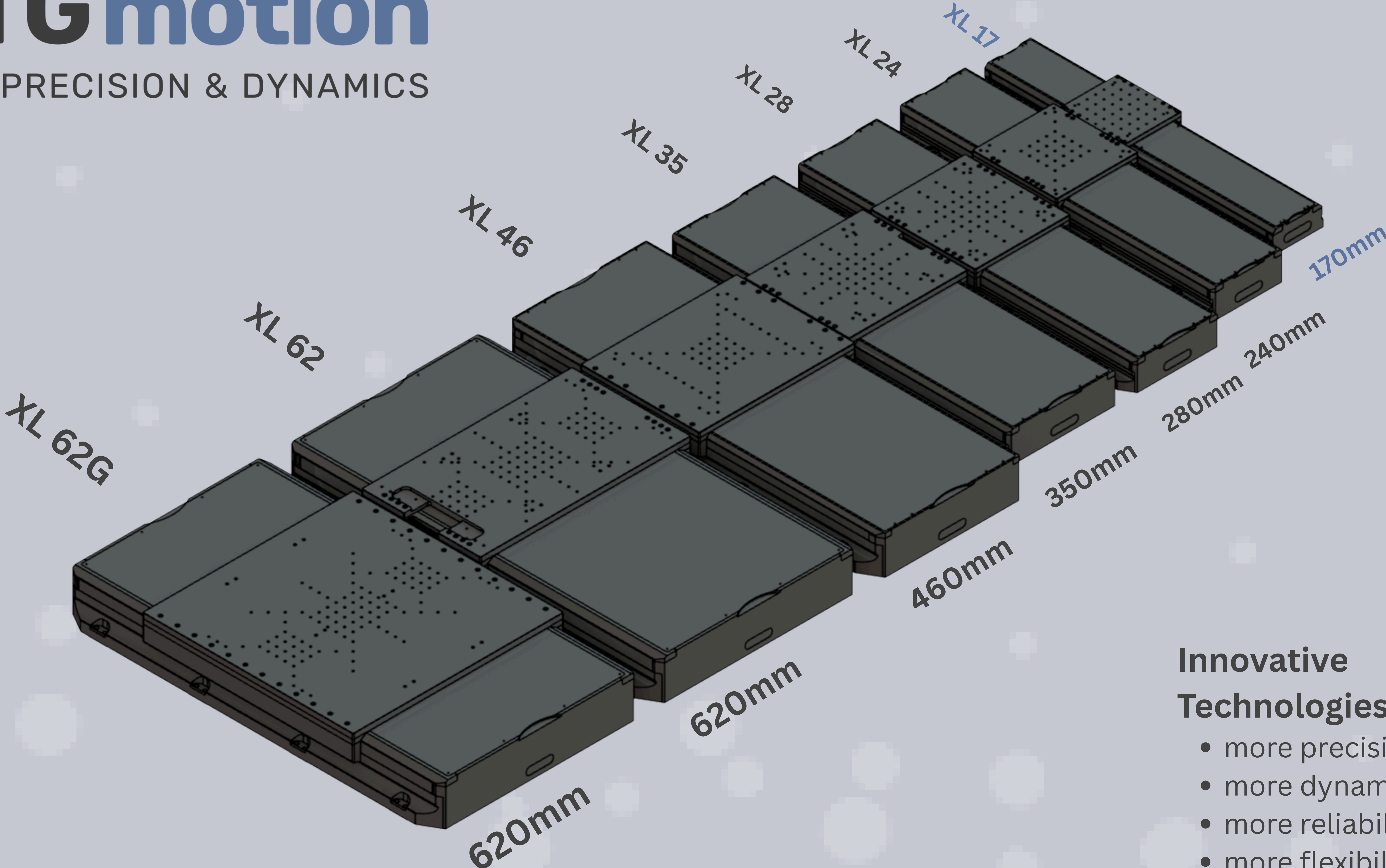


**XL Family**

Direct Driven Linear Axes with up to 4600mm nominal travel

# NTG motion

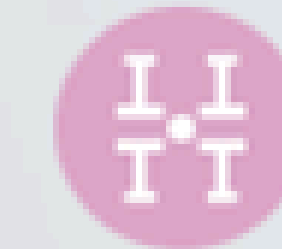
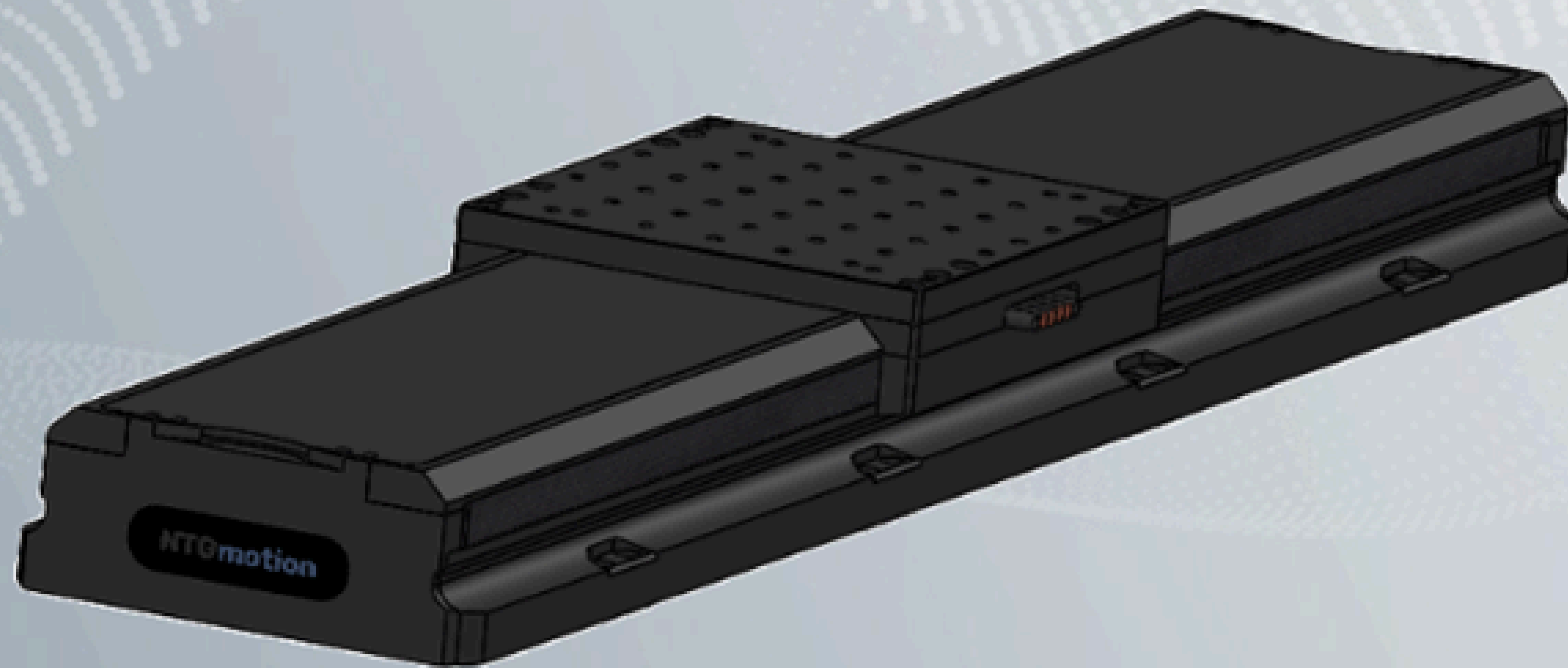
HIGH PRECISION & DYNAMICS



