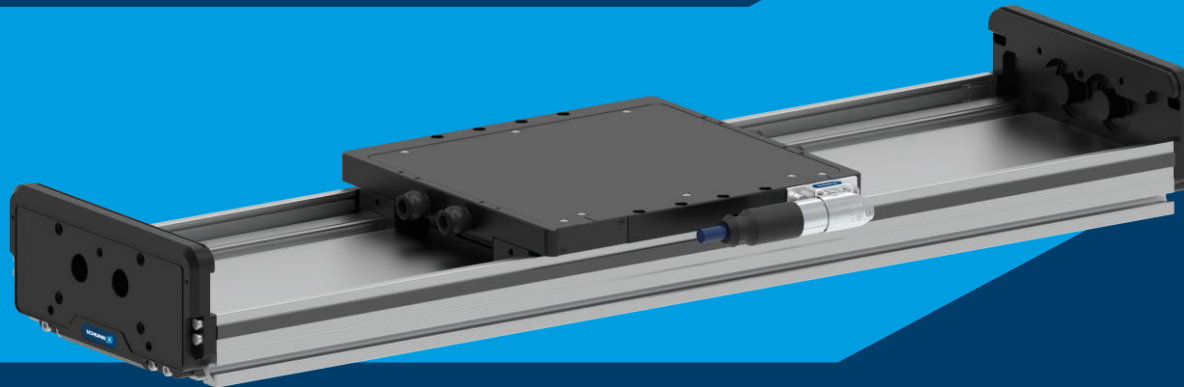
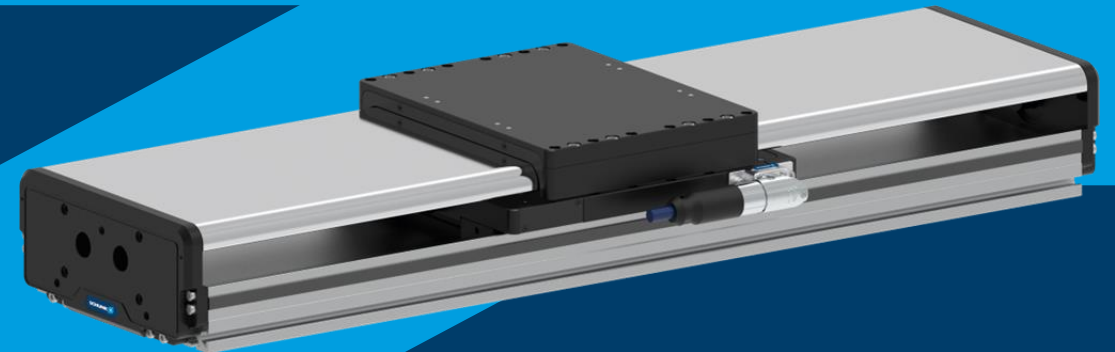


Linear direct axis SLD

Product training

Julian Kümmerling



Hand in hand for tomorrow

- 1. Linear axes at SCHUNK**
- 2. Why a new electric axis?**
- 3. Implementation in the SCHUNK portfolio**
- 4. Applications**
- 5. Linear direct axis SLD**
- 6. Options/Accessories**
- 7. Calculation and Configuration**
- 8. Timeline**
- 9. Availability**
- 10. Competitors**
- 11. Pricing**
- 12. Documents/Communication**

1. Linear axes at SCHUNK

Linear axes at SCHUNK

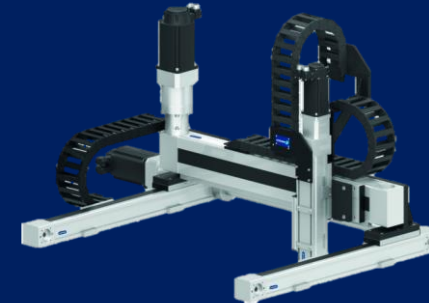
- + Over 25 years of experience in the field of linear technology
- + More than 450 standard components, pneumatic and electric
- + The world's most complete axis system portfolio on the market
- + Over 10,000 axis systems implemented in different industries
- + Over 100km linear axes in the field 😊



**Pneumatic
Linear modules**



**Electric
linear modules**



Axis systems

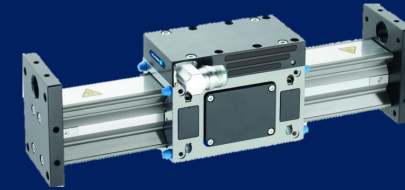
Electric linear axis



Linear axis with external motor

- Adaptable drive motor for flexible control
- Choice of toothed belt, rack and pinion, or spindle drives
- Different guide options

HSB in Reutlingen



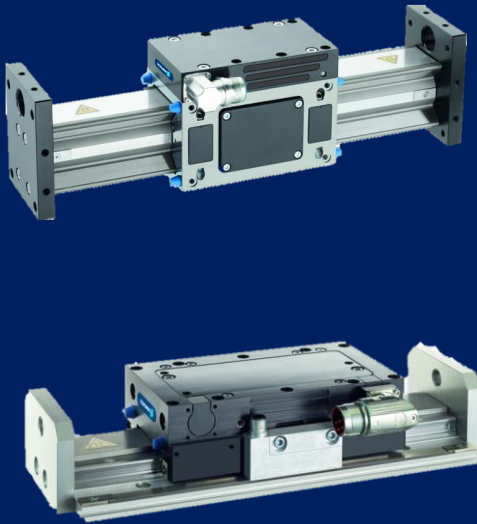
Linear axis with integrated motor

- Integrated motor and measuring system in the axis
- No mechanical gap between the drive elements
- Almost no wear parts
- High dynamics for shorter cycle times

SCHUNK Electronic Solutions in St. Georgen

Linear direct axis

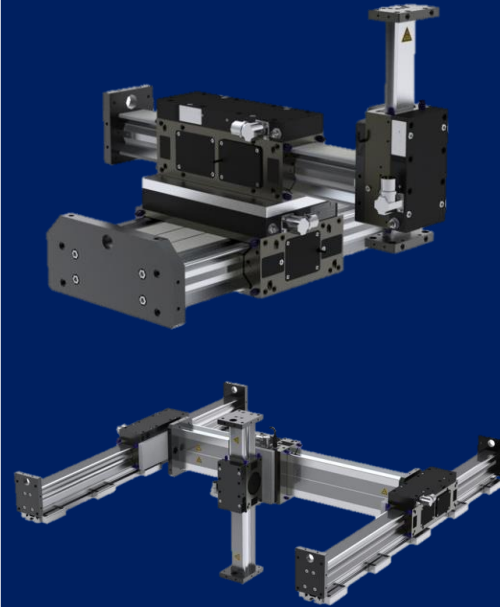
**Standard
single axis**



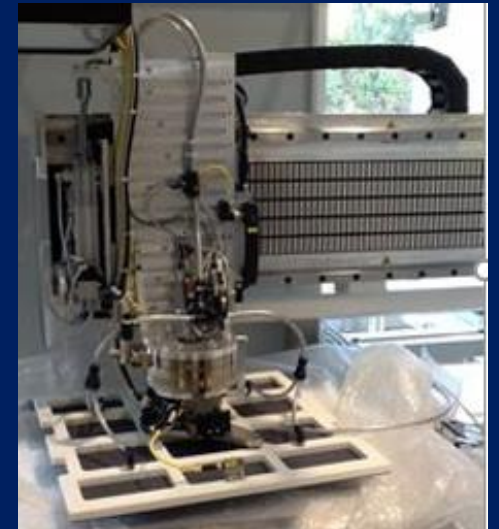
**Special
single axis**



**Standard
axis systems**



**Special
Axis systems**



2. Why a new electric axis?

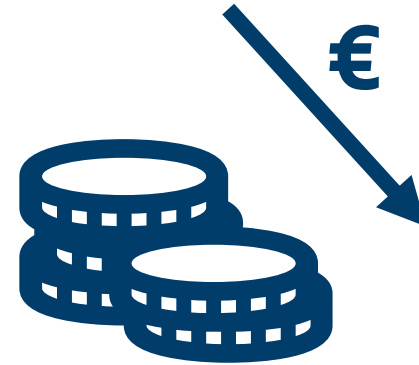
Why a new electric axis?



