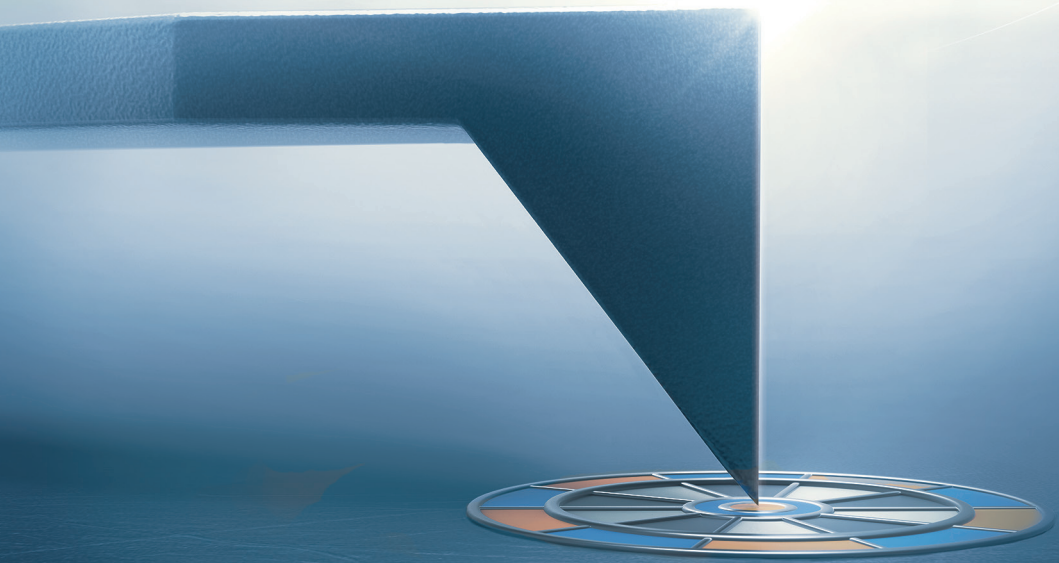
OPUS® by μmasch

OPTIMIZED POSITIONING UPON SAMPLE

OPUS Tips Catalogue



www.opustips.com

www.opustips.com

MikroMasch® Headquarters

Innovative Solutions Bulgaria Ltd.

48 Joliot Curie St.
1113 Sofia, Bulgaria
phone: +359 (0) 2 865-8629
fax: +359 (0) 2 963-0732
info@mikromasch.com
sales@mikromasch.com

MikroMasch® Europe

NanoAndMore GmbH

Spilburg Bld. A1,Steinbühlstrasse 7
D-35578 Wetzlar,
Germany
phone: +49 (0) 6441 2003561
fax: +49 (0) 6441 2003562
europe@mikromasch.com

MikroMasch® USA

NanoAndMore USA Corp.

21 Brennan Street, Suite 10
Watsonville, CA 95076, USA
Toll Free (US): +1 866 SPMTIPS (776-8477)
phone: +1 831-536-5970
fax: +1 831-475-4264
usa@mikromasch.com

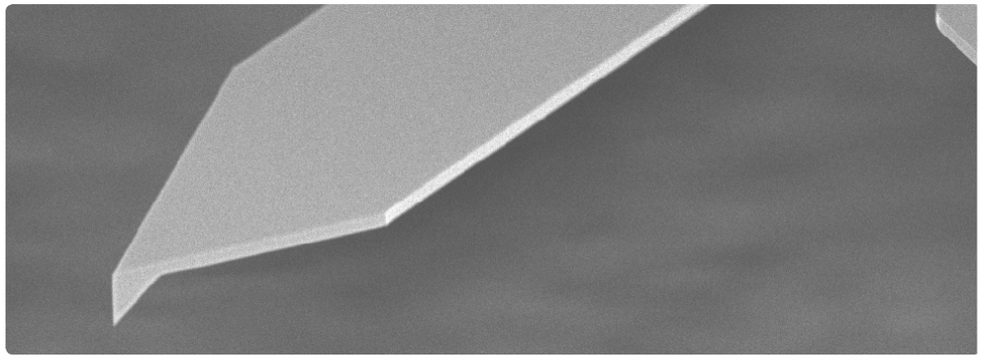
MikroMasch® Japan

NanoAndMore Japan K.K.

201 KTT5 Building, 1-1-1 Waseda
Misato-shi, Saitama-ken
341-0018 Japan
phone: +81 48 951 0958
fax: +81 48 951 0959
sales@nanoandmore.jp

OPUS Distributor

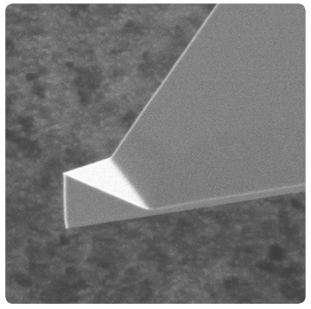
OPUS PRODUCT LINE



OPTIMIZED POSITIONING UPON SAMPLE

SPECIAL TIP SHAPE

The tip is located exactly at the end of the cantilever, which allows exact positioning of the tip apex over the region of interest on the sample surface.

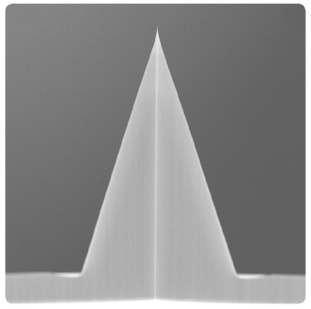


CONSISTENT CANTILEVER AND TIP PROPERTIES

Our state-of-the-art manufacturing process ensures consistency in cantilever and tip properties. High quality factor, smooth resonance curves, good cantilever reflectivity and excellent tip sharpness are only a few of the many advantages you can count on with every single OPUS silicon micro cantilever.

HIGH QUALITY BASE SILICON MATERIAL

All OPUS silicon micro cantilevers are manufactured from highly n-doped monocrystalline silicon with resistivity in the range 0.01 - 0.025 Ohm.cm for static charge dissipation. The cantilever and chip surface is a (100) plane and the cantilevers point in the <110> direction.



INDUSTRY STANDARD HOLDER CHIPS

OPUS micro cantilever holder chips have industry standard dimensions (3.4 x 1.6 x 0.315 mm) and fit all AFM systems that use unmounted probes. All single cantilever models feature alignment grooves on the back side of the chip.