**Innovative Technologies for**

- more precision
- more dynamics
- more reliability
- more flexibility

**HIGH PERFORMANCE MOTION SOLUTIONS**



Multi Motor Technology



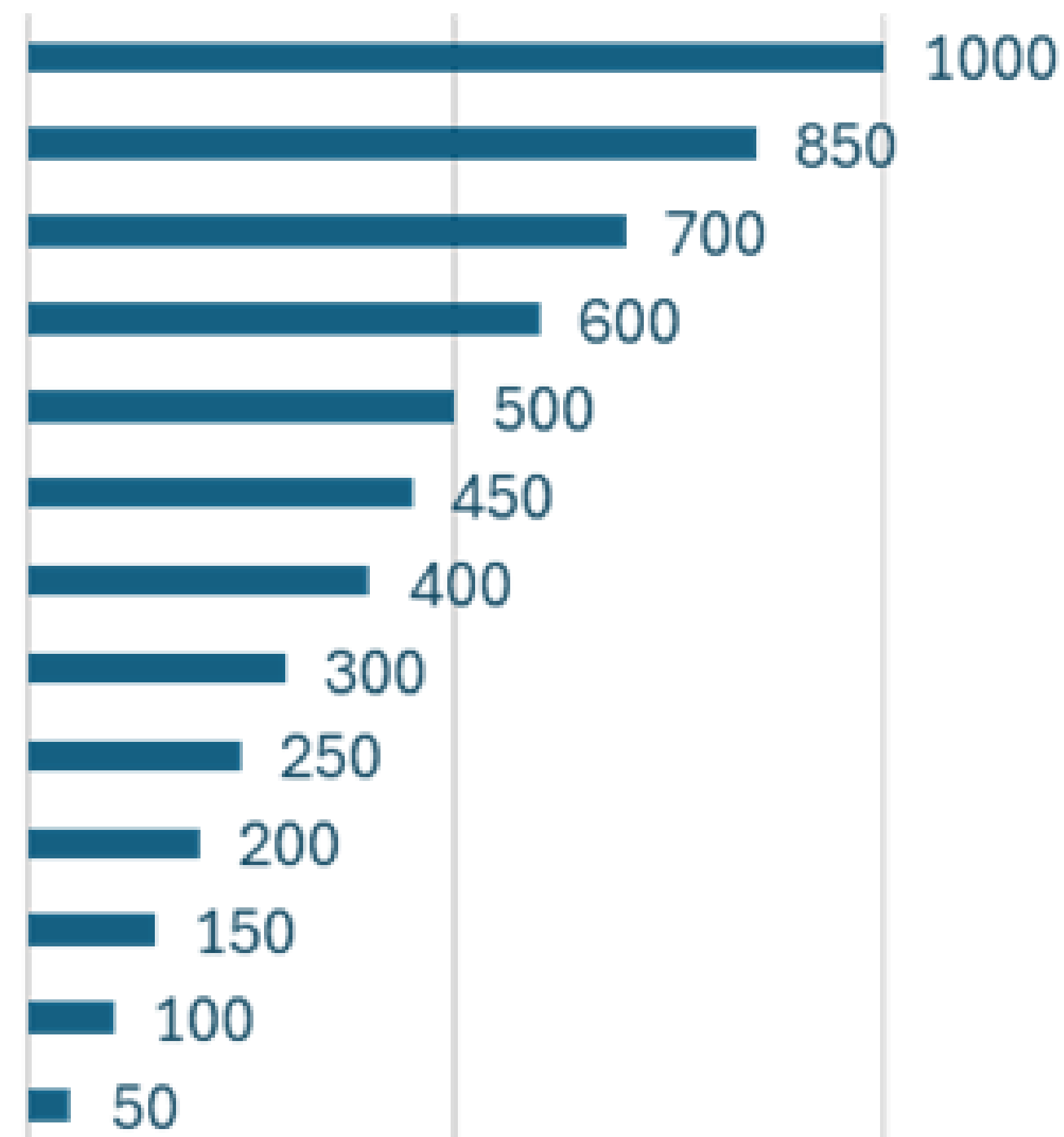
Optional Integral Closed Loop Water Cooling System