**Further development
of the linear direct
axis portfolio**



**Response to increasing
requirements of load
capacities and lifetime**



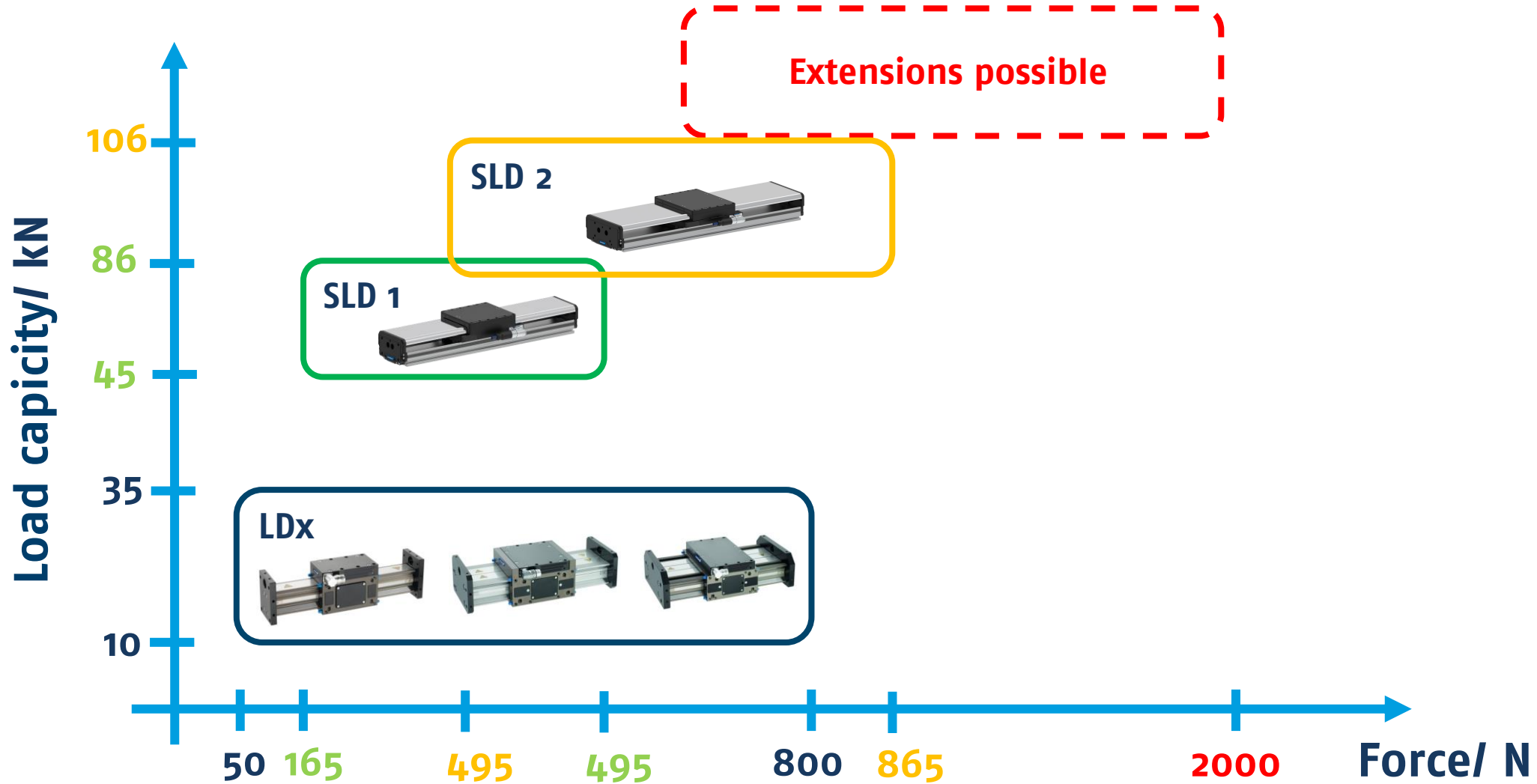
Price optimization



**Possibility of online
configuration**

3. Implementation in the SCHUNK portfolio

Implementation in the SCHUNK portfolio



4. Applications

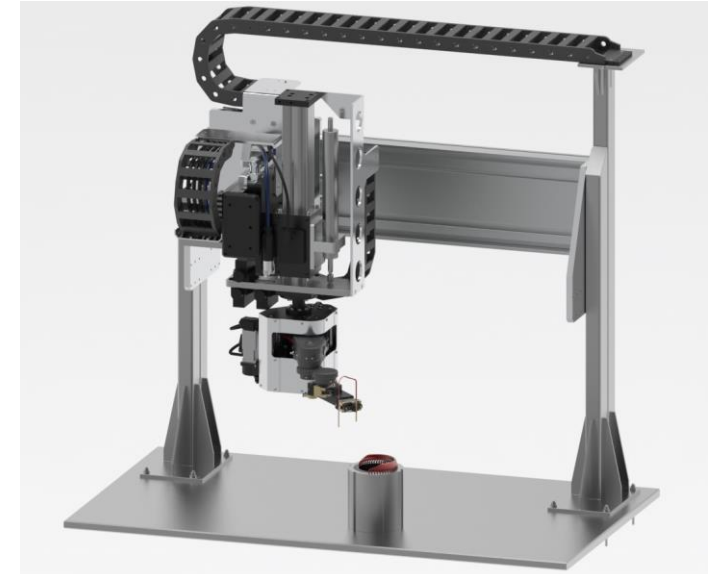
Applications

Automotive/E-Mobility

- Highly flexible and dynamic handling
- Combustion Vehicles (CE)
 - Handling of gear parts or engine components
- Electric Vehicles (EV)
 - For fast and precise setting of hairpins in a stator
 - Handling of battery cells (prismatic, round)

Why is the SLD suitable for this application?

- High forces (linear direct motor)
- High loads (profile rail guide)
- Long lifetime (high load capacities and no wear parts)



Applications

Life-Science

- Dynamic Handling
- Pharma, MedTech
- Handling of trays and samples, e.g. injections or petri dishes
- Clean environments

Why is the SLD suitable for this application?

- Cover (clean design)
- Absolute encoder ensures maximum process stability
- H1 grease (optional and not yet available)
- Clean room certification (not yet available)



5. Linear direct axis SLD

Linear direct axis SLD

Sizes



4 variants
165 – 495 N nominal force
Up to 5.500 mm max. stroke
5 m/s max. speed
± 0,01 mm repeat accuracy

SLD 1

SLD 2

4 variants
285 – 865 N nominal force
Up to 5.470 mm max. stroke
5 m/s max. speed
± 0,01 mm repeat accuracy

