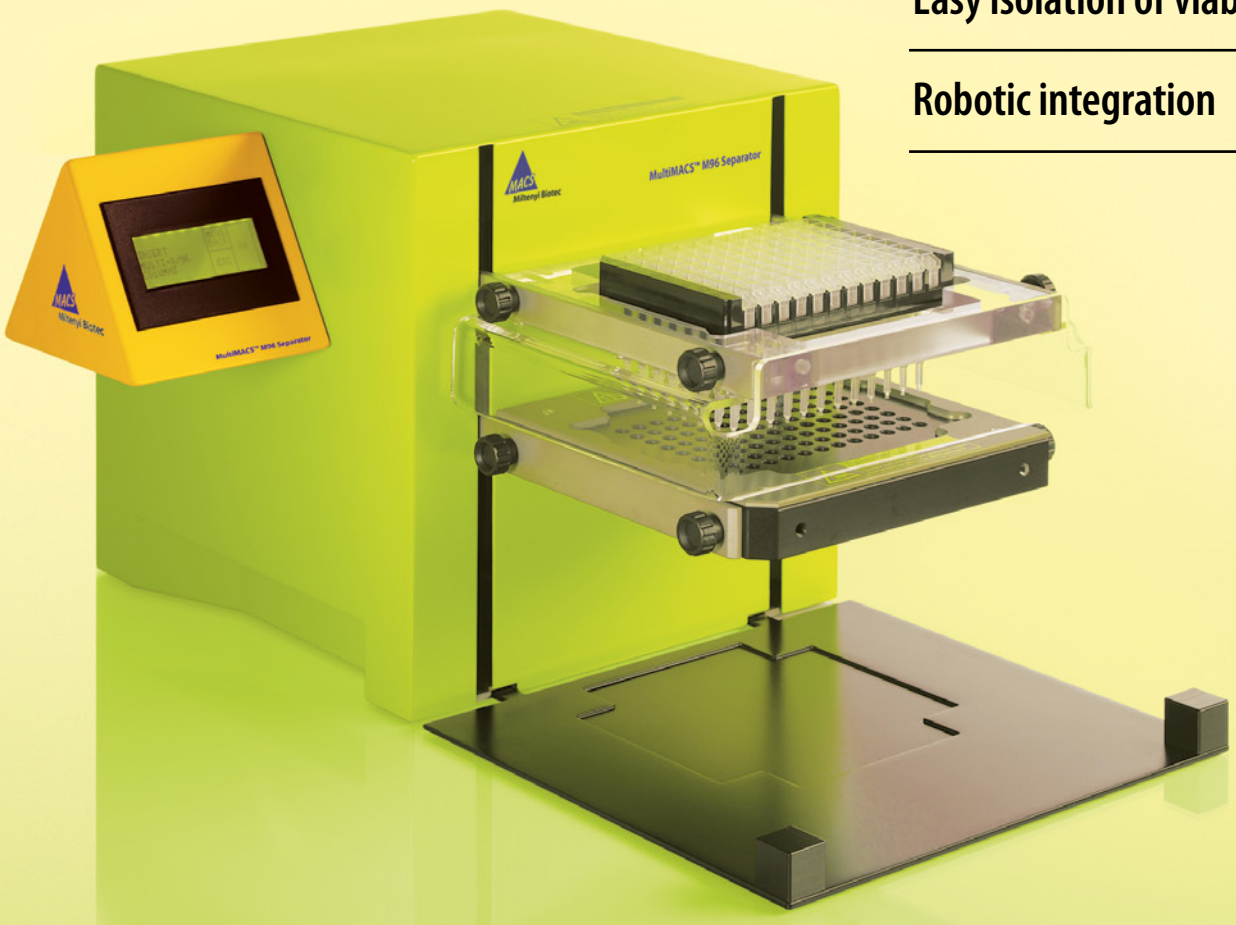
Miltenyi Biotec

Rapid, multisample biomolecule isolation & processing

# MultiMACS™ M Separator

- 96-well multisample processing
- Sensitive in-column cDNA synthesis
- Rapid protein isolation
- Easy isolation of viable viruses
- Robotic integration



