



Motorized Low-Cost-Linear Stage



Technical Use Manual
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Only valid for Version 1.92



In your own interest:
Please read the manual and keep it for future reference.
Please note and follow the safety notices.

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1. General notices

You will find in this manual all important Information about the installation, the put into the operation and the service of your motorized stage unit. Furthermore, you will receive detailed information, important notices to your Safety as well as help steps for troubleshooting by encountered Problems. The motorized positioning unit has been manufactured in accordance with the actual valid Norms and Directives.



The motorized positioning unit, as an uncompleted machine, should be taken in operation, first after having asserted that the final machine, into which the incomplete positioning machine unit is to be integrated, is in accordance with the provisions of the Directive 2600/42/EC.

1.1 Short product description

The motorized Low-Cost-Stage is made of anodized aluminium. Such units is to be integrated into a general machine or in professional laboratory applications, and should not be used for other purposes. Please note, that we are not in charge for any damages caused by ignoring this warning important notice.

1.2 Unpacking notices

1.2.1 Visual Control

Before unpacking, please make sure that damages of the packing, that may have been caused by improper packing or improper transport, didn't occur. If external damages or loose screws or components should be to be seen, please take a picture as evidence and and inform us immediately.

1.2.2 Unpacking

Please, open carefully the packing under use of suitable tools. Please, provide that by using of tools, like knife or scissors, thereby the contents of the packaging should not be damaged.

1.2.3 Content Check

Please, check the items contents and make sure that items part numbers and items designations are consistent with those listed in the delivery note enclosed. In case of deviations and if any parts are missing, please inform us immediately.

2. Warranty

2.1 Disclaimer of warranties

Our motorized stage was checked and inspected thoroughly and have left our workshop in safety-technical trouble-free conditions. GMT Europe GmbH motorized stages are warranted for a period of 1 full year after from date of delivery, of course for items to be free from defects in material and to meet all specifications that characterize them. The achievement within the scope of guarantee is limited to items repair and re-adjustment, though defective or not to be compliant.

Please, keep the original packaging for an eventual later items return. Damages in transit on account of not proper packaging of returns are excluded from the guarantee.

Our guarantee terms for provable material or processing defects amounts 1 full year from date of delivery, Wear and tear parts are excluded from any warranty.



We are also not be liable for damages resulting from improper operation, alteration, improper assembly or Not taking account of the instructions and notes given and of the specifications data listed respectively in this technical Use Manual. If a defect within the guarantee time appears, the manufacturer GMT Europe GmbH must be immediately informed. No warranty is provided for self-executed repair or non expert maintenance.

2.2 Warranty instructions

- Within a warranty period, if any following listed failures occur, our company will be in charge for the repair.
- The product is warranted for one year, and is started from the product delivery date to the designated delivery location.
- If any mention listed below occurs, it will not be covered under warranty:



1. The damage caused by using the product in any unspecified environments or methods.
2. The damage caused by unauthorized modifications or repairs.
3. The damage caused by natural disasters or misuses.
4. The damage caused after the purchase due to the careless uses or motions.
5. The malfunctions or damage caused by unauthorized connections with the other machines.
6. The malfunctions or damage caused by the violations of precautions and instructions.

3. Safety notices

3.1 General notices

Please, read carefully the safety precautions to secure the starting operation and take in consideration of the cautions listed and described respectively below in order to prevent unit using personal from being injured. The assembly, the electrical connecting, the adjustment and the putting into operation of all motorized stages from our product range must be carried only out by qualified personnel, a specialist or a trained person for such using.

Qualified personnel are aware of the valid standards, directives, statutes and injuries prevention regulations to be used, that imperative must be considered in such work with motorized stages.

The operator is obligated to ensure a proper training and instruct the persons in charge for the assembly, removal, putting into operation and maintenance or repair of such delivered unit.

3.2 Indications and Safety Symbols

Please consider the important note, Info and warning symbols used by the instructions text and those pasted onto the Low-Cost-Linear-Stage.



Info

- Note / Info



- Warning
- Danger
- Caution



Warning
against
burning



Warning
against hand
and crushing
injuries



Warning against risk
of Slipping / falling
and electric shock



Warning
to ESD
Electro Static
Discharge

3.3 Safety declaration

Our motorized units have been designed and manufactured in accordance with the current technical standards. It is not permitted to carry out any changes without prior consultation with our technical support.



Handling the stage unit without a take in consideration of the instructions that are noticed with warning and caution symbols may result in serious injuries.



