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## TECHNICAL INFORMATION

Direct Drive Linear Translation Stage

8MTL120XY-LEn1-200

S/N: 00000\_

REV: 1.00.00

Date: 2019/10/08



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## 1. DESCRIPTION

8MTL120XY-LEn1 is Standa high-end linear motion system designed for light industrial applications: laser cutting, laser marking, scanning etc. 8MTL120XY-LEn1 can be used for highly repeatable fabrication systems. The information presented in particular manual may vary. Please check serial number if exact information is required.



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## 2. CAUTIONS

Please read this manual entirely before installing, operating or servicing the product. Please do not make mechanical or electrical change if you do not understand the information in this manual. Failure to observe precautions could result in serious injury of the operator and/or damage the equipment.

### 2.1. Recommendations!

Proper requirements of mechanical interface and ambient conditions should be maintained before connecting the stage to the working position:

- Standa recommends maintaining **+/-6.00 µm** absolute flatness value to maintain the *absolute accuracy, repeatability* and *angular deviations (Pitch, Yaw & Roll)*.
- Standa recommends maintaining the requirements for screws and fastening torque: *Screws: M6x25 DIN 912; Please see compliance table of fastening torque in Table 3.*
- Standa recommends lifting and transporting 8MTL120XY-LEn1 securely and with care.
- Operators must be trained before operating the equipment.
- Before starting operation in dusty environment, connect the stages 8MTL120XY-LEn1 to the source of compressed air. Pressure in the pneumatic system should be set up by experimental path.

### 2.2. Restrictions!

- Access to the 8MTL120XY-LEn1 internal parts is restricted.
- Access to electrical parts of 8MTL120XY-LEn1 (including connection and disconnection) is restricted during operation.
- Control system & all internal components must be grounded.



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- Safeguarding requirements must be addressed to the operator before final integration of the product.
- Do not connect or disconnect electrical power while connected to a power source.
- Disconnect electrical power before maintain.
- All components must be properly grounded according to these manual and local requirements.

### **2.3. Warnings!**

- If application requires access to the stages, stages and the base MUST be appropriate grounded. System integrator is responsible for determining and meeting all safety and compliance requirements necessary for the integration of this stage into their final application.
- Moving parts can cause injuries. Physical access to the working zone must be restricted.
- Cables must be securely mounted/ placed in order to avoid dangerous hazards.
- Environment conditions indicated in the specification must be maintained in order to not damage the equipment.
- 8MTL120XY-LEn1 series stages must be mounted properly in accordance to the mounting requirements. Improper mounting can result injury and damage of the equipment.
- Improper moving and lifting the stage can result damage of the equipment. Please lift and move the stage in accordance to the manual and with care.



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- If 8MTL120XY-LEn1 is used in conditions not specified by manufacturer, protections provided by the design of product can be impaired and result in damage, shock, injury or death.
- The moving platform may exceed temperature 75 °C.
- Product 8MTL120XY-LEn1 is dedicated for light industrial operations and laboratory use. The duty cycle of product is limited.
- Operator must understand basics of: mechanical, electrical and automation principles.

## 2.4. Part Number Explanation

Technology	Travel	Active Axes	Encoder Model	Resolution, nm
8MTL	120	XY	LEN1	200

- All 8MTL series stages are equipped with proper cable management.
- All 8MTL series stages are measured and calibrated by interferometer.
- All 8MTL series stages are equipped with optical encoder which could be supplied with analog signal interface (1Vpp when multiplication factor is 000) or factory set Multiplication factor with digital differential signal interface (RS422 when multiplication factor is XXX). Please check part number.
- Precise XY assembly would be processed due to special agreement. Please see measurement report to identify the angle.



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## 2.5. Environmental specifications!

