan potentes LED para iluminar las botellas. La radiación de las unidades desmontadas puede conllevar lesiones oculares. Según la norma internacional CEI 62471, este sistema de lámparas supera el grupo de riesgo exento y existen riesgos que dependen del uso del instrumento. El valor del peligro de exposición (EHV) medido a una distancia de 20 cm de los soportes para botellas es de 0,91, y la distancia de peligro es de 19 cm para el grupo de riesgo 1.

- No mire directamente a la radiación LED.
- No desmonte, modifique ni retire las fuentes de radiación LED instaladas ni sus soportes de montaje. Las fuentes de radiación LED no dejan de emitir automáticamente cuando se desmontan.
- No retire los soportes para botellas a menos que se integre el instrumento en un sistema de manejo de líquidos.

Peligro radiación láser

⚠ ATENCIÓN

La exposición directa al rayo láser podría causar lesiones oculares.

Detección de bastidor

El instrumento tiene cuatro láseres de emisión superficial con cavidad vertical (VCSEL) para la detección automática de bastidores (Clase 1M). La radiación no es visible.

- No mire al puerto VCSEL a través de instrumentos ópticos como lentes, lupas, etc.
- Mantenga una distancia de 10 cm del puerto VCSEL.
- Evite que la trayectoria del haz de luz esté a la misma altura que el ojo humano durante el funcionamiento.

Láser

El instrumento tiene tres Láseres de onda continua. Los láseres están clasificados como de clase 3B. Los láseres están protegidos por una carcasa protectora.

- No retire la carcasa protectora.

	Potencia del láser	Duración del impulso	Longitud de onda
MACSQuant Analyzer 10			
Detección del rack de reactivos	3.3 mW	215 µs	850 nm
Láser interno 1	40 mW	continuo	405 nm
Láser interno 2	30 mW	continuo	488 nm
Internal Laser 3	20 mW	continuo	640 nm
MACSQuant VYB			
Detección del rack de reactivos	3.3 mW	215 µs	850 nm
Láser interno 1	40 mW	continuo	405 nm
Láser interno 2	50 mW	continuo	488 nm
Láser interno 3	100 mW	continuo	561 nm
MACSQuant Analyzer 16			
Detección del rack de reactivos	3.3 mW	215 µs	850 nm
Láser interno 1	65 mW	continuo	405 nm
Láser interno 2	50 mW	continuo	488 nm
Láser interno 3	72 mW	continuo	640 nm

Table 4.1: Potencia del láser, duración de impulso, y longitud de onda

Riesgos ergonómicos

⚠ ADVERTENCIA

Instrumento pesado.

Riesgo de desgarro o distensión muscular.

- Se requieren dos personas para levantar el equipo.
- Coja el equipo por la base de las cestas de frascos de color naranja, situadas a ambos lados del equipo.

Reparación y transporte

Reparación

La reparación inadecuada del instrumento o el uso de piezas no autorizadas pueden provocar un mal funcionamiento o daños en el instrumento. Esto puede constituir un peligro para los usuarios. A menos que se indique específicamente lo contrario en este manual del usuario o en otros documentos de Miltenyi Biotec, no realice usted mismo los trabajos demantenimiento y reparación del instrumento. La reparación debe ser realizada por personal de servicio cualificado y certificado por Miltenyi Biotec. Si el instrumento necesita reparación, descontamínelo para eliminar cualquier material peligroso. Si tiene alguna pregunta relativa a la descontaminación o el envío adecuados, póngase en contacto con el Miltenyi Biotec Technical Support para que le ayuden. Utilice solo accesorios y actualizaciones recomendados por Miltenyi Biotec. Consulte a su representante local de Miltenyi Biotec sobre el amplio servicio de reparaciones de instrumentos y los contratos de reparaciones de Miltenyi Biotec, o visite **www.miltenyibiotec.com/support**.

Transporte

El instrumento deberá transportarse con cuidado en el embalaje especificado por Miltenyi Biotec. Se podrían producir daños internos si el instrumento se somete a un exceso de vibraciones o se cae. Si es necesario enviar el instrumento al fabricante para su reparación, comuníquese con Miltenyi Biotec para obtener instrucciones y materiales de embalaje.

Eliminación

INFORMACIÓN AL CLIENTE SOBRE LA DIRECTIVA DE RESIDUOS DE APARATOS ELÉCTRICOS Y ELECTRÓNICOS (RAEE)

Deseche sus productos Miltenyi Biotec al final de su vida útil de acuerdo con la legislación aplicable sobre eliminación de desechos peligrosos y residuos de aparatos eléctricos y electrónicos (RAEE), que puede diferir según el país o la región. El equipo eléctrico puede contener sustancias peligrosas que pueden tener un efecto perjudicial grave en el medio ambiente y/o la salud humana. Todo el equipo debe ser recogido y tratado específicamente en instalaciones de desechos designadas y en sistemas conformes a la legislación sobre RAEE. Al asegurarse de desechar sus aparatos eléctricos y electrónicos no deseados de acuerdo con la legislación aplicable sobre eliminación de desechos peligrosos y RAEE, está ayudando a preservar nuestros recursos naturales y proteger la salud humana. Miltenyi Biotec se compromete a proteger el medio ambiente. Miltenyi Biotec ofrece programas de devolución de productos al final de su vida útil en muchos países y socios con licencia que disponen de sistemas conformes a la legislación sobre RAEE en todo el mundo. Miltenyi Biotec recoge su equipo Miltenyi Biotec al final de su vida útil para reciclarlo de forma gratuita. Los términos y la disponibilidad de esta oferta pueden variar según la región geográfica, debido a las diferencias en los requisitos reglementarios. Tenga en cuenta que, dependiendo del tipo y uso del equipo, pueden aplicarse requisitos adicionales. Antes de devolver el instrumento al fabricante para que lo deseche, descontamine el instrumento para eliminar cualquier material peligroso. Para obtener más información, o si desea desechar su

equipo Miltenyi Biotec al final de su vida útil, póngase en contacto con su representante local de Miltenyi Biotec o con el Miltenyi Biotec Technical Support.

FR

Informations de sécurité importantes

Lisez d'abord le manuel d'utilisation

⚠ AVERTISSEMENT

Avant d'utiliser le MACSQuant Instrument (MACSQuant Analyzer 10, VYB, or Analyzer 16), veuillez lire les **Informations de sécurité importantes** qui suivent et toutes les autres informations données dans le présent manuel. Accordez une attention particulière à tous les avertissements affichés sur l'instrument. Le non-respect de ces consignes peut entraîner une utilisation inappropriée ou incorrecte et endommager l'instrument. Une utilisation incorrecte peut également causer des blessures graves, la mort, des résultats imprévisibles, un mauvais fonctionnement de l'instrument et une usure prématurée des composants, ce qui réduit la durée de vie de l'instrument. De telles actions peuvent annuler votre garantie. Conservez le manuel d'utilisation et les autres instructions de sécurité et de fonctionnement fournies avec les produits dans un endroit qui reste accessible à tous les utilisateurs pour qu'ils puissent s'y référer ultérieurement.

Si vous avez de sérieuses inquiétudes concernant l'utilisation en toute sécurité de votre instrument, veuillez contacter votre fournisseur de services agréé Miltenyi Biotec ou appeler Miltenyi Biotec Technical Support.

Instructions générales de sécurité

CE CHAPITRE DÉCRIT LES SITUATIONS POTENTIELLEMENT DANGEREUSES ASSOCIÉES À CET INSTRUMENT ET FOURNIT DES INFORMATIONS DE SÉCURITÉ IMPORTANTES DESTINÉES À RÉDUIRE LES RISQUES ET À VOUS PROTÉGER AINSI QU'À PROTÉGER LES AUTRES.

Le présent chapitre donne des informations importantes pour votre sécurité personnelle et pour l'utilisation correcte de l'instrument. Veuillez lire attentivement toutes les instructions et les retenir avant de procéder à l'installation de l'instrument et d'utiliser celui-ci. Appliquez les mesures de sécurité générales en plus de celles exposées dans le manuel d'utilisation.

- Utilisez toujours cet instrument en suivant les indications fournies dans ce manuel d'utilisation, afin d'éviter toute blessure et tous dommages matériels.
- Respecter les consignes de sécurité sur le lieu de travail et les protocoles de laboratoire, ainsi que les normes en matière de santé, de sécurité et de prévention des accidents.
- Conservez ce Guide de l'Utilisateur dans un endroit qui reste toujours accessible à tous les utilisateurs.
- En cas d'accident grave, d'endommagement de l'instrument ou si de la fumée ou des flammes apparaissent, coupez immédiatement l'alimentation électrique.
- Pour éteindre entièrement l'instrument de l'alimentation électrique, débranchez le câble d'alimentation.
- Assurez-vous que l'interrupteur principal et la prise du câble d'alimentation de l'instrument soient facilement accessibles.

Niveaux de danger

Les mots d'avertissement sont utilisés pour mettre l'utilisateur en garde contre des situations dangereuses et des dommages matériels. Les mots d'avertissement suivants sont utilisés dans ce Guide de l'Utilisateur.

⚠ AVERTISSEMENT ou AVERTISSEMENT ! signale une situation dangereuse qui, si elle n'est pas évitée, peut causer la mort ou des blessures graves.

⚠ ATTENTION ou ATTENTION ! signale une situation dangereuse qui, si elle n'est pas évitée, peut causer des blessures de gravité mineure ou modérée. Il est aussi utilisé pour mettre en garde contre des pratiques dangereuses.

***AVIS* ou AVIS signale des informations jugées importantes mais qui ne concernent pas un danger (p. ex. les messages relatifs à des dommages matériels).**

Symboles


AVERTISSEMENT DE SÉCURITÉ: LA DOCUMENTATION DOIT ÊTRE CONSULTÉE DANS TOUS LES CAS OÙ CE SYMBOLE DE SÉCURITÉ EST UTILISÉ SUR L'INSTRUMENT


DANGER ÉLECTRIQUE


PIÈCES AMOVIBLES


RAYONNEMENT OPTIQUE


DANGERS LIÉS AUX RAYONNEMENTS LASER


RISQUE BIOLOGIQUE


RISQUES ERGONOMIQUES


LES PERSONNES PORTANT UN STIMULATEUR CARDIAQUE OU UN AUTRE IMPLANT ÉLECTRONIQUE DOIVENT RESTER À DISTANCE


SOULEVER À DEUX

MARCHE (INSTRUMENT ALLUMÉ)


ARRÊT (INSTRUMENT ÉTEINT)


LISEZ LE GUIDE DE L'UTILISATEUR AVANT D'UTILISER L'INSTRUMENT


FUSIBLE


DEEE (DÉCHETS D'ÉQUIPEMENTS ÉLECTRIQUES ET ÉLECTRONIQUES)

NUMÉRO DE COMMANDE

NUMÉRO DE SÉRIE

NUMÉRO DE MODÈLE


FABRICANT


MARQUAGE DE CONFORMITÉ EUROPÉENNE

MARQUE DE CERTIFICATION NRTL : LE PRODUIT RÉPOND AUX NORMES DE SÉCURITÉ CONSENSUELLES IMPOSÉES PAR L'OCCUPATIONAL SAFETY/HEALTH ADMINISTRATION (OSHA), DÉTERMINÉES PAR LES NATIONALLY RECOGNIZED TESTING LABORATORIES (NRTL) TÜV SÜD

MARQUAGE DE PRODUIT DU ROYAUME-UNI

Étiquettes de sécurité

Repérez les points dangereux et les symboles de sécurité de l'instrument.

- Maintenez les étiquettes et les marquages de sécurité propres et lisibles.
- Contrôlez régulièrement les étiquettes et marquages de sécurité et remplacez ceux qui ne sont pas lisibles ou identifiables à une distance sûre.
- Contactez Miltenyi Biotec pour obtenir des étiquettes de rechange.

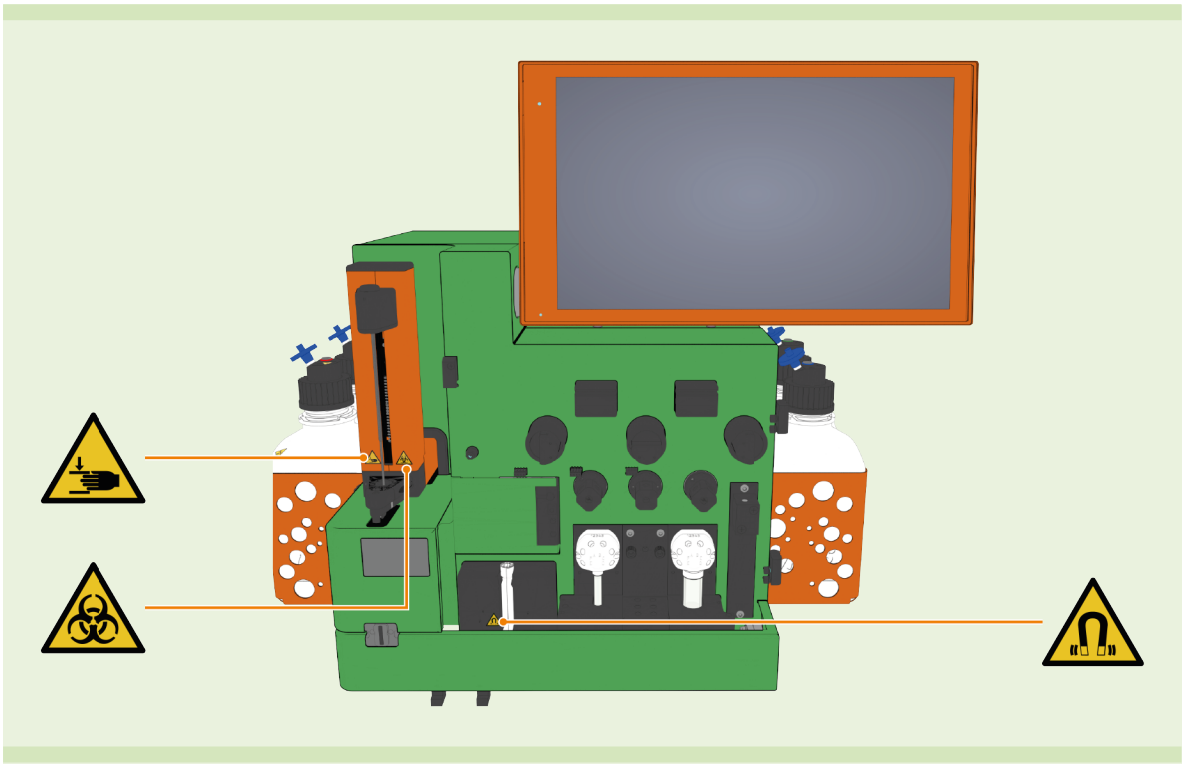


Figure 1: Zones de danger et symboles de sécurité sur l'avant de l'instrument

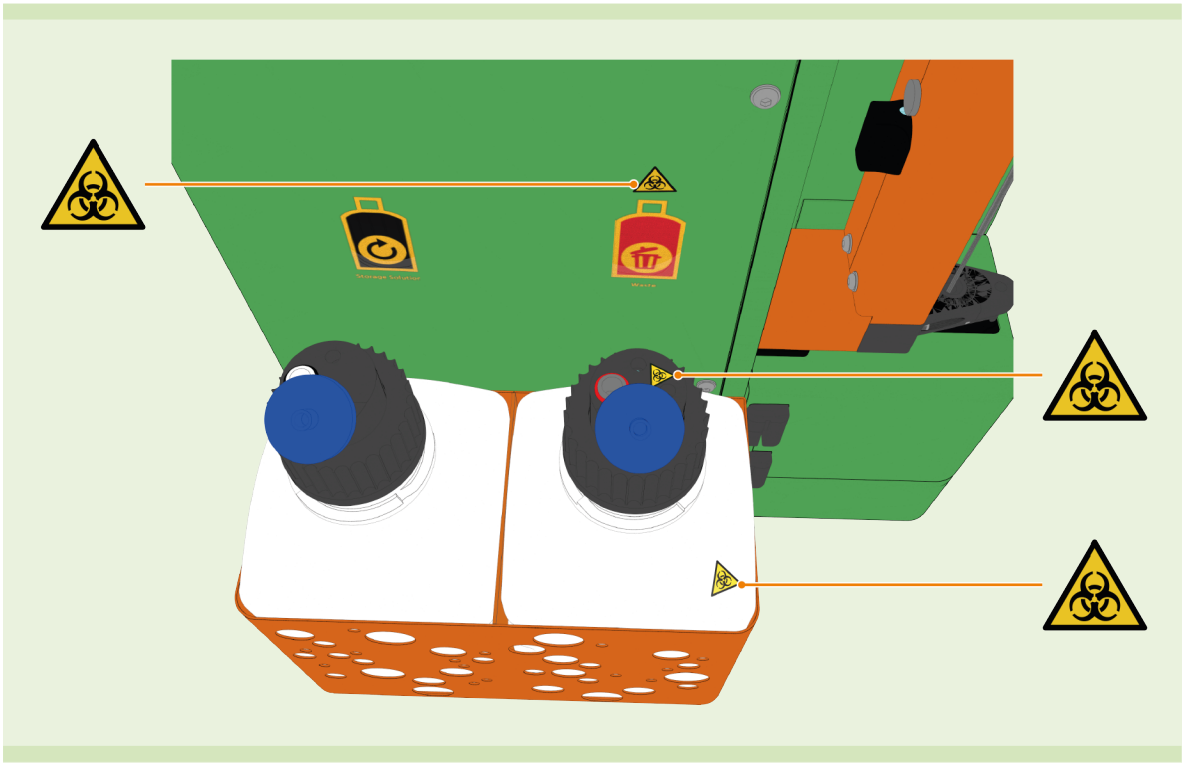


Figure 2: Zones de danger et symboles de sécurité sur le côté gauche de l'instrument

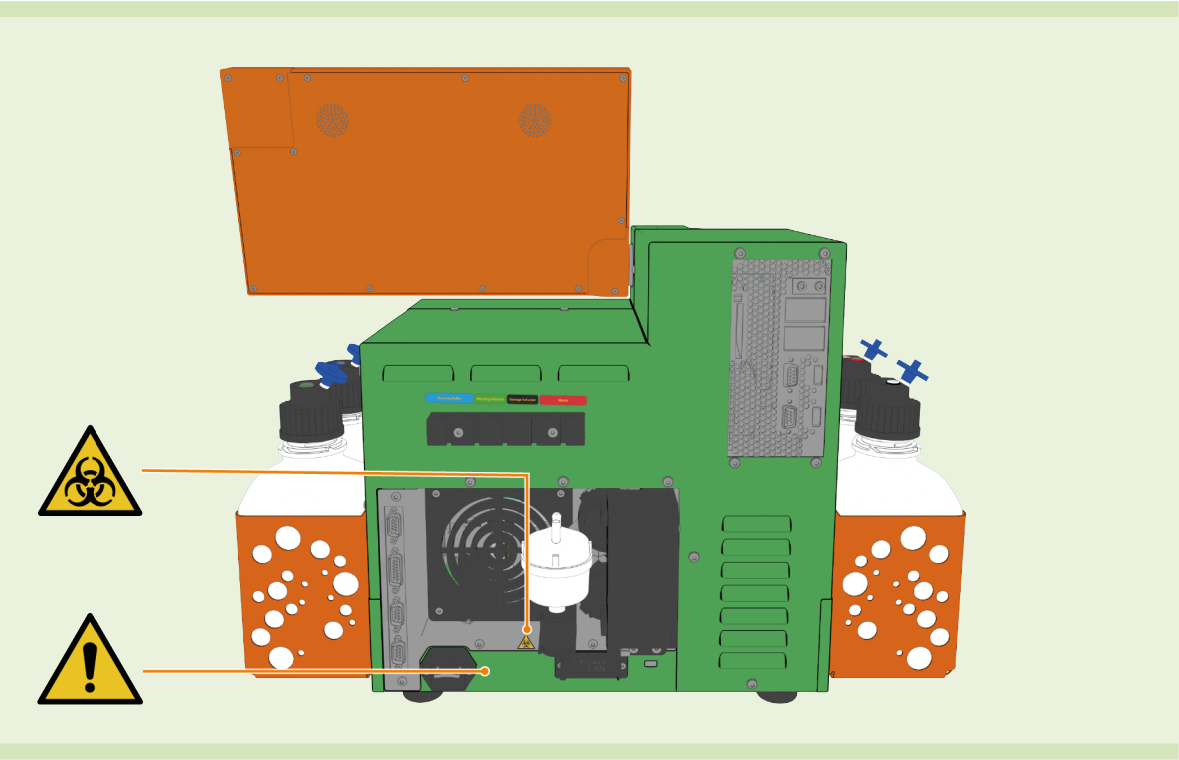


Figure 3: Zones de danger et symboles de sécurité sur l'arrière de l'instrument

Dangers électriques et thermiques

⚠ AVERTISSEMENT

Un choc électrique, un court-circuit, une surchauffe, un incendie ou une explosion peuvent causer des blessures graves ou la mort.

Boîtier de protection

Le boîtier de l'instrument réduit le risque de choc électrique et de court-circuit. Un court-circuit peut se produire si des pièces démontées ou des objets tombent à l'intérieur de l'instrument. Les étincelles dues à un court-circuit peuvent enflammer des vapeurs ou matières combustibles. Le boîtier de protection empêche la propagation d'incendie. N'utilisez pas l'instrument dans des zones classées dangereuses, comme les environnements chargés en oxygène.

- Ne retirez pas et ne franchissez pas le capot du boîtier, sauf la partie d'accès à l'avant.
- Seul le personnel de service de Miltenyi Biotec est autorisé à retirer les couvercles de l'instrument.
- N'utilisez pas l'instrument s'il est ouvert ou démonté.
- N'utilisez pas l'instrument s'il est tombé ou endommagé.
- N'utilisez pas l'instrument si un objet a pénétré à l'intérieur de l'instrument.

Surchauffe et risque d'incendie

Protégez l'instrument de toute surchauffe.

- Laissez suffisamment d'espace autour de l'instrument (au moins 15 cm de chaque côté).
- Ne posez pas l'instrument à proximité de sources de chaleur, un radiateur par exemple.
- Ne couvrez pas les orifices et ouvertures de ventilation de l'instrument.
- Assurez une circulation d'air appropriée pendant que l'instrument est en marche.

Liquides à l'intérieur de l'instrument

Du liquide dans l'instrument peut entraîner des courts-circuits.

- Protégez l'instrument des liquides renversés.
- Nettoyez immédiatement tout liquide renversé.
- Ne pas utiliser l'instrument si du liquide s'est répandu à l'intérieur.
- Débranchez l'instrument avant de le nettoyer.
- Utilisez uniquement de petites quantités d'agents de nettoyage sur un chiffon doux pour essuyer l'instrument. Ne vaporisez et ne versez pas d'agents de nettoyage sur ou dans l'instrument.

Environnements humides et poussiéreux

Les environnements humides et poussiéreux peuvent provoquer des courts-circuits.

- N'utilisez pas l'instrument dans un endroit humide ou dans des zones avec une humidité ou une condensation élevée.
- Après avoir déplacé l'instrument d'un environnement froid à un environnement à température ambiante, attendez que l'instrument se déshumidifie avant de l'utiliser.

Câbles et alimentation électrique

L'utilisation de l'instrument avec d'autres câbles que ceux fournis peut être dangereuse. L'instrument a une prise trifilaire dont une troisième fiche pour la mise à la terre. Il s'agit d'un équipement de sécurité.

- Insérer la fiche uniquement dans une prise électrique reliée à la terre. Ne pas essayer d'insérer la fiche dans une prise électrique non reliée à la terre.
- N'utilisez pas l'instrument si le câble d'alimentation est endommagé.
- Utilisez uniquement le câble d'alimentation fourni.
- N'utilisez pas de rallonge électrique ou de multiprise.
- Ne surchargez pas la prise de courant.

Dangers biologiques

⚠ AVERTISSEMENT

Selon le matériel utilisé, une contamination ou une infection peuvent causer des blessures graves ou la mort.

Matériel biologique

Tous les matériels biologiques doivent être considérés comme potentiellement infectieux.

