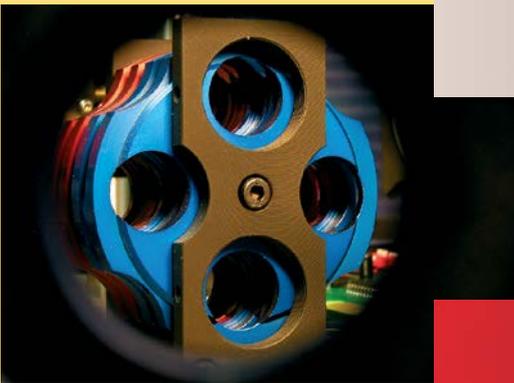


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Motion Control

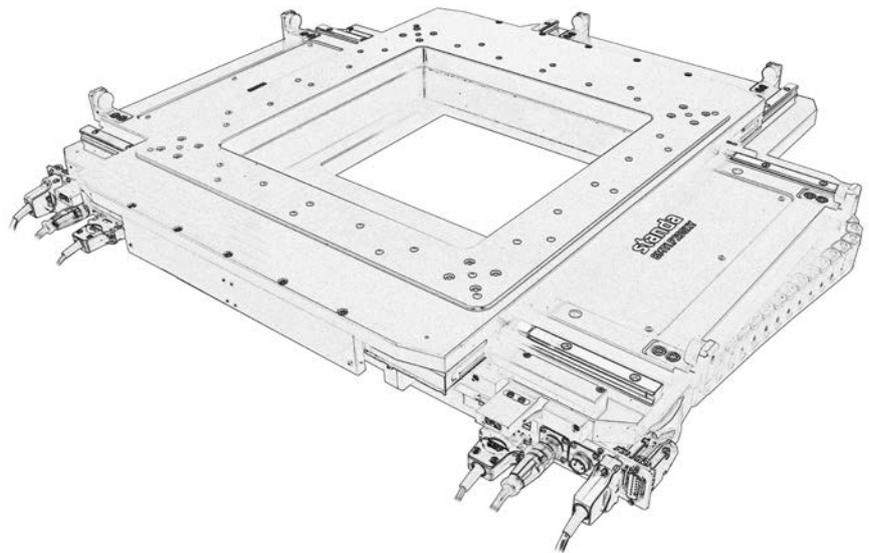
2019

Research, Development and Manufacturing in Lithuania

standa

Motion Control

For Science & Industry



2019
Volume #1

Company

STANDA FACTS

- > In the photonics business since 1987
- > Factory located in Vilnius, Lithuania
- > Employs 160 people and growing
- > More than 1000 m² of factory space
- > Represented by 30 distributors
- > Sales to 80 countries across the globe

FIELDS OF ACTIVITY

- > Vibration isolation
- > Precise adjustment of optics
- > Opto-mechanics
- > Motion control
- > Automation
- > Solid state micro lasers
- > Light measurement equipment
- > OEM solutions for science and industry

OUR MISSION

- > Facilitate scientific research
- > Increase productivity of our partners
- > Create value for customers via innovation
- > Rock`n`Roll Motion Control



Contents



8MTLF250XY / 4
Open Frame XY Linear Stages



8MTL120XY / 6
Planar XY Linear Stage



8MTL220 / 8
Direct Drive Linear Translation Stage



8MTL165-300 / 11
Precision Linear Stage



8MTL1401-300 / 13
Direct Drive Linear Translation Stage



8MTL1301-170 / 16
Direct Drive Linear Translation Stage



8MT165-200 / 19
High-Load Precision Motorized Linear Stage



8MRL120-15 / 22
High-Speed Precision Rotation Stage



8MRL180, 8MRL250 / 24
Direct Drive Rotation Stages



8MTF-200 / 26
Motorized XY Microscope Stage



8MVT-120 / 28
Precision Vertical Positioner



ACS SPiiPlusCM / 30
32 Axes EtherCAT® Master Control Module with Three Built-in Drives



ACS NPMpm / 33
EtherCAT® Single/Dual Axis NanoPWM Drive Module



ACS LCM / 36
EtherCAT® Laser Control Module



LUMS / 38
Laser Machining Software: Universal Micromachining

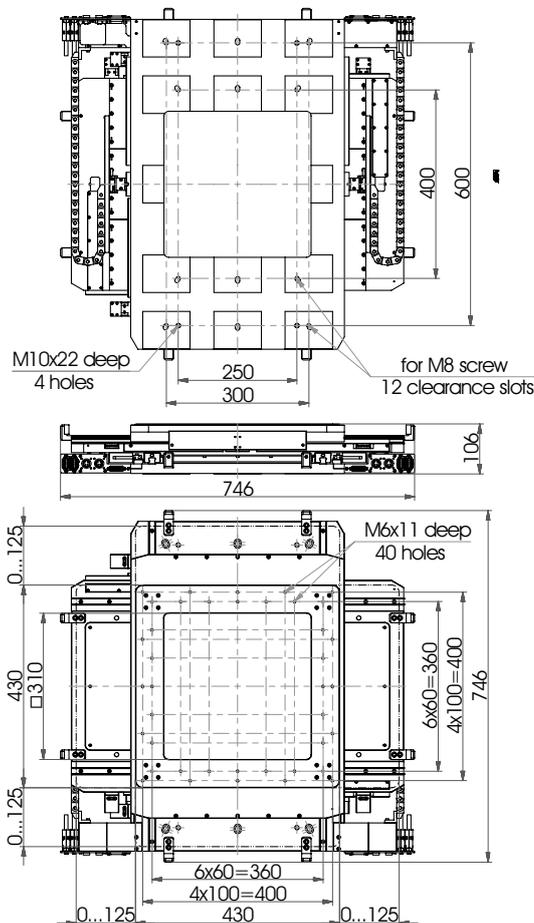
8MTLF250XY

Open Frame XY Linear Stages

(Planar/Gantry, Direct Drive Motors, Mechanical Bearings)

FEATURES

- Direct drive zero backlash system
- High resolution non-contact optical incremental encoder
- Integrated, low-profile, XY, linear motor stage
- High accuracy linear guide with crossed roller bearings, anti-creep
- Easy integration with metric/imperial opto-mechanical systems



- 1) With x4 evaluation; system can be delivered with standard analog SIN/COS encoder interface for personal interpolation.
- 2) Absolute Accuracy & Bi-Directional Repeatability measurements are processed with Zygo ZMI 501 Michelson laser interferometer.
- 3) Pitch & Yaw measurements are processed with 11D-ALI-COL electronic autocollimator. Resolution of 11D-ALI-COL: 1 μ rad. Environment error: 1 μ rad.
- 4) Maximum Velocity is electrically limited by encoder and driver CUT-OFF frequency; maximum velocity is also limited by guiding system.
- 5) Maximum Acceleration is limited by Drivers' Peak Current, Motors' Peak Current and External Load (inertia). Please contact Standa for support.
- 6) Load Capacity is limited by position of load and integrated guiding system. Please contact Standa support for loading calculation.
- 7) Moving Mass is constant parameter of system which characterize m_0 or inertia of unloaded system.
- 8) Recommended controllers & Recommended drivers can be optimized for a certain application. Please contact Standa support for recommendation.
- 9) Recommended power supply depends on required duty cycle and load. Please contact Standa support for recommendation.
- 10) Differential Outputs are available in passive (buffered) or active (modulated) way with LCMv2.
- 11) Stages can be assembled with better orthogonality by request.
- 12) Scalar Control can be implemented with USB / TCP-IP / RS-232 communication interface; for vector control we recommend to use EtherCAT.

SPECIFICATIONS

Model	8MTLF250XY -2L-2U-4LEn1	8MTLF250XY -1L-2U-3LEn1	8MTLF250XY -2L-1U-3LEn1	8MTLF250XY -1L-1U-2LEn1
KINEMATICS & FEEDBACK INFORMATION				
Travel range	250 × 250 mm			
Encoder type	Optical			
Encoder model	LEN1			
Encoder resolution	Any of the range: 25 nm to 5 µm (on demand)			
Encoder interface	Differential RS422			
Internal multiplier	Yes			
Multiplication factor ¹⁾	4 – 200 (on demand)			
Encoder grating period	20 µm			
Reference mark (index)	Yes			
Absolute accuracy ²⁾				
Before calibration	±5 µm	±6 µm		
After calibration	±1.5 µm	±2 µm		
Bi-directional repeatability (peak to peak) ²⁾	±0.25 µm	±0.5 µm		
Bi-directional repeatability (RMS) ²⁾	±0.15 µm	±0.30 µm		
Pitch ³⁾	±30 µrad / ±6.20 arcsec			
Yaw ³⁾	±30 µrad / ±6.20 arcsec			
Maximum velocity (with load 4 kg) ⁴⁾	<1500 mm/s			
Maximum acceleration (with load 4 kg) ⁵⁾	<20000 mm/s ²			
Limits switches type (safety)	Hall sensors			
Limit switch polarity (safety)	Pushed is closed			
Limit switch voltage	5...24 V			
LOAD, GUIDING & TRANSMISSION INFORMATION				
Design type	Real Gantry (MIMO)	Planar-Gantry hybrid	Planar	
Linear motor model	LM5			
Linear motor design type	Ironless BLDC motor			
Maximum bus voltage	>300 VDC			
Quantity of motors	4	3	2	
Load capacity (centrally placed) ⁶⁾				
Horizontal	30 kg			
Moving mass ⁷⁾				
X (bottom)	39.1 kg	37.8 kg	34.4 kg	33.9 kg
Y (upper)	7.5 kg	7.1 kg	7.5 kg	7.1 kg
Guiding system	Recirculating linear rails and carriages units with caged balls			
MATERIAL & ENVIRONMENT CONDITIONS				
Housing material	Aluminum alloy			
Housing coating (finish)	Black anodizing			
Environment pressure	Normal atmosphere			
Operating temperature	20±2 °C			
CONTROL, COMMUNICATION AND CABLING				
Recommended controllers ⁸⁾	ACS Products Line or 8SMC5-USB series			
Recommended drivers ⁸⁾	ACS Products Line or 8SMC5-USB series			
Recommended power supply ⁹⁾	2 phase / 3 phase source			
Recommended communication interface ¹²⁾	EtherCAT / RS232 / USB / TCP-IP			
Cable length	2 m (other by request)			
Differential outputs ¹⁰⁾	On request			
ACCESSORIES INFORMATION				
Base Plate for Mechanical Interface	Granite is recommended			
Z Configuration	Not available (choose from other Standa stages series)			
ADDITIONAL DETAILS				
Dimensions of moving platform (W × L)	430 × 430 mm			
Overall linear stage dimensions (W × L × H)	746 × 746 × 106 mm			
Measurement system	Metric / Imperial			
Orthogonality ¹¹⁾	24 µrad / 5 arcsec			
Protection level	Request Standa support			
RoHS	Compliant			
Weight	~68 kg			

8MTL120XY

Planar XY Linear Stage

(Direct Drive Motors, Mechanical Bearings)



FEATURES

- > Direct drive zero backlash system
- > High resolution non-contact optical incremental encoder
- > Integrated, low-profile, XY, linear motor stage
- > High accuracy linear guide with crossed roller bearings, anti-creep
- > Easy integration with metric/imperial opto-mechanical systems
- > Default ≤ 5 arcsec orthogonality
- > All measurement reports are included by default

Direct Drive Linear Translation Stage of series 8MTL120XY are based on pair of 3 phase ironless linear brushless servo motor technology. Direct drive technology allow user to reach zero backlash motion with high accuracy, repeatability and low friction. Linear non-contact optical encoder as a feedback system guarantees direct control of position with sub-nanometer resolution of motion.

Naturally aged aluminum alloy guaranties high temperature stability, softness of 8MT120XY instruments and excellent long period kinematics without drift of guide system. Small Special linear rails with crossed roller bearings for higher stiffness.

Translation stages of series 8MTL120XY can be prepared for clean rooms and vacuum up to 10^{-3} Torr. For higher vacuum please contact Standa support. Additional requirement of cleanliness can be supported on demand.

Motorized translation stage can be easily connected to standard imperial/metric optical table directly. XY scanning stage is directly assembled to PLANAR like design, without using any connecting plates. Extremely high orthogonality is available by default.

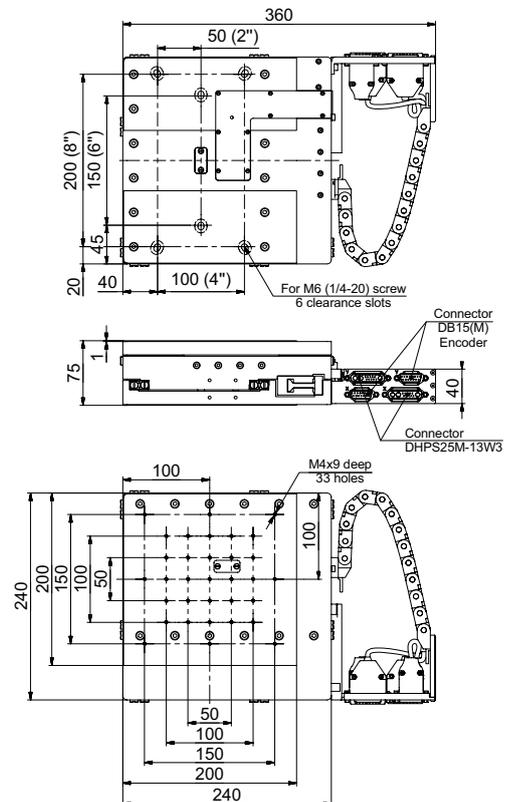
Motion control of 8MTL120XY series translation stages is available with Standa or ACS motion Controllers & Drivers in exposed or housed configurations.

For industry applications 8MTL120XY stages can be supplied mounted on standard optical table or extremely flat granite plate fully sealed from spray and dust to ensure performance of kinematic pairs.