For personal injuries and material damages which result from modifications which are not written approved by the manufacturer GMT Europe GmbH, we do not accept any liability for them. For installation and use of the unit, please take account of the instructions mentioned in this operation use manual. Moreover, are valid the general technical safety- and accident prevention-related regulations mentioned.

3.4 Stage Use Cautions



Never touch the stage when it is in operation, except under carefully use of the in delivery enclosed technical manual.

3.5 Precautions with product use environment

The motorized Low-Cost linear stage should only be used, where the following environment conditions ar



Transporting temperature	5°-40°
Transporting humidity	less 80% at 31°C
Installation temperature	5°-40°
Installation humidity	Indoor use only, less 80% at 31°C
Environmental gases	It must not contain any corrosive, inflammable or explosive gas, oil mist dust indoors or water

- For safe installations and operations, please follow the electrical safety instructions. **Do not use it in any explosive, flammable, corrosive, humid environments or wet conditions nor near to such materials. Otherwise, there would be risks of fire and electric shocks.**

CAUTION: A violation may result in serious personal injuries or product damage.



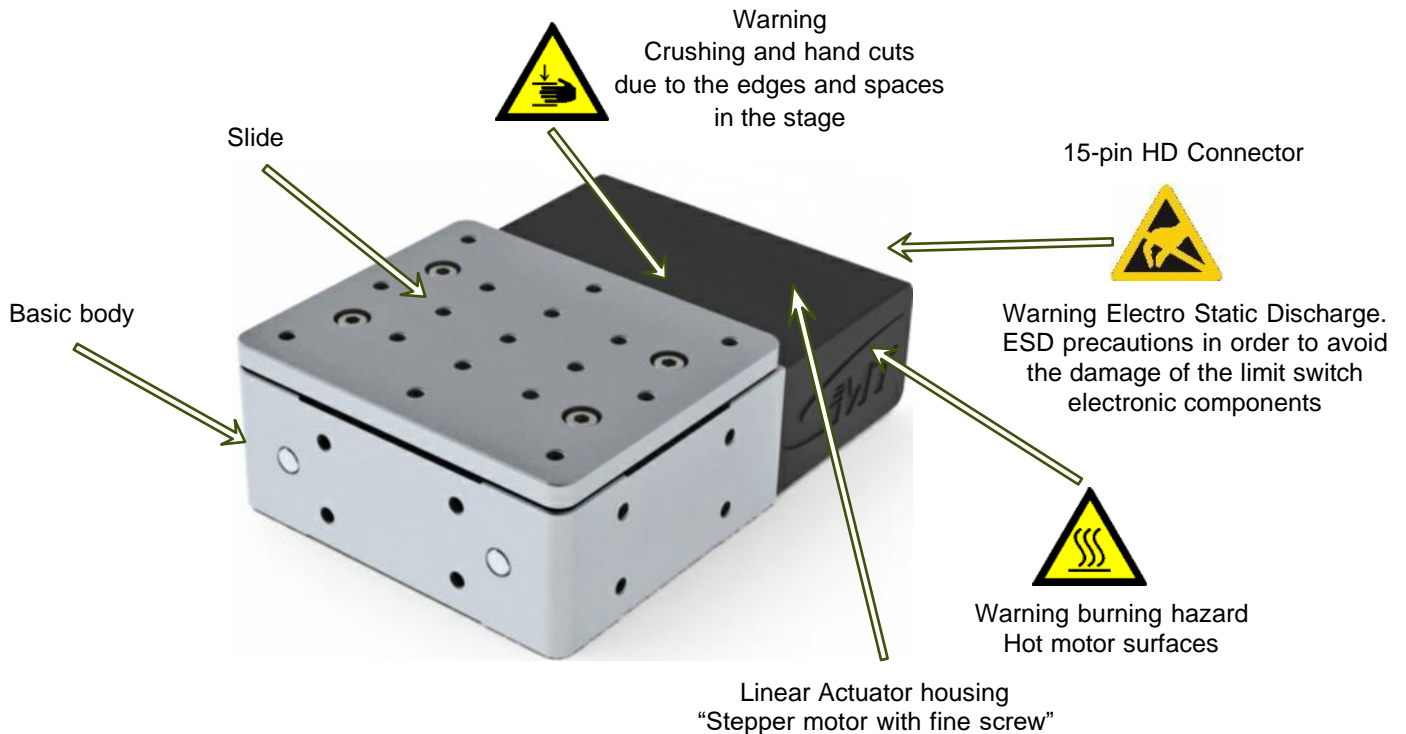
3.6 Product excluded use environment



the motorized Low-Cost linear stage delivered is not provided to be used in following application environmen

