Miltenyi Biotec

MACSQuant® Analyzer 10

Your trusted partner in automated flow cytometry

JOIN THE FLOW REVOLUTION

Your trusted partner in automated flow cytometry

The MACSQuant Analyzer 10 brings to life the versatility and power required for modern flow cytometry applications. Whether mining for rare cells, analyzing the efficiency of your cell manufacturing process, or investigating signaling pathways, you are equipped for the task at hand.

Truly hands-free operation

With a range of automated features, the MACSQuant Analyzer 10 lays the foundation for true automation.

Flexibility

Easily and immediately switch between tubes and plates at the click of a button.

Simplicity

Minimize the learning curve with straightforward experiment setup and operation.

Multi-instrument alignment

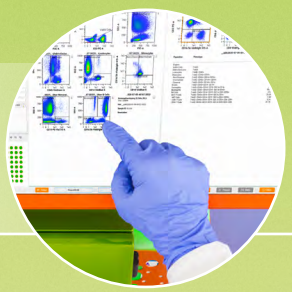
Using our Smart Gain software technology, users can harmonize data with collaborating labs to ensure reproducibility.


MACS
Quant 10

The features that make the difference

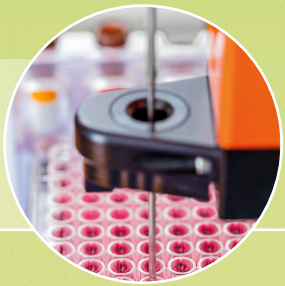
Large monitor

Integrated 15.6" monitor for simple touchscreen operation



Robotic needle arm

At the heart of automated sample mixing, processing, and autolabeling



Integrated MACS® Magnetic Cell Enrichment

Focus on your cells of interest and fortify your data

Precision volume uptake syringe

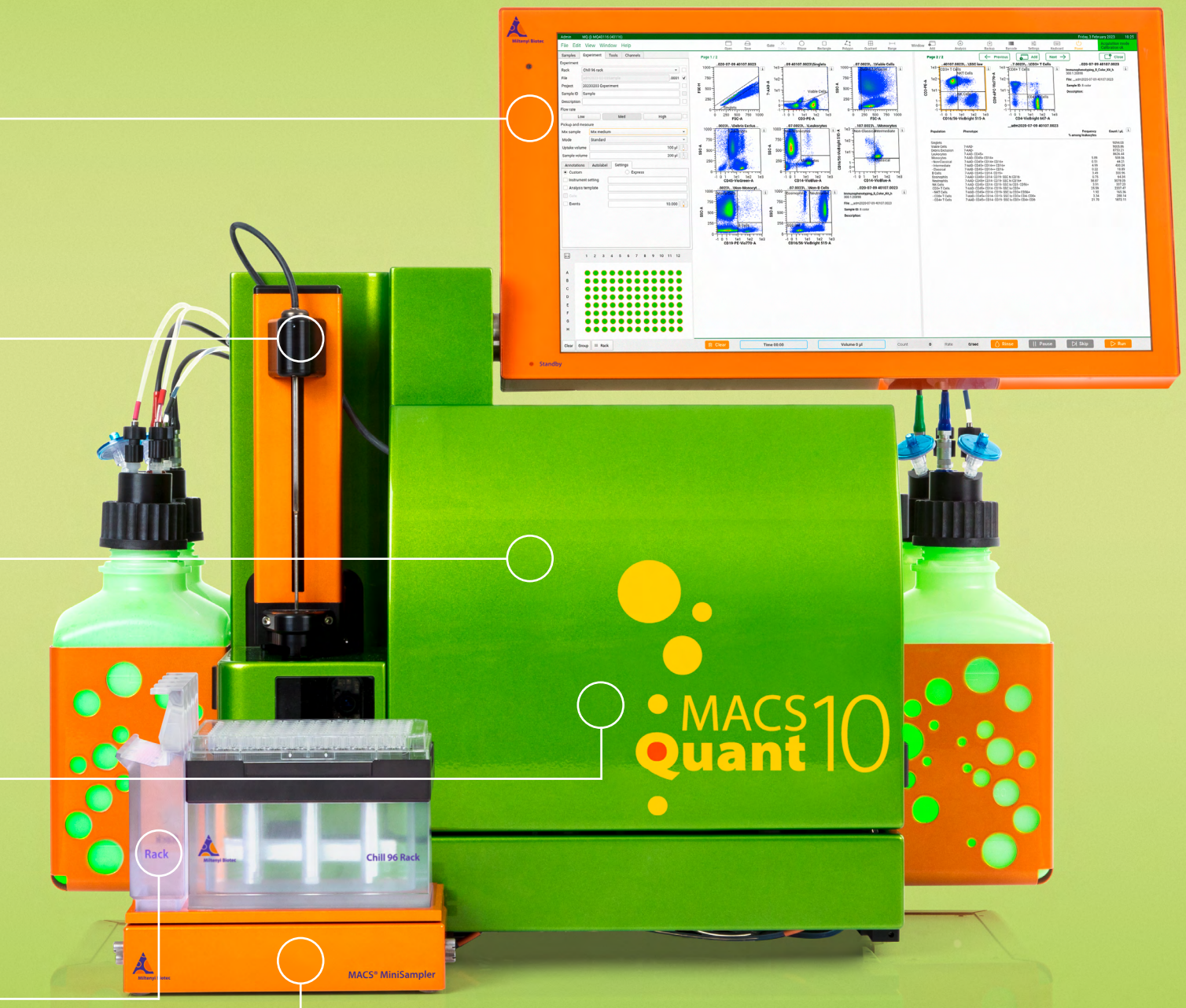
True volumetric cell counting without counting beads