SPECIFICATIONS

Model	8MTL120XY
KINEMATICS & FEEDBACK INFORMATION	
Active axes	X, Y
Travel range	120 × 120 mm
Encoder type	Optical
Encoder model	Len1
Encoder resolution	any of the range: 25 nm to 5 µm (on demand)
Encoder interface	Differential RS422
Internal multiplier	Yes
Multiplication factor ¹⁾	4 – 200 (on demand)
Encoder grating period	20 µm
Reference mark (index)	Yes
Absolute accuracy ²⁾	
Before calibration	± 4.00 µm
After calibration	± 0.5 µm
Bi-directional repeatability (peak to peak) ²⁾	± 0.15 µm
Bi-directional repeatability (RMS) ²⁾	± 0.10 µm
Pitch ³⁾	±30 µrad / ±6.20 arcsec
Yaw ³⁾	±30 µrad / ±6.20 arcsec
Maximum velocity (load 4 kg) ⁴⁾	<1000 mm/s
Maximum acceleration (load 4 kg) ⁵⁾	<20000 mm/s ²
Limits switches type (safety)	Optical (optrons)
Limit switch polarity (safety)	Pushed is closed
Limit switch voltage	5...24 V
LOAD, GUIDING & TRANSMISSION INFORMATION	
Design type	Linear Motor Stage; Planar Design
Linear motor model	LM3
Linear motor design type	Ironless BLDC motor
Maximum bus voltage	>300 V DC
Load capacity (centrally placed) ⁶⁾	30 kg
Moving mass X ⁷⁾	3.00 kg
Moving mass Y ⁷⁾	8.50 kg
Guiding system	Crossed roller bearings with cage drift protection
MATERIAL AND ENVIRONMENT CONDITIONS	
Housing material	Aluminum alloy
Housing coating (finish)	Black anodizing
Environment pressure	Normal atmosphere
Operating temperature	20±2 °C
CONTROL, COMMUNICATION & CABLING	
Recommended controllers ⁸⁾	ACS Products Line or 8SMC5-USB series
Recommended drivers ⁸⁾	ACS Products Line or 8SMC5-USB series
Recommended power supply ⁹⁾	2 phase / 3 phase source
Recommended communication interface ¹²⁾	EtherCAT / RS232 / USB / TCP-IP
Cable length	2 m (other by request)
Differential outputs ¹⁰⁾	Optionally available by request
ADDITIONAL DETAILS	
Dimensions of moving platform (W × L)	240 × 240 mm
Stage dimensions (W × L × H)	240 × 360 × 75 mm
Measurement system	Metric / Imperial
Orthogonality ¹¹⁾	24 µrad / 5 arcsec
Protection level ¹³⁾	Basic
RoHS	Compliant
Weight	12.5 kg

- ¹⁾ With x4 evaluation; system can be delivered with standard analog SIN/COS encoder interface for personal interpolation.
- ²⁾ Absolute Accuracy & Bi-Directional Repeatability measurements are processed with Zygo ZMI 501 Michelson laser interferometer.
- ³⁾ Pitch & Yaw measurements are processed with 11D-ALI-COL electronic autocollimator. Resolution of 11D-ALI-COL: 1 µrad. Environment error: 1 µrad.
- ⁴⁾ Maximum Velocity is electrically limited by encoder and driver CUT-OFF frequency; maximum velocity is also limited by guiding system.
- ⁵⁾ Maximum Acceleration is limited by Drivers' Peak Current, Motors' Peak Current and External Load (inertia). Please contact Standa for support.
- ⁶⁾ Load Capacity is limited by position of load and integrated guiding system. Please contact Standa support for loading calculation.
- ⁷⁾ Moving Mass is constant parameter of system which characterize m_0 or inertia of unloaded system.
- ⁸⁾ Recommended controllers & Recommended drivers can be optimized for a certain application. Please contact Standa support for recommendation.
- ⁹⁾ Recommended power supply depends on required duty cycle and load. Please contact Standa support for recommendation.
- ¹⁰⁾ Differential Outputs are available in passive (buffered) or active (modulated) way with LCMv2.
- ¹¹⁾ Stages can be assembled with better orthogonality by request.
- ¹²⁾ Scalar Control can be implemented with USB / TCP-IP / RS-232 communication interface; for vector control we recommend to use EtherCAT.
- ¹³⁾ Protection of guiding system is limited and not supposed to be used in wet and dusty environment.



8MTL220

Direct Drive Linear Translation Stage



8MTL220



8MTL220 XY

FEATURES

- > Direct drive zero backlash system
- > $\pm 0.5 \mu\text{m}$ bidirectional repeatability
- > High resolution non-contact optical incremental encoder
- > High accuracy linear guide and carriage system with caged balls
- > Long life performance guaranteed
- > XY configuration has ≤ 5 arcsec orthogonality
- > Can be applied to industry applications like: laser cutting, scribing, drilling, marking
- > Linear stage is protected from dust and spray
- > All measurement reports are included by default

Direct Drive Linear Translation Stage of series 8MTL220 are based on 3 phase ironless linear brushless servo motor technology. Direct drive technology allow user to reach zero backlash motion with high accuracy, repeatability and low friction.

Linear non-contact optical encoder as a feedback system guarantees direct control of position with sub-nanometer resolution of motion.

Naturally aged aluminum alloy guaranties high temperature stability, softness of 8MTL220 instruments and excellent long period kinematics without drift of guide system. Small Special guiding system with caged recirculating ball ensure long last precision of stage.

Translation stages of series 8MTL220 can be prepared for clean rooms and vacuum up to 10^{-3} Torr with small changes. For higher vacuum please contact Standa support. Additional requirement of cleanliness could be requested separately.

Motorized translation stage can be easily connected to standard imperial/metric optical table directly. XY scanning stages can be directly assembled without using any connecting plates. For extreme orthogonality please contact Standa separately.

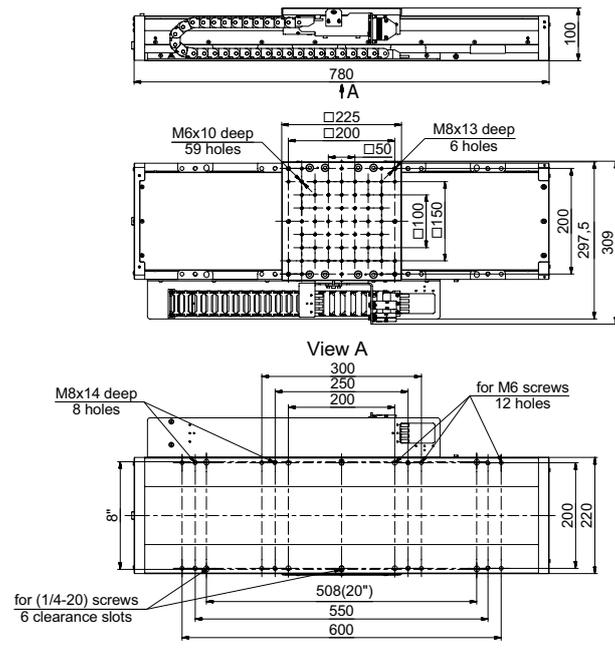
Motion control of 8MTL220 series translation stages is available with Standa or ACS motion Controllers & Drivers in exposed or housed configurations.

For industry applications 8MTL220 stages can be supplied mounted on standard optical table or extremely flat granite plate fully sealed from spray and dust to ensure performance of kinematic pairs.

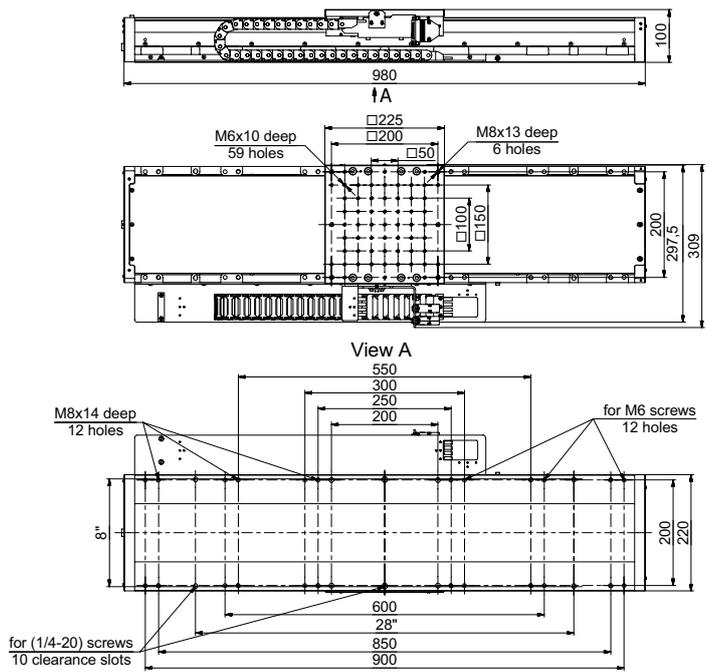
SPECIFICATIONS

Model	8MTL220-400-LEn1	8MTL220-600-LEn1
KINEMATICS & FEEDBACK INFORMATION		
Travel range	400 mm	600 mm
Encoder type	Optical	
Encoder model	LEN1	
Encoder resolution	Any of the range: 25 nm to 5 µm (on demand)	
Encoder interface	Differential RS422	
Internal multiplier	Yes	
Multiplication factor ¹⁾	4 – 200 (on demand)	
Encoder grating period	20 µm	
Reference mark (index)	Yes	
Absolute accuracy ²⁾		
Before calibration	±10 µm	±12 µm
After calibration	±1 µm	±1 µm
Bi-directional repeatability (peak to peak) ²⁾	±0.5 µm	
Bi-directional repeatability (RMS) ²⁾	±0.26 µm	
Pitch ³⁾	±30 µrad / ±6.20 arcsec	
Yaw ³⁾	±30 µrad / ±6.20 arcsec	
Maximum velocity (with load 4 kg) ⁴⁾	<2000 mm/s	
Maximum acceleration (with load 4 kg) ⁵⁾	<20000 mm/s ²	
Limits switches type (safety)	Optical (optrons)	
Limit switch polarity (safety)	Pushed is closed	
Limit switch voltage	5...24 V	
LOAD, GUIDING & TRANSMISSION INFORMATION		
Design type	Linear motor stage	
Linear motor model	LM4	
Linear motor design type	Ironless BLDC motor	
Maximum bus voltage	> 300 VDC	
Load capacity (centrally placed) ⁶⁾		
Horizontal	100 kg	
Moving mass ⁷⁾	9.5 kg	
Guiding system	Recirculating linear rails and carriages units with caged balls	
MATERIAL & ENVIRONMENT CONDITIONS		
Housing material	Aluminum alloy	
Housing coating (finish)	Black anodizing	
Environment pressure	Normal atmosphere	
Operating temperature	20±2 °C	
CONTROL, COMMUNICATION AND CABLING		
Recommended controllers ⁸⁾	ACS Products Line or 8SMC5-USB series	
Recommended drivers ⁸⁾	ACS Products Line or 8SMC5-USB series	
Recommended power supply ⁹⁾	2 phase / 3 phase source	
Recommended communication interface ¹²⁾	EtherCAT / RS232 / USB / TCP-IP	
Cable length	2 m (other by request)	
Differential outputs ¹⁰⁾	On request	
ACCESSORIES INFORMATION		
Base plate for mechanical interface	Not required	
XY stack	Directly	
Z configuration	Not available (choose from other Standa stages series)	
ADDITIONAL DETAILS		
Dimensions of moving platform (W × L)	225 × 225 mm	
Overall linear stage dimensions (W × L × H)	780 × 297.5 × 100 mm	980 × 297.5 × 100 mm
Measurement system	Metric	
Orthogonality (XY configuration) ¹¹⁾	24 µrad / 5 arcsec	
Protection level	From solid particles and spray	
RoHS	Compliant	
Weight	37 kg	46 kg

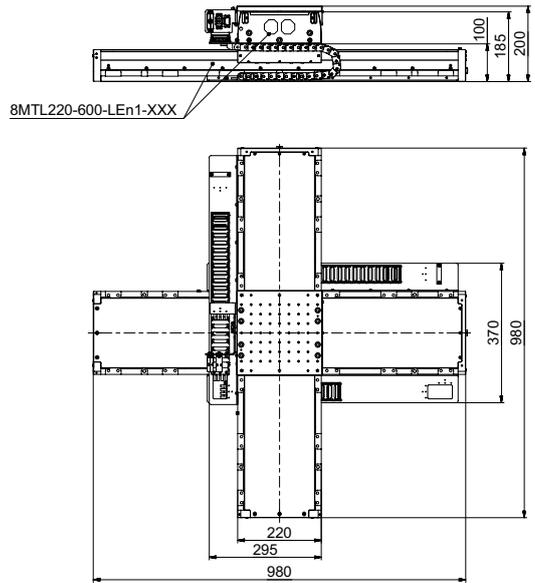
- 1) With x4 evaluation; system can be delivered with standard analog SIN/COS encoder interface for personal interpolation.
- 2) Absolute Accuracy & Bi-Directional Repeatability measurements are processed with Zygo ZMI 501 Michelson laser interferometer.
- 3) Pitch & Yaw measurements are processed with 11D-ALI-COL electronic autocollimator. Resolution of 11D-ALI-COL: 1 μ rad. Environment error: 1 μ rad.
- 4) Maximum Velocity is electrically limited by encoder and driver CUT-OFF frequency; maximum velocity is also limited by guiding system.
- 5) Maximum Acceleration is limited by Drivers' Peak Current, Motors' Peak Current and External Load (inertia). Please contact Standa for support.
- 6) Load Capacity is limited by position of load and integrated guiding system. Please contact Standa support for loading calculation.
- 7) Moving Mass is constant parameter of system which characterize m_0 or inertia of unloaded system.
- 8) Recommended controllers & Recommended drivers can be optimized for a certain application. Please contact Standa support for recommendation.
- 9) Recommended power supply depends on required duty cycle and load. Please contact Standa support for recommendation.
- 10) Differential Outputs are available in passive (buffered) or active (modulated) way with LCMv2.
- 11) Stages can be assembled with better orthogonality by request.
- 12) Scalar Control can be implemented with USB / TCP-IP / RS-232 communication interface; for vector control we recommend to use EtherCAT.



8MTL220-400-LEn1



8MTL220-600-LEn1



8MTL220-600-LEn1-XXX

8MTL165-300

Precision Linear Stage

FEATURES

- > Direct drive zero backlash system
- > High resolution non-contact optical incremental encoder
- > Integrated, low-profile, XY, linear motor stage
- > High accuracy linear guide with crossed roller bearings, anti-creep
- > Easy integration with metric/imperial opto-mechanical systems

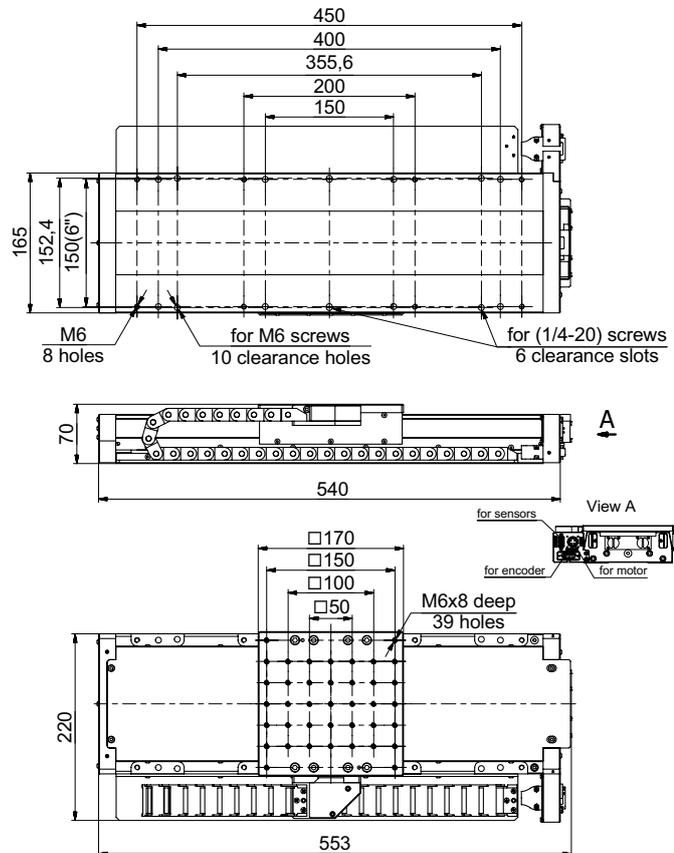


Direct Drive Linear Translation Stage of series 8MTL220 are based on 3 phase ironless linear brushless servo motor technology. Direct drive technology allow user to reach zero backlash motion with high accuracy, repeatability and low friction.