**Table 1.** Environmental Conditions

<b>Ambient Temperature</b>	Operating temperature: 10deg. C to 35deg. C. The optimal operating temperature is 20 deg. C +/-2 deg. C. The deviation from optimal temperature may cause temperature deformations and deviation of mechanical parameters.
<b>Humidity</b>	Optimal operating humidity: 20% to 60%.
<b>Vibrations</b>	Building and acoustic vibrations may influence the performance of system. Standa recommends to use the system in low vibration environment. For vibration control advice contact: <a href="mailto:sales@standa.lt">sales@standa.lt</a>
<b>Protection Rating</b>	8MTL120XY-LEn1 stages have limited protection against liquids and other fluids. Stage has limited protection from dust. Indoor use only.

## 2.6. Operation in Vacuum

Brief explanation:

- Standa is able to offer operation in vacuum ( $10^{-6}$  torr) with entire redesign of system. Please contact: [sales@standa.lt](mailto:sales@standa.lt)
- Standa is able to offer operation in vacuum ( $10^{-4}$  torr) with small design changes. Please contact: [sales@standa.lt](mailto:sales@standa.lt).



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### 3. BASIC SPECIFICATION

**Table 2.** Technical Specification of 8MTL120XY-LEn1.

<b>Part #</b>	<b>8MTL120XY-LEn1-200</b>	
<b>Serial #</b>	<b>00000_</b>	
<b>SPECIFICATION</b>		
<b>Parameters</b>	<b>Units</b>	<b>Value</b>
<b>Kinematics &amp; Feedback information</b>		
Travel Range	mm	120.00
Encoder Type	-	Optical
Encoder Model	-	Len1
Encoder Resolution	nm	200.00
Encoder Interface	-	RS-422
Internal Multiplier	-	YES
<sup>1)</sup> Multiplication factor	-	x25
Encoder Grating Period	µm	20.00
Reference Mark (Index)	-	YES
XY Stage Axes Orthogonality	µrad/arcsec	5.78 /28.00
<sup>2)</sup> Absolute X axis Accuracy (before calibration)	µm	± 6.00
<sup>2)</sup> Absolute Y axis Accuracy (before calibration)	µm	± 3.00
Absolute X axis Accuracy (after calibration)	µm	± 0.50
Absolute Y axis Accuracy (after calibration)	µm	± 0.50
Uni-Directional Repeatability of X axis	µm	NA
Uni-Directional Repeatability of Y axis	µm	NA
<sup>2)</sup> Bi-Directional Repeatability of X axis (peak to peak)	µm	±0.20
<sup>2)</sup> Bi-Directional Repeatability of X axis (RMS)	µm	±0.07
<sup>2)</sup> Bi-Directional Repeatability of Y axis (peak to peak)	µm	±0.20
<sup>2)</sup> Bi-Directional Repeatability of Y axis (RMS)	µm	±0.07
<sup>3)</sup> Pitch of X axis	µrad/arcsec	±15.00/±3.10
<sup>3)</sup> Yaw of X axis	µrad/arcsec	±30.00/±6.19
Roll of X axis	µrad/arcsec	±30.00/±6.19
<sup>3)</sup> Pitch of Y axis	µrad/arcsec	±15.00/±3.10
<sup>3)</sup> Yaw of Y axis	µrad/arcsec	±30.00/±6.19
Roll of Y axis	µrad/arcsec	±30.00/±6.19
<sup>4)</sup> Maximum Velocity(no load)	mm/s	<2000.00