# Flexibility in magnetic biomolecule isolation

## One instrument for manual or fully-automated processes

**Figure 1:** Easy manual operation of the MultiMACS M96 Separator via the touchscreen

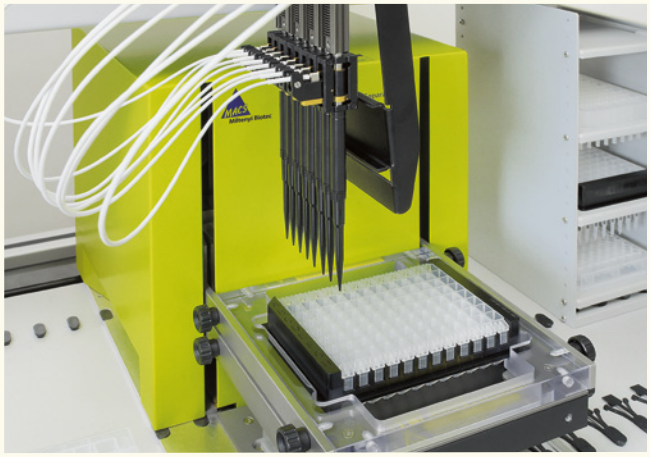


**Figure 2:** Automated use of the MultiMACS M96 Separator in a pipet robot

## The MultiMACS™ M Separator family

The MultiMACS M Separator family is composed of the **MultiMACS M96 Separator** and **MultiMACS M96thermo Separator** – instruments that easily upscale Miltenyi Biotec's MACS® Technology for molecular applications to a higher throughput format. Both instruments perform efficient biomolecule isolation, with the MultiMACS M96thermo Separator also providing precise enzymatic reactions of isolated molecules directly in the column via a heatable magnet.

## The family at a glance

- Small benchtop instruments
- Parallel processing of up to 96 samples
- Manual or robotic operation (fig. 1 and fig. 2)
- Reliable and convenient data
- Heatable magnet on the MultiMACS M96thermo Separator allows enzymatic reactions of isolated molecules

**One instrument for a scope of applications:**

**Nucleic acid research**
- mRNA isolation and in-column cDNA synthesis

**Protein research**
- Purification of epitope-tagged proteins
- (Co-)Immunoprecipitation of proteins
- Protein isolation via biotinylated capture probes
- In-column enzymatic reactions at 37 °C or 42 °C

**Virus research**
- Isolation of infectious virues particles such as HIV-1


**Figure 3:** µMACS Anti-GFP MicroBeads

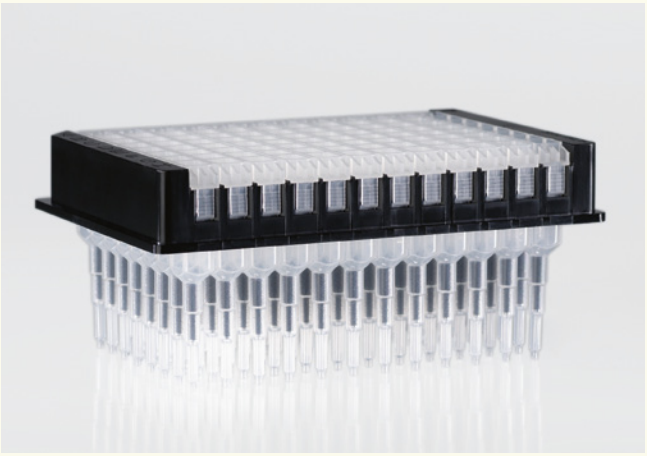


**Figure 4:** Multi-96 Columns enable efficient small-scale isolation of biomolecules with MACS® MicroBeads

## MACS® Technology for biomolecule isolation

The recognized standard in cell separation is applied to biomolecule isolation for fast and sensitive isolation of mRNA, cDNA, proteins or viruses.

## How MACS Technology works

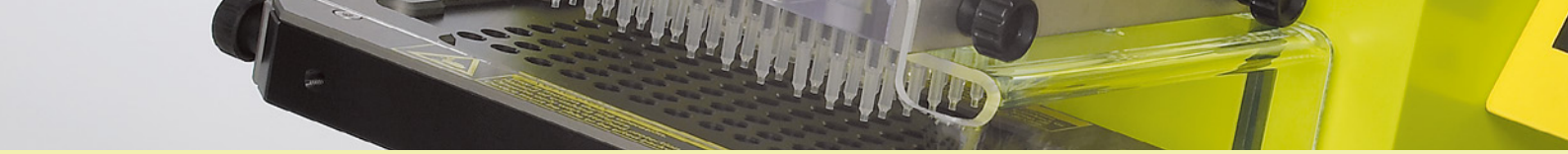
Superparamagnetic µMACS™ MicroBeads (fig. 3) are added to the cell lysate and instantly bind to their target. The magnetically labeled target molecules are isolated and purified in Multi-96 Columns (fig. 4) positioned within the magnetic field of the MultiMACS M Separator. Pure target molecules are eluted after thorough washing.