Linear non-contact optical encoder as a feedback system guarantees direct control of position with sub-nanometer resolution of motion.

Naturally aged aluminum alloy guaranties high temperature stability, softness of 8MTL220 instruments and excellent long period kinematics without drift of guide system. Small Special guiding system with caged recirculating ball ensure long last precision of stage.

Translation stages of series 8MTL220 can be prepared for clean rooms and vacuum up to 10^{-3} Torr with small changes. For higher vacuum please contact Standa support. Additional requirement of cleanliness could be requested separately.



SPECIFICATIONS

Model	8MTL165-300-LEn1
KINEMATICS & FEEDBACK INFORMATION	
Travel range	300 mm
Encoder type	Optical
Encoder model	LEN1
Encoder resolution	Any of the range: 25 nm to 5 µm (on demand)
Encoder interface	Differential RS422
Internal multiplier	Yes
Multiplication factor ¹⁾	4 – 200 (on demand)
Encoder grating period	20 µm
Reference mark (index)	Yes
Absolute accuracy ²⁾	
Before calibration	±10 µm
After calibration	±1 µm
Bi-directional repeatability (peak to peak) ²⁾	±0.5 µm
Bi-directional repeatability (RMS) ²⁾	±0.24 µm
Pitch ³⁾	±30 µrad / ±6.20 arcsec
Yaw ³⁾	±30 µrad / ±6.20 arcsec
Maximum velocity (with load 4 kg) ⁴⁾	<2000 mm/s
Maximum acceleration (with load 4 kg) ⁵⁾	<20000 mm/s ²
Limits switches type (safety)	Optical (optrons)
Limit switch polarity (safety)	Pushed is closed
Limit switch voltage	5...24 V
LOAD, GUIDING & TRANSMISSION INFORMATION	
Design type	Linear motor stage
Linear motor model	LM3
Linear motor design type	Ironless BLDC motor
Maximum bus voltage	>300 VDC
Load capacity (centrally placed) ⁶⁾	
Horizontal	50 kg
Moving mass ⁷⁾	2.6 kg
Guiding system	Recirculating linear rails and carriages units
MATERIAL & ENVIRONMENT CONDITIONS	
Housing Material	Aluminum alloy
Housing Coating (Finish)	Black anodizing
Environment Pressure	Normal atmosphere
Operating Temperature	20±2 °C
CONTROL, COMMUNICATION AND CABLING	
Recommended controllers ⁸⁾	ACS Products Line or 8SMC5-USB series
Recommended drivers ⁸⁾	ACS Products Line or 8SMC5-USB series
Recommended power supply ⁹⁾	2 phase / 3 phase source
Recommended communication interface ¹²⁾	EtherCAT / RS232 / USB / TCP-IP
Cable length	2 m (other by request)
Differential outputs ¹⁰⁾	On request
ACCESSORIES INFORMATION	
Base plate for mechanical interface	Not required
XY stack	Directly
Z configuration	Not available (choose from other Standa stages series)
ADDITIONAL DETAILS	
Dimensions of moving platform (W × L)	170 × 170 mm
Overall linear stage dimensions (W × L × H)	220 × 553 × 70 mm
Measurement system	Metric/Imperial
Orthogonality (XY configuration) ¹¹⁾	24 µrad / 5 arcsec
Protection level ¹³⁾	From solid particles and spray
RoHS	Compliant
Weight	13.5 kg

- ¹⁾ With x4 evaluation; system can be delivered with standard analog SIN/COS encoder interface for personal interpolation.
- ²⁾ Absolute Accuracy & Bi-Directional Repeatability measurements are processed with Zygo ZMI 501 Michelson laser interferometer.
- ³⁾ Pitch & Yaw measurements are processed with 11D-ALI-COL electronic autocollimator. Resolution of 11D-ALI-COL: 1 µrad. Environment error: 1 µrad.
- ⁴⁾ Maximum Velocity is electrically limited by encoder and driver CUT-OFF frequency; maximum velocity is also limited by guiding system.
- ⁵⁾ Maximum Acceleration is limited by Drivers` Peak Current, Motors` Peak Current and External Load (inertia). Please contact Standa for support.
- ⁶⁾ Load Capacity is limited by position of load and integrated guiding system. Please contact Standa support for loading calculation.
- ⁷⁾ Moving Mass is constant parameter of system which characterize m_0 or inertia of unloaded system.
- ⁸⁾ Recommended controllers & Recommended drivers can be optimized for a certain application. Please contact Standa support for recommendation.
- ⁹⁾ Recommended power supply depends on required duty cycle and load. Please contact Standa support for recommendation.
- ¹⁰⁾ Differential Outputs are available in passive (buffered) or active (modulated) way with LCMv2.
- ¹¹⁾ Stages can be assembled with better orthogonality by request.
- ¹²⁾ Scalar Control can be implemented with USB / TCP-IP / RS-232 communication interface; for vector control we recommend to use EtherCAT.
- ¹³⁾ Stages include special covers which allow their usage in dusty and partially wet environment.

8MTL1401-300

Direct Drive Linear Translation Stage



8MTL1401-300



8MTL1401-300 XY

FEATURES

- > Ultra precise motion
- > Direct drive zero backlash system
- > High resolution non-contact optical incremental encoder
- > High accuracy linear guide and carriage system
- > Long life performance guaranteed
- > Easy integration with metric/imperial opto-mechanical systems
- > Integrated Cable management for ergonomics
- > XY configuration has ≤ 5 arcsec orthogonality
- > All measurement reports are included by default
- > Best choice in market for optical delay line application

Motorized Translation Stages of 8MTL series are based on 3 phase ironless linear brushless servo motor technology. Direct drive technology allows users to reach zero backlash motion with high accuracy, repeatability and low friction.

Linear non-contact optical encoder as a feedback system guarantees direct control of position with sub-nanometer resolution of motion.

Naturally aged aluminum alloy guarantees high temperature stability, softness of 8MTL instruments and excellent long period kinematics without drift of guide system. Small footprint of the stage allows to integrate it into very high density machines and tight space applications.

8MTL series translation stages can be prepared for clean room and vacuum (up to 10^{-3} Torr) applications by request. For higher vacuum please contact Standa support. Special requirements for cleanliness should be requested additionally (Please, indicate that in products request).

Motorized translation stage can be easily connected to standard imperial/metric optical table directly. XY scanning stages can be directly assembled without using any connecting plates. Extreme orthogonality requirements could be additionally requested from Standa support.

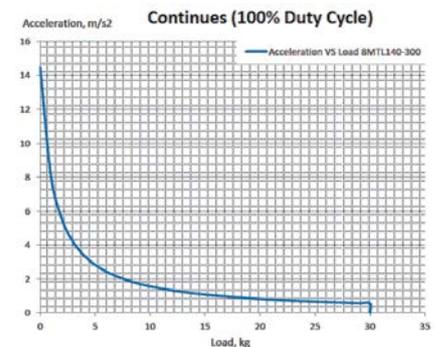
Motion control of 8MTL series translation stages is available with Standa or ACS motion Controllers & Drivers.

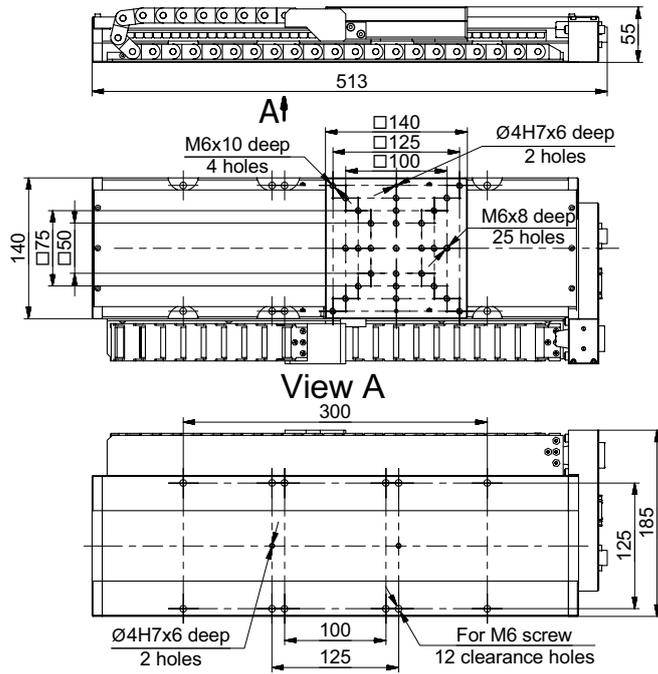
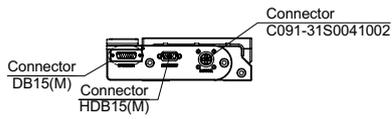
For light industry applications 8MTL stages can be supplied mounted on standard optical table or extremely flat granite plate.

SPECIFICATIONS

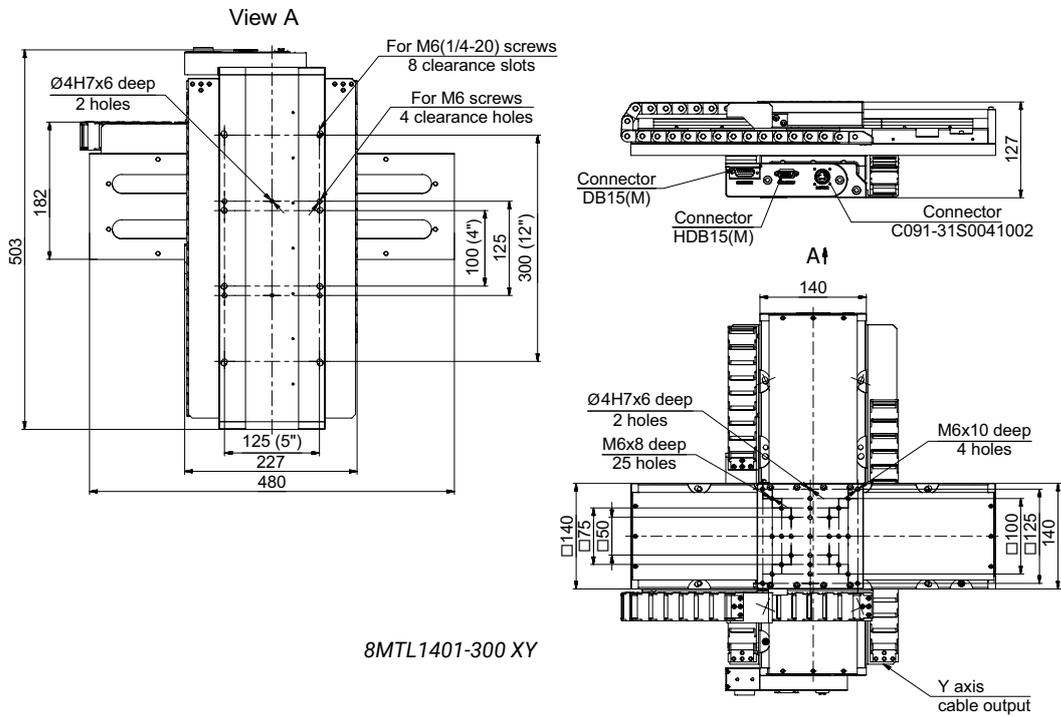
Model	8MTL1401-300
KINEMATICS & FEEDBACK INFORMATION	
Travel range	300 mm
Encoder type	Optical Encoder
Encoder model	LEn1
Encoder resolution	any of the range: 25 nm to 5 μ m (on demand)
Encoder interface	Differential RS422
Internal multiplier	Yes
Multiplication factor ¹⁾	4 – 200 (on demand)
Encoder grating period	20 μ m
Reference mark (index)	Yes
Absolute accuracy ²⁾	
Before calibration	$\pm 5.00 \mu$ m
After calibration	$\pm 1 \mu$ m
Bi-directional repeatability (peak to peak) ²⁾	$\pm 0.15 \mu$ m or better
Bi-directional repeatability (RMS) ²⁾	$\pm 0.08 \mu$ m
Pitch ³⁾	$\pm 30 \mu$ rad / ± 6.20 arcsec
Yaw ³⁾	$\pm 30 \mu$ rad / ± 6.20 arcsec
Maximum velocity (load 4 kg) ⁴⁾	<2000 mm/s
Maximum acceleration (load 4 kg) ⁵⁾	<20000 mm/s ²
Limits switches type (safety)	Optical (optrons)
Limit switch polarity (safety)	Pushed is closed
Limit switch voltage	5...24 V
LOAD, GUIDING & TRANSMISSION INFORMATION	
Design type	Linear motor stage
Linear motor model	LM3
Linear motor design type	Ironless BLDC motor
Maximum bus voltage	>300 VDC
Load capacity (centrally placed) ⁶⁾	30 kg
Moving mass ⁷⁾	1.2 kg
Guiding system	Recirculating linear rails and carriages units
MATERIAL AND ENVIRONMENT CONDITIONS	
Housing material	Aluminum alloy
Housing coating (finish)	Black anodizing
Environment pressure	Normal atmosphere
Operating temperature	20 \pm 2, $^{\circ}$ C
CONTROL, COMMUNICATION AND CABLING	
Recommended controllers ⁸⁾	ACS Products Line or 8SMC5-USB series
Recommended drivers ⁸⁾	ACS Products Line or 8SMC5-USB series
Recommended power supply ⁹⁾	2 phase / 3 phase source
Recommended communication interface ¹²⁾	EtherCAT / RS232 / USB / TCP-IP
Cable length	2 m (other by request)
Differential outputs ¹⁰⁾	Optionally available by request
ACCESSORIES INFORMATION	
Base plate for mechanical interface	Not required
XY stack	Directly
Z configuration	Not available (choose from other Standa stages series)
ADDITIONAL DETAILS	
Dimensions of moving platform (W \times L)	140 \times 140 mm
Stage dimensions (W \times L \times H)	185 \times 513 \times 55 mm
Measurement system	Metric / Imperial
Orthogonality ¹¹⁾	24 μ rad / 5 arcsec
Protection level ¹³⁾	Basic
RoHS	Compliant
Weight	6.75 kg

- 1) With x4 evaluation; system can be delivered with standard analog SIN/COS encoder interface for personal interpolation.
- 2) Absolute Accuracy & Bi-Directional Repeatability measurements are processed with Zygo ZMI 501 Michelson laser interferometer.
- 3) Pitch & Yaw measurements are processed with 11D-ALI-COL electronic autocollimator. Resolution of 11D-ALI-COL: 1 μ rad. Environment error: 1 μ rad.
- 4) Maximum Velocity is electrically limited by encoder and driver CUT-OFF frequency; maximum velocity is also limited by guiding system.
- 5) Maximum Acceleration is limited by Drivers` Peak Current, Motors` Peak Current and External Load (inertia). Please contact Standa for support.
- 6) Load Capacity is limited by position of load and integrated guiding system. Please contact Standa support for loading calculation.
- 7) Moving Mass is constant parameter of system which characterize m_0 or inertia of unloaded system.
- 8) Recommended controllers & Recommended drivers can be optimized for a certain application. Please contact Standa support for recommendation.
- 9) Recommended power supply depends on required duty cycle and load. Please contact Standa support for recommendation.
- 10) Differential Outputs are available in passive (buffered) or active (modulated) way with LCMV2.
- 11) Stages can be assembled with better orthogonality by request.
- 12) Scalar Control can be implemented with USB / TCP-IP / RS-232 communication interface; for vector control we recommend to use EtherCAT.
- 13) Protection of guiding system is limited and not supposed to be used in wet and dusty environment.





