



MACSQuant® X

Instrument specifications

More than just a screener

The MACSQuant® X has been engineered from the ground up to provide maximum speed and reliability in highthroughput cell analysis. The compact and fully automated, instrument design, taken together with the 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: 404 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®, Viability™ 405/452
	V2	525/50 nm	VioGreen™, Viability 405/520
	B1	525/50 nm	FITC, VioBright™ FITC, Vio® 515, VioBright 515, Viability 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, VioBright 667
	R2	750 nm LP	APC-Vio 770
Fluorescence sensitivity (MESF)	FITC < 150 PE < 100 APC < 150		
Fluorescence precision (CV)	< 5% CV with alignment verification particles		
Scatter resolution	Scatter performance is optimized for resolving human peripheral blood lymphocytes, monocytes, and granulocytes		
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		
Laser spot size	15×45 µm		

Fluidics	
Minimum measurement volume	1 µL
Dead 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 = +10 µL
Sample flow rate	25–100 µL/minute plus automated flow rate to maintain 500, 1000, or 2000 events/second
Measurement speed ^{1,2}	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	Uptake port (for y/z axis movements) with an automated washing station
Buffer consumption ²	4 mL/min + required rinsing
Maximal event rate	15,000 events/second
System maintenance	Automated startup, PMT calibration, cleaning cycles, and shutdown
Sample mixing	2-dimensional orbital shaking (200–3000 rpm) Frequency of needle arm vibration (300–1200 pwm)

Performance	
Absolute counts performance (reproducibility) ^{2,3}	CV < 10% for fast mode CV < 5% for standard mode CV < 4% for extended mode
Sample carryover ^{2,4}	0.01% (extended washing)
Sample tube/plates allowed	384-well plate (U, V, flat) 96-well plate (U, V, flat, deep well) FACS tubes (5 mL) Eppendorf tubes
Automation	Integration into liquid handling systems

Data processing	
Signal processing	> 20-bit dynamic range in area with 32-bit floating point signal processing
Sampling rate	10 MHz
Operating system	Microsoft® Windows 7 (embedded)/MACSQuantify™ Software
Measurement parameters	Area, width, height, time, volume
Compensation	Automated or manual with 8×8 matrix, during or post acquisition
Trigger	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)

1 The measurement speed is determined by measuring the time between the first movement of the robotic arm into the first measured well and the first movement out of the last well. The measurements itself were carried out at the highest possible flow rate in fast mode measuring 5 µL per well.

2 Referred threshold indicates the average value from multiply experiments and can differ in individual sample measurements.

3 For counting performance, full 96-well plates were loaded with 200 µL/well of peripheral blood mononuclear cell (PBMC) suspension at a nominal concentration of 5000 cells/µL. The uptake volume was set to 50 µL at medium flowrate. Plate shaking was set to 1200 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.

4 For carry-over, full 96-well plates were loaded with 200 µL/well of PBMC suspension at a nominal concentration of 5000 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. Plate shaking was set to 1200 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.

Operation details	
Size	
Width×depth (without MACSQuant Orbital Shaker)	669×368 mm (26.3×14.5")
Width×depth (with MACSQuant Orbital Shaker)	814×473 mm (32×18.6")
Height (with MACSQuant Orbital Shaker)	393–582 mm (15.4×20.4")
Weight	50 kg (110 lbs)
Monitor	15.6" HD touchscreen, height-adjustable (internal)
Temperature/humidity	Temperature range 15–25°C; humidity range 10–90%
Power requirements	100–240 VAC, 50/60 Hz
Power consumption	450W
Emission sound pressure level at workstation	<70 dB(A)
Certification	CE-marked, NRTL, TUV Sued

Accessories	
Shaker unit	MACSQuant X Orbital Shaker (# 130-112-558)
Racks	Universal Reagent Rack (# 130-115-722) MACSQuant X 5 Rack (# 130-112-413)
Optional accessories	Buffer Supply Station (# 130-101-841)

Consumables	
Buffers	MACSQuant Running Buffer (# 130-092-747) MACSQuant 16× Running Buffer (#130-111-562) MACSQuant Washing Solution (# 130-092-749) MACSQuant Storage Solution (# 130-092-748) MACS Bleach Solution (# 130-093-663)
Automated calibration	MACSQuant Calibration Beads (# 130-093-607)
Automated or manual compensation	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)

Service and Support	
Warranty	1 year warranty
MACSQuant Live Support	Reliable technical support in real time

	Full Service (# 160-001-932)	Planned Maintenance (# 160-001-932)
Maintenance		
Planned maintenance	●	●
Replacement of wearing parts	●	●
Software updates	●	●
Labor, shipment, and product maintenance logistic costs	●	●
Maintenance intervals (visits per year)	2	2
Repairs service		
Repair and replacement	●	
Labor and travel expenses	●	
Replacement parts	●	
Laser head included	●	
Additional services		
Technical support services	●	●
Service documentation	●	●

MACSQuant® X Instrument configurations at a glance

Channel	Laser	Filter	MACSQuant X	MACSQuant Analyzer 10	MACSQuant VYB
FSC	488	488/10	●	●	
FSC	561	561/10			●
SSC	488	488/10	●	●	
SSC	561	561/10			●
V1	405	450/50	●	●	●
V2	405	525/50	●	●	●
B1	488	525/50	●	●	●
B2	488	585/40	●	●	
B2	488	614/50			●
B3	488	655–730	●	●	
B4	488	750 LP	●	●	
R1	638	655–730	●	●	
R2	638	750 LP	●	●	
Y1	561	586/15			●
Y2	561	615/20			●
Y3	561	661/20			●
Y4	561	750 LP			●



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