**How you benefit from MACS® Technology for biomolecule isolation:**

**Fast**
45 minutes for 96 mRNA samples and less than two hours for 96 protein isolations.

**Highly sensitive**
Due to fast reaction kinetics of 50-nm small MicroBeads.

**High specificity**
Due to low rate of background binding of MicroBeads and usage of proven binding moieties.



# One-step mRNA isolation & cDNA synthesis

## Manual or fully-automated 96-well PCR sample preparation at its best

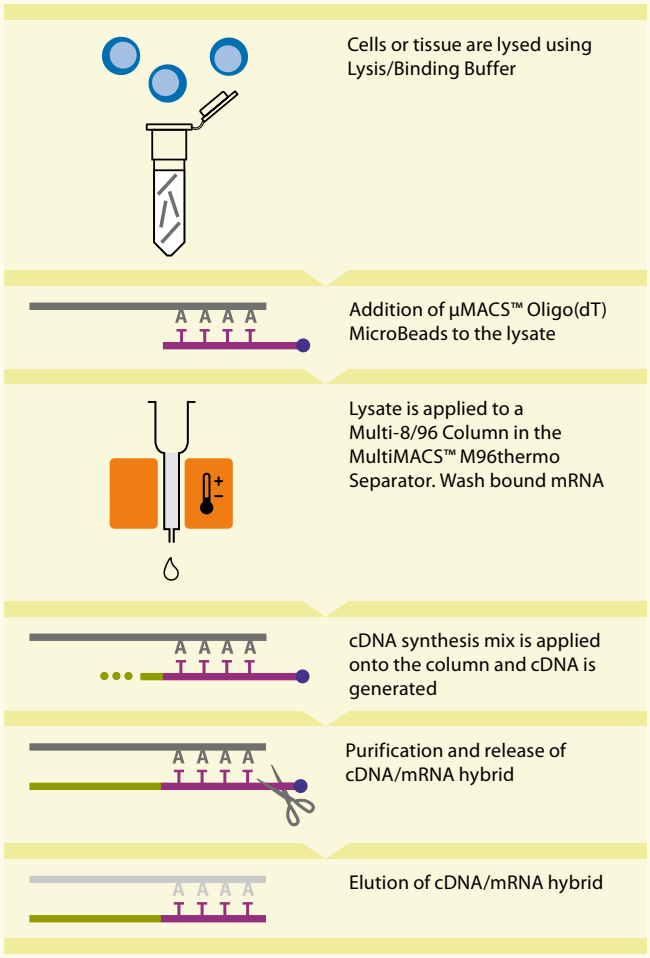



**Figure 5:** Principle of MACS Technology for mRNA isolation and cDNA synthesis

## High-purity mRNA from small sample amounts

The **MultiMACS™ mRNA Isolation Kits** are precisely developed for the MultiMACS M96 Separator to provide scientists with a robust and reproducible 96-well mRNA isolation procedure based on MACS® Technology. Genomic DNA contamination is below the limit of detection[1] and 96 mRNA samples can be processed within just 45 minutes.

1) Mack *et al.* (2007) Cytometry 71: 404–409.

## Save time and material – perform cDNA synthesis instantly

Instead of eluting purified mRNA from the Multi-96 Columns, first-strand cDNA can be synthesized directly in the same column. By employing the **MultiMACS cDNA Synthesis Kits** and the MultiMACS M96thermo Separator with a heatable magnet, PCR templates can be prepared in the same column. It takes less than 2 hours to obtain pure cDNA from 96 samples.

**"We usually process several dozen samples. Now, with the MultiMACS M96thermo Separator we can do parallel cDNA synthesis from up to 96 samples and save a lot of time and costs."**