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<sup>5)</sup> Maximum Acceleration(no load)	mm/s <sup>2</sup>	<20000.00
Limits Switches Type (Safety)	-	Optical (Optrons)
Limit Switch Polarity (Safety)	-	Pushed is closed
Limit Switch Voltage (Safety)	VDC	5.00...24.00
<b>Load, Guiding &amp; Transmission Information</b>		
Design Type	-	Planar XY stage
Linear Motor Model	-	LM3
Linear Motor Design Type	-	Ironless BLDC motor
Maximum Bus Voltage	V <sub>DC</sub>	>300.00
Maximal Continues Current	A <sub>PK</sub>	2.21
Maximal Continues Current with Heatsink	A <sub>PK</sub>	3.41
Maximal Peak Current	A <sub>PK</sub>	13.6
Maximal Peak Current with Heatsink	A <sub>PK</sub>	8.79
Maximal Continues Force	N <sub>N</sub>	28.40
Maximal Continues Force with Heatsink	N <sub>N</sub>	43.90
Maximal Peak Force	N <sub>PK</sub>	113.50
Maximal Peak Force with Heatsink	N <sub>PK</sub>	175.40
Pole Pitch N to S/ N to N	mm	15.00/30.00
<sup>6)</sup> Load Capacity (Centrally Placed)	kg	30.00
<sup>7)</sup> Moving Mass of X axis (bottom)	kg	8.50
<sup>7)</sup> Moving Mass of Y axis (bottom)	kg	3.00
Guiding System	-	Linear Crossed Roller Bearings with Cage drift protection
<b>Material And Environment Conditions</b>		
Housing Material	-	Aluminum Alloy
Housing Coating (Finish)	-	Black Anodizing
Environment pressure	-	Normal Atmosphere
Operating Temperature	deg. C	20±2
<b>Control, Communication and Cabling</b>		
<sup>8)</sup> Recommended controllers	-	SPiiPlus EC series
<sup>8)</sup> Recommended drivers	-	UDMhp series
<sup>9)</sup> Recommended BUS power supply	-	1phase(splinted from 3phase source)
Built-in Communication Interface	-	EtherCAT/RS232
Cable Length	m	N/A (separated)
<sup>10)</sup> Differential Outputs	-	YES (LCMv2 available optional)



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Accessories Information		
Base plate for mechanical interface	-	Not required
XY Stack	-	Planar Stage
Z Configuration	-	Not Available
Additional Details		
Dimensions of Moving Platform	(W x L) mm	240.00x240.00
Stage Dimensions	(W x L x H) mm	360.00 x 240.00 x 75.00
Measurement System	-	Metric
RoHS	-	Compliant
Weight	kg	12.5

1) With x4 evaluation.

2) Absolute Accuracy & Bi-Directional Repeatability measurements processed by **Zygo ZMI 501** Michelson laser interferometer. Resolution of ZMI 501: 1.6nm. Environment error: <20nm. Accuracy for a stage 8MTL1401 series is measured above the table with the stage loaded by 2.00kg conditions. Accuracy specification listed in the Table 2 assumes a 20°C +/-2 °C operating environment. If the temperature of the stage differs from 20°C, the encoder scale in the stage will expand and accuracy may drift.

3) Pitch & Yaw measurements are processed by **11D-ALI-COL** electronic autocollimator. Resolution of 11D-ALI-COL: 1 µrad. Environment error: 1 µrad.

4) Maximum Velocity is limited by encoder and driver CUT-OFF frequency. Saturation point of Len1 and **CMhp-ba** series is **50MHz**. Additionally, velocity is limited by Maximum acceleration (please see <sup>5)</sup>).

5) Maximum Acceleration is limited by Drivers` Peak Current, Motors` Peak Current and External Load (inertia). Combination of 8MT1401 series and CMhp-ba series will not saturate at: 20000.00 mm/s<sup>2</sup>;



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2000.00 mm/s; 0 (moving mass only) kg; 2.70 A<sub>PK</sub> @57VDC conditions.

Please take into account, that increasing external load, acceleration of system must be observed in order to not saturate (overcurrent) driver and for successful operation e.g.: 4000.00 mm/s<sup>2</sup>; 400.00 mm/s; 20 (including moving mass) kg will result 2.88 A<sub>RMS</sub> (8.35 A<sub>PK</sub>) @71VDC. Please avoid operation in borders to avoid saturation of presented specification. For technical support please contact Standa. The calculator of duty cycle will be provided.