- Vacuum room
- Clean room
- Environment with radiation
- Aeronautics and space

3.7 Stage Safety Warning Illustration



4. Technical stage overview

4.1 Quick description

The Low-Cost-Linear-Stage, made of black anodised aluminium, is characterized by an integrated of a Nanotec Linear - Actuator LSA201S06-A-TDBA-102 composed of 2-phase stepper motor equipped with a fine screw. The guiding is realized by ball cages. Further, in the unit are two optical limit

XY Mounting

For XY mounting please use screw (19) (4 pc.). The table must be moved to one end position to screw first pair of screws and than to the other end position to mount second pair of screws
Option you can use Pin (24) (2pc.) to fix in exact 90° position

Z Mounting

For Z mounting please use a M4x8 ISO 4762 Screw. The stage has to me moved into motor side position. Screw for Z-mounting can be placed from back side. Please use PIN DIN6325 2.0 M6x5 also for Z-mounting, otherwise Z-axis will not be fixed sufficiently. Z-Axis can be adjusted by a few degrees before fixing the screw.

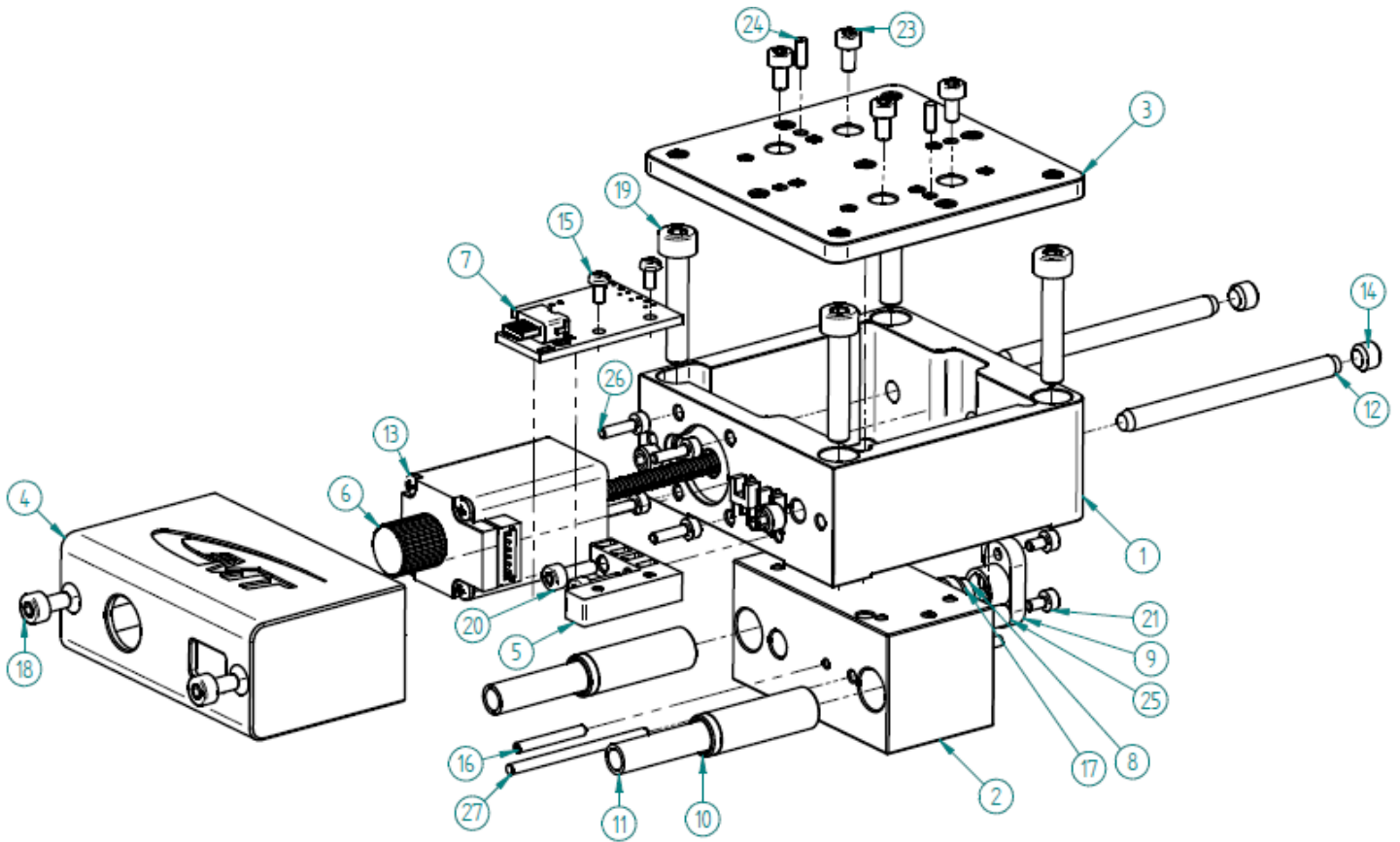


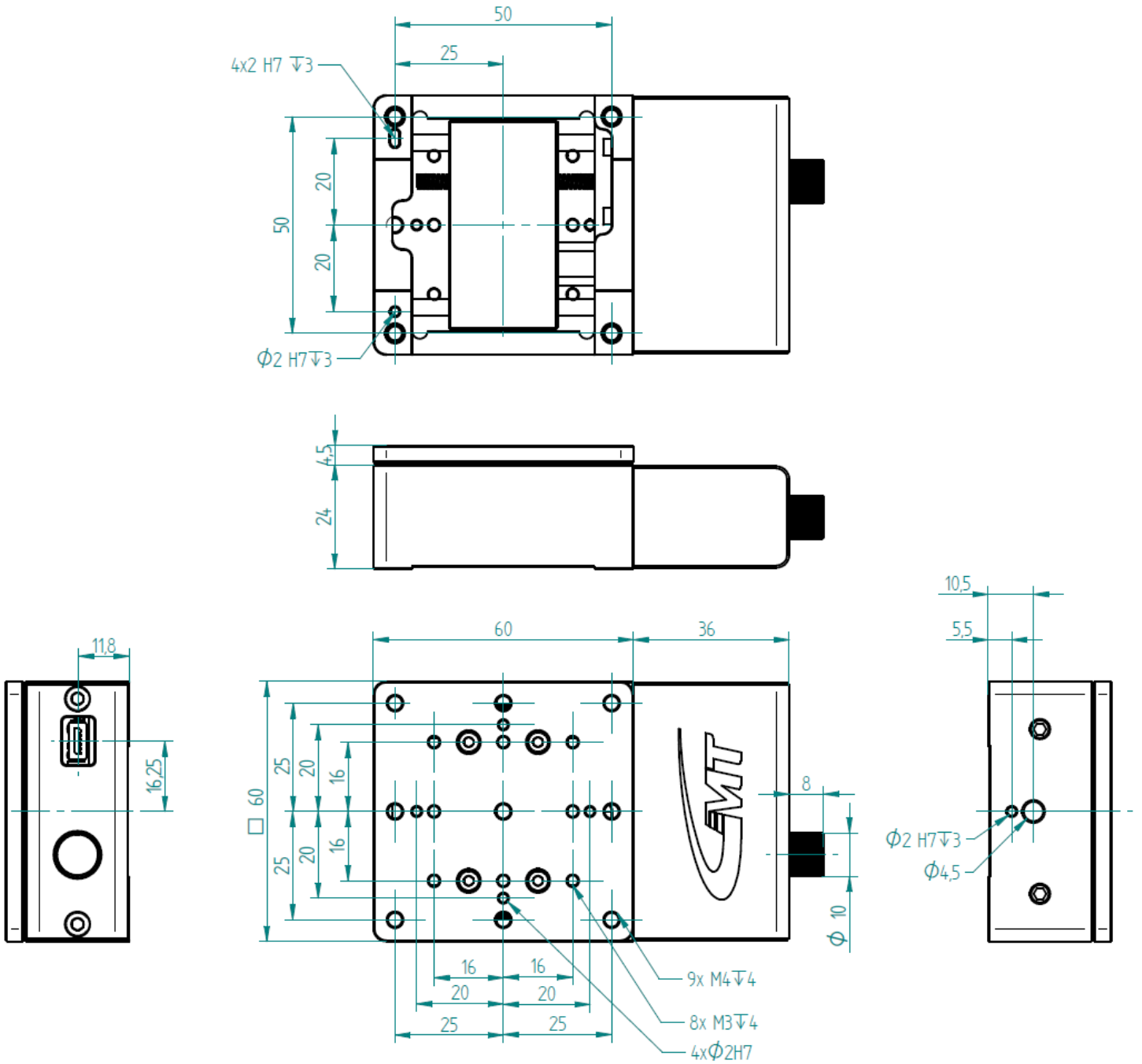
Abb: exploded drawing

Pos.	Bauteil	Anzahl		Anzahl	
1	LCT-001-B	1	14	Gewindestift DIN913-I6K-M5 x 4-A2	4