No ready identification number! Axis will configure customer specific

Linear direct axis SLD

Sizes

	SLD	1	1
Series			
Number of magnetic lines			
Number of motor units			

	SLD	2	1
Series			
Number of magnetic line			
Number of motor units			



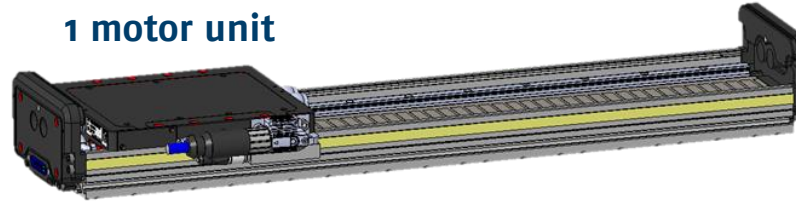
Linear direct axis SLD

Variants SLD 1

SLD 1 = 1 magnet line

SLD 11

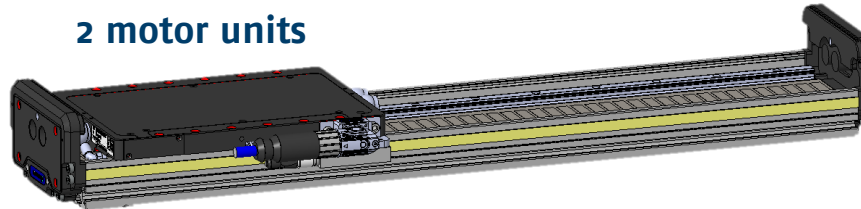
1 motor unit



165 N nominal force
300 N max. force
5.500 mm max. stroke
5 m/s max. speed

SLD 12

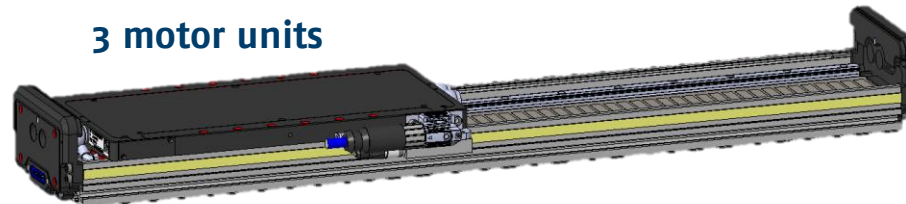
2 motor units



265 N nominal force
600 N max. force
5.440 mm max. stroke
5 m/s max. speed

SLD 13

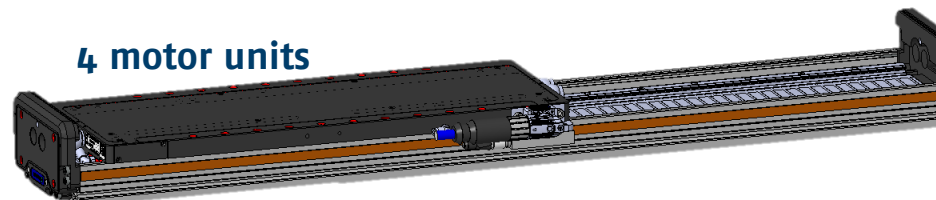
3 motor units



375 N nominal force
900 N max. force
5.330 mm max. stroke
5 m/s max. speed

SLD 14

4 motor units

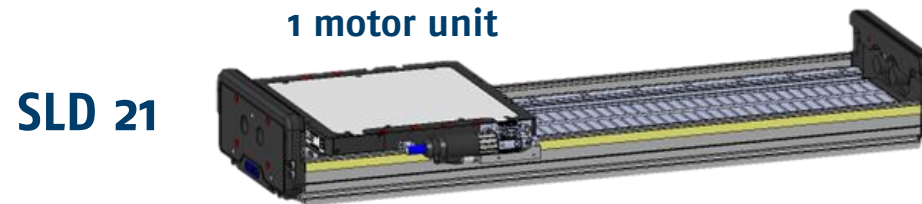


495 N nominal force
1.200 N max. force
5.190 mm max. stroke
5 m/s max. speed

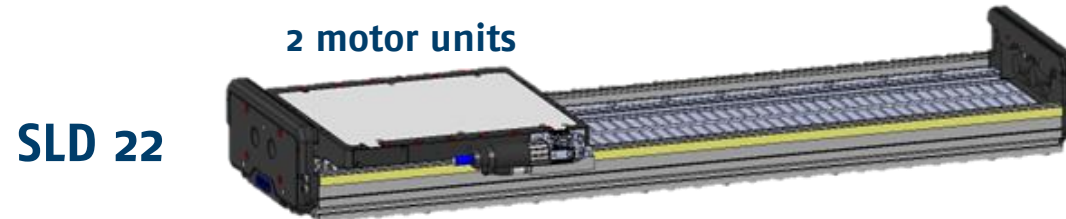
Linear direct axis SLD

Variants SLD 2

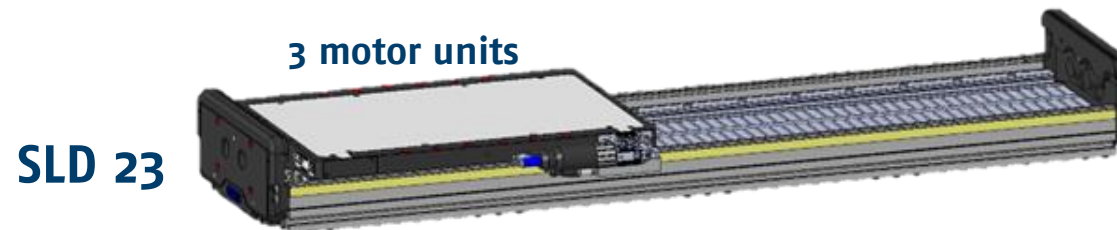
SLD 2 = 2 magnet line



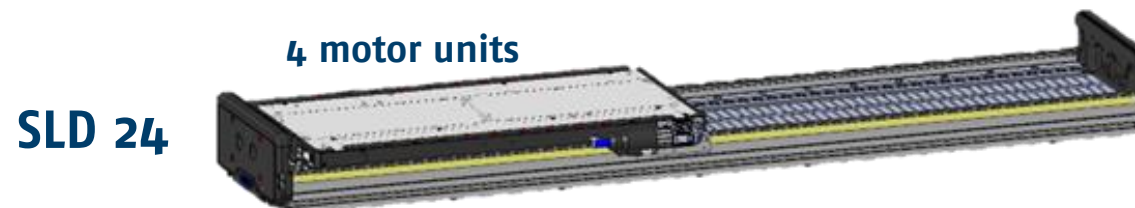
285 N nominal force
600 N max. force
5.470 mm max. stroke
5 m/s max. speed



450 N nominal force
1.200 N max. force
5.440 mm max. stroke
5 m/s max. speed



665 N nominal force
1.800 N max. force
5.330 mm max. stroke
5 m/s max. speed



865 N nominal force
2.400 N max. force
5.190 mm max. stroke
5 m/s max. speed

Linear direct axis SLD

Layout

Number magnet tracks

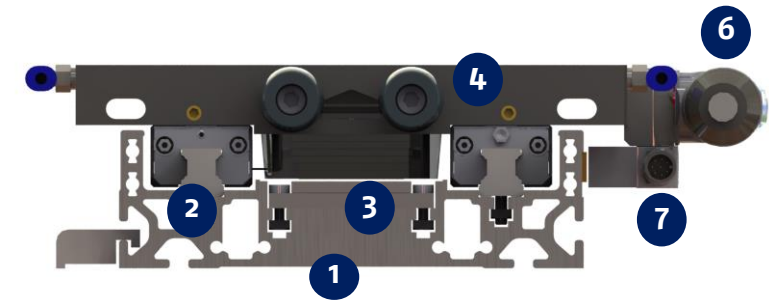
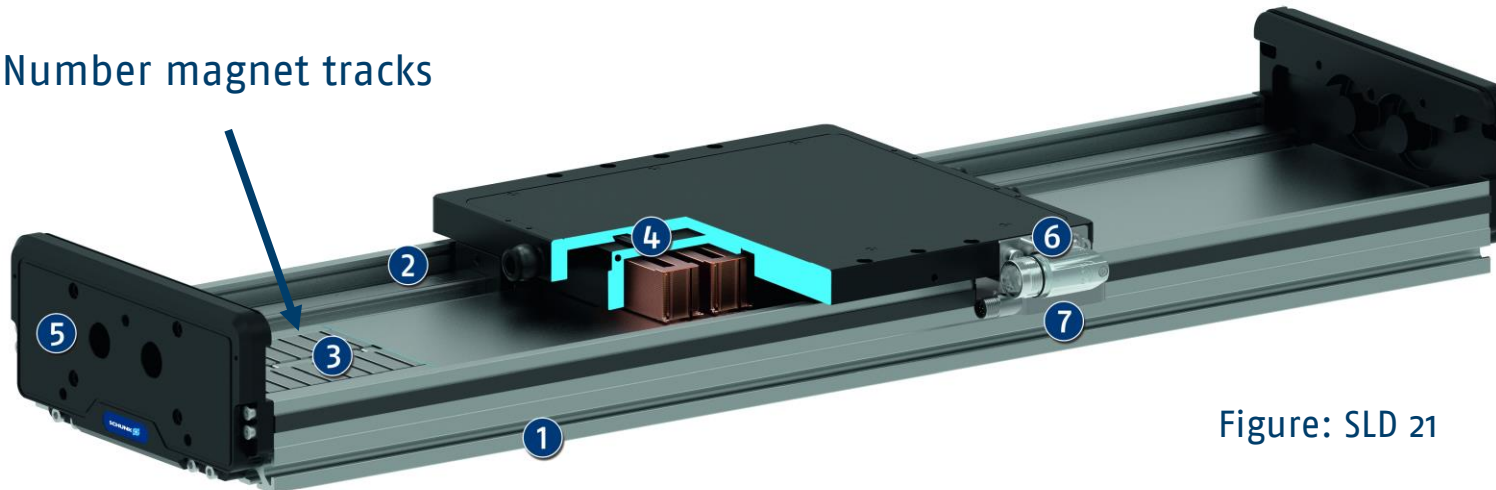


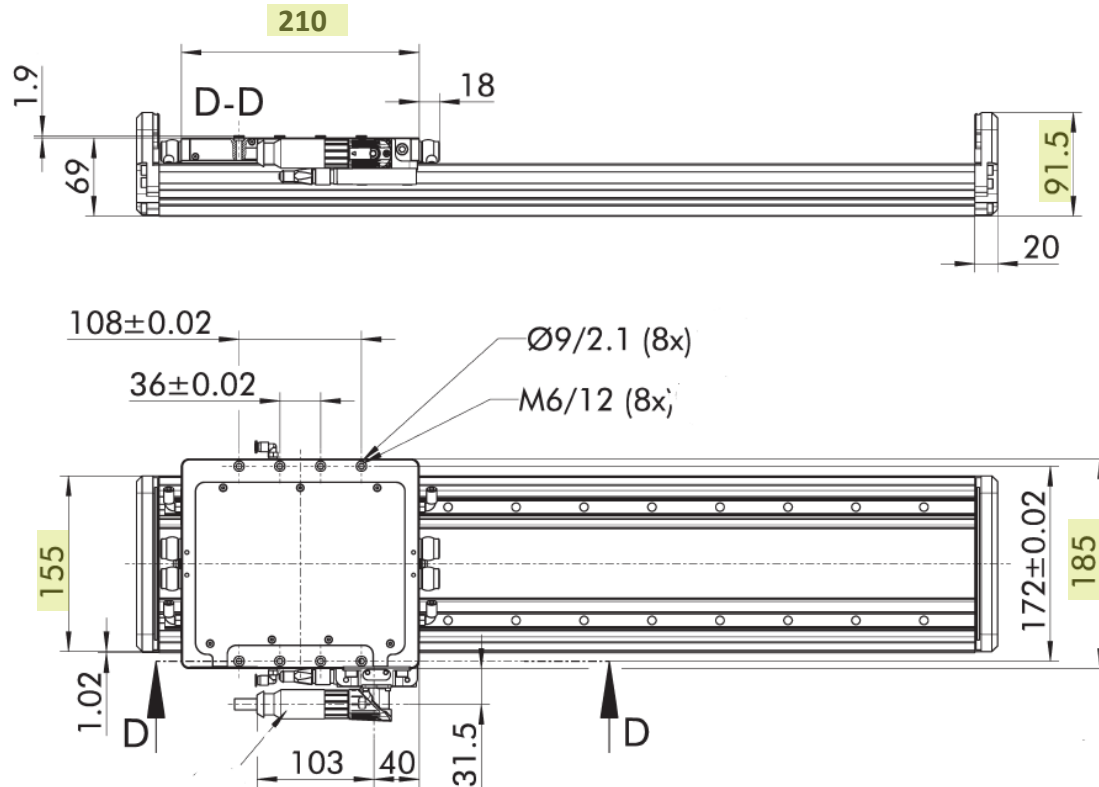
Figure: SLD 21

- 1 Aluminum profile
- 2 Rail guide with ball bearing carriage
- 3 Integrated secondary parts (high power magnets)
- 4 Compact primary part slide (with integrated motor)
- 5 End plates (with crash absorber)
- 6 Motor connector
- 7 Measuring system