Cantilever Series		Available Packs	Length	Width	Thickness	Resonance Frequency (typical)	(range)	Force Constant (typical)	(range)	Tip Side Coating	Detector Side Coating	Tip Radius	Environment	Application
TOPOGRAPHY MEASUREMENTS														
			± 10 µm	± 2 µm	± 0.5 µm	kHz		N/m		nm	nm	nm		
55AC-NN		5/ 10 / 24 / 50 / 100	65	31	2.9	1200	(650 - 1850)	85	(35 - 215)	none	none	< 7	Air / vacuum	High speed scanning
55AC-NA		5/ 10 / 24 / 50 / 100	65	31	2.9	1200	(650 - 1850)	85	(35 - 215)	none	Al, 30	< 7	Air / vacuum	High speed scanning
160AC-NN		10 / 24 / 50 / 100	160	40	4	300	(200 - 400)	26	(8 - 57)	none	none	< 7	Air / vacuum	Non-contact / tapping mode
160AC-NA		10 / 24 / 50 / 100	160	40	4	300	(200 - 400)	26	(8 - 57)	none	Al, 30	< 7	Air / vacuum	Non-contact / tapping mode
200AC-NA		10 / 24 / 50 / 100	200	40	3.5	135	(85 - 175)	9	(3 - 22)	none	Al, 30	< 7	Air / vacuum	Non-contact / soft tapping mode
240AC-NN		10 / 24 / 50 / 100	240	40	2.6	70	(45 - 90)	2	(0.6 - 3.9)	none	none	< 7	Air / vacuum	Soft tapping / force modulation mode
240AC-NA		10 / 24 / 50 / 100	240	40	2.6	70	(45 - 90)	2	(0.6 - 3.9)	none	Al, 30	< 7	Air / vacuum	Soft tapping / force modulation mode
3XC-NN	Cantilever A	10 / 24 / 50 / 100	500	30	3	17	(11 - 22)	0.3	(0.1 - 0.6)	none	none	< 7	Air / vacuum	Contact mode
	Cantilever B		175	40	3	150	(100 - 200)	9	(2.8 - 21)	none	none	< 7	Air / vacuum	Non-contact / soft tapping mode
	Cantilever C		240	30	3	75	(50 - 100)	2.5	(0.75 - 5.3)	none	none	< 7	Air / vacuum	Soft tapping / force modulation mode
3XC-NA	Cantilever A	10 / 24 / 50 / 100	500	30	3	17	(11 - 22)	0.3	(0.1 - 0.6)	none	Al, 30	< 7	Air / vacuum	Contact mode
	Cantilever B		175	40	3	150	(100 - 200)	9	(2.8 - 21)	none	Al, 30	< 7	Air / vacuum	Non-contact / soft tapping mode
	Cantilever C		240	30	3	75	(50 - 100)	2.5	(0.75 - 5.3)	none	Al, 30	< 7	Air / vacuum	Soft tapping / force modulation mode
			± 15 µm	± 2 µm	± 0.5 µm	kHz		N/m		nm	nm	nm		
4XC-NN	Cantilever A	10 / 24 / 50 / 100	500	30	3	17	(11 - 22)	0.3	(0.1 - 0.6)	none	none	< 7	Air / vacuum	Contact mode
	Cantilever B		240	30	3	75	(50 - 100)	2.5	(0.75 - 5.3)	none	none	< 7	Air / vacuum	Soft tapping / force modulation mode
	Cantilever C		175	40	3	150	(100 - 200)	9	(2.8 - 21)	none	none	< 7	Air / vacuum	Non-contact / soft tapping mode
	Cantilever D		65	31	3	1200	(650 - 1850)	100	(35 - 215)	none	none	< 7	Air / vacuum	High speed scanning

Cantilever Series		Available Packs	Length	Width	Thickness	Resonance Frequency (typical)	(range)	Force Constant (typical)	(range)	Tip Side Coating	Detector Side Coating	Tip Radius	Environment	Application
BIO AND SPECIAL APPLICATIONS														
			± 10 µm	± 2 µm	± 0.5 µm	kHz		N/m		nm	nm	nm		
55AC-NG		5/ 10 / 24 / 50 / 100	65	31	2.9	1200	(650 - 1850)	85	(35 - 215)	none	Au, 70	< 7	Air / vacuum / liquid	High speed scanning
160AC-NG		10 / 24 / 50 / 100	160	40	4	300	(200 - 400)	26	(8 - 57)	none	Au, 70	< 7	Air / vacuum / liquid	Non-contact / tapping mode
160AC-GG		10 / 24 / 50 / 100	160	40	4	300	(200 - 400)	26	(8 - 57)	Au, 70	Au, 70	< 30	Air / vacuum / liquid	Non-contact / tapping mode
240AC-NG		10 / 24 / 50 / 100	240	40	2.6	70	(45 - 90)	2	(0.6 - 3.9)	none	Au, 70	< 7	Air / vacuum / liquid	Soft tapping / force modulation mode
240AC-GG		10 / 24 / 50 / 100	240	40	2.6	70	(45 - 90)	2	(0.6 - 3.9)	Au, 70	Au, 70	< 30	Air / vacuum / liquid	Soft tapping / force modulation mode
3XC-GG	Cantilever A	10 / 24 / 50 / 100	500	30	3	17	(11 - 22)	0.3	(0.1 - 0.6)	Au, 70	Au, 70	< 30	Air / vacuum / liquid	Contact mode
	Cantilever B		175	40	3	150	(100 - 200)	9	(2.8 - 21)	Au, 70	Au, 70	< 30	Air / vacuum / liquid	Non-contact / soft tapping mode
	Cantilever C		240	30	3	75	(50 - 100)	2.5	(0.75 - 5.3)	Au, 70	Au, 70	< 30	Air / vacuum / liquid	Soft tapping / force modulation mode
			± 15 µm	± 2 µm	± 0.5 µm	kHz		N/m		nm	nm	nm		
4XC-GG	Cantilever A	10 / 24 / 50 / 100	500	30	3	17	(11 - 22)	0.3	(0.1 - 0.6)	Au, 70	Au, 70	< 30	Air / vacuum / liquid	Contact mode
	Cantilever B		240	30	3	75	(50 - 100)	2.5	(0.75 - 5.3)	Au, 70	Au, 70	< 30	Air / vacuum / liquid	Soft tapping / force modulation mode
	Cantilever C		175	40	3	150	(100 - 200)	9	(2.8 - 21)	Au, 70	Au, 70	< 30	Air / vacuum / liquid	Non-contact / soft tapping mode
	Cantilever D		65	31	3	1200	(650 - 1850)	100	(35 - 215)	Au, 70	Au, 70	< 30	Air / vacuum / liquid	High speed scanning