- N'ouvrez pas les capots d'accès à l'avant lorsque l'instrument est en marche. Les procédures de maintenance explicitement décrites dans le présent Guide sont les seules exceptions.
- Tenez-vous éloigné du porte aiguille robotisé lorsque l'instrument est en marche.
- Portez des équipements de protection individuelle (tels que des gants, lunettes de protection, etc.) suivant les indications fournies dans la fiche de données de sécurité de la substance en question.
- Des gouttelettes peuvent s'échapper du système. Utilisez l'instrument dans une enceinte de sécurité biologique adapté à l'échantillon utilisé si des matières dangereuses ou potentiellement infectieuses sont traitées.
- Décontaminez l'instrument après la manipulation de matériel dangereux ou potentiellement infectieux.

- En cas de dispersion ou de fuite de matériel dangereux ou potentiellement infectieux du système, décontaminez la zone touchée.
- Ne continuez pas à utiliser des accessoires ou pièces de l'instrument contaminés.
- Exécutez le programme **Clean** avant les interventions d'entretien sur toute partie du système fluidique.
- Ne chargez et ne déchargez pas d'échantillons ou de portoirs lorsque l'instrument est en mouvement.
- Laissez suffisamment d'espace autour du MACS MiniSampler Plus (au moins 15 cm à gauche et à droite).

Déchets

Tous les déchets liquides et solides doivent être considérés comme dangereux.

- Remplissez au préalable le flacon à déchet vide avec un désinfectant approprié en observant les spécifications du fabricant.
- Remplacez le flacon à déchets immédiatement après l'avoir démonté et fixez le bouchon au nouveau flacon.
- Gardez toujours un flacon à déchets vide à portée de main.
- Pour éviter les renversements, n'installez qu'un seul flacon à la fois.
- Autoclavez les déchets ou décontaminez-les à l'aide d'un désinfectant approprié.
- Observez les réglementations générales de sécurité du laboratoire lors de la manipulation de déchets liquides et solides.
- Respecter les réglementations locales relatives à l'élimination des déchets.

Dommages de l'équipement

Des équipements défectueux ou inadéquats peuvent provoquer un risque biologique.

- Inspectez toujours le système fluidique et contrôlez la présence éventuelle de fuites avant d'utiliser l'instrument.
- Remplacez les filtres à air hydrophobes une fois par an pour éviter toute obstruction due aux dépôts de poussière.
- Remplacez les filtres à air hydrophobes s'ils sont entrés en contact direct avec quelque liquide que ce soit, afin d'éviter le colmatage des filtres et de prévenir la contamination des liquides.

Dangers chimiques

⚠ AVERTISSEMENT

Les substances et les réactifs peuvent être dangereux.

- Toutes les mesures de sécurité indiquées à la rubrique **Dangers biologiques** s'appliquent également à toutes les substances ou tous les réactifs susceptibles d'être présents dans l'échantillon.
- Utilisez l'instrument sous une hotte si des substances et réactifs dangereux sont traités.
- Utilisez toujours toute substance ou tout réactif en suivant les indications figurant dans la fiche de données de sécurité correspondante.

Dangers liés au champ magnétique

⚠ AVERTISSEMENT

L'instrument est équipé d'un aimant puissant.
Les champs magnétiques puissants peuvent influencer le fonctionnement des stimulateurs cardiaques ou des implants médicaux électroniques.

Les personnes qui portent un stimulateur cardiaque ou des implants médicaux électroniques doivent rester à une distance d'au moins 30 cm de l'instrument.

⚠ ATTENTION

L'instrument est équipé d'un aimant puissant.
Les objets aimantables peuvent subitement se déplacer vers l'aimant.

- Gardez tous les dispositifs de stockage magnétiques, équipements électroniques et objets aimantables à une distance d'au moins 30 cm de l'instrument.

Dangers mécaniques

⚠ ATTENTION

Pièces amovibles.
Risque d'écrasement ou de coupure.

Porte aiguille robotisé

Le porte aiguille robotisé est en mouvement lorsque l'instrument est en marche.

- N'utilisez pas l'instrument sans la protection d'aiguille.
- Tenez-vous éloigné du porte aiguille robotisé lorsque l'instrument est en marche.
- Ne bloquez pas le mouvement du porte aiguille robotisé.

MiniSampler

Le chariot du MiniSampler est mobile.

- Tenez-vous éloigné du MiniSampler lorsque l'instrument est en marche.
- Arrêtez ou annulez toujours tout processus avant de manipuler des matériels accessoires ou des consommables.
- Ne chargez et ne déchargez pas d'échantillons ou de portoirs lorsque l'instrument est en mouvement.

Système fluidique

Les pompes à seringue font partie du système fluidique. Elles sont en mouvement lorsque l'instrument est en marche.

- Tenez-vous éloigné du système fluidique lorsque l'instrument est en marche.
- N'ouvrez pas les capots d'accès à l'avant lorsque l'instrument est en marche.

Dangers liés au rayonnement optique

⚠ ATTENTION

Une exposition aux rayonnements optiques peut entraîner des lésions oculaires.

Éclairage des flacons

Des LEDs puissantes sont utilisées pour éclairer les flacons. Le rayonnement provenant des unités démontées

peut entraîner une blessure oculaire. Selon la norme internationale CEI 62471, ce système de lampe dépasse le groupe sans risque et il existe des risques liés à l'utilisation de l'instrument. Le quotient de danger (QD) mesuré à une distance de 20 cm des supports de flacons étant de 0,91, la distance de risque est de 19 cm pour le groupe de risque 1.

- Ne regardez pas directement le rayonnement des LEDs.
- Ne démontez, ne modifiez et ne retirez pas les sources de rayonnement LEDs ni leurs supports de montage. Les sources de rayonnement LED n'arrêtent pas automatiquement d'émettre lorsqu'elles sont démontées.
- Ne retirez pas les support des flacons sauf si l'instrument est intégré dans un système de manipulation des liquides.

Dangers liés aux rayonnements laser

⚠ ATTENTION

Une exposition directe au faisceau laser peut entraîner des lésions oculaires.

Détection des portoirs

L'instrument est équipé de quatre lasers à émission de surface à cavité verticale (VCSEL) pour la détection automatique des portoirs (classe 1M). Le rayonnement n'est pas visible.

- Ne regardez pas le port des VCSEL à travers des instruments optiques tels que des lentilles, des verres grossissants, etc.
- Ne regardez pas directement le rayonnement LED ni le rayonnement LED réfléchi d'une surface réfléchissante.
- Maintenez une distance de 10 cm du port VCSEL.
- Évitez d'ajuster le trajet du faisceau laser à la même hauteur que l'œil humain lorsqu'il est en marche.

Laser

L'instrument est équipé de trois lasers continus. Les lasers sont de classe 3B.Les lasers sont sécurisés par un boîtier de protection.

- Ne retirez pas le boîtier de protection.

	Puissance de sortie	Durée d'impulsion	Longueur d'ondes
MACSQuant Analyzer 10			
Détection de porte-éprouvettes	3.3 mW	215 µs	850 nm
Laser interne 1	40 mW	continu	405 nm
Laser interne 2	30 mW	continu	488 nm
Laser interne 3	20 mW	continu	640 nm
MACSQuant VYB			
Détection de porte-éprouvettes	3.3 mW	215 µs	850 nm
Laser interne 1	40 mW	continu	405 nm
Laser interne 2	50 mW	continu	488 nm
Laser interne 3	100 mW	continu	561 nm
MACSQuant Analyzer 16			
Détection de porte-éprouvettes	3.3 mW	215 µs	850 nm
Laser interne 1	65 mW	continu	405 nm
Laser interne 2	50 mW	continu	488 nm
Laser interne 3	72 mW	continu	640 nm

Table 5.1: Puissance de sortie de laser, durée d'impulsion, et longueur d'ondes

Risques ergonomiques

⚠ AVERTISSEMENT

Instrument lourd.

Risque d'élongation ou de foulure musculaire.

- L'instrument doit être soulevé par deux personnes.
- Tenez l'instrument à la base des supports pour flacons orange situés à droite et à gauche de l'instrument.

Maintenance et transport

Maintenance

Une maintenace ou une réparation inappropriée de l'instrument ou l'utilisation de pièces non autorisées peut provoquer un dysfonctionnement de l'instrument ou l'endommager. Cela peut mettre en danger les utilisateurs. Sauf indication contraire dans ce manuel d'utilisation ou dans toute autre documentation fournie par Miltenyi Biotec, ne procédez pas vous-même à l'entretien ou la réparation de l'instrument. La maintenace et la réparation doivent être effectuées par du personnel de maintenance Miltenyi Biotec qualifié et certifié. Si l'instrument doit être révisé, décontaminez-le pour éliminer toute matière dangereuse. Si vous avez des questions sur la décontamination ou l'envoi, veuillez contacter le Miltenyi Biotec Technical Support pour obtenir de l'aide. Utilisez uniquement les accessoires et les mises à jour recommandés par Miltenyi Biotec. Contactez votre représentant local Miltenyi Biotec pour en savoir plus sur la révision des instruments et les contrats de révision de Miltenyi Biotec, ou consultez le site **www.miltenyibiotec.com/support**.

Transport

L'instrument doit être transporté avec soin dans l'emballage indiqué par Miltenyi Biotec. Des dommages internes peuvent se produire si l'instrument est soumis à des vibrations excessives ou à une chute. Si

l'instrument doit être renvoyé au fabricant pour maintenance, contactez Miltenyi Biotec pour obtenir les instructions et le matériel d'emballage.

Élimination

INFORMATION CLIENT SUR LES DÉCHETS D'ÉQUIPEMENTS ÉLECTRIQUES ET ÉLECTRONIQUES (DEEE)

Éliminez vos produits Miltenyi Biotec en fin de vie conformément à la directive DEEE et à la législation applicable relative à l'élimination des déchets dangereux, qui peut varier en fonction du pays ou de la région. Les équipements électriques peuvent contenir des substances dangereuses susceptibles d'avoir un effet nocif grave sur l'environnement et/ou la santé humaine. Tous les équipements doivent être spécifiquement collectés et traités par des établissements désignés de gestion des déchets et des systèmes qualifiés de conformité à la directive DEEE. En veillant à éliminer vos déchets d'équipements électriques et électroniques en accord avec la directive DEEE et la législation applicable relative à l'élimination des déchets dangereux, vous contribuez à la préservation des ressources naturelles et à la protection de la santé humaine. Miltenyi Biotec s'engage à protéger l'environnement. Miltenyi Biotec propose des programmes de retour des produits en fin de vie dans de nombreux pays, et conclut des partenariats avec des établissements conduisant des systèmes de conformité DEEE agréés dans le monde entier. Miltenyi Biotec reprend et recycle gratuitement vos équipements Miltenyi Biotec en fin de vie. Les conditions et la disponibilité de cette offre varient selon les pays et les différentes exigences réglementaires. Selon le type et l'utilisation de votre équipement, des exigences suppléméntaires peuvent s'appliquer. Avant d'expédier l'instrument au fabricant pour élimination, décontaminez-le pour éliminer tout matériel dangereux. Pour de plus amples informations, ou si vous souhaitez éliminer votre équipement Miltenyi Biotec arrivé en fin de vie, veuillez contacter votre représentant Miltenyi Biotec local ou le Miltenyi Biotec Technical Support.

IT

Importanti istruzioni di sicurezza

Leggere prima il manuale d'uso

⚠ AVVERTENZA

Prima di utilizzare il prodotto MACSQuant Instrument (MACSQuant Analyzer 10, VYB, or Analyzer 16), leggere queste **Informazioni importanti sulla sicurezza** e tutte le altre informazioni contenute nel manuale d'uso. Prestare particolare attenzione a tutte le avvertenze visualizzate sullo strumento. La mancata lettura e osservanza delle presenti linee guida può comportare un utilizzo improprio o scorretto e determinare danni allo strumento. L'uso improprio potrebbe anche causare gravi lesioni personali, decesso, risultati imprevisti, malfunzionamento dello strumento e usura precoce dei componenti con conseguente riduzione della vita utile dello strumento. Queste azioni possono invalidare la garanzia. Tenere il manuale d'uso e le altre istruzioni di sicurezza e d'uso forniti con lo strumento in un posto sicuro che sia accessibile a tutti gli utilizzatori per ogni esigenza futura.

In caso di dubbi riguardo all'uso in sicurezza dello strumento, contattare il fornitore di assistenza Miltenyi Biotec autorizzato o chiamare il Miltenyi Biotec Technical Support.

Istruzioni generali di sicurezza

NEL PRESENTE CAPITOLO SI DESCRIVONO LE SITUAZIONI POTENZIALMENTE PERICOLOSE ASSOCIATE A QUESTO STRUMENTO E SI FORNISCONO INFORMAZIONI IMPORTANTI SULLA SICUREZZA PER RIDURRE AL MINIMO I RISCHI E PROTEGGERE SE STESSI E GLI ALTRI.

Nel presente capitolo si forniscono informazioni importanti per la sicurezza personale e l'uso corretto dello strumento. Leggere e osservare attentamente tutte le istruzioni prima di procedere all'installazione e all'utilizzo dello strumento. Osservare le prassi generali in materia di sicurezza, oltre al presente manuale d'uso.

- Per evitare lesioni personali e danni materiali, utilizzare lo strumento solo come indicato nel presente manuale d'uso.
- Osservare le istruzioni locali per la sicurezza sul posto di lavoro, le prassi di laboratorio locali e le norme in materia di salute, sicurezza e prevenzione degli incidenti.
- Conservare il manuale d'uso in un luogo che sia sempre accessibile a tutti gli utilizzatori.
- In caso di incidenti gravi, danni allo strumento o comparsa di fumo o fiamme, interrompere immediatamente l'alimentazione elettrica.
- Per scollegare completamente lo strumento dall'alimentazione elettrica, staccare il cavo di alimentazione dalla presa.
- Assicurarsi che l'interruttore di alimentazione e la spina del cavo di alimentazione dello strumento siano facilmente accessibili.

Livelli di pericolo

Le indicazioni di avvertenza servono a mettere in guardia su situazioni pericolose e danni materiali. Nel presente manuale d'uso si utilizzano le seguenti indicazioni di avvertenza.

⚠ AVVERTENZA o AVVERTENZA! indica una situazione pericolosa che, se non evitata, potrebbe provocare decesso o gravi lesioni.

⚠ ATTENZIONE o ATTENZIONE! indica una situazione pericolosa che, se non evitata, potrebbe provocare lesioni di entità minore o moderata. Serve anche a mettere in guardia su pratiche non sicure.

AVVISO **o AVVISO indica informazioni considerate importanti ma non correlate a pericoli (ad esempio messaggi relativi a danni materiali).**

Simboli


AVVERTENZA DI SICUREZZA: CONSULTARE LA DOCUMENTAZIONE IN TUTTI I CASI IN CUI SULLO STRUMENTO COMPARE QUESTO SIMBOLO DI SICUREZZA


PERICOLO ELETTRICO


PARTI MOBILI


RADIAZIONE OTTICA


PERICOLO DI RADIAZIONE LASER


PERICOLO BIOLOGICO


PERICOLO ERGONOMICO


I PORTATORI DI PACEMAKER O ALTRI DISPOSITIVI ELETTRONICI IMPIANTABILI DEVONO MANTENERSI A DISTANZA


SOLLEVARE IN DUE PERSONE

ON (ACCESO)


OFF (SPENTO)

LEGGERE IL MANUALE D'USO PRIMA DI UTILIZZARE LO STRUMENTO

FUSIBILE

RAEE (RIFIUTI DI APPARECCHIATURE ELETTRICHE ED ELETTRONICHE)

NUMERO D'ORDINE

NUMERO DI SERIE

NUMERO DI IDENTIFICAZIONE

FABBRICANTE

MARCATURA DI CONFORMITÀ EUROPEA

MARCHI DI CERTIFICAZIONE NRTL: IL PRODOTTO È CONFORME ALLE NORME DI SICUREZZA, BASATE SUL CONSENSO, IMPOSTE DALL'AMMINISTRAZIONE DELLA SICUREZZA E DELLA SALUTE SUL LAVORO (OSHA), DETERMINATE DAL LABORATORIO DI PROVA RICONOSCIUTO A LIVELLO NAZIONALE (NRTL) TÜV SÜD

MARCATURA DELLA VALUTAZIONE DI CONFORMITÀ DEL REGNO UNITO

Etichette di sicurezza

Prestare attenzione ai punti pericolosi e ai simboli di sicurezza dello strumento.

- Mantenere le etichette e i contrassegni sicurezza puliti e leggibili.
- Controllare regolarmente le etichette e i contrassegni di sicurezza e sostituirli se non sono leggibili o identificabili da una distanza sicura.
- Contattare Miltenyi Biotec per la sostituzione delle etichette.

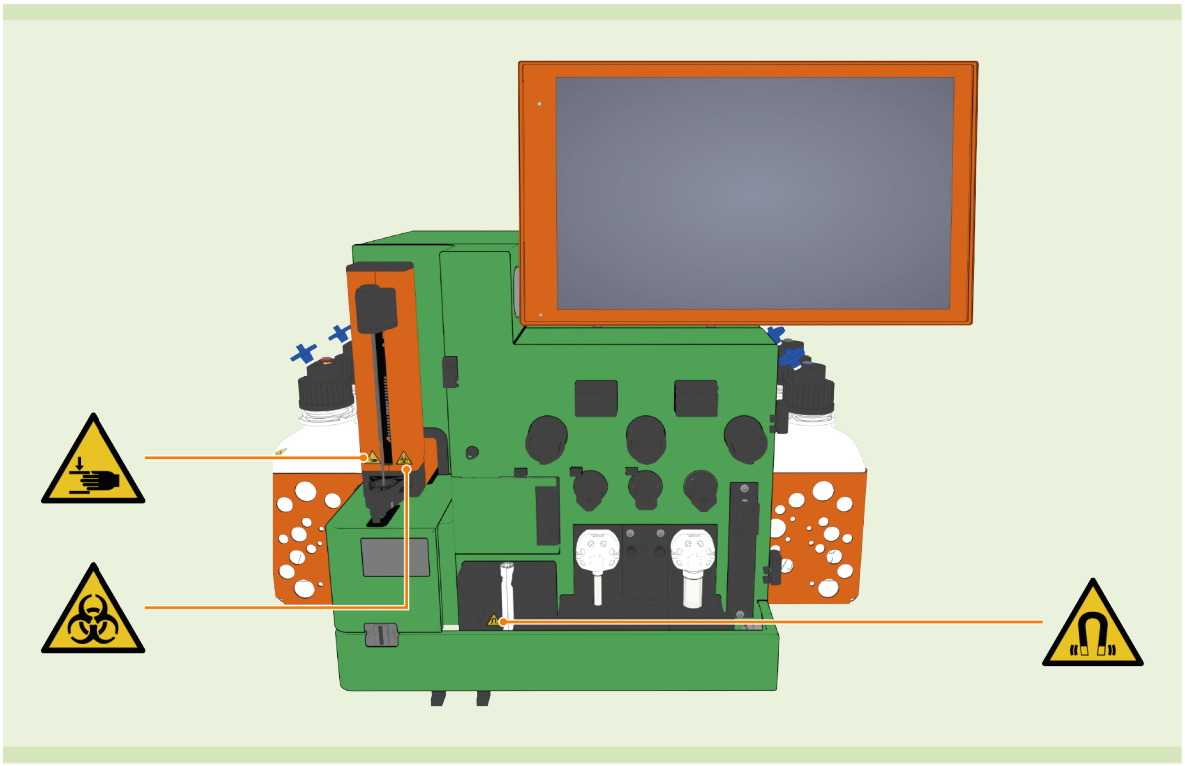


Figure 1: Aree di pericolo e simboli di sicurezza sul lato frontale dello strumento

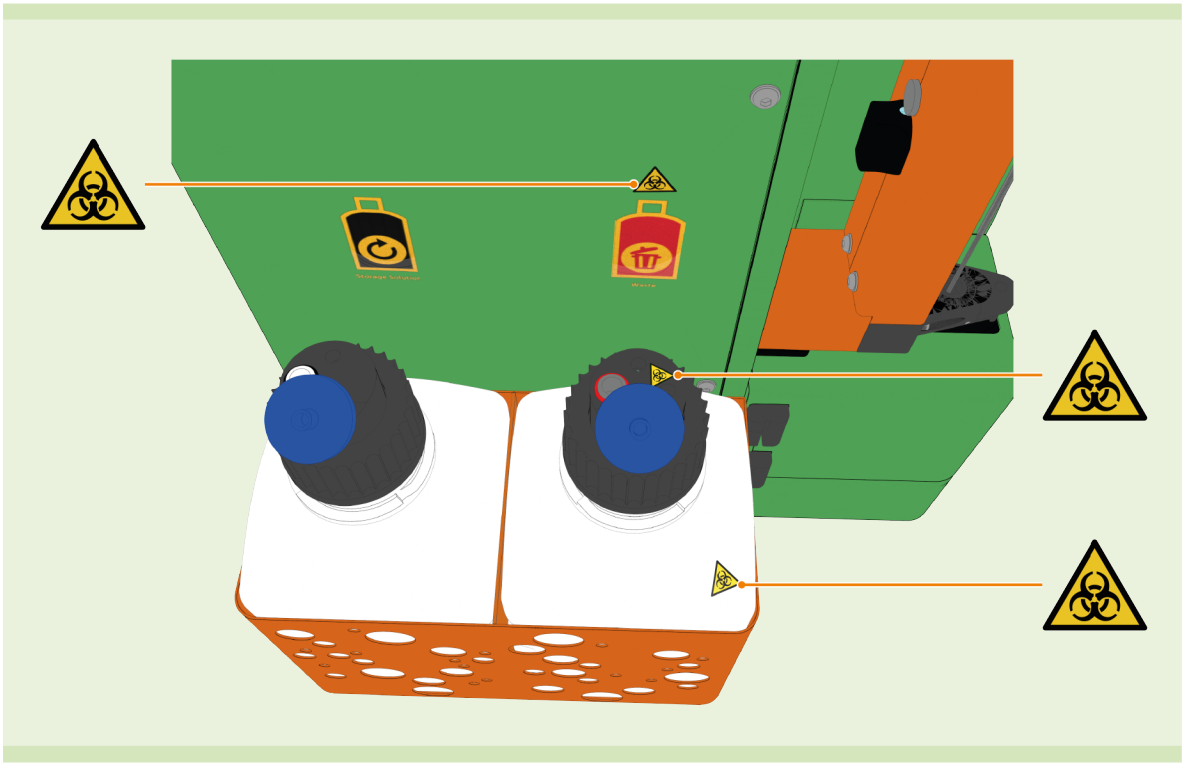


Figure 2: Aree di pericolo e simboli di sicurezza sul lato sinistro dello strumento

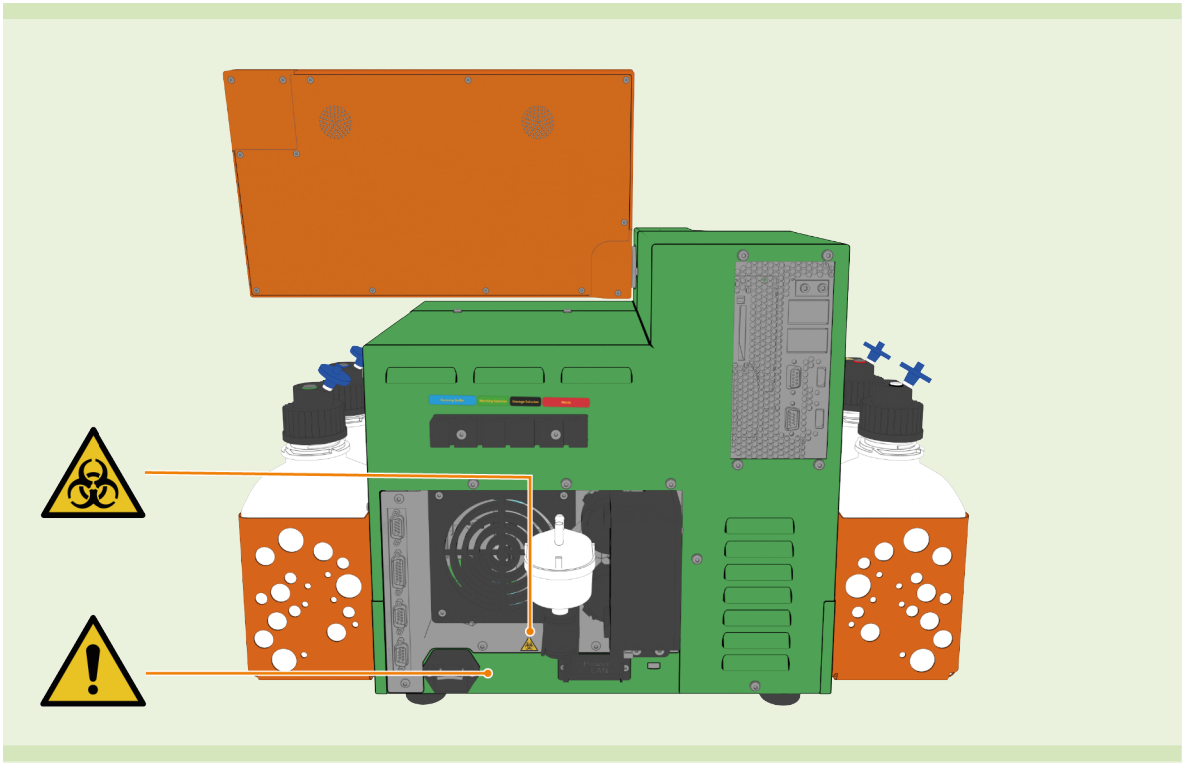


Figure 3: Aree di pericolo e simboli di sicurezza sul retro dello strumento

Pericoli elettrici e termici

⚠ AVVERTENZA

Scosse elettriche, cortocircuiti, surriscaldamento, incendi ed esplosioni potrebbero causare morte o gravi lesioni.