Universal Reagent Rack

Flexible autolabeling options from glass or plastic vials

MACS MiniSampler Plus

Seamless sampling from single tubes, multiple tubes, or 96-well plates


MACS Quant 10
Rack
Chill 96 Rack
MACS® MiniSampler

Simplicity

Automation

Reliability

Automated analysis, reproducible results

Express Modes are unique add-on features for the MACSQuantify™ Software. They are standardized data analysis tools that are optimized to automate flow cytometric measurements and analysis via predefined experiment settings, acquisition, and automated gating. Derived from mathematical algorithms that are based on real-life experimental data, they reduce human error and therefore increase experimental reproducibility.

Express Modes contain application-dependent templates that are based on a significant amount of real data, including up to 1,000 test cases for a given application.

Custom Express Modes

Custom Express Modes can be developed specifically for your workflow and individual needs. They can cover automated acquisition and analysis with custom statistic tables and export of reports in various file formats.

For more information please contact:
Application_Development@miltenyibiotec.de

MACSPlex Cytokine Assays

MACSPlex Cytokine Assays are designed for determining concentrations of up to 12 soluble analytes in a single sample. The analysis is based on MACSPlex Capture Beads that have been coated with capture antibodies specific for cytokines. The bead populations can be distinguished by different fluorescence intensities.

In combination with the Express Modes of the MACSQuant Analyzer 10, the MACSPlex Cytokine Kits are optimized for automated measurement. They simplify flow cytometric analysis via predefined experiment settings, as well as acquisition and analysis templates (fig. 1).