Cantilever Series	Available Packs	Length	Width	Thickness	Resonance Frequency (typical)	Resonance Frequency (range)	Force Constant (typical)	Force Constant (range)	Tip Side Coating	Detector Side Coating	Tip Radius	Environment	Application
ELECTRICAL MEASUREMENTS													
		± 10 µm	± 2 µm	± 0.5 µm	kHz		N/m		nm	nm	nm		
240AC-PP	10 / 24 / 50 / 100	240	40	2.6	70	(45 - 90)	2	(0.6 - 3.9)	Pt, 25	Pt, 25	< 25	Air / vacuum	Electrical measurements (EFM, KPFM, etc.)
MAGNETIC MEASUREMENTS													
		± 10 µm	± 2 µm	± 0.5 µm	kHz		N/m		nm	nm	nm		
240AC-MA	10 / 24 / 50 / 100	240	40	2.6	70	(45 - 90)	2	(0.6 - 3.9)	Co-alloy	Al, 30	< 60	Air / vacuum	Magnetic measurements (MFM)
HIGH RESOLUTION MEASUREMENTS													
		± 10 µm	± 2 µm	± 0.5 µm	kHz		N/m		nm	nm	nm		
160AC-SG	5	160	40	4	300	(200 - 400)	26	(8 - 57)	Au, 70*	Au, 70	~ 1	Air / vacuum / liquid	High resolution non-contact / tapping mode
240AC-SG	5	240	40	2.6	70	(45 - 90)	2	(0.6 - 3.9)	Au, 70*	Au, 70	~ 1	Air / vacuum / liquid	High resolution soft tapping mode
TRENCH MEASUREMENTS													
		± 10 µm	± 2 µm	± 0.5 µm	kHz		N/m		nm	nm	nm		
160AC-FG	5	160	40	4	300	(200 - 400)	26	(8 - 57)	Au, 70*	Au, 70	~ 10	Air / vacuum / liquid	Tapping mode trench measurements
240AC-FG	5	240	40	2.6	70	(45 - 90)	2	(0.6 - 3.9)	Au, 70*	Au, 70	~ 10	Air / vacuum / liquid	Soft tapping mode trench measurements

** Please note that while the tetrahedral tip and the tip side of the cantilever are gold coated, the diamond-like spike remains uncoated.*

Measurement Environments

Different measurement environments – liquid, air and vacuum

Liquid

Air or UHV

Measurement Modes

Cantilevers with a wide range of mechanical properties for AC mode and contact mode

Contact Mode

AC Mode

High Frequency AC Mode

Detection Signals

Cantilevers for electrical, magnetic and mechanical characterization

Electrical Measurements

Magnetic Measurements

Mechanical Measurements

Geometric and Mechanical Properties

High resolution

High aspect ratio

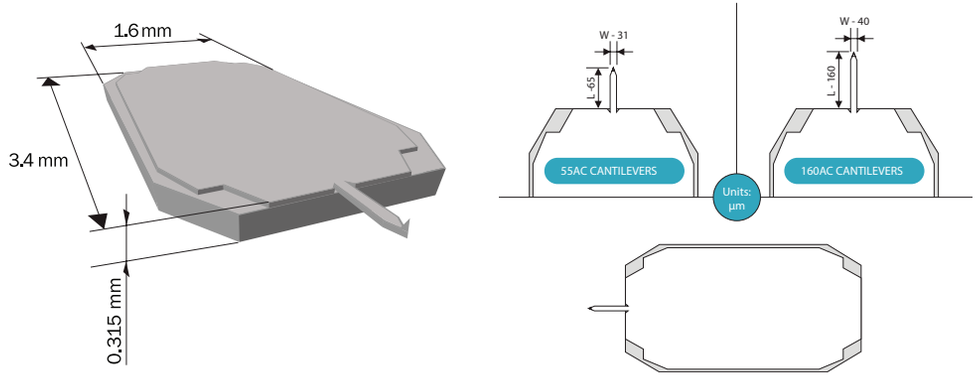
Tip at the end of the cantilever

Number of cantilevers per chip

Resonance Frequency

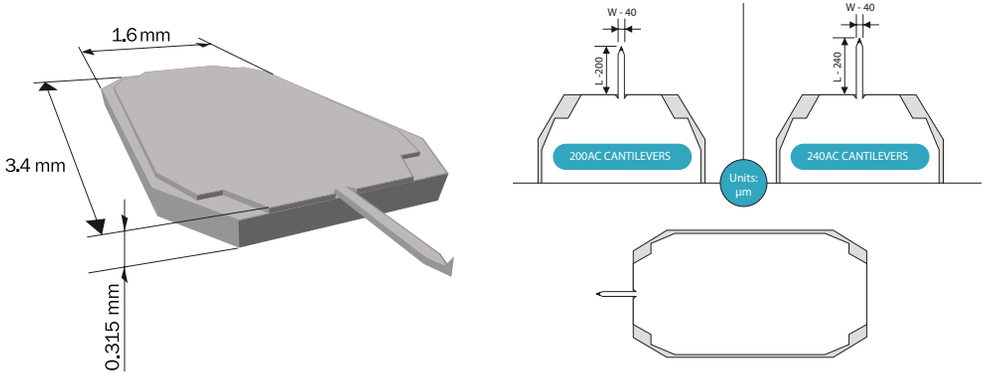
Force Constant

OPUS 55AC & 160AC Micro Cantilever Series



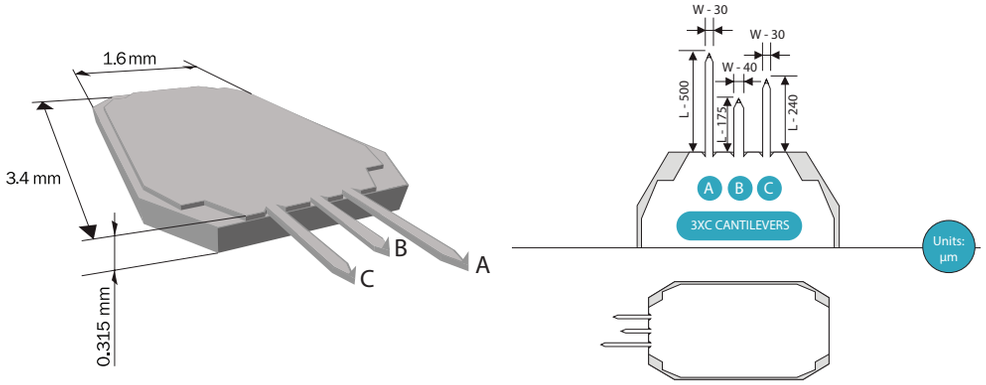
Cantilever material	n-type silicon
Tip shape	.tetrahedral
Tip height	12 - 16 µm
Tip angles	0° front / 35° back / < 9° side
Tip set back	0 µm