- 6) Load Capacity is limited by position of load and integrated guiding system. Sufficient duty cycle with added 30.00 kg (maximal) external load is allowed with CMhp-ba and active cooling system e.g.: 220.00 V<sub>DC</sub>; 3.37 A<sub>N</sub>; 8.30 A<sub>PK</sub>; 2700.00 mm/s<sup>2</sup>; 50 mm/s; 30.00 kg; constant velocity travel: 163mm. Sufficient duty cycle (except of start/stop). Please see loading calculator.
- 7) Moving Mass is constant parameter of system which characterize m<sub>0</sub> or inertia of unloaded system.
- 8) Recommended controllers & Recommended drivers are optimized for a repeatable motion and flexibility. For additional feature of CMhp-ba intelligent control system, please contacts Standa.
- 9) Recommended power supply output is limited by we recommend use 2/3 phase filtered source.
- 10) Differential Outputs are available in passive or active (modulated) way with LCMv2.

**FOR MORE INFORMATION, PLEASE CONTACT PRODUCER DIRECTLY.**



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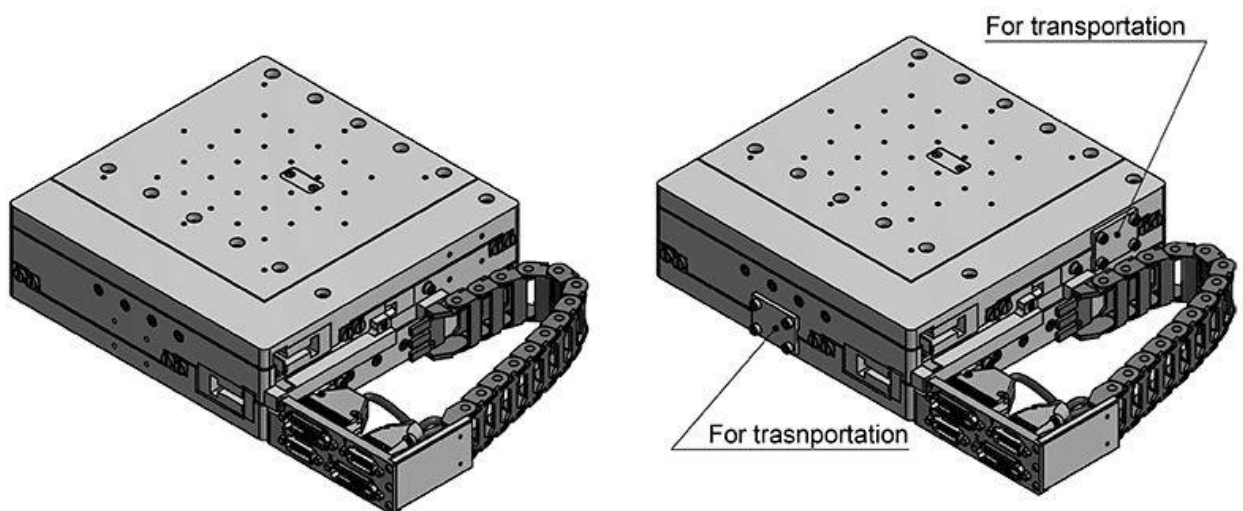
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## 4. INSTALLATION INSTRUCTIONS

### 4.1. Interfacing recommendations

8MTL120XY-LEn1 installation must be accomplished in accordance to interfacing recommendations (see. 2.1) and accompanying documentation. Failure to follow these instructions could result in injury or damage of equipment User must understand that:

- 8MTL120XY-LEn1 should be lifted by one or two person (see Picture 1),
- **Avoid lifting single 8MTL120XY-LEn1 XY configuration by moving parts or above stage. For stacked multi axes system use bottom stage for lifting.**
- 8MTL120XY-LEn1 should be lifted by its base in order to avoid damage and deformations of guiding system. Do not use platform or cable management as lifting points.
- All - 8MTL120XY-LEn1 moving parts should be secured before lifting,
- During shift/impact of unsecured moving parts 8MTL120XY may be damaged.





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Picture 1. Example of stacked 8MTL120 series.

## 4.2. Unpack

Carefully remove the 8MTL120XY-LEn1 from its package. Gently set 8MTL120XY-LEn1 on a smooth, flat and clean surface (*according to 2.1. Recommendations*).