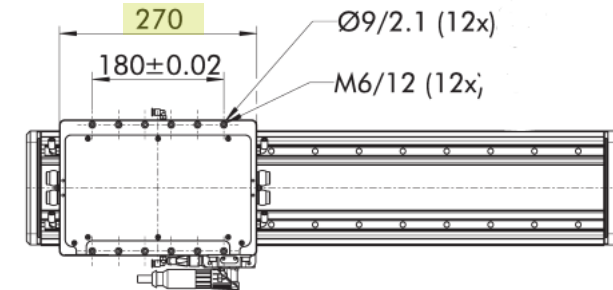
Linear direct axis SLD

Dimensions of the SLD 1 variants

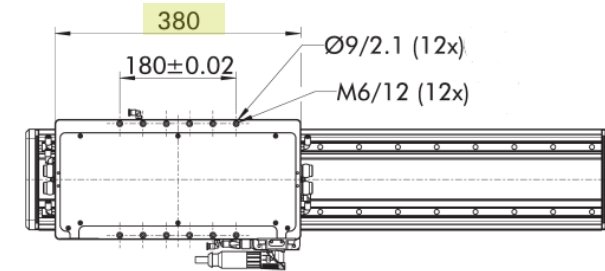
SLD 11



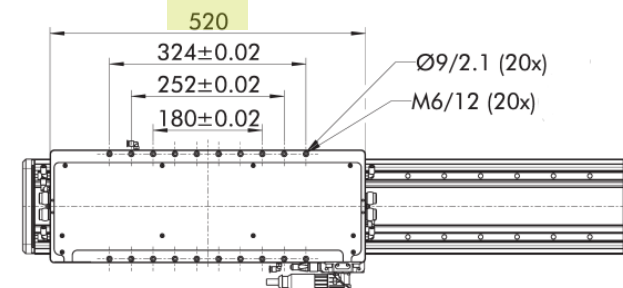
SLD 12



SLD 13



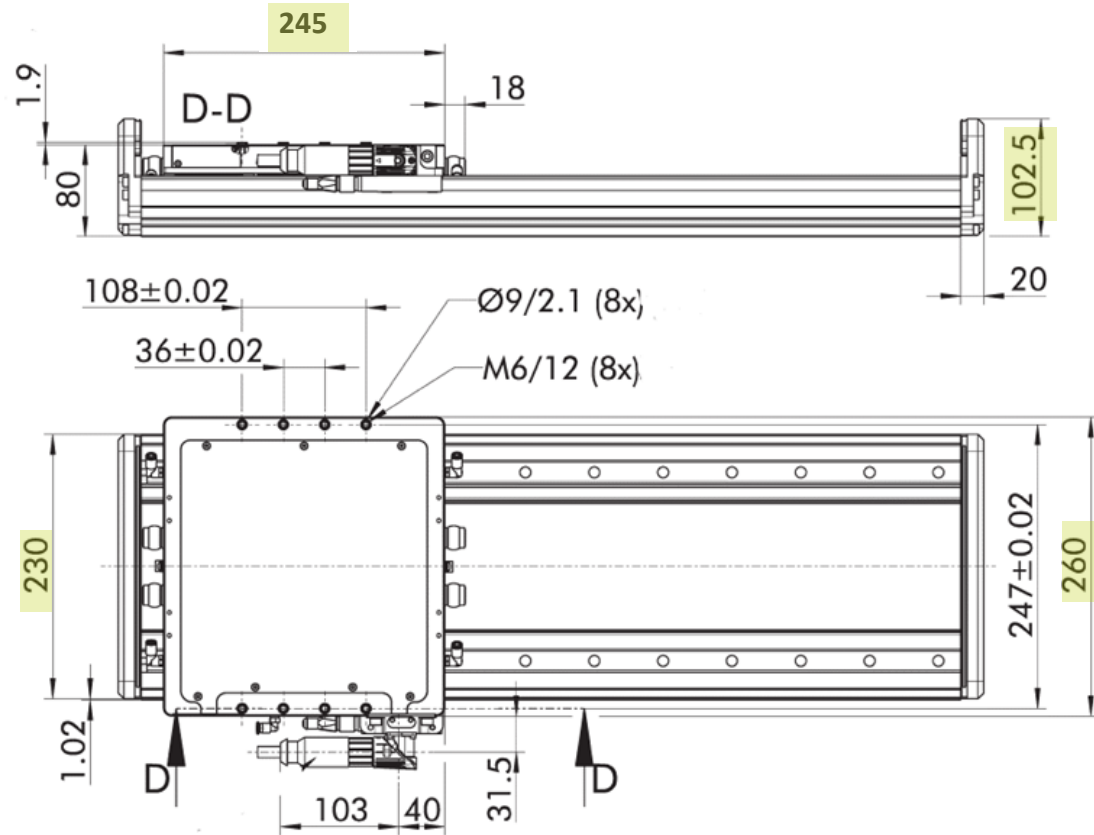
SLD 14



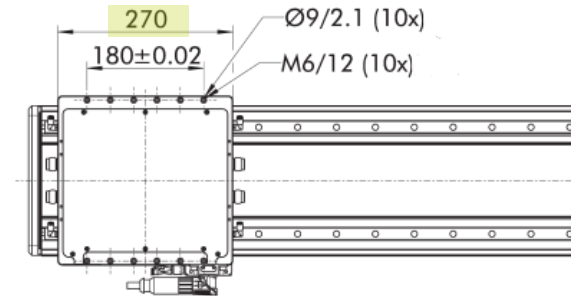
Linear direct axis SLD

Dimensions of the SLD 2 variants

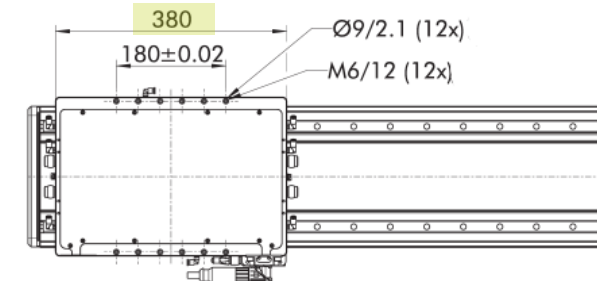
SLD 21



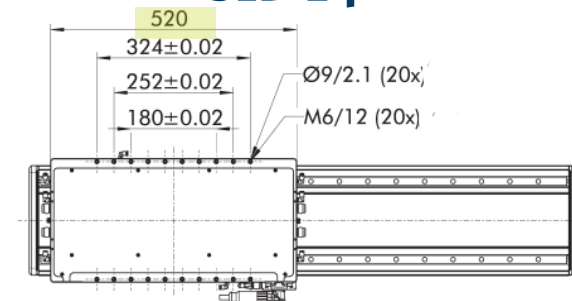
SLD 22



SLD 23

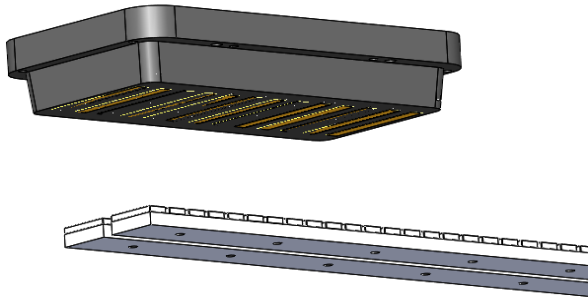


SLD 24



Combination of advantages

Direct drive

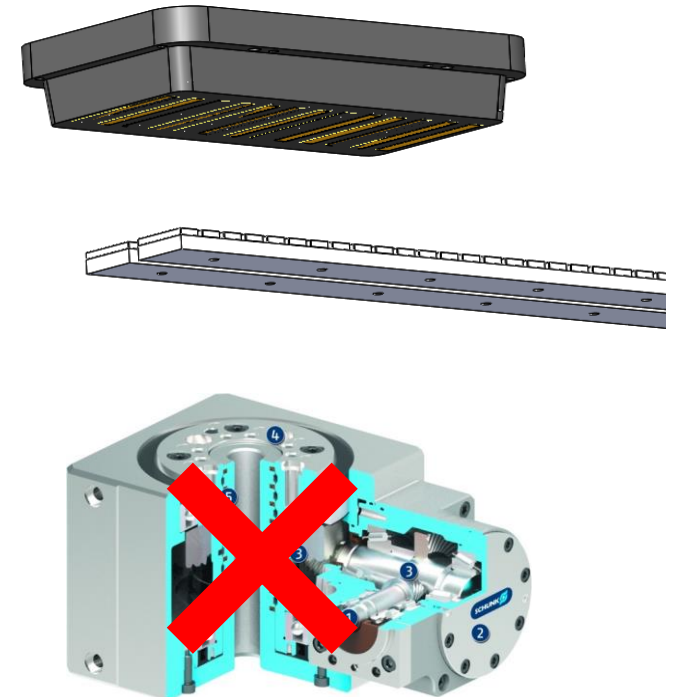


Profile rail guide



Advantages direct drive

- + No mechanical power transmission elements (belt/spindle/gear)
- + No wear parts on the drive
- + Best dynamics because of accelerations up to 100m/s^2
- + Short cycle times because of speeds of 5m/s
- + Highest accuracies of $\pm 0.01\text{mm}$
- + Any length without loss of performance
- + No interfering contours due to external motor



Advantages profile rail guide

- + Very high loads possible
- + Long strokes possible up to 5.5 meters
- + Long lifetime with high payloads
- + Compact design possible
- + Covering possible