2	LCT-002-B	1	15	Schraube ISO1580-M2x4	2
3	LCT-003-B	1	16	Gew.stift DIN913-I6K-M2x16-A2	1
4	LCT-004-B	1	17	O-Ring 5x1 NBR Shore70	1
5	LCT-005-B	1	18	Schraube ISO4762-ZK-I6K-M3 x 6-A2	2
6	LCT-008-B	1	19	Schraube ISO4762-ZK-I6K-M4 x 22-A2	4
7	PCP-LCT-006-B	1	20	Schraube ISO4762-ZK-I6K-M2.5 x 8-A2	2
8	LCT-009-B	1	21	Schraube ISO4762-ZK-I6K-M2 x 4-A2	2
9	LCT-010-B	1	22*	Gew.stift ISO4026-I6K-M2.5 x 5-A2	1
10	BAM-04-025BR	2	23	Schraube ISO4762-ZK-I6K-M2.5 x 5-A2	4
11	CAM-04-025BR	2	24	Zylinderstift DIN6325 2.0 m6 x 5	3
12	PAM-04-50	2	25	Schraube ISO4762-ZK-I6K-M4 x 8	1
13	LSA201S06-B-TDBA-102	1	26	Schraube ISO4762-ZK-I6K-M2 x 8-A2	4
			27	Zylinderstift ISO2338 2.0 m6 x 32 A2	1

4.2 Technical Stage specifications

Designation	Data
Stroke	15 mm
Fine screw pitch	1 mm
Motor shaft backlash	<5 μ m
Resolution	5 μ m / step
Repeatability	2 μ m
Speed max	12 mm/s
Actuating force	15 N
Motor voltage	24 V max.
Motor phase current	0,6 A
Load capacity (hor)	1kg
Own Weight	210 g

4.3 Drawing and dimensions



4.4 Mounting Options

XY Mounting

For XY mounting please use screw (19) (4 pc.). The table must be moved to one end position to screw first pair of screws and then to the other end position to mount second pair of screws