Optional three level Thermal Energy Control System

## OVERVIEW

### Standard nominal travel ranges in mm:



### Size and load capability:

Length: Travel + 250mm  
 Height: 80mm (inclusive Tabletop)  
 Width: 170mm (exclusive CMS (\*))

Max. horizontal load (\*\*): 85kg  
 Max. side load (\*\*): 65kg

(\*): CMS = "Cable Management System"  
 (\*\*): Look at the LCC (Load capability chart on page)

### XL 17 can operate in different Enviroments:

Eo; E1; E2; E3; E4; E5      NTGmotion E-classifications (p.8)

### XL 17 Stages

are designed for 24/7 operation to meet agressive demands on PRECISION, VELOCITY, and DYNAMICS at HIGH DUTY CYCLE.

These stages are ideal for applications which require high throughput without sacrificing precision.

## TOP or SIDE loading

The bearing setup inside the stage allows operation with different loading szenarios:

- Horizontal load top loading: 100% (see LCC)
- Horizontal load up side down loading: 85% reduction
- Side load 100% (see LCC)

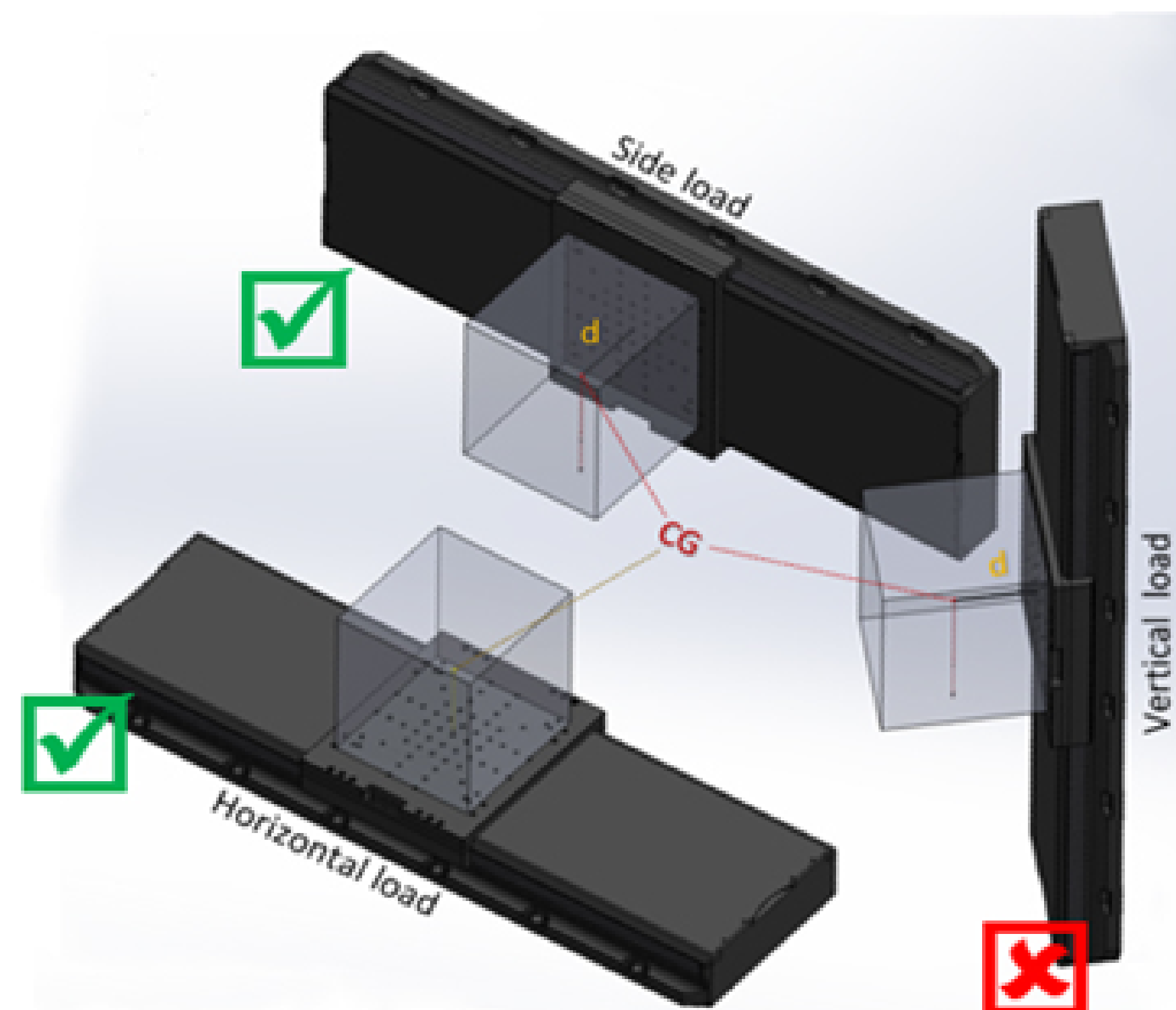
Vertical Loading is not considered!