OPUS 200AC & 240AC Micro Cantilever Series



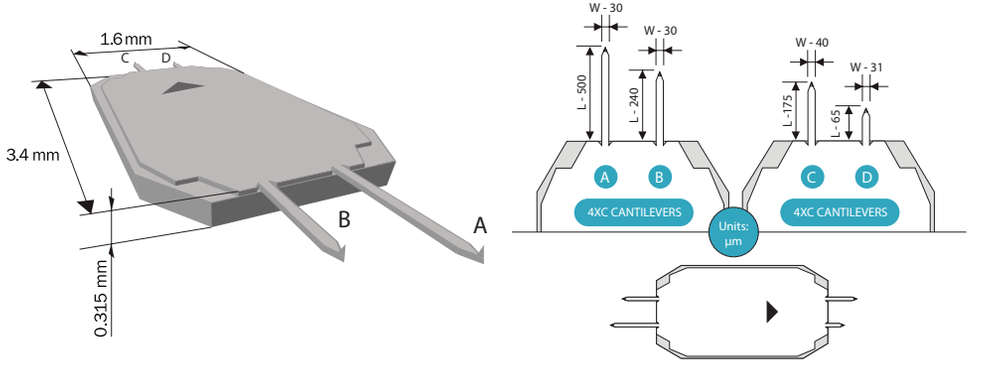
Cantilever material	n-type silicon
Tip shape	.tetrahedral
Tip height	12 - 16 µm
Tip angles	0° front / 35° back / < 9° side
Tip set back	0 µm

OPUS 3XC Micro Cantilever Series

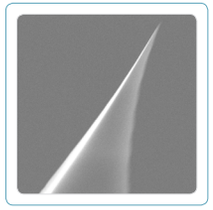


Cantilever material	n-type silicon
Tip shape	.tetrahedral
Tip height	12 - 16 µm
Tip angles	0° front / 35° back / < 9° side
Tip set back	0 µm

OPUS 4XC Micro Cantilever Series

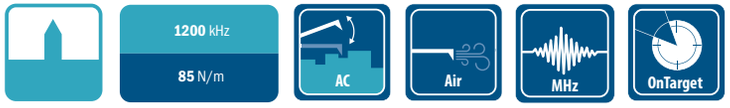


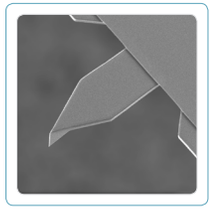
Cantilever material	n-type silicon
Tip shape	.tetrahedral
Tip height	12 - 16 µm
Tip angles	0° front / 35° back / < 9° side
Tip set back	0 µm



55AC-NN

High frequency tapping mode cantilever without coating

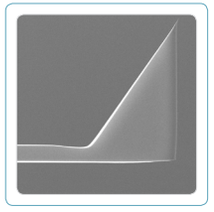




The 55AC series is designed for high speed AC mode imaging. The uncoated AFM tip offers a sharp tip apex, chemical inertness and a high cantilever Quality factor. The tetrahedral tip is located precisely at the free end of the cantilever. This allows the tip to be positioned accurately over the area of interest on the sample surface.

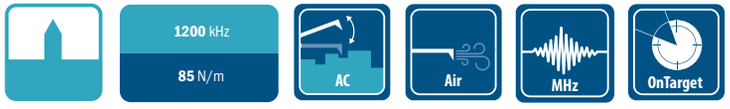
Coating:
Tip Side . . . . . none Back Side . . . . . none

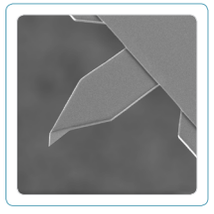
Cantilever	Res. Frequency (kHz)	Force Constant (N/m)	Tip Radius (nm)	Length (± 10 µm)	Width (± 2 µm)	Thickness (± 0.5 µm)
Single	**1200** (650 - 1850)	**85** (35 - 215)	< 7	65	31	2.9



55AC-NA

High frequency tapping mode cantilever with Al reflective coating

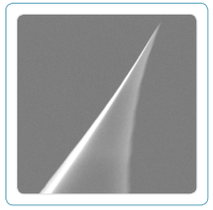




The 55AC series is designed for high speed AC mode imaging. The uncoated AFM tip offers a sharp tip apex and chemical inertness. The back side aluminum coating significantly enhances the cantilever reflectivity. The tetrahedral tip is located precisely at the free end of the cantilever. This allows the tip to be positioned accurately over the area of interest on the sample surface.

Coating:
Tip Side . . . . . none Back Side . . . . . Al, 30 nm

Cantilever	Res. Frequency (kHz)	Force Constant (N/m)	Tip Radius (nm)	Length (± 10 µm)	Width (± 2 µm)	Thickness (± 0.5 µm)
Single	**1200** (650 - 1850)	**85** (35 - 215)	< 7	65	31	2.9



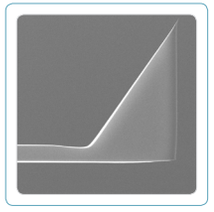
160AC-NN

Standard tapping mode AFM cantilever without coating

The 160AC series is designed for standard AC mode AFM imaging in air or vacuum. The uncoated AFM tip offers a sharp tip apex, chemical inertness and a high cantilever Quality factor. The tetrahedral tip is located precisely at the free end of the cantilever. This allows the tip to be positioned accurately over the area of interest on the sample surface.

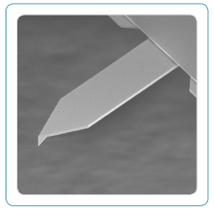
Coating:
Tip Side . . . . . none Back Side . . . . . none

Cantilever	Res. Frequency (kHz)	Force Constant (N/m)	Tip Radius (nm)	Length (± 10 µm)	Width (± 2 µm)	Thickness (± 0.5 µm)
Single	**300** (200 - 400)	**26** (8 - 57)	< 7	160	40	4



160AC-NA

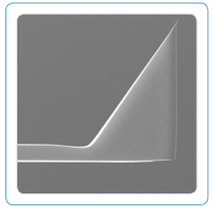
Standard tapping mode AFM cantilever with Al reflective coating



The 160AC series is designed for standard AC mode AFM imaging in air or vacuum. The uncoated AFM tip offers a sharp tip apex and chemical inertness. The back side aluminum coating significantly enhances the cantilever reflectivity. The tetrahedral tip is located precisely at the free end of the cantilever. This allows the tip to be positioned accurately over the area of interest on the sample surface.

