



Miltenyi Biotec



Instrument specifications

MACSQuant® X

More than just a screener

The MACSQuant X has been engineered from the ground up to provide maximum speed and reliability in high-throughput cell analysis. The compact and fully automated instrument design, together with one possibility of modifying your sample format with the click of a button, makes the MACSQuant X the simplest and most powerful solution for high-throughput flow cytometry applications.

It allows you to get more data, in less time, with less effort.

Perfect for laboratories that want to optimize time while enjoying the certainty of getting reliable results every single run, the MACSQuant X has been designed to meet high-throughput cell analysis needs for the most challenging large-scale screening settings, including, but not limited to, cell therapy research labs, cell manufacturing centers, antibody engineering laboratories, and drug discovery facilities.

Optics

Laser excitation

Spatially separated:
405 nm, 40 mW diode
488 nm, 30 mW DPSS (diode pumped solid state)
640 nm, 20 mW diode

Emission detectors

Channel	Filter	Dye
FSC	488/10 nm	Size
SSC	488/10 nm	Granularity
V1	450/50 nm	VioBlue®, Viobility™ 405/452
V2	525/50 nm	VioGreen™, Viobility 405/520
B1	525/50 nm	FITC, Vio® Bright FITC, Vio® 515, Vio Bright 515, Viobility 488/520
B2	585/40 nm	PE
B3	655–730 nm	PerCP, PerCP-Vio 700, PE-Vio 615
B4	750 nm LP	PE-Vio 770
R1	655–730 nm	APC, Vio 667, Vio Bright 667
R2	750 nm LP	APC-Vio 770

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	1 µL (25 µL recommended for volumetric counting applications)
Excess volume	1–5 µL sample volume: dead Volume = +6 µL 6–10 µL sample volume: dead volume = +6–10 µL (same volume as sample volume) 11 µL–5 mL sample volume: dead volume = +11 µL
Sample flow rate	25, 50, or 100 µL/min, or automated flow rate to maintain 500, 1,000, or 2,000 events/second
Measurement speed ^{2,3}	15 minutes per 96-well plate (5 µL measurement volume; fast mode) <60 minutes per 384-well plate (5 µL measurement volume; fast mode)
Sample uptake	1–5,000 µL
Maximal event rate	Up to 15,000 events/second
System maintenance	Automated startup, PMT calibration, cleaning cycles, and shutdown
Sample mixing	2-dimensional orbital shaking (200–3,000 rpm) Frequency of needle arm vibration (300–1,200 pwm)

Performance	
Absolute counts performance ^{2,4}	Volumetric; reproducibility (CV) <5%
Sample carry-over ^{2,5}	0.1%
Fluorescence performance	5-decade logarithmic scales (10^{-2} to 10^3), display in lin, log, or hlog scales
Sample tube/plate	384-well plate (U, V, flat), 96-well plate (V, U, flat well, deep well), FACS tubes (5 mL), Eppendorf tubes
Automation	Custom integration into liquid handling systems available

Data management	
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)

Operation details	
Size	
Width × depth (with Orbital Shaker)	814 × 474 mm (32.05 × 18.66" in)
Height (adjustable touchscreen)	427 × 586.5 mm (16.81 × 23.09" in)
Weight	50 kg (110 lbs)
Monitor	15.6" 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)
RAM	8 GB DDR4 (SO-DIMM)
Mass storage	500 GB SSD

- At every uptake, an additional excess volume is aspirated by the instrument. The excess volumes are calibration- and process-dependent, and do not exceed 15 µL.
- Referred value indicates the average of multiple experiments and can differ for individual sample materials.
- 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.
- For counting performance, 96-well plates were loaded with 200 µL/well of fixed peripheral blood mononuclear cells (PBMC) suspension at a nominal concentration of 5,000 cells/µL. The uptake volume was set to 50 µL at medium flowrate and standard mode. Plate shaking was set to 1,200 rpm and a singlet gate was used to determine singlet counting CV over all measured wells. Results for 384-well plates do not differ significantly from those measured in 96-well plates.
- For carry-over, full 96-well plates were loaded with 200 µL/well of PBMC suspension at a nominal concentration of 5,000 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 50 µL at medium flowrate and standard mode. Plate shaking was set to 1,200 rpm and a singlet gate was used to determine singlet counts in originating wells as well as in carry-over wells. The carry-over is defined by $\text{sum}(\text{CO-singletcount})/\text{sum}(\text{SRC-singletcount}) \times 100\%$. Results for 384-well plates do not differ significantly from those measured in 96-well plates.

Accessories	
MACSQuant X Orbital Shaker (#130-112-558)	For measurement of up to 384 samples in a single run
MACSQuant X 5 Rack (#130-112-413)	For running multiple 5 mL conical tubes
Universal Reagent Rack (# 130-115-722)	For automated addition of up to four reagents from both 5 mL glass vials and 2 mL polypropylene vials
Buffer Supply Station (# 130-101-841)	For automatic buffer supply using fluid container with 20 L capacity for the MACSQuant Running Buffer and a 20 L waste bottle

Consumables	
Buffers	MACSQuant Running Buffer (# 130-092-747) MACSQuant Washing Solution (# 130-092-749) MACSQuant Storage Solution (# 130-092-748) MACSQuant 16x Running Buffer (# 130 111 562)
MACSQuant Calibration Beads (# 130-093-607)	For use with automated calibration program
MACS® Comp Bead Kits	MACS Comp Bead Kit, anti-human IgK (# 130-104-187) MACS Comp Bead Kit, anti-mouse IgK (# 130-097-900) MACS Comp Bead Kit, anti-rat IgK (# 130-107-755) MACS Comp Bead Kit, anti-REA (# 130-104-693)

Reagents	
Antibodies	Works with all flow cytometry reagents. For a complete list visit www.macsantibodies.com

Service and Support	
Warranty	1 year warranty
MACSQuant Live Support	24/5 real-time remote support directly from your flow cytometer

Service contracts	MACSQuant X Essential Service (# 160-001-932)	MACSQuant X Preventive Maintenance (# 160-001-933)
Maintenance		
Replacement of wearing parts	●	●
Software updates	●	●
Labor, shipment, and product maintenance logistic costs	●	●
Maintenance intervals (visits per year)	2	2
Repairs service		
Unlimited numbers of repairs	●	●
Labor and travel expenses	●	●
All spare parts included	●	●
Service priority response	●	●
Additional services		
Technical support services	●	●
Service documentation	●	●
Remote Support service	●	●

MACSQuant® Instrument configurations at a glance

Channel	Laser	Filter	MACSQuant X	MACSQuant 10	MACSQuant VYB	MACSQuant16
FSC	488	488/10	●	●		●
FSC	561	561/4			●	
SSC	405	405/10				●
SSC	488	488/10	●	●		
SSC	561	561/4			●	
V1	405	450/50	●	●		●
V1	405	452/45			●	
V2	405	525/50	●	●	●	●
V3	405	579/34				●
V4	405	615/20				●
V5	405	667/30				●
B1	488	525/50	●	●	●	●
B2	488	585/40	●	●		
B2	488	593-650			●	
B2	488	579/34				●
B3	488	655-730	●	●		
B3	488	615/20				●
B4	488	750 LP	●	●		
B4	488	667/30				●
B5	488	725/40				●
B6	488	785/62				●
R1	640	655-730	●	●		
R1	640	667/30				●
R2	640	750 LP	●	●		
R2	640	725/40				●
R3	640	785/62				●
Y1	561	586/15			●	
Y2	561	615/20			●	
Y3	561	661/20			●	
Y4	561	740 LP			●	



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