## Load vs. Bearing Lifetime

XL 17 Linear stages use high quality bearings to minimize motion errors and to maximize life time. The bearing life time is dependent on the load- and dynamic requirements as well as the move profile defined by the application.

The Load capability chart is based on long stroke moves with moderate dynamics. For more details and lifetime- calculations contact our experts.

## Mounting orientation:



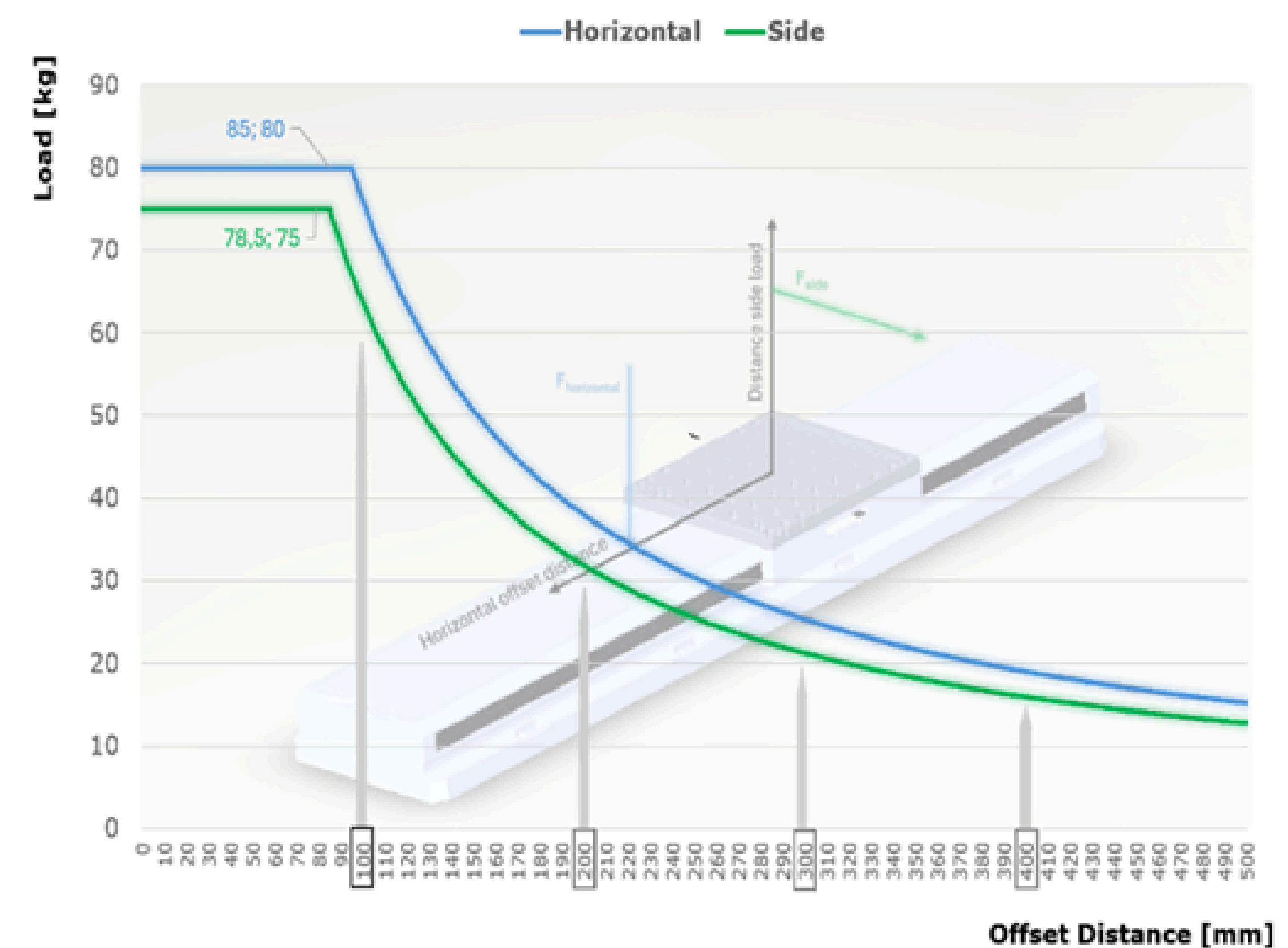
CG = Center of Gravity  
 d = Distance between CT (Center of Tabletop) and CG  
 ☒ = This Mode of operation is not allowed

Using the stage in vertical mounting orientation is not considered:

**⚠** Due to the low friction, the table top with the load falls down (Gravity) and potentially damage objects or hurt the operator.

If vertical operation is required we recommend the XS-, XT- or XE series stages or contact our experts!