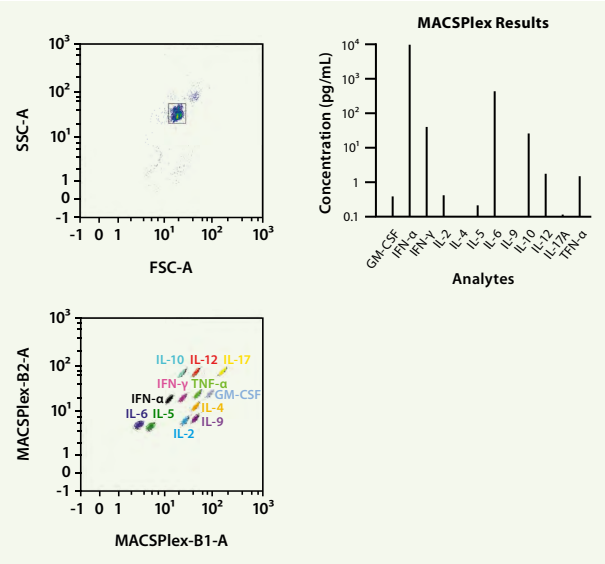


Figure 1: MACSPlex Express Mode – Standardized detection of the soluble human cytokines GM-CSF, IFN-α, IFN-γ, IL-2, IL-4, IL-5, IL-6, IL-9, IL-10, IL-12, IL-17A, and TNF-α in a single sample.

MACSPlex Cytokine 12 Kit, human Sample A, Donor A	
GM-CSF	0.4 pg/mL
IFN-α	>10000.0 pg/mL
IFN-γ	40.9 pg/mL
IL-2	0.4 pg/mL
IL-4	<0.0 pg/mL
IL-5	0.2 pg/mL
IL-6	456.4 pg/mL
IL-9	<0.0 pg/mL
IL-10	26.5 pg/mL
IL-12	1.7 pg/mL
IL-17A	0.1 pg/mL
TFN-α	1.5 pg/mL

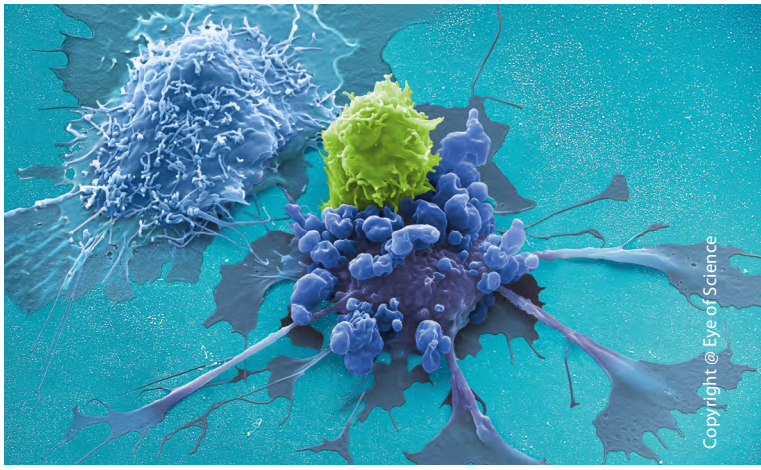
Your partner in cell therapy

Further characterize and enumerate your cells in your cell manufacturing applications. The MACSQuant Analyzer 10 hardware and software are configured to support small- to large-scale manufacturing requirements.