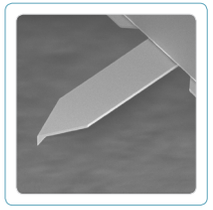
Coating:
Tip Side . . . . . none Back Side . . . . . Al, 30 nm

Cantilever	Res. Frequency (kHz)	Force Constant (N/m)	Tip Radius (nm)	Length (± 10 µm)	Width (± 2 µm)	Thickness (± 0.5 µm)
Single	**300** (200 - 400)	**26** (8 - 57)	< 7	160	40	4



200AC-NA

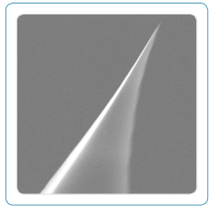
Standard tapping mode AFM cantilever with Al reflective coating



The 200AC series is designed for AC mode AFM imaging of standard and soft samples. The uncoated AFM tip offers a sharp tip apex, chemical inertness and a high cantilever Quality factor. The tetrahedral tip is located precisely at the free end of the cantilever. This allows the tip to be positioned accurately over the area of interest on the sample surface.

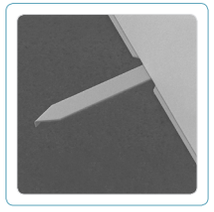
Coating:
Tip Side . . . . . none Back Side . . . . . Al, 30 nm

Cantilever	Res. Frequency (kHz)	Force Constant (N/m)	Tip Radius (nm)	Length (± 10 µm)	Width (± 2 µm)	Thickness (± 0.5 µm)
Single	**135** (85 - 175)	**9** (3 - 22)	< 7	200	40	3.5



240AC-NN

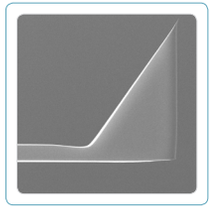
Soft tapping mode AFM cantilever without coating



The 240AC series is designed for AC mode AFM imaging of soft samples. The uncoated AFM tip offers a sharp tip apex, chemical inertness and a high cantilever Quality factor. The tetrahedral tip is located precisely at the free end of the cantilever. This allows the tip to be positioned accurately over the area of interest on the sample surface.

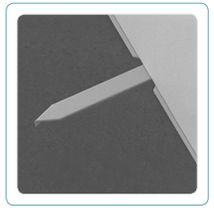
Coating:
Tip Side . . . . . none Back Side . . . . . none

Cantilever	Res. Frequency (kHz)	Force Constant (N/m)	Tip Radius (nm)	Length (± 10 µm)	Width (± 2 µm)	Thickness (± 0.5 µm)
Single	**70** (45 - 90)	**2** (0.6 - 3.9)	< 7	240	40	2.6



240AC-NA

Soft tapping mode AFM cantilever with Al reflective coating



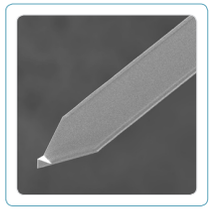
The 240AC series is designed for AC mode AFM imaging of soft samples. The uncoated AFM tip offers a sharp tip apex and chemical inertness. The back side aluminum coating significantly enhances the cantilever reflectivity. The tetrahedral tip is located precisely at the free end of the cantilever. This allows the tip to be positioned accurately over the area of interest on the sample surface.

Coating:
Tip Side . . . . . none Back Side . . . . . Al, 30 nm

Cantilever	Res. Frequency (kHz)	Force Constant (N/m)	Tip Radius (nm)	Length (± 10 µm)	Width (± 2 µm)	Thickness (± 0.5 µm)
Single	**70** (45 - 90)	**2** (0.6 - 3.9)	< 7	240	40	2.6

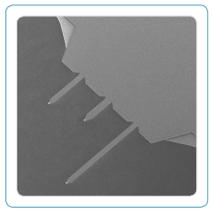
3XC-NN

Multiple AFM cantilevers without coating for various applications



The 3XC series features three different cantilevers for various measurement modes:

A - Contact mode imaging
B - Standard AC mode cantilever
C - Soft AC mode cantilever for imaging soft samples



The uncoated AFM tips offer sharp tip apexes, chemical inertness and high cantilever Quality factors. The tetrahedral tips are located precisely at the free ends of the cantilevers. This allows the tips to be positioned accurately over the area of interest on the sample surface.

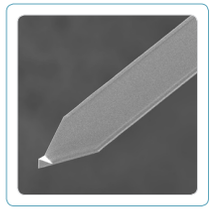
Coating:

Tip Side . . . . . none Back Side . . . . . .none

Cantilever	Res. Frequency (kHz)	Force Constant (N/m)	Tip Radius (nm)	Length (± 15 µm)	Width (± 2 µm)	Thickness (± 0.5 µm)
A	**17** (11 - 22)	**0.3** (0.1 - 0.6)	< 7	500	30	3
B	**150** (100 - 200)	**9** (2.8 - 21)	< 7	175	40	3
C	**75** (50 - 100)	**2.5** (0.75 - 5.3)	< 7	240	30	3

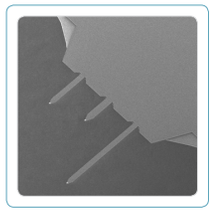
3XC-NA

Multiple AFM cantilevers with Al reflective coating for various applications



The 3XC series features three different cantilevers for various measurement modes:

A - Contact mode imaging
B - Standard AC mode cantilever
C - Soft AC mode cantilever for imaging soft samples



The uncoated AFM tips offer sharp tip apexes and chemical inertness. The back side aluminum coating significantly enhances the cantilever reflectivity. The tetrahedral tips are located precisely at the free ends of the cantilevers. This allows the tips to be positioned accurately over the area of interest on the sample surface.