Option you can use Pin (24) (2pc.) to fix in exact 90° position

Z Mounting

For Z mounting please use a M4x8 ISO 4762 screw. The stage has to be moved into motor side position. Screw for Z-mounting can be placed from back side. Please use PIN DIN6325 2.0 M6x5 also for Z-mounting, otherwise Z-axis will not be fixed sufficiently. Z-Axis can be adjusted by a few degrees before fixing the screw.



Abb: XYZ Mounting



Abb: XY Mounting



Abb: XZ mounting



Abb: YZ Mounting

5. Electrical specifications

5.1 Limit switches evaluation

The linear stages are equipped with two forked photoelectric limit switches CCWLS CWLS. They are mounted in the stages as shown in the following illustration (chapter 5.2) and evaluated as drafted in the operating sequence diagram

CCWLS limit switch will be achieved by a counterclockwise motor motion (motion in direction to the motor side), CWLS on the other hand by a clockwise motor motion (motion to the opposite / reversed motor side).



Info

The limit switches mounted in the linear stages are configured as normally closed "NC" They have OP-Amp-Outputs and are Low-Active.

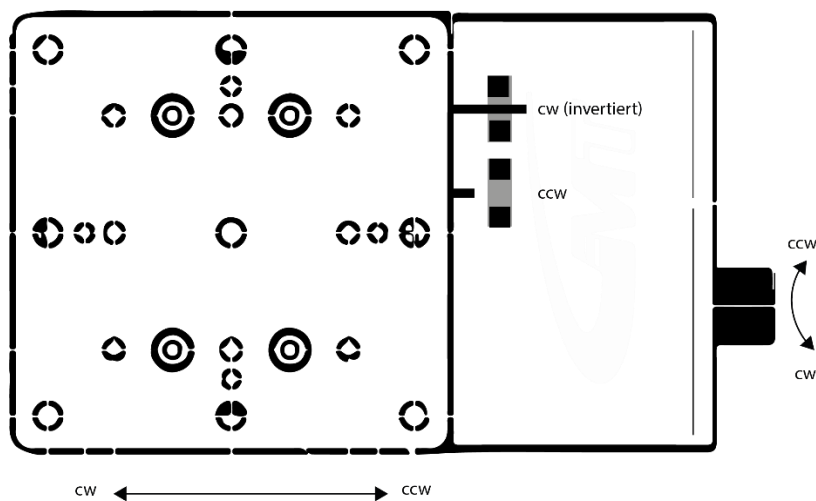


Abb: Stage Sensor Location

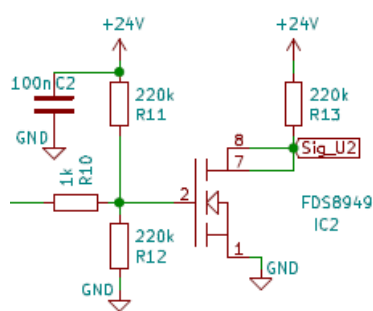
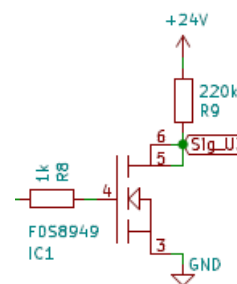