Prof. C. Wolfrum, ETH Zurich, Switzerland

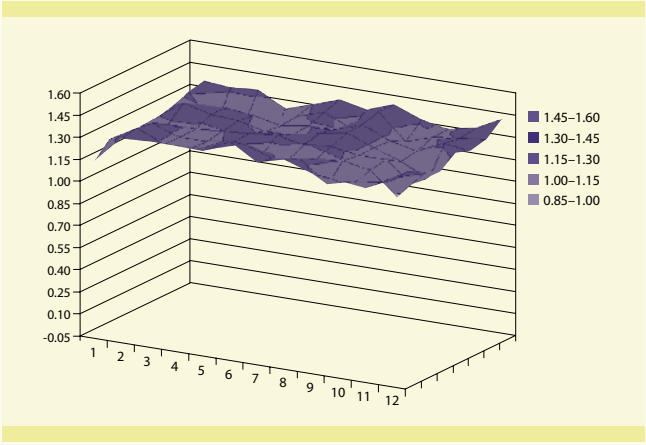




**Figure 6:** Quantification of 96 mRNA samples purified from 100 µg total RNA extracted from mouse liver using the MultiMACS mRNA Isolation Kit Average yield: 1.3 µg mRNA; coefficient of variation of 96 samples: 5.2%

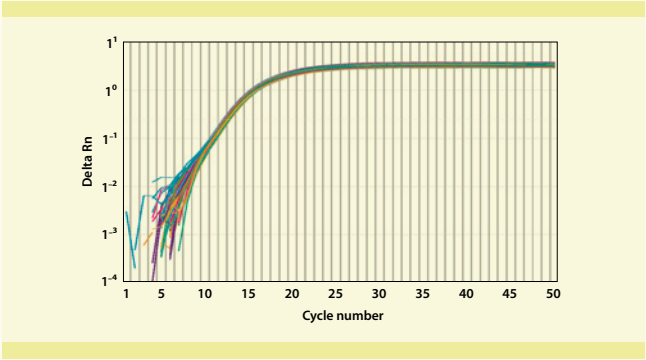



**Figure 7:** Quantitative RT-PCR of 96 samples purified from 100 µg total RNA extracted from mouse liver using the MultiMACS cDNA Synthesis Kit. After reverse transcription, quantitative amplification of the housekeeping gene GAPDH was performed. Mean cycle threshold: 12.0; coefficient of variation: 2.0%

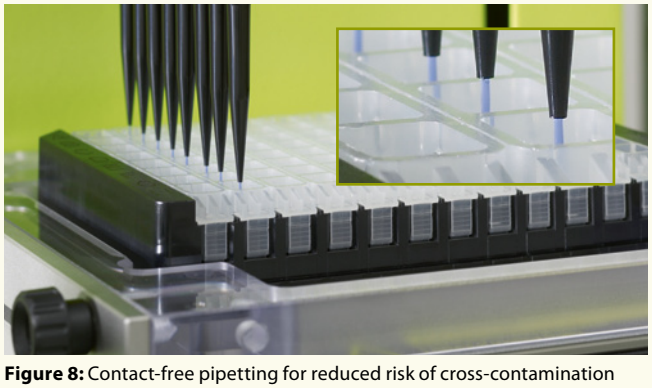


**Figure 8:** Contact-free pipetting for reduced risk of cross-contamination

## High reliability and reproducibility

The MultiMACS M96thermo Separator and kits enable exceptionally low variation in the yield and quality of isolated mRNA and synthesized cDNA as shown in figures 6 and 7.

## Contact-free pipetting eliminates cross-contamination

A hallmark of MACS Technology is the gravity-driven column flow. This not only circumvents centrifugation steps but also enables contact-free pipetting as there is no need to remove buffers after washing steps. The risk of cross-contamination of adjacent columns is thus minimized (fig. 8).