## 4.3. Stabilization

Before operating 8MTL120XY-LEn1, it is important to let it stabilize at room temperature for at least 12 or more hours. Stabilization process will ensure specified values made by factory. Use compressed nitrogen or clean oil less air to remove dust that may be resulted during shipping process.

## 4.4. Labeling

Labeling placed on the stage is necessary to adjust the software or upgrade the calibration, please avoid removing the labels from the stage (cables, housings etc.) and appropriate driver as the serial numbers contains the technical information.

## 4.5. Shipping brackets

All 8MTL120XY-LEn1 series stages are packed with the protective plates and shipping brackets to prevent stages` motion and shock during transportation (see Picture 1). Shipping brackets must be removed before any operation with stage.

## 4.6. Fastening Instructions

Fastening should be processed using standard M6x25 DIN912 with the torque not more than 12.0 Nm for screws of grade 12.9. Screws must be



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fastened starting from the center and processed with "chess-like" sequence. Fastening should be processed by two phases – first phase with torque 1/3 from the nominal fastening torque; second phase with torque 2/3. Please see compliance table for different grade of screws:

**Table 3. Compliance table of 8MTL120XY fastening screws DIN912 M8x25**

Grade	8.8	10.9	12.9
Torque, Nm	7.0	10.0	12.0

Note: Please use washers for fastening.

#### 4.7. Electrical Installation

Electrical and control adjustment must be performed by qualified personnel. Electrical installation may vary depending on the chosen product level. If chosen integration level of product (stage or controller or driver), for more technical support please contact Standa. If chosen completely equipped product: stages and controller, and driver, and power supply, the System will be factory adjusted for a primary, but not sufficient operation and equipped with appropriate cables, wirings and cable management. Final tuning should be processed in operation area. Labels placed on the cables and chassis usually indicates appropriate connections.

If system was purchased separately (stage), all default wiring information is placed in particular document.

#### PRECAUTIONS:

- If application requires access to the stages, stages and the base **MUST** be **appropriate grounded**. System integrator is responsible for



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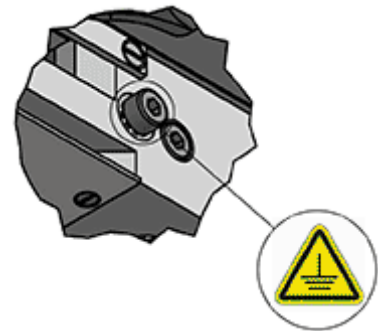
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determining and meeting all safety and compliance requirements necessary for the integration of this stage into their final application.



**Picture 2.** Grounding example of base; moving part is grounded through the motor cable.

- Remove power source of all devices before connecting or disconnecting electrical or electronic components, otherwise it may damage the equipment or result injury.