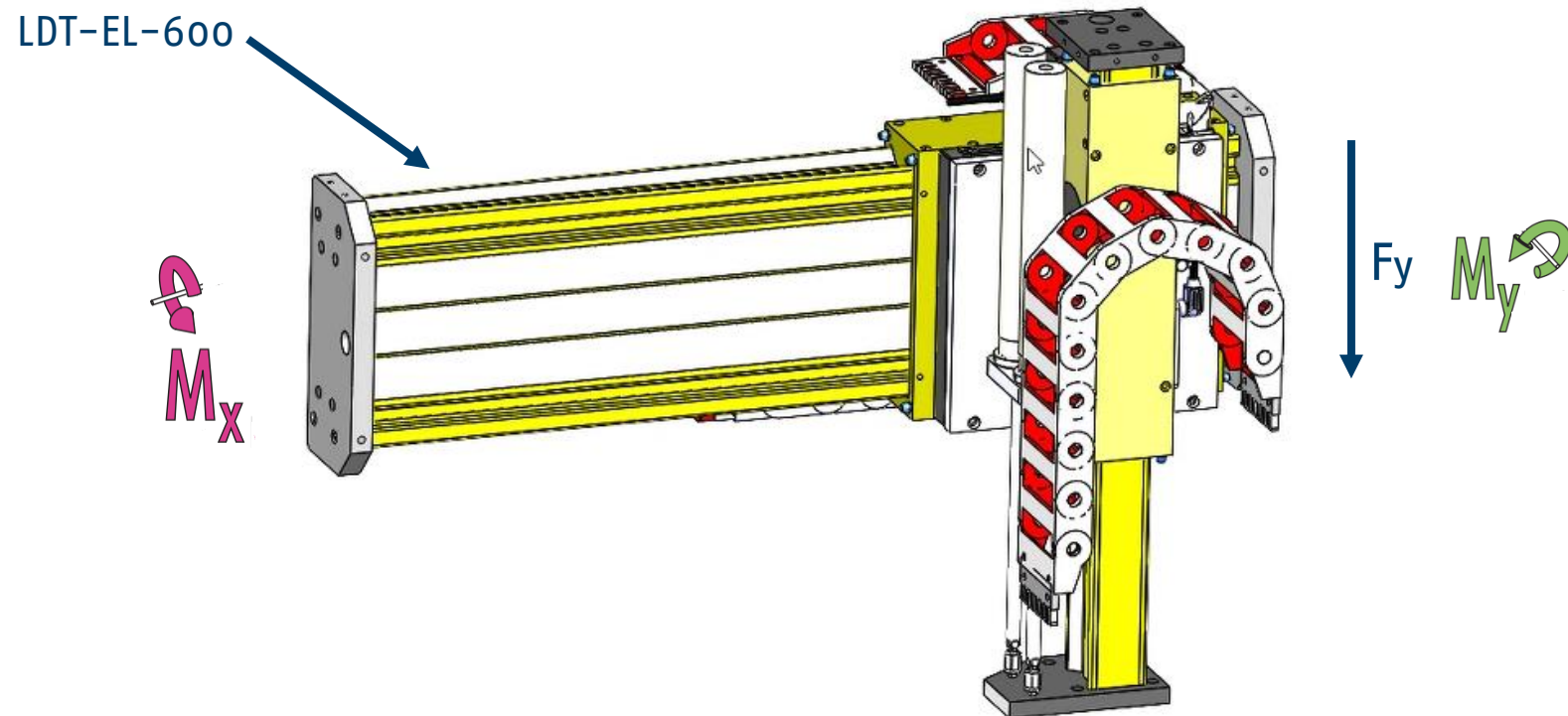


Linear direct axis SLD



- + **High dynamics for shorter cycle times**
therefore high productivity
- + **Integrated motor and measuring system in the axis**
Minimizes interference contours and space requirements
- + **Almost no wearing parts**
for long lifetime and reliability of the system
- + **No mechanical gap between the drive elements**
For fast response and high positioning accuracy
- + **High load capacities**
for high load capacity and lifetime
- + **Can be equipped with absolute encoder**
for less programming effort and time savings during commissioning and operation
- + **Can be equipped with many options**
Holding brake, cover, grease adapter, different measuring system interfaces

Comparison of load capacities



Comparison of load capacities

LDT-EL-600

Smart Tool Bearings

Axis / Drive
Typ: **LDT**
Sub type: **LDT-EL-0600**

Fy_max: 17200 [N]
Fz_max pos: 34400 [N]
Fz_max neg: 17200 [N]
Mx_max: 1742,36 [Nm]
My_max: 1943,6 [Nm]
Mz_max: 1943,6 [Nm]
Exponent: 3,33
Vorspannung: 15 [%]
Motor Anzugskraft: 4800 [N]

Boundary conditions
Fy: 1130 [N]
Fz pos: 0 [N]
Fz neg: 0 [N]
Mx: 175 [Nm]
My: 0 [Nm]
Mz: 0 [Nm]

Calculate
Print
☒ Additional options

Result
Lifetime
520 km
Calculated lifetime 520 km

Beta V 0.9 pre-release

SLD 23

Smart Tool Bearings

Axis / Drive
Typ: **SLD**
Sub type: **SLD 23**

Fy_max: 106188 [N]

Boundary conditions
Fy: 1130 [N]
Fz pos: 0 [N]
Fz neg: 0 [N]
Mx: 175 [Nm] ☐ 50%
My: 368 [Nm] ☒ 50%
Mz: 0 [Nm] ☐ 50%

Calculate
Print
☒ Additional options

Exponent: 3
Vorspannung: 8 [%]
Motor Anzugskraft: 6600 [N]

Result
Lifetime
12324 km
Calculated lifetime 12324 km

Beta V 0.9 pre-release

23 times higher

Linear direct axis SLD

- **UL certification in standard**

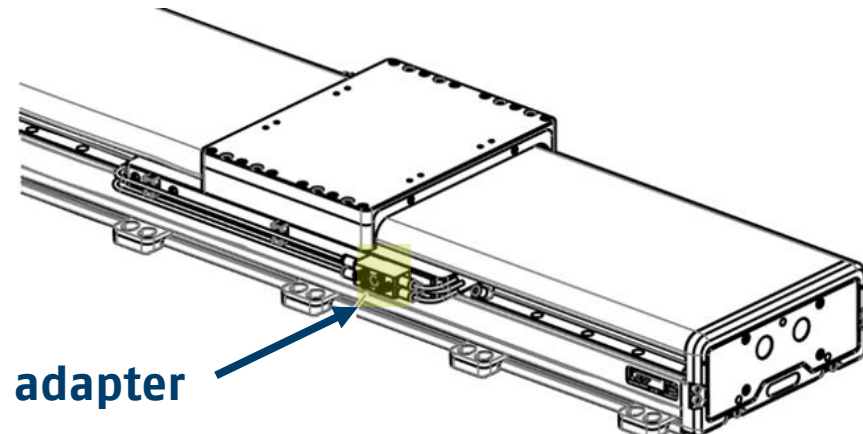
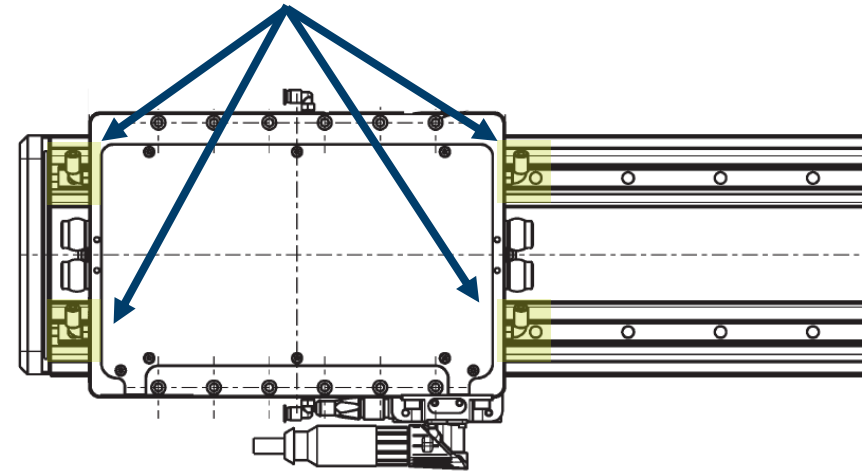
enables fast market access to Canada and the U.S. market



Greasing

- + Axis must be greased at regular intervals!
- + Greasing possible for each carriage or collected by greasing adapter
- + Calculation of the greasing intervals is described in the manuals or will be communicated to the customer at the time of dimensioning.
- + Experience value: with the max. load capacity the axis must be greased every 300km

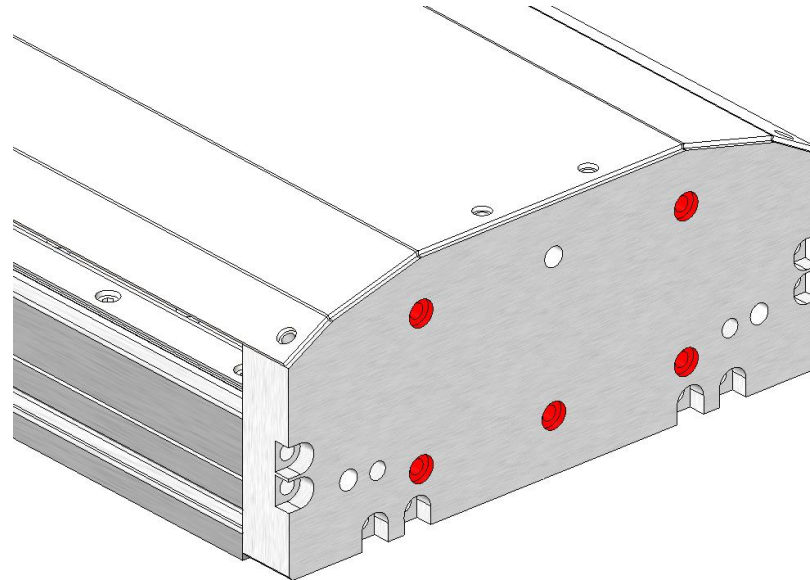
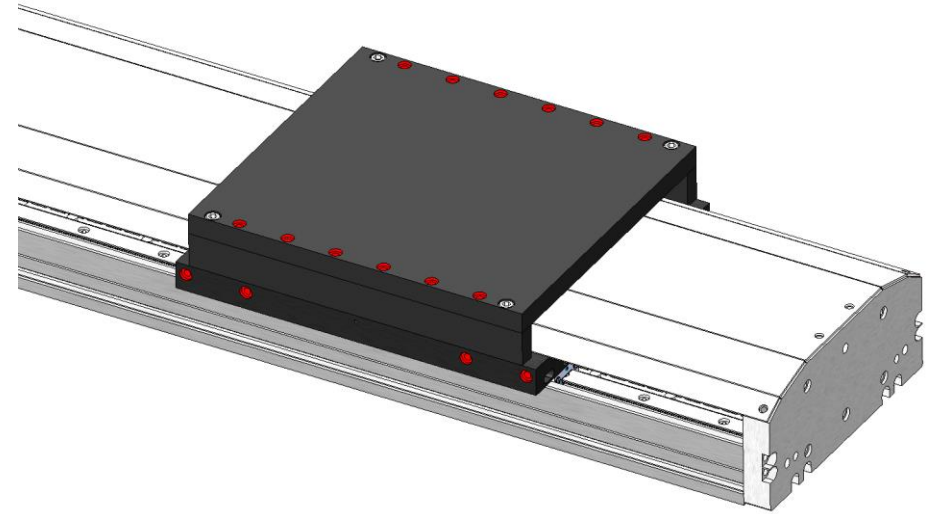
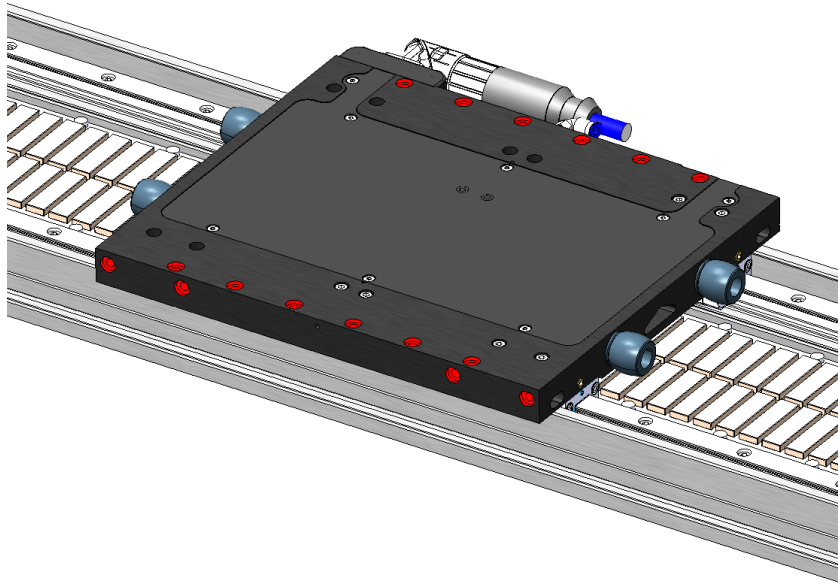
Grease nipple per carriage