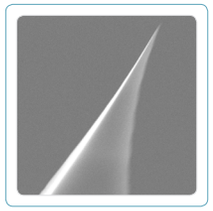
Coating:

Tip Side . . . . . none Back Side . . . . . Al, 30 nm

Cantilever	Res. Frequency (kHz)	Force Constant (N/m)	Tip Radius (nm)	Length (± 15 µm)	Width (± 2 µm)	Thickness (± 0.5 µm)
A	**17** (11 - 22)	**0.3** (0.1 - 0.6)	< 7	500	30	3
B	**150** (100 - 200)	**9** (2.8 - 21)	< 7	175	40	3
C	**75** (50 - 100)	**2.5** (0.75 - 5.3)	< 7	240	30	3

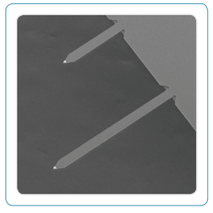
4XC-NN

Multiple AFM cantilevers without coating for various applications



The 4XC series features four different cantilevers for various measurement modes, two on each side of the holder chip:

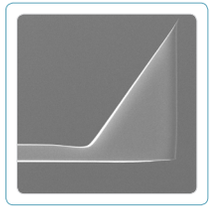
A - Contact mode imaging
B - Tapping mode imaging on soft samples
C - Standard tapping mode imaging
D - High speed scanning



The uncoated AFM tips offer sharp tip apexes, chemical inertness and high cantilever Quality factors. The tetrahedral tips are located precisely at the free ends of the cantilevers. This allows the tips to be positioned accurately over the area of interest on the sample surface.

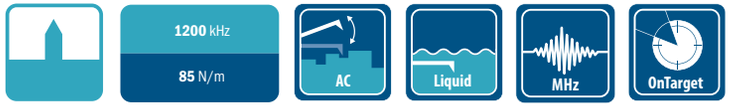
Coating:
Tip Side . . . . . none Back Side . . . . . .none

Cantilever	Res. Frequency (kHz)	Force Constant (N/m)	Tip Radius (nm)	Length (± 15 µm)	Width (± 2 µm)	Thickness (± 0.5 µm)
A	**17** (11 - 22)	**0.3** (0.1 - 0.6)	< 7	500	30	3
B	**75** (50 - 100)	**2.5** (0.75 - 5.3)	< 7	240	30	3
C	**150** (100 - 200)	**9** (2.8 - 21)	< 7	175	40	3
D	**1200** (650 - 1850)	**100** (35 - 215)	< 7	65	31	3



55AC-NG

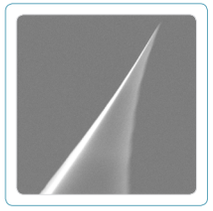
High frequency tapping mode cantilever with Au reflective coating



The 55AC series is designed for high speed AC mode imaging. The uncoated AFM tip offers a sharp tip apex and chemical inertness. The back side gold coating ensures high and stable laser reflectivity in air, liquid and aggressive chemical environments. The tetrahedral tip is located precisely at the free end of the cantilever. This allows the tip to be positioned accurately over the area of interest on the sample surface.

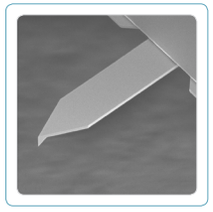
Coating:
Tip Side . . . . . none Back Side . . . . . Au, 70 nm

Cantilever	Res. Frequency (kHz)	Force Constant (N/m)	Tip Radius (nm)	Length (± 10 µm)	Width (± 2 µm)	Thickness (± 0.5 µm)
Single	**1200** (650 - 1850)	**85** (35 - 215)	< 7	65	31	2.9



160AC-NG

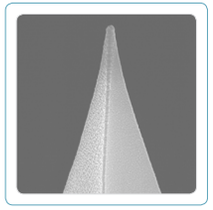
Standard tapping mode AFM cantilever with Au reflective coating



The 160AC series is designed primarily for standard AC mode AFM imaging in air or vacuum. The uncoated AFM tip offers a sharp tip apex and chemical inertness. The back side gold coating ensures high and stable laser reflectivity in air, liquid and aggressive chemical environments. The tetrahedral tip is located precisely at the free end of the cantilever. This allows the tip to be positioned accurately over the area of interest on the sample surface.

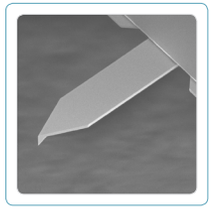
Coating:
Tip Side . . . . . none Back Side . . . . . Au, 70 nm

Cantilever	Res. Frequency (kHz)	Force Constant (N/m)	Tip Radius (nm)	Length (± 10 µm)	Width (± 2 µm)	Thickness (± 0.5 µm)
Single	**300** (200 - 400)	**26** (8 - 57)	< 7	160	40	4



160AC-GG

Standard tapping mode AFM cantilever with Au overall coating

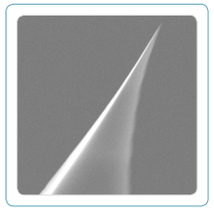


The 160AC series is designed primarily for standard AC mode AFM imaging in air or vacuum. The gold coated AFM tip is suitable for biological applications, tip functionalization and custom applications. The overall gold coating ensures inertness and electrical conductivity, as well as high and stable laser reflectivity in air, liquid and aggressive chemical environments. The tetrahedral tip is located precisely at the free end of the cantilever. This allows the tip to be positioned accurately over the area of interest on the sample surface.

Coating:
Tip Side . . . . . Au, 70 nm Back Side . . . . . Au, 70 nm

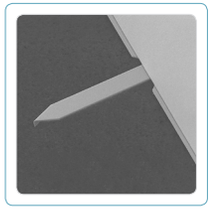
Cantilever	Res. Frequency (kHz)	Force Constant (N/m)	Tip Radius (nm)	Length (± 10 µm)	Width (± 2 µm)	Thickness (± 0.5 µm)
Single	**300** (200 - 400)	**26** (8 - 57)	< 30	160	40	4

BIOLOGICAL MEASUREMENTS AND SPECIAL APPLICATIONS



240AC-NG

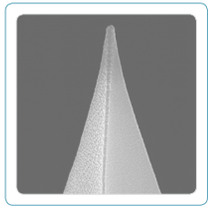
Soft tapping mode AFM cantilever with Au reflective coating



The 240AC series is designed for AC mode AFM imaging of soft samples. The uncoated AFM tip offers a sharp tip apex and chemical inertness. The back side gold coating ensures high and stable laser reflectivity in air, liquid and aggressive chemical environments. The tetrahedral tip is located precisely at the free end of the cantilever. This allows the tip to be positioned accurately over the area of interest on the sample surface.