# Accelerate your protein research

## Protein isolation from 96 samples in less than 2 hours

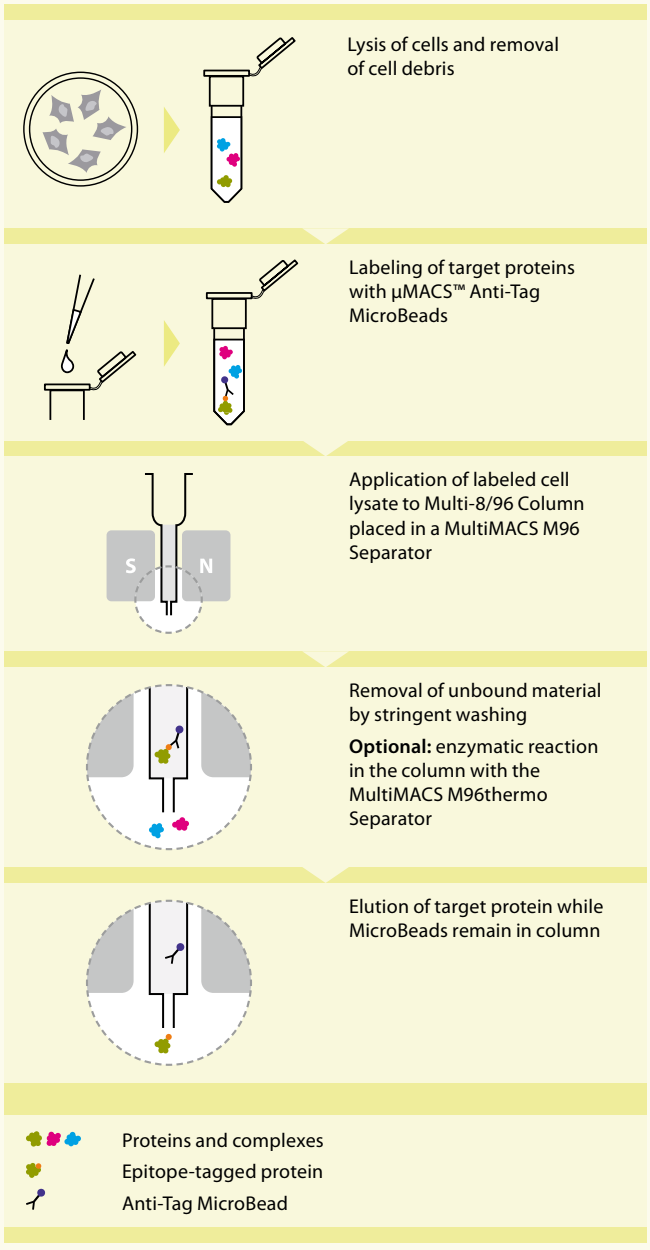



**Figure 9:** Principle of MACS Technology for isolation of epitope-tagged proteins

## Manual or automated 96-well isolation of proteins

In combination with one of the **MultiMACS™ Protein Isolation Kits** the MultiMACS M96 Separator can also be used for manual or automated 96-well isolation of proteins[2].

The main principle of MACS® Technology for protein isolation is illustrated in figure 9.

[2]Hubner, Mann *et al.* (2010) JCB 189: 739–754.

**How you benefit from MACS® Technology for protein isolation:**

**Time-saving**
In less than 2 hours you can isolate proteins with high purity from up to 96 samples in a single run.

**Manual or fully-automated approaches**
Effortless robotic integration enables precise liquid handling and fully automated sample processing[2].

**Reliable data**
Precise and accurate sample handling ensures reproducibile results that you can rely on.

**No cross-contamination**
Contact-free pipetting ensures that cross-contamination is completely eliminated (refer to page 5).

**Flexibile**
Numerous reagent kits are available for a wide selection of protein applications.

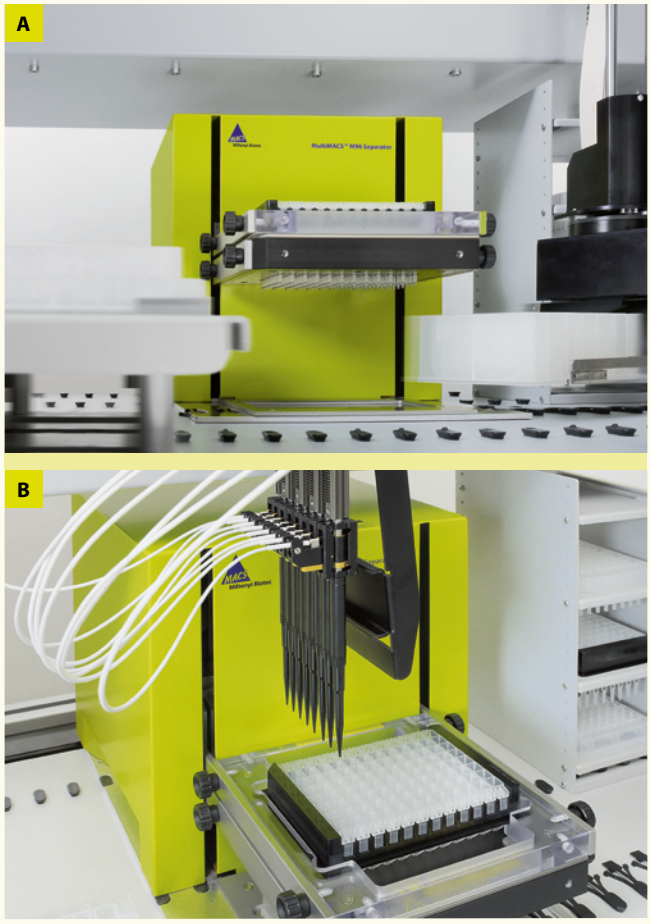



**Figure 10:** Automated use of MultiMACS M96 Separator in a pipet robot.
A: The robotic arm places the waste plate in the right position.
B: The pipetting arm applies samples and buffers to the columns.