Abb: Signal Circuit CCW / U2



Signal Circuit CW / U3

Fig.5 Collector Current vs. Collector-emitter Voltage

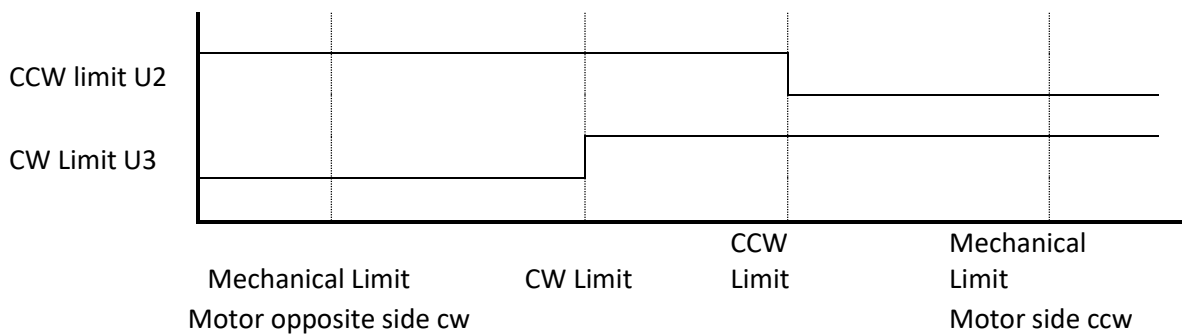
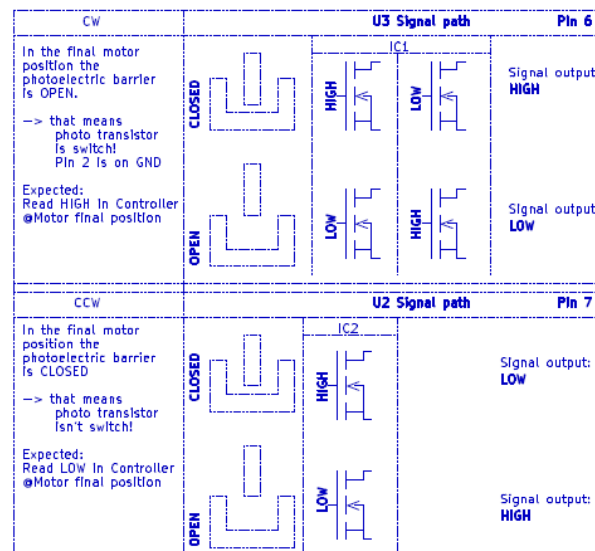
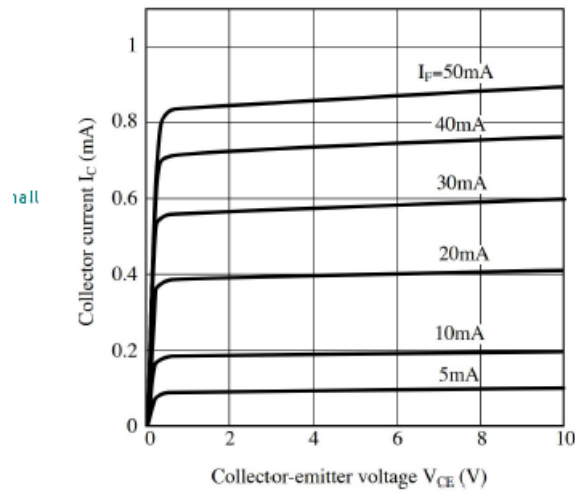