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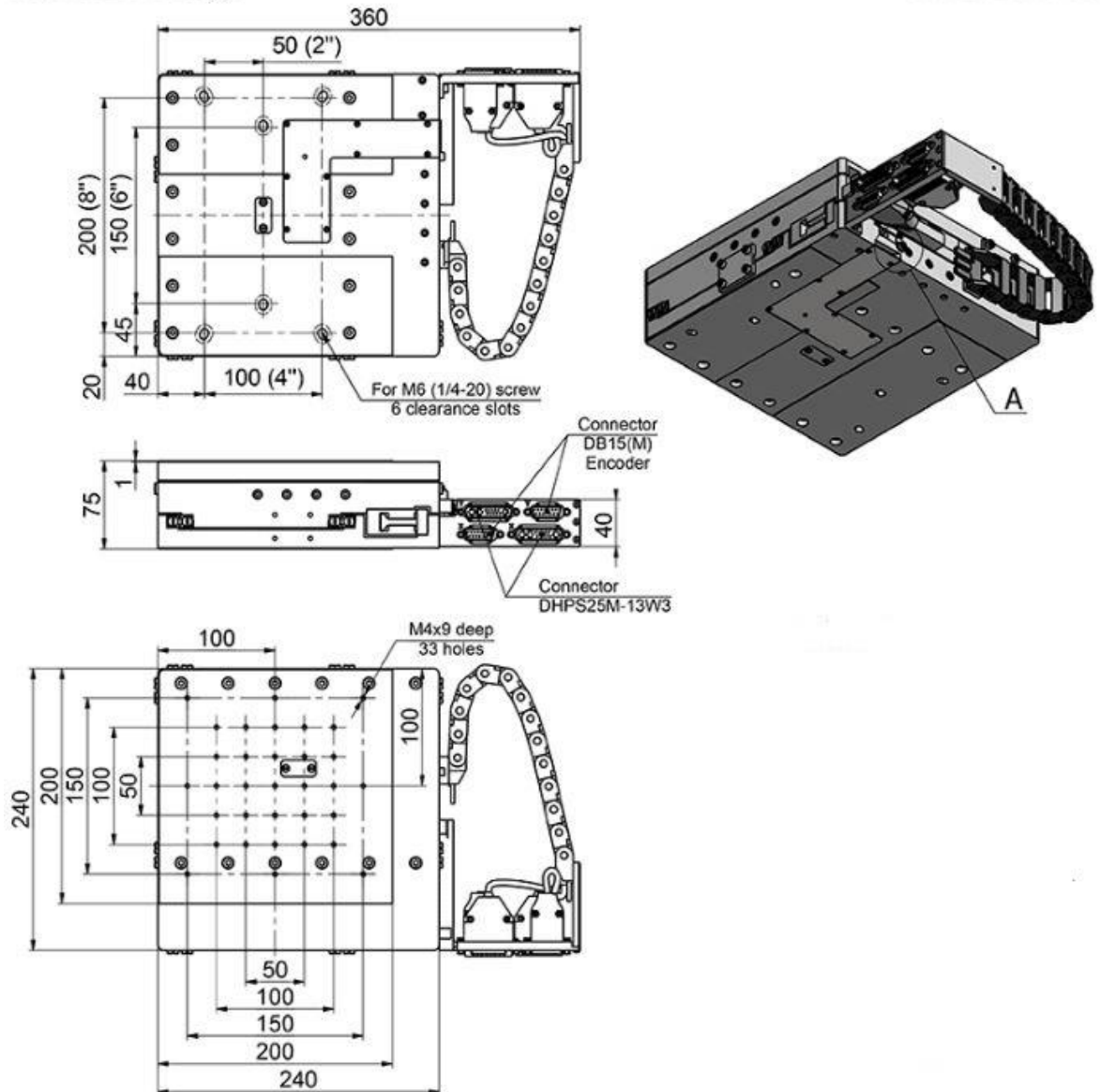
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## 5. MECHANICAL DRAWING AND ELECTRICAL WIRING SCHEMES