Grease adapter

Linear direct axis SLD

Attachment possibilities

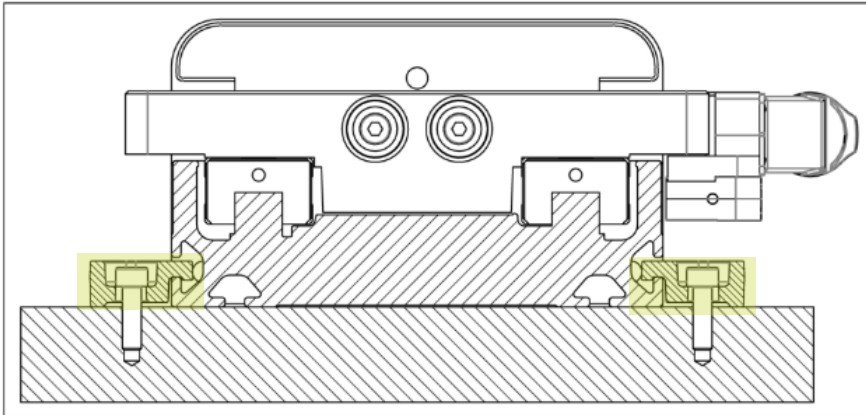


Linear direct axis SLD

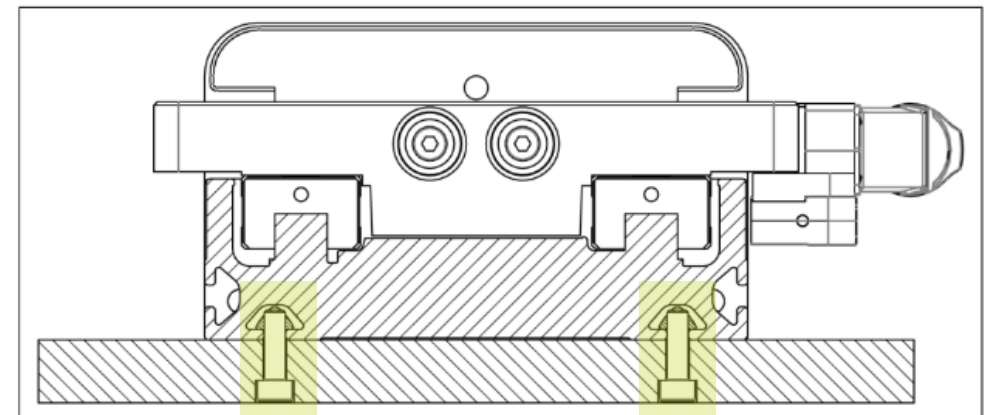
Mounting

Axis is not self-supporting and must always be mounted on a substructure (plate, profile, ...)!