8MTL1401-300



8MTL1401-300 XY

8MTL1301-170

Direct Drive Linear Translation Stage



8MTL1301-170



8MTL1301-170 XY

FEATURES

- > Small footprint; low-profile
- > Resolution up to 1 nm
- > Direct drive zero backlash system
- > High resolution non-contact optical incremental encoder
- > High accuracy linear guide and carriage system
- > Maximum velocity: 1200 mm/s
- > High resolution non-contact optical incremental encoder
- > Direct drive zero backlash system
- > High accuracy linear guide and carriage system
- > Long life performance guaranteed
- > Easy integration with metric/imperial opto-mechanical systems
- > All measurement reports are included by default

Motorized Translation Stages of 8MTL series are based on 3 phase ironless linear brushless servo motor technology. Direct drive technology allows users to reach zero backlash motion with high accuracy, repeatability and low friction.

Linear non-contact optical encoder as a feedback system guarantees direct control of position with sub-nanometer resolution of motion.

Naturally aged aluminum alloy guarantees high temperature stability, softness of 8MTL instruments and excellent long period kinematics without drift of guide system. Small footprint of the stage allows to integrate it into very high density machines and tight space applications.

8MTL series translation stages can be prepared for clean room and vacuum (up to 10^{-3} Torr) applications by request. For higher vacuum please contact Standa support. Special requirements for cleanliness should be requested additionally (Please, indicate that in products request).

Motorized translation stage can be easily connected to standard imperial/metric optical table directly. XY scanning stages can be directly assembled without using any connecting plates. Extreme orthogonality requirements could be additionally requested from Standa support.

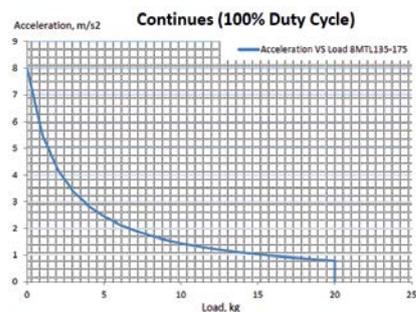
Motion control of 8MTL series translation stages is available with Standa or ACS motion Controllers & Drivers.

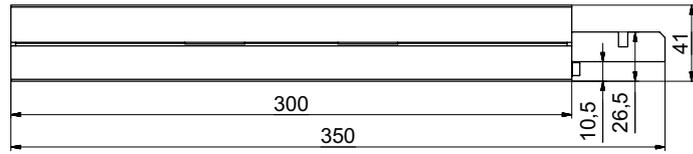
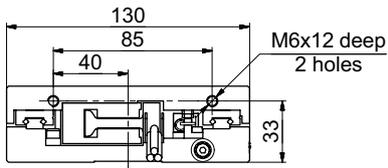
For light industry applications 8MTL stages can be supplied mounted on standard optical table or extremely flat granite plate.

SPECIFICATIONS

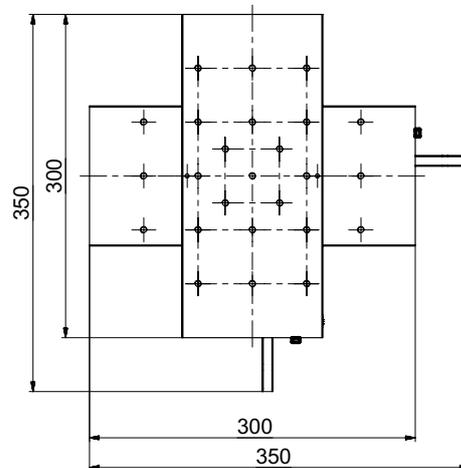
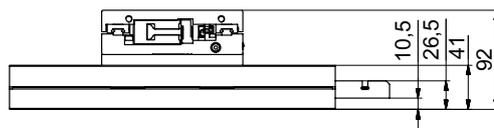
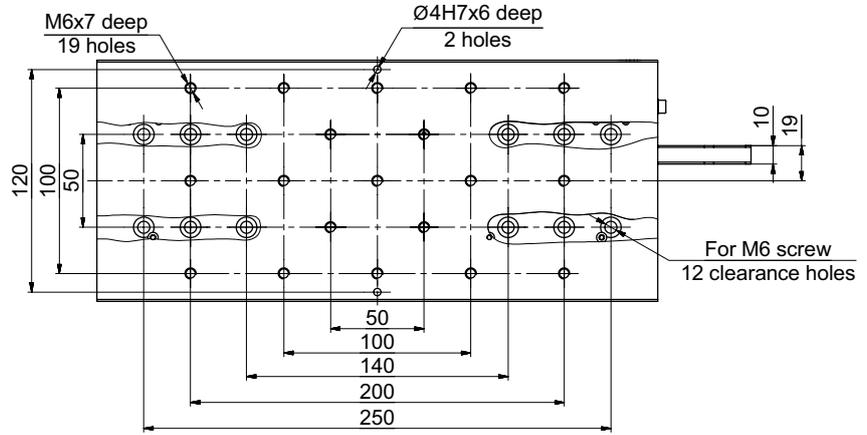
Model	8MTL1301-170
KINEMATICS & FEEDBACK INFORMATION	
Travel range	170 mm
Encoder type	Optical Encoder
Encoder model	LEn1
Encoder resolution	any of the range: 25 nm to 5 µm (on demand)
Encoder interface	Differential RS422
Internal multiplier	Yes
Multiplication factor ¹⁾	4 – 200 (on demand)
Encoder grating period	20 µm
Reference mark (index)	Yes
Absolute accuracy ²⁾	
Before calibration	±5 µm
After calibration	±1 µm
Bi-directional repeatability (peak to peak) ²⁾	±0.15 µm
Bi-directional repeatability (RMS) ²⁾	±0.10 µm
Pitch ³⁾	±55 µrad / ±11.34 arcsec
Yaw ³⁾	±55 µrad / ±11.34 arcsec
Maximum velocity (load 4 kg) ⁴⁾	<2000 mm/s
Maximum acceleration (load 4 kg) ⁵⁾	<20000 mm/s ²
Limits switches type (safety)	Optical (optrons)
Limit switch polarity (safety)	Pushed is closed
Limit switch voltage	5...24 V
LOAD, GUIDING & TRANSMISSION INFORMATION	
Design type	Linear motor stage
Linear motor model	LM3
Linear motor design type	Ironless BLDC motor
Maximum bus voltage	>300 VDC
Load capacity (centrally placed) ⁶⁾	30 kg
Moving mass ⁷⁾	2.2 kg
Guiding system	Recirculating linear rails and carriages units
MATERIAL AND ENVIRONMENT CONDITIONS	
Housing material	Aluminum alloy
Housing coating (finish)	Black anodizing
Environment pressure	Normal atmosphere
Operating temperature	20±2, °C
Control, communication and cabling	
Recommended controllers ⁸⁾	ACS Products Line or 8SMC5-USB series
Recommended drivers ⁸⁾	ACS Product Line or 8SMC5-USB series
Recommended power supply ⁹⁾	2 phase / 3 phase source
Recommended communication interface ¹²⁾	EtherCAT / RS232 / USB / TCP-IP
Cable length	2 m (other by request)
Differential outputs ¹⁰⁾	Optionally available by request
ACCESSORIES INFORMATION	
Base plate for mechanical interface	Not required
XY stack	Directly
Z configuration	Available (on request)
ADDITIONAL DETAILS	
Dimensions of moving platform (W × L)	130 × 295 mm
Stage dimensions (W × L × H)	130 × 345 × 40 mm
Measurement system	Metric / Imperial
Orthogonality ¹¹⁾	24 µrad / 5 arcsec
Protection level ¹³⁾	Basic
RoHS	Compliant
Weight	4.1 kg

- 1) With x4 evaluation; system can be delivered with standard analog SIN/COS encoder interface for personal interpolation.
- 2) Absolute Accuracy & Bi-Directional Repeatability measurements are processed with Zygo ZMI 501 Michelson laser interferometer.
- 3) Pitch & Yaw measurements are processed with 11D-ALI-COL electronic autocollimator. Resolution of 11D-ALI-COL: 1 µrad. Environment error: 1 µrad.
- 4) Maximum Velocity is electrically limited by encoder and driver CUT-OFF frequency; maximum velocity is also limited by guiding system.
- 5) Maximum Acceleration is limited by Drivers' Peak Current, Motors' Peak Current and External Load (inertia). Please contact Standa for support.
- 6) Load Capacity is limited by position of load and integrated guiding system. Please contact Standa support for loading calculation.
- 7) Moving Mass is constant parameter of system which characterize m₀ or inertia of unloaded system.
- 8) Recommended controllers & Recommended drivers can be optimized for a certain application. Please contact Standa support for recommendation.
- 9) Recommended power supply depends on required duty cycle and load. Please contact Standa support for recommendation.
- 10) Differential Outputs are available in passive (buffered) or active (modulated) way with LCMv2.
- 11) Stages can be assembled with better orthogonality by request.
- 12) Scalar Control can be implemented with USB / TCP-IP / RS-232 communication interface; for vector control we recommend to use EtherCAT.
- 13) Protection of guiding system is limited and not supposed to be used in wet and dusty environment.





8MTL1301-170



8MTL1301-170 XY

8MT165-200

High-Load Precision Motorized Linear Stage



8MT165-200

FEATURES

- > Precise ball screw design with preloaded low backlash screw pair
- > High resolution non-contact optical on shaft incremental encoder
- > Maximum velocity: 150 mm/s
- > High load capacity up to 50 kg
- > Easy integration with metric/imperial opto-mechanical systems
- > Stackable to multi-axis systems with <5 arcsec axes orthogonality
- > Can be supplied with different type of gears, brakes on demand
- > Can be applied to industry applications like: laser cutting, scribing, drilling, marking
- > Perfect suitable for vertical focusing-like applications
- > Linear stage is protected from dust and spray
- > All measurement reports are included by default

Direct Drive Linear Translation Stage of series 8MTL165 are based on 3 phase ironless linear brushless servo motor technology (version with stepper motor available by request) . Direct drive technology allow user to reach zero backlash motion with high accuracy, repeatability and low friction.

Linear non-contact optical encoder as a feedback system guarantees direct control of position with sub-nanometer resolution of motion.

Naturally aged aluminum alloy guaranties high temperature stability, softness of 8MTL165 instruments and excellent long period kinematics without drift of guide system. Special guiding system with recirculating balls ensures long-lasting linear positioner precision.

Linear translation stages of series 8MTL165 can be prepared for clean rooms and vacuum up to 10^{-3} Torr. For higher vacuum please contact Standa. Higher cleanliness requirements could be requested additionally.

Motorized translation stage can be easily connected to standard imperial/metric optical table directly. XY configuration stages can be assembled by direct stacking without using any connecting plates. Standa could deliver assembled preset XY system with extremely high orthogonality for additional cost.

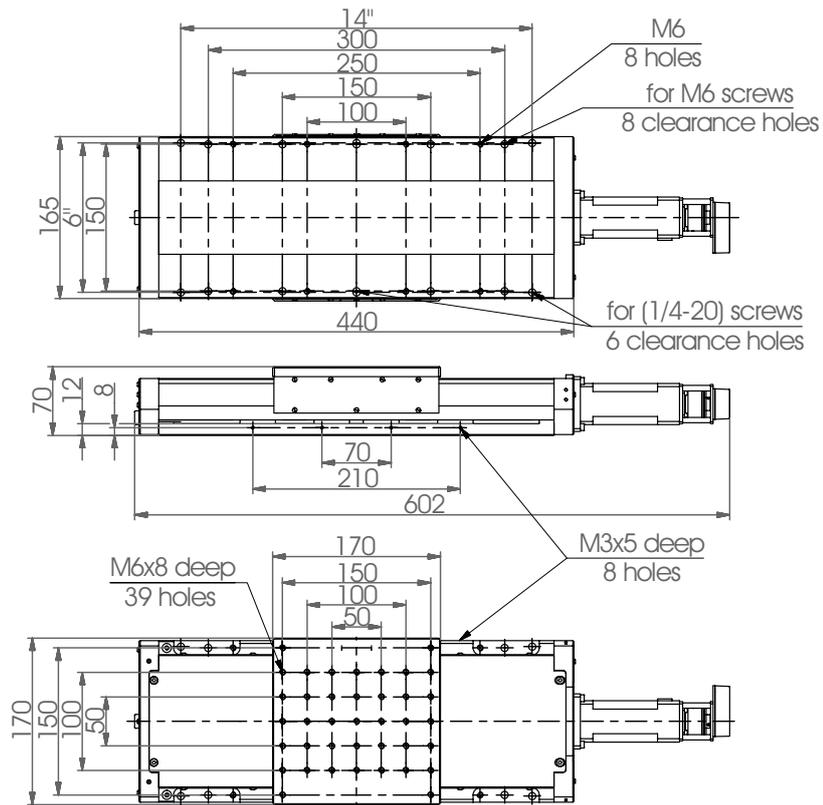
Motion control of 8MTL165 series translation stages is available with Standa or ACS motion Controllers & Drivers in exposed or housed configurations.