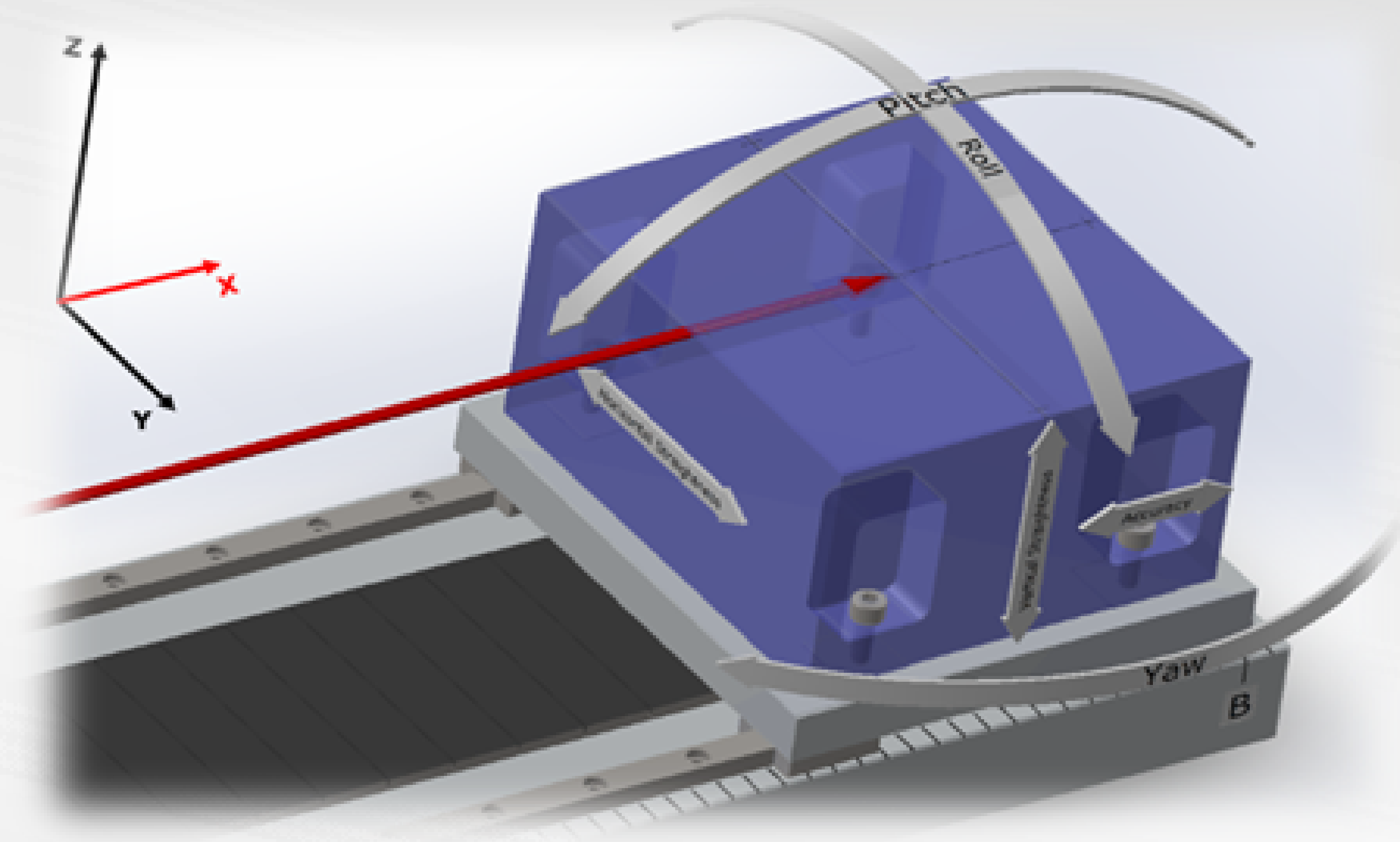
## Load capability chart [LCC]:



# XL 17

# Direct Driven Linear Axis

As any other linear motion device in the world, the XL 17 is not performing a perfect motion. It produces motion errors in all six degrees of freedom. Figure 1 roughly illustrates the meaning of the specifications in the table above.



For detailed explanations about the meaning of the specifications, how they are measured and environmental conditions, download our engineering reference document "Linear Motion Guide".

SPECIFICATIONS		Units	Nominal Travel in mm															
			50	100	150	200	250	300	400	450	500	600	700	850	1000			
<b>Stage Size:</b>	Width	mm								170								
	Length	mm	300	350	400	450	500	550	650	700	750	850	950	1100	1250			
	Height	mm								80								
<b>Stage Mass:</b>		kg	8,9	10	11,1	12,2	13,3	14,4	16,6	17,7	18,8	21	23,2	26,5	29,8			
<b>Max. Load Capability:</b>	Horizontal	kg							80									
	Side	kg							65									
<b>Moving Mass</b>		kg							4,0									
<b>Max. Force</b>	Continuous	N	-S Option 47,6; -D Option: 95,2; -Q Option 190,4;															
	Peak	N	-S Option 151; -D Option: 302; -Q Option 604;															
<b>Max. Acceleration</b>		m/s <sup>2</sup>	-S Option 18; -D Option: 32; -Q Option 40;															
<b>Max. Speed</b>		mm/s							2600									
<b>Accuracy:</b>	Uncalibrated	µm	±3	±4	±6	±8	±9	±10	±12	±13	±14	±15,5	±16	±17	±18			
	Calibrated	µm	±0,75								±1							±1,5
<b>Bidirectional Repeatability</b>		µm	±0,3						±0,4					±0,5		±0,5		
<b>Straightness</b>		µm	±1,5	±1,5	±2,0	±2,5	±3	±3,5	±4,5	±5	±5,5	±6,5	±7	±8	±9,5			
<b>Flatness</b>		µm	±1,5	±1,5	±2,0	±2,5	±3	±3,5	±4,5	±5	±5,5	±6,5	±7	±8	±9,5			
<b>Pitch; Yaw; Roll</b>		µrad	19	27	29	40	45	50	60	65	70	80	85	90	110			
		arcsec	3,9	5,6	6	8,3	9,3	10,3	12,4	13,4	14,4	16,5	17,5	17,6	22,7			
<b>Smallest (mechanical) step size</b>		µm	0,003															