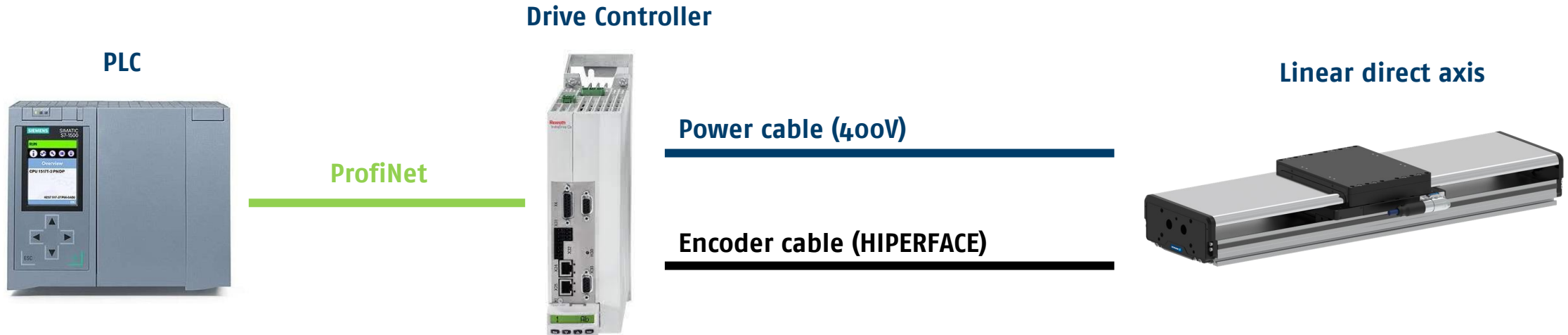
Fastening strip



T-slot nuts



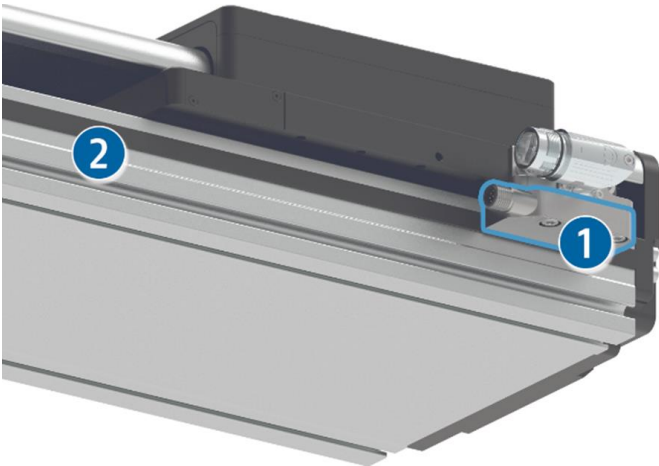
Control structure



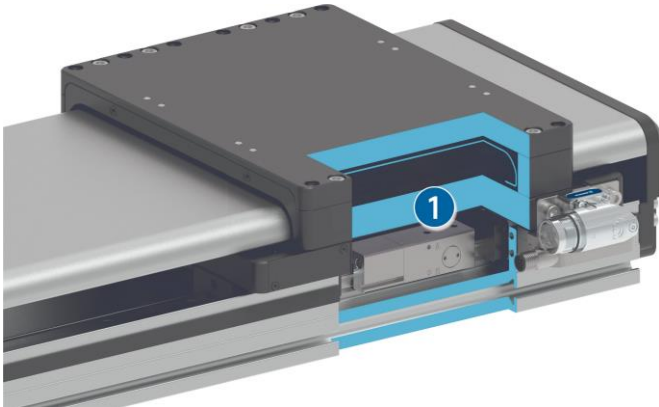
6. Options/Accessories

Options

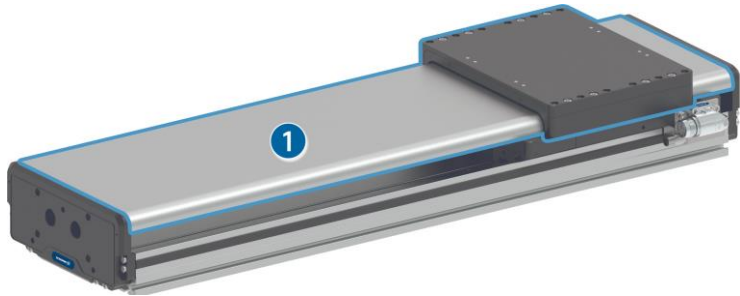
Modular encoder system



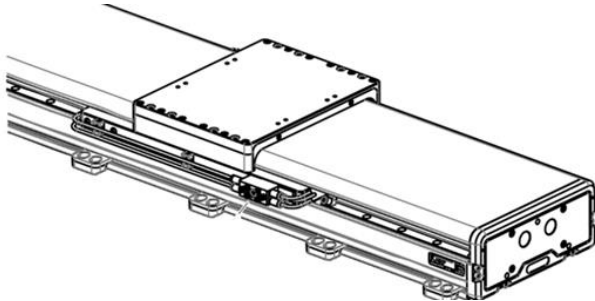
Holding brake



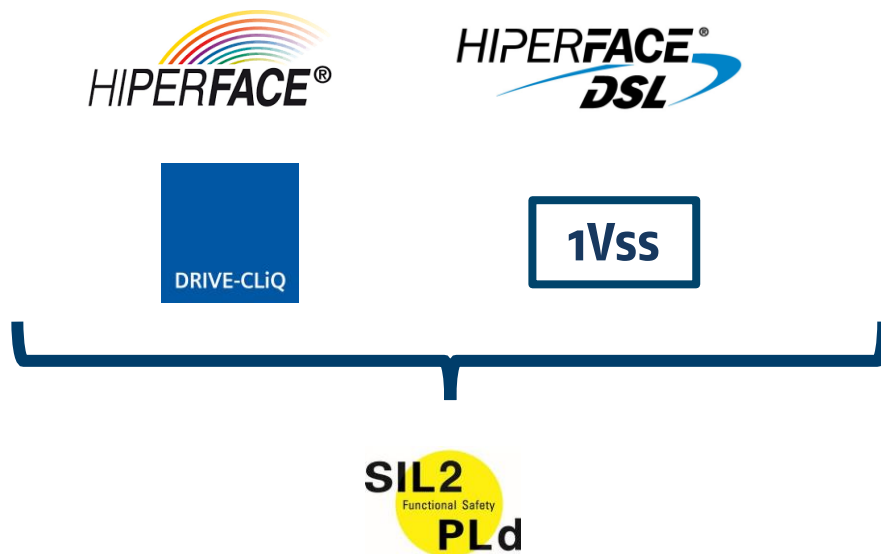
Cover



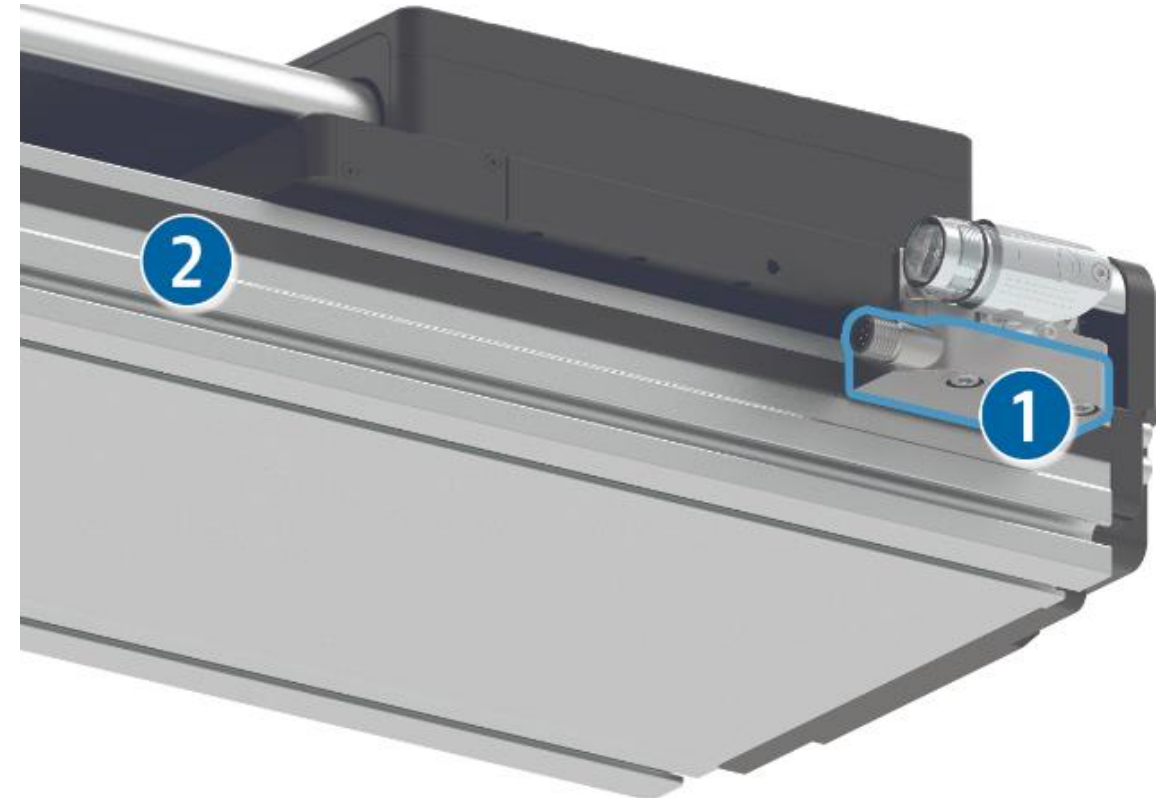
Grease adapter



Modular encoder system



Because the measuring system is mounted outside the axis, other measuring systems are possible!



- 1 Reading head of the measuring system, mounted on the slide
- 2 Measuring tape of the measuring system, mounted on the aluminum profile

Holding brake

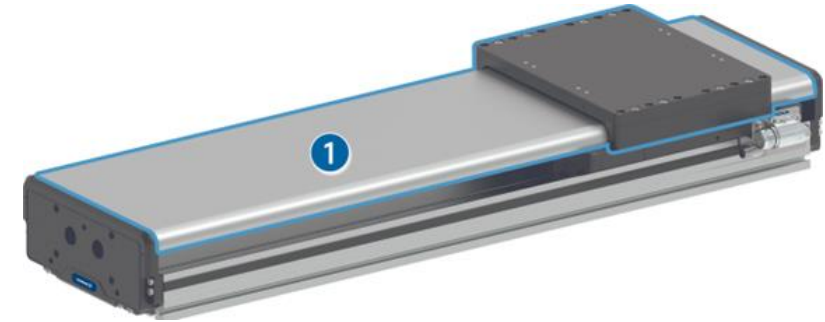
- + Prevents unintentional sinking or falling of gravity-loaded axes
- + Pneumatically actuated and mounted under carriage
- + Safe brake application in case of power failure (NC closed without power)
- + Long lifetime (B10d value = 5 million braking cycles)



1 Holding brake, pneumatically actuated

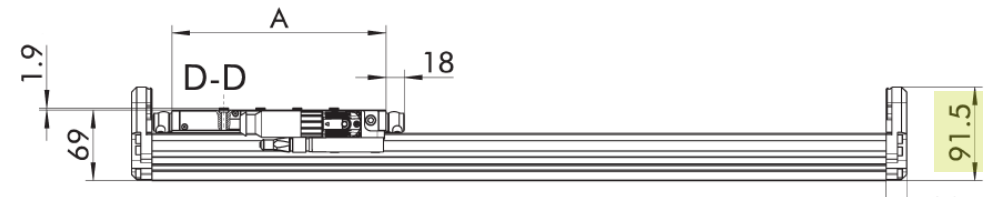
Cover

- ⊕ Prevents parts and rough dirt from entering the inside of the axis
- ⊕ Allows axes to be used in areas with rough, sharp-edged or hot objects
- ⊕ Prevents grease from escaping when the axis is mounted horizontally and vertically
- ⊕ Axis builds 17.5mm higher with cover because of the carriage adapter
- ⊕ The grease adapter is necessary for the option with cover!

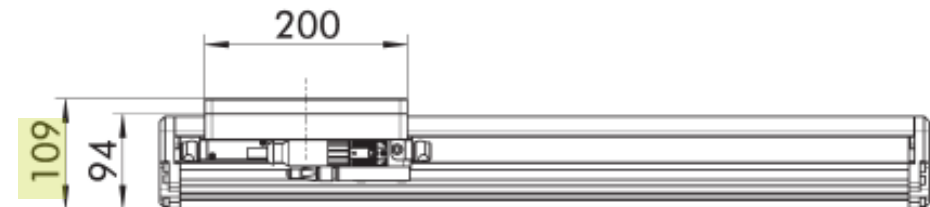


1 Cover

Without Cover



With Cover



Overview Accessories



Power and encoder cables for Bosch and SIEMENS drive controllers

in 5-, 10-, 15- and 20-meters length, drag chain compatible (same cables as LDx). Special cables for other controller types also available



Inductive limit/reference switches for incremental measuring systems



Mounting elements

T-Slot Nuts in M4, M5, M6 and matching fastening strips



Drag chain

must be designed by St. Georgen



Brake valve

for controlling the pneumatic holding brake

7. Calculation and configuration

Calculation and configuration

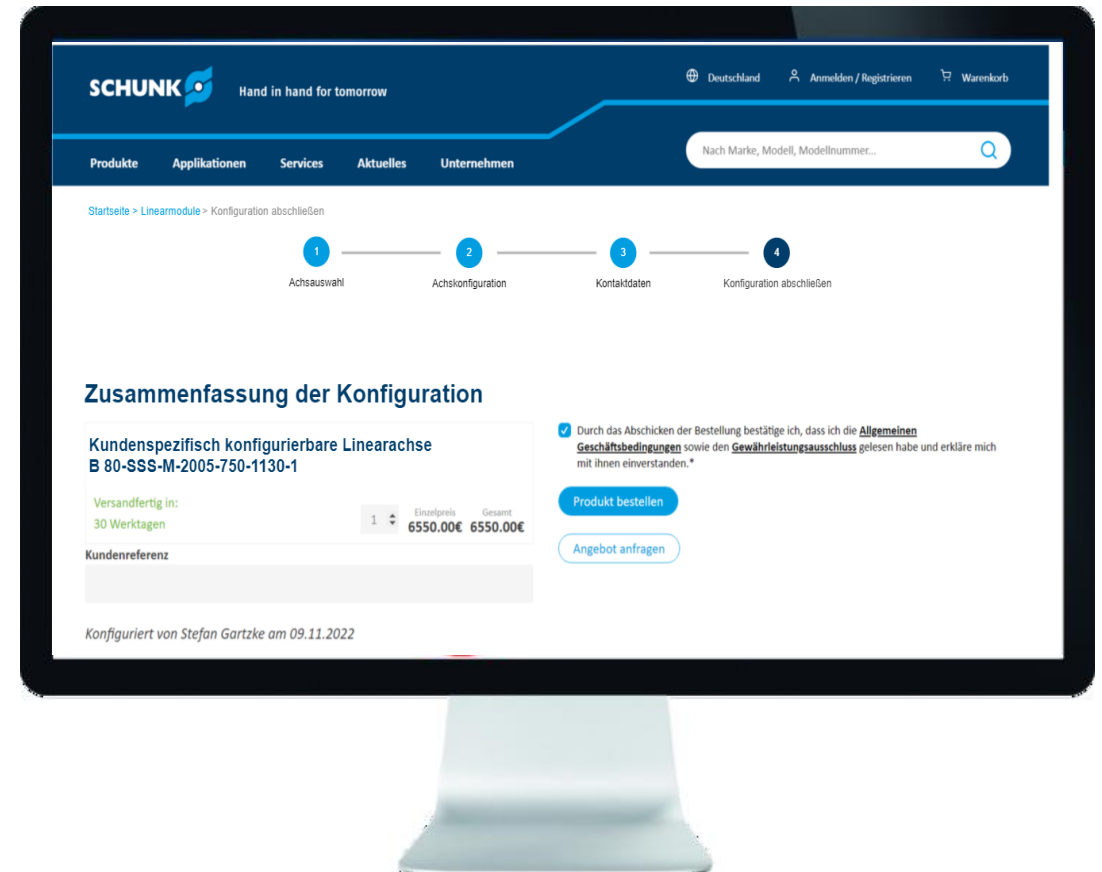
- + Calculation and configuration as usual by inside sales team