Alloggiamento di protezione

L'alloggiamento dello strumento riduce il rischio di scosse elettriche e corto circuiti. Un corto circuito può essere provocato da parti disassemblate o da oggetti caduti all'interno dello strumento. L'emissione di scintille, provocata da un corto circuito, può innescare l'accensione di vapori o materiali combustibili. L'alloggiamento di protezione impedisce la propagazione del fuoco. Non utilizzare lo strumento in aree classificate come pericolose, ad esempio in ambienti carichi di ossigeno.

- Non rimuovere né perforare le coperture dell'alloggiamento ad eccezione delle coperture di accesso frontale.
- Ogni altra copertura dello strumento può essere rimossa solo dal personale di servizio diMiltenyi Biotec.
- Non utilizzare lo strumento se è aperto o smontato.
- Non usare lo strumento se è caduto o danneggiato.
- Non usare lo strumento se un oggetto è entrato al suo interno.

Surriscaldamento e pericoli di incendio

Proteggere lo strumento dal surriscaldamento.

- Lasciare uno spazio sufficiente intorno allo strumento (almeno 15 cm su tutti i lati).
- Non collocare lo strumento vicino a fonti di calore, come ad esempio i caloriferi.
- Non coprire le fessure e le aperture di ventilazione dello strumento.
- Assicurare un'adeguata circolazione dell'aria durante il funzionamento.

Liquidi all'interno dello strumento

I liquidi all'interno dello strumento possono causare corto circuiti.

- Proteggere lo strumento da liquidi versati.
- Pulire immediatamente i liquidi versati.
- Non utilizzare lo strumento se sono penetrati liquidi all'interno dello strumento.
- Scollegare lo strumento dall'alimentazione elettrica prima di pulirlo.
- Per pulire lo strumento utilizzare solo piccole quantità di detergente su un panno morbido. Non spruzzare né versare detergenti liquidi sullo strumento o al suo interno.

Ambienti umidi e polverosi

Gli ambienti umidi e polverosi possono causare cortocircuiti.

- Non utilizzare lo strumento in luoghi umidi o in aree con elevata umidità o condensa.
- Dopo aver spostato lo strumento da un ambiente freddo a uno a temperatura ambiente, attendere che lo strumento si deumidifichi prima di utilizzarlo.

Cavi e alimentazione elettrica

L'uso dello strumento con cavi diversi da quelli forniti in dotazione è potenzialmente pericoloso. Lo strumento è dotato di una spina elettrica a tre contatti, che presenta un terzo pin per la messa a terra. Questa è una caratteristica di sicurezza.

- Inserire la spina solo in una presa elettrica con messa a terra. Non cercare di inserire la spina in una presa elettrica priva di messa a terra.
- Non utilizzare lo strumento se il cavo di alimentazione è danneggiato.
- Utilizzare esclusivamente il cavo di alimentazione incluso.
- Non utilizzare cavi di prolunga o ciabatte elettriche.
- Non sovraccaricare la presa elettrica.

Pericoli biologici

⚠ AVVERTENZA

La contaminazione o l'infezione potrebbe causare morte o gravi lesioni, a seconda del materiale utilizzato.

Materiale biologico

Tutto il materiale biologico deve essere considerato potenzialmente infetto.

- Non aprire le coperture di accesso frontale quando lo strumento è in funzione. Fanno eccezione le procedure di manutenzione esplicitamente descritte nel presente manuale.
- Mantenersi a distanza dal braccio-ago robotico mentre lo strumento è in funzione.
- Indossare dispositivi di protezione individuale (ad esempio guanti, occhiali di sicurezza ecc.) come indicato nella scheda di dati di sicurezza della specifica sostanza.
- Le goccioline potrebbero fuoriuscire dal sistema. Se si stanno trattando materiali pericolosi o potenzialmente infetti, utilizzare lo strumento in una cabina di sicurezza biologica adatta al campione in uso.
- Decontaminare lo strumento dopo aver trattato materiale pericoloso o potenzialmente infetto.
- In caso di perdita o fuoriuscita di materiale pericoloso o potenzialmente infetto dal sistema, decontaminare l'area interessata.

- Non continuare a utilizzare accessori o parti dello strumento contaminati.
- Prima di effettuare un intervento di manutenzione su qualsiasi parte del sistema fluidico, eseguire il programma **Clean**.
- Non caricare né scaricare campioni o rack mentre lo strumento è in movimento.
- Lasciare uno spazio sufficiente attorno al MACS MiniSampler Plus (almeno 15 cm sul lato sinistro e sul lato destro).

Scarti

Tutti gli scarti solidi e liquidi devono essere considerati pericolosi.

- Preriempire la bottiglia degli scarti vuota con un apposito disinfettante secondo quanto specificato dal fabbricante.
- Sostituire immediatamente la bottiglia degli scarti dopo averla smontata e fissare la chiusura alla nuova bottiglia.
- Tenere sempre a disposizione una bottiglia degli scarti vuota.
- Per evitare versamenti, installare una sola bottiglia alla volta.
- Sterilizzare gli scarti in autoclave o decontaminarli con un apposito disinfettante.
- Durante la manipolazione degli scarti liquidi e solidi, attenersi ai regolamenti generali sulla sicurezza in laboratorio.
- Osservare le norme locali sullo smaltimento dei rifiuti.

Danno alle apparecchiature

Apparecchiature difettose o inadeguate possono comportare un pericolo biologico.

- Prima di utilizzare lo strumento ispezionare sempre il sistema fluidico e controllare che non vi siano perdite.
- Per evitare ostruzioni dovute ai depositi di polvere, sostituire i filtri dell'aria idrofobi una volta all'anno.
- Sostituire i filtri dell'aria idrofobi se vengono a contatto diretto con i liquidi, onde evitare l'ostruzione dei filtri e prevenire la contaminazione dei liquidi.

Pericoli chimici

⚠ AVVERTENZA

Sostanze e reagenti possono essere pericolosi.

- Tutte le misure di sicurezza riportate nella sezione **Pericoli biologici** valgono anche per le sostanze e i reagenti pericolosi eventualmente presenti nel campione.
- Se si stanno trattando sostanze e reagenti pericolosi utilizzare lo strumento sotto cappa.
- Utilizzare sostanze e reagenti solo come indicato nella relativa scheda di dati di sicurezza.

Pericoli correlati ai campi magnetici

⚠ AVVERTENZA

Lo strumento è dotato di un potente magnete.
Forti campi magnetici potrebbero influenzare il funzionamento di pacemaker o impianti medici elettronici.

Se si indossano pacemaker o dispositivi medici elettronici impiantabili, mantenere una distanza di almeno 30 cm dallo strumento.

⚠ ATTENZIONE

Lo strumento è dotato di un potente magnete.
Gli oggetti magnetizzabili potrebbero muoversi improvvisamente verso il magnete.

- Mantenere tutti i dispositivi di archiviazione magnetica, le apparecchiature elettroniche e gli oggetti magnetizzabili a una distanza di almeno 30 cm dallo strumento.

Pericoli meccanici

⚠ ATTENZIONE

Parti mobili.
Rischio di taglio o schiacciamento.

Braccio-ago robotico

Il braccio-ago robotico si muove mentre lo strumento è in funzione.

- Non utilizzare lo strumento senza la protezione dell'ago.
- Mantenersi a distanza dal braccio-ago robotico mentre lo strumento è in funzione.
- Non ostacolare il movimento del braccio-ago robotico.

MiniSampler

Il carrello del MiniSampler si muove.

- Tenere lontano dal MiniSampler quando lo strumento è in funzione.
- Interrompere o cancellare sempre un processo prima di maneggiare hardware o materiali di consumo accessori.
- Non caricare né scaricare campioni o rack mentre lo strumento è in movimento.

Sistema fluidico

Le pompe a siringa fanno parte del sistema fluidico. Si muovono mentre lo strumento è in funzione.

- Tenere lontano dal sistema fluidico quando lo strumento è in funzione.
- Non aprire le coperture di accesso frontale quando lo strumento è in funzione.

Pericoli correlati alla radiazione ottica

⚠ ATTENZIONE

L'esposizione alle radiazioni ottiche potrebbe provocare lesioni agli occhi.

Illuminazione del flacone

Per illuminare le bottiglie si utilizzano potenti LED. Le radiazioni delle unità smontate possono causare lesioni agli occhi. Secondo lo standard internazionale CEI 62471, questo sistema di lampade supera il gruppo di rischio esente e vi sono rischi dipendenti dall'uso dello strumento. Il valore del pericolo di esposizione (EHV) misurato a una distanza di 20 cm dai supporti per flaconi è pari a 0,91, e la distanza di rischio è di 19 cm per il gruppo di rischio 1.

- Non guardare direttamente le radiazioni dei LED.
- Non smontare, modificare o rimuovere le sorgenti di radiazioni LED installate o le relative staffe di montaggio. Le sorgenti di radiazioni LED non smettono automaticamente di emettere quando vengono smontate.
- Non rimuovere i supporti per flaconi se non si integra lo strumento in un sistema di trattamento dei liquidi.

Pericolo di radiazioni laser

⚠ ATTENZIONE

L'esposizione diretta al raggio laser può provocare lesioni agli occhi.

Rilevamento del rack

Lo strumento è dotato di quattro laser a cavità verticale a emissione superficiale (VCSEL) per il rilevamento automatico dei rack (Classe 1M). La radiazione non è visibile.

- Non guardare la porta VCSEL attraverso strumenti ottici come lenti, occhiali di ingrandimento, ecc.
- Non guardare direttamente le radiazioni LED o le radiazioni LED riflesse da una superficie specchiata.
- Mantenere una distanza di 10 cm dalla porta VCSEL.
- Evitare che il percorso del raggio luminoso si trovi alla stessa altezza dell'occhio umano durante il funzionamento.

Laser

Lo strumento dispone di tre laser a onda continua. I laser sono classificati come laser di classe 3B. I laser sono protetti da un alloggiamento protettivo.

- Non rimuovere l'alloggiamento protettivo.

	Potenza di uscita	Durata dell'impulso	Lunghezza d'onda
MACSQuant Analyzer 10			
Rilevamento del portaprovette	3.3 mW	215 µs	850 nm
Laser interno 1	40 mW	continuativo	405 nm
Laser interno 2	30 mW	continuativo	488 nm
Laser interno 3	20 mW	continuativo	640 nm
MACSQuant VYB			
Rilevamento del portaprovette	3.3 mW	215 µs	850 nm
Laser interno 1	40 mW	continuativo	405 nm
Laser interno 2	50 mW	continuativo	488 nm
Laser interno 3	100 mW	continuativo	561 nm
MACSQuant Analyzer 16			
Rilevamento del portaprovette	3.3 mW	215 µs	850 nm
Laser interno 1	65 mW	continuativo	405 nm
Laser interno 2	50 mW	continuativo	488 nm
Laser interno 3	72 mW	continuativo	640 nm

Table 6.1: Potenza di uscita, durata dell'impulso, e lunghezza d'onda

Pericoli ergonomici

⚠ AVVERTENZA

Strumento pesante.

Rischio di strappo o stiramento muscolare.

- Per sollevare lo strumento sono necessarie due persone.
- Afferrare lo strumento alla base dei cestelli portabottiglie arancioni situati su entrambi i lati dello strumento.

Manutenzione e trasporto

Interventi di manutenzione

Interventi di manutenzione o riparazione impropri sullo strumento o l'uso di parti non autorizzate possono causare malfunzionamento o danni allo strumento. Ciò può comportare pericoli per gli utilizzatori. Salvo quanto altrimenti specificato nel presente manuale d'uso o in altra documentazione di Miltenyi Biotec, la manutenzione o la riparazione dello strumento da soli. Gli interventi di manutenzione e riparazione devono essere eseguiti da personale di servizio Miltenyi Biotec certificato e qualificato. Se lo strumento necessita di un intervento di manutenzione, decontaminarlo per rimuovere eventuali materiali pericolosi. In caso di domande relative a una decontaminazione o a una spedizione corrette, contattare il Miltenyi Biotec Technical Support per ricevere assistenza. Utilizzare esclusivamente accessori e aggiornamenti raccomandati da Miltenyi Biotec. Per informazioni sull'assistenza estesa e sui contratti di assistenza di Miltenyi Biotec relativi allo strumento, rivolgersi al rappresentante Miltenyi Biotec di zona o visitare la pagina **www.miltenyibiotec.com/support**.

Trasporto

Lo strumento deve essere trasportato con cura nell'imballaggio specificato da Miltenyi Biotec. Danni interni potrebbero verificarsi se lo strumento è soggetto a vibrazioni eccessive o viene fatto cadere. Se lo strumento deve essere rispedito al fabbricante per assistenza, contattare Miltenyi Biotec per istruzioni e materiali di imballaggio.

Smaltimento

INFORMAZIONE PER L'UTILIZZATORE SUI RIFIUTI DI APPARECCHIATURE ELETTRICHE ED ELETTRONICHE (RAEE)

Smaltire i prodotti Miltenyi Biotec al termine del ciclo vita conformemente alla legislazione applicabile in materia di smaltimento dei RAEE e dei rifiuti pericolosi, che può variare da regione a regione e da Paese a Paese. Le apparecchiature elettriche possono contenere sostanze pericolose che a loro volta possono avere un grave effetto deleterio sull'ambiente e/o sulla salute dell'uomo. Tutte le apparecchiature devono essere raccolte e trattate in maniera specifica dagli appositi impianti per la gestione dei rifiuti e tramite piani di conformità RAEE qualificati. Provvedendo a smaltire le apparecchiature elettriche ed elettroniche non più necessarie secondo la legislazione applicabile in materia di RAEE e rifiuti pericolosi, si contribuisce a preservare le risorse naturali e a proteggere la salute dell'uomo. Miltenyi Biotec si impegna a proteggere l'ambiente. Miltenyi Biotec offre in molti Paesi programmi per la restituzione dei prodotti al termine del ciclo vita e collabora in tutto il mondo con piani di conformità RAEE autorizzati. Miltenyi Biotec accetta gratuitamente la restituzione delle apparecchiature Miltenyi Biotec al termine del ciclo vita per avviarle al riciclo. I termini e la disponibilità di questa offerta variano in base all'area geografica a causa delle differenze nei requisiti regolatori. Si noti che, a seconda del tipo di apparecchiatura e del suo impiego, possono valere requisiti aggiuntivi. Prima di rispedire lo strumento al fabbricante per lo smaltimento, decontaminare lo strumento per rimuovere eventuale materiale pericoloso. Per ulteriori informazioni o se si desidera smaltire le apparecchiature Miltenyi Biotec al termine del ciclo vita, contattare il rappresentante locale Miltenyi Biotec oppure il Miltenyi Biotec Technical Support.

1 Introduction

This user manual applies to following instruments running with MACSQuantify Software version 3.0 or higher.

- MACSQuant Analyzer 10 (# 130-096-343)
- MACSQuant VYB (# 130-096-116)
- MACSQuant Analyzer 16 (# 130-109-803)

In the following, the name MACSQuant Instrument refers to all three instruments. Unless further specified, the stated information applies to all instrument models.

MACSQuant Instruments are compact flow cytometers that combine multisample and multiparameter sample analysis with unrivaled ease of use. With processing rates of up to 15,000 events per second, they facilitate also absolute quantification of cell populations. MACS Antibodies and Cell Separation Reagents are designed for easy and convenient handling with MACSQuant Instruments. Miltenyi Biotec is leading provider of comprehensive solutions for flow cytometry.

1.1 Intended use

The MACSQuant Instrument is a digital benchtop flow cytometer equipped with three lasers for cellular analysis. Units are equipped with an enrichment unit for the pre-analysis enrichment of rare cells. It is intended for both phenotypic analysis with fluorescent antibodies and functional analysis of fluorescently labeled cells. The MACSQuant Instrument is intended for research use only. Only laboratory professional users are allowed to use the MACSQuant Instrument. The instrument is intended to be used only as stated in the provided instructions.

1.2 Instrument description

1.2.1 Key features of the MACSQuant Instrument

- An integrated computer controlled by a touchscreen runs the MACSQuantify Software, which is used for sample acquisition as well as for data analysis.
- A fully automated computer-controlled robotic needle arm delivers samples to the sample injection port, which is located in the washing station. The uptake needle as well as the sample injection port are automatically washed during and after cell processing.
- The Single tube rack is used for the analysis of individual samples.
- The optional MACS MiniSampler Plus allows fully automated multiple sample processing. It holds different racks that can be automatically recognized by a 2D barcode reader. The MACS MiniSampler Plus can also be combined with the Universal Reagent Rack.
- A color-coded and easy to access fluidics system supplies the MACSQuant Instrument with all buffers and solutions required during and after operation. The sheath particle filter prevents any debris from entering the fluidic system.

- Bottles for MACSQuant Running Buffer, MACSQuant Washing Solution, and MACSQuant/MACSima Storage Solution are placed in bottle holders. Liquid waste is collected in a separate waste bottle. All fluid levels are constantly monitored and visualized by the illumination of the fluid bottles.
- The MACS Cell Enrichment Unit with the optional MACSQuant Column allows easy analysis of particularly challenging cell samples, such as rare cell populations in high volumes of buffer, or precious low volume samples.

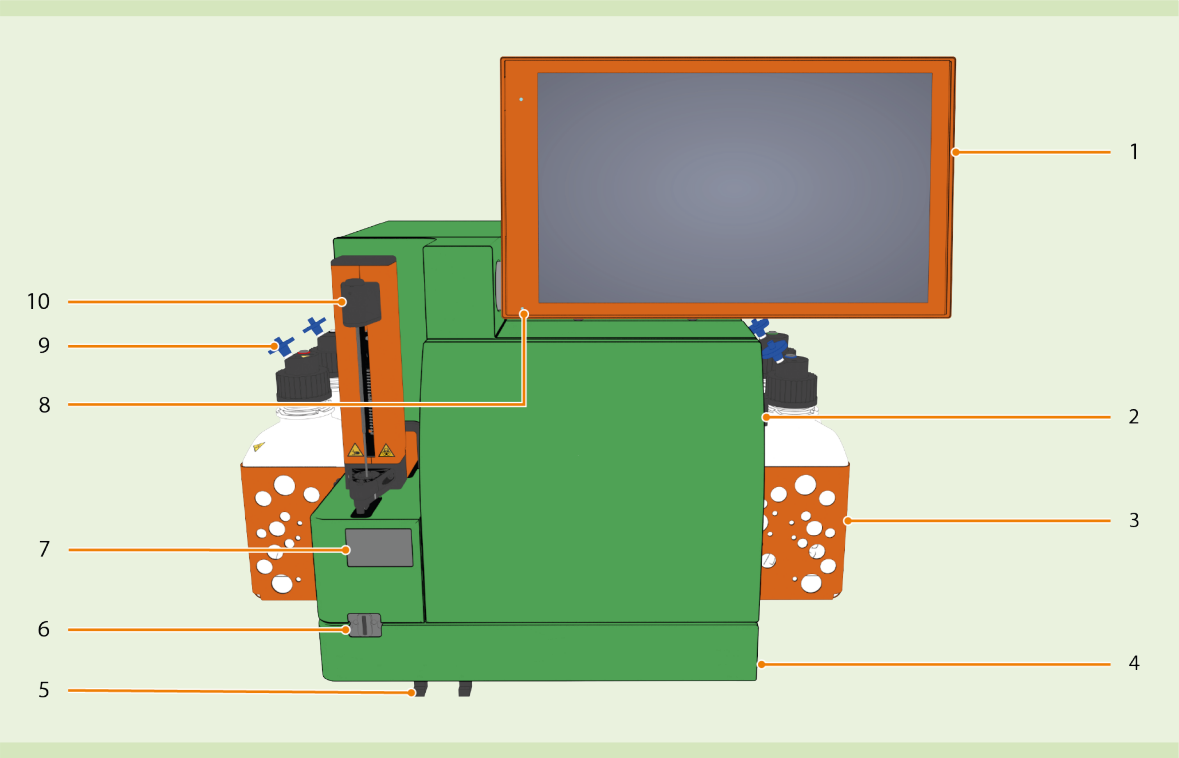


Figure 1.1: Front view of the MACSQuant Analyzer 10, VYB, and Analyzer 16

1	touchscreen	**6**	rack detector
2	front cover	**7**	2D barcode reader
3	bottle holder	**8**	LED status light
4	main switch	**9**	hydrophobic air filter
5	slot for MACS MiniSampler Plus	**10**	robotic needle arm

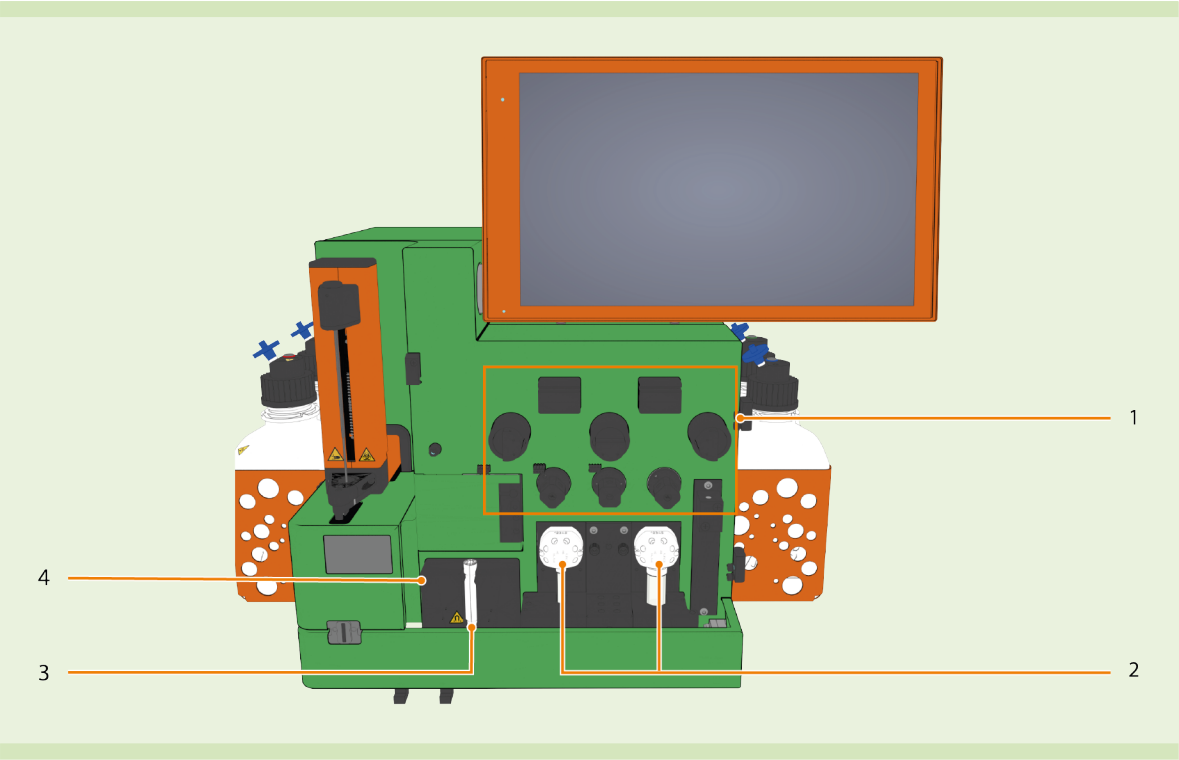


Figure 1.2: Front view of the MACSQuant Analyzer 10, VYB, and Analyzer 16 without front cover