## Isolate any protein with ease

MultiMACS™ Protein Isolation Kits are available for:

**Isolation of epitope-tagged proteins**
Anti-Tag MicroBeads are coupled to high-quality monoclonal antibodies ensuring specific isolation of proteins tagged with:

- **GFP** (green fluorescent protein)
- **GST** (glutathione S-transferase)
- **HA** (hemagglutinin)
- **His** (histidine)
- **c-myc**

**(Co-)Immunoprecipitation of proteins**
The extremely small MicroBeads of the MultiMACS™ Protein A/G Kits ensure very fast reaction kinetics: formation of the labeled immune complex is generally completed in 30 minutes – no need for overnight incubation.

**Chromatin immunoprecipitation (ChIP)**
ChIP protocols also benefit from the higher specificity and lower rate of background binding of Protein A/G MicroBeads.

**Isolation of proteins via biotinylated capture probes**
The MultiMACS Streptavidin Kits efficiently isolate any molecule interacting with a biotinylated capture probe.

**"Small magnetic beads in combination with a flow-through column system gave the best results for bait sequence coverage by MS, detection of interaction partners, and robustness while keeping background proteins at acceptable levels."**

**"The small beads provide a large surface to volume ratio and consequently favorable binding kinetics as well as short incubation times …"**

Hubner and Mann *et. al.* (2010) JCB 189: 739–754.

# Standardize 96-well isolation of infectious HIV

## Isolate infectious HIV virions in less than 1 hour

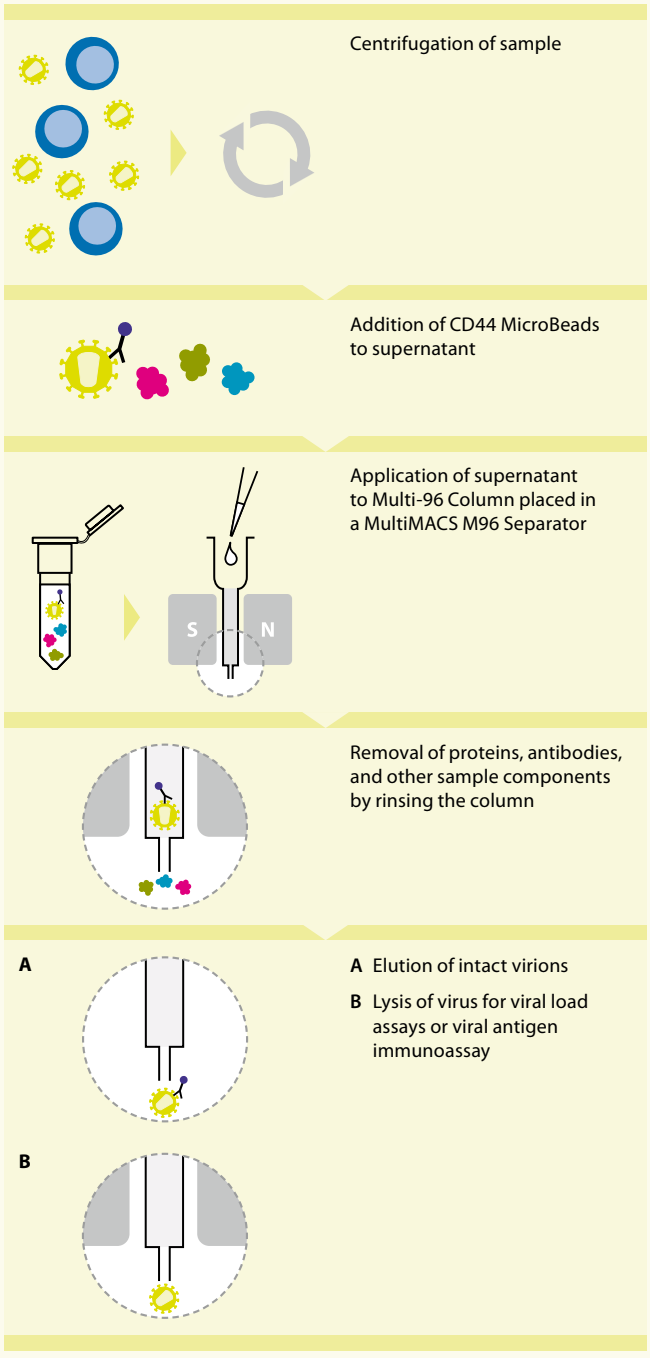



**Figure 11:** Principle of HIV-1 isolation with MACS® Technology

## Rapid magnetic virus isolation

In combination with the **MultiMACS™ VitalVirus Isolation Kits**, the MultiMACS M96 Separator accelerates your HIV research.