## RECOMMENDED DRIVE:



DX-Series: 100kHz Servo Drives.  
For the optimal selection call our experts.

## FEEDBACK INTERFACE:

- Standard: ANALOG 1Vpp differential
- Optional: DIGITAL TTL differential
- Optional: DIGITAL BISS C

## MOTOR(s):

XL 17 contain **MLU1-F-2-D** motor(s):



Type:	U-channel-Ironless three phase synchron linear motor
$U_{max}$ :	500Vrms
$I_{contmax}$ :	11,7A
$I_{peakmax}$ :	17A

Specs for single motor with delta connected winding.  
For Y-connected windings or other options call our experts.

Opional windings:

The MLU1-F-2 Coil- setup offers many options:

- Internal parallel, delta connected
- Internal serial, delta connected
- Internal double parallel, delta connected (standard)
- Internal parallel, Y connected
- Internal serial, Yconnected
- Internal double parallel, Y connected (standard)

In addition with the -D and -Q setup motor coils could be serial or parallel connected (external wiring).

## CONFIGURATION:

For maximum flexibility the XL17 can be configured for different speeds and dynamic ranges, for different levels of precision, different cable management options and various mechanical interfaces as well as for different environments.

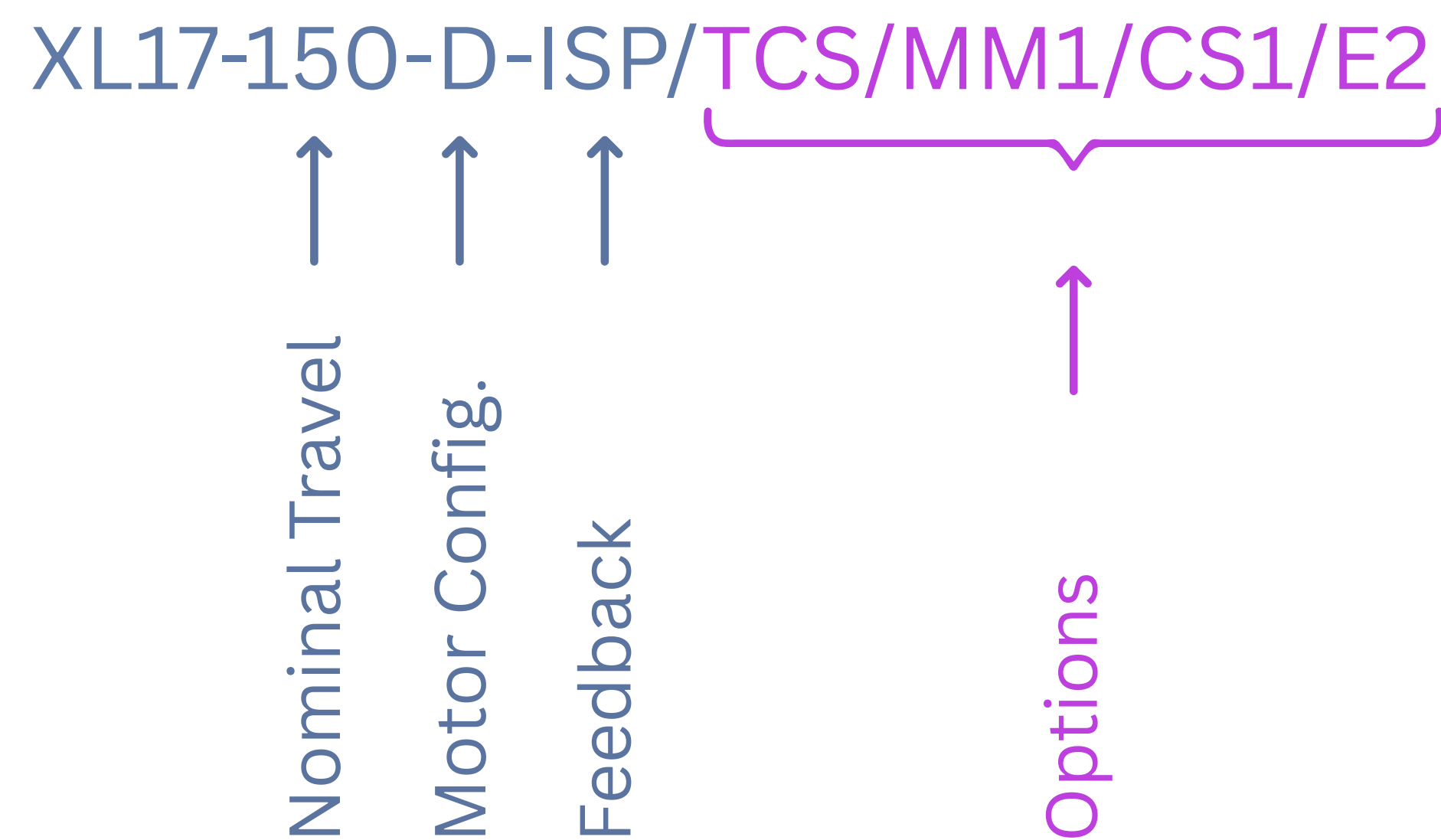
### MANDATORY

### OPTIONAL

Series	Nominal Travel	Motor Setup	Feedbacksystem	Technology	Tabletop adaption	Measurement and calibration	Cable Management System	Environment	Design change
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## ORDERING INFO

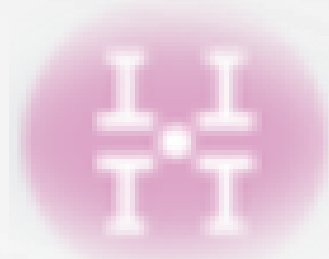
### Example:



XL17				ICS	TXX	MM0	CS0	E0	D00
	-50	-S	-ISP	TCS		MW0	CS1	E1	
	-100	-D	-IHP			MM1	CS2	E2	
	-150	-Q	-IUP			MW1	CSC	E3	
	-200		-ASP			MM2		E4	
	-250					MW2		E5	
	-300					MCT			
	-400								
	-450								
	-500								
	-600								
	-750								
	-1000								

For short descriptions of the terms above read the next page. For more details check out the HIGHLIGHT section of our Web page and download our engineering reference paper "Linear axes" or call our experts.

## INNOVATION



**FOR MAXIMUM FLEXIBILITY AND DYNAMIC PERFORMANCE**

With 18 different motor configurations, XL17 offers the highest flexibility without changing its formfactor to meet your dynamic requirements. With the -Q option XL17 offers unmatched force and speed characteristics for high acceleration at high speeds.



**FOR MAXIMUM FLEXIBILITY AND DYNAMIC PERFORMANCE**

An Integrated closed loop Cooling System "ICS" allows to drastically expand **duty cycles** without burning the motors by **removing** thermal energy from the stage. ICS increases throughput without changing the formfactor of the stage.