1	fluidics (tubings not shown)	**3**	MACSQuant Column
2	syringe pumps	**4**	MACS Cell Enrichment Unit

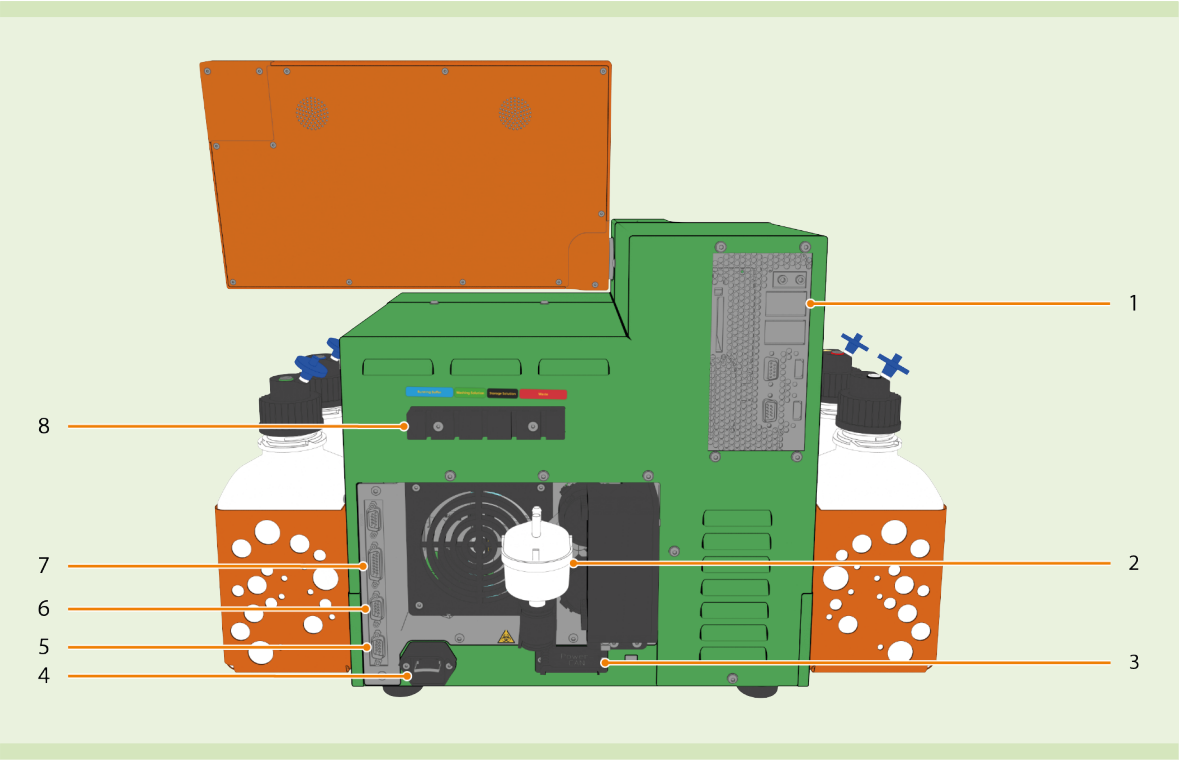


Figure 1.3: Rear view of the MACSQuant Analyzer 10, VYB, and Analyzer 16

1	USB port	**5**	External CAN
2	sheath particle filter	**6**	RS232/BCR
3	Power CANs	**7**	bottle sensor port
4	power cable port	**8**	bottle distribution block

2 Installation

Unpacking and installation of the MACSQuant Instrument should be only done by qualified Miltenyi Biotec representatives.

⚠ WARNING

Electric shock, short circuit, overheating, fire, and explosion could result in death or serious injury. This may lead to burns, severe personal injury, or death.

- Do not use the instrument if it has been dropped or is damaged.

The instrument is designed to fit onto benchtops, into standard size laminar flows, into safety cabinets, or in connection to fully automated liquid handling systems. It should be installed on a stable, flat, and vibration-free surface. The operating environment should be dust-free, sufficiently ventilated, and free from sources of electromagnetic radiation. To ensure a flat surface in laminar flow hoods, the MACSQuant Instrument can be placed on an autoMACS Pro Laminar Hood Plate.

2.1 Components included in the delivery

Component
MACSQuant Instrument
fluid sensor cable module
power cable
6 × fluidics tubing
4 × bottle closure with sensors
Single tube rack
user manual
empty bottles with lids
keyboard
hydrophobic air filters
MACSQuant Calibration Beads
MACSQuant Starting Buffer Kit

Table 2.1: Components included in the delivery

2.2 Consumables

Component	Description	Order no.
MACSQuant Columns	for use with the MACS Cell Enrichment Unit	130-094-458
Hydrophobic Air Filter	to vent fluid bottles	130-090-385
MACSQuant Calibration Beads	for instrument calibration	130-093-607
MACSQuant Running Buffer	6×1.5 L	130-092-747
MACSQuant Running Buffer (16x)	1×1.25 L	130-111-562
MACSQuant Running Buffer (16x)	6×1.25 L	130-111-747
MACSQuant Washing Solution	6×1.5 L	130-092-749
MACSQuant/MACSima Storage Solution	6×1.5 L	130-092-748
MACSQuant Starting Buffer Kit	4×1.5 L Running Buffer 1×1.5 L Washing Solution 1×1.5 L MACSQuant/MACSima Storage Solution	130-094-190
MACSQuant Washing & Storage Solution Kit	3×1.5 L Washing Solution 3×1.5 L MACSQuant/MACSima Storage Solution	130-092-801
MACS Comp Bead Kit, anti-REA MACS Comp Bead Kit, anti-mouse Igκ MACS Comp Bead Kit, anti-rat Igκ MACS Comp Bead Kit, anti-human Igκ	for 100 tests for 100 tests for 100 tests for 100 tests	130-104-693 130-097-900 130-107-755 130-104-187

Table 2.2: Consumables

2.3 Accessories

Complementary components can be ordered separately.

Component	Description	Order no.
MACS MiniSampler Plus	use with the Universal Reagent Rack and one of the available Chill Racks for automated multisample processing	130-105-745
Chill 5, 15, 50 Rack Set	set of cooling racks	130-097-038
Chill 5 Rack	cooling rack for 24×5 mL tubes	130-092-951
Chill 15 Rack	cooling rack for 15×15 mL and 5×5 mL tubes	130-092-952
Chill 50 Rack	cooling rack for 6×50 mL, 3×15 mL, and 3×5 mL tubes	130-092-953
Chill 96 Rack	cooling rack for 96-well plates	130-094-459
Buffer Supply Station	to connect larger fluid containers	130-101-841
Universal Reagent Rack	rack for autolabeling reagents	130-115-722

Table 2.3: Accessories available for the MACSQuant Instrument

2.4 Service contracts

For information about available service contracts for the MACSQuant Instrument, visit **www.miltenyibiotec.com**.

2.5 Assembly

2.5.1 Installing the fluid bottles

⚠ WARNING

Biohazardous waste.
Contamination or infection may lead to severe personal injury or death, depending on the material used.

- Prefill the empty waste bottle with an appropriate disinfectant according to the specification of the manufacturer.

⚠ CAUTION

Powerful LEDs are used to illuminate the bottles.
Exposure to optical radiation may cause eye injury.

- Do not remove the bottle holders.

Operating the instrument requires MACSQuant Running Buffer, MACSQuant Washing Solution, and MACSQuant/MACSima Storage Solution. An additional bottle is required for waste collection. Always operate the instrument with ready-to-use MACSQuant buffers and solutions only. The bottles, closures, tubings, and fluid sensor cables are color-coded for easier handling.

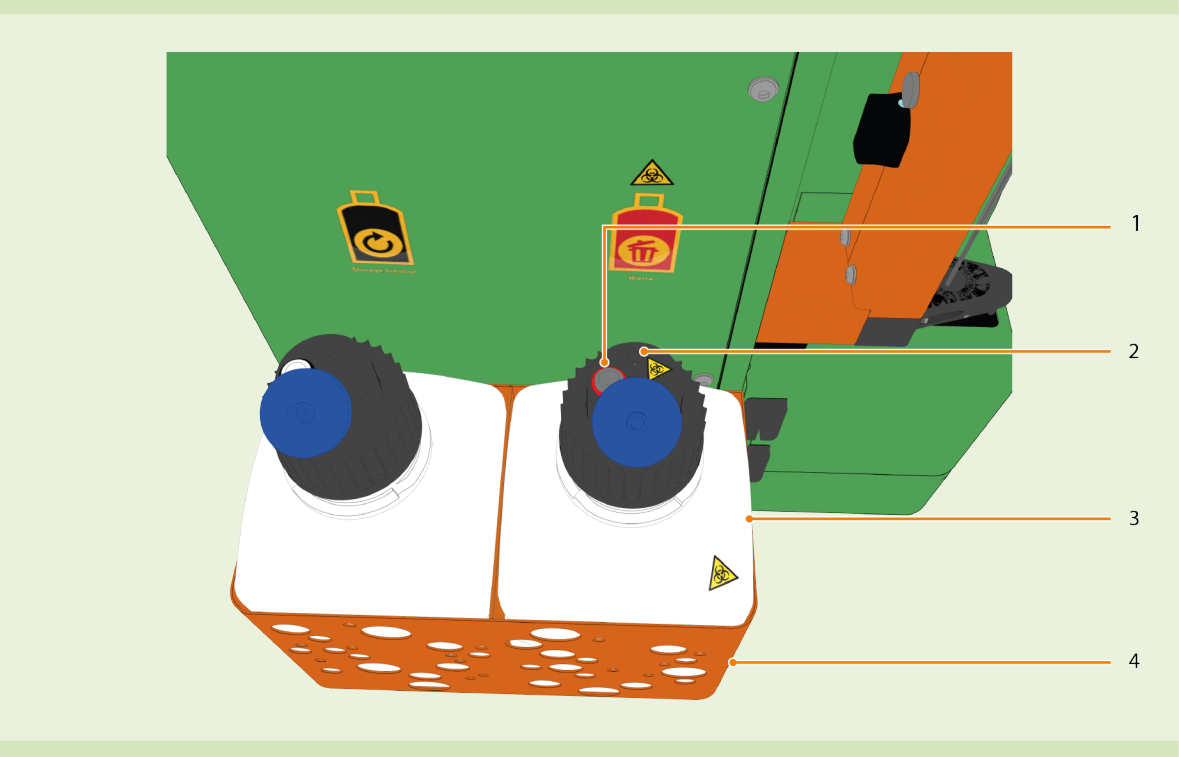


Figure 2.1: Connect fluid bottles

1 Install only one fluid bottle at a time. Place the new bottle (3) into the orange bottle holder (4). Note the corresponding color coding.

2 Unscrew the lid of the fluid bottle and replace it with the appropriate bottle closure delivered with the instrument.

3 Remove the caps from the bottle distribution block and connect the tubing to the appropriate color-coded fluid port of the bottle distribution block on the rear side of the instrument. Refer to **Figure 1.3**.

4 Note the color coding of the tubes and connect them to the respective bottle closure (2).

5 Connect the 4-end fluid sensor cable to the port labeled **Bottle Sensor** at the rear side of the instrument. Refer to **Figure 1.3** . Fasten the screws of the sensor cable plug securely.

6 Note the color coding and connect each fluid sensor cable to the respective bottle closure (1).

NOTICE! Do not screw in the sensor cable.

7 Proceed with **Installing hydrophobic air filters below**.

	Running Buffer	Washing Solution	Storage Solution	Waste container
Icon				
Color of sensor cables and tubes	blue	green	black	red

Table 2.4: Bottle symbols and their respective color coding

2.5.2 Installing hydrophobic air filters

The MACSQuant Instrument is equipped with hydrophobic air filters to allow air flow and to prevent contamination. Use only hydrophobic air filters from Miltenyi Biotec. Refer to **Consumables on page 70**.

1 Remove the Chill Rack.

2 Open the front cover.

3 Connect hydrophobic air filters via Luer connectors. Refer to **Table 2.5** for an overview about the locations. Avoid any contact with liquids because this could cause clogging of the filter.

Location	Amount
on fluidic bottles	4×
behind the front cover	1×
on the rear side of the instrument	1×

Table 2.5: Locations of hydrophobic air filters on the MACSQuant Analyzer 10, VYB, and Analyzer 16

2.5.3 Installing the Single tube rack

The instrument is delivered with the Single tube rack. The Single tube rack is compatible with all standard 5 mL flow cytometry tubes and can also be used with 1.5 mL and 2 mL reaction tubes.

1 Gently insert the Single tube rack (1) into the corresponding slots (2) located at the front of the instrument. The rack should click into place.

2 To remove the Single tube rack, hold it between two fingers and pull gently.

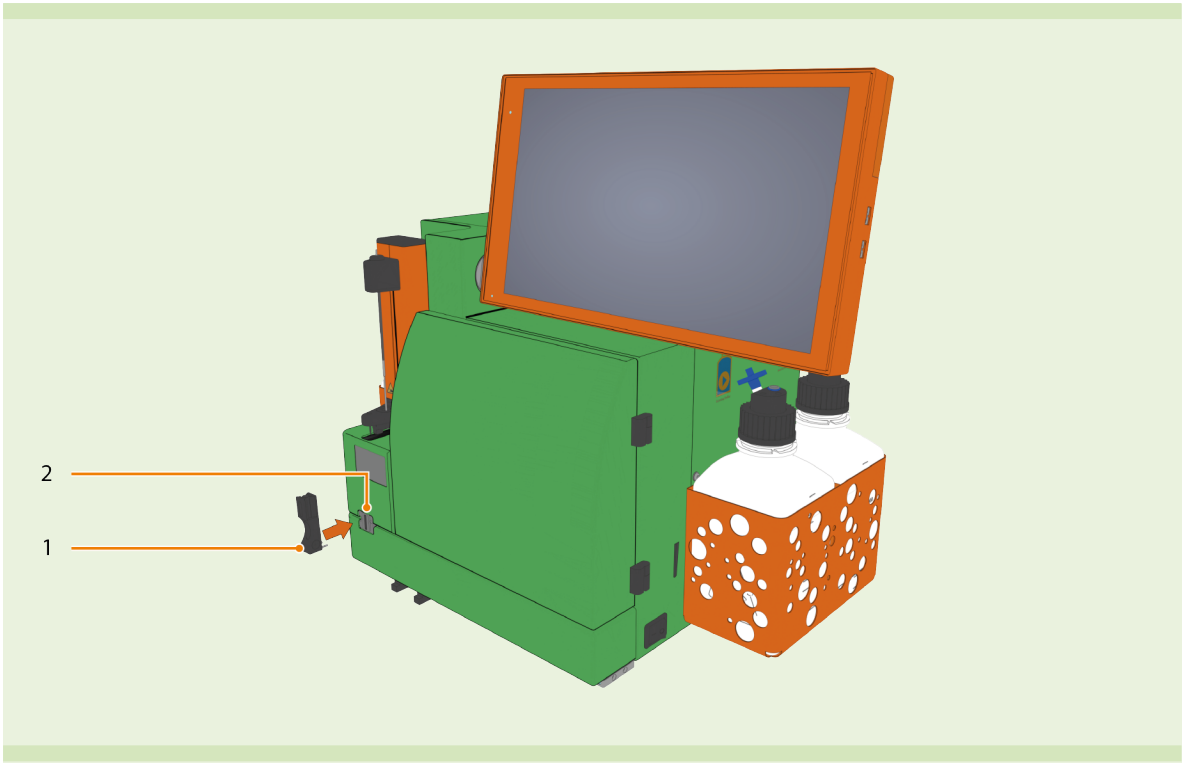


Figure 2.2: Installation of the Single tube rack

2.5.4 Connecting the instrument to the power supply

⚠ WARNING

Electric shock, short circuit, overheating, fire, and explosion could result in death or serious injury. This may lead to burns, severe personal injury, or death.

- Do not use the instrument if the power cable is damaged.
- Only use the included power cable.

1. Connect the power cable to the power socket at the rear side of the instrument. The main switch is located on the right-hand side of the instrument. Refer to **Figure 1.1**. Ensure that the main switch is in position O (off) before connecting the power cable.
2. Attach the cable coming from the 2D barcode reader to the port labeled **RS232/BCR** at the rear side of the instrument and fasten securely.
3. Plug in the power cable to a grounded power outlet.
4. Connect the keyboard included in the delivery to a USB port.
5. Use the main switch on the right-hand side on the instrument to turn the instrument into standby mode.
6. Tap the screen to start the MACSQuantify Software. Wait until the MACSQuantify Software shows the login window.

2.5.5 Installing the MACSQuant Column

⚠ WARNING

The instrument has a powerful magnet.

Magnetizable objects can suddenly move towards the magnet.

- Keep all magnetic storage devices, electronic equipment, and magnetizable objects at a distance of at least 30 cm from the instrument.

⚠ WARNING

The instrument has a powerful magnet.

Strong magnetic fields can influence the functioning of pacemakers or electronic medical implants.

If wearing pacemakers or electronic medical implants, keep a distance of at least 30 cm from the instrument.

The MACSQuant Instrument is delivered with a column substitute, which must be replaced by a MACSQuant Column before using the MACS Cell Enrichment Unit. The MACS Cell Enrichment Unit is integrated in the instrument. Magnetically and fluorochrome-labeled cells are pre-enriched in the MACSQuant Column prior to cell analysis allowing flow cytometric analysis of rare cell populations in a fraction of time. Up to 5×10^6 magnetically labeled cells can be enriched and analyzed in a single step. The entire process of labeling, pre-enrichment, and flow cytometric analysis is fully automated. The MACSQuant Column can be used for up to three months before it needs to be replaced. Keep the column substitute, it can be re-installed if the MACSQuant Column is no longer needed.

Follow the instructions below to replace the column substitute or to exchange an old column with a new column.

1 Open the front cover of the instrument to access the MACS Cell Enrichment Unit with the column substitute or MACSQuant Column.

2 Hold the top and bottom of the column (1) with both hands and pull gently but firmly to remove the column from the MACS Cell Enrichtment Unit (2).

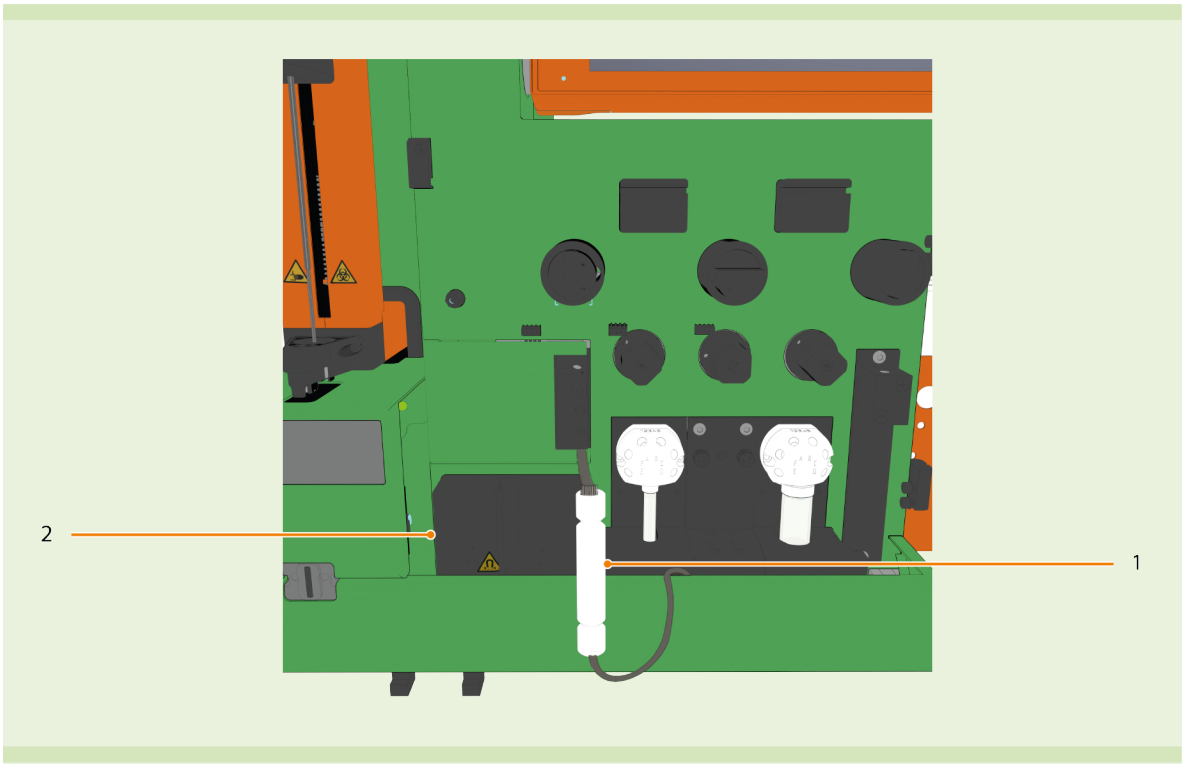


Figure 2.3: MACSQuant Column removal

3 Hold the column (4) in one hand and gently unscrew the top column connector (3) counterclockwise. Tilt the column downwards to empty any liquid into a paper towel.

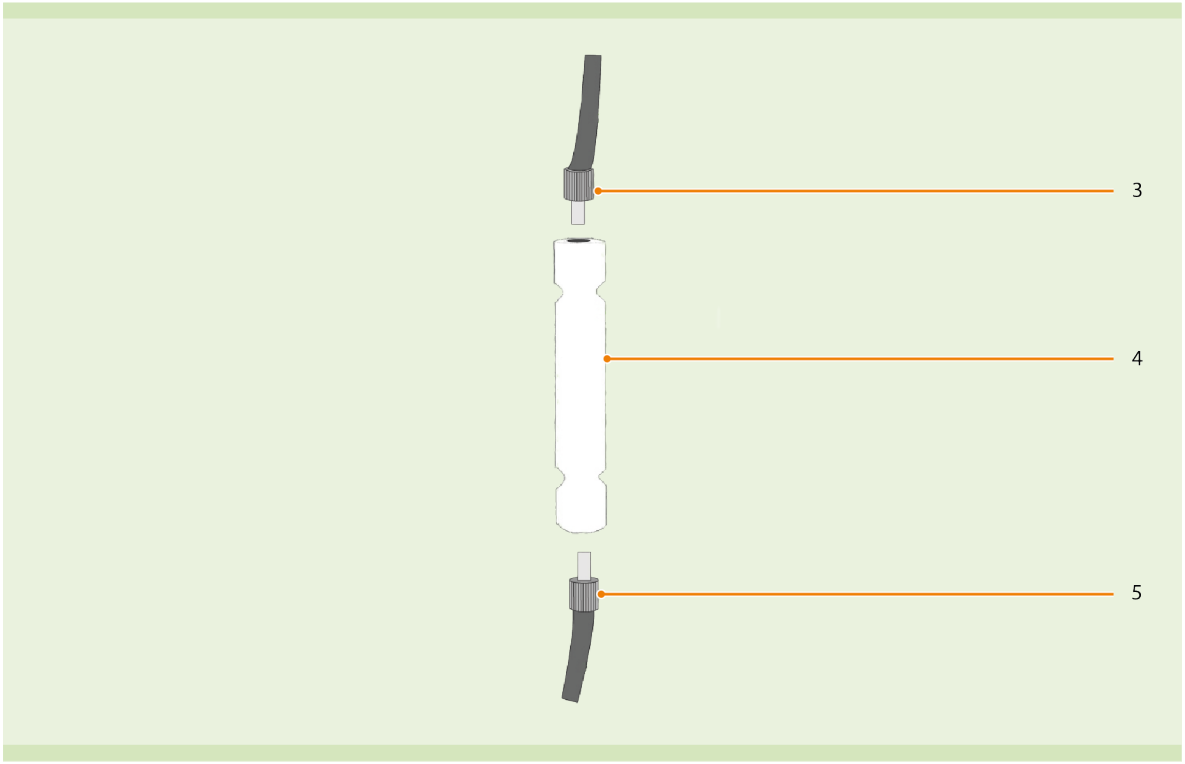


Figure 2.4: MACSQuant Column overview

4 Unscrew the bottom column connector (5) to remove the column.

5 Screw the bottom column connector into the bottom end of the new column. Note the correct orientation of the column. The top end of the MACSQuant Column has a clearly visible spacer, while the metal beads reach further to the bottom end of the column. Insert the column only with the spacer in upward position.