You can isolate infectious HIV-1 virions from up to 96 samples in less than 1 hour.

The MicroBeads are coupled to a monoclonal antibody recognizing CD44 on human hematopoietic cells. CD44 is incorporated into HIV particles when the virus buds from the host cell membrane.

Infectious virions can be isolated without extensive sample processing from plasma, serum, or other bodily fluids, such as, cerebral spinal fluid, breast milk, seminal fluid, or cervical lavage.

# Complete customer care

## Trusted worldwide customer support from Miltenyi Biotec

## Support when and where it's needed

Miltenyi Biotec is committed to providing outstanding customer care worldwide.

### Sales support

All Miltenyi Biotec technical sales consultants have a background in life sciences and can offer advice on:

- experimental design
- troubleshooting experimental protocols
- choosing the appropriate Miltenyi Biotec product

### Technical Support

Worldwide technical support can be accessed by:

- e-mail or telephone: simply ask technical support a question
- an online discussion forum
- a list of frequently asked questions
- a comprehensive library of datasheets and protocols

### Learning centre

Training resources are adapted to the individual:

- hands-on training offered onsite or at dedicated Miltenyi Biotec facilities
- online multimedia presentations
- webinars provide real-time access to a Miltenyi Biotec expert

Visit **www.miltenyibiotec.com/support** for more details.

# Technical specifications

## Instrument specifications of the MultiMACS M Separator

| MultiMACS M Separator specifications | |
|---|---|
| Size | 230 × 435 × 230 mm |
| Weight | 11 kg |
| Conditions of operation | 15 – 30 °C with 0 – 85% humidity at a maximum altitude of 2000 m |
| Input voltage | 100 – 240 VAC, ~ 50/60 Hz |
| Current | 3.5 A max. |
| Power consumption | 200 W |
| Fuses | T3.15AH 250V, 5 × 20 mm |
| RS232-Interface (labeled “com”) | Pin 1, 4, 6, 7, 8, 9 NC; Pin 2 RXD; Pin 3 TXD; Pin 5 GND |
| DC-Output | Module 1 24 VDC / 8 A; Module 2 24 VDC / 0.315 A |

# Ordering information

## Place your order by fax, phone, or online!

| Products | Capacity | Order no. |
|---|---|---|
| **Isolation of epitope-tagged proteins** | | |
| MultiMACS c-myc Isolation Kit (12×8)[1] | 96 isolations | 130-094-250 |
| MultiMACS c-myc Isolation Kit (4×96)[2] | 384 isolations | 130-094-251 |
| MultiMACS GFP Isolation Kit (12×8)[1] | 96 isolations | 130-094-252 |
| MultiMACS GFP Isolation Kit (4×96)[2] | 384 isolations | 130-094-253 |
| MultiMACS GST Isolation Kit (12×8)[1] | 96 isolations | 130-094-254 |
| MultiMACS GST Isolation Kit (4×96)[2] | 384 isolations | 130-094-256 |
| MultiMACS HA Isolation Kit (12×8)[1] | 96 isolations | 130-094-255 |
| MultiMACS HA Isolation Kit (4×96)[2] | 384 isolations | 130-094-257 |
| MultiMACS His Isolation Kit (12×8)[1] | 96 isolations | 130-094-258 |
| MultiMACS His Isolation Kit (4×96)[2] | 384 isolations | 130-094-259 |
| **(Co)-Immunoprecipitation of proteins** | | |
| MultiMACS Protein A Kit (24×8)[3] | 192 isolations | 130-092-944 |
| MultiMACS Protein G Kit (24×8)[3] | 192 isolations | 130-092-946 |
| MultiMACS Protein A Kit (4×96)[4] | 384 isolations | 130-092-945 |
| MultiMACS Protein G Kit (4×96)[4] | 384 isolations | 130-092-947 |