For industrial applications 8MTL165 stages can be supplied mounted on standard optical table or extremely flat granite plate fully sealed from spray and dust to ensure performance of kinematic pairs

SPECIFICATIONS

Model	8MT165-200-B43
KINEMATICS & FEEDBACK INFORMATION	
Travel range	200 mm
Encoder type	Optical
Encoder model	MEn3
Encoder resolution ¹⁾	5000 (PPR) / 20000 (CPR)
Encoder interface	Differential RS422
Encoder grating period	72 mdeg
Reference mark (index)	Yes
Absolute accuracy ²⁾	
Before calibration	±5 µm
After calibration	< ±2 µm
Bi-directional repeatability (peak to peak) ²⁾	better than ±1 µm
Bi-directional repeatability (RMS) ²⁾	±0.55 µm
Pitch ³⁾	±130 µrad / ±27 arcsec
Yaw ³⁾	±25 µrad / ±5 arcsec
Maximum velocity (no load) ⁴⁾	<150 mm/s
Maximum acceleration (no load) ⁵⁾	Please contact Standa for duty cycle
Limits switches type (safety)	Optical (optrons)
Limit switch polarity (safety)	Pushed is closed
Limit switch voltage	5...24 V
LOAD, GUIDING & TRANSMISSION INFORMATION	
Design type	Ball screw linear stage (pitch: 3 mm)
Motor model	43B
Motor design type	Internal rotor BLDC motors (3 phase)
Maximum bus voltage	48 VDC
Load capacity (centrally placed) ⁶⁾	
Horizontal	50 kg
Vertical	20 kg
Moving mass ⁷⁾	2.2 kg
Guiding system	Recirculating linear rails and carriages units
MATERIAL & ENVIRONMENT CONDITIONS	
Housing material	Aluminum alloy
Housing coating (finish)	Black anodizing
Environment pressure	Normal atmosphere
Operating temperature	20±2 °C
CONTROL, COMMUNICATION AND CABLING	
Recommended controllers ⁸⁾	ACS Products Line or 8SMC5-USB series
Recommended drivers ⁸⁾	ACS Products Line or 8SMC5-USB series
Recommended power supply ⁹⁾	Request Standa support
Recommended communication interface ¹²⁾	EtherCAT / RS232 / USB / TCP-IP
Cable length	2 m (other by request)
Differential outputs ¹⁰⁾	On request
ACCESSORIES INFORMATION	
Base plate for mechanical interface	Not required
XY stack	Directly
Z configuration	Available
ADDITIONAL DETAILS	
Dimensions of moving platform (W × L)	170 × 170 mm
Overall linear stage dimensions (W × L × H)	602 × 170 × 70 mm
Measurement system	Metric / Imperial
Orthogonality (XY configuration) ¹¹⁾	24 µrad / 5 arcsec
Protection ILevel ¹³⁾	From solid particles and spray
RoHS	Compliant
Weight	9 kg

- ¹⁾ CPR – encoder periods or counts per revolution; with default x4 evaluation PPR - pulses per revolution.
- ²⁾ Absolute Accuracy & Bi-Directional Repeatability measurements are processed with Zygo ZMI 501 Michelson laser interferometer.
- ³⁾ Pitch & Yaw measurements are processed with 11D-ALI-COL electronic autocollimator. Resolution of 11D-ALI-COL: 1 µrad. Environment error: 1 µrad.
- ⁴⁾ Maximum Velocity is electrically limited by encoder and driver CUT-OFF frequency; maximum velocity is also limited by guiding system.
- ⁵⁾ Maximum Acceleration is limited by Drivers` Peak Current, Motors` Peak Current and External Load (inertia). Please contact Standa for support.
- ⁶⁾ Load Capacity is limited by position of load and integrated guiding system. Please contact Standa support for loading calculation.
- ⁷⁾ Moving Mass is constant parameter of system which characterize m_0 or inertia of unloaded system.
- ⁸⁾ Recommended controllers & Recommended drivers can be optimized for a certain application. Please contact Standa support for recommendation.
- ⁹⁾ Recommended power supply depends on required duty cycle and load. Please contact Standa support for recommendation.
- ¹⁰⁾ Differential Outputs are available in passive (buffered) or active (modulated) way with LCMV2.
- ¹¹⁾ Stages can be assembled with better orthogonality by request.
- ¹²⁾ Scalar Control can be implemented with USB / TCP-IP / RS-232 communication interface; for vector control we recommend to use EtherCAT.
- ¹³⁾ Stages include special covers which allow their usage in dusty and partially wet environment.



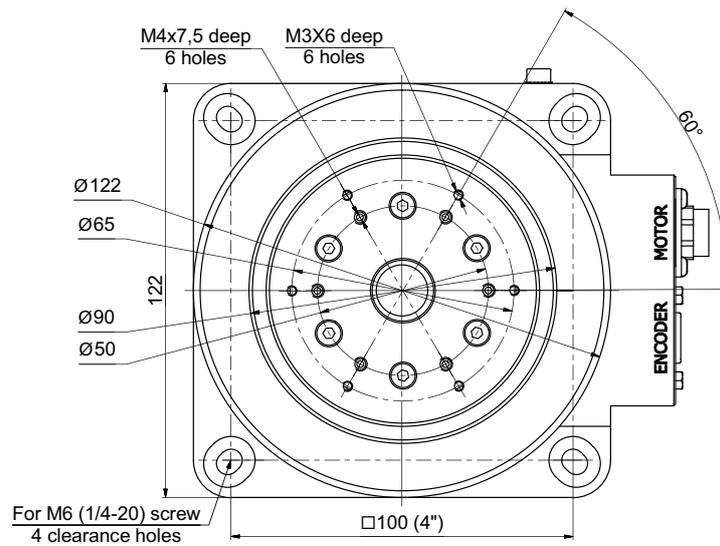
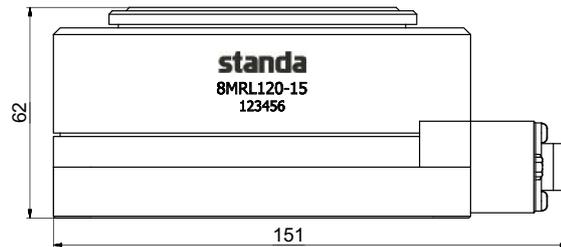
8MT165-200

8MRL120-15

High-Speed Precision Rotation Stage

FEATURES

- Direct-Drive (Torque) Motor Rotation Stage
- Ultra-high-speed rotation: 9000°/s (1500 rpm)
- High position repeatability & high accuracy
- Low runout & high load capacity
- Compact design



8MRL120-15

SPECIFICATIONS

Model	8MRL120-15-MEn
KINEMATICS & FEEDBACK INFORMATION	
Angular range	360 Deg
Encoder type	Optical
Encoder model	Len3
Encoder resolution ¹⁾	0.0000625 Deg
Encoder interface	Differential rs422
Internal multiplier	Yes (optionally analog sin/cos)
Multiplication factor	200
Encoder grating period	0.05 deg
Reference mark (index)	Yes
Absolute accuracy ²⁾	
Before calibration	±218 Mrad / ±45.00 Arcsec
After calibration	Request
Bi-directional repeatability (peak to peak) ²⁾	±7.30 Mrad / ±1.50 Arcsec
Bi-directional repeatability (RMSs) ²⁾	±2.90 Mrad / ±0.60 Arcsec
Eccentricity ³⁾	±5.00 Mm
Wooble ³⁾	±19.40 Mrad / ±4.00 Arcsec
Maximum velocity (no load, @ 300 VDC) ⁴⁾	<9000 Deg/s / 1500 rpm
Maximum acceleration (no load) ⁵⁾	1080000 Deg/s ² / 180 krpm/s ²
Maximum torque (continuous) ⁵⁾	5.4 Nm
Limits switches	N/a
LOAD, GUIDING & TRANSMISSION INFORMATION	
Design type	Torque motor (Direct-Drive) rotation stage
Linear motor model	TM 105.34N
Linear motor design type	Torque motor
Maximum bus voltage	>300 VDC
Load capacity (centrally placed) ⁶⁾	
Horizontal	40 kg
Vertical	20 kg
Moving mass ⁷⁾	request
Guiding system	Crossed roller bearings
MATERIAL & ENVIRONMENT CONDITIONS	
Housing material	Aluminum alloy
Housing coating (finish)	Black anodizing
Environment pressure	Normal atmosphere
Operating temperature	20±2 °C
CONTROL, COMMUNICATION AND CABLING	
Recommended controllers ⁸⁾	ACS Products Line or 8SMC5-USB series
Recommended drivers ⁸⁾	ACS Products Line or 8SMC5-USB series
Recommended power supply ⁹⁾	2 phase / 3 phase source
Recommended communication interface ¹²⁾	EtherCAT / RS232 / USB / TCP-IP
Cable length	2 m (other by request)
Differential outputs ¹⁰⁾	On request
ACCESSORIES INFORMATION	
Base plate for mechanical interface	Not required
Ox, Oy stack	Through angle bracket
ADDITIONAL DETAILS	
Dimensions of moving platform	Ø 90 mm
Central aperture	Ø 15, mm
Overall linear stage dimensions (W × L × H)	151 × 122 × 62 mm
Measurement system	Metric / Imperial (Base)
RoHS	Compliant
Weight	2.6 kg

8MRL180, 8MRL250

Direct Drive Rotation Stages



8MRL180



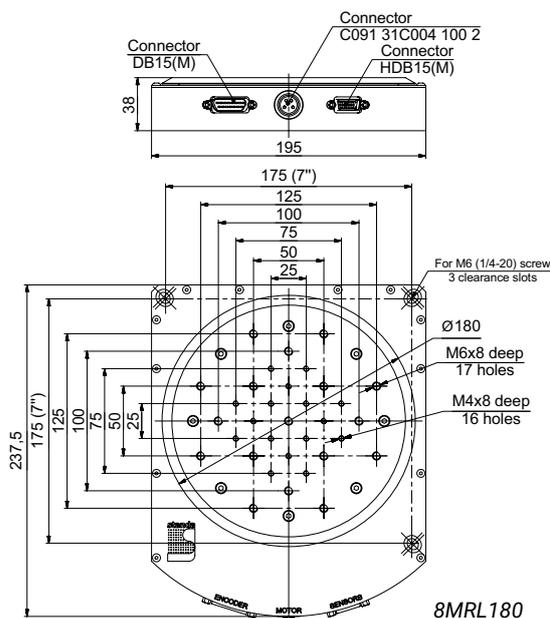
8MRL250

FEATURES

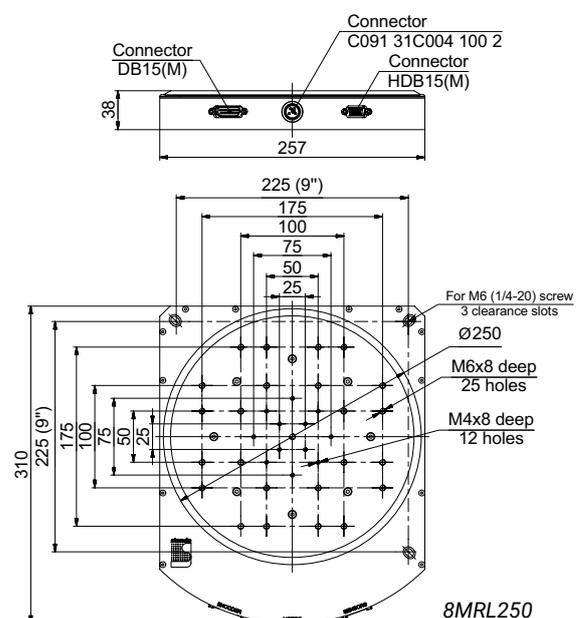
- > High angular velocity up to 6600 deg/s
- > High angular acceleration
- > High bi-directional repeatability up to <5 arcsec
- > Sophisticated control & drive systems
- > Analog encoder interface and wide range of RS422 interpolation factors
- > Perfectly fits with 8MTL series linear motor high resolution stages

Standa 8MRL series rotation stages are based on direct drive torque motors in order to avoid mechanical inaccuracies (e.g. backlash) and reach high dynamical response of rotation system. Ironless design of motor allows high acceleration and high velocity and it perfectly suits for a start-stop application which is especially important in: 3D printing, laser fabrication, wafer scanning or PCB etching applications.

High quality bearings and feedback system allows user to reach high positioning accuracy. Mechanical accuracy of stages is personally mapped using laser autocollimator in order to avoid constant inaccuracy. User is allowed to choose up to $\times 200$ interpolation using Standa external interpolation system or fit necessary servo controller with internal interpolation circuit for higher resolution of stage. 8MRL series stages are capable to operate with <4 arcsec bi-directional repeatability.



8MRL180



8MRL250

SPECIFICATIONS

Model	8MRL180	8MRL250
MOTION CONTROL		
Travel range (coarse/fine)	360/360 deg	
Encoder type ¹⁾	1Vpp Analoge inductance	
Encoder resolution ²⁾	2 arcsec	1 arcsec
Bidirectional repeatability	5 arcsec	4 arcsec
Unidirectional repeatability	On request	
Accuracy (before calibration)	50 arcsec	40 arcsec
Axial runout	30 µm	30 µm
Radial runout	30 µm	20 µm
Backlash	0 arcsec	
Maximal speed	6600 deg/s	3300 deg/s
Limit switches / reference mark	Reference mark	
Switch polarity / reference mark interface	RS422	
LOAD AND TRANSMISION INFORMATION		
Horizontal load capacity	12 kg	20 kg
Vertical load capacity	12 kg	15 kg
Transmission type	direct drive	
Motor type	3-phase brushless motor	
Nominal torque	6.4 Nm	6.9 Nm
Peak torque	21.6 Nm	22.9 Nm
Bearing type	4 contact ball bearings	
CONTROL AND COMMUNICATION		
Recommended controllers	SPiiPlusEC	
Recommended driver	UDMlc series	
Recommended power supply	PS36-4.4-4	
Connector	on request	
Cable length	on request	
MATERIAL AND ENVIROMENT CONDITIONS		
Base material	Aluminum	
Finish	Black anodized	
Environment pressure	up to 10 ⁻³ Torr	
Ambient temperature	on request	
ACCESSORIES		
Base plate	3BP8MRL180	3BP8MRL250
Connecting plate	on request	
ADDITIONAL DETAILS		
Rotating platform diameter	180 mm	250 mm
Measurement system	metric	
Weight	5 kg	9 kg
Central aperture	on request	

¹⁾ Encoder can be equipped with external interpolation circuit which will result differential RS422 encoder interface.