6 Point the column towards the top of the device and screw in the top column connector.

7 Align the column so that the top column connector sits on the guide of the magnet cover. Push the column into the slot until you hear a click. Verify that the column is placed in the center of the magnet cover.

8 Close the front cover of the instrument.

9 Log in as MQ Administrator.

10 Go to the **Tools** tab in the side pane.

11 Select the box **Prime column** to prime the new MACSQuant Column. Refer to the MACSQuantify Software user manual.

2.5.6 Installing the needle guard

1 Check if the needle guard (1) is attached to the robotic needle arm (2).

2 If not, install as depicted below.

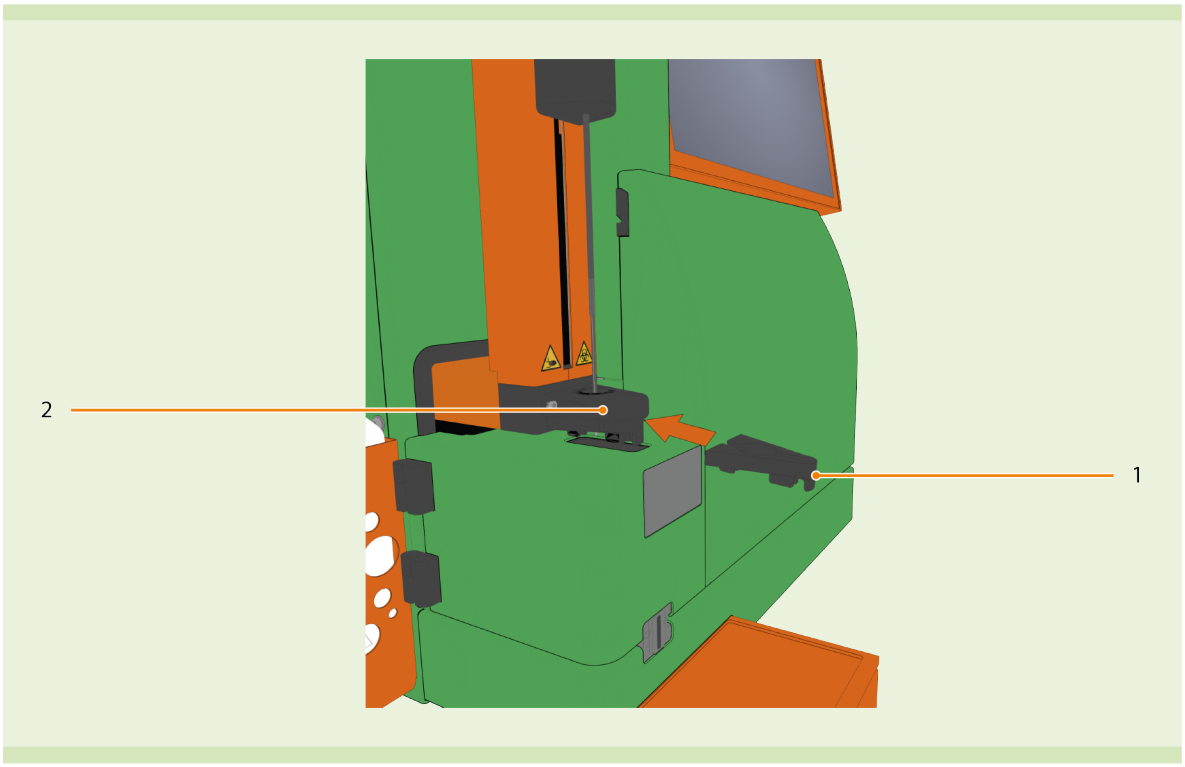


Figure 2.5: Attachment of the needle guard

2.5.7 Installing the MACS MiniSampler Plus

If using the instrument with a MACS MiniSampler Plus, follow the instructions below. The MACS MiniSampler Plus can be installed to either the autoMACS Pro or the MACSQuant Instrument (MACSQuant Analyzer 10, VYB, Analyzer 16).

Use a MiniSampler Plus only with one type of instrument. After a MiniSampler Plus was used with a MACSQuant Instrument, it cannot be used with the autoMACS Pro anymore.

1 Switch off the instrument before installing the MACS MiniSampler Plus.

2 Remove the transparent protection foil from the lens of the rack detector. Note the position of the MACS MiniSampler Plus slot (1) located at the front of the instrument and the MACS MiniSampler Plus guiding (2).

3 Tilt the MACS MiniSampler Plus.

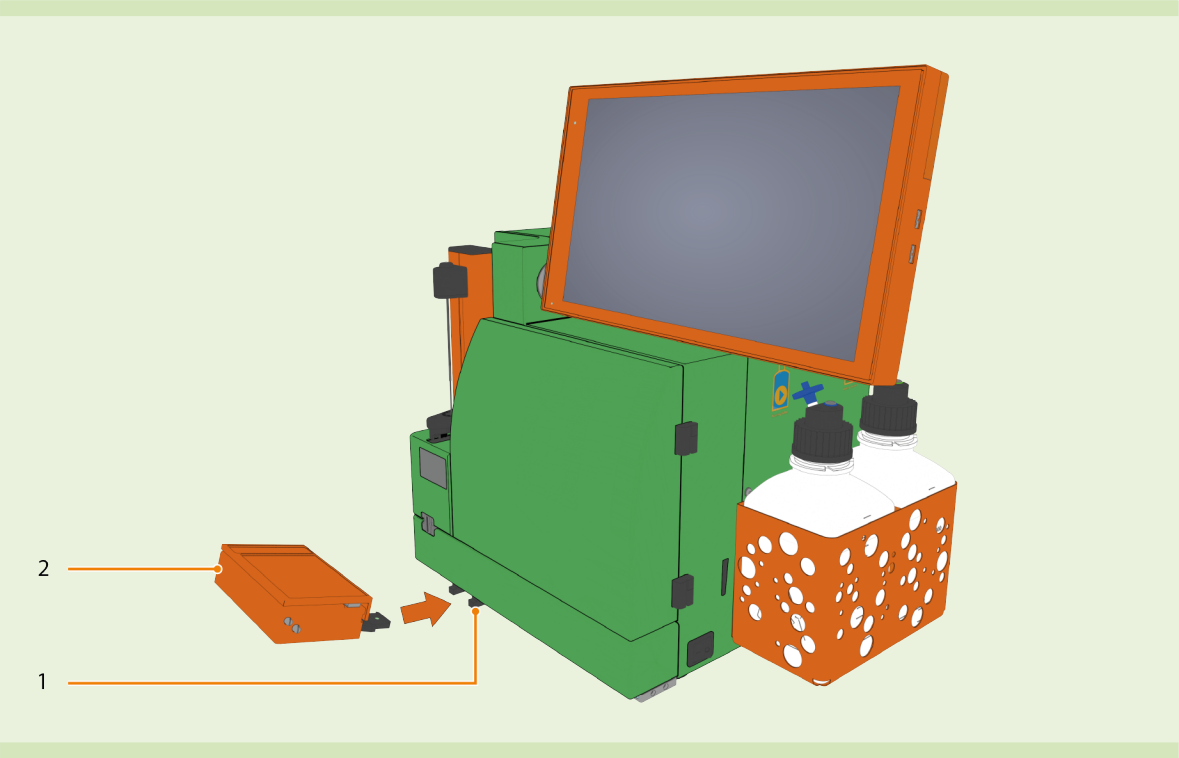


Figure 2.6: Install the MACS MiniSampler Plus

4 Slide the guiding into the receiving slot. Keep the MACS MiniSampler Plus in a tilted position until resistance is met.

5 Lower the MACS MiniSampler Plus to a horizontal position to lock it.

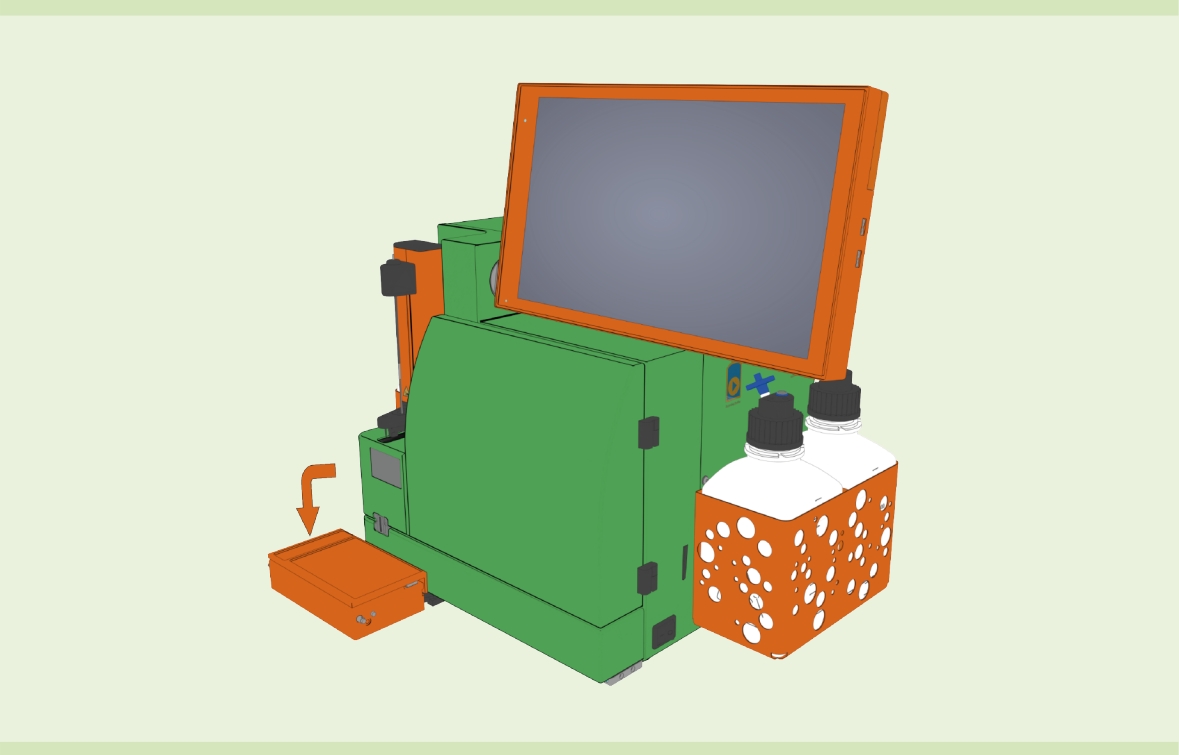


Figure 2.7: MACS MiniSampler Plus in the horizontal position

6 Open the front door of the instrument and fix the MACS MiniSampler Plus (4) with the screw (3).

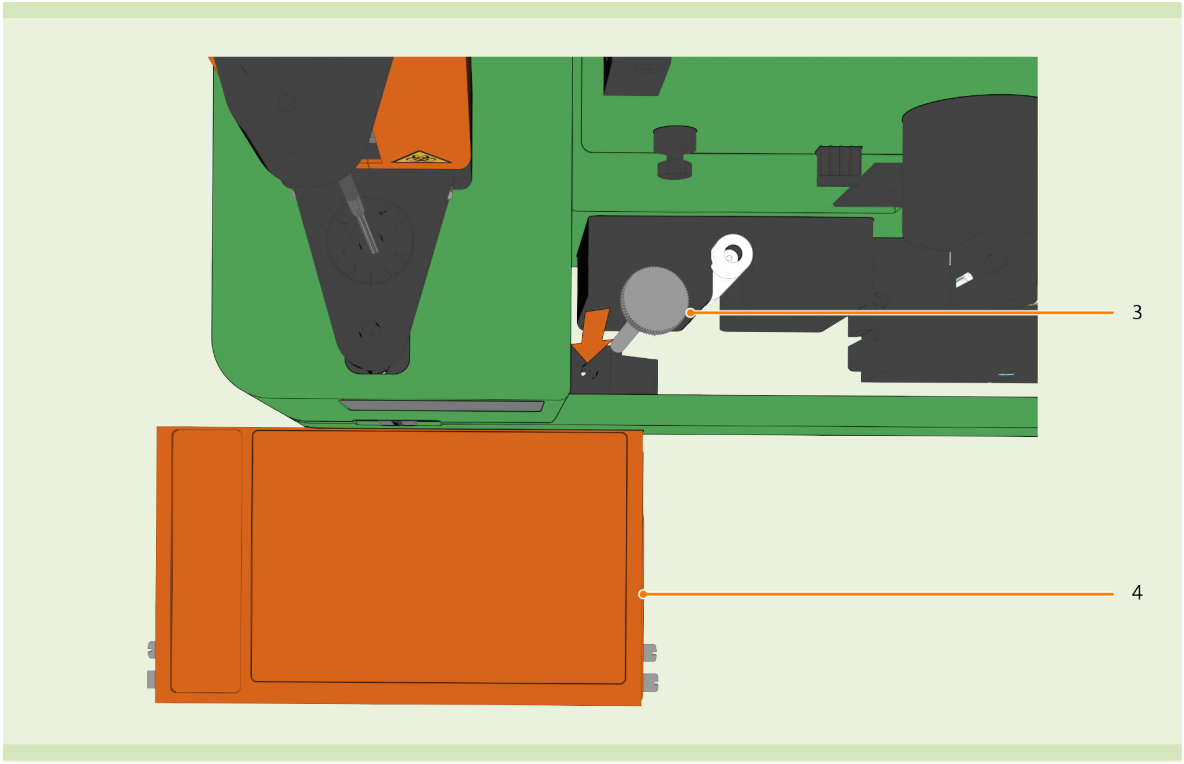


Figure 2.8: Fix MACS MiniSampler Plus in installation position

7 Close the front cover of the instrument and ensure that the MACS MiniSampler Plus is properly set and secured.

8 Guide the MACS MiniSampler Plus cable underneath the instrument and connect it to the port labeled **External CAN** at the rear side of the instrument.

2.5.8 Installing the Chill Rack and Universal Reagent Rack

1 Install the Universal Reagent Rack (1) onto the MACS MiniSampler Plus (3) into the left recess by snapping the engagement hook (2) into the undercut.

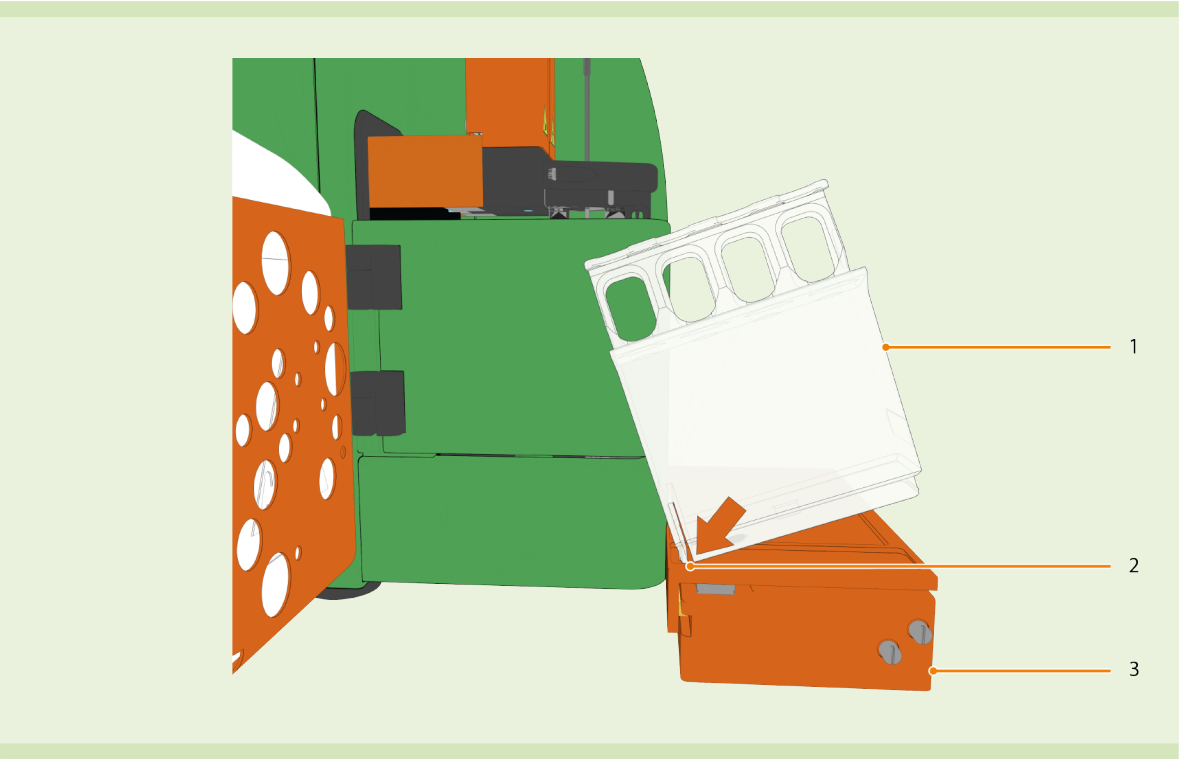


Figure 2.9: Install the Universal Reagent Rack

2 Place a MACS Chill Rack (4) onto the MACS MiniSampler Plus (3) into the right-hand recess, ensuring that the rack bar code is facing the instrument. If automatic recognition of the tube rack fails, the instrument shows a window for manual selection of the tube rack. Ensure the rack is placed correctly into the recess before confirming the selection of the rack.

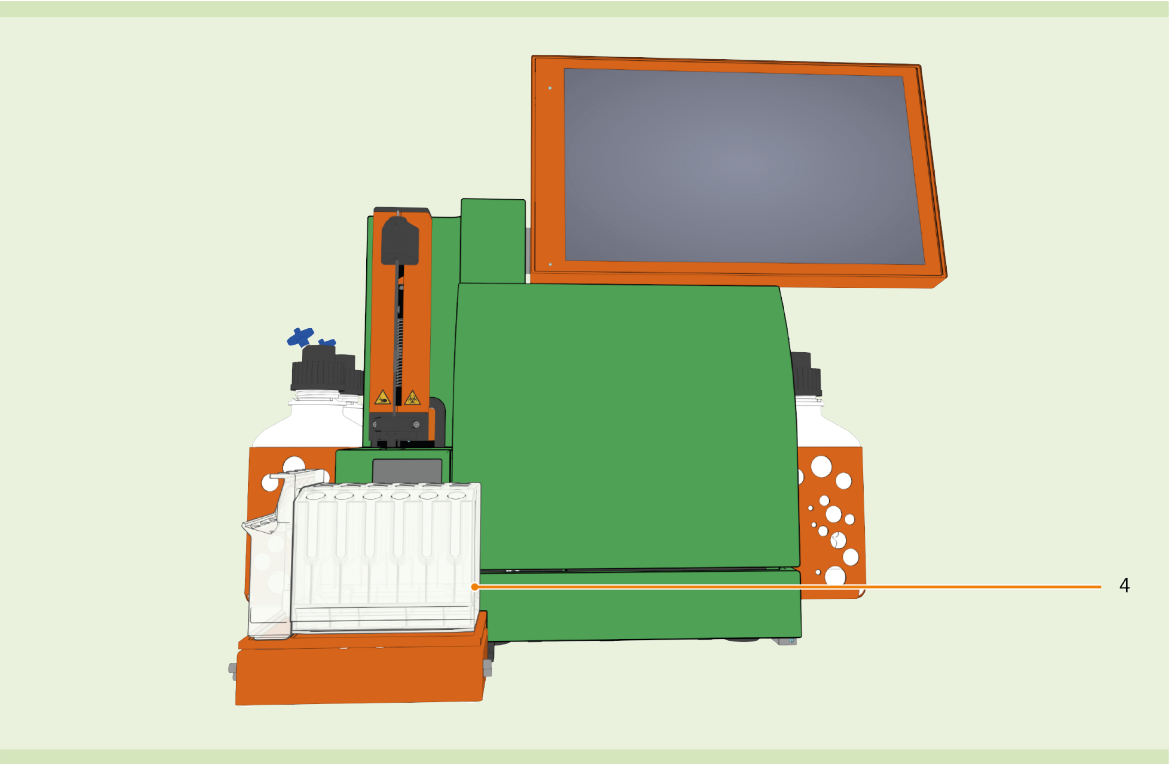


Figure 2.10: Install the MACS Chill Rack

3 Note the position of the lid guiding (5) at both sides of the MACS MiniSampler Plus and attach the protective cover (6). Keep the protective cover attached and closed while the instrument is in operation.

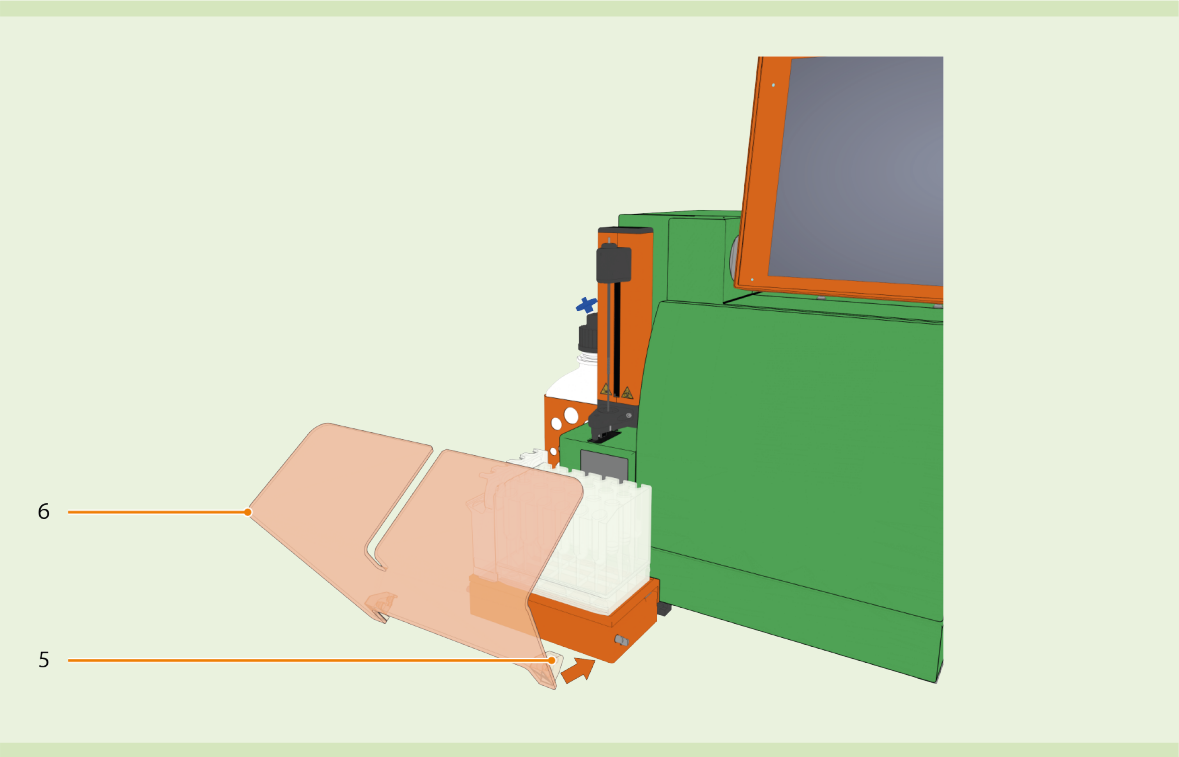


Figure 2.11: Attach the protective cover

2.5.9 Installing a webcam

1 Connect a webcam to a USB port at the rear side of the instrument.

The webcam is recognized by the software automatically during a MACSQuant Live Support session.

Unplug the webcam during normal operation of the instrument. Use it only during a MACSQuant Live Support session.