**FOR HIGH PRECISION**  
(Requires "ICS" and our Dynamix Controller)

A sophisticated Thermal Control System "TCS" **measures** temperature at strategic points of the stage, **controls** removal of thermal energy (ICS) and **dynamically compensates** thermal drift effects using intelligent algorithms. TCS increases ACCURACY and STABILITY.

## MANDATORY:

Nominal Travel [mm]

Motor Configurations

- S Single ironless Linear Motor
- D Dual ironless Linear Motors
- Q Quattro ironless Linear Motors

Feedback options

- ISP Incremental Standard Precision
- IHP Incremental High Precision
- IUP Incremental Ultra High Precision
- ASP Absolute Standard Precision

Those options are mandatory, they define the stage configuration. Use "-" separator between the options. If none of the **optional items** are added the following terms will be automatically included: /MM0/CS0/E0.

## OPTIONAL:

- /ICS Integral Closed Loop Cooling System
- /TCS Three Level Thermal Control System reduces impact of thermal gradients
- /TXX Tabletop Adaption for mounting another Xx-xxx axis (XX: E; L; M; R; S + size)
- /MM0 Standard single axis measurement of static errors (no cal.1)
- /MM1 Standard single axis measurement of static errors with cal.1
- /MM2 Single Axis measurement of static & dynamic errors and cal.1
- /MW0 Single axis measurement of static errors in WPL.2 (no cal.1)
- /MW1 Single axis measurement of static errors in WPL.2 with cal.1
- /MW2 Single axis measurement of static and dynamic errors in WPL.2 with cal.1
- /MCT Custom defined measurements, calibrations and tests
- /CS0 External Cable Management System for cables and hoses relating to the axis
- /CS1 External Cable Management System for cables and hoses for two axes
- /CS2 External Cable Management System for cables and hoses for three axes
- /CSC Custom external Cable Management System (involves Engineering)
- /D00 Custom modifications of the stage (involves Engineering)

Use the "/" separator between these options

## INTERACTION WITH ENVIROMENT



### ENVIRONMENTAL CONDITIONS

have a major impact in the whole process of building motion systems (MS). Starting at material- and component selection, continuing with design, manufacturing, handling, assembly, test and shipment. Because environmental conditions strongly influence performance and cost of a MS, all environmental parameters need to be clarified and carefully evaluated.