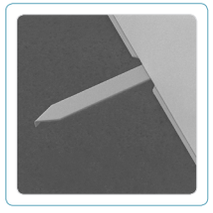
Coating:
Tip Side . . . . . none Back Side . . . . . .Au, 70 nm

Cantilever	Res. Frequency (kHz)	Force Constant (N/m)	Tip Radius (nm)	Length (± 10 µm)	Width (± 2 µm)	Thickness (± 0.5 µm)
Single	**70** (45 - 90)	**2** (0.6 - 3.9)	< 7	240	40	2.6



240AC-GG

Soft tapping mode AFM cantilever with Au overall coating



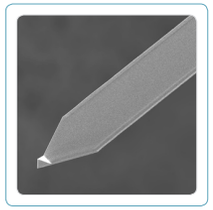
The 240AC series is designed for AC mode AFM imaging of soft samples. The gold coated AFM tip is suitable for biological applications, tip functionalization and custom applications. The overall gold coating ensures inertness and electrical conductivity, as well as high and stable laser reflectivity in air, liquid and aggressive chemical environments. The tetrahedral tip is located precisely at the free end of the cantilever. This allows the tip to be positioned accurately over the area of interest on the sample surface.

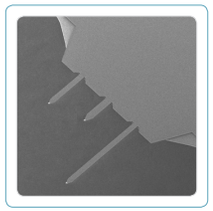
Coating:
Tip Side . . . . . Au, 70 nm Back Side . . . . . .Au, 70 nm

Cantilever	Res. Frequency (kHz)	Force Constant (N/m)	Tip Radius (nm)	Length (± 10 µm)	Width (± 2 µm)	Thickness (± 0.5 µm)
Single	**70** (45 - 90)	**2** (0.6 - 3.9)	< 30	240	40	2.6

3XC-GG

Multiple AFM cantilevers with Au overall coating for various applications





The 3XC series features three different cantilevers for various measurement modes:

A - Contact mode imaging
B - Standard AC mode cantilever
C - Soft AC mode cantilever for imaging soft samples

The gold coated AFM tips are suitable for biological applications, tip functionalization and custom applications. The overall gold coating ensures inertness and electrical conductivity, as well as high and stable laser reflectivity in air, liquid and aggressive chemical environments. The tetrahedral tips are located precisely at the free ends of the cantilevers. This allows the tips to be positioned accurately over the area of interest on the sample surface.

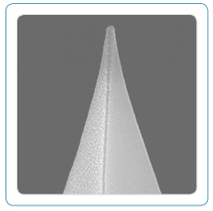
Coating:

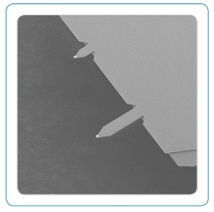
Tip Side . . . . . Au, 70 nm Back Side . . . . . .Au, 70 nm

Cantilever	Res. Frequency (kHz)	Force Constant (N/m)	Tip Radius (nm)	Length (± 15 µm)	Width (± 2 µm)	Thickness (± 0.5 µm)
A	**17** (11 - 22)	**0.3** (0.1 - 0.6)	< 30	500	30	3
B	**150** (100 - 200)	**9** (2.8 - 21)	< 30	175	40	3
C	**75** (50 - 100)	**2.5** (0.75 - 5.3)	< 30	240	30	3

4XC-GG

Multiple AFM cantilevers with Au overall coating for various applications





The 4XC series features four different cantilevers for various measurement modes, two on each side of the holder chip:

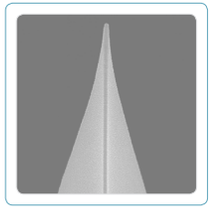
A - Contact mode imaging
B - Tapping mode imaging on soft samples
C - Standard tapping mode imaging
D - High speed scanning

The gold coated AFM tips are suitable for biological applications, tip functionalization and custom applications. The overall gold coating ensures inertness and electrical conductivity, as well as high and stable laser reflectivity in air, liquid and aggressive chemical environments. The tetrahedral tips are located precisely at the free ends of the cantilevers. This allows the tips to be positioned accurately over the area of interest on the sample surface.

Coating:

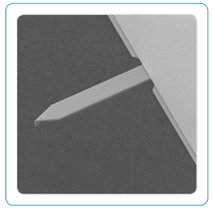
Tip Side . . . . . Au, 70 nm Back Side . . . . . Au, 70 nm

Cantilever	Res. Frequency (kHz)	Force Constant (N/m)	Tip Radius (nm)	Length (± 15 µm)	Width (± 2 µm)	Thickness (± 0.5 µm)
A	**17** (11 - 22)	**0.3** (0.1 - 0.6)	< 30	500	30	3
B	**75** (50 - 100)	**2.5** (0.75 - 5.3)	< 30	240	30	3
C	**150** (100 - 200)	**9** (2.8 - 21)	< 30	175	40	3
D	**1200** (650 - 1850)	**100** (35 - 215)	< 30	65	31	3



240AC-PP

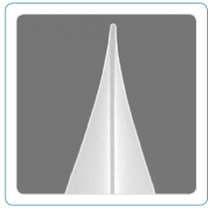
Soft tapping mode AFM cantilever with Pt overall coating



The 240AC-PP is designed for AC mode electrical characterization measurements such as Electrostatic Force Microscopy (EFM), Kelvin Probe Force Microscopy (KPFM), etc. The overall platinum coating ensures high electrical conductivity and significantly enhances the cantilever reflectivity. The tetrahedral tip is located precisely at the free end of the cantilever. This allows the tip to be positioned accurately over the area of interest on the sample surface.

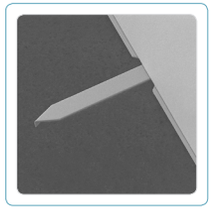
Coating:
Tip Side . . . . . Pt, 25 nm Back Side . . . . . Pt, 25 nm

Cantilever	Res. Frequency (kHz)	Force Constant (N/m)	Tip Radius (nm)	Length (± 10 µm)	Width (± 2 µm)	Thickness (± 0.5 µm)
Single	**70** (45 - 90)	**2** (0.6 - 3.9)	< 25	240	40	2.6



240AC-MA

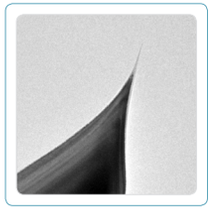
Soft tapping mode AFM cantilever with magnetic tip coating



The 240AC-MA is designed for Magnetic Force Microscopy (MFM) measurements. The hard magnetic tip side coating ensures high magnetic force sensitivity and resolution. The back side aluminum coating significantly enhances the cantilever reflectivity. The tetrahedral tip is located precisely at the free end of the cantilever. This allows the tip to be positioned accurately over the area of interest on the sample surface.