²⁾ Resolution is indicated using analog encoder interface. While increasing the factor of external interpolation circuit the higher resolution can be adjusted for specific applications.

8MTF-200

Motorized XY Microscope Stage

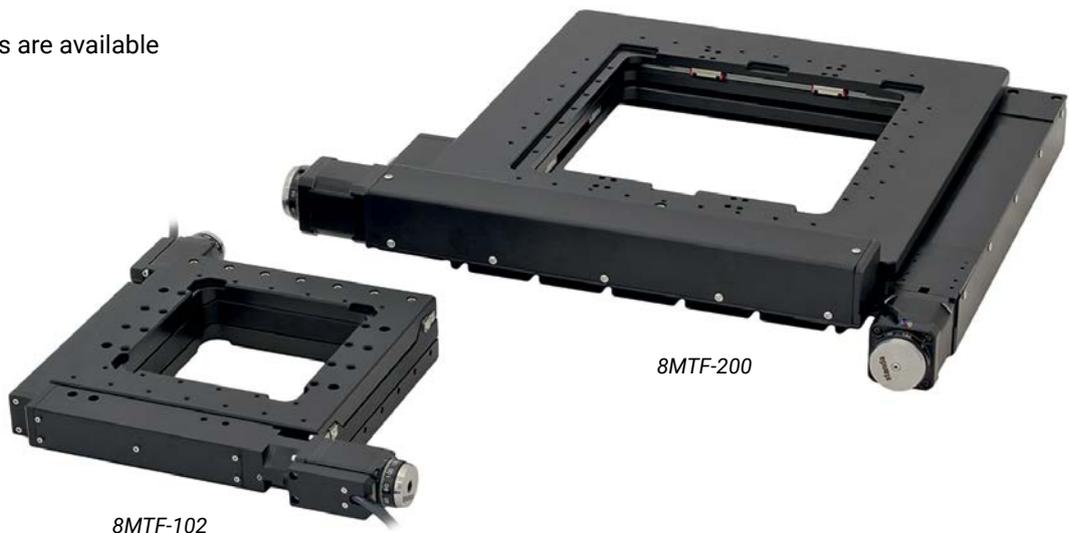


8MTF-200

FEATURES

- > Designed for smooth and precise motion
- > 200 × 200 mm travel range
- > 205 × 205 mm central opening
- > Calibrated screw pair and guiding system
- > Very low-profile for its aperture and travel range
- > Custom adaptors are available upon request

Motorized XY microscope stage is ideal for transmissive and reflective imaging applications as well as processes which require access from above and below of the sample. Extremely low profile and compact design allow 8MTF-200 to be incorporated into many different types of scanning systems and easily mounted to most common microscope platforms.

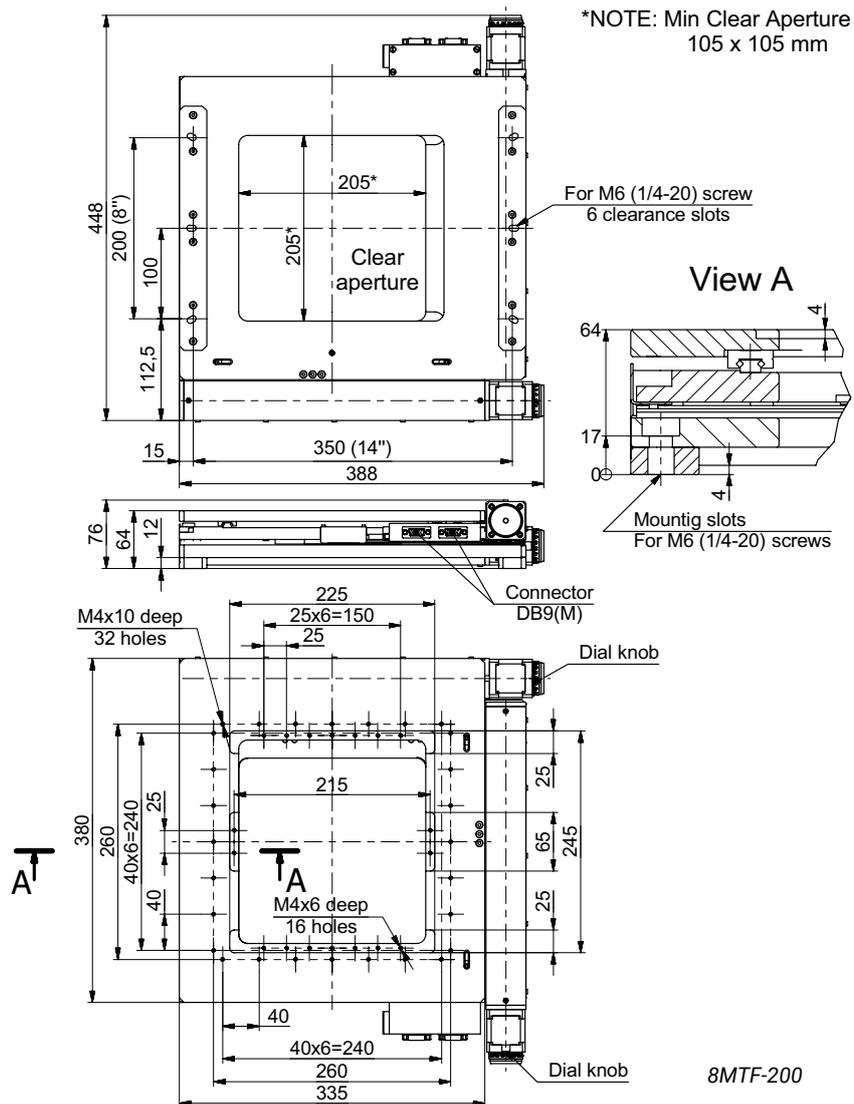


8MTF-200

8MTF-102

SPECIFICATIONS

Model	8MTF-200
Travel range	200 × 200 mm
Resolution	
Full step	10 μm
1/16 step	0.625 μm
Ortgonality	<15 arcsec
Repeatability	
Unidirectional	1 μm
Bidirectional	2 μm
Absolute on-axis accuracy	12 μm
Pitch	±100 μrad
Yaw	±50 μrad
Backlash	0
Max speed	30 mm/sec
Load capacity	
Horizontal	8 kg
Motor connector	DB9(M)
Limit switches	hall sensors (4 pcs on borders)
Switch polarity	pushed is open
Stepper motors	4247
Recommended controller	8SMC5-USB-B9-2
Weight	11.8 kg



8MVT-120

Precision Vertical Positioner



8MVT120-12



8MVT120-25

FEATURES

- > True vertical elevation of the platform
- > Compact design
- > Long life time
- > Vacuum version available

Precision vertical positioner provides high-precision positioning and smooth travel for loads up to 10 kg. The wedge design, driven by precision rolled leadscrew, converts horizontal motion into vertical. Together with high quality linear bearing guide the system ensures rigid and smooth movement across all range of travel and long lifetime. Precision bearings provide platform stiffness and stability while the screw mechanism assures positioning accuracy. For protection of mechanics, optical limit switches are installed. Based on specifics of application other stepper motors or servos can be used. Stepper motor can be equipped with linear encoder and brake.

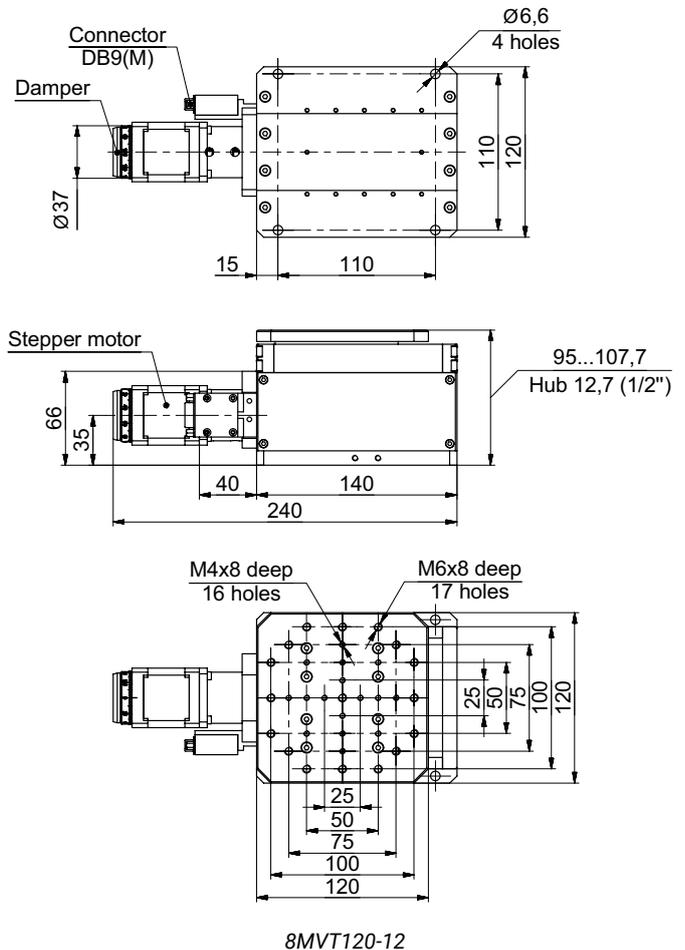
SPECIFICATIONS

Model	8MVT120-12-4247	8MVT120-25-4247	8MVT120-25-42C01 ¹⁾
Travel range	12.7 mm (0.5 inch)	25.4 mm (1 inch)	25.4 mm (1 inch)
Resolution in full step	2.5 µm	5 µm	-
Resolution in 1/256 step	0.018 µm ²⁾	0.019 µm ²⁾	-
Encoder pulses per revolution	by request		4000
Travel per 1 pulse	-		0.36 µm
Lead screw pitch	1 mm		1.44 mm ³⁾
Wedge reduction rate	2:1	1:1	
Unidirectional repeatability	1.5 µm		
Bidirectional repeatability	3 µm		
Accuracy	10 µm		
Lift parallelism (to the base)	35 µm (by request up to 15 µm)		
Maximum speed	10 mm/s	20 mm/s	25 mm/s
Maximum load capacity	10 kg (20 kg by request)	10 kg (15 kg by request)	10 kg
Stepper motor	4247		
Brushless DC motor	-		
Brake	by request		DB42-100
Optocoupler end limit switches	2		3
Switch polarity	Pushed is open		
Motor connector	DB9(M)		By request
Material	Aluminium		
Finish	Black anodize hard cover		
Weight	3.5 kg	4.05 kg	4.5 kg
Recommended Controller	8SMC5-USB		8SMC5-USB, SPiiPlusCMnt

¹⁾ 8MVT120-12-42C01 model constructed for operating in clean room, with cleanliness class up to 100. This model also equipped with vacuum sleeve for dust removal from inside the stage, which accumulates during stage operation.

²⁾ With Standa 8SMC5-USB controller.

³⁾ Screw coated with BlackIce TFE coating and equipped with plastic anti-backlash self-lubricating nut, which provide up time equal to 7 million cycles.

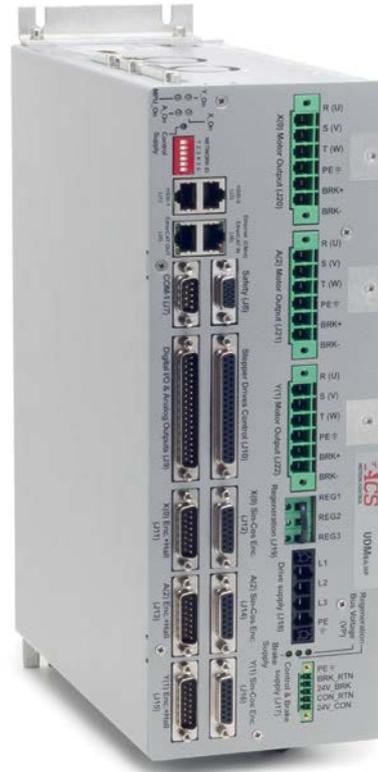


ACS SPiiPlusCM

32 Axes EtherCAT® Master Control Module with Three Built-in Drives

FEATURES

- Up to 32 axes and thousands of I/O
- Open Architecture – Command ACS and third party EtherCAT drives and I/O
- Plug-in replacement for the series of SPiiPlusCM Control Modules
- Two versions: Economical (ba) and High Performance (hp)
- Three built-in drives:
 - 85 to 265 VAC, up to 15 A continuous and 30 A peak current
 - 4 encoders
 - 20 kHz sampling and update rate of all control loops
- Digital I/O:
 - 8/8 general purpose inputs / outputs
 - 4 Registration Mark inputs, 2/8 PEG outputs (Pulse/States)
 - 3 motor brake outputs 24 V / 1 A
- Analog I/O: 8/2
- Optional built-in 4-axis Pulse/Dir interface



The SPiiPlusCMHP/BA is a state of the art series of EtherCAT motion controllers with three built-in universal drives. It addresses the needs of modern machinery for both economical and for high performance, scalable and distributed control for motion centric applications. Its open architecture operates in conjunction with ACS' line of EtherCAT servo and step motor drives and I/Os modules, as well as with any certified EtherCAT module that complies with CAN over EtherCAT (CoE) protocol, providing a comprehensive and cost effective control solution for demanding machinery. The SPiiPlusCMhp/ba controls and generates the motion profile for up to 32 axes.

The SPiiPlusCMHP addresses high accuracy demanding applications, while the SPiiPlusCMBA econo version addresses more price sensitive applications. The SPiiPlusCMHP/BA are complemented by the SPiiPlusNT suite of software tools with built-in simulator that minimizes development effort and time to market. It provides extraordinarily easy setup, fast host and embedded application development, and quick diagnostics, reducing efforts and costs. The built-in drives are offered with three current levels: 5/10 A, 10/20 A and 15/30 A (cont./peak).

The modules are powered by a single or three-phase AC from 24 to 265 VAC (rectified internally to generate a VAC × 1.4 motor voltage) and by a separate 24 VDC control supply that keeps all low voltage signals alive during emergency conditions. It supports a wide range of position feedback devices:

SERVO

A standard comprehensive set of powerful algorithms to enhance accuracy, move & settle time, smooth velocity, stability and robustness.

- Advanced PIV cascaded structure
- Loop shaping filters
- Gain Scheduling
- Gantry MIMO control
- Dual feedback / loop control
- Disturbance rejection control

Optional Servoboost® algorithm that provides better, more consistent servo performance, insensitive to noise and large changes in the system.