### EVALUATION OF BOTH SIDES

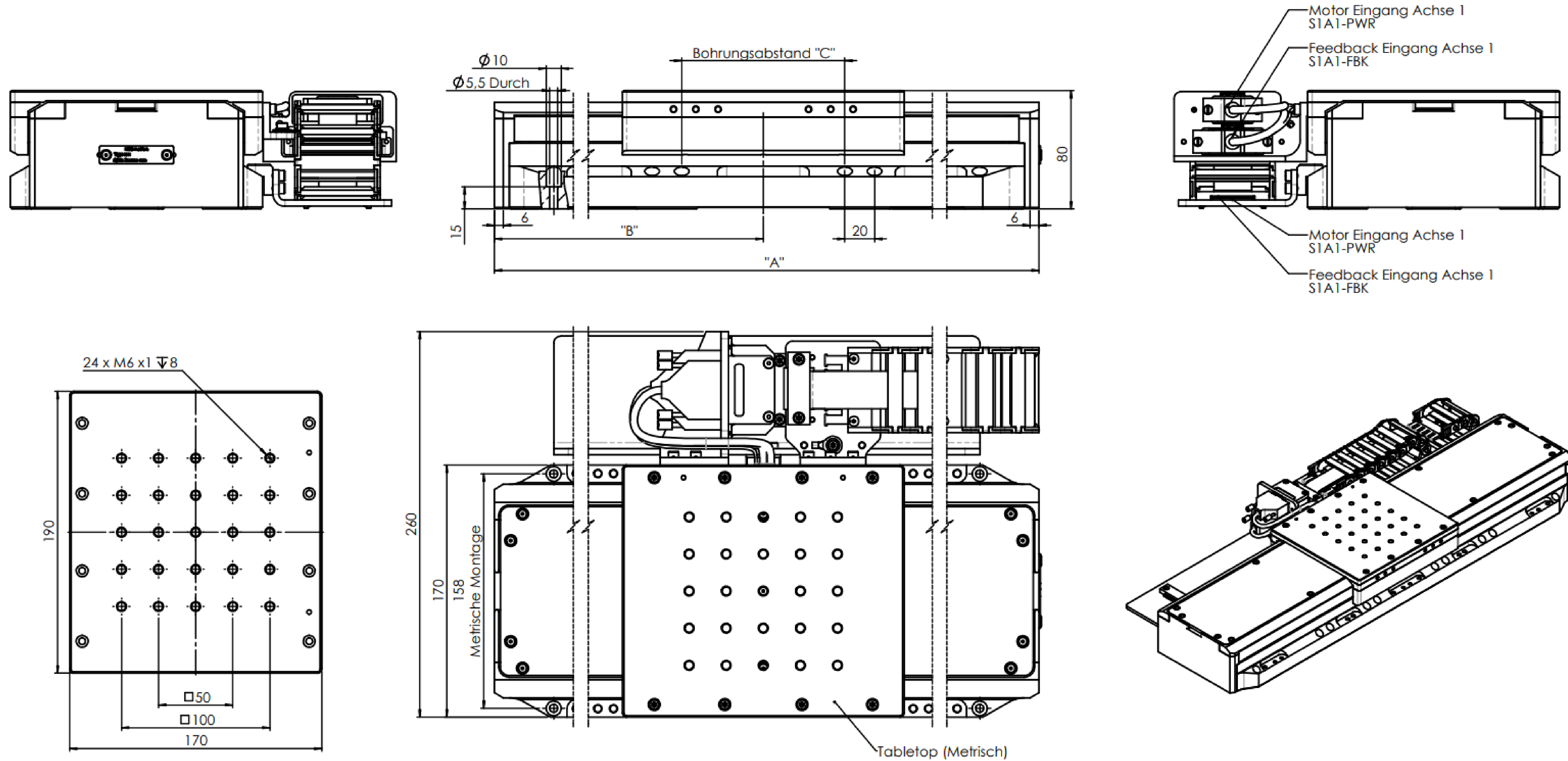
Temperature changes, humidity, air pressure, particles, vibration, and forces from the environment directly impact the performance of a MS as well as the quality (flatness) of mechanical interfaces. On the other side MS also influences the environment by emitting thermal energy or particles or vibration into the surrounding environment. That is particularly a problem in Clean room or Vacuum applications.

## Enviromental Classifications

- /E0 (standard) LAB Environment (no additional actions required)
- /E1 PRECISION LAB Environment (thermal control system, cooling system, isolated machione base...)
- /E2 Cleanroom Environment (additional actions are required depending on ISO Class and material restrictions)
- /E3 Vacuum (up to 10<sup>-9</sup>Torr) (additionl actions are required depending on pressure and material restrictions)
- /E4 ESD critical environment (additional actions are required)
- /E5 Industrial dry (additional actions are required such as shielding...)

NTGmotion has many years of experience with the environments mentioned above and is able to design and build motion systems after clarification of all details.





Modell	Hub Nominal	Hub elektrische Endlagen	Hub mech. Endlagen	A	B	C
XL17-50	50	51,6	72	300	150	110, 150
XL17-100	100	101,6	122	350	175	110, 150
XL17-150	150	151,6	172	400	200	110, 150
XL17-200	200	201,6	222	450	225	110, 150
XL17-250	250	251,6	272	500	250	110, 150, 290
XL17-300	300	301,6	322	550	275	110, 150, 290, 330
XL17-400	400	401,6	422	650	325	110, 150, 290, 330
XL17-450	450	451,6	472	700	350	110, 150, 290, 330
XL17-500	500	501,6	522	750	375	110, 150, 290, 330
XL17-600	600	601,6	622	850	425	110, 150, 290, 330, 570, 610
XL17-700	700	701,6	722	950	475	110, 150, 290, 330, 570, 610
XL17-850	850	851,6	872	1100	550	110, 150, 290, 330, 570, 610, 850, 890
XL17-1000	1000	1001,6	1022	1250	625	110, 150, 290, 330, 570, 610, 850, 890, 1170