CAR T Cell Express Modes

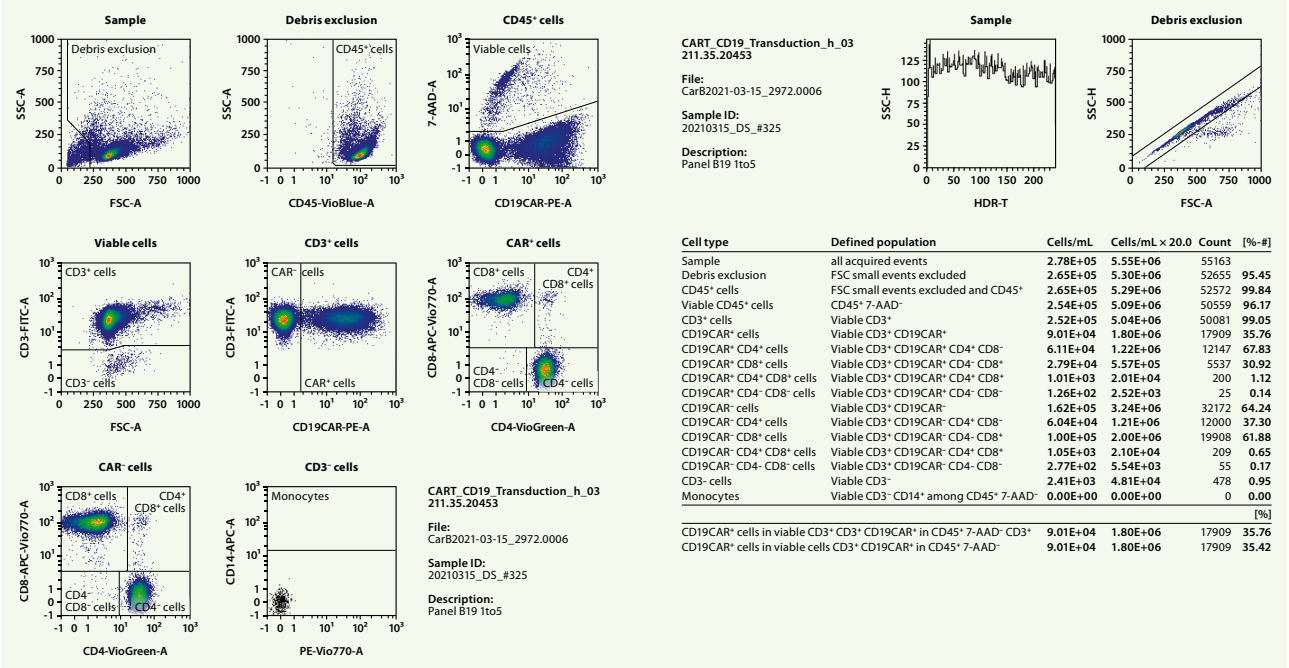
T cells control a variety of immune responses and therefore play a central role in the adaptive immune system. Recently, T cells have been redirected against cancer by genetic transduction with a receptor recognizing a specific tumor antigen. CD19 chimeric antigen receptor (CAR) T cells have shown tremendous clinical efficacy in the treatment of patients with hematological malignancies. As part of the CAR T cell production process, multicolor flow cytometry is a suitable and easy method to identify, characterize, and monitor CAR T cells.

For standardization and automation of CAR T cell analysis, Miltenyi Biotec has developed an Express Mode package that contains 12 optimized, application-specific Express Modes. It includes the CAR T Cell Transduction Express Mode (fig. 2), which can be used for the determination of transduction efficiency.



Express Mode Packages:

- CD19 CAR T Cell
- Virus-specific T Cell Cytokine Capture System
- TCRαβ/CD45RA T Cell
- Master (contains all three)