Abb: Sequence Diagram

5.2 Wiring Diagram and Connector

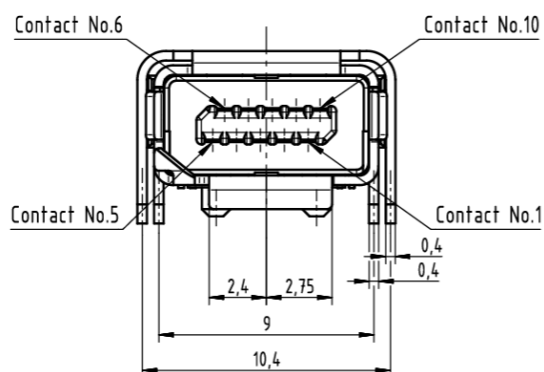


Abb: Harting ix industrial Type B

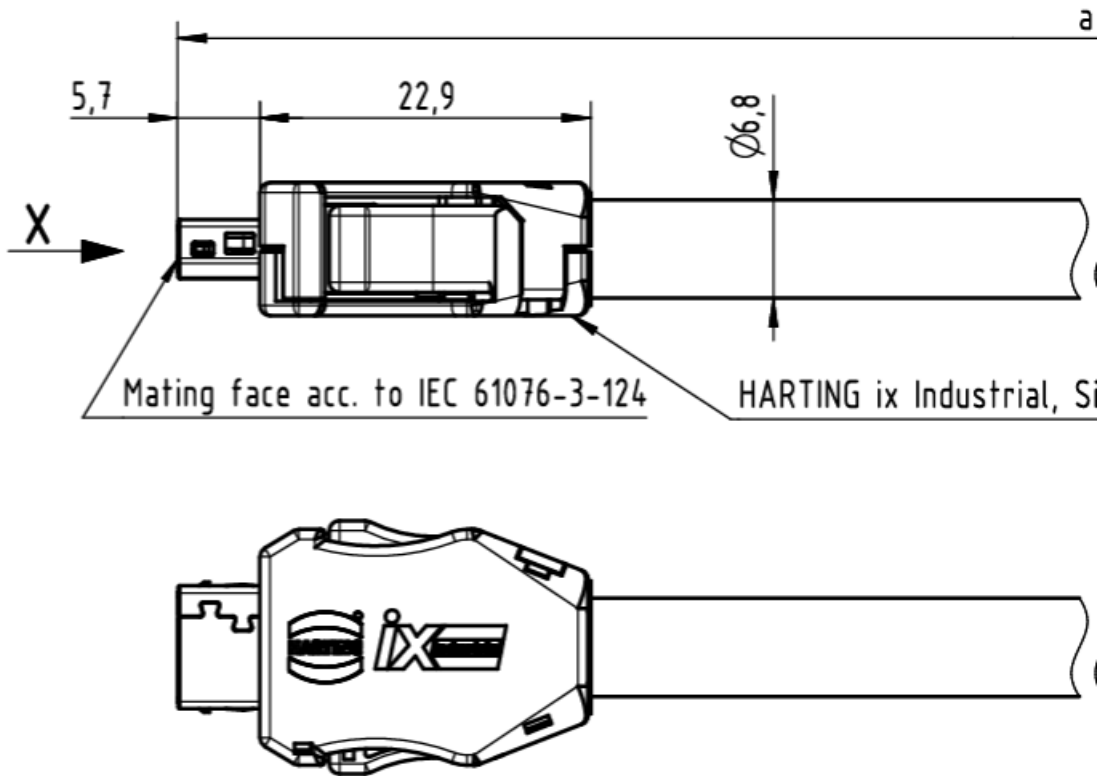
Harting IX Typ B

Pin	
1	B/
2	B
3	A/
4	A
5	Reserve
6	U3 cw
7	U2 ccw
8	Reserve
9	24V
10	GND

Abb: Wiring Diagram

5.3 IX Adapter

If you are using the iX Type B cable, please pay attention to the different Wiring diagram



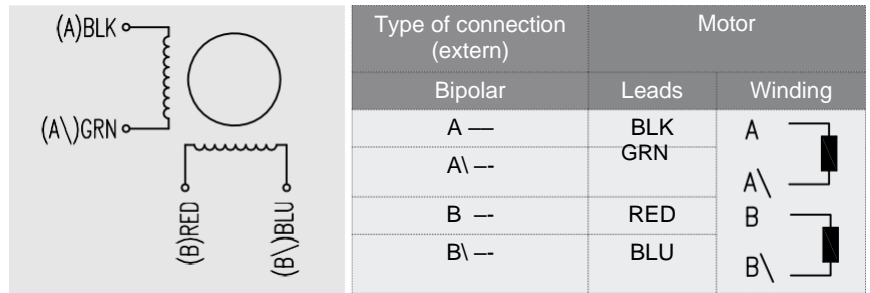
Harting IX Typ B

Pin		color
1	B/	
2	B	brown
3	A/	green
4	A	yellow
5	Reserve	grey
6	U3 cw	pink
7	U2 ccw	blue
8	Reserve	red
9	24V	black
10	GND	purple