DRIVES

- Type: digital current control with field oriented control and space vector modulation.
- Current ripple frequency: 40 kHz Current loop sampling rate: 20 kHz.
- Programmable Current loop bandwidth: up to 4 kHz, will vary with tuning & load parameters.
- Commutation type: sinusoidal. Initiation with and without hall sensors.
- Switching method: advanced unipolar PWM.
- Protection: Over voltage, Phase-to-phase short circuit, Short to ground, Over current, Over temperature, motor over temperature.
- Current sensing: CMba: 12b ADC, CMhp: 16b ADC.

POWER SUPPLIES

- The module is fed by three power sources. A motor AC supply, a 24 VDC control supply and 24 VDC motor brake supply.
- During emergency conditions there is no need to remove the 24 VDC control supply.

MOTOR SUPPLIES

- Range: 85 to 265 VAC (Optional – Low Voltage 17 – 85 VAC or 24 – 120 VDC)

incremental digital, analog SIN-COS, and absolute encoders. The modules are optionally available with built-in additional 4-axis control of drives with Pulse/Dir interface. The series are a plug-in replacement to the series of SPiiPlusCM control modules with identical dimensions and pin to pin connectivity.

CONTROL SUPPLIES

- 24 VDC ± 10%, 4 A

MOTOR BRAKE SUPPLY

- 24 VDC ± 20%, 3 A

MOTOR TYPE

- Two- and three-phase permanent magnet synchronous (DC brushless/AC servo), DC brush, Voice coil, Two- and three-phase stepper (micro-stepping open or closed loop), AC Induction.

FEEDBACK

- Incremental Digital Encoder: Four, A&B,I; Clk/Dir,I
- RS-422. Max. rate: 50 million encoder counts/sec., Protection: Encoder error, not connected
- Sin-Cos Analog Encoder (optional): Three.1Vptp, differential.
- Multiplication factor: From x4, to-CMba-x4,096, CMhp-x65,536.
- Maximum frequency: 250 kHz
- Automatic compensation of Offset, Phase and Amplitude
- ADC used: CMba: 12b, CMhp: 16b low S/N
- Maximum acceleration: 108 million sine periods/sec². Protection: Encoder error, not connected.
- Hall inputs: Three sets of three per axis. Single-ended, 5 V, source, opto-isolated.
- Input current: <7 mA.
- Absolute encoders (optional): EnDat 2.1/2.2, Tamagawa Smart-ABS, Panasonic, BiSS-C .
- 5 V feedback supply: Total current available for feedback devices: 1 A.

PULSE/DIRECTION INTERFACE (Optional)

- (Optional) Four pairs
- Type: RS-422. Up to 5 million pulse/sec.
- Programmable pulse width
- Range: 0.08 to 80 microseconds

DIGITAL I/O

- > Safety Inputs: Left + right limit per axis, E-stop, General Purpose Inputs: 8 Single-ended, 5 VDC ($\pm 10\%$) or 24 VDC ($\pm 20\%$), opto-isolated, sink/source,
- > Input current: 4 – 14 mA.
- > Registration Mark inputs: Four. RS422.
- > Motor Brake Outputs: Three. 24 V, 1 A ,opto-isolated. Powered by the 24 V Brake Supply.
- > General Purpose Outputs: Eight. Single-ended, 5 VDC ($\pm 10\%$) or 24 VDC ($\pm 20\%$), opto-isolated, sink/source, Max. output current per output: 100 mA, Max. total of 800 mA for all.
- > Position Event Generator outputs (PEG): Two PEG_Pulse and eight PEG_State, RS422.
- > Can be used as GP outputs.
- > HSSI channels: Two. RS422.

ANALOG I/O

- > Inputs: Six ± 10 V, differential, 20 kHz sampling rate. The inputs can be used as feedback to the servo loops. Resolution: CMba - 12b, CMhp - 16b. Joystick inputs: two single-end, ± 10 V, 12b resolution
- > Outputs: Two, single-end, ± 10 V, 10b resolution.

CONTROLLER AND ETHERCAT MASTER

- > Number of axes: Up to 32
- > MPU/EtherCAT Cycle Rate: 2 kHz (4, 6, 8, 16 axes), 1 kHz (32 axes)
- > Communication Channels
- > Serial ports: one RS-232. One RS-232/422. Up to 115,200 bps.
- > Ethernet channel: TCP/IP 10/100 Mbits/sec (10/100 BaseT).
- > EtherCAT: Two, In & Out, 100 Mbit/sec, CoE and FoE protocols support.
- > MPU
- > User Memory: RAM: 1 Gb.
- > Non-volatile memory (Flash): 512 Mb.
- > Power up Time: 35sec. with no additional EtherCAT nodes.

ENVIRONMENT

- > Operating: 0 to +40 °C. Storage : -25 to +60 °C.
- > Humidity: 5% to 90% non-condensing

SPECIFICATIONS

Product (xx – ba or hp) (y – number o axes)	CMxyA...	CMxyB...	CMxyC...
Number of built-in drives	1, 2, 3		
Motor voltage AC input	85 – 265 VAC, single and 3 phase		
Control voltage input	24 \pm 10% VDC		
Phase current Cont./Peak sine amplitude	5 / 10 A	10 / 20 A	15 / 30 A
Phase current Cont./Peak RMS	3.6 / 7.1 A	7 / 14 A	10.6 / 21.2 A
Peak current time	1 sec		
Max. output voltage	(Vac in) \times 1.41 \times 88% VDC		
Max. motor phase to phase voltage amplitude	(Vac in) \times 1.41 \times 88% VDC		
Max. RMS input current			
1-phase supply	18 A	18 A	24 A
3-phase supply	13 A	18 A	24 A
Min. load Inductance, at maximum motor voltage	0.050 mH		
Max. Heat dissipation per axis	30 W	48 W	79 W
Weight	5.75 kg		
Dimensions	324 \times 249 \times 120 mm		
Standards	CE, UL (pending)		

ACS NPMpm

EtherCAT® Single/Dual Axis NanoPWM Drive Module

FEATURES

- > Powerful & Smart EtherCAT Drive Module
 - Two drives per module for Gantry control
 - Voltage: 12 Vdc – 100 Vdc
 - Current: Up to 13.3 A / 40 A (cont./peak)
- > The Ultimate Drive for Demanding Positioning Applications
 - Sub-nanometer standstill jitter
 - Nanometer tracking error and optimal velocity smoothness
- > A Lower Cost of Ownership Alternative to Linear Drives
 - Lower heat dissipation
 - Better reliability
 - Significantly smaller
 - Simpler supply requirements
 - Digitally controlled and easy setup
- > Uncompromised speed and resolution
 - Up to 4 Analog Sin-Cos 1Vpt encoders with frequency up to 10 MHz
 - Encoder multiplication of 4 to 65,536
 - Automatic encoder compensation and error detection
 - Dual feedback support
 - Two squared Sin-Cos
 - Position feed forward for active vibration isolation systems
 - Optional internal relays for dynamic braking (shorting motor phases)
- > Smart Motion related I/O
 - Digital I/O
 - Inputs: 4 encoder registration MARK / general purpose
 - Outputs: 2 Position Event Generators, 2 motor brake / general purpose
- > Analog I/O
 - Inputs: 4, 12 bit resolution, ±10 V
 - Outputs: 4, 16 bit resolution, ±10 V



The NPMPM is a line of the most advanced servo drives available today.

It is specifically designed to address the most demanding applications with regards to move and settle times, standstill jitter, and velocity smoothness, such as wafer metrology and inspection, FPD inspection, and ultra-precision machining for processing of optical components.

It is based on the proprietary and unique technology that exceeds stand still jitter and tracking error performance that until now has been achieved only with linear drives, with reduced cost of ownership.

With the optional combination of a 10MHz laser encoder interface and the powerful algorithm, demanding sub-nanometer resolution positioning systems can achieve ultimate throughput and accuracy with minimal sensitivity to disturbances and stage to stage manufacturing differences.

The NPMPM is a slave that runs under any ACS EtherCAT masters. A comprehensive set of software support tools are provided for module configuration, setup and tuning.

DRIVES

- > Type: digital current control with field oriented control and space vector modulation.
- > Current ripple frequency: 40 kHz.
- > Current loop sampling rate: 20 kHz.
- > Programmable Current loop bandwidth: up to 4 kHz, will vary with tuning & load parameters.
- > Commutation type: sinusoidal. Initialization with or without hall sensors.
- > Switching method: advanced unipolar PWM.
- > Built-in motor phases shortening relays.
- > Protection: Over & under voltage, Over current, Over temperature, Phase to phase and phase to ground short (short circuit on one of the motor phases might damage the drive).

SUPPLIES

- > The module is fed by two power sources. A motor supply and a 24 Vdc control supply.
- > During emergency conditions there is no need to remove the 24 Vdc control supply.

MOTOR DRIVE SUPPLY

- > Range: 12 Vdc – 100 Vdc, recommended: 12 Vdc – 96 Vdc.
- > Current rating should be calculated based on actual load.
- > If regen resistor is required, it should be added in parallel to motor supply with 102 V shunt activation.

CONTROL SUPPLY

- > Range: 24 Vdc \pm 10%
- > Maximum input current / power: 0.9 A @ 21.6 V / 20 W Without motor brakes.
- > With 2 motor brakes: 1.9 A @ 21.6 Vdc / 42 W
- > Built-in motor phases shortening relays.
- > Protection: reverse polarity. A 4 A external fuse must be used.

MOTOR TYPE

- > Two- and three-phase permanent magnet synchronous (DC brushless/AC servo), DC brush, Voice coil, Two- and three-phase stepper (micro-stepping open or closed loop).

FEEDBACK

- > Types: Incremental digital encoders (AqB), Hall inputs, analog Sin-Cos (optional), absolute encoders (optional).
- > Incremental Digital Encoder: Two per axis. A&B,I and Clk/Dir
- > Type: Differential RS-422
- > Max. rate: 50 million quad counts/sec.
- > Protection: Encoder error, not connected

- > Sin-Cos Analog Encoder: Up to two per axis.
- > Type: 1Vptp, differential.
- > Programmable multiplication factor: x4 to x65,536.
- > Maximum frequency: 500 kHz or 10 MHz.
- > Maximum acceleration with Sin-Cos encoder: 108 sine periods/second².
- > Squared Sin-Cos output: Two, differential RS422.
- > Absolute encoders (optional): Up to two. Smart-Abs, Panasonic, BiSS-A/B/C, SSI, Sanyo Denki.
- > Hall inputs: A set of three per axis.
- > Type: single-ended, 5 V, source, open cathode. Input current: <7 mA.
- > Feedback supplies: For all digital feedback devices: 5 V, 0.5 A.
- > For all analog feedback devices: 5 V, 1.5 A.

DIGITAL I/O

- > For different I/O configurations see ordering options
- > Safety Inputs: Left and right limit inputs per axis
- > Type: 24 V/ source (default), single ended, opto-isolated. Input current 4 – 14 mA.
- > STO: Two inputs, 24 V \pm 20%. Input current: <50 mA
- > Registration MARK Inputs (High Speed Position Capture): Four. Fast, 24 V \pm 20%, opto-isolated, two terminals.
- > Input current 4 – 14 mA.
- > Can be used as general purpose inputs.
- > General purpose output, Motor Mechanical Brake output: Two, 24 V/source (default), single ended, opto-isolated, 0.1 A
- > External Motor relay control: Two, 24 V \pm 20%, source, 0.5 A.
- > These outputs are used to shorten the phases of the motors by external
- > relays (if the optional internal relays are not present).
- > PEG (Position Event Generator): Two, Pulse or State, Differential, RS422.
- > Pulse width: 26nSec to 1.75mSec. Maximum rate: 10 MHz.
- > Can be used as general purpose output.

ANALOG I/O

- > Analog Inputs: Four, \pm 10 V, differential, 12 bit resolution.
- > Max. input frequency: 1 KHz. Offset: < 30 mV
- > Analog Outputs: Four, \pm 10 V, differential, 16 bit resolution.
- > Offset: \pm 50 mV, Bandwidth: 5 KHz. Max. output load: 10 K Ω ,
- > Noise / Ripple: <40 mV.

ETHERCAT® COMMUNICATION

- > Two ports, In and Out, RJ45 connector

ENVIRONMENT

- > Operating range: 0 to + 40 °C
- > Storage and transportation range: -25 to +60 °C
- > Humidity (operating range): 5% to 90% non-condensing

DIMENSIONS

- > 257 x 154.9 x 50.9 mm³

ACCESSORIES

- > NPXpm-ACC1: Mating connectors kit
- > UDMmc&NPXpm-ACC2: (J1) mating 2m flying lead cable
- > STO-ACC1: 2 meter cable with flying leads

CE, UL (PENDING)

- > EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

SPECIFICATIONS

Per Axis	A	B	C	D
Continuous/Peak current Sine amplitude	3.3 / 10 A	6.63 / 20 A	103 / 30 A	13.33 / 40 A
Continuous/Peak current	2.3 / 7 Arms	4.6 / 14.1 Arms	7 / 21.2 Arms	9.4 / 28.2 Arms
Maximum cont. Input current	2.6 Arms	5.3 Arms	8 Arms	10.6 Arms
Maximum heat dissipation, W	7 + 0.9 × (no. of drives)	7 + 2.1 × (no. of drives)	7 + 3.7 × (no. of drives)	7 + 5.6 × (no. of drives)
Maximum cont./peak output power @ 100 Vdc	260 / 780 W	520 / 1560 W	790 / 2340 W	1050 / 3120 W
Peak current time	1 sec			
Minimum load inductance @100 Vdc. Can be derated linearly for lower voltages	0.05 mH			

PER MODULE

Control voltage input	24 ±10% Vdc			
Drive voltage input range	12 – 100 Vdc (96 Vdc recommended)			
Maximum output voltage	(Vin motor) × 88% Vdc			
Maximum cont. input current	5.2 Arms	10.6 Arms	16 Arms	21.2 Arms

ACS LCM

EtherCAT® Laser Control Module

FEATURES

- > Digital pulse modulation for dynamic laser power control
- > Pulse synchronization with XYZ motion path at specific positions
- > Laser gating (on/off) synchronization with XYZ motion path at specific positions
- > Flexible electrical interface: laser enable output, safety interlock input, fault input for robust safety implementation, general purpose programmable I/O
- > User defined operational zones
- > Laser delay compensation
- > Auxiliary P/D outputs
- > Ability to combine control modes to meet wide ranging application requirements



LASER CONTROL MODES

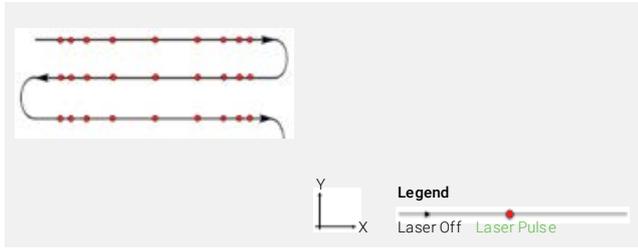
- > Digital Modulation Mode (for power control)
 - Fixed frequency
 - Fixed pulse width
 - Fixed duty cycle
- > Tickle Mode
 - Fixed frequency and pulse width
- > Fixed Distance Pulse Firing Mode
- > Array Based Pulse Firing Mode
- > Array Based Gating Mode
- > Axis Range Windowing Mode
- > Motion Capabilities (by ACS Controller)
- > Rapid point to point positioning on a single or multi-axis using 3rd order interpolation
- > Up to 5 axes cordinted path motion via G-Code or ACS native XSEG motion commands with advanced look-ahead and corner rounding algorithms
- > Error mapping compensation
- > Support for cartesian and non-cartesian systems

LCM is an EtherCAT slave module that enables ACS Controllers and Control Modules to control a laser source directly with full synchronization to motion, resulting in highest quality laser micro-machining and optimal throughput. It is able to interface with a wide range of lasers designed for processing and machining applications such as DPSS, CO₂, excimer, fiber, Q-switched, picosecond, femtosecond, and more.