Cell type	Defined population	Cells/mL	Cells/mL × 20.0	Count	[%-#]
Sample	all acquired events	2.78E+05	5.55E+06	55163	
Debris exclusion	FSC small events excluded	2.65E+05	5.30E+06	52655	95.45
CD45⁺ cells	FSC small events excluded and CD45⁺	2.65E+05	5.29E+06	52572	99.84
Viable CD45⁺ cells	CD45⁺ 7-AAD⁻	2.54E+05	5.09E+06	50559	96.17
CD3⁺ cells	Viable CD3⁺	2.52E+05	5.04E+06	50081	99.05
CD19CAR⁺ cells	Viable CD3⁺ CD19CAR⁺	9.01E+04	1.80E+06	17909	35.76
CD19CAR⁺ CD4⁺ cells	Viable CD3⁺ CD19CAR⁺ CD4⁺ CD8⁻	6.11E+04	1.22E+06	12147	67.83
CD19CAR⁺ CD8⁺ cells	Viable CD3⁺ CD19CAR⁺ CD4⁻ CD8⁺	2.79E+04	5.57E+05	5537	30.92
CD19CAR⁺ CD4⁺ CD8⁺ cells	Viable CD3⁺ CD19CAR⁺ CD4⁺ CD8⁺	1.01E+03	2.01E+04	200	1.12
CD19CAR⁺ CD4⁻ CD8⁻ cells	Viable CD3⁺ CD19CAR⁺ CD4⁻ CD8⁻	1.26E+02	2.52E+03	25	0.14
CD19CAR⁻ cells	Viable CD3⁺ CD19CAR⁻	1.62E+05	3.24E+06	32172	64.24
CD19CAR⁻ CD4⁺ cells	Viable CD3⁺ CD19CAR⁻ CD4⁺ CD8⁻	6.04E+04	1.21E+06	12000	37.30
CD19CAR⁻ CD8⁺ cells	Viable CD3⁺ CD19CAR⁻ CD4⁻ CD8⁺	1.00E+05	2.00E+06	19908	61.88
CD19CAR⁻ CD4⁺ CD8⁺ cells	Viable CD3⁺ CD19CAR⁻ CD4⁺ CD8⁺	1.05E+03	2.10E+04	209	0.65
CD19CAR⁻ CD4⁻ CD8⁻ cells	Viable CD3⁺ CD19CAR⁻ CD4⁻ CD8⁻	2.77E+02	5.54E+03	55	0.17
CD3⁻ cells	Viable CD3⁻	2.41E+03	4.81E+04	478	0.95
Monocytes	Viable CD3⁻ CD14⁺ among CD45⁺ 7-AAD⁻	0.00E+00	0.00E+00	0	0.00
					[%]
CD19CAR⁺ cells in viable CD3⁺	CD3⁺ CD19CAR⁺ in CD45⁺ 7-AAD⁻ CD3⁺	9.01E+04	1.80E+06	17909	35.76
CD19CAR⁺ cells in viable cells	CD3⁺ CD19CAR⁺ in CD45⁺ 7-AAD⁻	9.01E+04	1.80E+06	17909	35.42

Figure 2: CAR T Cell Transduction Express Mode. Standardized determination of transduction efficiency of CAR T cells.

Harmonizing the world of flow cytometry is just an instrument setting away

Smart Gain with MACSQuantify™ Software

Experience consistently reproducible results from day to day, instrument to instrument, and operator to operator. With the Smart Gain technology of MACSQuantify Software, you can transfer your assay from one instrument to another, while passing on all necessary information to ensure an identical setup. As a result, the MACSQuant Operating System produces comparable, standardized results, every time, everywhere.

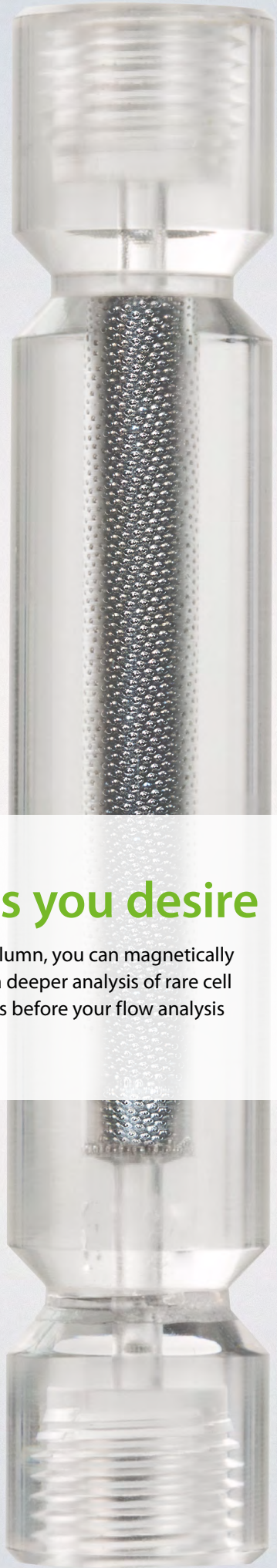
Consistency you can count on:

- **Reliable data from test to test**
- **From user to user**
- **From instrument to instrument**
- **Across sites**

Compliance with 21 CFR Part 11

You can be sure that your data is suitable for submission to regulatory agencies with the optional 21 CFR Part 11 feature, which includes:

- **Audit trail**
- **Analysis reports with e-signature**
- **User management system according to 21 CFR Part 11**



Focus on the cells you desire

Using the integrated MACS Enrichment Column, you can magnetically enrich your target population to perform a deeper analysis of rare cell subsets. Removing the non-relevant events before your flow analysis makes your assay even more robust.