*Motorized XY Stage*

*8MTL120XY series*



**Picture 3.** 8MTL120XY-LEn1 drawing.





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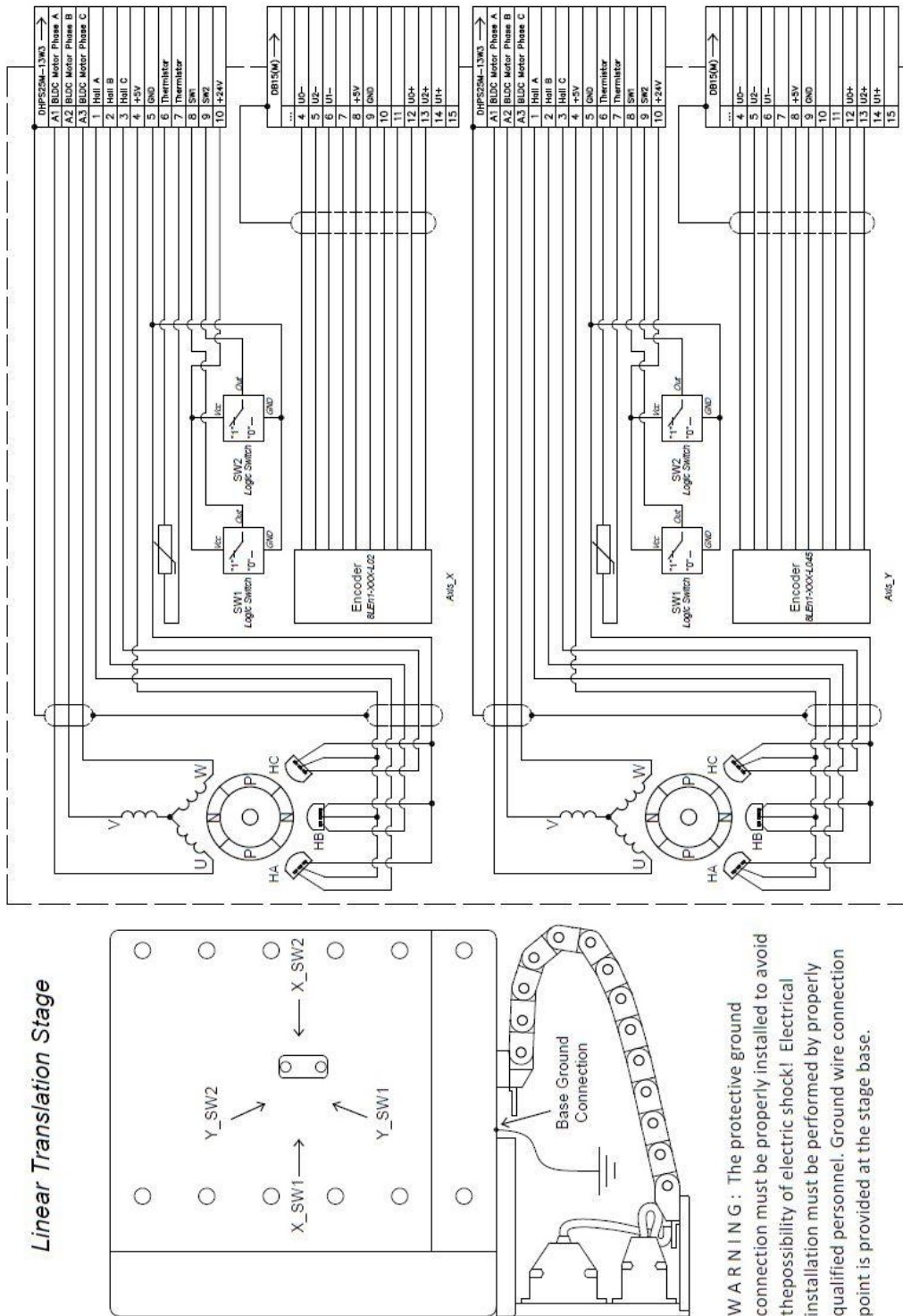
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**Picture 4.** 8MTL120XY-LEn1-XXX electrical scheme.



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## 6. MAINTANCE

Prevent the guiding system from possible liquid and dust. Else it will influence of long-life of equipment.

To prevent the electrical shock or injury disconnect power source before processing maintain.

Lubrication process should be processed every 500km if 50% of duty cycle is applied to the system during operation. For appropriate lubrication mark contact Standa.

Visual inspection should be processed every month and include: inspection of cabling, re-tightening of connectors, cleans the 8MTL120XY series.



Mailing address:  
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Registras – Lietuvos Respublikos Juridinių asmenų registras

## A. APPENDIX: CALIBRATION FILES

### !!! Axis 1 (bottom) calibration file X

X	dX
-60	-0.005248
-50	-0.003407
-40	-0.00222
-30	-0.00139
-20	-0.001156
-10	-0.00064
0	0
10	0.001638
20	0.003205
30	0.004632
40	0.005803
50	0.006738
60	0.00798

### !!! Axis 2 (above) calibration file Y

X	dX
-60	-0.000285
-50	-0.00051
-40	-0.00045
-30	0.000128
-20	0.00008
-10	-0.00024
0	0
10	0.00016
20	0.00031
30	0.00054
40	0.000306
50	0.000426
60	0.000331