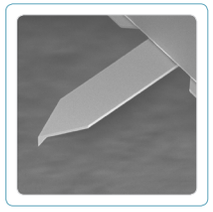
Coating:
Tip Side . . . . . Co-alloy Back Side . . . . . Al, 30 nm

Cantilever	Res. Frequency (kHz)	Force Constant (N/m)	Tip Radius (nm)	Length (± 10 µm)	Width (± 2 µm)	Thickness (± 0.5 µm)
Single	**70** (45 - 90)	**2** (0.6 - 3.9)	< 60	240	40	2.6



160AC-SG

High resolution standard tapping mode AFM cantilever

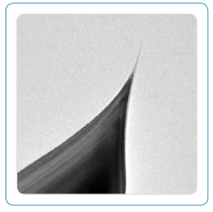


The 160AC-SG with a sharp diamond-like spike is designed for high resolution AC mode AFM imaging. The gold coating ensures high and stable laser reflectivity in air and liquids. The tetrahedral tip is located precisely at the free end of the cantilever. This allows the tip to be positioned accurately over the area of interest on the sample surface.

Please note that while the tetrahedral tip and the tip side of the cantilever are gold coated, the diamond-like spike remains uncoated.

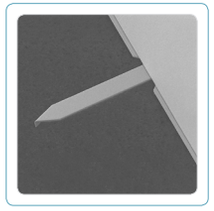
Coating:
Tip Side . . . . . Au, 70 nm Back Side . . . . . Au, 70 nm

Cantilever	Res. Frequency (kHz)	Force Constant (N/m)	Tip Radius (nm)	Length (± 10 µm)	Width (± 2 µm)	Thickness (± 0.5 µm)
Single	**300** (200 - 400)	**26** (8 - 57)	~ 1	160	40	4



240AC-SG

High resolution soft tapping mode AFM cantilever

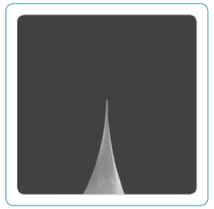


The 240AC-SG with a sharp diamond-like spike is designed for high resolution AC mode AFM imaging of soft samples. The gold coating ensures high and stable laser reflectivity in air and liquids. The tetrahedral tip is located precisely at the free end of the cantilever. This allows the tip to be positioned accurately over the area of interest on the sample surface.

Please note that while the tetrahedral tip and the tip side of the cantilever are gold coated, the diamond-like spike remains uncoated.

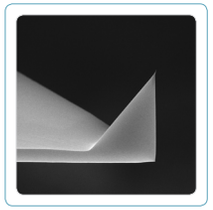
Coating:
Tip Side . . . . . Au, 70 nm Back Side . . . . . Au, 70 nm

Cantilever	Res. Frequency (kHz)	Force Constant (N/m)	Tip Radius (nm)	Length (± 10 µm)	Width (± 2 µm)	Thickness (± 0.5 µm)
Single	**70** (45 - 90)	**2** (0.6 - 3.9)	~ 1	240	40	2.6



160AC-FG

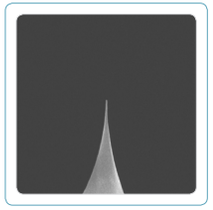
High aspect ratio standard tapping mode AFM cantilever



The 160AC-FG with a carbon nanofiber at the end of the silicon tip is designed for AC mode AFM imaging of deep trenches. The typical fiber radius of curvature is 10 nm and the diameter is 50 nm at a height of 200 nm away from the apex. The gold coating ensures high and stable laser reflectivity in air and liquids. The tetrahedral tip is located precisely at the free end of the cantilever. This allows the tip to be positioned accurately over the area of interest on the sample surface. ***Please note that while the tetrahedral tip and the tip side of the cantilever are gold coated, the diamond-like spike remains uncoated.***

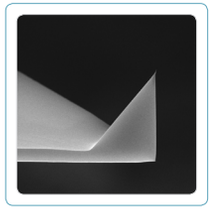
Coating:
Tip Side . . . . . Au, 70 nm Back Side . . . . . Au, 70 nm

Cantilever	Res. Frequency (kHz)	Force Constant (N/m)	Tip Radius (nm)	Length (± 10 µm)	Width (± 2 µm)	Thickness (± 0.5 µm)
Single	**300** (200 - 400)	**26** (8 - 57)	~ 10	160	40	4



240AC-FG

High aspect ratio soft tapping mode AFM cantilever



The 240AC-FG with a carbon nanofiber at the end of the silicon tip is designed for soft AC mode AFM imaging of deep trenches. The typical fiber radius of curvature is 10 nm and the diameter is 50 nm at a height of 200 nm away from the apex. The gold coating ensures high and stable laser reflectivity in air and liquids. The tetrahedral tip is located precisely at the free end of the cantilever. This allows the tip to be positioned accurately over the area of interest on the sample surface. ***Please note that while the tetrahedral tip and the tip side of the cantilever are gold coated, the diamond-like spike remains uncoated.***

Coating:
Tip Side . . . . . Au, 70 nm Back Side . . . . . Au, 70 nm

Cantilever	Res. Frequency (kHz)	Force Constant (N/m)	Tip Radius (nm)	Length (± 10 µm)	Width (± 2 µm)	Thickness (± 0.5 µm)
Single	**70** (45 - 90)	**2** (0.6 - 3.9)	~ 10	240	40	2.6

Notes

MikroMasch® Headquarters
Innovative Solutions Bulgaria Ltd.
48 Joliot Curie Str.
1113 Sofia, Bulgaria
phone: +359 (0) 2 865-8629
fax: +359 (0) 2 963-0732
info@mikromasch.com
sales@mikromasch.com

OPUS® by μmasch

www.opustips.com

www.mikromasch.com

www.spmtips.com

MikroMasch® Europe
NanoAndMore GmbH
Spilburg Bld. A1,Steinbühlstrasse 7
D-35578 Wetzlar,
Germany
phone: +49 (0) 6441 2003561
fax: +49 (0) 6441 2003562
europe@mikromasch.com

MikroMasch® USA
NanoAndMore USA Corp.
21 Brennan Street, Suite 10
Watsonville, CA 95076, USA
Toll Free (US): +1 866 SPMTIPS (776-8477)
phone: +1 831-536-5970
fax: +1 831-475-4264
usa@mikromasch.com

MikroMasch® Japan
NanoAndMore Japan K.K.
201 KTT5 Building, 1-1-1 Waseda
Misato-shi, Saitama-ken
341-0018 Japan
phone: +81 48 951 0958
fax: +81 48 951 0959
sales@nanoandmore.jp

April 2022