2.5.10 Installation checklist

Ensure the correct installation of the instrument by the following checklist:

- Note the correct positioning of each fluid bottle and the waste bottle, recognizable by the color code and the symbols. This is crucial for successful analysis.
- Ensure that the correct tubing and fluid sensor cable is attached to the corresponding bottle, and that all tubing connections as well as the bottle closures are fastened. If necessary, tighten loose connections.
- Ensure that the fluid bottles are filled and installed correctly. For safe operation of the instrument, all fluid bottles must contain at least 150 mL of the respective solution. In order to prevent contamination of the fluidics system the use of non-sterile buffers and solutions is not recommended. Only use buffers and solutions supplied by Miltenyi Biotec for operation of the instrument. A reproducible and optimal performance of the instrument cannot be guaranteed when the instrument is operated using home-made buffers and/or solutions purchased from another manufacturer.
- Make sure that the waste bottle is empty and installed correctly.

  WARNING! When working with biohazardous samples, it is recommended to fill the waste bottle with 100 mL of disinfectant before use. Empty bottles from the Running Buffer, Washing Solution, or Storage Solution may be used as waste bottles only with the appropriate safety label on it. For proper disposal, follow local regulation.

- Open the front cover and check that the column substitute or the MACSQuant Column is installed correctly. Ensure that the tubes are securely fastened to the column and that no part of the visible tubing is pinched or obstructed.
- Ensure that the needle guard is attached to the instrument.

  WARNING! There is a hazard of crushing, shearing, or puncturing bodily parts. Operate only with attached needle guard.

When all points of this installation checklist are fulfilled, close all covers.

3 Operating the instrument

3.1 Switching on

1 Switch on the instrument by using the main switch on the right-hand side of the instrument. The instrument is in standby mode indicated by a red LED.

2 Tap the screen to start the MACSQuantify Software.

3 Optional: Refer to **Priming the instrument below** to switch to acquisition mode.

For a detailed instruction how to use the MACSQuantify Software, refer to the MACSQuantify Software user manual.

3.2 Priming the instrument

⚠ WARNING

Defective or inadequate equipment can cause a biological hazard.
Contamination or infection may lead to severe personal injury or death, depending on the material used.

- Always inspect the fluidic system and check for leakages before using the instrument.

1 To prime the instrument (power up the lasers, activate fluidics), click the **Power** button in the upper right corner of the software and select **Acquisition mode**.

2 Let the optical bench warm up after priming for at least 30 minutes.

3 Go to **View > Hardware > Lasers and detectors** to check the current laser temperature. Refer to **Lasers and detectors on page 1**.

While the instrument is warming up, it is recommended to perform a **Flush** cycle followed by a **Clean** program. Refer to **Cleaning programs on page 101**.

3.3 Switching off

Before switching off the instrument, start the shutdown procedure. During the shutdown procedure, the fluidic system is cleaned and filled with MACSQuant/MACSima Storage Solution.
The shutdown procedure can be started manually. Alternatively, set the instrument to automatic shutdown after a defined idle time. Refer to the MACSQuantify Software user manual for details.

3.3.1 Manual shutdown

1. Click the **Power** button at the upper right corner of the screen to shut down manually.
2. Select **Instrument off** to switch the instrument to standby mode, or select **Data analysis** to proceed with data analysis after the shutdown procedure. After a seven-minute washing procedure (default setting), the instrument is in standby or data analysis mode.
3. From data analysis mode select **Instrument off** to switch to standby mode.
4. Optional: Use the main switch at the right-hand side of the instrument to switch off completely after shutdown.

3.3.2 Automatic shutdown

Automatic shutdown is enabled by default after a defined idle time. An MQ Administrator can change the timer settings. Refer to the MACSQuantify Software user manual.

4 Calibration

Before using the MACSQuant Instrument for the first time, the hardware must be calibrated. Hardware calibration can only be performed by an MQ Administrator. To calibrate the hardware the user must be familiar with the MACSQuantify Software. Refer to the MACSQuantify Software user manual.

4.1 Calibrating the sample uptake unit

4.1.1 Calibrating the needle arm

⚠ CAUTION

Moving robotic needle arm.
Risk of crushing or cutting.

- Do not obstruct the movement of the robotic needle arm.
- Keep away from the robotic needle arm while the instrument is in operation.

During calibration, the needle arm moves between the samples and the washing station with its sample injection port and washing port.

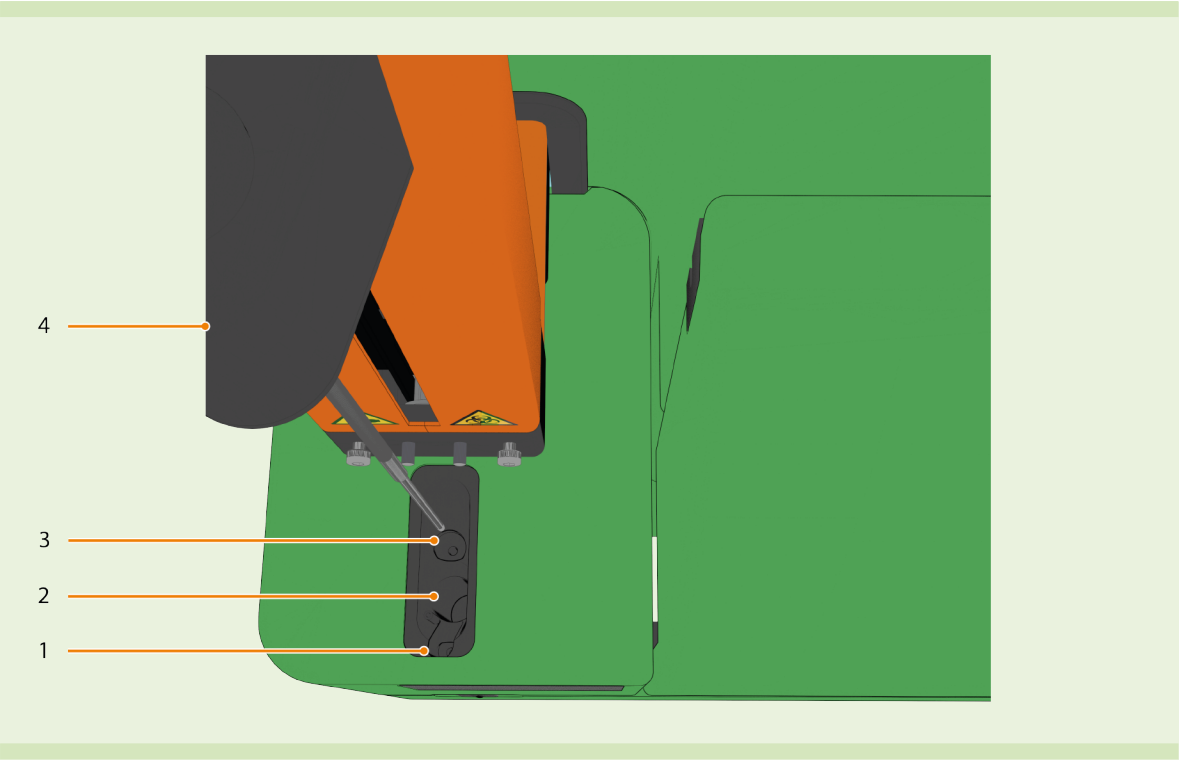
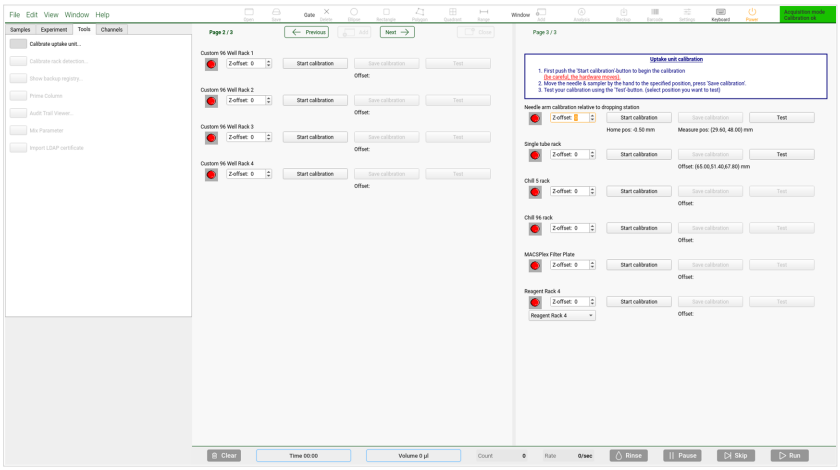


Figure 4.1: The washing station, top view (needle guard not shown)

1	sample injection port	**3**	washing port
2	waste port	**4**	robotic needle arm

1 Go to the **Tools** tab in the side pane of the MACSQuantify Software and select the **Calibrate uptake unit** box. A red closed circle indicates that the respective uptake component is not calibrated.



2 Click **Start calibration** in the section **Needle arm calibration relative to dropping station**. The robotic needle arm moves towards the washing station before being inserted into the sample injection port.

If the uptake needle pops out of the robotic needle arm holder, a system failure is caused and a prompt screen to reinitialize appears. Re-insert the uptake needle, adjust the robotic needle arm appropriately, and click **OK** to confirm.

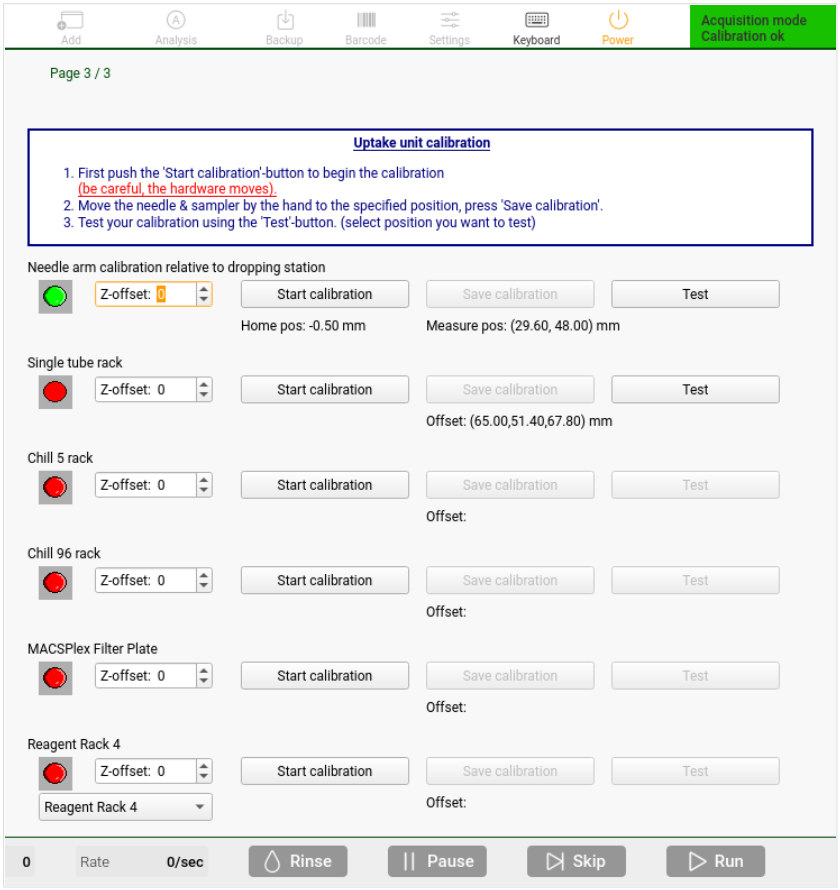
3 Manually adjust the robotic needle arm to place the uptake needle over the center of the sample injection port.

4 Gently lower the robotic needle arm manually into the sample injection port until it makes first contact with the bottom of the orifice. The uptake needle must not pop out of the needle holder and always remain perpendicular to the horizontal plane. Do not bend the needle or insert it diagonally.

5 In the field Z-offset, enter 30.

6 Click **Save calibration**.

7 The closed green circle indicates that the calibration is completed. Click **Test** to confirm successful calibration.



4.2 Calibrating racks and plates

4.2.1 Calibrating the Single tube rack

1 Go to the **Tools** tab in the side panel of the MACSQuantifySoftware and select the **Calibrate uptake unit** box. Red closed circles indicate that the uptake components are not calibrated.

2 Attach the Single tube rack with an empty sample tube to the instrument. Refer to **Installing the Single tube rack on page 72**.

3 Click **Start calibration** in the section **Single tube rack**. The robotic needle arm moves automatically forward.

4 Adjust the uptake needle to the center of the tube (i.e. equidistant from the tube edges). Move the needle arm forward or backward.

5 Lower the robotic needle arm carefully until it almost touches the tube bottom (i.e. only a fraction of a millimeter from the bottom of the tube). To check the uptake needle position, gently wiggle the tube to ensure that there is a small amount of movement.

6 Click **Save calibration**. The closed green circle indicates that the calibration is completed. Click **Test** to confirm that the correct coordinates are saved.

4.2.2 Calibrating the Chill 5 Rack

For the correct usage of the MACS MiniSampler Plus, calibrate the Chill 5 Rack.

1. Attach the MACS MiniSampler Plus to the MACSQuant Instrument.
2. Go to the **Tools** tab in the side pane of the MACSQuantify Software and select the **Calibrate uptake unit** box. Red closed circles indicate that the uptake components are not calibrated.
3. Place the Chill 5 Rack onto the MACS MiniSampler Plus and place an empty 5 mL tube in position D6.
4. Click **Start calibration** in the section **Chill 5 rack**. The robotic needle arm automatically moves forward.
5. Adjust the uptake needle to the center of the tube in position D6 (i.e. equidistant from the tube edges). Move the needle arm forward or backward. Move the MACS MiniSampler Plus for movement to the right and left side.
6. Lower the robotic needle arm carefully until it almost touches the tube bottom (i.e. only a fraction of a millimeter from the bottom of the tube). To check the uptake needle position, gently wiggle the tube to ensure that there is a small amount of movement.
7. Click **Save calibration**. The closed green circle indicates that the calibration is completed.
8. Select test position in the rack window in the side pane.
9. Click **Test** to confirm successful calibration. The MACSQuant Instrument tests selected positions.

4.2.3 Calibrating the Chill 96 Rack

1. Go to the **Tools** tab in the side pane of the MACSQuantify Software and select the **Calibrate uptake unit** box. Red closed circles indicate that the uptake components are not calibrated.
2. Place a Chill 96 Rack onto the MACS MiniSampler Plus and load an empty 96-well plate.
3. Click **Start calibration** in the section **Chill 96 rack**. The robotic needle arm automatically moves forward.
4. Adjust the uptake needle to the center of the well H12 (i.e. equidistant from the well edges). Move the needle arm forward or backward. Move the MACS MiniSampler Plus for movement to the right and left side.
5. Lower the robotic needle arm carefully until it almost touches the well bottom (i.e. only a fraction of a millimeter from the bottom of the well). To check the uptake needle position, gently wiggle the plate to ensure that there is a small amount of movement.
6. Click **Save calibration**. The closed green circle indicates that the calibration is completed.
7. Select test position in the rack window in the side pane.
8. Click **Test** to confirm successful calibration. The MACSQuant Instrument tests selected positions.

4.2.4 Calibrating the MACSPlex Filter Plate

1. Go to the **Tools** tab in the side pane of the MACSQuantify Software and select the **Calibrate uptake unit** box. Red closed circles indicate that the uptake components are not calibrated.
2. Place a Chill 96 Rack onto the MACS MiniSampler Plus and load a MACSPlex Filter Plate.
3. Click **Start calibration** in the section **MACSPlex Filter Plate**. The robotic needle arm automatically moves forward.
4. Adjust the uptake needle to the center of the well H12. Move the needle arm forward or backward. Move the MACS MiniSampler Plus for movement to the right and left side.
5. Lower the robotic needle arm carefully until it almost touches the well bottom (i.e. only a fraction of a millimeter from the bottom of the well).
6. Go to the field **Z-offset** and enter a value of -7.
7. Press enter.

Be careful not to damage the membrane of well H12 when calibrating the MACSPlex Filter Plate.

8 Click **Save calibration**. The closed green circle indicates that the calibration is completed.

9 Select test position in the rack window in the side pane.

10 Click **Test** to confirm successful calibration. The MACSQuant Instrument tests selected positions.

4.2.5 Calibrating the Universal Reagent Rack

1 The MACSQuant Instrument can be used in combination with both the Universal Reagent Rack and the Reagent Rack 4. The instructions for calibration apply to both.

2 Go to the **Tools** tab in the side pane of the MACSQuantify Software and select the **Calibrate uptake unit** box. Red closed circles indicate that the uptake components are not calibrated.

3 Place the Universal Reagent Rack onto the MACS MiniSampler Plus.

4 Place an empty reagent vial on position 4 (front-most position) of the Universal Reagent Rack.

5 Remove the cap from the reagent vial.

6 Click **Start calibration** in the section **Reagent Rack 4**.

7 Select a reagent rack from the drop-down menu. A dialog box will prompt you to ensure that the Universal Reagent Rack is installed correctly and that the Single tube rack is removed.

8 Confirm the dialog box by clicking **OK**. The robotic needle arm automatically moves forward.

9 Adjust the uptake needle to the deepest point of the vial on position 4.

10 Lower the robotic needle arm carefully until it almost touches the vial bottom (i.e. only a fraction of a millimeter from the bottom of the vial). To check the uptake needle position, gently wiggle the vial to ensure that there is a small amount of movement.

11 Click **Save calibration**. The closed green circle indicates that the calibration is completed.

12 Click **Test** to confirm successful calibration. The MACSQuant Instrument tests all positions.

4.2.6 Calibrating the custom 96 racks

If 96-well plates of different format (e.g. deep well or round bottom) are used, they might have a different distance from the bottom of the rack to the bottom of the well. To pick the samples correctly, individual custom racks can be defined for each required rack format.

1 Go to the **Tools** tab in the side pane of the MACSQuantify Software and select the **Calibrate uptake unit** box. Red closed circles indicate that the uptake components are not calibrated.

If the rack type is not shown, use the next or previous window button in the **Calibrate uptake unit** window to switch to another page.

2 Click **Start calibration** in the section **Custom 96 Well Rack 1**. The robotic needle arm automatically moves forward.

If several types of 96 well plates are used, it is recommended to calibrate each type as a custom rack.

3 Proceed as described for standard 96 well plates. Refer to **Calibrating the Chill 96 Rack on the previous page**.

4.3 Calibrating the rack detection

⚠ CAUTION

Direct exposure to laser beam could result in eye injury.

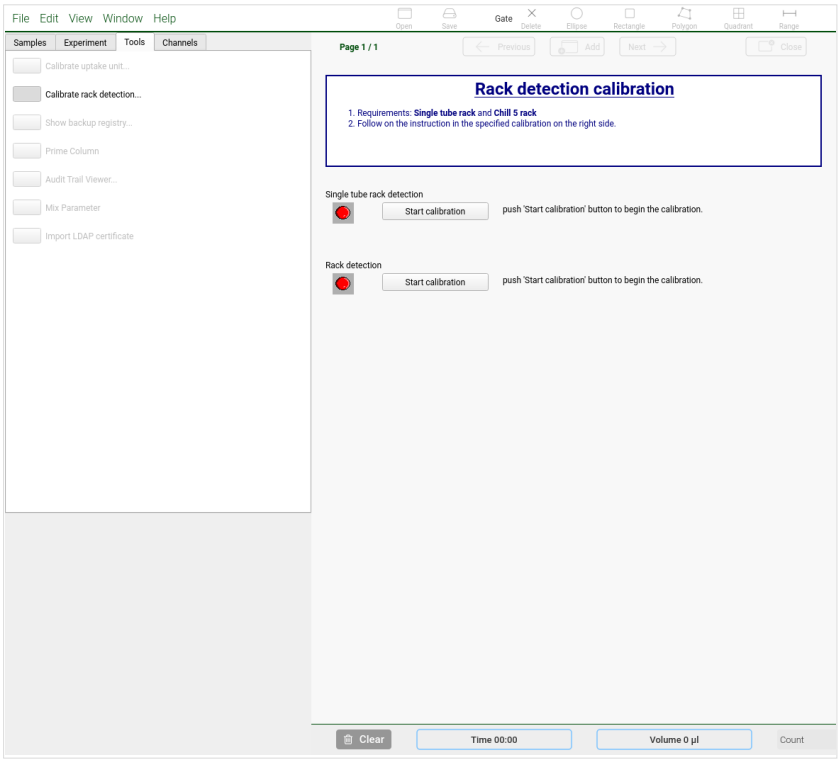
The instrument has four vertical cavity surface emitting lasers (VCSEL) for automated rack detection (Class 1M). The radiation is not visible.

- Keep a distance of 10 cm from the VCSEL port.

4.3.1 Calibrating the Single tube rack detection

1 Go to the **Tools** tab in the side panel of the MACSQuantify Software and select the **Calibrate rack detection** box. Red closed circles indicate that the components are not calibrated.

2 Click **Start calibration** in the section **Single tube rack detection**.



3 Follow the instructions on the screen.

4 The closed green circle indicates that the calibration is completed.

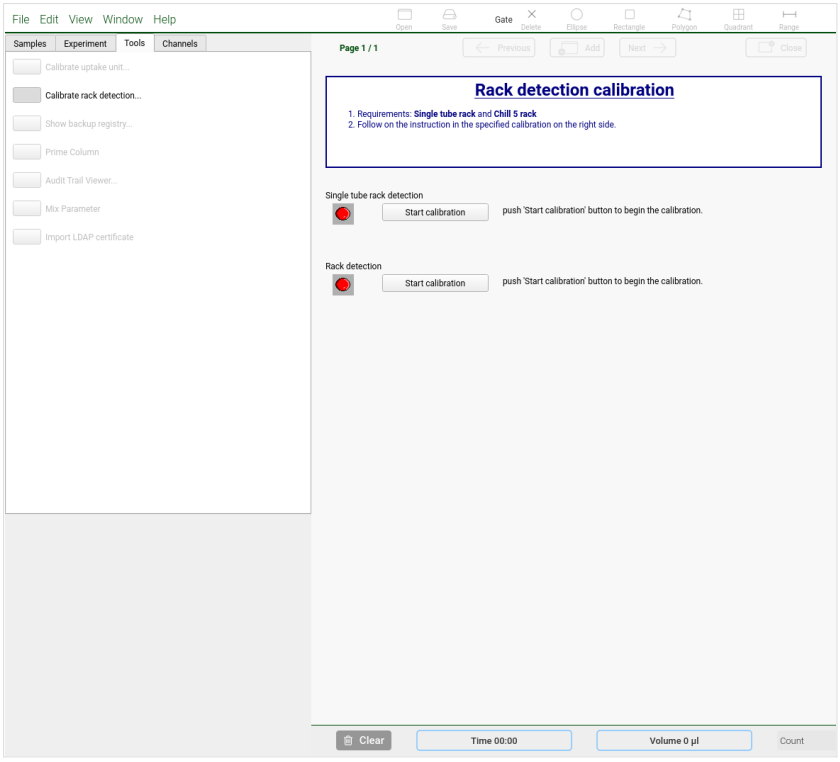
4.3.2 Calibrating the rack detection

This step is required for the automatic detection of Chill 5, 15, and 50 Racks by the MACSQuant Instrument if using the MACS MiniSampler Plus.

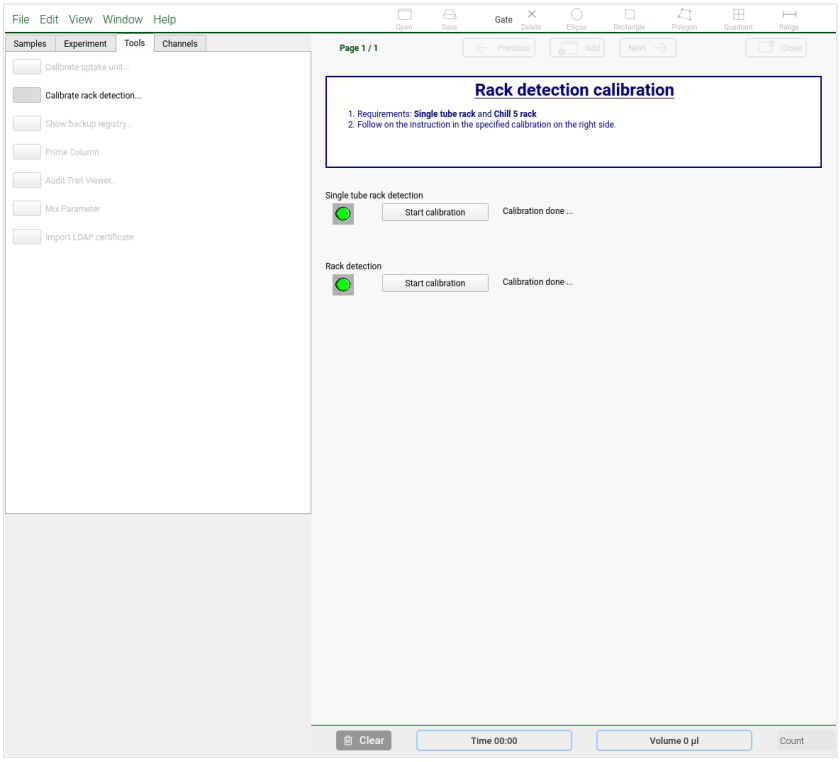
1 Attach the MACS MiniSampler Plus to the MACSQuant Instrument.