automationsolution@de.schunk.com



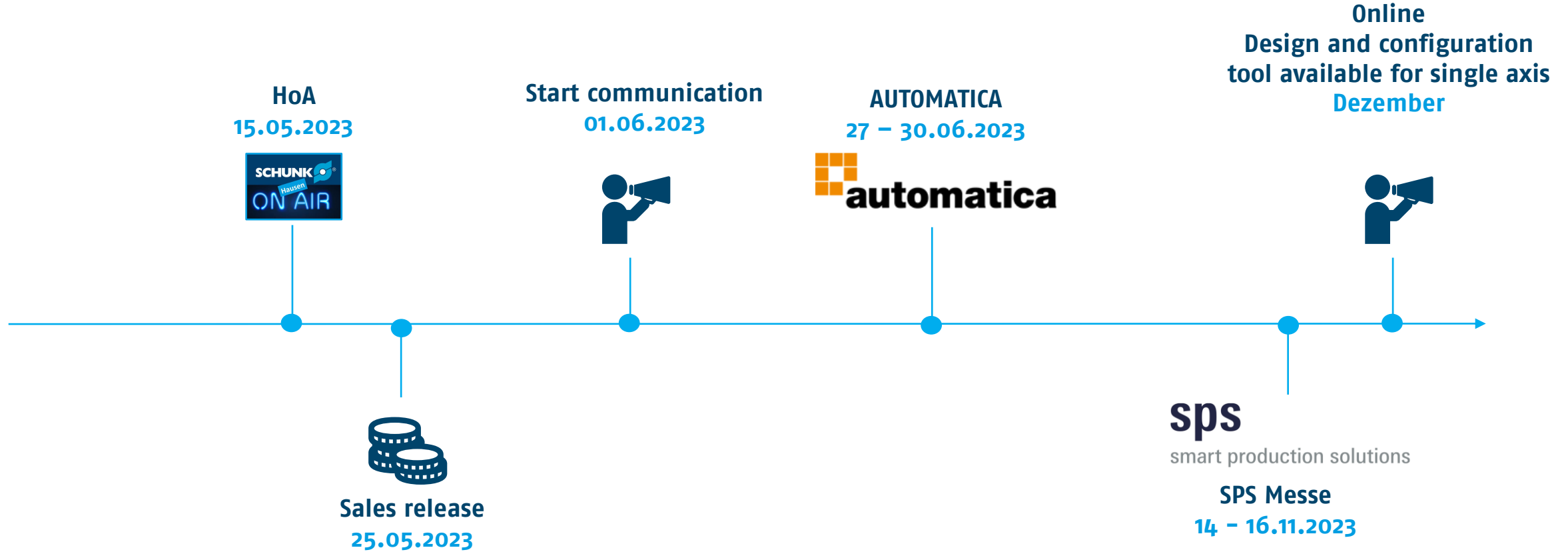
Outlook: Online calculation and configuration tools for single axes

- + Single axes can be calculated online by the customer and then configured
- + Immediately after the configuration information about price and delivery time
- + Direct access to CAD models



8. Timeline

SLD – Timeline 2023



9. Availability

Availability

What does availability mean?

- No stock. Axes are produced on demand
- Basic material for 500 meters available
- Delivery time 8 weeks at the start. Target 2-4 weeks

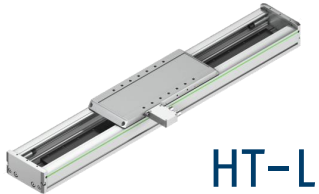


10. Competitors

Competitors

Who are the competitors we are fighting with the SLD?

HIWIN
Motion Control & Systems



HT-L

afag



PDL



LE



HN



HG

JENNY SCIENCE



LINAX



CTL

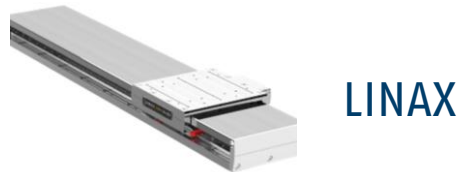
UNIMOTION

SINADRIVES
DIRECT DRIVE EXPERTS



MLS

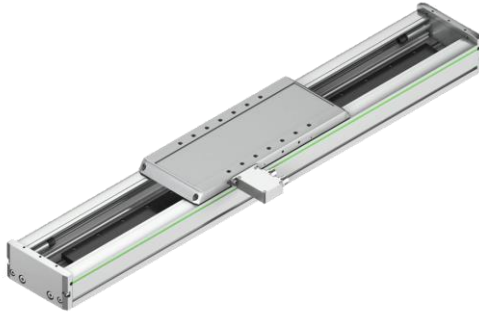
Competitors



Competitive comparison

HIWIN HT-L vs. SLD

Summary:



HT-L Serie



SLD Serie

- HT-L and SLD are very similar in the structure/Layout of the axis
- In the comparable axes, SLD is stronger in nominal force
- HT-L series builds slightly more compact than SLD axis (few millimeters)
- SLD axis has much more options
- Because of the smaller and lighter motors in the HT-L series, the load capacity is higher
- Both axes must be greased
- HIWIN has a very good online design and configuration tool

11. Pricing

Positioning

The goal was to be slightly above HIWIN and stay below our existing portfolio. Why?

- Experience shows that our existing portfolio (LDx) is too expensive.
- We offer a good overall performance on the market with the SLD axis

The following charts are based on 1000mm stroke



Vs.

-20% €



SLD 21

1000mm stroke

Incremental



Absolute



12. Documents/Communication

Product training SLD Documents



Competitive comparison

HIWIN HT-L



Catalog



General document

Encoder certifications, Start-up instructions

FB – Nr. 119	Qualitätsmanagement Formblatt	
Änderungsstand: 05	Anfrage-Checkliste Lineardirektmodule	Seite 1 von 4

1. Kontaktdaten		
Firma:		Adresse:
Ansprechpartner:		Telefon:
E-Mail:		Datum:
Schunk Kundennummer:		Schunk Außenbestell:

Beschreiben Sie bitte die Aufgabenstellung genau.

3. Änderung der Anwendung

Skizzieren Sie bitte den gewünschten Vorgang mit Angabe der Maße und Massen der Einzelteile.

Checklist linear modules, direct drives



Manual

Database for direct drive SLD 11 and servo drive InverterDrive Co
 Type of motor SLD 11
 Type of axis SLD 11
 Date of creation: 13.06.2023

Parameter	Symbol	Unit	comment
2-2-014	Type of axis		SLD 11
2-2-015	Axis position	mm	1000
2-2-016	Interpolation sensor	mm	10
2-2-017	Interpolation sensor	mm	10
2-2-018	Interpolation sensor	mm	10
2-2-019	Interpolation sensor	mm	10
2-2-020	Interpolation sensor	mm	10
2-2-021	Interpolation sensor	mm	10
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2-2-326	Interpolation sensor		

Motor parameter



Presentations for customers



**eCademy
new product
training**

Communication



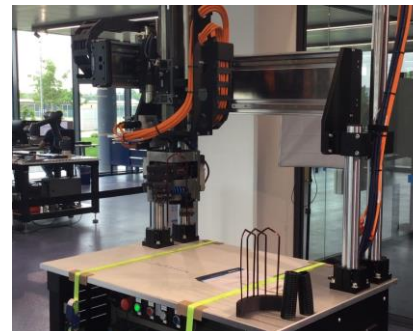
Start communication on 01.06.2023



Animations:
E-Mobility & Life Science



New product flyer 2023

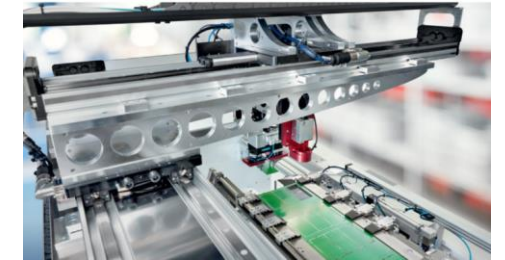
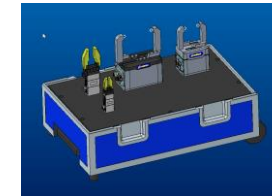


Exhibition pedestal
Hairpin pedestal
& Hand sample



Press reports in
in various magazines

Roadshow case



Application pictures

Thank you for your attention





Hand in hand for tomorrow

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