Autolabeling: the missing step in a fully automated flow cytometry assay

With the inclusion of the MACS MiniSampler Plus, the MACSQuant Analyzer 10 enables autolabeling of your samples using the automated pipetting arm. The newly designed Universal Reagent Rack allows you to add reagents to your tubes or plates from 5 mL glass or 1 mL plastic vials.

Why risk the variability when you can automate your applications?

Reduce the risk of pipetting error with the reliability of robotics. All you have to do is program the titer of your reagent, the time for incubation, and the dilution of your sample, if applicable. That's it! You are now ready for the instrument to label and prepare your samples automatically.

The MACSQuant Analyzer 10 optical bench

Violet laser 405 nm

V1	450/50 nm	**VioBlue®/Vio® Bright V423**
V2	525/50 nm	**VioGreen™**

Blue laser 488 nm

FSC	488/10 nm	
SSC	488/10 nm	
B1	525/50 nm	**FITC/Vio® Bright B515**
B2	585/40 nm	**PE**
B3	655–730 nm	**PerCP-Vio® 700**
B4	750 nm LP	**PE-Vio® 770**

Red laser 640 nm

R1	655–730 nm	**APC/Vio® Bright R667**
R2	750 nm LP	**APC-Vio® 770**

Complete your automation loop with reproducible reagents

Achieving maximum reproducibility between experiments cannot depend on the flow cytometer alone. In order to achieve consistent results, Miltenyi Biotec offers a complete flow cytometry solution, including a dedicated range of reagents. We help you make sure that variations in your experiment are due to your sample, and not due to unreliable antibodies or instruments.

REAfinity™ Recombinant Antibodies – flow cytometry is in their genes

Miltenyi Biotec has introduced a portfolio of REAfinity Recombinant Antibodies that provide superior lot-to-lot consistency and purity compared to mouse or rat monoclonal and polyclonal antibodies. Our recombinant technology also diminishes the need for FcR blocking and allows for analyses with single isotype control, generating high-quality data with no more background signal and saving effort when setting up experiments. For more information, visit: **miltenyibiotec.com/reafinity**

Advantages of REAfinity Recombinant Antibodies:

- **High lot-to-lot consistency**
- **One universal isotype**
- **No more background signal**

Vio® Dyes – brighter dyes for flow cytometry

When used in combination with our proprietary Vio and Vio Bright Dyes, you can take advantage of superior mean fluorescence intensity and high stain indices. With the brightest dyes on the market, setting up complex multicolor experiments has never been so simple. For more information, visit: **miltenyibiotec.com/vio**

Ready-to-use kits

Use Miltenyi Biotec's range of ready-to-use, pre-titrated kits and save valuable experiment set-up time and assay costs. Our kits have been validated for use with the automatic labeling capacities of the MACSQuant Analyzer 10, which in combination with our Express Modes gives you true walk-away capability. All you have to do is set up the experiment and return later to look at fully analyzed data.

Customized solutions

Miltenyi Biotec's custom antibody design service enables researchers to benefit from personalized flow cytometry solutions. This service includes purified, functional-grade antibodies, and single- and multicolor antibody conjugates, as well as multicolor antibody cocktails. To find out more, visit: **miltenyibiotec.com/customab**

MACSQuant Analyzer 10 specifications

Optics

Laser excitation	405 nm, 40 mW diode 488 nm, 30 mW DPSS (diode pumped solid state) 640 nm, 20 mW diode			
Emission detectors	FSC: 488/10 nm SSC: 488/10 nm	B1: 525/50 nm B2: 585/40 nm B3: 655–730 nm B4: 750 nm LP	V1: 450/50 nm V2: 525/50 nm	R1: 655–730 nm R2: 750 nm LP
Fluorescence sensitivity and resolution	MESFs (CV <5%): FITC <200 PE <100 APC <150			
Flow cell dimensions	200 × 250 µm			
Fluorescence detectors	Optimized with spectrally matched PMTs for all channels			
Optical alignment	Fixed tree-like configuration, no user adjustments needed			