| Products | Capacity | Order no. |
|---|---|---|
| **Protein isolation via biotinylated capture probe** | | |
| MultiMACS Streptavidin Kit (12×8)[5] | 96 isolations | 130-092-948 |
| MultiMACS Streptavidin Kit (4×96)[6] | 384 isolations | 130-092-949 |
| **mRNA isolation and cDNA synthesis** | | |
| MultiMACS mRNA Isolation Kit (12×8)[7] | 96 reactions | 130-092-520 |
| MultiMACS mRNA Isolation Kit (4×96)[8] | 384 reactions | 130-092-519 |
| MultiMACS cDNA Synthesis Kit (12×8)[9] | 96 reactions | 130-094-410 |
| MultiMACS cDNA Synthesis Kit (4×96)[10] | 384 reactions | 130-094-408 |
| **HIV-1 isolation** | | |
| MultiMACS VitalVirus HIV Isolation (12×8)[11] | 96 isolations | 130-092-806 |
| MultiMACS VitalVirus HIV Isolation (4×96)[12] | 384 isolations | 130-092-807 |

| Product | Components | Order no. |
|---|---|---|
| **MultiMACS M Separators** | | |
| MultiMACS M96 Separator | | 130-091-937 |
| MultiMACS M96thermo Separator | | 130-094-534 |
| **MultiMACS Accessories** | | |
| Multi-8 Columns, molecular (12×8) | 12 Multi-8 Columns, 1 MultiColumn Frame, 1 Deep Well Block, 1 Microtiter Plate | 130-092-444 |
| Multi-96 Columns, molecular (4×96) | 4 Multi-96 Columns with MultiColumn Frame, 4 Deep Well Blocks, 4 Microtiter Plate | 130-092-445 |
| Multi-8 Filters | 12 Multi-8 Filters | 130-092-546 |
| Multi-8 Filters and Frames | 1 Multi-8 Filter Frame, 12 Multi-8 Filters | 130-092-548 |
| Multi-96 Filters | 4 Multi-96 Filters | 130-092-547 |
| Deep Well Block, 2.5 mL | 6 Deep Well Blocks, 2.5 mL | 130-092-549 |

[1] Kit contains 3×2 mL µMACS Anti-Tag MicroBeads, Equilibration Buffer, 12× Multi-8 Columns, 1 MultiColumn Frame, 1 Deep Well Block, 1 Microtiter Plate.
[2] Kit contains 5×4.6 mL µMACS Anti-Tag MicroBeads, Equilibration Buffer, 4× Multi-96 Columns, 4 Deep Well Blocks, 4 Microtiter Plates.
[3] Kit contains 5×2 mL µMACS Protein A or G MicroBeads, 24× Multi-8 Columns, 2 MultiColumn Frame, 2 Deep Well Block, 2 Microtiter Plate.
[4] Kit contains 10×2 mL µMACS Protein A or G MicroBeads, 4 Multi-96 Columns, 4 Deep Well Blocks, 4 Microtiter Plates.
[5] Kit contains 5×2 mL µMACS Streptavidin MicroBeads, Equilibration Buffers, 12 Multi-8 Columns, 1 MultiColumn Frame, 1 Deep Well Block, 1 Microtiter Plate.
[6] Kit contains 20×2 mL µMACS Streptavidin MicroBeads, Equilibration Buffers, 4 Multi-96 Columns, 4 Deep Well Blocks, 4 Microtiter Plate.
[7] Kit contains 3×1 mL Oligo(dT) MicroBeads, all needed buffers, 12 Multi-8 Columns, 1 MultiColumn Frame, 1 Deep Well Block, 1 Microtiter Plate.
[8] Kit contains 4×3×1 mL Oligo(dT) MicroBeads, all needed buffers, 4 Multi-96 Columns, 4 Deep Well Blocks, 4 Microtiter Plates.
[9] Kit contains 3×1 mL Oligo(dT) MicroBeads, 96 cDNA synthesis enzym mixes, all needed buffers, 12 Multi-8 Columns, 1 MultiColumn Frame, 1 Deep Well Block, 1 Microtiter Plate.
[10] Kit contains 4×3×1 mL Oligo(dT) MicroBeads, 4×96 cDNA synthesis enzyme mixes, all needed buffers, 4 Multi-96 Columns, 4 Deep Well Blocks, 4 Microtiter Plates.
[11] Kit contains 5× µMACS VitalVirus HIV Isolation Reagents, 12 Multi-8 Columns, 1 Deep Well Block, 1 Microtiter Plate.
[12] Kit contains 20× µMACS VitalVirus HIV Isolation Reagents, 4 Multi-96 Columns, 4 Deep Well Blocks, 4 Microtiter Plates.


MACS

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