2 Go to the **Tools** tab in the side panel of the MACSQuantify Software and select the **Calibrate rack detection** box. Red closed circles indicate that the components are not calibrated.

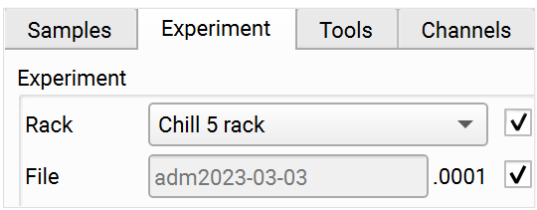
3 Place a Chill 5 Rack onto the MACS MiniSampler Plus and click **Start calibration** in the section **Rack detection**.



4 The MACS MiniSampler Plus moves the Chill 5 Rack to check the 2D code. The closed green circle indicates that the calibration is completed.



5 To activate the rack detection, select the box next to the field **Rack** in the **Experiment** tab.



5 Instrument monitoring

5.1 Hardware monitor

Go to **View > Hardware...** to access the hardware monitor. With the hardware monitor the real time status of the MACSQuant Instrument can be assessed, for example, to provide additional information in case of error messages appearing on the screen. The serial number of the MACSQuant Instrument and photomultiplier tube (PMT) information can be found in the hardware monitor.

5.1.1 Fluidics

The **Fluidics** tab in the hardware monitor shows the pumps and valves in the live status as well as the status of the fluid bottles.

Component	Further information
Fluid container	buffer and solution levels in real time.
Pumps	status of the waste (W), air (A), and fill (F) pumps
Separation unit	status of the MACSQuant Column and MACS Cell Enrichment Unit
Valves 1–3	position of the valves for the MACSQuant Column: C = closed, O = open, green = in use
Valves 4–6	position of the general fluidics system valves
Syringe drive	position of the diluter
Sensors	general system pressure and fluid reservoir levels

Table 5.1: Panels of the **Fluidics** tab

The waste (W), air (A), and fill pump symbols (F) are shown in green when active. Active separator valves (Valves 1-3) are indicated in green, defective rotary valves in red. Valve status is indicated by O for open and C for closed. The fluid bottles in the hardware monitor as well as on the instrument are illuminated in red when empty. The waste bottle is illuminated in red when full.

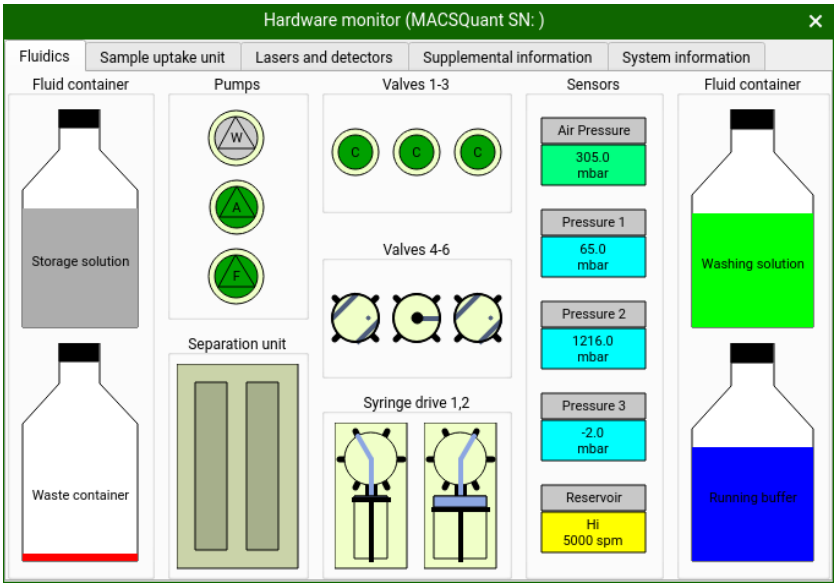


Figure 5.1: Real-time hardware monitor of the fluidics components. Specifications may vary between instrument models.

5.1.2 Sample uptake unit

The **Sample uptake unit** tab shows in the left panel the position of the robotic needle arm and if the Single tube rack is connected.

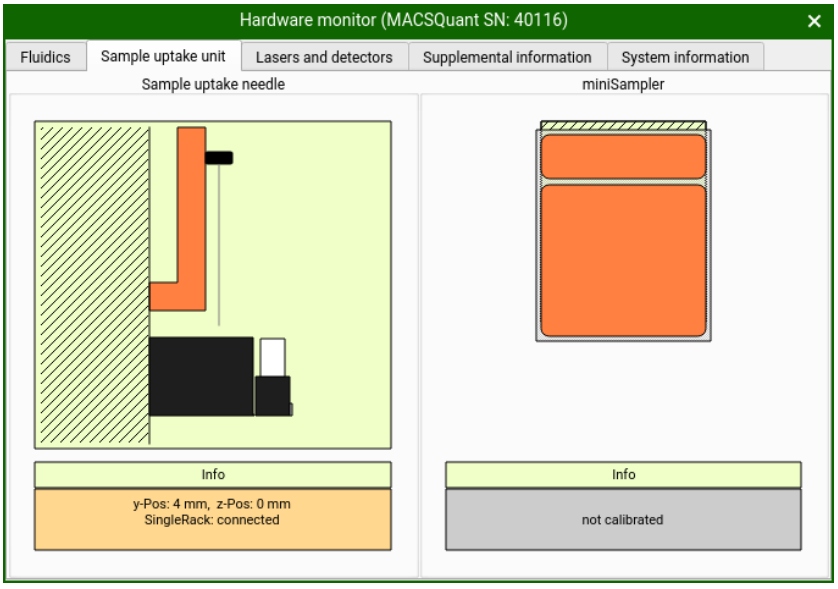


Figure 5.2: Real-time hardware monitor of the sample uptake unit

5.1.3 Lasers and detectors

The **Lasers and detectors** tab displays the status of the optical bench. The temperature, fan speed, PMT voltage, filter settings, and annotated path of each laser is shown. The operating temperature for the main laser should be between 35 °C and 45 °C. The main laser is the blue laser for MACSQuant Analyzer 10, and 16, and the yellow laser for the MACSQuant VYB. The side lasers are kept at a temperature of 25 °C. When in acquisition mode, colored lines from the lasers to the detectors indicate that lasers are switched on. The bench temperature is kept between 33 °C and 37 °C. The fan speed is regulated automatically depending on the room temperature and internal temperature of the MACSQuant Instrument. In case of errors, contact Miltenyi Biotec Technical Support.

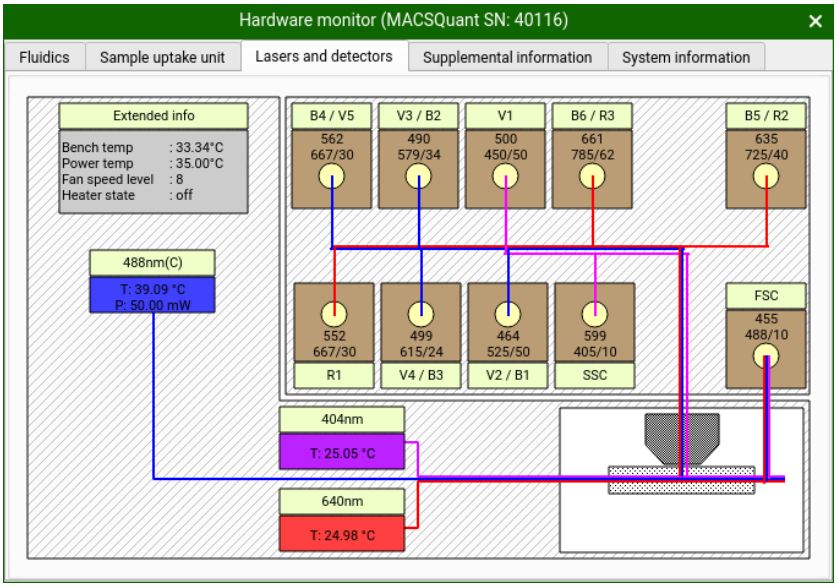


Figure 5.3: Real-time hardware monitor of the MACSQuant Analyzer 16 optical bench. T indicates the current temperature, P the power of the main laser. Specifications may vary between instrument models.

5.2 Instrument status LEDs

The MACSQuant Instrument is equipped with LEDs, illuminating each bottle to indicate the status of the instrument in acquisition mode. If the fluid bottles are not illuminated, the MACSQuant Instrument is in data analysis mode and the lasers are off.

Bottle illumination	Description
green	instrument is in acquisition mode and ready to measure
blue	instrument processes a sample and is busy
red	critical bottle level or general instrument error. The blinking red light indicates which bottle is affected. A message in the Instrument status bar specifies the instrument error.

Table 5.2: Color coding of the fluid bottle illumination on the MACSQuant Instrument

6
MACSQuant Live Support

MACSQuant Live Support is a real-time diagnostic service provided by Miltenyi Biotec Technical Support. Highly trained MACSQuant Specialists can be reached in real-time to assist with any queries you may have. A webcam can be used for communication during MACSQuant Live Support. Refer to **Installing a webcam on page 81**. Note that the MACSQuant Instrument must be connected to the internet to use the MACSQuant Live Support.

For details on how to set up and use the MACSQuant Live Support, refer to the MACSQuantify Software user manual.

7 Maintenance

⚠ WARNING

Electric shock, short circuit, overheating, fire, and explosion could result in death or serious injury. This may lead to burns, severe personal injury, or death.

- Do not remove or penetrate any cover of the housing except for the front access covers.
- Only Miltenyi Biotec service personnel are allowed to remove any other cover of the instrument.

⚠ WARNING

Biohazardous material.
Contamination or infection could result in death or serious injury depending on the material used.

- Run the **Clean** program first before maintenance work on any part of the fluidic system.

Instrument parts wear over time and require regular maintenance and/or replacement. Contact Miltenyi Biotec Technical Support regarding spare parts. Miltenyi Biotec also offers service contracts for the MACSQuant Instruments. Visit **www.miltenyibiotec.com** for further information.

7.1 Surface disinfection

The uptake needle of the needle arm and the surface of the instrument must be decontaminated upon contact with biohazardous samples. Use 70% ethanol for disinfection of the instrument surface. Use 70% ethanol or isopropyl alcohol for cleaning of the needle arm.

WARNING! Liquids inside the instrument can cause short circuits. Unplug the instrument before cleaning it. Use only small amounts of cleaning agents on a soft cloth to wipe the instrument. Do not spray or pour liquid cleaning agents onto or into the instrument.

7.2 Disinfection of the fluidic system

The fluidic system must be decontaminated by running the standard shutdown sequence if the instrument was used to process biohazardous samples. Additionally, use the **Clean** program before starting the standard shutdown sequence. Refer to **Cleaning programs on page 101**.

7.3 Exchanging buffer and solution bottles

1. Install one bottle at a time. Remove the bottle to be exchanged from the bottle holder.
2. Place a new, sealed bottle into the orange bottle holder. Note the corresponding color-coding.
3. Unscrew the lid of the new fluid bottle.

4 Remove the bottle closure from the old bottle and install it on the new bottle. Do not disconnect the color-coded tubing and sensor cable from the bottle closure. Take care not to invert the bottle closures as this could cause liquid to enter the hydrophobic air filter.

7.4 Exchanging the waste bottle

Before exchanging the waste bottle, wait for ongoing measurements or washing cycles to be finished to avoid spillage.

1 Remove the waste bottle from the bottle holder.
2 Place an empty, safety labeled (biohazard) bottle into the orange bottle holder.
3 Unscrew the lid of the empty bottle.
4 Remove the bottle closure from the waste bottle and install the bottle closure on the empty bottle. Do not disconnect the color-coded tubing and sensor cable from the bottle closure. Take care not to invert the bottle closures because this could result in liquid entering the hydrophobic air filter.

7.5 Exchanging hydrophobic air filters

⚠ WARNING

Defective or inadequate equipment can cause a biological hazard.
Contamination or infection could result in death or serious injury depending on the material used.

- Exchange hydrophobic air filters once a year to avoid clogging through dust deposits.
- Exchange hydrophobic air filters if they came into direct contact with any liquid to avoid clogging of the filters and to prevent contamination of liquids.

The MACSQuant Instrument is equipped with hydrophobic air filters to allow air flow and to prevent contamination. Use only hydrophobic air filters from Miltenyi Biotec. Refer to **Consumables on page 70**.

1 Remove the Chill Rack.
2 Open the front cover.
3 Unscrew the hydrophobic air filters. For an overview about the location of hydrophobic air filters, refer to **Table 2.5**.
4 Replace with a new hydrophobic air filter.

7.6 Exchanging the MACSQuant Column

⚠ WARNING

The instrument has a powerful magnet.
Magnetizable objects can suddenly move towards the magnet.

- Keep all magnetic storage devices, electronic equipment, and magnetizable objects at a distance of at least 30 cm from the instrument.

⚠ WARNING

The instrument has a powerful magnet.

Strong magnetic fields can influence the functioning of pacemakers or electronic medical implants.

If wearing pacemakers or electronic medical implants, keep a distance of at least 30 cm from the instrument.

The MACSQuant Column should be exchanged every three months or replaced with the column substitute after three months.

1. Open the front cover of the instrument to access the MACS Cell Enrichment Unit with the column substitute or MACSQuant Column.
2. Hold the top and bottom of the column with both hands and pull gently but firmly to remove the column from the MACS Cell Enrichtment Unit.
3. Hold the column in one hand and gently unscrew the top column connector counterclockwise. Tilt the column downwards to empty any liquid into a paper towel.
4. Unscrew the bottom column connector to remove the column.
5. Screw the bottom column connector into the bottom end of the new column. Note the correct orientation of the column. The top end of the MACSQuant Column has a clearly visible spacer while the metal beads reach further to the bottom end of the column. Insert the column only with the spacer in upward position.
6. Point the column towards the top of the device and screw in the top column connector.
7. Align the column so that the top column connector sits on the guide of the magnet cover. Push the column into the slot until you hear a click. Verify that the column is placed in the center of the magnet cover.
8. Close the front access cover.
9. Prime the new column: Go to the **Tools** tab in the side pane of the MACSQuantify Software. Refer to the MACSQuantify Software user manual for further information.

7.7 Cleaning the instrument

7.7.1 Cleaning programs

Cleaning programs	Description
Rinse	Rinses the needle with MACSQuant Running Buffer. Duration 2 minutes.
Clean	Cleans the needle and flow cell with 0.25 mL 1% hypochlorite solution. Duration 12 minutes.
Flush	System backflush rinse if a blockage of the fluidic sytem occurs. Duration 16 minutes.

Table 7.1: Cleaning programs available for the MACSQuant Instrument

To start a cleaning program, select one of the following options:

- Click the **Rinse** button in the status bar to start a needle **Rinse**.
- Right-click **Rinse** in the status bar. Select **Clean** to start a **Clean** program. Follow the instructions on the screen.
- Right-click **Rinse** in the status bar. Select **Flush** to start a **Flush** program. Follow the instructions on the screen.

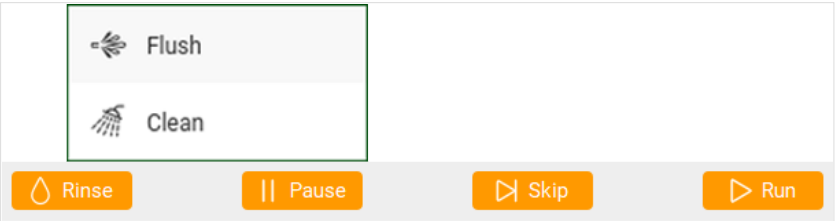


Figure 7.1: Rinse button in the status bar with the options **Clean** and **Flush**

7.7.2 Cleaning recommendations

Indication	Cleaning programs
after each user (optional)	**Clean** program
after sticky material, such as bone marrow or tumor samples	**Clean** program followed by a **Flush** program
during laser warm up in acquisition mode (recommended)	**Flush** program followed by a **Clean** program
debris or high noise	**Clean** program, hot bleach
blockage of the fluidic system can also be used as weekly cleaning routine	hot bleach, refer to **Removing a potential blockage below**

Table 7.2: Cleaning recommendations for the MACSQuant Instrument

Refer to **Cleaning programs on the previous page** and **Removing a potential blockage below** for details how to start the cleaning programs.

7.7.3 Removing a potential blockage

Clogs or blockages in the sample tube or flow cell can cause greatly reduced event rates. Optimized sample preparation can prevent most clogs. Use a hot bleach cycle as described below to remove blockages. Contact Miltenyi Biotec Technical Support if the problem persists.

The following protocol can also be used as a weekly cleaning routine.

1 Go to the **Experiment** tab.

2 Select the Chill 5 Rack.

3 Highlight column 1.

4 Enter Hot bleach in the **Sample ID** field.

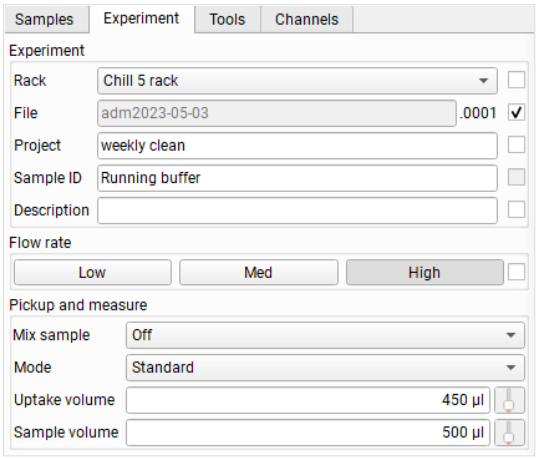
5 Highlight column 2.

6 Enter Running buffer in the **Sample ID** field.

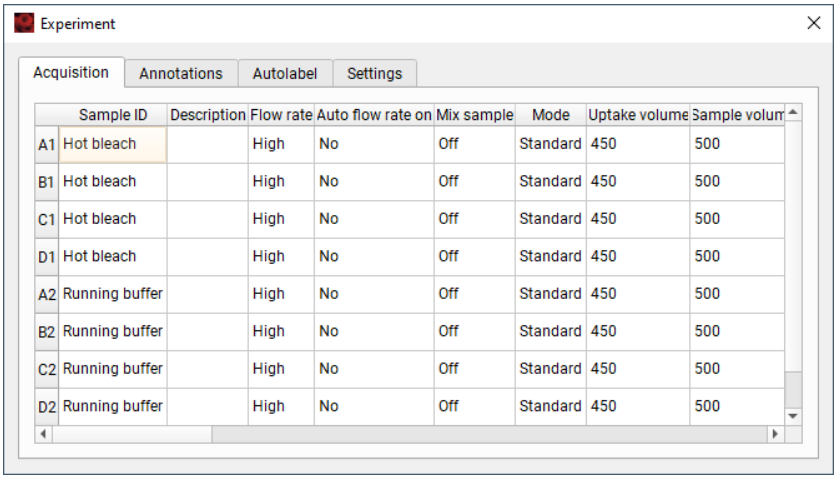
7 Highlight all wells.

8 Set the flow rate to high, the uptake volume to 450 µL, and the sample volume to 500 µL. It is not necessary to open an analysis window.

9 Optional: Enter weekly clean in the **Project** field.



10 Optional: Check all settings via **View > Experiment**.



	Sample ID	Description	Flow rate	Auto flow rate on	Mix sample	Mode	Uptake volume	Sample volum
A1	Hot bleach		High	No	Off	Standard	450	500
B1	Hot bleach		High	No	Off	Standard	450	500
C1	Hot bleach		High	No	Off	Standard	450	500
D1	Hot bleach		High	No	Off	Standard	450	500
A2	Running buffer		High	No	Off	Standard	450	500
B2	Running buffer		High	No	Off	Standard	450	500
C2	Running buffer		High	No	Off	Standard	450	500
D2	Running buffer		High	No	Off	Standard	450	500

11 Save this as an experiment file called **weekly cleaning** in the Public folder, so that the file can be opened by any user.

12 Open the **weekly cleaning** experiment file.

13 Prepare 2 mL hot bleach solution. Mix 1mL of 1% hypochlorite solution with 1 mL boiled distilled water. Use a microwave oven or water kettle to boil the water.

14 Place four tubes containing 0.5 mL hot bleach solution into wells A1-D1 of the Chill 5 Rack.

Use a Chill 5 Rack stored at room temperature.

15 Place four tubes containing 0.5 mL MACSQuant Running Buffer into wells A2-D2.

16 Place the Chill 5 Rack onto the MACS MiniSampler Plus.

17 Click the **Start** button.

7.7.4 Cleaning the washing station

⚠ WARNING

Electric shock, short circuit, overheating, fire, and explosion could result in death or serious injury. This may lead to burns, severe personal injury, or death.

Liquids inside the instrument can cause short circuits.

- Unplug the instrument before cleaning it.
- Use only small amounts of cleaning agents on a soft cloth to wipe the instrument. Do not spray or pour liquid cleaning agents onto or into the instrument.

1. Switch off the instrument.
2. Remove the Single tube rack and other racks.
3. Open the cover of the washing station to the left side.

   WARNING! Potentially contaminated liquid may spill out of the orifice of the washing station and the tubing.

4. Clean the washing station by wiping it with a tissue and an appropriate disinfectant, for example, 70% ethanol or isopropyl alcohol.
5. Rinse with distilled water.
6. Close the cover of the washing station.

7.7.5 Cleaning the uptake needle

Clean the uptake needle regularly to prevent contamination or clogging.

Be careful not to bend or damage the needle while cleaning.

1. Switch off the instrument.
2. Take the needle at the top and pull it out of the magnetic holder.
3. Clean the needle by wiping it with a tissue and an appropriate disinfectant, for example, 70% ethanol or isopropyl alcohol.
4. Wipe the needle holder with a tissue and an appropriate disinfectant, for example, 70% ethanol or isopropyl alcohol.
5. Clean the needle and the needle holder with a tissue with distilled water.
6. Reinstall the needle.
7. Calibrate the needle arm. Refer to **Calibrating the needle arm on page 85**.

7.8 Long-term storage of the instrument

The instrument should be used every two weeks to prevent clogging. If the instrument is not in use, start the instrument every two weeks and switch it into acquisition mode. Refer to **Priming the instrument on page 83**. During the priming procedure, the fluidic system is flushed. After the instrument has been primed, shut down the instrument. Refer to **Manual shutdown on page 84**.

8 Troubleshooting

⚠ WARNING

Biohazardous material.

Contamination or infection could result in death or serious injury depending on the material used.

- If hazardous or potentially infectious material has been spilled or leaked from the system, decontaminate the affected area.
- Do not continue to use contaminated accessories or parts of the instrument.

If you encounter an issue with the MACSQuant Instrument, refer to **Table 8.1** for general issues and to **Table 8.2** for issues with error messages.