Fluidics

Minimal uptake volume*	1 µL (25 µL recommended for volumetric counting applications)
Sample flow rate	25, 50, or 100 µL/minute or automate flow rate to maintain 500, 1,000, or 2,000 events/second
Measurement speed [1,4]	<25 minutes per 96-well plate (5 µL measurement volume per well)
Sample uptake	1–450µL
Maximal event rate	15,000 events/second
System maintenance	Automated startup, PMT calibration, cleaning cycles, and shutdown
Sample mixing	Aspiration

Performance

Absolute counts performance[1,2]	Volumetric, reproducibility (CV) <5%
Sample carryover[1,3]	0.01%
Fluorescence performance	5-decade logarithmic scale (10^{-2} to 10^{3}), displayed in lin, log, or hlog scales
Sample tube/plate	96-well plate (U, V, flat well, deep well), 5 mL, 2 mL, and 1.5 mL tubes
MACS Cell Enrichment Unit	Rare cell enrichment prior to analysis

Data management

Operating system	Embedded operating system
Measurement parameters	Area, width, height for all parameters, with time and volume
Signal processing	>18-bit dynamic range in area with 32-bit floating point signal processing
Compensation	Automated or manual with 8 × 8 matrix during or post-acquisition
Threshold	Threshold can be set for any channel by selecting the trigger value
Data files	.mqd (proprietary file type), .fcs (2.0, 3.0, 3.1 compatible)

Technical specifications

Size (w × d) (with MACS MiniSampler) Height (adjustable touchscreen)	669 mm × 500 mm (26.34" × 19.69") 394 mm–553.5 mm (15.51"–21.79")
Weight	50 kg (110 lbs)
Monitor	15.6" LCD touchscreen (internal)
Power requirements	100–240 V~, 50/60 Hz
Power consumption	450 W
Ports	4× USB 2.0 ports, 6× USB 3.0 ports (2 at display), 2× DisplayPort, 2× LAN, DVI, RE-232, Audio
Emission sound pressure level at workstation	<61 dB(A)
Certification	CE-marked

* At every uptake, an additional excess volume is aspirated by the instrument. The excess volumes are calibration- and process-dependent and do not exceed 10 µL for Fast, Standard, and Extended modes, and 20 µL for Screen mode.

[1] Referred value indicates the average of multiple experiments and can differ for individual sample materials.

[2] For counting performance, 96-well plates were loaded with 200 µL/well of fixed peripheral blood mononuclear cell (PBMC) suspension at a nominal concentration of 1,000 cells/µL. The uptake volume was set to 50 µL at low flow rate.

[3] For carry-over, full 96-well plates were loaded with 200 µL/well of PBMC suspension at a nominal concentration of 10,000 cells/µL in every other well ("SRC-wells"). Alternating wells are loaded with an equal volume of MACSQuant Running Buffer ("CO-wells"). The uptake volume was set to 100 µL and measured at medium flow rate in standard mode. The carry-over is defined by sum (CO-singlet count)/sum(SRC-singlet count) × 100%.

[4] The measurement speed is determined by measuring the time between the movement of the robotic arm into the first measured well and its movement out of the last measured well. The measurements were carried out at high flow rate in fast mode.

Support at your fingertips

MACSQuant® Live Support

- Live support at your fingertips via MACSQuant Support portal
- Have your questions answered in real time by one of our experts

▸ **miltenyi.com/support**

Application and instrument support

- Technical and field application support
- Custom automation and Express Mode development

▸ **miltenyi.com/custom-application-service**

Instrument training

- Training at regional Miltenyi Innovation and Training Centers (MITC)
- Onsite training and assay development
- Online application resources

▸ **miltenyi.com/training**

Service

- Comprehensive service options
- Globally distributed field service teams

▶ miltenyibiotec.com/mq10

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