6. Nanotec Linear Actuator

The motorized Low-Cost-Linear stage is equipped with Nanotec Linear Actuator motors “2MS-N28D32A2 with 4 connecting wires. The stepper motors (NEMA 11) are in the version with second motor shaft for mounting a suitable resonance attenuation damper. (Shown lead color are inside the stage only)


6.1 Motor technical data



Specifications	Data
AMPS / Phase	0,6 A
Resistance / Phase @ °C	6.4 ± 10%
Inductance / Phase @1 KHz	2.6 ± 20 % mH
Thread-0 (mm / inch)	3,5 / 0,138
Thread lead (mm / inch)	1 / 0,0394
Thrust	46 N
Resolution	0,005mm / step
Speed max. @ 24 V	40 mm/s
Own weight (Kg / lb)	0,063 / 0.139

Designation	Data
Temperature rise:	max. 80 °C (motor standstill, for 2 phase energized)
Ambient Temperature:	- 10 ~ 50 °C [14 °F ~ 122 °F]
Insulation resistance:	100 MOhm (under normal temperature and humidity)
Insulation class B:	130 °C [266 °F]
Dielectric strength:	500 V for 1 Min. (between motor coils and motor case)
Ambient humidity:	max 85% (No Condensation)

FULL STEP 2 PHASE—Ex.,
 WHEN FACING MOUNTING END (X)

STEP	A	B	A\ —	B\ —	
1	+	+	-	-	
2	-	+	+	-	
3	-	-	+	+	
4	+	-	-	+	

7.0 Electrical specifications

7.1 Motor voltage



Please note:

With refer to the low voltage directive, the maximum motor supply voltage in connection with the Motion Controller to be used for driving the motorized goniometer stages should strictly not exceed 48 V DC.

7.3 Installation procedures



1. Please make sure there is no flash, dust, or dent on the installation surface.
2. Please put the product on the installation surface.
3. The screw holes should be aligned with the ones located on the installation surface.
4. It is suggested to use the screws according to the compliance of the standard specifications.
5. Use a torque wrench to tighten screws.



6. Make sure that the power is OFF before servicing the motorized linear stage
7. Do not touch the motorized linear stage during servicing
8. Never wire the cable when it is connected to stage
9. Never touch the connector pins while power is ON

7.4 Precautions by the initial operation

- If any unusual sounds and vibrations arise during operations, please immediately stop the machine.
- Do not forcibly pull or bend any electric wires and follow the wiring diagram for correct wiring.
CAUTION: A violation may result in personal injuries or product damage.
- For tightening screws, please use a torque wrench corresponds to specifications of the screws.
CAUTION: A violation may cause loosening.
- Please do not allow the setting of machine speed to exceed the maximum default speed and avoid extreme changes of the setting and parameters.
CAUTION: A violation may result in personal injuries or product damage.
- If any malfunctions or damage arise, please do not continue the use.
- Please make sure the wiring and connections of electric equipment are secured and the parameters are set correctly.
CAUTION: A violation may cause fire, electric shocks, personal injuries or product damage.
- The product is designed and planned to be operated horizontally.
CAUTION: If the product is used in otherwise directions, it will reduce the life and increase the probability of malfunctions.
- Do not apply any inappropriate forces on or strike the product to prevent damage and deterioration of its specifications.
CAUTION: A violation may cause a deterioration of technical specifications indicated in the data sheet.
- In order to avoid a function inefficiency, please do not turn off the travel stroke limitation sensors during the operation.
CAUTION: A violation may result in personal injuries or product damage.
- If any screw holes do not fit or need additional screw holes, please contact our sales persons and do not handle it by self to guarantee the specifications given and the warranties.
CAUTION: A violation may cause damage on product and deterioration of its technical specifications.
- All of the accessories and parts of the product are not water-proof or dust-proof; please do not directly use in oil mist dusty or humid environments.
CAUTION: A violation may cause damage on product and the precision unable to match the specifications marked in the data sheet.

8.0 Troubleshooting

- If the Linear Actuator or mechanisms are hit by the external forces, please check whether the properties of the fine screw and the guiding are in normal.



- Please do not arbitrarily adjust the position of both left and right limits to prevent the collisions and the loss of warranties.
- The wires and receptacles of the limit switches must be secured to prevent loosening.



- Do not arbitrarily loosen the couplings and transmission structures to guarantee the precision and warranties.
- If any unusual noises or vibrations occur in operations, for safety, please turn off the power first immediately.
- Do not mount or dismount the linear Actuator or parts onto the slide "linear part to be moved" during servicing.
- Do not touch the linear stage during servicing and do not put any parts or your hands between the slide of the "linear part in motion" and the stage body. Otherwise serious hands injuries and product damage may occur.