Issue	Root cause	Action	Reference
leakage	MACSQuant Column	check MACSQuant Column	**Column leakage on page 109**
	loose syringe	tighten 0.5 and 5 mL syringe	**Loose connections on page 109**
	loose tubings	check connections of buffer tubings	
	broken check valve	replace check valve	**Replacing the check valve on page 108**
air in system	loose syringe	tighten 0.5 and 5 mL syringe	**Loose connections on page 109**
	loose tubings	check connections of buffer tubings	
	air in sheath particle filter	release air from sheath particle filter	**Releasing air from the sheath particle filter on page 109**
no events	loose syringe	tighten 0.5 and 5 mL syringe	**Loose connections on page 109**
	wet air filter	exchange air filter	**Exchanging hydrophobic air filters on page 100**
	blockage	clean the instrument	**Removing a potential blockage on page 102**
	incorrect needle arm calibration	recalibrate the needle arm	**Calibrating the needle arm on page 85**
unusual pattern in dot plot	wet air filter	exchange air filter	**Exchanging hydrophobic air filters on page 100**
	blockage	clean the instrument	**Removing a potential blockage on page 102**
incomplete PMT calibration	not enough events	provide enough MACSQuant Calibration Beads, vortex beads thoroughly before use	
		repeat PMT calibration	
	loose syringe	tighten 0.5 and 5 mL syringe	**Loose connections on page 109**
failed PMT calibration	high noise (CV) or low SI	clean the instrument	**Cleaning recommendations on page 102**
		tighten 0.5 and 5 mL syringe	**Loose connections on page 109**
		check connections of buffer tubings	
		release air from sheath particle filter	**Releasing air from the sheath particle filter on page 109**
high debris or high noise	air in system	tighten 0.5 and 5 mL syringe	**Loose connections on page 109**
		check connections of buffer tubings	
		release air from sheath particle filter	**Releasing air from the sheath particle filter on page 109**
	dirt in fluidic system	clean the instrument	**Cleaning recommendations on page 102**
gap in event rate (HDR-T plot), uptake of air	incorrect calibration	recalibrate plates	**Calibrating racks and plates on page 87**
	incorrect sample or uptake volume	provide sufficient sample volume check uptake volume consider excess volume	**Excess volume of the MACSQuant Analyzer 10, VYB, and Analyzer 16 on page 116**

Table 8.1: Issues on the MACSQuant Instrument without error message

Error message	Root cause	Action	Reference
plunger overload during acquisition **DeviceError: 0x0309: Plunger overload**	clogging	clean the instrument	**Cleaning recommendations on page 102**
Error on MiniSampler Plus **Device Error: 0x0901: Position not allowed or parameter-range invalid**	obstruction	ensure enough space around the MiniSampler Plus during acquisition	
	wrong calibration	restart the instrument	
Error on uptake unit Y (movement back and forth)	obstruction	ensure that the needle arm can move freely	
DeviceError: 0x0101: Position not allowed or parameter-range invalid	wrong calibration	calibrate the needle arm	**Calibrating the needle arm on page 85**
Error on uptake unit Z (movement up and down)	obstruction	ensure that the needle arm can move freely	
DeviceError: 0x0101: Position not allowed or parameter-range invalid	dirty needle holder	clean needle holder	**Cleaning the uptake needle on page 104**
	wrong calibration	calibrate the needle arm	**Calibrating the needle arm on page 85**
		calibrate rack or plates	**Calibrating racks and plates on page 87**
Laser overheating **DeviceError: 0x005b : Laser rec. Timeout**	room conditions	leave 15 cm space around the instrument do not place the instrument near radiators, heaters, or into direct sunlight keep the room temperature below 25°C	
Error on valve **DriverError: 0x04000000: Module init flag lost DeviceError: 0x0025: Unknown error 5**	valve blocked	restart the instrument	
	wrong (homemade) buffer used	use only MACSQuant Running buffer to avoid wearing of valves	
Error on valve **DeviceError: 0x001c: Rotate failed**	valve blocked	restart the instrument	
	wrong (homemade) buffer used	use only MACSQuant Running Buffer to avoid wearing of valve	
System pressure control failed	wet air filter	exchange air filter	**Exchanging hydrophobic air filters on page 100**
	loose syringe	tighten 0.5 and 5 mL syringe	**Loose connections on page 109**
	loose tubing	check connections of buffer tubings	
	air in system	tighten 0.5 and 5 mL syringe	**Loose connections on page 109**
		check connections of buffer tubings	
		release air from sheath particle filter	**Releasing air from the sheath particle filter on page 109**

Table 8.2: Error messages of the MACSQuant Instrument

8.1 Leakage

⚠ WARNING

Defective or inadequate equipment can cause a biological hazard.
Contamination or infection may lead to severe personal injury or death, depending on the material used.

- If hazardous or potentially infectious material has been spilled or leaked from the system, decontaminate the affected area.
- Do not continue to use contaminated accessories or parts of the instrument.

8.1.1 Replacing the check valve

Follow the instructions below to replace the check valve.

1 Switch off the instrument.
2 Remove the Single tube rack or remove Chill Racks from the MACS MiniSampler Plus.
3 Open the front cover.
4 Remove the MACSQuant Column from its holder. Do not disconnect the column from the connectors.
5 Slide the cover of the washing station to the left.
6 Slide the small door above the MACSQuant Column to the right. The purple part is the check valve.
7 Unscrew the check valve from the black Luer connectors.
8 Connect the new check valve to the Luer connectors. Fasten the connections carefully but tightly. Proceed with step 11.

Optional: It is possible to use the MACSQuant Instrument short term without a check valve. Proceed with step 10. Otherwise continue with step 11.

9 Connect the black Luer connectors without a check valve.

If the instrument is used without a check valve, make sure that the waste bottle level is lower than the MACSQuant Running Buffer bottle level when the instrument is switched off or in data analysis mode.

Note that the absolute cell count might be affected if the instrument is used without a check valve .

10 Start and prime the instrument.
11 Check if the leakage has stopped during priming. If the instrument is used without a check valve and the leakage persists, the Luer connectors might be broken. Contact Miltenyi Biotec Technical Support.
12 Close the door above the MACSQuant Column and the cover of the washing station.
13 Put the MACSQuant Column back into its holder.
14 Close the front cover.
15 Attach the Single tube rack or place a Chill Rack on the MACS MiniSampler Plus.

If the problem persists, contact Miltenyi Biotec Technical Support.

8.1.2 Syringe leakage

⚠ WARNING

Defective or inadequate equipment can cause a biological hazard.
Contamination or infection may lead to severe personal injury or death, depending on the material used.

- If hazardous or potentially infectious material has been spilled or leaked from the system, decontaminate the affected area.
- Do not continue to use contaminated accessories or parts of the instrument.

A loose syringe can lead to a leakage. Refer to **Loose connections below**.

8.1.3 Column leakage

If a recently exchanged MACSQuant Column shows signs of leakage, do the following:

1. Check if the column is installed properly. The column should be inserted precisely into the column connector and fastened to the point of resistance. If the column is not installed correctly, loosen the column connector, insert the column precisely, and tighten the connector again. Refer to **Installing the MACSQuant Column on page 74**.
2. Check if the column is broken or cracked.
3. Check if the leakage persists. If so, unscrew the column and check if the connectors of the columns are damaged. If necessary, exchange the leaking column with a new MACSQuant Column.
4. Check if the column connector is fastened properly.

If the problem persists, contact Miltenyi Biotec Technical Support.

8.2 Air in system

8.2.1 Loose connections

If connections are loose, air can enter the fluidic system. Follow the instructions below to check syringes and buffer tubing connections. Use your fingers to tighten the connections. Do not use any tools.

1. Open the front cover.
2. Tighten the glass syringes. Turn the metal part on top of the syringe counterclockwise.
3. Tighten the tubing connections on the buffer bottles clockwise.
4. Check the tubing connections coming from the bottles to the rear side of the instrument. Tighten them clockwise.

If the problem persists, contact Miltenyi Biotec Technical Support.

8.2.2 Releasing air from the sheath particle filter

Check the fluid level of the sheath particle filter regularly. If air enters the fluidic system or fluid evaporates, air can be trapped in the sheath particle filter. Follow the instructions below to release air from the sheath particle filter.

1. Prime the instrument. Release of air is only possible with a pressurized system.
2. Get a paper towel to collect liquid.

3 Carefully unscrew the white cap of the sheath particle filter until air has been fully released. Do not remove the cap entirely.

4 Close the cap of the sheath particle filter when liquid comes out. Collect the liquid with a paper towel.

If the problem persists, contact Miltenyi Biotec Technical Support.

9 Technical data and specifications

The MACSQuant Instrument is labeled as a protection class I device and must be plugged into a grounded power outlet.

The MACS MiniSampler Plus is labeled as a protection class III device and must be connected to the main instrument.
Note that for USA and Canada, the main power supply cord and plug of the instrument shall comply with the following specifications: UL listed and KAM cord, minimum type SJ, minimum 18 AWG, 3 conductors. Rated for a minimum temperature of 60 °C. Provided with grounding-type (NEMA 5-15P) attachment plug, rated 125 VAC, 10 A. Opposite end terminates in IEC 320-style connector, rated 125 VAC, 10A. Supply voltage fluctuations up to +/– 10% of the nominal voltage.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the distance between the equipment and the receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications of the instrument, unless expressly approved by Miltenyi Biotec, may void your authority to operate the instrument pursuant to FCC 47 CFR. For other safety considerations, refer to the product label, or visit **www.miltenyibiotec.com**. Design and specifications are subject to change without notice.

9.1 Technical data and specification of the MACSQuant Instrument

Technical data	Specification		
model	MACSQuant Analyzer 10 (# 130-096-343)	MACSQuant VYB (# 130-096-116)	MACSQuant Analyzer 16 (# 130-109-803)
color	green/orange		
size (width × depth)	669 mm × 400 mm (26.34 × 15.75 in)		
size (width × depth) with MACS MiniSampler Plus	669 mm × 500 mm (26.34 × 19.69 in)		
footprint (width × depth)	385.5 mm × 284.5 mm (15.18 × 11.2 in)		
height (adjustable touchscreen)	394-553.5 mm (15.51–21.79 in)		
weight	50 kg		
input voltage	100-240 V~, 50/60 Hz		
power consumption	450 W		
fuses	2 × 8 AT, 250 V		
RS232 Interface (labeled "RS232/AUX") Not in use	Pin 1, 4, 6-9: NC Pin 2: RXD Pin 3: TXD Pin 5: GND		
AC Output (labeled "Bottle Sensor")	Pin1-5: Input Pin 6-15: GND Pin 9-13: Input/Output 5 VAC/10kΩ		
RS232 Interface + DC-Output (labeled "RS232/BCR")	Pin1: Input/Output Pin 2: TXD Pin 3: RXD Pin 4,6: NC Pin 5: GND Pin 7, 8: Shorted Pin 9: 5VDC/2.6 A		
CAN Bus + DC-Output (labeled "External CAN")	Pin 1, 4, 8: NC Pin 2: CAN-L Pin 3, 6: GND Pin 5,9: 24 VDC/1.85 A Pin 7: CAN-H		
RS232 Interface (labeled "COM 1")	Pin 1: DCD Pin 2: RxD Pin 3: TxD Pin 4: DTR Pin 5: GND Pin 6: DSR Pin 7: RTS Pin 8: CTS Pin 9: RI		

Technical data	Specification
CAN Bus + DC-Output (labeled "Power Can")	Pin 1: CAN-L Pin 2: CAN-H Pin 3, A2; GND Pin 4: NC Pin 5: 24 VDC/1.1 A Pin A1: 24VDC, 5A
USB ports	4× USB 2.0 ports (labeled "USB 1-4") 4× USB 3.0 ports (labeled "USB-5-8") 2× USB 3.0 ports (at Display)
DVI-D port (labeled "DVI1")	
2× Display Port V1.2 (labeled "Display1" and "Display2")	
2× Ethernet ports (GbE) (labeled "LAN 1" and "LAN 2")	Pin 1: TXD+ Pin 2: TXD- Pin3: RXD+ Pins 4, 5, 7, 8: NC Pin 6: RXD+
audio ports	green: headphones pink: microphone
CFast card slot	The CFast card contains the Linux based MBCore operating system of the MACSQuant Instrument.
RAM	8 GB DDR4 (SO-DIMM)
mass storage	SSD M.2
monitor	15,6" LCD touchscreen
working temperature	+20 °C to +25 °C, indoor use only
humidity	0% to 85% relative humidity, non-condensing
altitude	max. 2,000 m
emission sound pressure level at workstation	<61 dB(A)

Table 9.1: Technical specifications of the MACSQuant Analyzer 10, VYB, and Analyzer 16

9.1.1 Specifications

Parameter	Specification
minimum sample volume	1 µL (25µl recommended for volumetric applications)
sample flow rate	25-100 µl/min plus automated flow rate to maintain 500, 1000, or 2000 events/second
sheath fluid consumption	2-10 mL/min
maximal event rate	up to 15,000 events/second
lasers MACSQuant Analyzer 10	405 nm, 40 mW 488 nm, 30 mW 640 nm, 20 mW
lasers MACSQuant VYB	405 nm, 40 mW 488 nm, 50 mW 561 nm, 100 mW
lasers MACSQuant Analyzer 16	405 nm, 65 mW 488 nm, 50 mW 640 nm, 72 mW
rack detection	850 nm, 3.3mW, pulse time 215 µs
absolute cell count performance	accuracy +/- 7%; reproducibility (CV) <5%
sample carryover	0.01%

Table 9.2: Specifications of the MACSQuant Analyzer 10, VYB, and Analyzer 16

9.1.2 Instrument configurations

Model	Channel	Laser [nm]	Filter [nm]
MACSQuant Analyzer 10	FSC	488	488/10
	SSC	488	488/10
	V1	405	450/50
	V2	405	525/50
	B1	488	525/50
	B2	488	585/40
	B3	488	655-730
	B4	488	750 LP
	R1	640	655-730
	R2	640	750 LP
MACSQuant VYB	FSC	561	561/4
	SSC	561	561/4
	V1	405	425/45
	V2	405	525/50
	B1	488	525/50
	B2	488	593-650
	Y1	561	586/15
	Y2	561	615/20
	Y3	561	661/20
	Y4	561	740 LP
MACSQuant Analyzer 16	FSC	488	488/10
	SSC	405	405/10
	V1	405	450/50
	V2	405	525/50
	V3	405	579/34
	V4	405	615/20
	V5	405	667/30
	B1	488	525/50
	B2	488	579/34
	B3	488	615/20
	B4	488	667/30
	B5	488	725/40
	B6	488	785/62
	R1	640	667/30
	R2	640	725/40
	R3	640	785/62

Table 9.3: Instrument configurations

9.1.3 Excess volume of the MACSQuant Analyzer 10, VYB, and Analyzer 16

The MACSQuant Analyzer 10, VYB, and Analyzer 16 pick up some additional volume (excess volume) depending on the selected **Mode** in the **Experiment** tab. Make sure to provide enough sample volume as the excess volume is additionally picked up to the programmed uptake volume.

Mode	Additionally picked up volume (excess volume)
Screen	19.9 µL
Fast	9.9 µL
Standard	9.9 µL
Extended	9.9 µL
Enrich	9.9 µL
EnrichS	9.9 µL
EnrichS2	9.9 µL

Table 9.4: Excess volume of the MACSQuant Analyzer 10, VYB, and Analyzer 16

9.2 EC/EU Declaration of Conformity

This declaration applies to the MACSQuant Analyzer 16, MACSQuant Analyzer 10, and MACSQuant VYB. The legislative requirements are equivalent for all three MACSQuant Instruments.

This declaration of conformity is issued under the sole responsibility of the manufacturer:

Miltenyi Biotec B.V. & Co. KG
Friedrich-Ebert-Straße 68
51429 Bergisch Gladbach
Germany

This declaration relates exclusively to the machinery in the state in which it was placed on the market, and excludes components which are added and/or operations carried out subsequently by the final user.

The declaration of conformity refers to the machinery identified as follows:

Description: Laboratory equipment
Model: MACSQuant Analyzer 10, MACSQuant VYB and MACSQuant Analyzer 16

The machinery complies with all essential requirements of the following directives:

2006/42/EC Machinery
2011/65/EU Restriction of the use of certain hazardous substances in electrical & electronic equipment
2014/30/EU Electromagnetic compatibility

The machinery is in conformity with the following harmonized standards:

EN 60825-1:2014
EN 61010-1:2010
EN 61010-2-081:2015
EN 61326-1:2013

Person authorized to compile the relevant technical documentation:

Dr. Bernd Schröder
Global Head Regulatory Affairs
Miltenyi Biotec B.V. & Co. KG
Friedrich-Ebert-Straße 68
51429 Bergisch Gladbach
Germany

Additional international conformity (MACSQuant Analyzer 10, MACSQuant VYB, and MACSQuant Analyzer 16)

The MACSQuant Instruments are in conformity with:

- IEC 61010-1
- IEC 61010-2-081
- UL 61010-1
- UL 61010-2-081
- CAN/CSA-C22.2 No. 61010-1

- CAN/CSA-C22.2 No. 61010-2-081
- IEC 60825-1
- CAN/CSA-E60825-1

9.3 UK Declaration of Conformity

This declaration applies to the MACSQuant Analyzer 16, MACSQuant Analyzer 10, and MACSQuant VYB. The legislative requirements are equivalent for all three MACSQuant Instruments.

This declaration of conformity is issued under the sole responsibility of the manufacturer:

Miltenyi Biotec B.V. & Co. KG
Friedrich-Ebert-Straße 68
51429 Bergisch Gladbach
Germany

This declaration relates exclusively to the machinery in the state in which it was placed on the market, and excludes components which are added and/or operations carried out subsequently by the final user.

The declaration of conformity refers to the machinery identified as follows:

Description: Laboratory equipment
Model: MACSQuant Analyzer 10, MACSQuant VYB, and MACSQuant Analyzer 16

The machinery complies with all essential requirements of the following legislations:

Supply of machinery (Safety) regulations 2008
The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012
Electromagnetic Compatibility Regulations 2016

The machinery is in conformity with the following harmonized standards:

EN 60825-1:2014
EN 61010-1:2010
EN 61010-2-081:2015
EN 61326-1:2013

Person authorized to compile the relevant technical documentation:

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Additional international conformity (MACSQuant Analyzer 10, MACSQuant VYB, and MACSQuant Analyzer 16)

The MACSQuant Instruments are in conformity with:

- IEC 61010-1
- IEC 61010-2-081
- UL 61010-1
- UL 61010-2-081
- CAN/CSA-C22.2 No. 61010-1
- CAN/CSA-C22.2 No. 61010-2-081
- IEC 60825-1
- CAN/CSA-E60825-1

9.4 Technical data and specifications of the MACS MiniSampler Plus

The MACS MiniSampler Plus is labeled as a protection class III device and must be plugged into the connector of the Instrument labeled with **External CAN**.

For other safety considerations, refer to the product label, or visit **www.miltenyibiotec.com**.

Design and specifications are subject to change without notice.

Technical data	Specification
size without lid	182 mm × 148 mm × 47 mm
size with lid	280 mm × 153 mm × 172 mm
weight	1.5 kg
input voltage	24 VDC
current	0.8 A
Sub D9 interface with shielding	Pins 1, 4 and 8: NC Pin 2: CAN-L Pins 3 and 6: GND Pins 5 and 9: +24 VDC/2A Pin 7: CAN-H
working temperature	+ 20 °C to + 25 °C
humidity	0% to 85% relative humidity, non-condensing
altitude	max. 2000 m

Table 9.5: Technical specifications of the MACS MiniSampler Plus

9.5 EC/EU Declaration of Conformity

This declaration of conformity is issued under the sole responsibility of the manufacturer:

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This declaration relates exclusively to the machinery in the state in which it was placed on the market, and excludes components which are added and/or operations carried out subsequently by the final user.

The declaration of conformity refers to the machinery identified as follows:

Description: Laboratory equipment
Model: MACS MiniSampler Plus

The machinery complies with all essential requirements of the following directives:

2006/42/EC Machinery
2011/65/EU Restriction of the use of certain hazardous substances in electrical & electronic equipment
2014/30/EU Electromagnetic compatibility

The machinery is in conformity with the following harmonized standards:

EN 61010-1:2010
EN 61010-2-081:2015
EN 61326-1:2013

Person authorized to compile the relevant technical documentation:

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9.6 UK Declaration of Conformity

This declaration of conformity is issued under the sole responsibility of the manufacturer:

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51429 Bergisch Gladbach
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This declaration relates exclusively to the machinery in the state in which it was placed on the market, and excludes components which are added and/or operations carried out subsequently by the final user.

The machinery complies with all essential requirements of the following legislations:

Description: Laboratory equipment
Model: MACS MiniSampler Plus

The machinery complies with all essential requirements of the following legislations:

Supply of machinery (Safety) regulations 2008
The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012
Electromagnetic Compatibility Regulations 2016

The machinery is in conformity with the following harmonized standards:

EN 61010-1:2010
EN 61010-2-081:2015
EN 61326-1:2013

Person authorized to compile the relevant technical documentation:

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10 Technical support

For technical support, contact your local Miltenyi Biotec representative or Miltenyi Biotec Technical Support at Miltenyi Biotec headquarters:

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Friedrich-Ebert-Straße 68
51429 Bergisch Gladbach
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Phone: +49 2204 8306 3803
technicalsupport@miltenyi.com

Visit **www.miltenyibiotec.com** for local Miltenyi Biotec Technical Support contact information.

11 Legal notes

11.1 Limited warranty

Except as stated in a specific warranty statement which may accompany this product or as otherwise agreed in writing by an authorized representative of Miltenyi Biotec, Miltenyi Biotec's warranty to you, the original purchaser and end user ("you" or "your"), with respect to the product accompanied by this limited warranty shall be subject to the following provisions and the general terms and conditions of sale of the company within the Miltenyi Biotec group which supplied the product in effect at the date of purchase. Those terms and conditions of sale may vary by country and region. Nothing in this document should be construed as constituting an additional warranty.

Miltenyi Biotec warrants that this product will operate or perform substantially in conformance with Miltenyi Biotec's published specifications and be free from material defects in material and workmanship, when subjected to normal, proper, and intended usage by properly trained personnel, for the period of time set forth in the product documentation or package inserts accompanying the product (the "Warranty Period").

Miltenyi Biotec agrees, during the Warranty Period, to repair or replace, at Miltenyi Biotec's option, the defective product so as to cause the same to operate in substantial conformance with said published specifications; provided that you shall (a) promptly notify Miltenyi Biotec in writing upon the discovery of any nonconformity or defect, which notice shall include the product model and serial number (if applicable) and details of the warranty claim; and (b) return the nonconforming or defective product to Miltenyi Biotec, freight prepaid, only after receipt of a Return Material Authorization ("RMA") from Miltenyi Biotec, which may include biohazard decontamination procedures and other product-specific handling instructions, if applicable.

Miltenyi Biotec shall have no obligation to make repairs, replacements, or corrections to the product or any component thereof required, in whole or in part, as the result of (i) normal wear and tear, (ii) improper handling, installation, operation, storage, service, maintenance, or repair, (iii) failure to follow the instructions, cautions, warnings, and notes set forth in the product documentation provided with the product or provided by Miltenyi Biotec from time to time, (iv) abnormal use, misuse, neglect, abuse, mishandling, misapplication, modification, or alteration of the product, (v) use of the product in a manner for which it was not designed, (vi) causes external to the product such as, but not limited to, power failure or electrical power surges, (vii) use of the product in combination with equipment, accessories, consumables, or software not supplied or approved by Miltenyi Biotec, or (viii) accident, disaster, or acts of God. ANY INSTALLATION, MAINTENANCE, REPAIR, SERVICE, OR ALTERATION TO OR OF, OR OTHER TAMPERING WITH, THE PRODUCT PERFORMED BY ANY PERSON OR ENTITY OTHER THAN MILTENYI BIOTEC AUTHORIZED PERSONNEL WITHOUT MILTENYI BIOTEC'S PRIOR WRITTEN APPROVAL, OR ANY USE OF REPLACEMENT PARTS NOT SUPPLIED BY MILTENYI BIOTEC, SHALL IMMEDIATELY VOID AND CANCEL ALL WARRANTIES WITH RESPECT TO THE AFFECTED PRODUCT.

Miltenyi Biotec's warranty does not cover products sold AS IS or WITH ALL FAULTS, or which had its serial number defaced, altered, or removed, or any consumables or parts identified as being supplied by a third party.

Miltenyi Biotec must be informed promptly if a claim is made under this limited warranty. If a material or manufacturing defect occurs within the Warranty Period, Miltenyi Biotec will take the appropriate steps, at Miltenyi Biotec's option, to make repairs, replacements, or corrections to the product or any component thereof as may be required to restore the full usability of your product. If Miltenyi Biotec determines that a product for which you have requested warranty services is not covered by the warranty hereunder, you shall pay or reimburse Miltenyi Biotec for all costs of investigating and responding to such request at Miltenyi Biotec's then prevailing time and materials rates. If Miltenyi Biotec provides repair services or replacement parts that are not covered by this warranty, you shall pay Miltenyi Biotec therefor at Miltenyi Biotec's then prevailing time and materials rates.

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