CAPABILITIES FOR LASER PROCESSING APPLICATIONS

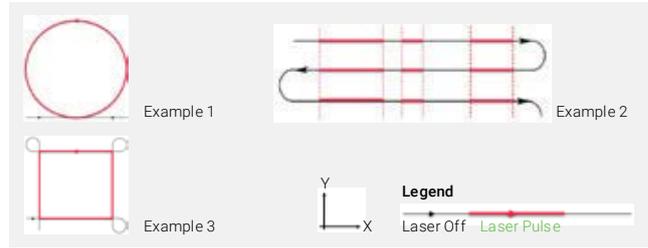
Array based pulse firing mode

Pulsating the laser at pre-defined positions along the path



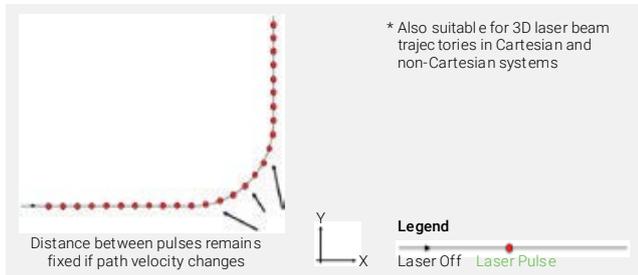
Array based pulse gating

Turning the laser on/off at pre-defined positions along the path



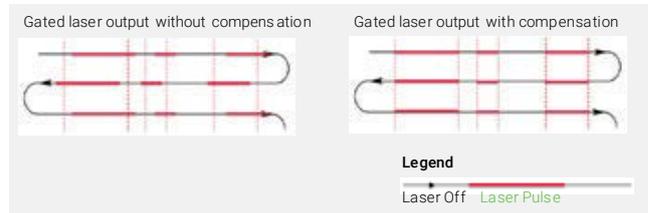
Fixed distance pulse firing mode

Triggering laser pulses at precise positions with fixed distance interval



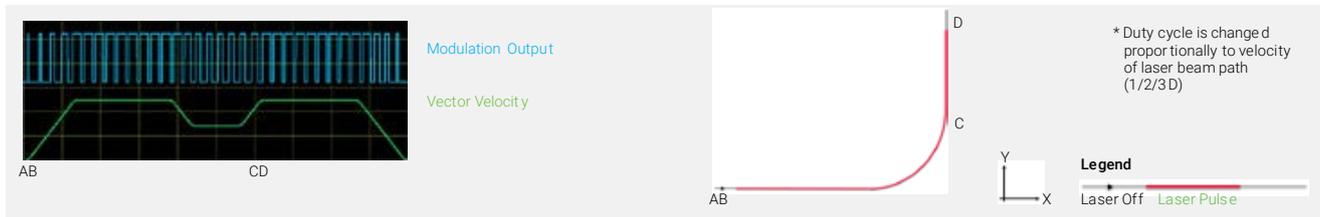
Laser delay compensation feature

Compensating for laser time shift (delay, advance) relative to the motion



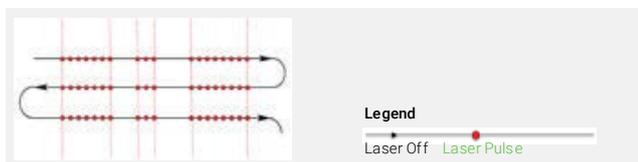
Pulse modulation mode

PWM modulation as a function of velocity

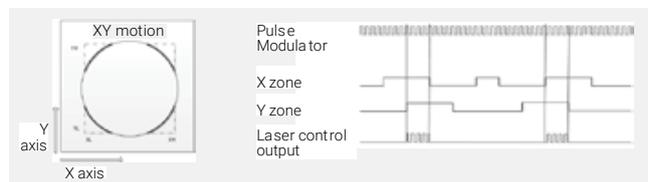


Combined / hybrid mode

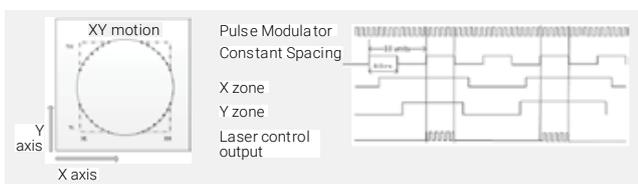
Array based gating & fixed interval pulse firing



Axis range windowing & digital modulation



Fixed distance pulse firing, digital modulation & axis range windowing

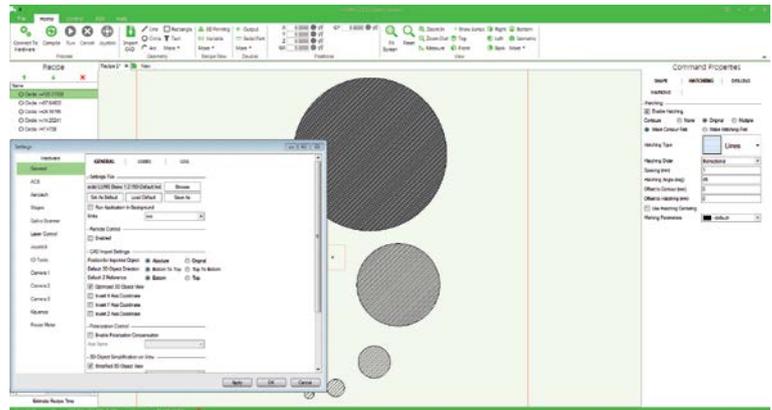


LUMS

Laser Machining Software: Universal Micromachining

FEATURES

- In LUMS trajectories can be generated by importing CAD files (DXF, DWG, STL, Gerber, NC Drill, etc.) or by drawing them with built in tools.
- Stitching feature to split large objects to machine with galvo scanners
- Advanced slicing and hatching algorithms allows to slice 300 MB file with 4 million triangles in less than a minute
- Formulas and Variables can be used and interpreted in text as well using {}
- LUMS controls all of the hardware directly
- LUMS laser machining software controls positioning stages directly using manufacturer's .dll files
- LUMS laser machining software controls many hardware of the machine directly: stages, galvo, lasers, sensors, I/O interfaces
- LUMS supports several cameras: one camera for general view and one camera for high resolution view
- Fully compatible with ACS products
- Key Applications
 - Laser Additive Manufacturing
 - PCB Laser Processing and fabrication
 - Laser Engraving
 - Laser Drilling
 - 3D printing



DOT. LINE. PLANE. SHAPE

LUMS software imports DXF, DWG, Gerber files to prepare for laser cutting, etching, ablation and other 2D, 2.5D applications. All objects are imported as lines and arcs for efficient machining. Set size and position of the object or simply drag it where it should be machined.

Use Hatching to fill the volume of the object. Use Stitching feature to split large objects to machine with galvo scanners.

Using 64-bit architecture, LUMS not only supports large and complex STL files, but handles them really fast. Our advanced slicing and hatching algorithms allows to slice 300 MB file with 4 million triangles in less than a minute. Faulty STL models can be fixed using LUMS Slice Repair tool.

LUMS allows NC Drill file import for laser drilling processes. Adjust via hole size by offsets to compensate beam spot diameter. Use either helical or layer by layer drilling. In Helical drilling mode, Z axis moves constantly, while XY axes draws circles. In Layer mode a set number of repeats are done before moving Z axis by a specified step size to increase drilling depth. Use Stitching tool to center each hole at the center of galvo scanners. Combine NC Drill file with Gerber files to do both PCB etching and drilling.

Simple shapes like lines, circles, arcs and rectangles are easy to draw in LUMS software. You can draw them by hand and/or add precise parameters for size and position. You can even draw poly-lines and polygon shapes with a special easy to use tool. All closed shapes can be hatched with one of the hatching types (lines, cross-hatching, dots, contours). Select motion speed and laser parameters either for each shape, groups of shapes or the whole

SPECIFICATIONS

Version	LUMS	LUMS PRO	LUMS Ultimate
MOTION CONTROL			
Galvanometric scanner control	+	+	+
Positioning stages control	+	+	+
Up to 3 axes control	+	+	+
Unlimited number of axes	-	+	+
Galvo+Stages Stitching	-	+	+
Virtual Joystick	+	+	+
FILE IMPORT			
DXF, DWG	+	+	+
STL	Up on request	+	+
STP, IGES	-	+	+
Gerber, NC Drill/Excellon	Up on request	+	+
TXT, CSV	+	+	+
TOOLS / COMMANDS			
Drawing tools	+	+	+
Hatching (lines, cross-hatching)	+	+	+
Advanced hatching (stripes, chess pattern)	-	+	+
Measuring	-	+	+
Logical Commands (Loop, If)	+	+	+
Variables	-	+	+
Math functions	+	+	+
Logging, Data Export	-	+	+
Sample surface height mapping	-	+	+
3D Printing tool	Up on request	+	+
Support generation for 3D models	-	+	+
3D model fixing	Up on request	+	+
DEVICE CONTROL			
IO	+	+	+
Serial Port control	+	+	+
Wait For IO Trigger	-	+	+
SECURITY FEATURES			
User access levels	-	+	+
Process Parameter locking	-	+	+
CUSTOM FEATURES			
APIs to add new hardware and features	-	+	+
Development of custom features and hardware support (up to 16 hours)	-	+	+
Development of custom features, hardware support and user interface	-	-	+
TRAINING AND SUPPORT			
Personal online training session	+	+	+
Online assistance with configuration	-	+	+
Training for recipe creation for your application	-	+	+
Installation, configuration and testing on your machine at your site	-	-	+
Training on your machine at your site	-	-	+
Follow-up online training	-	+	+
SYSTEM			
64 bit support	+	+	+
Multicore processing	+	+	+
CAMERAS AND VISION			
Webcam support	Up on request	Up on request	+
Industrial camera support	Up on request	Up on request	+
Camera view calibration with positioning system	Up on request	Up on request	+
Autofocus feature (to find laser focus position)	Up on request	Up on request	+
Perspective distortion correction	Up on request	Up on request	+
Manual alignment	Up on request	Up on request	+
Automatic feature recognition	Up on request	Up on request	+

recipe. Use Stitching tool to split large shapes or to center them in galvo scanner field.

To add a text in the machining recipe, simply click on Text tool and click where it should appear. LUMS supports fonts supported by Windows, bold, italic, underline, and strikethrough functions.

Formulas and Variables can be used and interpreted in text as well using {}. E.g. a line "speed = {v} mm/s", where "v" is a variable with value 50, will return a result "speed = 50 mm/s". This function is especially useful in R&D as process parameters can be marked near object for future reference.

Any imported or drawn object with a closed contour can be hatched in LUMS laser machining software. LUMS has several different hatching modes: Line, Cross-Hatching (up to 5 angles), Dots and Contours.

AUTOMATION. SYNCHRONIZATION. LOOPS

Complex laser machining recipes can be created and automated with LUMS software. LUMS laser machining software has a Stitching tool to combine motion of galvo scanners and standa linear stages. It makes use of fast speed of galvo scanners and the field size of linear stages. And all of it is controlled with an easy function in a single window. Stitching allows to divide large object or recipe to tiles or center each object in the galvo field e.g. for laser drilling. LUMS controls all of the hardware directly, so all the motions are coordinated with an available feedback from controllers.

Any part of the laser machining recipe can be looped in LUMS. Loops inside loops are also allowed. LUMS allows recipe start or restart loop by digital inputs. When sample is tilted or has an uneven surface, distance to it can be acquired via sensor focus function. That data is generated to a height map and is used to compensate beam focus position. User can select which area should be mapped and device to do it. A map can be imported as a CSV file.

Additive laser manufacturing or 3D laser printing processes like SLS, SLM or stereolithography may use additional level of automation.

ONE INTERFACE FOR ALL HARDWARE

LUMS laser machining software controls many hardware of the machine directly:

- > Positioning stages;
- > Joysticks;
- > Galvanometric scanners;
- > Laser sources;
- > Serial ports;
- > I/O control;
- > Sensors and cameras.

LUMS laser machining software controls positioning stages directly using manufacturer's .dll files. Therefore, control is always precise and does not need additional post processing, proofing and upload. Just click run and motion is executed.

LUMS controls XY or XYZ galvo scanners.

Functionality such as galvo delays tables and skywriting is implemented and easily accessible in LUMS. Combined motion by galvo scanners and stages is possible by using Stitching function.

Laser sources can be triggered through motion controller outputs. Triggering can be done at a set frequency or position based. For laser sources supporting the function, power can be controlled via analog output from LUMS.

Peripheral devices can be controlled by LUMS Laser machining software via Serial Port tool.

A selection of various sensors is supported in LUMS. They are mostly used for: distance, height detection. Power meters can be used to automatically set required laser power via analog output or direct laser control.

MACHINE VISION AND CAMERA

LUMS software seamlessly integrates machine vision for laser machining processes. Use it to see machining results or position your fabrication trajectories on the sample precisely. Camera view is displayed in the Recipe Preview window in LUMS. It is calibrated to match coordinate system of positioning stages and galvo scanners.

LUMS supports several cameras: one camera for general view and one camera for high resolution view. Camera view can be calibrated to be coaxial to laser beam or off-axis.

LUMS Machine Vision module has an Autofocus function for the camera(s) used in the system. Focus can be found by scanning whole set range continuously or by small steps looking for focus improvement.

Built-in LUMS's Machine Vision module provides alignment functionality for laser machining processes. There are several alignment modes:

- > Manual, when machining trajectories are dragged to match sample view.
- > Manual, when fiducials are selected in camera view by operator.
- > Simple, when Machine Vision finds a position of a user set image.
- > Advanced, when Machine Vision searches for a set pattern e.g. cross, edge, etc.

Alignment can be done using one or two alignment marks. After alignment all recipe is rotated and translated automatically to match sample displacement error.

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